SECTION 2

INFORMATION BEFORE DRIVING YOUR TOYOTA

Information before driving your Toyota

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Break−in period

Drive gently and avoid high speeds.

Your vehicle does not need an elaborate break−in. But following a few simple tips for the first 1600 km (1000 miles) can add to the future economy and long life of your vehicle:

- Avoid full throttle acceleration when starting and driving.
- Avoid racing the hybrid system.
- Try to avoid hard stops during the first 300 km (200 miles).
- Do not drive for a long time at any single speed, either fast or slow.
- Do not tow a trailer during the first 800 km (500 miles).

Fuel

FUEL TYPE

Your new vehicle must use only unleaded gasoline.

To help prevent gas station mix−ups, your Toyota has a smaller fuel tank opening. The special nozzle on pumps with unleaded fuel will fit it, but the larger standard nozzle on pumps with leaded gas will not.

At a minimum, the gasoline you use should meet the specifications of ASTM D4814 in the U.S.A. and CGSB 3.5−M93 in Canada.

NOTICE

Do not use leaded gasoline. Use of leaded gasoline will cause the three−way catalytic converter to lose its effectiveness and the emission control system to function improperly. Also, this can increase maintenance costs.

OCTANE RATING

Select Octane Rating 87 (Research Octane Number 91) or higher.

Use of unleaded gasoline with an octane rating lower than 87 may result in engine knocking. Persistent knocking can lead to engine damage.

If your engine knocks...

If you detect heavy knocking even when using the recommended fuel, or if you hear steady knocking while holding a steady speed on level roads, consult your Toyota dealer.

However, occasionally, you may notice light knocking for a short time while accelerating or driving up hills. This is normal and there is no need for concern.

GASOLINE CONTAINING DETERGENT ADDITIVES

Toyota recommends the use of gasoline that contains detergent additives to avoid build−up of engine deposits.

However, all gasoline sold in the U.S. contains detergent additives to keep clean and/or clean intake systems.

QUALITY GASOLINE

Automotive manufacturers in the U.S., Europe and Japan have developed a specification for quality fuel named World−Wide Fuel Charter (WWFC) that is expected to be applied world wide. The WWFC consists of four categories that depend on required emisvels. In the U.S., category 4 has been adopted. The WWFC improves air quality by providing for better emissions in vehicle fleets, and customer satisfaction through better vehicle performance.

CLEANER BURNING GASOLINE

Cleaner burning gasoline, including reformulated gasoline that contains oxygenates such as ethanol or MTBE is available in many areas.

Toyota recommends the use of cleaner burning gasoline and appropriately blended reformulated gasoline. These types of gasoline provide excellent vehicle performance, reduce vehicle emissions, and improve air quality.

OXYGENATES IN GASOLINE

Toyota allows the use of oxygenate blended gasoline where the oxygenate content is up to 10% ethanol or 15% MTBE. If you use gasohol in your Toyota, be sure that it has an octane rating no lower than 87.

Toyota does not recommend the use of gasoline containing methanol.

GASOLINE CONTAINING MMT

Some gasoline contain an octane enhancing additive called MMT (Methylcyclopentadienyl Manganese Tricarbonyl).

Toyota does not recommend the use of gasoline that contains MMT. If fuel containing MMT is used, your emission control system may be adversely affected. The Malfunction Indicator Lamp on the instrument cluster may come on. If this happens, contact your Toyota dealer for service.

GASOLINE QUALITY

In a very few cases, you may experience driveability problems caused by the particular gasoline that you are using. If you continue to have unacceptable driveability, try changing gasoline brands. If this does not rectify your problem, then consult your Toyota dealer.

NOTICE

- ***Do not use gasohol other than stated above. It will cause fuel system damage or vehicle performance problems.***
- ***If driveability problems are encountered (poor hot starting, vaporizing, engine knock, etc.), discontinue the use.***
- ***Take care not to spill gasohol during refueling. Gasohol may cause paint damage.***

FUEL TANK CAPACITY

65 L (17.2 gal., 14.3 Imp. gal.)

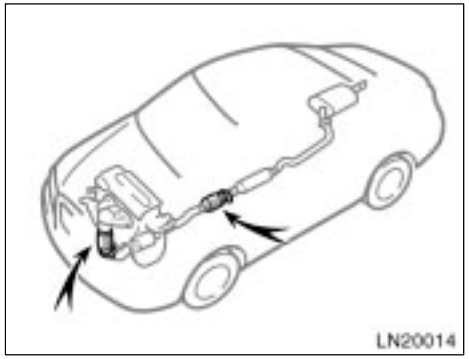
Operation in foreign countries

If you plan to drive your Toyota in another country...

First, comply with the vehicle registration laws.

Second, confirm the availability of the correct fuel (unleaded and minimum octane number).

Three−way catalytic converters



The three−way catalytic converter is an emission control device installed in the exhaust system.

The purpose is to reduce pollutants in the exhaust gas.

⚠ CAUTION

- **Keep people and combustible materials away from the exhaust pipe while the engine is running. The exhaust gas is very hot.**
- **Do not drive, idle or park your vehicle over anything that may burn easily such as grass, leaves, paper or rags.**

NOTICE

A large amount of unburned gases flowing into the three−way catalytic converter may cause it to overheat and create a fire hazard. To prevent this and other damage, observe the following precautions:

- *Use only unleaded gasoline.*
- *Do not drive with an extremely low fuel level; running out of fuel could cause the engine to misfire, creating an excessive load on the three−way catalytic converter.*
- *Do not turn the "POWER" switch off while the vehicle is moving.*
- *Keep your engine in good running order. Malfunctions in the engine electrical system, electronic ignition system/distributor ignition system or fuel system could cause an extremely high three−way catalytic converter temperature.*
- *If the engine becomes difficult to start or stalls frequently, take your vehicle in for a check−up as soon as possible. Remember, your Toyota dealer knows your vehicle and its three−way catalytic converter system best.*
- *To ensure that the three−way catalytic converter and the entire emission control system operate properly, your vehicle must receive the periodic inspections required by the Toyota Maintenance Schedule. For scheduled maintenance information, refer to the "Scheduled Maintenance Guide" or "Owner's Manual Supplement".*
- *Do not apply a coating agent such as an anti−rust under−coating to the exhaust pipe.*

Engine exhaust cautions

⚠ CAUTION

- **Avoid inhaling the engine exhaust. It contains carbon monoxide, which is a colorless and odorless gas. It can cause unconsciousness or even death.**
- **Make sure the exhaust system has no holes or loose connections. The system should be checked from time to time. If you hit something, or notice a change in the sound of the exhaust, have the system checked immediately.**
- **Do not run the hybrid system in a garage or enclosed area except for the time needed to drive the vehicle in or out. The exhaust gases cannot escape, making this a particularly dangerous situation.**
- **Do not remain for a long time in a parked vehicle with the hybrid system operating. If it is unavoidable, however, do so only in an unconfined area and adjust the heating or cooling system to force outside air into the vehicle.**

- **Keep the trunk lid closed while driving. An open or unsealed trunk lid may cause exhaust gases to be drawn into the vehicle.**
- **To allow proper operation of your vehicle’s ventilation system, keep the inlet grilles in front of the windshield clear of snow, leaves, or other obstructions.**
- **If you smell exhaust fumes in the vehicle, open the windows and close the trunk lid to ensure plenty of fresh air enters the vehicle. If you can smell exhaust fumes even though there are no other vehicles in the surrounding area, have your vehicle checked by your Toyota dealer. Continued inhalation of exhaust fumes can lead to death by gas poisoning.**

Facts about engine oil consumption

FUNCTIONS OF ENGINE OIL

Engine oil has the primary functions of lubricating and cooling the inside of the engine, and plays a major role in maintaining the engine in proper working order.

ENGINE OIL CONSUMPTION

It is normal that an engine should consume some engine oil during normal engine operation. The causes of oil consumption in a normal engine are as follows.

- Oil is used to lubricate pistons, piston rings and cylinders. A thin film of oil is left on the cylinder wall when a piston moves downwards in the cylinder. High negative pressure generated when the vehicle is decelerating sucks some of this oil into the combustion chamber. This oil as well as some part of the oil film left on the cylinder wall is burned by the high temperature combustion gases during the combustion process.
- Oil is also used to lubricate the stems of the intake valves. Some of this oil is sucked into the combustion chamber together with the intake air and is burned along with the fuel. High temperature exhaust gases also burn the oil used to lubricate the exhaust valve stems.

The amount of engine oil consumed depends on the viscosity of the oil, the quality of the oil and the conditions the vehicle is driven under.

More oil is consumed by high−speed driving and frequent acceleration and deceleration.

A new engine consumes more oil, since its pistons, piston rings and cylinder walls have not become conditioned.

Oil consumption: Max. 1.0 L per 1000 km (1.1 qt./600 miles, 0.9 Imp. qt./600 miles)

When judging the amount of oil consumption, note that the oil may become diluted and make it difficult to judge the true level accurately.

As an example, if a vehicle is used for repeated short trips, and consumes a normal amount of oil, the dipstick may not show any drop in the oil level at all, even after 1000 km (600 miles) or more. This is because the oil is gradually becoming diluted with fuel or moisture, making it appear that the oil level has not changed.

The diluting ingredients evaporate out when the vehicle is then driven at high speeds, as on an express way, making it appear that oil is excessively consumed after driving at high speeds.

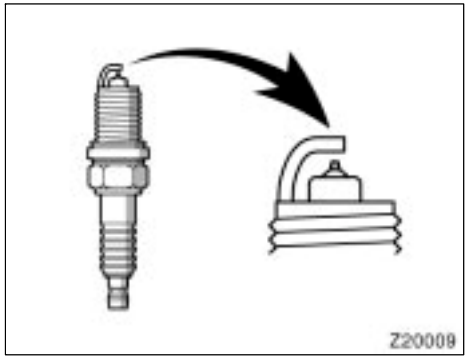
IMPORTANCE OF ENGINE OIL LEVEL CHECK

One of the most important points in proper vehicle maintenance is to keep the engine oil at the optimum level so that oil function will not be impaired. Therefore, it is essential that the oil level be checked regularly. Toyota recommends that the oil level be checked every time you refuel the vehicle.

NOTICE
Failure to check the oil level regularly could lead to serious engine trouble due to insufficient oil.

For detailed information on oil level check, see “Checking the engine oil level” on page 355 in Section 7−2.

Iridium−tipped spark plugs



Your engine is fitted with iridium−tipped spark plugs.

NOTICE
Use only iridium−tipped spark plugs. Do not adjust gaps for engine performance or smooth driveability.

Brake system

REGENERATIVE BRAKE

When the brake is applied, the motor generator converts kinetic energy into electric energy.

When applying brakes, you may hear a sound coming from the motor generator. However, this does not indicate any trouble.

The regenerative brake works in the following operations.

1. When the accelerator pedal is released, the reduced speed equal to engine braking in a gasoline−fueled vehicle is obtained in accordance with the running mode position of the selector lever.
2. When the brake pedal is depressed with the selector lever in “D” or “B”, the regenerative brake works.

HYDRAULIC BRAKE

This brake system has 3 independent hydraulic circuits. If any circuit should fail, the other will still work. However, the pedal will be harder to press, and your stopping distance will increase. Also, the brake system warning light may come on.

⚠ CAUTION

Do not drive your vehicle if any hydraulic circuit has failed. Have your brakes fixed immediately.

BRAKE ACTUATOR

The brake actuator uses brake fluid pressurized by the pump to power−assist the brakes. If the brake actuator fails during driving, the brake system warning light comes on and the buzzer sounds continuously. In this case, the brakes may not work properly. If they do not work well, depress the brake pedal firmly. If the brake system warning light comes on, immediately stop your vehicle and contact your Toyota dealer.

The red and yellow brake system warning lights may stay on for about 60 seconds after the hybrid system is turned on. It is normal if the light turns off after a while.

Depressing the brake pedal repeatedly may turn on the red warning light and buzzer. It is normal if the light turns off after a few seconds.

In the following conditions, you may hear a sound in the engine compartment. This is not a malfunction.

- The driver’s door is opened with the hybrid system turned off.
- The brake pedal is depressed with the hybrid system turned off.
- After the hybrid system is turned on.
- The brake pedal is depressed repeatedly with the hybrid system turned on.
- After the hybrid system is turned off.

The brake pedal may be hard to depress or the brake pedal stroke may be short before turning the hybrid system on. This is not a malfunction.

CAUTION

- **Do not pump the brake pedal if the hybrid system is not operating. Each push on the pedal uses up your reserved brake fluid pressure.**
- **Even if the power assist is completely lost, the brakes will still work. But you will have to push the pedal hard, much harder than normal. And your braking distance will increase.**

DRUM−IN−DISC TYPE PARKING BRAKE SYSTEM

Your vehicle has a drum−in−disc type parking brake system. This type of brake system needs bedding−down of the brake shoes periodically or whenever the parking brake shoes and/or drums are replaced.

Have your Toyota dealer perform the bedding−down.

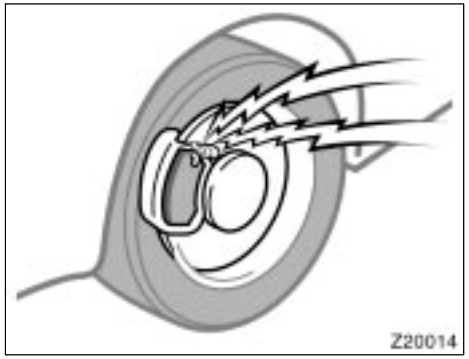
Electric power steering system

Driving conditions where the steering wheel must be turned frequently may cause an overload to the electric power steering system. The system will reduce assistance for sometime to prevent the power steering from overheating. In this case, you may feel some resistance when turning the steering wheel though it is not a malfunction.

CAUTION

If the “P/S” warning light comes on, take your vehicle to the Toyota dealer as soon as possible. In this case, you may feel the heavy steering wheel maneuvering. Drive your vehicle while gripping the steering wheel firmly.

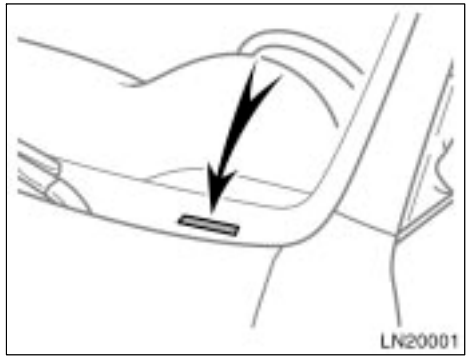
Brake pad wear limit indicators



The brake pad wear limit indicators on your disc brakes give a warning noise when the brake pads are worn to where replacement is required.

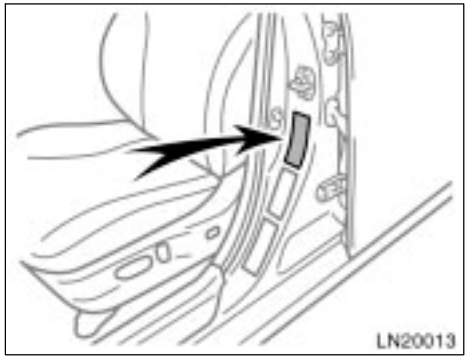
If you hear a squealing or scraping noise while driving, have the brake pads checked and replaced by your Toyota dealer as soon as possible. Expensive rotor damage can result if the pads are not replaced when necessary.

Your Toyota’s identification— —Vehicle identification number



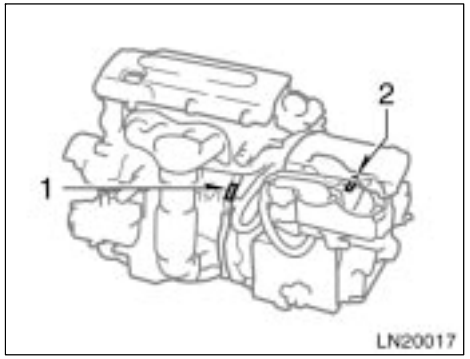
The vehicle identification number (VIN) is the legal identifier for your vehicle. This number is on the left top of the instrument panel, and can be seen through the windshield from outside.

This is the primary identification number for your Toyota. It is used in registering the ownership of your vehicle.



The vehicle identification number (VIN) is also on the Certification Label.

—Engine and traction motor numbers



1. Engine number
2. Traction motor number

The engine and traction motor numbers are stamped as shown.

Theft prevention labels

Your new vehicle carries theft prevention labels which are approximately 47 mm (1.85 in.) by 12 mm (0.47 in.).

The purpose of these labels is to reduce the incidence of vehicle thefts by facilitating the tracing and recovery of parts from stolen vehicles. The label is designed so that once it is applied to a surface, any attempt to remove it will result in destroying the integrity of the label. Transferring these labels intact from one part to another, will be impossible.

NOTICE

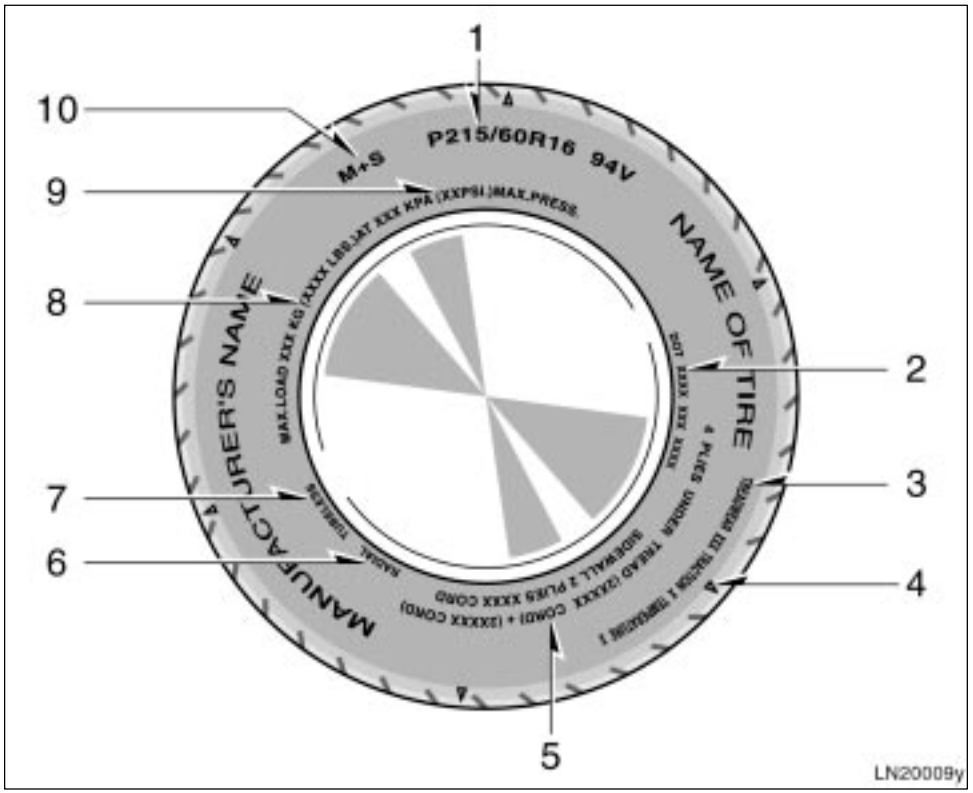
You should not attempt to remove the theft prevention labels as it may violate certain state or federal laws.

Suspension and chassis

⚠ CAUTION

Do not modify the suspension/chassis with lift kits, spacers, springs, etc. It can cause dangerous vehicle handling characteristics, resulting in loss of control.

Tire information—
—Tire symbols (standard tire)

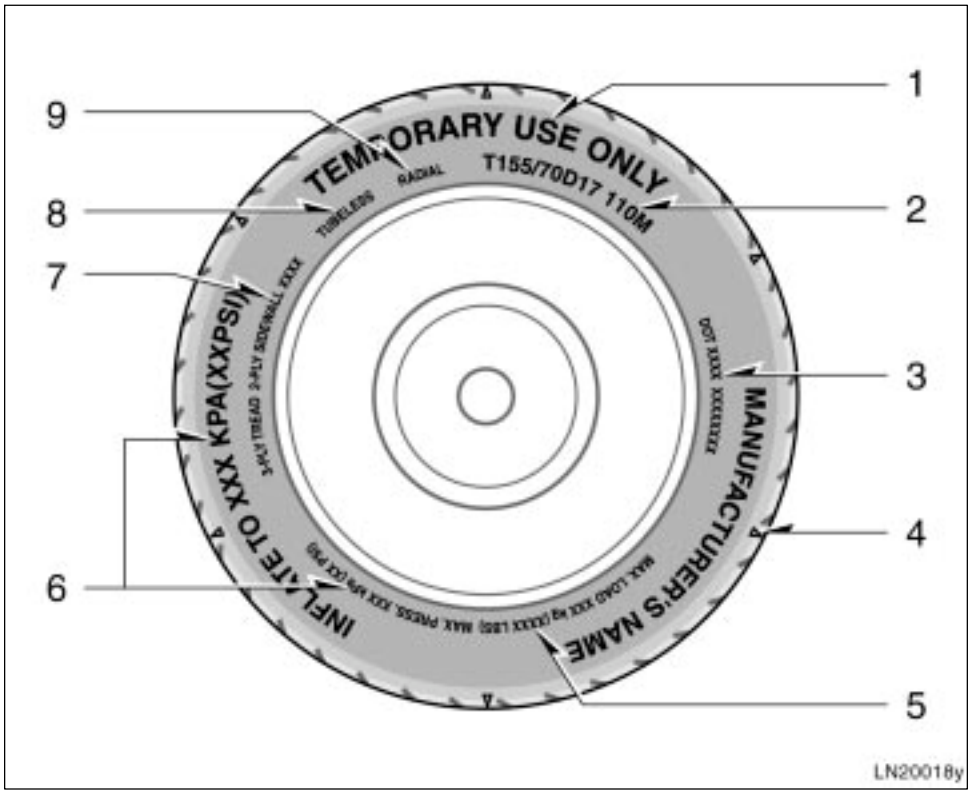


This illustration indicates typical tire symbols.

1. **Tire size—**For details, see “—Tire size” on page 289.
2. **DOT and Tire Identification Number (TIN)—**For details, see “—DOT and Tire Identification Number (TIN)” on page 288.
3. **Uniform tire quality grading—**For details, see “Uniform Tire Quality Grading” that follows.
4. **The location of the tread wear indicators—**For details, see “Checking and replacing tires” on page 362.
5. **Tire ply composition and materials—**Plies mean a layer of rubber−coated parallel cords. Cords mean the strands forming the plies in the tire.
6. **Radial tires or bias−ply tires—**A radial tire has “RADIAL” on the sidewall. A tire not marked with “RADIAL” is a bias−ply tire.

7. **“TUBELESS” or “TUBE TYPE”—**A tubeless tire does not have a tube inside the tire and air is directly filled in the tire. A tube type tire has a tube inside the tire and the tube maintains the air pressure.
8. **Load limit at maximum cold tire inflation pressure—**For details, see “Checking and replacing tires” on page 362.
9. **Maximum cold tire inflation pressure—**This means the pressure to which a tire may be inflated. For details about recommended cold tire inflation pressure, see “Tires” on page 385.
10. **Summer tire or all season tire—**An all season tire has “M+S” on the sidewall. The tire not marked with “M+S” is a summer tire. For details, see “Types of tires” on page 298.

—Tire symbols (compact spare tire)



This illustration indicates typical tire symbols.

1. **“TEMPORARY USE ONLY”—**A compact spare tire is identified by the phrase “TEMPORARY USE ONLY” molded into its sidewall. This tire is designed for temporary emergency use only. For details, see “Compact spare tire” on page 319.
2. **Tire size—**For details, see “—Tire size” on page 289.
3. **DOT and Tire Identification Number (TIN)—**For details, see “—DOT and Tire Identification Number (TIN)” on page 288.
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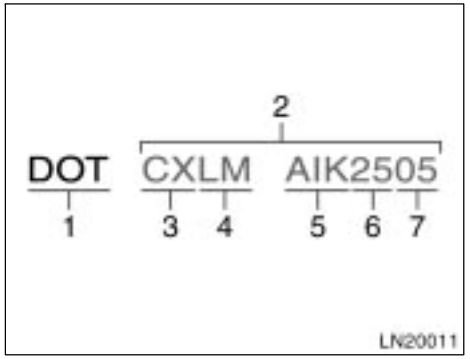
—DOT and Tire Identification Number (TIN)

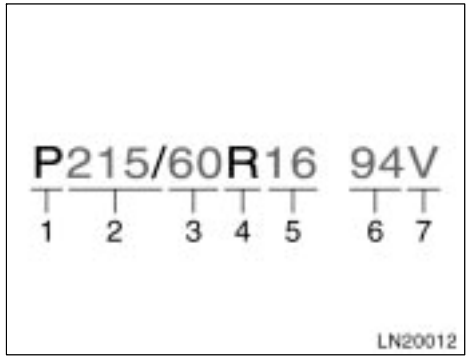


This illustration indicates typical DOT and Tire Identification Number (TIN).

1. “DOT” symbol
2. Tire Identification Number (TIN)
3. Tire manufacturer’s identification mark
4. Tire size code
5. Manufacturer’s optional tire type code (3 or 4 letters)
6. Manufacturing week
7. Manufacturing year

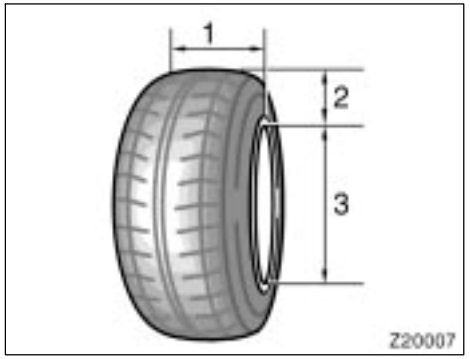
The “DOT” symbol certifies that the tire conforms to applicable Federal Motor Vehicle Safety Standards.

—Tire size



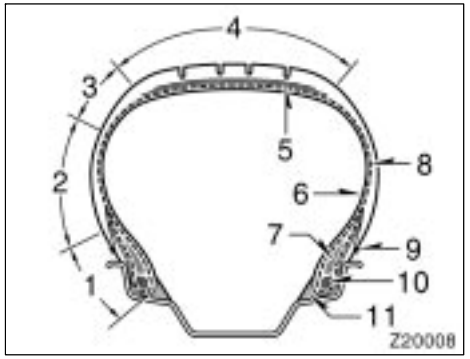
This illustration indicates typical tire size.

1. Tire use (P=Passenger car, T=Temporary use)
2. Section width (in millimeters)
3. Aspect ratio (tire height to section width)
4. Tire construction code (R=Radial, D=Diagonal)
5. Wheel diameter (in inches)
6. Load index (2 digits or 3 digits)
7. Speed symbol (alphabet with one letter)



1. Section width
2. Tire height
3. Wheel diameter

—Name of each section of tire



1. Bead
2. Sidewall
3. Shoulder
4. Tread
5. Belt
6. Inner liner
7. Reinforcing rubber
8. Carcass
9. Rim lines
10. Bead wires
11. Chafer

—Uniform Tire Quality Grading

This information has been prepared in accordance with regulations issued by the National Highway Traffic Safety Administration of the U.S. Department of Transportation. It provides the purchasers and/or prospective purchasers of Toyota vehicles with information on uniform tire quality grading.

Your Toyota dealer will help answer any questions you may have as you read this information.

DOT quality grades—All passenger vehicle tires must conform to Federal Safety Requirements in addition to these grades. Quality grades can be found where applicable on the tire sidewall between tread shoulder and maximum section width. For example: Treadwear 200 Traction AA Temperature A

Treadwear—The treadwear grade is a comparative rating based on the wear rate of the tire when tested under controlled conditions on a specified government test course. For example, a tire graded 150 would wear one and a half (1−1/2) times as well on the government course as a tire graded 100. The relative performance of tires depends upon the actual conditions of their use, however, and may depart significantly from the norm due to variations in driving habits, service practices and differences in road characteristics and climate.

Traction AA, A, B, C—The traction grades, from highest to lowest, are AA, A, B, and C, and they represent the tire's ability to stop on wet pavement as measured under controlled conditions on specified government test surfaces of asphalt and concrete. A tire marked C may have poor traction performance.

Warning: The traction grade assigned to this tire is based on braking (straight ahead) traction tests and does not include cornering (turning) traction.

Temperature A, B, C—The temperature grades are A (the highest), B, and C, representing the tire’s resistance to the generation of heat and its ability to dissipate heat when tested under controlled conditions on a specified indoor laboratory test wheel. Sustained high temperature can cause the material of the tire to degenerate and reduce tire life, and excessive temperature can lead to sudden tire failure. The grade C corresponds to a level of performance which all passenger car tires must meet under the Federal Motor Vehicle Safety Standard No.109. Grades B and A represent higher levels of performance on the laboratory test wheel than the minimum required by law.

Warning: The temperature grades for this tire are established for a tire that is properly inflated and not overloaded. Excessive speed, underinflation, or excessive loading, either separately or in combination, can cause heat buildup and possible tire failure.

—Glossary of tire terminology

Tire related term	Meaning
Accessory weight	the combined weight (in excess of those standard items which may be replaced) of transaxle, power steering, power brakes, power windows, power seats, radio, and heater, to the extent that these items are available as factory−installed equipment (whether installed or not)
Cold tire inflation pressure	tire inflation pressure when the vehicle has been parked for at least 3 hours or more, or it has not been driven more than 1.5 km or 1 mile under that condition
Curb weight	the weight of a motor vehicle with standard equipment including the maximum capacity of fuel, oil, and coolant, and, if so equipped, air conditioning and additional weight optional engine
Intended outboard sidewall	(A) the sidewall that contains a whitewall, bears white lettering or bears manufacturer, brand, and/or model name molding that is higher or deeper than the same molding on the other sidewall of the tire, or (B) the outward facing sidewall of an asymmetrical tire that has a particular side that must always face outward when mounted on a vehicle
Maximum inflation pressure	the maximum cold inflation pressure to which a tire may be inflated and it is shown on the sidewall of the tire
Maximum loaded vehicle weight	the sum of— (a) curb weight; (b) accessory weight; (c) vehicle capacity weight; and (d) production options weight

Tire related term	Meaning
Normal occupant weight	68 kg (150 lb.) times the number of occupants specified in the second column of Table 1 that follows
Occupant distribution	distribution of occupants in a vehicle as specified in the third column of Table 1 that follows
Production options weight	the combined weight of those installed regular production options weighing over 2.3 kg (5 lb.) in excess of those standard items which they replace, not previously considered in curb weight or accessory weight, including heavy duty brakes, ride levelers, roof rack, heavy duty battery, and special trim
Recommended inflation pressure	cold tire inflation pressure recommended by a manufacturer
Rim	a metal support for a tire or a tire and tube assembly upon which the tire beads are seated
Rim diameter (Wheel diameter)	nominal diameter of the bead seat
Rim size designation	rim diameter and width
Rim type designation	the industry of manufacturer’s designation for a rim by style or code
Rim width	nominal distance between rim flanges
Vehicle capacity weight (Total load capacity)	the rated cargo and luggage load plus 68 kg (150 lb.) times the vehicle’s designated seating capacity
Vehicle maximum load on the tire	the load on an individual tire that is determined by distributing to each axle its share of the maximum loaded vehicle weight and dividing by two

Tire related term	Meaning
Vehicle normal load on the tire	the load on an individual tire that is determined by distributing to each axle its share of the curb weight, accessory weight, and normal occupant weight (distributed in accordance with Table 1 that follows) and dividing by two
Weather side	the surface area of the rim not covered by the inflated tire

Table 1—Occupant loading and distribution for vehicle normal load for various designated seating capacities

Designated seating capacity, number of occupants	Vehicle normal load, number of occupants	Occupant distribution in a normally loaded vehicle
2 through 4	2	2 in front
5 through 10	3	2 in front, 1 in second seat

Vehicle load limits

Vehicle load limits include total load capacity, seating capacity, towing capacity and cargo capacity. Follow the load limits shown below. Total load capacity and seating capacity are also described on the tire and loading information label. For location of the tire and loading information label, see "Checking tire inflation pressure" on page 359.

Total load capacity:
410 kg (900 lb.)
Total load capacity means combined weight of occupants, cargo and luggage. Tongue load is included when trailer towing.

Seating capacity:
Total 5 (Front 2, Rear 3)
Seating capacity means the maximum number of occupants whose estimated average weight is 68 kg (150 lb.) per person. Depending on the weight of each person, the seating capacity given may exceed the total load capacity.

NOTICE

Even if the number of occupants are within the seating capacity, do not exceed the total load capacity.

Towing capacity:
Toyota does not recommend towing a trailer with your vehicle. It is not designed for trailer towing.

Cargo capacity

Cargo capacity may increase or decrease depending on the size (weight) and the number of occupants. For details, see "Capacity and distribution" that follows.

⚠ CAUTION

Do not apply the load more than each load limit. That may cause not only damage to the tires, but also deterioration to the steering ability and braking ability, which may cause an accident.

Cargo and luggage— —Stowage precautions

When stowing cargo and luggage in the vehicle, observe the following:

- Put cargo and luggage in the trunk when at all possible. Be sure all items are secured in place.
- Be careful to keep the vehicle balanced. Locating the weight as far forward as possible helps maintain balance.
- For better fuel economy, do not carry unneeded weight.

⚠ CAUTION

- **To prevent cargo and luggage from sliding forward during braking, do not stack anything in the enlarged trunk. Keep cargo and luggage low, as close to the floor as possible.**
- **Never allow anyone to ride in the enlarged trunk. It is not designed for passengers. They should ride in their seats with their seat belts properly fastened. Otherwise, they are much more likely to suffer serious bodily injury, in the event of sudden braking or a collision.**
- **Do not place anything on the package tray behind the rear seatback. Such items may be thrown about and possibly injure people in the vehicle during sudden braking or an accident.**

- **Do not drive with objects left on top of the instrument panel. They may interfere with the driver’s field of view. Or they may move during sharp vehicle acceleration or turning, and impair the driver’s control of the vehicle. In an accident they may injure the vehicle occupants.**

—Capacity and distribution

Cargo capacity depends on the total weight of the occupants.

(Cargo capacity) = (Total load capacity) – (Total weight of occupants)

Steps for Determining Correct Load Limit—

(1) Locate the statement “The combined weight of occupants and cargo should never exceed XXX kg or XXX lbs.” on your vehicle’s placard.

(2) Determine the combined weight of the driver and passengers that will be riding in your vehicle.

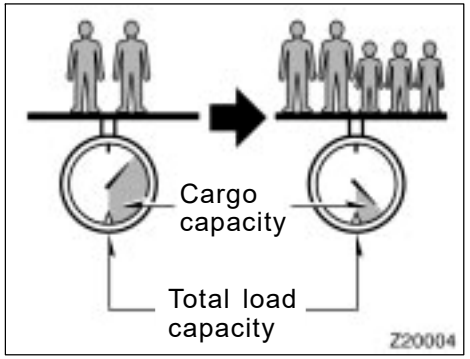
(3) Subtract the combined weight of the driver and passengers from XXX kg or XXX lbs.

(4) The resulting figure equals the available amount of cargo and luggage load capacity. For example, if the “XXX” amount equals 1400 lbs. and there will be five 150 lb passengers in your vehicle, the amount of available cargo and luggage load capacity is 650 lbs. (1400–750 (5x150)=650 lbs.)

(5) Determine the combined weight of luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage load capacity calculated in Step 4.

(6) If your vehicle will be towing a trailer, load from your trailer will be transferred to your vehicle. Consult this manual to determine how this reduces the available cargo and luggage load capacity of your vehicle.

For details about trailer towing, see page 310.



Example on Your Vehicle

In case that 2 people with the combined weight of 166 kg (366 lb.) are riding in your vehicle with the total load capacity of 410 kg (900 lb.), the available amount of cargo and luggage load capacity will be as follows:

410 kg – 166 kg = 244 kg.
(900 lb. – 366 lb. = 534 lb.)

From this condition, if 3 more passengers with the combined weight of 176 kg (388 lb.) get on, the available cargo and luggage load will be reduced as follows:

244 kg – 176 kg = 68 kg.
(534 lb. – 388 lb. = 146 lb.)

As shown in the above example, if the number of occupants increases, the cargo and luggage load equaling the combined weight of occupants who got on later must be reduced. In other words, if the increase in the number of occupants causes the excess of the total load capacity (combined weight of occupants plus cargo and luggage load), you have to reduce the cargo and luggage on your vehicle.

For details about total load capacity, see “Vehicle load limits” on page 295.

⚠ CAUTION

Even if the total load of occupant's weight and the cargo load is less than the total load capacity, do not apply the load unevenly. That may cause not only damage to the tire but also deterioration to the steering ability due to unbalance of the vehicle, causing an accident.

Types of tires

Determine what kind of tires your vehicle is originally equipped with.

1. Summer tires

Summer tires are high−speed capability tires best suited to highway driving under dry conditions.

Since summer tires do not have the same traction performance as snow tires, summer tires are inadequate for driving on snow−covered or icy roads. For driving on snow−covered or icy roads, we recommend using snow tires. If installing snow tires, be sure to replace all four tires.

2. All season tires

All season tires are designed to provide better traction in snow and to be adequate for driving in most winter conditions, as well as for use all year round.

All season tires, however, do not have adequate traction performance compared with snow tires in heavy or loose snow. Also, all season tires fall short in acceleration and handling performance compared with summer tires in highway driving.

The details about how to distinguish summer tires from all season tires are described on page 285.

⚠ CAUTION

- **Do not mix summer and all season tires on your vehicle as this can cause dangerous handling characteristics, resulting in loss of control.**
- **Do not use tires other than the manufacturer's designated tires, and never mix tires or wheels of the sizes different from the originally equipped tires and wheels.**

SECTION 3

STARTING AND DRIVING

Starting and driving

Preparing to start the hybrid system 301
How to start the hybrid system 301
Driving and parking using smart key system 304
Tips for driving in various conditions 307
Winter driving tips 309
Dinghy towing 310
Trailer towing 310
How to save fuel and make your vehicle last longer 311

Preparing to start the hybrid system

1. Check the area around the vehicle before getting in.
2. Adjust seat position, seatback angle, seat cushion angle, seat height, head restraint height and steering wheel angle.
3. Adjust the inside and outside rear view mirrors.
4. Lock all side doors and back door.
5. Fasten seat belts.

When you get in the vehicle, check whether the “READY” light is on or not.

⚠ CAUTION

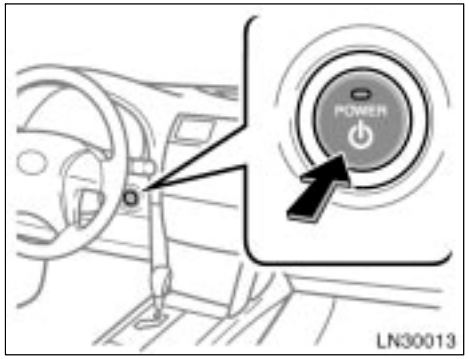
Your vehicle does not produce any noise or vibration when the vehicle is ready to be driven with the “READY” indicator light on. Move your foot carefully from the brake pedal to the acceleration pedal when driving.

How to start the hybrid system—
(a) Before starting

1. Apply the parking brake firmly.
2. Turn off unnecessary lights and accessories.
3. Put the selector lever in “P”.
4. Depress the brake pedal and hold it to the floor until driving off.

As the hybrid system can be started only with the transmission in the “P” position, put the selector lever in “P” whenever starting the system.

(b) Starting the hybrid system



PUSH BUTTON START FUNCTION

The hybrid system can be started by pressing the “POWER” switch.

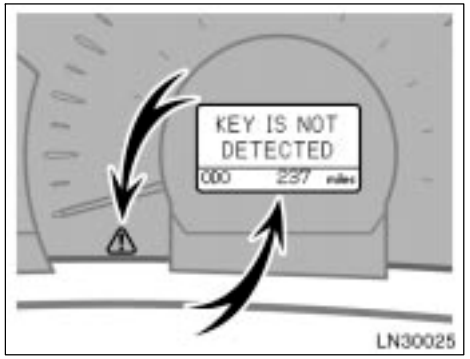
Before starting the hybrid system, be sure to follow the instructions in “(a) Before starting”.

Starting procedure

With your foot off the accelerator pedal, press the “POWER” switch briefly and firmly. The “READY” light starts flashing and then it stays on with sounding a beep. If the ambient temperature is low, such as during winter driving conditions, it may take longer than the usual amount of time until the “READY” light stays on.

The engine may not start even with the “READY” light on.

If there is a problem somewhere in the hybrid system, the message “CHECK HYBRID SYSTEM” will appear on the multi−information display. Have your vehicle checked by your Toyota dealer as soon as possible.



If the hybrid system will not start...

In the following cases, the hybrid system will not start.

- If a buzzer sounds from the vehicle, and the message “KEY IS NOT DETECTED” appears on the multi−information display and the master warning light comes on when pressing the “POWER” switch, this indicates that the key is not in the vehicle.
- If the key is placed in the trunk, the hybrid system cannot be started.
- There are instances in which the hybrid system will not start, even if the key is in the vehicle (e.g. on the floor, in the cup holder or glove box).

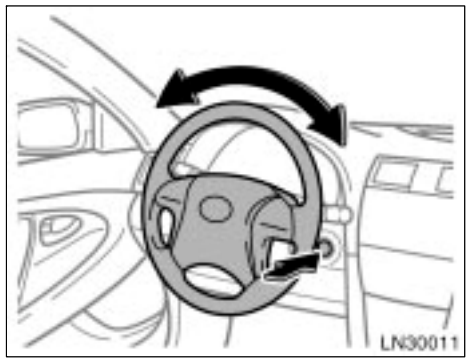
When the push button start function does not operate properly, the following may be causes:

- The key battery may be discharged if the electronic key does not work.

  You can start the hybrid system by touching the Toyota logo side of the electronic key to the “POWER” switch. For details, see “Smart key system” on page 32 in Section 1−2.

  Replace the key battery as soon as possible. (See “—Replacing battery” on page 30 in Section 1−2.)
- The hybrid system was repeatedly turned on and off over a short period.

  Wait 10 seconds and then start the hybrid system.



- If the green indicator light on the “POWER” switch flashes, and the message “S/T IS NOT UNLOCKED” appears on the multi−information display and the master warning light comes on, the steering wheel is locked.

  To free the steering lock, turn the steering wheel slightly while pressing the “POWER” switch.

- If the amber indicator light on the “POWER” switch flashes, and the message “CHECK S/T LOCK” appears on the multi−information display and the master warning light comes on, there is a problem in the steering lock function.

  Contact your Toyota dealer, and have your vehicle and all keys inspected.

- If the amber indicator light on the “POWER” switch flashes, and no message appears on the multi−information display, there is a problem in the push button start function.

  Contact your Toyota dealer, and have your vehicle and all keys inspected.

- In addition to the above, there are instances in which the smart key system does not operate properly because of the circumstances of use. For details, see “Smart key system” on page 32 in Section 1−2.

In cases other than those described above, it is possible that a problem has occurred in an area other than the start system. See “If your vehicle will not start” on page 313 in Section 4.

If the 12 volt battery is disconnected or run down...

The “READY” light will not come on and the hybrid system will not start after you reconnect, replace or recharge the battery. In this case, perform the following procedure to restart the hybrid system:

1. Turn the hybrid system off.
2. Open and close the driver’s door.
3. Press the “POWER” switch briefly and firmly.

If the hybrid system still will not start, contact your Toyota dealer.

⚠ CAUTION

Never start the hybrid system from outside the vehicle, or an accident may occur. Be sure to sit in the driver seat, then start the system.

NOTICE

- ***If any message appears on the multi−information display or service reminder indicator light comes on (see page 140 and page 150 in Section 1−6 for details) or the 12 volt battery is disconnected, the hybrid system may not be started. In that case, push the “POWER” switch again. If the “READY” light does not come on, contact your Toyota dealer.***
- ***When you start the hybrid system at a lower outside temperature, it may take longer before the blinking “READY” light changes to constant on.***

Driving and parking using smart key system

TIPS FOR USING SMART KEY SYSTEM

When using the smart key system, it is possible to start or stop the hybrid system as long as the key is on your person.

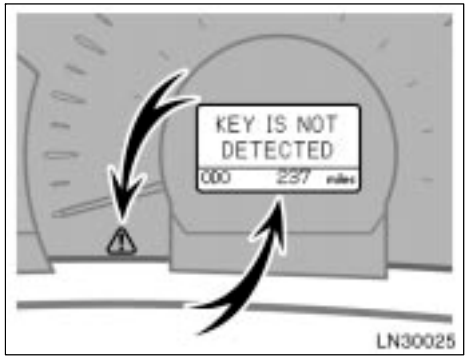
For this reason, it is possible that a passenger may remove the key from the vehicle without the driver being aware of the fact. In such a case, it is not possible to restart the hybrid system after having turned it off. In addition, it is possible that one may get out of the vehicle without being aware that the “POWER” switch has not been turned off completely.

When driving or getting in or out of the vehicle, drivers should make sure that they are carrying the key.

⚠ CAUTION

Do not touch the “POWER” switch while driving.

If you have to make an emergency stop, press and hold the “POWER” switch for more than 3 seconds.



Master warning light and multi−information display

SYSTEM FUNCTION REMINDERS

Follow the instructions described below if any of the following warnings occur:

(A) A warning buzzer sounds once from the instrument cluster when the “POWER” switch is pushed.

This indicates that the driver has gotten into the vehicle without the key. The message “KEY IS NOT DETECTED” will also appear on the multi−information display and the master warning light will come on.

Operate the “POWER” switch only after taking care that the key is in the vehicle.

If the warning light is still lit when the key is in the vehicle, the key battery is discharged. Check that the indicator light on the key comes on by pushing the lock button on the key. When the indicator light does not come on, change the key battery so that smart key system works properly.

(B) A warning buzzer sounds once from the instrument cluster, accompanied by three warning sounds from the vehicle when the driver gets out of the vehicle and closes the door.

This indicates that the driver is attempting to leave the vehicle carrying the key with “POWER” switch turned off although the transmission selector lever has been set in the “P” position. The message “KEY IS NOT DETECTED” will also appear on the multi−information display and the master warning light will come on.

Get out of the vehicle only after turning off the hybrid system by pressing the “POWER” switch and checking that the indicator light on the “POWER” switch has gone off. If the driver returns to the vehicle without carrying the key and begins driving, a warning buzzer will sound once more.

(C) A warning buzzer sounds from the vehicle for two seconds after locking the door with the door handle switch.

This indicates that the driver is attempting to lock the doors while carrying the key, neglecting to follow the instructions for case (B) above.

Lock the doors only after turning off the hybrid system by pressing the “POWER” switch and checking that the indicator light on the “POWER” switch has gone off.

A warning buzzer that sounds even though the engine has been turned off indicates that driver is attempting to lock the vehicle with the keys still in the vehicle.

Leave the vehicle only after making sure that you are carrying the key.

(D) A warning buzzer sounds continuously from the instrument cluster when opening the driver’s door.

This indicates that the transmission selector lever is in a position other than “P” and that the “POWER” switch is not turned off. The message “SHIFT TO P RANGE” will also appear on the multi−information display.

Get out of the vehicle only after setting the transmission selector lever in the “P” position, turning off the hybrid system by pressing the “POWER” switch and checking that the indicator light on the “POWER” switch has gone off.

(E) A warning buzzer sounds continuously from the instrument cluster and from the vehicle when closing the door after getting out of the vehicle.

This indicates that the driver is attempting to leave the vehicle carrying the key, neglecting to follow the instructions for case (D) above. The messages, “SHIFT TO P RANGE” and “KEY IS NOT DETECTED”, will also appear alternately on the multi−information display and the master warning light will come on.

Get out of the vehicle only after setting the transmission selector lever in the “P” position, turning off the hybrid system by pressing the “POWER” switch and checking that the indicator light on the “POWER” switch has gone off.

(F) A warning buzzer sounds once from the instrument cluster and three times from the vehicle when a passenger is getting out of the vehicle.

This indicates that the passenger is attempting to leave the vehicle carrying the key, without turning the hybrid system off. The message “KEY IS NOT DETECTED” will also appear on the multi−information display and the master warning light will come on.

When passengers get out of the vehicle, care should be taken to leave the key with the driver. If the driver begins driving after a passenger gets out of the vehicle carrying the key, a warning buzzer will sound once more.

(G) A warning buzzer sounds from the vehicle for two seconds when locking the vehicle from the outside with the door handle switch.

This indicates that the driver is attempting to lock the door with the key still in the vehicle.

Leave the vehicle only after making sure that you are carrying the key.

(H) A warning buzzer sounds once from the instrument cluster when the “POWER” switch is turned off.

This indicates that the key battery is low. (This warning buzzer sounds only when the hybrid system has been on or the “POWER” switch has been set at ON for 20 minutes or more.) The message “LOW KEY BATTERY” will also appear on the multi−information display.

Change the key battery ahead of time in order to ensure that the smart key system works properly.

(I) A warning buzzer sounds repeatedly from the instrument cluster when opening the driver’s door with the “POWER” switch turned off.

This indicates that the steering wheel is not locked. Turn the engine off and then open the door in order to lock the steering wheel.

(J) The “POWER” switch flashes green once every second.

This indicates that the steering lock is stuck. The message “S/T IS NOT UNLOCKED” will also appear on the multi−information display.

To free it, rotate the steering wheel slightly while pressing the “POWER” switch.

(K) The “POWER” switch flashes amber once every 2 seconds.

When the message “CHECK S/T LOCK” appears on the multi−information display—
This indicates a problem with the steering lock function. Have your vehicle checked at your Toyota dealer.

When no message appears on the multi−information display—
This indicates a problem with the push button start function. Have your vehicle checked at your Toyota dealer.

THEFT PREVENTION FUNCTION

- When the hybrid system is turned off, the engine immobilizer system is automatically set. (See “Engine immobilizer system” on page 24 in Section 1−2.)
- When the driver’s door is opened after turning off the hybrid system, the steering wheel will lock.

  When the 12 volt battery is discharged, the steering lock function may not operate properly.

Tips for driving in various conditions

- Always slow down in gusty crosswinds. This will allow you much better control.
- Drive slowly onto curbs and, if possible, at a right angle. Avoid driving onto high, sharp−edged objects and other road hazards. Failure to do so can lead to severe tire damage such as a tire burst.

  Drive slowly when passing over bumps or travelling on a bumpy road. Otherwise, the impact could cause severe damage to the tires and/or wheels.
- When parking on a hill, turn the front wheels until they touch the curb so that the vehicle will not roll. Apply the parking brake, and place the transmission in “P”. If necessary, block the wheels.

- Washing your vehicle or driving through deep water may get the brakes wet. To see whether they are wet, check that there is no traffic near you, and then press the pedal lightly. If you do not feel a normal braking force, the brakes are probably wet. To dry them, drive the vehicle cautiously while lightly pressing the brake pedal with the parking brake applied. If they still do not work safely, pull to the side of the road and call a Toyota dealer for assistance.

⚠ CAUTION

- **Before driving off, make sure that the parking brake is fully released and the parking brake reminder light is off.**
- **Do not leave your vehicle unattended while the hybrid system is operating.**
- **Do not rest your foot on the brake pedal while driving. It can cause dangerous overheating, needless wear, and poor fuel economy.**

- **To drive down a long or steep hill, reduce your speed and use engine brake. Remember, if you ride the brakes excessively, they may overheat and not work properly.**
- **Be careful when accelerating, engine braking or braking on a slippery surface. Sudden acceleration or engine braking could cause the vehicle to skid or spin.**
- **Do not drive in excess of the speed limit. Even if the legal speed limit permits it, do not drive over 140 km/h (85 mph) unless your vehicle has high−speed capability tires. Driving over 140 km/h (85 mph) may result in tire failure, loss of control and possible injury. Be sure to consult a tire dealer to determine whether the tires on your vehicle are high−speed capability tires or not before driving at such speeds.**

- **Do not continue normal driving when the brakes are wet. If they are wet, your vehicle will require a longer stopping distance, and it may pull to one side when the brakes are applied. Also, the parking brake will not hold the vehicle securely.**

Winter driving tips

Make sure your coolant is properly protected against freezing.

Only use “Toyota Super Long Life Coolant” or similar high quality ethylene glycol based non−silicate, non−amine, non−nitrite, and non−borate coolant with long−life hybrid organic acid technology. (Coolant with long−life hybrid organic acid technology is a combination of low phosphates and organic acids.)

See “Checking the coolant level” on page 357 in Section 7−2 for details of coolant type selection.

For the U.S.A.—“Toyota Super Long Life Coolant” is a mixture of 50% coolant and 50% deionized water. This coolant provides protection down to about −35°C (−31°F).

For Canada—“Toyota Super Long Life Coolant” is a mixture of 55% coolant and 45% deionized water. This coolant provides protection down to about −42°C (−44°F).

NOTICE
Do not use plain water alone.

Check the condition of the 12 volt battery and cables.

Cold temperatures lower the performance of the 12 volt battery, so it must be in top shape to provide enough power for winter starting. Section 7−3 tells you how to visually inspect the 12 volt battery. Your Toyota dealer and most service stations will be pleased to check the level of charge.

Make sure the engine oil viscosity is suitable for the cold weather.

See page 356 in Section 7−2 for recommended viscosity. Leaving a heavy summer oil in your vehicle during winter months may cause harder starting. If you are not sure about which oil to use, call your Toyota dealer—they will be pleased to help.

Keep the door locks from freezing.

Squirt lock de−icer or glycerine into the locks to keep them from freezing.

Use a washer fluid containing an antifreeze solution.

This product is available at your Toyota dealer and most auto parts stores. Follow the manufacturer’s directions for how much to mix with water.

NOTICE
Do not use engine antifreeze or any other substitute because it may damage your vehicle’s paint.

Do not use your parking brake when there is a possibility it could freeze.

When parking, put the transmission into “P” and block the rear wheels. Do not use the parking brake, or snow or water accumulated in and around the parking brake mechanism may freeze, making it hard to release.

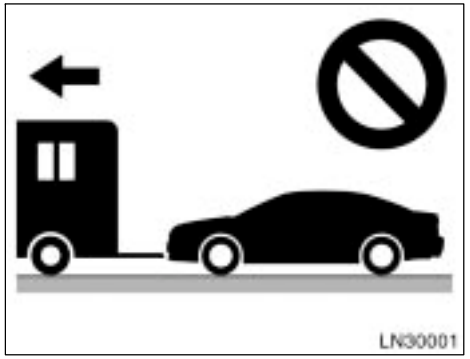
Keep ice and snow from accumulating under the fenders.

Ice and snow built up under your fenders can make steering difficult. During bad winter driving, stop and check under the fenders occasionally.

Depending on where you are driving, we recommend you carry some emergency equipment.

Some of the things you might put in the vehicle are tire chains, window scraper, bag of sand or salt, flares, small shovel, jumper cables, etc.

Dinghy towing



Your vehicle is not designed to be dinghy towed (with four wheels on the ground) behind a motorhome.

NOTICE

Do not tow your vehicle with four wheels on the ground. This may cause serious damage to your vehicle.

Trailer towing

Toyota does not recommend towing a trailer with your Toyota. Toyota also does not recommend the installation of a tow hitch or the use of a tow hitch carrier for a wheelchair, scooter, bicycle, etc. Your Toyota is not designed for trailer towing or for the use of tow hitch mounted carriers.

How to save fuel and make your vehicle last longer

Improving fuel economy is easy—just take it easy. It will help make your vehicle last longer, too. Here are some specific tips on how to save money on both fuel and repairs:

- **Keep your tires inflated at the correct pressure.** Underinflation causes tire wear and wastes fuel. See page 359 in Section 7−2 for instructions.
- **Do not carry unneeded weight in your vehicle.** Excess weight puts a heavier load on the hybrid system, causing greater fuel consumption.
- **Accelerate slowly and smoothly.** Avoid jackrabbit starts. Get into high gear as quickly as possible.
- **Avoid continuous speeding up and slowing down.** Stop−and−go driving wastes fuel.
- **Avoid unnecessary stopping and braking.** Maintain a steady pace. Try to time the traffic signals so you only need to stop as little as possible or take advantage of through streets to avoid traffic lights. Keep a proper distance from other vehicles to avoid sudden braking. This will also reduce wear on your brakes.
- **When parking, be sure to put the transmission into the “P” position.** In the “N” position, the engine operates but electricity cannot be generated. The hybrid battery will be discharged requiring unnecessary engine power to recharge.
- **Avoid heavy traffic or traffic jams whenever possible.**
- **Do not rest your foot on the brake pedal.** This causes premature wear, overheating and poor fuel economy.
- **Maintain a moderate speed on highways.** The faster you drive, the greater the fuel consumption. By reducing your speed, you will cut down on fuel consumption.
- **Keep the front wheels in proper alignment.** Avoid hitting the curb and slow down on rough roads. Improper alignment not only causes faster tire wear but also puts an extra load on the hybrid system, which, in turn, wastes fuel.
- **Keep the bottom of your vehicle free from mud, etc.** This not only lessens weight but also helps prevent corrosion.
- **Keep your vehicle tuned−up and in top shape.** A dirty air cleaner, improper valve clearance, dirty plugs, dirty oil and grease, brakes not adjusted, etc. all lower engine performance and contribute to poor fuel economy. For longer life of all parts and lower operating costs, keep all maintenance work on schedule, and if you often drive under severe conditions, see that your vehicle receives more frequent maintenance. (For scheduled maintenance information, please refer to the “Scheduled Maintenance Guide” or “Owner’s Manual Supplement”.)

⚠ CAUTION

Never turn off the hybrid system to coast down hills. Your power steering and brake booster do not function when the hybrid system is off. In addition, the emission control system operates properly only when the hybrid system is operating.

SECTION 4

IN CASE OF AN EMERGENCY

In case of an emergency

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If you lose your keys 330

If your vehicle will not start—
(a) Simple checks

Before making these checks, make sure you have sufficient fuel and that you have followed the correct starting procedure given in “How to start the hybrid system” on page 301 in Section 3. If your vehicle is equipped with the engine immobilizer system, also check whether the other keys will start the hybrid system. If they work, your key may be broken. Have the key checked at your Toyota dealer. If none of your keys work, there may be a malfunction in the immobilizer system. Call your Toyota dealer. (See “Keys” on page 22 in Section 1−2.)

If the instrument cluster displays with normal brightness levels with the “POWER” switch set at ON...

You may try emergency start. See “(b) Emergency start” for further instructions.

If the instrument cluster dims or the instrument cluster display turns off with the “POWER” switch set at ON...

1. Check that the 12 volt battery terminals are tight and clean.
2. If the 12 volt battery terminals are O.K., the 12 volt battery is discharged. You may try jump starting. See “(c) Jump starting” that follows for further instructions.

NOTICE

Hybrid vehicles cannot be push−started.

(b) Emergency start

When the hybrid system cannot be started, the following procedure can be used if the hybrid system and “POWER” switch function normally.

1. Put the transmission in “P”.
2. Set the mode to ACC by pushing the “POWER” switch once.
3. Push and hold the “POWER” switch for about 15 seconds while depressing the brake pedal firmly.

Even if the hybrid system can be started using the above procedure, the system may be malfunctioning. Have the vehicle checked by your Toyota dealer.

If the hybrid system cannot be started using the above procedure, immediately contact your Toyota dealer.

⚠ CAUTION

Do not place any objects close to the “POWER” switch. If the object pushes on the switch, the hybrid system may be started unexpectedly.

(c) Jump starting

If the 12 volt battery is discharged, the hybrid system can be started by jump starting. Depending on the vehicle condition, however, the hybrid system may not start.

To avoid serious injury and damage to your vehicle which might result from an explosion of the battery, acid burns, electrical burns, or damaged electronic components, follow instructions carefully.

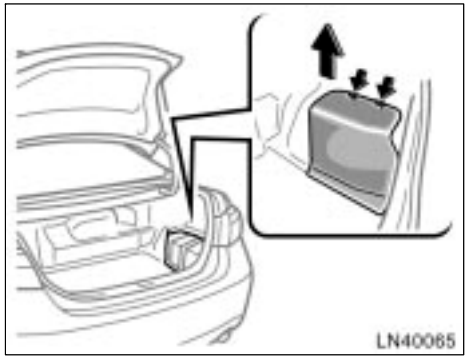
If you are unsure about how to follow this procedure, we strongly recommend that you seek the help of a competent mechanic or towing service.

⚠ CAUTION

- **Batteries contain sulfuric acid which is poisonous and corrosive. Wear protective safety glasses when jump starting, and avoid spilling acid on your skin, clothing, or vehicle.**
- **If you should accidentally get acid on yourself or in your eyes, remove any contaminated clothing and flush the affected area with water immediately. Then get immediate medical attention. If possible, continue to apply water with a sponge or cloth while en route to the medical office.**
- **The gas normally produced by a battery will explode if a flame or spark is brought near. Use only standardized jumper cables and do not smoke or light a match while jump starting.**

NOTICE

The battery used for boosting must be 12 V. Do not jump start unless you are sure that the booster battery is correct.



12 VOLT BATTERY LOCATION

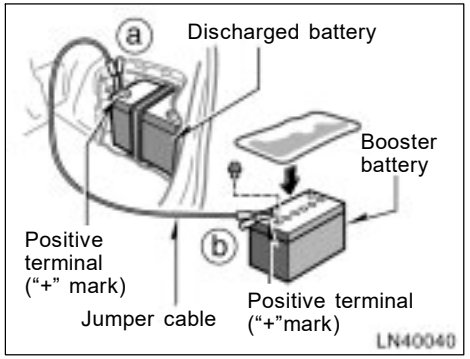
The 12 volt battery is located in the right−hand side of the trunk. Remove the cover to access the battery.

JUMP STARTING PROCEDURE

1. If the booster battery is installed in another vehicle, make sure the vehicles are not touching. Turn off all unnecessary lights and accessories.

   When boosting, use the battery of matching or higher quality. Any other battery may be difficult to jump start with.

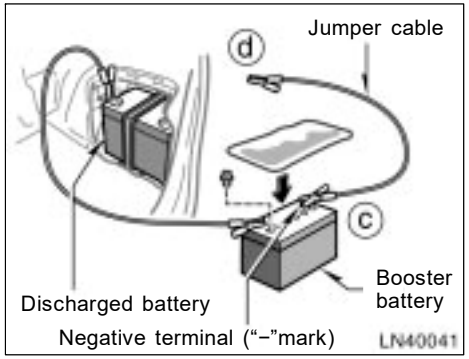
   If jump starting is difficult, charge the battery for several minutes.
2. If required, remove all the vent plugs from the booster battery. Lay a cloth over the open vents on the battery. (This helps reduce the explosion hazard, personal injuries and burns.)
3. If the engine in the vehicle with the booster battery is not running, start it and let it run for a few minutes. During jump starting, run the engine at about 2000 rpm with the accelerator pedal lightly depressed.



4. Make the cable connections in the order a, b, c, d.

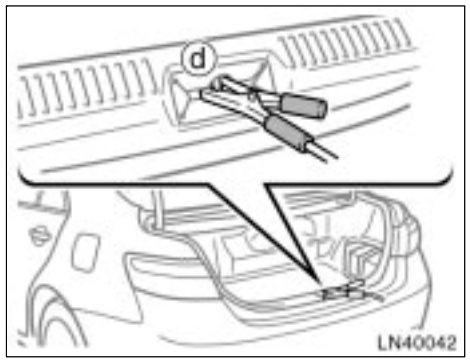
   a. Connect the clamp of the positive (red) jumper cable to the positive (+) terminal of the discharged 12 volt battery.

   b. Connect the clamp at the other end of the positive (red) jumper cable to the positive (+) terminal of the booster battery.



   c. Connect the clamp of the negative (black) jumper cable to the negative (−) terminal on the booster battery.

   d. Connect the clamp at the other end of the negative (black) jumper cable to a solid, stationary, unpainted, metallic point of the vehicle with the discharged battery.



The recommended connecting point is ⓓ in the above illustration.

⚠ CAUTION

When making the connections, to avoid serious injury, do not lean over the battery or accidentally let the jumper cables or clamps touch anything except the correct battery terminals or the ground.

5. Start the hybrid system. Make sure the “READY” light is on.

   If the ”READY” light will not come on and the hybrid system will not start after you recharge the battery, perform the following procedure. Turn the hybrid system off. Open and close the driver’s door. Then push the ”POWER” switch briefly and firmly.

   If the the message “LOW T. BATTERY STOP THE VEHICLE SHIFT TO P” appears on the multi−information display, the hybrid battery is also discharged. In this condition, the hybrid system may not start. Contact your Toyota dealer.
6. Carefully disconnect the cables in the exact reverse order: the negative cable and then the positive cable.
7. Carefully dispose of the battery cover cloths—they may now contain sulfuric acid.
8. If removed, replace all the battery vent plugs.

If the cause of the 12 volt battery discharging is not apparent (for example, lights left on), have the battery checked by your Toyota dealer.

If the first start attempt is not successful...

Check that the clamp on the jumper cables are tight. Recharge the discharged battery with the jumper cables connected for several minutes and restart the hybrid system in the normal way.

If the another attempt is not successful, the battery may be depleted. Have it checked at your Toyota dealer.

If your hybrid system stalls while driving

If your hybrid system stalls while driving...

1. Reduce your speed gradually, keeping a straight line. Move cautiously off the road to a safe place.
2. Turn on your emergency flashers.
3. Set the “POWER” switch at ACC or off, and try starting the hybrid system again.

If the hybrid system will not start, see “If your vehicle will not start” on page 313 in this Section.

⚠ CAUTION

- **If the hybrid system is not operating, the power assist for the brakes and steering will not work so steering and braking will be much harder than usual.**
- **If the hybrid system stalls while driving, do not open the driver’s door until the vehicle comes to a complete stop. Opening the driver’s door locks the steering wheel, resulting in loss of steering control.**

If your vehicle overheats

Any of the following may indicate that the hybrid system has overheated:

- **The engine coolant temperature gauge indicates overheating.**
- **The message “WATER TEMP” or “HYBRID SYSTEM OVER HEAT” appears on the multi−information display.**
- **A loss of power is experienced.**
- **A loud knocking or pinging noise is heard.**

If the hybrid system overheats, follow the procedures below:

1. Pull safely off the road, stop the vehicle and turn on your emergency flashers. Put the transmission in “P” and apply the parking brake. Turn off the air conditioning if it is being used.
2. If coolant or steam is boiling out of the radiator or reservoir, stop the hybrid system. Wait until the steam subsides before opening the hood. If there is no coolant boiling over or steam, leave the hybrid system turned on and make sure the electric cooling fan is operating. If it is not, turn the hybrid system off.

⚠ CAUTION

To help avoid personal injury, keep the hood closed until there is no steam. Escaping steam or coolant is a sign of very high pressure.

3. Look for obvious coolant leaks from the radiator, hoses, and under the vehicle. However, note that water draining from the air conditioning is normal if it has been used.

⚠ CAUTION

When the hybrid system is on, keep hands and clothing away from the moving fan.

4. If the coolant is leaking, stop the hybrid system immediately. Call a Toyota dealer for assistance.
5. If there are no obvious leaks, check the coolant reservoir. If it is dry, add coolant to the reservoir while the hybrid system is on. Fill it about half full. For the coolant type, see “Coolant type selection” on page 357 in Section 7−2.

⚠ CAUTION

Do not attempt to remove the radiator cap when the hybrid system and radiator are hot. Serious injury could result from scalding hot fluid and steam blown out under pressure.

6. After the coolant temperature has cooled to normal, again check the coolant level in the reservoir. If necessary, bring it up to half full again. Serious coolant loss indicates a leak in the system. You should have it checked as soon as possible at your Toyota dealer.

If you have a flat tire—

1. Reduce your speed gradually, keeping a straight line. Move cautiously off the road to a safe place well away from the traffic. Avoid stopping on the center divider of a highway. Park on a level spot with firm ground.
2. Stop the hybrid system and turn on your emergency flashers.
3. Firmly set the parking brake and put the transmission in “P”.
4. Have everyone get out of the vehicle on the side away from traffic.
5. Read the following instructions thoroughly.

⚠ CAUTION

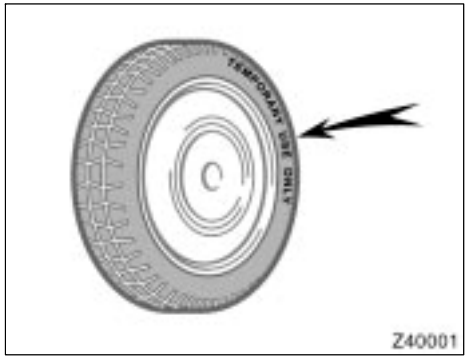
When jacking, be sure to observe the following to reduce the possibility of death or serious injury:

- **Follow jacking instructions.**
- **Do not put any part of your body under the vehicle supported by the jack. Otherwise, personal injury may occur.**
- **Do not start the hybrid system while your vehicle is supported by the jack.**
- **Stop the vehicle on a level firm ground, firmly set the parking brake and put the transmission in “P”. Block the wheel diagonally opposite to the one being changed if necessary.**

- **Make sure to set the jack properly in the jack point. Raising the vehicle with jack improperly positioned will damage the vehicle or may allow the vehicle to fall off the jack and cause personal injury.**
- **Never get under the vehicle when the vehicle is supported by the jack alone.**
- **Use the jack only for lifting your vehicle during wheel changing.**
- **Do not raise the vehicle with someone in the vehicle.**
- **When raising the vehicle, do not place any objects on top of or underneath the jack.**
- **Raise the vehicle only high enough to remove and change the tire.**

NOTICE

Do not continue driving with a deflated tire. Driving even a short distance can damage a tire and wheel beyond repair.



Compact spare tire

The compact spare tire is designed for temporary emergency use only.

The compact spare tire is identified by the distinctive wording “TEMPORARY USE ONLY” molded into the side wall of the tire.

The compact spare tire saves space in your luggage compartment, and its lighter weight helps to improve fuel economy and permits easier installation in case of a flat tire.

The compact spare tire can be used many times, if necessary. It has tread life of up to 4800 km (3000 miles) depending on road conditions and your driving habits. When tread wear indicators appear on the tire, replace the tire.

See also the tire information on page 362 in Section 7−2 for details on the tread wear indicators and other service information.

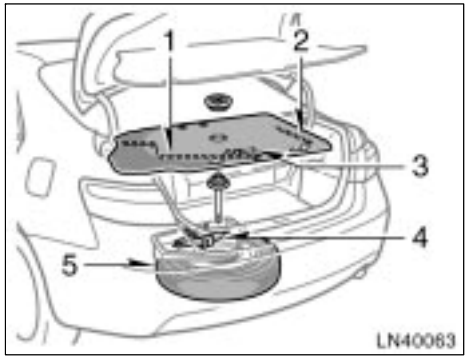
⚠ CAUTION

- **The compact spare tire was designed especially for your Toyota. Do not use it on any other vehicle.**
- **Do not use more than one compact spare tire at the same time.**
- **The pressure for the compact spare tire must be 420 kPa (4.2 kgf/cm^2 or bar, 60 psi).**
- **Do not exceed 80 km/h (50 mph) when driving with the compact spare tire.**
- **Replace the compact spare tire with the standard tire as soon as possible.**
- **Avoid sudden acceleration, sudden deceleration and sharp turns with the compact spare tire.**

NOTICE

Your ground clearance is reduced when the compact spare tire is installed so avoid driving over obstacles and drive slowly on rough, unpaved roads and speed bumps. Also, do not attempt to go through an automatic car wash as the vehicle may get caught, resulting in damage.

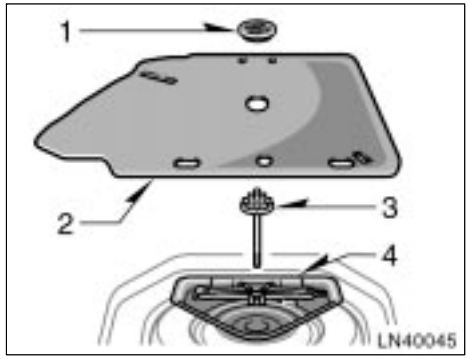
—Required tools and spare tire



1. Get the required tools and spare tire.

1. Jack handle
2. Wheel nut wrench
3. Transport eyelet (on some models)
4. Jack
5. Spare tire

To prepare yourself for an emergency, you should familiarize yourself with the use of the jack, each of the tools and their storage locations.

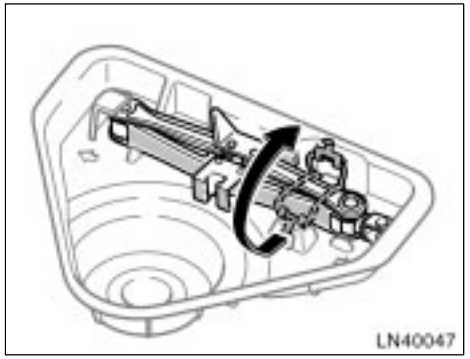


To remove the spare tire:

1. Loosen the nut and remove it.
2. Remove the spare tire cover.
3. Loosen the bolt and remove it.
4. Remove the jack tray.

Then take the spare tire out of the vehicle.

When storing the spare tire, put it in place with the outer side of the wheel facing up. Then secure the tire by repeating the above removal steps in reverse order to prevent it from flying forward during a collision or sudden braking.

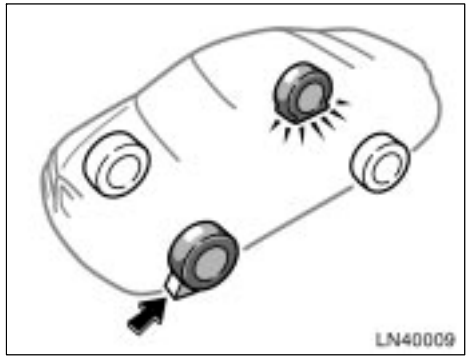


Before removing the jack, unhook the tightening strap.

After storing the jack, make sure it is securely held by the tightening strap.

This prevents the jack from flying forward during a collision or sudden stop.

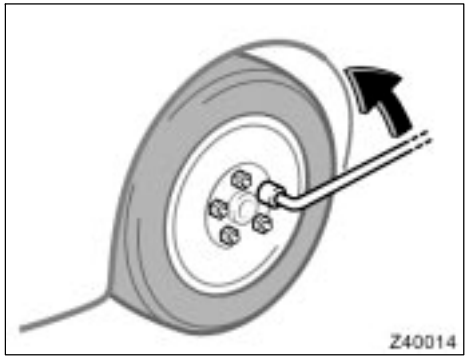
—Blocking the wheel



2. Block the wheel diagonally opposite the flat tire to keep the vehicle from rolling when it is jacked up.

When blocking the wheel, place a wheel block or equivalent in front of one of the front wheels or behind one of the rear wheels.

—Loosening wheel nuts



3. Loosen all the wheel nuts.

Always loosen the wheel nuts before raising the vehicle.

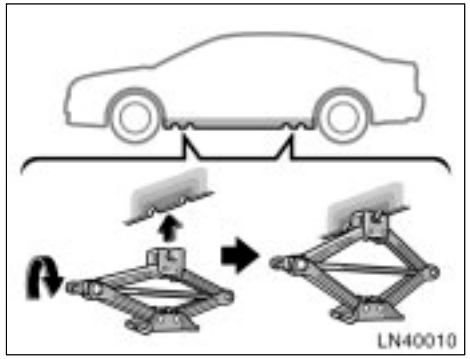
Turn the wheel nuts counterclockwise to loosen. To get maximum leverage, fit the wrench to the nut so that the handle is on the right side, as shown above. Grab the wrench near the end of the handle and pull up on the handle. Be careful that the wrench does not slip off the nut.

Do not remove the nuts yet—just unscrew them about one−half turn.

⚠ CAUTION

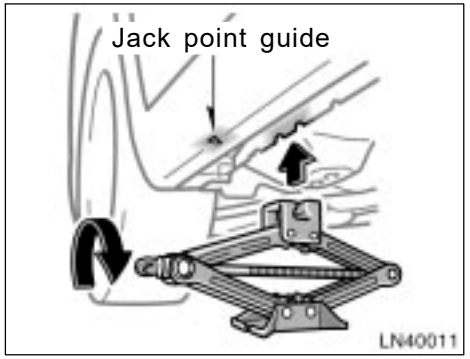
Never use oil or grease on the bolts or nuts. The nuts may become loose and the wheels may fall off, which could cause a serious accident.

—Positioning the jack



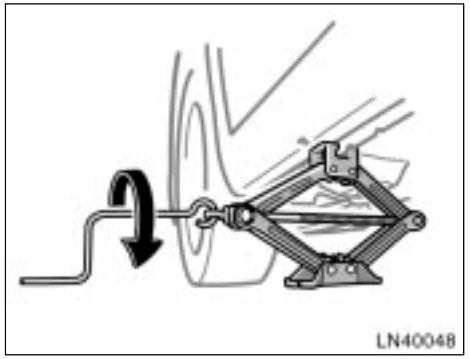
4. Position the jack at the correct jack point as shown.

Make sure the jack is positioned on a level and solid place.



The jack point guides are located under the rocker panel. They indicate the jack point positions.

—Raising your vehicle



5. After making sure that no one is in the vehicle, raise it high enough so that the spare tire can be installed.

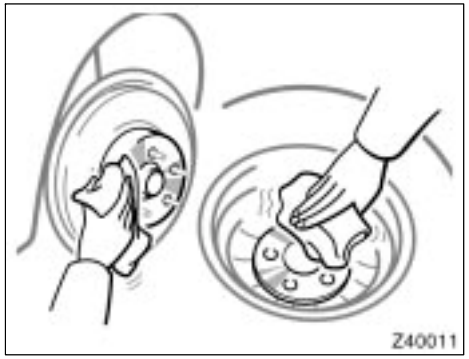
Remember you will need more ground clearance when putting on the spare tire than when removing the flat tire.

To raise the vehicle, insert the jack handle into the jack (it is a loose fit) and turn it clockwise. As the jack touches the vehicle and begins to lift, double−check that it is properly positioned.

—Changing wheels

⚠ CAUTION

Never get under the vehicle when the vehicle is supported by the jack alone.



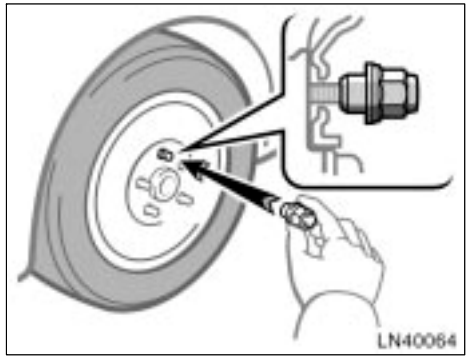
6. Remove the wheel nuts and change tires.

Lift the flat tire straight off and put it aside.

Roll the spare wheel into position and align the holes in the wheel with the bolts. Then lift up the wheel and get at least the top bolt started through its hole. Wiggle the tire and press it back over the other bolts.

Before putting on wheels, remove any corrosion on the mounting surfaces with a wire brush or such. Installation of wheels without good metal−to−metal contact at the mounting surface can cause wheel nuts to loosen and eventually cause a wheel to come off while driving.

—Reinstalling wheel nuts



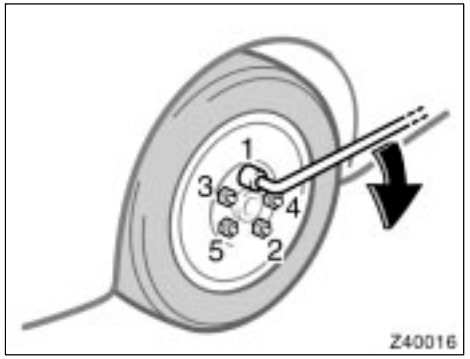
7. Reinstall all the wheel nuts finger tight.

Reinstall the wheel nuts (tapered end inward) and tighten them as much as you can by hand. Press back on the tire and see if you can tighten them more.

⚠ CAUTION

Never use oil or grease on the bolts or nuts. Doing so may lead to overtightening the nuts and damaging the bolts. The nuts may loose and the wheels may fall off, which could cause a serious accident. If there is oil or grease on any bolt or nut, clean it.

—Lowering your vehicle



8. Lower the vehicle completely and tighten the wheel nuts.

Turn the jack handle counterclockwise to lower the vehicle.

Use only the wheel nut wrench to tighten the nuts. Do not use other tools or any additional leverage other than your hands, such as a hammer, pipe or your foot. Make sure the wrench is securely engaged over the nut.

Tighten each nut a little at a time in the order shown. Repeat the process until all the nuts are tight.

⚠ CAUTION

- **When lowering the vehicle, make sure all portions of your body and all other persons around will not be injured as the vehicle is lowered to the ground.**
- **Have the wheel nuts tightened with torque wrench to 103 N·m (10.5 kgf·m, 76 ft·lbf), as soon as possible after changing wheels. Otherwise, the nuts may loosen and the wheels may fall off, which could cause a serious accident.**
- **Do not attach a heavily damaged plastic wheel ornament. It may fly off the wheel and cause accidents while the vehicle is moving.**

—After changing wheels

9. Check the air pressure of the replaced tire.

Adjust the air pressure to the specification designed on page 385 in Section 8. If the pressure is lower, drive slowly to the nearest service station and fill to the correct pressure.

Do not forget to reinstall the tire inflation valve cap as dirt and moisture could get into the valve core and possibly cause air leakage. If the cap is missing, have a new one put on as soon as possible.

10. Restow all the tools, jack and flat tire securely.

As soon after changing wheels as possible, tighten the wheel nuts to the torque specified on page 385 in Section 8 with a torque wrench. Have a technician repair the flat tire and replace the spare tire with it.

Initial adjustment of the tire pressure warning system is necessary after you have replaced your tires or wheels. See “Tire pressure warning system” on page 168 in Section 1−7.

⚠ CAUTION

Before driving, make sure all the tools, jack and flat tire are securely in place in their storage location to reduce the possibility of personal injury during a collision or sudden braking.

If your vehicle becomes stuck

If your vehicle becomes stuck in snow, mud, sand, etc., then you may attempt to rock the vehicle free by moving it forward and backward.

⚠ CAUTION

Do not attempt to rock the vehicle free by moving it forward and backward if people or objects are anywhere near the vehicle. During the rocking operation the vehicle may suddenly move forward or backward as it becomes unstuck, causing injury or damage to nearby people or objects.

NOTICE

If you rock your vehicle, observe the following precautions to prevent damage to the transmission and other parts.

- ***Do not depress the accelerator pedal while shifting the selector lever or before the transmission is completely shifted to forward or reverse gear.***
- ***Avoid spinning the wheels.***
- ***If your vehicle remains stuck after rocking the vehicle several times, consider other ways such as towing.***

If your vehicle needs to be towed—

(a) Towing with wheel lift type truck—

—From front

—From rear

(b) Using flat bed truck

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If towing is necessary, we recommend you to have it done by your Toyota dealer or a commercial tow truck service. In consultation with them, have your vehicle towed using either (a) or (b).

Proper equipment will help ensure that your vehicle is not damaged while being towed. Commercial operators are generally aware of the state/provincial and local laws pertaining to towing.

Your vehicle can be damaged if it is towed incorrectly. Although most operators know the correct procedure, it is possible to make a mistake. To avoid damage to your vehicle, make sure the following precautions are observed. If necessary, show this page to the tow truck driver.

⚠ CAUTION

If your vehicle needs to be towed, do it with the front wheels raised. If the wheels with the motor generator are on the ground when towing, the motor may continue to generate electricity. This may cause the electricity leakage. Depending on the severity of the damage, electricity leakage may cause fire.

TOWING PRECAUTIONS:

Use a safety chain system for all towing, and abide by the state/provincial and local laws. The wheels and axle on the ground must be in good condition. If they are damaged, use a towing dolly.

(a) Towing with wheel lift type truck

NOTICE

When lifting wheels, take care to ensure adequate ground clearance for towing at the opposite end of the raised vehicle. Otherwise, the bumper and/or underbody of the towed vehicle will be damaged during towing.

From front—Release the parking brake.

From rear—

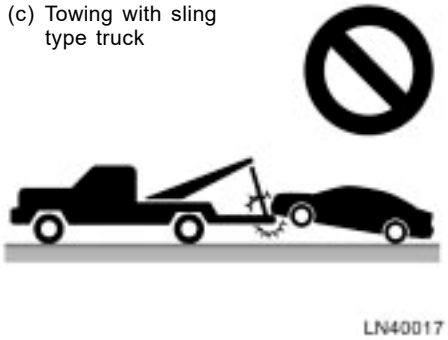
Use a towing dolly under the front wheels.

NOTICE

Never tow a vehicle from the rear with the front wheels on the ground, as this may cause serious damage to the transmission.

(b) Using flat bed truck

(c) Towing with sling type truck

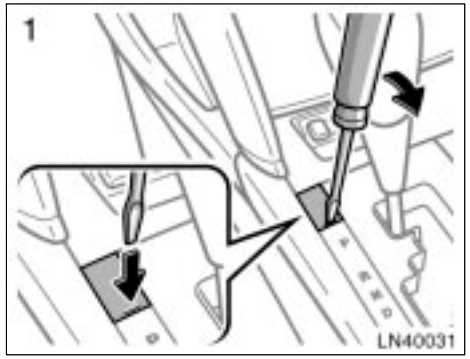


(c) Towing with sling type truck

NOTICE

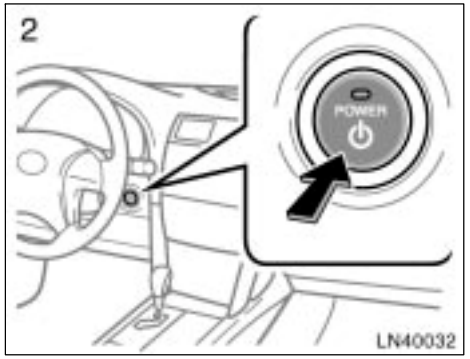
Do not tow with sling type truck, either from the front or rear. This may cause body damage.

If you cannot shift transmission selector lever

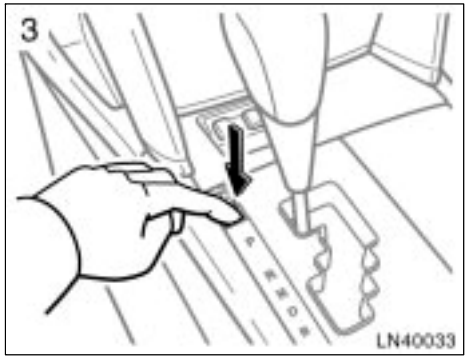


If you cannot shift the selector lever out of “P” position to other positions even though the brake pedal is depressed, use the shift lock override button as follows:

1. **Make sure the hybrid system is turned off and the parking brake is on. Insert the flathead screwdriver or equivalent to the slot of the cover and pry it up.**



2. **Press the “POWER” switch and start the hybrid system. For your safety, keep the brake pedal depressed.**



3. **With pushing down the shift lock override button, shift out of the “P” position while depressing the brake pedal.**

As the hybrid system starts only with the transmission in the “P” position, put the selector lever in “P” whenever starting the system.

Be sure to have the system checked by your Toyota dealer as soon as possible.

If you lose your keys

You can purchase a new electronic key at your Toyota dealer if you can give them the key number and master key.

If you lose any of your keys, contact your Toyota dealer to have new keys made. Lost keys increase the danger of vehicle theft. Bring all of the remaining vehicle keys when you visit your Toyota dealer.

See the suggestion given in “Keys” on page 22 in Section 1−2.

You can use the wireless remote control function and smart entry and start function by new key. Contact your Toyota dealer for detailed information.

If your keys are locked in the vehicle and you cannot get a duplicate, many Toyota dealers can still open the door for you, using their special tools. If you must break a window to get in, we suggest breaking the smallest side window because it is the least expensive to replace. Be extremely cautious to avoid cuts from the glass.

SECTION 5

CORROSION PREVENTION AND APPEARANCE CARE

Corrosion prevention and appearance care

Protecting your Toyota from corrosion 333
Washing and waxing your Toyota 334
Cleaning the interior 336

Protecting your Toyota from corrosion

Toyota, through the diligent research, design and use of the most advanced technology available, helps prevent corrosion and provides you with the finest quality vehicle construction. Now, it is up to you. Proper care of your Toyota can help ensure long−term corrosion prevention.

The most common causes of corrosion to your vehicle are:

- The accumulation of road salt, dirt and moisture in hard−to−reach areas under the vehicle.
- Chipping of paint, or undercoating caused by minor accidents or by stones and gravel.

Care is especially important if you live in particular areas or operate your vehicle under certain environmental conditions:

- Road salt or dust control chemicals will accelerate corrosion, as will the presence of salt in the air near the sea−coast or in areas of industrial pollution.
- High humidity accelerates corrosion especially when temperatures range just above the freezing point.
- Wetness or dampness to certain parts of your vehicle for an extended period of time, may cause corrosion even though other parts of the vehicle may be dry.
- High ambient temperatures can cause corrosion to those components of the vehicle which do not dry quickly due to lack of proper ventilation.

The above signifies the necessity to keep your vehicle, particularly the underside, as clean as possible and to repair any damage to paint or protective coatings as soon as possible.

To help prevent corrosion on your Toyota, follow these guidelines:

Wash your vehicle frequently. It is, of course, necessary to keep your vehicle clean by regular washing, but to prevent corrosion, the following points should be observed:

- If you drive on salted roads in the winter or if you live near the ocean, you should hose off the undercarriage at least once a month to minimize corrosion.
- High pressure water or steam is effective for cleaning the vehicle’s underside and wheel housings. Pay particular attention to these areas as it is difficult to see all the mud and dirt. It will do more harm than good to simply wet the mud and debris without removing. The lower edge of doors, rocker panels and frame members have drain holes which should not be allowed to clog with dirt as trapped water in these areas can cause corrosion.
- Wash the underside of the vehicle thoroughly when winter is over.

See “Washing and waxing your Toyota” on page 334 for more tips.

Check the condition of your vehicle’s paint and trim. If you find any chips or scratches in the paint, touch them up immediately to prevent corrosion from starting. If the chips or scratches have gone through the bare metal, have a qualified body shop make the repair.

Check the interior of your vehicle. Water and dirt can accumulate under the floor mats and could cause corrosion. Occasionally check under the mats to make sure the area is dry. Be particularly careful when transporting chemicals, cleansers, fertilizers, salt, etc.; these should be transported in proper containers. If a spill or leak should occur, immediately clean and dry the area.

Use mud shields on your wheels. If you drive on salted or gravel roads, mud shields help protect your vehicle. Full−size shields, which come as near to the ground as possible, are the best. We recommend that the fittings and the area where the shields are installed be treated to resist corrosion. Your Toyota dealer will be happy to assist in supplying and installing the shields if they are recommended for your area.

Keep your vehicle in a well ventilated garage or a roofed place. Do not park your vehicle in a damp, poorly ventilated garage. If you wash your vehicle in the garage, or if you drive it covered with water or snow, your garage may be so damp as to cause corrosion. Even if your garage is heated, a wet vehicle can corrode if the ventilation is poor.

Washing and waxing your Toyota

Your Toyota is a hybrid vehicle. Pay particular attention when washing your Toyota.

NOTICE

Before washing your Toyota, be sure to observe the following in order to avoid the risk of damage to your vehicle.

Do not splash water on the electric components in the engine compartment. This may cause malfunction of the electric components.

Washing your Toyota

Keep your vehicle clean by regular washing.

The following cases may cause weakness to the paint or corrosion to the body and parts. Wash your vehicle as soon as possible.

- When driving in a coastal area
- When driving on a road sprinkled with antifreeze
- When exposed to coal tar, tree sap, bird droppings and carcass of an insect
- When driving in areas where there is a lot of smoke, soot, dust, iron dust or chemical substances
- When the vehicle becomes remarkably dirty with dust and mud

Hand−washing your Toyota

Work in the shade and wait until the vehicle body is not warm to the touch.

⚠ CAUTION

- **When cleaning under floor or chassis, be careful not to injure your hands.**
- **Exhaust gases cause the exhaust pipe to become quite hot. When washing the vehicle, be careful not to touch the pipe until it has cooled sufficiently, as touching a hot exhaust pipe can cause burns.**

1. Rinse off loose dirt with a hose. Remove any mud or road salt from the underside of the vehicle or the wheel wells.

2. Wash with a mild car−wash soap, mixed according to the manufacturer’s instructions. Use a soft cotton mitt and keep it wet by dipping it frequently into the wash water. Do not rub hard—let the soap and water remove the dirt.

Fuel filler door: Do not apply water (high−pressure car wash, for example) at or near the fuel tank inlet with the fuel filler door opened. If the water enters the air vent, you may experience trouble with refueling or rough engine idling.

Plastic wheel ornaments: The plastic wheel ornaments are damaged easily by organic substances. If any organic substances splash an ornament, be sure to wash them off with water and check if the ornament is damaged.

Aluminum wheels: Use only a mild soap or neutral detergent.

Plastic bumpers: Wash carefully. Do not scrub with abrasive cleaners. The bumper faces are soft.

Exterior lights: Wash carefully. Do not use organic substances or scrub them with a hard brush. This may damage the surfaces of the lights.

Road tar: Remove with turpentine or cleaners that are marked safe for painted surfaces.

3. Rinse thoroughly—dried soap can cause streaking. In hot weather you may need to rinse each section right after you wash it.
4. To prevent water spots, dry the vehicle using a clean soft cotton towel. Do not rub or press hard—you might scratch the paint.

NOTICE

- ***Do not use organic substances (gasoline, kerosene, benzine or strong solvents), which may be toxic or cause damage.***
- ***Do not scrub any part of the vehicle with a hard brush, which may cause damage.***

Automatic car wash

Your vehicle may be washed in an automatic car wash, but remember that the paint can be scratched by some types of brushes, unfiltered washing water, or the washing process itself. Scratching reduces paint durability and gloss, especially on darker colors. The manager of the car wash should be able to advise you whether the process is safe for the paint on your vehicle.

Waxing your Toyota

Polishing and waxing is recommended to maintain the original beauty of your Toyota’s finish.

Apply wax once a month or if the vehicle surface does not repel water well.

1. Always wash and dry the vehicle before you begin waxing, even if you are using a combined cleaner and wax.
2. Use a good quality polish and wax. If the finish has become extremely weathered, use a car−cleaning polish, followed by a separate wax. Carefully follow the manufacturer’s instructions and precautions. Be sure to polish and wax the chrome trim as well as the paint.

Windshield washer nozzles: Make sure that the nozzles do not become blocked when waxing. If a nozzle becomes blocked, contact your Toyota dealer to have the vehicle serviced.

NOTICE

If a nozzle becomes blocked, do not try to clear it with a pin or other object. The nozzle will be damaged.

Exterior lights: Do not apply wax on the surfaces of the lights. Wax may cause damage to the lenses. If you accidentally put wax on the light surfaces, wipe or wash it off.

3. Wax the vehicle again when water does not bead but remains on the surface in large patches.

Cleaning the interior

⚠ CAUTION

- **Be careful not to splash water or spill liquid on the floor. This may prevent the side airbags from activating correctly, resulting in serious injury.**
- **Do not wash the vehicle interior or trunk with water. The hybrid battery is located behind the rear seat and allowing water to come into contact with the battery can cause electric shock that may result in death or serious injury.**

Vinyl interior

The vinyl upholstery may be easily cleaned with a mild soap or detergent and water.

First vacuum over the upholstery to remove loose dirt. Then, using a sponge or soft cloth, apply the soap solution to the vinyl. After allowing it to soak in for a few minutes to loosen the dirt, remove the dirt and wipe off the soap with a clean damp cloth. If all the dirt do not come off, repeat the procedure. Commercial foaming−type vinyl cleaners are also available which work well. Follow the manufacturer’s instructions.

NOTICE

Do not use solvent, thinner, gasoline or window cleaner on the interior.

Carpets

Use a good foam−type shampoo to clean the carpets.

Begin by vacuuming thoroughly to remove as much dirt as possible. Several types of foam cleaners are available; some are in aerosol cans and others are powders or liquids which you mix with water to produce a foam. To shampoo the carpets, use a sponge or brush to apply the foam. Rub in overlapping circles.

Do not apply water—the best results are obtained by keeping the carpet as dry as possible. Read the shampoo instructions and follow them closely.

Seat belts

The seat belts may be cleaned with mild soap and water or with lukewarm water.

Use a cloth or sponge. As you are cleaning, check the belts for excessive wear, fraying, or cuts.

NOTICE

- ***Do not use dye or bleach on the belts—it may weaken them.***
- ***Do not use the belts until they become dry.***

Windows

The windows may be cleaned with any household window cleaner.

NOTICE

When cleaning the inside of the rear window, be careful not to scratch or damage the heater wires or connectors.

Air conditioning control panel, audio panel, instrument panel, console panel and switches.

Use a soft damp cloth for cleaning.

Soak a clean soft cloth in water or lukewarm water then lightly wipe off dirt.

NOTICE

- ***Do not use organic substances (solvents, kerosene, alcohol, gasoline, etc.) or alkaline or acidic solutions. These chemicals can cause discoloring, staining or peeling of the surface.***
- ***If you use cleaners or polishing agents, make sure their ingredients do not include the substances mentioned above.***
- ***If you use a liquid car freshener, do not spill the liquid onto the vehicle’s interior surfaces. It may contain the ingredients mentioned above. Immediately clean any spill using the method mentioned above.***

Leather interior

The leather upholstery may be cleaned with neutral detergent for wool.

Remove dirt using a soft cloth dampened with 5% solution of neutral detergent for wool. Then thoroughly wipe off all traces of detergent with a clean damp cloth.

After cleaning or whenever any part of the leather gets wet, dry with a soft clean cloth. Allow the leather to dry in a ventilated shaded area.

NOTICE

- ***If a stain should fail to come out with a neutral detergent, apply a cleaner that does not contain an organic solvent.***
- ***Never use organic substances such as benzine, alcohol or gasoline, or alkaline or acid solutions for cleaning the leather as these could cause discoloring.***
- ***Use of a nylon brush or synthetic fiber cloth, etc. may scratch the fine grained surface of the leather.***
- ***Mildew may develop on soiled leather upholstery. Be especially careful to avoid oil spots. Try to keep your upholstery always clean.***
- ***Long exposure to direct sunlight may cause the leather surface to harden and shrink. Keep your vehicle in a shaded area, especially in the summer.***
- ***The interior of your vehicle is apt to heat up on hot summer days, so avoid placing on the upholstery items made of vinyl or plastic or containing wax as these tend to stick to leather when warm.***
- ***Improper cleaning of the leather upholstery could result in discoloration or staining.***

If you have any questions about the cleaning of your Toyota, your local Toyota dealer will be pleased to answer them.

SECTION 6

VEHICLE MAINTENANCE AND CARE

Vehicle maintenance and care

Maintenance requirements 341
General maintenance 342
Does your vehicle need repairing? 344
Emissions Inspection and Maintenance (I/M) programs 345

For scheduled maintenance information, please refer to the “Scheduled Maintenance Guide” or “Owner’s Manual Supplement”.

Maintenance requirements

Your Toyota vehicle has been designed for fewer maintenance requirements with longer service intervals to save both your time and money. However, each regular maintenance, as well as day−to−day care, is more important than ever before to ensure smooth, trouble−free, safe, and economical drivings.

It is the owner’s responsibility to make sure the specified maintenance, including general maintenance service, is performed. Note that both the new vehicle and emission control system warranties specify that proper maintenance and care must be performed. See “Owner’s Warranty Information Booklet” or “Owner’s Manual Supplement” for complete warranty information.

General maintenance

General maintenance items are those day−to−day care practices that are important to your vehicle for proper operation. It is the owner’s responsibility to insure that the general maintenance items are performed regularly.

These checks or inspections can be done either by yourself or a qualified technician, or if you prefer, your Toyota dealer will be pleased to do them at a nominal cost.

Scheduled maintenance

The scheduled maintenance items listed in the “Scheduled Maintenance Guide” or “Owner’s Manual Supplement” are those required to be serviced at regular intervals.

For details of your maintenance schedule, read the “Scheduled Maintenance Guide” or “Owner’s Manual Supplement”.

It is recommended that any replacement parts used for maintenance or for the repair of the emission control system be Toyota supplied.

The owner may elect to use non−Toyota supplied parts for replacement purposes without invalidating the emission control system warranty. However, use of replacement parts which are not of equivalent quality may impair the effectiveness of the emission control systems.

You may also elect to have maintenance, replacement, or repair of the emission control devices and system performed by any automotive repair establishment or individual without invalidating this warranty. See “Owner’s Warranty Information Booklet” or “Owner’s Manual Supplement” for complete warranty information.

Where to go for service?

Toyota technicians are well−trained specialists and are kept up to date with the latest service information through technical bulletins, service tips, and in−dealership training programs. They learn to work on Toyotas before they work on your vehicle, rather than while they are working on it.

You can be confident that your Toyota dealer’s service department performs the best job to meet the maintenance requirements on your vehicle—reliably and economically.

Your copy of the repair order is proof that all required maintenance has been performed for warranty coverage. If any problems should arise with your vehicle while under warranty, your Toyota dealer will promptly take care of it. Again, be sure to keep a copy of the repair order for any service performed on your Toyota.

What about do−it−yourself maintenance?

Many of the maintenance items are easy to do yourself if you have a little mechanical ability and a few basic automotive tools. Simple instructions for how to perform them are presented on page 346 in Section 7.

If you are a skilled do−it−yourself mechanic, the Toyota service manuals are recommended. Please be aware that do−it−yourself maintenance can affect your warranty coverage. See “Owner’s Warranty Information Booklet” or “Owner’s Manual Supplement” for the details.

General maintenance

Listed below are the general maintenance items that should be performed as frequently as specified. In addition to checking the items listed, if you notice any unusual noise, smell or vibration, you should investigate the cause or take your vehicle to your Toyota dealer or a qualified service shop immediately. It is recommended that any problem you notice be brought to the attention of your dealer or the qualified service shop for their advice.

⚠ CAUTION

Make these checks only with adequate ventilation if the hybrid system is operating.

IN THE ENGINE COMPARTMENT

Items listed below should be checked from time to time, e.g. each time when refueling.

Washer fluid
Make sure there is sufficient fluid in the tank. See page 373 in Section 7−3 for additional information.

Coolant level
Make sure the coolant level is between the full and low lines on the see−through reservoir when the hybrid system is cold. See page 357 in Section 7−2 for additional information.

Radiator, condenser and hoses
Check that the front of the radiator and condenser are clean and not blocked with leaves, dirt or insects. See page 358 in Section 7−2 for additional information.

Brake fluid level
Make sure the brake fluid level is correct. See page 359 in Section 7−2 for additional information.

Engine oil level
Check the level on the dipstick with the engine turned off and the vehicle parked on a level spot. See page 355 in Section 7−2 for additional information.

Exhaust system
If you notice any change in the sound of the exhaust or smell exhaust fumes, have the cause located and corrected immediately. See “Engine exhaust cautions” on page 278 in Section 2.

IN THE TRUNK

12 volt battery condition
See page 369 in Section 7−3 for additional information.

INSIDE THE VEHICLE

Items listed below should be checked regularly, e.g. while performing periodic services, cleaning the vehicle, etc.

Lights
Make sure the headlights, stop lights, tail lights, turn signal lights, and other lights are all working. Check headlight aim.

Service reminder indicators and warning buzzers
Check that all service reminder indicators and warning buzzers function properly.

Steering wheel
Be alert for changes in steering condition, such as hard steering or strange noise.

Seats
Check that all front seat controls such as seat adjusters, seatback recliner, etc. operate smoothly and that all latches lock securely in any position. Check that the head restraints move up and down smoothly and that the locks hold securely in any latched position. For folding−down rear seatbacks, check that the latches lock securely.

Seat belts
Check that the seat belt system such as buckles, retractors and anchors operate properly and smoothly. Make sure that the belt webbings not cut, frayed, worn or damaged.

Accelerator pedal
Check the pedal for smooth operation and uneven pedal effort or catching.

Brake pedal
Check the pedal for smooth operation and that the pedal has the proper clearance. Check the brake booster function.

Brakes
In a safe place, check that the brakes do not pull to one side when applied.

Parking brake
Check that the pedal has the proper travel and that, on a safe incline, your vehicle is held securely with only the parking brake applied.

Transmission “Park” mechanism
Check the lock release button of the selector lever for proper and smooth operation. On a safe incline, check that your vehicle is held securely with the selector lever in “P” position and all brakes released.

OUTSIDE THE VEHICLE

Items listed below should be performed from time to time, unless otherwise specified.

Fluid leaks
Check underneath for leaking fuel, oil, water or other fluid after the vehicle has been parked for a while. If you smell fuel fumes or notice any leak, have the cause found and corrected immediately.

Doors and engine hood
Check that all doors including trunk lid operate smoothly and all latches lock securely. Make sure the engine hood secondary latch secures the hood from opening when the primary latch is released.

Tire inflation pressure
Check the pressure with a gauge every two weeks, or at least once a month. See page 359 in Section 7−2 for additional information.

Tire surface and wheel nuts
Check the tires carefully for cuts, damage or excessive wear. See page 362 in Section 7−2 for additional information. When checking the tires, make sure no nuts are missing, and check the nuts for looseness. Tighten them if necessary.

Tire rotation
Rotate the tires according to the maintenance schedule. (For scheduled maintenance information, please refer to the “Scheduled Maintenance Guide” or “Owner’s Manual Supplement”.) See page 364 in Section 7−2 for additional information.

Does your vehicle need repairing?

Be on the alert for changes in performance, sounds, and visual tip−offs that indicate service is needed. Some important clues are as follows:

- Engine missing, stumbling, or pinging
- Appreciable loss of power
- Strange engine noises
- A leak under the vehicle (however, water dripping from the air conditioning after use is normal.)
- Change in exhaust sound (This may indicate a dangerous carbon monoxide leak. Drive with the windows open and have the exhaust system checked immediately.)
- Flat−looking tire; excessive tire squeal when cornering; uneven tire wear
- Vehicle pulls to one side when driving straight on a level road
- Strange noises related to suspension movement
- Loss of brake effectiveness; spongy feeling brake pedal; pedal almost touches floor; vehicle pulls to one side when braking
- Coolant temperature continuously higher than normal

If you notice any of these clues, take your vehicle to your Toyota dealer as soon as possible. It probably needs adjustment or repair.

⚠ CAUTION

Do not continue driving with the vehicle unchecked. It could result in serious vehicle damage and possibly personal injury.

Emissions Inspection and Maintenance (I/M) programs

Some states have vehicle emission inspection programs which include OBD (On−Board Diagnostics) checks.

The OBD system monitors the operation of the emission control system. When the OBD system determines that a problem exists somewhere in the emission control system, the malfunction indicator lamp comes on. In this case, your vehicle may not pass the I/M test and need to be repaired. Contact your Toyota dealer to service the vehicle.

Even if the malfunction indicator lamp does not come on, your vehicle may not pass the I/M test as readiness codes have not been set in the OBD system.

Readiness codes are automatically set during ordinary driving. However, when the 12 volt battery is disconnected or run down, the codes are erased. Also, depending on your driving habits, the codes may not be completely set.

Also, if the malfunction indicator lamp had come on recently due to temporary malfunction such as a loose fuel tank cap, your vehicle may not pass the I/M test.

The malfunction indicator lamp will go off after taking several driving trips, but the error code in the OBD system will not be cleared unless about 40 trips or more are taken.

If your vehicle does not pass the I/M test even the malfunction indicator lamp does not come on, contact your Toyota dealer to prepare the vehicle for re−testing.

SECTION 8

SPECIFICATIONS

Specifications

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Engine 380
Fuel 381
Traction motor 381
Hybrid battery 381
Service specifications 382
Tires 385
Fuses 386

Dimensions and weights

Overall length	mm (in.)	4805 (189.2)
Overall width	mm (in.)	1820 (71.7)
Overall height*	mm (in.)	1470 (57.9)
Wheelbase	mm (in.)	2775 (109.3)
Front tread	mm (in.)	1575 (62.0)
Rear tread	mm (in.)	1565 (61.6)
Vehicle capacity weight (occupants + luggage)	kg (lb.)	410 (900)

*: Unladen vehicle

Engine

Model:
2AZ−FXE

Type:
4 cylinder in line, 4 cycle, gasoline

Bore and stroke, mm (in.):
88.5 × 96.0 (3.48 × 3.78)

Displacement, cm^3 (cu. in.):
2362 (144.1)

Fuel

Fuel type:

Unleaded gasoline, Octane Rating 87 (Research Octane Number 91) or higher

Fuel tank capacity, L (gal., Imp. gal.):
65 (17.2, 14.3)

Traction motor

Type:
Permanent magnet synchronous motor

Maximum output:
105 kW

Maximum torque:
270 N·m (27.5 kgf·m, 199 ft·lbf)

Hybrid battery

Type:
Nickel−Metal hydride battery

Voltage:
7.2 V/module

Capacity:
6.5 Ah

Quantity:
34 modules

Overall voltage:
244.8 V

Service specifications

ENGINE

Valve clearance (engine cold), mm (in.):

Intake	0.19—0.29 (0.007—0.011)
Exhaust	0.38—0.48 (0.015—0.019)

Spark plug type:

DENSO	SK20R11
NGK	IFR6A11

Spark plug gap, mm(in.):
1.1 (0.043)

NOTICE

Use only above spark plugs. Do not adjust gaps for engine performance or smooth driveability.

ENGINE LUBRICATION

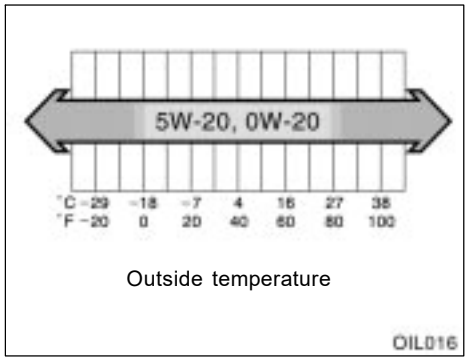
Oil capacity (drain and refill), L (qt., Imp. qt.):

With filter	4.3 (4.5, 3.8)
Without filter	4.1 (4.3, 3.6)

“Toyota Genuine Motor Oil” is used in your Toyota vehicle. Use Toyota approved “Toyota Genuine Motor Oil” or equivalent to satisfy the following grade and viscosity.

Oil grade:
ILSAC multigrade engine oil

Recommended oil viscosity:
SAE 5W−20 or 0W−20



Outside temperature

Please contact your Toyota dealer for further details.

COOLING SYSTEM

Total capacity, L (qt., Imp. qt.):

Engine
6.2 (6.6, 5.5)

Inverter, traction motor and motor generator
2.9 (3.1, 2.6)

Coolant type:

“Toyota Super Long Life Coolant” is used in your Toyota vehicle at factory fill. In order to avoid technical problems, only use “Toyota Super Long Life Coolant” or similar high quality ethylene glycol based non−silicate, non−amine, non−nitrite, and non−borate coolant with long−life hybrid organic acid technology. (Coolant with long−life hybrid organic acid technology is a combination of low phosphates and organic acids.)

Do not use plain water alone.

Please contact your Toyota dealer for further details.

12 VOLT BATTERY

Open voltage* at 20°C (68°F):

12.6—12.8 V	Fully charged
12.2—12.4 V	Half charged
11.8—12.0 V	Discharged

*: Voltage that is checked 20 minutes after the key is removed with all the lights turned off

Charging rates:

5 A max.

⚠ CAUTION

When replacing the battery, only install a battery designated for your hybrid vehicle. Using a conventional battery may cause hydrogen gas to build up in the vehicle.

TRANSAXLE

Fluid capacity (drain and refill), L (qt., Imp. qt.):

3.8 (4.0, 3.3)

Fluid type:

Toyota Genuine ATF WS

Change the transmission fluid only as necessary.

Generally, it is necessary to change transmission fluid only if your vehicle is driven under one of the Special Operating Conditions listed in your “Scheduled Maintenance Guide” or “Owner’s Manual Supplement”. When changing the transmission fluid, use only “Toyota Genuine ATF WS” (ATF JWS3324 or NWS9638) to aid in assuring optimum transaxle performance.

Notice: Using transmission fluid other than “Toyota Genuine ATF WS” may cause deterioration in shift quality, locking up of your transmission accompanied by vibration, and ultimately damage the transmission of your vehicle.

Please contact your Toyota dealer for further details.

BRAKES

Minimum pedal clearance when depressed with the force of 490 N (50 kgf, 110 lbf) with the hybrid system operating, mm (in.):
80 (3.1)

Pedal free play, mm (in.):
1—2 (0.04—0.08)

Pad wear limit, mm (in.):
1.0 (0.04)

Parking brake

Parking brake adjustment when depressed with the force of 300 N (31 kgf, 67 lbf):
7—10 clicks

Fluid type:
SAE J1703 or FMVSS No.116 DOT 3

STEERING

Wheel free play:
Less than 30 mm (1.2 in.)

Tires

Tire size and cold tire inflation pressure:

Front and rear kPa (kgf/cm^2 or bar, psi)

Tire size	Front	Rear	Wheel size
P215/60R16 94V	220 (2.2, 32)	220 (2.2, 32)	16 × 6 1/2 J

When driving under the above vehicle conditions at sustained high speeds above 160 km/h (100 mph), in countries where such speeds are permitted by−law, inflate the front and rear tires to 240 kPa (2.4 kgf/cm^2 or bar, 35 psi) provided that it does not exceed the maximum cold tire inflation pressure molded on the tire sidewall.

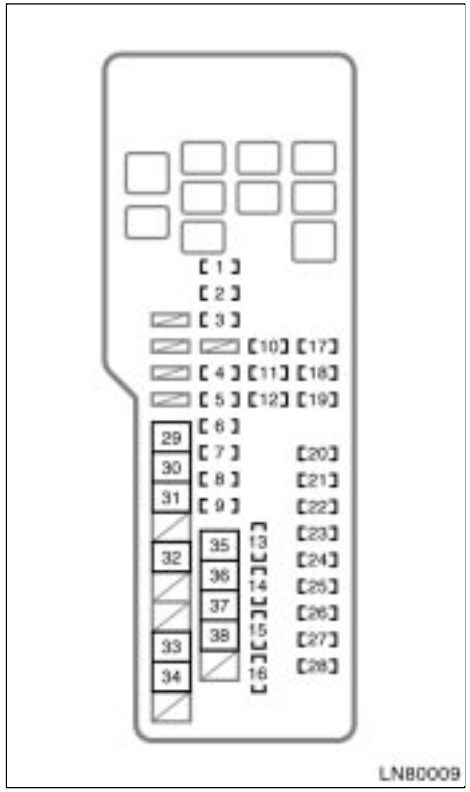
Spare kPa (kgf/cm^2 or bar, psi)

Tire size	Front	Rear	Wheel size
T155/70D17 110M	420 (4.2, 60)	420 (4.2, 60)	17 × 4T

Wheel nut torque, N·m (kgf·m, ft·lbf):
103 (10.5, 76)

NOTE: For a complete information on tires (e.g. replacing tires or replacing wheels), see “Checking tire inflation pressure” through “Aluminum wheel precautions”, pages 359 through 367, in Section 7−2.

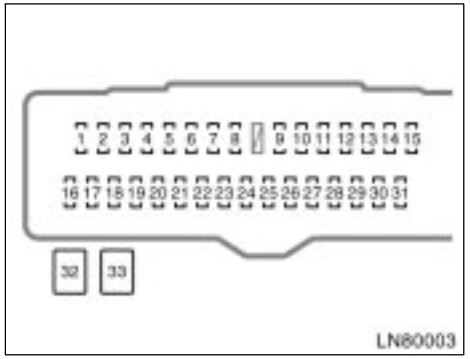
Fuses



ENGINE COMPARTMENT

1. **AM2 7.5 A:** “POWER” switch
2. **ABS MAIN No.2 10 A:** Electronically controlled brake system
3. **ABS MAIN No.1 10 A:** Electronically controlled brake system
4. **ABS MAIN No.3 10 A:** Electronically controlled brake system
5. **BATT FAN 10 A:** Hybrid battery fan
6. **ETCS 10 A:** Electronic throttle control system
7. **HAZ 15 A:** Turn signal lights
8. **IG2 20 A:** Multiport fuel injection system/sequential multiport fuel injection system, starting system, “GAUGE NO.2”, “IGN” and “INJ” fuses
9. **STR LOCK 20 A:** Steering lock system
10. **DOME 10 A:** Gages and meters, vanity lights, trunk light, “POWER” switch light, door courtesy lights, interior light, personal lights, clock, smart key system
11. **ECU−B NO.1 10 A:** Front passenger occupant classification system, main body ECU
12. **RADIO NO.1 15 A:** Audio system, navigation system
13. **DOOR NO.1 25 A:** Main body ECU, power door lock
14. **IGCT 30 A:** Hybrid system ECU, “PWR”, “IGCT No.2” and “INV W/P” fuses
15. **AMP 25 A:** Audio system
16. **EFI MAIN 30 A:** Multiport fuel injection system/sequential multiport fuel injection system, electronic throttle control system and “EFI NO.3” fuses
17. **EFI NO.3 10 A:** Fuel tank system, multiport fuel injection system/sequential multiport fuel injection system
18. **IGCT NO.2 10 A:** Hybrid system ECU, motor generator ECU
19. **INV W/P 15 A:** Hybrid system ECU, traction battery, DC/DC converter, multiport fuel injection system/sequential multiport fuel injection system
20. **S−HORN 7.5 A:** No circuit
21. **A/F 20 A:** No circuit
22. **MPX−B 10 A:** Gauges and meters
23. **EFI NO.1 10 A:** Smart key system
24. **HORN 10 A:** Horns
25. **H−LP(RL) 15 A:** Right−hand headlight (low beam)

26. **H−LP(LL) 15 A:** Left−hand headlight (low beam)
27. **H−LP(RH) 15 A:** Right−hand headlight (high beam)
28. **H−LP(LH) 15 A:** Left−hand headlight (high beam)
29. **HTR 50 A:** Air conditioning system
30. **HTR SUB2 50 A:** PTC heater
31. **HTR SUB1 50 A:** PTC heater
32. **RR DEF 50 A:** Rear window defogger, “MIR HTR” fuse
33. **CDS FAN 40 A:** Electric cooling fans
34. **RDI FAN 40 A:** Electric cooling fans
35. **DC/DC 120 A:** “ABS MTR2”, “EPS”, “ABS MTR”, “AM2”, DOOR NO.1”, “ETCS”, “IG2”, “HAZ”, “AMP”, “ABS MAIN1”, “ABS MAIN2”, “STR LOCK”, “ABS MAIN3”, “BTT FAN”, “EFI MAIN”, “EFI NO.1” and “IGCT” fuses
36. **EPS 80 A:** Electric power steering system
37. **ABS MTR2 40 A:** Electronically controlled brake system
38. **ABS MTR1 50 A:** Electronically controlled brake system



INSTRUMENT PANEL

1. **RR DOOR RH 25 A:** Rear right power window
2. **RR DOOR LH 25 A:** Rear left power window
3. **FUEL OPN 7.5 A:** Fuel fillter door opening system
4. **FR FOG 15 A:** No circuit
5. **OBD 7.5 A:** On−board diagnosis system
6. **ECU−B NO.2 7.5 A:** No circuit
7. **STOP 10 A:** Stop lights, high mounted stoplight, shift lock control system, multiport fuel injection system/sequential multiport fuel injection system, main body ECU, electronically controlled brake system, electronic throttle control system
8. **TI&TE 30 A:** No circuit
9. **AM1 7.5 A:** Starting system, multiport fuel injection system/sequential multiport fuel injection system
10. **A/C 7.5 A:** Air conditioning system
11. **PWR 25 A:** Power windows
12. **DOOR NO.2 25 A:** Main body ECU
13. **S/ROOF 30 A:** Electric moon roof
14. **TAIL 15 A:** Front side marker lights, tail lights, rear side marker lights, license plate lights
15. **PANEL 7.5 A:** Navigation system, seat heaters, emergency flashers, air conditioning system, audio system, glove box light, instrument panel lights, steering switches, clock
16. **ECU IG NO.1 10 A:** Main body ECU, push start system, electric moon roof, auto anti−glare inside rear view mirror, tire pressure warning system, navigation system

17. **ECU IG NO.2 7.5 A:** Electronically controlled brake system, electric power steering system, shift lock control system
18. **A/C NO.2 10 A:** Air conditioning system, rear window defogger
19. **WASH 10 A:** Windshield wipers and washer
20. **S−HTR 20 A:** Seat heaters
21. **GAUGE NO.1 10 A:** Emergency flashers, back−up lights
22. **WIP 25 A:** Windshield wipers and washer
23. **H−LP LVL 7.5 A:** No circuit
24. **INJ 15 A:** Multiport fuel injection system/sequential multiport fuel injection system
25. **IGN 10 A:** Multiport fuel injection system/sequential multiport fuel injection system, SRS airbag system, steering lock system, front passenger occupant classification system, smart key system, electronic throttle control system
26. **GAUGE NO.2 7.5 A:** Gages and meters, clock
27. **ECU−ACC 7.5 A:** Clock, main body ECU, shift lock control system, outside rear view mirrors, smart key system, push start system
28. **CIG 20 A:** No circuit
29. **PWR OUTLET 20 A:** Power outlet
30. **RADIO NO.2 7.5 A:** Audio system, navigation system
31. **MIR HTR 10 A:** Outside rear view mirror defoggers
32. **30 A:** Power windows
33. **30 A:** Power seats

SECTION 9

REPORTING SAFETY DEFECTS FOR U.S. OWNERS

Reporting safety defects for U.S. owners

Reporting safety defects for U.S. owners 390

Reporting safety defects for U.S. owners

If you believe that your vehicle has a defect which could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying Toyota Motor Sales, U.S.A., Inc.
(Toll−free: 1−800−331−4331).

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer, or Toyota Motor Sales, U.S.A., Inc.

To contact NHTSA, you may either call the Auto Safety Hotline toll−free at 1−888−327−4236 (or 366−0123 in Washington, DC area) or write to: NHTSA, U.S. Department of Transportation, Washington, DC 20590. You can also obtain other information about motor vehicle safety from the Hotline.

VEHICLE LIFT AND SUPPORT LOCATIONS

1. NOTICE ABOUT VEHICLE CONDITION WHEN JACKING UP

(a) As a rule, the vehicle must be unloaded when jacking up. Never jack up or lift up the vehicle loaded with things of heavy weight.

(b) When removing any parts of heavy weight like the engine and transaxle, the center of gravity of the vehicle moves. Place a balance weight so as to keep it from rolling, or hold the jacking support location using the mission jack.

2. NOTICE FOR USING 4 POST LIFT

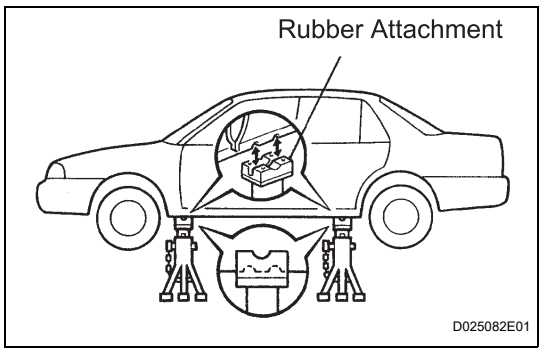
(a) Follow the instruction manual for a safety operation.

(b) Do not damage tires or wheels with a free wheel beam.

(c) Using a wheel stopper, fix the vehicle.

3. NOTICE FOR USING JACK AND SAFETY STAND

(a) Work in the flat place using a wheel stopper at all times.



(b) Use a safety stand with a rubber attachment, as shown in the illustration.

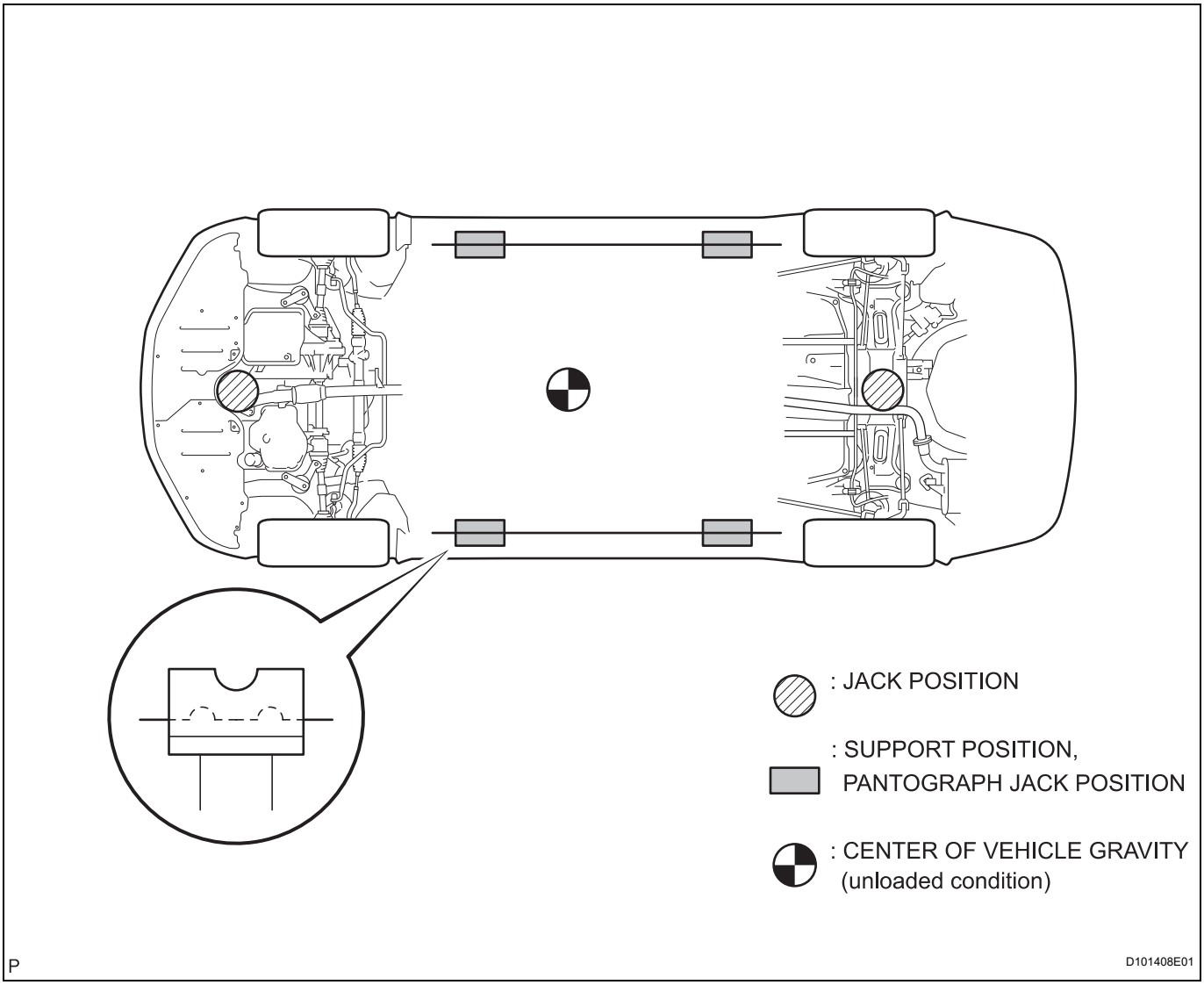
(c) Support the specified location with a jack and safety stand accurately.

(d) When jacking up the front wheels, release the parking brake and place wheel stoppers only behind the rear wheels. When jacking up the rear wheels, place wheel stoppers only in front of the front wheels.

(e) Do not work or leave the vehicle supported only by a jack. Be sure to support the vehicle with a safety stand.

(f) When jacking up only the front wheels or only the rear wheels, place wheel stoppers to both sides of the wheels that contact ground.

(g) When jacking down the vehicle with its front wheels jacked up, release the parking brake and place wheel stoppers only in front of the rear wheels. When jacking down the vehicle with its rear wheels jacked up, place wheel stoppers only behind the front wheels.



4. NOTICE FOR USING SWING ARM TYPE LIFT

(a) Follow the instruction manual of the lift for a safety operation.
(b) Use a cradle with a rubber attachment, as shown in the illustration.
(c) Set in the vehicle so as to make its center of gravity as close as possible to the center of the lift.
(d) Place the vehicle horizontally by adjusting the height of the cradle, and match the groove of the cradle and the safety stand support location accurately.
(e) Be sure to lock the swing arm during the operation.
(f) Lift the vehicle up until the tires float, and shake the vehicle to make sure that the vehicle is stable.

5. NOTICE FOR USING PLATE TYPE LIFT

(a) Follow the instruction manual of the lift for a safety operation.

(b) Use a plate lift attachment.

(c) Be sure to set the vehicle to the specified position.

Right and left set position	• Place the vehicle over the center of the lift.
Front and rear set position	• Align the cushion gum ends of the plate with the attachment lower ends (A and C). • Align the attachment upper end (B) with the rocker flange front side notch.

(d) Lift the vehicle up until the tires float a bit, and shake the vehicle to make sure that the vehicle is stable.

IN

Swing Arm Type Lift:

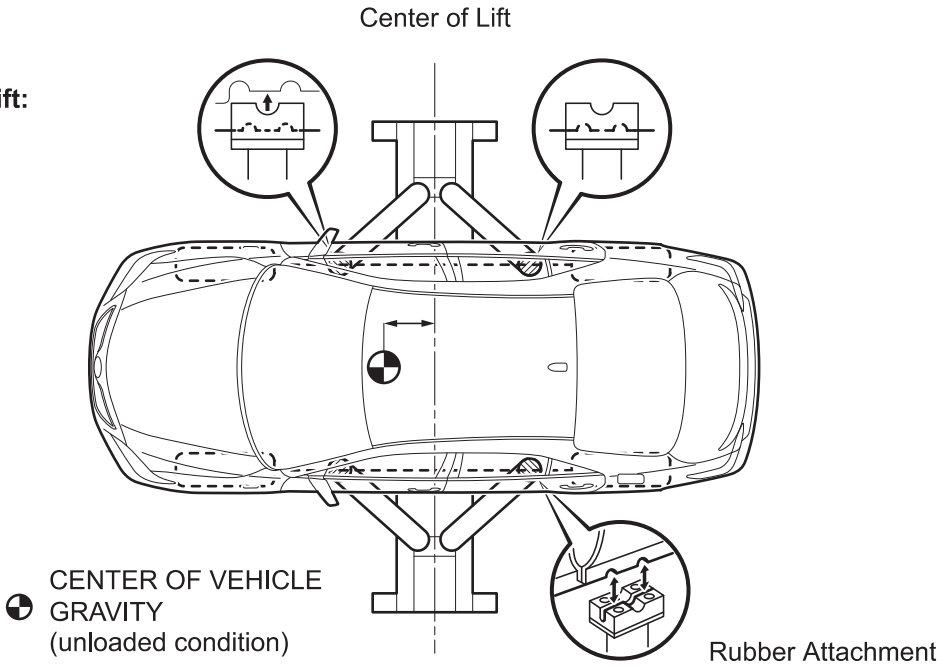
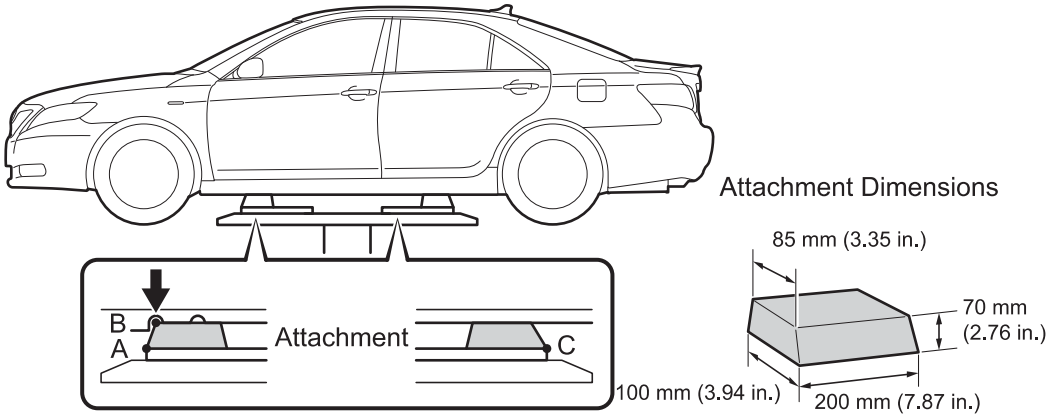


Plate Type Lift:



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SECTION 1-1

OPERATION OF INSTRUMENTS AND CONTROLS

Hybrid vehicle overview

Toyota hybrid system 2
Fuel consumption indicators 2
Energy monitor 3
Starting your hybrid vehicle 5
Efficient use of your hybrid vehicle 6
Precautions for the use of hybrid vehicle 7
Road accident cautions 13
Instrument panel overview 14
Steering switches and overhead console overview 16
Instrument cluster overview 17
Indicator symbols on the instrument panel 18

Toyota hybrid system

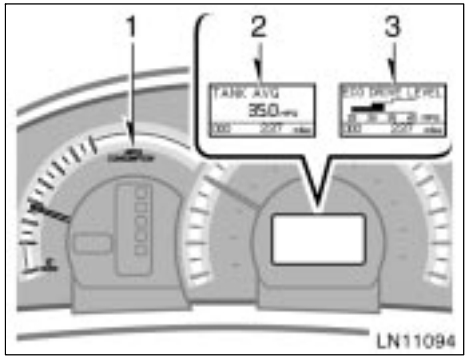
Toyota hybrid system combines the power of an engine and a traction motor to minimize fuel consumption and emissions.

Depending on driving conditions, the vehicle runs optimally on a combination of the engine and traction motor.

Since the engine charges the hybrid battery as needed, the battery does not have to be charged from an outside source like an electric vehicle.

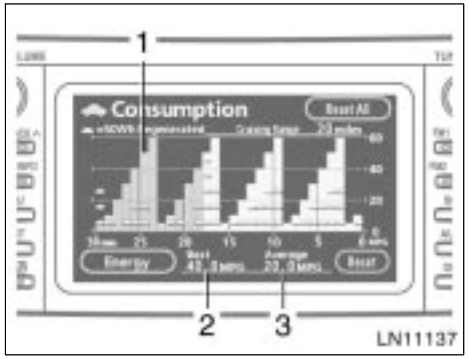
Fuel consumption indicators

In your hybrid vehicle, there are several indicators that show different aspects of fuel consumption:



Instrument cluster indicators

1. Current fuel consumption (fuel economy meter):
   See “Fuel economy meter” in Section 1−6 on page 133.
2. Average fuel consumption after refueling (“TANK AVG”):
   See “—Outside temperature and cruise information” in Section 1−6 on page 135.
3. Average fuel consumption after the hybrid system is turned on (“ECO DRIVE LEVEL”):
   See “—Outside temperature and cruise information” in Section 1−6 on page 135.



Navigation system indicators (models with navigation system only)

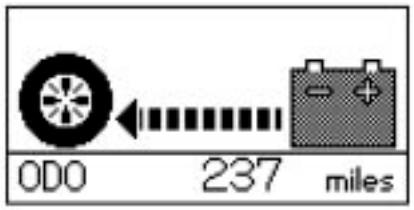
1. Transition of fuel consumption in the past 30 minutes (“Consumption”): See “Trip information (with navigation system)” in Section 1−10 on page 255.
2. Best fuel economy (lowest fuel consumption) among average (“Best”): See “Trip information (with navigation system)” in Section 1−10 on page 255.
3. Average fuel consumption (“Average”): See “Trip information (with navigation system)” in Section 1−10 on page 255.

Energy monitor—

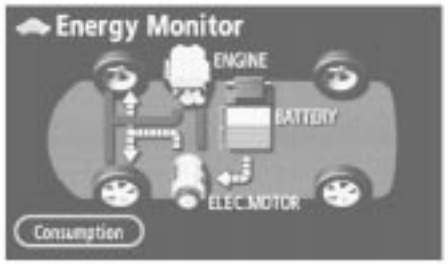
Toyota hybrid system performs various controls depending on the operating condition. The condition appears on the multi−information display and/or navigation system screen (with navigation system) when the display and/or screen is in “Energy Monitor” mode. See “—Outside temperature and cruise information” on page 135 in Section 1−6 and “Trip information” on page 255 in Section 1−10 for the operation of the display and screen.

These are representative examples of energy monitor displays. Depending on the condition, the energy monitor displays the graphics different from those shown below. Depending on conditions, the graphic does not reflect the actual motion of the vehicle.

Multi−information display

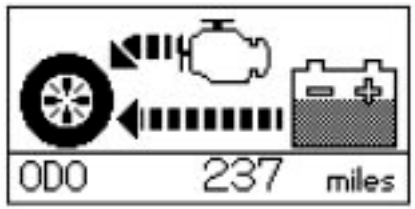


Navigation system screen



- **When the vehicle is powered only by the traction motor.**

Multi−information display

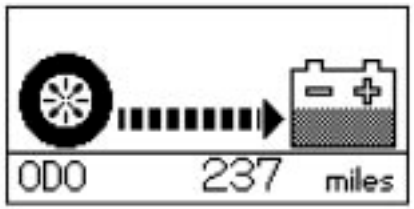


LN11096

Multi−information display

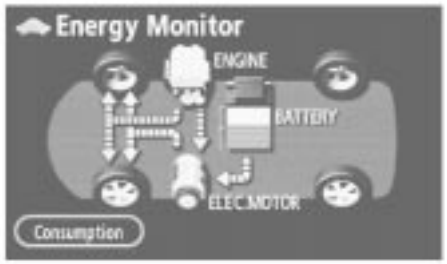
LN11097

Multi−information display



LN11098

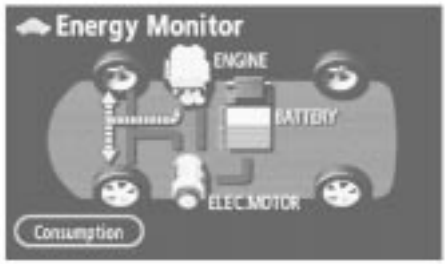
Navigation system screen



LN11046

- **When the vehicle is powered by both the engine and the traction motor.**

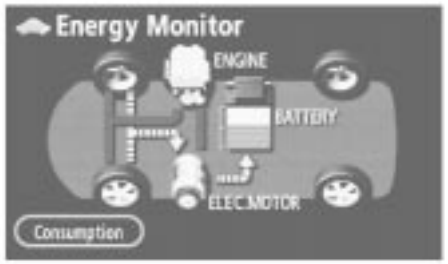
Navigation system screen



LN11047

- **When the vehicle is powered only by the engine.**

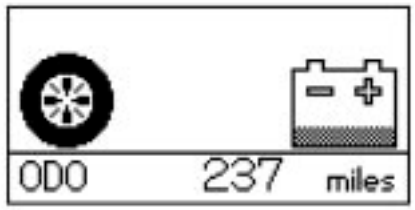
Navigation system screen



LN11048

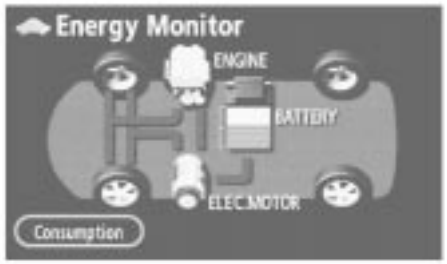
- **When the vehicle is regenerating and charging the hybrid battery.**

Multi−information display



LN11099

Navigation system screen



LN11049

- **When there is no energy flow.**

—Hybrid battery status

Status	Multi−information display	Navigation system screen
Level 8		
Level 7		
Level 6		
Level 5		
Level 4		
Level 3		
Level 2		
Level 1		
Level 0		

Starting your hybrid vehicle

Your vehicle is equipped with a push start system. Follow the procedure below to start the hybrid system:

1. Make sure that you are carrying the electronic key.
2. Make sure that the transmission is in the “P” position.
3. Press the “POWER” switch briefly and firmly with the brake pedal depressed.

The “READY” light starts flashing and then it stays on with sounding a beep. If the ambient temperature is low, such as during winter driving conditions, it may take longer than the usual amount of time until the “READY” light stays on.

The hybrid system cannot be started without the brake pedal depressed.

For details, see “How to start the hybrid system” on page 301 in Section 3.

The engine may not start even with the “READY” light on.

Efficient use of your hybrid vehicle

Drive your vehicle with smooth acceleration and deceleration.

- While driving, energy is recovered through the regenerative brake as the vehicle decelerates. However, for efficient use, do not accelerate or decelerate your vehicle more than necessary.
- Avoid abrupt acceleration and deceleration.
- The power of the hybrid battery can be checked on the multi−information display or the navigation system screen (with navigation system). See “—Hybrid battery status” on page 5 for details. Gradual or non−abrupt acceleration and deceleration will make more effectively use of the traction motor without having to use engine power.

When parking, be sure to put the transmission into the “P” position. While driving, put the transmission into the “D” position.

- In the “N” position, the engine operates but electricity cannot be generated. The hybrid battery will be discharged requiring unnecessary engine power to recharge.
- The hybrid system automatically recharges the hybrid battery when the remaining battery power is reduced. However, the hybrid battery cannot be recharged if the transmission is in the “N” position.

For detailed information, see “How to save fuel and make your vehicle last longer” on page 311 in Section 3.

INFORMATION

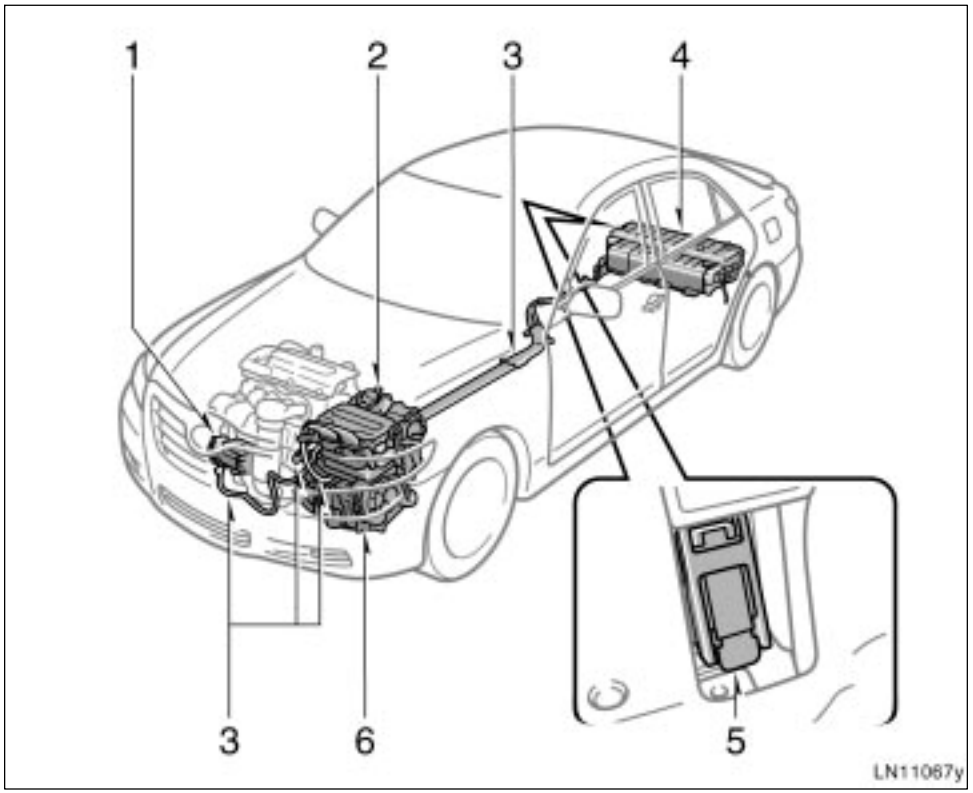
The engine starts and stops automatically. (It stops during a low load driving, deceleration or when the vehicle is stopped.)

As long as the “READY” light remains on, you can start your vehicle using the traction motor even with the engine stopped.

The engine may not stop automatically in the following conditions:

- ***During engine warm−up***
- ***During hybrid battery charging***
- ***During low or high hybrid battery temperature***

Precautions for the use of hybrid vehicle— —High voltage components



1. Air conditioning compressor
2. Inverter unit
3. High voltage cables
4. Hybrid battery and DC/DC converter
5. Service plug
6. Traction motor, transaxle and motor generator

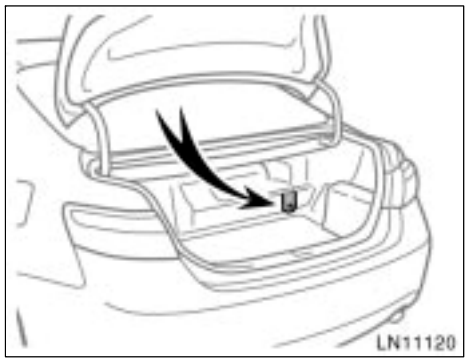
The hybrid system uses high voltage up to 650 V. High voltage components are indicated in the illustration above. High voltage cables are orange. The system can be hot while and after starting. Be careful of both the high voltage and the high temperature.

Caution label

⚠ CAUTION

The vehicle has high voltage DC and AC systems as well as a 12−volt system. DC and AC high voltage is very dangerous and can cause severe burns and electric shock that may result in death or serious injury.

- **Never touch, disassemble, remove or replace the high voltage parts, cables and their connectors. High voltage parts and cables are indicated in the illustration above. Touching, disassembling, removing or replacing those parts and cables can cause severe burns or electric shock that may result in death or serious injury.**
- **The hybrid system uses high voltage and the system can be hot while and after starting. Be careful of both the high voltage and the high temperature. Obey the caution labels attached to the vehicle.**



- **Never try to open the service plug access hole located in the trunk. The service plug is used only when the vehicle is serviced and is subject to high voltage. Touching the service plug can cause severe burns or electric shock that may result in death or serious injury.**

—The characteristics of the hybrid vehicle

Be sure to put the transmission in the “P” position when parking.

In the “N” position, the hybrid battery does not recharge, even if the engine is operating. Leaving the transmission in the “N” position for an extended period of time may discharge the hybrid battery. The vehicle cannot run if the hybrid battery is discharged.

When you leave your vehicle, apply the parking brake, put the transmission in the “P” position, be sure to carry the key with you and lock all the doors.

If you leave the “POWER” switch at “ACC” or “ON”, the 12 volt battery will be discharged and the hybrid system may not start.

- Because the vehicle is powered by both the engine and the traction motor, you may hear a motor sound coming from the engine compartment. However, this does not indicate any trouble.
- When the hybrid system is started or stopped, you may hear a sound coming from the hybrid battery behind the rear seats. However, this does not indicate any trouble.
- When the hybrid system is started or stopped, or while the vehicle is idling, you may hear a sound coming from the transmission. However, this does not indicate any trouble.
- When accelerating rapidly, the engine noise may rise. However, this does not indicate any trouble.
- Repeated acceleration consumes hybrid battery power, resulting in poor acceleration. Battery power can be restored by driving with the accelerator pedal slightly released.
- When applying brakes, you may hear a sound coming from the motor generator. However, this does not indicate any trouble.
- You may hear a sound in the engine compartment when the driver’s door is opened or the brake pedal is depressed with the hybrid system turned off. However, this does not indicate any trouble.
- You may hear a sound in the engine compartment after the hybrid system is turned on or off. However, this does not indicate any trouble.
- You may hear a sound in the engine compartment when the brake pedal is depressed repeatedly with the hybrid system turned on. However, this does not indicate any trouble.
- When the engine is started or stopped with the hybrid system turned on, you may feel a vibration. However, this does not indicate any trouble.
- If the “READY” light is on, you can start even when the engine is off.
- When you put the transmission in the “B” position and take your foot off the accelerator pedal, engine braking will be applied. However, during high speed driving you may feel that engine braking is less effective than that of conventional vehicle.

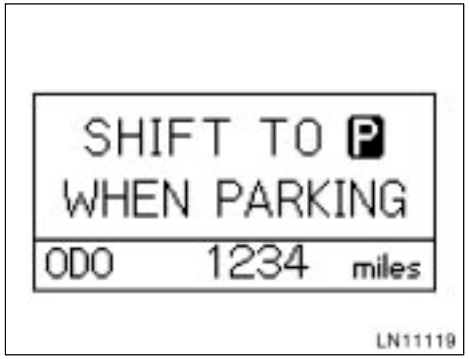
- High voltage parts and cables on the hybrid vehicles emit approximately the same amount of electromagnetic waves as the conventional gasoline powered vehicles or home electronic appliances despite of their electromagnetic shieldings.

  Unwanted noise may occur in the reception of the mobile two−way radio.

- If the vehicle is parked for a long time, the hybrid battery will discharge gradually. To keep the hybrid battery in good condition, drive the vehicle at least once every several months for at least 30 minutes or 10 miles. If the hybrid battery becomes fully discharged and the vehicle will not start even with a jump start to the 12 volt battery, contact your Toyota dealership.

⚠ CAUTION

- The driver should pay special attention to pedestrians when the vehicle is powered only by the traction motor. Because there is no engine noise, the pedestrians may misjudge the vehicle’s movement.
- When you leave your vehicle, be sure to turn off the hybrid system.
- Be sure to put the transmission in the “P” position because the vehicle can move when the “READY” light is on even if the engine is stopped. When the “READY” light is on, do not leave your vehicle in a shift position other than the “P” and “N” positions. The vehicle will creep and start abruptly if the accelerator pedal is depressed by mistake. This may cause death or serious injury.

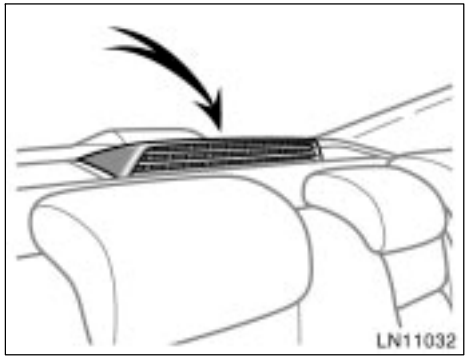


Multi−information display

Navigation system screen

If you open the door with the hybrid system turned on and the transmission is not in the “P” position, a message appears on the multi−information display and navigation system screen (for vehicles with navigation system).

- When you leave your vehicle, or stop or park for a while, put the transmission in the “P” position.
- Charging the hybrid battery while driving is important. In the “N” position, the hybrid battery will not be charged. Do not leave the transmission in the “N” position. The motor generator operates in the “P”, “R”, “D” and “B” positions. When you drive, put the transmission in the “D” or “B” position and depress the accelerator pedal. When driving in a traffic jam, operate the vehicle in the “D” position to prevent the hybrid battery from being discharged.



Hybrid battery air vent

An air vent is located behind the rear seats to cool the hybrid battery. If the vent is covered, the battery will overheat resulting in reduced performance of the hybrid system.

You may hear a noise from the air vent.

For vehicle repairs or maintenance, be sure to consult your Toyota dealer.

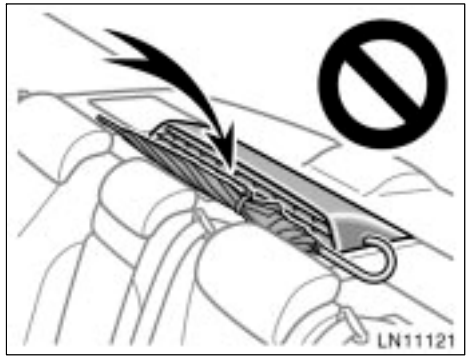
If your vehicle is beyond repair, contact your Toyota dealer for assistance. Do not attempt to dispose of your vehicle by yourself.

⚠ CAUTION

- **Do not wash the vehicle interior or trunk. Because the hybrid battery is located behind the rear seat, pouring the water over the battery can cause electric shock that may result in death or serious injury.**
- **Your vehicle contains a sealed Nickel−Metal hydride battery. If disposed of improperly, it is hazardous to the environment and there is a risk of severe burns and electrical shock that may result in death or serious injury.**

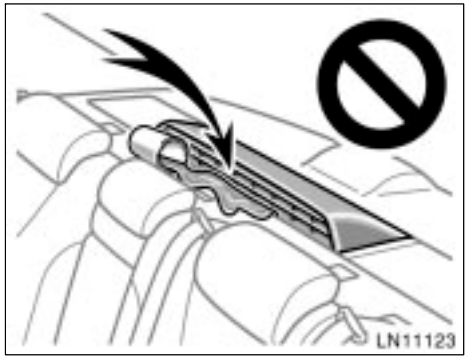
NOTICE

- ***Clean the air vent regularly to prevent the hybrid battery from overheating.***



◆ *Do not put foreign objects over the air vent. The hybrid battery may be overheated and damaged.*

◆ *Do not load a large amount of water such as an aquarium into the vehicle. If water spills over the hybrid battery, the battery may be damaged.*



◆ *Do not spill water over the air vent. This may adversely affect or damage the hybrid battery.*

Road accident cautions—

⚠ CAUTION

- Pull your vehicle off the road, put the transmission in the “P” position, apply the parking brake, turn the hybrid system off and carry the key.
- In order to avoid death or serious injury, do not touch high voltage wiring, connectors or high voltage parts (inverter unit, hybrid battery and etc.). High voltage parts and cables are indicated in the illustration on page 7.
- If exposed electric wires are protruding inside or outside of your vehicle, an electric shock may occur. Never touch the electric wires.
- If fluid leaks or gets into some parts of the vehicle, never touch it because it may be strong alkaline electrolyte from the hybrid battery. If it contacts your skin or eyes, wash it off immediately with a large amount of water or if possible, boric acid solution. Get immediate medical attention in order to help avoid serious injury.

- If a fire occurs in the hybrid vehicle, leave the vehicle as soon as possible. Never use a fire extinguisher that is not meant for electric fires. Using a small amount of water may be also dangerous.
- If your vehicle needs to be towed, do it with the front wheels raised. If the wheels with the motor generator are on the ground when towing, the motor may continue to generate electricity. This may cause the electricity leakage. Depending on the severity of the damage, electricity leakage may cause fire. See “If your vehicle needs to be towed” on page 327 in Section 4.

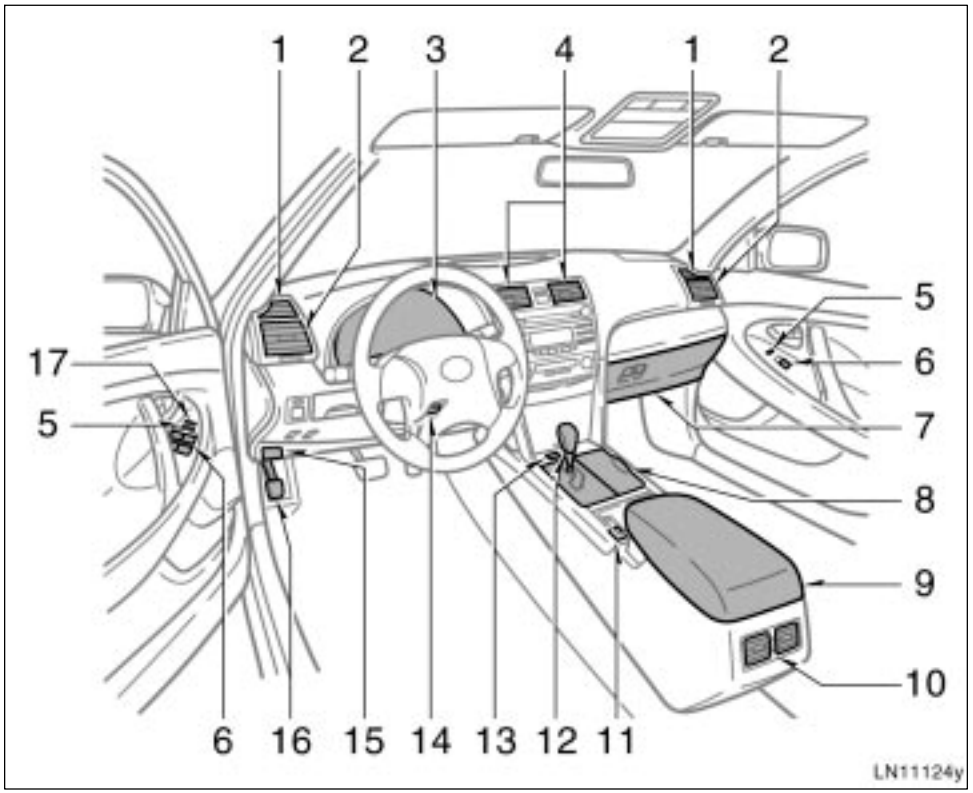
—Emergency shut off system

The emergency shut off system blocks off the high voltage current and stops the fuel pump to minimize the risk of the electric leakage and the fuel leakage when a certain level of impact is detected by the impact sensor. If the system activates, your vehicle will not restart. To restart the hybrid system, contact a Toyota dealer.

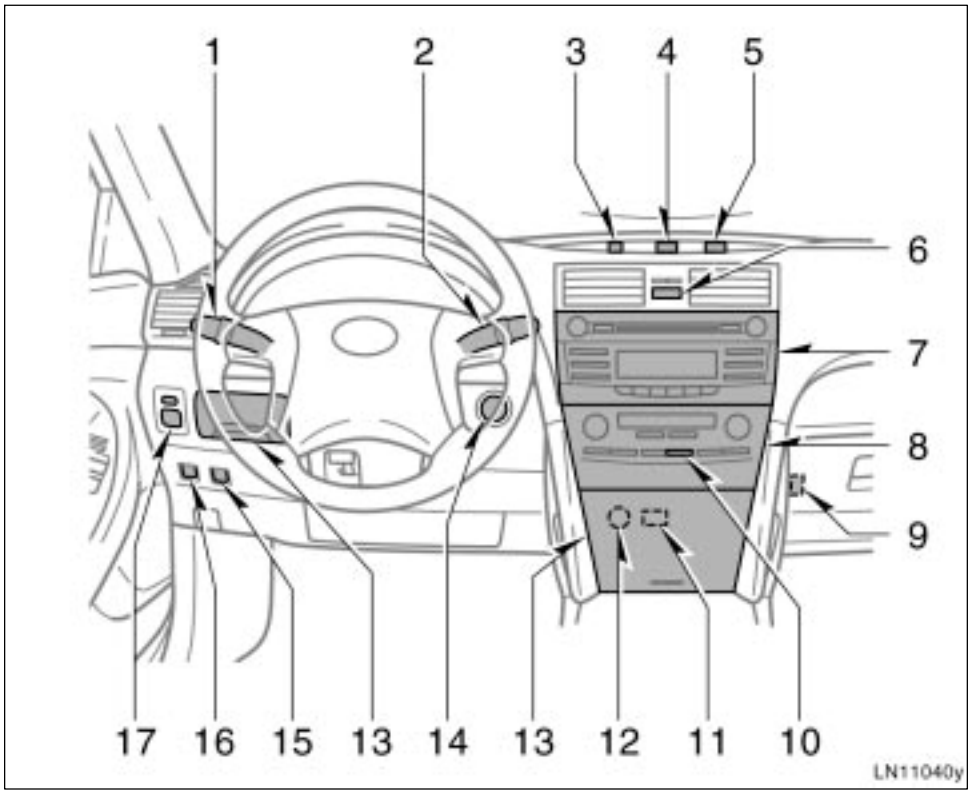
⚠ CAUTION

- Check to see if there are exposed high voltage parts and cables. Never touch the parts and cables. See “—High voltage components” on page 7 in this Section for the locations of the high voltage parts and cables.
- Inspect the ground under the vehicle. If you find that liquid has leaked onto the ground, the fuel system may have been damaged. Leave the vehicle as soon as possible.

Instrument panel overview



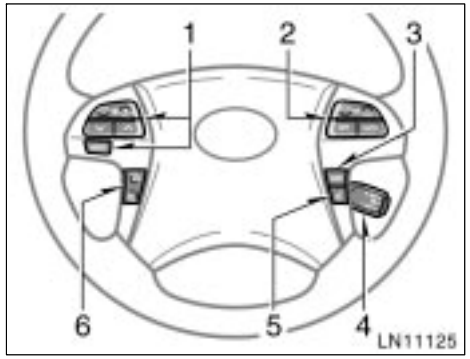
1. Side defroster outlets
2. Side vents
3. Instrument cluster
4. Center vents
5. Power door lock switches
6. Power window switches
7. Glove box
8. Cup holder
9. Rear console box
10. Rear vents
11. Power outlet
12. Transmission selector lever
13. Seat heater switches
14. Tilt and telescopic steering wheel lock release lever
15. Hood lock release lever
16. Parking brake pedal
17. Window lock switch



1. Headlight and turn signal switches
2. Wiper and washer switches
3. Engine immobilizer system indicator light
4. Clock
5. “AIRBAG ON” and “AIRBAG OFF” indicator lights and front passenger seat belt reminder light
6. Emergency flasher switch
7. Audio system or navigation system including audio system (For the navigation system, see the separate “Navigation System Owner’s Manual”.)
8. Air conditioning controls
9. Tire pressure warning system reset switch
10. Rear window and outside rear view mirror defogger switch
11. AUX adapter
12. Power outlet
13. Auxiliary boxes
14. “POWER” switch
15. Air conditioning economy mode switch
16. Fuel filler door opener switch
17. Power rear view mirror control switches

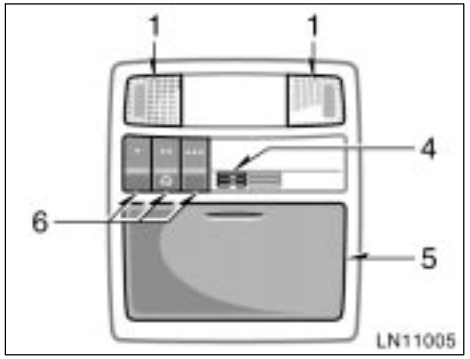
Steering switches and overhead console overview

▶Steering switches

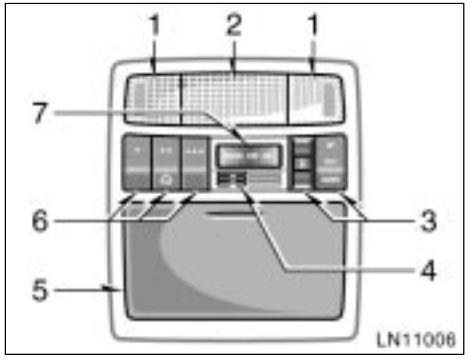


1. Audio remote control switches
2. Climate remote control switches
3. Multi−information display control switch
4. Cruise control switch
5. Speech command switch
6. Telephone switches

▶Overhead console



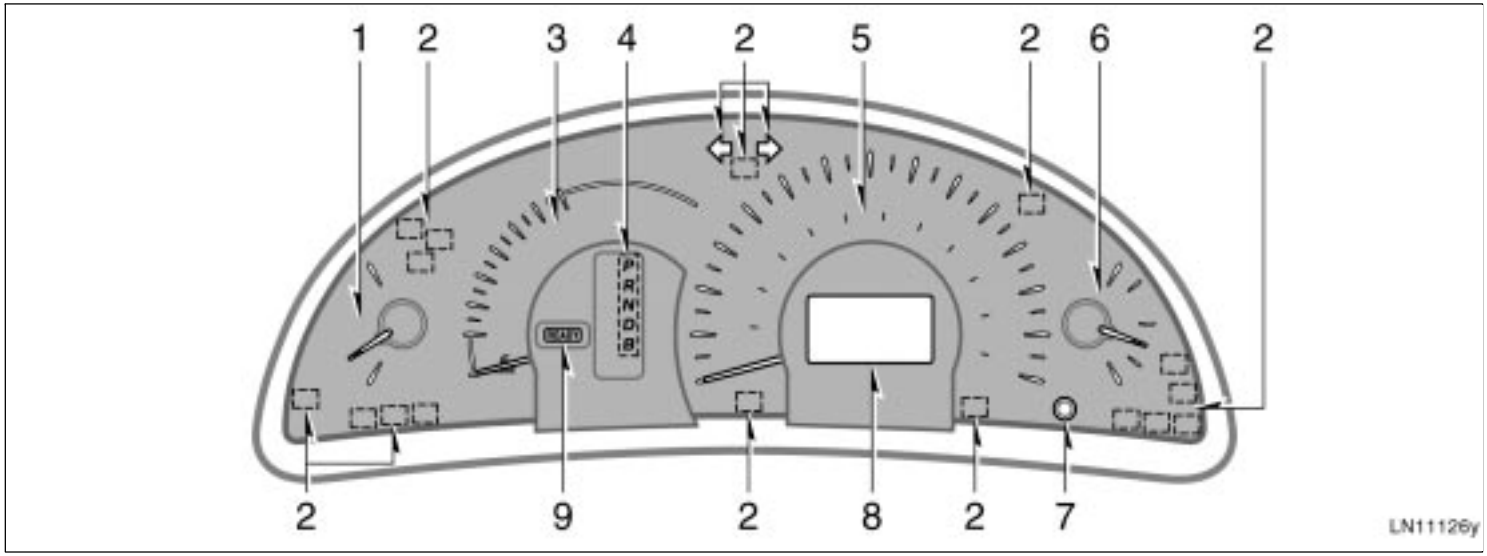
Without moon roof



With moon roof

1. Personal lights
2. Interior light
3. Moon roof switches
4. Microphone
5. Auxiliary box
6. Garage door opener
7. Interior light switch

Instrument cluster overview



1. Engine coolant temperature gauge
2. Service reminder indicators and indicator lights
3. Fuel economy meter
4. Transmission shift position indicator lights
5. Speedometer
6. Fuel gauge
7. Trip meter reset knob/instrument panel light control knob
8. Multi−information display
9. Driving ready light

Indicator symbols on the instrument panel

BRAKE or (red indicator)	Brake system warning lights*1	CHECK or	Malfunction indicator lamp*1
(yellow indicator)			Low fuel level warning light*1
	Driver’s seat belt reminder light*1	ABS or	Anti−lock brake system warning light*1
PASSENGER	Front passenger’s seat belt reminder light*1	P/S	Electric power steering system warning light*1
	Charging system warning light*1		Open door warning light*1
			SRS warning light*1

	Low tire pressure warning light*1
	Master warning light*1
	Driving ready light
	“AIRBAG ON” indicator light
	“AIRBAG OFF” indicator light
	Headlight indicator light
	Tail light indicator light
	Headlight high beam indicator light
	Turn signal indicator lights

	Slip indicator light
	Cruise control indicator light*2

*1: For details, see “Service reminder indicators and warning buzzers” on page 150 in Section 1−6.

*2: If this light flashes, see “Cruise control” on page 176 in Section 1−7.

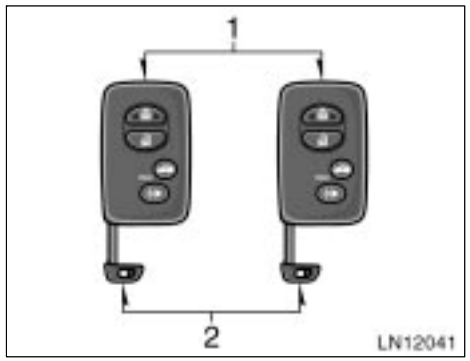
SECTION 1-2

OPERATION OF INSTRUMENTS AND CONTROLS

Keys and Doors

Keys 22
Engine immobilizer system 24
Wireless remote control 25
Smart key system 32
Side doors 38
Power windows 45
Trunk lid 47
Hood 50
Fuel tank cap 51
Electric moon roof 53

Keys



The key consists of an electronic key and a mechanical key. The mechanical key is for emergency use. If the electronic key does not operate, you can open the driver’s door using the mechanical key.

1. Electronic keys—These keys can lock or unlock all the doors and can open the trunk by using the wireless remote control function or entry function of the smart key system.
2. Mechanical keys—These keys can lock or unlock the driver’s door and the glove box.

Spare keys should not be left in the cabin. In the event that a spare key is left in the cabin, the smart key system will remain actuated even after the doors have been locked. Under these circumstances, the trunk can be opened even after the driver has exited and locked the vehicle, increasing the danger of theft. (Refer to “—Opening trunk lid with smart key system” on page 47 in this Section.)

To protect items locked in the trunk or the glove box when using valet parking, leave the electronic key with the attendant. Keep the mechanical key with you. For details about locking the trunk opener switch, see “—Luggage security system” on page 49 in this Section.

A transponder chip for engine immobilizer system has been placed in the electronic keys. These chips are needed to enable the system to function correctly, so be careful not to lose these keys.

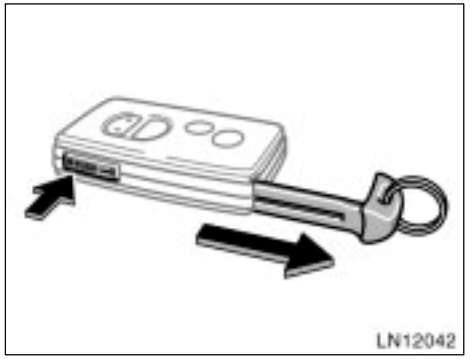
⚠ CAUTION

- **People with implanted pacemakers or cardiac defibrillators should maintain a reasonable distance between themselves and the smart key system antennas, because the radio waves may affect the operation of such devices. For the antenna locations see “ANTENNA LOCATION” on page 34 in this Section.**
- **Users of any electrical medical device other than implanted pacemakers and implanted cardiac defibrillators should consult the manufacturer of the device for information about its operation under the influence of radio waves. Radio waves could have unexpected effects on the operation of such medical devices.**
- **If necessary, the entry function can be disabled. See “DISABLING THE SMART KEY SYSTEM” on page 38 in this Section.**

NOTICE

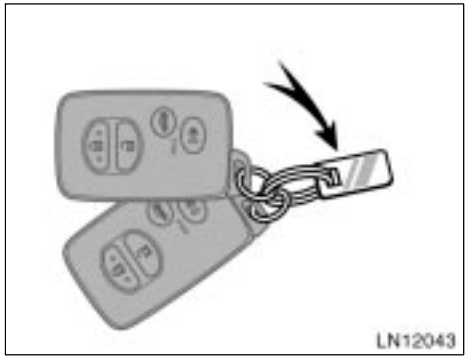
When using a electronic key containing a transponder chip, observe the following precautions:

- ***Do not affix any material that cuts off electromagnetic waves (such as a metal seal) on the electronic key.***
- ***Do not knock the electronic key hard against other objects.***
- ***Do not leave the electronic key exposed to high temperatures for a long period, such as on the dashboard or hood under direct sunlight.***
- ***Do not put the electronic key in water or wash it in an ultrasonic washer.***
- ***Do not keep the electronic key together with the products emitting electromagnetic waves such as a cellular phone.***



USING A MECHANICAL KEY

When you use the mechanical key, push the release button and take out the mechanical key as shown. Be sure to put the mechanical key back when not in use.



KEY NUMBER PLATE

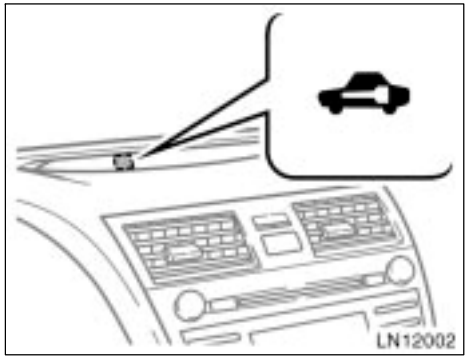
Your key number is shown on the plate. Keep the plate in a safe place such as your wallet, not in the vehicle.

If you should lose your keys or if you need additional keys, duplicates can be made by Toyota dealer using the key number.

We recommend writing down the key number and storing it in a safe place.

Engine immobilizer system

The engine immobilizer system is a theft prevention system. The transponder chip in the key transmits an electronic code to the vehicle. The hybrid system will start only when the electronic code in the chip corresponds to the registered ID code for the vehicle.



The engine immobilizer system is automatically set when the “POWER” switch is turned off.

The indicator light will start flashing to show that the system is set.

If any of the following indicator conditions occur, contact your Toyota dealer.

- The indicator light remains on.
- The indicator light does not start flashing when the “POWER” switch is turned off.
- The indicator light flashes inconsistently.

The engine immobilizer system is automatically canceled when you enter the vehicle carrying an electronic key and press the “POWER” switch.

Even if the key battery is discharged, the hybrid system can be turned on. See “Smart key system” on page 32 in this Section.

When the system is canceled, the indicator light will go off.

For your Toyota dealer to make you a new key with built−in transponder chip, your dealer will need your key number and electronic key. However, there is a limit to the number of additional keys your Toyota dealer can make for you.

NOTICE

Do not modify, remove or disassemble the engine immobilizer system. If any unauthorized changes or modifications are made, proper operation of the system cannot be guaranteed.

For vehicles sold in U.S.A.

FCC ID: NI4TMIMB−1

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

⚠ CAUTION

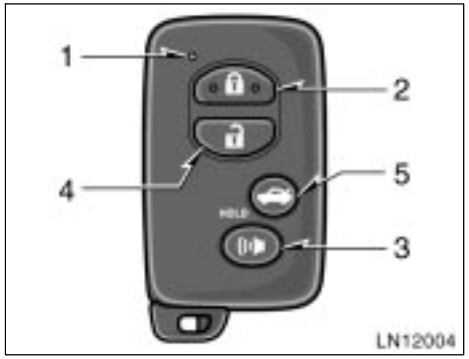
Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

For vehicles sold in Canada

This device complies with RSS−210 of Industry Canada. Operation is subject to the following two conditions:

(1) This device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Wireless remote control—



1. Indicator light
2. Lock switch
3. Alarm switch
4. Unlock switch
5. Trunk opener switch

The wireless remote control function is designed to lock or unlock all the doors, open the trunk lid, or activate the alarm from a distance within approximately 1 m (3 ft.) of the vehicle.

When you operate any switch, push it slowly and securely.

When the switch is operated, the indicator light flashes once. If not, the battery may be discharged. Replace the battery at the earliest opportunity.

Observe the following precautions to prevent damage the key.

- Do not leave the electronic key in places where the temperature becomes high such as on the dashboard.
- Do not disassemble it.
- Avoid knocking it hard against other objects or dropping it.
- Avoid putting it in water.

If the wireless remote control function does not actuate the doors, or does not operate from a normal distance, or if the indicator on the key is dimmed or does not come on:

- Check for closeness to a radio transmitter such as a radio station or an airport which can interfere with normal operation of the key.
- The battery may have been consumed. Check the battery in the key. To replace the battery, see “—Replacing battery” on page 30 in this Section.

If you lose your key, contact your Toyota dealer as soon as possible to avoid the possibility of theft, or an accident. (See “If you lose your keys” on page 330 in Section 4.)

It is possible to disable the wireless remote control system. For details, contact your Toyota dealer.

For vehicles sold in U.S.A.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTICE:
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

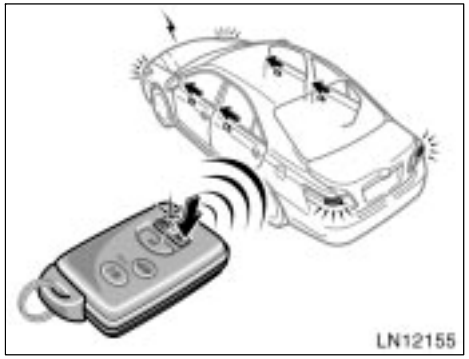
FCC WARNING:
Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

For vehicles sold in Canada

Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

—Locking and unlocking doors



Locking operation

Unlocking operation

To lock or unlock all the doors, push the switches slowly and securely.

To lock: Push the lock switch. All the doors are locked simultaneously. At this time one beep will sound and turn signal lights flash once.

Check to see that the doors are securely locked.

If any of the doors is not securely closed, or if the key is left in the vehicle, locking cannot be performed by the lock switch and a beep will sound continuously for 10 seconds.

To stop the beep, take out the key from the vehicle or push the unlock switch.

The answerback function (the turn signal flash and the beep) can be disabled. For details, contact your Toyota dealer.

To unlock: Push the unlock switch once to unlock the driver’s door alone. Pushing the switch twice within 3 seconds unlocks all the doors simultaneously. Each time the unlock switch is pushed, two beeps will sound and turn signal lights flash twice.

This double switch operation to unlock all doors can be changed to a single switch operation. For details, contact your Toyota dealer.

If the “POWER” switch is set at ACC or ON, the vehicle cannot be unlocked via the unlock switch.

You have 60 seconds to open a door after using the wireless remote unlock feature. If a door is not opened by then, all the doors will be automatically locked again.

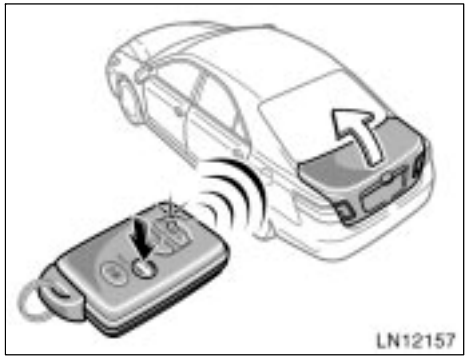
If the wireless remote control is used to lock the doors near the window or door handle, there is a possibility that the door may not unlocked by entry function of smart key system. Under these circumstances, use the wireless remote control function to unlock the doors.

The automatic locking time can also be set to 30 seconds. For details, contact your Toyota dealer.

If the lock or unlock switch is kept pressed in, the locking or unlocking operation is not repeated. Release the switch and then push again.

When you unlock doors using the wireless remote control, the illuminated entry function will be activated. (For further information, see “Illuminated entry system” on page 127 in Section 1−5.)

—Opening trunk lid



To open the trunk lid, push the trunk opener switch of the electronic key for 1 second. A long beep will sound.

If the “POWER” switch is set at ACC or ON, the trunk lid cannot be opened by the trunk opener switch.

Opening of the trunk lid with the wireless remote control can be changed as follows. Contact your Toyota dealer for details.

- Trunk lid opens by pushing the trunk opener switch twice in succession.
- Trunk lid opens by pushing the trunk opener switch once regardless of how long the switch is being pressed.
- Opening of the trunk lid with the wireless remote control function is disabled.

—Activating alarm

Pushing the switch blows the horn intermittently and flashes the exterior lights and interior light.

When pushing the switch, the indicator light flashes.

The alarm switch is used to deter vehicle theft when you witness anyone attempting to break into or damage your vehicle.

The alarm will last for one minute. To stop the alarm midway, push the switch once again, unlock a door with the wireless remote control function, or set the “POWER” switch at ON.

If the “POWER” switch is set at ACC or ON, the alarm does not work.

This alarm function can be disabled. For details, contact your Toyota dealer.

—Replacing battery

The electronic key can easily be damaged when replacing the battery. We recommend having the battery replaced by your Toyota dealer. If you have to do it yourself, use a CR1632 lithium battery or equivalent and a flathead screwdriver.

⚠ CAUTION

Special care should be taken to prevent small children from swallowing the removed battery or components.

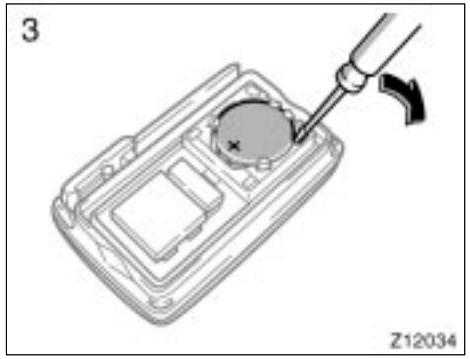
NOTICE

- ***Be careful not to touch the circuit, as this may generate static electricity that can damage the key.***
- ***When replacing the battery, be careful not to lose the components.***
- ***Replace only with the same or equivalent type recommended by a Toyota dealer.***
- ***Dispose of used batteries according to the local laws.***

Replace the battery by following these procedures:

1. Push the release button and take out the mechanical key.

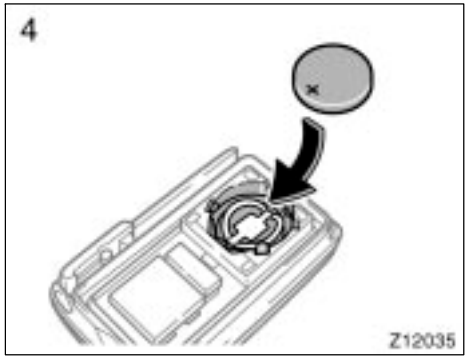
2. Using a flathead screwdriver or equivalent, open the key case.



3. Remove the discharged battery by flat-head screwdriver or equivalent. Insert the guide groove and lift as shown in the above illustration.

NOTICE

Do not modify the battery case. It may cause a trouble.



4. Put in a new battery with the positive (+) side up. Close the case securely and insert the mechanical key.

NOTICE

- ***Make sure the positive side and negative side of the battery are faced correctly.***
- ***Do not replace the battery with wet hands. Water may cause unexpected rust.***
- ***Do not touch or move any components inside the key, or it may interfere with proper operation.***
- ***Be careful not to bend the electrode when inserting the battery and that dust or oils do not adhere to the case.***
- ***Close the case securely.***

After replacing the battery, check that the key operates properly. If the electronic key still does not operate properly, contact your Toyota dealer.

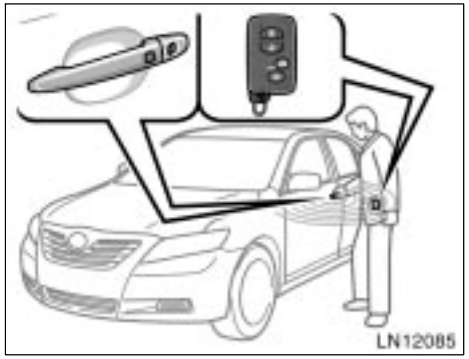
Smart key system

The smart key system consists mainly of the following functions.

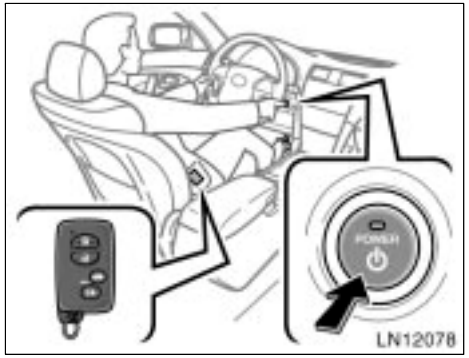
- Engine immobilizer function (For details, see “Engine immobilizer system” on page 24 in this Section.)
- Wireless remote control function (For details, see “Wireless remote control” on page 25 in this Section.)
- Push button start function (For details, see “How to start the hybrid system” on page 301 in Section 3.)
- Entry function and start function (See “ENTRY FUNCTION AND START FUNCTION” described below.)
- Steering lock function (See “STEERING LOCK FUNCTION” described below.)

⚠ CAUTION

- **People with implanted pacemakers or cardiac defibrillators should maintain a reasonable distance between themselves and the smart key system antennas, because the radio waves may affect the operation of such devices. For the antenna locations see “ANTENNA LOCATION” on page 34 in this Section.**
- **Users of any electrical medical device other than implanted pacemakers and implanted cardiac defibrillators should consult the manufacturer of the device for information about its operation under the influence of radio waves. Radio waves could have unexpected effects on the operation of such medical devices.**
- **If necessary, the entry function can be disabled. See “DISABLING THE SMART KEY SYSTEM” on page 38 in this Section.**



Entry function



Start function

ENTRY FUNCTION AND START FUNCTION

Simply by carrying the key, you can lock and unlock the doors and start the hybrid system.

Entry function—You can lock and unlock the doors and open the trunk without inserting the key in the keyholes. For further information, see “Side doors” on page 38 and “Trunk lid” on page 47 in this Section.

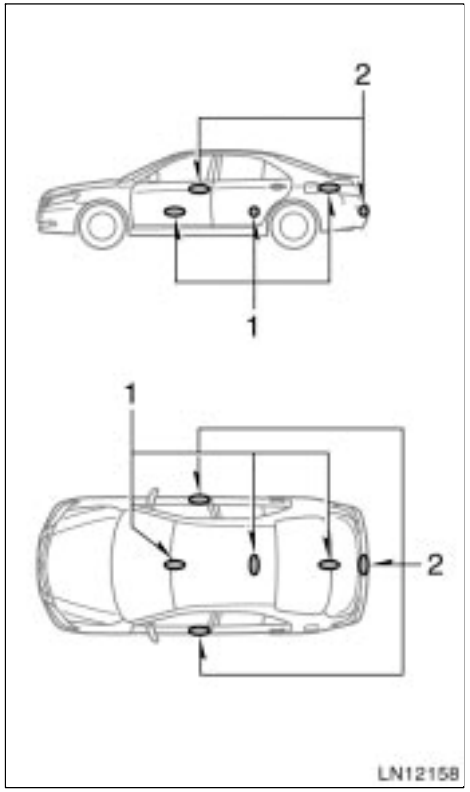
Start function—You can shift the power supply mode and start the hybrid system when the electronic key is in the vehicle. For further information, see “‘POWER’ switch” on page 160 in Section 1−7 and “How to start the hybrid system” on page 301 in Section 3.

If the smart key system does not operate properly because of a system malfunction, consult your Toyota dealer. Make sure to bring all of the keys. They may be necessary to repair the system.

STEERING LOCK FUNCTION

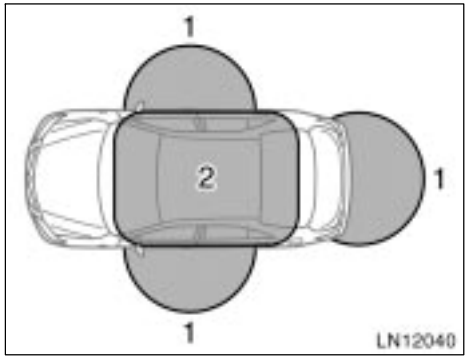
When the driver’s door is opened after turning off the hybrid system, the steering wheel will lock.

The steering lock is automatically unlocked when the “POWER” switch is pressed. If the indicator light on the “POWER” switch flashes green, this indicates that the steering wheel remains locked. If the amber indicator light flashes, this indicates that the steering lock is malfunctioning. For details, see “How to start the hybrid system” on page 301 in Section 3.



ANTENNA LOCATION

1. Antenna inside cabin and trunk
2. Antenna outside cabin and trunk



ACTUATION AREA

The entry function and start function are available to use when a registered key is in the actuation area.

1. **Entry function actuation area—**About 1 m (3 ft.) from each outside front door handle and the trunk opener switch

   Only the door handle of the actuation area that the key holder is in can be operated.

   If the key is close to the door handle, windows or the center of the rear bumper, on the ground or above the roof, the entry function may not be activated.

2. **Start function actuation area—**Inside of the cabin

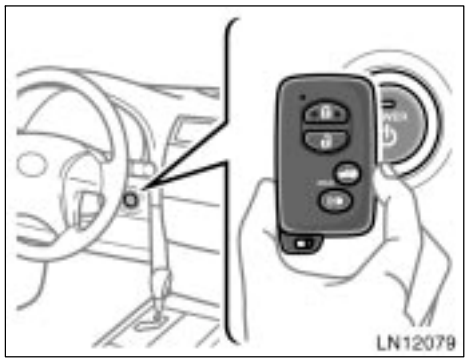
   The start function may not be activated, if the key is in the auxiliary box of the driver’s side instrument panel and glove box, on the instrument panel, on the package tray, on the floor, etc.

In the following cases, the smart key system may not operate properly.

- When facilities issuing strong electromagnetic waves such as TV towers, electric power stations, broad casting stations are nearby.
- In places where automated payment facilities are installed (such as gas stations).
- When you are carrying a electronic key together with a mobile communications system such as a two−way radio or cellular phone.
- When the electronic key is in contact with or covered by a metallic object.
- When another person is operating a wireless remote control function on another vehicle near your vehicle.
- When the battery is discharged. To replace the battery, see “—Replacing battery” on page 30 in this Section.

- When the electronic key is near a high−voltage or noise−emitting device.
- When you are carrying an electronic key together with a key for another smart key system equipped vehicle or another instrument emitting radio waves.
- Depending on the position of the key or vehicle body shape, the key may not work well even within the actuation area.
- When the key surface is covered by a sticker, etc. that may cut off electromagnetic wave.

Even if the smart key system does not operate properly, you can still enter and start the hybrid system. For further information, see “Side doors” on page 38 and “Trunk lid” on page 47 in this Section, and see “How to start the hybrid system” on page 301 in Section 3.



STARTING THE HYBRID SYSTEM WHEN THE ELECTRONIC KEY BATTERY IS DISCHARGED

If the key indicator does not flash and the hybrid system cannot be started by using the start function, the battery may be discharged. Replace the key battery as soon as possible. (See “—Replacing battery” on page 30 in this Section.)

However the hybrid system can be turned on in the following procedures.

1. While the brake pedal is depressed, touch the Toyota logo side of the electronic key to the “POWER” switch.
2. Start the hybrid system within 5 seconds after the green indicator light on the “POWER” switch comes on and a buzzer sounds.

BATTERY POWER SAVING

Both the vehicle and key transmitters are always sending signals to each other. To prevent battery drain, the smart key system is automatically deactivated in the following conditions:

- If the electronic key is left outside of the vehicle and within the effective range of the entry function actuation area for more than 10 minutes.
- If the door lock or unlock operation is not performed more than 2 weeks.

The key and the vehicle are communicating even while the vehicle is not being driven. Do not leave the key near the vehicle (within 2 m [7 ft.]).

The vehicle battery may drain if the vehicle is not used for a long period of time. To prevent battery drain, disconnect the battery negative (−) terminal or disable the smart key system. (For details about disable the smart key system, see “DISABLING THE SMART KEY SYSTEM” in this Section.)

To reactivate the smart key system, perform any of the following:

(a) Press the lock button on the front outside door handle or trunk open button while carrying the electronic key.

(b) Perform a wireless remote control operation.

(c) Insert and turn the mechanical key in the keyhole of the driver’s door.

If the electronic key receives strong electromagnetic waves over a period of time, the battery can be drastically run down. You should always keep the following electrical appliances at least 1 m (3 ft.) away from the electronic key.

- TV
- Personal computer
- Cellular phone or cordless phone recharger unit
- Electric light stand
- Fluorescent desk light

For vehicles sold in U.S.A.

FCC ID: NI4TMLF−2

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CAUTION

Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

For vehicles sold in Canada

This device complies with RSS−210 of Industry Canada. Operation is subject to the following two conditions:

(1) This device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

For vehicles sold in U.S.A.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTICE:
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC WARNING:
Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

For vehicles sold in Canada

Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

DISABLING THE SMART KEY SYSTEM

The following functions can be disabled:

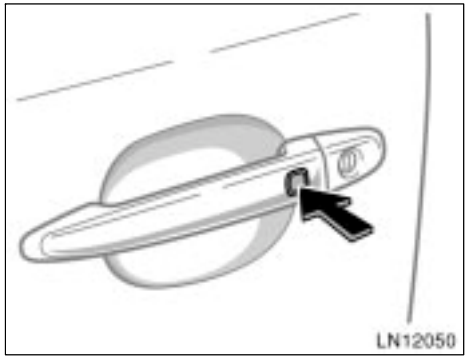
- A function that allows you to lock/unlock the doors and open the trunk by simply carrying a key
- A function that causes the vehicle to beep if keys are forgotten inside the vehicle or trunk and a door is closed
- A function that recalls the position of the driver’s seat and side rear view mirror
- A function that shifts the power supply mode and starts the hybrid system when the electronic key is in the vehicle.
- Warning lights and buzzers

For details, contact your Toyota dealer.

If the smart key system does not operate properly because of a system malfunction, consult your Toyota dealer. Make sure to bring all of the keys. They may be necessary to repair the system.

Side doors— —Locking and unlocking with smart key system

When you carry the registered key with smart key system into the actuation area, you can lock and unlock the side doors without using the key. For further information of actuation area, see “Smart key system” on page 32 in this Section.



Locking operation

Push the lock button on the front outside door handle slowly and firmly. All the doors lock simultaneously. At this time one beep will be heard and turn signal lights flash once.

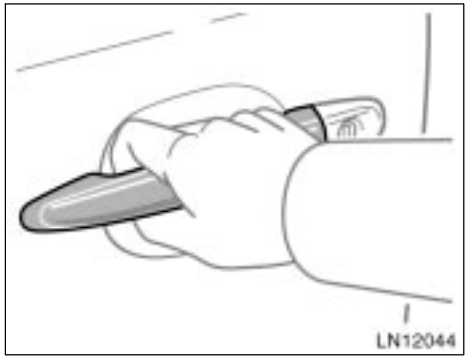
For three seconds after the doors have been locked, the doors cannot be unlocked via the smart key system. This feature allows the operator to confirm that the doors are locked.

In the following cases, the doors cannot be locked by pushing the lock button and a beep will sound as an indicator.

- When any of the doors are not securely closed. A beep will sound continuously for 10 seconds.
- When the lock button is pressed while opening or closing the door. A beep will sound continuously for 10 seconds.
- When the hybrid system is not turned off. A beep will sound continuously for 2 seconds.
- When the key is left in the vehicle. A beep will sound continuously for 2 seconds.
- When attempting to lock the doors with the key near a window or a door handle. A beep will sound continuously for 2 seconds.

The beep may not sound if the key is on the instrument panel, on the package tray, in the glove box or on the floor, etc.

The answerback function (the turn signal flash and the beep) can be disabled. For details, contact your Toyota dealer.



Unlocking operation

Grasp the front outside door handle (sensors are located on the underside of the door handles). Only the driver’s door unlocks when the driver’s door handle is grasped. All the doors unlock when the front passenger’s door handle is grasped. At this time two beeps will be heard and the turn signal lights flash twice.

The doors may not unlock if the handle is grasped too quickly. Be sure to confirm that the doors are unlocked before pulling the door handle. If the doors do not open when the handle is pulled, return the handle to its original position.

Wearing gloves may slow response time. For three seconds after the doors have been locked, the doors cannot be re−unlocked via the smart key system.

The answerback function (the turn signal flash and the beep) can be disabled. For details, contact your Toyota dealer.

When you enter the entry function actuation area, the interior and exterior lights come on for about 15 seconds. After the light comes on, all the side doors can be unlocked by grasping the outside door handle.

You have 60 seconds to open a door after using the unlocking function. If a door is not opened by then, all the doors will be automatically locked again.

The automatic locking time can also be set to 30 seconds. For details, contact your Toyota dealer.

The doors may unlock if the key is within the entry function actuation area and a large amount of water splashes on the door handle (for example, in the rain or in a car wash).

When you enter the entry function actuation area, the illuminated entry system will be activated. (For further information, see “Illuminated entry system” on page 127 in Section 1−5.)

SELECTING DOORS TO BE UNLOCKED WITH ENTRY FUNCTION

The unlocking operation has 2 modes. To change the mode, within 1 m (3 ft.) of the vehicle press the lock switch and the alarm, trunk opener or unlock switch simultaneously for five seconds.

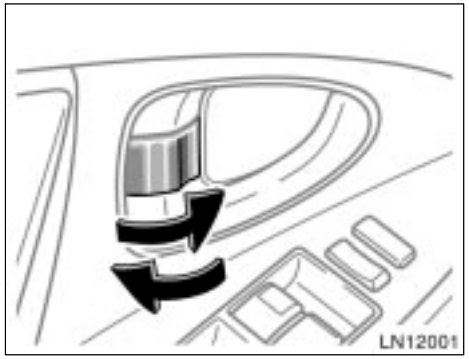
The “POWER” switch must be turned off.

When the mode is changed, the buzzer will sound and an indicator is displayed on the multi−information display as follows:

Mode	Door to be unlocked	Wireless remote control buzzer	Indicator and meter buzzer
1	All doors	2 beeps	1 beep
2	Driver’s door only (from driver’s door switch) All doors (from front passenger’s door switches)	3 beeps	1 beep

Repeating the above process allows you to toggle between 1 and 2.

—Locking and unlocking with inside lock knob



Move the lock knob.

To lock: Push the knob forward.
To unlock: Pull the knob backward.

The front doors can be opened by pulling the inside handle even if the lock knobs are in the locked position.

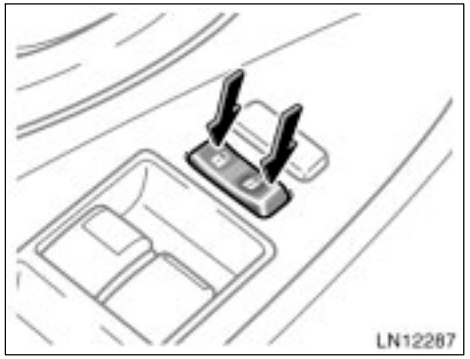
⚠ CAUTION

Do not pull the inside handle of the front doors while driving. The doors will open and an accident may occur. Toyota strongly recommends that all children be placed in the rear seat of the vehicle.

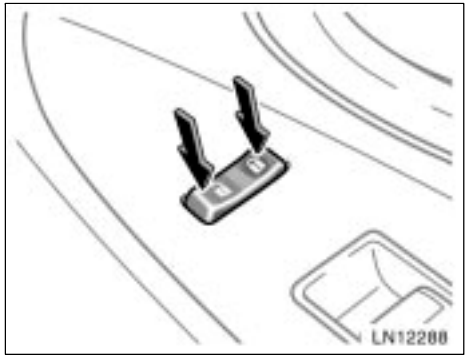
Closing the door with the lock knob in the lock position will also lock the door. Be careful not to lock your keys in the vehicle.

Doors cannot be locked when either front door is open and the key is left in the vehicle.

—Locking and unlocking with power door lock switch



Driver’s side



Passenger’s side

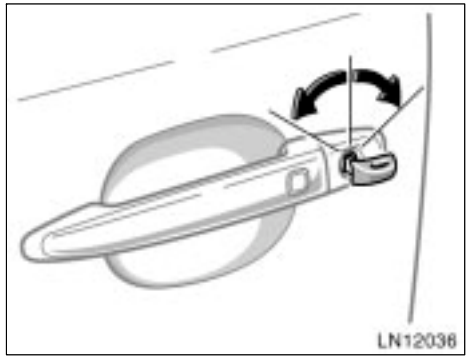
Push the switch.

To lock: Push the switch down on the right side.
To unlock: Push the switch down on the left side.

All the doors lock or unlock simultaneously.

When the front doors are locked from the outside or locked with the wireless remote control function, the power door lock switch will not work until either front door is unlocked with the key, lock knob, or wireless remote control function.

—Locking and unlocking door with mechanical key



Insert the mechanical key into the keyhole and turn it.

To lock: Turn the key forward.

All the doors lock simultaneously with the driver’s door.

For three seconds after the doors have been locked, the doors cannot be unlocked via the smart key system. This feature allows the operator to confirm that the doors are locked.

To unlock: Turn the key backward.

Turning the key once will unlock the driver’s door and twice in succession will unlock all the doors simultaneously.

This double key turning operation to unlock all the doors can be changed to a single key turning operation. For details, contact your Toyota dealer.

When you unlock the doors, the illuminated entry system will be activated. (For further information, see “Illuminated entry system” on page 127 in Section 1−5.)

—Automatic door locking and unlocking functions

AUTOMATIC DOOR LOCKING

You can select the following functions:

- **Locking linked with the shift position**

  All doors are automatically locked when the selector lever is moved out of “P” position.

- **Locking linked with vehicle speed**

  All doors are automatically locked when the vehicle speed goes above about 20 km/h (12 mph).

You can set or cancel the automatic door locking functions:

Be sure to apply the parking brake when performing the following operations.

To select the locking linked with the shift position:

1. Close all doors and set the “POWER” switch at ON.
2. Shift the selector lever to the “P” position.
3. Within 10 seconds of turning the “POWER” switch on, press and hold the driver’s side power door lock switch in the lock position for 5 seconds and then release.

   The doors will be locked and unlocked to indicate that the function is set.

To cancel the function, do the above operation again.

To select the locking linked with the vehicle speed:

1. Close all doors and set the “POWER” switch at ON.
2. Shift the selector lever from “P” to the “N” position.
3. Within 10 seconds of turning the “POWER” switch on, press and hold the driver’s side power door lock switch in the lock position for 5 seconds and then release.

   The doors will be locked and unlocked to indicate that the function is set.

To cancel the function, do the above operation again.

AUTOMATIC DOOR UNLOCKING

You can select the following functions:

- **Unlocking linked with the shift position**

  All doors are automatically unlocked when the selector lever is moved to “P” position.

- **Unlocking linked with the “POWER” switch**

  All doors are automatically unlocked when the driver’s door is opened within 10 seconds after the “POWER” switch is set from ON to ACC or OFF.

You can set or cancel the automatic door unlocking functions:

Be sure to apply the parking brake when performing the following operations.

To select the unlocking linked with the shift position:

1. Close all doors and set the “POWER” switch at ON.
2. Shift the selector lever to the “P” position.
3. Within 10 seconds of turning the “POWER” switch on, press and hold the driver’s side power door lock switch in the unlock position for 5 seconds and then release.

   The doors will be locked and unlocked to indicate that the function is set.

To cancel the function, do the above operation again.

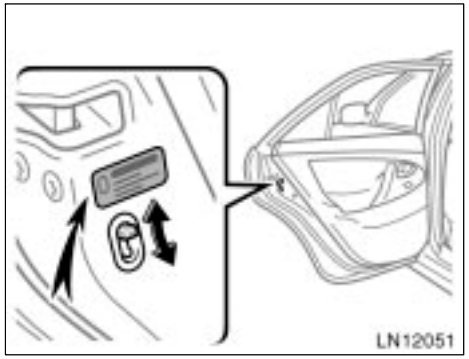
To select the unlocking linked with the “POWER” switch:

1. Close all doors and turn the “POWER” switch at ON.
2. Shift the selector lever from “P” to the “N” position.
3. Within 10 seconds of turning the “POWER” switch on, press and hold the driver’s side power door lock switch in the unlock position for 5 seconds and then release.

   The doors will be locked and unlocked to indicate that the function is set.

To cancel the function, do the above operation again.

—Rear door child−protectors



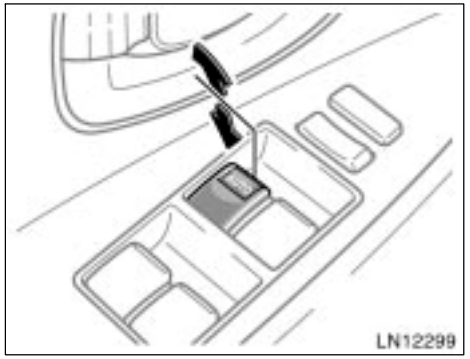
Move the lock lever to the “LOCK” position as shown on the label.

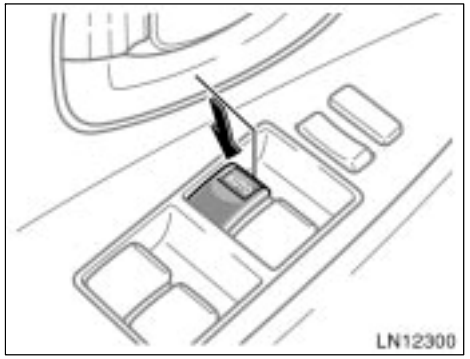
When the child−protector is locked, you cannot open the rear door by the inside door handle. We recommend using this feature whenever small children are in the vehicle.

⚠ CAUTION

Before driving, be sure that the doors are closed and locked, especially when small children are in the vehicle. Along with the proper use of seat belts, locking the doors helps prevent the driver and passengers from being thrown out from the vehicle in an accident. It also helps prevent the doors from being opened unintentionally.

Power windows





The windows can be operated with the switch on each door.

The power windows work when the “POWER” switch is set at ON.

Key off operation: All windows work for about 45 seconds even after the “POWER” switch is turned off. They stop working when either front door is opened.

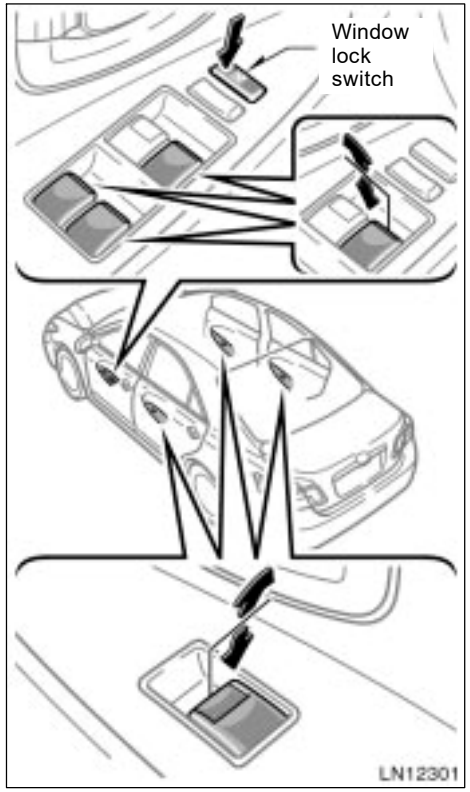
OPERATING THE DRIVER’S WINDOW

Use the switch on the driver’s door.

Normal operation: The window moves as long as you hold the switch.

To open: Lightly push down the switch.
To close: Pull up the switch.

Automatic operation: Push the switch completely down and then release it. The window will fully open. To stop the window partway, pull the switch up and then release it.



OPERATING THE PASSENGERS’ WINDOWS

Use the switches on the passengers’ doors. The driver’s door also has switches that control the passengers’ windows.

The window moves as long as you hold the switch.

To open: Push down the switch.
To close: Pull up the switch.

If you push in the window lock switch on the driver’s door, the passengers’ windows cannot be operated.

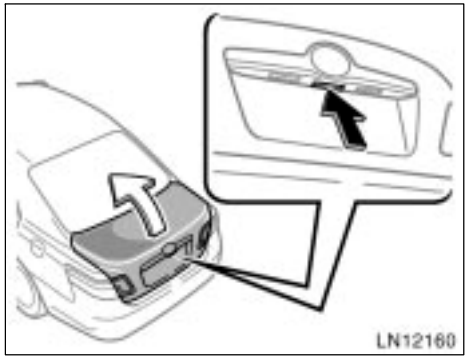
⚠ CAUTION

To avoid death or serious personal injury, you must do the following.

- **Before you close the power windows, always make sure there is nobody around the power windows. You must also make sure the heads, hands and other parts of the bodies of all occupants are kept completely inside the vehicle. If someone’s neck, head or hands get caught in a closing window, it could result in death or serious injury. When anyone closes the power windows, make sure he or she operates the windows safely.**
- **When small children are in the vehicle, never let them use the power window switches without supervision. Use the window lock switch to prevent them from making unexpected use of the switches.**

- **Never leave anyone (particularly a small child) alone in your vehicle, especially with the “POWER” switch set at ON. Otherwise, he/she could use the power window switches and get trapped in a window. Unattended person (particularly a small child) can be involved in a serious accident.**

Trunk lid—
—Opening trunk lid with smart key system



When you carry the registered key into the actuation area, the trunk can be opened. For further information of actuation area, see “Smart key system” on page 32 in this Section.

See “—Stowage precautions” on page 295 in Section 2 for precautions when loading luggage.

To close the trunk lid, lower it and press down on it. After closing the trunk lid, try pulling it up to make sure it is securely closed.

The trunk lid can be opened with the wireless remote control function, see “—Opening trunk lid” on page 28 in this Section.

⚠ CAUTION

Keep the trunk lid closed while driving. This not only keeps the luggage from being thrown out but also prevents exhaust gases from entering the vehicle.

A warning buzzer may sound when:

- The key is brought into the cabin after the trunk is opened, and the trunk is then closed.
- The key is near the trunk when the trunk is closed.

The buzzer may sound even when the key is not in the trunk. This does not indicate a problem. However, under these circumstances, the trunk cannot be opened using the smart key system. Open the trunk using other methods.

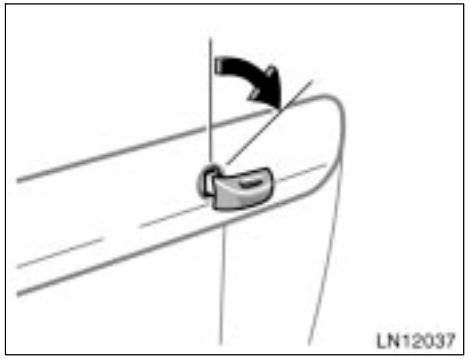
If the trunk is closed with the key left in the trunk when all side doors are locked, a beep will sound continuously for 2 seconds. You can open the trunk pushing the trunk opener switch without carrying another key. However, in some instances, the beep may not sound when the trunk is closed depending on the location of the key in the trunk. In addition, when the doors are open or unlocked, the beep may not sound when the trunk is closed. When closing the trunk, make sure that the key is not left in it.

—Opening trunk lid by lock release lever

To open the trunk lid from the driver’s seat, pull up on the lock release lever.

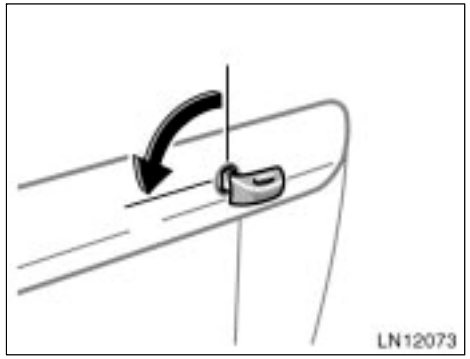
To deactivate this lock release lever from opening the trunk lid, see “—Luggage security system” described below.

—Opening trunk lid with mechanical key



To open the trunk lid manually from the outside, insert the mechanical key and turn it clockwise.

—Luggage security system



This system helps protect things locked in the trunk by safeguarding the trunk lid lock release lever from unwanted access.

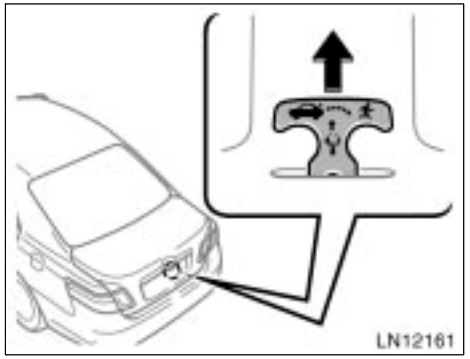
Close the trunk lid. Insert the mechanical key and turn it counterclockwise to deactivate the trunk lid lock release lever.

After the operation, try pulling up on the trunk lid lock release lever to make sure it is locked.

NOTICE

Implement the above steps to maximize security of the luggage in the trunk whenever the vehicle is unattended.

—Internal trunk release strap



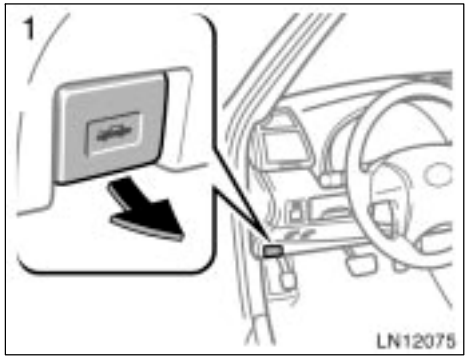
If a person is locked in the trunk, he/she can pull up the phosphorescent strap on the inside of trunk lid to open the trunk lid.

The phosphorescent (glow−in−the−dark) strap will continue to glow for a time after the trunk lid is closed. Exposing the handle to stronger light will cause it to glow longer.

⚠ CAUTION

- **Always lock the trunk lid and all doors, and keep away the vehicle keys out of children’s reach.**
- **Never leave children unattended in the vehicle. Unsupervised children may lock themselves in the vehicle or trunk and suffer serious injuries or death.**

Hood

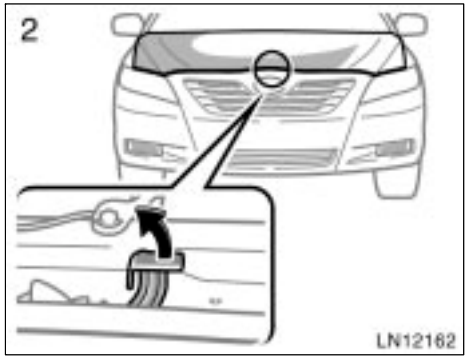


To open the hood:

1. Pull the hood lock release lever. The hood will spring up slightly.

⚠ CAUTION

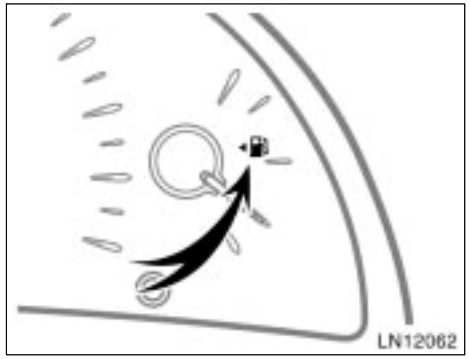
Before driving, be sure that the hood is closed and securely locked. Otherwise, the hood may open unexpectedly while driving and an accident may occur.



2. In front of the vehicle, pull up the auxiliary catch lever and lift the hood.

Before closing the hood, check to see that you have not forgotten any tools, rags, etc. Then lower the hood and make sure it locks into place. If necessary, press down gently on the front edge to lock it.

Fuel tank cap—

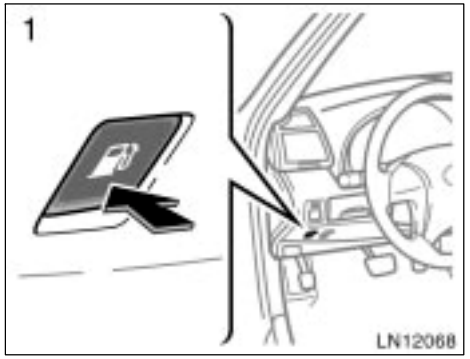


This indicates that the fuel filler door is on the left side of your vehicle.

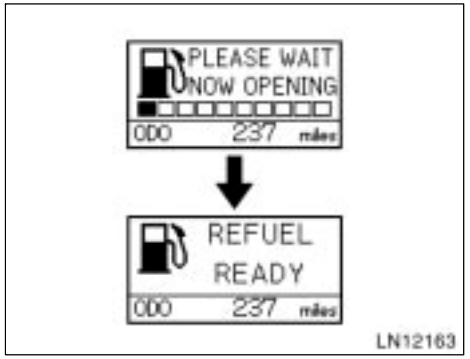
To refuel your vehicle, turn the hybrid system off.

⚠ CAUTION

Do not smoke, cause sparks or allow open flames in the area when refueling. The fumes are flammable.



1. To open the fuel filler door, push the switch.



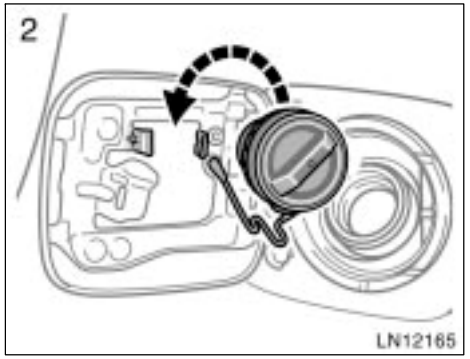
If the pressure in the fuel tank is high, a message “PLEASE WAIT NOW OPENING” will appear on the multi−information display. It may take up to 10 seconds if the internal pressure is high. The segments in the display increase to indicate the time left. The segments in the display decrease to indicate the time left.

When the pressure lowers, a message “REFUEL READY” will appear and the fuel filler door will open.

If the fuel filler door does not open, the opener may have a malfunction. For details, see “—If the fuel filler door opener is not actuated” on page 53 in this Section.

⚠ CAUTION

When opening the cap, do not remove the cap quickly. In hot weather, fuel under pressure could cause injury by spraying out of the filler neck if the cap is suddenly removed.



2. **Turn the cap slowly counterclockwise and remove it.**

   The removed cap can be stored on the backside of the fuel filler door.

When reinstalling, turn the cap clockwise until you hear a click.

If the cap is not tightened securely, the malfunction indicator lamp will come on. Make sure the cap is tightened securely. The indicator lamp will go off after driving the vehicle several times. If the indicator lamp does not go off, contact your Toyota dealer as soon as possible.

If you leave the fuel filler door open and start the hybrid system, a message “CLOSE FUEL LID” will appear on the multi−information display. Make sure the fuel filler door is closed.

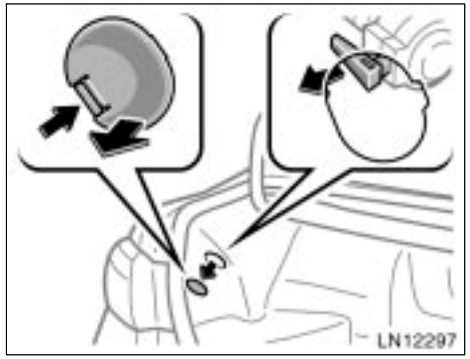
⚠ CAUTION

- **Make sure the cap is installed securely to prevent fuel spillage in the event of an accident.**
- **Use only a genuine Toyota fuel tank cap for replacement. It is designed to regulate fuel tank pressure.**

NOTICE

Finish refueling within 30 minutes. If more than 30 minutes passes, the internal valve closes. In this condition, fuel may spill out if you continue to refuel the vehicle. About 5 minutes after the valve is closed, a message “CLOSE FUEL LID” will appear on the multi−information display. To refuel the vehicle again, tighten the fuel tank cap and close the fuel filler door, and then push the fuel filler door opener switch again.

—If the fuel filler door opener is not actuated



If the opener is not actuated, contact your Toyota dealer to service the vehicle. If you must refuel your vehicle, you can open the fuel filler door manually as instructed below.

The system to lower internal pressure in the fuel tank may not be functioning so you must turn the cap slowly with releasing the pressure. In addition, fuel may spill out during refueling. Fill the fuel tank carefully and slowly.

1. **Open the trunk and remove the cover located in the left−hand side of the trunk.**
2. **Pull the manual lock release lever.**

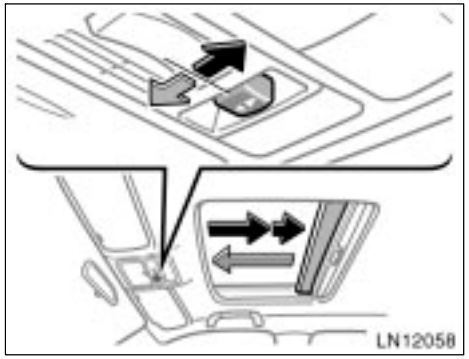
   The fuel filler door will open.
3. **Turn the cap slowly counterclockwise.**

   You may hear a slight swoosh when you remove the cap.

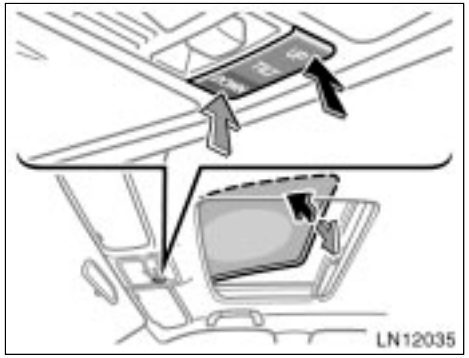
⚠ CAUTION

When opening the cap, do not remove it quickly. The fuel may spray out of the filler opening if the cap is suddenly removed.

Electric moon roof



Sliding operation



Tilting operation

To operate the moon roof, use the switches on the overhead console.

The moon roof works when the "POWER" switch is set at ON.

The sun shade can be opened or closed by hand.

Sliding operation—

To open: Push and hold the switch for 1 second toward the vehicle's rear.

The roof will open and stop partway 90 mm (3.6 in.) from the fully opened position. When you push the switch again, the moon roof will open fully. To stop the roof partway, push one of the moon roof switches briefly.

As driving with the moon roof opened fully will cause wind throbs, we recommend you to drive with the moon roof partway 90 mm (3.6 in.) from the fully opened position.

The sun shade will be opened together with the roof.

To close: Push and hold the switch for 1 second toward the vehicle's front.

The roof will fully close automatically. To stop the roof partway, push one of the moon roof switches briefly.

Tilting operation—

To tilt up: Push and hold the "TILT" switch for 1 second on the "UP" side.

The roof will fully tilt up automatically. To stop the roof partway, push one of the moon roof switches briefly.

To tilt down: Push and hold the "TILT" switch for 1 second on the "DOWN" side.

The roof will fully tilt down automatically. To stop the roof partway, push one of the moon roof switches briefly.

Open moon roof reminder: If the moon roof is left open when you set the "POWER" switch at ACC or off and open the driver's door, a message "MOONROOF OPEN" appears on the multi−information display and a warning tone sounds.

Key off operation: If both front doors are closed, the moon roof works for about 45 seconds even after the "POWER" switch is turned off. It stops working when either door is opened.

Jam protection function: If something gets caught between the moon roof and frame during closing operation, the moon roof stops and opens.

If the moon roof receives a strong impact, this function may work even if nothing is caught.

⚠ CAUTION

To avoid death or serious personal injury, you must do the following.

- **While the vehicle is moving, always keep the heads, hands and other parts of the bodies of all occupants away from the roof opening. Otherwise, they could be killed or seriously injured if the vehicle stops suddenly or if the vehicle is involved in an accident.**

- **Before you close the moon roof, always make sure there is nobody around the moon roof. You must also make sure nobody places his or her head, hands and other parts of the body in the roof opening. If someone’s neck, head or hands get caught in the closing roof, it could result in death or serious injury. When anyone closes the moon roof, first make sure it is safe to do so.**
- **Never leave anyone (particularly a small child) alone in your vehicle, especially with the “POWER” switch set at ON. Otherwise, he/she could use the moon roof switch and get trapped in the roof opening. Unattended person (particularly a small child) can be involved in a serious accident.**
- **Never sit on top of the vehicle around the roof opening.**
- **Never try jamming any part of your body to activate the jam protection function intentionally, as it could result in a death or serious injury.**

- **The jam protection function may not work if something gets caught just before the moon roof is fully closed.**

SECTION 1-3

OPERATION OF INSTRUMENTS AND CONTROLS

Occupant restraint systems

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Seats

While the vehicle is being driven, all vehicle occupants should have the seatback upright, sit well back in the seat and properly wear the seat belts provided.

CAUTION

- **Do not drive the vehicle unless the occupants are properly seated. Do not allow any passengers to sit on top of a folded−down seatback, or in the luggage compartment or cargo area. Persons not properly seated and/or not properly restrained by seat belts can be killed or severely injured in the event of emergency braking or a collision.**
- **During driving, do not allow any passengers to stand up or move around between seats. Otherwise, death or severe injuries can occur in the event of emergency braking or a collision.**

Front seats— —Front seat precautions

Driver seat

CAUTION

The SRS driver airbag deploys with considerable force, and can cause death or serious injury especially if the driver is very close to the airbag. The National Highway Traffic Safety Administration (“NHTSA”) advises:

Since the risk zone for driver airbag is the first 50—75 mm (2—3 in.) of inflation, placing yourself 250 mm (10 in.) from your driver airbag provides you with a clear margin of safety. This distance is measured from the center of the steering wheel to your breastbone. If you sit less than 250 mm (10 in.) away now, you can change your driving position in several ways:

- **Move your seat to the rear as far as you can while still reaching the pedals comfortably.**
- **Slightly recline the back of the seat. Although vehicle designs vary, many drivers can achieve the 250 mm (10 in.) distance, even with the driver seat all the way forward, simply by reclining the back of the seat somewhat. If reclining the back of your seat makes it hard to see the road, raise yourself by using a firm, non−slippery cushion, or raise the seat if your vehicle has that feature.**
- **If your steering wheel is adjustable, tilt it downward. This points the airbag toward your chest instead of your head and neck.**

The seat should be adjusted as recommended by NHTSA above, while still maintaining control of the foot pedals, steering wheel, and your view of the instrument panel controls.

Front passenger seat

CAUTION

The SRS front passenger airbag also deploys with considerable force, and can cause death or serious injury especially if the front passenger is very close to the airbag. The front passenger seat should be as far from the airbag as possible with the seatback adjusted, so the front passenger sits upright.

Front seats

CAUTION

The SRS side airbags are installed in the driver and front passenger seats. Observe the following precautions.

- Do not lean against the front door when the vehicle is in use, since the side airbag inflates with considerable speed and force. Otherwise, you may be killed or seriously injured.
- Do not use seat accessories which cover the area where the side airbags inflate. Such accessories may prevent the side airbags from activating correctly, causing death or serious injury.
- Do not modify or replace the seats or upholstery of the seats. Such change may prevent the side airbag system from activating correctly, disable the system, or cause the side airbags to inflate accidentally, resulting in death or serious injury.

—Seat adjustment precautions

CAUTION

- Do not adjust the seat while the vehicle is moving as the seat may unexpectedly move and cause the driver to lose control of the vehicle.
- Be careful that the seat does not hit a passenger or luggage.
- After adjusting the seat position, release the lever and try sliding the seat forward and backward to make sure it is locked in position.
- After adjusting the seatback, push your body back against the seat to make sure the seat is locked in position.
- Do not put objects under the seats. Otherwise, the objects may interfere with the seat−lock mechanism or unexpectedly push up the seat position adjusting lever and the seat may suddenly move, causing the driver to lose control of the vehicle.

—Adjusting driver’s seat

● While adjusting the seat, do not put your hands under the seat or near the moving parts. Otherwise, your hands or fingers may be caught and injured.

1. SEAT POSITION AND SEAT HEIGHT ADJUSTING SWITCH

Move the control switch in the desired direction.

Releasing the switch will stop the seat at that position.

Do not place anything under the seat, as this might interfere with the seat movement.

2. SEATBACK ANGLE ADJUSTING SWITCH

Move the control switch in the desired direction.

Releasing the switch will stop the seatback at that position.

CAUTION

Avoid reclining the seatback any more than needed. The seat belts provide maximum protection in a frontal or rear collision when the driver and the front passenger are sitting up straight and well back in the seats. If you are reclined, the lap belt may slide past your hips and apply restraint forces directly to the abdomen or your neck may contact the shoulder belt. In the event of a frontal collision, the more the seat is reclined, the greater the risk of death or serious injury.

3. SEAT LUMBAR SUPPORT ADJUSTING SWITCH

Push the control switch in the desired direction.

The amount of lumbar support will change while the switch is pushed.

—Adjusting front passenger's seat (manual seat)

1. SEATBACK ANGLE ADJUSTING LEVER

Lean forward and pull the lever up. Then lean back to the desired angle and release the lever.

2. SEAT POSITION ADJUSTING LEVER

Hold the center of the lever and pull it up. Then slide the seat to the desired position with slight body pressure and release the lever.

⚠ CAUTION

Avoid reclining the seatback any more than needed. The seat belts provide maximum protection in a frontal or rear collision when the driver and the front passenger are sitting up straight and well back in the seats. If you are reclined, the lap belt may slide past your hips and apply restraint forces directly to the abdomen or your neck may contact the shoulder belt. In the event of a frontal collision, the more the seat is reclined, the greater the risk of death or serious injury.

—Adjusting front passenger’s seats (power seat)

1. SEATBACK ANGLE ADJUSTING SWITCH

Move the control switch in the desired direction.

Releasing the switch will stop the seatback at that position.

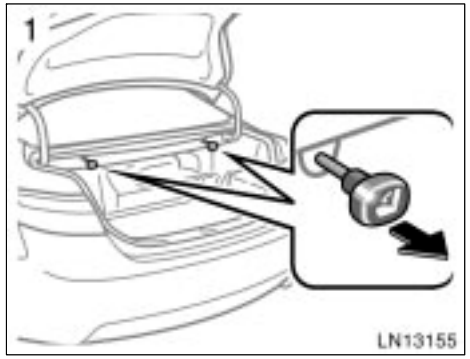
2. SEAT POSITION ADJUSTING SWITCH

Move the control switch in the desired direction.

Releasing the switch will stop the seat at that position.

Do not place anything under the seat, as this might interfere with the seat movement.

Rear seats—
—Fold−down rear seat



FOLDING DOWN REAR SEAT

1. To unlock the seatback, pull the lever in the trunk.

2. Fold down the seatback.

Each seatback can be folded separately.

This will enlarge the trunk as far as the seatbacks. See “—Stowage precautions” on page 295 in Section 2 for precautions when loading luggage.

NOTICE

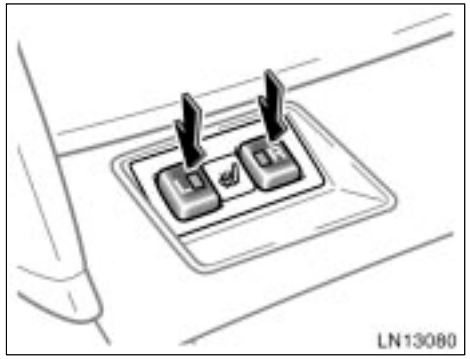
Make sure the luggage loaded in the enlarged trunk will not damage the webbing of the rear center seat belt when the left seatback is folded down.

⚠ CAUTION

When returning the seatback to the upright position, observe the following precautions in order to prevent death or serious injury in a collision or sudden stop:

- **Make sure the seatback is securely locked by pushing forward and rearward on the top of the seatback. Failure to do so will prevent the seat belt from operating properly.**
- **Make sure the seat belts are not twisted or caught in the seatback and are arranged in the proper position and are ready to use.**

Seat heaters



To turn on the seat heater, push the switch. At this time, the indicator light will illuminate to indicate the seat heater is operating.

To turn off the seat heater, push the switch once again.

The “POWER” switch must be set at ON to operate seat heaters.

⚠ CAUTION

Occupants must use caution when operating the seat heater because it may make them feel too hot or cause burns at low temperatures (erythema, varicella). Use extra caution for the following:

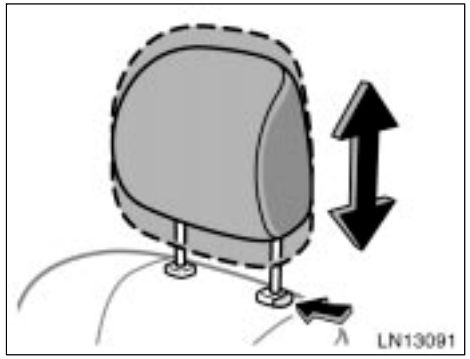
- **Babies, small children, elderly persons, sick persons or persons with physical disabilities**
- **Persons who have sensitive skin**
- **Persons who are exhausted**
- **Persons who have taken alcohol or drugs which induce sleep (sleeping drug, cold remedy, etc.)**

To prevent the seat overheating, do not use the seat heater with a blanket, cushion, or other insulating objects which cover the seat.

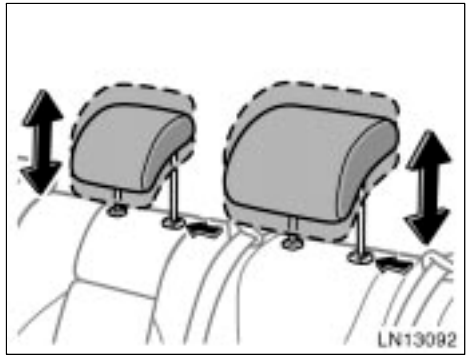
NOTICE

- ***Do not put unevenly weighed objects on the seat and do not stick sharp objects (needles, nails, etc.) into the seat.***
- ***When cleaning the seats, do not use organic substances (paint thinner, benzine, alcohol, gasoline, etc.). They may damage the heater and seat surface.***
- ***To prevent the 12 volt battery from being discharged, turn the switch off when the hybrid system is turned off.***

Head restraints



Front



Rear

For your safety and comfort, adjust the head restraint before driving.

To raise: Pull it up.
To lower: Push it down while pressing the lock release button.

Rear center head restraint—When an occupant sits on the rear center seat, always pull up the rear center head restraint to the lock position.

The head restraint is most effective when it is close to your head. Therefore, using a cushion on the seatback is not recommended.

⚠ CAUTION

- **Adjust the center of the head restraint so that it is closest to the top of your ears.**
- **After adjusting the head restraint, make sure it is locked in position.**
- **Do not drive with the head restraints removed.**

Armrest

To use the armrest, pull it out as shown above.

Seat belts—
—Seat belt precautions

Toyota strongly urges that the driver and passengers in the vehicle be properly restrained at all times with the seat belts provided. Failure to do so could increase the chance of injury and/or the severity of injury in accidents.

The seat belts provided for your vehicle are designed for people of adult size, large enough to properly wear them.

Child. Use a child restraint system appropriate for the child until the child becomes large enough to properly wear the vehicle’s seat belts. See “Child restraint” on page 96 in this Section for details.

If a child is too large for a child restraint system, the child should sit in the rear seat and must be restrained using the vehicle’s seat belt. According to accident statistics, the child is safer when properly restrained in the rear seat than in the front seat.

If a child must sit in the front seat, the seat belts should be worn properly. If an accident occurs and the seat belts are not worn properly, the force of the rapid inflation of the airbag may cause death or serious injury to the child.

Do not allow any children to stand up or kneel on either rear or front seats. An unrestrained child could suffer serious injury or death during emergency braking or a collision. Also, do not let the child sit on your lap. Holding a child in your arms does not provide sufficient restraint.

Pregnant woman. Toyota recommends the use of a seat belt. Ask your doctor for specific recommendations. The lap belt should be worn securely and as low as possible over the hips and not on the waist.

Injured person. Toyota recommends the use of a seat belt. Depending on the injury, first check with your doctor for specific recommendations.

⚠ CAUTION

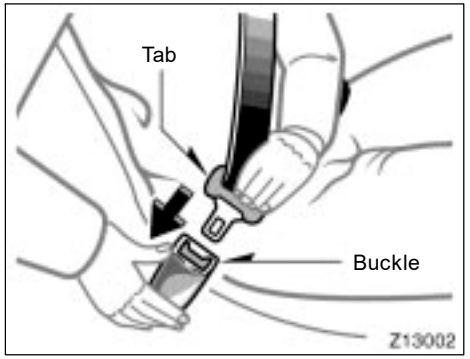
Persons should ride in their seats properly wearing their seat belts whenever the vehicle is moving. Otherwise, they are much more likely to suffer serious bodily injury or death in the event of sudden braking or a collision.

When using the seat belts, observe the following:

- **Use the belt for only one person at a time. Do not use a single belt for two or more people—even children.**
- **Avoid reclining the seatback any more than needed. The seat belts provide maximum protection in a frontal or rear collision when the driver and the front passenger are sitting up straight and well back in the seats. If you are reclined, the lap belt may slide past your hips and apply restraint forces directly to the abdomen or your neck may contact the shoulder belt. In the event of a frontal collision, the more the seat is reclined, the greater the risk of death or serious injury.**

- **Be careful not to damage the belt webbing or hardware. Take care that they do not get caught or pinched in the seat or doors.**
- **Inspect the belt system periodically. Check for cuts, fraying, and loose parts. Damaged parts should be replaced. Do not disassemble or modify the system.**
- **Keep the belts clean and dry. If they need cleaning, use a mild soap solution or lukewarm water. Never use bleach, dye, or abrasive cleaners, or allow them to come into contact with the belts—they may severely weaken the belts. (See “Cleaning the interior” on page 336 in Section 5.)**
- **Replace the belt assembly (including bolts) if it has been used in a severe impact. The entire assembly should be replaced even if damage is not obvious.**

—Fastening front and rear seat belts



Adjust the seat as needed and sit up straight and well back in the seat. To fasten your belt, pull it out of the retractor and insert the tab into the buckle.

You will hear a click when the tab locks into the buckle.

The seat belt length automatically adjusts to your size and the seat position.

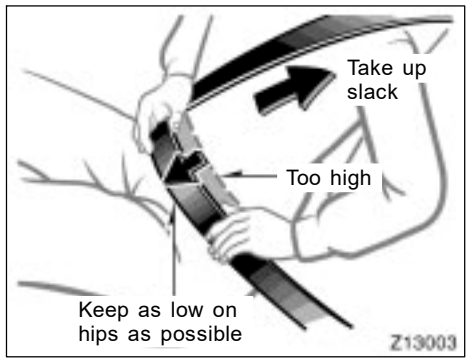
The retractor will lock the belt during a sudden stop or on impact. It also may lock if you lean forward too quickly. A slow, easy motion will allow the belt to extend, and you can move around freely.

When a passenger’s shoulder belt is completely extended and is then retracted even slightly, the belt is locked in that position and cannot be extended. This feature is used to hold the child restraint system securely. (For details, see “Child restraint” on page 96 in this Section.) To free the belt again, fully retract the belt and then pull the belt out once more.

If the seat belt cannot be pulled out of the retractor, firmly pull the belt and release it. You will then be able to smoothly pull the belt out of the retractor.

⚠ CAUTION

- **After inserting the tab, make sure the tab and buckle are locked and that the belt is not twisted.**
- **Do not insert coins, clips, etc. in the buckle as this may prevent you from properly latching the tab and buckle.**
- **If the seat belt does not function normally, immediately contact your Toyota dealer. Do not use the seat until the seat belt is fixed, because it cannot protect an adult occupant or your child from death or serious injury.**

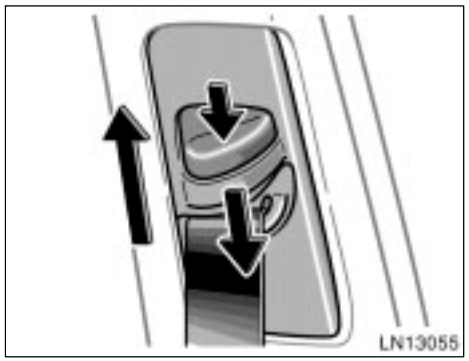


Adjust the position of the lap and shoulder belts.

Position the lap belt as low as possible on your hips—not on your waist, then adjust it to a snug fit by pulling the shoulder portion upward through the latch plate.

⚠ CAUTION

- **Both high−positioned lap belts and loose−fitting belts could cause serious injuries due to sliding under the lap belt during a collision or other unintended event. Keep the lap belt positioned as low on hips as possible.**
- **Do not place the shoulder belt under your arm.**



Seat belts with an adjustable shoulder anchor—

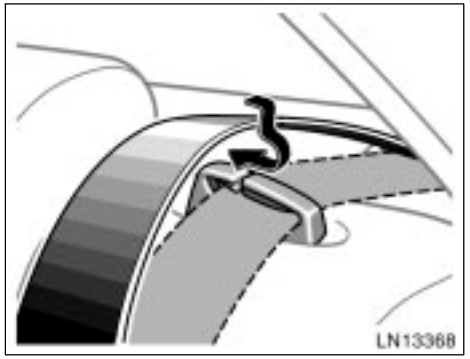
Adjust the shoulder anchor position to your size.

To raise: Slide the anchor up.
To lower: Push in the lock release button and slide the anchor down.

After adjustment make sure the anchor is locked in position.

⚠ CAUTION

Always make sure the shoulder belt is positioned across the center of your shoulder. The belt should be kept away from your neck, but not falling off your shoulder. Failure to do so could reduce the amount of protection in an accident and cause death or serious injures in a collision.



Rear seat belts—

Use the seat belt after passing it through the guide if the seat belt comes free from the guide.

⚠ CAUTION

- **Always make sure the shoulder belt passes through the guide when using the seat belt. Failure to properly position the belt may reduce the amount of protection in an accident and could lead to serious injures in a collision or sudden stop.**
- **Always make sure that the seat belt is not twisted, does not get caught in the guide or the seatback and is arranged in the proper position.**

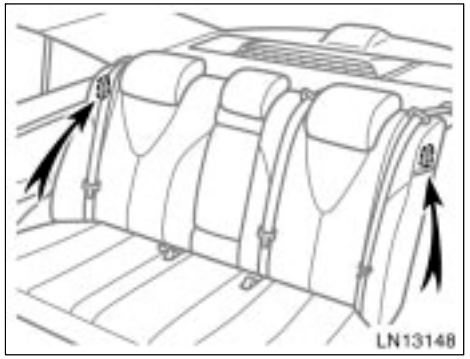
—Seat belt comfort guides

To release the belt, press the buckle release button and allow the belt to retract.

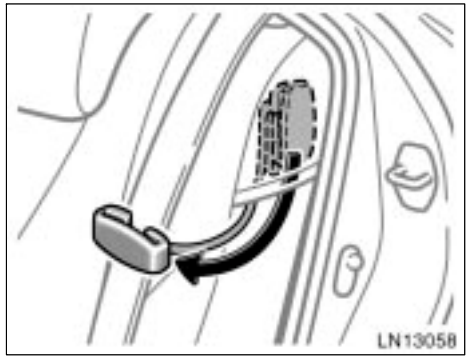
If the belt does not retract smoothly, pull it out and check for kinks or twists. Then make sure it remains untwisted as it retracts.

The outside shoulder belt comfort guides for the rear seat outside positions will provide added seat belt comfort for children who have outgrown child restraints and for small adults. When the outside shoulder belt is inserted through the guide, the comfort guide pulls the belt away from the neck and head of an occupant.

To use the comfort guide, do as follows.

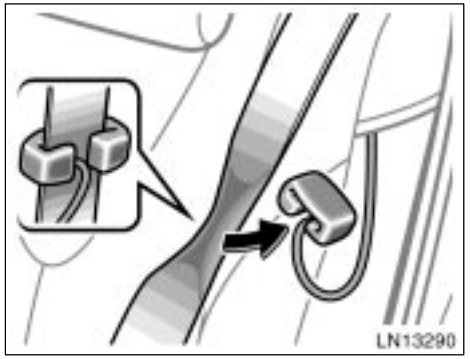


Seat belt comfort guides are stored in the both pockets on the sides of the rear seatback.



INSTALLING THE COMFORT GUIDE

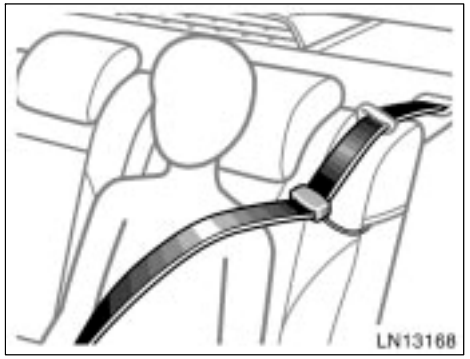
1. Pull out the comfort guide from the pocket.



2. Pinch the two edges of the shoulder belt for the rear seat outside position with your fingers and slide the belt past the slot of the guide as shown above. At this time, the elastic cord must be behind the seat belt.

⚠ CAUTION

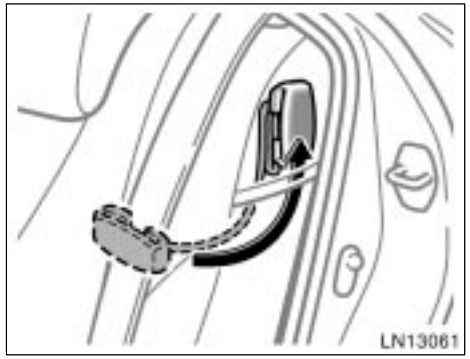
Make sure the belt is not twisted and that it lies flat. The elastic cord must be behind the belt and the guide must be on the front.



3. Buckle, position and release the seat belt. (For wearing the seat belt, see “—Fastening front and rear seat belts” on page 67 in this Section.)

⚠ CAUTION

Always make sure the shoulder belt is positioned across the center of the shoulder. The belt should be kept away from the neck, and should not fall off the shoulder. Failure to observe these precautions could reduce the effectiveness of the seat belt in an accident, causing death or serious injury.



REMOVING AND STORING THE COMFORT GUIDE

Pinch the two edges of the seat belt together so that you can slide them out of the guide. Store the guide with the elastic cord into the pocket.

⚠ CAUTION

To reduce the chance of injury in case of an accident or a sudden stop while driving, remove and store the comfort guide in its pocket when it is not in use.

—Seat belt extender

If your seat belts cannot be fastened securely because they are not long enough, a personalized seat belt extender is available from your Toyota dealer free of charge.

Please contact your local Toyota dealer to order the proper required length for the extender. Bring the heaviest coat you expect to wear for proper measurement and selection of length. Additional ordering information is available at your Toyota dealer.

⚠ CAUTION

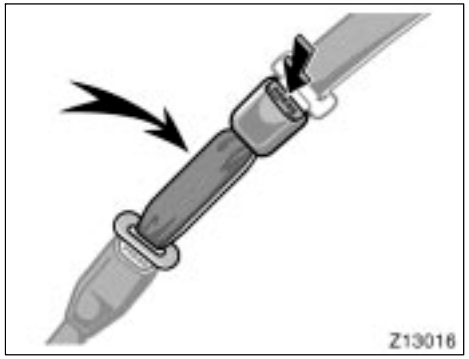
When using the seat belt extender, observe the following precautions. Failure to follow these instructions could reduce the effectiveness of the seat belt restraint system in case of an accident, increasing the chance of death or serious injury.

- **Remember that the extender provided for you may not be safe when used on a different vehicle, for another person, or at a different seating position than the one originally intended.**

- **If the seat belt extender has been connected to the driver’s seat belt buckle without wearing the seat belt when using the extender in the driver’s seat, the SRS driver’s airbag system will judge that the driver wears the seat belt even if not wearing it. In this case, the driver’s airbag may not activate correctly, causing death or serious injury in the event of collision. Be sure to wear the seat belt with the seat belt extender.**

- **Make sure the “AIRBAG ON” indicator light is illuminated when using the seat belt extender for the front passenger seat. If the “AIRBAG OFF” indicator light is illuminated, disconnect the extender tongue from the seat belt buckle, then reconnect the seat belt. Reconnect the seat belt extender after making sure the “AIRBAG ON” indicator light is illuminated. If you use the seat belt extender while the “AIRBAG OFF” indicator light is illuminated, the front passenger airbag and side airbag on the front passenger side may not activate correctly, causing death or serious injury in the event of collision.**
- **Be sure to wear the seat belt without the seat belt extender if you can fasten the seat belt without the extender.**

- **Do not use the seat belt extender when installing a child restraint system on the front or rear passenger seat. If installing a child restraint system with the seat belt extender connected to the seat belt, the seat belt will not securely hold the child restraint system, which could cause death or serious injury to the child or other passengers in the event of collision.**



To connect the extender to the seat belt, insert the tab into the seat belt buckle so that the “PRESS” signs on the buckle release buttons of the extender and the seat belt are both facing outward as shown.

You will hear a click when the tab locks into the buckle.

When releasing the seat belt, press on the buckle release button on the extender, not on the seat belt. This helps prevent damage to the vehicle interior and extender itself.

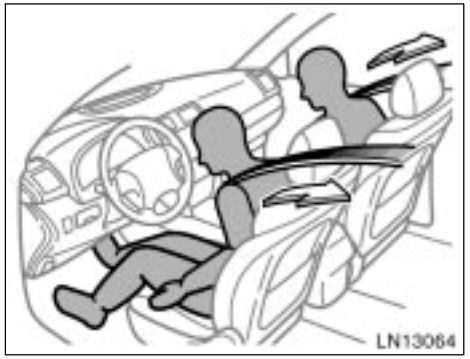
As far as the seat belt extender on the front passenger side is concerned, do not fail to disconnect the extender from the seat belt after the above operation in order to activate the front passenger airbag correctly when getting into the vehicle next time.

When not in use, remove the extender and store in the vehicle for future use.

⚠ CAUTION

- **After inserting the tab, make sure the tab and buckle are locked and that the lap and shoulder portions of the belt and the seat belt extender are not twisted.**
- **Do not insert coins, clips, etc. in the buckle as this may prevent you from properly latching the tab and buckle.**
- **If the seat belt does not function normally, immediately contact your Toyota dealer. Do not use the seat until the seat belt is fixed, because it cannot protect an adult occupant or your child from death or serious injury.**

—Seat belt pretensioners

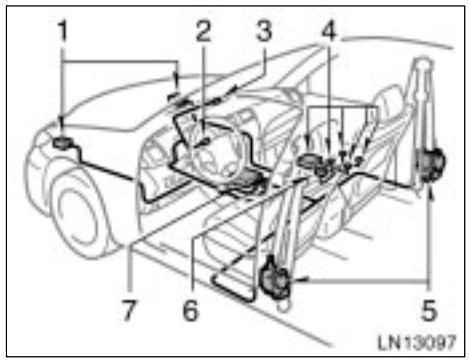


The driver and front passenger seat belt pretensioners are designed to be activated in response to a severe frontal impact.

When the sensor detects a severe frontal impact, the front seat belts are quickly drawn back by the retractors so that the belts snugly restrain the occupants.

The front passenger’s seat belt pretensioner will not activate if no passenger is detected in the front passenger seat by the front passenger occupant classification system. However, the front passenger’s seat belt pretensioner may activate if luggage is put on the seat, or the seat belt is buckled up regardless of the presence of an occupant in the seat. (As for the front passenger occupant classification system, see “—Front passenger occupant classification system” on page 92 in this Section.)

The seat belt pretensioners and SRS airbags may not operate together in all collisions.



The seat belt pretensioner system consists mainly of the following components and their locations are shown in the illustration.

1. Front airbag sensors
2. SRS warning light
3. “AIRBAG ON” and “AIRBAG OFF” indicator lights (for front passenger airbag and side airbag on the front passenger seat)
4. Front passenger occupant classification system (ECU and sensors)
5. Seat belt pretensioner assemblies
6. Front passenger’s seat belt buckle switch
7. Airbag sensor assembly

The seat belt pretensioners are controlled by the airbag sensor assembly. The airbag sensor assembly consists of a safing sensor and airbag sensor.

When the seat belt pretensioners are activated, an operating noise may be heard and a small amount of non−toxic gas may be released. This does not indicate that a fire is occurring. This gas is normally harmless.

Once the seat belt pretensioners have been activated, the seat belt retractors remain locked.

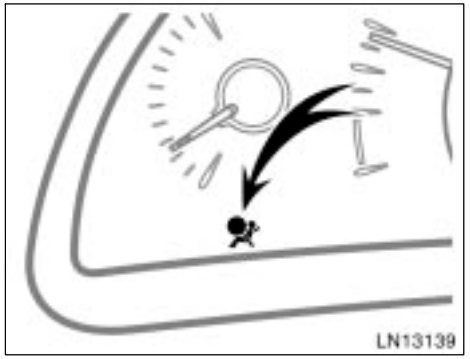
⚠ CAUTION

Do not modify, remove, strike or open the seat belt pretensioner assemblies, airbag sensor or surrounding area or wiring. Failure to follow these instructions may prevent the seat belt pretensioners from activating correctly, cause sudden operation of the system or disable the system, which could result in death or serious injury. Consult your Toyota dealer about any repair and modification.

NOTICE

Do not perform any of the following changes without consulting your Toyota dealer. Such changes can interfere with proper operation of the seat belt pretensioners in some cases.

- ***Installation of electronic devices such as a mobile two−way radio, cassette tape player or compact disc player***
- ***Repairs on or near the front seat belt retractor assemblies***
- ***Modification of the suspension system***
- ***Modification of the front end structure***
- ***Attachment of a grille guard (bull bar, kangaroo bar, etc.), snowplow, winches or any other equipment to the front end***
- ***Repairs made on or near the front fenders, front end structure or console***

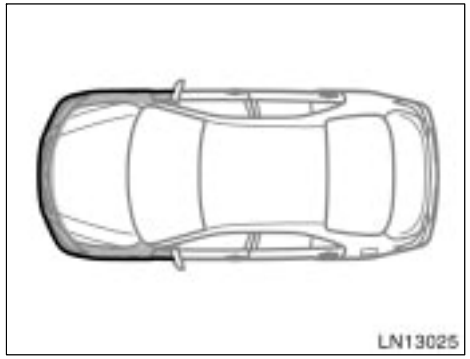


This indicator comes on when the “POWER” switch is set at ON. It goes off after about 6 seconds. This means the seat belt pretensioners are operating properly.

This warning light system monitors the airbag sensor assembly, front airbag sensors, side and curtain shield airbag sensors, curtain shield airbag sensors, driver’s seat position sensor, driver’s seat belt buckle switch, front passenger occupant classification system, “AIRBAG ON” indicator light, “AIRBAG OFF” indicator light, front passenger’s seat belt buckle switch, seat belt pretensioner assemblies, inflators, interconnecting wiring and power sources. (For details, see “Service reminder indicators and warning buzzers” on page 150 in Section 1−6.)

If any of the following conditions occurs, this indicates a malfunction of the airbags or seat belt pretensioners. Contact your Toyota dealer as soon as possible.

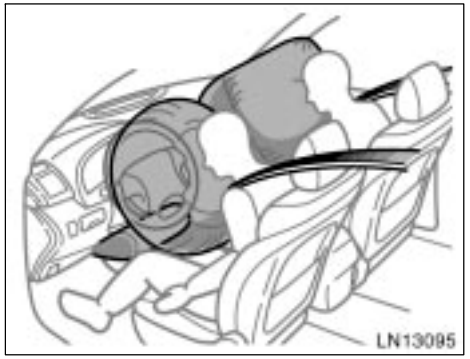
- The light does not come on when the “POWER” switch is set at ON or remains on for more than about 6 seconds.
- The light comes on or starts flashing while driving.
- If any seat belt does not retract or cannot be pulled out due to a malfunction or activation of the relevant seat belt pretensioner.
- The seat belt pretensioner assembly or surrounding area has been damaged.



In the following cases, contact your Toyota dealer as soon as possible:

- The front of the vehicle (shaded in the illustration) was involved in an accident that was not severe enough to cause the seat belt pretensioners to operate.
- Either seat belt pretensioner assembly or surrounding area is scratched, cracked, or otherwise damaged.

SRS airbags—
—SRS driver airbag, driver knee airbag and front passenger airbag



The SRS (Supplemental Restraint System) front airbags are designed to provide further protection for the driver and front passenger in addition to the primary safety protection provided by the seat belts.

Your vehicle is equipped with “ADVANCED AIRBAGS” designed based on US motor vehicle safety standards (FMVSS208). The airbag system controls airbag deployment power for the driver and front passenger. The driver airbag system consists of the driver seat’s position sensor etc. The front passenger’s airbag system consists of the front passenger occupant classification sensor etc.

In response to a severe frontal impact, the SRS front airbags work with the seat belts to help reduce injury by inflating. The SRS front airbags help reduce injuries mainly to the driver’s or front passenger’s head, chest or knee caused by hitting the vehicle interior.

The SRS front passenger airbag will not activate if there is no passenger sitting in the front passenger seat. However, the front passenger airbag may deploy if luggage is put in the seat, or the seat belt is buckled up, regardless of the presence of an occupant in the seat. (As for the front passenger occupant classification system, see “—Front passenger occupant classification system” on page 92 in this Section.)

Always wear your seat belt properly.

⚠ CAUTION

- **The SRS front airbag system is designed only as a supplement to the primary protection of the driver and front passenger seat belt systems. The driver and front passenger can be killed or seriously injured by the inflating airbags if they do not wear the available seat belts properly. During sudden braking just before a collision, an unrestrained driver or front passenger can move forward into direct contact with or close proximity to the airbag which may then deploy during the collision. To ensure maximum protection in an accident, the driver and all passengers in the vehicle must wear their seat belts properly. Wearing a seat belt properly during an accident reduces the chances of death or serious injury or being thrown out of the vehicle. For instructions and precautions concerning the seat belt system, see “Seat belts” on page 66 in this Section.**

- **Improperly seated and/or restrained infants and children can be killed or seriously injured by the deploying airbags. An infant or child who is too small to use a seat belt should be properly secured using a child restraint system. Toyota strongly recommends that all infants and children be placed in the rear seat of the vehicle and properly restrained. The rear seat is the safest for infants and children. For instructions concerning the installation of a child restraint system, see “Child restraint” on page 96 in this Section.**

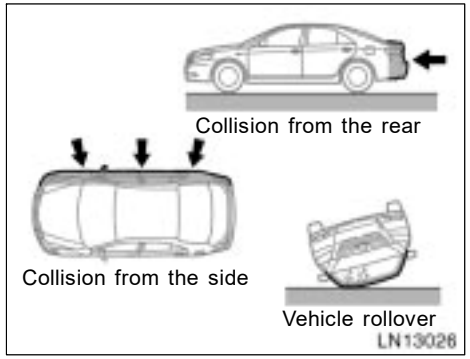
The SRS front airbags are designed to deploy in severe (usually frontal) collisions where the magnitude and duration of the forward deceleration of the vehicle exceeds the designed threshold level.

The SRS front airbags will deploy if the severity of the impact is above the designed threshold level, comparable to an approximate 25 km/h (15 mph) collision when the vehicle has the impact straight into a fixed barrier that does not move or deform.

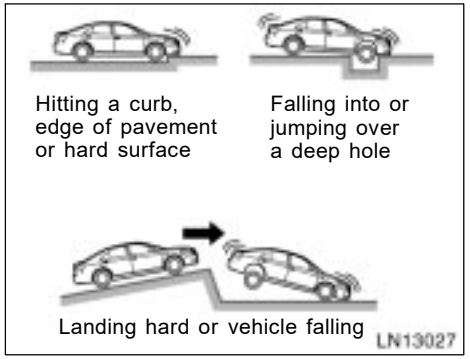
However, this threshold velocity will be considerably higher if the vehicle strikes an object, such as a parked vehicle or sign pole, which can move or deform on impact, or if the vehicle is involved in an underride collision (e.g. a collision in which the front of the vehicle “underrides”, or goes under, the bed of a truck, etc.).

It is possible that in some collisions where the forward deceleration of the vehicle is very close to the designed threshold level, the SRS front airbags and the seat belt pretensioners may not activate together.

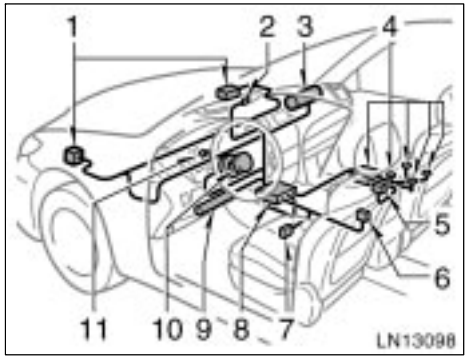
Always wear your seat belts properly.



The SRS front airbags are not generally designed to inflate if the vehicle is involved in a side or rear collision, if it rolls over, or if it is involved in a low−speed frontal collision. But, whenever a collision of any type causes sufficient forward deceleration of the vehicle, deployment of the SRS front airbags may occur.



The SRS front airbags may also deploy if a serious impact occurs to the underside of your vehicle. Some examples are shown in the illustration.



The SRS front airbag system consists mainly of the following components, and their locations are shown in the illustration.

1. Front airbag sensors
2. “AIRBAG ON” and “AIRBAG OFF” indicator lights (for front passenger airbag and side airbag on the front passenger seat)
3. Airbag module for front passenger (airbag and inflator)
4. Front passenger occupant classification system (ECU and sensors)
5. Front passenger’s seat belt buckle switch
6. Driver’s seat belt buckle switch

7. Driver’s seat position sensor
8. Airbag sensor assembly
9. Knee airbag module for driver (airbag and inflator)
10. Airbag module for driver (airbag and inflator)
11. SRS warning light

The airbag sensor assembly consists of a safing sensor and airbag sensor.

The front airbag sensors constantly monitor the forward deceleration of the vehicle. If an impact results in a forward deceleration beyond the designed threshold level, the system triggers the airbag inflators. At this time a chemical reaction in the inflators very quickly fills the airbags with non−toxic gas to help restrain the forward motion of the occupants. The front airbags then quickly deflate, so that there is no obstruction of the driver’s vision should it be necessary to continue driving.

When the airbags inflate, they produce a loud noise and release some smoke and residue along with non−toxic gas. This does not indicate a fire. This smoke may remain inside the vehicle for some time, and may cause some minor irritation to the eyes, skin or breathing. Be sure to wash off any residue as soon as possible to prevent any potential skin irritation with soap and water. If you can safely exit from the vehicle, you should do so immediately.

Deployment of the airbags happens in a fraction of a second, so the airbags must inflate with considerable force. While the system is designed to reduce serious injuries, primarily to the head and chest, it may also cause other, less severe injuries to the face, chest, arms and hands. These are usually in the nature of minor burns or abrasions and swelling, but the force of a deploying airbag can cause more serious injuries, especially if an occupant’s hands, arms, chest or head is in close proximity to the airbag module at the time of deployment. This is why it is important for the occupant to; avoid placing any object or part of the body between the occupant and the airbag module; sit straight and well back into the seat; wear the available seat belt properly; and sit as far as possible from the airbag module, while still maintaining control of the vehicle.

Parts of the airbag module (steering wheel hub, lower portion of driver’s side instrument panel, airbag cover and inflator) may be hot for several minutes after deployment, so do not touch! The airbags inflate only once. The windshield may be damaged by absorbing some of the force of the inflating airbag.

⚠ CAUTION

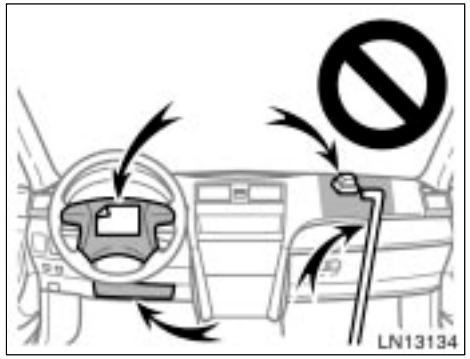
The driver or front passenger who is too close to the steering wheel, lower portion of driver’s side instrument panel or dashboard during airbag deployment can be killed or seriously injured. Toyota strongly recommends that:

- **The driver sit as far back as possible from the steering wheel while still maintaining control of the vehicle.**
- **The front passenger sit as far back as possible from the dashboard.**
- **All vehicle occupants be properly restrained using the available seat belts.**

For instructions and precautions concerning the seating position, see “—Front seat precautions” on page 58 in this Section.

- **Do not sit on the edge of the seat or lean against the dashboard when the vehicle is in use, since the front passenger airbag could inflate with considerable speed and force. Anyone who is up against, or very close to, an airbag when it inflates, can be killed or seriously injured. Sit up straight and well back in the seat, and always use your seat belt properly.**

- **Toyota strongly recommends that all infants and children be placed in the rear seat of the vehicle and be properly restrained.**
- **Do not hold a child on your lap or in your arms. Use a child restraint system in the rear seat. For instructions concerning the installation of a child restraint system, see “Child restraint” on page 96 in this Section.**



- **Do not put anything or any part of your body on or in front of the dashboard, lower portion of driver’s side instrument panel or steering wheel pad that houses the front airbag system. They might restrict inflation or cause death or serious injury as they are projected rearward by the force of the deploying airbags. Likewise, the driver and front passenger should not hold objects in their arms or on their knees.**

- **Do not modify or remove any wiring. Do not modify, remove, strike or open any components such as the steering wheel pad, steering wheel, column cover, dashboard near the front passenger airbag, front passenger airbag cover, front passenger airbag, driver knee airbag or airbag sensor assembly. Doing so may prevent the front airbag system from activating correctly, cause sudden activation of the system or disable the system, which could result in death or serious injury.**

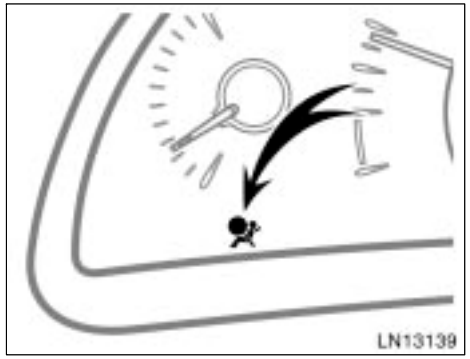
Failure to follow these instructions can result in death or serious injury. Consult your Toyota dealer about any repair and modification.

If you wish to modify your vehicle for a person with a physical disability, consult your Toyota dealer. It may dangerously interfere with the SRS front airbags operation.

NOTICE

Do not perform any of the following changes without consulting your Toyota dealer. Such changes can interfere with proper operation of the SRS front airbag system in some cases.

- ***Installation of electronic devices such as a mobile two−way radio, cassette tape player or compact disc player***
- ***Modification of the suspension system***
- ***Modification of the front end structure***
- ***Attachment of a grille guard (bull bar, kangaroo bar, etc.), snowplow, winches or any other equipment to the front end***
- ***Repairs made on or near the front fenders, front end structure, console, steering column, steering wheel or dashboard near the front passenger airbag***



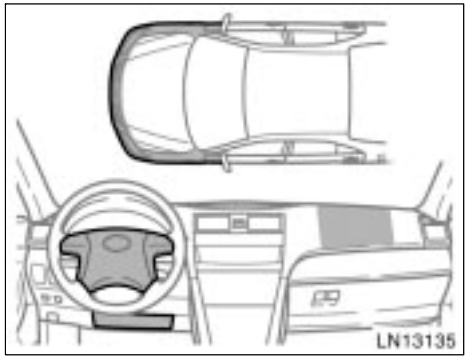
The indicator comes on when the “POWER” switch is set at ON. It goes off after about 6 seconds. This means the SRS front airbags are operating properly.

This warning light system monitors the airbag sensor assembly, front airbag sensors, side and curtain shield airbag sensors, curtain shield airbag sensors, driver’s seat position sensor, driver’s seat belt buckle switch, front passenger occupant classification system, “AIRBAG ON” indicator light, “AIRBAG OFF” indicator light, front passenger’s seat belt buckle switch, seat belt pretensioner assemblies, inflators, interconnecting wiring and power sources. (For details, see “Service reminder indicators and warning buzzers” on page 150 in Section 1−6.)

If any of the following conditions occurs, this indicates a malfunction of the airbags or seat belt pretensioners. Contact your Toyota dealer as soon as possible.

- The light does not come on when the “POWER” switch is set at ON or remains on for more than about 6 seconds.
- The light comes on or starts flashing while driving.

The SRS warning light and “AIRBAG OFF” indicator light will come on if there is a malfunction in the front passenger occupant classification system.



In the following cases, contact your Toyota dealer as soon as possible:

- The SRS front airbags have been inflated.
- The front of the vehicle (shaded in the illustration) was involved in an accident that was not severe enough to cause the SRS front airbags to inflate.
- The pad section of the steering wheel or front passenger airbag cover (shaded in the illustration) is scratched, cracked, or otherwise damaged.

NOTICE

Do not disconnect the 12 volt battery cables before contacting your Toyota dealer.

—SRS side airbags and curtain shield airbags

The SRS (Supplemental Restraint System) side airbags and curtain shield airbags are designed to provide further protection for the driver, front passenger and rear outside passengers in addition to the primary safety protection provided by the seat belts.

In response to a severe side impact, the SRS side airbags and curtain shield airbags work with the seat belts to help reduce injury by inflating. The SRS side airbags help reduce injuries mainly to the driver’s or front passenger’s chest, and the SRS curtain shield airbags help reduce injuries mainly to the driver’s, front passenger’s or rear outside passenger’s head.

The SRS side airbag on the passenger seat will not activate if there is no passenger sitting in the front passenger seat. However, the side airbag on the passenger seat may deploy if luggage is put in the seat, or the seat belt is buckled up regardless of the presence of the occupant in the seat. (As for the front passenger occupant classification system, see “—Front passenger occupant classification system” on page 92 in this Section.)

The SRS curtain shield airbag on the passenger side are activated even with no passenger in the front seat or rear outside seat.

The SRS curtain shield airbags may activate even when the side airbags are not activated.

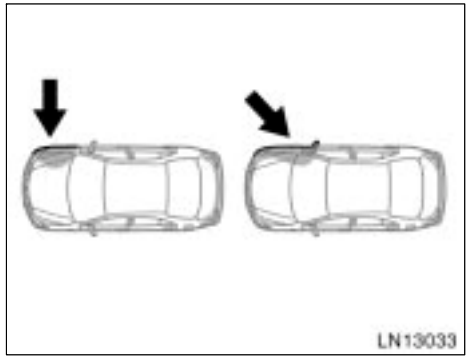
Always wear your seat belt properly.

⚠ CAUTION

- **The SRS side airbag and curtain shield airbag system is designed only as a supplement to the primary protection of the driver, front passenger and rear outside passenger seat belt systems. To ensure maximum protection in an accident, the driver and all passengers in the vehicle must wear their seat belts properly. Wearing a seat belt properly during an accident reduces the chances of death or serious injury or being thrown out of the vehicle. For instructions and precautions concerning the seat belt system, see “Seat belts” on page 66 in this Section.**

- **Do not allow anyone to lean his/her head or any part of his/her body against the door or the area of the seat, front pillar, rear pillar or roof side rail from which the SRS side airbag and curtain shield airbag deploy even if he/she is a child seated in the child restraint system. It is dangerous if the SRS side airbag and curtain shield airbag inflate, and the impact of the deploying airbag could cause death or serious injury to the occupant.**

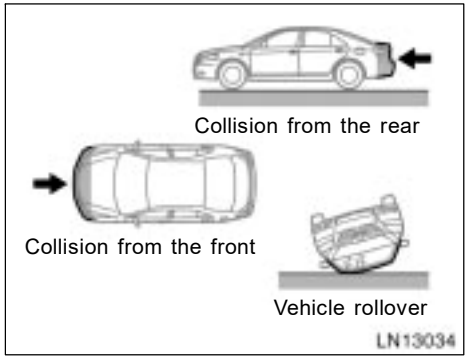
- **Improperly seated and/or restrained infants and children can be killed or seriously injured by the deploying airbags. An infant or child who is too small to use a seat belt should be properly secured using a child restraint system. Toyota strongly recommends that all infants and children be placed in the rear seats of the vehicle and properly restrained. The rear seats are the safest for infants and children. For instructions concerning the installation of a child restraint system, see “Child restraint” on page 96 in this Section.**



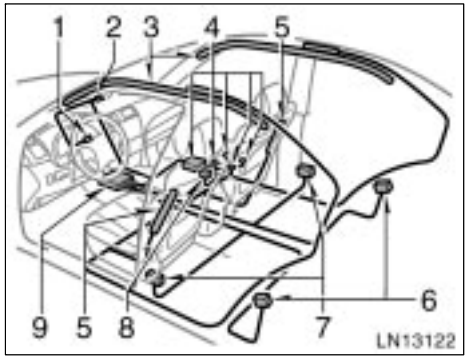
The SRS side airbag and curtain shield airbag system may not activate if the vehicle is subjected to a collision from the side at certain angles, or a collision to the side of the vehicle body other than the passenger compartment as shown in the illustration.

The SRS side airbags and curtain shield airbags are designed to inflate when the passenger compartment area suffers a severe impact from the side.

Always wear your seat belts properly.



The SRS side airbags and curtain shield airbags are not generally designed to inflate if the vehicle is involved in a front or rear collision, if it rolls over, or if it is involved in a low−speed side collision.



The SRS side airbag and curtain shield airbag system consists mainly of the following components, and their locations are shown in the illustration.

1. SRS warning light
2. “AIRBAG ON” and “AIRBAG OFF” indicator lights (for front passenger airbag and side airbag on the front passenger seat)
3. Curtain shield airbag modules (airbag and inflator)
4. Front passenger occupant classification system (ECU and sensors)
5. Side airbag modules (airbag and inflator)
6. Curtain shield airbag sensors

7. Side and curtain shield airbag sensors
8. Front passenger’s seat belt buckle switch
9. Airbag sensor assembly

The SRS side airbag and curtain shield airbag system is controlled by the airbag sensor assembly. The airbag sensor assembly consists of a safing sensor and airbag sensor.

In a severe side impact, the side and curtain shield airbag sensor and/or the curtain shield airbag sensor trigger(s) the side airbag inflators and/or the curtain shield airbag inflators. At this time a chemical reaction in the inflators quickly fills the airbags with non−toxic gas to help restrain the lateral motion of the occupants.

When the airbags inflate, they produce a fairly loud noise and release some smoke and residue along with non−toxic gas. This does not indicate a fire. This smoke may remain inside the vehicle for some time, and may cause some minor irritation to the eyes, skin or breathing. Be sure to wash off any residue as soon as possible to prevent any potential skin irritation with soap and water. If you can safely exit from the vehicle, you should do so immediately.

Deployment of the airbags happens in a fraction of a second, so the airbags must inflate with considerable force. While the system is designed to reduce serious injuries, it may also cause minor burns or abrasions and swelling.

Front seats as well as parts of the front and rear pillars, and roof side rail may be hot for several minutes, but the airbags themselves will not be hot. The airbags are designed to inflate only once.

⚠ CAUTION

SRS side airbags and curtain shield airbags inflate with considerable force. To reduce the possibility of death or serious injury when they inflate, the driver, front passenger and rear outside passengers must:

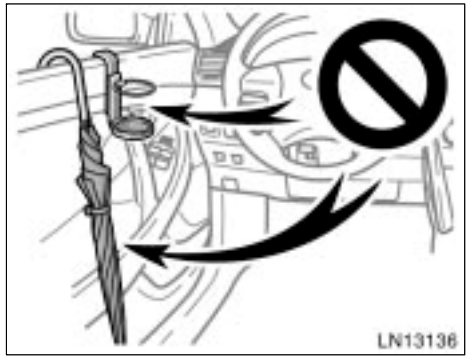
- **Wear their seat belts properly.**
- **Remain properly seated with their backs upright and against the seats at all times.**

- **Do not allow anyone to lean against the door when the vehicle is in use, since the side airbag and curtain shield airbag could inflate with considerable speed and force. Otherwise, he/she may be killed or seriously injured. Special care should be taken especially when you have a small child in the vehicle.**
- **Sit up straight and well back in the seat, distributing your weight evenly in the seat. Do not apply excessive weight to the outer side of the seats with a side airbag and to the front pillar, rear pillar and roof side rail with a curtain shield airbag.**

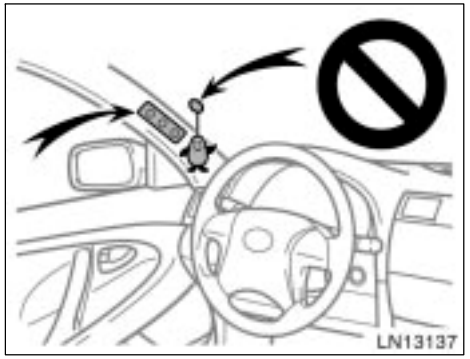
- Do not allow anyone to get his/her head close to the area where the side airbag and curtain shield airbag inflate, since these airbags could inflate with considerable speed and force. Otherwise, he/she may be killed or seriously injured. Special care should be taken especially when you have a small child in the vehicle.

- Do not allow anyone to kneel on the passenger seat, facing the passenger’s side door, since the side airbag and curtain shield airbag could inflate with considerable speed and force. Otherwise, he/she may be killed or seriously injured. Special care should be taken especially when you have a small child in the vehicle.

- Do not allow anyone to get his/her head or hands out of windows, since the curtain shield airbags could inflate with considerable speed and force. Otherwise, he/she may be killed or seriously injured. Special care should be taken especially when you have a small child in the vehicle.



- Do not attach a cup holder or any other device or object on or around the door. When the side airbag inflates, the cup holder or any other device or object will be thrown with great force, or the side airbag may not activate correctly, resulting in death or serious injury. Likewise, the driver and front passenger should not hold objects in their arms or on their knees.



- Do not attach a microphone or any other device or object around the area where the curtain shield airbag activates such as on the windshield glass, side door glass, front and rear pillars, roof side rail and assist grips. When the curtain shield airbag inflates, the microphone or other device or object will be thrown away with great force or the curtain shield airbag may not activate correctly, resulting in death or serious injury.

- Do not hook a hanger, heavy or sharp pointed objects on the coat hook. If the curtain shield airbag inflates, those items will be thrown away with great force or the curtain shield airbag may not activate correctly, resulting in death or serious injury. When you hang clothes, hang them on the coat hook directly.
- Do not use seat accessories which cover the parts where the side airbags inflate. Such accessories may prevent the side airbags from activating correctly, causing death or serious injury.
- Do not modify or replace the seats or upholstery of the seats. Such changes may prevent the side airbag system from activating correctly, disable the system or cause the side airbags to inflate accidentally, resulting in death or serious injury.

- **Do not disassemble or repair the front and rear pillars and roof side rails containing the curtain shield airbags. Such changes may disable the system or cause the curtain shield airbags to inflate accidentally, resulting in death or serious injury.**

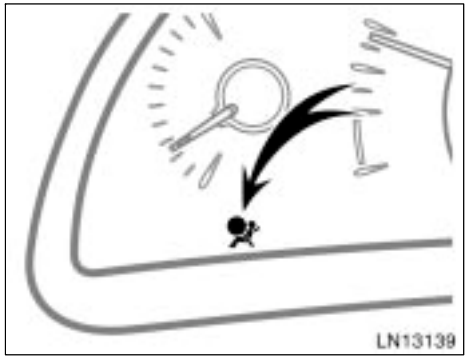
Failure to follow these instructions can result in death or serious injury. Consult your Toyota dealer about any repair and modification.

If you wish to modify your vehicle for a person with a physical disability, consult your Toyota dealer. It may dangerously interfere with the SRS side airbags and curtain shield airbags operation.

NOTICE

Do not perform any of the following changes without consulting your Toyota dealer. Such changes can interfere with proper operation of the SRS side airbag and curtain shield airbag system in some cases.

- ***Installation of electronic devices such as a mobile two-way radio, cassette tape player or compact disc player***
- ***Modification of the suspension system***
- ***Modification of the side structure of the passenger compartment***
- ***Repairs made on or near the console or front seat***



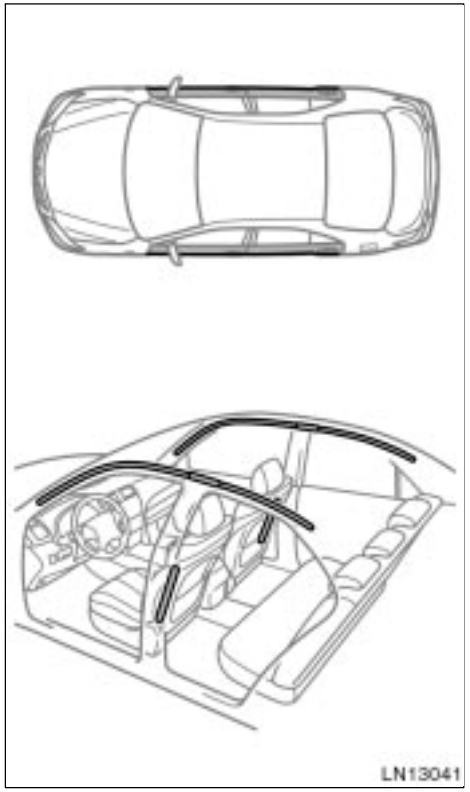
This indicator comes on when the “POWER” switch is set at ON. It goes off after about 6 seconds. This means the SRS side airbags and curtain shield airbags are operating properly.

This warning light system monitors the airbag sensor assembly, front airbag sensors, side and curtain shield airbag sensors, curtain shield airbag sensors, driver’s seat position sensor, driver’s seat belt buckle switch, front passenger occupant classification system, “AIRBAG ON” indicator light, “AIRBAG OFF” indicator light, front passenger’s seat belt buckle switch, seat belt pretensioner assemblies, inflators, interconnecting wiring and power sources. (For details, see “Service reminder indicators and warning buzzers” on page 150 in Section 1−6.)

If any of the following conditions occurs, this indicates a malfunction of the airbags or seat belt pretensioners. Contact your Toyota dealer as soon as possible.

- The light does not come on when the “POWER” switch is set at ON or remains on for more than about 6 seconds.
- The light comes on or starts flashing while driving.

The SRS warning light and “AIRBAG OFF” indicator light will come on if there is a malfunction in the front passenger occupant classification system.



In the following cases, contact your Toyota dealer as soon as possible:

- Any of the SRS side airbags and curtain shield airbags have been inflated.
- The portion of the doors (shaded in the illustration) was involved in an accident that was not severe enough to cause the SRS side airbags and curtain shield airbags to inflate.
- The surface of the seats with the side airbag (shaded in the illustration) is scratched, cracked, or otherwise damaged.
- The portion of the front pillars, rear pillars or roof side rail garnishes (padding) containing the curtain shield airbags inside (shaded in the illustration) is scratched, cracked, or otherwise damaged.

NOTICE

Do not disconnect the 12 volt battery cables before contacting your Toyota dealer.

—Front passenger occupant classification system

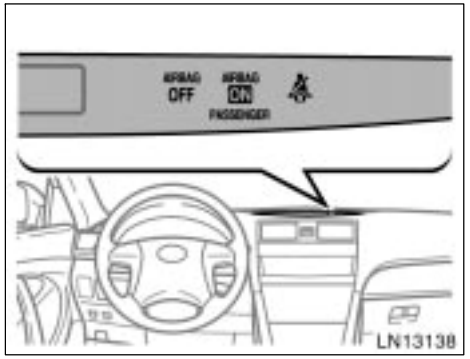
Your vehicle is equipped with a front passenger occupant classification system. This system detects the conditions 1—4 in the table on page 94 and based on these conditions activates or deactivates the following systems;

- Front passenger airbag
- Side airbag on the front passenger seat
- Front passenger’s seat belt pretensioner

The system monitors the weight and load on the front passenger seat, and the seat belt buckle switch to determine conditions 1—4.

In order for the system to detect the conditions correctly, do not do any of the following:

- Apply a heavy load to the front passenger seat or equipment (e.g. seatback pocket).
- Attach a commercial seatback table, etc. to the front passenger seat seatback.
- Put weight on the front passenger seat by putting your hands or feet on the seatback from the rear passenger seat.



The “AIRBAG ON” and “AIRBAG OFF” indicator lights indicate the actuation of the front passenger airbag, side airbag on the front passenger seat and front passenger’s seat belt pretensioner.

The “AIRBAG OFF” indicator light will be illuminated when the “POWER” switch is set at ON with the condition 2 in the table shown below.

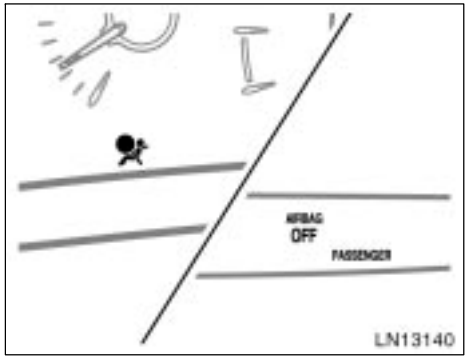
If the front passenger occupant classification system determines that a person of adult size sits in the front passenger seat but the “AIRBAG OFF” indicator light is illuminated, one of the following is likely to have occurred:

- A rear passenger lifts the front passenger seat cushion with their legs.
- Objects are placed under the front passenger seat.
- The front passenger seatback is in contact with the rear seat.

To ensure the system correctly detects an adult sitting in the front passenger seat, make sure the above do not occur.

Make sure that the “AIRBAG ON” indicator light is illuminated when an adult is seated in the front passenger seat. If the “AIRBAG OFF” indicator light is illuminated, ask the passenger to sit up straight, well back in the seat, and with the seat belt worn correctly. If the “AIRBAG OFF” indicator light still remains illuminated, either ask the passenger to move to the rear seat, or if that is not possible, move the front passenger seat fully rearward.

The “AIRBAG ON” and “AIRBAG OFF” indicator lights will be illuminated initially when the “POWER” switch is set at ON. After about four seconds, they will go off. After that, the front passenger occupant classification system operates and judges which indicator light be illuminated.



The SRS warning light and “AIRBAG OFF” indicator light will come on if there is a malfunction in the front passenger occupant classification system.

Condition and operation in the front passenger occupant classification system

<table>
<tr><th rowspan="2">Condition detected by the front passenger occupant classification system</th><th colspan="3">Indicator/warning light</th><th colspan="4">Devices</th></tr>
<tr><th>“AIRBAG ON” and “AIRBAG OFF” indicator lights</th><th>SRS warning light</th><th>Front passenger’s seat belt reminder light</th><th>Front passenger airbag</th><th>Side airbag on the front passenger seat</th><th>Curtain shield airbag in the front passenger side</th><th>Front passenger’s seat belt pretensioner</th></tr>
<tr><td>1. Adult*1</td><td>“AIRBAG ON”</td><td>Off</td><td>Flashing*4</td><td colspan="4">Activated</td></tr>
<tr><td>2. Child*2 or child restraint system*3</td><td>“AIRBAG OFF”</td><td>Off</td><td>Flashing*4</td><td colspan="2">Deactivated</td><td rowspan="3">Activated</td><td>Activated</td></tr>
<tr><td>3. Unoccupied</td><td>Not illuminated</td><td>Off</td><td>Off</td><td colspan="2">Deactivated</td><td>Deactivated</td></tr>
<tr><td>4. There is a malfunction in the system</td><td>“AIRBAG OFF”</td><td>On</td><td>Off</td><td colspan="2">Deactivated</td><td>Activated</td></tr>
</table>

*1: The system judges a person of adult size as an adult. When a smaller adult sits in the front passenger seat, the system may recognize him/her as a child depending on his/her physique and posture.

*2: When a larger child who has outgrown a child restraint system sits in the front passenger seat, the system may recognize him/her as an adult depending on his/her physique or posture.

*3: Never install a rear−facing child restraint system on the front passenger seat. A forward−facing child restraint system should only be installed on the front passenger seat when it is unavoidable. (See “Child restraint” on page 96 in this Section as for installing the child restraint system.)

*4: In the event that the front passenger does not wear a seat belt.

⚠ CAUTION

To avoid potential death or serious injury when the front passenger occupant classification system does not detect the conditions correctly, observe the following.

- **Do not recline the front passenger seat seatback so that it interferes with a rear seat as it may cause the “AIRBAG OFF” indicator light be illuminated. If the seatback interferes with the rear seat, return the seatback to a position where it does not interfere with the rear seat.**

  Keep the front passenger seatback as upright as possible when the vehicle is moving. Reclining the seatback excessively may lessen the effectiveness of the seat belt system.

- **Make sure the “AIRBAG ON” indicator light is illuminated when using the seat belt extender for the front passenger seat. If the “AIRBAG OFF” indicator light is illuminated, disconnect the extender tongue from the seat belt buckle, then reconnect the seat belt. Reconnect the seat belt extender after making sure the “AIRBAG ON” indicator light is illuminated. If you use the seat belt extender while the “AIRBAG OFF” indicator light is illuminated, the front passenger airbag and side airbag on the front passenger side may not activate correctly, which could cause death or serious injury in the event of collision.**

- **If an adult sits in the front passenger seat, the “AIRBAG ON” indicator light should be illuminated. If the “AIRBAG OFF” indicator light is illuminated, ask the passenger to sit up straight, well back in the seat, feet on the floor, and with the seat belt worn correctly. If the “AIRBAG OFF” indicator light still remains illuminated, either ask the passenger to move to the rear seat, or if that is not possible, move the front passenger seat fully rearward.**
- **Wear the seat belt properly.**
- **Make sure the front passenger’s seat belt tab has not been left inserted into the buckle before someone sits in the front passenger seat.**
- **Do not apply a heavy load to the front passenger seat or equipment (e.g. seatback pocket).**

- **Do not put weight on the front passenger seat by putting your hands or feet on the front passenger seat seatback from the rear passenger seat.**
- **Do not let a rear passenger lift the front passenger seat with their feet or press on the seatback with their legs.**
- **Do not put objects under the front passenger seat.**
- **Child restraint systems installed on the rear seat should not contact the front seatbacks.**
- **When it is unavoidable to install the forward−facing child restraint system on the front passenger seat, install the child restraint system on the front passenger seat in the proper order. (As for the installation order, see “—Child restraint system” on page 98 in this Section.)**

- **Do not remove the seat.**
- **Do not kick the front passenger seat or subject it to severe impact. Otherwise, the SRS warning light may come on to indicate a malfunction of the detection system. In this case, contact your Toyota dealer immediately.**

The “AIRBAG ON” indicator light may be illuminated (the front passenger airbag and side airbag on the front passenger seat may deploy) even if observing the above cautions, when a child sits in, or a forward−facing child restraint system is installed on the front passenger seat. Refer to all the cautions in “SRS airbags” on page 77 and “Child restraint” on page 96 in this Section.

Child restraint— —Child restraint precautions

Toyota strongly urges the use of appropriate child restraint systems for children.

The laws of all 50 states in the U.S.A. and Canada now require the use of a child restraint system.

Your vehicle conforms to SAEJ1819.

If a child is too large for a child restraint system, the child should sit in the rear seat and must be restrained using the vehicle’s seat belt. See “Seat belts” on page 66 in this Section for details.

⚠ CAUTION

- **For effective protection in automobile accidents and sudden stops, a child must be properly restrained, using a seat belt or child restraint system depending on age and size of the child. Holding a child in your arms is not a substitute for a child restraint system. In an accident, the child can be crushed against the windshield, or between you and the vehicle’s interior.**

- Toyota strongly urges use of a proper child restraint system which conforms to the size of the child, installed on the rear seat. According to accident statistics, the child is safer when properly restrained in the rear seat than in the front seat.
- Never install a rear−facing child restraint system on the front passenger seat even if the “AIRBAG OFF” indicator light is illuminated. In the event of an accident, the force of the rapid inflation of the front passenger airbag can cause death or serious injury to the child if the rear−facing child restraint system is installed on the front passenger seat.

- A forward−facing child restraint system should be allowed to be installed on the front passenger seat only when it is unavoidable. Always move the seat as far back as possible even if the “AIRBAG OFF” indicator light is illuminated, because the front passenger airbag could inflate with considerable speed and force. Otherwise, the child may be killed or seriously injured.
- Do not allow the child to lean his/her head or any part of his/her body against the door or the area of the seat, front or rear pillar or roof side rail from which the side airbags or curtain shield airbags deploy even if the child is seated in the child restraint system. It is dangerous if the side airbags and/or curtain shield airbags inflate, and the impact could cause death or serious injury to the child.

- Do not use the seat belt extender when installing a child restraint system on the front or rear passenger seat. If installing a child restraint system with the seat belt extender connected to the seat belt, the seat belt will not securely hold the child restraint system, which could cause death or serious injury to the child or other passengers in the event of collision.
- Make sure you have complied with all installation instructions provided by the child restraint manufacturer and that the system is properly secured. If it is not secured properly, it may cause death or serious injury to the child in the event of a sudden stop or accident.

—Child restraint system

A child restraint system for a small child or baby must itself be properly restrained on the seat with the lap portion of the lap/shoulder belt. You must carefully consult the manufacturer’s instructions which accompany the child restraint system.

To provide proper restraint, use a child restraint system following the manufacturer’s instructions about the appropriate age and size of the child for the child restraint system.

Install the child restraint system correctly following the instructions provided by its manufacturer. General directions are also provided under the following illustrations.

The child restraint system should be installed on the rear seat. According to accident statistics, the child is safer when properly restrained in the rear seat than in the front seat.

When not using the child restraint system, keep it secured with the seat belt or place it in the trunk or somewhere other than the passenger compartment. This will prevent it from injuring passengers in the event of a sudden stop or accident.

—Types of child restraint system

Child restraint systems are classified into the following 3 types depending on the child’s age and size.

(A) Infant seat
(B) Convertible seat
(C) Booster seat

Install the child restraint system following the instructions provided by its manufacturer.

Your vehicle has anchor brackets for securing the top strap of a child restraint system.

For instructions about how to use the anchor bracket, see “—Using a top strap” on page 109 in this Section.

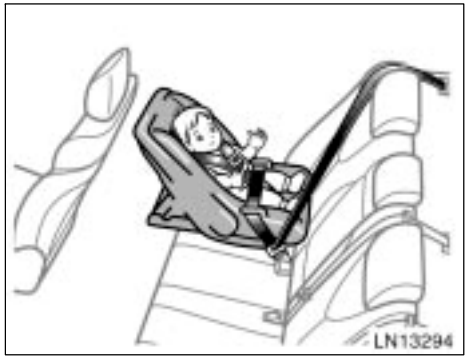
The child restraint lower anchorages approved for your vehicle may also be used. See “—Installation with child restraint lower anchorages” on page 111 in this Section.

(A) Infant seat

(B) Convertible seat

—Installation with seat belt

(C) Booster seat



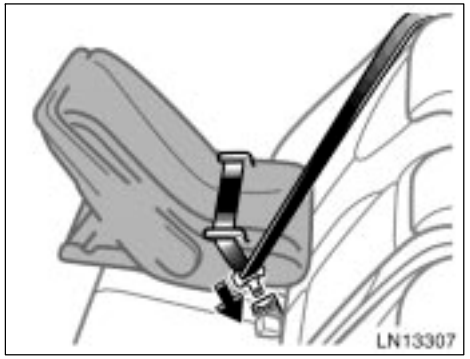
(A) INFANT SEAT INSTALLATION

An infant seat must be used in rear−facing position only.

⚠ CAUTION

- **Never install a rear−facing child restraint system on the front passenger seat even if the “AIRBAG OFF” indicator light is illuminated. In the event of an accident, the impact of the rapid inflation of the front passenger airbag could cause death or serious injury to the child if the rear−facing child restraint system is installed on the front passenger seat.**

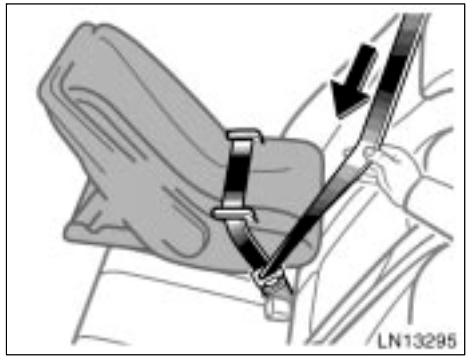
- **Do not install a child restraint system on the rear seat if it interferes with the lock mechanism of the front seats. Otherwise, the child or front seat occupant(s) may be killed or seriously injured in case of sudden braking or a collision.**
- **If the driver’s seat position does not allow sufficient space for safe installation, install the child restraint system on the rear right seat.**



1. Run the lap and shoulder belt through or around the infant seat following the instructions provided by its manufacturer and insert the tab into the buckle taking care not to twist the belt. Keep the lap portion of the belt tight.

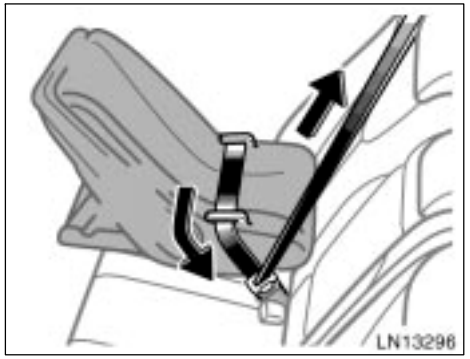
⚠ CAUTION

- **After inserting the tab, make sure the tab and buckle are locked and that the lap and shoulder portions of the belt are not twisted.**
- **Do not insert coins, clips, etc. in the buckle as this may prevent your child from properly latching the tab and buckle.**
- **If the seat belt does not function normally, it cannot protect your child from death or serious injury. Contact your Toyota dealer immediately. Do not install the child restraint system on the seat until the seat belt is fixed.**

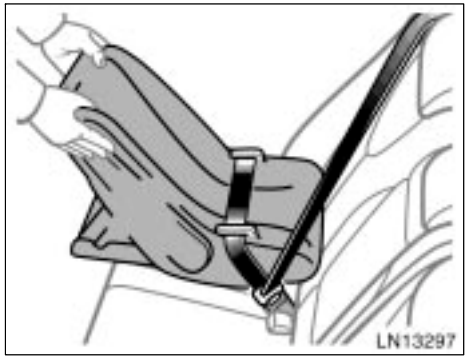


2. Fully extend the shoulder belt to put it in the lock mode. When the belt is then retracted even slightly, it cannot be extended.

To hold the infant seat securely, make sure the belt is in the lock mode before letting the belt retract.

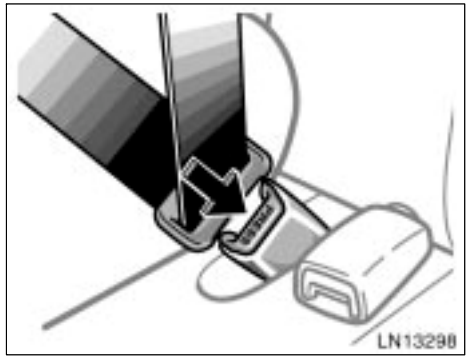


3. While pressing the infant seat firmly against the seat cushion and seatback, let the shoulder belt retract as far as it will go to hold the infant seat securely.

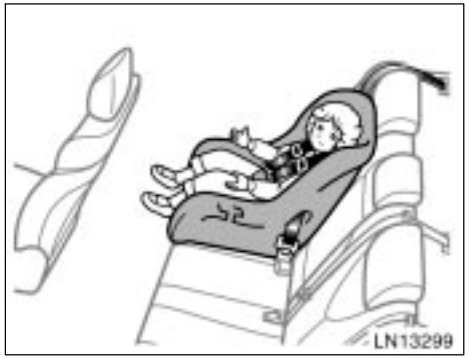


⚠ CAUTION

Push and pull the child restraint system in different directions to be sure it is secure. Follow all the installation instructions provided by its manufacturer.



4. To remove the infant seat, press the buckle release button and allow the belt to retract completely. The belt will move freely again and be ready to work for an adult or older child passenger.



(B) CONVERTIBLE SEAT INSTALLATION

A convertible seat must be used in forward−facing or rear−facing position depending on the age and size of the child. When installing, follow the manufacturer’s instructions about the appropriate age and size of the child as well as directions for installing the child restraint system.

Install the child restraint system on the front passenger seat only when it is unavoidable. Your vehicle is equipped with a front passenger occupant classification system. In order to activate the occupant classification system correctly, install the forward−facing child restraint system on the front passenger seat in the following order:

1. Press the “POWER” switch and set it at ON.
2. Move the front passenger seat to the rearward position.
3. Put the child restraint system on the front passenger seat without putting your weight on the front passenger seat.
4. Insert the seat belt tab into the seat belt buckle.
5. Fully extend the shoulder belt to put it in the lock mode. When the belt is then retracted even slightly, it cannot be extended. To hold the seat securely, make sure the belt is in the lock mode before letting the belt retract.
6. While pressing the convertible seat firmly against the seat cushion and seatback, let the shoulder belt retract as far as it will go to hold the convertible seat securely.

⚠ CAUTION

Push and pull the child restraint system in different directions to be sure it is secure. Follow all the installation instructions provided by its manufacturer.

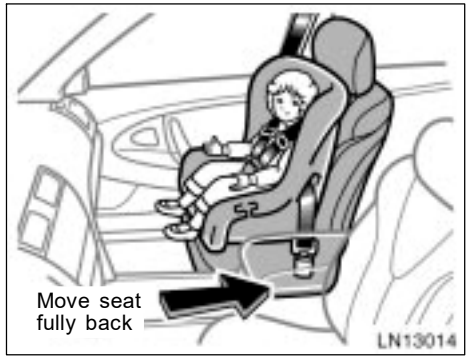
7. Put a child on the child restraint system and secure the child, complying with the instructions provided by the child restraint system manufacturer.

The “AIRBAG OFF” indicator light should be illuminated when the “POWER” switch is set at ON and the child is in the child restraint system after following these procedures. The “AIRBAG OFF” indicator light indicates the SRS front passenger airbag and side airbag on the passenger side will not deploy. If the “AIRBAG ON” indicator light is illuminated, remove the child restraint system and reinstall it with the hybrid system turned off. If the “AIRBAG ON” indicator light is illuminated when the “POWER” switch is set at ON, then the SRS front passenger airbag and side airbag on the passenger side may deploy in an accident. Do not drive the vehicle in this condition. Remove the child restraint system and contact your Toyota dealer.

⚠ CAUTION

- **Never install a rear−facing child restraint system on the front passenger seat. A forward−facing child restraint system should only be installed on the front passenger seat when unavoidable. If you must install the child restraint system on the front passenger seat, put the seat in its most rearward position, and install the forward−facing child restraint system in the proper order. Otherwise, the front passenger occupant classification system can not detect the presence of the child restraint system and the front passenger airbag and side airbag on the front passenger seat could deploy, and the impact could cause death or serious injury to the child.**

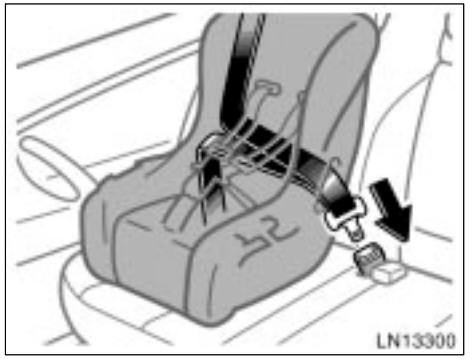
- **Never install a rear−facing child restraint system on the front passenger seat even if the “AIRBAG OFF” indicator light is illuminated. In the event of an accident, the impact of the rapid inflation of the front passenger airbag could cause death or serious injury to the child if the rear−facing child restraint system is installed on the front passenger seat.**



- A forward−facing child restraint system should be allowed to be installed on the front passenger seat only when it is unavoidable. Always move the seat as far back as possible even if the “AIRBAG OFF” indicator light is illuminated, because the front passenger airbag could inflate with considerable speed and force. Otherwise, the child may be killed or seriously injured.

- Do not allow the child to lean his/her head or any part of his/her body against the door or the area of the seat, front or rear pillar or roof side rail from which the side airbags or curtain shield airbags deploy even if the child is seated in the child restraint system. It is dangerous if the side airbag and/or curtain shield airbag inflate, and the impact could cause death or serious injury to the child.

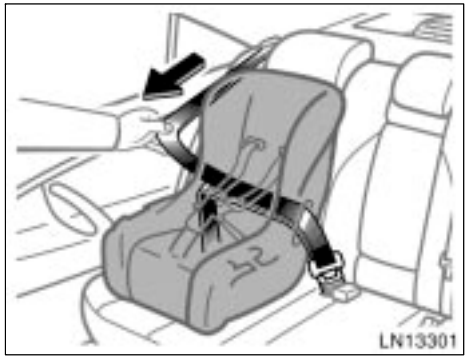
- Do not install a child restraint system on the rear seat if it interferes with the lock mechanism of the front seats. Otherwise, the child or front seat occupant(s) may be killed or seriously injured in case of sudden braking or a collision.
- If the driver’s seat position does not allow sufficient space for safe installation, install the child restraint system on the rear right seat.



1. Run the lap and shoulder belt through or around the convertible seat following the instructions provided by its manufacturer and insert the tab into the buckle taking care not to twist the belt. Keep the lap portion of the belt tight.

⚠ CAUTION

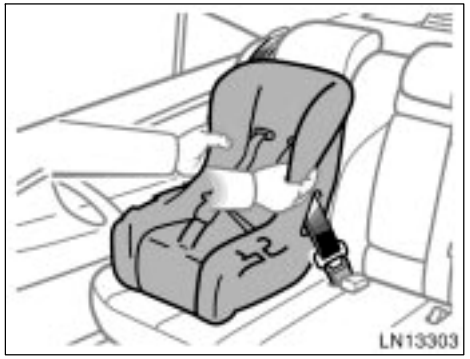
- **After inserting the tab, make sure the tab and buckle are locked and that the lap and shoulder portions of the belt are not twisted.**
- **Do not insert coins, clips, etc. in the buckle as this may prevent your child from properly latching the tab and buckle.**
- **If the seat belt does not function normally, it cannot protect your child from death or serious injury. Contact your Toyota dealer immediately. Do not install the child restraint system on the seat until the seat belt is fixed.**



2. Fully extend the shoulder belt to put it in the lock mode. When the belt is then retracted even slightly, it cannot be extended.

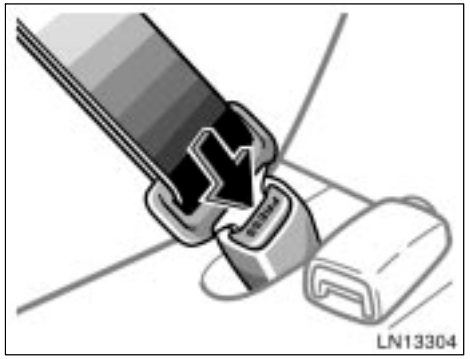
To hold the convertible seat securely, make sure the belt is in the lock mode before letting the belt retract.

3. While pressing the convertible seat firmly against the seat cushion and seatback, let the shoulder belt retract as far as it will go to hold the convertible seat securely.



⚠ CAUTION

Push and pull the child restraint system in different directions to be sure it is secure. Follow all the installation instructions provided by its manufacturer.



4. To remove the convertible seat, press the buckle release button and allow the belt to retract completely. The belt will move freely again and be ready to work for an adult or older child passenger.

(C) BOOSTER SEAT INSTALLATION

A booster seat must be used in forward−facing position only.

CAUTION

- **A forward−facing child restraint system should be allowed to be installed on the front passenger seat only when it is unavoidable. Always move the seat as far back as possible even if the “AIRBAG OFF” indicator light is illuminated, because the front passenger airbag could inflate with considerable speed and force. Otherwise, the child may be killed or seriously injured.**

- **Do not allow the child to lean his/her head or any part of his/her body against the door or the area of the seat, front or rear pillar or roof side rail from which the side airbags or curtain shield airbags deploy even if the child is seated in a child restraint system. It is dangerous if the side airbag and/or curtain shield airbag inflate, and the impact could cause death or serious injury to the child.**

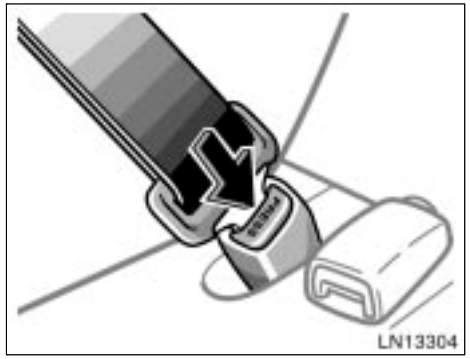
1. Sit the child on a booster seat. Run the lap and shoulder belt through or around the booster seat and across the child following the instructions provided by its manufacturer and insert the tab into the buckle taking care not to twist the belt.

Make sure the shoulder belt is correctly across the child’s shoulder and that the lap belt is positioned as low as possible on the child’s hips. See “Seat belts” on page 66 in this Section for details.

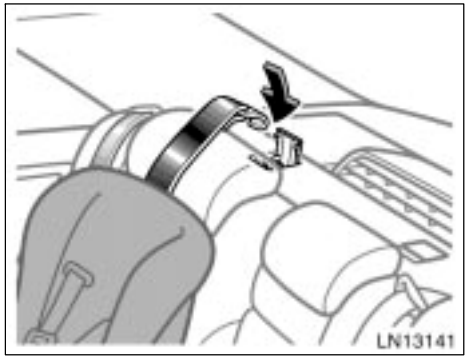
⚠ CAUTION

- **Always make sure the shoulder belt is positioned across the center of child’s shoulder. The belt should be kept away from child’s neck, but not falling off child’s shoulder. Otherwise, the child may be killed or seriously injured in case of sudden braking or a collision.**
- **Both high−positioned lap belts and loose−fitting belts could cause death or serious injuries due to sliding under the lap belt during a collision or other unintended event. Keep the lap belt positioned as low on a child’s hips as possible.**
- **For child’s safety, do not place the shoulder belt under child’s arm.**
- **After inserting the tab, make sure the tab and buckle are locked and that the lap and shoulder portions of the belt are not twisted.**
- **Do not insert coins, clips, etc. in the buckle as this may prevent your child from properly latching the tab and buckle.**
- **If the seat belt does not function normally, it cannot protect your child from death or serious injury. Contact your Toyota dealer immediately. Do not install the child restraint system on the seat until the seat belt is fixed.**

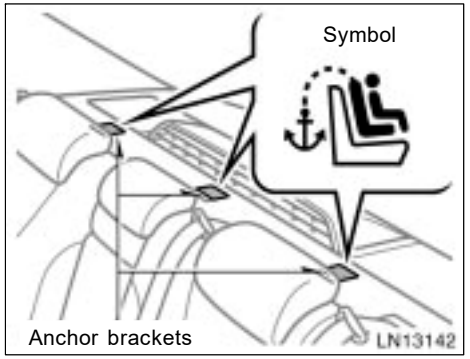
—Using a top strap



2. To remove the booster seat, press the buckle release button and allow the belt to retract.



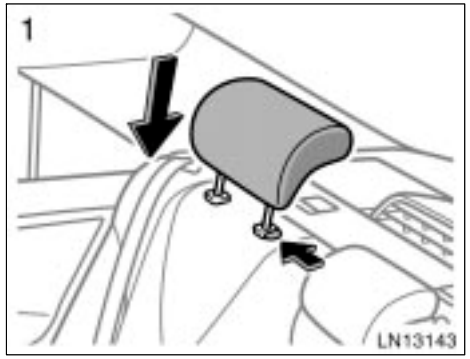
Follow the procedure below for a child restraint system that requires the use of a top strap.



Use the anchor bracket on the package tray behind the rear seat to attach the top strap.

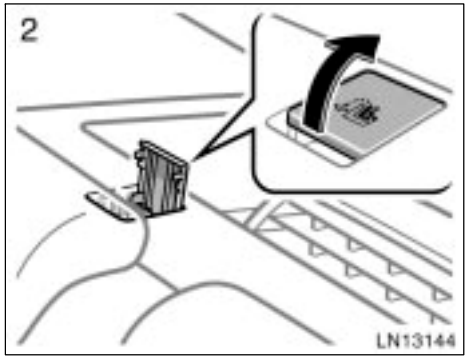
Anchor brackets are installed for each rear seating position.

This symbol indicates the locations of the anchor brackets.

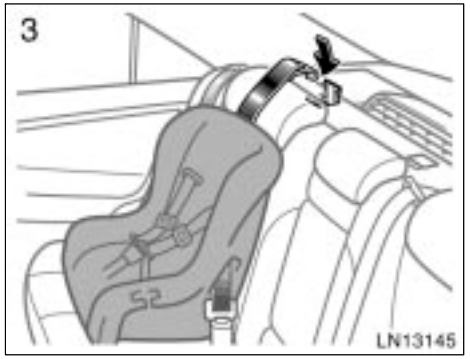


TO USE THE ANCHOR BRACKET:

1. **Lower the head restraint to the lowest position.**



2. **Open the lid of the anchor bracket.**



3. **Fix the child restraint system with the seat belt.**

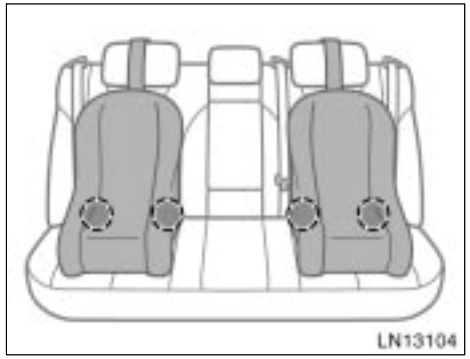
   Latch the hook onto the anchor bracket and tighten the top strap.

For instructions to install the child restraint system, see “Child restraint” on page 96 in this Section.

⚠ CAUTION

Make sure the top strap is securely latched, and check that the child restraint system is secure by pushing and pulling it in different directions. Follow all the installation instructions provided by its manufacturer.

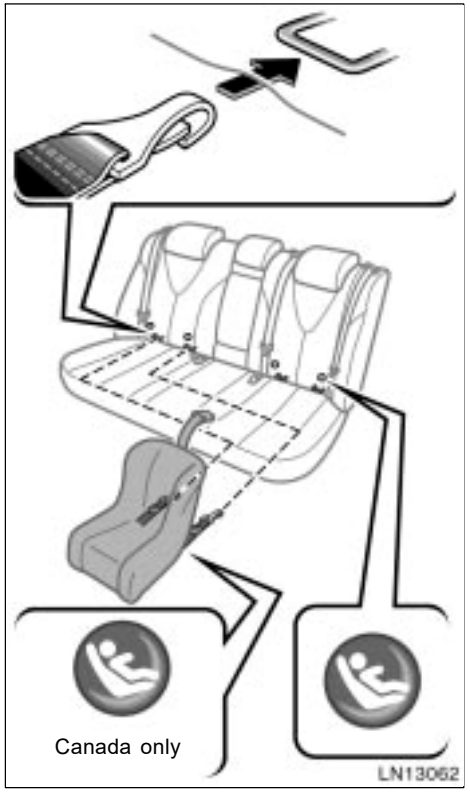
—Installation with child restraint lower anchorages



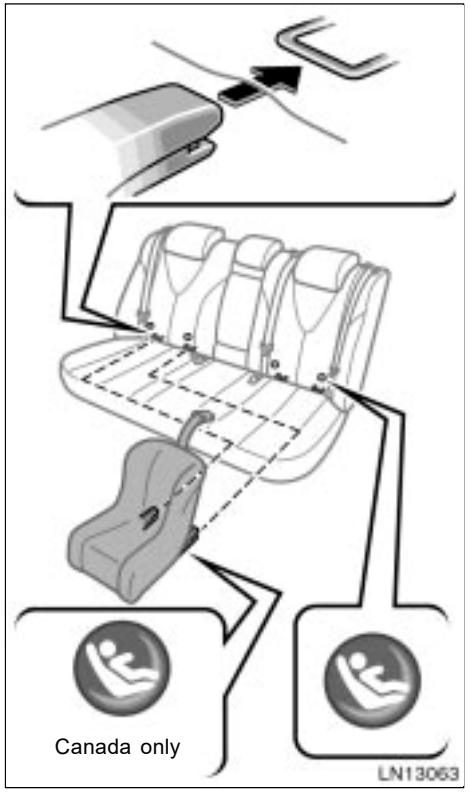
Lower anchorages for the child restraint systems interfaced with the FMVSS225 or CMVSS210.2 specifications are installed in the rear seat.

The anchorages are installed in the clearance between the seat cushion and seatback of both outside rear seats.

Child restraint systems interfaced with the FMVSS213 or CMVSS213 specification can be fixed with these anchorages. In this case, it is not necessary to fix the child restraint system with a seat belt on the vehicle.



Type A



Type B

CHILD RESTRAINT SYSTEM INSTALLATION

1. **Widen the gap between the seat cushion and seatback slightly and confirm the position of the lower anchorages near the button on the seatback.**
2. **Type A—Latch the hooks of lower straps onto the anchorages and tighten the lower straps.**

   Type B—Latch the buckles onto the anchorages.

For owners in Canada—The symbol on a child restraint system indicates the presence of a lower connector system.

If your child restraint system has a top strap, it should be anchored. (For the installation of the top strap, see “—Using a top strap” on page 109 in this Section.)

For installation details, refer to the instruction manual equipped with each product.

⚠ CAUTION

- **When using the lower anchorages for the child restraint system, be sure that there are no irregular objects around the anchorages or that the seat belt is not caught.**
- **Push and pull the child restraint system in different directions to be sure it is secure. Follow all the installation instructions provided by its manufacturer.**
- **Do not install a child restraint system on the rear seat if it interferes with the lock mechanism of the front seats. Otherwise, the child or front seat occupant(s) may be killed or seriously injured in case of sudden braking or a collision.**

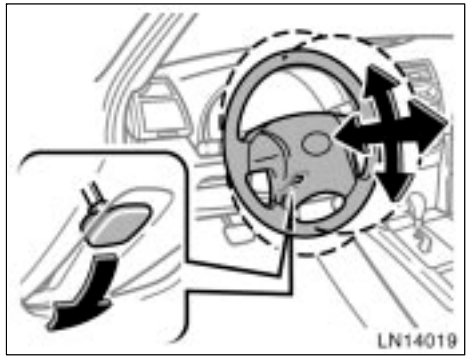
SECTION 1-4

OPERATION OF INSTRUMENTS AND CONTROLS

Steering wheel and Mirrors

Tilt and telescopic steering wheel 114
Outside rear view mirrors 114
Anti−glare inside rear view mirror 116
Auto anti−glare inside rear view mirror 116
Vanity mirrors 117

Tilt and telescopic steering wheel



To adjust the steering wheel position, hold the steering wheel, push down the lock release lever. Then tilt the steering wheel to the desired angle, push or pull it to the desired steering column length and return the lever to its original position.

⚠ CAUTION

- **Do not adjust the steering wheel while the vehicle is moving. Doing so may cause the driver to mishandle the vehicle and an accident may occur resulting in death or serious injuries.**
- **After adjusting the steering wheel, try moving it up and down or forward and rearward to make sure it is locked in position.**

Outside rear view mirrors—

Adjust the mirror so that you can just see the side of your vehicle in the mirror.

Be careful when judging the size or distance of any object seen in the outside rear view mirror on the passenger’s side because it is a convex mirror. Any object seen in a convex mirror will look smaller and farther away than when seen in a flat mirror.

On some models, when you push the rear window defogger switch, the heater panels in the outside rear view mirrors will quickly clear the mirror surface. (See “Rear window and outside rear view mirror defoggers” on page 129 in Section 1−5.)

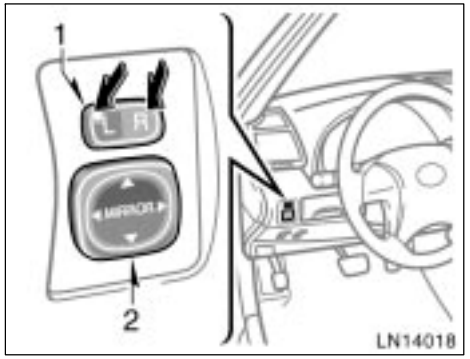
⚠ CAUTION

- **Do not adjust the mirror while the vehicle is moving. Doing so may cause the driver to mishandle the vehicle and an accident may occur resulting in death or serious injuries.**
- **Since the mirror surfaces can get hot, do not touch them when the defogger switch is on.**

NOTICE

The outside rear view mirrors are fixed in place. Do not try to fold the mirrors. It may damage the mirrors.

—Power rear view mirror control



To adjust a mirror, use the switches.

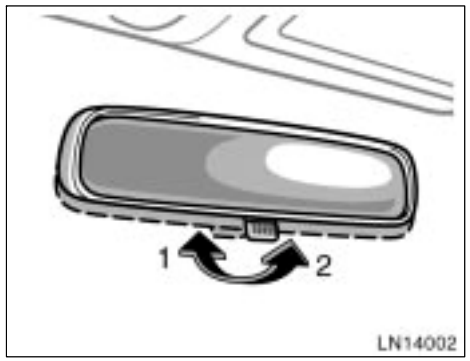
1. Master switch—To select the mirror to be adjusted
   Push the switch to “L” (left) or “R” (right).
2. Control switch—To move the mirror
   Push the switch in the desired direction.

Mirrors can be adjusted when the “POWER” switch is set at ACC or ON.

NOTICE

If ice should jam the mirror, do not operate the control or scrape the mirror face. Use a spray de−icer to free the mirror.

Anti−glare inside rear view mirror



Adjust the mirror so that you can just see the rear of your vehicle in the mirror.

To reduce glare from the headlights of the vehicle behind you during night driving, operate the lever on the lower edge of the mirror.

Daylight driving—Lever at position 1

The reflection in the mirror has greater clarity at this position.

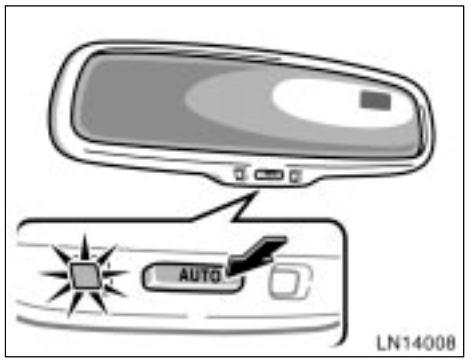
Night driving—Lever at position 2

Remember that by reducing glare you also lose some rear view clarity.

⚠ CAUTION

Do not adjust the mirror while the vehicle is moving. Doing so may cause the driver to mishandle the vehicle and an accident may occur resulting in death or serious injuries.

Auto anti−glare inside rear view mirror



Adjust the mirror so that you can just see the rear of your vehicle in the mirror.

This mirror is equipped with auto anti−glare function. The function is designed to reduce glare from the headlights of the vehicle behind you during night driving.

When the “POWER” switch is set at ON, the inside rear view mirror always turns on in the automatic function mode.

The indicator illuminates to show you that the function is on.

In automatic function mode, if the mirror detects light from the headlights of the vehicle behind you, the mirror surface darkens slightly to reduce the reflected light.

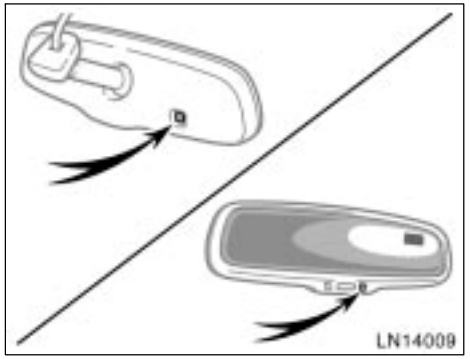
To turn off and on the automatic function, push the “AUTO” switch.

Adjust it before driving so that the rear view is in the best condition.

When the inside air temperature is low, it may take a little longer for the mirror to darken in response to the detection of headlights.

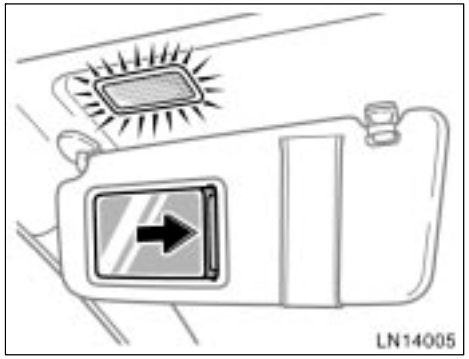
⚠ CAUTION

Do not adjust the mirror while the vehicle is moving. Doing so may cause the driver to mishandle the vehicle and an accident may occur resulting in death or serious injuries.



To ensure correct functioning of anti−glare mirror sensors located on both sides of the mirror, do not touch or cover the sensors with your finger or a piece of cloth, etc.

Vanity mirrors



To use the vanity mirror, swing down the sun visor and slide the cover.

On some models—The lights come on when you slide the cover.

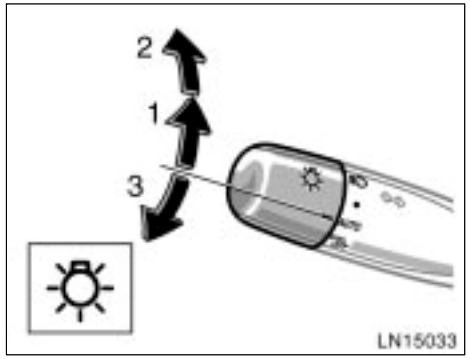
SECTION 1-5

OPERATION OF INSTRUMENTS AND CONTROLS

Lights, Wipers and Defogger

Headlights and turn signals 120
Emergency flashers 125
Instrument panel light control 126
Interior light 126
Personal lights 127
Illuminated entry system 127
Windshield wipers and washer 128
Rear window and outside rear view mirror defoggers 129

Headlights and turn signals (for the U.S.A.)



HEADLIGHTS

Manual operation—

To turn on the following lights: Twist the headlight/turn signal lever knob.

Position 1—Parking, tail, license plate, side marker and instrument panel lights

Position 2—Headlights and all of the above

The headlight indicator lights up in the instrument cluster.

When the tail lights/headlights are turned on, the brightness of the instrument cluster will be reduced slightly unless the instrument panel light control knob is turned fully clockwise.

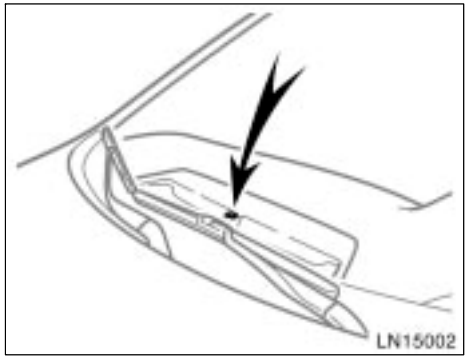
However, the brightness of the instrument cluster will not be reduced in daytime even when the tail lights/headlights are turned on.

Automatic operation—

To turn on or off the lights automatically, twist the headlight/turn signal lever knob to the “AUTO” position when the “POWER” switch is set at ON.

The headlights and/or all of the lights in position 1 automatically turn on or off depending on the darkness of the surroundings.

Manually twist the knob to the position 2 to turn on the headlights if they are needed immediately when entering a dark tunnel, parking structure, etc.



The automatic light control sensor is on the top of the instrument panel.

Do not place anything on the instrument panel, and/or do not affix anything on the windshield to block this sensor.

If you feel that the automatic light control comes into operation too early or too late, have the sensor adjusted by your Toyota dealer.

Automatic light cut off system

Position 1 or “AUTO” position with the tail lights on—

The lights automatically turn off when the driver’s door is opened after the “POWER” switch is turned off.

Position 2 or “AUTO” position with the headlights on—

The lights automatically turn off after 30 seconds when any of the doors or trunk lid is opened and closed after the “POWER” switch is turned off.

The lights can be turned off immediately by pushing the lock switch on the electronic key with all the doors locked and the trunk lid closed.

The time period before the lights turn off can be changed. For details, ask your Toyota dealer.

If any of the doors or trunk lid is left open, the lights automatically turn off after 20 minutes.

To turn on the lights again, set the “POWER” switch at ON or actuate the headlight switch. If you are going to park for over one week, make sure the knob is in the “DRL OFF” position.

NOTICE

To prevent the 12 volt battery from being discharged, do not leave the lights on for a long period when the hybrid system is turned off.

Daytime Running Light (DRL) system

The Daytime Running Light (DRL) system can make it easier for others to see the front of your vehicle during the day. The DRL system can be helpful in many different driving conditions, but they can be especially helpful in the short periods after dawn and before sunset.

The DRL system will make your headlights come on at a reduced brightness when:

- The “POWER” switch is set at ON with the hybrid system turned on.
- The light switch is in the “AUTO” position with the headlights off or position 1.
- The parking brake is released.

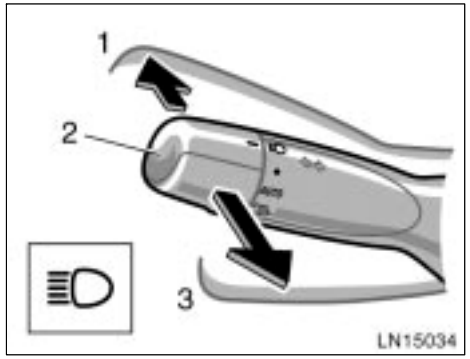
To turn on the other exterior lights and instrument panel lights, twist the knob to position 1.

Twist the knob to position 2 to turn the headlights to full intensity for night driving.

To turn off the DRL system, twist the knob to the position 3 (“DRL OFF”) or turn the “POWER” switch off.

The daytime running light system can be disabled. For details, contact your Toyota dealer.

Headlights and turn signals (for Canada)

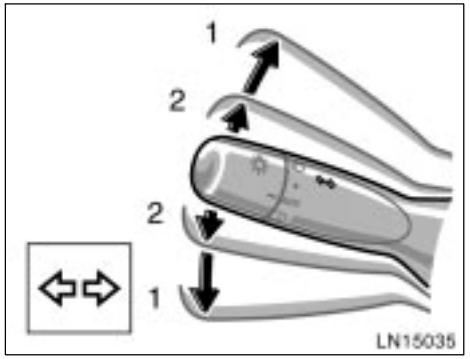


High−Low beams—For high beams, turn the headlights on and push the lever away from you (position 1). Pull the lever toward you (position 2) for low beams.

The headlight high beam indicator light (blue light) on the instrument panel will tell you that the high beams are on.

Flashing the high beam headlights (position 3)—Pull the lever all the way back. The high beam headlights turn off when you release the lever.

You can flash the high beam headlights even when the headlights are off.



TURN SIGNALS

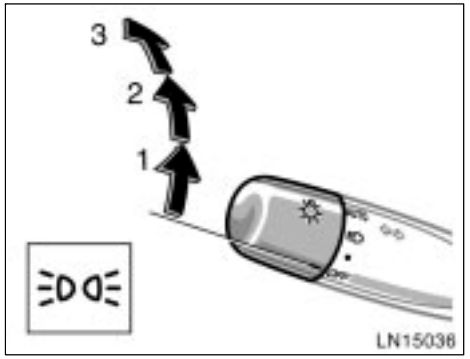
To signal a turn, push the headlight/turn signal lever up or down to position 1.

The “POWER” switch must be set at ON.

The lever automatically returns after you make a turn, but you may have to return it by hand after you change lanes.

To signal a lane change, move the lever up or down to the pressure point (position 2) and hold it.

If the turn signal indicator lights (green lights) on the instrument panel flash faster than normal, a front or rear turn signal bulb is burned out. See “Replacing light bulbs” on page 373 in Section 7−3.



HEADLIGHTS

To turn on the following lights: Twist the headlight/turn signal lever knob.

Position 1—Parking, tail, license plate, side marker and instrument panel lights

The tail light indicator (green light) on the instrument panel will tell you that the tail lights are on.

Position 2—Headlights and all of the above

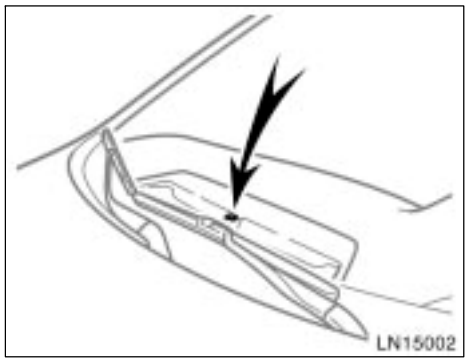
Position 3 (“AUTO”)—Headlights and all of the lights in the position 1

They automatically turn on or off depending on the darkness of the surroundings.

Manually twist the knob to the position 2 to turn on the headlights if they are needed immediately when entering a dark tunnel, parking structure, etc.

When the tail lights/headlights are turned on, the brightness of the instrument cluster will be reduced slightly unless the instrument panel light control knob is turned fully clockwise.

However, the brightness of the instrument cluster will not be reduced in daytime even when the tail lights/headlights are turned on.



The automatic light control sensor is on the top of the instrument panel.

Do not place anything on the instrument panel, and/or do not affix anything on the windshield to block this sensor.

If you feel that the automatic light control comes into operation too early or too late, have the sensor adjusted by your Toyota dealer.

Automatic light cut off system

Position 1 or position 3 with the tail lights on—

The lights automatically turn off when the driver’s door is opened after the “POWER” switch is turned off.

Position 2 or position 3 with the headlights on—

The lights automatically turn off after 30 seconds when any of the doors or trunk lid is opened and closed after the “POWER” switch is turned off.

The lights can be turned off immediately by pushing the lock switch on the electronic key with all the doors locked and the trunk lid closed.

The time period before the lights turn off can be changed. For details, ask your Toyota dealer.

If any of the doors or trunk lid is left open, the lights automatically turn off after 20 minutes.

To turn on the lights again, set the “POWER” switch at ON or actuate the headlight switch. If you are going to park for over one week, make sure the knob is in the “OFF” position.

NOTICE

To prevent the 12 volt battery from being discharged, do not leave the lights on for a long period when the hybrid system is turned off.

Daytime Running Light (DRL) system

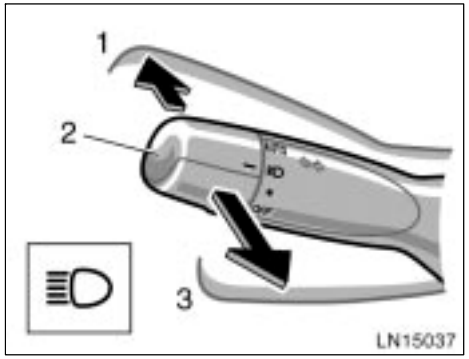
The Daytime Running Light (DRL) system can make it easier for others to see the front of your vehicle during the day. The DRL system can be helpful in many different driving conditions, but they can be especially helpful in the short periods after dawn and before sunset.

The DRL system will make your headlights come on at a reduced brightness when:

- The “POWER” switch is set at ON with the hybrid system turned on.
- The knob is in the “OFF” position, position 1 or position 3 with the headlights off.
- The parking brake is released.

To turn on the other exterior lights and instrument panel lights, twist the knob to position 1.

Twist the knob to position 2 to turn the headlights to full intensity for night driving.

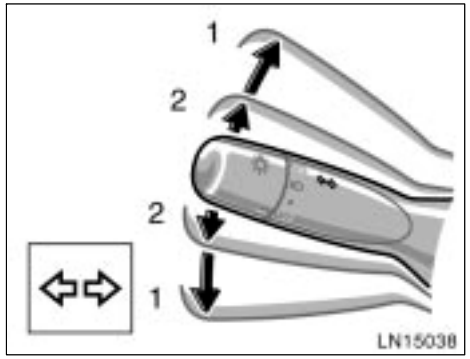


High−Low beams—For high beams, turn the headlights on and push the lever away from you (position 1). Pull the lever toward you (position 2) for low beams.

The headlight high beam indicator light (blue light) on the instrument panel will tell you that the high beams are on.

Flashing the high beam headlights (position 3)—Pull the lever all the way back. The high beam headlights turn off when you release the lever.

You can flash the high beam headlights with the knob turned to “OFF”.



TURN SIGNALS

To signal a turn, push the headlight/ turn signal lever up or down to position 1.

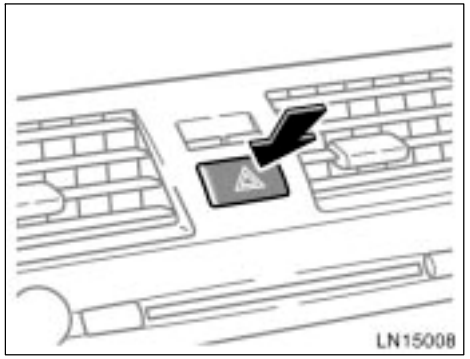
The “POWER” switch must be set at ON.

The lever automatically returns after you make a turn, but you may have to return it by hand after you change lanes.

To signal a lane change, move the lever up or down to the pressure point (position 2) and hold it.

If the turn signal indicator lights (green lights) on the instrument panel flash faster than normal, a front or rear turn signal bulb is burned out. See “Replacing light bulbs” on page 373 in Section 7−3.

Emergency flashers



To turn on the emergency flashers, push the switch.

All the turn signal lights will flash. To turn them off, push the switch once again.

Turn on the emergency flashers to warn other drivers if your vehicle must be stopped where it might be a traffic hazard.

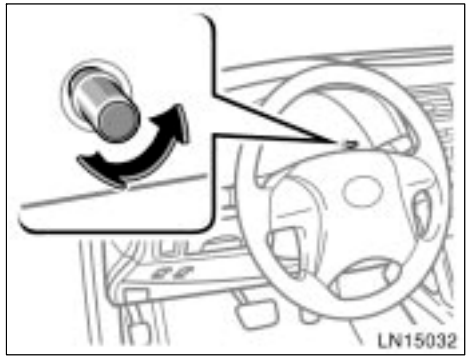
Always pull as far off the road as possible.

The turn signal light switch will not work when the emergency flashers are operating.

NOTICE

To prevent the 12 volt battery from being discharged, do not leave the switch on longer than necessary when the hybrid system is turned off.

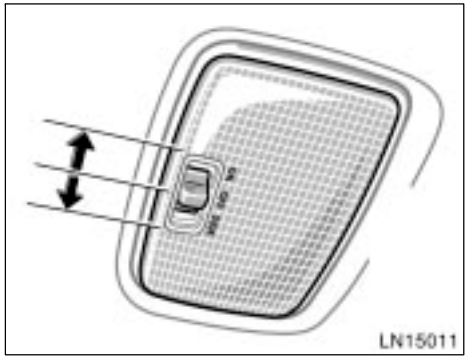
Instrument panel light control



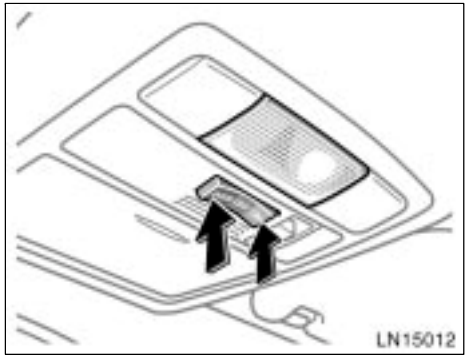
To adjust the brightness of the instrument panel lights, turn the knob.

With the knob turned fully clockwise, the intensity of the instrument cluster lights will not be reduced even when the tail lights/headlights are turned on.

Interior light



Without moon roof



With moon roof

To turn on the interior light, slide the switch.

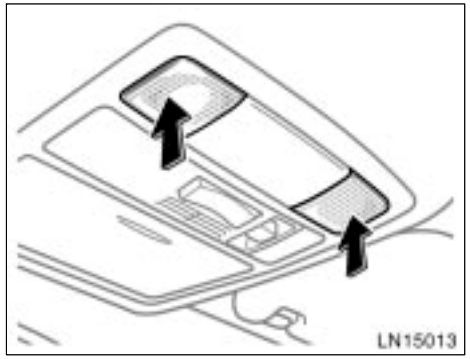
The interior light switch has the following positions:

“ON”—Keeps the light on all the time.

“OFF”—Turns the light off.

“DOOR”—Turns the light on when the illuminated entry system acts. For details, see “Illuminated entry system” on page 127 in this Section.

Personal lights



FRONT PERSONAL LIGHTS

To turn on the front personal light, push the lens. To turn it off, push the lens once again.

REAR PERSONAL LIGHTS (vehicles with moon roof)

To turn on the rear personal light, push the switch. To turn it off, push the switch once again.

By gently adjusting the shade of the rear personal light, you can change the direction of the light to suit your preference.

When either of the rear side doors is opened, the light on that side turns on automatically. Closing the rear side doors will turn the lights off.

Illuminated entry system

The interior light and the “POWER” switch light come on and remain on for about 15 seconds when you carry the registered key into the entry function actuation area. For further information of entry function actuation area, see “Smart key system” on page 32 in Section 1−2.

If all the doors are closed and the “POWER” switch is set at ACC or ON, the lights will fade out.

If all the doors are locked, the lights will fade out.

To prevent the 12 volt battery being discharged, all of the lights will automatically turn off when the “POWER” switch is turned off, and the door is left opened for about 20 minutes.

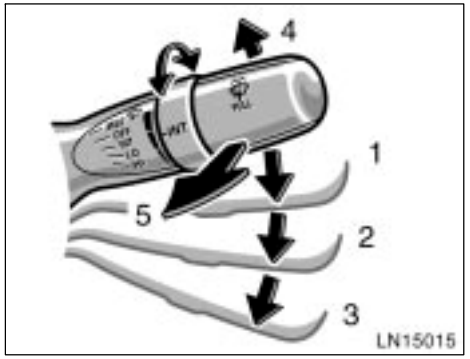
When any of the doors are unlocked with wireless remote control function or mechanical key, the lights will come on and remain on for about 15 seconds before fading out.

When any of the doors are opened, the lights will come on and remain on for about 15 seconds before fading out.

If all the doors are closed, when the “POWER” switch is turned off, the lights will come on and remain on for about 15 seconds.

This feature can be disabled and the duration of the lighting can be changed. For details, ask your Toyota dealer.

Windshield wipers and washer



To turn on the windshield wipers, move the lever to the desired setting.

The “POWER” switch must be set at ON.

Lever position	Operation
Position 1	Intermittent operation
Position 2	Low speed operation
Position 3	High speed operation
Position 4	Single sweep operation
Position 5	Washer on

Rotating the band on the lever lets you adjust the wiper time interval when the wiper lever is in the intermittent position (position 1). Twist the band upward to increase the time between sweeps, and downward to decrease it.

To spray washer fluid, pull the lever toward you.

If the windshield wipers are off, they will operate a couple of times after the washer sprays.

For instructions on adding washer fluid, see “Adding washer fluid” on page 373 in Section 7−3.

In freezing weather, warm the windshield with the defroster before using the washer. This will help prevent the washer fluid from freezing on your windshield, which can block your vision.

NOTICE

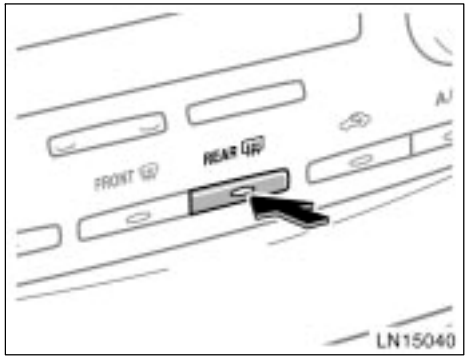
Do not operate the wipers if the windshield is dry. It may scratch the glass.

When waxing your vehicle, make sure that the washer nozzles do not become blocked. If a nozzle becomes blocked, contact your Toyota dealer to have the vehicle serviced.

NOTICE

If a nozzle becomes blocked, do not try to clear it with a pin or other object. The nozzle will be damaged.

Rear window and outside rear view mirror defoggers



To defog or defrost the rear window, push the switch.

The “POWER” switch must be set at ON.

The thin heater wires on the inside of the rear window will quickly clear the surfaces. An indicator light will illuminate to indicate the defogger is operating.

Heater panels in the outside rear view mirrors will also quickly clear the surfaces.

Push the switch once again to turn the defogger off.

The system will automatically shut off when the operation time has been completed. The operation time is between 15 minutes and 1 hour depending on the ambient temperature and vehicle speed.

⚠ CAUTION

Since the mirror surfaces can get hot do not touch them when the defogger switch is on.

Make sure you turn the defoggers off when the surfaces are clear. Leaving the defoggers on for a long time could cause the 12 volt battery to discharge, especially during stop−and−go driving. The defoggers are not designed for drying rain water or for melting snow.

If the outside rear view mirrors are heavily coated with ice, use a spray de−icer before operating the switch.

NOTICE

When cleaning the inside of the rear window, be careful not to scratch or damage the heater wires or connectors.

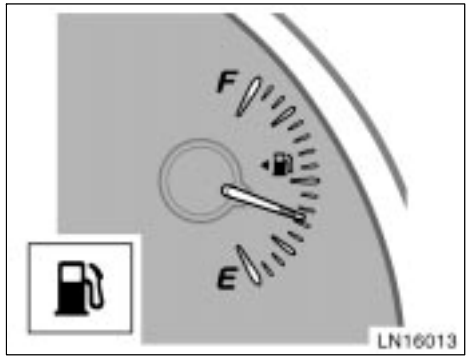
SECTION 1-6

OPERATION OF INSTRUMENTS AND CONTROLS

Gauges, Meters and Service reminder indicators

Fuel gauge 132
Engine coolant temperature gauge 132
Fuel economy meter 133
Multi−information display 134
Service reminder indicators and warning buzzers 150

Fuel gauge



The gauge indicates the approximate quantity of fuel remaining in the tank when the “POWER” switch is set at ON.

Nearly full—Needle at “F”
Nearly empty—Needle at “E”

It is a good idea to keep the tank over 1/4 full.

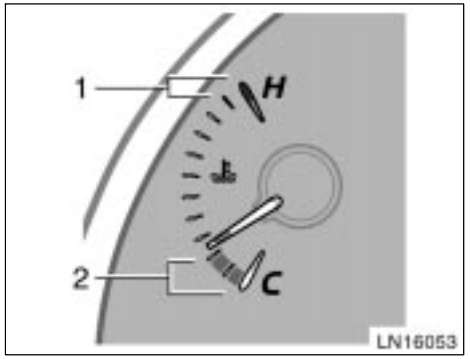
If the fuel level approaches “E” or the low fuel level warning light comes on, fill the fuel tank as soon as possible.

On inclines or curves, due to the movement of fuel in the tank, the fuel gauge needle may fluctuate or the low fuel level warning light may come on earlier than usual.

If the fuel tank is completely empty, the malfunction indicator lamp comes on. Fill the fuel tank immediately.

The indicator lamp goes off after driving several times. If the indicator lamp does not go off, contact your Toyota dealer as soon as possible.

Engine coolant temperature gauge



The gauge indicates the engine coolant temperature when the “POWER” switch is set at ON. The engine operating temperature will vary with changes in weather and engine load.

1. Red zone
2. Blue zone

If the needle moves into the red zone, your engine is too hot. If your vehicle overheats, stop your vehicle and allow the engine to cool.

When the needle is in the blue zone, the coolant temperature is cold. Because the heated coolant temperature is used by the air conditioning system to warm the interior air, warm air will not flow during the blue zone pointed.

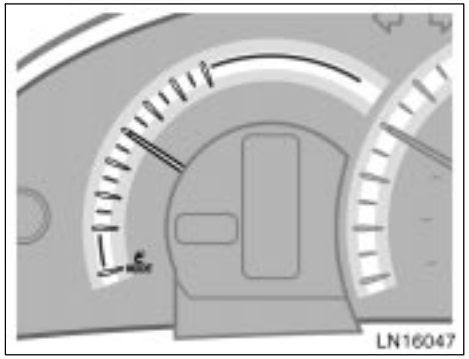
Your vehicle may overheat during severe operating conditions, such as:

- Driving up a long hill on a hot day.
- Reducing speed or stopping after high speed driving.
- Idling for a long period with the air conditioning on in stop−and−go traffic.

NOTICE

- ***Do not remove the thermostat in the engine cooling system as this may cause the engine to overheat. The thermostat is designed to control the flow of coolant to keep the temperature of the engine within the specified operating range.***
- ***Do not continue driving with an overheated engine. See “If your vehicle overheats” on page 317 in Section 4.***

Fuel economy meter



The fuel economy meter indicates the current fuel consumption in analog form when the engine is running. When only the traction motor powers the vehicle, the needle indicates “E MODE”.

- The needle may indicate the best rate on the meter when the engine is running but the fuel is not consumed.
- The needle may indicate the best rate on the meter when fuel consumption is less than the indicated value.
- The needle may indicate the worst rate on the meter when fuel consumption is more than the indicated value.

Multi−information display—

The following information is displayed on the multi−information display when the “POWER” switch is set at ON.

- **Outside temperature and cruise information**
- **Odometer and two trip meters**
- **Messages**

During ordinary driving, the information is displayed. However, in case the vehicle has a system malfunction or if there is some information that the driver should be informed of, a message appears on the display. See “—Messages” on page 140 for details.

If the electrical power source has been disconnected from the cruise information display, the display will automatically be set to the initial mode.

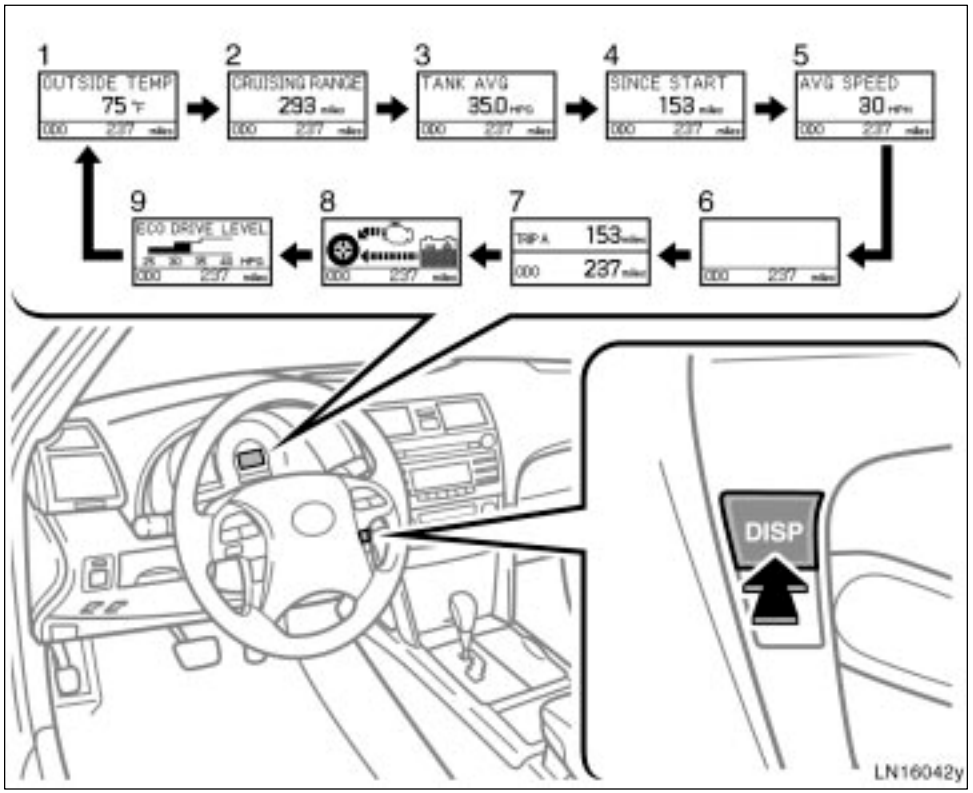
When the instrument panel lights are turned on, the brightness of the display will be reduced.

At extremely low temperatures, the multi−information display may respond slowly.

⚠ CAUTION

Do not adjust the display while the vehicle is moving. Be sure to adjust the display only when the vehicle is stopped.

—Outside temperature and cruise information



Each time you push the “DISP” button, the display toggles through the following information.

1. Outside temperature
2. Cruising range
3. Average fuel consumption after refueling
4. Driving distance
5. Average vehicle speed
6. Cruise information off
7. Zoom display of odometer and trip meter
8. Energy monitor
9. Eco drive level

The display will return to the outside temperature display with pushing and holding the “DISP” button for 1 second.

The displayed values in the cruise information display indicate general driving conditions. Accuracy varies with driving habits and road conditions.

When the “POWER” switch is set at ON, the last previously used mode displayed just before the “POWER” switch is turned off will appear.

1. Outside temperature (“OUTSIDE TEMP”)

The outside temperature display indicates the outside air temperature.

The displayed temperature ranges from −40°C (−40°F) up to 50°C (122°F).

If an abnormality exists in the connection of the outside air temperature sensor, “––” or “E” will appear on the display. If “––” or “E” appears on the display, contact your Toyota dealer.

There may be a case that “––” appears momentarily when the “POWER” switch is quickly set to ON. It is normal if it goes out soon.

2. Driving range (“CRUISING RANGE”)

The distance the vehicle can travel with the remaining fuel is calculated and displayed based on the quantity of remaining fuel and past fuel consumption.

The driving range display indicates the approximate distance that you can drive until the fuel gauge reaches “E”. It is different from the actual distance traveled.

If the fuel gauge malfunctions, the mileage figure will not appear.

When the vehicle is refueled, the driving range is recalculated.

The actual driving range varies with driving habits and road conditions. If fuel consumption is good, the driving range will be longer than indicated. If fuel consumption is poor, the driving range will be shorter than indicated.

If the low fuel level warning light comes on, refuel the vehicle even if the display indicates that the vehicle can be driven further.

3. Average fuel consumption after refueling (“TANK AVG”)

Average fuel consumption after refueling is calculated and displayed based on total driving distance and total fuel consumption.

Every time you refuel the vehicle, the displayed value is reset.

4. Driving distance (“SINCE START”)

The driving distance after the hybrid system started is displayed.

Every time you turn on the hybrid system, the driving distance display is reset.

5. Average vehicle speed (“AVG SPEED”)

Average vehicle speed is calculated and displayed based on total driving distance and total driving time.

6. Cruise information off

The display indicates only odometer and two trip meters.

7. Zoom display of odometer and trip meter

The odometer and one of the trip meters are displayed simultaneously. See “—Odometer and two trip meters” described below.

8. Energy monitor

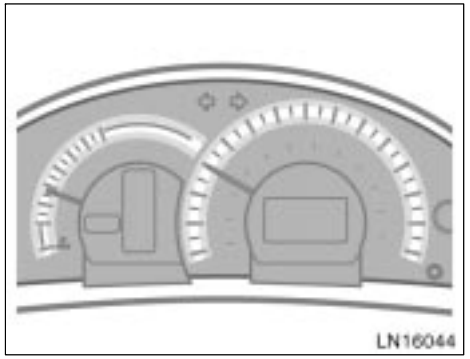
The operating condition of the hybrid system appears on the display.

See “Energy monitor” on page 3 for details.

9. Eco drive level

The eco drive level is visually displayed on the multi−information display, and it indicates the average fuel consumption after the hybrid system is turned on. In accordance with the average fuel consumption, the levels are displayed as follows:

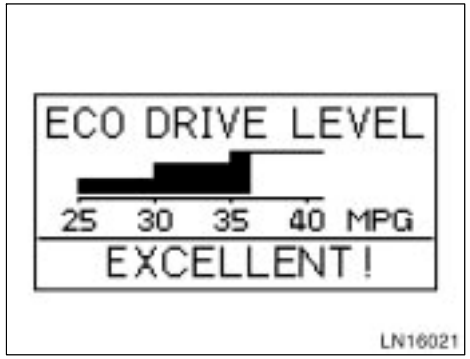
Level 0—25 MPG or less or 9.0 L/100 km or more
Level 1—26 to 30 MPG or 8.8 to 8.0 L/100 km
Level 2—31 to 35 MPG or 7.8 to 7.0 L/100 km
Level 3—36 MPG or more or 6.8 L/100 km or less



The brightness of the arcs around the fuel economy meter and speedometer change according to the eco drive level. The higher the fuel economy, the brighter the light becomes.

Level 0—Does not illuminate
Level 1—Illuminates weakly
Level 2—Illuminates brightly
Level 3—Illuminates most brightly

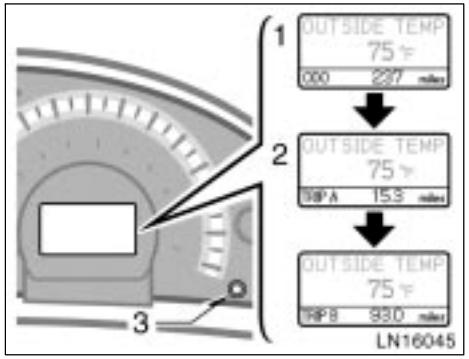
This function works even if a display other than the eco drive level is shown on the multi−information display.



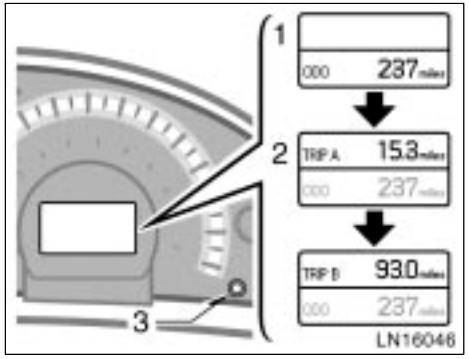
When the hybrid system is turned off, the eco drive level is displayed for a few seconds to show the average fuel consumption for the most recent trip.

If the average fuel consumption is in level 3, “EXCELLENT!” is simultaneously displayed under the eco drive level.

—Odometer and two trip meters



Normal display



Zoom display

This meter displays the odometer and two trip meters.

Selecting the zoom display of the odometer and trip meter when the cruise information is displayed causes the odometer and one of the trip meters to be displayed simultaneously.

1. Odometer—Shows the total distance the vehicle has been driven.
2. Two trip meters—Show two different distances independently driven since the last time each trip meter was set to zero.

   You can use one trip meter to calculate the fuel economy and the other to measure the distance on each trip. All trip meter data is cancelled if the electrical power source is disconnected.

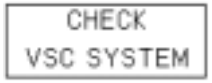
3. Trip meter reset knob—Resets the two trip meters to zero, and also change the meter display.

   To change the meter display, quickly push and release the knob. The meter display changes in the order from the odometer to trip meter A to trip meter B, then back to the odometer each time you push.

   To reset the trip meter A to zero, display the meter A reading, then push and hold the knob until the meter is set to zero. The same process can be applied for resetting the trip meter B.

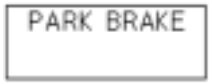
—Messages

	Message	Status	Action
a	PARK BRAKE	Parking brake is not released.	Release parking brake.
b	LOW ENGINE OIL PRESSURE	Engine oil pressure is low.	Stop and check.
c	CHECK HYBRID SYSTEM	Hybrid system malfunction is detected.	Stop your vehicle and call a Toyota dealer.
d	WATER TEMP	Coolant temperature is high.	Stop your vehicle immediately.
e	HYBRID SYSTEM OVER HEAT	The temperature for the inverter, traction motor or motor generator is high.	Stop your vehicle immediately.

Message		Status	Action
f		Any of doors are opened.	Close doors completely.
g		Hood is opened.	Close hood completely.
h		Trunk is opened.	Close trunk completely.
i		Malfunction of VSC function is detected.	Take vehicle to your Toyota dealer.
j		Transmission is out of the “P” position when starting the hybrid system.	Shift the transmission to the “P” position when starting the hybrid system.

	Message	Status	Action
k	LOW T. BATT STOP THE VEHICLE SHIFT TO P	Hybrid battery is discharged or its voltage is low.	Stop and check.
l	SHIFT TO P WHEN PARKING	Transmission selector lever is not set “P” position.	Shift the transmission selector lever to “P” position.
m	WHEN STARTING DEPRESS THE BRAKE PEDAL	Brake pedal is not depressed when starting the hybrid system.	Depress brake pedal firmly.
n	SHIFT TO P RANGE	Transmission selector lever is not set “P” position.	Shift the transmission selector lever to “P” position.
o	KEY IS NOT DETECTED	● “POWER” switch is not turned off when getting out vehicle carrying the electronic key. ● Electronic key is not detected in the vehicle when “POWER” switch is set at ON.	● Turn hybrid system off. ● Confirm that the key is in the vehicle.
p	LOW KEY BATTERY	Electronic key battery is low.	Replace key battery.
q	CHECK S/T LOCK	Steering lock system malfunction is detected.	Contact your Toyota dealer.

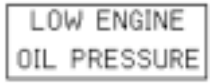
Message		Status	Action
r	S/T IS NOT UNLOCKED	Steering lock is stuck.	Turn steering wheel slightly.
s	MAINT REQD SOON	Oil change is nearly due.	Check engine oil.
t	MAINT REQD	Oil change is due.	Change engine oil.
u	LOW WASHER FLUID	Washer fluid level is low.	Add washer fluid.
v	MOONROOF OPEN	Moon roof is opened with “POWER” switch turned off.	Close moon roof.
w	CLOSE FUEL LID	Fuel door is left open.	Close the fuel door.

(a) 

This message is to warn the driver that the parking brake is not completely released at the vehicle speed of 5 km/h (3 mph) or more.

Stop the vehicle and release the parking brake fully.

The message appears with the master warning light and a warning tone sounds.

(b) 

This message is to warn the driver that the engine oil pressure is too low.

Turn the engine off as soon as possible and contact your Toyota dealer.

The message appears with the master warning light and a warning tone sounds.

(c)

This message is to warn the driver that the hybrid system is malfunctioning.

If a malfunction of the hybrid system is detected, the message appears with the master warning light and warning tone when the “POWER” switch is on.

If the message appears, stop the vehicle as soon as possible and contact a Toyota dealer.

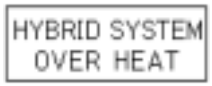
(d)

This message is to warn the driver that the engine coolant temperature is too high.

Stop the vehicle and allow the engine to cool. See “If your vehicle overheats” on page 317 in Section 4.

The message appears with the master warning light and a warning tone sounds.

NOTICE
Do not continue driving with an overheated engine.

(e) 

This message is to warn the driver that the temperature for the inverter, traction motor or motor generator is too high.

Stop the vehicle and allow the the inverter, traction motor and motor generator to cool. See “If your vehicle overheats” on page 317 in Section 4.

The message appears with the master warning light and a warning tone sounds.

NOTICE
Do not continue driving with the message displayed.

(f)

This message is to remind the driver that any of the doors are opened.

Close the door securely.

The message appears with the master warning light and a warning tone sounds when the vehicle speed rises above 5 km/h (3 mph).

(g)

This message is to remind the driver that the hood is opened.

Close the hood securely.

The message appears with the master warning light and a warning tone sounds when the vehicle speed rises above 5 km/h (3 mph).

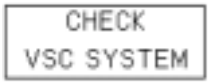
(h)

This message is to remind the driver that the trunk is opened.

Close the trunk securely.

The message appears with the master warning light a warning tone sounds when the vehicle speed rises above 5 km/h (3 mph).

(i)



This message is to warn the driver that the vehicle stability control (VSC) function of the vehicle dynamics integrated management (VDIM) is malfunctioning.

If the message appears, the functions of VDIM listed below may not work properly. Have the vehicle checked by a Toyota dealer as soon as possible. However, as conventional braking operates when applied, there is no problem to continue your driving.

- **Traction control function**
- **Vehicle stability control function**

The message appears with the master warning light and a warning tone sounds.

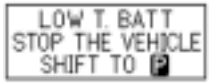
If the message appears together with the red brake system warning light, stop the vehicle immediately. For details, see “Service reminder indicators and warning buzzers” on page 150.

(j)

This message is to remind the driver that the transmission is not in the “P” position when starting the vehicle.

If the message appears, put the transmission in the “P” position and push the “POWER” switch again. For the hybrid system starting procedure, see “How to start the hybrid system” on page 301 in Section 3.

The message appears with the master warning light and a warning tone sounds.

(k) 

This message is to warn of the hybrid battery condition.

The message appears in the following conditions.:

- The hybrid battery voltage drops because the transmission is left in the “N” position.

  If you put the transmission in the “P” position and the message disappears, the system is working properly.

- The hybrid battery is discharged.

  If the hybrid battery is discharged and the message appears along with the “READY” light turned on, stop your vehicle in a safe place and contact your Toyota dealer.

The message appears with the master warning light and a warning tone sounds.

(l)

This message is to warn the driver that the transmission is not in the “P” position when the driver’s door is opened.

Put the transmission in the “P” position.

The message appears with the master warning light and a warning tone sounds.

(m)

This message is to remind the driver that the brake pedal is not depressed when starting the hybrid system.

Depress the brake pedal firmly and press the “POWER” switch. For the starting procedure, see “How to start the hybrid system” on page 301 in Section 3.

If the brake pedal is not depressed, the message appears and a warning tone sounds when the hybrid system is started.

(n)

This message is to warn the driver that the transmission is not in the “P” position when leaving the vehicle.

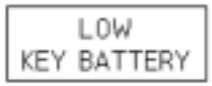
Put the transmission in the “P” position.

The message appears with the master warning light and a warning tone sounds.

(o)

When this message appears in the following cases, a warning tone sounds.

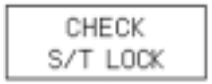
- The key is not detected in the vehicle because someone has taken the key outside of the vehicle without turning the hybrid system off. At this time, a warning tone sounds. The above message turns off if the “POWER” switch is turned off or the key is in the vehicle.
- The key is not detected in the vehicle when the “POWER” switch is pushed. In this case, the above message appears for 8 seconds.

(p) 

This message is to warn the driver that the electronic key battery is low.

Change the key battery as soon as possible to ensure that the smart key system operates properly.

The message appears with the master warning light and a warning tone sounds.

(q) 

This message warns the driver that the steering lock function malfunctions. At this time, the amber indicator light on the “POWER” switch flashes.

The hybrid system will not be turned on in this case. Contact your Toyota dealer as soon as possible.

The message appears with the master warning light and a warning tone sounds.

(r)

This message appears when the steering lock is stuck. The message appears for 15 seconds. At this time, the green indicator light on the “POWER” switch flashes.

To free the steering lock, rotate the steering wheel slightly left or right while pressing the “POWER” switch.

The message appears with the master warning light and a warning tone sounds.

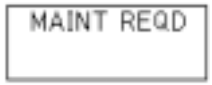
(s)

This message is to remind the driver to change the engine oil. The message is a prior notice.

Toyota recommends that the engine oil be changed as soon as possible.

If the driving range after the previous oil change reaches 7200 km (4500 miles), the message appears for about 15 seconds with the master warning light and a warning tone sounds.

The engine oil maintenance data must be reset after the engine oil change. See following “Resetting the engine oil maintenance data”.

(t) 

This message is to remind the driver to change the engine oil.

Change the engine oil as soon as possible.

If the driving range after the previous oil change reaches 8000 km (5000 miles), the message appears with the master warning light and a warning tone sounds. The message stays on with the “POWER” switch set at ON.

The engine oil maintenance data must be reset after the engine oil change. See “Resetting the engine oil maintenance data” below for the procedure to reset the system.

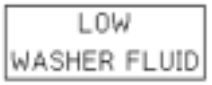
Resetting the engine oil maintenance data

The engine oil maintenance data must be reset after replacement of the engine oil. Reset the data by the following procedure:

1. Turn off the hybrid system with the trip meter A reading shown.

For details, see “—Odometer and two trip meters” on page 138 in this Section.

2. The “POWER” switch must be set at ON while holding down the trip meter reset knob. A message “OIL MILEAGE RESET MODE” will appear on the display.
3. Hold down the knob at least 5 seconds. A message “COMPLETE” will appear and the message “OIL MILEAGE RESET MODE” goes off.

(u) 

This message appears when the washer fluid level becomes very low.

Fill the tank as soon as possible.

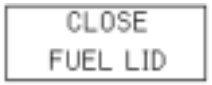
The message appears with the master warning light a warning tone sounds.

(v)

This message appears when the driver’s door is opened with the “POWER” switch turned off and the moon roof opened.

When you leave your vehicle, be sure to close the moon roof.

The message appears with the master warning light and a warning tone sounds.

(w) 

This message is to remind the driver that the fuel filler door is open.

The message appears in the following cases.

1. When you start the vehicle with the fuel door left open after refueling.
2. When you leave the fuel door open for more than 30 minutes during refueling.

In case 1, stop the vehicle and close the fuel lid. In case 2, the internal valve in the fuel tank is closed. You must remove the fuel nozzle, tighten the fuel tank cap and close the fuel door. If refueling is not completed you must start refueling from the beginning.

⚠ CAUTION

Do not continue to refuel in case 2. Fuel may spray out of the fuel opening if you refuel the vehicle.

The message appears with the master warning light and a warning tone sounds.

Service reminder indicators and warning buzzers

If the indicator or buzzer comes on...		Do this.
(a)	**BRAKE** or (red indicator and buzzer)	If parking brake is off, stop immediately and contact Toyota dealer.
	(yellow indicator)	Take vehicle to Toyota dealer. If red brake system warning light is also on, stop immediately and contact Toyota dealer.
(b)	(indicator and buzzer)	Fasten driver’s seat belt.
(c)	PASSENGER (indicator and buzzer)	Fasten front passenger’s seat belt.
(d)		Stop immediately and contact Toyota dealer.
(e)	CHECK or	Take vehicle to Toyota dealer.
(f)		Fill up tank.

If the indicator or buzzer comes on...		Do this.
(g)	ABS or	Take vehicle to Toyota dealer. If red brake system warning light is also on, stop immediately and contact Toyota dealer.
(h)	P/S	Take vehicle to Toyota dealer.
(i)	 (indicator and buzzer)	Close all doors and trunk lid.
(j)		Take vehicle to Toyota dealer immediately.
(k)		Adjust tire inflation pressure (including spare tire). If the light comes on after blinking for 1 minute, contact Toyota dealer.
(l)		Read a message on multi−information display.
(m)	Parking brake reminder buzzer	Release parking brake.

(a) Brake System Warning Lights

These lights come on in the following cases when the hybrid system is turned on.

RED WARNING LIGHT

- **When the parking brake is applied...**

When the vehicle speed exceeds 5 km/h (3 mph), a message “PARK BRAKE” appears on the multi−information display, the master warning light flashes and a warning tone sounds.

- **When the brake fluid level is low...**

⚠ CAUTION

It is dangerous to continue driving normally when the brake fluid level is low.

YELLOW WARNING LIGHT

- **When the regenerative brake system or electronically controlled brake system fails...**

When the yellow warning light comes on, the regenerative brake system and/or electronically controlled brake system is malfunctioning. Take your vehicle to your Toyota dealer.

RED AND YELLOW WARNING LIGHT

- **When the hydraulic brake system fails...**

If the red and yellow warning lights come on, it indicates a serious problem and you can continue driving no longer.

Have your vehicle checked at your Toyota dealer in the following cases:

- The red warning light does not come on even if the parking brake is applied when the hybrid system is on.
- The lights do not come on when the hybrid system is turned on with the parking brake released.

A red or yellow warning light turning on briefly during operation does not indicate a problem.

⚠ CAUTION

If any of the following conditions occurs, immediately stop your vehicle at a safe place and contact your Toyota dealer.

- **The red warning light does not turn off even after the parking brake is released with the hybrid system turned on.**
- **The red warning light stays on with the hybrid system turned on.**

In either case, this can indicate that the brakes may not work properly and your stopping distance will become longer. Depress the brake pedal firmly and bring the vehicle to an immediate stop.

- **The red brake system warning light remains on together with the “ABS” warning light and “CHECK VSC SYSTEM” warning message.**

In this case, not only the anti−lock brake system and vehicle stability control system will fail but also the vehicle will become extremely unstable during braking.

In the following case, drive directly to the nearest Toyota dealer.

- **The yellow warning light comes on while driving.**

Any of the following conditions may occur, but do not indicate the malfunction:

- The red and yellow warning lights may stay on for about 60 seconds after the hybrid system is started. It is normal if it turns off after a while.
- Depressing the brake pedal repeatedly may turn on the red and yellow warning lights. It is normal if the light turns off after a few seconds.
- The brake pedal stroke may be short when the brake pedal is depressed with the hybrid system off.

(b) Driver’s Seat Belt Reminder Light and Buzzer

The light and buzzer act as a reminder to buckle up the driver’s seat belt.

Once the “POWER” switch is set at ON or engine start, the reminder light flashes and buzzer sounds if the driver’s seat belt is not fastened. Unless the driver fastens the belt, the light continues flashing and the buzzer sounds for about 6 seconds.

If the vehicle speed rises above 20 km/h (12 mph) with the seat belt unfastened, the buzzer will sound for about 10 seconds. Then, if the seat belt is still unfastened, the buzzer will sound in a different tone for 20 seconds. Even if the vehicle speed drops below 20 km/h (12 mph), the buzzer will continue to sound. To stop the buzzer, fasten the seat belt. If the buzzer still sounds, make sure the front passenger’s seat belt is fastened.

The vehicle speed linked seat belt reminder buzzer can be disabled. For details, contact your Toyota dealer.

However, Toyota recommends that the seat belt reminder buzzer be operational to alert the driver and front passenger that the seat belts are not fastened.

(c) Front Passenger’s Seat Belt Reminder Light and Buzzer

The light and buzzer act as a reminder to have the front passenger buckle up the seat belt.

Once the “POWER” switch is set at ON, the reminder light flashes if a passenger sits in the front passenger seat and does not fasten the seat belt. Unless the front passenger fastens the belt, the light continue flashing.

If the vehicle speed rises above 20 km/h (12 mph) with the seat belt unfastened, the buzzer will sound for about 10 seconds. Then, if the seat belt is still unfastened, the buzzer will sound in a different tone for 20 seconds. Even if the vehicle speed drops below 20 km/h (12 mph), the buzzer will continue to sound. To stop the buzzer, fasten the seat belt. If the buzzer still sounds, make sure the driver’s seat belt is fastened.

If luggage or other load is placed on the front passenger seat, depending on its weight, the reminder light to flash and buzzer to sound.

The vehicle speed linked seat belt reminder buzzer can be disabled. For details, contact your Toyota dealer.

However, Toyota recommends that the seat belt reminder buzzer be operational to alert the driver and front passenger that the seat belts are not fastened.

(d) Charging System Warning Light

When there are problems in the charging system while the hybrid system is running, the warning light comes on.

NOTICE
When the charging system warning light comes on while the hybrid system is running, malfunctions may have occurred. If the warning light comes on, immediately stop the vehicle in a safe place and contact your Toyota dealer.

(e) Malfunction Indicator Lamp

This lamp comes on when the “POWER” switch is set at ON and goes off when the “READY” light comes on. This means that the warning light system is operating properly.

If the lamp remains on, or the lamp comes on while driving, first check the followings.

- Empty fuel tank

  If the fuel tank is empty, refuel immediately.

- Loose fuel tank cap

  If the fuel tank cap is loose, securely tighten it.

These cases are temporary malfunctions. The malfunction indicator lamp will go off after taking several driving trips.

If the lamp does not go off even after several trips, contact your Toyota dealer as soon as possible.

If the fuel tank is not empty or the fuel tank cap is not loose...

There is a problem somewhere in the hybrid system, emission control system, electronic throttle control system, transmission electrical system or warning light system itself.

Contact your Toyota dealer as soon as possible to service the vehicle.

Emissions Inspection and Maintenance (I/M) programs

Your vehicle may not pass a state emission inspection if the malfunction indicator lamp remains on. Contact your Toyota dealer to check your vehicle’s emission control system and OBD (On−Board Diagnostics) system before taking your vehicle for the inspection.

For details, see “Emissions Inspection and Maintenance (I/M) programs” on page 345 in Section 6.

(f) Low Fuel Level Warning Light

This light comes on when the fuel level in the tank becomes nearly empty. Fill up the tank as soon as possible.

On inclines or curves, due to the movement of fuel in the tank, the low fuel level warning light may come on earlier than usual.

(g) “ABS” Warning Light

This light comes on when the “POWER” switch is set at ON. If the anti−lock brake system function of the VDIM (vehicle dynamics integrated management) is working properly, the light goes off when the “READY” light comes on. Thereafter, if the function malfunctions, the light comes on again.

When the “ABS” warning light is on and the yellow brake system warning light is on, the anti−lock brake system function and the brake assist function of the VDIM may not operate so that the wheel could lock up during a sudden braking or braking on slippery road surfaces However, the brake system still operates conventionally.

If any of the following conditions occurs, this indicates a malfunction somewhere in the parts monitored by the warning light system. Contact your Toyota dealer as soon as possible to service the vehicle.

- The light does not come on when the “POWER” switch is set at ON.
- The light remains on when the “READY” light is on.
- The light comes on while you are driving.

A warning light turning on briefly during operation does not indicate a problem.

If the light comes on together with the red brake system warning light, stop the vehicle immediately. For details, see “(a) Brake system warning light”.

Either of the following conditions may occur, but does not indicate the malfunction:

- The light may stay on for about 60 seconds after the hybrid system is started. It is normal if the light goes off after a while.
- Depressing the brake pedal repeatedly may turn on the light. It is normal if the light goes off after a few seconds.

CAUTION

If the “ABS” warning light remains on together with the red brake system warning light, stop your vehicle immediately in a safe place and contact your Toyota dealer.

In this case, not only the anti−lock brake system function and brake assist function will fail but also the vehicle will become extremely unstable during braking.

(h) Electric Power Steering System Warning Light

This light comes on when the power steering control system fails.

⚠ CAUTION

If this light comes on, take your vehicle to the Toyota dealer as soon as possible. In this case, you may feel the heavy steering wheel maneuvering. Drive your vehicle while gripping the steering wheel firmly.

(i) Open Door Warning Light and Buzzer

This light remains on until all the doors and trunk lid are completely closed.

The buzzer also sounds once when any of the doors or trunk lid is not completely closed at the vehicle speed 5 km/h (3 mph) or more. Stop the vehicle and close the door and trunk lid completely.

(j) SRS Warning Light

This indicator comes on when the “POWER” switch is set at ON. It goes off after about 6 seconds. This means the SRS front airbags and seat belt pretensioners are operating properly.

This warning light system monitors the airbag sensor assembly, front airbag sensors, side and curtain shield airbag sensors, curtain shield airbag sensors, driver’s seat position sensor, driver’s seat belt buckle switch, front passenger occupant classification system, “AIRBAG ON” indicator light, “AIRBAG OFF” indicator light, front passenger’s seat belt buckle switch, seat belt pretensioner assemblies, inflators, interconnecting wiring and power sources.

If any of the following conditions occurs, this indicates a malfunction of the airbags or seat belt pretensioners. Contact your Toyota dealer as soon as possible to.

- The light does not come on when the “POWER” switch is set at ON or remains on for more than 6 seconds.
- The light comes on or starts flashing while driving.

The SRS warning light and “AIRBAG OFF” indicator light will come on if there is a malfunction in the front passenger occupant classification system.

(k) Low Tire Pressure Warning Light

This light warns that the tire pressure of one or more of your tires (including the spare tire) is low. The light comes on when the “POWER” switch is set at ON. It goes off when the “READY” light comes on. This indicates that the tire pressure warning system is functioning properly.

If the warning light comes on, stop your vehicle in a safe place as soon as possible and check that the inflation pressure of all tires (including the spare tire) is as specified on the tire and loading information label. (See “Checking tire inflation pressure” on page 359 in Section 7−2.) The light should go off a few minutes after the tire pressure is adjusted.

If the warning light blinks (comes on after blinking for 1 minute), the tire pressure warning system may be malfunctioning. Contact your Toyota dealer.

For details, see “Tire pressure warning system” on page 168 in Section 1−7.

(l) Master Warning Light

If the master warning light comes on, a message appears on the multi−information display. Depending on the conditions a warning tone may sound.

(m) Parking Brake Reminder Buzzer

The buzzer acts once when the parking brake is not completely released at the vehicle speed of 5 km/h (3 mph) or more. Stop the vehicle and release the parking brake fully.

CHECKING SERVICE REMINDER INDICATORS (except the low fuel level warning light)

1. Apply the parking brake.
2. Open one of the doors.
   The open door warning light should come on.
3. Close the door.
   The open door warning light should go off.
4. With your foot off the brake pedal, press the “POWER” switch and set it at ON.
   All the service reminder indicators except the open door warning light should come on. The electric power steering warning light goes off after a few seconds. The SRS warning light goes off after about 6 seconds.
5. With depressing the brake pedal, press the “POWER” switch.

All of the service reminder indicators except the red brake system warning light and driver’s seat belt reminder light go off when the “READY” light comes on.

The driver’s seat belt reminder light goes off when the driver’s seat belt is fastened. The red brake system warning light goes off when the parking brake is released.

There may be the case that the red and yellow brake system warning lights and “ABS” warning light stay on for about 60 seconds. It is normal if they go out after a while.

If any service reminder indicator or warning buzzer does not function as described above, have it checked by your Toyota dealer as soon as possible.

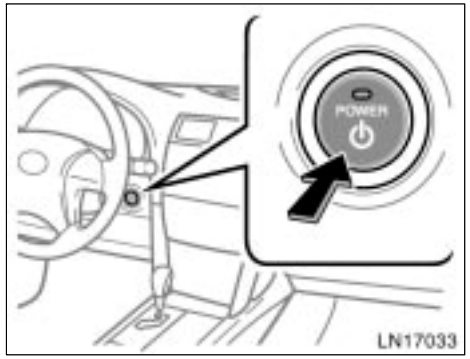
SECTION 1–7

OPERATION OF INSTRUMENTS AND CONTROLS

“POWER” switch, Transmission and Parking brake

“POWER” switch 160
Transmission 162
Vehicle dynamics integrated management 164
Tire pressure warning system 168
Parking brake 175
Cruise control 176

“POWER” switch



When the key is in the vehicle, pressing the “POWER” switch (hybrid system start−up switch) allows you to start and stop the hybrid system or choose at the ACC, ON, or “POWER” switch off.

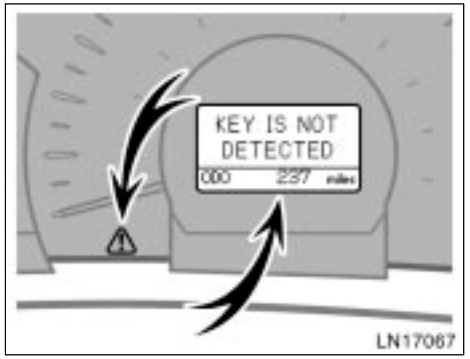
When the brake pedal is not depressed, pressing the “POWER” switch changes the mode as follows. Press the switch slowly and firmly.

First time—ACC (accessory) mode (illuminates amber)
Accessories such as the radio operate.

Second time—ON mode (illuminates amber)
All accessories on.

Third time—Power off (indicator light off)

Pressing the “POWER” switch again returns the mode switch to ACC.



If a buzzer sounds and the master warning light comes on for 5 seconds when pressing the “POWER” switch, this indicates that the key is not in the vehicle. The message “KEY IS NOT DETECTED” will also appear on the multi−information display.

If the brake pedal is depressed, the indicator light will turn green, regardless of which mode is selected. When the indicator light is green, pressing the “POWER” switch once turns the hybrid system on. (For starting tips, see “How to start the hybrid system” on page 301 in Section 3.)

When the “POWER” switch is changed from ON (with the hybrid system turned off) to off and then changed to ACC, “DEPRESS THE BRAKE PEDAL” will appear on the multi−information display.

If the amber indicator light on the “POWER” switch blinks, this indicates a malfunction of the push start system. Turn off the hybrid system immediately and contact your Toyota dealer.

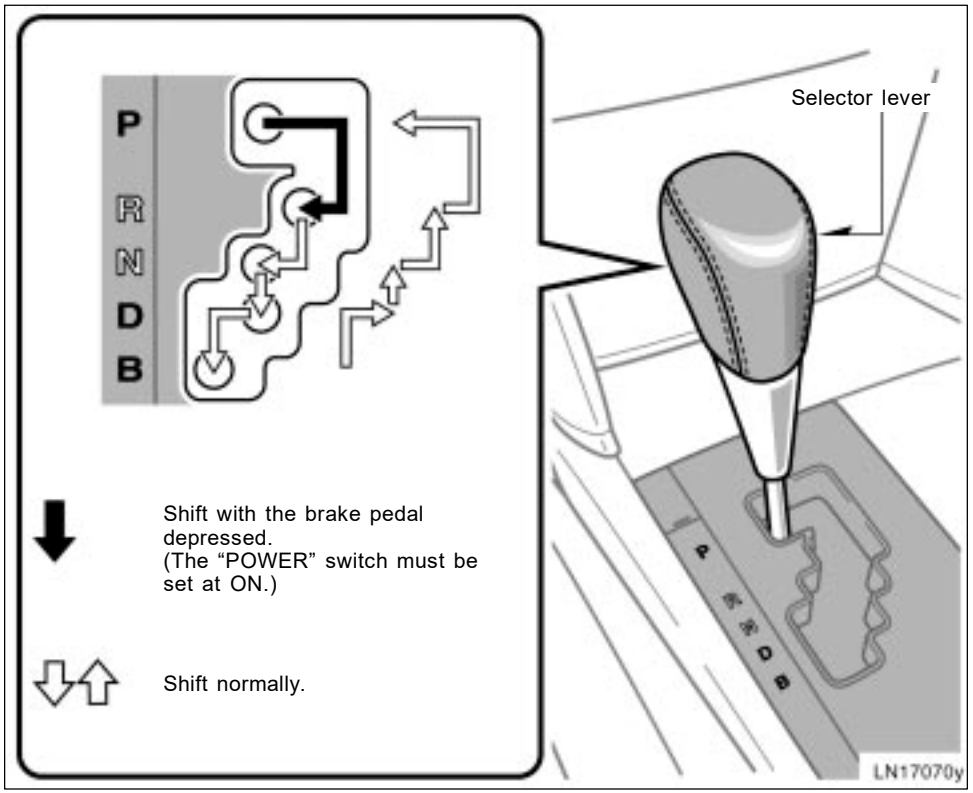
Approximately five hours after the hybrid system is turned off, you may hear sound coming from underneath the trunk for several minutes. This is normal operation and does not indicate a malfunction. (See “Leak detection pump” on page ix.)

It is not a malfunction if the needle on all meters and gauges move slightly when the “POWER” switch is set at ACC, ON or when the hybrid system is turned on.

NOTICE
Do not leave the “POWER” switch at ACC or ON with the hybrid system turned off. The 12 volt battery will discharge.

When the 12 volt battery is disconnected or run down, the push button start function memorizes the current mode. After you reconnect, replace, or recharge the battery, the memorized mode is selected automatically. In any of these cases, turn off the hybrid system if the hybrid system is turned on.

Transmission



Your transmission has a shift lock system to minimize the possibility of incorrect operation. This means you can only shift out of “P” position when the brake pedal is depressed (with the “POWER” switch set at ON).

(a) Selector lever

The shift position is also displayed on the instrument cluster.

P: Parking, hybrid system starting

R: Reverse

N: Neutral

D: Normal driving

B: Engine braking

(b) Normal driving

1. Start the hybrid system as instructed in “How to start the hybrid system” on page 301 in Section 3. The transmission must be in “P”.
2. With your foot holding down the brake pedal, shift the selector lever to “D”.

⚠ CAUTION

Never put your foot on the accelerator pedal while shifting.

3. Release the parking brake and brake pedal. Depress the accelerator pedal slowly for smooth starting.

⚠ CAUTION

Always keep your foot on the brake pedal while stopped with the hybrid system on. This prevents the vehicle from creeping.

NOTICE

Always use the brake pedal or the parking brake to hold the vehicle on an upgrade. Do not attempt to hold the vehicle using the accelerator pedal, as this can cause the transmission to overheat.

(c) Using engine braking

To use engine braking intentionally, shift the selector lever to the “B” position and take your foot off the accelerator pedal.

During high speed driving you may feel that engine braking is less effective than that of conventional vehicle.

Do not continue normal driving with the transmission in “B” for a long time. This may cause decreased fuel economy.

⚠ CAUTION

Be careful when using engine braking on a slippery surface. Abrupt shifting could cause the vehicle to spin or skid.

(d) Backing up

1. Bring the vehicle to a complete stop.
2. With the brake pedal held down with your foot, shift the selector lever to the “R” position.

NOTICE

Never shift into reverse while the vehicle is moving.

(e) Parking

1. Bring the vehicle to a complete stop.
2. With the brake pedal pressed down, fully depress the parking brake pedal to apply the parking brake securely.
3. With the brake pedal pressed down, shift the selector lever to the “P” position.

When turning the hybrid system off, put the transmission in the “P” position.

⚠ CAUTION

Never attempt to move the selector lever into “P” position under any circumstances while the vehicle is moving. Serious mechanical damage and loss of vehicle control may result.

(f) If you cannot shift the selector lever out of “P” position

If you cannot shift the selector lever from the “P” position even though the brake pedal is depressed, use the shift lock override button. For instructions, see “If you cannot shift transmission selector lever” on page 329 in Section 4.

Vehicle dynamics integrated management

Vehicle dynamics integrated management (VDIM) is designed to control vehicle motion continuously using all possible functions to stabilize the motion.

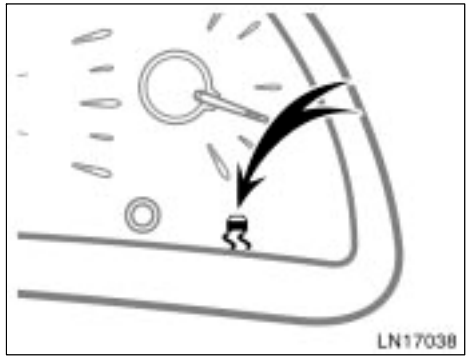
It is important to keep the tires in good condition for the system to properly control vehicle motion. Refer to the information for tires on pages 359 through 367 in Section 7−2.

The system has the functions listed below. Each function becomes operational when the vehicle speed exceeds the speeds as shown below.

- Brake assist function
  7 km/h (4 mph)
- Anti−lock brake system function
  7 km/h (4 mph)
- Traction control function
  0 km/h (0 mph)
- Vehicle stability control function
  15 km/h (9 mph)

⚠ CAUTION

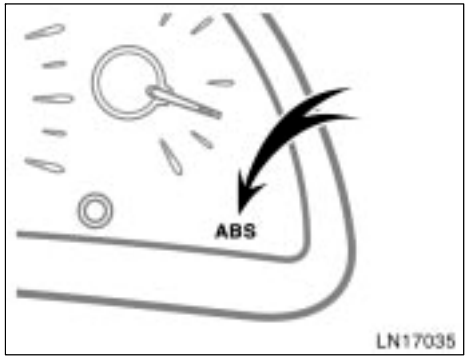
- **Do not rely excessively on the VDIM. Even if the system is operating, you must always drive carefully and attentively. Reckless driving will result in an unexpected accident. If the slip indicator flashes, special care should be taken.**
- **Only use tires of specified size. The size, manufacturer, brand and tread pattern for all 4 tires should be the same. If you use any tires other than specified, or different types or sizes, the VDIM may not function correctly. When replacing the tires or wheels, contact your Toyota dealer.**
- **Do not modify the suspensions. If you modify the suspensions, the VDIM may not function correctly.**
- **In situations where the road surface is covered with ice or snow, snow tires or tire chains should be used.**



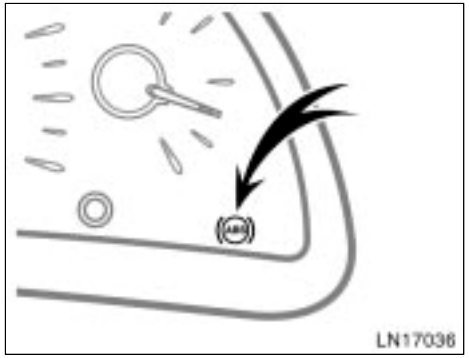
Slip indicator light

When the “POWER” switch is set at ON is turned on, the slip indicator light comes on. It will go off when the “READY” light comes on. If the slip indicator light does not come on when the “POWER” switch is set at ON, contact your Toyota dealer.

While the VDIM is using its various functions to stabilize vehicle motion, the slip indicator in the instrument cluster flashes and the buzzer sounds. Drive carefully when you are in situations where the indicator flashes. You may feel some vibrations from the underbody and you may feel some resistance when turning the steering wheel when the VDIM is using its various functions.



“ABS” warning light (U.S.A.)

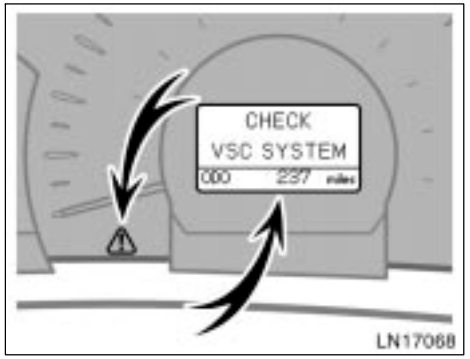


“ABS” warning light (Canada)

“ABS” warning light

When the “POWER” switch is set at ON, the “ABS” warning light comes on. It will go off when the “READY” light comes on. If the “ABS” warning light does not come on when the “POWER” switch is set at ON, contact your Toyota dealer.

If the “ABS” warning light remains on after the “POWER” switch is set at ON or if it comes on while driving, the anti−lock brake system function may not operate properly. Although the brake system operates without the function, drive carefully and have your vehicle checked by a Toyota dealer as soon as possible. For details, see “Service reminder indicators and warning buzzers” on page 150 in Section 1−6.



Message “CHECK VSC SYSTEM”

If “CHECK VSC SYSTEM” appears on the multi−information display, the traction control and vehicle stability control functions may not operate properly. Although the brake system operates normally without these functions, drive carefully and have your vehicle checked by a Toyota dealer as soon as possible. For details, see “—Messages” on page 140 in Section 1−6.

BRAKE ASSIST FUNCTION

The brake assist function is designed to assist with emergency braking. When the driver suddenly depresses the brake pedal, the device treats it as emergency braking and adds braking force.

If you slam the brakes on or apply the brakes more firmly, more powerful braking will be applied.

⚠ CAUTION

The brake assist function is not designed to shorten braking distance. Always drive at a moderate speed and maintain a safe distance from the vehicle in front of you. Depending on road conditions, braking distance may be longer than that of a vehicle without the brake assist device. If tire chains are used, braking distance may become longer.

ANTI−LOCK BRAKE SYSTEM FUNCTION

The anti−lock brake system function is designed to help prevent lock−up of the wheels during sudden braking or when braking on slippery road conditions. This assists in providing directional stability and steering performance of the vehicle under these circumstances.

Effective way to press the ABS brake pedal: When the brake pedal is depressed and the anti−lock brake system function is in action, the slip indicator flashes. In this situation, to let the anti−lock brake system work for you, just hold the brake pedal down more firmly. Do not pump the brake in a panic stop. This will result in reduced braking performance.

Depressing the brake pedal on slippery road surfaces such as on a manhole cover, a steel plate at a construction site, joints in a bridge, etc. on a rainy day tends to activate the anti−lock brake system function.

When the anti−lock brake system function is activated, you may hear the anti−lock brake system function operating sound and the vibrations of the vehicle body and steering wheel. You may also hear the motor sound in the engine compartment even after the vehicle is stopped. However, it does not indicate any trouble.

⚠ CAUTION

The anti−lock brake system function is not designed to shorten braking distance. Always drive at a moderate speed and maintain a safe distance from the vehicle in front of you. Depending on road conditions, braking distance may be longer than that of a vehicle without the anti−lock brake system. If tire chains are used, braking distance may become longer.

Compared with vehicles without an anti−lock brake device, your vehicle may require a longer stopping distance in the following cases:

- **Driving on rough, gravel or snow−covered roads.**
- **Driving with tire chains installed.**
- **Driving over the steps such as the joints on the road.**
- **Driving on roads where the road surface is pitted or has other differences in surface height.**

If tire grip performance exceeds its capability, or if hydroplaning occurs during high speed driving in the rain, the anti−lock brake system does not provide vehicle control.

TRACTION CONTROL FUNCTION

The traction control function is designed to help prevent skid of the drive wheels during sudden acceleration on slippery road surfaces.

You may feel vibration or noise in your vehicle, caused by operation of the brakes.

⚠ CAUTION

Under certain slippery road conditions, full traction of the vehicle and power against drive wheels cannot be maintained, even though the traction control system is in operation. Do not drive the vehicle under any speed or maneuvering conditions which may cause the vehicle to lose traction control. In situations where the road surface is covered with ice or snow, your vehicle should be fitted with snow tires or tire chains. Always drive at a moderate speed.

VEHICLE STABILITY CONTROL FUNCTION

The vehicle stability control function is designed to help prevent skid of the wheels while cornering on slippery road surfaces or when turning the steering wheel abruptly.

The system controls the driving and braking forces on each tire and also controls the power steering assistance to help the driver to recover vehicle stability.

⚠ CAUTION

Depending on the road conditions, the vehicle stability control function may not be able to stabilize your vehicle. Always drive at a moderate speed.

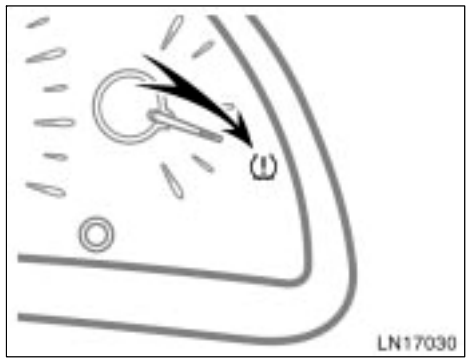
Tire pressure warning system

The tire pressure warning system warns you that the tire inflation pressure is low.

The tire pressure warning system is not a substitute for checking normal tire inflation pressure. Check the tire inflation pressure with a tire pressure gauge regularly.

⚠ CAUTION

The warning system may not activate immediately if bursts or sudden air leakage should occur.



The tire pressure warning light comes on when the “POWER” switch is set at ON and goes off after a few seconds. This means the tire pressure warning light is operating properly. If the tire inflation pressure becomes low, the light comes on again. In this case, adjusting the tire inflation pressure will turn off the light after a few minutes. If the light comes on after blinking for 1 minute, the tire pressure warning system is not working properly.

Indicator status	Meanings	Do this
ON	Tire inflation pressure is low	Adjust the tire inflation pressure
ON after blinking for 1 minute	Tire pressure warning system malfunction	Have the system checked at your Toyota dealer

⚠ CAUTION

If the tire pressure warning light comes on, be sure to observe the following precautions. Failure to do so could cause loss of vehicle control and result in death or serious injury.

- **Stop your vehicle in a safe place as soon as possible. Adjust the tire inflation pressure immediately.**
- **If the tire pressure warning light comes on even after tire inflation pressure adjustment, it is probable that you have a flat tire. Check the tires. If the tire is flat, change to the spare tire and have the flat tire repaired by the nearest Toyota dealer.**
- **Avoid abrupt maneuvering and braking. If the vehicle tires deteriorate, you could lose control of the steering wheel or the brakes.**

The tire pressure warning light may turn on due to natural causes such as natural air leaks or tire inflation pressure changes caused by temperature. In this case, adjusting the tire inflation pressure will turn off the light after a few minutes.

Pushing the tire pressure warning reset switch does not turn off the tire pressure warning light. Adjusting the tire inflation pressure will turn off the light.

The compact spare tire is not equipped with the tire pressure warning valve and transmitter. If a tire goes flat, the warning light will not turn off even though the flat tire is replaced with the spare tire. Replace the spare tire with the repaired tire and adjust the proper tire inflation pressure. The tire pressure warning light will turn off after a few minutes.

⚠ CAUTION

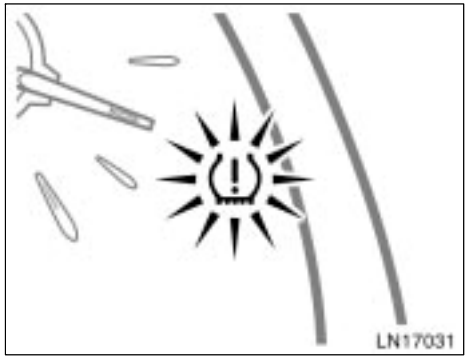
Each tire, including the spare (if provided), should be checked monthly when cold and inflated to the inflation pressure recommended by the vehicle manufacturer on the vehicle placard or tire inflation pressure label (tire and load information label). (If your vehicle has tires of a different size than the size indicated on the vehicle placard or tire inflation pressure label (tire and load information label), you should determine the proper tire inflation pressure for those tires.)

As an added safety feature, your vehicle has been equipped with a tire pressure monitoring system (TPMS–tire pressure warning system) that illuminates a low tire pressure telltale (tire pressure warning light) when one or more of your tires is significantly under−inflated. Accordingly, when the low tire pressure telltale (tire pressure warning light) illuminates, you should stop and check your tires as soon as possible, and inflate them to the proper pressure. Driving on a significantly under−inflated tire causes the tire to overheat and can lead to tire failure. Under−inflation also reduces fuel efficiency and tire tread life, and may affect the vehicle’s handling and stopping ability.

Please note that the TPMS (tire pressure warning system) is not a substitute for proper tire maintenance, and it is the driver’s responsibility to maintain correct tire pressure, even if under−inflation has not reached the level to trigger illumination of the TPMS low tire pressure telltale (tire pressure warning light).

NOTICE

- ***Do not use liquid sealants for a flat tire as tire pressure warning valve and transmitter will be damaged.***
- ***When the tires must be repaired or replaced, have them repaired or replaced by the nearest Toyota dealer or authorized tire dealer. The tire pressure warning valves and transmitters will be affected by the installation or removal of tires.***



IF THE TIRE PRESSURE WARNING LIGHT BLINKS (comes on after blinking for 1 minute)...

If the tire pressure warning light blinks (comes on after blinking for 1 minute) when the “POWER” switch is set at ON, the tire pressure warning system is not working properly.

The system will be disabled in the following conditions:
(When the condition becomes normal, the system will work properly.)

- If tires not equipped with tire pressure warning valves and transmitters are used.

- If the ID code on the tire pressure warning valves and transmitters is not registered on the tire pressure warning ECU.
- If electronic devices or facilities using similar radio wave frequencies are nearby.
- If a radio set at similar frequencies is in use in the vehicle.
- If a window tint that affects the radio wave signals is installed.
- If there is a lot of snow or ice on the vehicle, in particular around the wheels or wheel housings.
- If non−genuine Toyota wheels are used.
- If tire chains are used.
- If the tire inflation pressure is more than 500 kPa (5.1 kgf/cm^2 or bar, 73 psi).

If the tire pressure warning light comes on after blinking for 1 minute frequently when the “POWER” switch is set at ON, have it checked by your Toyota dealer.

Even if you use genuine wheels, the tire pressure warning system may not work properly with some types of tires.

Pushing the tire pressure warning reset switch should not turn off the tire pressure warning light.

For vehicles sold in U.S.A.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTICE:
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

−Reorient or relocate the receiving antenna.

−Increase the separation between the equipment and receiver.

−Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

−Consult the dealer or an experienced radio/TV technician for help.

FCC WARNING:
Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

For vehicles sold in Canada

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

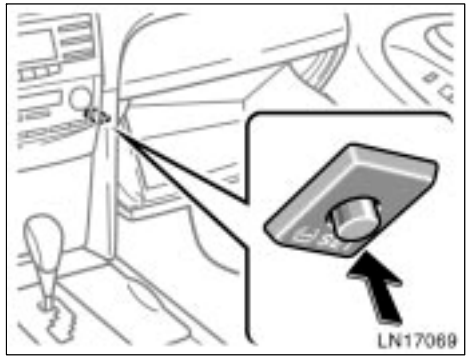
REPLACING TIRES AND WHEELS

When replacing the tires and wheels, be sure to install tire pressure warning valves and transmitters. ID codes on the tire pressure warning valves and transmitters are registered on the tire pressure warning ECU. When replacing a tire pressure warning valve and transmitter, it is necessary to register the ID code of tire pressure warning valve and transmitter. Have the ID code registered by your Toyota dealer.

If the ID code is not registered the system will not work properly, After about 1 hour, the tire pressure warning light come on after blinking for 1 minute to indicate a system malfunction.

NOTICE

When the tires or tire pressure warning valves and transmitters must be replaced, have them replaced by your Toyota dealer. The tire pressure warning valves and transmitters will be affected by the installation or removal of tires.



TIRE PRESSURE WARNING RESET SWITCH

When initializing the system, the present tire inflation pressure is stored as standard. The tire pressure warning system determines decreased air pressure by comparing the present and the standard tire inflation pressures. When you change the set tire inflation pressure, it is necessary to initialize the tire pressure warning system.

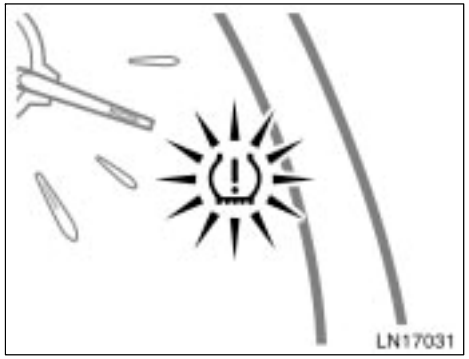
- When rotating the tires on vehicles differing with front and rear tire inflation pressures.
- When changing the tire size.

To initialize the system, perform the following:

1. Park the vehicle in a safe place and turn the “POWER” switch off.
2. Adjust the pressure of all the installed tires to the specified cold tire inflation pressure level. (See “Tires” on page 385 in Section 8.)
3. Press the “POWER” switch and set it at ON.
4. Open the glove box, and push and hold the tire pressure warning reset switch until the tire pressure warning light blinks slowly three times.
5. Leave the system for a few minutes with the “POWER” switch set at ON and then turn the “POWER” switch off.

If you push the tire pressure reset switch while vehicle is moving, initialization is not performed.

If you push the tire pressure reset switch accidentally and initialization is performed, adjust the tire inflation pressure to the specified level and initialize the system again.

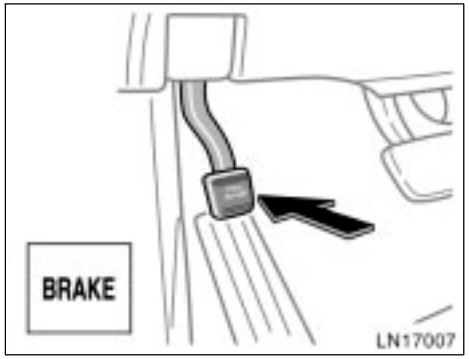


If the tire pressure warning light does not blink slowly three times when you push and hold the reset switch, initialization has failed and the tire pressure warning system may not work properly. In this case, initialize the system again. If initialization cannot be performed, have the system checked at your Toyota dealer.

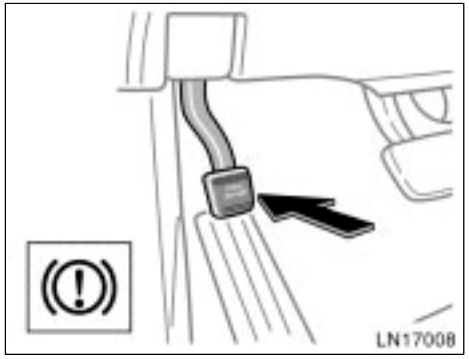
⚠ CAUTION

Do not push the reset switch without adjusting the tire inflation pressure to the specified level. Otherwise, the tire pressure warning light may not come on even if the tire inflation pressure is low, or it may come on when the tire inflation pressure is actually normal.

Parking brake



Type A



Type B

When parking, firmly apply the parking brake to avoid inadvertent creeping.

To set: Fully depress the parking brake pedal. For better holding power, first depress the brake pedal and hold it while setting the parking brake.
To release: Depress the parking brake pedal while depressing the brake pedal.

To remind you that the parking brake is set, the parking brake reminder light in the instrument panel remains on until you release the parking brake.

A warning message “PARK BRAKE” appears on the multi−information display and a warning tone sounds to remind you to release the parking brake when the vehicle speed rises above 5 km/h (3 mph) with the parking brake is applied.

⚠ CAUTION

Before driving, be sure the parking brake is fully released and the parking brake reminder light is off.

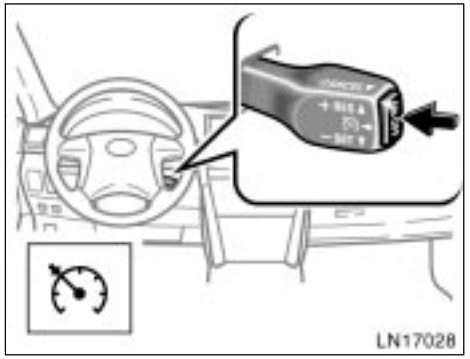
Cruise control

The cruise control is designed to maintain a set cruising speed without requiring the driver to operate the accelerator. Cruising speed can be set to any speed above 40 km/h (25 mph).

Within the limits of the vehicle capabilities, cruising speed can be maintained up or down grades. However, changes in vehicle speed may occur on steeper grades.

⚠ CAUTION

- **To help maintain maximum control of your vehicle, do not use the cruise control when driving in heavy or varying traffic, or on slippery (rainy, icy or snow−covered) or winding roads.**
- **Avoid vehicle speed increases when driving downhill. If the vehicle speed is too fast in relation to the cruise control set speed, cancel the cruise control then downshift the transmission to use engine braking to slow down.**



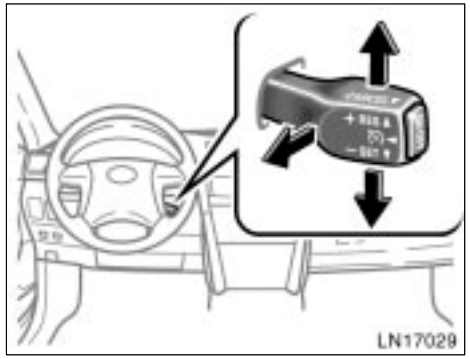
TURNING THE SYSTEM ON AND OFF

To turn the cruise control on, press the “ON−OFF” button. The cruise control indicator light on the instrument panel will come on to indicate that the cruise control is operational. Pressing the “ON−OFF” button again turns the system off.

When the system is turned off, cruising speed must be reset when the cruise control is turned on again.

⚠ CAUTION

To avoid accidentally engaging the cruise control, turn the system off when it is not in use. Make sure the cruise control indicator light is off.



SETTING THE CRUISING SPEED

The transmission must be in “D” before you set the cruising speed.

Bring your vehicle to the desired speed, push the lever down in the “− SET” direction and release it. This sets the vehicle at that speed. If the speed is not satisfactory, tap the lever up for a faster speed, or tap it down for a slower speed. Each tap changes the set speed by 1.6 km/h (1.0 mph). You can now take your foot off the accelerator pedal.

If you need acceleration—for example, when passing—depress the accelerator pedal enough for the vehicle to exceed the set speed. When you release it, the vehicle will return to the speed set prior to the acceleration.

CANCELLING THE CRUISE CONTROL

The cruise control may be temporarily cancelled by the driver or by the system itself under certain circumstances. Temporary cancellation allows the set cruising speed to remain in memory.

The cruise control can be temporarily cancelled by doing the following:

- Pulling the lever in the “CANCEL” direction and releasing it
- Depressing the brake pedal

Under certain circumstances, the cruise control is temporarily cancelled:

- When vehicle speed falls below 40 km/h (25 mph)
- When vehicle stability control is activated

When vehicle speed drops 16 km/h (10 mph) below the set speed, the cruise control is cancelled and the set speed is erased from memory.

The cruise control indicator light remains on to indicate that the system is still in operation.

To turn the cruise control off, press the “ON−OFF” button. Make sure the cruise control indicator light is off.

If the cruise control automatically cancels out other than for the above cases, have your vehicle checked by your Toyota dealer at the earliest opportunity.

RESUMING THE CRUISE CONTROL

If the cruise control is temporarily cancelled, the cruising speed can be resumed by pushing the lever up in the “+ RES” direction.

Vehicle speed must be above 40 km/h (25 mph).

RESETTING TO A FASTER SPEED

Push the lever up in the “+ RES” direction and hold it. Release the lever when the desired speed is attained. While the lever is held up, the vehicle will gradually gain speed.

However, a faster way to reset is to accelerate the vehicle and then push the lever down in the “− SET” direction.

RESETTING TO A SLOWER SPEED

Push the lever down in the “− SET” direction and hold it. Release the lever when the desired speed is attained. While the lever is held down, the vehicle speed will gradually decrease.

However, a faster way to reset is to depress the brake pedal and then push the lever down in the “− SET” direction.

CRUISE CONTROL FAILURE WARNING

If the cruise control indicator light flashes when using the cruise control, press the “ON−OFF” button to turn the system off and then press it again to turn it on.

If any of the following conditions then occurs, there is some trouble in the cruise control system.

- The indicator light does not come on.
- The indicator light flashes again.
- The indicator light goes out after it comes on.

If this is the case, contact your Toyota dealer and have your vehicle inspected.

SECTION 1-8

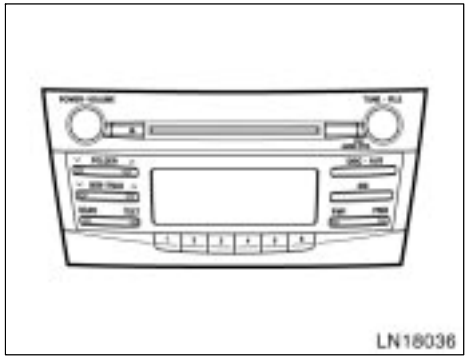
OPERATION OF INSTRUMENTS AND CONTROLS

Audio and hands−free phone systems

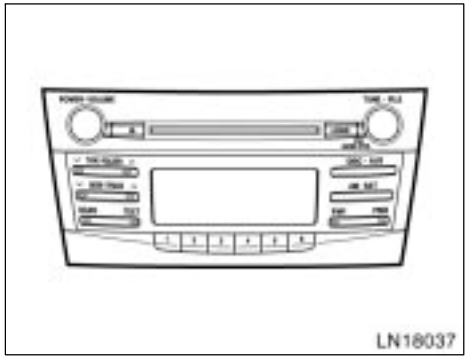
Reference 181
Using your audio system 181
Audio remote controls 201
AUX adapter 202
Audio system operating hints 203
Hands−free phone system 210

For vehicle equipped with Navigation system, please refer to the separate “Navigation System Owner’s Manual”.

Reference



Type 1: AM·FM radio/compact disc player (with compact disc changer controller)



Type 2: AM·FM radio/compact disc player with changer (with XM satellite radio* controller)

*: Use of satellite radio requires XM tuner and service. Contact your Toyota dealer for details.

Using your audio system— —Some basics

This section describes some of the basic features on Toyota audio systems. Some information may not pertain to your system.

Your audio system works when the ignition switch is set at ACC or ON.

⚠ CAUTION

For vehicles sold in U.S.A. and Canada:

- **Part 15 of the FCC Rules**

FCC Warning:
Any unauthorized changes or modifications to this equipment will void the user’s authority to operate this device.

- **Laser products**
  - **Do not take this unit apart or attempt to make any changes yourself. This is an intricate unit that uses a laser pickup to retrieve information from the surface of compact discs. The laser is carefully shielded so that its rays remain inside the cabinet. Therefore, never try to disassemble the player or alter any of its parts since you may be exposed to laser rays and dangerous voltages.**
  - **This product utilizes a laser. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.**

TURNING THE SYSTEM ON AND OFF

Push “POWER·VOLUME” to turn the audio system on and off.

Push “AM”, “FM1”, “FM2”, “AM·SAT”* or “DISC·AUX” to turn on that function without pushing “POWER·VOLUME”.

You can turn on the compact disc player by inserting a compact disc.

You can turn off the compact disc player by ejecting the compact disc. If the audio system was previously off, then the entire audio system will be turned off when you eject the compact disc. If the radio was previously on, it will come on again.

*: Use of satellite radio requires XM tuner and service. Contact your Toyota dealer for details.

SWITCHING BETWEEN FUNCTIONS

Push “AM”, “FM1”, “FM2”, “AM·SAT”* or “DISC·AUX” if the system is already on but you want to switch from one function to other.

*: Use of satellite radio requires XM tuner and service. Contact your Toyota dealer for details.

LISTENING TO THE XM SATELLITE RADIO BROADCAST* (type 2)

To listen to a satellite radio broadcast in your vehicle, an additional genuine Toyota satellite receiver and antenna (or equivalents) must be purchased and installed. A subscription to the XM satellite radio service is also necessary.

How to subscribe to an XM satellite radio

An XM satellite radio is a tuner designed exclusively to receive broadcasts provided under a separate subscription. Availability is limited to the 48 contiguous states.

How to subscribe:
You must enter into a separate service agreement with the XM radio in order to receive satellite broadcast programming in the vehicle. Additional activation and service subscription fees apply that are not included in the purchase price of the vehicle and optional digital satellite tuner. For complete information on subscription rates and terms, or to subscribe to the XM radio, visit XM on the web at www.xmradio.com or call an XM’s Listener Care at (800) 967−2346. The XM radio is solely responsible for the quality, availability and content of the satellite radio services provided, which are subject to the terms and conditions of the XM radio customer service agreement.

Customers should have their radio ID ready; the radio ID can be found by tuning to “channel 000” on the radio. For details, see “Displaying the radio ID” below.

All fees and programming are the responsibility of the XM satellite radio and are subject to change.

Satellite tuner technology notice:
Toyota’s satellite radio tuners are awarded Type Approval Certificates from XM Satellite Radio Inc. as proof of compatibility with the services offered by the XM satellite radio.

Displaying the radio ID

Each XM tuner is identified with a unique radio ID. You will need the radio ID when activating XM service or when reporting a problem.

If you select the “CH 000” using the “TUNE·FILE” knob, the ID code of 8 alphanumeric characters appears. If you select another channel, display of the ID code is canceled. The channel (000) alternates the display between the radio ID and the specific radio ID code.

*: Use of satellite radio requires XM tuner and service. Contact your Toyota dealer for details.

TONE AND BALANCE

For details about your system’s tone and balance controls, see the description of your own system.

SRS ® (type 1 only)

The audio systems utilize SRS FOCUS® and SRS TruBass® audio enhancement technologies, under license from SRS Labs, Inc., in all mode except AM radio mode.

FOCUS, TruBass, SRS and symbol are trademarks of SRS Labs, Inc.
FOCUS and TruBass technologies are incorporated under license from SRS Labs, Inc.

Tone

How good an audio program sounds to you is largely determined by the mix of the treble, midrange (type 2 only), and bass levels. In fact, different kinds of music and vocal programs usually sound better with different mixes of treble, midrange and bass.

You can adjust sound characteristics. Different sound characteristics can be recorded for each audio source.

Balance

A good balance of the left and right stereo channels and of the front and rear sound levels is also important.

Keep in mind that if you are listening to a stereo recording or broadcast, changing the right/left balance will increase the volume of one group of sounds while decreasing the volume of other.

YOUR RADIO ANTENNA

Your vehicle has an antenna printed on the inside of the rear window.

NOTICE

Putting a film (especially a conductive or metallic film) on the rear window will noticeably reduce the sensitivity of the radio.

YOUR COMPACT DISC PLAYER (type 1)

When you insert a disc, gently push it in with the label side up. The compact disc player will play from track 1 through to the end of the disc. Then it will play from track 1 again.

NOTICE

Never try to disassemble or oil any part of the compact disc player. Do not insert anything other than compact discs into the slot.

8 cm (3 in.) compact disc singles

Your compact disc player does not need an adaptor to play compact disc singles. Compact disc singles are about 8 cm (3 in.) in diameter−smaller than standard discs.

NOTICE

Do not use an adaptor for compact disc singles—it could cause tracking errors or interfere with the ejection of compact discs.

YOUR COMPACT DISC PLAYER WITH CHANGER (type 2)

When you insert a disc, push the “LOAD” button and gently push the disc in with the label side up. This compact disc player can store up to six discs. The player will play from track 1 through to the end of the disc. Then it will play from track 1 of the next disc.

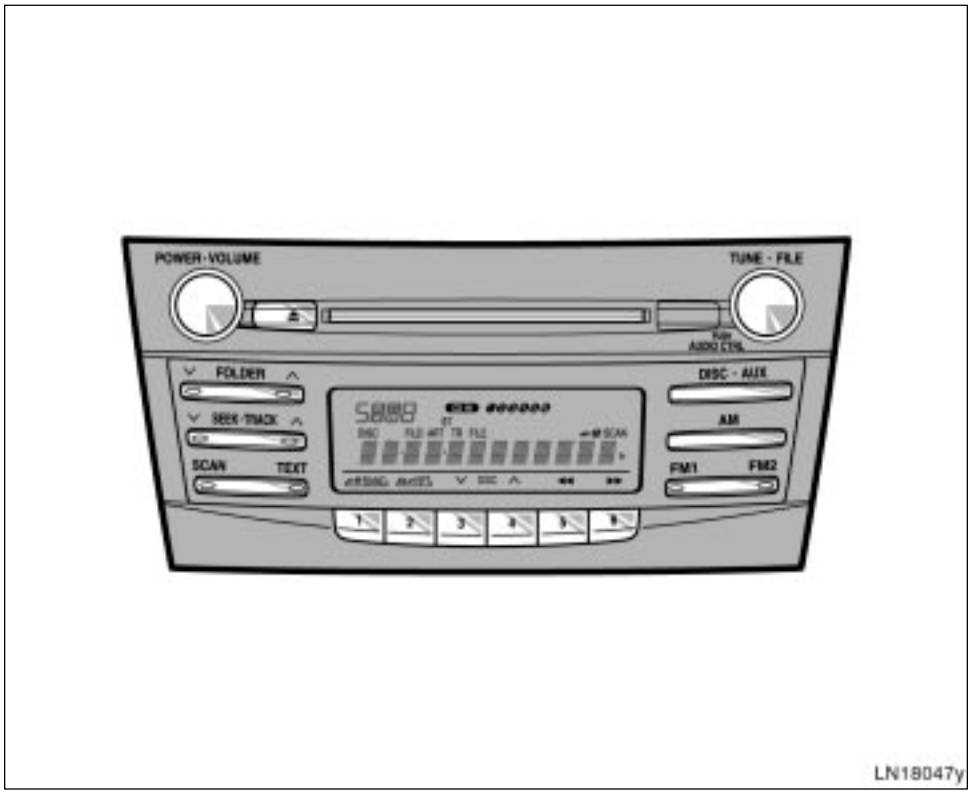
The player is intended for use with 12 cm (4.7 in.) discs only.

NOTICE

- ***Do not stack up two discs for insertion, or it will cause damage to the compact disc player. Insert only one compact disc into slot at a time.***
- ***Never try to disassemble or oil any part of the compact disc player. Do not insert anything other than compact discs into the slot.***

—Controls and features

▶Type 1



Details of specific buttons, controls and features are described in the alphabetical list that follows.

1 2 3 4 5 6 (Preset buttons)

These buttons are used to preset and tune in radio stations.

To preset a station to a button: Tune in the desired station. (See “TUNE·FILE” or “SEEK·TRACK”.) Push and hold down the button until you hear a beep—this will set the station to the button. The preset button number will appear on the display.

To recall a preset station: Push the button for the station you want. The preset button number and station frequency will appear on the display.

These systems can store one AM and two FM stations for each button. (The display will show “AM”, “FM1” or “FM2” when you push “AM”, “FM1” or “FM2” button.)

⏏ (Eject button)

Push the compact disc eject button to eject a compact disc.

◀◀/▶▶ (Reverse/Fast forward button)

Push and hold “▶▶” (preset button 6) or “◀◀” (preset button 5) to fast forward or reverse within a compact disc. When you release the button, the player will resume playing.

AM

Push the “AM” button to turn on the radio and select the AM band. “AM” will appear on the display.

AUDIO CTRL (Tone and sound balance controls)

Each time you push the “AUDIO CTRL” knob, the mode changes. To adjust the tone and balance, turn the knob.

BAS: Adjusts low−pitched tones. The display ranges from −5 to 5.

TRE: Adjusts high−pitched tones. The display ranges from −5 to 5.

FAD: Adjusts the sound balance between the front and rear speakers. The display ranges from F7 to R7.

BAL: Adjusts the sound balance between the right and left speakers. The display ranges from L7 to R7.

Switching over the Speed Automatic Sound Levelizer (ASL) level

ASL: The Automatic Sound Levelizer can be turned on by turning the knob. In addition, turning the knob allows you to select from LOW, MID, and HIGH volume and tone settings. The ASL system automatically adjusts volume and tone in accordance with the driving speed.

DISC·AUX (Compact disc)

Push the “DISC·AUX” button to play a compact disc.

When the audio system is set to compact disc operation, the display shows the track number currently being played.

To switch between CD and AUX (external device) modes, press the “DISC·AUX” button. The AUX mode is only available when AUX adapter is connected to the system. When the AUX adapter is in use, “AUX” will appear on the display.

Error messages

If the player malfunctions, your audio system will display following error messages.

“WAIT”: The compact disc player unit may be too hot. Allow the player to cool down.

“ERROR 1”: The disc may be dirty, damaged or inserted incorrectly (up−side down). Clean the disc and re−insert it.

“NO DISC”: The compact disc changer of the separate unit is empty. Insert a disc.

“ERROR 3”: There is a problem inside the system.

“ERROR 4”: Over−current. Ask your Toyota dealer to inspect.

“CD OPEN”: The compact disc changer lid of the separate unit is open. Close the compact disc changer lid.

If “NO MUSIC” appears on the display, it indicates that a disc with no MP3/WMA data has been inserted. Remove the disc from the player and insert an MP3/WMA data disc.

If the malfunction still exists, take your vehicle to your Toyota dealer.

∨ DISC ∧

With compact disc changer only—

Use these buttons to select a disc you want to listen to.

Push “∨” (preset button 3) or “∧” (preset button 4) until the number of the disc you want to listen appears on the display.

FM1 FM2

Push the “FM1” or “FM2” button to turn on the radio and select the FM band. “FM1” or “FM2” will appear on the display. This system allows you to set twelve FM stations, two for each of the preset button.

FOLDER (Folder up/down)

To skip up or down to a different folder:
Push “∧” or “∨” side of the “FOLDER” several times until the number of the folder you want to listen to appears on the display.

To jump to the first file in the first folder:
Push and hold the “∨” side of the button until you hear a beep.

When playing a disc featuring both audio data (CD−DA) and MP3/WMA files, audio data (CD−DA) is played.

POWER·VOLUME (Power and Volume)

Push “POWER·VOLUME” to turn the audio system on and off. Turn “POWER·VOLUME” to adjust the volume.

RAND (Random)

Compact disc player

There are two random features—you can either listen to the tracks on one compact disc in random order, or listen to the tracks on all the compact discs in the magazine in random order.

To play the tracks on one disc in random order:
Quickly push and release “RAND” (preset button 1). “RAND” will appear on the display and the player will perform the tracks on the disc you are listening to in random order. To turn off the random feature, push this button again.

With compact disc changer only—

To play all the tracks in the magazine in random order:
Push and hold “RAND” (preset button 1) until you hear a beep. “RAND” will appear on the display and the player will perform all the tracks on all the discs in the magazine in random order. To turn off the random feature, push this button again.

MP3/WMA player

There are two random playback features—you can either listen to all of the files on the compact discs in random order. You can also listen to the files in a single folder in random order.

To randomly play the files in a folder:
Quickly push and release “RAND” (preset button 1). “RAND” will appear on the display.

To randomly play all of the files on the compact disc:
Push and hold “RAND” (preset button 1) until you hear a beep. “RAND” will appear on the display and the player will play all of the files on the disc in random order. To turn off the random playback feature, push this button again.

RPT (Repeat)

Compact disc player

There are two repeat features—you can either replay a disc track or a whole compact disc.

Repeating a track:
Quickly push and release “RPT” (preset button 2) while the track is playing. “RPT” will appear on the display. When the track ends, it will automatically replay. To turn off the repeat feature, push this button again.

With compact disc changer only—

Repeating a disc:
Push and hold “RPT” (preset button 2) until you hear a beep. “RPT” will appear on the display. The player will repeat all the tracks on the disc you are listening to. When the disc ends, the player will automatically go back to the first track on the disc and replay. To turn off the repeat feature, push this button again.

MP3/WMA player

There are two repeat features—you can repeat a signal file or an entire folder.

Repeating a file:
Quickly push and release “RPT” (preset button 2) while the file is playing. “RPT” will appear on the display. When the file ends, it will repeat automatically. This process will be continued until you push the button again to turn off the repeat feature.

Repeating a folder:
Push and hold “RPT” (preset button 2) until you hear a beep. “RPT” will appear on the display. The player will repeat all of the files in the folder. When the last file in the folder ends, the folder will repeat from the beginning. To turn off the repeat feature, push this button again.

SCAN

Radio

You can either scan all the frequencies on a band or scan only the preset stations for that band.

To scan the preset stations:
Push and hold the “SCAN” button until you hear a beep. The radio will tune in the next preset station up the band, stay there for 5 seconds, and then move to the next preset station. To stop scanning, push this button again.

To scan all the frequencies:
Quickly push and release the “SCAN” button. The radio will find the next station up the station band, stay there for 5 seconds, and then scan again to the next station. To stop scanning, push this button again.

Compact disc player

There are two scan features—you can either scan the tracks on a specific disc or scan the first tracks of all the discs in the magazine.

Scanning the tracks on a disc:
Quickly push and release the “SCAN” button. “SCAN” will appear on the display and the player will scan all the tracks on the disc you are listening to. To stop scanning, push this button again. If the player scanned all the tracks on the disc, it will stop scanning.

With compact disc changer only—

Scanning the first tracks of all the discs in the magazine:
Push the “SCAN” button until you hear a beep. “SCAN” will appear on the display and the player will scan the first track on the next disc. To stop scanning, push this button again. If the player has scanned all the discs, it will stop scanning.

MP3/WMA player

There are two scan features—you can either scan the files in a folder on a specific disc or scan the first file of all the folder.

Scanning the files on a folder:
Quickly push and release “SCAN”. “SCAN” will appear on the display and the player will scan all the files in the folder you are listening to. To select a file, push the “SCAN” again. After all the tracks on the disc have been scanned in one pass, normal play resumes.

Scanning the first file of all the folders:
Push “SCAN” until you hear a beep. “SCAN” will appear on the display and the player will scan the first file of the next folder. To select a folder, push the “SCAN” again. After all the folders have been scanned in one pass, normal play resumes.

SEEK·TRACK (Seeking/Tracking up/down)

Radio

In the seek mode, the radio finds and plays the next station up or down the station band.

To seek the next station, quickly push and release “∧” or “∨” side of the “SEEK·TRACK” button. Do this again to find the station after that.

Compact disc player

Use this button to skip up or down to a different track.

Push “∧” or “∨” side of the “SEEK·TRACK” button until the number of the track you want to listen to appears on the display. If you want to return to the beginning of the current track, quickly push the “∨” side of the button one time.

MP3/WMA player

Use this button to file up or down to a different file.

Push “∧” or “∨” side of the “SEEK·TRACK” several times until the file you want to listen to appears on the display. If you want to return to the beginning of the current file, push the “∨” side of the button one time.

ST (Stereo reception) display

Your radio automatically changes to stereo reception when a stereo broadcast is received. “ST” appears on the display. If the signal becomes weak, the radio reduces the amount of channel separation to prevent the weak signal from creating noise. If the signal becomes extremely weak, the radio switches from stereo to mono reception.

TEXT

Compact disc player

This button is used to change the display for the compact disc that contains text data.

To change the display, quickly push and release the “TEXT” button while the compact disc is playing. The display changes in the order from the elapsed time to disc title to track title, then back to the elapsed time.

If this button is pushed while a compact disc that does not contain text data is playing, “NO TITLE” will appear on the display.

If the entire disc or track title does not appear on the display, push and hold the button until you hear a beep. The rest of the title will appear.

MP3/WMA player

This button is used to change the display for the MP3/WMA file that contains text data.

To change the display, quickly push and release the “TEXT” button while the MP3/WMA file is playing. The display changes in the order from the elapsed time to folder name to file name to album title to track title to artist name, then back to the elapsed time.

If this button is pushed while an MP3/WMA file that does not contain text data is playing, “NO TITLE” will appear on the display.

If the entire text data is not displayed, push and hold it until you hear a beep. The rest of the text data will appear.

TUNE·FILE (Tuning and File up/down)

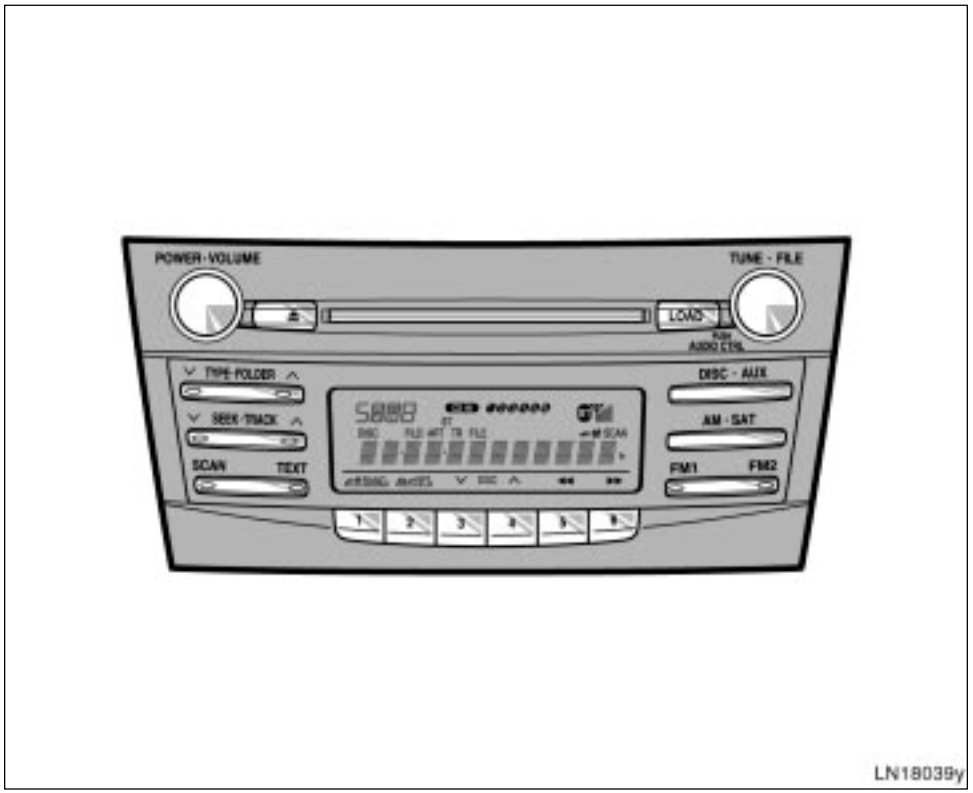
Radio

Turn the “TUNE·FILE” knob clockwise to step up the frequency. Turn the knob counterclockwise to step down the frequency.

MP3/WMA player

Turn the “TUNE·FILE” knob clockwise to file up. Turn the knob counterclockwise to file down.

▶**Type 2**



Details of specific buttons, controls and features are described in the alphabetical list that follows.

1 2 3 4 5 6 (Preset buttons)

These buttons are used to preset and tune in radio stations.

To preset a station to a button: Tune in the desired station. (See “TUNE·FILE” or “SEEK·TRACK”.) Push and hold down the button until you hear a beep—this will set the station to the button. The preset button number will appear on the display.

To recall a preset station: Push the button for the station you want. The preset button number and station frequency will appear on the display.

These systems can store one AM and two FM stations for each button. (The display will show “AM”, “FM1” or “FM2” when you push “AM·SAT”, “FM1” or “FM2” button.)

XM satellite radio*—

These buttons are used to preset and tune in radio channels.

To preset a channel to a button: Tune in the desired channel. (See “TUNE·FILE” or “SEEK·TRACK”.) Push and hold down the button until you hear a beep—this will set the channel to the button. The preset button number will appear on the display.

To recall a preset channel: Push the button for the channel you want. The preset button number and channel number will appear on the display.

This radio can store three XM channels for each button. (The display will show “SAT1”, “SAT2” or “SAT3” when you push “AM·SAT” button.)

*: Use of satellite radio requires XM tuner and service. Contact your Toyota dealer for details.

⏏ (Eject button)

This button is used to eject one or all compact discs.

To eject the current compact disc, push and release the compact disc eject button.

To eject a specific disc, push “∨” (preset button 3) or “∧” (preset button 4) until the number of the disc you want to eject is displayed. Push and release the eject button.

To eject all discs at a time, press and hold the eject button until you hear a beep. The last compact disc played before pushing the button will be ejected first. If the ejected disc is not removed for a long time, the eject function will be cancelled.

◀◀/▶▶ (Reverse/Fast forward button)

Push and hold “▶▶” (preset button 6) or “◀◀” (preset button 5) to fast forward or reverse within a compact disc. When you release the button, the player will resume playing.

AM·SAT (AM band and XM satellite radio*)

Push the “AM·SAT” button to turn on the radio and select the AM or XM band. “AM”, “SAT1”, “SAT2” or “SAT3” will appear on the display.

Error messages

If the satellite radio tuner malfunctions, your audio system will display following error messages.

“ANTENNA”:

- The XM antenna is not connected. Check whether the XM antenna cable is attached securely.
- A short−circuit occurs in the antenna or the surrounding antenna cable. See a Toyota certified dealer.

“UPDATING”:

- You have not subscribed to the XM satellite radio. The radio is being updated with the latest encryption code. Contact the XM satellite radio for subscription information. When a contact is canceled, you can choose the “CH000” and all free−to−air channels.
- The premium channel you selected is not authorized. Wait for about 2 seconds until the radio returns to the previous channel or “CH001”. If it does not change automatically, select another channel. If you want to listen to the premium channel, contact the XM satellite radio.

“NO SIGNAL”: The XM signal is too weak at the current location. Wait until your vehicle reaches a location with a stronger signal.

“LOADING”: The unit is acquiring audio or program information. Wait until the unit has received the information.

“OFF AIR”: The channel you selected is not broadcasting any programming. Select another channel.

“− − −”: The channel you selected is no longer available. Wait for about 2 seconds until the radio returns to the previous channel or “CH001”. If it does not change automatically, select another channel.

The XM Listener Care Center is also available on the phone, please call (800) 967−2346 during the following hours:
Monday—Saturday: 7 a.m.—1 a.m.
Sunday: 12 p.m.—12 a.m.

*: Use of satellite radio requires XM tuner and service. Contact your Toyota dealer for details.

AUDIO CTRL (Tone and sound balance controls)

Each time you push the “AUDIO CTRL” knob, the mode changes. To adjust the tone and balance, turn the knob.

BAS: Adjusts low−pitched tones. The display ranges from −5 to 5.

MID: Adjusts mid−pitched tones. The display ranges from −5 to 5.

TRE: Adjusts high−pitched tones. The display ranges from −5 to 5.

FAD: Adjusts the sound balance between the front and rear speakers. The display ranges from F7 to R7.

BAL: Adjusts the sound balance between the right and left speakers. The display ranges from L7 to R7.

Switching over the Speed Automatic Sound Levelizer (ASL) level

ASL: The ASL system automatically adjusts volume and tone in accordance with the driving speed.

The ASL system can be turned on or off. Pushing and holding the “TUNE·FILE” knob shows the current status of the ASL system on the display. Turn the “TUNE·FILE” knob to turn on or off the system.

DISC·AUX (Compact disc)

Push the “DISC·AUX” button to play a compact disc.

When the audio system is set to compact disc operation, the display shows the track, or track and disc number currently being played.

To switch between CD and AUX (external device) modes, press the “DISC·AUX” button. The AUX mode is only available when AUX adapter is connected to the system. When the AUX adapter is in use, “AUX” will appear on the display.

Error messages

If the player malfunctions, your audio system will display following error messages.

“WAIT”: The compact disc player unit may be too hot. Allow the player to cool down.

“ERROR 1”: The disc may be dirty, damaged or inserted incorrectly (up−side down). Clean the disc and re−insert it.

“NO DISC”: Eject the disc or magazine. Set the disc or magazine again.

“ERROR 3”: There is a problem inside the system.

“ERROR 4”: Over−current. Ask your Toyota dealer to inspect.

If “NO MUSIC” appears on the display, it indicates that a disc with no MP3/WMA data has been inserted. Remove the disc from the player and insert an MP3/WMA data disc.

If the malfunction still exists, take your vehicle to your Toyota dealer.

∨ DISC ∧

Use these buttons to select a disc you want to listen to.

Push “∨” (preset button 3) or “∧” (preset button 4) until the number of the disc you want to listen appears on the display.

FM1 FM2

Push the “FM1” or “FM2” button to turn on the radio and select the FM band. “FM1” or “FM2” will appear on the display. This system allows you to set twelve FM stations, two for each of the preset button.

LOAD

This button is used to load the compact discs in the compact disc player. This player can store up to six discs.

To load one compact disc only, quickly push and release the button. When the indicators on both sides of the slot turn green, insert a compact disc. After the disc is loaded, the shutter of the slot will close.

If no compact disc is inserted, the shutter will close after 15 seconds.

To load multiple compact discs, push and hold the button (until you hear a beep when the audio system is on). When the indicators on both sides of the slot turn green, insert the first compact disc. After the disc is loaded, the shutter of the slot will close. After a few seconds, the shutter will automatically open again and the indicators will turn green so the next disc can be inserted. The same process can be applied for loading the rest of the discs. If the player is full of discs, “DISC FULL” will appear on the display.

If no compact disc is inserted, the shutter will close after 15 seconds.

POWER·VOLUME (Power and Volume)

Push “POWER·VOLUME” to turn the audio system on and off. Turn “POWER·VOLUME” to adjust the volume.

RAND (Random)

Compact disc player

There are two random features—you can either listen to the tracks on one compact disc in random order, or listen to the tracks on all the compact discs in the magazine in random order.

To play the tracks on one disc in random order:
Quickly push and release “RAND” (preset button 1). “RAND” will appear on the display and the player will perform the tracks on the disc you are listening to in random order. To turn off the random feature, push this button again.

To play all the tracks in the magazine in random order:
Push and hold “RAND” (preset button 1) until you hear a beep. “RAND” will appear on the display and the player will perform all the tracks on all the discs in the magazine in random order. To turn off the random feature, push this button again.

MP3/WMA player

There are two random playback features—you can either listen to all of the files on the compact discs in random order. You can also listen to the files in a single folder in random order.

To randomly play the files in a folder:
Quickly push and release “RAND” (preset button 1). “RAND” will appear on the display.

To randomly play all of the files on the compact disc:
Push and hold “RAND” (preset button 1) until you hear a beep. “RAND” will appear on the display and the player will play all of the files on the disc in random order. To turn off the random playback feature, push this button again.

RPT (Repeat)

Compact disc player

There are two repeat features—you can either replay a disc track or a whole compact disc.

Repeating a track:
Quickly push and release “RPT” (preset button 2) while the track is playing. “RPT” will appear on the display. When the track ends, it will automatically replay. To turn off the repeat feature, push this button again.

Repeating a disc:
Push and hold “RPT” (preset button 2) until you hear a beep. “RPT” will appear on the display. The player will repeat all the tracks on the disc you are listening to. When the disc ends, the player will automatically go back to the first track on the disc and replay. To turn off the repeat feature, push this button again.

MP3/WMA player

There are two repeat features—you can repeat a signal file or an entire folder.

Repeating a file:
Quickly push and release “RPT” (preset button 2) while the file is playing. “RPT” will appear on the display. When the file ends, it will repeat automatically. This process will be continued until you push the button again to turn off the repeat feature.

Repeating a folder:
Push and hold “RPT” (preset button 2) until you hear a beep. “RPT” will appear on the display. The player will repeat all of the files in the folder. When the last file in the folder ends, the folder will repeat from the beginning. To turn off the repeat feature, push this button again.

SCAN

Radio

You can either scan all the frequencies on a band or scan only the preset stations for that band.

To scan the preset stations:
Push and hold the “SCAN” button until you hear a beep. The radio will tune in the next preset station up the band, stay there for 5 seconds, and then move to the next preset station. To stop scanning, push this button again.

To scan all the frequencies:
Quickly push and release the “SCAN” button. The radio will find the next station up the station band, stay there for 5 seconds, and then scan again to the next station. To stop scanning, push this button again.

XM satellite radio*—

You can either scan the currently selected channel category or scan only the preset channels for that band.

To scan the preset channels:
Push and hold the “SCAN” button until you hear a beep. “SCAN” appears on the display. The radio will tune in the next preset channel up the band, stay there for 5 seconds, and then move to the next preset channel. To stop scanning, push this button again.

To scan the currently selected channel category:
Quickly push and release the “SCAN” button. “SCAN” appears on the display. The radio will find the next channel in the same channel category up the band, stay there for 5 seconds, and then scan again. To stop scanning, push this button again.

*: Use of satellite radio requires XM tuner and service. Contact your Toyota dealer for details.

Compact disc player

There are two scan features—you can either scan the tracks on a specific disc or scan the first tracks of all the discs in the magazine.

Scanning the tracks on a disc:
Quickly push and release the “SCAN” button. “SCAN” will appear on the display and the player will scan all the tracks on the disc you are listening to. To stop scanning, push this button again. If the player scanned all the tracks on the disc, it will stop scanning.

Scanning the first tracks of all the discs in the magazine:
Push the “SCAN” button until you hear a beep. “SCAN” will appear on the display and the player will scan the first track on the next disc. To stop scanning, push this button again. If the player has scanned all the discs, it will stop scanning.

MP3/WMA player

There are two scan features—you can either scan the files in a folder on a specific disc or scan the first file of all the folder.

Scanning the files on a folder:
Quickly push and release “SCAN”. “SCAN” will appear on the display and the player will scan all the files in the folder you are listening to. To select a file, push the “SCAN” again. After all the tracks on the disc have been scanned in one pass, normal play resumes.

Scanning the first file of all the folders:
Push “SCAN” until you hear a beep. “SCAN” will appear on the display and the player will scan the first file of the next folder. To select a folder, push the “SCAN” again. After all the folders have been scanned in one pass, normal play resumes.

SEEK·TRACK (Seeking/Tracking up/down)

Radio

In the seek mode, the radio finds and plays the next station up or down the station band.

To seek the next station, quickly push and release “∧” or “∨” side of the “SEEK·TRACK” button. Do this again to find the station after that.

XM satellite radio*—

To select the next channel within the current channel category, push the “∧” or “∨” side of the “SEEK·TRACK” button. Repeat until a desired channel is found.

*: Use of satellite radio requires XM tuner and service. Contact your Toyota dealer for details.

Compact disc player

Use this button to skip up or down to a different track.

Push “∧” or “∨” side of the “SEEK·TRACK” button until the number of the track you want to listen to appears on the display. If you want to return to the beginning of the current track, quickly push the “∨” side of the button one time.

MP3/WMA player

Use this button to file up or down to a different file.

Push “∧” or “∨” side of the “SEEK·TRACK” several times until the file you want to listen to appears on the display. If you want to return to the beginning of the current file, push the “∨” side of the button one time.

ST (Stereo reception) display

Your radio automatically changes to stereo reception when a stereo broadcast is received. “ST” appears on the display. If the signal becomes weak, the radio reduces the amount of channel separation to prevent the weak signal from creating noise. If the signal becomes extremely weak, the radio switches from stereo to mono reception.

TEXT

XM satellite radio*1—

When you push the “TEXT” button, the display changes as follows:
CH NAME → TITLE (SONG/PROGRAM TITLE) → NAME (ARTIST NAME/FEATURE) → CH NUMBER → CH NAME

Up to 10 alphanumeric characters can be displayed. (Some information will not be fully displayed.)

The message display will be canceled if any button that affects the display is pushed.

If there is no song/program title or artist name/feature associated with the channel at that time, “– – – – –” will appear on the display.

This XM tuner supports “Audio Services” (Music and Talk) of only XM satellite radio and “Text Information”*2 linked to the respective audio services.

*1: Use of satellite radio requires XM tuner and service. Contact your Toyota dealer for details.

*2: Text Information includes, Channel Name, (Artist) Name, (Song) Title and Category Name.

Compact disc player

This button is used to change the display for the compact disc that contains text data.

To change the display, quickly push and release the “TEXT” button while the compact disc is playing. The display changes in the order from the elapsed time to disc title to track title, then back to the elapsed time.

If this button is pushed while a compact disc that does not contain text data is playing, “NO TITLE” will appear on the display.

If the entire disc or track title does not appear on the display, push and hold the button until you hear a beep. The rest of the title will appear.

MP3/WMA player

This button is used to change the display for the MP3/WMA file that contains text data.

To change the display, quickly push and release the “TEXT” button while the MP3/WMA file is playing. The display changes in the order from the elapsed time to folder name to file name to album title to track title to artist name, then back to the elapsed time.

If this button is pushed while an MP3/WMA file that does not contain text data is playing, “NO TITLE” will appear on the display.

If the entire text data is not displayed, push and hold it until you hear a beep. The rest of the text data will appear.

TUNE·FILE (Tuning and File up/down)

Radio

Turn the “TUNE·FILE” knob clockwise to step up the frequency. Turn the knob counterclockwise to step down the frequency.

XM satellite radio*—

Turn the “TUNE·FILE” knob clockwise to step up the channel. Turn the knob counterclockwise to step down the channel.

*: Use of satellite radio requires XM tuner and service. Contact your Toyota dealer for details.

MP3/WMA player

Turn the “TUNE·FILE” knob clockwise to file up. Turn the knob counterclockwise to file down.

TYPE·FOLDER (Type/Folder up/down)

Radio

XM satellite radio*—

When you push the “∨” or “∧” side of the “TYPE·FOLDER” button while receiving a XM channel, the current channel category appears on the display.

When the channel category appears, push either “∨” or “∧” side of the “TYPE·FOLDER” button to switch to the next or previous category.

*: Use of satellite radio requires XM tuner and service. Contact your Toyota dealer for details.

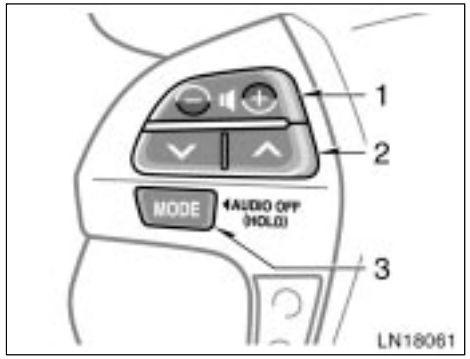
MP3/WMA player

To skip up or down to a different folder: Push “∧” or “∨” side of the “TYPE·FOLDER” several times until the number of the folder you want to listen to appears on the display.

To jump to the first file in the first folder: Push and hold the “∨” side of the button until you hear a beep.

When playing a disc featuring both audio data (CD−DA) and MP3/WMA files, audio data (CD−DA) is played.

Audio remote controls (steering switches)



Some parts of the audio system can be adjusted using the switches on the steering wheel.

Details of the specific switches, controls, and features are described below.

1. Volume control switch
2. “∧ ∨” switch
3. “MODE” switch

1. Volume control switch

Push the “+” side to increase the volume. The volume continues to increase while the switch is being pushed.

Push the “−” side to decrease the volume. The volume continues to decrease while the switch is being pushed.

2. “∧ ∨” switch

Radio

This switch has the following features—

To select a preset station:
Quickly push and release the “∧” or “∨” side of the switch. Do this again to select the next preset station.

To seek a station:
Push and hold the “∧” or “∨” side of the switch until you hear a beep. Do this again to find the next station. If you push the switch on either side during the seek mode, seeking will be cancelled.

To step up or down the frequency, push and hold the switch even after you hear a beep. When you release the switch, the radio will begin seeking up or down for a station. Do this again to find the next station.

XM satellite radio*—

To select a preset channel, push the “∧” or “∨” side of the switch. Repeat until a desired channel is found.

*: Use of satellite radio requires XM tuner and service. Contact your Toyota dealer for details.

Compact disc player

Use this switch to skip up or down to a different track in either direction.

Quickly push and release the “∧” or “∨” side of the switch until the track you want to listen to is set. If you want to return to the beginning of the current track, push the “∨” side of the switch once, quickly.

Push and hold the “∧” or “∨” side of the switch until the disc you want to listen to is set.

MP3/WMA player

To select a desired file:
Quickly push and release the “∧” or “∨” side of the switch until the file you want to listen to is set. If you want to return to the beginning of the current file, push the “∨” side of the switch once, quickly.

To select a desired folder:
Push and hold the “∧” or “∨” side of the switch until you hear a beep. Repeat this until the folder you want to listen to is set.

To select a desired disc:
Push and hold the “∧” or “∨” side of the switch until you hear a beep. Repeat this until the disc you want to listen to is set.

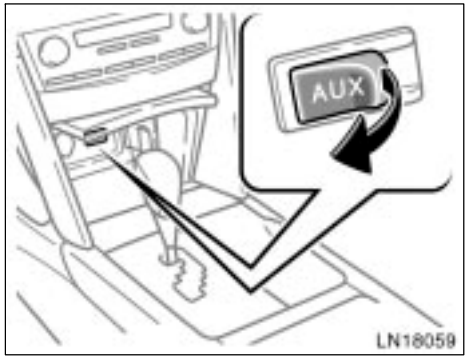
3. “MODE” switch

Push the “MODE” switch to select an audio mode. Each push changes the mode sequentially if the desired mode is ready to use.

To turn the audio system on, push the “MODE” switch.

To turn the audio system off, push and hold the “MODE” switch until the system turns off.

AUX adapter



An AUX adapter is installed inside the auxiliary box.

By inserting a mini plug into the AUX adapter, you can listen to music from a portable audio device through the vehicle’s speaker system.

To use the AUX adapter, switch to the AUX mode (external device mode) by pressing the “DISC·AUX” button. When the AUX adapter is in use, “AUX” will appear on the display. To adjust the volume, turn the “POWER·VOLUME” knob.

When using a portable audio device connected to the power outlet, noise may occur during playback. If this happens, use the power source of the portable audio device.

If you install an audio system other than a genuine audio system, you will not be able to use the AUX adapter.

Connected cables can be passed through the hold to the front passenger side of the auxiliary box. For details, see “Auxiliary boxes” on page 268 in Section 1−10.

Audio system operating hints

NOTICE

To ensure correct audio system operations:

- ***Be careful not to spill beverages over the audio system.***
- ***Do not put anything other than a compact disc into the slot.***
- ***The use of a cellular phone inside or near the vehicle may cause a noise from the speakers of the audio system which you are listening to. However, this does not indicate a malfunction.***

RADIO RECEPTION

Usually, a problem with radio reception does not mean there is a problem with your radio—it is just the normal result of conditions outside the vehicle.

For example, nearby buildings and terrain can interfere with FM reception. Power lines or telephone wires can interfere with AM signals. And of course, radio signals have a limited range. The farther you are from a station, the weaker its signal will be. In addition, reception conditions change constantly as your vehicle moves.

Here are some common reception problems that probably do not indicate a problem with your radio:

FM

Fading and drifting stations—Generally, the effective range of FM is about 40 km (25 miles). Once outside this range, you may notice fading and drifting, which increase with the distance from the radio transmitter. They are often accompanied by distortion.

Multi−path—FM signals are reflective, making it possible for two signals to reach your antenna at the same time. If this happens, the signals will cancel each other out, causing a momentary flutter or loss of reception.

Static and fluttering—These occur when signals are blocked by buildings, trees, or other large objects. Increasing the bass level may reduce static and fluttering.

Station swapping—If the FM signal you are listening to is interrupted or weakened, and there is another strong station nearby on the FM band, your radio may tune in the second station until the original signal can be picked up again.

AM

Fading—AM broadcasts are reflected by the upper atmosphere—especially at night. These reflected signals can interfere with those received directly from the radio station, causing the radio station to sound alternately strong and weak.

Station interference—When a reflected signal and a signal received directly from a radio station are very nearly the same frequency, they can interfere with each other, making it difficult to hear the broadcast.

Static—AM is easily affected by external sources of electrical noise, such as high tension power lines, lightening, or electrical motors. This results in static.

XM*

Alternation or modifications carried out without appropriate authorization may invalidate the user’s right to operate the equipment.

*: Use of satellite radio requires XM tuner and service. Contact your Toyota dealer for details.

NOTICE

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

CARING FOR YOUR COMPACT DISC PLAYER AND DISCS

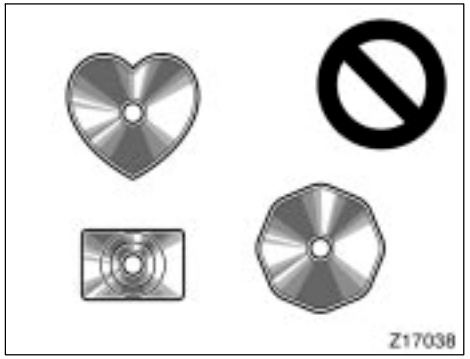
- Your compact disc player is intended for use with 12 cm (4.7 in.) discs only.
- Extremely high temperatures can keep your compact disc player from working. On hot days, use the air conditioning to cool the vehicle interior before you listen to a disc.
- Bumpy roads or other vibrations may make your compact disc player skip.
- If moisture gets into your compact disc player, you may not hear any sound even though your compact disc player appears to be working. Remove the disc from the player and wait until it dries.

⚠ CAUTION

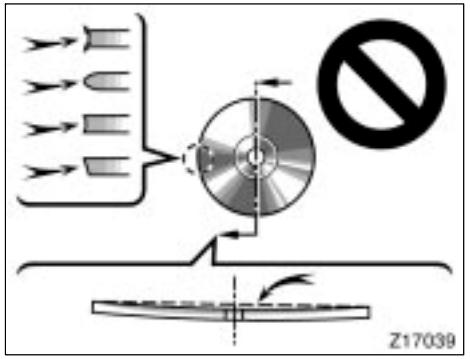
Compact disc players use an invisible laser beam which could cause hazardous radiation exposure if directed outside the unit. Be sure to operate the player correctly.

- Use only compact discs marked as shown above. The following products may not be playable on your compact disc player.

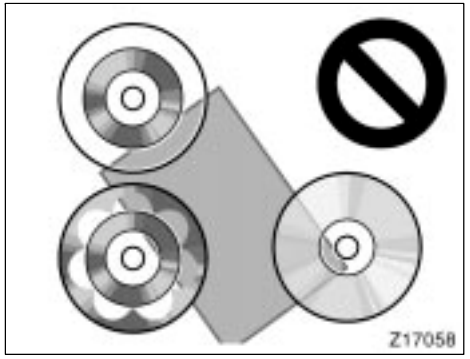
  Copy−protected CD
  CD−R (CD−Recordable)
  CD−RW (CD−Re−writable)
  CD−ROM



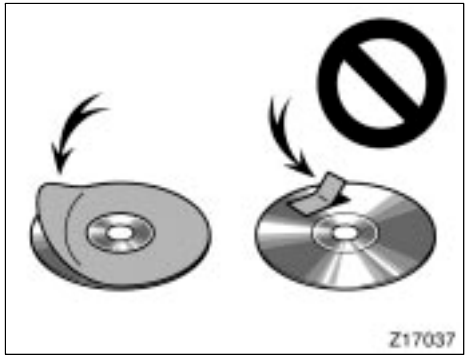
Special shaped discs



Low quality discs



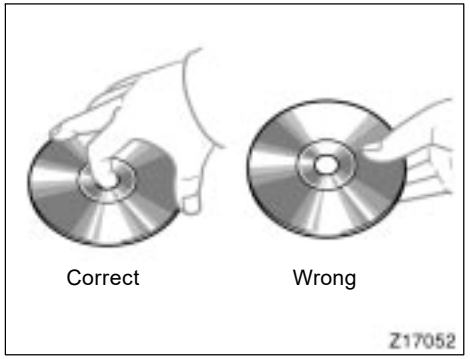
Transparent/translucent discs



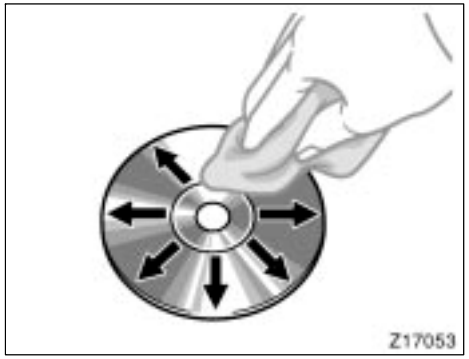
Labeled discs

NOTICE

Do not use special shaped, transparent/translucent, low quality or labeled discs such as those shown in the illustrations. The use of such discs may damage the player, or it may be impossible to eject the disc.



- Handle compact discs carefully, especially when you are inserting them. Hold them on the edge and do not bend them. Avoid getting fingerprints on them, particularly on the shiny side.
- Dirt, scratches, warping, pin holes, or other disc damage could cause the player to skip or to repeat a section of a track. (To see a pin hole, hold the disc up to the light.)
- Remove discs from the compact disc player when you are not listening to them. Store them in their plastic cases away from moisture, heat, and direct sunlight.



To clean a compact disc: Wipe it with a soft, lint−free cloth that has been dampened with water. Wipe in a straight line from the center to the edge of the disc (not in circles). Dry it with another soft, lint−free cloth. Do not use a conventional record cleaner or anti−static device.

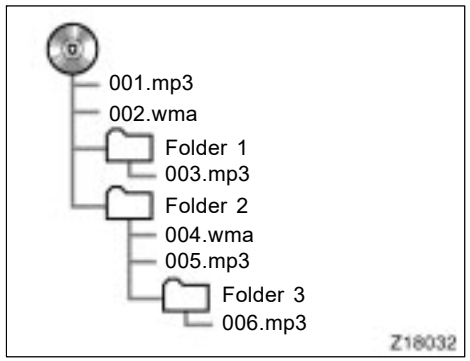
MP3/WMA FILES

- MP3 (MPEG Audio Layer 3) and WMA (Windows Media Audio) are audio compression standards.
- The MP3/WMA player can play MP3 and WMA files on CD−ROM, CD−R and CD−RW discs.

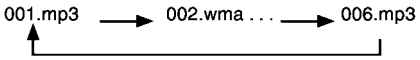
  The unit can play disc recordings compatible with ISO 9660 level 1 and level 2 and with the Romeo and Joliet file system.
- When naming an MP3 or WMA file, add the appropriate file extension (.mp3 or .wma).
- The MP3/WMA player plays back files with .mp3 or .wma file extensions as MP3 or WMA files. To prevent noise and playback errors, use the appropriate file extensions.
- Multi−session compatible CDs can also be played.
- MP3 files are compatible with the ID3 Tag Ver. 1.0, Ver. 1.1, Ver. 2.2, and Ver. 2.3 formats. The unit cannot display disc title, track title and artist name in other formats.
- WMA files can contain a WMA tag that is used in the same way as an ID3 tag. WMA tags carry information such as track title, artist name.
- The emphasis function is available only when playing MP3/WMA files recorded at 32, 44.1 and 48 kHz. (The system can play MP3 files with sampling frequencies of 16, 22.05, and 24 kHz. However, the emphasis function is not available for files recorded at these frequencies.)
- The sound quality of MP3/WMA files generally improves with higher bit rates. In order to achieve a reasonable level of sound quality, discs recorded with a bit rate of at least 128 kbps are recommended.

Playable bit rates
MP3 files:
MPEG1 LAYER3—64 to 320 kbps
MPEG2 LSF LAYER3—64 to 160 kbps
WMA files:
Ver. 7, 8 CBR—48 to 192 kbps
Ver. 9 CBR—48 to 320 kbps

- The MP3/WMA player does not play back MP3/WMA files from discs recorder using packet write data transfer (UDF format). Discs should be recorded using “pre−mastering” software rather than packet−write software.
- M3u playlists are not compatible with the audio player.
- MP3i (MP3 interactive) and MP3PRO formats are not compatible with the audio player.
- The MP3 player is compatible with VBR (Variable Bit Rate).
- When playing back files recorded as VBR (Variable Bit Rate) files, the play time will not be correctly displayed if fast forward or reverse operations are used.
- It is not possible to check folders that do not include MP3/WMA files.
- MP3/WMA files in folders up to 8 levels deep can be played. However, the start of playback may be delayed when using discs containing numerous levels of folders. For this reason, we recommend creating discs with no more than two levels of folders.
- It is possible to play up to 192 folders or 255 files on one disc.



- The play order of the compact disc with the structure shown on the left is as follows:



CD−R and CD−RW discs

- CD−R/CD−RW discs that have not been subject to the “finalizing process” (a process that allows discs to be played on a conventional CD player) cannot be played.
- It may not be possible to play CD−R/CD−RW discs recorded on a music CD recorder or a personal computer because of disc characteristics, scratches or dirt on the disc, or dirt, condensation, etc. on the lens of the unit.
- It may not be possible to play discs recorded on a personal computer depending on the application settings and the environment. Record with the correct format. (For details, contact the appropriate application manufacturers of the applications.)
- CD−R/CD−RW discs may be damaged by direct exposure to sunlight, high temperatures or other storage conditions. The unit may be unable to play some damaged discs.
- If you insert a CD−RW disc into the MP3/WMA player, playback will begin more slowly than with a conventional CD or CD−R disc.
- Recordings on CD−R/CD−RW cannot be played using the DDCD (Double Density CD) system.

TERMS

Packet write—

This is a general term that describes the process of writing data on−demand to CD−R, etc., in the same way that data is written to floppy or hard discs.

ID3 Tag—

This is a method of embedding track−related information in an MP3 file. This embedded information can include the track title, the artist’s name, the album title, the music genre, the year of production, comments and other data. The contents can be freely edited using software with ID3 tag editing functions. Although the tags are restricted to the number of characters, the information can be viewed when the track is played back.

WMA Tag—

WMA files can contain a WMA tag that is used in the same way as an ID3 tag. WMA tags carry information such as track title, artist name.

ISO 9660 format—

This is the international standard for the formatting of CD−ROM folders and files. For the ISO 9660 format, there are two levels of regulations.

Level 1:

The file name is in 8.3 format (8 character file names, with a 3 character file extension. File names must be composed of one−byte capital letters and numbers. The “_” symbol may also be included.)

Level 2:

The file name can have up to 31 characters (including the separation mark “.” and file extension). Each folder must contain fewer than 8 hierarchies.

m3u—

Playlists created using “WINAMP” software have a playlist file extension (.m3u).

MP3—

MP3 is an audio compression standard determined by a working group (MPEG) of the ISO (International Standard Organization). MP3 compresses audio data to about 1/10 the size of that on conventional discs.

WMA—

WMA (Windows Media Audio) is an audio compression format developed by Microsoft. It compresses files into a size smaller than that of MP3 files. The decoding formats for WMA files are Ver. 7, 8, and 9.

Hands−free phone system——Reference

Phone Setup (see page 216)

- **Pair phone**

  To use the hands−free system, you need to register your phone in the system.

- **Change name**

  The registered phone names can be changed.

- **Delete**

  The registered phones can be deleted.

- **List phones**

  The registered phone names can be checked.

- **Select phone**

  The registered phones can be selected.

- **Set passkey**

  The passkey can be changed.

Security (see page 221)

- **Set PIN**

  The PIN can be set or changed.

- **Phone book lock**

  The phone book can be locked.

- **Phone book unlock**

  The locked phone book can be unlocked.

System Setup (see page 225)

- **Adjust Guidance Volume**

  Guidance volume can be adjusted.

- **Initialize**

Phone Book (see page 225)

- **Add Entry**

  Phone numbers and voice tags can be registered.

- **Change Name**

  The registered names can be changed.

- **Delete Entry**

  The registered names can be deleted.

- **Delete Speed Dial**

  The registered speed dial can be deleted.

- **List names**

  The registered names can be checked.

- **Set Speed Dial**

  Speed dials can be set

Redial (see page 233)

Callback (see page 234)

Making a phone call (see page 235)

Receiving a phone call (see page 238)

Talking on the phone (see page 239)

—Some basics

This system supports Bluetooth®, a wireless system that allows you to make or receive calls without taking your hands from the steering wheel and without using cables to connect the phone and system.

The phone must be paired to the system before using the hands−free feature. If your cellular phone does not support Bluetooth®, this system will not function.

⚠ CAUTION

While you are driving, do not use a cellular phone or connect the Bluetooth® phone.

NOTICE

Do not leave your cellular phone in the car. The temperature indoor may be high and damage the phone.

The system may not function in the following conditions and places:

- The cellular phone is turned off.
- The current position is outside the communication area.
- The cellular phone is not connected.
- The cellular phone has a low battery.
- The cellular phone is hiding behind the seat or in the glove box and console box.
- The cellular phone touches or is covered with metal materials.

This system supports the following service.

- HFP (Hands Free Profile) Ver. 1.0
- OPP (Object Push Profile) Ver. 1.1

If your cellular phone does not support HFP, you cannot enter the Bluetooth® phone, and take OPP service individually.

Bluetooth®

BLUETOOTH is a trademark owned by Bluetooth SIG. Inc.

When transferring ownership of the vehicle:

A lot of personal data is registered when you use the hands−free system. When transferring ownership of the vehicle, initialize the system.

If you initialize it, the former state will never come back again. Pay much attention when initializing the data.

You can initialize the following data in the system.

- Phone book data
- Dialed numbers and received calls
- Speed dial
- Bluetooth® phone data
- Security code

FCC Information

Caution: Any changes or modifications in construction of this device which are not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

FCC Label Information

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, Including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

−Reorient or relocate the receiving antenna.

−Increase the separation between the equipment and receiver.

−Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

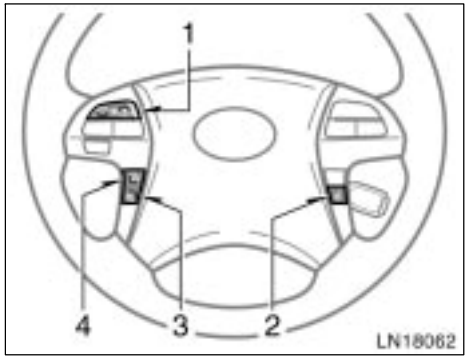
−Consult the dealer or an experienced radio/TV technician for help.

CAUTION: Radio Frequency Radiation Exposure
This equipment complies with FCC radiation exposure limits set forth for uncontrolled equipment and meets the FCC radio frequency (RF) Exposure Guidelines in Supplement C to OET65. This equipment has very low levels of RF energy that it deemed to comply without maximum permissive exposure evaluation (MPE). But it is desirable that it should be installed and operated with at least 20 cm and more between the radiator and person’s body (excluding extremities: hands, wrists, feet and legs).

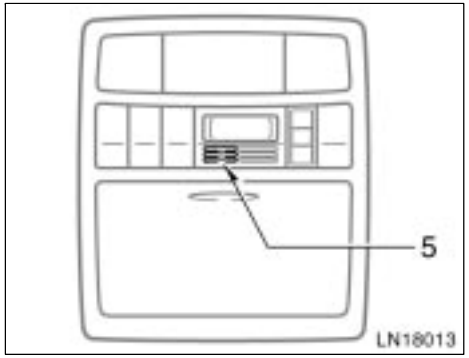
Co−location: This transmitter must not be co−located or operated in conjunction with any other antenna or transmitter.

—Control and features

▶Steering switches and microphone



Steering switches



Overhead console

1. Volume control switch

To increase the volume: Push “+”.
To decrease the volume: Push “−”.

When driving at 80 km/h (50 mph) or more, the volume automatically increases without switch adjustment. When your speed falls below 70 km/h (43 mph), the volume automatically returns to its original level.

Voice guidance volume can be changed by pushing the volume control switch on the steering wheel.

2. Talk switch

Pushing the talk switch turns the hands−free system on and initiates the speech command system.

Pushing and holding the talk switch ends the speech command system.

3. Off−hook switch

Pushing the off−hook switch turns the hands−free system on.

When receiving a call, pushing the off−hook switch allows you to talk on the phone.

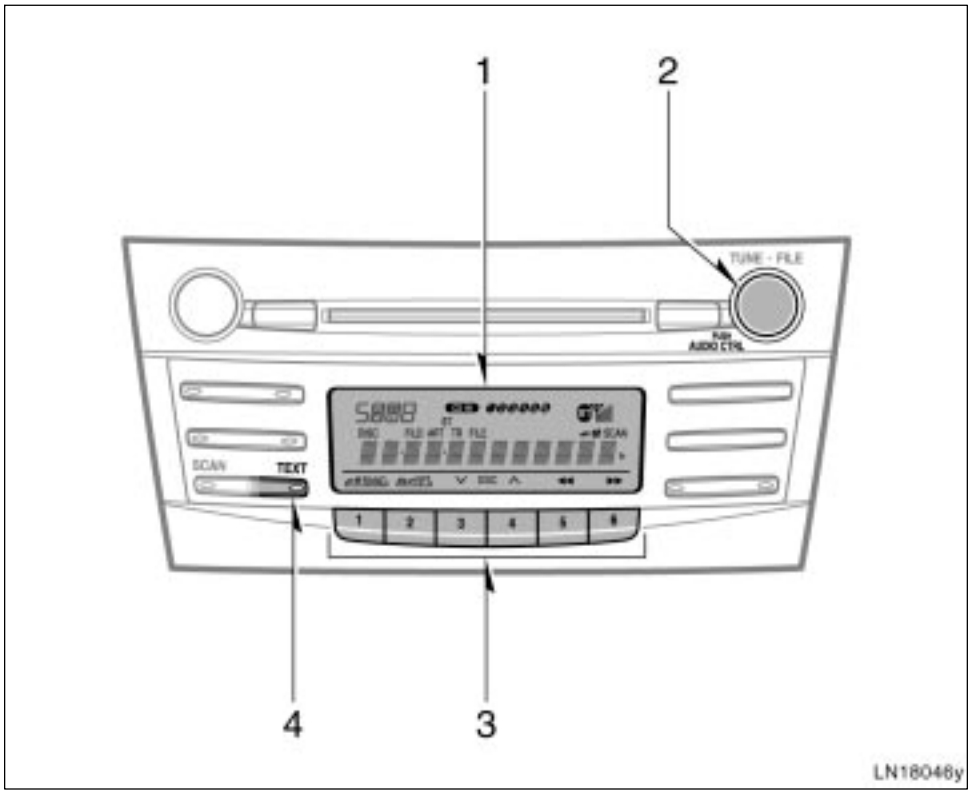
4. On−hook switch

When the hands−free system is on, pushing the on−hook switch turns the hands−free system off.

5. Microphone

The microphone is used when talking on the phone or using the speech command system.

▶**Audio unit**



1. Display

Displays such items as the reception level, a party’s name and phone number. See “DISPLAY” described on the following page for further details about the display.

2. “AUDIO CTRL” knob

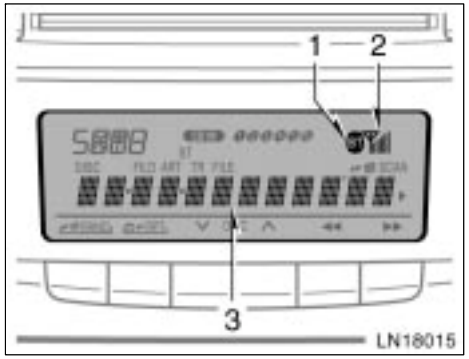
Turning the “AUDIO CTRL” knob displays the menu items, names, numbers, etc. to be selected. To select an item, push the “AUDIO CTRL” knob. Due to safety concerns, the “AUDIO CTRL” knob does not function while the vehicle is in motion.

3. Preset buttons

Pushing the preset button displays the registered speed dial numbers.

4. “TEXT” button

When the party’s name or phone number is too long to be displayed, pushing and holding the “TEXT” button displays the remaining characters.



DISPLAY

1. Bluetooth® display

Displays when a Bluetooth® connection is made. If there is no display, the Bluetooth® connection has not been made and communication between the phone and system is not possible. When using the hands−free system, make sure that “BT” is displayed. The display is updated in real time.

2. Reception level display

Displays the reception level of the radio wave signals. This may not match the display on the cellular phone. The reception level of some cellular phones may not be displayed.

The number of bars is greater when the signal received is stronger.

3. Message display

Displays phone numbers, names, comments, menu items, etc.

—Phone Setup

The phone setup menu includes the following:

- Pair Phone

To use the hands−free system, you need to register your phone in the system. Once you have registered it, you can make a hands−free call. Up to 6 phones can be registered.

- Select Phone

When the system connects to Bluetooth®, the phone previously used is automatically selected. Select a different phone if necessary. Only the selected phone can be used with the hands−free system.

- Change Name

The registered phone names can be changed.

- List Phones

The registered phone names can be checked.

The following can be performed during the name playback:

- **Select phone**
- **Change name**
- **Delete**

- Set PassKey

The passkey can be changed. A 4 to 8 digit code can be input as a passkey.

- Delete

The registered phones can be deleted.

To enter the phone setup menu

1. Push the off−hook switch to turn the hands−free system on.
2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Setup” is displayed and push the knob.

“Setup. Please push the talk switch and say security, or phone setup.” is heard.

3. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Phone Setup” is displayed and push the knob.

“Phone setup. Push the talk switch and say pair phone, select phone, change name, list phones, set passkey or delete.” is heard.

“XXX (phone name) already selected.” is heard and “XXX (phone name)” is displayed.

If no phone has been registered, the system may not function properly.

To pair phones

1. Push the talk switch and say “Pair phone”, or turn the “AUDIO CTRL” knob until “Pair Phone” is displayed and push the knob.

“Pair. Push the talk switch and say a name for the phone.” is heard.

2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Record Name” is displayed, push the knob and say “XXX (desired phone name)”.

“Push the talk switch and say confirm. Otherwise, say go back.” is heard.

3. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“XXX Ready for phone pairing. Please use the phone to connect it to the hands−free system. The passkey for the phone is....” is heard.

After “HANDS FREE” is displayed, a passkey* is displayed and “Searching.” is heard.

4. Input the displayed passkey into the phone.

“The phone is paired and ready for use. Returning to the main menu.” is heard and “Paired” is displayed.

The system may not function in the following cases:

- If 6 phones have already been registered.
- If the vehicle is moving.
- If the system cannot communicate with the phone.

*: Passkey is a password required to register a phone to the system.

INFORMATION

- ***To use the hands−free system, you need to register your phone in the system. Once you have registered it, you can make a hands−free call. Up to 6 phones can be registered.***
- ***For the operation of the phone, see the manual that comes with your cellular phone.***
- ***The passkey can be changed. See page 220 for changing the passkey.***

To select a phone

1. Push the talk switch and say “Select phone”, or turn the “AUDIO CTRL” knob until “Select Phone” is displayed and push the knob.

“Select phone. Push the talk switch and say the phone name or say list phones.” is heard.

2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until the desired phone name is displayed and push the knob.

When the phone is selected by a voice command:

“XXX Push the talk switch and say confirm. Otherwise, say go back.” is heard and “XXX” is displayed.

Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“XXX selected. Returning to the phone setup.” is heard.

When the phone is selected by using the knob:

“XXX selected. Returning to the phone setup.” is heard.

The system may not function in the following cases:

- If the phone is not found.
- If the system does not recognize the voice command.

To change a name

1. Push the talk switch and say “Change name”, or turn the “AUDIO CTRL” knob until “Change Name” is displayed and push the knob.

“Change name. Push the talk switch and say the phone name to change.” is heard.

2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until the phone name that you want to change is displayed and push the knob.

When the phone is selected by a voice command:

“XXX Push the talk switch and say confirm. Otherwise, say go back.” is heard and “XXX” is displayed.

1. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“Push the talk switch and say a new name.” is heard.

2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Record Name” is displayed, push the knob and say “XXX (desired phone name)”.

“XXX Push the talk switch and say confirm. Otherwise, say go back.” is heard.

3. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“Name changed. Returning to the phone setup.” is heard and “Changed” is displayed.

When the phone is selected by using the knob:

“XXX Push the talk switch and say confirm. Otherwise, say go back.” is heard and “XXX” is displayed.

1. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“Push the talk switch and say a new name.” is heard.

2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Record Name” is displayed, push the knob and say “XXX (desired phone name)”.

“XXX Push the talk switch and say confirm. Otherwise, say go back.” is heard.

3. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“Name changed. Returning to the phone setup.” is heard and “Changed” is displayed.

The system may not function in the following cases:

- If no phone has been registered.
- If the system does not recognize the voice command.

To list phones

1. Push the talk switch and say “List phones”, or turn the “AUDIO CTRL” knob until “List Phones” is displayed and push the knob.

“List phones. To select a name, push the talk switch during the name playback.” is heard.

2. Follow voice guidance instructions.

“Push the talk switch and say select phone, change name, or delete.” is heard.

Select one of the following:

Select phone

Push the talk switch and say “Select phone”, or turn the “AUDIO CTRL” knob until “Select Phone” is displayed and push the knob.

For further details on selecting a phone, see page 218.

Change name

Push the talk switch and say “Change name”, or turn the “AUDIO CTRL” knob until “Change Name” is displayed and push the knob.

For further details on changing a name, see page 218.

Delete

Push the talk switch and say “Delete”, or turn the “AUDIO CTRL” knob until “Delete” is displayed and push the knob.

For further details on deleting a phone, see page 221.

If no phone has been registered, the system may not function properly.

To set a passkey

1. Push the talk switch and say “Set passkey”, or turn the “AUDIO CTRL” knob until “Set PassKey” is displayed and push the knob.

“Set Passkey. The passkey is required for the phone pairing process. Push the talk switch and say a new passkey.” is heard and passkey is displayed.

2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob to select a number.

When using a voice command:

“XXXX (new passkey) Push the talk switch and say confirm. Otherwise, continue adding numbers, or say go back or delete.” is heard and “XXXX (new passkey)” is displayed.

Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“Passkey changed. Returning to the phone setup.” is heard.

When using the knob:

1. Turn the “AUDIO CTRL” knob to select a number. Push the “AUDIO CTRL” knob to set.
2. When the passkey is set, push the “AUDIO CTRL” knob.

“Passkey changed. Returning to the phone setup.” is heard.

The system may not function in the following cases:

- If the passkey has less than 4 digits.
- If the passkey has more than 8 digits.

To delete a phone

1. Push the talk switch and say “Delete”, or turn the “AUDIO CTRL” knob until “Delete” is displayed and push the knob.

“Delete. Push the talk switch and say the phone name to delete.” is heard.

2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until the phone name you want to delete is displayed and push the knob.

When using a voice command:

“XXX Push the talk switch and say confirm. Otherwise, say go back.” is heard and “XXX” is displayed.

Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“Deleted. Returning to the phone setup.” is heard and “Deleted” is displayed.

When using the knob:

“Deleted. Returning to the phone setup.” is heard and “Deleted” is displayed.

The system may not function in the following cases:

- If no phone has been registered.
- If the system does not recognize the voice command.

—Security

The security menu includes the following:

- **Set PIN (Personal Identification Number)**

The PIN can be set or changed.

- **Phone book lock**

The phone book can be locked.

When the phone book is locked, the following functions cannot be used:

- Dial by name
- Redial
- Callback
- Speed Dial
- PhoneBook
- **Phone book unlock**

The locked phone book can be unlocked.

To enter the security menu

1. Push the off−hook switch to turn the hands−free system on.
2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Setup” is displayed and push the knob.

“Setup. Please push the talk switch and say security, or phone setup.” is heard.

3. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Security” is displayed and push the knob.

“Security. Push the talk switch and say set PIN, phone book lock, or phone book unlock.” is heard.

To set a PIN

Push the talk switch and say “Set PIN”, or turn the “AUDIO CTRL” knob until “Set PIN” is displayed and push the knob.

“There is no PIN number set. Please register a PIN number. Please push the talk switch and say a four−digit PIN number.” is heard.

When using a voice command:

1. Push the talk switch and say “XXX (new PIN number)”.
2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“The PIN number has been set. Returning to the security.” is heard and “Completed” is displayed.

When using the knob:

1. Turn the “AUDIO CTRL” knob to select a number. Push the “AUDIO CTRL” knob to set.
2. Repeat the above procedure until the entire four−digit number is set.
3. When the PIN is set, push the “AUDIO CTRL” knob.
4. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“The PIN number has been set. Returning to the security.” is heard and “Completed” is displayed.

If the PIN is to be changed:

“There is a PIN number in place. Push the talk switch and say the correct PIN number.” is heard and “Current PIN?” is displayed.

1. Follow voice guidance instructions, or use the “AUDIO CTRL” knob to input the current PIN number.

“Please push the talk switch and say a four−digit PIN number.” is heard.

2. Push the talk switch and say “XXXX (new PIN number)”.

“The PIN number has been set. Returning to the security.” is heard and “Completed” is displayed.

If the current number is not correct, the system does not function properly.

To lock the phone book

1. Push the talk switch and say “Phone book lock”, or turn the “AUDIO CTRL” knob until “Phbk Lock” is displayed and push the knob.

“There is a PIN number in place. Push the talk switch and say the correct PIN number.” is heard and “Current PIN?” is displayed.

2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob to select a number.

When using a voice command:

“XXXX Push the talk switch and say confirm. Otherwise, say go back.” is heard and “XXXX” is displayed.

Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“PIN number accepted. The phone book is now locked. Returning to the main menu.” is heard and “Locked” is displayed.

When using the knob:

1. Turn the “AUDIO CTRL” knob to select a number. Push the “AUDIO CTRL” knob to set.
2. When the PIN number is set, push the “AUDIO CTRL” knob.

“XXXX Push the talk switch and say confirm. Otherwise, say go back.” is heard and “XXXX” is displayed.

3. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“PIN number accepted. The phone book is now locked. Returning to the main menu.” is heard and “Locked” is displayed.

The system may not function in the following cases:

- If the current number is not correct.
- If the phone book has already been locked.
- If the PIN number does not exist.

To unlock the phone book

1. Push the talk switch and say “Phone book unlock”, or turn the “AUDIO CTRL” knob until “Phbk Unlock” is displayed and push the knob.

“Phonebook unlock. There is a PIN number in place. Push the talk switch and say the correct PIN number.” is heard and “Current PIN?” is displayed.

2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob to select a number.

When using a voice command:

“XXXX Push the talk switch and say confirm. Otherwise, say go back.” is heard and “XXXX” is displayed.

Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“PIN number accepted. The phone book is now unlocked. Returning to the main menu.” is heard and “Unlocked” is displayed.

When using the knob:

1. Turn the “AUDIO CTRL” knob to select a number. Push the “AUDIO CTRL” knob to set.
2. When the PIN number is set, push the “AUDIO CTRL” knob.

“XXXX Push the talk switch and say confirm. Otherwise, say go back.” is heard and “XXXX” is displayed.

3. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“PIN number accepted. The phone book is now unlocked. Returning to the main menu.” is heard and “Unlocked” is displayed.

The system may not function in the following cases:

- If the current number is not correct.
- If the phone book has already been unlocked.

INFORMATION

A shortcut to each of the following functions is available. Enter the phone book menu, push the off−hook switch, and say either of the following:

- ***Phone book lock***
- ***Phone book unlock***

—System Setup

The system setup menu includes the following:

- Adjust Guidance Volume
- Initialize

To enter the system setup menu

1. Push the off−hook switch to turn the hands−free system on.
2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Setup” is displayed and push the knob.
3. Turn the “AUDIO CTRL” knob until “System Setup” is displayed and push the knob.

“System setup. Please select guidance volume or initialize.” is heard.

To adjust the guidance volume

1. Turn the “AUDIO CTRL” knob until “Guidance Vol” is displayed and push the knob.

“Guidance will be at this volume” is heard and the present volume level is displayed.

2. Turn the “AUDIO CTRL” knob to adjust the volume and push the knob.

To initialize

1. Turn the “AUDIO CTRL” knob until “Initialize” is displayed and push the knob.

“System initialization. This will erase all user information in the hands free system; including paired phones, phone book entries, and call history. Select confirm to initialize. Otherwise, select go back.” is heard.

2. Turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“System initialization. This will erase all user information in the hands free system; including paired phones, phone book entries, and call history. Select confirm to initialize. Otherwise, select go back.” is heard.

3. Turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“Initialized. Returning to the main menu.” is heard.

—Phone Book

The phone book menu includes the following:

- Add Entry

Phone numbers and voice tags can be registered.

- Change Name

The registered names can be changed.

- Delete Entry

The registered names can be deleted.

- Delete Speed Dial

The registered speed dial can be deleted.

- List Names

The registered names can be checked.

- Set Speed Dial

Speed dials can be set.

To enter the phone book menu

1. Push the off−hook switch to turn the hands−free system on.
2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Phonebook” is displayed and push the knob.

“Phone book. Please push the talk switch and say add entry, change name, delete entry, list names, set speed dial or delete speed dial.” is heard.

If the phone book is locked, the system may not function properly.

To add entry

The add entry includes the following:

(a) By Voice

(b) By Phone

(c) Call History

(d) Manual Input

Push the talk switch and say “Add entry”, or turn the “AUDIO CTRL” knob until “Add Entry” is displayed and push the knob.

“Add Entry. How will the number be entered. Push the talk switch and say by voice, by phone, or call history.” is heard.

(a) By voice

1. Push the talk switch and say “By voice”, or turn the “AUDIO CTRL” knob until “By Voice” is displayed and push the knob.

“Voice entry. Push the talk switch and say the number.” is heard.

2. Push the talk switch and say the dial number that you want to register.

“To store, push the talk switch and say confirm. Otherwise, continue adding numbers, or say go back, or delete.” is heard and number is displayed.

3. Follow voice guidance instructions.

If “Confirm” is said, then input a voice tag.

“Push the talk switch and say a name.” is heard.

1. Push the talk switch and say the name of the dial number that you want to register.

“XXXX Push the talk switch and say confirm. Otherwise, say go back.” is heard.

2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“Stored. To register this as a speed dial entry, push the talk switch and say set speed dial. Otherwise, say confirm.” is heard and “Stored” is displayed.

3. Select one of the following:

- **Confirm**
- **Speed Dial**

Confirm

Push the talk switch and say “Confirm”, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“Returning to the phone book.” is heard.

Speed Dial

1. Push the talk switch and say “Set speed dial”, or turn the “AUDIO CTRL” knob until “Speed Dial” is displayed and push the knob.

“Set speed dial. Push the preset button to assign to XXXX” is heard.

2. Push and hold the desired preset button.

“preset... is now assigned. Returning to the phone book.” is heard.

The system may not function in the following cases:

- If the phone book is full.
- If the dial number has more than 24 digits.

(b) By Phone

1. Push the talk switch and say “By phone”, or turn the “AUDIO CTRL” knob until “By Phone” is displayed and push the knob.

“Phone entry. Prepare to send the information from the phone. When ready, push the talk switch and say confirm.” is heard.

2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“Send the information at this time.” is heard.

After the system has received the name and phone number, “Push the talk switch and say confirm. To select an alternate number, say next or previous. Otherwise, say go back.” is heard and “XXX (name)” and “XXX (number)” is displayed.

3. Follow voice guidance instructions, push the talk switch and say “Confirm”, or turn the “AUDIO CTRL” knob until the dial number that you want to register is displayed and push the knob.

Next, input a voice tag.

For further details, see page 226.

(c) Call History

1. Push the talk switch and say “Call history”, or turn the “AUDIO CTRL” knob until “Call history” is displayed and push the knob.

“Call history. Push the talk switch and say incoming or outgoing.” is heard and “Call History” is displayed.

2. Select one of the following:

- **Incoming**
- **Outgoing**

Incoming

1. Push the talk switch and say “Incoming”, or turn the “AUDIO CTRL” knob until “Incoming” is displayed and push the knob.

“Most recent incoming call was XXXX” is heard and the incoming number is displayed.

“Push the talk switch and say confirm. Otherwise, say previous, or go back.” is heard.

2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until the dial number that you want to register is displayed and push the knob.

Next, input a voice tag.

For further details, see page 226.

Outgoing

1. Push the talk switch and say “Outgoing”, or turn the “AUDIO CTRL” knob until “Outgoing” is displayed and push the knob.

“Most recent outgoing call was XXXX” is heard and the outgoing number is displayed.

“Push the talk switch and say confirm. Otherwise, say previous, or go back.” is heard.

2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until the dial number that you want to register is displayed and push the knob.

Next, input a voice tag.

For further details, see page 226.

(d) Manual Input

1. Turn the “AUDIO CTRL” knob until “Manual Input” is displayed and push the knob.
2. Turn the “AUDIO CTRL” knob to select a number. Push the “AUDIO CTRL” knob to set.
3. When the number is set, push the “AUDIO CTRL” knob.

Next, input a voice tag.

For further details, see page 226.

INFORMATION

- ***The system can recognize single digits from zero to nine, # (pound), * (star) and + (plus). Numbers that are ten or greater are not recognized.***
- ***To speed up input, it is a good idea to group all digits into a continuous string. However, you can enter each digit individually or group digits together in preferred string lengths.***

The display corresponding to each operation appears on the screen as follows:

Input operation—

You say: “Nine, nine, five”

Voice output: “995 to store push the talk switch and say confirm. Otherwise, continue adding numbers, or say go back, or delete.”

Display: “995”

You say: “Seven, three, four”

Voice output: “734 to store push the talk switch and say confirm. Otherwise, continue adding numbers, or say go back, or delete.”

Display: “995734”

Repeat the above procedure until the entire number that you want to register is input.

Go back operation—

You say: “Go back”

Voice output: “Go back. The last numbers said have been removed. Push the talk switch and say the number.”

Display: “995”

Repeating the above operation deletes the last digits in reverse order of input.

Delete operation—

You say: “Delete”

Voice output: “Deleted. Push the talk switch and say the number.”

Display: “Delete”

The display will return to the initial screen that allows a number to be input.

To list names

The voice tags can be edited during the name playback.

1. Push the talk switch and say “List names”, or turn the “AUDIO CTRL” knob until “List Names” is displayed and push the knob.

“List names. To select a name, push the talk switch during the name playback.” is heard.

2. Follow voice guidance instructions.

“XXXX selected.” is heard and “Selected” is displayed.

If you push the off−hook switch during the name playback, you can dial the number of the selected name.

Editing the voice tags

The following can be performed:

- **Dial**
- **Change Name**
- **Delete Entry**
- **Speed Dial**

“Push the talk switch and say dial, change name, delete entry, or set speed dial.” is heard and “Selected” is displayed.

Dial

Push the talk switch and say “Dial”, or turn the “AUDIO CTRL” knob until “Dial” is displayed and push the knob.

Change Name

Push the talk switch and say “Change name”, or turn the “AUDIO CTRL” knob until “Change Name” is displayed and push the knob.

For further details, see page 231.

Delete Entry

Push the talk switch and say “Delete entry”, or turn the “AUDIO CTRL” knob until “Delete Entry” is displayed and push the knob.

For further details, see page 230.

Speed dial

Push the talk switch and say “Set speed dial”, or turn the “AUDIO CTRL” knob until “Speed Dial” is displayed and push the knob.

For further details, see page 232.

To delete entry

1. Push the talk switch and say “Delete entry”, or turn the “AUDIO CTRL” knob until “Delete Entry” is displayed and push the knob.

“Delete entry. Push the talk switch and say the name to delete.” is heard.

2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until the name that you want to delete is displayed and push the knob.

When using a voice command:

“XXXX Push the talk switch and say confirm. Otherwise, say go back.” is heard and “XXXX” is displayed.

Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“Deleted. Returning to the phone book.” is heard and “Deleted” is displayed.

When using the knob:

“Deleted. Returning to the phone book.” is heard and “Deleted” is displayed.

The system may not function in the following cases:

- If no name has been registered.
- If the system does not recognize the voice command.

To delete speed dial

1. Push the talk switch and say “Delete speed dial”, or turn the “AUDIO CTRL” knob until “Del Spd Dial” is displayed and push the knob.

“Delete speed dial. Push the preset button to delete from speed dial.” is heard.

2. Select the preset button that you want to delete.

“To delete preset... push the talk switch and say confirm. Otherwise, say go back.” is heard.

3. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“Deleted.” is heard and “Deleted” is displayed.

“Returning to the phone book.” is heard.

The system may not function in the following cases:

- If no speed dial has been registered.
- If the preset button has not been assigned.

To change name

1. Push the talk switch and say “Change name”, or turn the “AUDIO CTRL” knob until “Change Name” is displayed and push the knob.

“Change name. Push the talk switch and say the name to change.” is heard.

2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until the dial number that you want to change is displayed and push the knob.

When using a voice command:

“XXXX Push the talk switch and say confirm. Otherwise, say go back.” is heard and “XXXX” is displayed.

1. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“Push the talk switch and say a new name.” is heard.

2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Record Name” is displayed, push the knob and say “XXX (new name)”.

“XXXX Push the talk switch and say confirm. Otherwise, say go back.” is heard.

3. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“Name changed. Returning to the phone book.” is heard and “Changed” is displayed.

When using the knob:

“Push the talk switch and say a new name.” is heard.

1. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Record Name” is displayed, push the knob and say “XXX (new name)”.

“XXXX Push the talk switch and say confirm. Otherwise, say go back.” is heard.

2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“Name changed. Returning to the phone book.” is heard and “Changed” is displayed.

The system may not function in the following cases:

- If no name has been registered.
- If the system does not recognize the voice command.

To set speed dial

1. Push the talk switch and say “Set Speed dial”, or turn the “AUDIO CTRL” knob until “Speed Dial” is displayed and push the knob.

“Set speed dial. Push the talk switch and say a name.” is heard.

2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until the dial number that you want to register is displayed and push the knob.

When using a voice command:

“XXXX To register this as a speed dial entry, push the talk switch and say confirm. Otherwise, push the talk switch and say go back.” is heard and “XXXX” is displayed.

1. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“Push the preset button to assign to XXXX” is heard.

2. Push and hold the desired preset button.

“preset... is now assigned. Returning to the phone book.” is heard.

When using the knob:

“Push the preset button to assign to XXXX” is heard.

Push and hold the desired preset button.

“preset... is now assigned. Returning to the phone book.” is heard.

The system may not function in the following cases:

- If no name has been registered.
- If the system does not recognize the voice command.

INFORMATION
A shortcut to each of the following functions is available. Push the off−hook switch and talk switch, and say one of the following:
• Phone book add entry
• Phone book change name
• Phone book delete entry
• Phone book delete speed dial
• Phone book list names
• Phone book set speed dial

—Redial

The following can be performed:

- Dial
- Delete
- Store

To enter the redial

1. Push the off−hook switch to turn the hands−free system on.
2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Redial” is displayed and push the knob.

“Redial. Most recent outgoing call was XXXX” is heard and outgoing history is displayed.

“Please push the off−hook switch to dial. Otherwise, push the talk switch and say dial, previous, go back, store, or delete.” is heard.

Dial

Turn the “AUDIO CTRL” knob until the number that you want to dial is displayed and push the knob. After that, do the one of the following:

- Push the off−hook switch.
- Push the talk switch and say “dial”.
- Turn the “AUDIO CTRL” knob until “Dial” is displayed and push the knob.

Delete

1. Turn the “AUDIO CTRL” knob until the dial number that you want to delete is displayed and push the knob.
2. Push the talk switch and say “Delete”, or turn the “AUDIO CTRL” knob until “Delete” is displayed and push the knob.

“Delete. Push the talk switch and say confirm. Otherwise, say go back” is heard.

3. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“Deleted.” is heard.

Store

1. Turn the “AUDIO CTRL” knob until the dial number that you want to register is displayed and push the knob.
2. Push the talk switch and say “Store”, or turn the “AUDIO CTRL” knob until “Store” is displayed and push the knob.

“Store. Push the talk switch and say confirm. Otherwise, say go back.” is heard.

3. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

Next, input a voice tag.

For further details, see page 226.

The system may not function in the following cases:

- If there is no outgoing history.
- If the phone book is locked.

INFORMATION

- ***Up to five outgoing calls can be stored in the system.***
- ***When five outgoing calls are stored in memory, the oldest outgoing call is deleted to make room in memory for new calls.***
- ***Only the latest outgoing call is stored when the same telephone number is dialed.***
- ***A shortcut to “Redial” is available. Push the off−hook switch twice.***

—Callback

The following can be performed:

- Dial
- Delete
- Store

To enter the callback

1. Push the off−hook switch to turn the hands−free system on.
2. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Callback” is displayed and push the knob.

“Callback. Most recent incoming call was XXXX” is heard and incoming history is displayed.

“Please push the off−hook switch to dial. Otherwise, push the talk switch and say dial, previous, go back, store, or delete.” is heard.

Dial

Turn the “AUDIO CTRL” knob until the number that you want to dial is displayed and push the knob. After that, do the one of the following:

- Push the off−hook switch.
- Push the talk switch and say “Dial”.
- Turn the “AUDIO CTRL” knob until “Dial” is displayed and push the knob.

Delete

1. Turn the “AUDIO CTRL” knob until the dial number that you want to delete is displayed and push the knob.
2. Push the talk switch and say “Delete”, or turn the “AUDIO CTRL” knob until “Delete” is displayed and push the knob.

“Delete. Push the talk switch and say confirm. Otherwise, say go back” is heard.

3. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

“Deleted.” is heard.

Store

1. Turn the “AUDIO CTRL” knob until the dial number that you want to register is displayed and push the knob.
2. Push the talk switch and say “Store”, or turn the “AUDIO CTRL” knob until “Store” is displayed and push the knob.

“Store. Push the talk switch and say confirm. Otherwise, say go back.” is heard.

3. Follow voice guidance instructions, or turn the “AUDIO CTRL” knob until “Confirm” is displayed and push the knob.

Next, input a voice tag.

For further details, see page 226.

The system may not function in the following cases:

- If there is no incoming history.
- If the phone book is locked.

INFORMATION

- ***Up to five incoming calls can be stored in the system.***
- ***When five incoming calls are stored in memory, the oldest incoming call is deleted to make room in memory for new calls.***

—Making a phone call

If the cellular phone is not registered, this system cannot be used. See page 216 for registering a cellular phone. Make sure that “BT” is displayed and get the cellular phone ready to use.

There are 3 ways to make a phone call with this system.

- **Speed dial**

A phone call can be made with a preset button in which a phone number is registered. See page 232 for setting the preset buttons.

- **Dial by Name**

The system dials the numbers corresponding to the spoken names registered in the system.

- **Dial by Number**

The system dials to the spoken numbers.

To make a phone call

Push the off−hook switch to turn the hands−free system on.

To speed dial

1. Push the preset button where the desired number is set. The name or telephone number is displayed.
2. Push the off−hook switch to dial.

To dial by Name

1. Push the talk switch and say “Dial by name”.

“Dial by name. Please push the talk switch and say the stored name, or say list names.” is heard and “Dial by Name” is displayed.

2. Push the talk switch and say “XXXX”, or turn the “AUDIO CTRL” knob until the phone name that you want to dial is displayed and push the knob.

When using a voice command:

“XXXX Push the off−hook switch to dial. Otherwise, push the talk switch and say dial, or go back.” is heard. After that, do the one of the following:

- Push the off−hook switch.
- Push the talk switch and say “Dial”.
- Turn the “AUDIO CTRL” knob until “Dial” is displayed and push the knob.

When using the knob:

It calls the number.

The system may not function in the following cases:

- If there is no number registered in the preset button.
- If the system does not recognize the voice command.

INFORMATION

- ***The phone numbers registered in the phone book can be retrieved.***
- ***The system does not recognize that the voice tag is not registered in the registered cellular phone. For details about voice tags, see “To add entry” on page 226.***
- ***A shortcut to “Dial by name” is available. Push the talk switch and say “Dial XXX (name you want to dial)”.***

To dial by Number

1. Push the talk switch and say “Dial by Number”.

“Dial by number. Please push the talk switch and say the number.” is heard and “Dial by Num” is displayed.

2. Push talk switch and say “XXXX”.

“Push the off−hook switch to dial. Otherwise, push the talk switch and say dial, go back, or delete.” is heard.

To dial the number, do the one of the following:

- Push the off−hook switch.
- Push the talk switch and say “Dial”.
- Turn the “AUDIO CTRL” knob until “Dial” is displayed and push the knob.

If the number exceeds 24 digits, the system may not function properly.

INFORMATION

- ***The system can recognize single digits from zero to nine, # (pound), * (star) and + (plus). Numbers that are ten or greater are not recognized.***
- ***To speed up input, it is a good idea to group all digits into a continuous string. However, you can enter each digit individually or group digits together in preferred string lengths.***

The display corresponding to each operation appears on the screen as follows:

Input operation—

You say: “Nine, nine, five”

Voice output: “995 push the off−hook switch to dial. Otherwise, push the talk switch and say dial, go back, or delete.”

Display: “995”

You say: “Seven, three, four”

Voice output: “734 push the off−hook switch to dial. Otherwise, push the talk switch and say dial, go back, or delete.”

Display: “995734”

Repeat the above procedure until the entire number that you want to dial is input.

Go back operation—

You say: “Go back”

Voice output: “Go back, the last numbers entered have been removed. Push the talk switch and continue adding numbers otherwise say dial, go back, or delete.”

Display: “995”

Repeating the above operation deletes the last digits in reverse order of input.

Delete operation—

You say: “Delete”

Voice output: “Deleted. The entire number to dial has been deleted. Please push the talk switch and say the number.”

Display: “Dial by Num”

The display will return to the initial screen that allows a number to be input.

Cancel operation—

Do either one of the following:

- ***Push the on−hook switch at anytime during the operation.***
- ***Push the talk switch and say “Cancel” after the beep at anytime during the operation except while a call is connected.***

—Receiving a phone call

When receiving a phone call, a ring tone is audible and the system changes into the telephone mode.

When receiving a phone call, the display is as follows. The display differs depending on whether or not the vehicle is in motion.

When the vehicle is stopped:
Number, name or “Incoming” is displayed.

When the vehicle is in motion:
“Incoming” is displayed.

Do either one of the following:

- Pushing the off−hook switch allows you to talk on the phone.
- Pushing the on−hook switch refuses the call.

To adjust the ring volume, push “+” or “−” on the steering volume controls. Volume adjustment cannot be done using the audio system.

Repeatedly pushing “−” on the steering volume controls mutes the ring.

When receiving an international phone call, the name of the party may not be displayed correctly depending on the cellular phone.

To transfer a call to the phone:

The received call can be transferred from the hands−free system to the cellular phone that is connected to Bluetooth®. For details, refer to the user’s guide for the cellular phone.

—Talking on the phone

While talking on the phone, the display is as follows. The display differs depending on whether or not the vehicle is in motion.

When the vehicle is stopped:
Number is displayed.

When the vehicle is in motion:
“Talking” is displayed.

When the call is finished, push the on−hook switch.

In the following situations, your voice may not reach the party.

- Talk alternately with the other party on the phone. If you talk at the same time, the voice may not reach each other. (It is not a malfunction.)
- Keep the volume of receiving voice down. Otherwise, echo is coming up. When you talk on the phone, speak clearly towards the microphone.
- When driving on a rough road.
- When driving at high speeds.
- When the window is open.
- When the air conditioning vents face the microphone.
- When the sound of the air conditioning fan is loud.

To transfer a call from the phone:

Pushing the off−hook switch while talking on the cellular phone that is connected to Bluetooth® allows you to talk hands−free.

To transfer a call to the phone:

The call can be transferred from the hands−free system to the phone that is connected to Bluetooth®. For details, refer to the user’s guide for the cellular phone.

SECTION 1-9

OPERATION OF INSTRUMENTS AND CONTROLS

Air conditioning system

Automatic air conditioning system
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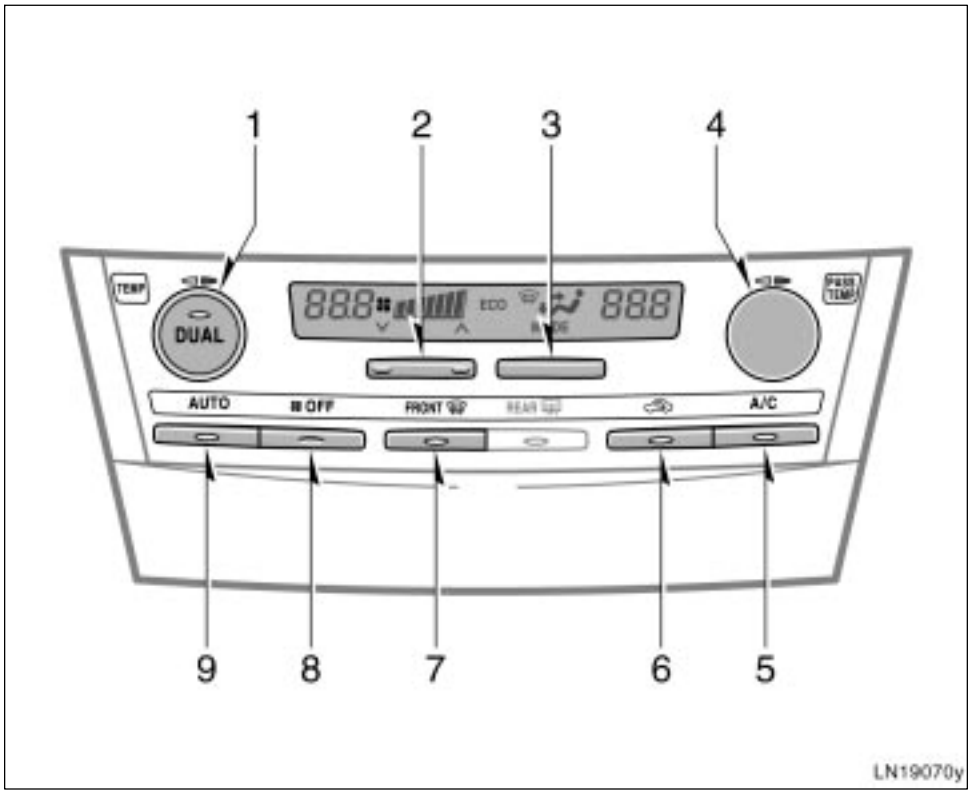
Operating tips 246
Climate remote controls 249
Side and rear vents 250
Air conditioning filter 251

Automatic air conditioning system—
—Controls



1. Temperature selector (“TEMP”)
   (with “DUAL” button indicator on—individual setting on driver side only)
   (with “DUAL” button indicator off—simultaneous setting on driver and front passenger)
2. Fan speed selector
3. Air flow selector button
4. Temperature selector (“PASS TEMP”)
   (individual setting on front passenger side only)
5. “A/C” button
6. Air intake selector
7. Windshield air flow button
8. “OFF” button
9. “AUTO” button

“AUTO” button

For automatic operation of the air conditioning, press the “AUTO” button. The “AUTO” button will turn on, indicating that the automatic operation mode has been selected.

In the automatic operation mode, the air conditioning selects the most suitable fan speed, air flow, air intake and on−off of the air conditioning according to the temperature.

When you press the “AUTO” button with the air intake mode at FRESH, internal circulation may be applied for maximum cooling.

You may use manual controls if you want to select your own settings.

Fan speed selector

Push the “∧” (increase) or “∨” (decrease) side of the button to adjust the fan speed.

In automatic operation, you do not have to adjust the fan speed unless you desire another fan speed mode.

“DUAL” button

Push the button to change the mode of the temperature setting.

With the indicator on—Individual temperature setting for driver and front passenger

With the indicator off—Simultaneous temperature setting for driver and front passenger

Temperature selectors

Turn the knob to adjust the temperature—to the right to warm, to the left to cool.

“LO” appears when you adjust to maximum cooling, and “HI” appears when you adjust to maximum warming.

—“TEMP” knob

With the “DUAL” button indicator on—This knob changes the temperature on the driver side only.

With the “DUAL” button indicator off—This knob changes the temperature on the driver side and front passenger side simultaneously. This function will be cancelled when the “PASS TEMP” knob is turned.

—“PASS TEMP” knob

This knob changes the temperature on the front passenger side only.

“OFF” button

Push the button to turn off the air conditioning system.

Air flow selector button

Push the button to select the vents used for air flow.

In automatic operation, you do not have to select the air flow unless you desire another air flow mode.

1. **Panel—**Air flows mainly from the instrument panel vents and the rear vents.
2. **Bi−level—**Air flows from both the floor vents, the instrument panel vents and the rear vents.
3. **Floor—**Air flows mainly from the floor vents.
4. **Floor/Windshield—**Air flows mainly from the floor vents and windshield vents.

   This position allows the air intake to select FRESH automatically. This is to clean up the front view more quickly.

   If you want to return the setting to RECIRCULATE mode, press the air intake selector button once again.

   Press the “A/C” button for dehumidified heating or cooling. This setting clears the front view more quickly.

Windshield air flow button

When this button is pressed, air flows mainly from the windshield vents and turns on the defogging function with the purpose of clearing the front view.

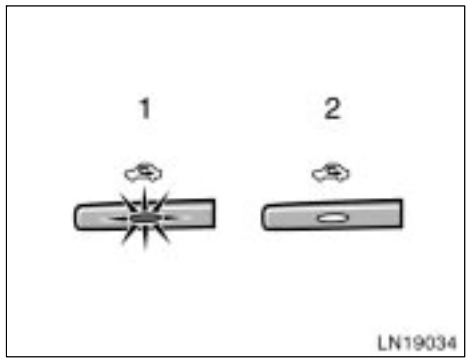
Pressing this button once again returns the air flow mode to the last one used.

This button allows the air intake to select FRESH automatically. This is to clean up the front view more quickly. It is not possible to return to RECIRCULATE in this mode.

Press the “A/C” button for dehumidified heating or cooling. This setting clears the front view more quickly.

For details about air flow selector settings, see “—Air flow selector settings” described below.

When the “POWER” switch is set at ON after the 12 volt battery is reconnected, the indicator light on the button may flash and a motor sound may be heard. This does not indicate a malfunction.



Air intake selector

Press the button to select the air source.

1. **RECIRCULATE** (indicator light is on)—Recirculates the air inside the vehicle.
2. **FRESH** (indicator light is off)—Draws outside air into the system.

To prevent fogging up of the windshield, the air intake mode may change automatically to FRESH depending on the condition of the air conditioning system.

“A/C” button

To turn on the air conditioning, press the “A/C” button. The “A/C” button indicator will come on. To turn the air conditioning off, press the button again.

If the “A/C” button indicator flashes, there is a problem in the air conditioning system and the air conditioning automatically shuts off. If this happens, take your vehicle to a Toyota dealer for service.

Plasmacluster™*

The Plasmacluster™* helps to keep good air quality in the cabin by emiting positive and negative ions into the cabin.

Operating the air conditioning system allows positive and negative ions to come out from the driver’s side vent.

A low noise may be heard during operation. This is not a malfunction.

Static electricity may be discharged near the driver’s side vent because high voltage is used to operate the system.

To clean the driver’s side vent, wipe the vent using a soft cloth after turning the system off.

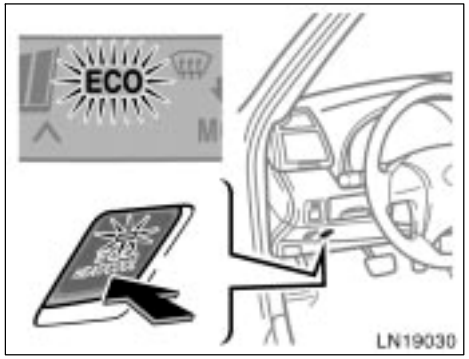
⚠ CAUTION

Do not disassemble or repair the system because it contains high voltage parts. Call your Toyota dealer if the system needs repair.

NOTICE

Do not insert anything into the driver’s side vent, attach anything to it, or use sprays around the driver’s side vent. These things may cause the system not to work properly.

*: This system adopts the plasmacluster technology, manufactured under license from SHARP Corporation. “Plasmacluster™” is a trademark of SHARP Corporation.



“ECO HEAT/COOL” switch

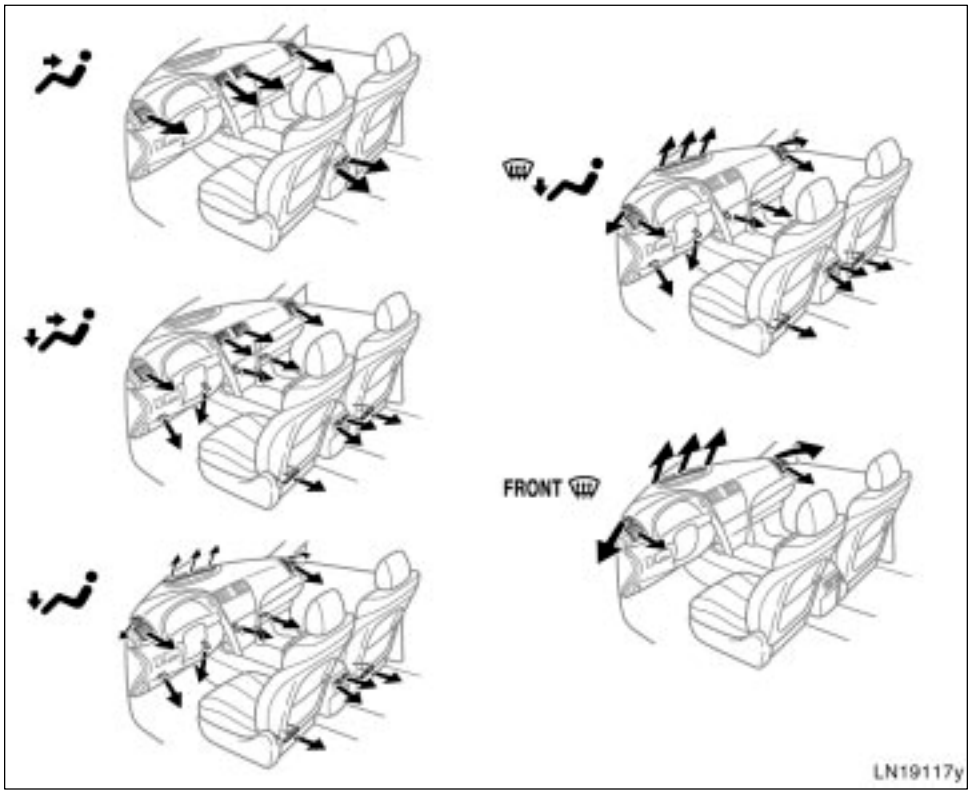
Push the “ECO HEAT/COOL” switch to select the “ECO HEAT/COOL” (economical) mode of the air conditioning. The indicator on the switch comes on and “ECO” appears on the air conditioning display to indicate that the mode is on.

The efficiency of the air conditioning is limited because the consumption of electricity is reduced, achieving a reduction of fuel consumption. As a result, it may take longer than the usual amount of time for the inside air temperature to reach the set temperature.

The “ECO HEAT/COOL” mode is canceled in the following cases:

- The temperature control is set at “LO” (the lowest temperature) or “HI” (the highest temperature).
- The air flow is set in the floor/windshield mode or windshield mode.
- “ECO HEAT/COOL” switch is pushed again.

—Air flow selector settings



—Operating tips

- To cool off your Toyota after it has been parked in the hot sun, drive with the windows open for a few minutes. This vents the hot air, allowing the air conditioning to cool the interior more quickly.
- Make sure the air intake grilles in front of the windshield are not blocked (by leaves or snow, for example).
- On humid days, do not blow cold air on the windshield. The windshield could fog up because of the difference in air temperature on the inside and outside of the windshield.
- Keep the area under the front seats clear to allow air to circulate throughout the vehicle.
- On cold days, set the fan speed to high for a minute to help clear the intake ducts of snow or moisture. This can reduce the amount of fogging on the windows.
- When driving on dusty roads, close all windows. If dust thrown up by the vehicle is still drawn into the vehicle after closing the windows, it is recommended that the air intake selector be set to FRESH and the fan speed selector to any setting except “OFF”.

- If following another vehicle on a dusty road, or driving in windy and dusty conditions, it is recommended that the air intake selector be temporarily set to RECIRCULATE, which will close off the outside passage and prevent outside air and dust from entering the vehicle interior.

Heating

For best results, set controls as follows:

For automatic operation—

Press in the “AUTO” button.
Temperature—To the desired temperature
Air intake—FRESH (outside air)
Air conditioning—OFF

For manual operation—

Fan speed—To the desired fan speed
Temperature—Towards **WARM**
Air intake—FRESH (outside air)
Air flow—FLOOR
Air conditioning—OFF

- For quick heating, select recirculated air for a few minutes. To keep the windows from fogging, select fresh after the vehicle interior has been warmed.
- Press the “A/C” button on for dehumidified heating.
- Choose floor/windshield air flow to heat the vehicle interior while defrosting or defogging the windshield.

Air conditioning

For best results, set controls as follows:

For automatic operation—

Press in the “AUTO” button.
Temperature—To the desired temperature
Air intake—FRESH (outside air)
Air conditioning—ON

For manual operation—

Fan speed—To the desired fan speed
Temperature—Towards **COLD**
Air intake—FRESH (outside air)
Air flow—PANEL
Air conditioning—ON

- For quick cooling, select recirculated air for a few minutes.

Ventilation

For best results, set controls as follows:

For automatic operation—

Press in the “AUTO” button.
Temperature—Towards low temperature
Air intake—FRESH (outside air)
Air conditioning—OFF

For manual operation—

Fan speed—To the desired fan speed
Temperature—Towards **COLD**
Air intake—FRESH (outside air)
Air flow—PANEL
Air conditioning—OFF

Defogging and defrosting

—The inside of the windshield

For best results, set controls as follows:

—For automatic operation

Temperature—Towards high temperature to heat; low temperature to cool
Air intake—FRESH (outside air)
Air flow—WINDSHIELD

—For manual operation

Fan speed—To the desired fan speed
Temperature—Towards high temperature to heat; low temperature to cool
Air intake—FRESH (outside air)
Air flow—WINDSHIELD

Pressing the windshield air flow button turns on the defogging function with the purpose of clearing the front view.

When pressing the windshield air flow button, the air intake selects FRESH automatically. This is to clean up the front view more quickly. It is not possible to return to RECIRCULATE in this mode.

Press the “A/C” button for dehumidified heating or cooling. This setting clears the front view more quickly.

- On humid days, do not blow cold air on the windshield—the difference between the outside and inside temperatures could make the fogging worse.

—The outside of the windshield

For best results, set controls as follows:

—For automatic operation

Temperature—Towards high temperature
Air intake—FRESH (outside air)
Air flow—WINDSHIELD

—For manual operation

Fan speed—To the desired fan speed
Temperature—Towards high temperature
Air intake—FRESH (outside air)
Air flow—WINDSHIELD

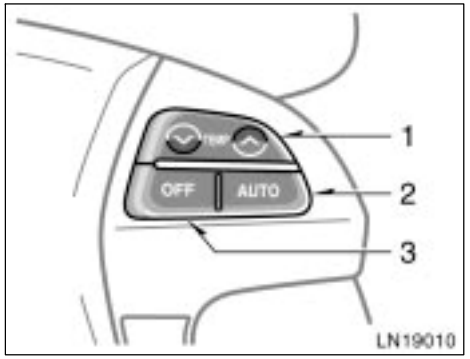
Pressing the windshield air flow button turns on the defrosting function with the purpose of clearing the front view.

When pressing the windshield air flow button, the air intake selects FRESH automatically. This is to clean up the front view more quickly. It is not possible to return to RECIRCULATE in this mode.

Press the “A/C” button for dehumidified heating or cooling. This setting clears the front view more quickly.

- To heat the vehicle interior while defrosting the windshield, choose floor/windshield air flow.

Climate remote controls (steering switches)



Some parts of the air conditioning system can be adjusted using the switches on the steering wheel.

Details of the specific switches, controls, and features are described below.

1. Temperature selector (“TEMP”)
   (with “DUAL” button indicator on—individual setting on driver side only)
   (with “DUAL” button indicator off—simultaneous setting on driver and front passenger)
2. “AUTO” button
3. “OFF” button

“AUTO” button

For automatic operation of the air conditioning, press the “AUTO” button. The “AUTO” button will turn on, indicating that the automatic operation mode has been selected.

In the automatic operation mode, the air conditioning selects the most suitable fan speed, air flow, air intake and on−off of the air conditioning according to the temperature.

When you press the “AUTO” button with the air intake mode at FRESH, internal circulation may be applied for maximum cooling.

You may use manual controls if you want to select your own settings.

Temperature selector

To increase the temperature, press the “∧” side. To decrease it, press the “∨” side.

“LO” appears when you adjust to maximum cooling, and “HI” appears when you adjust to maximum warming.

With the “DUAL” button indicator on—This button changes the temperature on the driver side only.

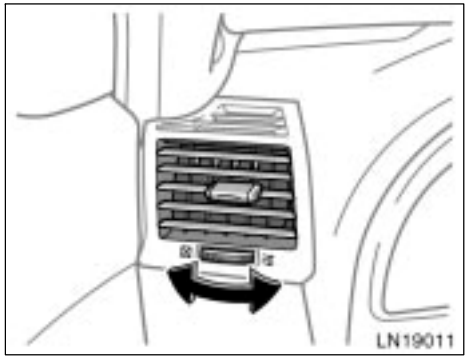
With the “DUAL” button indicator off—This button changes the temperature on the driver side and front passenger side simultaneously.

This function will be cancelled when the “PASS TEMP” knob on the instrument panel is turned.

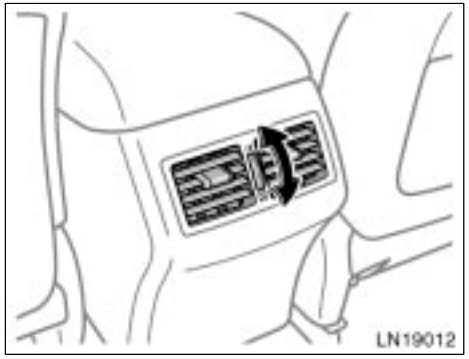
“OFF” button

Push the “OFF” button to turn off the air conditioning system.

Side and rear vents



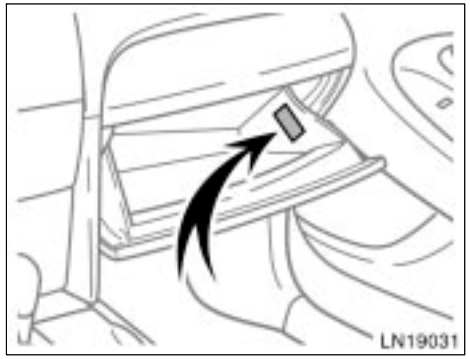
Side vents



Rear vents

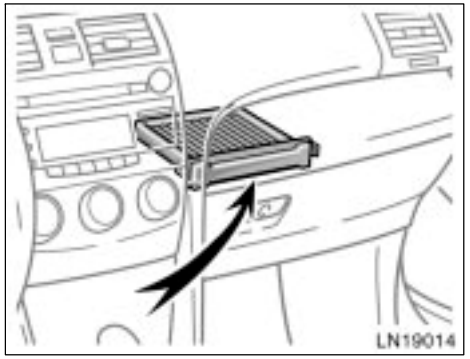
If air flow control is not satisfactory, check the side and rear vents. The side and rear vents may be opened or closed as shown.

Air conditioning filter—



The air conditioning filter information label is placed inside of the glove box as shown and indicates that a filter has been installed.

The air conditioning filter prevents dust from entering the vehicle through the air conditioning vent.

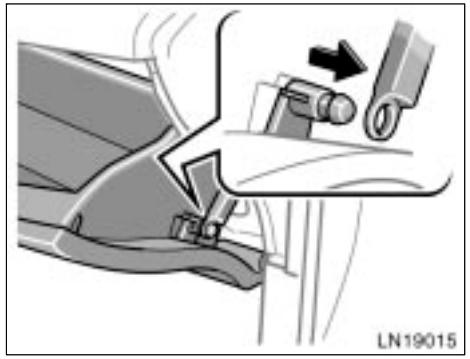


The air conditioning filter is behind the glove box.

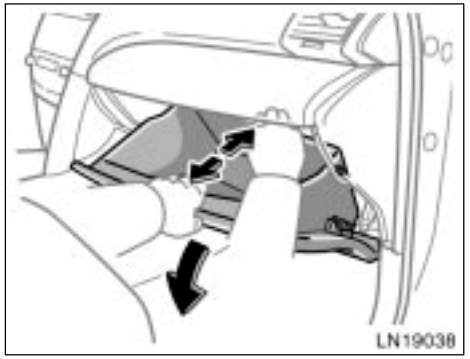
—Checking, cleaning and replacing the air conditioning filter

The air conditioning filter may clog after long use. The filter may need to be cleaned or replaced if the air flow of the air conditioning and heater experiences extreme reductions in operating efficiency, or if the windows begin to fog up easily in FRESH mode.

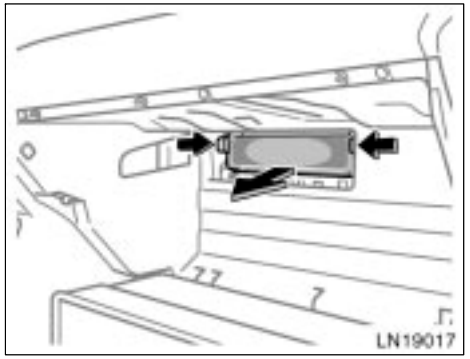
To maintain the air conditioning efficiency, inspect, clean and replace the air conditioning filter according to the maintenance schedule. In dusty areas or areas with heavy traffic flow, such as inner city or desert areas, early replacement may be required. (For scheduled maintenance information, please refer to the “Scheduled Maintenance Guide” or “Owner’s Manual Supplement”.)



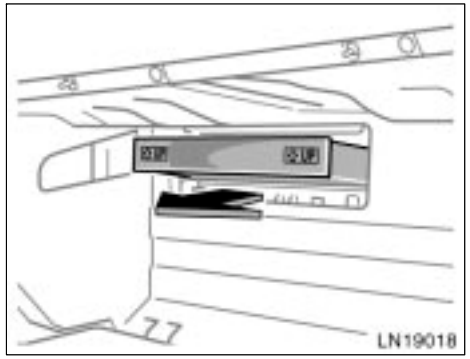
1. Open the glove box, and slide off the damper as shown.



2. Apply pressure to the glove box as shown to disengage the claws.



3. Remove the filter cover while pushing in both ends of the cover.



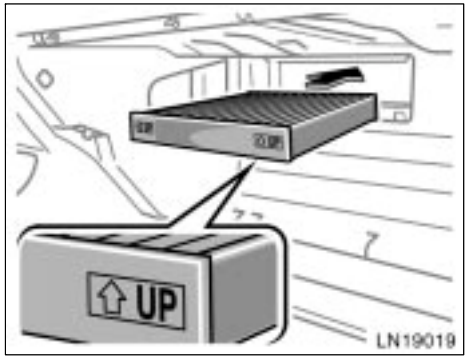
4. Pull the filter out of the filter outlet. Inspect the filter on the surface.

If it is dirty, it should be cleaned or replaced.

To clean the filter, blow compressed air through it from the bottom.

Hold the air gun 50 mm (2 in.) from the filter and blow for approximately 2 minutes at 500 kPa (5.0 kgf/cm^2 or bar, 72 psi).

If it is not available, have the filter cleaned by your Toyota dealer.



When inserting the filter in the filter outlet, keep the arrow pointing up.

NOTICE

To prevent damage to the air conditioning system, do the following.

- ***When using the air conditioning system, make sure that a filter is always installed.***
- ***When cleaning the filter, do not clean the filter with water.***

SECTION 1-10

OPERATION OF INSTRUMENTS AND CONTROLS

Other equipment

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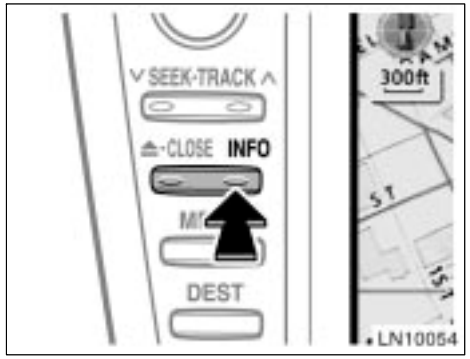
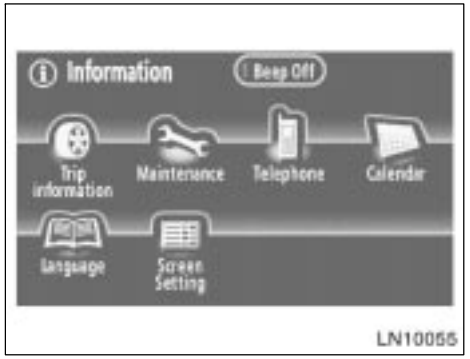
Trip information (with navigation system)



1. **Push the “INFO” button to display the “Information” screen.**



2. **Touch the “Trip information” on the screen.**

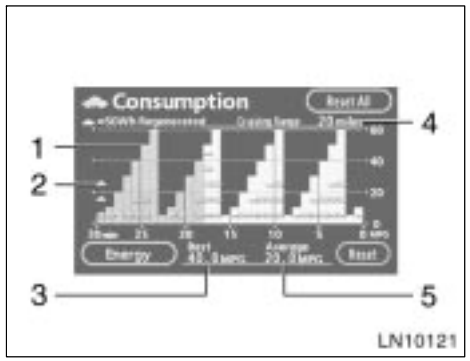
Trip information appears on the screen.

When the instrument panel lights are turned on, the brightness of the screen will be reduced.

You can adjust the brightness of the screen. To adjust the brightness, see the “Navigation System Owner’s Manual” for the procedure.

CAUTION

Do not operate the screen while the vehicle is moving. Be sure to operate the screen only when the vehicle is stopped.



Consumption screen

1. Transition of fuel consumption in the past 30 minutes
2. Regenerated energy in the past 30 minutes
3. Best fuel economy among average
4. Cruising range
5. Average fuel consumption

The information listed above is displayed when you touch the “Consumption” switch on the “Energy Monitor” screen.

The displayed values on the screen indicate general driving conditions. Accuracy varies with driving habits and road conditions.

When the “POWER” switch is set at ON, the last previously used mode displayed just before the “POWER” switch is turned off will appear.

If “Reset All” is touched, all of the graphics and values except the cruising range will be reset.

If the electrical power source is disconnected from the navigation system screen, the screen will automatically be set to the initial mode.

1. Fuel consumption in the past 30 minutes (“Consumption”)

The transition of fuel consumption in the past 30 minutes is displayed in the graph.

2. Regenerated energy in the past 30 minutes

The regenerated energy in the past 30 minutes is indicated with symbols.

One symbol indicates 50 Wh. Up to 4 symbols will be shown. The energy of 50 Wh illuminates a 50 W bulb for an hour.

3. Best fuel economy (lowest fuel consumption) among average (“Best”)

Best fuel economy among average is displayed.

If the average fuel consumption is reset by touching the “Reset” and the average fuel consumption is the lowest, the value is overwritten.

4. Cruising range (“Cruising Range”)

The distance the vehicle can travel with the remaining fuel is calculated and displayed based on the quantity of remaining fuel and past fuel consumption.

The cruising range display indicates the approximate distance that you can drive until the fuel gauge reaches “E”. It is different from the actual distance traveled.

If the fuel gauge malfunctions, the mileage figure will not appear.

When the vehicle is refueled, the driving range is recalculated.

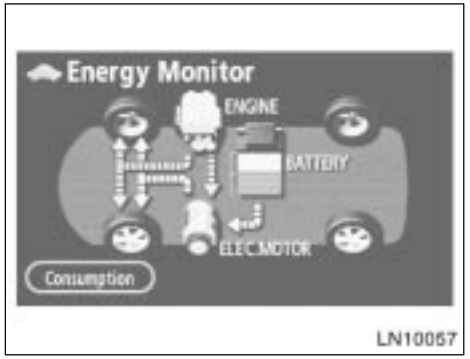
The actual driving range varies with driving habits and road conditions. If fuel consumption is good, the driving range will be longer than indicated. If fuel consumption is poor, the driving range will be shorter than indicated.

If the low fuel level warning light comes on, refuel the vehicle even if the display indicates that the vehicle can be driven further.

5. Average fuel consumption (“Average”)

Average fuel consumption is displayed based on total driving distance and total fuel consumption.

The calculation is reset by touching the “Reset”. If the average fuel consumption is the lowest, the value of the best fuel economy among average is overwritten.



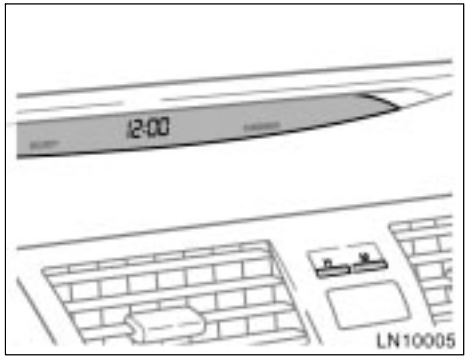
Energy Monitor screen

Touching the “Energy” switch turns on the “Energy Monitor” that displays the hybrid system operating condition.

The arrow on the screen indicates the movement of the energy. See “Energy monitor” on page 3 for the representative screen.

The segments of the battery on the screen indicate the status of the hybrid battery. See “—Hybrid battery status” on page 5 for details.

Clock



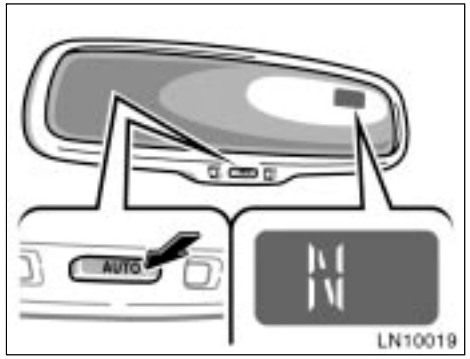
To reset the hour: Push the “H” button.
To reset the minutes: Push the “M” button.

The “POWER” switch must be set at ACC or ON.

If the electrical power source has been disconnected from the clock, the time display will automatically be set to 1:00 (one o’clock).

When the instrument panel lights are turned on, the brightness of the time indicator will be reduced.

Compass



The direction is indicated on the inside rear view mirror.

If the “POWER” switch was turned off with the system on, the system will automatically turn back on when the “POWER” switch is turned on.

Push the “AUTO” switch for longer than 3 seconds to turn the compass system on and off.

The compass indicates the direction that the vehicle is heading. In the above case, it shows that the vehicle is heading north.

Displays	Directions
N	North
NE	Northeast
E	East
SE	Southeast
S	South
SW	Southwest
W	West
NW	Northwest

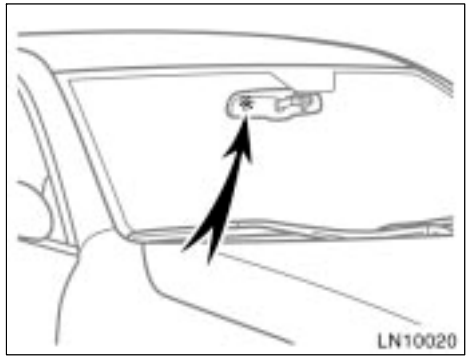
The compass may not show the correct direction in the following conditions:

- The vehicle is stopped immediately after turning.
- The compass does not adjust while the vehicle is stopped.
- The “POWER” switch is turned off immediately after turning.
- The vehicle is on an inclined surface.
- The vehicle is in a place where the earth’s magnetic field is subject to interference by artificial magnetic fields (underground parking, under a steel tower, between buildings, roof parking, near a crossing, near a large vehicle, etc.).
- The vehicle is magnetized. (There is a magnet or a metal object on or near the inside rear view mirror.)
- The 12 volt battery has been disconnected.

If your vehicle is out of the set zone, refer to “CALIBRATING THE COMPASS” below to set the zone number.

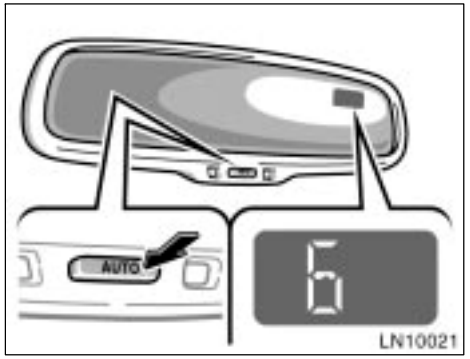
If the deviation is small, the compass works to calibrate the direction automatically while the vehicle is in motion.

For additional precision or for complete calibrating, see “CALIBRATING THE COMPASS” below.



The compass sensor is in the inside rear view mirror.

NOTICE
Do not put magnets or a metal object on or near the inside rear view mirror of the vehicle. Doing this may cause malfunction of the compass sensor.

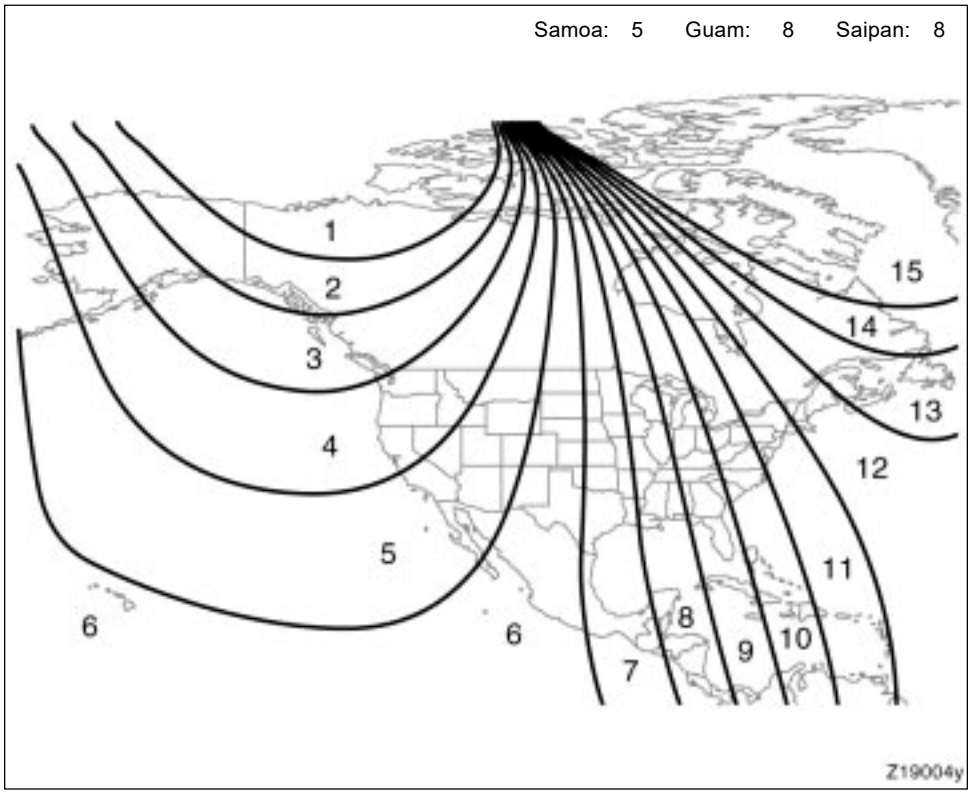


CALIBRATING THE COMPASS (deviation calibration)

The direction display on the compass deviates from the true direction determined by the earth’s magnetic field. The angle of deviation varies according to the geographic position of the vehicle.

To adjust this deviation, stop the vehicle, then push and hold the switch until the zone number appears on the display.

Then push the switch, referring to the following map to select the number of the zone where the vehicle is.

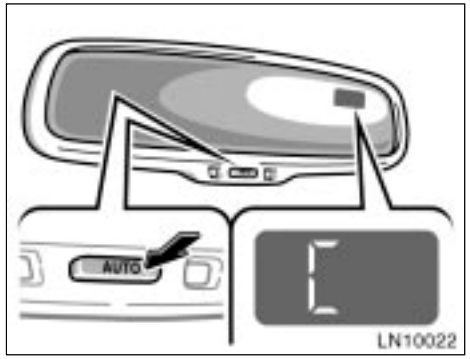


Zone numbers

After calibration, leaving the system for several seconds returns it to the compass mode.

⚠ CAUTION

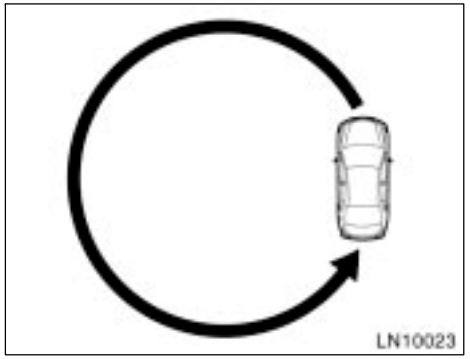
Do not adjust the display while the vehicle is moving. Be sure to adjust the display only when the vehicle is stopped.



CALIBRATING THE COMPASS (circling calibration)

Sometimes the direction display on the compass may not change after a turn. To rectify this, stop the vehicle and push and hold the switch until “C” appears on the display.

If “C” appears on the display because of a drastic change in the magnetic field, perform circling calibration.



Drive the vehicle in a circle at 8 km/h (5 mph) or less. If there is not enough space to drive in a circle, drive around the block.

After driving 1 to 3 circles in the above method, calibration is completed when the direction is shown on the display.

If calibration cannot be performed because of the magnetized vehicle etc., take your vehicle to Toyota dealer.

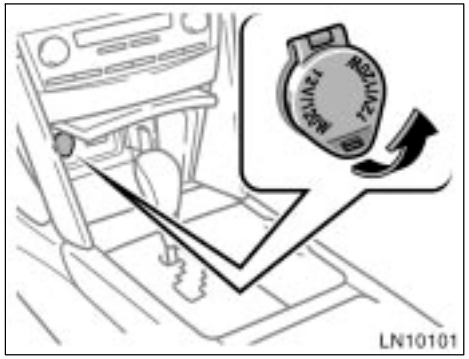
Perform circling calibration just after you have purchased your Toyota. And then always perform circling calibration after the 12 volt battery has been removed, replaced or disconnected.

- Do not perform circling calibration of the compass in a place where the earth’s magnetic field is subject to interference by artificial magnetic fields (underground parking, under a steel tower, between buildings, roof parking, near a crossing, near a large vehicle, etc.).
- During calibration, do not operate electric systems (moon roof, power windows, etc.) as they may interfere with the calibration.

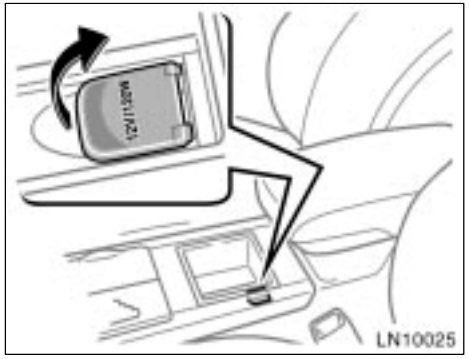
⚠ CAUTION

- **When doing the circling calibration, be sure to secure a wide space, and watch out for people and vehicles in the neighborhood. Do not violate any local traffic rules while performing circling calibration.**
- **Do not adjust the display while the vehicle is moving. Be sure to adjust the display only when the vehicle is stopped.**

Power outlets



Front console



Center console

The power outlets are designed for power supply for car accessories.

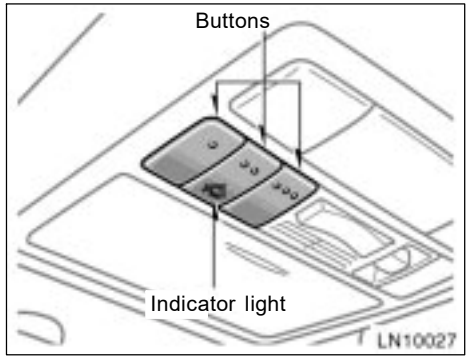
The “POWER” switch must be set at ACC or ON for the power outlet to be used.

Front console power outlet—Connected cables can be passed through the hole to the front passenger side of the auxiliary box. For details, see “Auxiliary boxes” on page 268 in this Section.

NOTICE

- ***To prevent the fuse from being blown, do not use the electricity over the total vehicle capacity of 12V/120W.***
- ***To prevent the 12 volt battery from being discharged, do not use the power outlets longer than necessary when the hybrid system is turned off.***
- ***Close the power outlet lids when the power outlets are not in use. Inserting anything other than an appropriate plug that fits the outlet, or allowing any liquid to get into the outlet may cause electrical failure or short circuits.***

Garage door opener



The garage door opener (HomeLink® Universal Transceiver) is manufactured under license from HomeLink® and can be programmed to operate garage doors, gates, entry doors, door locks, home lighting systems, and security systems, etc.

(a) Programming the HomeLink®

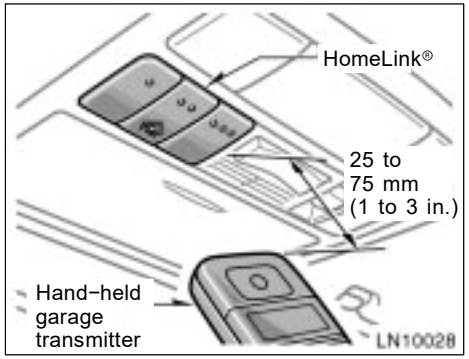
The HomeLink® in your vehicle has 3 buttons and you can store one program for each button.

To ensure correct programming into the HomeLink®, install a new battery in the hand−held transmitter prior to programming.

The battery side of the hand−held transmitter must be pointed away from the HomeLink® during the programming process.

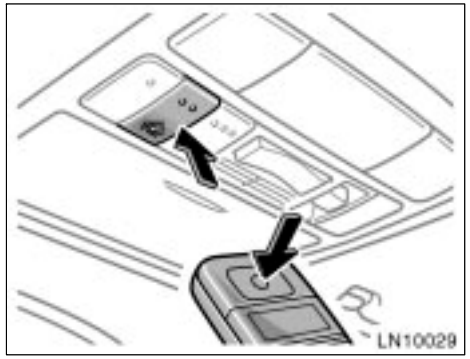
For Canadian users, follow the procedure in “Programming an entrance gate/programming all devices in the Canadian market”.

1. Decide which of 3 HomeLink® buttons you want to program.



2. Place your hand−held garage transmitter 25 to 75 mm (1 to 3 in.) away from the surface of the HomeLink®.

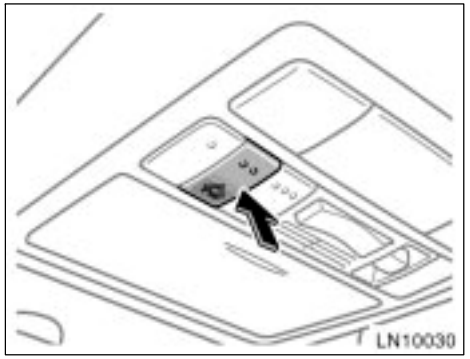
Keep the indicator light on the HomeLink® in view while programming.



3. Simultaneously press and hold the hand−held garage transmitter button along with the selected HomeLink® button.

Do not release the buttons until step 4 has been completed.

4. When the indicator light on the HomeLink® changes from a slow to a rapid flash after 20 seconds, you can release both buttons.



5. Test the operation of the HomeLink® by pressing the newly programmed button. If programming a garage door opener, check to see if the garage door opens and closes.

If the garage door does not operate, identify if your garage transmitter is of the “Rolling Code” type. Press and hold the programmed HomeLink® button. The garage door has the rolling code feature if the indicator light (on the HomeLink®) flashes rapidly and then remains lit after 2 seconds. If your garage transmitter is the “Rolling Code” type, proceed to the heading “Programming a rolling code system”.

6. Repeat steps 2 through 5 for each remaining HomeLink® button to program another device.

Programming a rolling code system

If your device is “Rolling Code” equipped, it is necessary to follow steps 1 through 4 under the heading “Programming the HomeLink®” before proceeding with the steps listed below.

1. Locate the “training” button on the ceiling mounted garage door opener motor. The exact location and color of the button may vary by brand of garage door opener. Refer to the owner’s guide supplied by the garage door opener manufacturer for the location of this “training” button.
2. Press the “training” button on the ceiling mounted garage door opener motor.

Following this step, you have 30 seconds in which to initiate step 3 below.

3. Press and release the vehicle’s programmed HomeLink® button twice. The garage door may open. If the door does open, the programming process is complete. If the door does not open, press and release the button a third time. This third press and release will complete the programming process by opening the garage door.

The ceiling mounted garage door opener motor should now recognize the HomeLink® unit and be able activate the garage door up/down.

4. Repeat steps 1 through 3 for each remaining HomeLink® button to program another rolling code system.

Programming an entrance gate/programming all devices in the Canadian market

1. Decide which of the 3 HomeLink® buttons you want to program.
2. Place your hand−held gate/device transmitter 25 to 75 mm (1 to 3 in.) away from the surface of the HomeLink®.

Keep the indicator light on the HomeLink® in view while programming.

3. Press and hold the selected HomeLink® button.
4. Continuously press and release (cycle) the hand−held gate/device transmitter button every two seconds until step 5 is complete.
5. When the indicator light on the HomeLink® changes from a slow to a rapid flash after 20 seconds, you can release both buttons.
6. Test the operation of the HomeLink® by pressing the newly programmed button. Check to see if the gate/device operates correctly.
7. Repeat steps 1 through 6 for each remaining HomeLink® button to program another device.

Programming other devices

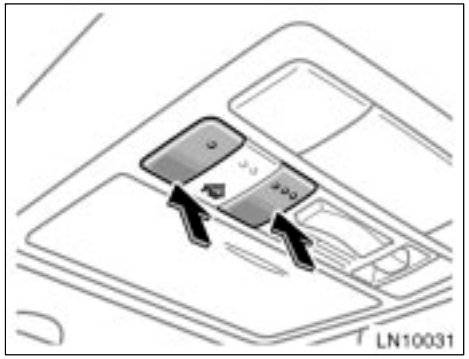
To program other devices such as home security systems, home door locks or lighting, contact your authorized Toyota dealer for assistance.

Reprogramming a button

Individual HomeLink® buttons cannot be erased, however, to reprogram a single button, follow the procedure “Programming the HomeLink®”.

(b) Operating the HomeLink®

To operate the HomeLink®, press the appropriate HomeLink® button to activate the programmed device. The HomeLink® indicator light should come on. The HomeLink® continues to send the signal for up to 20 seconds as long as the button is pressed.



(c) Erasing the entire HomeLink® memory (all three programs)

To erase all previously programmed codes at one time, press and hold down the 2 outside buttons for 20 seconds until the indicator light flashes.

If you sell your vehicle, be sure to erase the programs stored in the HomeLink® memory.

For additional programming assistance with your HomeLink® Universal Transceiver call the:

- Toyota Customer Experience Center at 1−800−331−4331 (U.S.A.)
- Toyota Canada Customer Interaction Centre at 1−888−869−6828 (Canada)

Refer to HomeLink® on the internet at: WWW.HOMELINK.COM

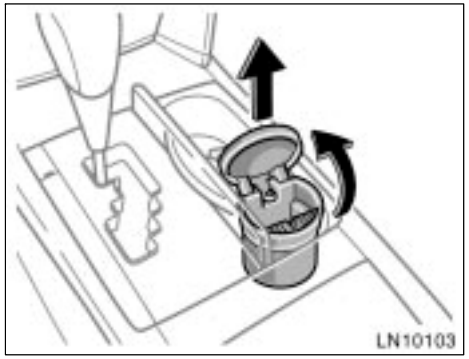
⚠ CAUTION

- **When programming the HomeLink® Universal Transceiver, you may be operating a garage door or other device. Make sure people and objects are out of the way of the garage door or other device to prevent potential harm or damage.**
- **Do not use this HomeLink® Universal Transceiver with any garage door opener that lacks the safety stop and reverse feature as required by federal safety standards. (This includes any garage door opener model manufactured before April 1, 1982.) A garage door opener which cannot detect an object (signaling the door to stop and reverse), does not meet current federal safety standards. Using a garage door opener without these features increases risk of serious injury or death.**

This device complies with Part 15 of the FCC Rules and with RSS−210 of the IC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

WARNING: This transmitter has been tested and complies with FCC and IC rules. Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the device.

Portable ashtray



The ashtray can be removed and used outside the vehicle. To use the ashtray, raise the lid.

When finished with your cigarette, thoroughly extinguish it in the ashtray to prevent other cigarette butts from catching fire. After using the ashtray, close the lid completely.

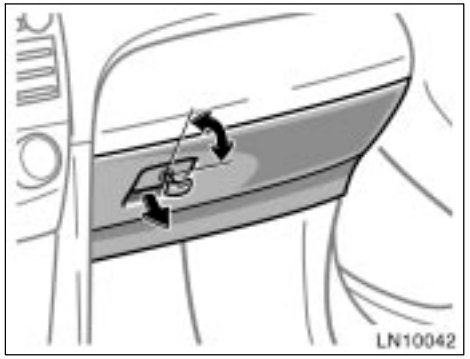
The cup holder lid cannot be closed while the ashtray is installed.

To detach the ashtray, pull it out.

⚠ CAUTION

To reduce the chance of injury in case of an accident or sudden stop while driving, always completely close the ashtray after use.

Glove box



To use the glove box:

Open by pulling the lever.

Lock by inserting the mechanical key and turning it clockwise.

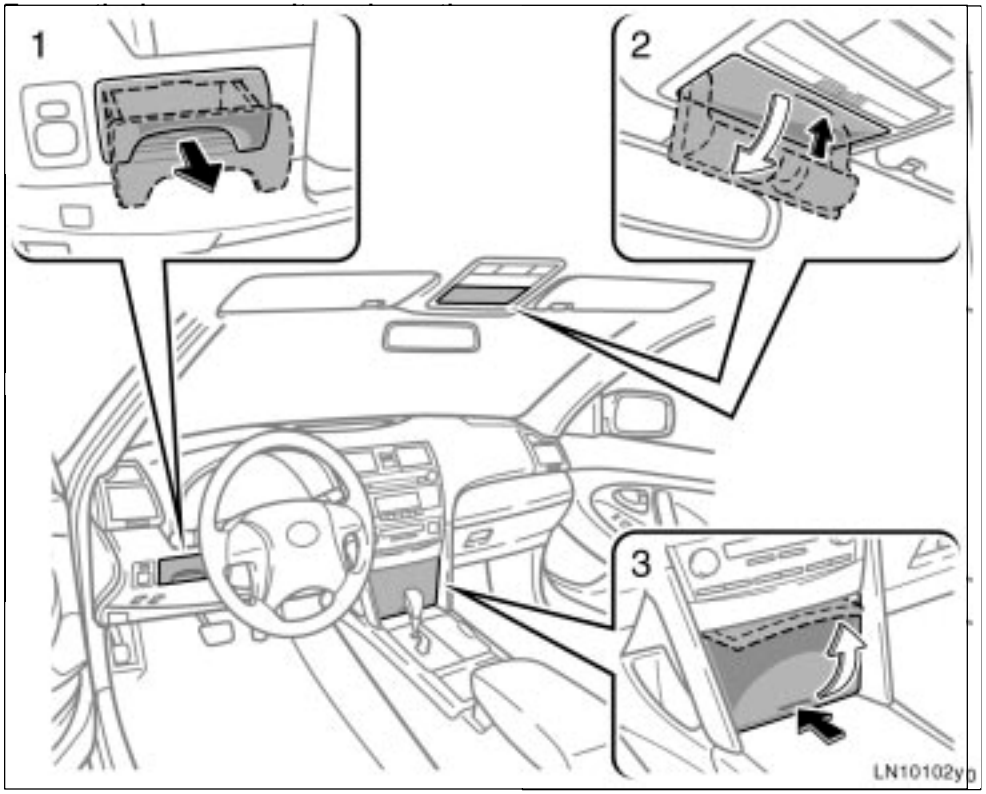
Unlock by inserting the mechanical key and turning it counterclockwise.

With the instrument panel lights on, the glove box light will come on when the glove box is open.

⚠ CAUTION

To reduce the chance of injury in case of an accident or a sudden stop, always keep the glove box door closed while driving.

Auxiliary boxes



CABLE PASS−THROUGH

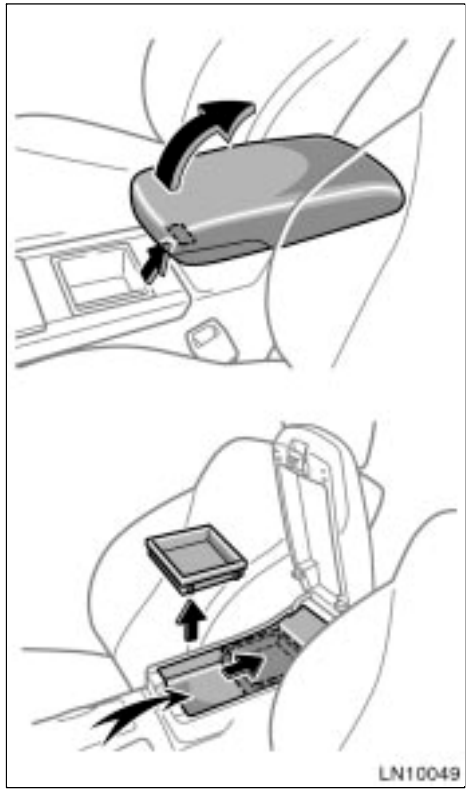
The auxiliary box of the front console is provided with a hole that allows cables to be passed into the cabin from the inside power outlet and AUX adapter.

To open the hole, perform the following procedure:

1. Remove the lid on the inside of the auxiliary box.
2. From the inside of the auxiliary box, push out and remove the outer lid.

Be careful not to lose the removed lids.

Rear console box



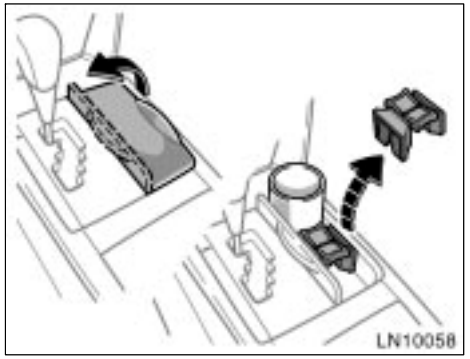
To open the console box, push the lock release button and raise the console box lid.

The upper tray slides forward/backward and can be removed.

⚠ CAUTION

To reduce the chance of injury in case of an accident or a sudden stop, always keep the console box closed while driving.

Front cup holder



The cup holder is designed for holding cups or drink−cans securely. To use them, open it as shown in the illustration.

The adapter for front cup holder is detachable. Replace it in its original position when using the front cup holder. Otherwise the drinks will not be held securely.

⚠ CAUTION

- Do not place anything else other than cups or drink−cans in the cup holder, as such items may be thrown about in the compartment and possibly injure people in the vehicle during sudden braking or in an accident.
- To reduce the chance of injury in case of an accident or sudden stop while driving, keep the cup holder closed when it is not in use.

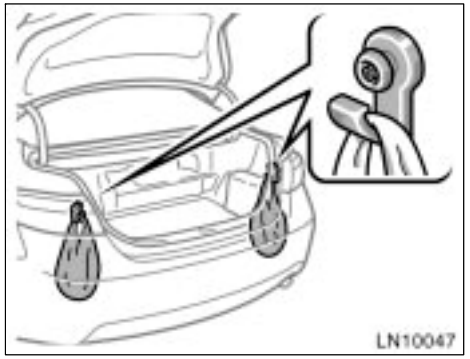
Rear cup holder

The cup holder is designed for holding cups or drink−cans securely. To use it, pull down the armrest.

⚠ CAUTION

- Do not place anything else other than cups or drink−cans in the cup holder, as such items may be thrown about in the compartment and possibly injure people in the vehicle during sudden braking or in an accident.
- Do not lift the armrest upright when the cup holder is in use.

Grocery bag hooks

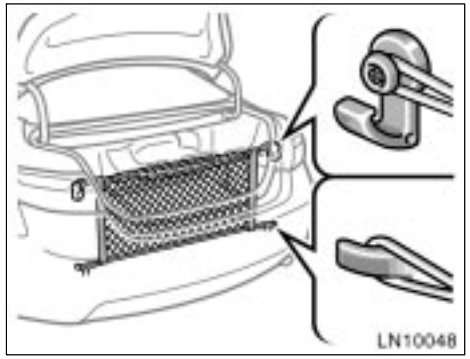


This hook is designed to hang things like grocery bags.

NOTICE

To prevent damage to the hook, avoid hanging heavy loads on it.

Cargo net

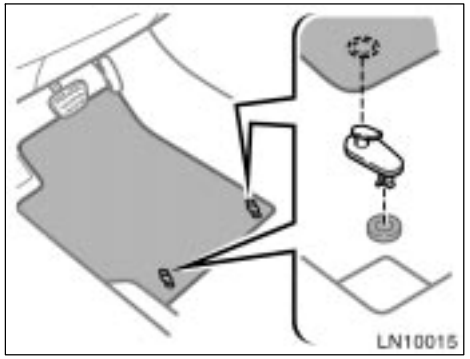


To secure belongings, hang the cargo net on the hooks.

NOTICE

- ***Do not use the net to secure sharp or heavy objects. The net will tear off.***
- ***Be sure not to twist the net when hooking.***

Floor mat



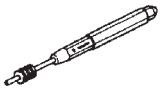
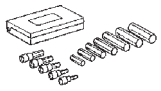
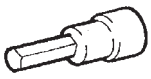
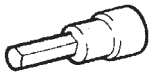
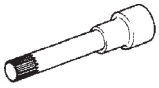
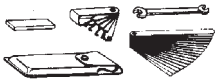
Use a floor mat of the correct size.

If the vehicle carpet and floor mat have two holes, then they are designed for use with locking clips. Attach the floor mat to the vehicle carpet using the clips. Lock the clips into the holes in the vehicle carpet.

⚠ CAUTION

Make sure the floor mat is properly placed on the vehicle carpet. If the floor mat slips and interferes with the movement of the pedals during driving, it may cause an accident.

RECOMMENDED TOOLS

	09011-12301	Socket Wrench 30 mm	
	09031-00040	Pin Punch	
	09040-00011	Hexagon Wrench Set	
	(09043-20060)	Socket Hexagon Wrench 6	
	(09043-20100)	Socket Hexagon Wrench 10	
	09043-50100	Bi-hexagon Wrench 10 mm	
	09090-04020	Engine Sling Device	
	09200-00010	Engine Adjust Kit	

PP

EQUIPMENT

Abrasive compound	Valve
Brush	Piston
Caliper gauge	
Carbide cutter	
CO/HC meter	
Compression gauge	
Connecting rod aligner	
Cylinder gauge	
Dial indicator	
Dye penetrant	
Engine tune-up tester	
Groove cleaning tool	Piston ring groove
Heater	
Hexagon wrench (1.5 mm)	Timing belt tensioner
Micrometer	
Pin hole grinder	Connecting rod bushing
Piston ring compressor	
Piston ring expander	
Plastigage	
Precision straight edge	
Press	
Reamer	Cylinder
Ridge reamer	Cylinder
Soft brush	Cylinder head Cylinder block
Solvent	
Spring tester	Valve spring
Steel square	Valve spring
Thermometer	
Torque wrench	
Torx socket wrench	
Valve seat cutter	
Valve guide bushing brush	
V-block	
Vernier calipers	
Wire brush	Valve Cylinder head
Insulated gloves	

HINT:
Torx is registered trademark of Textron Inc.

COOLANT

Capacity	Classification
2.9 liters (3.1 US qts, 2.6 Imp. qts)	Use only "TOYOTA Super Long Life Coolant" or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, non-borate coolant with long-life hybrid organic acid technology (coolant with long-life hybrid organic acid technology consists of a combination of low phosphates and organic acids).

EQUIPMENT

Torque wrench	

SSM

Toyota Genuine Windshield Glass Adhesive or equivalent	

EQUIPMENT

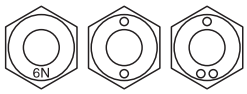
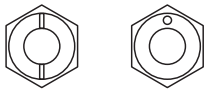
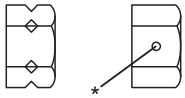
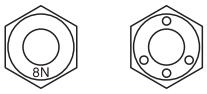
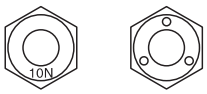
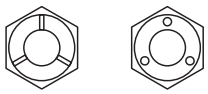
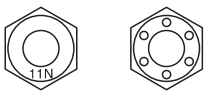
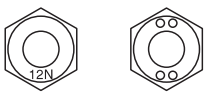
Torque wrench	
Hexagon wrench (10mm)	
vinyl tape	

LUBRICANT

Item	Capacity	Classification
Hybrid transaxle fluid	3.8 liter (4.0 US qts, 3.3 Imp. qts)	Toyota Genuine ATF WS or equivalent

HOW TO DETERMINE NUT STRENGTH

Nut Type

Present Standard Hexagon Nut	Old Standard Hexagon Nut		Class
	Cold Forging Nut	Cutting Processed Nut	
No Mark			4N
No Mark (w/ Washer)	No Mark (w/ Washer)	No Mark	5N (4T)
			6N
			7N (5T)
			8N
		No Mark	10N (7T)
			11N
			12N

HINT:
- *: Nut with 1 or more marks on one side surface of the nut.
- Use a nut with the same nut strength classification number (or greater) as the bolt strength classification number when tightening parts with a bolt and nut.

Example:
- Bolt = 4T
- Nut = 4N or more

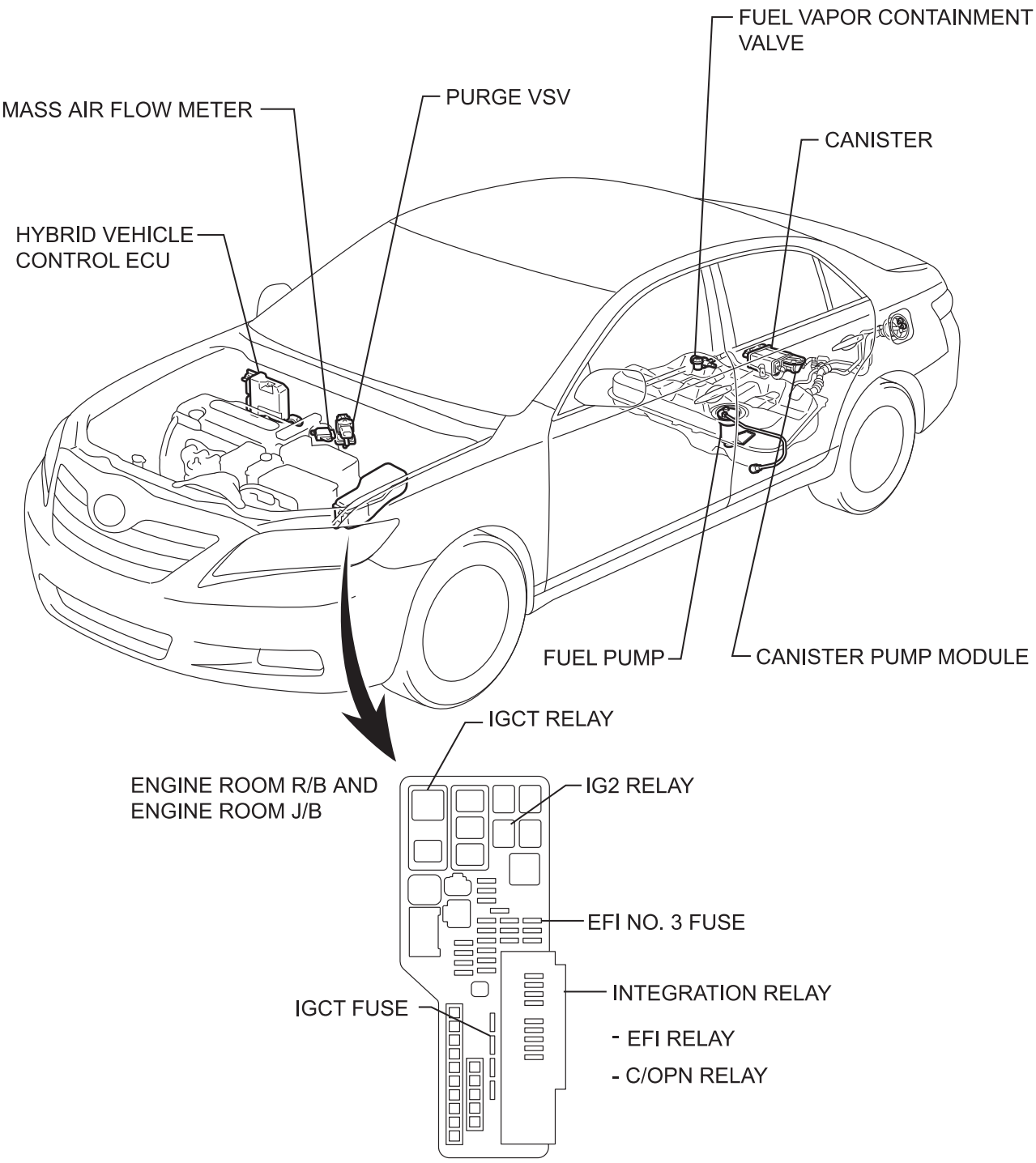
TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
Brake actuator assembly x Brake actuator bracket	8	82	71 in.*lbf
Brake actuator with No. 1 brake actuator bracket x Brake actuator bracket assembly	19	195	14
Brake actuator bracket x Body	19	195	14
Brake actuator assembly x Brake line	15 (14)	155 (143)	11 (10)
Cooler bracket x Body	9.8	100	87 in.*lbf
Front speed sensor x Knuckle	8	82	71 in.*lbf
Front speed sensor x Body	5	51	44 in.*lbf
Front speed sensor x Absorber	19	194	14
Yaw rate and acceleration sensor	13	133	10
Skid control ECU x Body	5	51	44 in.*lbf
Wiring harness clamp bracket x Body	8	82	71 in.*lbf
Brake control power supply assembly x Bracket	5	51	44 in.*lbf
Brake control power supply with bracket x Body	5	51	44 in.*lbf
Brake pedal stroke sensor x Brake pedal support assembly	8.5	87	75 in.*lbf

DEFINITION OF TERMS

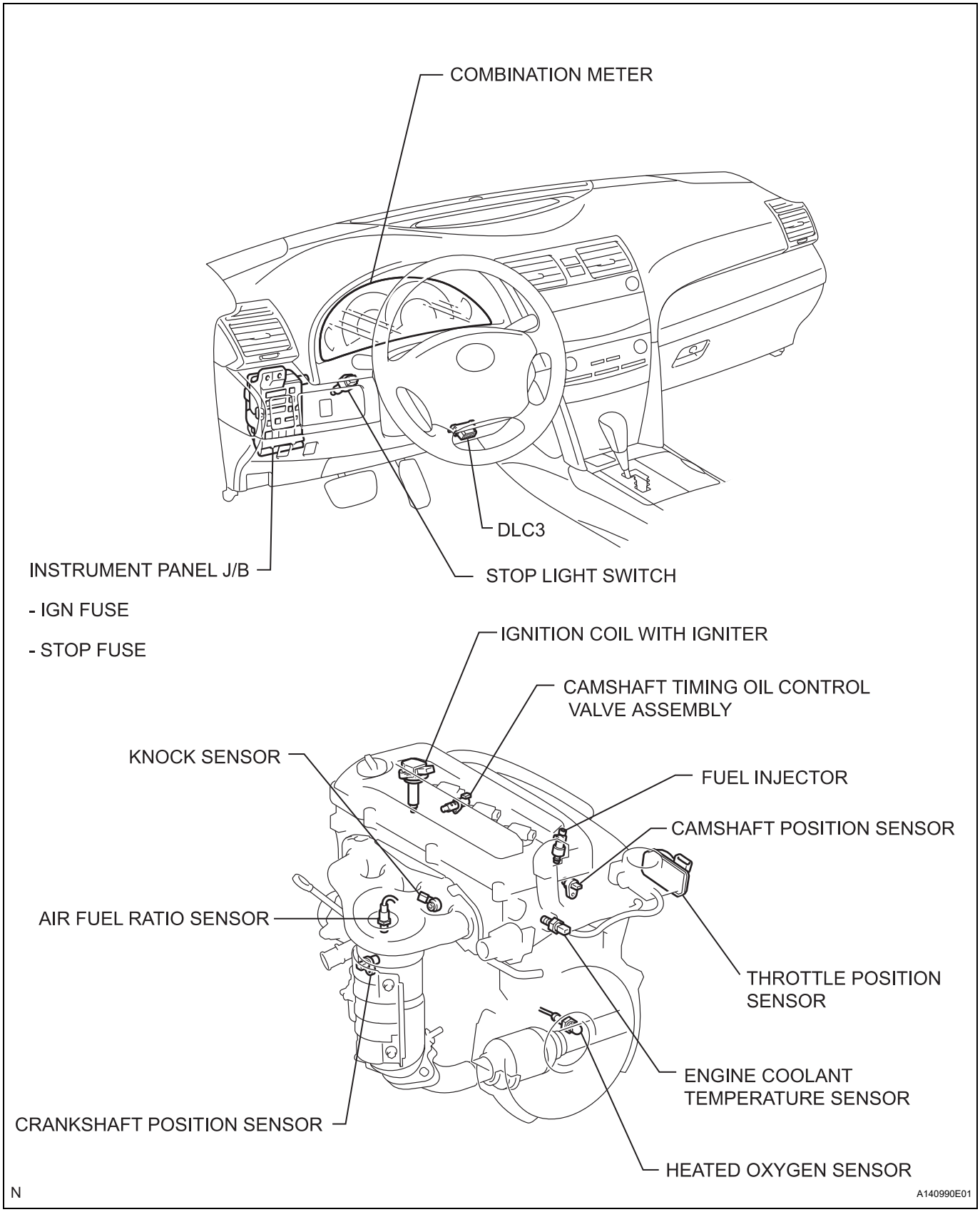
Terms	Definition
Monitor Description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	A group of diagnostic trouble codes that are output by ECM based on same malfunction detection logic.
Typical Enabling Condition	Preconditions that allow ECM to detect malfunctions. With all preconditions satisfied, ECM sets DTC when monitored value(s) exceeds malfunction threshold(s).
Sequence of Operation	Order of monitor priority, applied if multiple sensors and components involved in single malfunction detection process. Each sensor and component is monitored in turn and not monitored until previous detection operation is completed.
Required Sensor/Components	Sensors and components used by ECM to detect each malfunction.
Frequency of Operation	Number of times ECM checks for each malfunction during each driving cycle. "Once per driving cycle" means ECM only performs checks for that malfunction once during single driving cycle. "Continuous" means ECM performs checks for that malfunction whenever enabling conditions are met.
Duration	Minimum time for which ECM must detect continuous deviation in monitored value(s) in order to set DTC. Timing begins when Typical Enabling Conditions are met.
Malfunction Thresholds	Value, beyond which, ECM determines malfunctions exist and sets DTCs.
MIL Operation	Timing of MIL illumination after a malfunction is detected. "Immediate" means ECM illuminates MIL as soon as malfunction is detected. "2 driving cycle" means ECM illuminates MIL if same malfunction is detected second time during next sequential driving cycle.

PARTS LOCATION



N

A140989E02

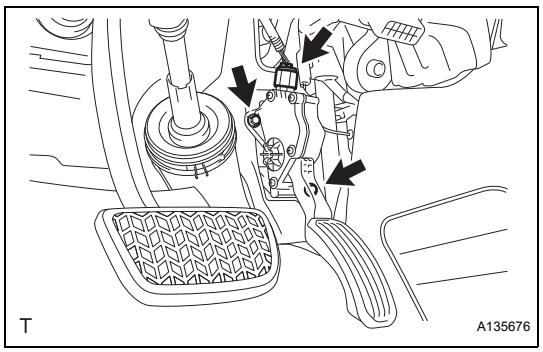

COMBINATION METER
DLC3
INSTRUMENT PANEL J/B
- IGN FUSE
- STOP FUSE
STOP LIGHT SWITCH
IGNITION COIL WITH IGNITER
CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY
KNOCK SENSOR
FUEL INJECTOR
CAMSHAFT POSITION SENSOR
AIR FUEL RATIO SENSOR
THROTTLE POSITION SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
CRANKSHAFT POSITION SENSOR
HEATED OXYGEN SENSOR
N
A140990E01

INSTALLATION

1. INSTALL ACCELERATOR PEDAL ROD

NOTICE:

- **Avoid physical shock to the accelerator pedal assembly.**
- **Do not disassemble the accelerator pedal assembly.**

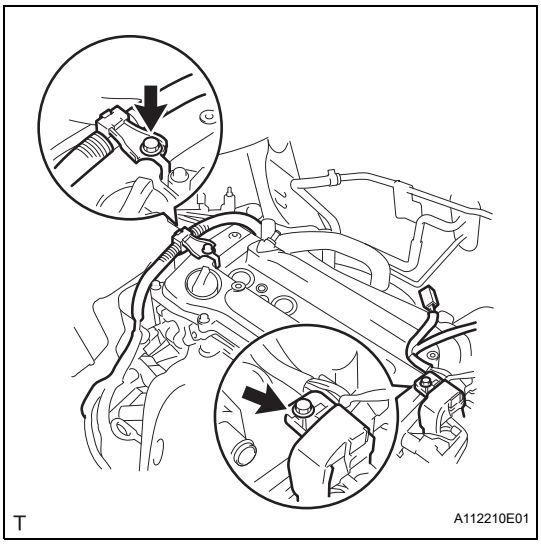


(a) Install the accelerator pedal rod with the 2 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

(b) Connect the accelerator pedal position sensor connector.

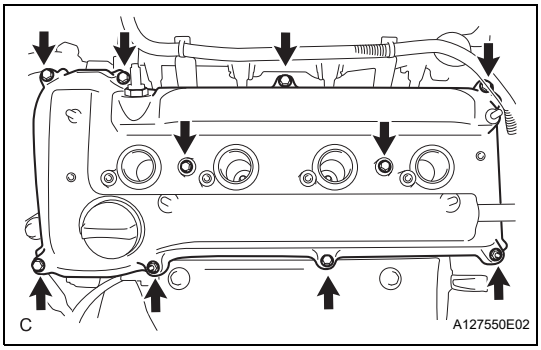
REMOVAL

1. **REMOVE LUGGAGE TRIM SERVICE HOLE COVER**
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (See page HV-560)**
3. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-90)**
4. **REMOVE FRONT WHEEL RH**
5. **REMOVE ENGINE UNDER COVER LH**
6. **REMOVE ENGINE UNDER COVER RH**
7. **REMOVE FRONT FENDER APRON SEAL RH**
8. **DRAIN ENGINE OIL (See page LU-4)**
9. **REMOVE FRONT EXHAUST PIPE ASSEMBLY**
   HINT:
   See page EX-2.
10. **REMOVE NO. 2 ENGINE MOUNTING STAY RH (See page EM-91)**
11. **REMOVE ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-91)**
12. **REMOVE NO. 2 ENGINE MOUNTING BRACKET RH (See page EM-91)**
13. **REMOVE V-RIBBED BELT TENSIONER COVER SUB-ASSEMBLY (See page EM-6)**
14. **REMOVE V-RIBBED BELT (See page EM-6)**
15. **REMOVE V-RIBBED BELT TENSIONER ASSEMBLY (See page EM-100)**
16. **REMOVE IDLER PULLEY BRACKET (See page EM-100)**
17. **REMOVE IGNITION COIL ASSEMBLY (See page EM-100)**
18. **DISCONNECT VENTILATION HOSE**
19. **DISCONNECT NO. 2 VENTILATION HOSE**



20. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY

(a) Remove the 2 bolts and disconnect the 2 engine wires.

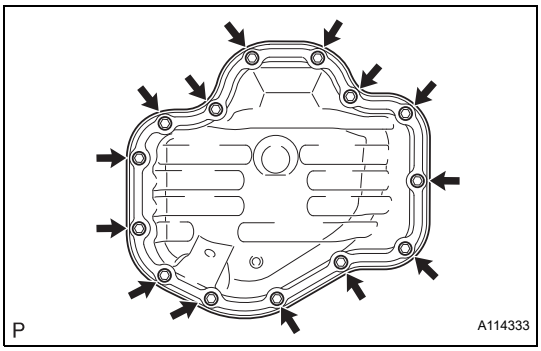


(b) Remove the 8 bolts, 2 nuts, and the cylinder head cover.

21. SET NO. 1 CYLINDER TO TDC/COMPRESSION (See page EM-8)

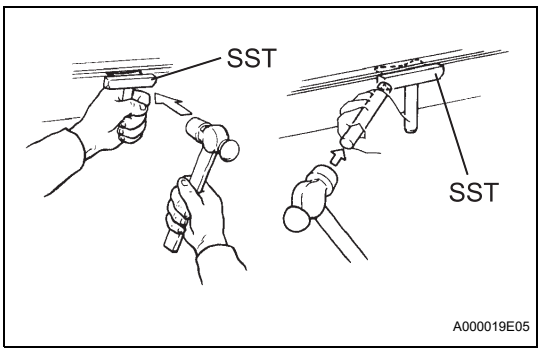
22. REMOVE CRANKSHAFT PULLEY (See page EM-74)

23. REMOVE CRANK POSITION SENSOR (See page ES-388)



24. REMOVE OIL PAN SUB-ASSEMBLY

(a) Remove the 12 bolts and 2 nuts.



(b) Insert the blade of SST between the crankcase and oil pan. Cut through the sealer and remove the oil pan.

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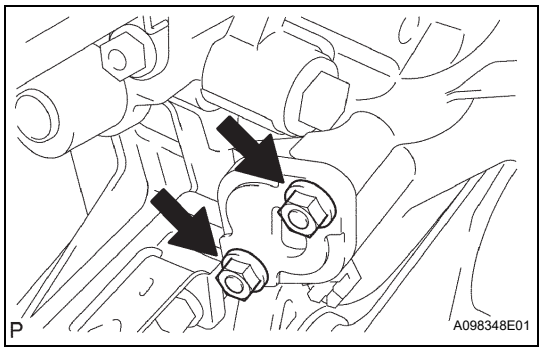
NOTICE:

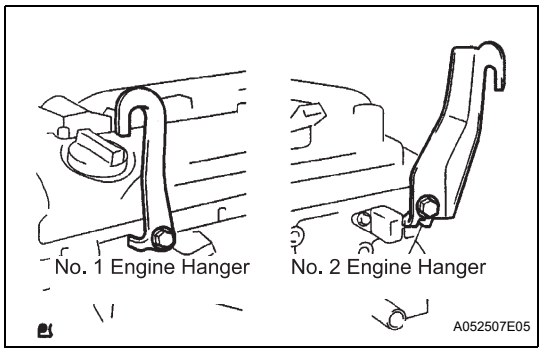
Be careful not to damage the contact surfaces of the crankcase, chain cover and oil pan.



25. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY

(a) Remove the 2 nuts, tensioner and gasket.

NOTICE:
Do not turn the crankshaft without the chain tensioner.



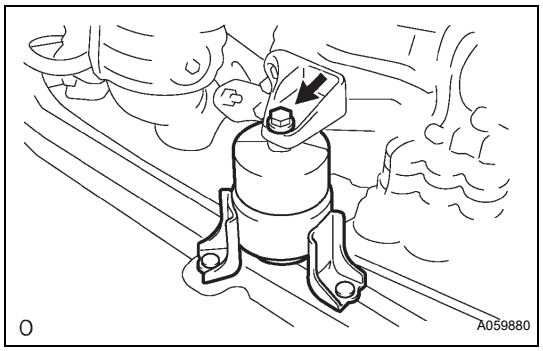
26. INSTALL ENGINE HANGERS

(a) Install the No. 1 engine hanger and No. 2 engine hanger with the bolts as shown in the illustration.
Parts No.:

No. 1 engine hanger	12281-28010
No. 2 engine hanger	12282-28010
Bolt	91512-61020

Torque: 38 N*m (387 kgf*cm, 28 ft.*lbf)

(b) Attach the sling device to the engine hangers and chain block.

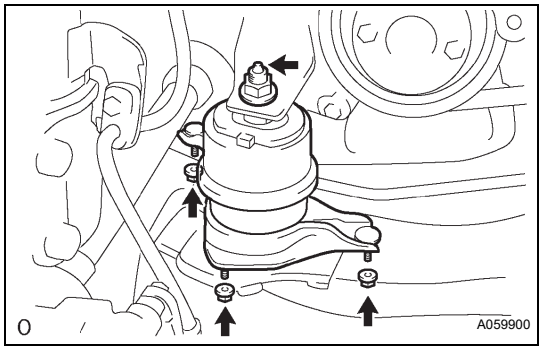


27. REMOVE ENGINE MOUNTING INSULATOR

(a) Attach the engine chain hoist to the engine hangers.

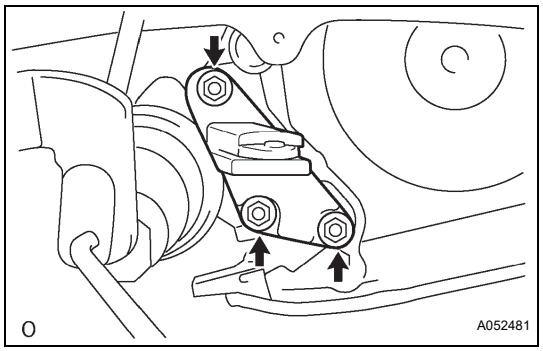
CAUTION:
Do not attempt to hang the engine by hooking the chain to any other part.

(b) Remove the bolt and disconnect the engine mounting insulator FR.



(c) Remove the 4 nuts from the engine mounting insulator RH.

(d) Raise the engine and remove the engine mounting insulator RH.

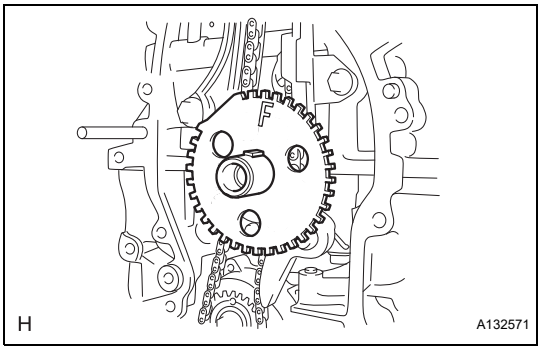


28. REMOVE ENGINE MOUNTING BRACKET RH

(a) Remove the 3 bolts and engine mounting bracket RH.

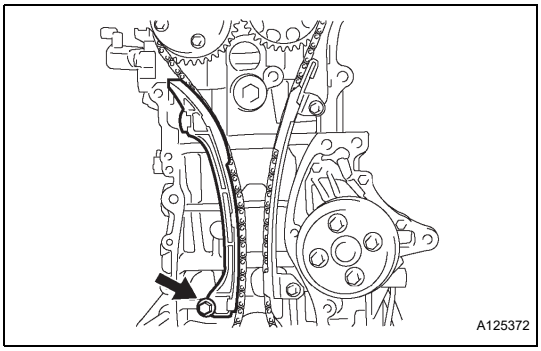
29. REMOVE TIMING CHAIN COVER SUB-ASSEMBLY (See page LU-11)

30. REMOVE TIMING CHAIN CASE OIL SEAL (See page LU-12)



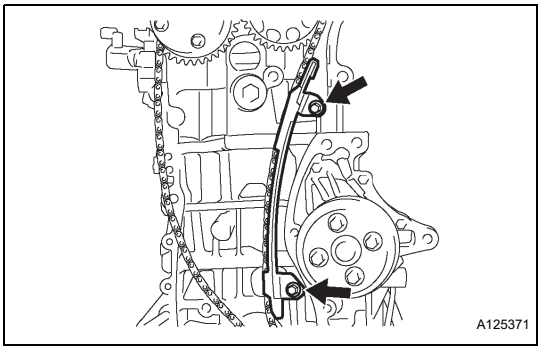
31. REMOVE NO. 1 CRANKSHAFT POSITION SENSOR PLATE

(a) Remove the crankshaft position sensor plate.



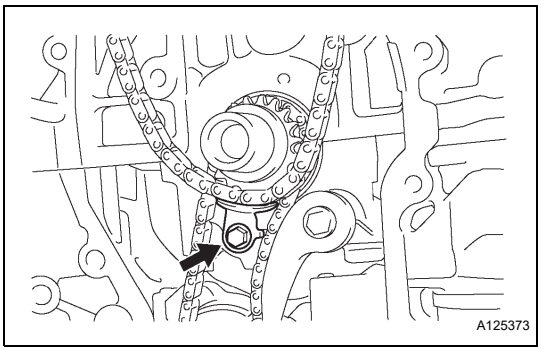
32. REMOVE CHAIN TENSIONER SLIPPER

(a) Remove the bolt and chain tensioner slipper.



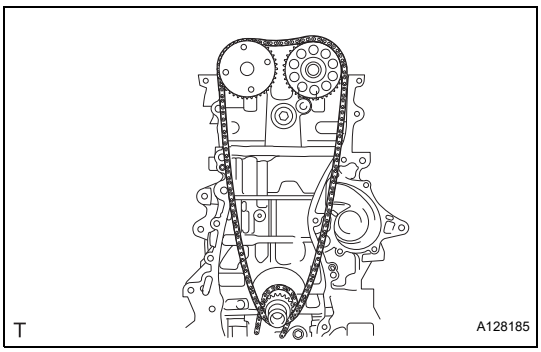
33. REMOVE NO. 1 CHAIN VIBRATION DAMPER

(a) Remove the 2 bolts and chain vibration damper.



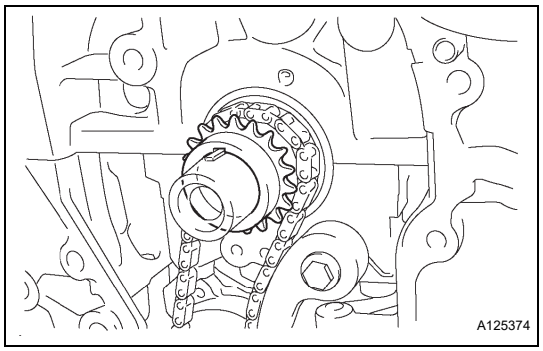
34. REMOVE TIMING CHAIN GUIDE

(a) Remove the bolt and timing chain guide.



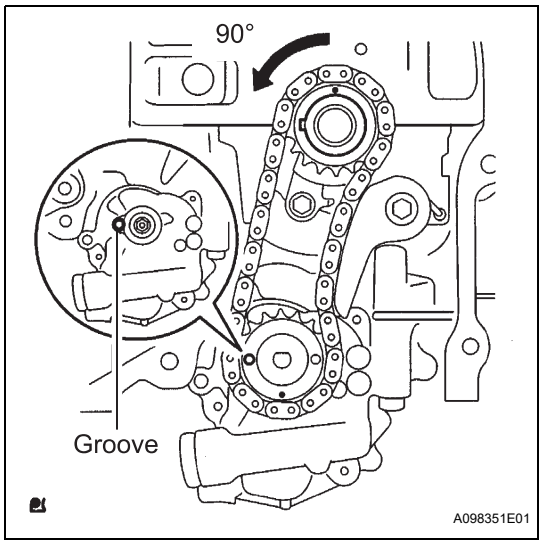
35. REMOVE CHAIN SUB-ASSEMBLY

(a) Remove the chain sub-assembly.



36. REMOVE CRANKSHAFT TIMING SPROCKET

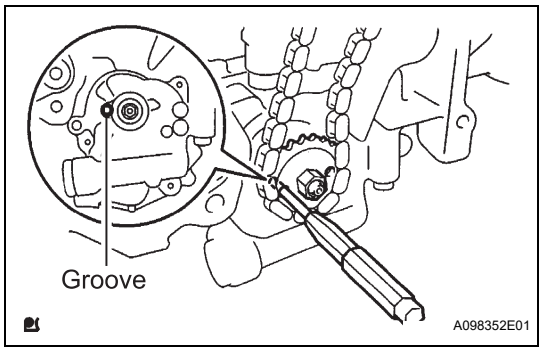
(a) Remove the crankshaft timing sprocket.



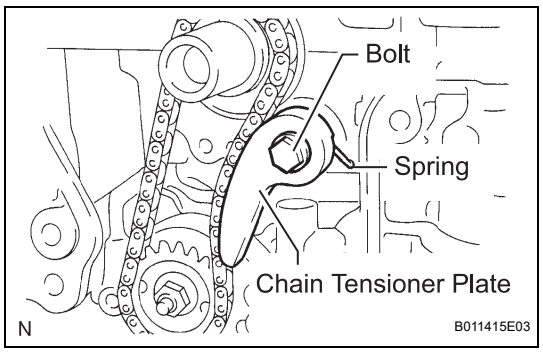
37. REMOVE NO. 2 CHAIN SUB-ASSEMBLY

(a) Turn the crankshaft 90° counterclockwise to align the adjusting hole of the oil pump drive shaft gear with the groove of the oil pump.

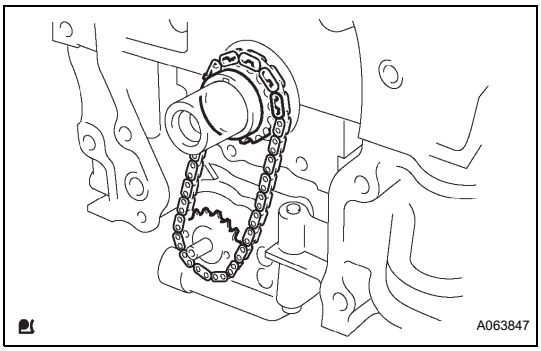
EM



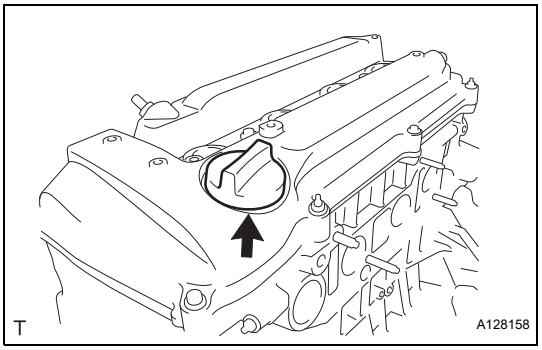
(b) Insert a 4 mm diameter bar into the adjusting hole of the oil pump drive shaft gear to lock the gear in position, and then remove the nut.



(c) Remove the bolt, chain tensioner plate and spring.



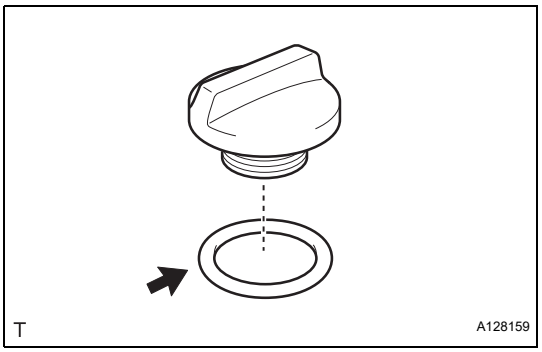
(d) Remove the chain tensioner, oil pump drive gear and chain.



DISASSEMBLY

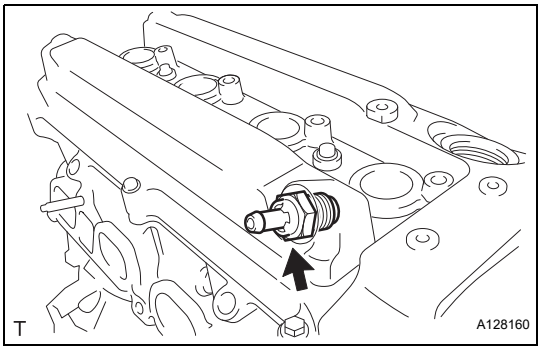
1. REMOVE OIL FILLER CAP SUB-ASSEMBLY

(a) Remove the oil filler cap.



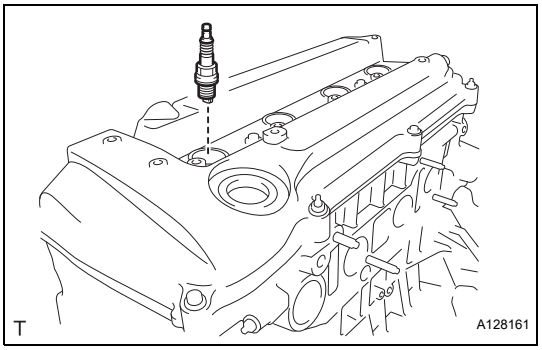
2. REMOVE OIL FILLER CAP GASKET

(a) Remove the oil filler cap gasket.



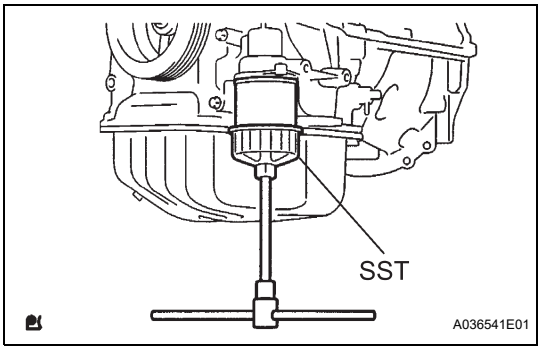
3. REMOVE VENTILATION VALVE SUB-ASSEMBLY

(a) Remove the ventilation valve.



4. REMOVE SPARK PLUG

(a) Remove the spark plugs.



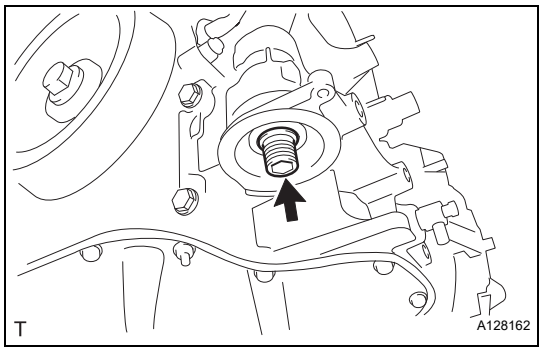
5. REMOVE OIL FILTER SUB-ASSEMBLY

(a) Using SST, remove the oil filter.

SST 09228-06501

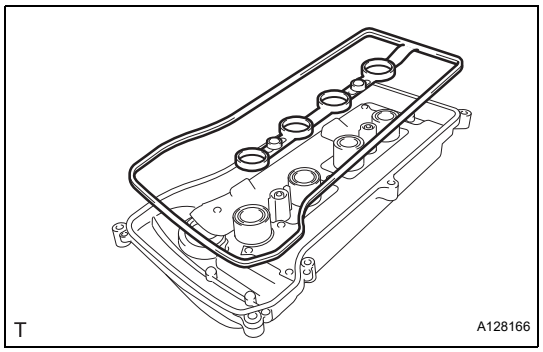
HINT:

Place a container for oil to be drained before removing the oil filter.

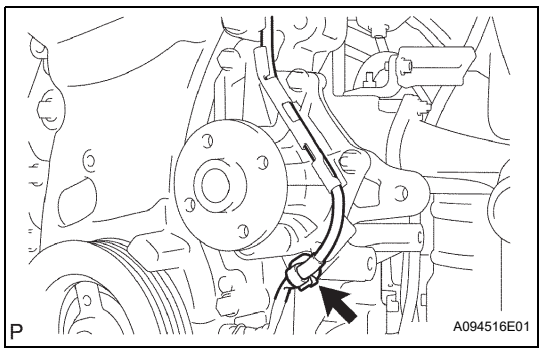


6. **REMOVE OIL FILTER UNION**
   (a) Using a 12 mm hexagon wrench, remove the union.

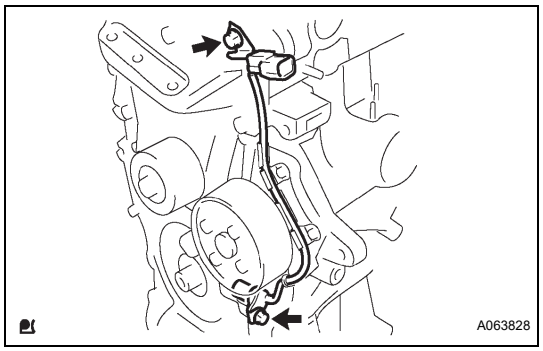
7. **REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY (See page EM-22)**



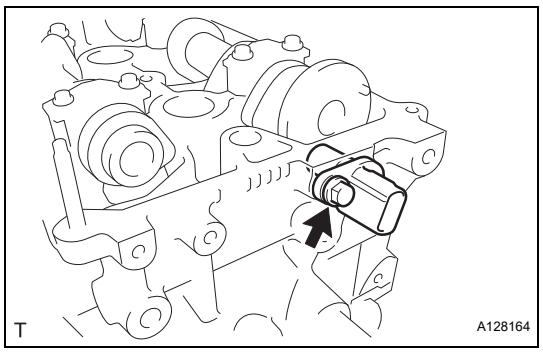
8. **REMOVE CYLINDER HEAD COVER GASKET**
   (a) Remove the cylinder head cover gasket.



9. **REMOVE CRANKSHAFT POSITION SENSOR**
   (a) Remove the wire harness clamp.
   (b) Separate the wire harness from the wire harness clamp bracket.



   (c) Remove the 2 bolts and sensor.



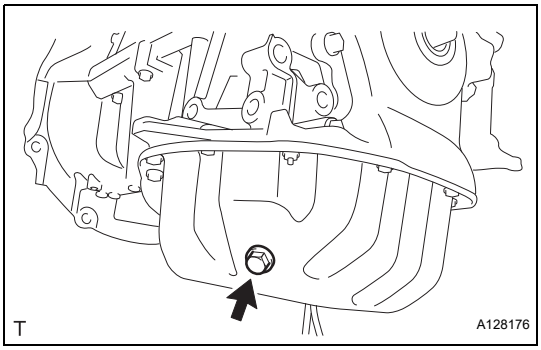
10. **REMOVE CAMSHAFT POSITION SENSOR**
    (a) Remove the bolt and sensor.

11. **REMOVE CRANKSHAFT PULLEY (See page EM-74)**

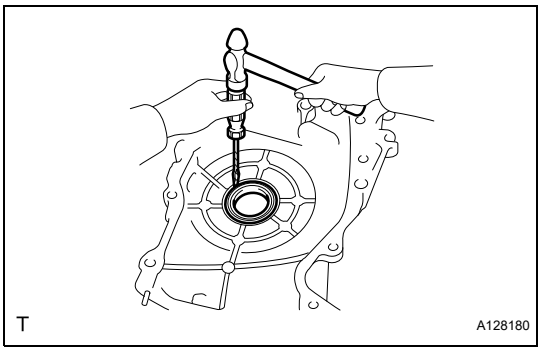
12. **REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (See page ES-381)**

13. **REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY (See page EM-23)**

14. **REMOVE WATER PUMP PULLEY (See page CO-9)**

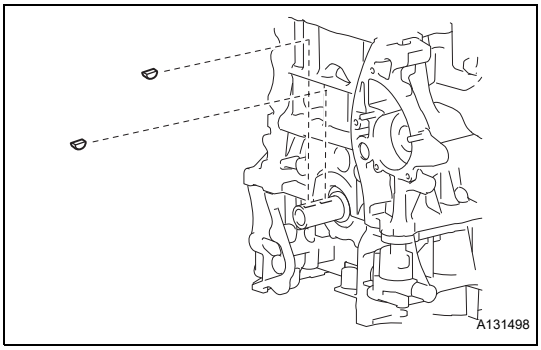


15. **REMOVE WATER PUMP ASSEMBLY (See page CO-9)**
16. **REMOVE OIL PAN DRAIN PLUG**
    (a) Remove the oil pan drain plug and gasket.
17. **REMOVE OIL PAN SUB-ASSEMBLY (See page EM-22)**
18. **REMOVE TIMING CHAIN COVER SUB-ASSEMBLY (See page LU-11)**

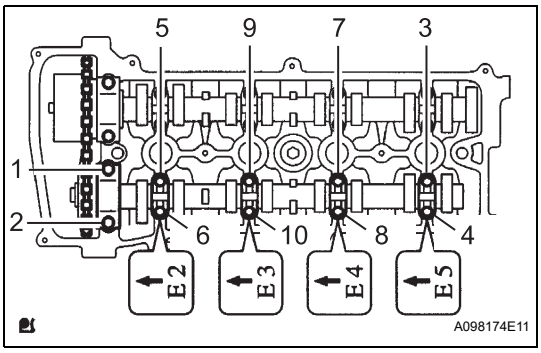


EM

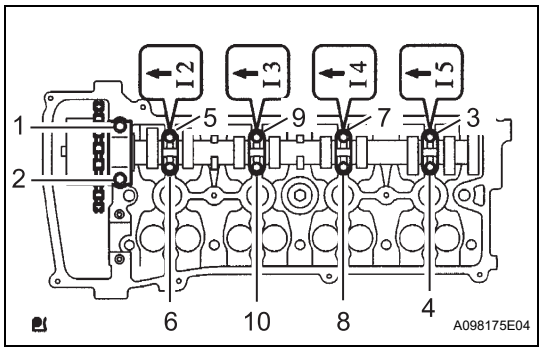
19. **REMOVE TIMING CHAIN CASE OIL SEAL**
    (a) Using a screwdriver and hammer, remove the oil seal.
20. **REMOVE NO. 1 CRANKSHAFT POSITION SENSOR PLATE (See page EM-24)**
21. **REMOVE TIMING CHAIN GUIDE (See page EM-24)**
22. **REMOVE CHAIN TENSIONER SLIPPER (See page EM-24)**
23. **REMOVE NO. 1 CHAIN VIBRATION DAMPER (See page EM-24)**
24. **REMOVE CHAIN SUB-ASSEMBLY (See page EM-24)**
25. **REMOVE CRANKSHAFT TIMING SPROCKET (See page EM-25)**
26. **REMOVE NO. 2 CHAIN SUB-ASSEMBLY (See page EM-25)**



27. **REMOVE KEYS**
    (a) Remove the 2 pulley set keys from the crankshaft.



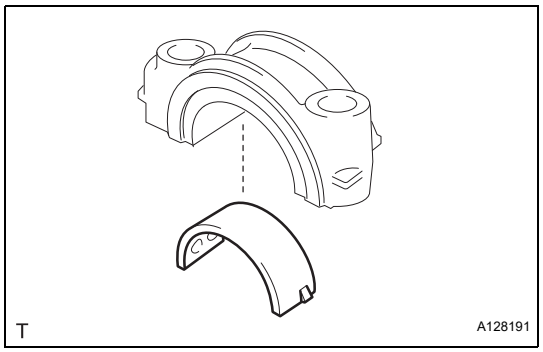
28. **REMOVE NO. 2 CAMSHAFT**
    (a) Using several steps, uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.
    (b) Remove the 5 bearing caps.



29. REMOVE CAMSHAFT

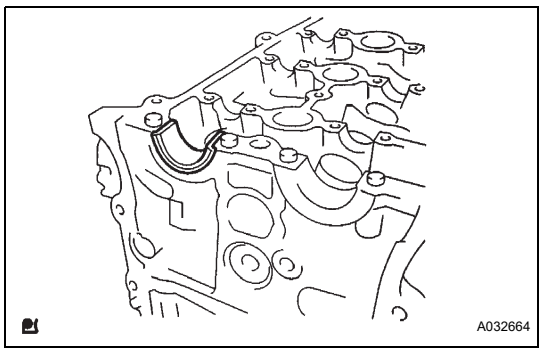
(a) Using several steps, uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.

(b) Remove the 5 bearing caps.



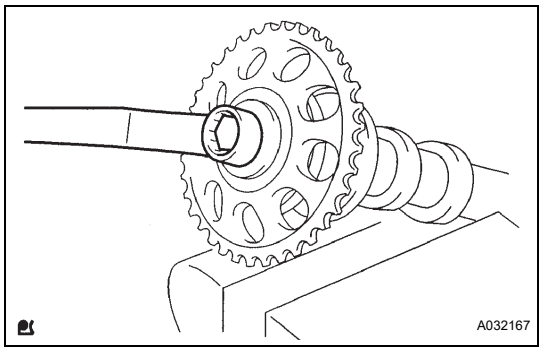
30. REMOVE NO. 1 CAMSHAFT BEARING

Remove the No. 1 camshaft bearing.



31. REMOVE NO. 2 CAMSHAFT BEARING

(a) Remove the No. 2 camshaft bearing.



32. REMOVE CAMSHAFT TIMING SPROCKET

(a) Clamp the camshaft in a vise.

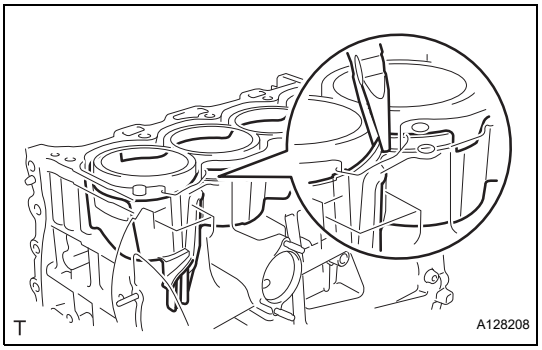
(b) Remove the flange bolt of the camshaft timing sprocket.

33. REMOVE CAMSHAFT TIMING GEAR ASSEMBLY (See page EM-38)

34. REMOVE CYLINDER HEAD SUB-ASSEMBLY (See page EM-54)

35. REMOVE CYLINDER HEAD GASKET (See page EM-54)

EM

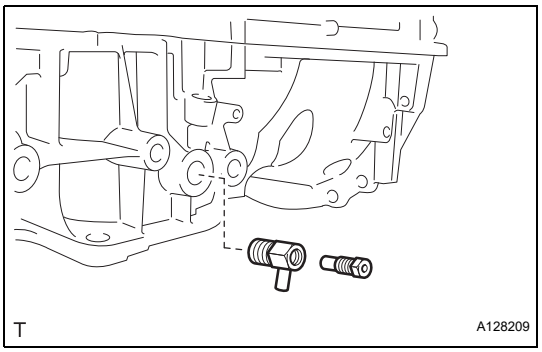


36. REMOVE CYLINDER BLOCK WATER JACKET SPACER

(a) Using needle-nose pliers, remove the cylinder block water jacket spacer.

NOTICE:

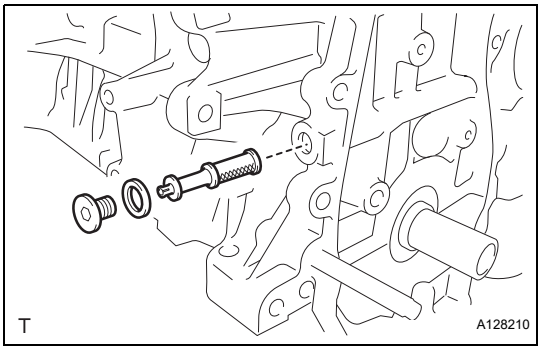
Be sure to remove the water jacket spacer if the cylinder block is to be turned upside down.



37. REMOVE CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY

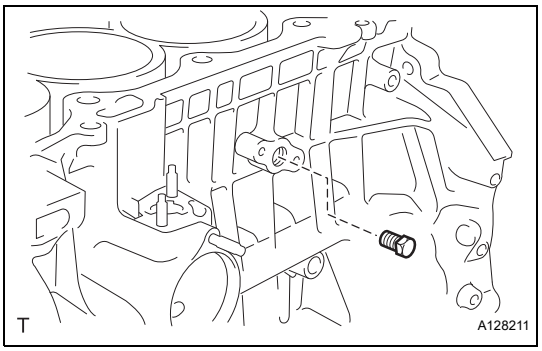
(a) Remove the water drain cock from the stiffening crankcase.

(b) Remove the water drain cock plug from the water drain cocks.



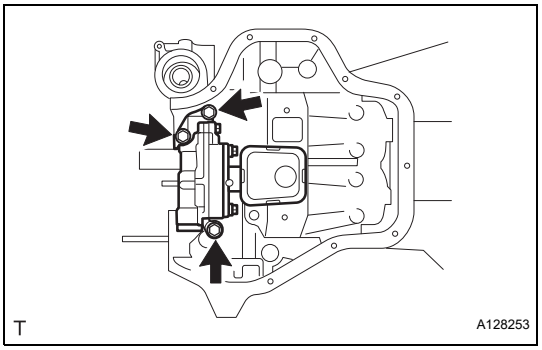
38. REMOVE OIL CONTROL VALVE FILTER

(a) Using an 8 mm socket hexagon wrench, remove the plug and filter.



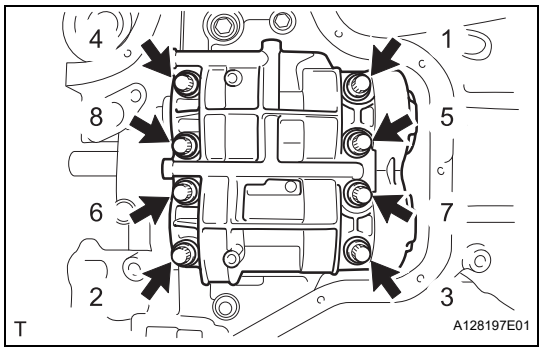
39. REMOVE NO. 1 TAPER SCREW PLUG

(a) Remove the No. 1 taper screw plug.



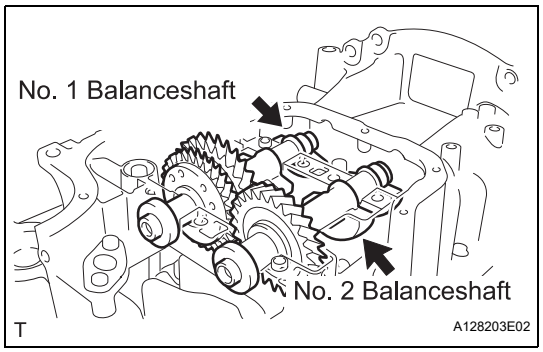
40. REMOVE OIL PUMP ASSEMBLY

(a) Remove the 3 bolts, oil pump and gasket.



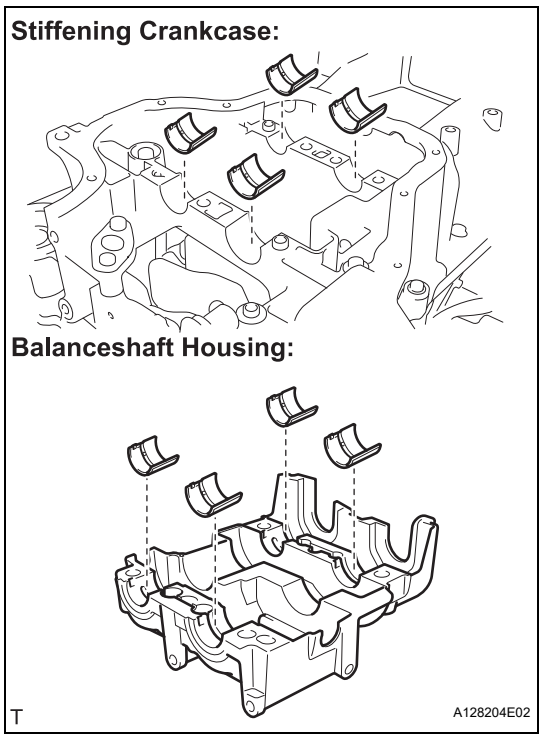
41. REMOVE NO. 1 AND NO. 2 BALANCESHAFT SUB-ASSEMBLY

(a) Uniformly loosen and remove the 8 bolts in the sequence shown in the illustration.



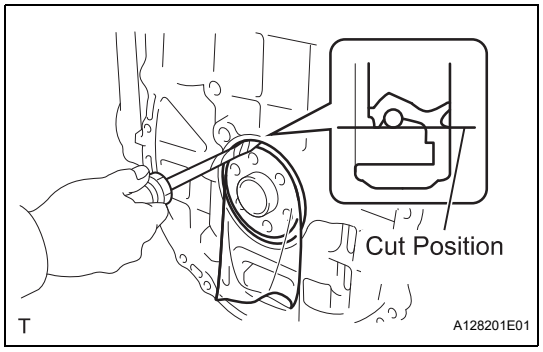
(b) Remove the No. 1 and No. 2 balanceshafts.

EM



42. REMOVE NO. 1 BALANCESHAFT BEARING

(a) Remove the No. 1 balanceshaft bearings.



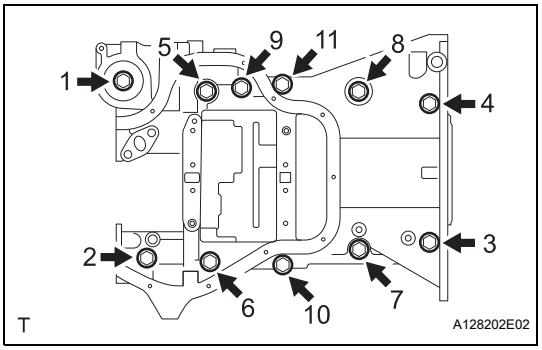
43. REMOVE ENGINE REAR OIL SEAL

(a) Using a knife, cut off the oil seal lip.

(b) Using a screwdriver with its tip taped, pry out the oil seal.

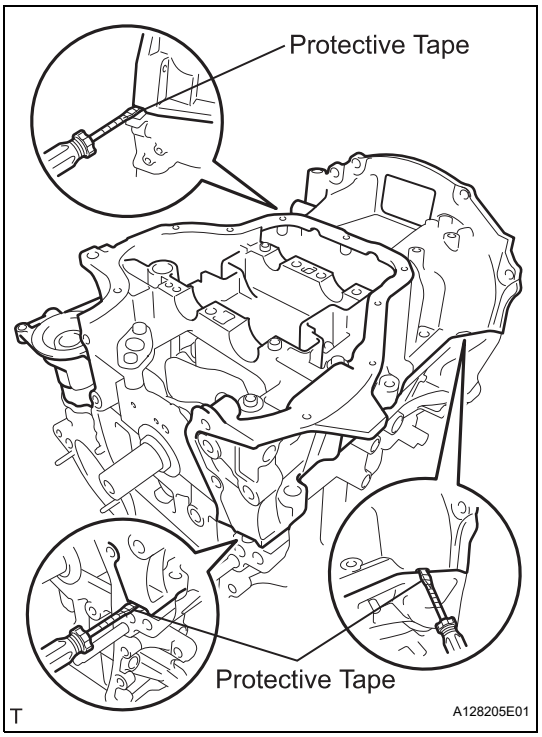
NOTICE:

After removing the oil seal, check the crankshaft for damage. If it is damaged, smooth the surface with 400-grit sandpaper.

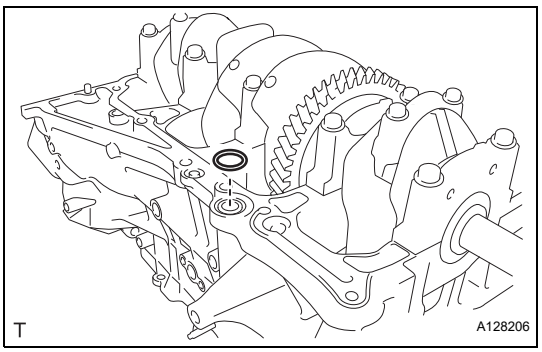


44. REMOVE STIFFENING CRANKCASE ASSEMBLY

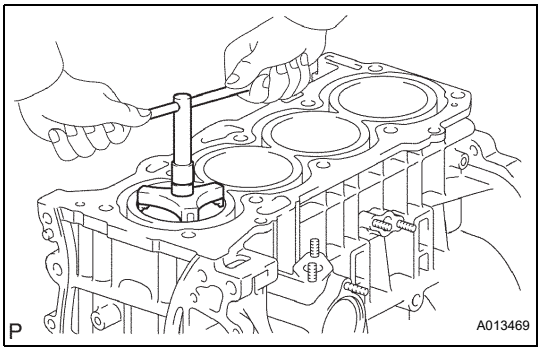
(a) Uniformly loosen and remove the 11 bolts in the sequence shown in the illustration.



(b) Using a screwdriver, remove the crankcase by prying between the crankcase and cylinder block.
NOTICE:
Be careful not to damage the contact surfaces of the crankcase and cylinder block.

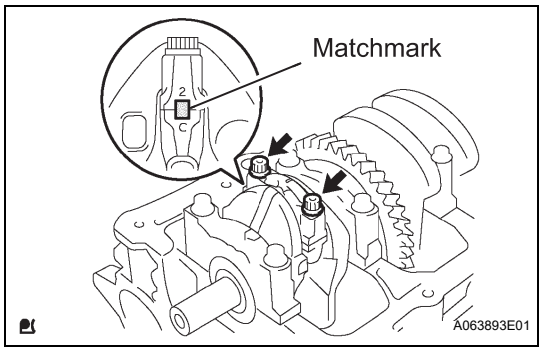


(c) Remove the O-ring from the cylinder block.

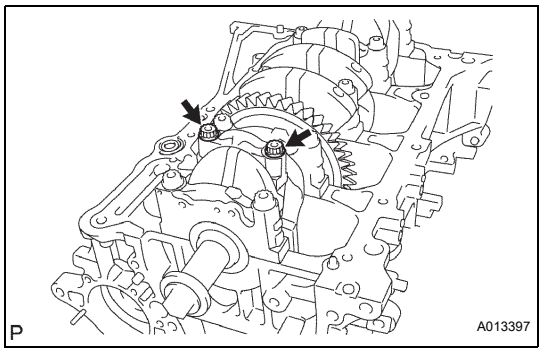


45. REMOVE PISTON SUB-ASSEMBLY WITH CONNECTING ROD

(a) Using a ridge reamer, remove all the carbon from the top of the cylinder.



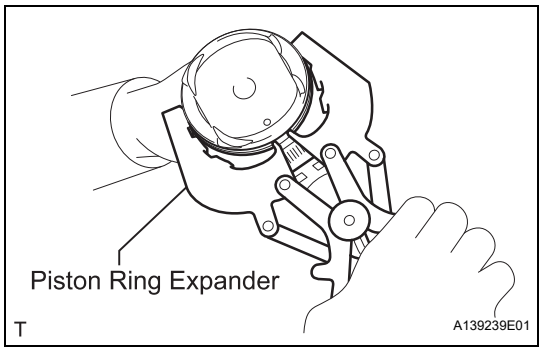
(b) Check that the matchmarks on the connecting rod and cap are aligned to ensure correct reassembly.
HINT:
The matchmarks on the connecting rods and caps are provided to ensure correct reassembly.



(c) Using a 12 mm socket wrench, uniformly loosen the 2 bolts.
(d) Using the 2 removed connecting rod cap bolts, remove the connecting rod cap and lower bearing by wiggling the connecting rod cap right and left.
HINT:
Keep the lower bearing inserted in the connecting rod cap.
(e) Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.
HINT:
- Keep the bearing, connecting rod and cap together.
- Arrange the piston and connecting rod assemblies in the correct order.

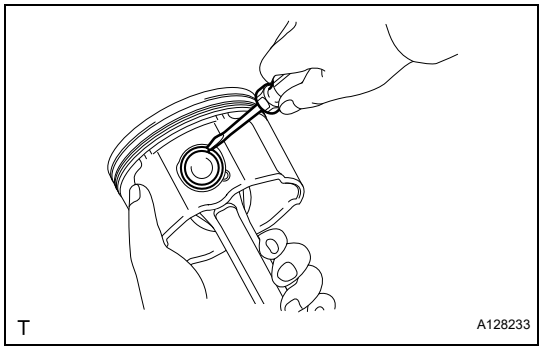
46. REMOVE CONNECTING ROD BEARING

(a) Remove the connecting rod bearings.
HINT:
Arrange the removed parts in the correct order.



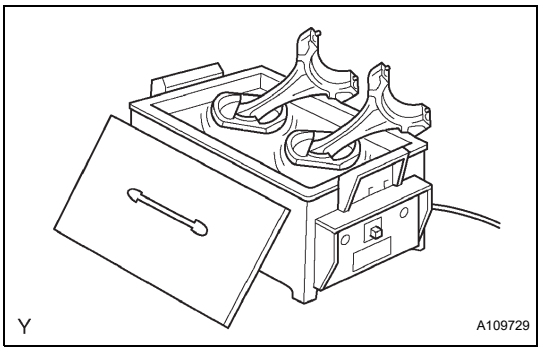
47. REMOVE PISTON RING SET

(a) Using a piston ring expander, remove the 2 compression rings.
(b) Remove the oil ring rail and oil ring expander by hand.
HINT:
Arrange the removed parts in the correct order.



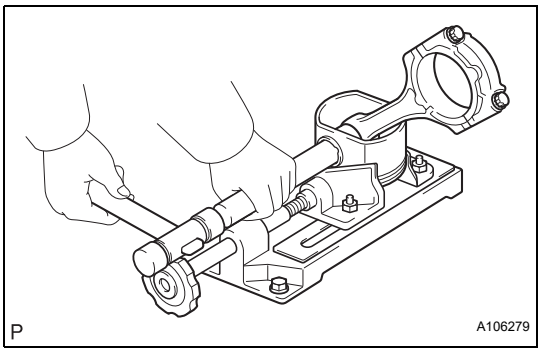
48. REMOVE PISTON PIN HOLE SNAP RING

(a) Using a screwdriver, pry out the 2 snap rings.

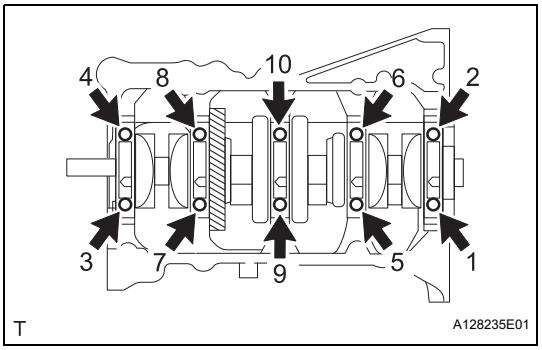


49. REMOVE PISTON

(a) Gradually heat each piston to approximately 80 to 90°C (176 to 194°F).

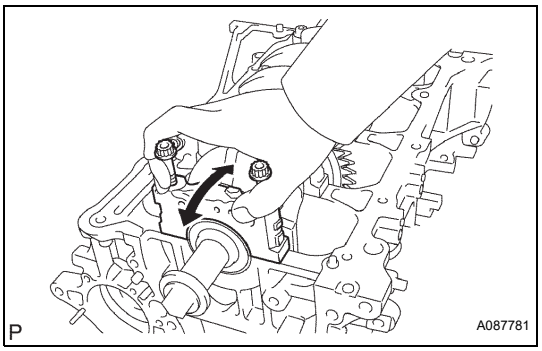


(b) Using a plastic hammer and brass bar, lightly tap out the piston pin and remove the connecting rod.
HINT:
- The piston and pin are a matched set.
- Arrange the pistons, pins, rings, connecting rods and bearings in the correct order.



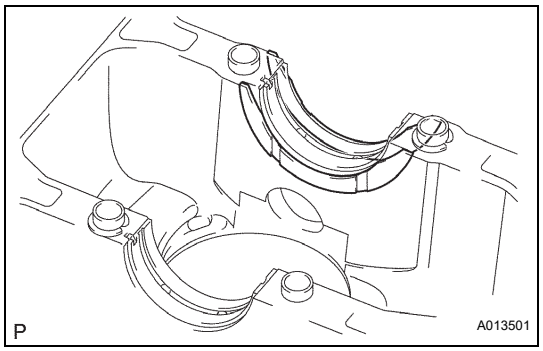
50. REMOVE CRANKSHAFT

(a) Uniformly loosen and remove the 10 main bearing cap bolts in the sequence shown in the illustration.



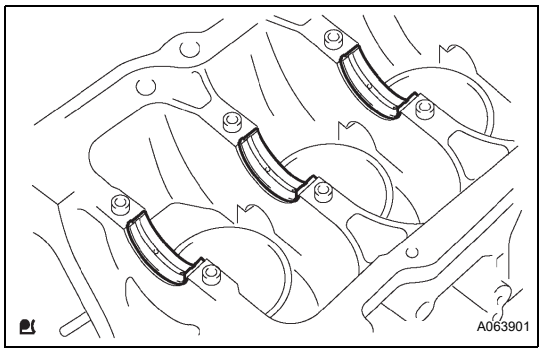
(b) Use 2 removed main bearing cap bolts to remove the 5 main bearing caps and 5 lower bearings.
NOTICE:
Insert the bolts into the caps in turn. Ease the cap out by gently pulling up and applying force toward the front and back sides of the cylinder block, as shown in the illustration. Take care not to damage the contact surfaces of the cap and cylinder block.
HINT:
- Keep the lower bearing and main bearing cap together.
- Arrange the main bearing caps in the correct order.

(c) Lift out the crankshaft.



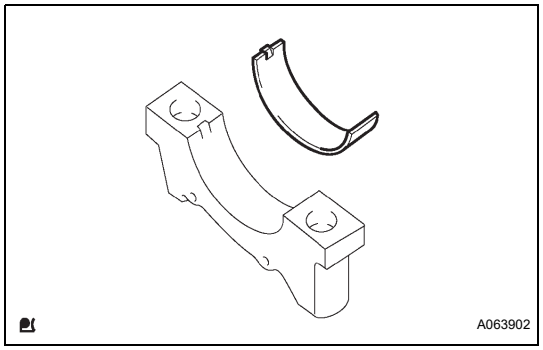
51. REMOVE UPPER CRANKSHAFT THRUST WASHER

(a) Remove the upper crankshaft thrust washers from the cylinder block.



52. REMOVE CRANKSHAFT BEARING

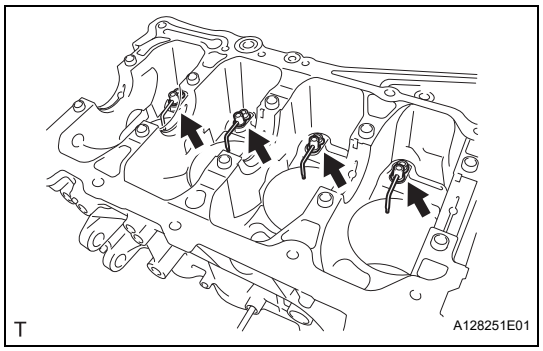
(a) Remove the 5 upper main bearings from the cylinder block.
HINT:
Arrange the bearings in the correct order.



53. REMOVE NO. 2 CRANKSHAFT BEARING

(a) Remove the 5 lower main bearings from the 5 main bearing caps.
HINT:
Arrange the bearings in the correct order.

54. REMOVE STUD BOLT



55. REMOVE NO. 1 OIL NOZZLE SUB-ASSEMBLY

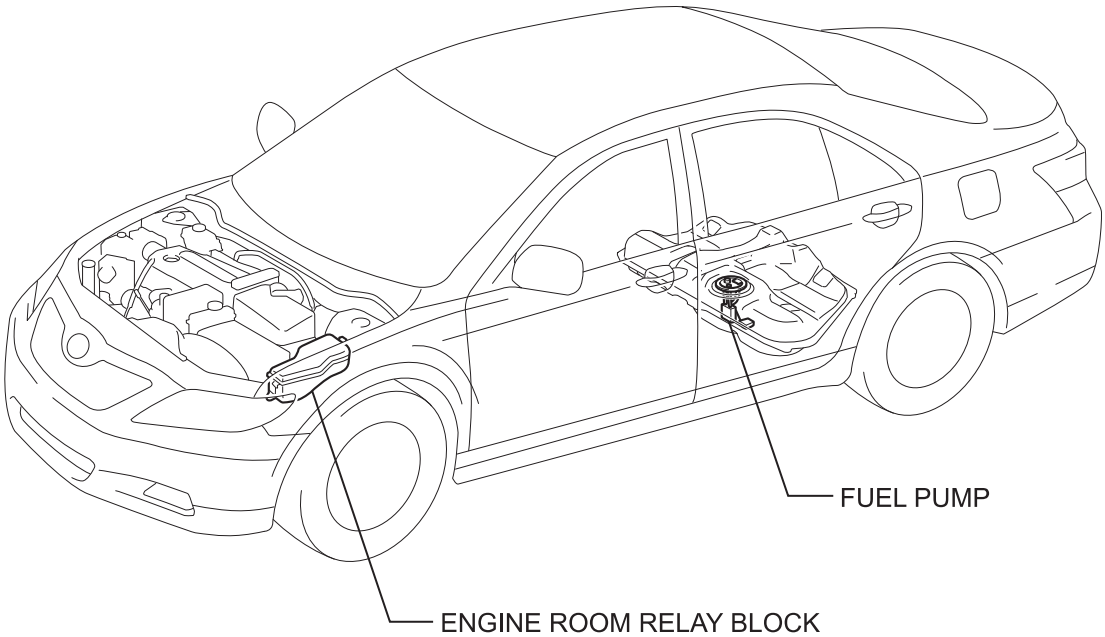
(a) Using a 5 mm hexagon wrench, remove the bolts and oil nozzles.

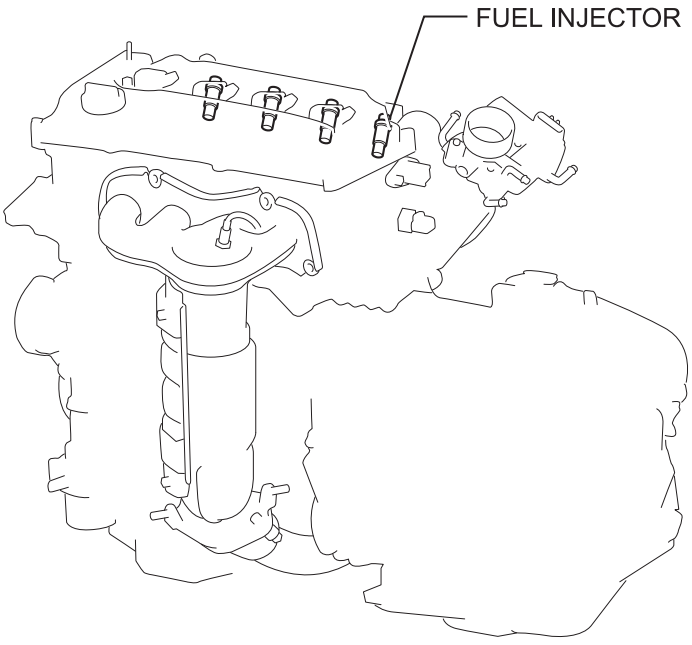
56. CLEAN CYLINDER BLOCK

NOTICE:

If the cylinder is washed at high temperatures, the cylinder liner will stick out beyond the cylinder block. Always wash the cylinder block at a temperature of 45°C (113°F) or less.

PARTS LOCATION





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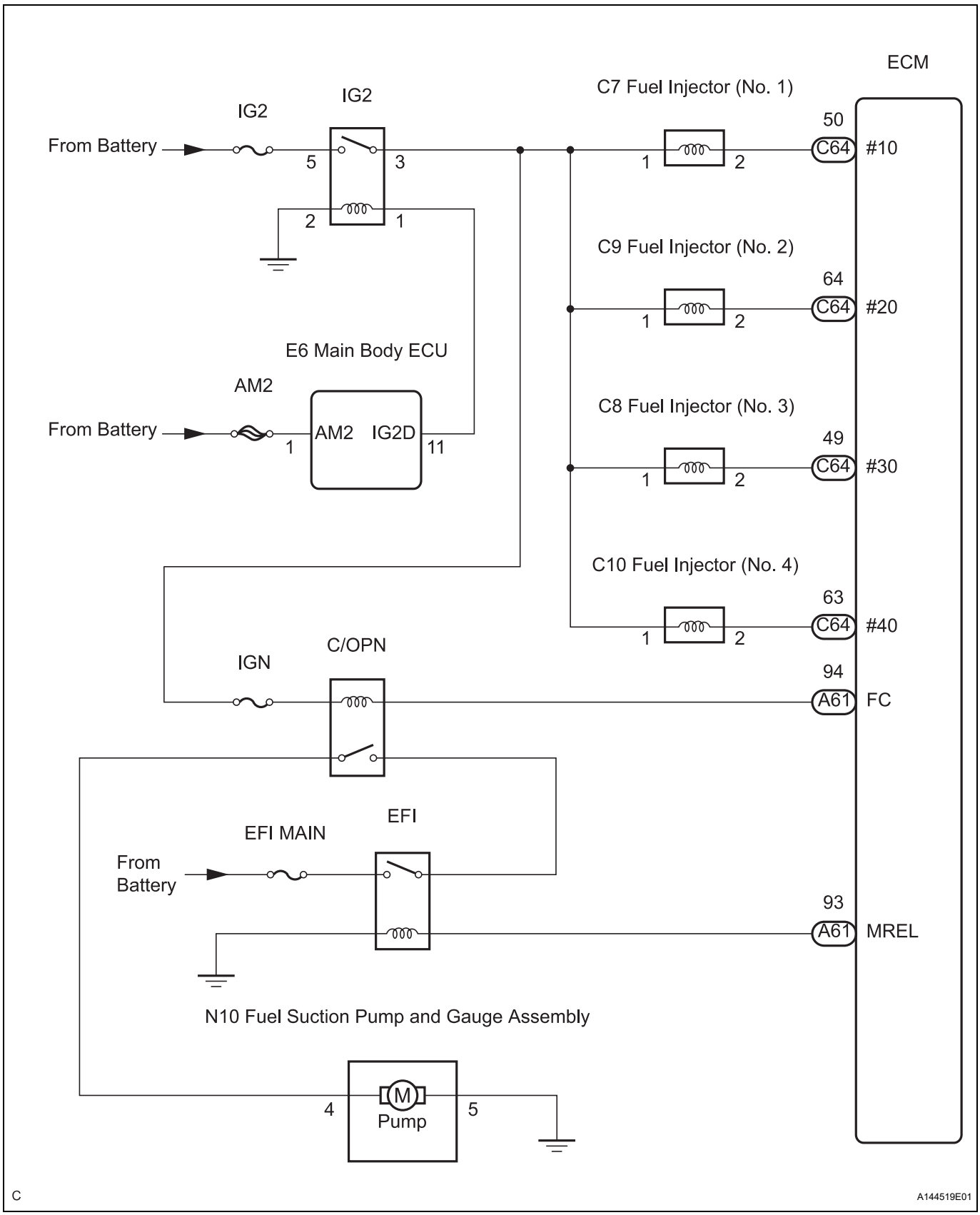
SYSTEM DIAGRAM



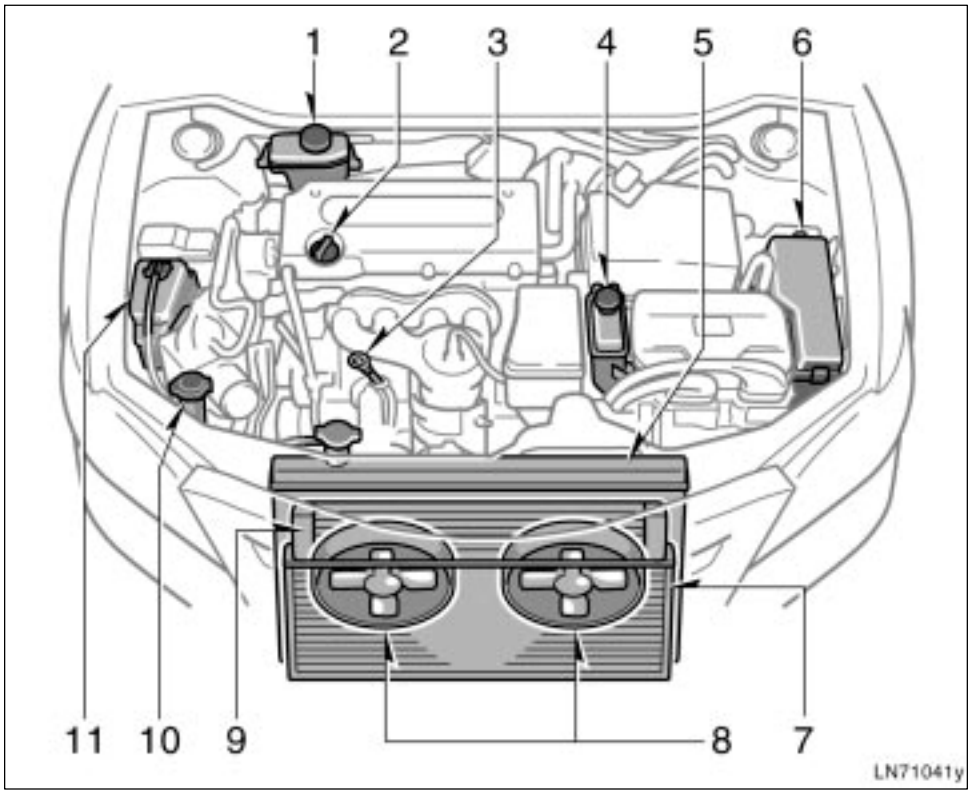
SECTION 7-1

DO−IT−YOURSELF MAINTENANCE

Introduction

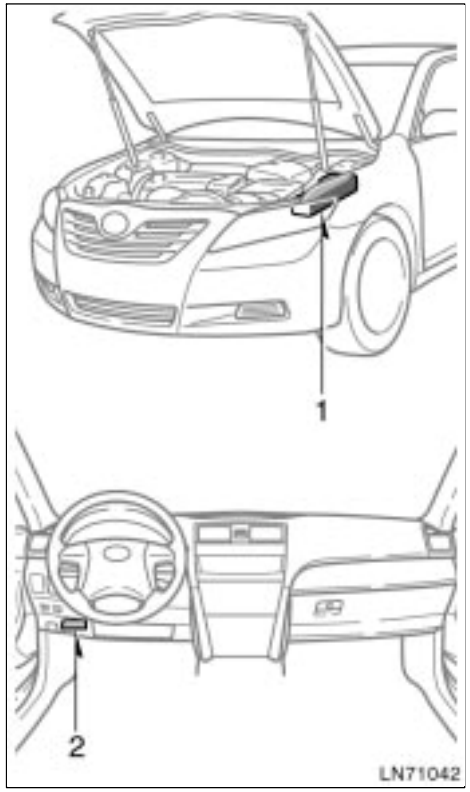
Engine compartment overview 347
Fuse locations 348
Do−it−yourself service precautions 348
Positioning the jack 350
Parts and tools 351

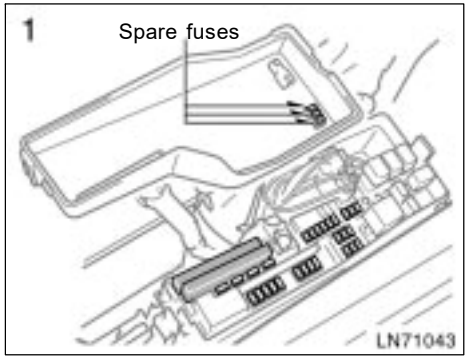
Engine compartment overview

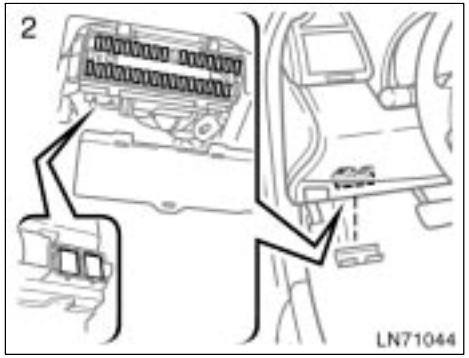


1. Brake fluid reservoir
2. Engine oil filler cap
3. Engine oil level dipstick
4. Coolant reservoir (for inverter, traction motor and motor generator)
5. Radiator (for engine)
6. Fuse block
7. Condenser
8. Electric cooling fans
9. Radiator (for inverter, traction motor and motor generator)
10. Windshield washer fluid tank
11. Coolant reservoir (for engine)

Fuse locations







Do−it−yourself service precautions

If you perform maintenance by yourself, be sure to follow the correct procedure given in this Section.

You should be aware that improper or incomplete servicing may result in operating problems.

Performing do−it−yourself maintenance during the warranty period may affect your warranty coverage. Read the separate Toyota Warranty statement for details and suggestions.

This Section gives instructions only for those items that are relatively easy for an owner to perform. As explained in Section 6, there are still a number of items that must be done by a qualified technician with special tools.

For information on tools and parts for do−it−yourself maintenance, see “Parts and tools” on page 351 in this Section.

Utmost care should be taken when working on your vehicle to prevent accidental injury. Here are a few precautions that you should be especially careful to observe:

⚠ CAUTION

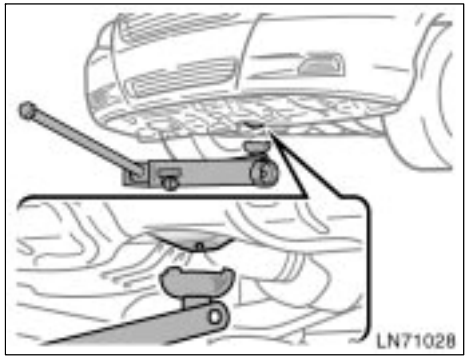
- Never touch, remove or disassemble high voltage parts and cables. Touching, removing or disassembling those parts and cables can cause severe burns or electric shock that may result in death or serious injury. For the locations of high voltage parts and cables, see “—High voltage components” on page 7 in Section 1−1.
- When the hybrid system is on, keep hands, clothing, and tools away from the moving fan. (Removing rings, watches, and ties is advisable.)
- Right after driving, the engine compartment—the engine, radiator, exhaust manifold and spark plug boots, etc.—will be hot. So be careful not to touch them. Oil, fluids and spark plugs may also be hot.
- If the radiator is hot, do not remove the radiator cap or loosen the drain plugs to prevent burning yourself.
- Do not leave anything that may burn easily, such as paper or rags, in the engine compartment.
- When the hybrid system is operating with the “READY” light on, the engine may suddenly start in some cases. When you inspect the engine compartment, be sure to turn off the hybrid system.
- Do not get under your vehicle with just the body jack supporting it. Always use automotive jack stands or other solid supports.
- Be sure that the POWER” switch is off if you work near the electric cooling fans or radiator grille. With the “POWER” switch on, the electric cooling fans will automatically start to run if the engine coolant temperature is high and/or the air conditioning is on.
- Use eye protection whenever you work on or under your vehicle where you may be exposed to flying or falling material, fluid spray, etc.
- Brake fluid can harm your hands or eyes and damage painted surfaces. If fluid gets on your hands or in your eyes, flush the affected area with clean water immediately. If you still feel uncomfortable with your hands or eyes, go to the doctor.
- Used engine oil contains potentially harmful contaminants which may cause skin disorders such as inflammation or skin cancer, so care should be taken to avoid prolonged and repeated contact with it. To remove used engine oil from your skin, wash thoroughly with soap and water.
- Do not leave used oil within the reach of children.
- Dispose of used oil and filter only in a safe and acceptable manner. Do not dispose of used oil and filter in household trash, in sewers or onto the ground. Call your dealer or a service station for information concerning recycling or disposal.
- Be extremely cautious when working on the 12 volt battery. It contains poisonous and corrosive sulfuric acid.

NOTICE

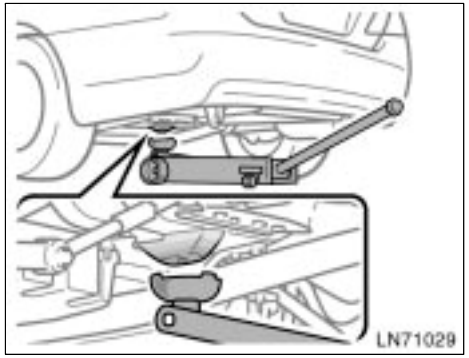
- *Remember that the 12 volt battery and ignition cables carry high currents or voltages. Be careful of accidentally causing a short circuit.*
- *Add only “Toyota Super Long Life Coolant” or similar high quality ethylene glycol based non−silicate, non−amine, non−nitrite, and non−borate coolant with long−life hybrid organic acid technology to fill the radiator. “Toyota Super Long Life Coolant” is a mixture of 50% coolant and 50% deionized water (for the U.S.A.) or 55% coolant and 45% deionized water (for Canada).*
- *If you spill some of the coolant, be sure to wash it off with water to prevent it from damaging the parts or paint.*
- *Do not allow dirt or anything else to fall through the spark plug holes.*
- *Use only spark plugs of the specified type. Using other types will cause engine damage, loss of performance or radio noise.*

- *Do not reuse iridium−tipped spark plugs by cleaning or regapping.*
- *Do not drive with the air cleaner filter removed, or excessive engine wear could result. Also backfiring could cause a fire in the engine compartment.*
- *Be careful not to scratch the glass surface with the wiper frame.*
- *When closing the engine hood, check to see that you have not forgotten any tools, rags, etc.*

Positioning the jack



Front



Rear

When jacking up your vehicle with the jack, position the jack correctly as shown in the illustrations.

⚠ CAUTION

When jacking, be sure to observe the following to reduce the possibility of death or serious injury:

- **Follow jacking instructions.**
- **Do not put any part of your body under the vehicle supported by the jack. Personal injury may occur.**
- **Do not start the hybrid system while your vehicle is supported by the jack.**
- **Stop the vehicle on a level firm ground, firmly set the parking brake and put the transmission in “P”. Block the wheels on the opposite side of the jack up point if necessary.**
- **Make sure to set the jack properly in the jack point. Raising the vehicle with jack improperly positioned will damage the vehicle or may allow the vehicle to fall off the jack and cause personal injury.**
- **Never get under the vehicle when the vehicle is supported by the jack alone; use vehicle support stands.**
- **Do not raise the vehicle with someone in the vehicle.**
- **When raising the vehicle, do not place any objects on top of or underneath the jack.**

NOTICE

Make sure to place the jack correctly, or your vehicle may be damaged.

Parts and tools

Here is a list of parts and tools you will need to perform do−it−yourself maintenance. Remember all Toyota parts are designed in metric sizes, so your tools must be metric.

CHECKING THE ENGINE OIL LEVEL

Parts (if level is low):

- “Toyota Genuine Motor Oil” or equivalent

  See page 356 in Section 7−2 for details about engine oil selection.

Tools:

- Rag or paper towel
- Funnel (only for adding oil)

CHECKING THE COOLANT LEVEL

Parts (if level is low):

- “Toyota Super Long Life Coolant” or similar high quality ethylene glycol based non−silicate, non−amine, non−nitrite, and non−borate coolant with long−life hybrid organic acid technology.

  “Toyota Super Long Life Coolant” is a mixture of 50% coolant and 50% deionized water (for the U.S.A.) or 55% coolant and 45% deionized water (for Canada).

Tools:

- Funnel (only for adding coolant)

CHECKING 12 VOLT BATTERY CONDITION

Tools:

- Warm water
- Baking soda
- Grease
- Conventional wrench (for terminal clamp bolts)

CHECKING AND REPLACING FUSES

Parts (if replacement is necessary):

- Genuine Toyota fuse or equivalent with same amperage rating as original

ADDING WASHER FLUID

Parts:

- Water
- Washer fluid containing antifreeze (for winter use)

Tools:

- Funnel

REPLACING LIGHT BULBS

Parts:

- Bulb with same number and wattage rating as original (See charts in “Replacing light bulbs” on page 373 in Section 7−3.)

SECTION 7-2

DO-IT-YOURSELF MAINTENANCE

Engine and Chassis

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Checking the coolant level 357
Checking the radiator and condenser 358
Checking brake fluid 359
Checking tire inflation pressure 359
Checking and replacing tires 362
Rotating tires 364
Installing snow tires and chains 365
Replacing wheels 367
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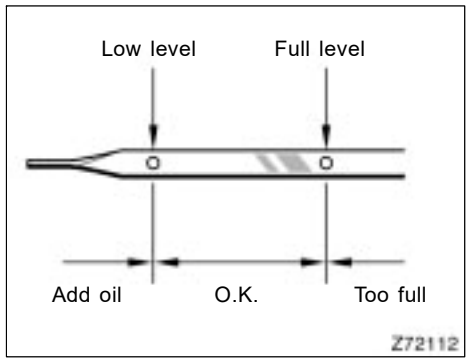
Checking the engine oil level



With the hybrid system at operating temperature and turned off, check the oil level on the dipstick.

1. To get a correct reading, the vehicle should be on level ground. After turning off the hybrid system, wait a few minutes for the oil to drain back into the bottom of the engine.
2. Pull the dipstick out, hold a rag under the end and wipe it clean.
3. Reinsert the dipstick—push it in as far as it will go, or the reading will not be correct.
4. Pull the dipstick out and look at the oil level while holding a rag under the end.

⚠ CAUTION

Be careful not to touch the hot exhaust manifold.

NOTICE

Be careful not to drop engine oil on the vehicle components.

If the oil level is below or only slightly above the low level line, add engine oil of the same type as already in the engine.

Remove the oil filler cap and add engine oil in small quantities at a time, checking the dipstick. We recommend that you use a funnel when adding oil.

The approximate quantity of oil needed to raise the level between low and full on the dipstick is indicated as follows:
1.1 L (1.2 qt., 1.0 Imp. qt.)

For the engine oil capacity, see “Service specifications” on page 382 in Section 8.

When the level reaches within the correct range, install the filler cap hand−tight.

NOTICE

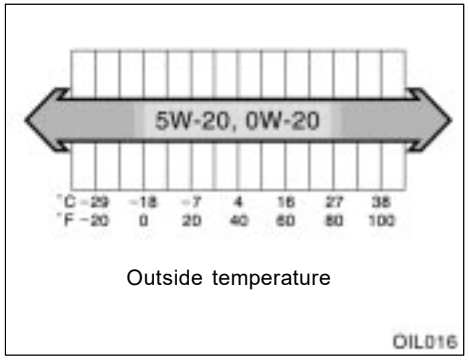
- ***Be careful not to spill engine oil on the vehicle components.***
- ***Avoid overfilling, or the engine could be damaged.***
- ***Check the oil level on the dipstick once again after adding the oil.***

ENGINE OIL SELECTION

“Toyota Genuine Motor Oil” is used in your Toyota vehicle. Use Toyota approved “Toyota Genuine Motor Oil” or equivalent to satisfy the following grade and viscosity.

Oil grade:
ILSAC multigrade engine oil

Recommended viscosity:
SAE 5W−20 or 0W−20



SAE 5W−20 or 0W−20 engine oil may be used. However, SAE 0W−20 is the best choice for good fuel economy and good starting in cold weather.

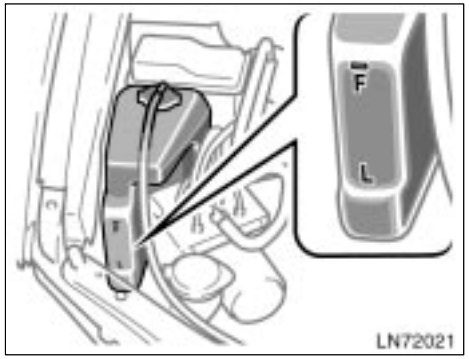
Oil identification mark

The ILSAC (International Lubricant Standardization and Approval Committee) Certification Mark is added to some oil containers to help you select the oil you should use.

To ensure excellent lubrication performance for your engine, “Toyota Genuine Motor Oil” is available, which has been specifically tested and approved for all Toyota engines.

Please contact your Toyota dealer for further details about “Toyota Genuine Motor Oil”.

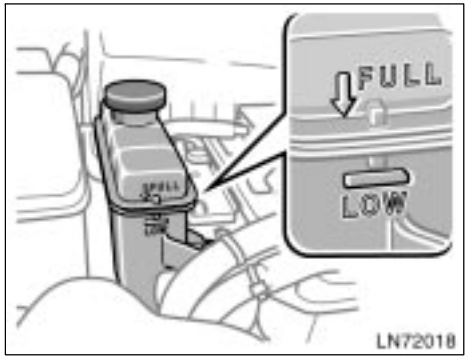
Checking the coolant level



Coolant reservoir for engine

Look at the see−through coolant reservoir when the hybrid system is cold. The coolant level is satisfactory if it is between the “F” and “L” lines on the reservoir. If the level is low, add the coolant. (For the coolant type, see “Coolant type selection” described below.)

The coolant level in the reservoir will vary with the hybrid system temperature. However, if the level is on or below the “L” line, add coolant. Bring the level up to the “F” line.



Coolant reservoir for inverter, traction motor and motor generator

Look at the see−through coolant reservoir when the hybrid system is cold. The coolant level is satisfactory if it is between the “FULL” and “LOW” lines on the reservoir. If the level is low, add the coolant. (For the coolant type, see “Coolant type selection” described below.)

The coolant level in the reservoir will vary with the hybrid system temperature. However, if the level is on or below the “LOW” line, add coolant. Bring the level up to the “FULL” line.

If the coolant level drops within a short time after replenishing, there may be a leak in the system. Visually check the radiator, hoses, coolant filler cap, radiator cap and drain cock and water pump.

If you can find no leak, have your Toyota dealer test the cap pressure and check for leaks in the cooling system.

⚠ CAUTION

To prevent burning yourself, do not remove the radiator cap when the hybrid system is hot.

Coolant type selection

Use of improper coolants may damage your cooling system.

Only use “Toyota Super Long Life Coolant” or similar high quality ethylene glycol based non−silicate, non−amine, non−nitrite, and non−borate coolant with long−life hybrid organic acid technology. (Coolant with long−life hybrid organic acid technology is a combination of low phosphates and organic acids.)

For the U.S.A.—“Toyota Super Long Life Coolant” is a mixture of 50% coolant and 50% deionized water. This coolant provides protection down to about −35°C (−31°F).

For Canada—“Toyota Super Long Life Coolant” is a mixture of 55% coolant and 45% deionized water. This coolant provides protection down to about −42°C (−44°F).

NOTICE
Do not use plain water alone.

Toyota recommends “Toyota Super Long Life Coolant”, which has been tested to ensure that it will not cause corrosion nor result in malfunction of your coolant system with proper usage. “Toyota Super Long Life Coolant” is formulated with long−life hybrid organic acid technology and has been specifically designed to avoid cooling system malfunction on Toyota vehicles.

Please contact your Toyota dealer for further details.

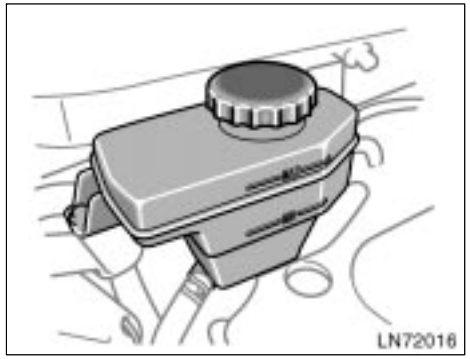
Checking the radiator and condenser

If any of the above parts are extremely dirty or you are not sure of their condition, take your vehicle to a Toyota dealer.

⚠ CAUTION
To prevent burning yourself, be careful not to touch the radiator or condenser when they may be hot after driving.

NOTICE
To prevent damage to the radiator and condenser, do not perform the work by yourself.

Checking brake fluid



To check the fluid level, simply look at the see−through reservoir. The level should be between the “MAX” and “MIN” lines on the reservoir.

It is normal for the brake fluid level to go down slightly as the brake pads wear or when the fluid level in the accumulator is high.

If the level is low, take your vehicle to a Toyota dealer as soon as possible. Do not drive your vehicle if the red brake system warning light is on. Call a Toyota dealer for assistance.

If the fluid level goes down soon after your vehicle is serviced, it may indicate a serious mechanical problem. Have your vehicle checked by a Toyota dealer.

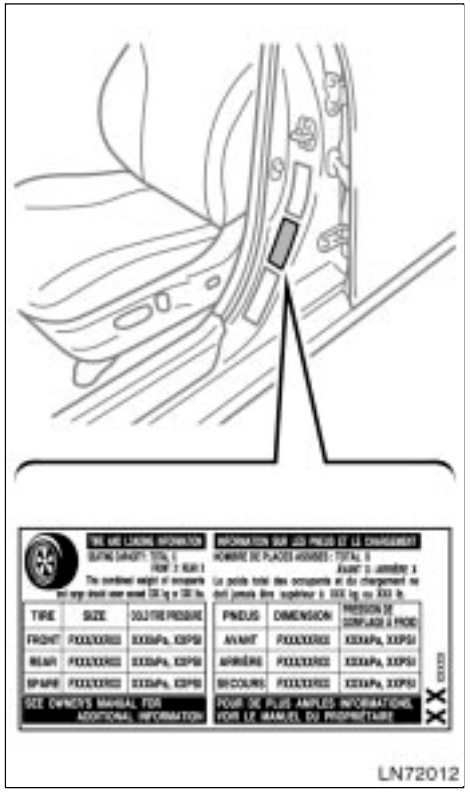
⚠ CAUTION

Brake fluid can harm your hands or eyes. If fluid gets on your hands or in your eyes, flush the affected area with clean water immediately. If you still feel uncomfortable with your hands or eyes, go to the doctor.

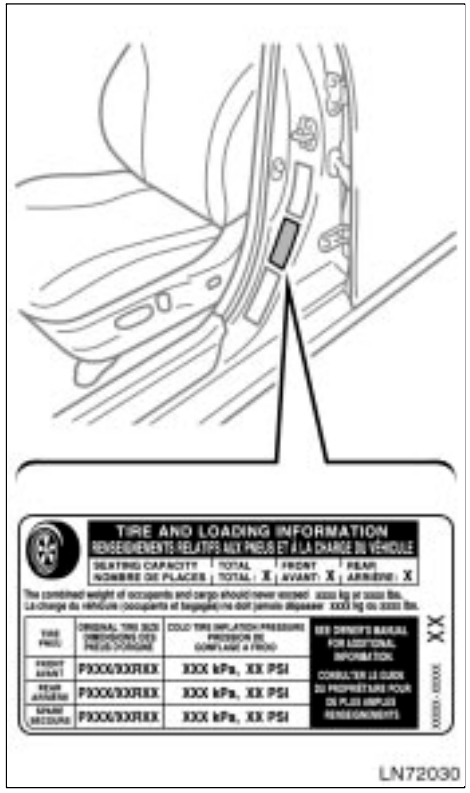
NOTICE

If brake fluid is spilled on the vehicle, be sure to wipe it off to prevent damage to parts or paint.

Checking tire inflation pressure



Type A



Type B

Keep your tire inflation pressures at the proper level.

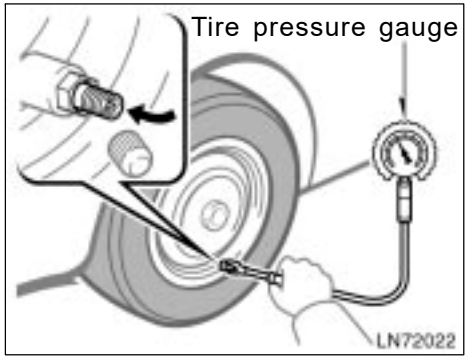
The recommended cold tire inflation pressures, tire sizes and the combined weight of occupants and cargo (vehicle capacity weight) are described on page 385 and 380. They are also on the tire and loading information label.

You should check the tire inflation pressure every two weeks, or at least once a month. And do not forget the spare!

The following instructions for checking tire inflation pressure should be observed:

- **The pressure should be checked only when the tires are cold.** If your vehicle has been parked for at least 3 hours and has not been driven for more than 1.5 km or 1 mile since, you will get an accurate cold tire inflation pressure reading.
- **Always use a tire pressure gauge.** The appearance of a tire can be misleading. Besides, tire inflation pressures that are even just a few pounds off can degrade ride and handling.
- **Take special care when adding air to the compact spare tire.** The smaller tire size can gain pressure very quickly. Add compressed air in small quantities and check the pressure often until it reaches the specified pressure.

- **Do not bleed or reduce tire inflation pressure after driving.** It is normal for the tire inflation pressure to be higher after driving.
- **Never exceed the vehicle capacity weight.** Passenger and luggage weight should be located so that the vehicle is balanced.



INSPECTION AND ADJUSTMENT PROCEDURE

1. Remove the tire valve cap.
2. Press the tip of the tire pressure gauge to the tire valve.
3. Read the pressure using the graduations of the gauge.
4. In case the tire inflation pressure is not within the prescribed range, insert the compressed air from the valve. In case of applying too much air, press the center of the valve and release the air to adjust.
5. After completing the tire inflation pressure measurement and adjustment, apply soapy water to the valve and check for leakage.
6. Install the tire valve cap.

If a gauge and air pump are not available, have your vehicle checked by your Toyota dealer.

⚠ CAUTION

Be sure to reinstall the tire valve caps. Without the valve caps, dirt or moisture could get into the valve core and cause air leakage. If the caps have been lost, have new ones put on as soon as possible.

Incorrect tire inflation pressure may waste fuel, reduce the comfort of driving, reduce tire life and make your vehicle less safe to drive.

If a tire frequently needs refilling, have it checked by your Toyota dealer.

⚠ CAUTION

Keep your tires properly inflated. Otherwise, the following conditions may occur and cause an accident resulting in death or serious injuries.

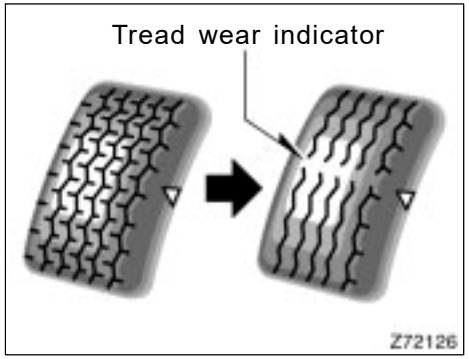
Low tire pressure (underinflation)—

- **Excessive wear**
- **Uneven wear**
- **Poor handling**
- **Possibility of blowouts from a overheated tire**
- **Poor sealing of the tire bead**
- **Wheel deformation and/or tire separation**
- **A greater possibility of tire damage from road hazards**

High tire pressure (overinflation)—

- **Poor handling**
- **Excessive wear**
- **Uneven wear**
- **A greater possibility of tire damage from road hazards**

Checking and replacing tires



CHECKING YOUR TIRES

Check the tire’s tread for tread wear indicators. If the indicators show, replace the tires. The location of tread wear indicators is shown by the “TWI” or “∆” marks, etc., molded on the sidewall of each tire.

The tires on your Toyota have built−in tread wear indicators to help you know when the tires need replacement. When the tread depth wears to 1.6 mm (0.06 in.) or less, the indicators will appear. If you can see the indicators in two or more adjacent grooves, the tire should be replaced. The lower the tread, the higher the risk of skidding.

The effectiveness of snow tires is lost if the tread wears down below 4 mm (0.16 in.).

If you have tire damage such as cuts, splits, cracks deep enough to expose the fabric, or bulges indicating internal damage, the tire should be replaced.

If a tire often goes flat or cannot be properly repaired due to the size or location of a cut or other damage, it should be replaced. If you are not sure, consult with your Toyota dealer.

If air loss occurs while driving, do not continue driving. Driving even a short distance can damage a tire beyond repair.

Any tires which are over 6 years old must be checked by a qualified technician even if damage is not obvious.

Tires deteriorate with age even if they have never or seldom been used.

This applies also to the spare tire and tires stored for future use.

REPLACING YOUR TIRES

When replacing a tire, use a tire of the same size and construction, and the same or greater maximum load as the originally installed tires.

Using any other size or type of tire may seriously affect handling, ride, speedometer/odometer calibration, ground clearance, and clearance between the body and tires or snow chains.

Check that the maximum load of the replaced tire is greater than 1/2 of the Gross Axle Weight Ratings (GAWR) of either the front axle or the rear axle, whichever is greater. As for the maximum load of the tire, see the load limit at maximum cold tire inflation pressure mentioned on the sidewall of the tire, and as for the Gross Axle Weight Ratings (GAWR), see the Certification Label.

For details about the side wall of the tire and the Certification Label, see pages 285 and 283.

⚠ CAUTION

Observe the following instructions. Otherwise, an accident may occur resulting in death or serious injuries.

- **Do not mix radial, bias belted, or bias−ply tires on your vehicle, as this may cause dangerous handling characteristics resulting in loss of control.**
- **Do not use tires other than the manufacturer’s recommended size, as this may cause dangerous handling characteristics resulting in loss of control.**

Toyota recommends all four tires, or at least both of the front or rear tires be replaced at a time as a set.

See “If you have a flat tire” on page 318 in Section 4 for tire change procedure.

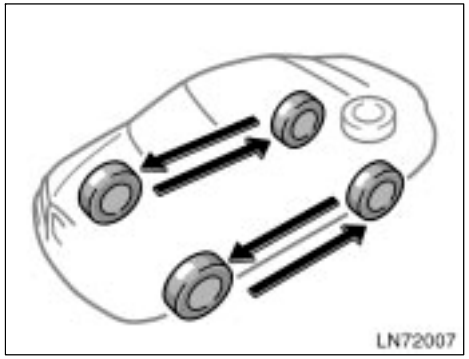
When a tire is replaced, the wheel should always be balanced.

An unbalanced wheel may affect vehicle handling and tire life. Wheels can get out of balance with regular use and should therefore be balanced occasionally.

When replacing a tubeless tire, the air valve should also be replaced with a new one.

Initial adjustment of the tire pressure warning system is necessary after you have replaced your tires. See “Tire pressure warning system” on page 168 in Section 1−7.

Rotating tires



To equalize the wear and help extend tire life, Toyota recommends that you rotate your tires according to the maintenance schedule. (For scheduled maintenance information, please refer to the “Scheduled Maintenance Guide” or “Owner’s Manual Supplement”.) However, the most appropriate timing for tire rotation may vary according to your driving habits and road surface conditions.

See “If you have a flat tire” on page 318 in Section 4 for tire change procedure.

When rotating tires, check for uneven wear and damage. Abnormal wear is usually caused by incorrect tire pressure, improper wheel alignment, out−of−balance wheels, or severe braking.

Initial adjustment of the tire pressure warning system is necessary after you have rotated your tires. See “Tire pressure warning system” on page 168 in Section 1−7.

⚠ CAUTION

Do not include a compact spare tire when rotating the tires. It is designed for temporary use only.

Installing snow tires and chains

WHEN TO USE SNOW TIRES OR CHAINS

Snow tires or chains are recommended when driving on snow or ice.

On wet or dry roads, conventional tires provide better traction than snow tires.

SNOW TIRE SELECTION

If you need snow tires, select tires of the same size, construction and load capacity as the originally installed tires.

Do not use tires other than those mentioned above. Do not install studded tires without first checking local regulations for possible restrictions.

⚠ CAUTION

Do not use snow tires other than the manufacturer’s recommended size, as this may cause dangerous handling characteristics resulting in loss of control. Otherwise, an accident may occur resulting in death or serious injuries.

SNOW TIRE INSTALLATION

Snow tires should be installed on all wheels.

Installing snow tires on the front wheels only can lead to an excessive difference in road grip capability between the front and rear tires which could cause loss of vehicle control.

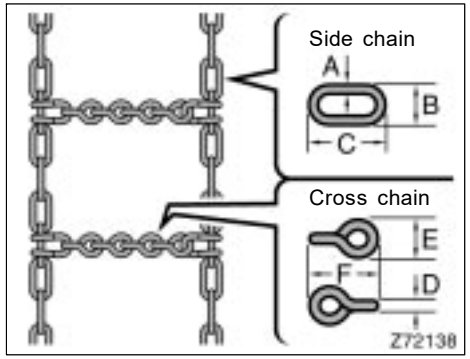
When storing removed tires you should store them in a cool dry place. Mark the direction of rotation and be sure to install them in the same direction when replacing.

⚠ CAUTION

- **Do not drive with the snow tires incorrectly inflated.**
- **Never drive over 120 km/h (75 mph) with any type of snow tires.**

TIRE CHAIN SELECTION

Use the tire chains of correct size.



Use the following type chains.

		mm (in.)
A	Diameter of side chain	3 (0.12)
B	Width of side chain	10 (0.39)
C	Length of side chain	30 (1.18)
D	Diameter of cross chain	4 (0.16)
E	Width of cross chain	14 (0.55)
F	Length of cross chain	25 (0.98)

Regulations regarding the use of tire chains vary according to location or type of road, so always check local regulations before installing chains.

NOTICE

If the wrong combination of tire and chain is used, the chains could damage the vehicle body.

CHAIN INSTALLATION

Install the chains on the front tires as tightly as possible. Do not use tire chains on the rear tires. Retighten chains after driving 0.5—1.0 km (1/4—1/2 mile).

When installing chains on your tires, carefully follow the instructions of the chain manufacturer.

If wheel covers are used, they will be scratched by the chain band, so remove the covers before putting on the chains.

⚠ CAUTION

- **Do not exceed 50 km/h (30 mph) or the chain manufacturer’s recommended speed limit, whichever is lower.**
- **Drive carefully avoiding bumps, holes, and sharp turns, which may cause the vehicle to bounce.**
- **Avoid sharp turns or locked−wheel braking, as use of chains may adversely affect vehicle handling.**
- **When driving with chains installed, be sure to drive carefully. Slow down before entering curves to avoid losing control of the vehicle. Otherwise an accident may occur.**

NOTICE

Do not attempt to use a tire chain on the compact spare tire, as it may result in damage to the vehicle as well as the tire.

Replacing wheels

WHEN TO REPLACE YOUR WHEELS

If you have wheel damage such as bending, cracks or heavy corrosion, the wheel should be replaced.

If you fail to replace a damaged wheel, the tire may slip off the wheel or cause loss of handling control.

WHEEL SELECTION

When replacing wheels, care should be taken to ensure that the wheels are replaced by ones with the same load capacity, diameter, rim width, and offset.

Correct replacement wheels are available at your Toyota dealer.

A wheel of a different size or type may adversely affect handling, wheel and bearing life, brake cooling, speedometer/odometer calibration, stopping ability, headlight aim, bumper height, vehicle ground clearance, and tire or snow chain clearance to the body and chassis.

Replacement with used wheels is not recommended as they may have been subjected to rough treatment or high mileage and could fail without warning. Also, bent wheels which have been straightened may have structural damage and therefore should not be used. Never use an inner tube in a leaking wheel which is designed for a tubeless tire.

⚠ CAUTION

Do not use wheels other than the manufacturer’s recommended size, as this may cause dangerous handling characteristics resulting in loss of control. Otherwise, an accident may occur resulting in death or serious injuries.

Initial adjustment of the tire pressure warning system is necessary after you have replaced your wheels. See “Tire pressure warning system” on page 168 in Section 1−7.

Aluminum wheel precautions

- When installing aluminum wheels, check that the wheel nuts are tight after driving your vehicle the first 1600 km (1000 miles).
- If you have rotated, repaired, or changed your tires, check that the wheel nuts are still tight after driving 1600 km (1000 miles).
- When using tire chains, be careful not to damage the aluminum wheels.
- Use only Toyota wheel nuts and wrench designed for your aluminum wheels.
- When balancing your wheels, use only Toyota balance weights or equivalent and a plastic or rubber hammer.
- As with any wheel, periodically check your aluminum wheels for damage. If damaged, replace immediately.

SECTION 7–3

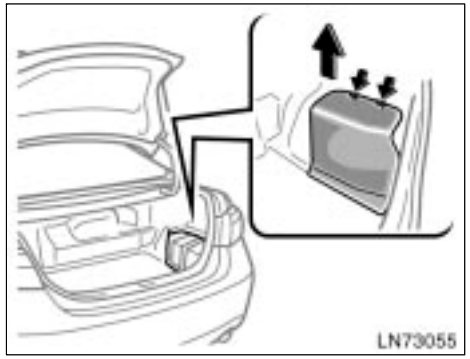
DO–IT–YOURSELF MAINTENANCE

Electrical components

Checking 12 volt battery condition 369
12 volt battery recharging precautions 370
Checking and replacing fuses 371
Checking the fusible link 372
Adding washer fluid 373
Replacing light bulbs 373

Checking 12 volt battery condition—

—12 volt battery location



A 12 volt battery is located in the right−hand side of the trunk. Remove the cover to access the battery.

The battery with a flammable hydrogen gas exhaust valve is specially designated for your vehicle. When replacing the battery, contact your Toyota dealer.

—Precautions

⚠ CAUTION

BATTERY PRECAUTIONS

The battery produces flammable and explosive hydrogen gas.

- Do not cause a spark from the battery with tools.
- Do not smoke or light a match near the battery.
- When replacing the battery, only install a battery designated for your hybrid vehicle. Using a conventional battery may cause hydrogen gas to build up in the vehicle.

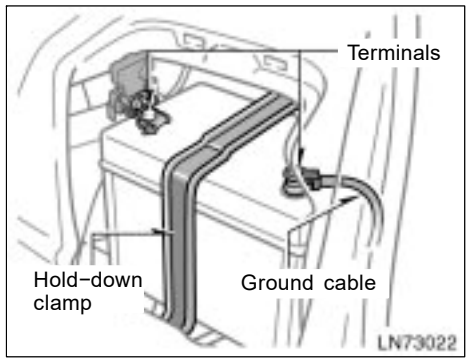
The electrolyte contains poisonous and corrosive sulfuric acid.

- Avoid contact with eyes, skin or clothes.
- Never ingest electrolyte.
- Wear protective safety glasses when working near the battery.
- Keep children away from the battery.

EMERGENCY MEASURES

- If electrolyte gets in your eyes, flush your eyes with clean water immediately and get immediate medical attention. If possible, continue to apply water with a sponge or cloth while en route to the medical office.
- If electrolyte gets on your skin, thoroughly wash the contact area. If you feel pain or burning, get medical attention immediately.
- If electrolyte gets on your clothes, there is a possibility of its soaking through to your skin, so immediately take off the exposed clothing and follow the procedure above, if necessary.
- If you accidentally swallow electrolyte, drink a large quantity of water or milk. Follow with milk of magnesia, beaten raw egg or vegetable oil. Then go immediately for emergency help.

—Checking the 12 volt battery exterior



Check the battery for corroded or loose terminal connections, cracks, or loose hold−down clamp.

a. If the battery is corroded, wash it off with a solution of warm water and baking soda. Coat the outside of the terminals with grease to prevent further corrosion.

b. If the terminal connections are loose, tighten their clamp nuts—but do not overtighten.

c. Tighten the hold−down clamp only enough to keep the battery firmly in place. Overtightening may damage the battery case.

NOTICE

- ***Be sure the hybrid system and all accessories are off before performing maintenance.***
- ***When checking the battery, remove the ground cable from the negative terminal ("−" mark) first and reinstall it last.***
- ***Be careful not to cause a short circuit with tools.***
- ***Take care no solution gets into the battery when washing it.***

12 volt battery recharging precautions

During recharging, the battery is producing hydrogen gas.

Therefore, before recharging:

1. If recharging with the battery installed on the vehicle, be sure to disconnect the ground cable.
2. Be sure the power switch on the recharger is off when connecting the charger cables to the battery and when disconnecting them.

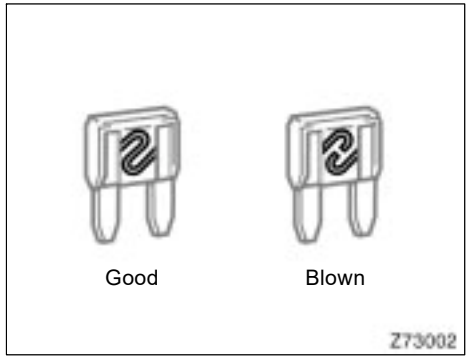
⚠ CAUTION

- **Always charge the battery in an unconfined area. Do not charge the battery in a garage or closed room where there is not sufficient ventilation.**
- **Only do a slow charge (5 A or less). Charging at a quicker rate is dangerous. The battery may explode, causing personal injuries.**

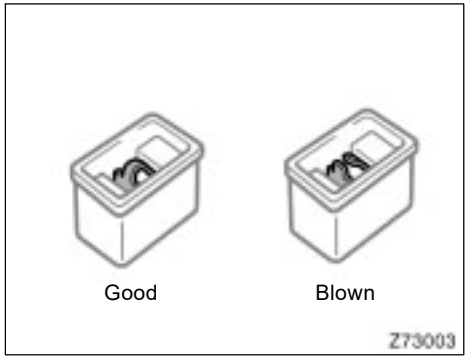
NOTICE

Never recharge the battery while the hybrid system is operating. Also, be sure all accessories are turned off.

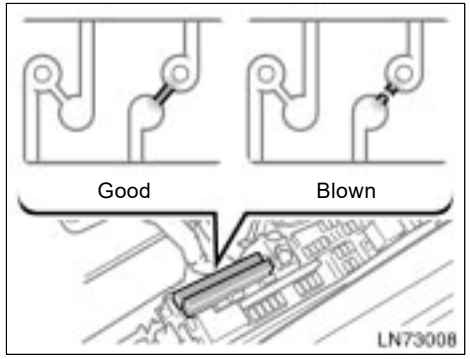
Checking and replacing fuses



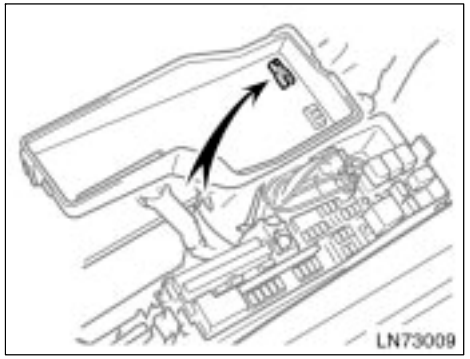
Type A



Type C



Type B



If the headlights or other electrical components do not work, check the fuses. If any of the fuses are blown, they must be replaced.

See “Fuse locations” on page 348 in Section 7−1 for locations of the fuses.

Turn the hybrid system and inoperative component off. Pull the suspected fuse straight out and check it.

Determine which fuse may be causing the problem. The lid of the fuse box shows the name of the circuit for each fuse. See page 386 in Section 8 for the functions controlled by each circuit.

Type B fuses—When any of the fuses are blown, contact your Toyota dealer.

Type A fuses can be pulled out by the pull−out tool. The location of the pull−out tool is shown in the illustration.

If you are not sure whether the fuse has blown, try replacing the suspected fuse with one that you know is good.

If the fuse has blown, push a new fuse into the clip.

Only install a fuse with the amperage rating designated on the fuse box lid.

If you do not have a spare fuse, in an emergency you can pull out the “RADIO NO.1” or “PWR OUTLET” fuse, which may be dispensable for normal driving, and use it if its amperage rating is the same.

If you cannot use one of the same amperage, use one that is lower, but as close to the rating as possible. If the amperage is lower than that specified, the fuse might blow out again but this does not indicate anything wrong. Be sure to get the correct fuse as soon as possible and return the substitute to its original clip.

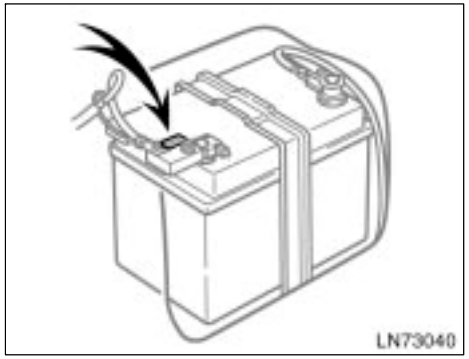
It is a good idea to purchase a set of spare fuses and keep them in your vehicle for emergencies.

If the new fuse immediately blows out, there is a problem with the electrical system. Have your Toyota dealer correct it as soon as possible.

⚠ CAUTION

Never use a fuse with a higher amperage rating, or any other object, in place of a fuse. This may cause extensive damage and possibly a fire.

Checking the fusible link



If the headlights or other electrical components do not work and the fuses are O.K., check the fusible link fitted on the “+” terminal of the 12 volt battery. If the link is melted, it must be replaced.

If there is an overload in the circuits, the fusible links are designed to melt before the entire wiring harness is damaged.

The battery is located in the right−hand side of the trunk. See “—12 volt battery location” on page 369 in this Section.

Adding washer fluid

If the washer does not work or the message “LOW WASHER FLUID” appears on the multi−information display, the washer tank may be empty. Add washer fluid.

You may use plain water as washer fluid. However, in cold areas where temperatures range below the freezing point, use washer fluid containing antifreeze. This product is available at your Toyota dealer and most auto parts stores. Follow the manufacturer’s directions for how much to mix with water.

NOTICE

Do not use engine antifreeze or any other substitute because it may damage your vehicle’s paint.

Replacing light bulbs—

The following illustrations show how to gain access to the bulbs. When replacing a bulb, make sure the hybrid system and light switch are off. Use bulbs with the wattage ratings given in the table.

The stop/tail lights and high mounted stoplight consist of a number of LEDs. If any of the LEDs burn out, take your vehicle to your Toyota dealer to have the light replaced.

If two or more LEDs in a stop light burn out, your vehicle may not conform to local laws (SAE).

⚠ CAUTION

- **To prevent burning yourself, do not replace the light bulbs while they are hot.**
- **Halogen bulbs have pressurized gas inside and require special handling. They can burst or shatter if scratched or dropped. Hold a bulb only by its plastic or metal case. Do not touch the glass part of a bulb with bare hands.**

NOTICE

Only use a bulb of the listed type.

The inside of the lens of exterior lights such as headlights may temporarily fog up when the lens becomes wet in the rain or in a car wash. This is not a problem because the fogging is caused by the temperature difference between the outside and inside of the lens, just like the windshield fogs up in the rain. However, if there is a large drop of water on the inside of the lens, or if there is water pooled inside the light, contact your Toyota dealer.

Light bulbs	Bulb No.	W	Type
Headlights (high)	9005	60	A
Headlights (low)	—	55	B
Front side marker lights	—	5	C
Front turn signal/parking lights	3457NAK	30/8	D
Rear turn signal lights	—	21	D
License plate lights	—	5	C
Back−up lights	921	16	C
Personal lights	—	5	C
Interior light	—	8	E
Door courtesy lights	168	5	C
Vanity lights	—	8	C
Glove box light	—	1.2	C
Trunk light	—	3.8	C

A: HB3 halogen bulbs
B: H11 halogen bulbs
C: Wedge base bulbs (clear)
D: Wedge base bulbs (amber)
E: Double end bulbs

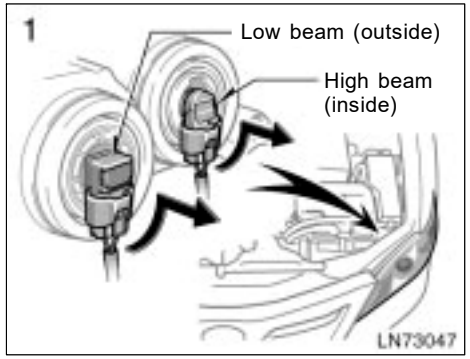
—Front turn signal/parking, side marker, tail and back−up lights, and high mounted stoplight

If the front turn signal/parking, side marker, tail or back−up lights, or high mounted stoplight burns out, contact your Toyota dealer.

NOTICE

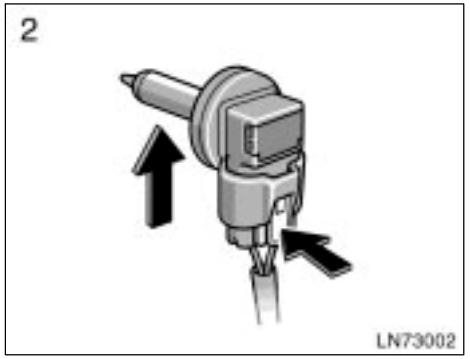
Do not try to replace the front turn signal/parking, side marker, tail, back−up light and high mounted stoplight bulbs by yourself. You may damage the vehicle.

—Headlights



1. Open the hood. Turn the bulb base counterclockwise to the front of the vehicle as shown.

The above illustration shows the left−hand headlight.



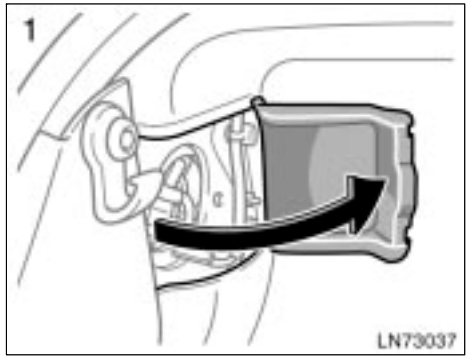
2. Unplug the connector while depressing the lock release.

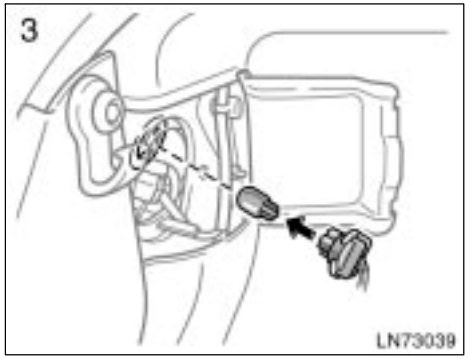
If the connector is tight, wiggle it.

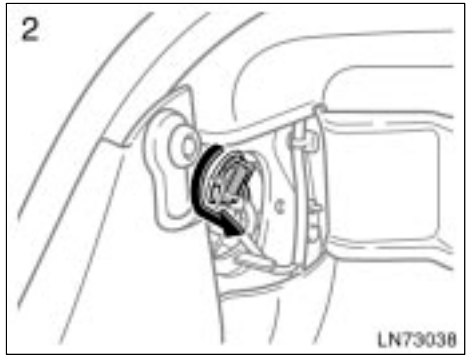
3. Plug in a new bulb into the connector and install it into the mounting hole.

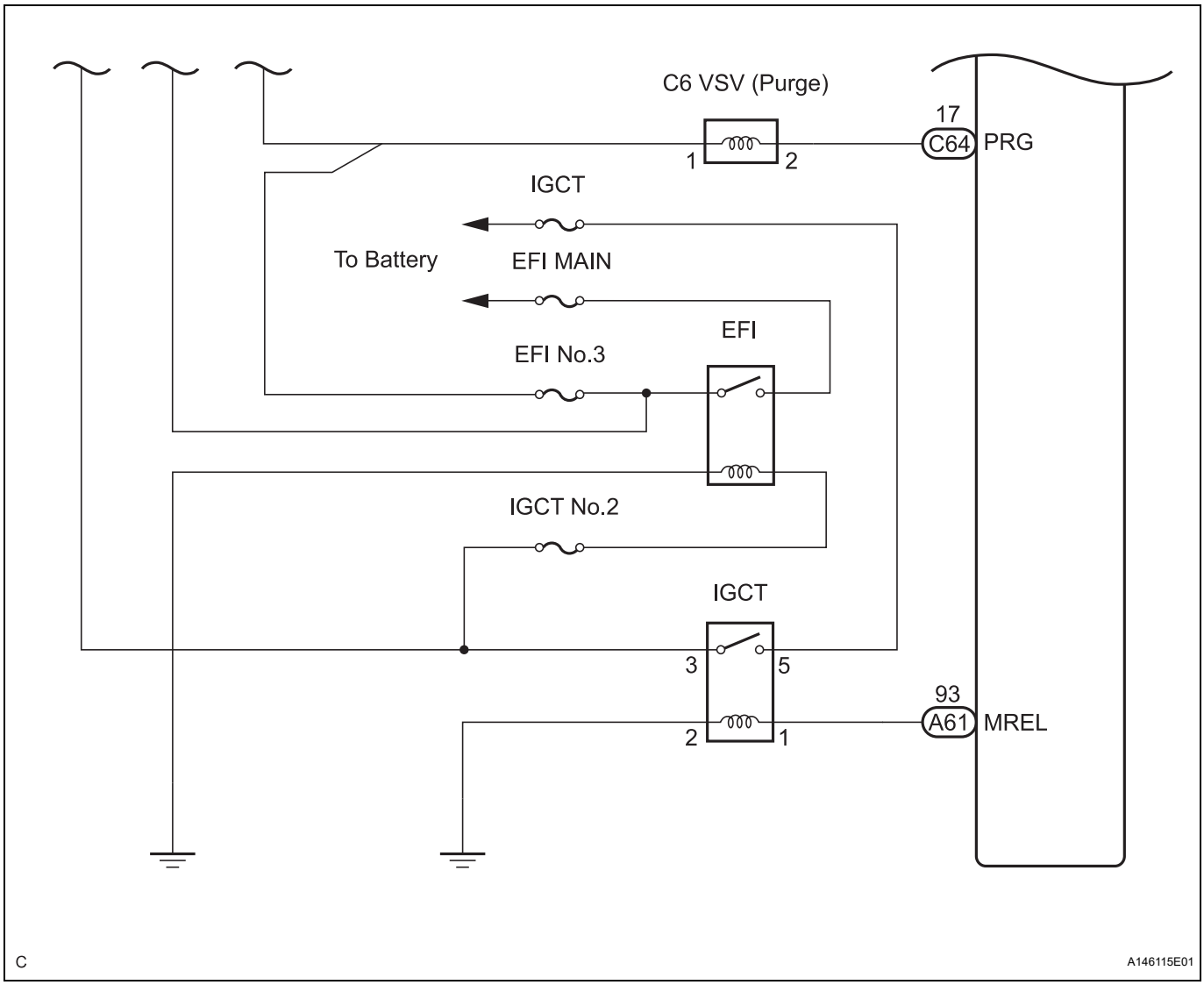
Aiming is not necessary after replacing the bulb. When aiming adjustment is necessary, contact your Toyota dealer.

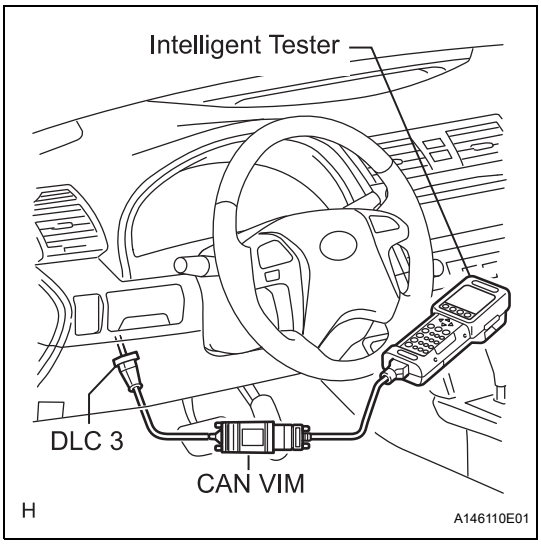
—Rear turn signal lights











ON-VEHICLE INSPECTION

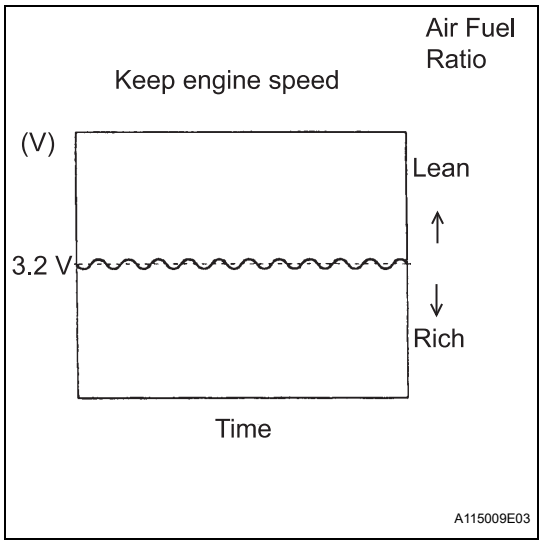
1. INSPECT AIR FUEL RATIO COMPENSATION SYSTEM

(a) Connect an intelligent tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the Date Link Connector 3 (DLC3).

(b) Select "DATA LIST". Then select "AFS B1 S1", "AFS B2 S1", "O2S B1 S2" and "O2S B2 S2" to display the monitors.

(c) Set the vehicle to inspection mode. (See page ES-35)

(d) Warm up the air fuel ratio sensor with the engine speed at 2,500 rpm for approximately 2 minutes.



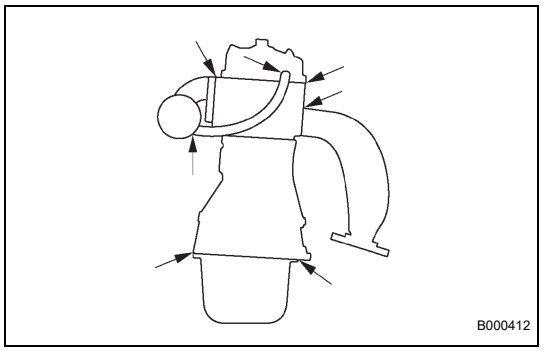
(e) Maintain the engine speed at 2,500 rpm and confirm that the displays of "AFS B1 S1" and "AFS B2 S1" are as shown in the illustration.
HINT:
- The illustration may differ slightly from the display on the intelligent tester.
- Only the intelligent tester displays the waveform of the air fuel ratio sensor.

(f) Confirm that the displays of "O2S B1 S2" and "O2S B2 S2" change between 0 and 1 V with the engine speed at 2,500 rpm.

2. INSPECT FUEL CUT OFF / RESTART RPM

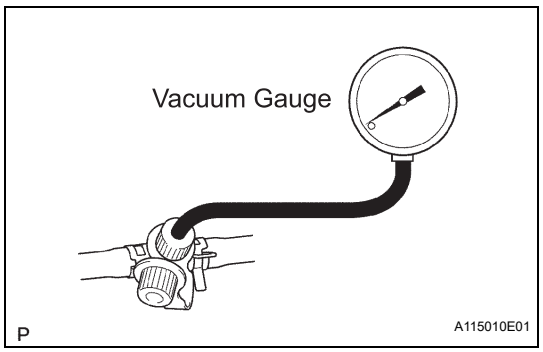
(a) Increase the engine speed to at least 2,500 rpm.
(b) Use a sound scope to check for injector operating sounds.
(c) Check that when the throttle lever is released, injector operation sound stops momentarily (at 2,500 rpm) and then resumes (at 1,200 rpm).
Standard

Item	Specified Condition
Fuel cut off rpm	1,800 rpm
Fuel injector restart rpm	1,500 rpm



3. VISUALLY INSPECT HOSE, CONNECTIONS AND GASKETS

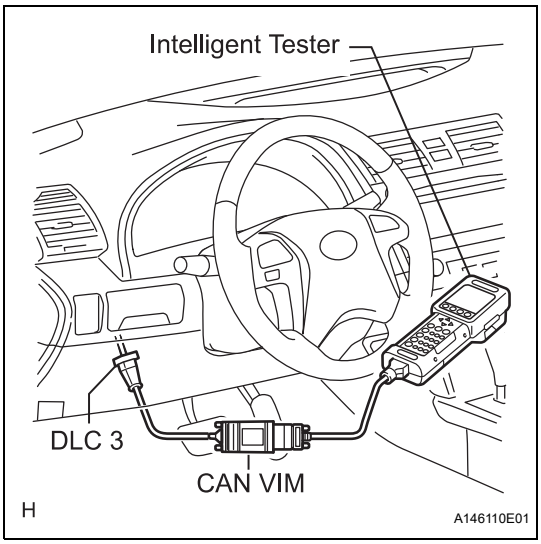
(a) Check for cracks, leaks or damage.
HINT:
Separation of the engine oil dipstick, oil filler cap, PCV hose, etc. may cause the engine to run improperly. Disconnection, looseness or cracks in the parts of the air induction system between the throttle body and cylinder head will allow air suction and cause the engine to run improperly.



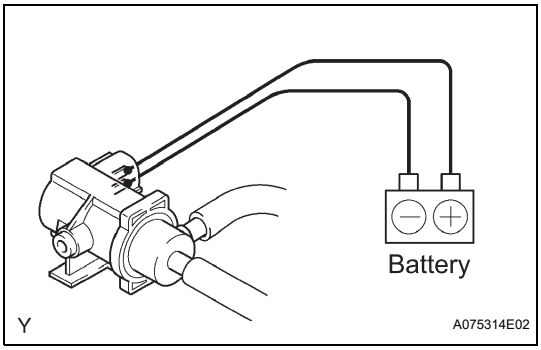
4. INSPECT EVAP SYSTEM LINE

(a) Warm up the engine to normal operating temperature and stop the engine.
(b) Install a vacuum gauge (EVAP control system test equipment vacuum gauge) into the EVAP service port on the purge line.

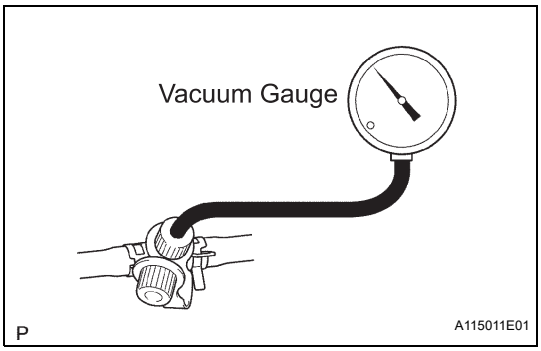
EC



(c) When using an intelligent tester: Force the VSV for EVAP to operate.
  (1) Connect an intelligent tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the Date Link Connector 3 (DLC3).
  (2) Start the engine.
  (3) Turn the intelligent tester main switch on.
  (4) Use the ACTIVE TEST mode on the intelligent tester to operate the VSV for the EVAP.



(d) When not using an intelligent tester: Force the VSV for EVAP to operate.
  (1) Disconnect the VSV for EVAP connector.
  (2) Connect the positive (+) and negative (-) leads from the battery to the VSV for EVAP terminals.
  (3) Start the engine.



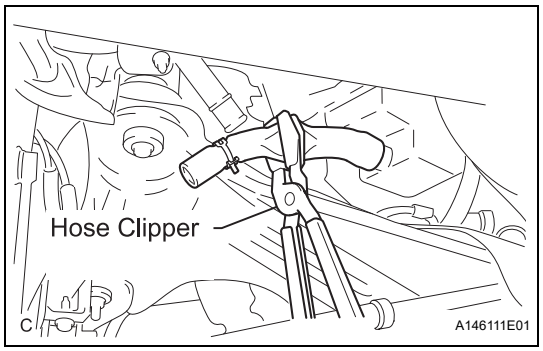
(e) Check the vacuum.
  (1) Set the vehicle to inspection mode. (See page ES-35)
  Vacuum:
  Maintain between 0.368 and 19.713 in.Hg (5 to 268 in.Ag) for over 5 seconds.
  HINT:
  If the vacuum does not change, the hose connecting the VSV and the service port is loose or blocked, or the VSV is malfunctioning.

(f) When using an intelligent tester: Conclude operation of the VSV for EVAP.
  (1) Stop the engine.
  (2) Disconnect the intelligent tester from the DLC3.

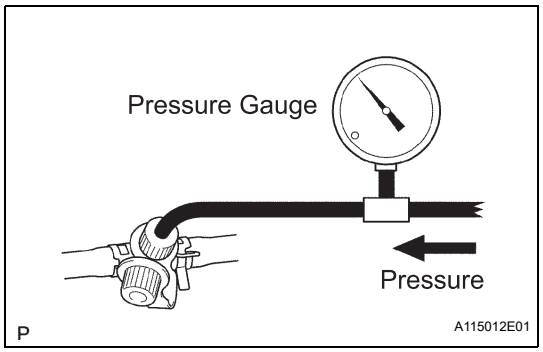
(g) When not using an intelligent tester: Conclude operation of the VSV for EVAP.
  (1) Stop the engine.
  (2) Disconnect the positive (+) and negative (-) leads of the battery from the VSV for EVAP terminals.
  (3) Connect the VSV for EVAP connector.

(h) Disconnect the vacuum gauge from the EVAP service port on the purge line.

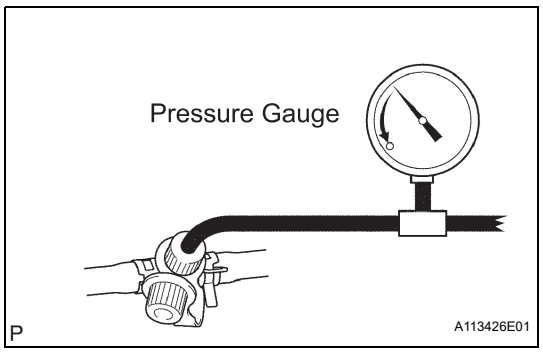
(i) Connect a pressure gauge to the EVAP service port on the purge line.



(j) Check the pressure.
(1) Disconnect the charcoal canister hose.
(2) Pinch the charcoal canister hose with the hose clipper to prevent air from entering into the canister passage.



(3) Apply pressure (13.5 to 15.5 in.Aq, 0.99 to 1.14 in.Hg) from the EVAP service port.
Pressure:
The gauge should still read over 7.7 in.Aq (0.57 in.Hg) for 2 minutes after the pressure is applied.
HINT:
If you cannot apply pressure, the hose connecting the VSV, charcoal canister and fuel tank has slipped off or the VSV is open.

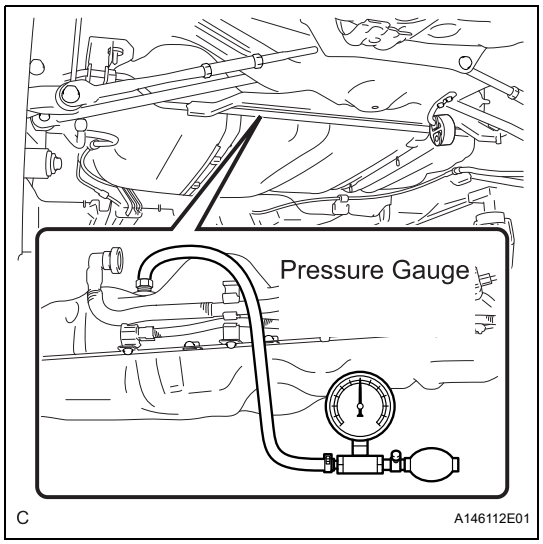


(4) Check if the pressure decreases when releasing the hose clipper while applying pressure.
HINT:
If the pressure does not decrease when the filler cap is removed, the hose connecting the service port and the fuel tank may be blocked.

(k) Disconnect the pressure gauge from the EVAP service port on the purge line.

5. CHECK AIR TIGHTNESS IN FUEL TANK AND FILLER PIPE

(a) Press the lid switch to release the pressure in the fuel tank.
(b) Check that the lid is opened.



(c) Disconnect the vent line hose from the fuel tank.
(d) Connect the pressure gauge to the fuel tank.
(e) Apply pressure to the fuel tank to create an internal pressure of 4 kPa (41 gf/cm^2, 0.58 psi).
(f) Check that the internal pressure of the fuel tank is maintained for 1 minute.
(g) Check the connected portions of each hose and pipe.
(h) Check the installed parts on the fuel tank.
If any malfunctions, damage or other problems are found, replace the fuel tank and filler pipe.
(i) Reconnect the vent line hose to the fuel tank.

6. INSPECT FUEL CUT OFF VALVE AND FILL CHECK VALVE

(a) Press the lid switch to release the pressure in the fuel tank.
(b) Check that the lid is opened.

EC

CUSTOMIZE PARAMETERS

HINT:
The following items can be customized.

NOTICE:

- **When the customer requests a change in a function, first make sure that the function can be customized.**
- **Be sure to make a note of the current settings before customizing.**
- **When troubleshooting a function, first make sure that the function is set to the default setting.**

1. AIR CONDITIONING SYSTEM

AIR CONDITIONER:

DISPLAY (ITEM)	DEFAULT	CONTENTS	SETTING
SET TEMP SHIFT (Set Temperature Shift)	NORMAL	To shift the temperature against the displayed temperature	+2 C / +1 C / NORMAL / -1 C / -2 C
AIR INLET MODE (Air Inlet Mode)	AUTO	In case of turning the A/C ON when you desire to make the compartment cool down quickly, this is the function to change the mode automatically to RECIRCULATION mode	MANUAL / AUTO
COMPRESSOR MODE (Compressor Mode)	AUTO	Function to turn the A/C ON automatically by pressing the AUTO button when the blower is ON and the A/C is OFF	MANUAL / AUTO
COMPRS / DEF OPER (Compressor / Air Inlet DEF Operation)	LINK	Function to turn the A/C ON automatically linked with the FRONT DEF button when the A/C is OFF	NORMAL / LINK
EVAP CTRL (Evaporator Control)	AUTO	Function to set the evaporator control to the AUTOMATIC position (AUTO) to save power, or to the coldest position (MANUAL) to dehumidify the air and to prevent the windows from fogging up	MANUAL / AUTO
FOOT / DEF MODE (Foot / DEF Auto Mode)	ON	Function to turn the airflow from FOOT/DEF ON automatically when AUTO MODE is ON	OFF / ON
AUTO BLOW UP (Foot / DEF Automatic Blower Up Function)	ON	Function to change the blower level automatically when the defroster is ON	OFF / ON
AMBIENT TMP SFT (Ambient Temperature Shift)	NORMAL	Function to shift the ambient temperature against the displayed ambient temperature	+3 C / +2 C / +1 C / NORMAL / -1 C / -2 C / -3 C

2. LIGHTING SYSTEM

ILLUMINATED ENTRY:

Display	Default	Contents	Setting
LIGHTING TIME	15 s	Changes the lighting time of the interior light and power switch illumination.	7.5 s / 15 s / 30 s
I/L ON / UNLOCK	ON	Lights up the interior light and power switch illumination when a door is unlocked.	ON / OFF
I/L ON / ACC OFF	ON	Lights up the interior light and power switch illumination when the power switch is turned from on (ACC) to off	ON / OFF

LIGHT CONTROL:

Display	Default	Contents	Setting
LIGHT OFF DELAY	30 s	Keeps the headlights on for a certain period of time after turning the power switch off and closing all the doors with the headlights on.	OFF / 30 s / 60 s / 90 s

Display	Default	Contents	Setting
SENSITIVITY	NORMAL	Adjusts the sensitivity of the automatic light control system. *1	LIGHT 2 / LIGHT 1 / NORMAL / DARK 1 / DARK 2
DISP EX ON SEN	NORMAL	Changes the ambient brightness level required to dim the lights such as the indicator lights of the combination meter, A/C indicator light, and clock. *1	LIGHT 2 / LIGHT 1 / NORMAL / DARK 1 / DARK 2
DISP EX OFF SEN	NORMAL	Changes the ambient brightness level required to cancel the dimming of the lights such as the indicator lights of the combination meter, A/C indicator light, and clock.	LIGHT 2 / LIGHT 1 / NORMAL / DARK 1 / DARK 2

HINT:
Sensitivity adjustment can hardly be confirmed. Check by driving the customer's vehicle.

Illustration *1

Ambient Brightness Level	Dark ◄——————————► Bright				
Setting	DARK2	DARK1	NORMAL	LIGHT1	LIGHT2

3. POWER DOOR LOCK CONTROL SYSTEM

DOOR LOCK:

Display (Item)	Default	Contents	Setting
UNLOCK/PARK (Unlock, power switch on (IG), shift P, speed 0 km/h (0 mph))	ON	Function that unlocks doors when the shift lever is moved to the P position from any other position while the power switch is on (IG)	ON/OFF
ALL UNLK/OPN-CL (All unlock, D door open-close)	OFF	Function that unlocks all other doors when opening driver side door within 10 seconds after turning the power switch off from on (IG)	ON/OFF
UNLK/KEY TWICE (Unlock, 2 times D key operation)	ON	• Function that unlocks only the driver side door when the driver side door key cylinder is turned to unlock once and unlocks all the doors when it is turned to unlock twice • In the OFF setting, turning it once unlocks all doors	ON/OFF
AUTO LOCK/SHIFT (Auto lock/shift not P)	ON	Function that locks doors when the shift lever is moved from the P position to any other position	ON/OFF
AUTO LOCK	OFF	Function that locks doors when vehicle reaches a vehicle speed 20 km/h (13 mph)	ON/OFF

WIRELESS D LOCK

Display (Item)	Default	Contents	Setting
AUTO LOCK DELAY	60s	Function that selects AUTO LOCK time (30 sec. or 60 sec.)	30s/60s

4. WIRELESS DOOR LOCK CONTROL SYSTEM

WIRELESS DOOR LOCK CONTROL SYSTEM

Display (item)	Default	Function	Setting
TRUNK LID OPER (Wireless trunk opener function setting)	0.8 s PR ON	This function changes operation method of transmitter to open luggage compartment door. • 1 TIME: Push once • 2 TIMES: Push twice • 0.8 s PR: Push and hold for 0.8 seconds • OFF: Does not operate	1 TIME/2 TIMES/0.8 s PR/ OFF
WIRELESS OPER (Wireless door lock control function)	ON	Function that turns wireless door lock function ON/OFF	ON/OFF
HAZARD ANS BACK (Hazard answer-back for wireless door lock control)	ON	• When the doors are locked by wireless operation, the hazard warning lights flash once. • When the doors are unlocked by wireless operation, the hazard warning lights flash twice.	ON/OFF
OPEN DOOR WARN (Door ajar warning)	ON	The buzzer sounds when LOCK is pressed when any of the doors are ajar.	ON/OFF
AUTO LOCK DELAY (Auto lock time)	60 s	This function regulates the interval between unlocking and automatic relocking of doors.	30 s/60 s
UNLOCK /2OPER (Wireless unlock operated twice)	ON	This function unlocks the driver's door when the UNLOCK switch is pressed once, and unlocks all doors when pressed twice within 3 seconds. If set to OFF, pressing UNLOCK once unlocks all doors.	ON/OFF
ALARM FUNCTION (Panic function)	ON	This function operates the theft deterrent system when PANIC is pressed and held for 0.8 seconds.	ON/OFF
WIRLS BUZZ RESP (Wireless buzzer answer-back)	ON	Wireless door lock buzzer response/ON or OFF	ON/OFF

5. SMART KEY SYSTEM (DOOR LOCK)

SMART:

Display (Item)	Default	Contents	Setting
PARK WAIT TIME (Wait time to permit opening door after locking)	2.5s	Function that sets waiting time to permit opening door after door is locked with entry lock function.	0.5s / 1.5s / 2.5s / 5.0s
SMART UNLOCK	D_DOOR	Function that switches the entry unlock detection area.	ALL / D_DOOR
IGNITION AREA (SMART ignition available area)	ALL	Function to choose the available area for electrical key to start HV control system and cancel the steering lock.	FRONT / ALL
SMART TRUNK (Luggage compartment opening operation)	ON	Function to open a luggage compartment when the driver has the electrical key and presses the luggage open button.	ON / OFF

WIRELESS DOOR LOCK:

Display (Item)	Default	Contents	Setting
ALARM FUNCTION (Panic function)	ON	Function to operate the theft deterrent system by keeping pressing the lock button of the transmitter for 2.5 seconds. If there is a panic button, press the panic button instead of the lock button.	ON / OFF

WARNING:

Display (Item)	Default	Contents	Setting
KEY LOW-BATT WRN	ON	Function to set a warning function for the time when a key battery becomes weak.	ON / OFF

6. METER / GAUGE SYSTEM

METER:

Display (Item)	Default	Contents	Setting
KEY REMND VOLUM	LARGE	Function to change the volume of the key reminder warning buzzer	LARGE, MEDIUM, SMALL
KEY REMND SOUND	NORMAL	Function to change the cycle of the key reminder warning buzzer	FAST, NORMAL, SLOW
SEAT-BELT WARN	D/P ON	Function to change the setting of the seat belt buzzer	D/P ON, D ON, P ON, D/P OFF

HINT:
This setting is only valid for the buzzer which sounds at 5 km/h (3 mph) or more.

7. SLIDING ROOF SYSTEM

Sliding roof ECU

Display (Item)	Default	Contents	Setting
OPEN/DOOR KEY	ON	Function to manually open sliding roof linked with power window if holding driver's side and passenger's side door key for 1.5 seconds or more to unlock position when power switch is off	ON/OFF
CLOSE/DOOR KEY	ON	Function to manually close sliding roof linked with power window if holding driver's side and passenger's side door key for 1.5 seconds or more to lock position when power switch is off	ON/OFF
OPEN/WIRELESS	ON	Function to manually open sliding roof linked with power window if pressing transmitter UNLOCK switch for 2.4 seconds or more when power switch is off	ON/OFF
CLOSE/WIRELESS	ON	Function to manually open sliding roof linked with power window if pressing transmitter LOCK switch for 2.4 seconds or more when power switch is off	ON/OFF
DOOR KEY OPER	SLIDE	Function to select tilt up or slide open of manual sliding roof operation linked with power window Activated by holding driver's side door key for 1.5 seconds or more to unlock position when power switch is off	TILT/SLIDE
WIRELESS OPER	SLIDE	Function to select tilt up or slide open of manual sliding roof operation linked with power window Activated by pressing transmitter UNLOCK switch for 2.4 seconds or more when power switch is off	TILT/SLIDE

ON-VEHICLE INSPECTION

1. INSPECT COOLING FAN OPERATION AT LOW TEMPERATURES (Below 83°C (181°F))

(a) Set the vehicle to inspection mode. (See page IN-5)
(b) Start the engine.
(c) Check that the cooling fan stops.
If not, check the cooling fan relay and engine coolant temperature sensor, and check whether there is disconnection or an open circuit between them.
(d) Disconnect the engine coolant temperature sensor connector.
(e) Check that the cooling fan rotates.
If not, check the fuses, cooling fan relay, ECM and cooling fan, and check for a short circuit between the cooing fan relay and engine coolant temperature sensor.
(f) Reconnect the engine coolant temperature sensor connector.

2. INSPECT COOLING FAN OPERATION AT HIGH TEMPERATURES (Above 93°C (199°F))

(a) Set the vehicle to 2WD inspection mode. (See page IN-5)
(b) Start the engine, and raise the engine coolant temperature to above 93°C (199°F).
HINT:
Engine coolant temperature is detected by the engine coolant temperature sensor on the water outlet.
(c) Check that the cooling fan rotates.
If not, replace the engine coolant temperature sensor.

INITIALIZATION

Procedures necessary when battery terminal is disconnected / reconnected

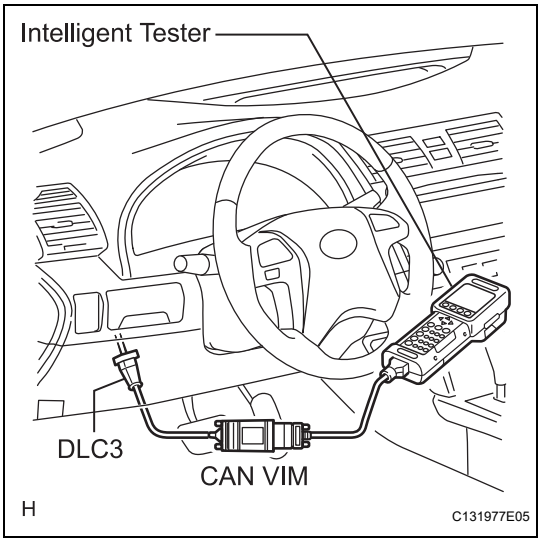
Necessary Procedures	Procedure Details	Effects / Inoperative Functions When Necessary Procedures are not Performed	Notes
Idle speed control learning	Perform the initialization using the intelligent tester.	-	-

Procedures necessary when ECU or other parts are replaced

Replacement Part	Necessary Procedures	Effects / Inoperative Functions When Necessary Procedures are not Performed	Notes
Tire pressure warning ECU	1. Register transmitter IDs to "MAIN" setting of switch 2. Register transmitter IDs to "2nd" setting of switch (if necessary) 3. Initialize tire pressure warning system	• Tire pressure warning light blinks • Tire pressure monitoring function (even if tire is punctured or pressure decreases, it is not detected)	-
Tire pressure warning valve and transmitter	1. Register transmitter IDs to "MAIN" setting of switch 2. Register transmitter IDs to "2nd" setting of switch (if necessary) 3. Initialize tire pressure warning system	• Tire pressure warning light blinks • Tire pressure monitoring function of replaced wheel (even if tire is punctured or pressure decreases, it is not detected)	-
Skid control ECU	1. Clear stored value of linear solenoid valve and calibration data 2. Initialize linear solenoid valve and perform calibration 3. Clear zero point calibration data 4. Perform yaw rate and acceleration sensor zero point calibration	• Brake control warning light come on • Brake warning light come on • ABS warning light come on • VSC warning display of multi-information display • Master warning light come on	-
Brake actuator	1. Clear stored value of linear solenoid valve and calibration data 2. Initialize linear solenoid valve and perform calibration	• Brake control warning light come on • Brake warning light come on • ABS warning light come on • VSC warning display of multi-information display • Master warning light come on	-
Brake pedal stroke sensor	1. Clear stored value of linear solenoid valve and calibration data 2. Initialize linear solenoid valve and perform calibration	-	-
Brake pedal	1. Inspect and adjust brake pedal height 2. Clear stored value of linear solenoid valve and calibration data 3. Initialize linear solenoid valve and perform calibration	Brake does not operate properly	-
Yaw rate and acceleration sensor	1. Clear zero point calibration data 2. Perform yaw rate and acceleration sensor zero point calibration	-	-

IN

Replacement Part	Necessary Procedures	Effects / Inoperative Functions When Necessary Procedures are not Performed	Notes
• Power steering ECU • Power steering link	Perform rotation angle sensor initialization and torque sensor zero point calibration	• EPS control • Steering effort is different between turning steering wheel to left and right • Steering effort varies • Rotation angle sensor or torque sensor malfunction DTC is stored	-
• Front sear assembly • Occupant classification ECU • Accessories (seatback tray and seat cover, etc.)	1. Zero point calibration 2. Sensitivity check	Occupant classification system does not operate properly	-
• ID code box • Certification ECU • Steering lock ECU • Key	1. Perform identification code registration (key code, ECU code) 2. Refer to immobiliser section "REGISTRATION" procedures	• Smart access system with push-button start • Wireless door lock control function • Engine start	When hybrid vehicle control ECU is replaced, registration of ECU communication ID is necessary
• Sliding roof drive gear (Sliding roof control ECU) • Sliding roof housing	Initialize sliding roof system	• Auto operation • Sliding roof operation after power switch is turned OFF • Jam protection function • Key-linked operation function (Driver's door only)	-



1. PERFORM INITIALIZATION (SFI SYSTEM)

(a) Apply the parking brake and chock the vehicle.

(b) Connect the intelligent tester to the DLC3.

(c) Put the engine in the inspection mode (See page ES-34).

(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.

(e) Warm up the engine with the A/C switch off until the coolant temperature becomes 83°C (181°F) or more.

(f) Select the following menu items: DIAGNOSIS / OBD/MOBD / HV ECU / DATA LIST / SOC.

(g) Move the shift lever to the N position, set the A/C switch to MAX cool or turn on the front defroster, and leave the vehicle until the SOC value becomes below 40%.
HINT:
If the SOC is substantially below 40%, the auxiliary battery may go dead. Therefore, do not allow the SOC to reach substantially below 40%.

(h) Move the shift lever to the P position and turn the power switch off.

(i) Disconnect the negative terminal from the auxiliary battery and leave it for 1 minute or more.

(j) Reconnect the negative terminal to the auxiliary battery and turn the power switch on (IG).

(k) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.

(l) Check that the engine coolant temperature is 83°C (181°F) or more.
HINT:
If the engine coolant temperature is below 83°C (181°F), start the engine by depressing the accelerator pedal with the shift lever in the P position to increase the coolant temperature.

(m) Select the following menu items: DIAGNOSIS / ENHANCED OBDII / DATA LIST / PRIMARY / CALCLOAD.

(n) Move the shift lever to the D position while depressing the brake pedal with your left foot.

(o) Depress the accelerator pedal with your right foot while firmly depressing the brake pedal with your left foot, and maintain an engine load value of 45% or more (60 to 70% of full acceleration) for approximately 30 seconds.
NOTICE:
Do not perform this step for 40 seconds or more.

(p) Shift the shift lever to the P position. Turn the power switch off and then wait for 5 seconds before putting the vehicle into the READY-on state again.

(q) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / USER DATA / ISC LEARNING.

(r) Check that the air conditioner is off. Lightly depress the accelerator pedal and release it when the engine starts.

(s) Check that "COMPLETE" is displayed on the intelligent tester screen.
HINT:
- If "ISC LEARNING" is not completed within 1 minute, repeat steps (o) through (r).
- The engine will usually stop when "ISC LEARNING" is completed. However, the engine will not stop even when "ISC LEARNING" is completed in such cases when the charge level of the auxiliary battery is decreased.

2. DESCRIPTION OF INITIALIZATION (TIRE PRESSURE WARNING SYSTEM)

(a) Perform initialization in the following cases:
- Before delivery of a new vehicle.
- After replacement of the tire pressure warning ECU*.
- After replacement of the tire pressure warning valve and transmitter.
- Specified tire pressure changes depending on the size or type of the tire.

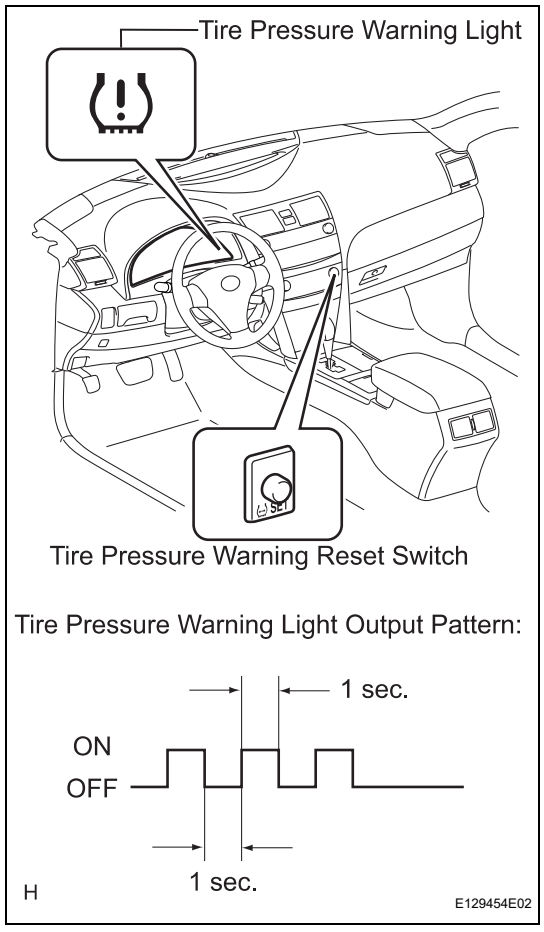
*: Perform initialization after the transmitter ID registration is completed (See page TW-14).

(b) Before initialization
(1) Set the air pressure of all wheels to the specified value.

Cold tire inflation pressure

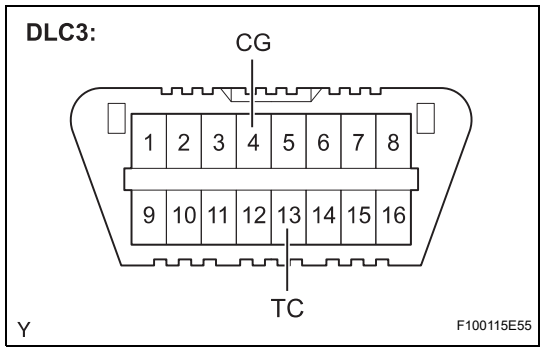
Tire size	Front kPa (kgf/cm^2, psi)	Rear kPa (kgf/cm^2, psi)
P215/60R16 94V	220 (2.2, 32)	220 (2.2, 32)

NOTICE:
Perform the tire pressure adjustment after the vehicle has sufficiently cooled down. If the vehicle is not sufficiently cooled down, increase the air pressure by 20 to 30 kPa (0.2 to 0.3 kgf/cm^2, 2.9 to 4.3 psi) above the specified value.



3. INITIALIZATION PROCEDURE (TIRE PRESSURE WARNING SYSTEM)

(a) Keep the tire pressure warning reset switch pressed for 3 seconds or more with the power switch on (IG).
(b) Check that the tire pressure warning light blinks 3 times (1 second ON, 1 second OFF).
HINT:
Initialization will be completed if signals are received from all wheels.



(c) Wait for 2 or 3 minutes with the power switch on (IG).
NOTICE:
- **The initialization is normally completed within 2 to 3 minutes.**
- **If the initialization has not been completed successfully, DTC C2177/77 is set approximately 20 minutes.**
- **The initialization can be terminated by making a short circuit between terminals TC and CG of the DLC3 connector.**

(d) Confirm that the initialization has been completed using the intelligent tester.

(1) Change the mode to test mode using the intelligent tester and check that the tire pressure warning light tire pressure warning light blinks at 0.125 second intervals.

HINT:

The tire pressure warning light will not blink until the system initialization is complete.

NOTICE:

The following operations can be used instead of above procedure:

1. **Turn the power switch from off to on (IG).**
2. **Monitor the tire pressure values of all the wheels using the intelligent tester.**
3. **If the tire pressure values cannot be displayed on the intelligent tester screen, the initialization has failed.**
4. **It takes 2 to 3 minutes to display the tire pressure data.**

HINT:

- In winter, as the tire pressure may decrease depending on the ambient temperature, increase the tire pressure by 20 to 30 kPa (0.2 to 0.3 kgf/cm^2, 2.9 to 4.3 psi) above the specified value after confirmation that the initialization has been completed.

4. DESCRIPTION (ELECTRONICALLY CONTROLLED BRAKE SYSTEM)

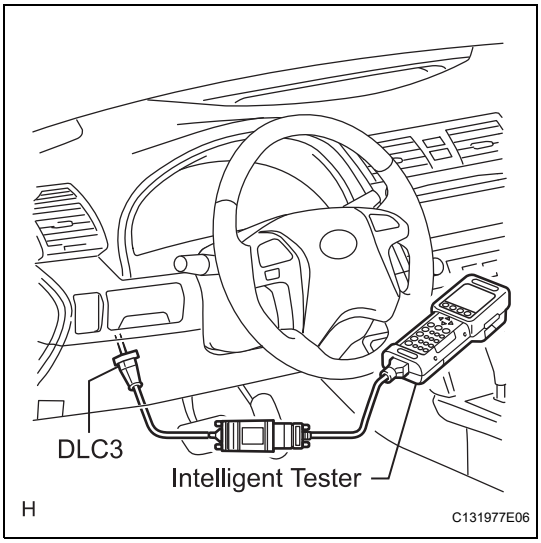
(a) Perform initialization of linear solenoid valve and calibration when the skid control ECU, brake actuator or brake pedal stroke sensor is replaced. Follow the procedure to perform initialization.

HINT:

- If there is a problem with the auxiliary battery (12 V) voltage, initialization of linear solenoid valve and calibration cannot be completed normally. Make sure to check the auxiliary battery voltage before performing initialization of linear solenoid valve and calibration.
- If the actuator's temperature is high, initialization of linear solenoid valve and calibration may not be completed normally. In such a case, wait until the temperature decreases and then perform initialization of linear solenoid valve and calibration.
- If the power switch is turned off, the brake pedal is operated or vehicle speed is input while the linear solenoid valve offset learning is being performed, the learning will be cancelled.

Replacement Parts	Necessary Operation
Skid control ECU	Initialization of linear solenoid valve and calibration

Replacement Parts	Necessary Operation
Brake actuator assembly	1. Bleed air 2. Clearing stored value of linear solenoid valve and calibration data 3. Initialization of linear solenoid valve and calibration
• Brake pedal stroke sensor • Brake pedal	1. Inspection and adjustment of brake pedal height 2. Clearing stored value of linear solenoid valve and calibration data 3. Initialization of linear solenoid valve and calibration

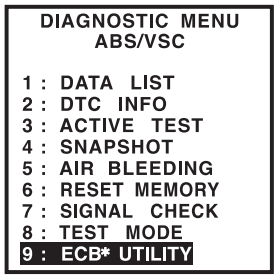


5. PERFORM INITIALIZATION OF LINEAR SOLENOID VALVE AND CALIBRATION (INTELLIGENT TESTER) (ELECTRONICALLY CONTROLLED BRAKE SYSTEM)

(a) Clear the stored value of linear solenoid valve and calibration data.
  (1) Turn the power switch off.
  (2) Connect the intelligent tester to the DLC3.
  (3) Move the shift lever to the P position.
  (4) Turn the power switch on (IG) with the brake pedal released.
  (5) Clear the stored value of initialization of linear solenoid valve and calibration following the screen.
  HINT:
  Refer to the intelligent tester operator's manual for further details.
  (6) Using the intelligent tester, perform initialization of linear solenoid valve and calibration.

(b) Perform the initialization of linear solenoid valve and calibration.
  (1) Turn the power switch off.
  (2) Connect the intelligent tester to the DLC3.
  (3) Move the shift lever to the P position.
  (4) Turn the power switch on (IG) with the brake pedal released.
  NOTICE:
  - **If the linear solenoid valve offset learning is performed without turning the power switch on (IG), the learning process may not be completed properly because of insufficient auxiliary battery voltage.**
  - **When the linear solenoid valve offset learning is interrupted, or the learning process is performed with the shift lever not in the P position, DTC C1345/66 will be stored (See page BC-190).**

Tester Display:



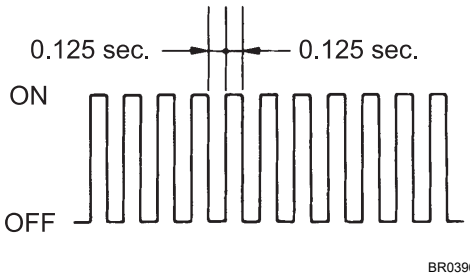
*: Electronically Controlled Brake

N C145966E01

(5) Set the intelligent tester to Test Mode (select "ECB* UTILITY").
*: Electronically Controlled Brake
HINT:
Refer to the intelligent tester operator's manual for further details.

(6) Leave the vehicle stationary without depressing the brake pedal for 1 or 2 minutes.

Blinking Pattern in TEST MODE:



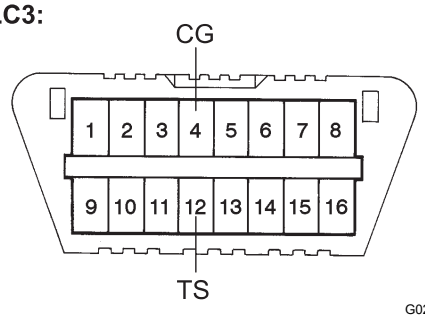
BR03904E15

(7) Check that the interval between blinks of the brake control warning light changes from 1 second to 0.25 seconds.
HINT:
- The time needed to complete initialization of linear solenoid valve and calibration varies depending on auxiliary battery voltage.
- The brake control warning light blinks at 1 second intervals during initialization of linear solenoid valve and calibration and changes to the Test Mode display.
- The brake control warning light blinks at 0.25 seconds intervals if the Test Mode is normal.

(8) Check that DTC C1345/66 which indicates trouble with stroke sensor zero point learning is not output when the brake control warning light changes to the Test Mode display upon initialization of linear solenoid valve and calibration completion.

(9) Enter the normal mode from the Test Mode following the intelligent tester prompts.
HINT:
Refer to the intelligent tester operator's manual for further details.

DLC3:



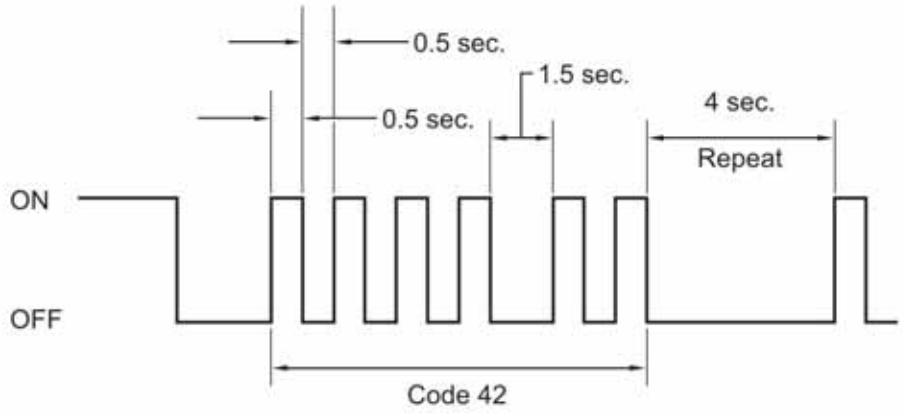
G022987E07

6. PERFORM INITIALIZATION OF LINEAR SOLENOID VALVE AND CALIBRATION (SST CHECK WIRE) (ELECTRONICALLY CONTROLLED BRAKE SYSTEM)

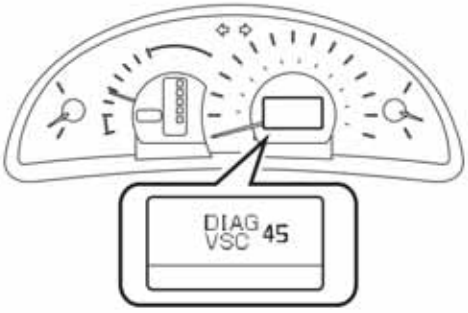
(a) Clear the stored value of linear solenoid valve and calibration data.
(1) Turn the power switch off.
(2) Move the shift lever to the P position.
(3) Turn the power switch on (IG) with the brake pedal released.
(4) Using SST, connect and disconnect terminals TS and CG of the DLC3 4 times or more within 8 seconds.
SST 09843-18040

(5) Check that no codes other than ABS code 42, VSC code 45 and Electronically Controlled Brake code 48, 66, or 95 are stored in the diagnostic system.

Blinking Pattern of ABS and Electronically Controlled Brake Code (Example Code 42):



Display of VSC Code:



N

C135830E02

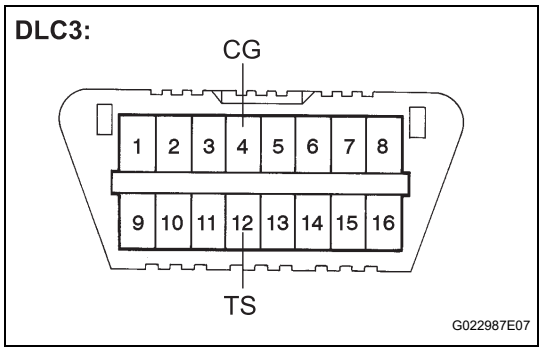
HINT:
The ABS warning, brake control warning lights and multi information display do not indicate the normal system code.

(6) Remove the SST from the terminals of the DLC3.

(7) Using the check wire, perform initialization of linear solenoid valve and calibration.

(b) Perform initialization of linear solenoid valve and calibration.

(1) Turn the power switch off.

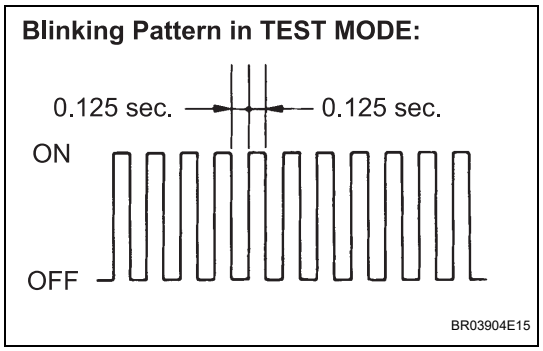


(2) Using SST, connect terminals TS and CG of the DLC3.
SST 09843-18040

(3) Move the shift lever to the P position.

(4) Turn the power switch on (IG) with the brake pedal released.
NOTICE:
- **If the linear solenoid valve offset learning is performed without turning the power switch on (IG), the learning process may not be completed properly because of insufficient auxiliary battery voltage.**
- **When the linear solenoid valve offset learning is interrupted, or the learning process is performed with the shift lever not in the P position, DTC C1345/66 will be stored (See page BC-190).**

(5) Leave the vehicle stationary without depressing the brake pedal for 1 or 2 minutes.



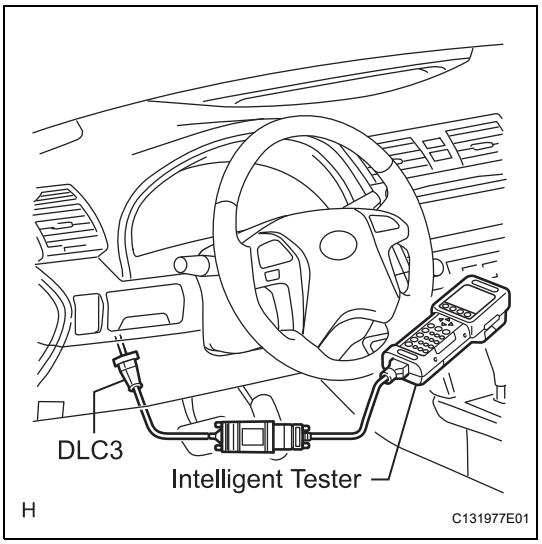
(6) Check that the interval between blinks of the brake control warning light changes from 1 second to 0.25 seconds.
HINT:
- The time needed to complete initialization of linear solenoid valve and calibration varies depending on the auxiliary battery voltage.
- The brake control warning light blinks at 1 second intervals during initialization of linear solenoid valve and calibration and changes to the Test Mode display.
- The brake control warning light blinks at 0.25 seconds intervals if the Test Mode is normal.

(7) Check that DTC C1345/66 which indicates trouble with stroke sensor zero point learning is not output when the brake control warning light changes to the Test Mode display upon initialization of linear solenoid valve and calibration completion.

(8) Turn the power switch off and disconnect the SST from the DLC3.

7. ROTATION ANGLE SENSOR VALUE INITIALIZATION AND TORQUE SENSOR ZERO POINT CALIBRATION (ELECTRONIC POWER STEERING SYSTEM)
NOTICE:
Clear the rotation angle sensor calibration value, initialize the rotation angle sensor value, and calibrate the torque sensor zero point if any of the following has occurred:
- **The power steering ECU assembly has been replaced.**
- **The power steering link assembly has been replaced.**
- **Steering effort differs between left and right.**

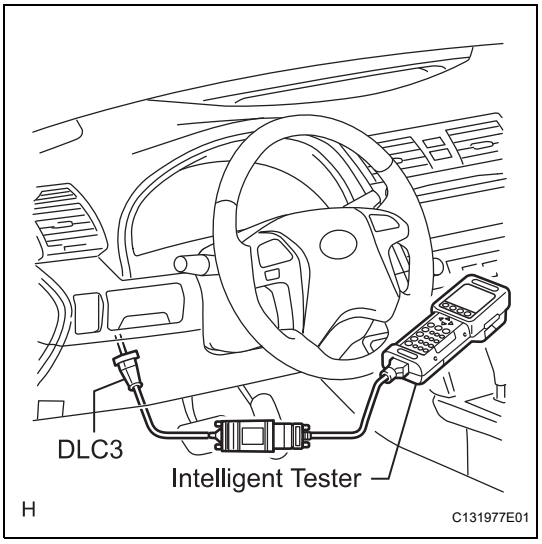
IN



(a) Inspection before calibration
(1) Connect the intelligent tester (with CAN VIM) to the DLC3.
(2) Turn the power switch on (IG).
(3) Turn the intelligent tester on.
(4) Select "IG SUPPLY" from the data list.
(5) Check the IG power supply voltage on the tester screen.

Tester Display	Measurement Item/Range	Inspection Condition	Reference Value
IG SUPPLY	ECU power source voltage/ Min.: 0 V, Max.: 25.5 V	Power switch on (IG)	10 to 14 V

Standard voltage:
10 to 14 V
NOTICE:
If the IG power supply voltage is 10 V or less, calibration cannot be performed. In this case, charge or replace the battery, and then perform calibration.



(b) Rotation angle sensor calibration value clear, rotation angle sensor value initialization, and torque sensor zero point calibration.
NOTICE:
- **If DTC C1516 (Torque Sensor Zero Point Adjustment Incomplete) is stored, the torque sensor zero point cannot be calibrated. Clear the DTC before starting calibration.**
- **If DTC C1526 (Rotation Angle Sensor Initialization Incomplete) is stored, the rotation angle sensor value cannot be initialized. Clear the DTC before starting initialization.**

(1) Connect the intelligent tester (with CAN VIM) to the DLC3.
(2) Turn the power switch on (IG).
(3) Turn the intelligent tester on.
(4) Select "TRQ SENSOR ADJ".

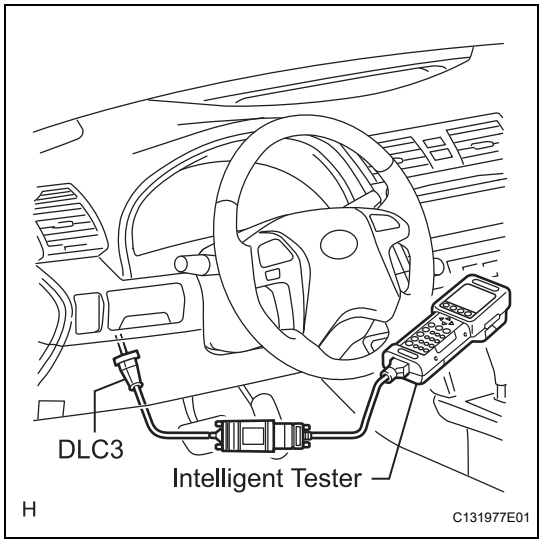
(5) Follow the procedures on the tester display to clear the rotation angle sensor calibration value, initialize the rotation angle sensor value, and calibrate the torque sensor zero point.
NOTICE:
- **When initializing the rotation angle sensor value, observe the following to stabilize sensor voltage:**
  After turning the power switch on (IG), wait for at least 2.5 seconds before turning the steering wheel. Do not turn the steering wheel quickly.
- **The steering wheel will vibrate during torque sensor zero point calibration. Do not touch the steering wheel while it is vibrating or for 2 seconds after it stops.**

8. ZERO POINT CALIBRATION (OCCUPANT CLASSIFICATION SYSTEM)
NOTICE:
Make sure that the front passenger seat is not occupied before performing the operation:
HINT:
Perform zero point calibration and sensitivity check if any of the following conditions occur.
- The occupant classification ECU is replaced.
- Accessories (seatback tray and seat cover, etc.) are installed.
- The front passenger seat is removed from the vehicle.
- The passenger airbag ON/OFF indicator ("OFF") comes on when the front passenger seat is not occupied.
- The vehicle is brought to the workshop for repair due to an accident or a collision.

(a) Zero point calibration and sensitivity check procedures.
HINT:
Make sure that zero point calibration has finished normally, and then perform the sensitivity check.
(1) Adjust the seat position according to the table below.

Adjustment Component	Position
Slide Direction	Rearmost position
Reclining Angle	Upright position
Headrest Height	Lowest position
Lifter Height	Lowest position

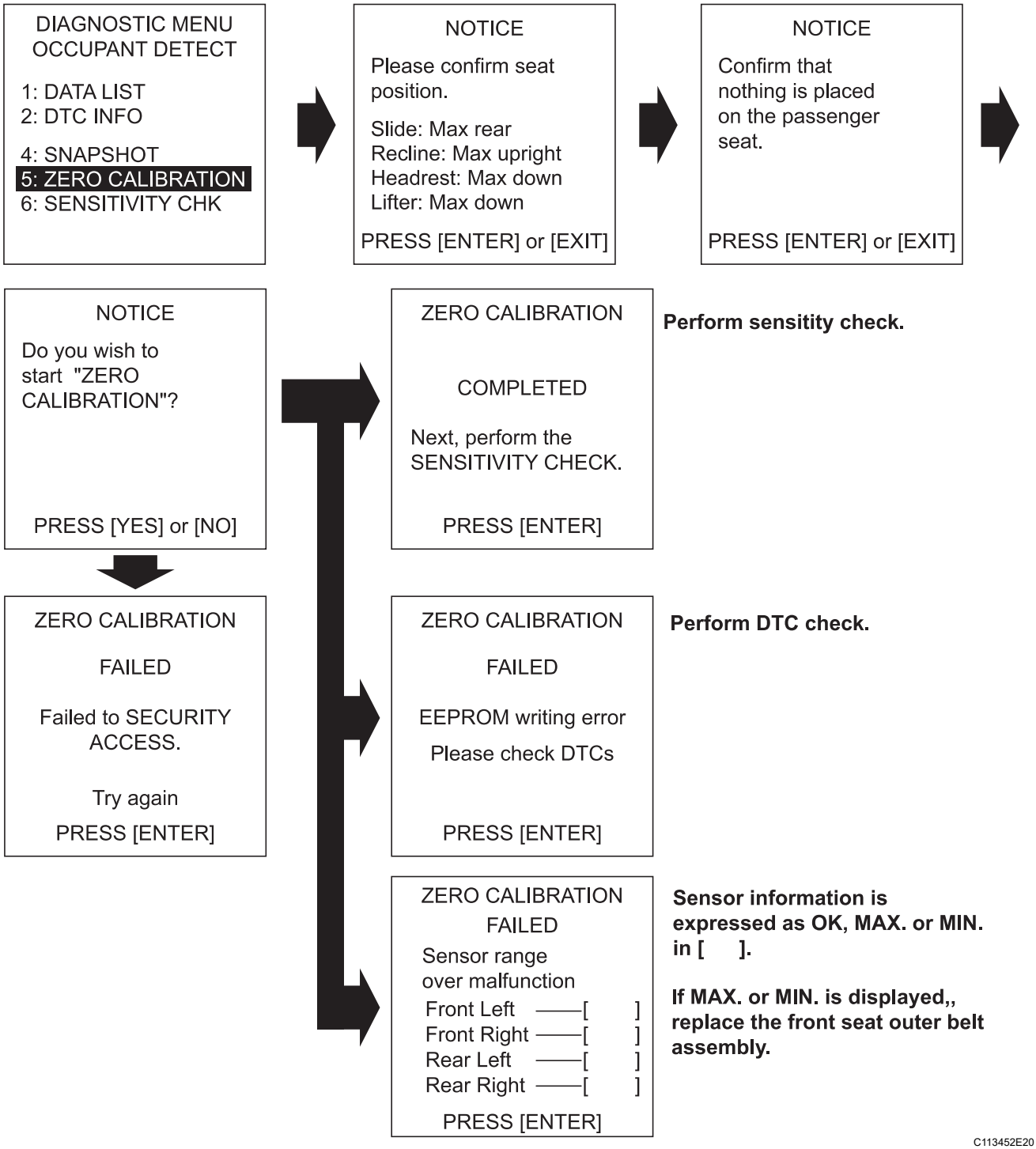
(2) Connect the intelligent tester to the DLC3.
(3) Turn the power switch on (IG).



(4) Perform the zero point calibration by following the prompts on the tester screen.

ZERO POINT CALIBRATION PROCEDURE

"1: DIAGNOSIS" - "1: OBD/MOBD" - "MODEL YEAR" - "MODEL SELECTION" - "CAMRY" - Select the option parts" - "9: OCCUPANT DETECT"
Refer to the following screen flow.



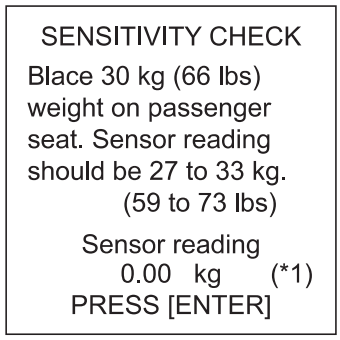
HINT:
Refer to the intelligent tester operator's manual for further details.

OK:
"COMPLETE" is displayed.

(5) Perform the sensitivity check by following the prompts on the tester screen.
(6) Confirm that the beginning sensor reading within standard value.
Standard value:
-3.2 to 3.2 kg (-7 to 7 lb)
(7) Place a 30 kg (66.14 lb) weight (eg. a 30 kg (66.14 lb) of lead mass) onto the front passenger seat.
(8) Confirm that the sensitivity is within the standard value.

SENSITIVITY CHECK PROCEDURE

"1: DIAGNOSIS" - "1: OBD/MOBD" - "MODEL YEAR" - "MODEL SELECTION = CAMRY" - Select the option parts - "9: OCCUPANT DETECT" - Refer to the following screen flow.



*1: kg = lb

Unit can be changed based on unit conversion setting.

[System Selection Screen]

"1: DIAGNOSIS" - "9: SETUP" - "4: UNIT CONVERSION" - "WEIGHT" (kg = lbs)

C

C113453E18

Standard value:
27 to 33 kg (59.52 to 72.75 lb)

HINT:

- When performing the sensitivity check, use a solid metal weight (the check result may not appear properly if the weight made from liquid is used).

- When the sensitivity deviates from the standard value, retighten the bolts of the front passenger seat without deforming the seat rail. After performing this procedure, if the sensitivity is not within the standard value, replace the front seat assembly RH.
- When zero point calibration has not finished normally, replace the front seat assembly RH.

9. DESCRIPTION OF CODE REGISTRATION (ENGINE IMMOBILIZER SYSTEM)

HINT:

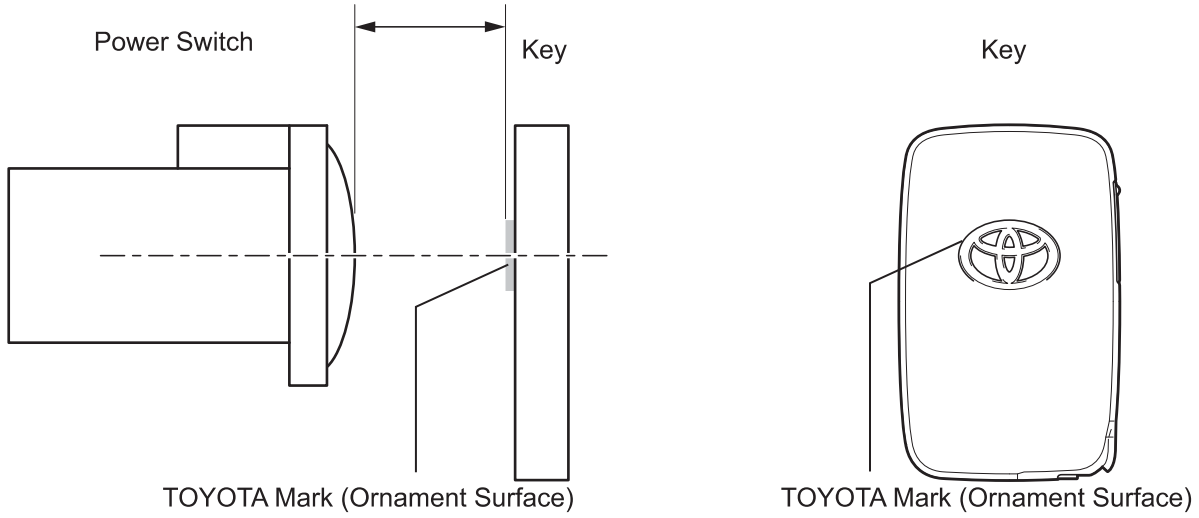
- ID codes are the same as recognition codes for the wireless transmitter and the engine immobiliser function. Registering an ID code enables the smart key system, the wireless door lock control function and the engine immobiliser function to be operated.
- Code registration is needed when the certification ECU, ID code box, steering lock ECU or key is replaced with a new one.

(a) PROCEDURE "1"
The vehicle with the smart key system does not have a key slot. Therefore, hold the key close to the power switch to register the key, as shown in the illustration below.

IN

Hold the key with its ornament surface within a range of 10 mm (0.39 in.) or less from the power switch.

Communication distance: 10 mm (0.39 in.) or less from the power switch.



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10. PART REPLACEMENT KEY REGISTRATION (ENGINE IMMOBILIZER SYSTEM)

The following table shows ECU replacement and key registration procedures in case the malfunctioning ECU has been identified after troubleshooting the smart key system.

HINT:

- The following procedures indicated in the table below require the use of the intelligent tester:
  - New key ID registration
  - Additional key ID registration
  - Key ID erasure
  - ECU code registration
- If all of the registered keys are not available, replacement of the ID code box is also required.
- A maximum of 7 keys can be registered.

IN

Part to be replaced	Condition		Procedure	Reference
Certification ECU	Customer has brought all keys		1. Replace certification ECU	-
			2. Reregister all keys (new key ID registration)	PROCEDURE "B"
	Some keys are lost	Key ID codes can be registered and erased	1. Erase key codes (key ID erasure)	PROCEDURE "D"
			2. Perform additional key registration procedure (additional key ID registration)	PROCEDURE "C"
			3. Replace certification ECU	-
			4. Reregister all keys (new key ID registration) HINT: If some keys are not registered during above steps, they will be disabled because they cannot be registered later.	PROCEDURE "B"
		Key ID codes cannot be either registered or erased	1. Replace certification ECU	-
			2. Replace ID code box	-
			3. Reregister all keys (new key ID registration) HINT: If key codes cannot be erased or additional keys cannot be registered due to a malfunction in certification ECU, replace ID code box and certification ECU. If some keys are not registered during above steps, they will be disabled because they cannot be registered later.	PROCEDURE "A"
			4. ECU communication ID registration	PROCEDURE "F"
ID code box	At least 1 key is available		1. Replace ID code box	-
			2. Register recognition codes in ECUs (ECU code registration)	PROCEDURE "E"
			3. ECU communication ID registration	PROCEDURE "F"
	All keys are lost		1. Replace ID code box	-
			2. Replace certification ECU	-
			3. Reregister all keys (new key ID registration) HINT: If some keys are not registered during above steps, they will be disabled because they cannot be registered later.	PROCEDURE "A"
			4. ECU communication ID registration	PROCEDURE "F"
Steering lock ECU	Customer has brought at least 1 key		1. Replace steering lock ECU	-
			2. Register recognition codes in ECUs (ECU code registration)	PROCEDURE "E"
	All keys are lost		1. Replace steering lock ECU	-
			2. Replace certification ECU	-
			3. Replace ID code box	-
			4. Reregister all keys (new key ID registration) HINT: If some keys are not registered during above steps, they will be disabled because they cannot be registered later.	PROCEDURE "A"
			5. ECU communication ID registration	PROCEDURE "F"
Main body ECU (Instrument panel J/B)	No condition required		Replace main body ECU (Instrument panel J/B)	-
Hybrid vehicle control ECU	No condition required		1. Replace hybrid vehicle control ECU	-
			2. ECU communication ID registration	PROCEDURE "F"

Part to be replaced	Condition	Procedure	Reference
Key	Customer has brought at least 1 key	1. Using remaining key, erase lost key code (key ID erasure)	PROCEDURE "D"
		2. Register additional keys as necessary (additional key ID registration)	PROCEDURE "E"
	All keys are lost	1. Replace certification ECU	-
		2. Replace ID code box	-
		3. Register all keys (new key ID registration) HINT: If customer brings lost keys at later date, they can be registered using additional key ID registration function.	PROCEDURE "A"
		4. ECU communication ID registration	PROCEDURE "F"

11. KEY REGISTRATION (ENGINE IMMOBILIZER SYSTEM)

(a) PROCEDURE "A"
New key ID registration (when replacing certification ECU and ID code box, or certification ECU, ID code box and steering lock ECU)

Process	Procedure
1. Start of registration	1. Connect intelligent tester (with CAN VIM) to DLC3 2. Turn power switch on (IG) 3. Select "SMART KEY / ID UTILITY / SMART CODE REG" from tester menu HINT: The power switch cannot be turned on (IG) more than 10 times. After connecting tester, turn tester on while turning driver's side door courtesy light switch on and off repeatedly at 1.5-second intervals or less to continue key registration procedure.
2. Confirmation of ECU code	Perform operation according to prompts on tester screen HINT: The mode is automatically selected by tester, new registration mode or add mode.
3. Verification of unregistered key *1	Hold unregistered key close to power switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds. Place unregistered key on front passenger's side seat.
	Confirm that wireless door lock buzzer sounds
4. Registration of ID code	Perform operation according to prompts on tester screen
5. End of registration	Finish new key ID code registration

*1: Repeat this process for each key which is to be registered for the vehicle. Finish the procedure for each key within 30 seconds. If the procedure for any of the keys has not been finished within the specified time, perform registration procedures from process 1 again. Make sure that only 1 key is in the cabin during registration procedures. If 2 or more keys are in the cabin simultaneously, electric waves will interfere with each other, preventing normal registration.

(b) PROCEDURE "B"
New key ID registration (when replacing certification ECU)

Process	Procedure
1. Start of registration	1. Connect intelligent tester (with CAN VIM) to DLC3 2. Turn power switch on (IG) 3. Select "SMART KEY / ID UTILITY / SMART CODE REG" from tester menu HINT: The power switch cannot be turned on (IG) more than 10 times. After connecting tester, turn tester on while turning driver's side door courtesy light switch on and off repeatedly at 1.5-second intervals or less to continue key registration procedure.
2. Confirmation of ECU code	Perform operation according to prompts on tester screen HINT: The mode is automatically selected by tester, new registration mode or add mode.
3. Confirmation of all registered keys *1	Hold unregistered key close to power switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds
4. Confirmation of ECU code	Perform operation according to prompts on tester screen
5. Verification of unregistered key *2	Hold unregistered key close to power switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds. Place unregistered key on front passenger side seat.
	Confirm that wireless door lock buzzer sounds
5. Registration of ID code	Perform operation according to prompts on tester screen
6. End of registration	Finish new key ID code registration

*1: Repeat this process for each key registered for the vehicle. Finish the procedure for each key within 30 seconds. If the procedure for any of the keys has not been finished within the specified time, perform registration procedures from process 1 again. If performing the key confirmation procedure for a key, the security indicator comes on and remains on until all the keys are confirmed.
*2: Repeat this process for each key which is to be registered for the vehicle. Finish the procedure for each key within 30 seconds. If the procedure for any of the keys has not been finished within the specified time, perform registration procedures from 1 again. Make sure that only 1 key is in the cabin during registration procedures. If 2 or more keys are in the cabin simultaneously, electric waves will interfere with each other, preventing normal registration.

(c) PROCEDURE "C"
Additional key ID registration

Process	Procedure
1. Start of registration	1. Connect intelligent tester (with CAN VIM) to DLC3 2. Turn power switch on (IG) 3. Select "SMART KEY / ID UTILITY / SMART CODE REG" from tester menu

Process	Procedure
2. Confirmation of registered key *1	Perform operation according to prompts on intelligent tester screen HINT: The mode is automatically selected by tester, new registration mode or add mode.
	Hold unregistered key close to power switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds once
3. Confirmation of ECU code	Perform operation according to prompts on tester screen
4. Verification of unregistered key *2	Hold unregistered key close to power switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds. Place unregistered key on front passenger's side seat.
	Confirm that wireless door lock buzzer sounds
5. Registration of ID code	Perform operation according to prompts on tester screen
6. End of registration	Finish key ID code registration

*1: Perform this process for one of the keys registered for the vehicle. Finish the procedure within 30 seconds. If the procedure has not been finished within the specified time, perform registration procedures from process 1 again.
*2: Repeat this process for each key which is to be registered for the vehicle. Finish the procedure for each key within 30 seconds. If the procedure for any of the keys has not been finished within the specified time, perform registration procedures from 1 again. Make sure that only 1 key is in the cabin during registration procedures. If 2 or more keys are in the cabin simultaneously, electric waves will interfere with each other, preventing normal registration.

(d) PROCEDURE "D"
Key ID erasure
HINT:
Erase all registered key codes except one.

Process	Procedure
1. Start of erasure	1. Connect intelligent tester (with CAN VIM) to DLC3 2. Turn power switch on (IG) 3. Select "SMART KEY / ID UTILITY / SMART CODE ERS" from tester menu
2. Confirmation of registered key *1	Perform operation according to prompts on intelligent tester screen
	Hold unregistered key close to power switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds once
3. Confirmation of ECU code	Perform operation according to prompts on tester screen
4. Erasure of ID code	Perform operation according to prompts on tester screen
5. End of erasure	Finish key ID code erasure

*1: Perform this process for one of the keys registered for the vehicle. Finish the procedure within 30 seconds. If the procedure has not been finished within the specified time, perform erasure procedures from process 1 again.

(e) PROCEDURE "E"
ECU code registration

Process	Procedure
1. Start of registration	1. Connect intelligent tester (with CAN VIM) to DLC3 2. Turn power switch on (IG) 3. Select "SMART KEY / ID UTILITY / ECU COMM ID REG / ID Code Box and Steering Lock" from tester menu
2. Confirmation of registered key *1	Hold unregistered key close to power switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds once
3. Registration of ECU code	Perform operation according to prompts on tester screen
4. End of registration	Finish ECU code registration

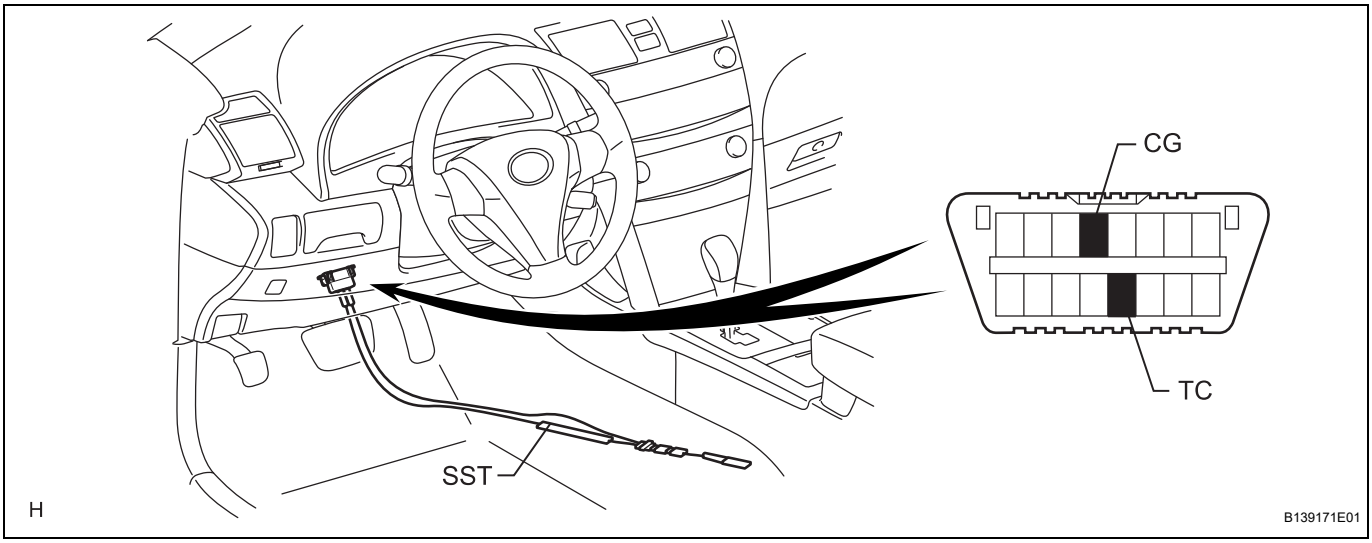
*1: Perform this process for one of the keys registered for the vehicle. Finish the procedure within 30 seconds. If the procedure has not been finished within the specified time, perform erasure procedures from process 1 again.

(f) PROCEDURE "F"
ECU communication ID registration

NOTICE:

- **The ECU communication ID should be registered when the ID code box and/or the hybrid vehicle control ECU is replaced in order to match these ECU communication ID.**
- **The engine cannot be started unless the ECU communication ID matches.**
- **After the registration, pressing the power switch may not start the hybrid control system on the first try. If so, press the power switch again.**
- **After the hybrid control system is started, erase DTC B2799-542, 790 (code for hybrid vehicle control ECU's immobiliser communication error).**

Register the ECU communication ID.



(1) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040

(2) Turn the power switch on (IG) and leave it for 30 minutes.
HINT:
Do not start the engine.
(3) Turn the power switch off and disconnect terminals TC and CG.
(4) Check that the hybrid control system.
OK:
Hybrid control system starts and stays on for more than 3 seconds.
HINT:
Using an already registered key, turn the power switch on (IG) with the brake pedal depressed.

12. INITIALIZE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF SYSTEM)
NOTICE:
When replacing the sliding roof drive gear, the sliding roof drive gear requires initialization. If a reset is not executed, the following functions do not operate: auto operation and key off operation.
(a) Turn the power switch on (IG).
(b) Make sure that the sliding roof is fully closed.
(c) Push and hold the CLOSE switch or the UP switch until the following movement finishes: Tilt up → approximately 1 second → tilt down → slide open → slide closed.
(d) Check that the sliding roof stops at the fully closed position.
(e) Finish the initialization.
(f) Check that the AUTO operation works normally.
NOTICE:
If the following conditions occur during initialization procedure, initialization will fail:
- **Power switch is turned off.**
- **Sliding roof control switch is released while sliding roof is operating.**
- **Vehicle speed is 5 km/h (3 mph) or more.**
- **Communication is cut off.**
- **Another switch is turned on during initialization.**
- **The vehicle experiences a strong vibration during initialization, such as the slamming of a door.**

HINT:
- If the sliding roof cannot be fully closed or its position has become misaligned, perform initialization again.
- If the roof glass stops moving or starts moving in the opposite direction while the CLOSE or UP switch is held down, continue to hold the switch for another 10 seconds or more to return the sliding roof control ECU to an uninitialized condition. Then perform the initialization procedure again.

- If the AUTO operation function and jam protection function do not operate after the drive gear has been reset, replace the sliding roof drive gear (sliding roof ECU).

INSPECTION MODE PROCEDURE

1. INSPECTION MODE

(a) Activating inspection mode (Not using the intelligent tester)

HINT:

Perform procedures "A" to "D" within 60 seconds.

(1) Turn the power switch on (IG) (Procedure "A").

(2) Fully depress the accelerator pedal twice with the shift P position (Procedure "B").

(3) Fully depress the accelerator pedal twice with the shift N position (Procedure "C").

(4) Fully depress the accelerator pedal twice with the shift P position (Procedure "D").

(5) Check that the HV system warning light blinked on the multi-information display (Procedure "E").

(6) Start the engine by turning the power switch while depressing the brake pedal (Procedure "F").

(b) Activating inspection mode (Using the intelligent tester)

(1) Connect the intelligent tester to the DLC3.

(2) Turn the power switch on (IG).

(3) Turn the intelligent tester on.

(4) Select following menu items: DIAGNOSIS / OBD/MOBD / HV ECU / ACTIVE TEST / INSPECTION MOD1 / ON.

(5) Check that the HV system warning light blinks on the multi-information display and the master warning light are illuminated in the combination meter.

(6) Start the engine by turning the power switch while depressing the brake pedal.

(c) Deactivating inspection mode

(1) Turn the power switch off. The HV main system turns off simultaneously.

CAUTION:

- **The idling speed in inspection mode is approximately 900 rpm. The engine speed increases to 1,500 rpm if the accelerator pedal is depressed by less than 60 %. If the accelerator pedal is depressed by more than 60%, the engine speed increases to 2,500 rpm.**
- **If a DTC is set during inspection mode, the master warning light and the warning massage illuminate on the multi-information display.**
- **When the master warning light illuminates during the inspection mode, deactivate the inspection mode, and check DTC(s).**
- **Driving the vehicle without deactivating the inspection mode may damage the transaxle.**

HOW TO PROCEED WITH TROUBLESHOOTING

1. OPERATION FLOW

HINT:
Perform troubleshooting in accordance with the procedures below. The following is an outline of basic troubleshooting procedures. Confirm the troubleshooting procedures for the circuit you are working on before beginning troubleshooting.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 CUSTOMER PROBLEM ANALYSIS

(a) Ask the customer about the conditions and environment when the problem occurred.

NEXT

3 INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V
If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

4 SYMPTOM CONFIRMATION AND DTC (AND FREEZE FRAME DATA) CHECK

(a) Visually check the wire harnesses, connectors and fuses for open and short circuits.
(b) Warm up the engine to the normal operating temperature.
(c) Confirm the problem symptoms and conditions, and check for DTCs.

Result

Result	Proceed to
DTC is output	A
DTC is not output	B

B → **Go to step 6**

A

5	DTC CHART

(a) Check the results obtained in step 4. Then find the output DTC in the DTC chart. Look at the "Trouble Area" column for a list of potentially malfunctioning circuits and/or parts.

NEXT → Go to step 7

6	PROBLEM SYMPTOMS CHART

(a) Check the results obtained in step 4. Then find the problem symptoms in the problem symptoms table. Look at the "Suspected Area" column for a list of potentially malfunctioning circuits and/or parts.

NEXT

7	CIRCUIT INSPECTION OR PARTS INSPECTION

(a) Identify the malfunctioning circuit or part.

NEXT

8	ADJUST, REPAIR OR REPLACE

(a) Adjust, repair or replace the malfunctioning circuit or parts.

NEXT

9	CONFIRMATION TEST

(a) After the adjustment, repairs or replacement, confirm that the malfunction no longer exists. If the malfunction does not reoccur, perform a confirmation test under the same conditions and in the same environment as when the malfunction occurred the first time.

NEXT

END

2. CUSTOMER PROBLEM ANALYSIS

HINT:

- In troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.
- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.
- The following 5 items are important points in the problem analysis:

What	Vehicle model, system name
When	Date, time, occurrence frequency
Where	Road conditions
Under what conditions?	Running conditions, driving conditions, weather conditions
How did it happen?	Problem symptoms

3. SYMPTOM CONFIRMATION AND DIAGNOSTIC TROUBLE CODE

HINT:

The diagnostic system in the CAMRY HV has various functions.

- The first function is the Diagnostic Trouble Code (DTC) check. A DTC is a code stored in the ECU memory whenever a malfunction in the signal circuits to the ECU occurs. In a DTC check, a previous malfunction's DTC can be checked by a technician during troubleshooting.
- Another function is the Input Signal Check, which checks if the signals from various switches are sent to the ECU correctly.

  By using these functions, the problem areas can be narrowed down and troubleshooting is more effective. Diagnostic functions are incorporated in the following system in the CAMRY HV.

System	DTC Check (Normal Mode)	DTC Check (Check Mode)	Sensor Check/Test Mode (Input Signal Check)	Data List	Active Test
SFI System	○	○		○	○
Smart Key System (Starting)	○			○	○
Hybrid Control System	○			○	○
Hybrid Battery System	○	○		○	○
Tire Pressure Warning System	○		○	○	○
Electronically Controlled Brake System	○		○	○	○
Electric Steering Lock	○			○	○
Electronic Power Steering System	○			○	

System	DTC Check (Normal Mode)	DTC Check (Check Mode)	Sensor Check/Test Mode (Input Signal Check)	Data List	Active Test
Air Conditioning System	○			○	○
Airbag System	○	○		○	
Occupant Classification System	○			○	
Seat Belt Warning System					○
Engine Immobilizer System	○			○	○
Cruise Control System	○			○	
Lighting System	○			○	○
Power Door Lock Control System	○			○	○
Wireless Door Lock Control System	○			○	○
Smart Key System (Door Lock)	○			○	○
Meter/Gauge System	○			○	○
Audio and Visual System	○				
Navigation System	○				
Window Defogger System					○
Fuel Lid Opener System				○	○
Sliding Roof System	○			○	○

- In the DTC check, it is very important to determine whether the problem indicated by the DTC either: 1) still occurs, or 2) occurred in the past but has returned to normal. In addition, the DTC should be compared to the problem symptom to see if they are related. For this reason, DTCs should be checked before and after confirmation of symptoms (i.e., whether or not problem symptoms exist) to determine current system conditions, as shown in the flowchart below.
- Never skip the DTC check. Failing to check DTCs may, depending on the case, result in unnecessary troubleshooting for systems operating normally or lead to repairs not related to the problem. Follow the procedures listed in the flowchart in the correct order.
- The following flowchart shows how to proceed with troubleshooting using the DTC check. Directions from the flowchart will indicate how to proceed either to DTC troubleshooting or to the troubleshooting of each problem symptom.

1	DTC CHECK

NEXT

2	MAKE A NOTE OF DTCS DISPLAYED AND THEN CLEAR MEMORY

NEXT

3	SYMPTOM CONFIRMATION

Result

Result	Proceed to
No symptoms exist	A
Symptoms exist	B

B → Go to step 5

A

4	SIMULATION TEST USING SYMPTOM SIMULATION METHODS

NEXT

5	DTC CHECK

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B → TROUBLESHOOTING OF PROBLEM INDICATED BY DTC

A

6	SYMPTOM CONFIRMATION

Result

Result	Proceed to
No symptoms exist	A
Symptoms exist	B

If a DTC was displayed in the initial DTC check, the problem may have occurred in a wire harness or connector in that circuit in the past. Check the wire harness and connectors.

B → SYSTEM NORMAL

A

TROUBLESHOOTING OF EACH PROBLEM SYMPTOM

IN

The problem still occurs in a place other than the diagnostic circuit (the DTC displayed first is either for a past problem or a secondary problem).

4. SYMPTOM SIMULATION

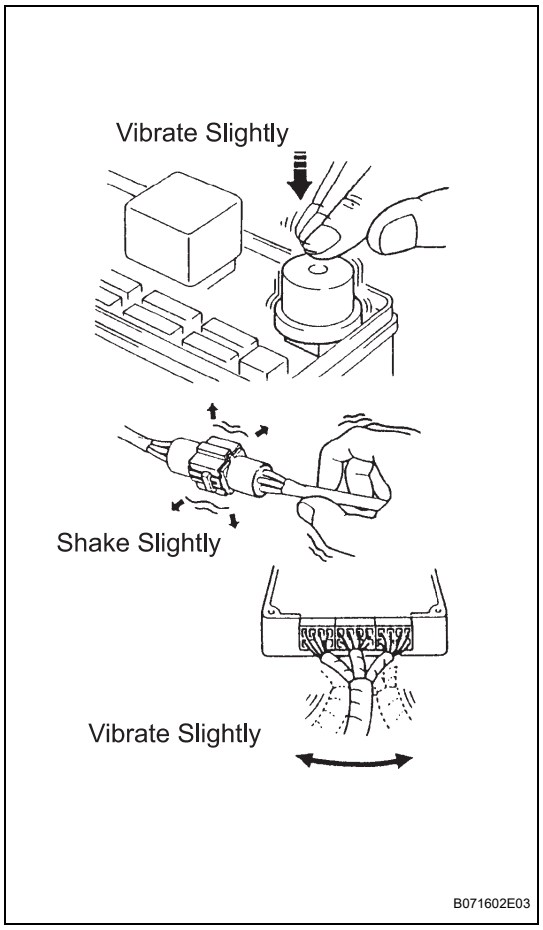
HINT:

The most difficult case in troubleshooting is when no problem symptoms occur. In such a case, a thorough problem analysis must be carried out. A simulation of the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be carried out. No matter how much skill or experience a technician has, troubleshooting without confirming the problem symptoms will lead to important repairs being overlooked and mistakes or delays.

For example:

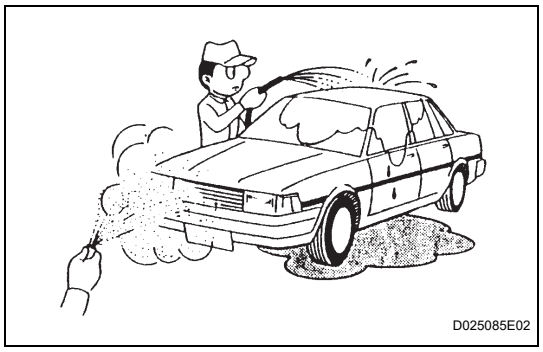
With a problem that only occurs when the engine is cold or as a result of vibration caused by the road during driving, the problem can never be determined if the symptoms are being checked on a stationary vehicle or a vehicle with a warmed-up engine. Vibration, heat or water penetration (moisture) are difficult to reproduce. The symptom simulation tests below are effective substitutes for the conditions and can be applied to a stationary vehicle. Important points in the symptom simulation test:

In the symptom simulation test, the problem symptoms as well as the problem area or parts must be confirmed. First, narrow down the possible problem circuits according to the symptoms. Then, connect the tester and carry out the symptom simulation test, judging whether the circuit being tested is defective or normal. Also, confirm the problem symptoms at the same time. Refer to the problem symptoms table for each system to narrow down the possible causes.

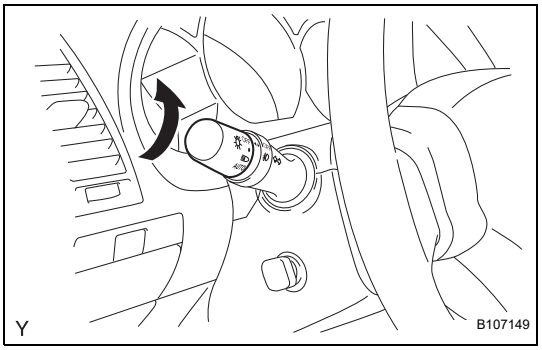


(a) VIBRATION METHOD: When a malfunction seems to occur as a result of vibration.
  (1) PART AND SENSOR
    Apply slight vibration with a finger to the part of the sensor suspected to be the cause of the problem, and check whether the malfunction occurs.
    NOTICE:
    Applying strong vibration to relays may open relays.
  (2) CONNECTORS
    Slightly shake the connector vertically and horizontally.
  (3) WIRE HARNESS
    Slightly shake the wire harness vertically and horizontally.
    HINT:
    The connector joint and fulcrum of the vibration are the major areas that should be checked thoroughly.

(b) HEAT METHOD: When a malfunction seems to occur when the area in question is heated.
  (1) Heat the component that is the possible cause of the malfunction with a hair dryer or similar device. Check if the malfunction occurs.
    NOTICE:
    - **Do not heat to more than 60°C (140°F). Exceeding this temperature may damage the components.**
    - **Do not apply heat directly to the parts in the ECU.**



(c) WATER SPRINKLING METHOD: When a malfunction seems to occur on a rainy day or in high-humidity.
  (1) Sprinkle water onto the vehicle and check if the malfunction occurs.
    NOTICE:
    - **Never sprinkle water directly into the engine compartment. Indirectly change the temperature and humidity by spraying water onto the front of the radiator.**
    - **Never apply water directly onto the electronic components.**
    HINT:
    If the vehicle has or had a water leakage problem, the leakage may have damaged the ECU or connections. Look for evidence of corrosion or short circuits. Proceed with caution during water tests.



(d) HIGH ELECTRICAL LOAD METHOD: When a malfunction seems to occur when an electrical load is excessive.
(1) Turn on the heater blower, headlight, rear window defogger and all other electrical loads. Check if the malfunction reoccurs.

5. DIAGNOSTIC TROUBLE CODE CHART

Look for output Diagnostic Trouble Codes (DTCs) (from the DTC checks) in the appropriate section's Diagnostic Trouble Code Chart. Use the chart to determine the trouble area and the proper inspection procedure. A description of each of the chart's columns is shown in the table below.

Item	Description
DTC No.	Indicates the diagnostic trouble code
Detection Item	Indicates the system or details of the problem
Trouble Area	Indicates the suspected areas of the problem
See Page	Indicates the page where the inspection procedures for each circuit is to be found, or gives instruction for checking and repairs.

6. PROBLEM SYMPTOMS TABLE

When a "Normal" code is output during a DTC check but the problem still occurs, use the Problem Symptoms Table. The suspected areas (circuits or parts) for each problem symptoms are in the table. The suspected areas are listed in order of probability. A description of each of the chart's columns is shown in the table below.

HINT:

In some cases, the problem is not detected by the diagnostic system even though a problem symptom occurs. It is possible that the problem occurs outside the detection range of the diagnostic system, or that the problem occurs in a completely different system.

Item	Description
Problem Symptom	-
Circuit Inspection, Inspection Order	Indicates the order in which the circuits need to be checked
Circuit or Part Name	Indicates the circuit or part which needs to be checked
See Page	Indicates the page where the flowchart for each circuit is located

7. CIRCUIT INSPECTION

A description of the main areas of each circuit inspection is shown in the table below.

Item	Description
Circuit Description	The major role, operation of the circuit and its component parts are explained.
Diagnostic Trouble Code No. and Detection Item	Indicates the diagnostic trouble codes, diagnostic trouble code settings and suspected areas for a problem
Wiring Diagram	This shows a wiring diagram of the circuit. Use this diagram together with ELECTRICAL WIRING DIAGRAM to thoroughly understand the circuit. Wire colors are indicated by an alphabetical code. B = Black, L = Blue, R = Red, BR = Brown, LG = Light Green, V = Violet, G = Green, O = Orange, W = White, GR = Gray, P = Pink, Y = Yellow, SB = Sky Blue The first letter indicates the basic wire color and the second letter indicates the color of the stripe.

Item	Description
Inspection Procedures	Use the inspection procedures to determine if the circuit is normal or abnormal. If abnormal, use the inspection procedures to determine whether the problem is located in the sensors, actuators, wire harnesses or ECU.
Indicates the condition of the connector of the ECU during the check	Connector being checked is connected. Connections of tester are indicated by (+) or (-) after the terminal name. Connector being checked is disconnected. The inspections between a connector and body ground, information about the body ground is not shown in the illustration.

GLOSSARY OF SAE AND TOYOTA TERMS

This glossary lists all SAE-J1930 terms and abbreviations used in this manual in compliance with SAE recommendations, as well as their TOYOTA equivalents.

SAE ABBREVIATIONS	SAE TERMS	TOYOTA TERMS ( )-ABBREVIATIONS
A/C	Air Conditioning	Air Conditioner
ACL	Air Cleaner	Air Cleaner, A/CL
AIR	Secondary Air Injection	Air Injection (AI)
AP	Accelerator Pedal	-
B+	Battery Positive Voltage	+B, Battery Voltage
BARO	Barometric Pressure	HAC
CAC	Charge Air Cooler	Intercooler
CARB	Carburetor	Carburetor
CFI	Continuous Fuel Injection	-
CKP	Crankshaft Position	Crank Angle
CL	Closed Loop	Closed Loop
CMP	Camshaft Position	Cam Angle
CPP	Clutch Pedal Position	-
CTOX	Continuous Trap Oxidizer	-
CTP	Closed Throttle Position	LL ON, Idle ON
DFI	Direct Fuel Injection	Direct Injection (DI./INJ)
DI	Distributor Ignition	-
DLC3	Data Link Connector 3	OBD II Diagnostic Connector
DTC	Diagnostic Trouble Code	Diagnostic Trouble Code
DTM	Diagnostic Test Mode	-
ECL	Engine Coolant Level	-
ECM	Engine Control Module	Engine Electronic Control Unit (ECU)
ECT	Engine Coolant Temperature	Coolant Temperature, Water Temperature (THW)
EEPROM	Electrically Erasable Programmable Read Only Memory	Electrically Erasable Programmable Read Only Memory (EEPROM), Erasable Programmable Read Only Memory (EPROM)
EFE	Early Fuel Evaporation	Cold Mixture Heater (CMH), Heat Control Valve (HCV)
EGR	Exhaust Gas Recirculation	Exhaust Gas Recirculation (EGR)
EI	Electronic Ignition	Distributorless Ignition (DLI)
EM	Engine Modification	Engine Modification (EM)
EPROM	Erasable Programmable Read Only Memory	Programmable Read Only Memory (PROM)
EVAP	Evaporative Emission	Evaporative Emission Control (EVAP)
FC	Fan Control	-
FEEPROM	Flash Electrically Erasable Programmable Read Only Memory	-
FEPROM	Flash Erasable Programmable Read Only Memory	-
FF	Flexible Fuel	-
FP	Fuel Pump	Fuel Pump
GEN	Generator	Alternator
GND	Ground	Ground (GND)
HO2S	Heated Oxygen Sensor	Heated Oxygen Sensor (HO_2S)
IAC	Idle Air Control	Idle Speed Control (ISC)
IAT	Intake Air Temperature	Intake or Inlet Air Temperature
ICM	Ignition Control Module	-

SAE ABBREVIATIONS	SAE TERMS	TOYOTA TERMS ( )-ABBREVIATIONS
IFI	Indirect Fuel Injection	Indirect Injection (IDL)
IFS	Inertia Fuel-Shutoff	-
ISC	Idle Speed Control	-
KS	Knock Sensor	Knock Sensor
MAF	Mass Airflow	Air Flow Meter
MAP	Manifold Absolute Pressure	Manifold Pressure Intake Vacuum
MC	Mixture Control	Electric Bleed Air Control Valve (EBCV) Mixture Control Valve (MCV) Electric Air Control Valve (EACV)
MDP	Manifold Differential Pressure	-
MFI	Multiport Fuel Injection	Electronic Fuel Injection (EFI)
MIL	Malfunction Indicator Light	Check Engine Light
MST	Manifold Surface Temperature	-
MVZ	Manifold Vacuum Zone	-
NVRAM	Non-Volatile Random Access Memory	-
O2S	Oxygen Sensor	Oxygen Sensor, O_2 Sensor (O_2S)
OBD	On-Board Diagnostic	On-Board Diagnostic System (OBD)
OC	Oxidation Catalytic Converter	Oxidation Catalytic Convert (OC), CCo
OL	Open Loop	Open Loop
PAIR	Pulsed Secondary Air Injection	Air Suction (AS)
PCM	Powertrain Control Module	-
PNP	Park/Neutral Position	-
PROM	Programmable Read Only Memory	-
PSP	Power Steering Pressure	-
PTOX	Periodic Trap Oxidizer	Diesel Particulate Filter (DPF) Diesel Particulate Trap (DPT)
RAM	Random Access Memory	Random Access Memory (RAM)
RM	Relay Module	-
ROM	Read Only Memory	Read Only Memory (ROM)
RPM	Engine Speed	Engine Speed
SC	Supercharger	Supercharger
SCB	Supercharger Bypass	E-ABV
SFI	Sequential Multiport Fuel Injection	Electronic Fuel Injection (EFI), Sequential Injection
SPL	Smoke Puff Limiter	-
SRI	Service Reminder Indicator	-
SRT	System Readiness Test	-
ST	Scan Tool	-
TB	Throttle Body	Throttle Body
TBI	Throttle Body Fuel Injection	Single Point Injection Central Fuel Injection (Ci)
TC	Turbocharger	Turbocharger
TCC	Torque Converter Clutch	Torque Converter
TCM	Transmission Control Module	Transmission ECU, ECT ECU
TP	Throttle Position	Throttle Position
TR	Transmission Range	-
TVV	Thermal Vacuum Valve	Bimetallic Vacuum Switching Valve (BVSV) Thermostatic Vacuum Switching Valve (TVSV)
TWC	Three-Way Catalytic Converter	Three-Way Catalytic (TWC) Manifold Converter CC_{RO}

SAE ABBREVIATIONS	SAE TERMS	TOYOTA TERMS ( )-ABBREVIATIONS
TWC+OC	Three-Way + Oxidation Catalytic Converter	CC_R + CCo
VAF	Volume Airflow	Air Flow Meter
VR	Voltage Regulator	Voltage Regulator
VSS	Vehicle Speed Sensor	Vehicle Speed Sensor
WOT	Wide Open Throttle	Full Throttle
WU-OC	Warm Up Oxidation Catalytic Converter	-
WU-TWC	Warm Up Three-Way Catalytic Converter	-
3GR	Third Gear	-
4GR	Fourth Gear	-

REMOVAL

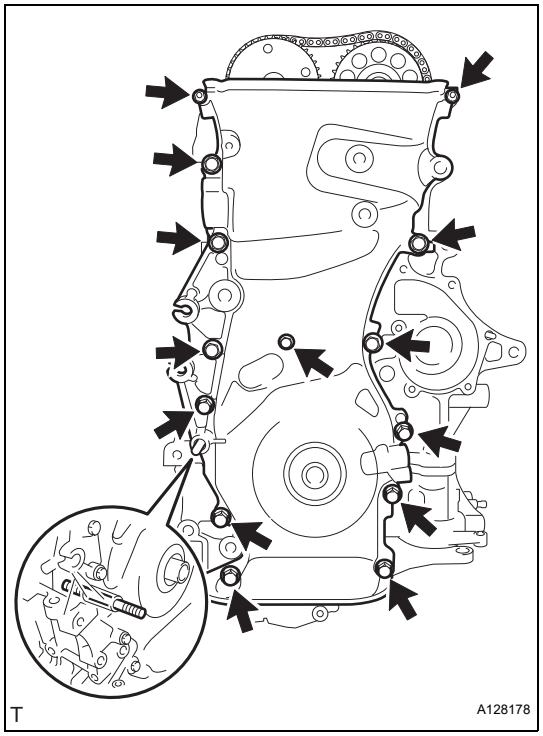
1. REMOVE LUGGAGE TRIM SERVICE HOLE COVER (See page HB-86)
2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (See page HV-560)
3. REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-90)
4. REMOVE FRONT WHEEL RH
5. REMOVE ENGINE UNDER COVER LH
6. REMOVE ENGINE UNDER COVER RH
7. REMOVE FRONT FENDER APRON SEAL RH
8. DRAIN ENGINE OIL (See page LU-4)
9. REMOVE FRONT EXHAUST PIPE ASSEMBLY (See page EX-2)
10. REMOVE NO. 2 ENGINE MOUNTING STAY RH (See page EM-91)
11. REMOVE ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-91)
12. REMOVE NO. 2 ENGINE MOUNTING BRACKET RH (See page EM-91)
13. REMOVE V-RIBBED BELT TENSIONER COVER SUB-ASSEMBLY (See page EM-6)
14. REMOVE V-RIBBED BELT (See page EM-6)
15. REMOVE V-RIBBED BELT TENSIONER ASSEMBLY (See page EM-100)
16. REMOVE IDLER PULLEY BRACKET (See page EM-100)
17. REMOVE IGNITION COIL ASSEMBLY (See page EM-100)
18. DISCONNECT VENTILATION HOSE
19. DISCONNECT NO. 2 VENTILATION HOSE
20. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY (See page EM-22)
21. SET NO. 1 CYLINDER TO TDC/COMPRESSION (See page EM-8)
22. REMOVE CRANKSHAFT PULLEY (See page EM-74)
23. REMOVE CRANK POSITION SENSOR (See page ES-388)
24. REMOVE OIL PAN SUB-ASSEMBLY (See page EM-22)
25. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY (See page EM-23)

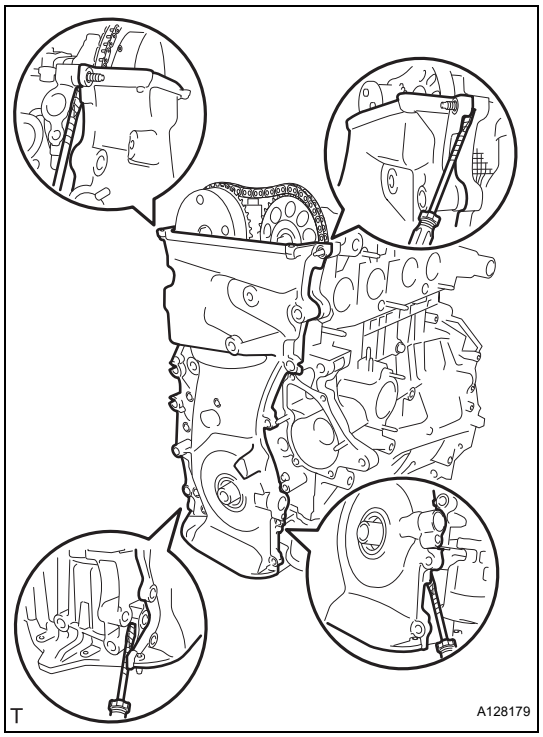
26. **INSTALL ENGINE HANGERS (See page EM-23)**

27. **REMOVE ENGINE MOUNTING INSULATOR (See page EM-23)**

28. **REMOVE ENGINE MOUNTING BRACKET RH (See page EM-23)**

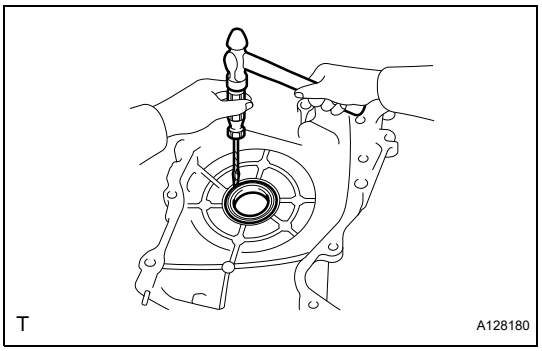
29. **REMOVE TIMING CHAIN COVER SUB-ASSEMBLY**
    (a) Using an E10 "TORX" socket, remove the stud bolt for the drive belt tensioner from the cylinder block.
    (b) Remove the 12 bolts and 2 nuts.



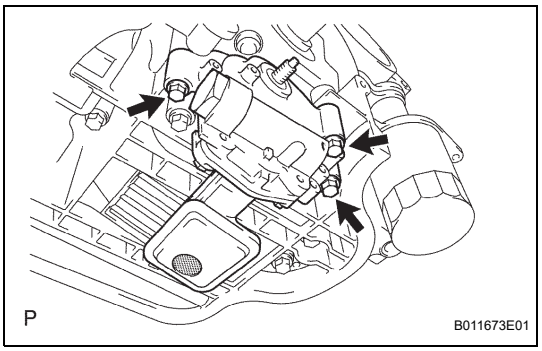


(c) Remove the timing chain cover by prying between the timing chain cover and cylinder head or cylinder block with a screwdriver.
NOTICE:
Be careful not to damage the contact surfaces of the timing chain cover, cylinder block and cylinder head.
HINT:
Tape the screwdriver tip before use.

LU



30. **REMOVE TIMING CHAIN CASE OIL SEAL**
    (a) Using a screwdriver and a hammer, tap out the oil seal.
    HINT:
    Tape the screwdriver tip before use.
31. **REMOVE NO. 1 CRANKSHAFT POSITION SENSOR PLATE (See page EM-24)**
32. **REMOVE CHAIN TENSIONER SLIPPER (See page EM-24)**
33. **REMOVE NO. 1 CHAIN VIBRATION DAMPER (See page EM-24)**
34. **REMOVE TIMING CHAIN GUIDE (See page EM-24)**
35. **REMOVE CHAIN SUB-ASSEMBLY (See page EM-24)**
36. **REMOVE CRANKSHAFT TIMING SPROCKET (See page EM-25)**
37. **REMOVE NO. 2 CHAIN SUB-ASSEMBLY (See page EM-25)**
38. **REMOVE OIL PUMP ASSEMBLY**
    (a) Remove the 3 bolts, oil pump and gasket.



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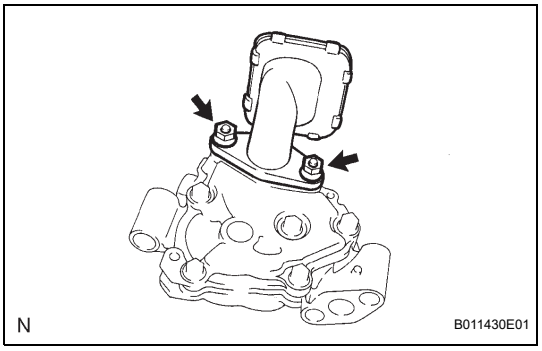
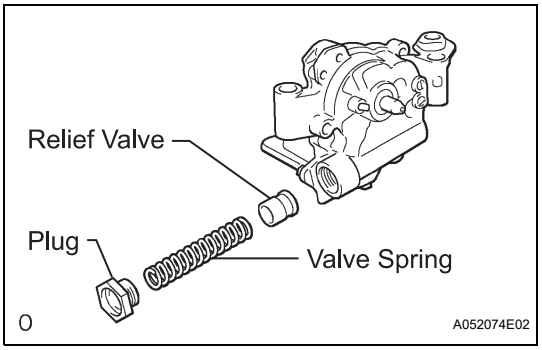
DISASSEMBLY

1. **REMOVE OIL PUMP STRAINER**
    (a) Remove the 2 nuts, oil pump strainer and gasket.



2. **REMOVE OIL PUMP RELIEF VALVE**
    (a) Using a 27 mm socket wrench, remove the plug.
    (b) Remove the valve spring and relief valve.



ON-VEHICLE INSPECTION

1. **CHECK IGNITION COIL ASSEMBLY AND PERFORM SPARK TEST**

NOTICE:

In this section, the terms "cold" and "hot" refer to the temperature of the coils. "Cold" means approximately -10 to 50°C (14 to 122°F). "Hot" means approximately 50 to 100°C (122 to 212°F).

(a) Check for DTCs.

NOTICE:

If any DTC is present, perform troubleshooting in accordance with the procedure for that DTC.

(b) Check that sparks occur.

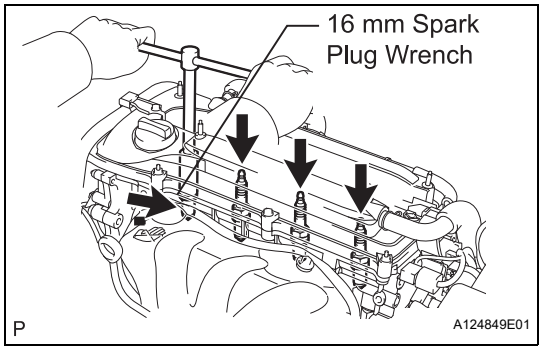
(1) Set the vehicle to inspection mode (See page IN-65).

(2) Remove the No. 1 engine cover.

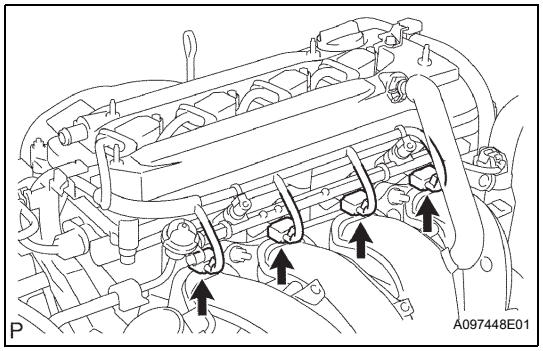
(3) Disconnect the 4 ignition coil connectors and remove the 4 bolts and ignition coils.

NOTICE:

If the ignition coil assembly connector is disconnected because a DTC is detected in inspection, always reconnect it.



(4) Using a 16 mm (0.63 in.) spark plug wrench, remove the 4 spark plugs.



(5) Disconnect the 4 fuel injector connectors.

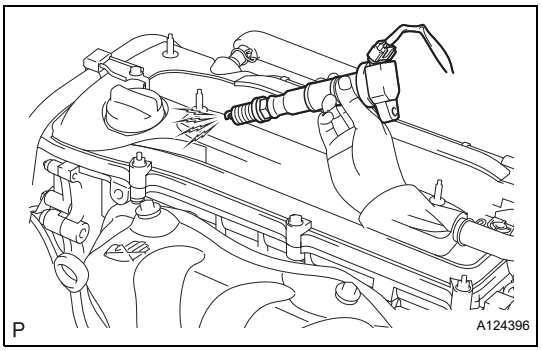
(6) Install the spark plug to each ignition coil, and connect the ignition coil connectors.

(7) Connect the intelligent tester to the DLC3.

NOTICE:

Check the HV battery voltage in the data list to ensure that the battery is fully charged.

IG



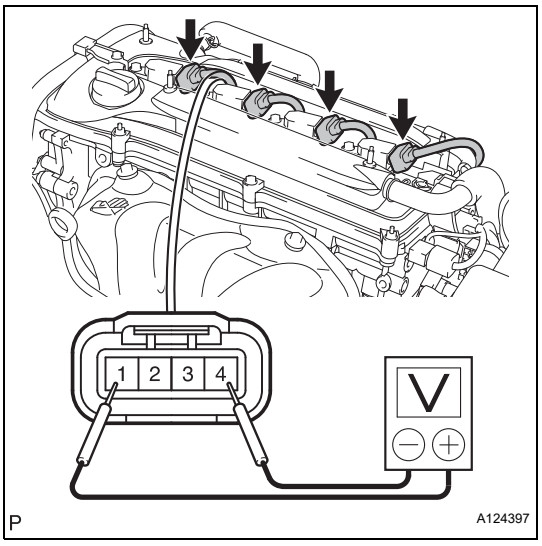
(8) Ground the spark plug.
(9) Enter Active Test on the intelligent tester.
(10) Check if a spark occurs at each spark plug while the engine is being cranked.
NOTICE:
- **Be sure to ground the spark plugs when checking.**
- **Replace the ignition coil if it receives an impact.**
- **Do not crank the engine for more than 2 seconds.**

(c) Perform the spark test according to the flowchart below.
(1) Check that the ignition coil connector is securely connected.
Result

Result	Procedure
NG	Connect connector securely
OK	Go to next step

(2) Perform the spark test on each ignition coil.
1. Replace the ignition coil with a normal one.
2. Perform the spark test again.
Result

Result	Procedure
OK	Replace ignition coil
NG	Go to next step



(3) Check the power supply to the ignition coil.
1. Turn the power switch on (READY).
2. Measure the voltage between the terminals of the wire harness side connector.
Standard voltage

Tester Connection	Specified Condition
1 (+B) - 4 (GND)	9 to 14 V

Result

Result	Procedure
NG	Check wire harness and connector
OK	Go to next step

(4) Measure the resistance of the camshaft position sensor.
Standard resistance

Temperature	Specified Condition
Cold	835 to 1,400 Ω
Hot	1,060 to 1,645 Ω

Result

Result	Procedure
NG	Replace camshaft position sensor
OK	Go to next step

IG

(5) Measure the resistance of the crankshaft position sensor.
Standard resistance

Temperature	Specified Condition
Cold	985 to 1,600 Ω
Hot	1,265 to 1,890 Ω

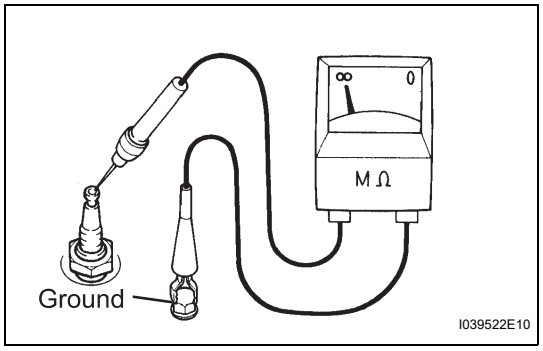
Result

Result	Procedure
NG	Replace crankshaft position sensor
OK	Go to next step

(6) Check the IGT signal from the ECM.
Result

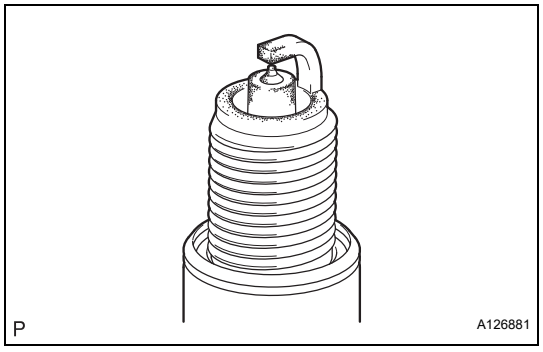
Result	Procedure
NG	Check ECM (see page ES-173)
OK	Repair wiring between ignition coil and ECM

(7) Using a 16 mm (0.63 in.) plug wrench, install the spark plug.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)
(8) Install the 4 ignition coils with the 4 bolts and connect the 4 ignition coil connectors.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
(9) Connect the 4 fuel injector connectors.
(10) Install the No. 1 engine cover.



2. CHECK SPARK PLUG

(a) Check the electrode.
(1) Using a megohmmeter, measure the insulation resistance.
Standard insulation resistance:
10 MΩ or more
HINT:
- If a megohmmeter is not available, perform the following simple inspection instead.
- If the result is 10 MΩ or less, clean the plug and measure the resistance again.

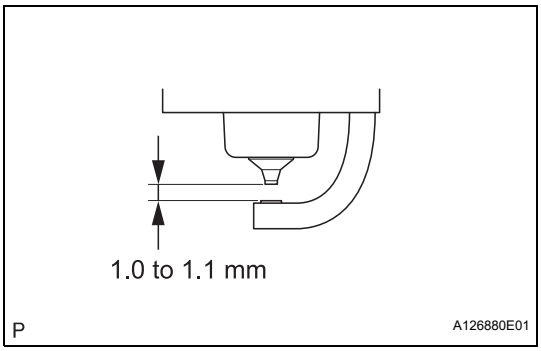


(b) Alternative inspection method:
(1) Set the vehicle to inspection mode (See page IN-65).
(2) Quickly accelerate the engine to 2,500 rpm 5 times.
(3) Remove the spark plug.
(4) Visually check the spark plug.
If the electrode is dry, the spark plug is functioning properly. If the electrode is damp, proceed to the next step.
(c) Check the spark plug for any damage to its threads and insulator.
If there is any damage, replace the spark plug.

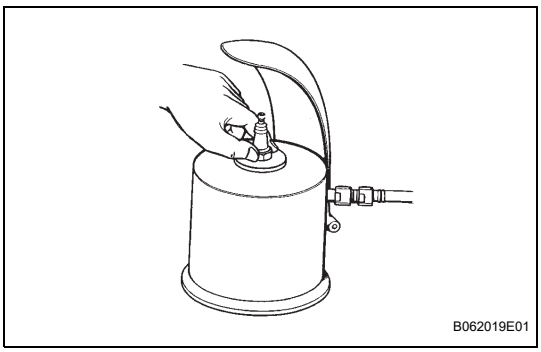
IG

Recommended spark plug

Manufacturer	Spark plug type
DENSO	SK20R11
NGK	IFR6A11

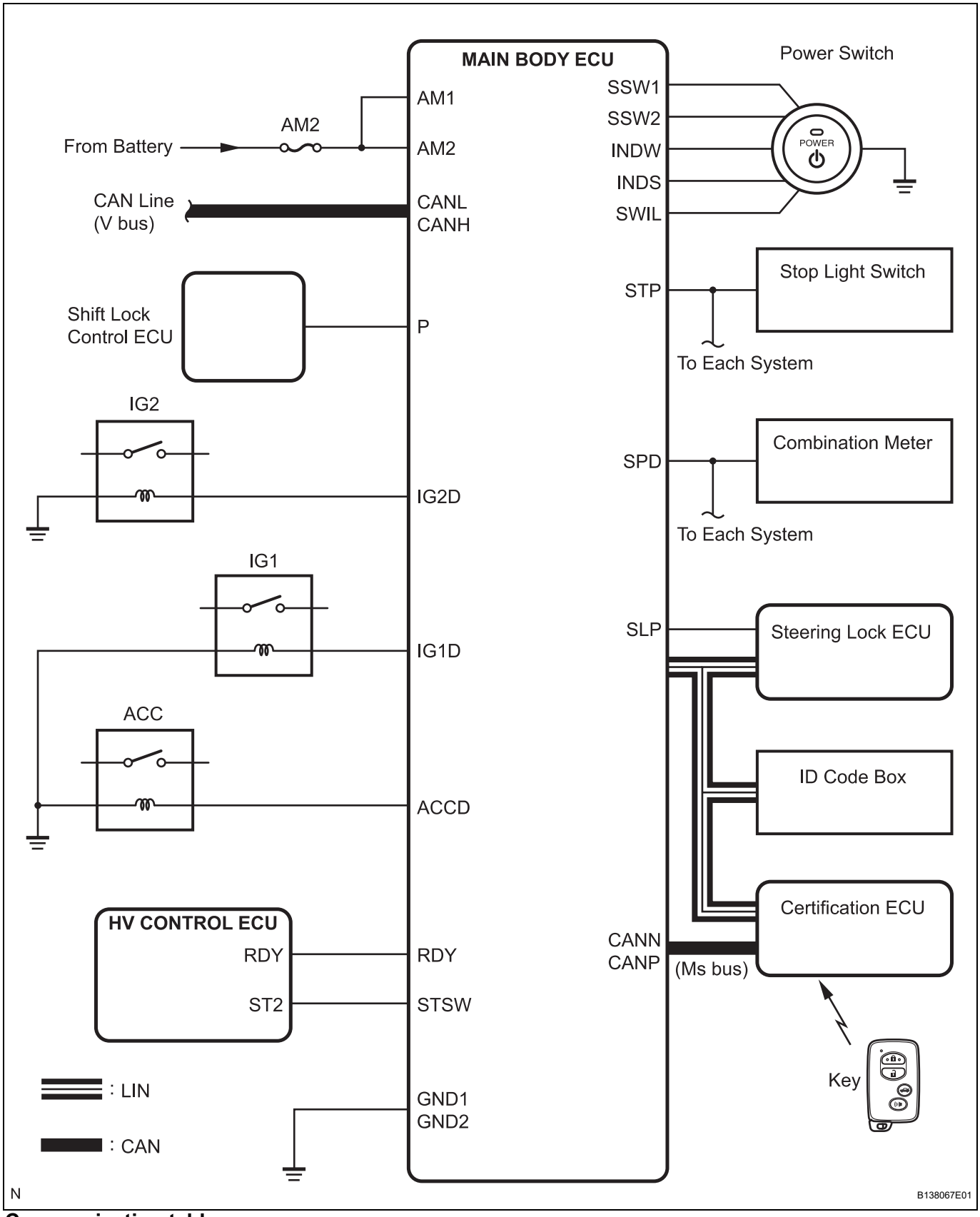


(d) Check the spark plug electrode gap.
Maximum electrode gap for a used spark plug:
1.3 mm (0.051 in.)
If the gap is greater than the maximum, replace the spark plug.
Electrode gap for a new spark plug:
1.0 to 1.1 mm (0.039 to 0.043 in.)



(e) Clean the spark plugs.
If the electrode has traces of wet carbon, clean the electrode with a spark plug cleaner and then dry it.
Standard air pressure:
588 kPa (6 kgf*cm^2, 85 psi)
Standard duration:
20 seconds or less
HINT:
Only use the spark plug cleaner when the electrode is free of oil. If the electrode has traces of oil, use gasoline to clean off the oil before using the spark plug cleaner.

SYSTEM DIAGRAM



Communication table:

Transmitting ECU (Transmitter)	Receiving ECU (Receiver)	Signal	Communication method
Combination meter	Main body ECU	Vehicle speed signal	CAN/Local communication

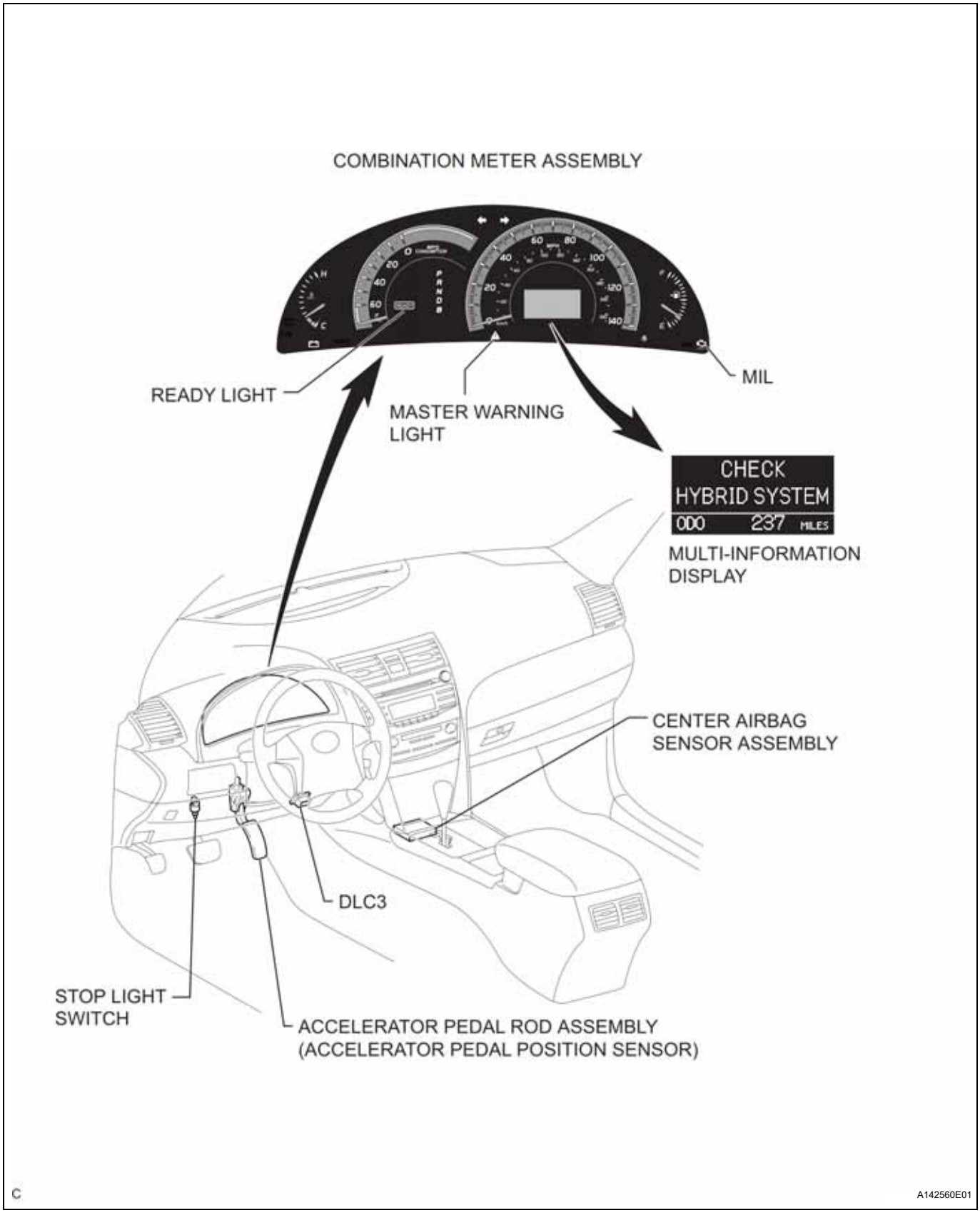
Transmitting ECU (Transmitter)	Receiving ECU (Receiver)	Signal	Communication method
Steering lock ECU	Main body ECU	Steering lock/unlock signal	LIN/Local communication
HV control ECU	Main body ECU	READY signal	CAN
		READY inhibition signal	
		Shift position signal	
		Stop light switch signal	
Main body ECU	Certification ECU	Engine switch position signal	CAN
		Courtesy light switch signal	
		Wireless door lock buzzer request signal	
Main body ECU	Combination meter	Entry start key signal	CAN
Certification ECU	Main body ECU	Illumination light request signal	CAN
Certification ECU	Main body ECU	Light answer back signal	CAN
Certification ECU	Combination meter	Meter buzzer single-shot request signal	CAN
		Meter buzzer intermittence request signal	
		Meter buzzer continuation request signal	
		Door open display signal	
		Key loss warning signal	
		Low key battery warning signal	
		Shift position warning signal	
		Steering lock abnormal warning	
		Steering lock unlock warning	
Combination meter	Certification ECU/Main body ECU	Vehicle speed signal	CAN
Shift lock control ECU	Main body ECU	Shift position signal	Local communication
Certification ECU	Main body ECU	Key ID matching request signal	LIN
Main body ECU	Certification ECU	ID required signal	LIN

ST

DEFINITION OF TERMS

Terms	Definitions
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	A group of diagnostic trouble codes that are output by the ECM based on the same malfunction detection logic.
Typical enabling condition	Preconditions that allow the ECM to detect malfunctions. With all preconditions satisfied, the ECM sets DTCs when the monitored value(s) exceeds malfunction threshold(s).
Sequence of operation	Order of monitor priority, applied if multiple sensors and components are involved in a single malfunction detection process. Each sensor and component are monitored in turn and subsequent items are not monitored until the previous detection operation completes.
Required sensors/components	Sensors and components used by the ECM to detect each malfunction.
Frequency of operation	Number of times the ECM checks for each malfunction during each driving cycle. "Once per driving cycle" means the ECM only performs checks for that malfunction once during single driving cycle. "Continuous" means that the ECM performs checks for that malfunction whenever enabling conditions are met.
Duration	Minimum time for which the ECM must detect continuous deviation in monitored value(s) in order to set a DTC. Timing begins when Typical Enabling Conditions are met.
Malfunction thresholds	Value beyond which the ECM determines malfunctions exist and sets DTCs.
MIL operation	Timing of MIL illumination after a malfunction is detected. "Immediate" means that the ECM illuminates the MIL as soon as the malfunction is detected. "2 driving cycle" means that the ECM illuminates the MIL if the same malfunction is detected again during the next driving cycle.

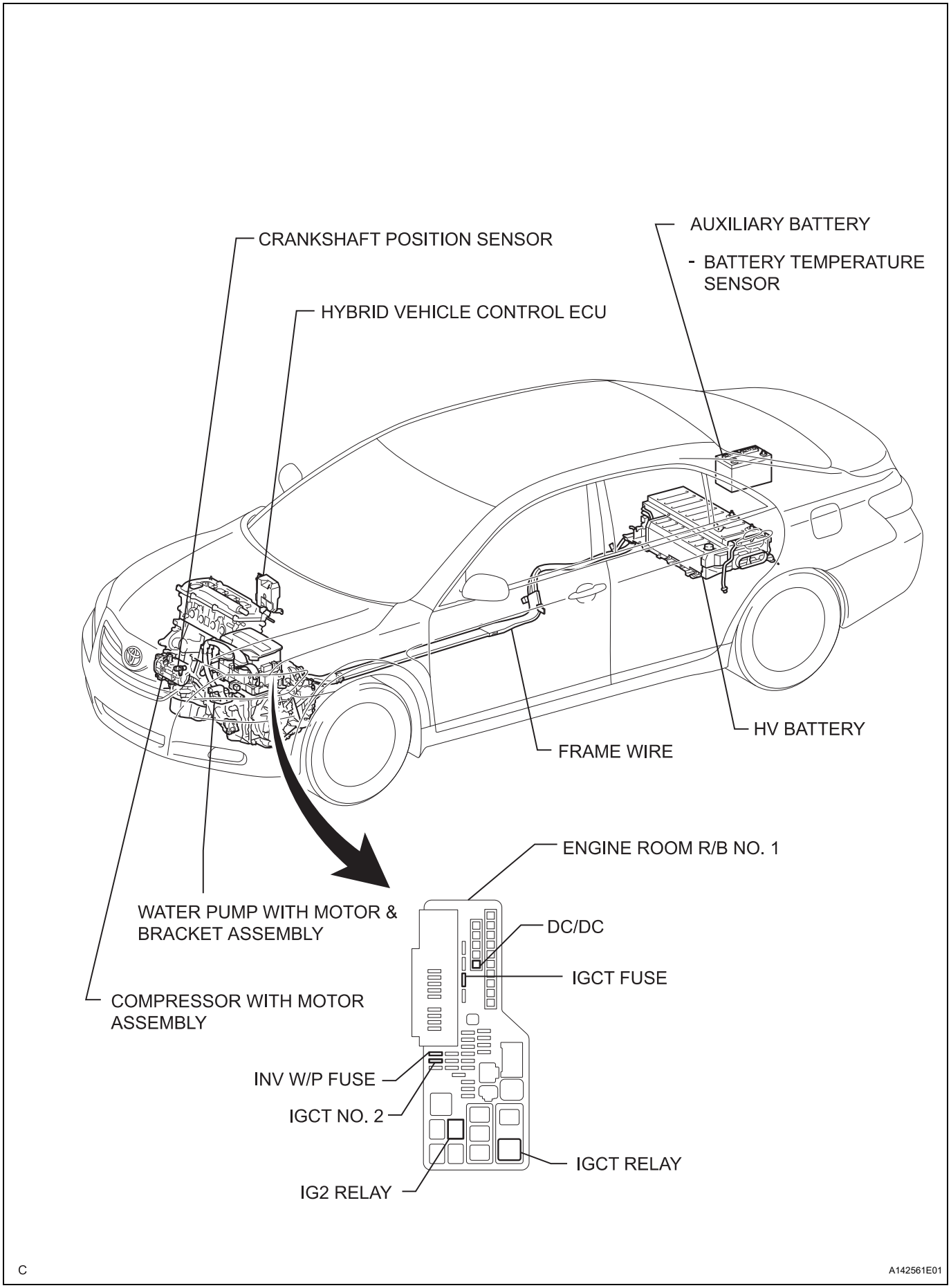
PARTS LOCATION



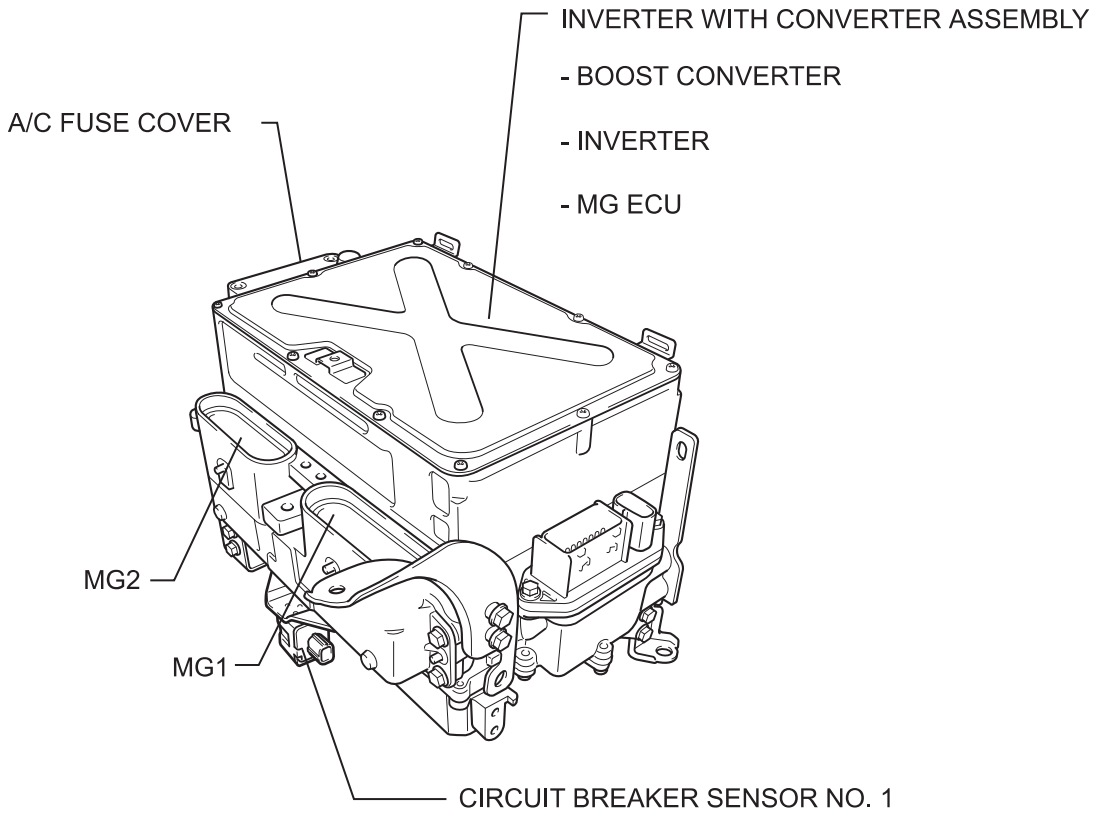
C

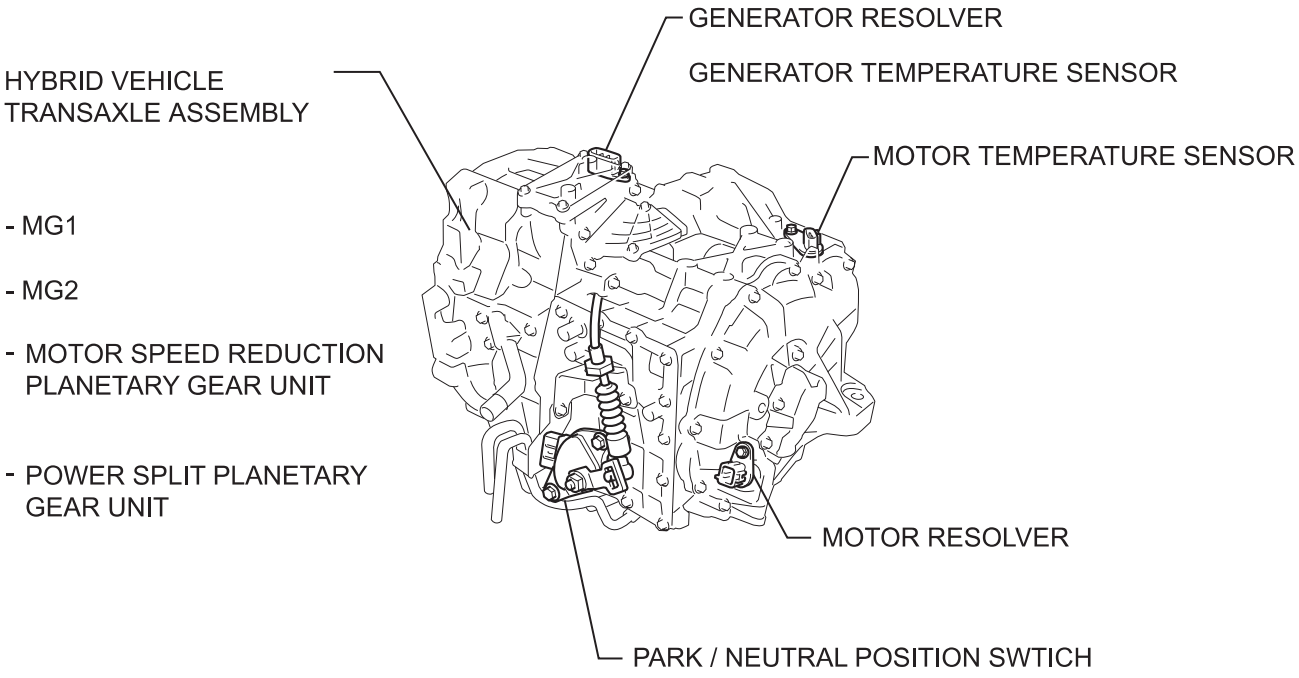
A142560E01

HV


CRANKSHAFT POSITION SENSOR
AUXILIARY BATTERY
- BATTERY TEMPERATURE SENSOR
HYBRID VEHICLE CONTROL ECU
HV BATTERY
FRAME WIRE
ENGINE ROOM R/B NO. 1
WATER PUMP WITH MOTOR & BRACKET ASSEMBLY
DC/DC
IGCT FUSE
COMPRESSOR WITH MOTOR ASSEMBLY
INV W/P FUSE
IGCT NO. 2
IGCT RELAY
IG2 RELAY
C
A142561E01

HV

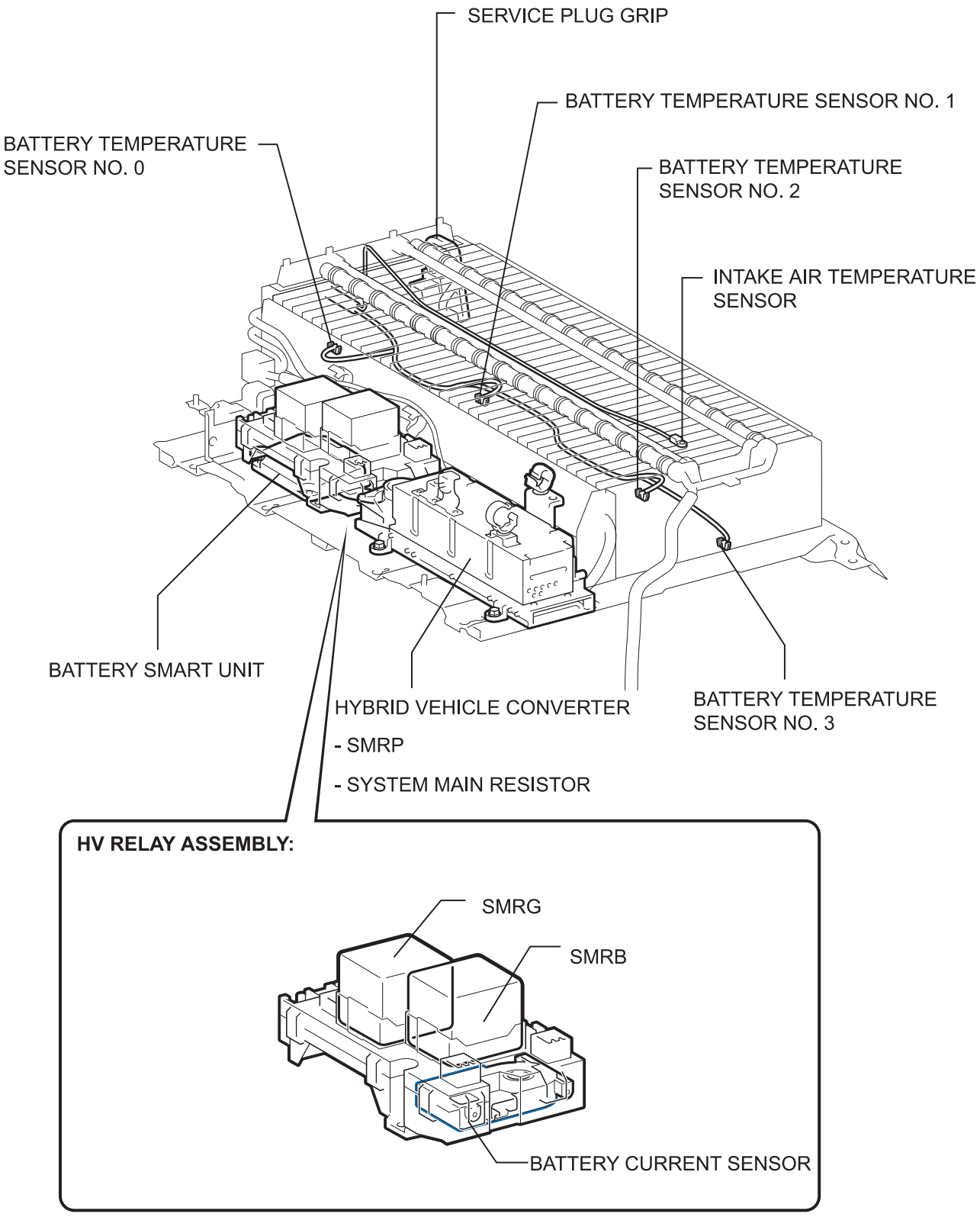




HV

C

A142562E01



HV

P

A143943E01

DEFINITION OF TERMS

Terms	Definitions
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	A group of diagnostic trouble codes that are output by the ECM based on the same malfunction detection logic.
Typical enabling condition	Preconditions that allow the ECM to detect malfunctions. With all preconditions satisfied, the ECM sets DTCs when the monitored value(s) exceeds malfunction threshold(s).
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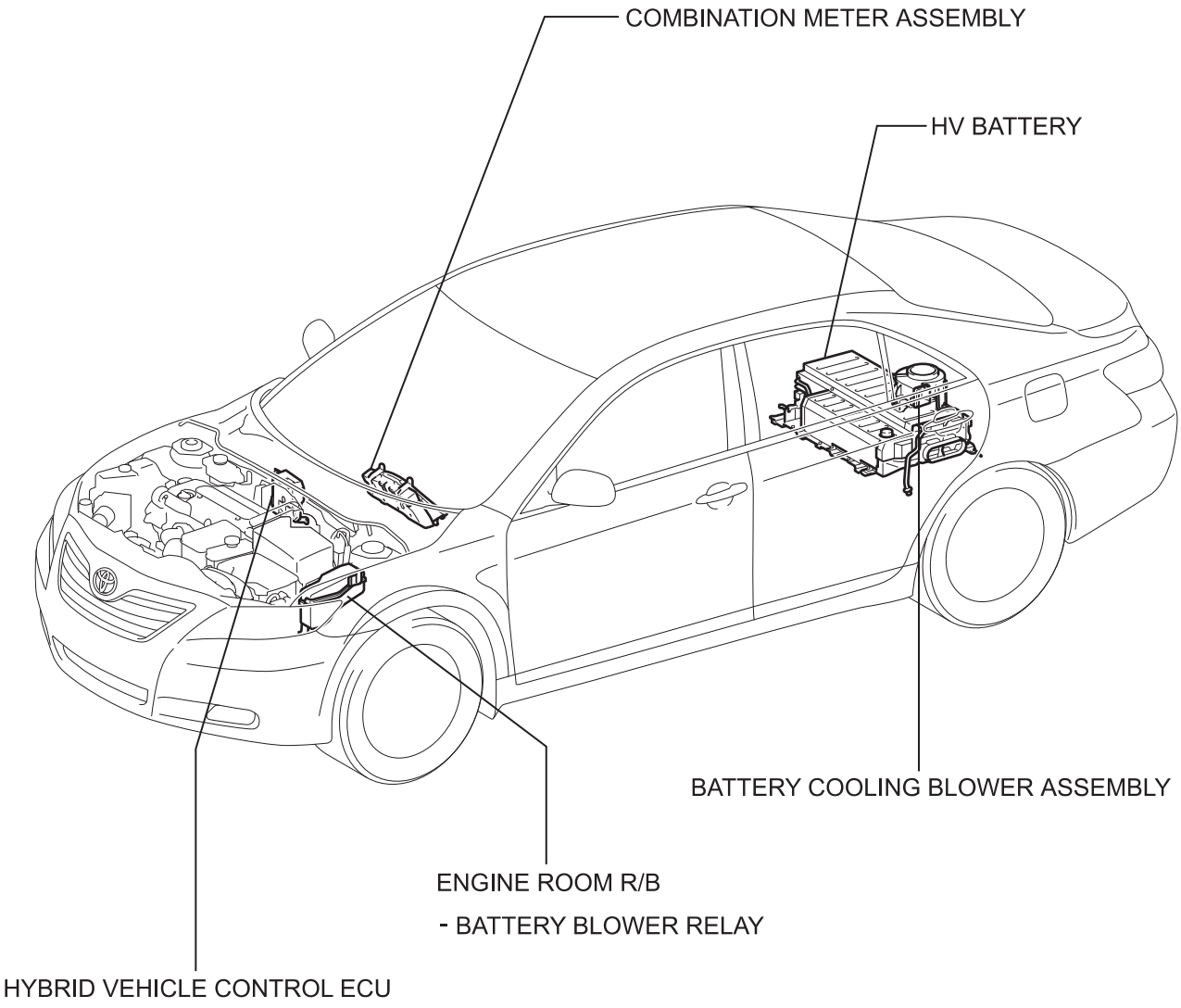
PARTS LOCATION



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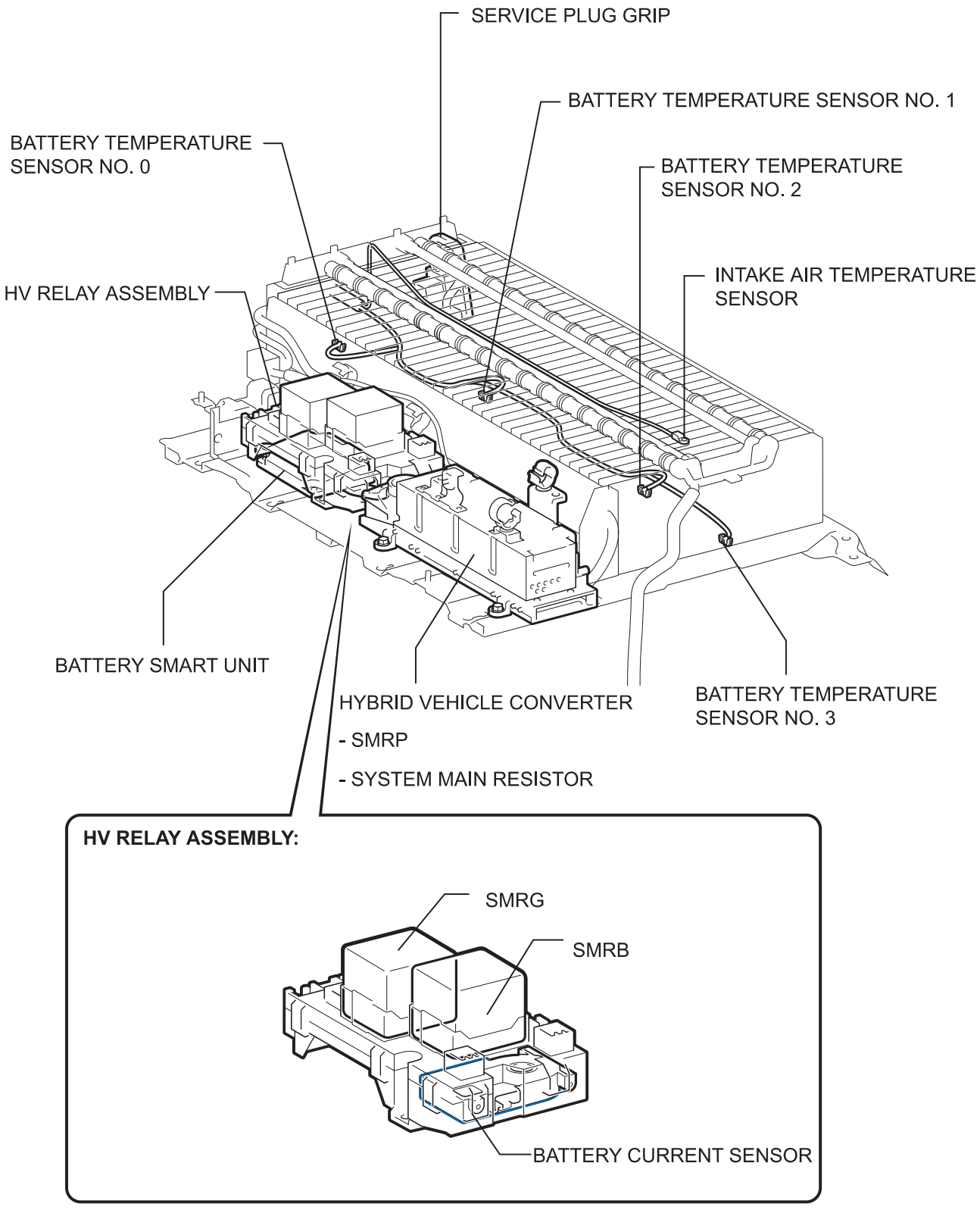
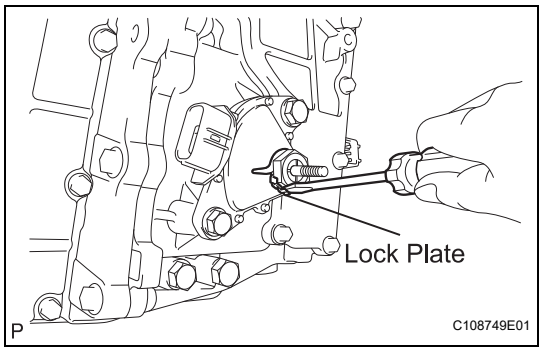
A143335E01



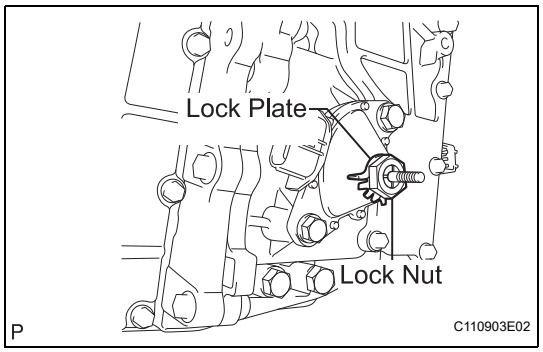
HB

P

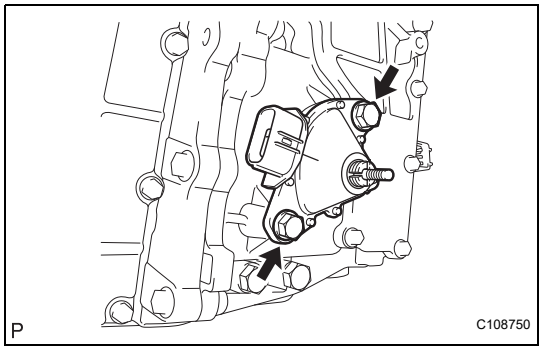
A143943E02



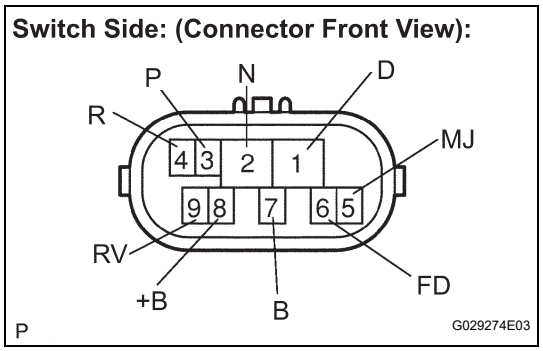
(c) Using a screwdriver, pry the tabs of the lock plate.



(d) Remove the lock nut and lock plate.



(e) Remove the 2 bolts and pull out the shift lever position sensor.



INSPECTION

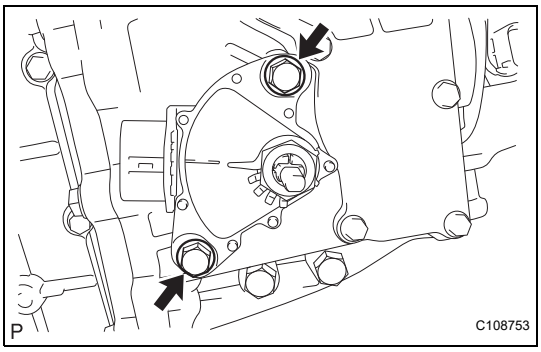
1. INSPECT SHIFT LEVER POSITION SENSOR

(a) Measure the resistance according to the value(s) in the table below when the shift lever is moved to each position.

Standard resistance

	8 (+B) - 1 (D)	8 (+B) - 2 (N)	8 (+B) - 3 (P)	8 (+B) - 4 (R)	8 (+B) - 5 (MJ)	8 (+B) - 6 (FD)	8 (+B) - 7 (B)	8 (+B) - 9 (RV)
P position	**10 kΩ or higher**	**4.2 to 5.1 kΩ**	**Below 1 Ω**	**10 kΩ or higher**	**Below 1 Ω**	**10 kΩ or higher**	**10 kΩ or higher**	**10 kΩ or higher**
R position	**10 kΩ or higher**	**4.2 to 5.1 kΩ**	**10 kΩ or higher**	**Below 1 Ω**	**Below 1 Ω**	**10 kΩ or higher**	**10 kΩ or higher**	**Below 1 Ω**
N position	**10 kΩ or higher**	**Below 1 Ω**	**10 kΩ or higher**	**10 kΩ or higher**	**Below 1 Ω**	**10 kΩ or higher**	**10 kΩ or higher**	**10 kΩ or higher**
D position	**Below 1 Ω**	**4.2 to 5.1 kΩ**	**10 kΩ or higher**	**10 kΩ or higher**	**Below 1 Ω**	**Below 1 Ω**	**10 kΩ or higher**	**10 kΩ or higher**
B position	**10 kΩ or higher**	**4.2 to 5.1 kΩ**	**10 kΩ or higher**	**10 kΩ or higher**	**Below 1 Ω**	**Below 1 Ω**	**Below 1 Ω**	**10 kΩ or higher**

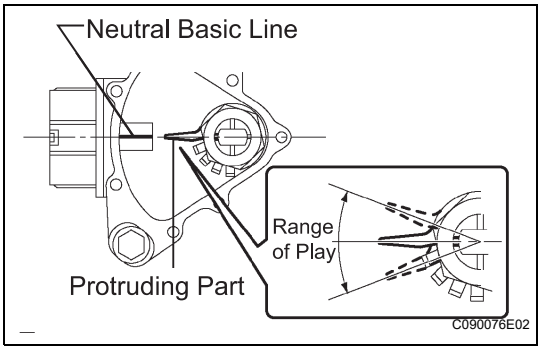
If operation cannot be done as specified, replace the shift lever position sensor.



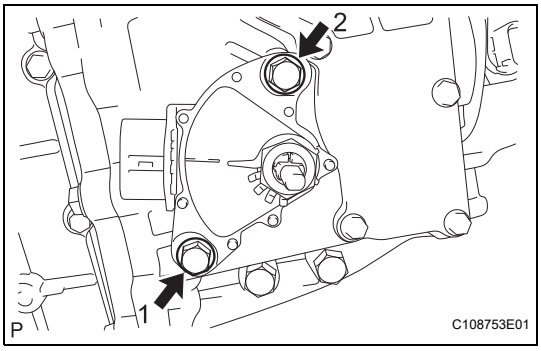
ADJUSTMENT

1. ADJUST SHIFT LEVER POSITION SENSOR

(a) Loosen the 2 bolts of the shift lever position sensor and set the shift lever to the N position.



(b) Align the protruding part with the neutral basic line.
NOTICE:
There is play on the nut stopper side (protruding part). Align the center point of the range of the play with the neutral basic line.



(c) Tighten the 2 bolts in the order shown in the illustration.
Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)

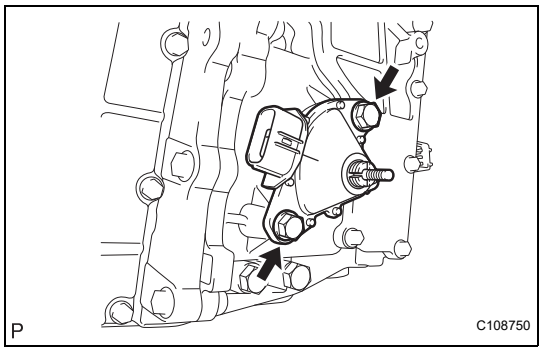
2. INSPECT SHIFT LEVER POSITION SENSOR (See page HX-5)

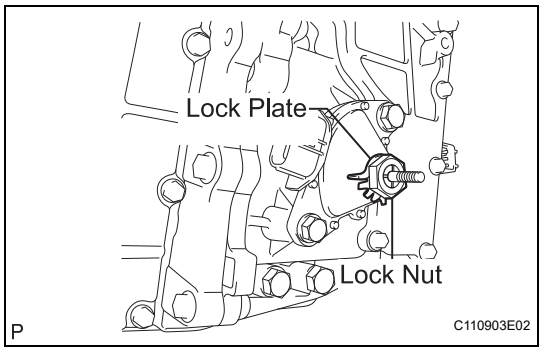
INSTALLATION

1. INSTALL SHIFT LEVER POSITION SENSOR

(a) Install the shift lever position sensor to the manual valve shaft.

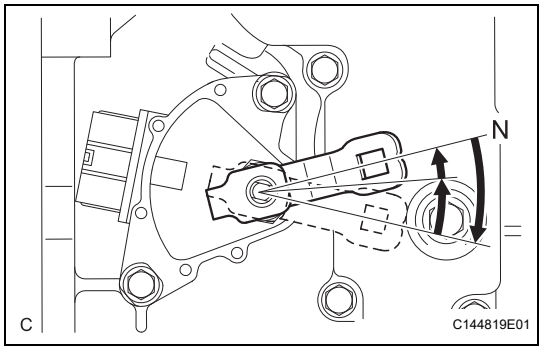
(b) Temporarily install the 2 bolts.





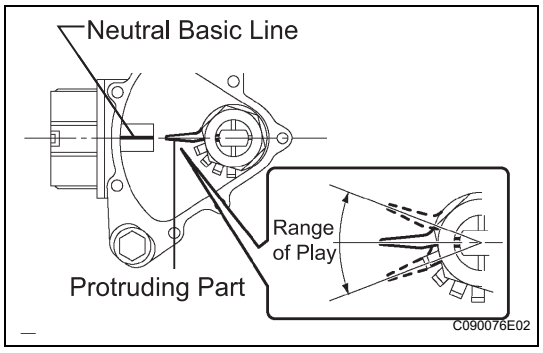
(c) Install a new lock plate and tighten the nut.
Torque: 6.9 N*m (70 kgf*cm, 61 in.*lbf)

(d) Temporarily install the control shaft lever.



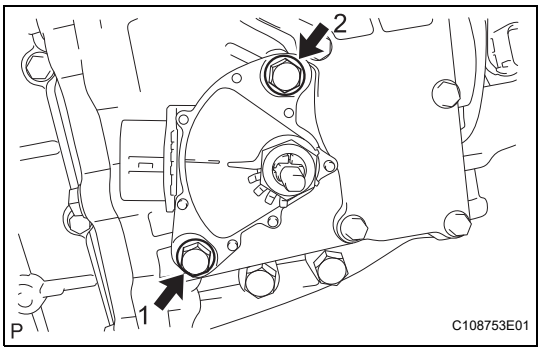
(e) Turn the lever clockwise until it stops, then turn it counterclockwise 2 notches.

(f) Remove the control shaft lever.

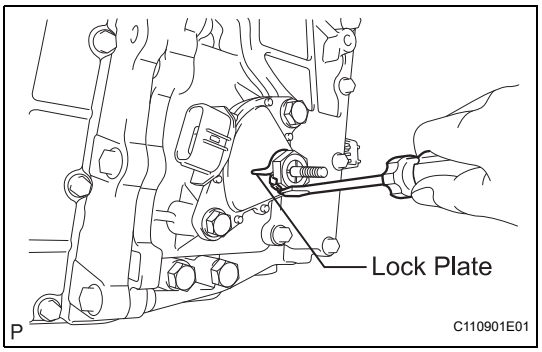


(g) Align the protruding part with the neutral basic line.
NOTICE:
There is play on the nut stopper side (protruding part). Align the center point of the range of the play with the neutral basic line.

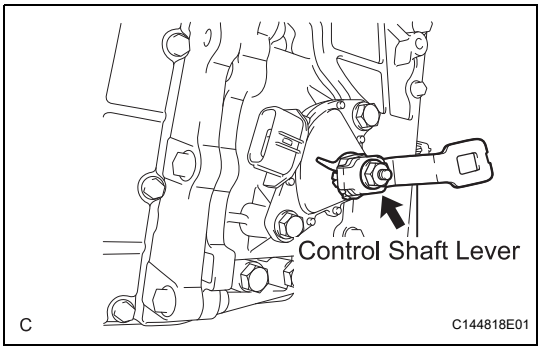
HX



(h) Tighten the 2 bolts in the order shown in the illustration.
Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)



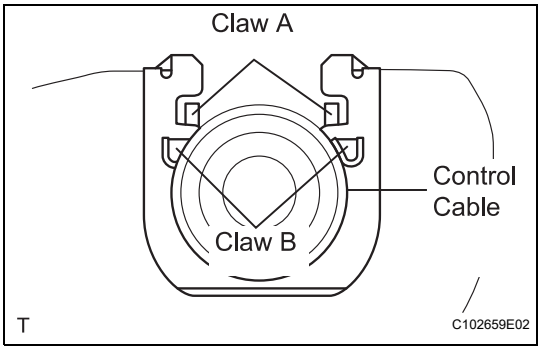
(i) Using a screwdriver, secure the nut with the lock plate.



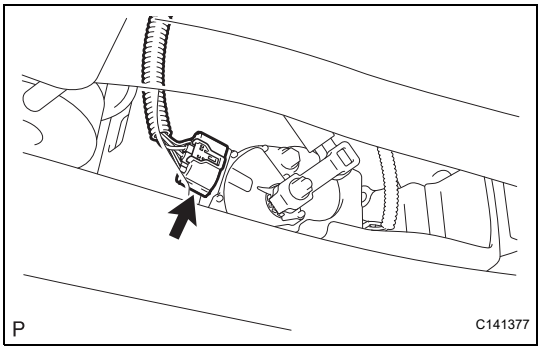
(j) Install the control shaft lever, washer, and nut.
Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)

2. CONNECT TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Move the shift lever to the N position.
(b) Install a new clip to the control bracket.

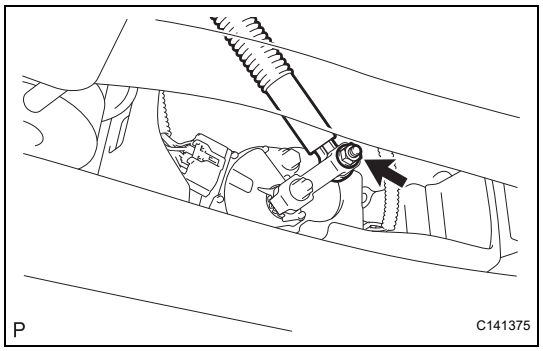


(c) Install the transmission control cable assembly to the control bracket.
NOTICE:
- **Make sure that the A claws on the clip are securely fit into the bracket holes.**
- **Make sure that the cable is securely installed inside the B claws of the clip.**



(d) Connect the shift lever position sensor connector.
(e) Move the control shaft lever to the N position.

HX



(f) Connect the transmission control cable assembly to the control shaft lever with the nut.
Torque: 15 N*m (150 kgf*cm, 11 ft.*lbf)

3. **INSPECT SHIFT LEVER POSITION (See page HX-24)**
4. **ADJUST SHIFT LEVER POSITION (See page HX-26)**
5. **ADJUST TRANSMISSION CONTROL CABLE ASSEMBLY (See page HX-42)**
6. **INSPECT SHIFT LEVER OPERATION (See page HX-28)**
7. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-113)**
8. **INSTALL ENGINE UNDER COVER LH**
9. **INSTALL ENGINE UNDER COVER RH**
10. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
11. **PERFORM INITIALIZATION**
(a) Perform initialization (See page IN-43).
NOTICE:
Certain systems need to be initialized after reconnecting the cable to the negative (-) battery terminal.

REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

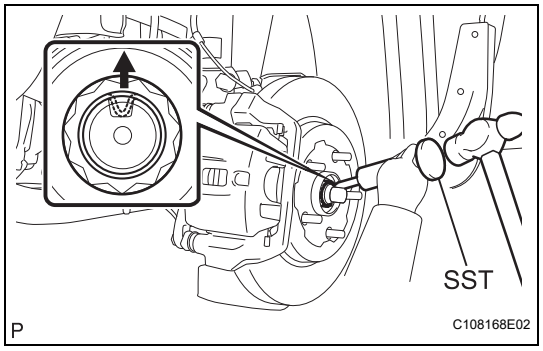
1. DRAIN HYBRID TRANSAXLE FLUID

HINT:
See page HX-2.

2. REMOVE FRONT WHEEL

3. REMOVE FRONT AXLE HUB NUT

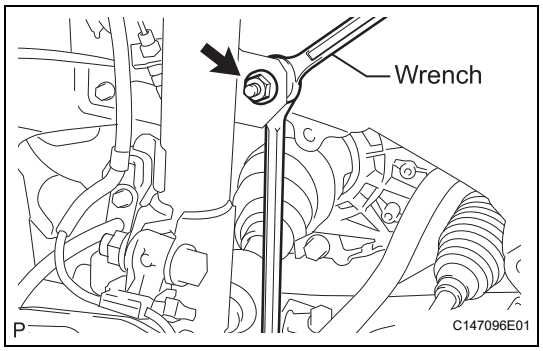
(a) Using SST and a hammer, release the staked part of the front axle hub nut.
SST 09930-00010
NOTICE:
Loosen the staked part of the nut completely, otherwise the thread of the drive shaft may be damaged.



(b) While applying the brakes, remove the front axle hub nut.

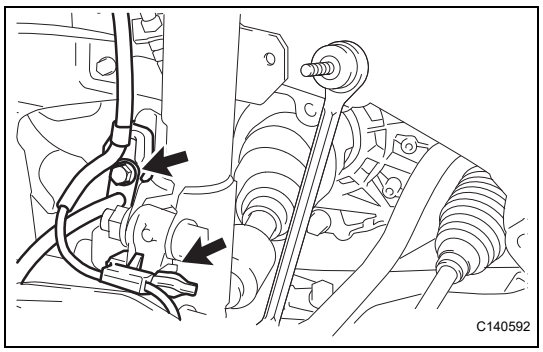
4. SEPARATE FRONT STABILIZER LINK ASSEMBLY

(a) Remove the nut and separate the front stabilizer link assembly.
HINT:
If the ball joint turns together with the nut, use a wrench (19 mm) to hold the stud.

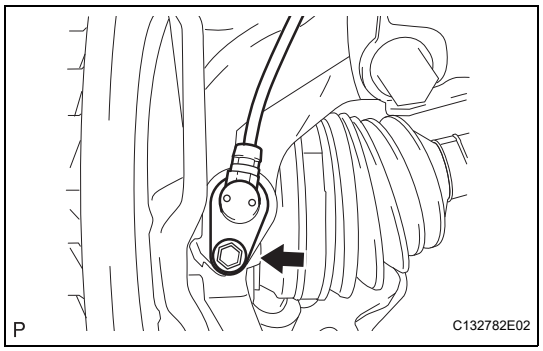


5. SEPARATE FRONT SPEED SENSOR

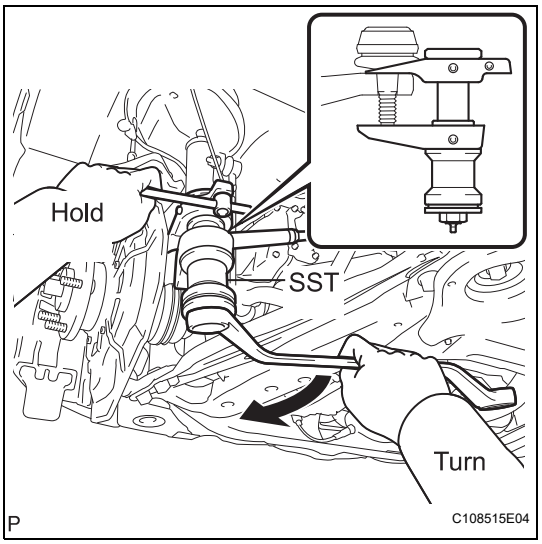
(a) Remove the bolt and clip, and separate the speed sensor wire and flexible hose from the shock absorber.



(b) Remove the bolt and separate the speed sensor from the steering knuckle.
NOTICE:
- **Prevent foreign matter from adhering to the speed sensor.**
- **Be careful not to damage the speed sensor.**



DS



6. SEPARATE TIE ROD END SUB-ASSEMBLY

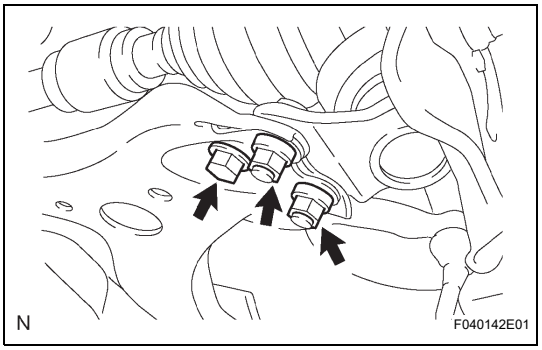
(a) Remove the cotter pin and nut.

(b) Using SST, separate the tie rod end sub-assembly from the steering knuckle.

SST 09628-00011

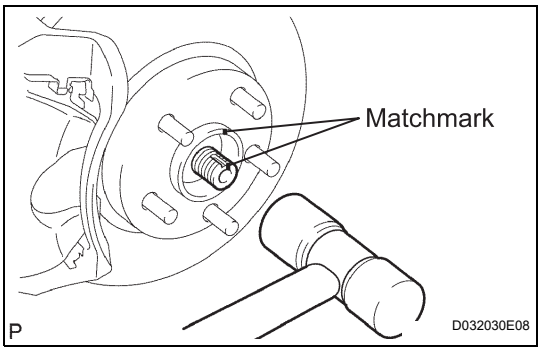
NOTICE:

- **Make sure that the string of the SST is securely tied to the vehicle.**
- **Be careful not to damage the ball joint dust cover.**
- **Be careful not to damage the steering knuckle.**
- **Be careful not to damage the front disc brake dust cover.**



7. SEPARATE FRONT SUSPENSION LOWER NO. 1 ARM

(a) Remove the bolt and 2 nuts, and separate the front suspension lower No. 1 arm from the lower ball joint.



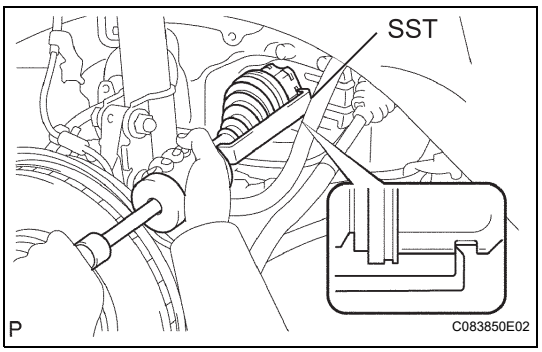
8. SEPARATE FRONT AXLE ASSEMBLY

(a) Put matchmarks on the front drive shaft assembly and the axle hub.

(b) Using a plastic hammer, separate the front drive shaft assembly from the front axle assembly.

NOTICE:

Be careful not to damage the drive shaft boot or speed sensor rotor.



9. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH

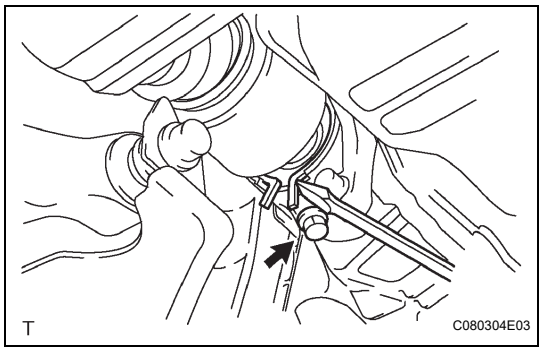
(a) Using SST, remove the front drive shaft assembly LH.

SST 09520-01010, 09520-24010 (09520-32040)

NOTICE:

- **Be careful not to damage the drive shaft dust cover, boot, or oil seal.**
- **Be careful not to drop the drive shaft assembly.**

DS



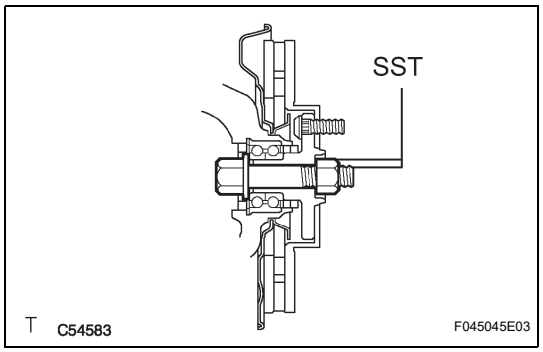
10. REMOVE FRONT DRIVE SHAFT ASSEMBLY RH

(a) Using a screwdriver, remove the bearing bracket hole snap ring.

(b) Remove the bolt and front drive shaft assembly RH from the drive shaft bearing bracket.

NOTICE:

Do not damage the boot or oil seal.



11. SECURE FRONT AXLE HUB SUB-ASSEMBLY

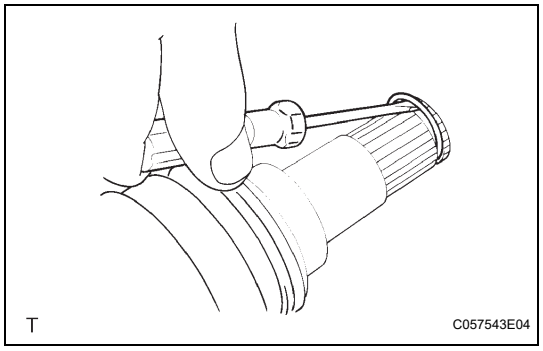
(a) Secure the front axle hub bearing.

SST 09608-16042 (09608-02021, 09608-02041)

NOTICE:

The hub bearing may be damaged if it is subjected to the vehicle's full weight, such as moving the vehicle with the drive shaft removed. If it is necessary to place the vehicle's weight on the hub bearing, first support it with SST.

12. INSPECT FRONT DRIVE SHAFT ASSEMBLY (See page DS-10)

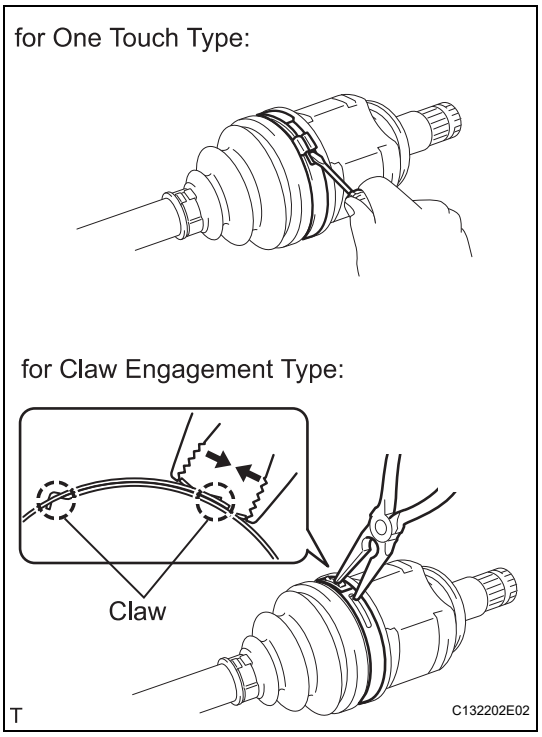


DISASSEMBLY

1. REMOVE FRONT DRIVE SHAFT LH HOLE SNAP RING

(a) Using a screwdriver, remove the front drive shaft LH hole snap ring.

DS



2. REMOVE NO. 2 FRONT AXLE INBOARD JOINT BOOT CLAMP

(a) for One touch type:
  (1) Using a screwdriver, remove the No. 2 front axle inboard joint boot clamp as shown in the illustration.

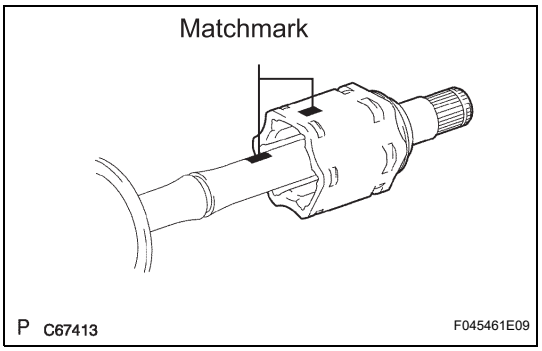
(b) for Claw engagement type:
  (1) Using needle nose pliers, remove the No. 2 front axle inboard joint boot clamp as shown in the illustration.

3. REMOVE FRONT AXLE INBOARD JOINT BOOT CLAMP

(a) Remove the front axle inboard joint boot clamp.
HINT:
Perform the same procedures as for the No. 2 front axle inboard joint boot clamp.

4. SEPARATE FRONT AXLE INBOARD JOINT BOOT

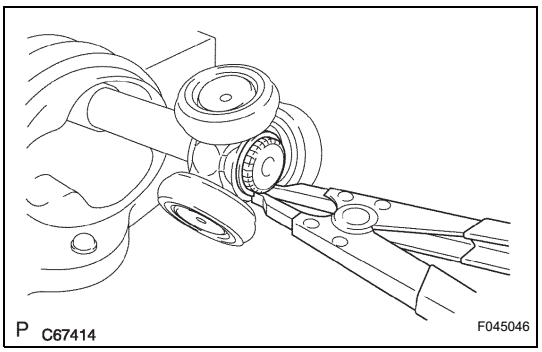
(a) Separate the front axle inboard joint boot from the inboard joint assembly.



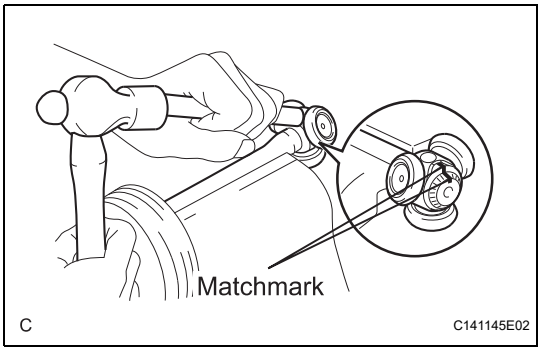
5. REMOVE FRONT DRIVE INBOARD JOINT ASSEMBLY

(a) Put matchmarks on the inboard joint assembly and outboard joint shaft.
NOTICE:
Do not use a punch for the marks.

(b) Remove the inboard joint assembly from the outboard joint shaft.



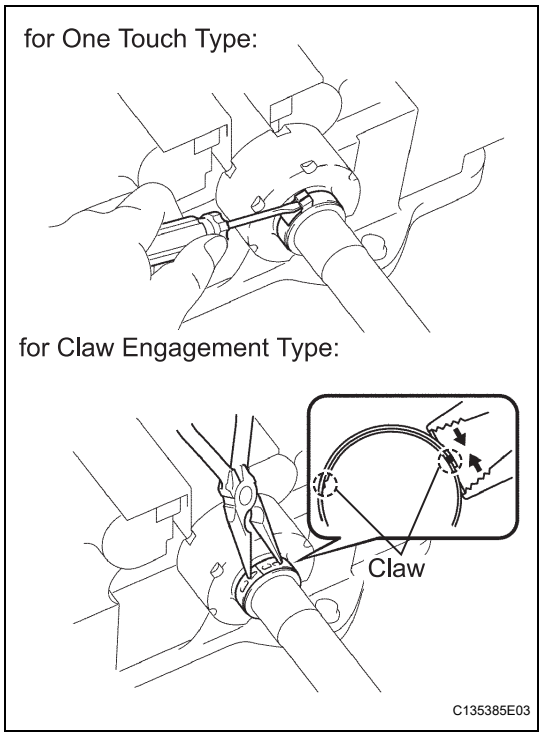
(c) Using a snap ring expander, remove the shaft snap ring.



(d) Put matchmarks on the outboard joint shaft and tripod joint.
NOTICE:
Do not use a punch for the marks.

(e) Using a brass bar and a hammer, remove the tripod joint from the outboard joint shaft.
NOTICE:
Do not tap the roller.

DS



6. REMOVE FRONT DRIVE SHAFT DAMPER LH

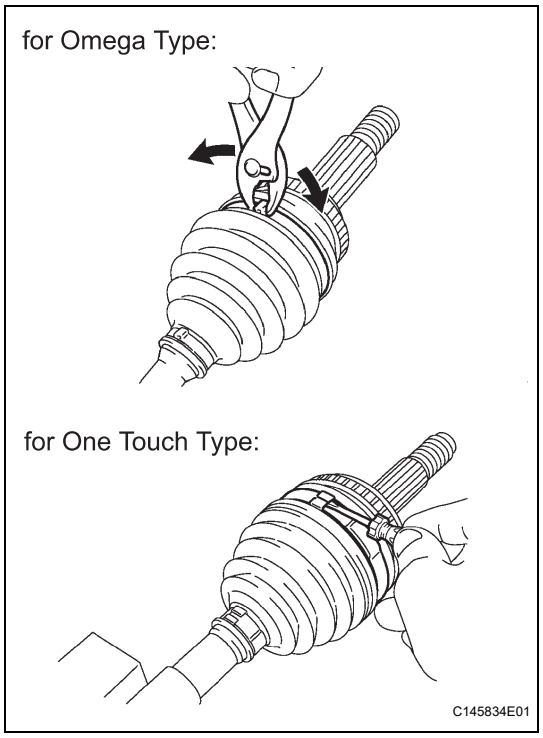
(a) for One touch type:
  (1) Using a screwdriver, remove the drive shaft damper clamp as shown in the illustration.

(b) for Claw engagement type:
  (1) Using needle nose pliers, remove the drive shaft damper clamp as shown in the illustration.

(c) Remove the drive shaft damper.

7. REMOVE FRONT DRIVE SHAFT DAMPER RH

(a) Remove the front drive shaft damper RH.
HINT:
Perform the same procedures as for the front drive shaft damper LH.



8. REMOVE NO. 2 FRONT AXLE OUTBOARD JOINT BOOT CLAMP

(a) for Omega type:
  (1) Using pliers, remove the No. 2 front axle outboard joint boot clamp as shown in the illustration.

(b) for One touch type:
  (1) Using a screwdriver, remove the No. 2 front axle outboard joint boot clamp as shown in the illustration.

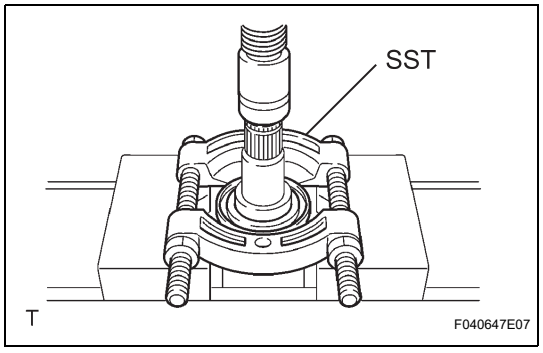
9. REMOVE FRONT AXLE OUTBOARD JOINT BOOT CLAMP

(a) Remove the front axle outboard joint boot clamp.
HINT:
Perform the same procedures as for the No. 2 front axle outboard joint boot clamp.

10. REMOVE FRONT AXLE OUTBOARD JOINT BOOT

(a) Remove the outboard joint boot from the outboard joint shaft.

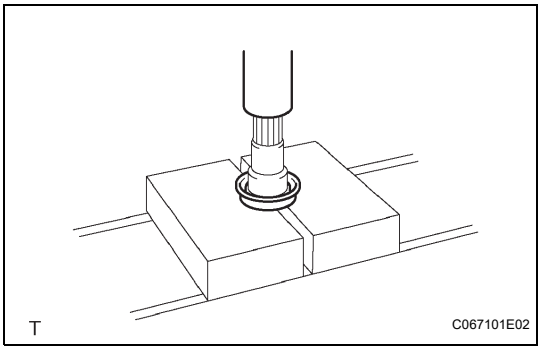
(b) Remove the grease from the outboard joint.



11. REMOVE FRONT DRIVE SHAFT DUST COVER LH

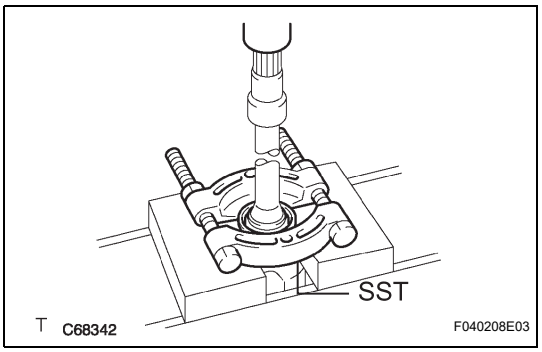
(a) Using SST and a press, remove the drive shaft dust cover LH.
SST 09950-00020
NOTICE:
Be careful not to drop the inboard joint assembly.

DS



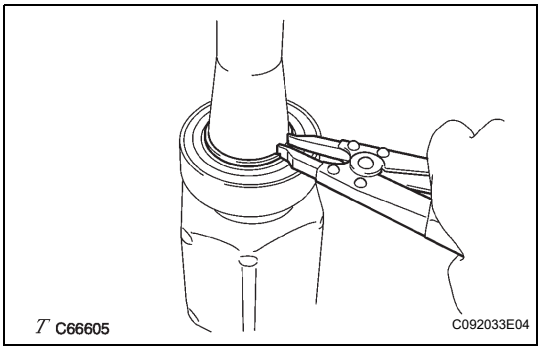
12. REMOVE FRONT DRIVE SHAFT DUST COVER RH

(a) Using a press, remove the drive shaft dust cover RH.



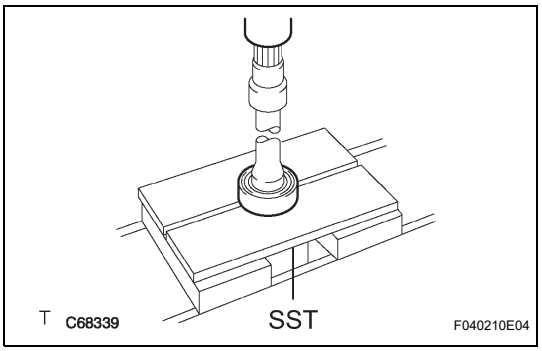
13. REMOVE FRONT DRIVE SHAFT DUST COVER

(a) Using SST and a press, remove the drive shaft dust cover.
SST 09950-00020



14. REMOVE FRONT DRIVE SHAFT BEARING

(a) Using a snap ring expander, remove the drive shaft hole snap ring.

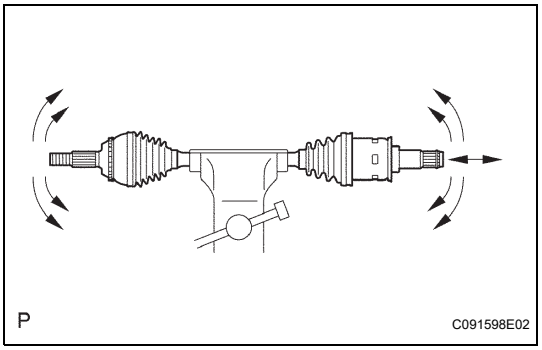


(b) Using SST and a press, remove the bearing.
SST 09527-10011

(c) Remove the bearing bracket hole snap ring.
NOTICE:
Be careful not to drop the inboard joint assembly.

DS

INSPECTION



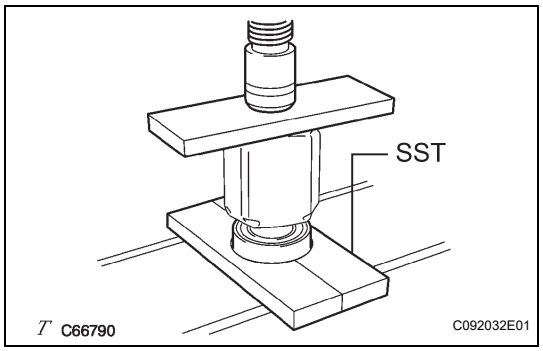
1. INSPECT FRONT DRIVE SHAFT ASSEMBLY

(a) Check that there is no excessive play in the outboard joint.

(b) Check that the inboard joint slides smoothly in the thrust direction.

(c) Check that there is no excessive play in the radial directions of the inboard joint.

(d) Check the boots for damage.



REASSEMBLY

1. INSTALL FRONT DRIVE SHAFT BEARING

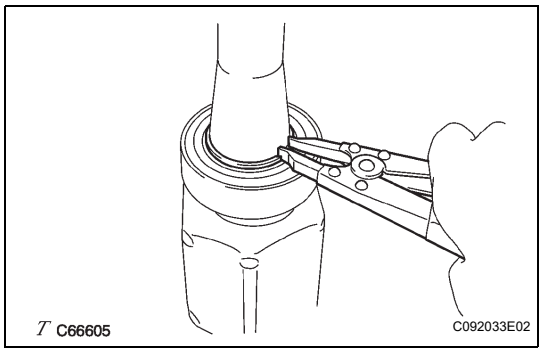
(a) Install a new bearing bracket hole snap ring to the front drive shaft assembly RH.

(b) Using SST and a steel plate, install a new front drive shaft bearing.

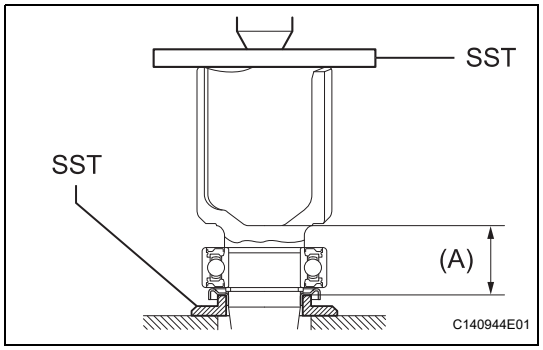
SST 09527-30010, 09527-10011

NOTICE:

The bearing should be completely installed.



(c) Using a snap ring expander, install a new drive shaft hole snap ring.



2. INSTALL FRONT DRIVE SHAFT DUST COVER

(a) Using SST and a press, install a new drive shaft dust cover.

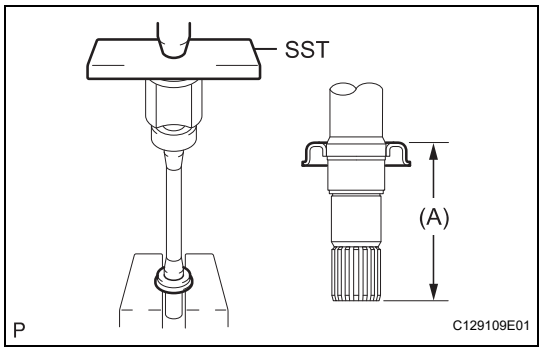
SST 09726-40010, 09527-10011

Distance (A):

41.6 to 42.6mm (1.6378 to 1.6772in.)

NOTICE:

- **The dust cover should be completely installed.**
- **Be careful not to damage the dust deflector.**



3. INSTALL FRONT DRIVE SHAFT DUST COVER RH

(a) Using SST and a press, install a new drive shaft dust cover RH until distance (A) from the tip of the center drive shaft to the drive shaft dust cover RH meets the specification.

SST 09527-10011

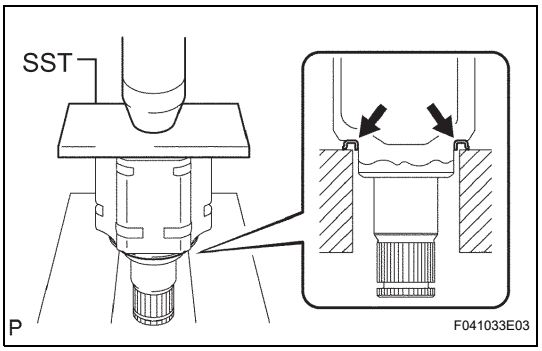
Distance (A):

110.0 to 111.0 mm (4.3307 to 4.3701 in.)

NOTICE:

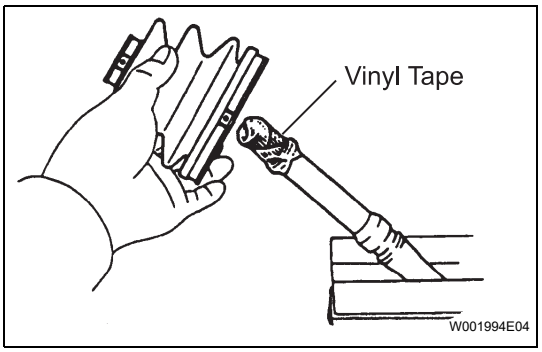
- **The dust cover should be completely installed.**
- **Be careful not to damage the dust deflector.**

DS



4. INSTALL FRONT DRIVE SHAFT DUST COVER LH

(a) Using SST and a press, install a new drive shaft dust cover LH.
SST 09527-10011
NOTICE:
- **The dust cover should be completely installed.**
- **Be careful not to damage the dust deflector.**

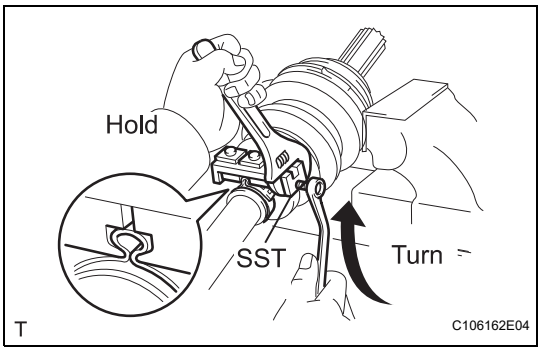


5. INSTALL FRONT AXLE OUTBOARD JOINT BOOT

(a) Hold the drive shaft lightly in a vise between aluminium plates.
HINT:
Before installing the boots, wrap the spline of the drive shaft with vinyl tape to prevent the boots from being damaged.

(b) Temporarily install a new outboard joint boot to the drive shaft with the 2 clamps.

(c) Pack the outboard joint shaft and boot with grease.
Grease capacity:
190 to 200 g (6.7 to 7.1 oz.)



6. INSTALL FRONT AXLE OUTBOARD JOINT BOOT CLAMP

(a) for Omega type:

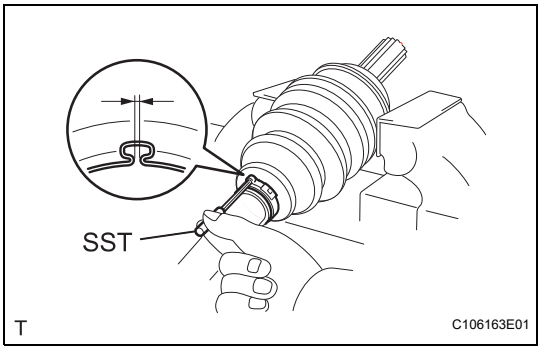
(1) Hold the drive shaft lightly in a vise between aluminum plates.
NOTICE:
Do not overtighten the vise.

(2) Install the 2 outboard joint boot clamps onto the boot.

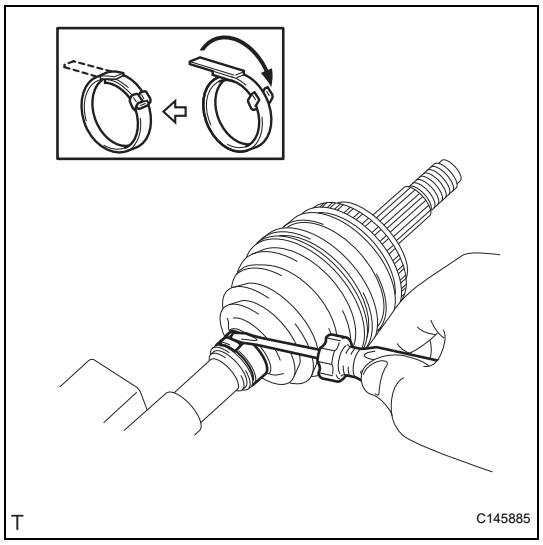
(3) Place SST onto the outboard joint boot clamp.
SST 09521-24010

(4) Tighten the SST so that the outboard joint boot clamp is pinched.
NOTICE:
Do not overtighten the SST.

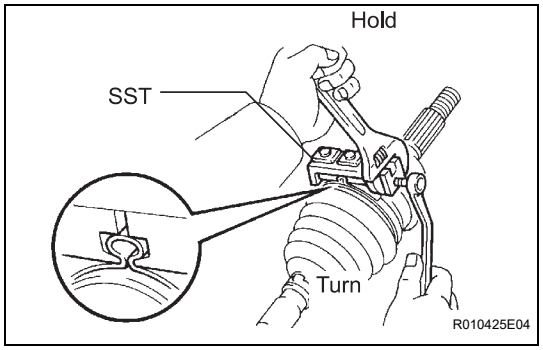
(5) Using SST, measure the clearance of the outboard joint boot clamp.
SST 09240-00020
Clearance:
0.5 to 1.5 mm (0.0197 to 0.0591 in.)
NOTICE:
If the measured value is greater than the specified value, retighten the clamp.



DS

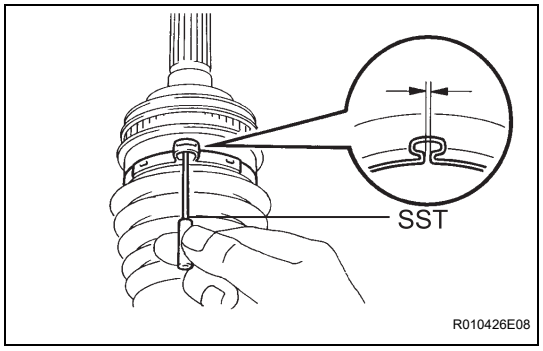


(b) for One touch type:
(1) Using a screwdriver, install the outboard joint boot clamp as shown in the illustration.

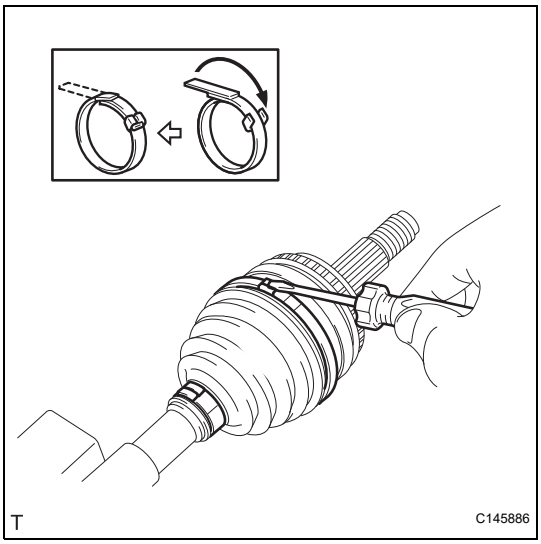


7. INSTALL NO. 2 FRONT AXLE OUTBOARD JOINT BOOT CLAMP

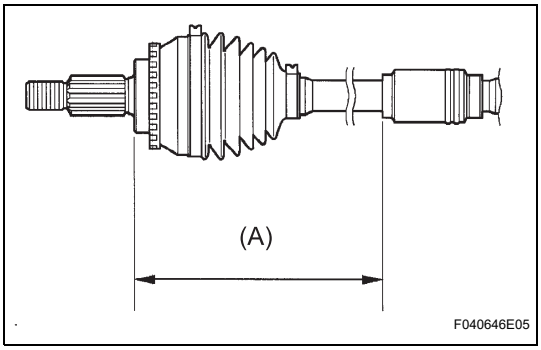
(a) for Omega type:
(1) Install the No. 2 outboard joint boot clamp onto the boot.
(2) Place SST onto the No. 2 outboard joint boot clamp.
SST 09521-24010
(3) Tighten the SST so that the No. 2 outboard joint boot clamp is pinched.
NOTICE:
Do not overtighten the SST.



(4) Using SST, measure the clearance of the No. 2 outboard joint boot clamp.
SST 09240-00020
Clearance:
0.5 to 1.5 mm (0.0197 to 0.0591 in.)
NOTICE:
If the measured value is greater than the specified value, retighten the clamp.



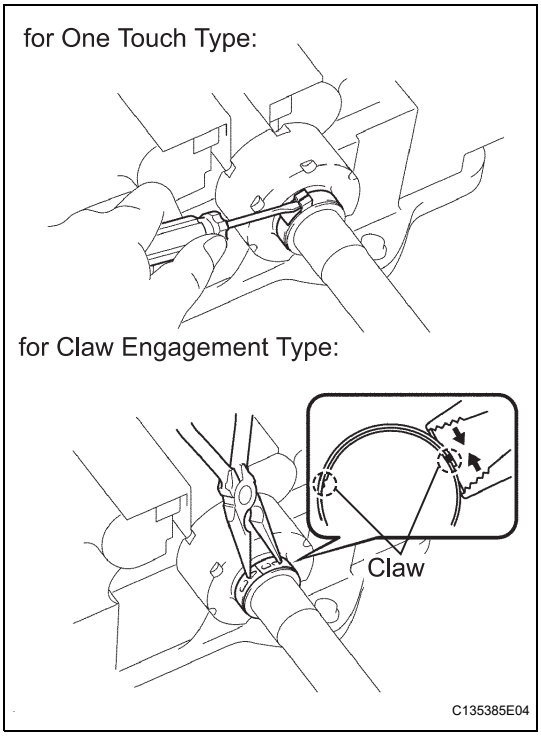
(b) for One touch type:
(1) Using a screwdriver, install the No. 2 outboard joint boot clamp as shown in the illustration.



8. INSTALL FRONT DRIVE SHAFT DAMPER

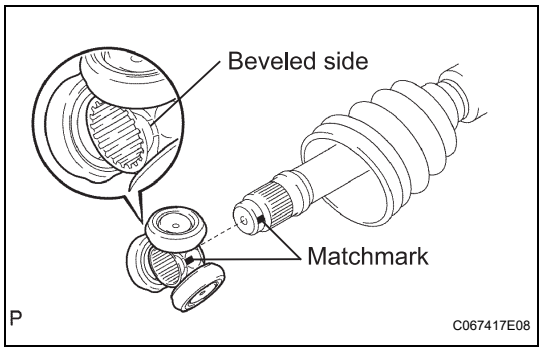
(a) Install the drive shaft damper to the drive shaft.
(b) Make sure that the damper is on the shaft groove.
(c) Set the distance as specified below.
Distance (A)

Item	Specified Condition
Front drive shaft LH	213.0 to 217.0 mm (8.386 to 8.543 in.)
Front drive shaft RH	223.4 to 227.4 mm (8.795 to 8.953 in.)



(d) for One touch type:
(1) Using a screwdriver, install a new drive shaft damper clamp as shown in the illustration.
(e) for Claw engagement type:
(1) Using needle nose pliers, install a new drive shaft damper clamp as shown in the illustration.

DS



9. INSTALL FRONT DRIVE INBOARD JOINT ASSEMBLY

(a) Temporarily install a new inboard joint boot to the drive shaft with the 2 clamps.

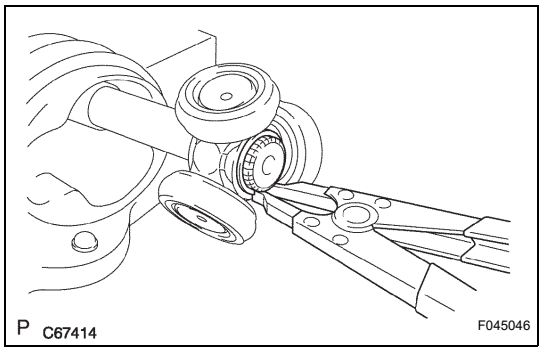
(b) Place the beveled side of the tripod joint axial spline toward the outboard joint shaft.

(c) Align the matchmarks.

(d) Using a brass bar and hammer, tap in the tripod joint to the outboard joint shaft.

NOTICE:

- **Do not tap the roller.**
- **Be sure to install the tripod joint assembly in the correct direction.**

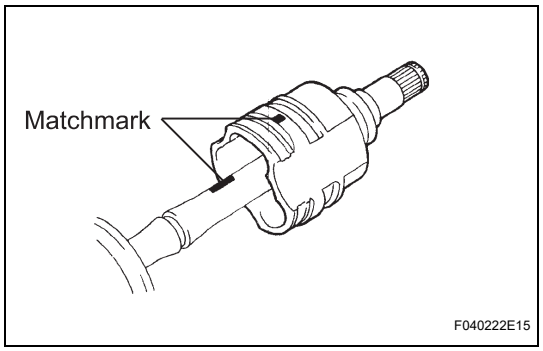


(e) Using a snap ring expander, install a new shaft snap ring.

(f) Coat the outboard joint shaft and boot with grease.

Grease capacity:

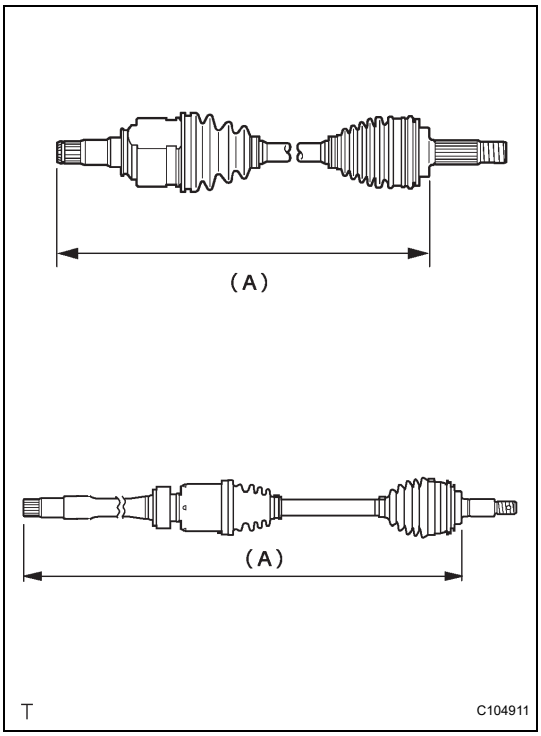
175 to 185 g (6.2 to 6.5 oz.)



(g) Align the matchmarks and install the inboard joint assembly to the outboard joint shaft assembly.

10. INSTALL FRONT AXLE INBOARD JOINT BOOT

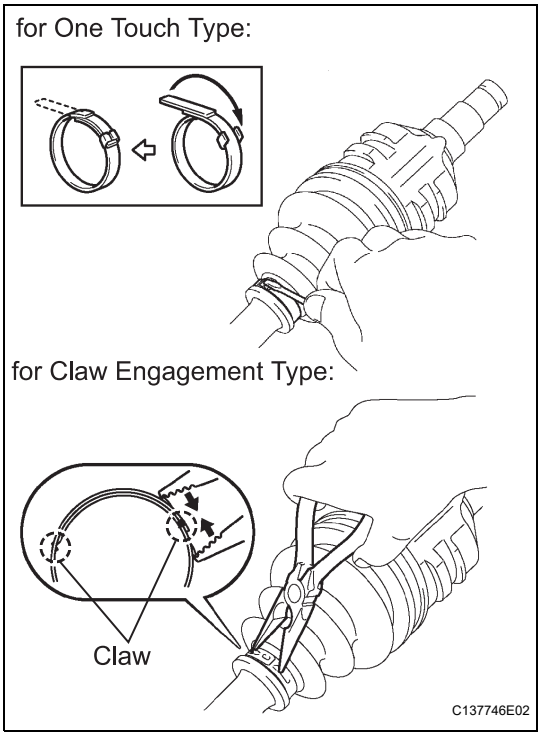
(a) Install the inboard joint boot to the inboard joint assembly.



(b) Check whether the drive shaft dimensions are within the following specifications.
HINT:
The following table shows distance (A) of the drive shaft.

Distance (A)

Item	Specified Condition
Front drive shaft LH	**579.5 to 589.5 mm (22.82 to 23.21 in.)**
Front drive shaft RH	**905.0 to 915.0 mm (35.63 to 36.02 in.)**

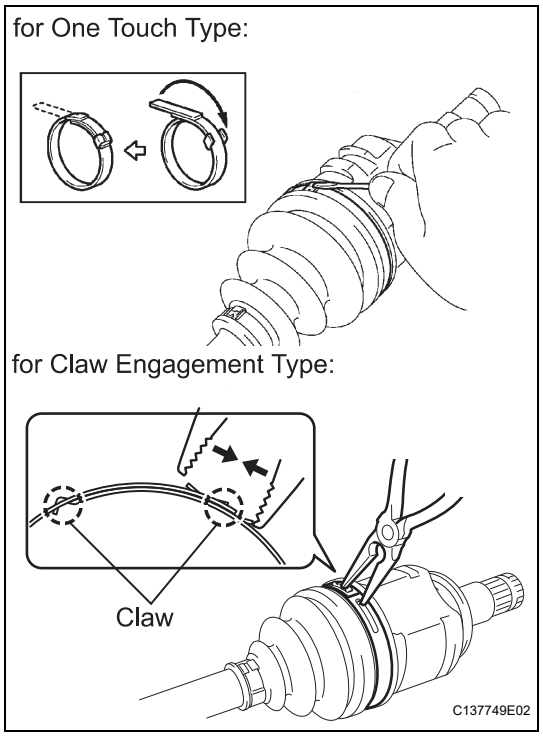


11. INSTALL FRONT AXLE INBOARD JOINT BOOT CLAMP

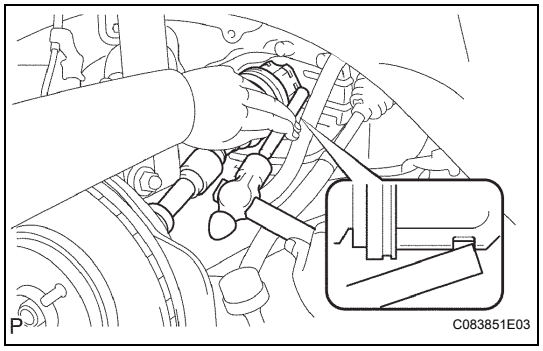
(a) for One touch type:
  (1) Using a screwdriver, install the inboard joint boot clamp as shown in the illustration.

(b) for Claw engagement type:
  (1) Using needle nose pliers, install the inboard joint boot clamp as shown in the illustration.

DS

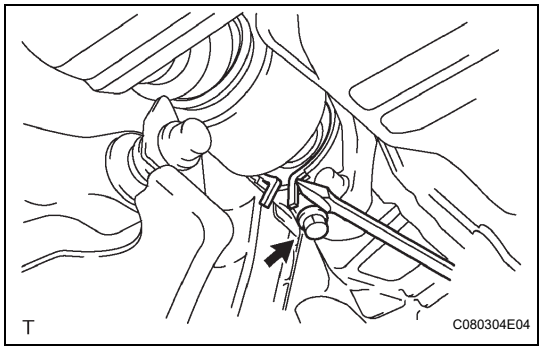


12. **INSTALL NO. 2 FRONT AXLE INBOARD JOINT BOOT CLAMP**
    (a) for One touch type:
        (1) Using a screwdriver, install the No. 2 front axle inboard joint boot clamp as shown in the illustration.
    (b) for Claw engagement type:
        (1) Using needle nose pliers, install the No. 2 front axle inboard joint boot clamp as shown in the illustration.
13. **INSTALL FRONT DRIVE SHAFT LH HOLE SNAP RING**
    (a) Install a new hole snap ring.
14. **INSPECT FRONT DRIVE SHAFT ASSEMBLY (See page DS-10)**



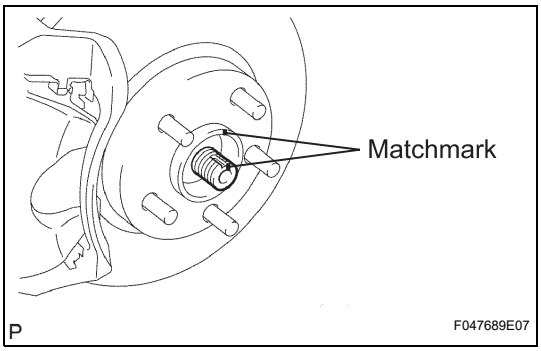
INSTALLATION

1. **INSTALL FRONT DRIVE SHAFT ASSEMBLY LH**
    (a) Coat the spline of the inboard joint shaft assembly with ATF.
    (b) Align the shaft splines and install the drive shaft assembly LH with a brass bar and hammer.
    NOTICE:
    - **Set the shaft snap ring with the opening side facing down.**
    - **Be careful not to damage the drive shaft dust cover, boot, or oil seal.**
    - **Move the drive shaft assembly while keeping it level.**



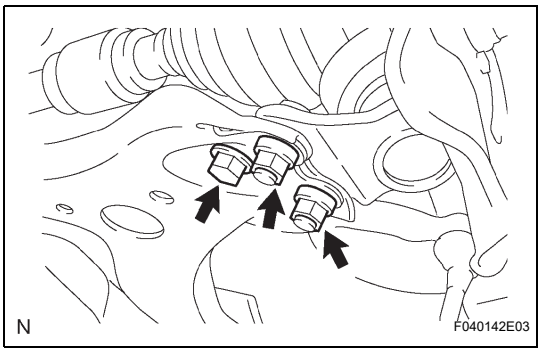
2. **INSTALL FRONT DRIVE SHAFT ASSEMBLY RH**
    (a) Coat the spline of the inboard joint shaft assembly with ATF.
    (b) Install the front drive shaft assembly RH.
    (c) Using a screwdriver, install a new bearing bracket hole snap ring.
    NOTICE:
    - **Do not damage the boot or oil seal.**
    - **Move the drive shaft assembly while keeping it level.**
    (d) Install a new bolt.
    Torque: 32 N*m (330 kgf*cm, 24 ft.*lbf)

DS



3. INSTALL FRONT AXLE ASSEMBLY

(a) Align the matchmarks and install the front drive shaft assembly to the front axle hub sub-assembly.
NOTICE:
Be careful not to damage the drive shaft boot or speed sensor rotor.



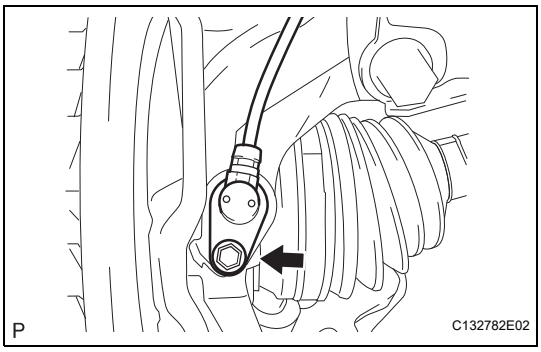
4. INSTALL FRONT SUSPENSION LOWER NO. 1 ARM

(a) Install the lower ball joint to the front suspension lower No. 1 arm with the bolt and 2 nuts.
Torque: 75 N*m (765 kgf*cm, 55 ft.*lbf)

5. INSTALL TIE ROD END SUB-ASSEMBLY

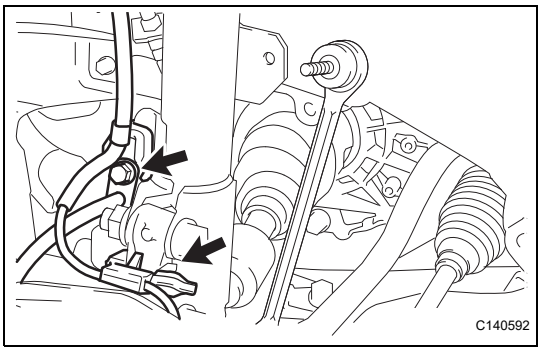
(a) Install the tie rod end sub-assembly to the steering knuckle with the nut.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

(b) Install a new cotter pin.
NOTICE:
If the holes for the cotter pin are not aligned, tighten the nut up to 60° further.



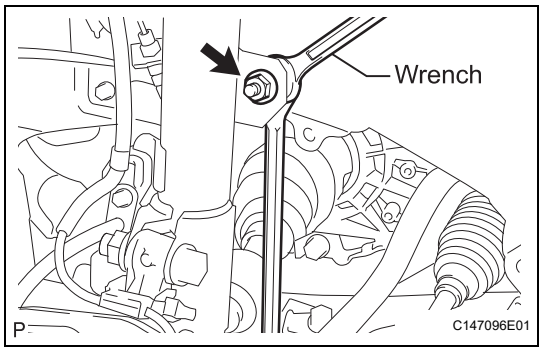
6. INSTALL FRONT SPEED SENSOR

(a) Install the front speed sensor to the steering knuckle with the bolt.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
NOTICE:
- **Prevent foreign matter from adhering to the speed sensor.**
- **Be careful not to damage the speed sensor.**

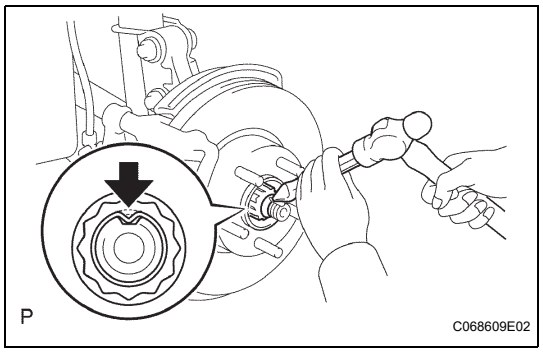


(b) Install the flexible hose and the speed sensor to the shock absorber with the bolt and set the sensor clip on the knuckle.
Torque: 19 N*m (192 kgf*cm, 14 ft.*lbf)
NOTICE:
- **Be careful not to damage the speed sensor.**
- **Prevent foreign matter from adhering to the speed sensor.**
- **Do not twist the sensor wire when installing the speed sensor.**

DS



7. **INSTALL FRONT STABILIZER LINK ASSEMBLY**
   (a) Install the stabilizer link assembly with the nut.
   Torque: 74 N*m (755 kgf*cm, 55 ft.*lbf)
   HINT:
   If the ball joint turns together with the nut, use a wrench (19 mm) to hold the stud.



8. **INSTALL FRONT AXLE HUB NUT**
   (a) Using a socket wrench (30 mm), install a new axle hub nut.
   Torque: 294 N*m (3,000 kgf*cm, 217 ft.*lbf)
   (b) Using a chisel and hammer, stake the front axle hub nut.

9. **ADD HYBRID TRANSAXLE FLUID**
   HINT:
   See page HX-2.

10. **INSPECT HYBRID TRANSAXLE FLUID**
    HINT:
    See page HX-2.

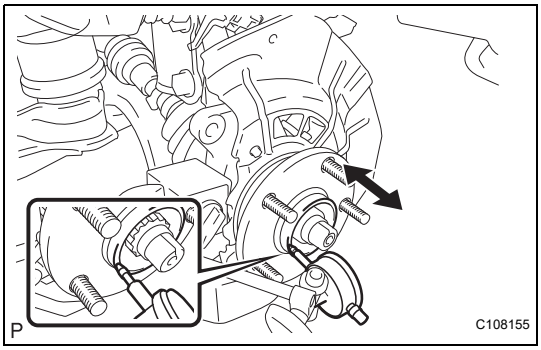
11. **INSTALL FRONT WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

12. **ADJUST FRONT WHEEL ALIGNMENT**
    HINT:
    See page SP-4.

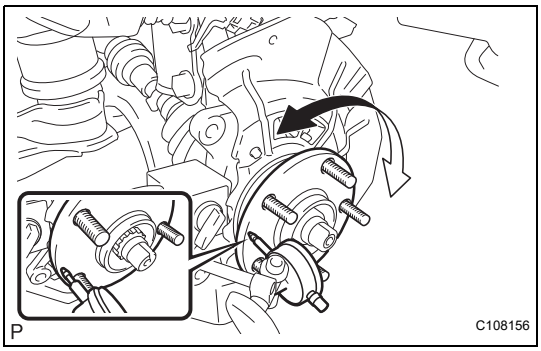
13. **CHECK ABS SPEED SENSOR SIGNAL**
    HINT:
    See page BC-35.

ON-VEHICLE INSPECTION

1. **REMOVE FRONT WHEEL**
2. **SEPARATE FRONT DISC BRAKE CALIPER ASSEMBLY (See page AH-6)**
3. **REMOVE FRONT DISC (See page BR-50)**
4. **INSPECT FRONT AXLE HUB BEARING LOOSENESS**
   (a) Using a dial indicator, check for looseness near the center of the axle hub.
   Maximum:
   0.05 mm (0.0020 in.)
   NOTICE:
   Ensure that the dial indicator is set perpendicular to the measurement surface.
   HINT:
   If looseness exceeds the maximum, replace the bearing.



5. **INSPECT FRONT AXLE HUB RUNOUT**
   (a) Using a dial indicator, check for runout on the surface of the axle hub outside the hub bolt.
   Maximum:
   0.05 mm (0.0020 in.)
   NOTICE:
   Ensure that the dial indicator is set perpendicular to the measurement surface.
   HINT:
   If runout exceeds the maximum, replace the axle hub.

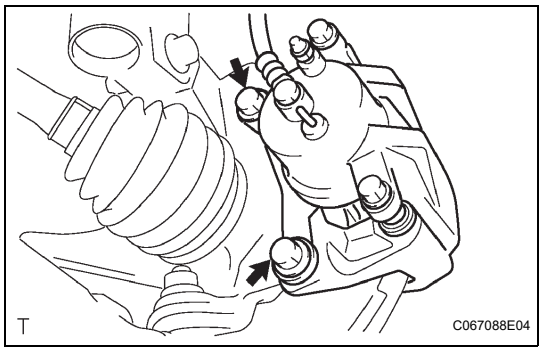


6. **INSTALL FRONT DISC (See page BR-51)**
7. **INSTALL FRONT DISC BRAKE CALIPER ASSEMBLY (See page AH-10)**
8. **INSTALL FRONT WHEEL**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

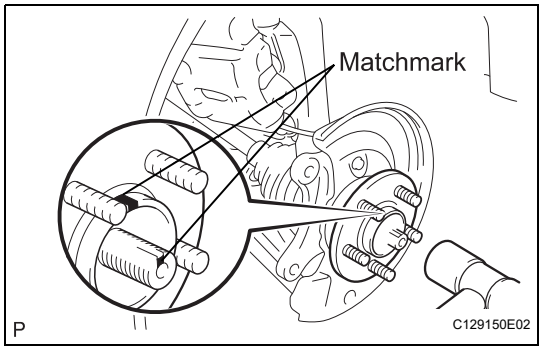
REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

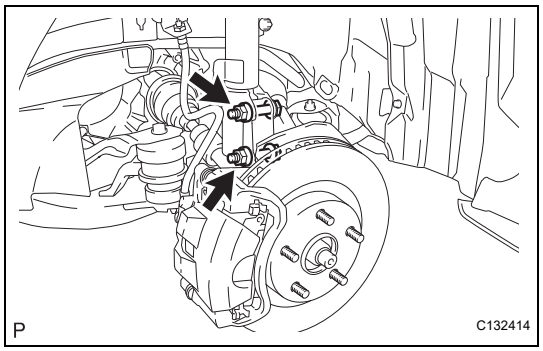
1. **REMOVE FRONT WHEEL**
2. **REMOVE FRONT AXLE HUB NUT (See page DS-5)**
3. **SEPARATE FRONT SPEED SENSOR (See page DS-5)**
4. **SEPARATE FRONT DISC BRAKE CALIPER ASSEMBLY**
   (a) Remove the 2 bolts and separate the front disc brake caliper assembly from the steering knuckle.
   NOTICE:
   Use wire or an equivalent tool to keep the brake caliper from hanging down by the flexible hose.



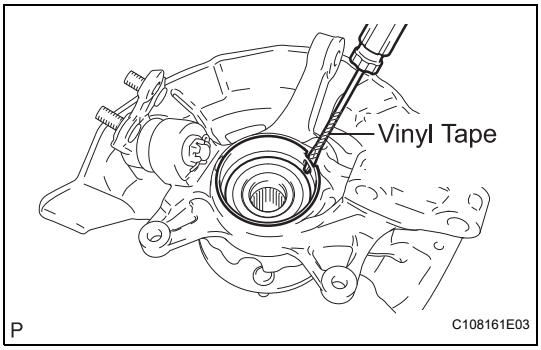
5. **REMOVE FRONT DISC (See page BR-50)**
6. **SEPARATE TIE ROD END SUB-ASSEMBLY (See page DS-6)**
7. **SEPARATE FRONT SUSPENSION LOWER NO. 1 ARM (See page DS-6)**
8. **REMOVE FRONT AXLE ASSEMBLY**
   (a) Put matchmarks on the front drive shaft assembly and the front axle hub sub-assembly.
   (b) Using a plastic hammer, separate the front drive shaft assembly from the front axle assembly.
   NOTICE:
   Be careful not to damage the drive shaft boot or speed sensor rotor.



   (c) Remove the 2 bolts, 2 nuts, and front axle assembly.



AH

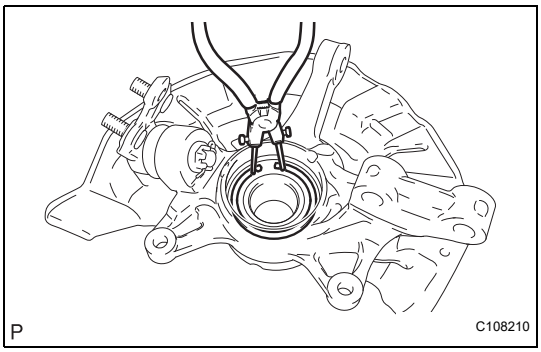


9. REMOVE NO. 1 FRONT WHEEL BEARING DUST DEFLECTOR

(a) Using a screwdriver with its tip wrapped with vinyl tape, remove the No. 1 front wheel bearing dust deflector.

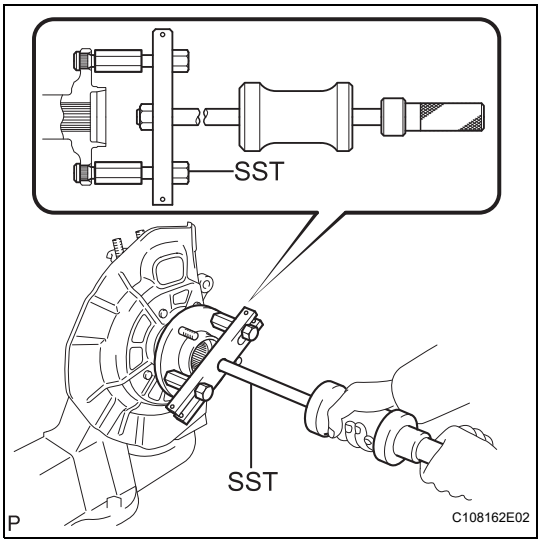
NOTICE:

Be careful not to damage the steering knuckle.



10. REMOVE FRONT AXLE HUB HOLE SNAP RING

(a) Using snap ring pliers, remove the front axle hub hole snap ring.



11. REMOVE FRONT AXLE HUB SUB-ASSEMBLY

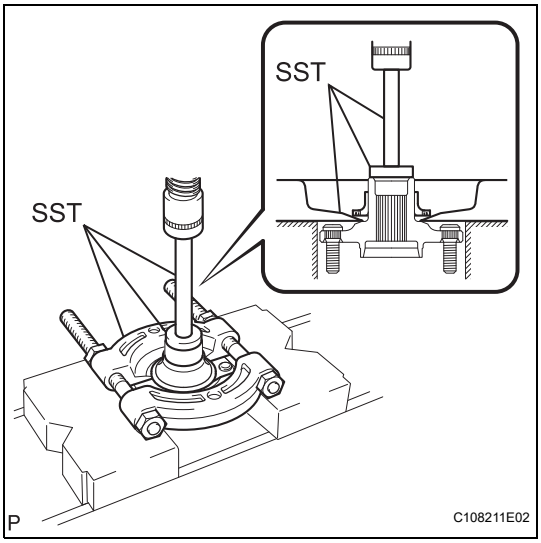
(a) Hold the front axle assembly between aluminium plates in a vise.

NOTICE:

Do not overtighten the vise.

(b) Using SST, remove the front axle hub sub-assembly.

SST 09520-00031



(c) Using SST and a press, remove the bearing inner race (outside) from the front axle hub sub-assembly.

SST 09555-55010, 09950-60010 (09951-00430), 09950-70010 (09951-07100)

NOTICE:

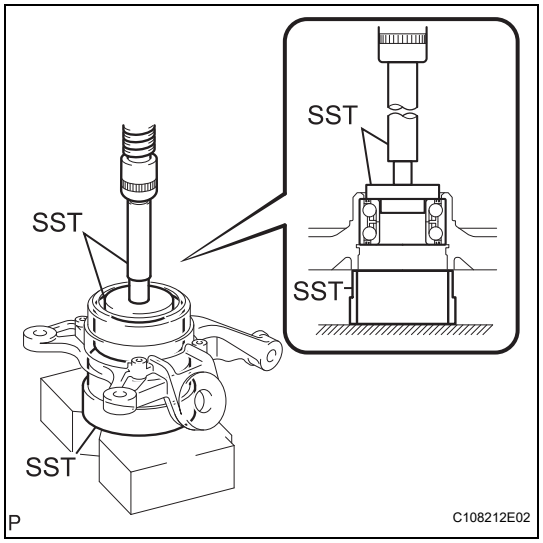
Be careful not to drop the front axle hub sub-assembly.

12. REMOVE FRONT DISC BRAKE DUST COVER

(a) Remove the 4 bolts and disc brake dust cover from the steering knuckle.

13. REMOVE FRONT LOWER BALL JOINT ASSEMBLY (See page SP-24)

AH

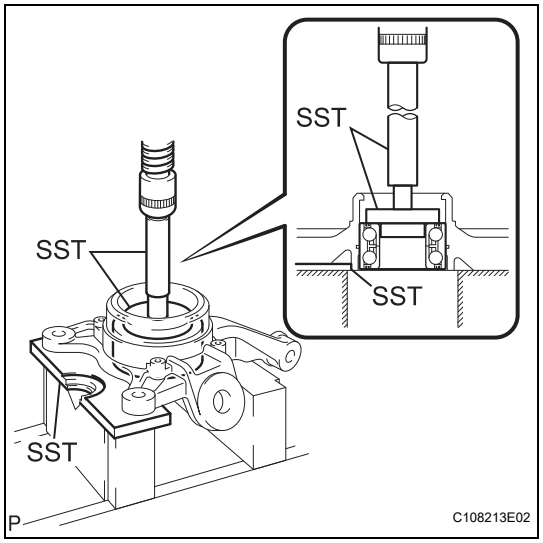


14. REMOVE FRONT AXLE HUB BEARING

(a) Place the bearing inner race (outside) on the front axle hub bearing.

(b) Using SST and a press, press the front axle hub bearing until it contacts the SST.

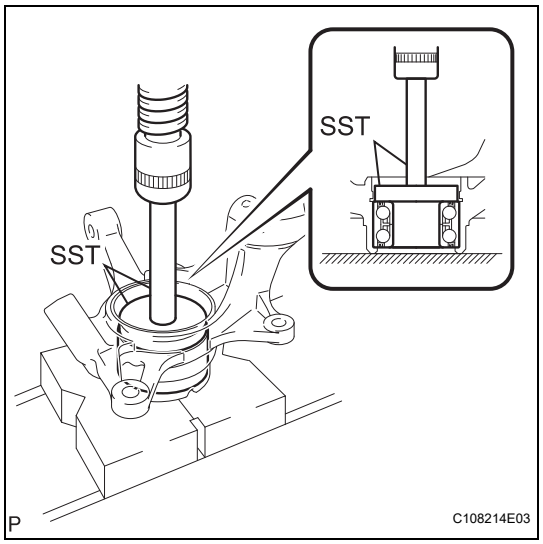
SST 09527-17011, 09950-60010 (09951-00600, 09951-00400, 09952-06010), 09950-70010 (09951-07100)



(c) Using SST to make the steering knuckle horizontal, fix it to the V-block as shown in the illustration.

SST 09527-20011, 09950-60010 (09951-00600, 09951-00400, 09952-06010), 09950-70010 (09951-07100)

(d) Using SST and a press, remove the front axle hub bearing from the steering knuckle.



INSTALLATION

1. INSTALL FRONT AXLE HUB BEARING

(a) Using SST and a press, install a new front axle hub bearing to the steering knuckle.

SST 09950-60020 (09951-00810), 09950-70010 (09951-07100)

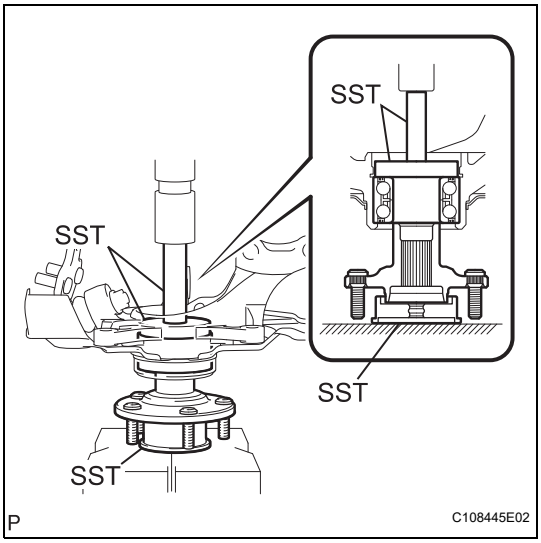
2. INSTALL FRONT LOWER BALL JOINT ASSEMBLY (See page SP-25)

3. INSTALL FRONT DISC BRAKE DUST COVER

(a) Install the disc brake dust cover to the steering knuckle with the 4 bolts.

Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)

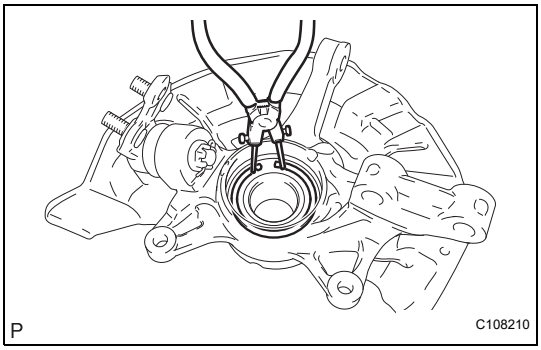
AH



4. INSTALL FRONT AXLE HUB SUB-ASSEMBLY

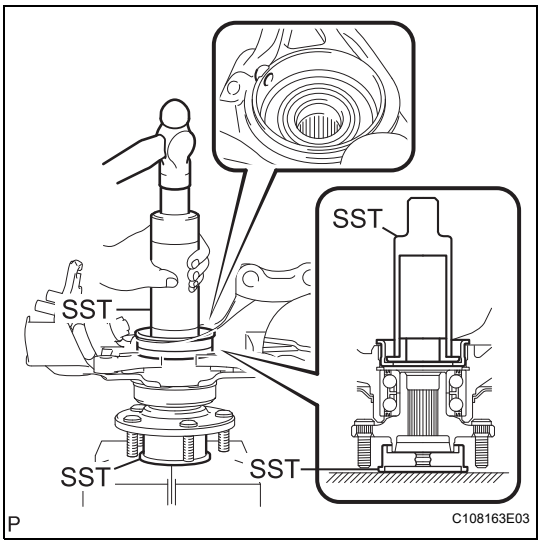
(a) Using SST and a press, install the front axle hub sub-assembly.

SST 09608-32010, 09950-60020 (09951-00810), 09950-70010 (09951-07100)



5. INSTALL FRONT AXLE HUB HOLE SNAP RING

(a) Using snap ring pliers, install a new front axle hub hole snap ring.



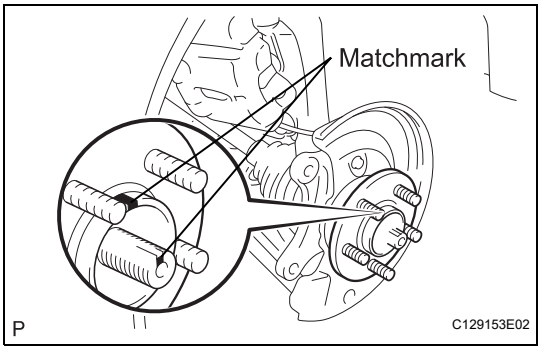
6. INSTALL NO. 1 FRONT WHEEL BEARING DUST DEFLECTOR

(a) Using SST and a hammer, install a new No. 1 front wheel bearing dust deflector.

SST 09316-60011 (09316-00011, 09316-00031), 09608-32010

HINT:

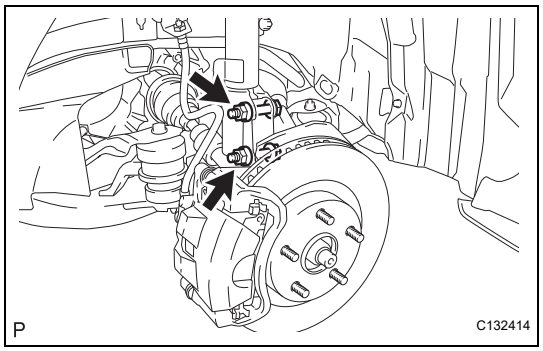
Align the hole for the speed sensor in the No. 1 front wheel bearing dust deflector with the steering knuckle.



7. INSTALL FRONT AXLE ASSEMBLY

(a) Align the matchmarks and install the front drive shaft assembly to the front axle hub sub-assembly.

AH

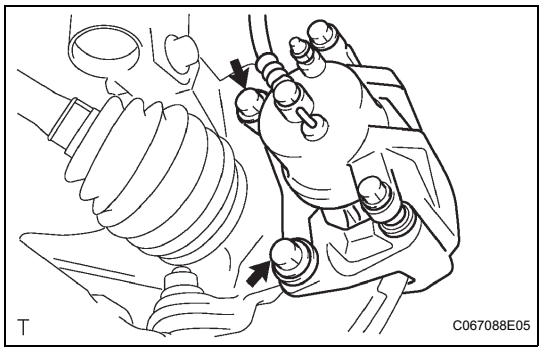


(b) Install the steering knuckle with the front axle assembly to the front shock absorber with the 2 bolts and 2 nuts.
Torque: 210 N*m (2,140 kgf*cm, 155 ft.*lbf)
NOTICE:
- **Only when reusing the bolts and nuts, apply a small amount of engine oil to the threads of the nuts.**
- **Be careful not to damage the drive shaft boot or speed sensor rotor.**

8. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM (See page DS-18)**

9. **INSTALL TIE ROD END SUB-ASSEMBLY (See page DS-18)**

10. **INSTALL FRONT DISC (See page BR-51)**



11. **INSTALL FRONT DISC BRAKE CALIPER ASSEMBLY**
(a) Install the front disc brake caliper assembly to the steering knuckle with the 2 bolts.
Torque: 107 N*m (1,090 kgf*cm, 79 ft.*lbf)
NOTICE:
Do not twist the brake hose when installing the front disc brake caliper assembly.

12. **INSTALL FRONT AXLE HUB NUT**
(a) Using a socket wrench (30 mm), install a new axle hub nut.
Torque: 294 N*m (3,000 kgf*cm, 217 ft.*lbf)
HINT:
Stake the nut after inspecting for looseness and runout in the following steps.

13. **SEPARATE FRONT DISC BRAKE CALIPER ASSEMBLY**
(a) Remove the 2 bolts and separate the front disc brake caliper assembly from the steering knuckle.
NOTICE:
Use wire or an equivalent tool to keep the brake caliper from hanging down by the flexible hose.

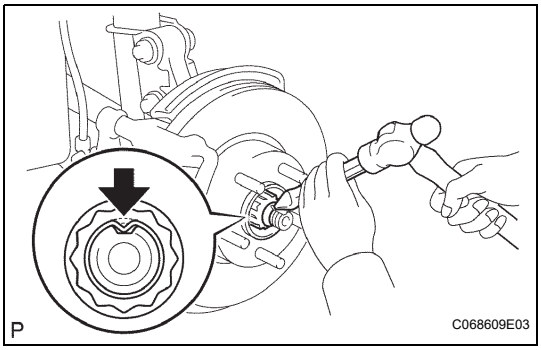
14. **REMOVE FRONT DISC (See page BR-50)**

15. **INSPECT FRONT AXLE HUB BEARING LOOSENESS (See page AH-5)**

16. **INSPECT FRONT AXLE HUB RUNOUT (See page AH-6)**

17. **INSTALL FRONT DISC (See page BR-51)**

18. **INSTALL FRONT DISC BRAKE CALIPER ASSEMBLY**
(a) Install the front disc brake caliper assembly to the steering knuckle with the 2 bolts.
Torque: 107 N*m (1,090 kgf*cm, 79 ft.*lbf)
NOTICE:
Do not twist the brake hose when installing the front disc brake caliper assembly.



19. **INSTALL FRONT SPEED SENSOR (See page DS-18)**

20. **INSTALL FRONT AXLE HUB NUT**
    (a) Using a chisel and hammer, stake the axle hub nut.

21. **INSTALL FRONT WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

22. **ADJUST FRONT WHEEL ALIGNMENT**
    HINT:
    See page SP-4.

23. **CHECK ABS SPEED SENSOR SIGNAL**
    HINT:
    See page BC-35.

PROBLEM SYMPTOMS TABLE

Use the table below to help find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts

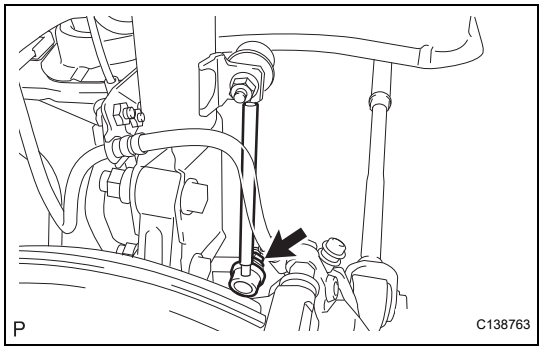
SUSPENSION SYSTEM

Symptom	Suspected Area	See page
Bottoming	1. Vehicle (Overloaded)	-
	2. Spring (Weak)	SP-15
	3. Shock absorber (Worn)	SP-15
Sways/pitches	1. Tire (Worn or improperly inflated)	TW-3
	2. Stabilizer bar (Bent or broken)	SP-28
	3. Shock absorber (Worn)	SP-15
Front wheel shimmy	1. Tire (Worn or improperly inflated)	TW-3
	2. Wheel (Out of balance)	TW-3
	3. Shock absorber (Worn)	SP-15
	4. Wheel alignment (Incorrect)	SP-4
	5. Lower ball joint (Worn)	SP-23
	6. Hub bearing (Worn)	AH-5
	7. Steering gear (Out of adjustment or broken)	PS-61
Rear wheel shimmy	1. Tire (Worn or improperly inflated)	TW-3
	2. Wheel (Out of balance)	TW-3
	3. Shock absorber (Worn)	SP-35
	4. Wheel alignment (Incorrect)	SP-11
	5. Hub bearing (Worn)	AH-5
Abnormal tire wear	1. Tire (Worn or improperly inflated)	TW-3
	2. Wheel alignment (Incorrect)	TW-3
	3. Shock absorber (Worn)	SP-15
	4. Suspension parts (Worn)	-

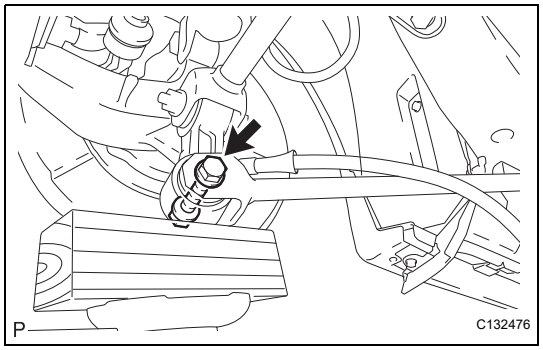
REMOVAL

NOTICE:
Check if an old gasket still remains on the pipe. If so, remove it. Also, check if any bolts or nuts are rusted. If so, replace them.

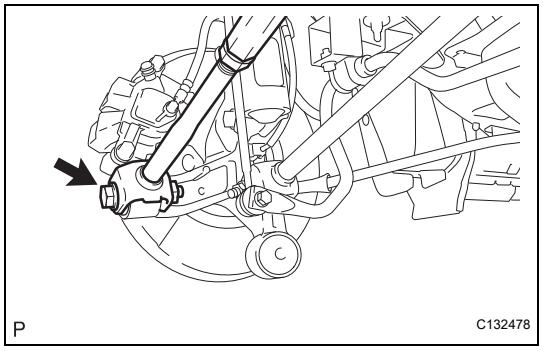
1. **REMOVE REAR WHEEL**
2. **REMOVE FLOOR NO. 1 UNDER COVER (See page SP-41)**
3. **REMOVE FLOOR NO. 2 UNDER COVER (See page SP-42)**
4. **REMOVE CENTER EXHAUST PIPE ASSEMBLY (See page EX-2)**
5. **SEPARATE REAR STABILIZER LINK ASSEMBLY LH**
   (a) Remove the nut and separate the rear stabilizer link assembly LH (lower side) from the rear stabilizer bar.
   HINT:
   If the ball joint turns together with the nut, use a hexagon wrench (5 mm) to hold the stud.



6. **SEPARATE REAR STABILIZER LINK ASSEMBLY RH**
   HINT:
   Separate the RH side using the same procedures as for the LH side.
7. **REMOVE REAR STABILIZER BAR NO. 1 BRACKET (See page SP-67)**
8. **REMOVE REAR STABILIZER BAR**
9. **REMOVE REAR STABILIZER BUSHING (See page SP-67)**
10. **SEPARATE REAR STRUT ROD**
    (a) Remove the bolt, nut and separate the rear strut rod from the rear axle carrier.
    NOTICE:
    When removing the bolt, keep the nut from rotating.



11. **SEPARATE REAR NO. 2 SUSPENSION ARM LH**
    (a) Remove the bolt, nut and separate the rear No. 2 suspension arm (outer side) from the rear axle carrier.
    NOTICE:
    When removing the bolt, keep the nut from rotating.

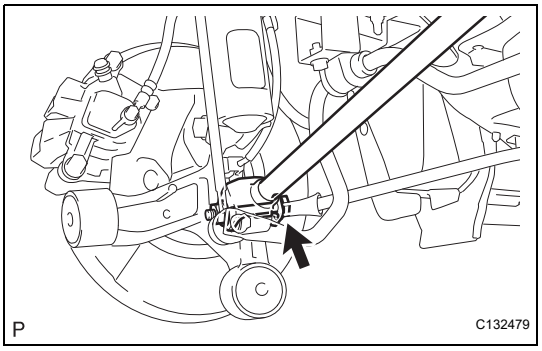


SP

12. SEPARATE REAR NO. 2 SUSPENSION ARM RH

HINT:

Separate the RH side using the same procedures as for the LH side.



13. SEPARATE REAR NO. 1 SUSPENSION ARM LH

(a) Remove the bolt, nut and the rear No. 1 suspension arm (outer side) from the rear axle carrier.

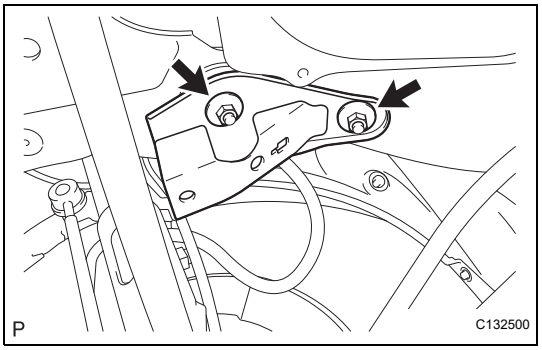
NOTICE:

When removing the bolt, keep the nut from rotating.

14. SEPARATE REAR NO. 1 SUSPENSION ARM RH

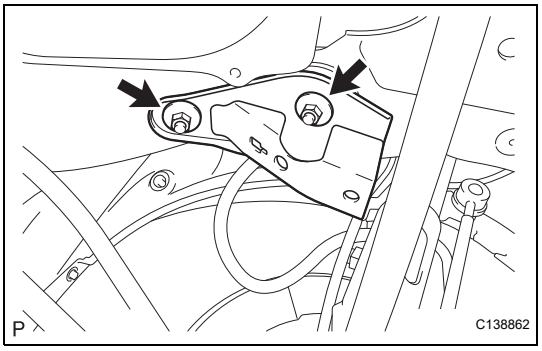
HINT:

Separate the RH side using the same procedures as for the LH side.



15. REMOVE REAR SUSPENSION MEMBER LOWER STOPPER LH

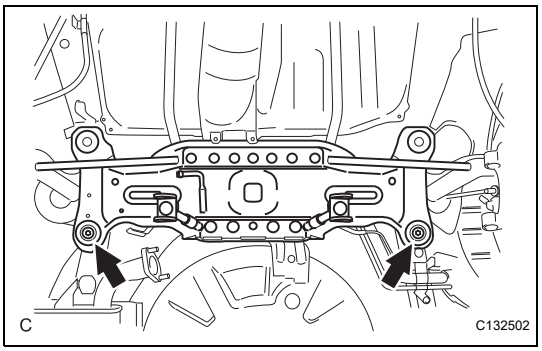
(a) Remove the 2 nuts and the rear suspension member lower stopper LH.



16. REMOVE REAR SUSPENSION MEMBER LOWER STOPPER RH

(a) Remove the 2 nuts and the rear suspension member lower stopper RH.

SP



17. REMOVE REAR SUSPENSION MEMBER SUB-ASSEMBLY

(a) Support the rear suspension member with a jack.

(b) Remove the 2 bolts and the rear suspension member sub-assembly.

SSM

Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent
Toyota Genuine Seal Packing 1282B, Three Bond 1282B or equivalent
Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

INSPECTION

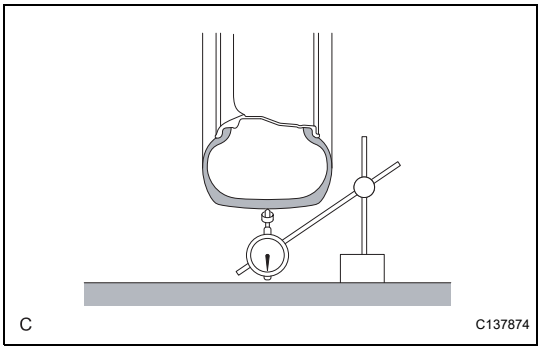
1. INSPECT TIRE

(a) Check the tires for wear and proper inflation pressure.

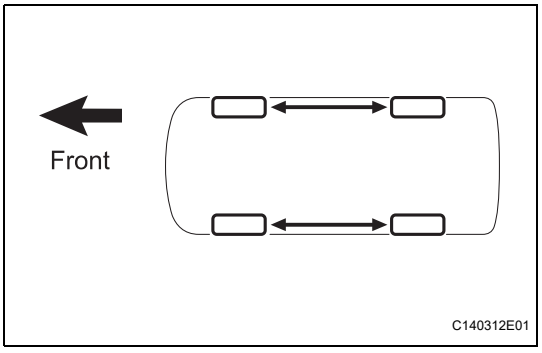
Cold tire inflation pressure

Tire size	Front kPa (kgf*cm^2, psi)	Rear kPa (kgf*cm^2, psi)
P215/60R16 94V	220 (2.2, 32)	220 (2.2, 32)

When driving under the above vehicle conditions at sustained high speeds above 160 km/h (100 mph), in countries where such speeds are permitted by law, inflate the front and rear tires to 240 kPa (2.4 kgf*cm^2, 35 psi) provided that it does not exceed the maximum cold tire inflation pressure molded on the tire sidewall.

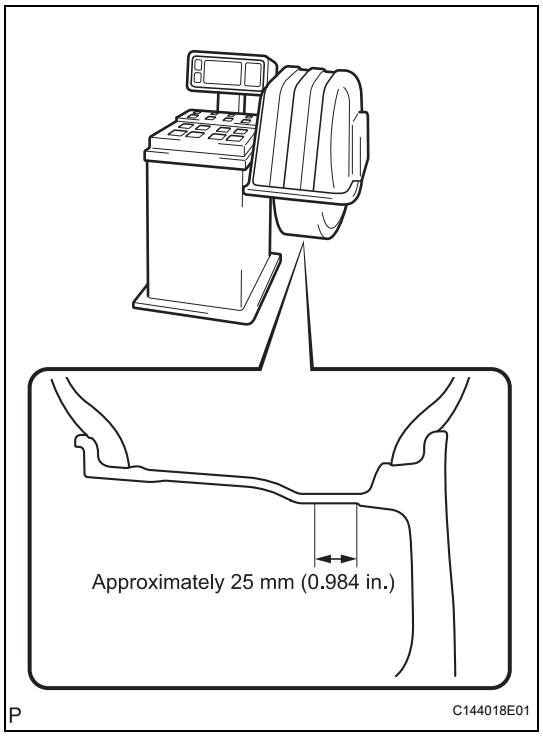


(b) Using a dial indicator, check the runout of the tires.
Tire runout:
1.4 mm (0.055 in.) or less



2. ROTATE TIRES

HINT:
Rotate the tires as shown in illustration.



3. **INSPECT WHEEL BALANCE**

(a) Check and adjust the off-the-car balance.

Imbalance after adjustment:
8.0 g (0.018 lb.) or less.

NOTICE:

- **Remove dirt, oil, and water from the surface where the balance weight is to be adhered with a cleaning detergent.**
- **Do not touch the sticking surface of the tape.**
- **Adhere the sticking type balance weight to the flat position shown in the illustration.**
- **Push the balance weight securely with a finger to adhere it to the indicated position.**
- **Do not reuse balance weights.**

HINT:

- The inner side balance weight should be installed by clipping it to the rim.
- If necessary, check and adjust the on-the-car balance.

4. **INSPECT FRONT AXLE HUB BEARING LOOSENESS**

HINT:

(See page AH-5)

5. **INSPECT REAR AXLE HUB BEARING LOOSENESS**

HINT:

(See page AH-14)

6. **INSPECT FRONT AXLE HUB RUNOUT**

HINT:

(See page AH-5)

7. **INSPECT REAR AXLE HUB RUNOUT**

HINT:

(See page AH-14)

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	

EQUIPMENT

Measuring Flask	
Ohmmeter	
Service Wire Harness	
Stopwatch	
Torque Wrench	
Vernier Calipers	

SSM

	08850-00065	Butyl Tape Set	

EQUIPMENT

Intelligent vacuum pump	
Ohmmeter	
Service Wire Harness	
Torque wrench	
Vacuum gauge	

EQUIPMENT

Ohmmeter	
Radiator cap tester	
Thermometer	
Torque wrench	
Vernier calipers	

COOLANT

Capacity	Classification
6.2 liters (6.6 US qts, 5.5 Imp. qts)	Use only "TOYOTA Super Long Life Coolant" or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, non-borate coolant with long-life hybrid organic acid technology (coolant with long-life hybrid organic acid technology consists of a combination of low phosphates and organic acids).

SSM

Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent	

EQUIPMENT

Precision straight edge	
Torque wrench	
Vernier calipers	
Deep socket wrench (24 mm)	
Socket wrench (27 mm)	
Oil pressure gauge	

LUBRICANT

Item	Capacity	Classification
Oil grade	-	Use ILSAC multigrade engine oil. SAE 5W-20 and SAE 0W-20 engine oil may be used. However, SAE 0W-20 is the best choice for good fuel economy and good starting in cold weather.
Drain and refill with oil filter change	4.3 liters (4.5 US qts, 3.8 Imp. qts)	-
Drain and refill without oil filter change	4.1 liters (4.3 US qts, 3.6 Imp. qts)	-
Dry fill	5.0 liters (5.3 US qts, 4.4 Imp. qts)	-

SSM

Toyota Genuine Adhesive 1344, Three Bond 1344B or Equivalent	
Toyota Genuine Seal Packing Black, Three Bond 1207B or Equivalent	

When a car becomes more.

CAMRY 07

TOYOTA | moving forward

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CE 4-Cylinder
5-Speed Manual (2513)
MSRP** Starting At: $18,270.00

CE 4-Cylinder
5-Speed Auto (2514)
MSRP** Starting At: $19,320.00

LE 4-Cylinder
5-Speed Manual (2531)
MSRP** Starting At: $19,725.00

LE 4-Cylinder
5-Speed Auto (2532)
MSRP** Starting At: $20,775.00

XLE 4-Cylinder
5-Speed Auto (2540)
MSRP** Starting At: $24,700.00

SE 4-Cylinder
5-Speed Manual (2545)
MSRP** Starting At: $20,940.00

SE 4-Cylinder
5-Speed Auto (2546)
MSRP** Starting At: $21,940.00

SE V6
6-Speed Auto (2550)
MSRP** Starting At: $24,615.00

LE V6
6-Speed Auto (2552)
MSRP** Starting At: $23,340.00

XLE V6
6-Speed Auto (2554)
MSRP** Starting At: $27,820.00

Hybrid 4-Cylinder
CVT (2560)
MSRP** Starting At: $26,200.00

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MSRP**
2007 Manufacturer's Suggested Retail Price, excludes the Delivery, Processing and Handling Fee of $620 for Cars and $645 for Trucks, Vans and SUVs. (Historically, vehicle manufacturers and distributors have charged a separate fee for processing, handling and delivering vehicles to dealerships. Toyota's charge for these services is called the "Delivery, Processing and Handling Fee" and is based on the value of the processing, handling and delivery services Toyota provides as well as Toyota's overall pricing structure. Toyota may make a profit on the Delivery, Processing and Handling Fee.) Excludes taxes, license, title and available or regionally required equipment. The Delivery, Processing and Handling Fee in AL, AR, FL, GA, LA, MS, NC, OK, SC and TX is $50-55 higher for Trucks, Sienna and SUVs, and $55 higher for all other Toyota vehicles. Actual dealer price may vary. Pricing, specifications, standard features and available equipment are based on information available when this page was produced and are subject to change without notice.

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Exterior colors available for your Camry*

Super White	Titanium Metallic	Black	Desert Sand Mica
Aloe Green Metallic	Sky Blue Pearl	Blue Ribbon Metallic	Magnetic Gray Metallic
Barcelona Red Metallic	Jasper Pearl		

Interior colors available for your Camry*

Ash Fabric	Bisque Fabric	Ash Leather	Bisque Leather
Dark Charcoal Fabric	Dark Charcoal Leather		

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Standard Features & Options S = Standard O = Optional P = Part of Package	CE 4-Cylinder 5-Speed Manual (2513)	CE 4-Cylinder 5-Speed Auto (2514)	LE 4-Cylinder 5-Speed Manual (2531)	LE 4-Cylinder 5-Speed Auto (2532)	XLE 4-Cylinder 5-Speed Auto (2540)	SE 4-Cylinder 5-Speed Manual (2545)	SE 4-Cylinder 5-Speed Auto (2546)	SE V6 6-Speed Auto (2550)	LE V6 6-Speed Auto (2552)	XLE V6 6-Speed Auto (2554)	Hybrid 4-Cylinder CVT (2560)
Mechanical & Performance											
3.5-Liter 6-Cylinder DOHC 24-Valve Dual VVT-i	–	–	–	–	–	–	–	S	S	S	–
2.4-Liter 4-Cylinder DOHC 16-Valve VVT-i	S	S	S	S	S	S	S	–	–	–	S
5-Speed Manual Transmission	S	–	S	–	–	S	–	–	–	–	–
5-Speed ECT-i Automatic Transmission	–	S	–	S	S	–	S	–	–	–	–
6-Speed ECT-i Automatic Transmission	–	–	–	–	–	–	–	S	S	S	–
Electronically Controlled Continuously Variable Transmission (ECVT)	–	–	–	–	–	–	–	–	–	–	S
Sport Suspension Include: Solid Front & Rear Anti-Roll Bars, Sport Springs & Bushings	–	–	–	–	–	S	S	S	–	–	–
Power Assisted Rack-and-Pinion Steering	S	S	S	S	S	S	S	S	S	S	S
4-Wheel Disc Brakes	S	S	S	S	S	S	S	S	S	S	S
Safety											
Anti-Lock Brake System (ABS)[1]	S	S	S	S	S	S	S	S	S	S	S
Driver & Front Passenger Advanced Airbag System (SRS)[2]	S	S	S	S	S	S	S	S	S	S	S
Driver & Front Passenger Front Seat-Mounted Side Airbags & Front and Rear Side Curtain Airbags[2]	S	S	S	S	S	S	S	S	S	S	S
Driver's Knee Airbag[2]	S	S	S	S	S	S	S	S	S	S	S
Adjustable Headrests for all 5 Seats	S	S	S	S	S	S	S	S	S	S	S
3-Point Front Seatbelts w/Adjustable Shoulder Anchors & Driver-Side Emergency Locking Retractor (ELR), Front Passenger Automatic/ Emergency Locking Retractor (ALR/ELR)	S	S	S	S	S	S	S	S	S	S	S
3-Point Rear Seatbelts w/Automatic/Emergency Locking Retractors (ALR/ELR) For All Passengers	S	S	S	S	S	S	S	S	S	S	S

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Child Restraint System (LATCH)	S	S	S	S	S	S	S	S	S	S	S
Direct Tire Pressure Monitor System[3]	S	S	S	S	S	S	S	S	S	S	S
Exterior											
Blacked-Out Sport Grille	–	–	–	–	–	S	S	S	–	–	–
Front & Rear Lower Spoilers & Rocker Panels	–	–	–	–	–	S	S	S	–	–	–
Halogen Auto On/Off Headlamps	S	S	S	S	S	S	S	S	S	S	S
Integrated Fog Lamps	–	–	–	–	S	S	S	S	–	S	-
Daytime Running Lights	S	S	S	S	S	S	S	S	S	S	S
Dual Color-Keyed Power Outside Mirrors	S	S	S	S	S	S	S	S	S	S	S
Power Tilt/Slide Moonroof w/Sunshade	–	–	P	P	S	P	P	P	P	S	P
Washer-Linked Variable Intermittent Windshield Wipers w/Mist Cycle	S	S	S	S	S	S	S	S	S	S	S
16” Steel Wheels w/P215/60R16 Tires and Full Wheel Covers	S	S	S	S	–	–	–	–	S	–	–
16” Steel Wheels w/P215/60R16 Tires	–	–	O	O	S	–	–	–	O	S	S
17” Aluminum Alloy Wheels w/P215/55R17 Tires[4][5]	–	–	–	–	–	S	S	S	–	–	–
Rear Window Defogger	S	S	S	S	S	S	S	S	S	S	S
Chrome Exhaust Tip	–	–	–	–	S	S	S	S	S	S	S
Dual Exhaust w/Chrome Exhaust Tips	–	–	–	–	–	–	–	S	S	S	–
Heated Outside Mirrors[6]	–	–	–	–	S	–	O/P	O/P	–	S	O/P
Comfort & Convenience											

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JBL® AM/FM 6-Disc In-Dash CD Changer w/Satellite Radio Capability, MP3/WMA Playback Capability, Hands-Free Phone Capability via Bluetooth® Wireless Technology, 8 Speakers in 6 Locations[7][8]	–	–	O	O	S	O	O	O	O	S	S
AM/FM CD Player with MP3/WMA Playback Capability	S	S	S	S	–	S	S	S	S	–	–
Defroster-Linked CFC-Free Dual Zone Auto Climate Control w/Dust & Pollen Filter, Plasmacluster[9] Ionizer, Steering Wheel-Mounted Controls & Rear-Seat Vents	–	–	–	–	S	–	–	–	–	S	S
Defroster-Linked CFC-Free Air Conditioning w/Dust & Pollen Filter	S	S	S	S	–	S	S	S	S	–	–
Remote Keyless Entry System With Lock, Unlock Trunk-Release, Panic Features	–	–	S	S	S	S	S	S	S	S	S
Illuminated Entry	S	S	S	S	S	S	S	S	S	S	S
Cruise Control	S	S	S	S	S	S	S	S	S	S	S
40/20/40 Split Manually Reclining Rear Seats, Center Armrest w/Cup Holders & Locking Trunk Pass-Through	–	–	–	–	S	–	–	–	–	S	–
Fabric Seat & Door Trim Treated w/Fraichir™ 6 Process w/Integrated Armrests & Dual Front & Rear Map Pockets	–	–	–	–	S	–	–	–	–	–	–
60/40 Split Rear Folding Seat	S	S	S	S	–	–	–	–	S	–	S
Homelink® Universal Transceiver[10]	–	–	–	–	S	–	–	–	–	S	S
Auto-Dimming Rearview Mirror w/Compass	–	–	–	O	S	O	P	P	O	S	S
Power Windows with Driver's Auto-Down & Retained-Power Features	S	S	S	S	–	S	S	S	S	–	–
Comfort & Convenience (continued)											

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Power Windows w/Driver's Auto Up/Down & Retained-Power Features w/Jam Protection	–	–	–	–	S	–	–	–	–	S	S
Fabric Seat & Door Trim w/Integrated Armrests & Dual Front & Rear Map Pockets	S	S	S	S	–	–	–	–	S	–	–
Power Door Locks w/Anti-Lockout Feature	S	S	S	S	S	S	S	S	S	S	S
Multi-Adjustable Power Driver's Seat w/Adjustable Headrests. Seatback Pockets & Lumbar Support	–	–	S	S	S	S	S	S	S	S	S
Sport Interior w/Sport Fabric Seats	S	S	–	–	–	–	–	–	–	–	–
Multi-Adjustable Front Bucket Seats w/Seatback Pockets; Manual Driver's Seat w/Vertical Seat Height Adjuster & Lumbar Support	S	S	–	–	–	–	–	–	–	–	–
Tilt/Telescopic Steering Wheel w/Audio Controls	S	S	S	S	S	S	S	S	S	S	S
Maintenance Indicator	S	S	S	S	S	S	S	S	S	S	S
Auxilary Audio Jack	S	S	S	S	S	S	S	S	S	S	S
Center Console Armest w/Dual Storage	S	S	S	S	S	S	S	S	S	S	S
Outside Temperature and Digital Clock	S	S	S	S	S	S	S	S	S	S	S
Wood Grain Style Interior Trim	–	–	–	–	S	–	–	–	–	S	–
Rear Personal Reading Lamps	–	–	P	P	S	P	P	P	P	S	–
Manually Retractable Rear Sunshade	–	–	–	–	S	–	–	–	–	S	–
Fabric Seat & Door Trim Treated w/Fraichir™ [11] Process w/Integrated Armrest & Dual Front & Rear Map Pockets	–	–	–	–	S	–	–	–	–	S	–
Fabric Seat & Door Trim w/Integrated Armrest & Dual Front & Rear Map Pockets	S	S	S	S	–	–	–	–	–	S	–
Leather-Trimmed Seats & Door Trim w/Integrated Armrest & Dual Front & Rear Map Pockets	–	–	–	–	O	–	O	O	–	S	–
Smart Key System with Push Button Start and Remote Illuminated Entry [12]	–	–	–	–	–	–	–	–	–	O	S

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OPTIONS

OPTIONS FOR CE

Vehicle Stability Control (VSC)[13] with Traction Control (TRAC)

OPTIONS FOR LE

Moonroof Package – includes power tilt/slide moonroof with sliding sunshade, dual illuminated visor vanity mirrors with dimmer control and rear personal reading lights

Auto-dimming rearview mirror with compass[14]

Vehicle Stability Control (VSC)[13] with Traction Control (TRAC)

16-in. 7-spoke aluminum alloy wheels with P215/60R16 tires

JBL® AM/FM 6-disc in-dash CD changer with satellite radio capability[7] MP3/WMA playback capability, auxiliary audio jack, hands-free phone capability via Bluetooth®[8] wireless technology, eight speakers in six locations and FM diversity reception

OPTIONS FOR SE

Sport Leather Package – includes heated front seats, leather-trimmed seats and door trim with integrated armrests and dual front and rear map pockets, and dual color-keyed, heated power outside mirrors [6]

Sport Convenience Package – includes HomeLink®[10] universal transceiver and auto-dimming rearview mirror with compass[6]

Moonroof Package – includes power tilt/slide moonroof with sliding sunshade, dual illuminated visor vanity mirrors with dimmer control and rear personal reading lights

Sport Leather-trimmed seats and door trim with integrated armrests and dual front and rear map pockets
Power tilt/slide moonroof with sliding sunshade

Color-keyed rear lip spoiler

JBL® AM/FM 6-disc in-dash CD changer with satellite radio capability [7] MP3/WMA playback capability, auxiliary audio jack, hands-free phone capability via Bluetooth® [8] wireless technology, eight speakers in six locations and FM diversity reception

Vehicle Stability Control (VSC)[13] with Traction Control (TRAC)

Voice-activated DVD navigation system [15] with JBL® AM/FM 4-disc in-dash CD changer with satellite radio capability[7], MP3/WMA playback capability, auxiliary audio jack, hands-free phone capability via Bluetooth®[8] wireless technology, eight speakers in six locations and FM diversity reception

Auto-dimming rearview mirror with compass[14]

Heated outside mirrors[6]

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OPTIONS

OPTIONS FOR XLE

Vehicle Stability Control (VSC)[13] with Traction Control (TRAC)
Leather-trimmed seats and door trim with integrated armrests and dual front and rear map pockets[16]
Heated front seats (requires leather)
Smart Key System [12] [17]
Voice-activated DVD navigation system [15] with JBL® AM/FM 4-disc in-dash CD changer with satellite radio capability[7], MP3/WMA playback capability, auxiliary audio jack, hands-free phone capability via Bluetooth® [8] wireless technology, eight speakers in six locations and FM diversity reception

OPTIONS FOR HYBRID

Moonroof Package – includes power tilt/slide moonroof with sliding sunshade, dual illuminated visor vanity mirrors with dimmer control and rear personal reading lights
Comfort and Convenience Package – includes heated front seats and outside mirrors
Leather Package – includes leather-trimmed seats and door trim with integrated armrests, driver and front passenger power seats, and dual front and rear map pockets
Voice-activated DVD navigation system [15] with JBL® AM/FM 4-disc in-dash CD changer with satellite radio capability[7], MP3/WMA playback capability, auxiliary audio jack, hands-free phone capability via Bluetooth® [8] wireless technology, eight speakers in six locations and FM diversity reception
Power tilt/slide moonroof with sliding sunshade
Heated outside mirrors [6]

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ACCESSORIES - INTERIOR

All Weather Floor Mats
$87.00
**Parts Only MSRP

Ashtray
$17.00
**Parts Only MSRP

Cargo Net
$49.00
*Installed MSRP

Cargo Tote
$40.00
*Installed MSRP

Carpet Floor/Trunk Mat Set (5pc. set)
$199.00
*Installed MSRP

Door Sill Enhancements by ACSCO
$159.00
*Installed MSRP

Emergency Assistance Kit
$70.00
*Installed MSRP

First Aid Kit
$29.00
*Installed MSRP

Shift Knob
$65.00
*Installed MSRP

Sport Pedals
$85.00
*Installed MSRP

Trunk Mat
$79.00
**Parts Only MSRP

VIP Remote Engine Start
$595.00
*Installed MSRP

* Installed MSRP is the Manufacturer's Suggest Retail Price for accessories installed by the manufacturer. Actual prices for dealer installed accessories may vary. Please see your local Toyota dealer for pricing.
** Installation not included. See your local dealer for installed pricing.

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ACCESSORIES - EXTERIOR

16" Alloy Wheels
$795.00
*Installed MSRP

18" TRD Alloy Wheel
$2,100.00
*Installed MSRP

Bodyside Molding
$195.00
*Installed MSRP

Mudguards
$73.00
**Parts Only MSRP

Premium License Plate Frames
Black Pearl - $42.95
Gold - $45.95
Chrome - $36.95
**Parts Only MSRP

Rear Bumper Applique
$49.00
*Installed MSRP

Rear Spoiler
$295.00
*Installed MSRP

Wheel Locks
$59.00
*Installed MSRP

These exterior accessories are also available:

- **Exhaust Tip by Valor**
- **Front End Mask**
- **Sunroof Wind Deflector**

* Installed MSRP is the Manufacturer's Suggest Retail Price for accessories installed by the manufacturer. Actual prices for dealer installed accessories may vary. Please see your local Toyota dealer for pricing.
** Installation not included. See your local dealer for installed pricing.

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ACCESSORIES - INTERIOR

VIP Security Systems
Glass Breakage Sensor - $165.00
RS3200 Plus - $359.00
*Installed MSRP

Sirius Satellite Radio
$449.00
*Installed MSRP

XM Satellite Radio
$449.00
*Installed MSRP

These interior accessories are also available:
- **Dash Applique**

* Installed MSRP is the Manufacturer's Suggest Retail Price for accessories installed by the manufacturer. Actual prices for dealer installed accessories may vary. Please see your local Toyota dealer for pricing.
** Installation not included. See your local dealer for installed pricing.

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Specifications	CE 4-Cylinder 5-Speed Manual (2513)	CE 4-Cylinder 5-Speed Auto (2514)	LE 4-Cylinder 5-Speed Manual (2531)	LE 4-Cylinder 5-Speed Auto (2532)	XLE 4-Cylinder 5-Speed Auto (2540)	SE 4-Cylinder 5-Speed Manual (2545)	SE 4-Cylinder 5-Speed Auto (2546)	SE V6 6-Speed Auto (2550)	LE V6 6-Speed Auto (2552)	XLE V6 6-Speed Auto (2554)	Hybrid 4-Cylinder CVT (2560)
Mechanical & Performance											
Engine	2.4-liter DOHC 16-valve VVT-i 4-cylinder 158 hp [18] @ 6000 rpm/161 lb.-ft. @ 4000 rpm							3.5-liter DOHC 24-valve Dual VVT-i V6 268 hp @ 6200 rpm/ 248 lb.-ft @ 4700 rpm			
HYBRID Engine	Gasoline Engine: 2.4-liter DOHC 16-valve VVT-i 4-cylinder Hybrid 147 hp @ 6000 rpm/138 lb.-ft @ 4400 rpm Electric Motor: (power Output) 199 lb.-ft @ 0-1500 rpm (105 kW @ rpm). Motor Type: Permanent Magnet AC Synchronous										
Ignition	Electronic, with Toyota Direct Ignition (TDI)										
5-speed manual overdrive	Standard	NA	Standard	NA	Standard	NA	NA				
5-speed electronically controlled automatic overdrive with intelligence (ECT-i)	NA	Standard	NA	Standard	NA	Standard	NA				
6-speed electronically controlled automatic overdrive with intelligence (ECT-i)	NA							Standard			NA
Electronically controlled continuously variable transmission	NA										Standard
Drivetrain	Front engine, front-wheel drive										
Body construction	Unitized body with front and rear vibration-dampening sub-frames										
Suspension	MacPherson strut front suspension with gas-filled shock absorbers and stabilizer bar; dual link independent MacPherson strut rear suspension with gas-filled shock absorbers and stabilizer bar (SE adds sport-tuned shock absorbers and springs, strut tower and truck-mounted braces)										
Steering	Variable-assist power rack-and-pinion										
Turning circle diameter, curb to curb (ft.)	36.1										
Brakes	Power-assisted ventilated front/solid rear disc										

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Specifications	CE 4-Cylinder 5-Speed Manual (2513)	CE 4-Cylinder 5-Speed Auto (2514)	LE 4-Cylinder 5-Speed Manual (2531)	LE 4-Cylinder 5-Speed Auto (2532)	XLE 4-Cylinder 5-Speed Auto (2540)	SE 4-Cylinder 5-Speed Manual (2545)	SE 4-Cylinder 5-Speed Auto (2546)	SE V6 6-Speed Auto (2550)	LE V6 6-Speed Auto (2552)	XLE V6 6-Speed Auto (2554)	Hybrid 4-Cylinder CVT (2560)
Mechanical & Performance (continued)											
4-channel 3-sensor Anti-lock Brake System (ABS) with Electronic Brake-force Distribution (EBD) and Brake Assist[1]	Standard										
Vehicle Stability Control (VSC)[13] with Traction Control (TRAC)	Available										
Exterior Dimensions (in.)											
Overall height, unloaded	57.9					57.7			57.9		57.5
Overall width	71.7										
Overall length	189.2										
Wheelbase	109.3										
Ground clearance	5.5					5.3		5.1	5.3		5.9
Track (front/rear)	62.0/61.6										
Coefficient of drag (Cd)	0.28										0.27
Interior Dimensions front/rear (in.)											
Head room (with moonroof)	38.8/37.8 (37.9/37.4)										
Shoulder room	57.8/56.9										
Hip room	54.6/53.9										
Leg room	41.7/38.3										
Seating capacity	5										

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Weights and Capacities											
Curb weight (lb.)	3263	3307	3263	3307	3373	3285	3351	3483	3461	3516	3680
EPA passenger volume (cu. ft.)	101.4										
Luggage capacity, rear seatbacks up (cu. ft.)	15.0				14.5				15.0	14.5	10.6
Fuel tank (gal.)	18.5										17.2
Tires											
Size	P215/60R16					P215/55R17			P215/60R16		
Type	All-Season					Performance[4][5]			All-Season		
Mileage Estimates (mpg city/highway)[19]											
MPG City/Highway[19]	24/34	24/33	24/34	24/33		24/34	24/33	22/31			40/38

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Warranties

Basic: 36 months/36,000 miles (all components other than normal wear and maintenance items).

Powertrain: 60 months/60,000 miles (engine, transmission/transaxle, front-wheel drive, rear-wheel drive, seatbelts and airbags).

Rust-Through: 60 months/unlimited miles (corrosion perforation of sheet metal).

Federal Emission Coverage: Components under the federal emission defect warranty are covered for 36 months/36,000 miles and specified major emission control components are covered for 8 years/80,000 miles. Specified major emission control components under emission performance warranty are also covered for 8 years/80,000 miles. In addition, emission performance warranty is applicable for 24 months/24,000 miles in states and local jurisdictions that require a periodic EPA-approved inspection and maintenance program.

California Emission Control Coverage:
Non-Hybrid/Non-PZEV: In California and any other state that adopts California emission warranty provisions, performance warranty and defect warranty coverage is applicable for 36 months/50,000 miles, and specific control devices are covered for 7 years/70,000 miles.
Hybrid: In California and any other state that adopts California emission warranty provisions, performance warranty and defect warranty coverage is applicable for 15 years/150,000 miles. The Hybrid Vehicle Battery is warranted for 10 years/150,000 miles.
PZEV: In California and any other state that adopts California emission warranty provisions, performance warranty and defect warranty coverage is applicable for 15 years/150,000 miles.

Accessories: Warranty coverage is for 12 months, regardless of mileage. If the part or accessory is installed during the New Vehicle Limited Warranty period, coverage is for 12 months or the remainder of the applicable warranty coverage, whichever is greater, with the exception of car covers, which are covered for 12 months only.

You may be eligible for transportation assistance if it's necessary that your vehicle be kept overnight for repairs covered under warranty. Please see your authorized Toyota dealership for further details.

For complete details about Toyota's warranties, please visit www.toyota.com, refer to the applicable Owner's Warranty Information booklet or see your Toyota dealer.

In addition, there may be times when we will establish a special policy adjustment that will further defray repair costs. For details about the new vehicle limited warranty, see your Toyota dealer. And for complete details of Toyota's warranties, please refer to your Owner's Warranty.

Disclaimers

[1] Brake Assist is designed to help the driver take full advantage of the benefits of ABS. It is not a substitute for safe driving practices. Braking effectiveness also depends on proper brake-system maintenance and tire and road conditions.
[2] The Toyota driver, front passenger, front seat-mounted side airbags, driver's knee airbag and side curtain airbags are Supplemental Restraint Systems (SRS). The driver and front passenger airbags and driver's knee airbag are designed to deploy in severe (usually frontal) collisions where the magnitude and duration of the forward deceleration of the vehicle exceed the design threshold level. The side airbags and side curtain airbags are designed to inflate in certain types of severe side-impact collisions. In all other accidents, the airbags will not inflate. To decrease the risk of injury from a deploying airbag, always wear seatbelts, sit upright in the middle of the seat as far back as possible from the airbag modules and do not lean against the door. Do not put objects in front of an airbag or around the seatback. Do not use rearward-facing child seats in any front passenger seat. The force of a deploying SRS airbag may cause serious injury or death. Please see your Owner's Manual for further instructions. Vehicle complies with "advanced airbag" requirements of FMVSS 208.
[3] Toyota's Direct Tire Pressure Monitor System alerts the driver when tire pressure is critically low. For optimal tire wear and performance, tire pressure should be checked regularly with a gauge; do not rely solely on the Monitor. See your Owner's Manual for details.
[4] SE available with All-Season tires as a no-cost option.
[5] Performance tires are expected to experience greater tire wear than conventional tires. Tire life may be less than 24,000 miles, depending upon driving conditions.
[6] Automatic transmission only.
[7] Satellite radio requires XM or Sirius compatibility, receiver and monthly service fee. See your Toyota dealer for further details. Reception of the satellite signal may vary depending on location. All fees and programming subject to change. Subscriptions subject to terms and conditions available at www.xmradio.com or www.sirius.com. Available only in the 48 contiguous United States.
[8] The phones on this site have been tested for Bluetooth compatibility with Toyota vehicles. Performance will vary based on phone software version, coverage, and your wireless carrier. Phones are warranted by their manufacturer, not Toyota.
[9] Plasmacluster is a trademark of Sharp Electronics, Inc.
[10] HomeLink® is a registered trademark of Johnson Controls, Inc.
[11] Fraichir is a trademark of Seiren Co., Ltd.

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[12] The Smart Key system may interfere with some pacemakers or cardiac defibrillators. If you have one of these medical devices, please talk to your doctor to see if you should deactivate this system.
[13] Vehicle Stability Control (VSC) is an electronic system designed to help the driver maintain vehicle control under adverse conditions. It is not a substitute for safe driving practices. Factors including speed, road conditions and driver steering input can all affect whether VSC will be effective in preventing a loss of control. Please see your Owner's Manual for further details.
[14] Manual transmission only.
[15] The Toyota DVD navigation system is designed to assist in locating an address or point of interest. Discrepancies may be encountered between the system and your actual location. Changes in street names, road closures, traffic flow or other road system changes may affect the accuracy of the mapping software. Rely upon your common sense to decide whether to follow a specified route. Detailed coverage not available in every city. Optional periodic geographical updates available at an additional cost. See your Navigation System Owner's Manual and your Toyota dealer for further details.
[16] Standard on V6, available on 4-cylinder.
[17] V6 only.
[18] In certain areas, 4-cylinder automatic models are equipped as Partial Zero Emission Vehicles (PZEV). Equipment causes nominal reduction in horsepower (from 158 hp to 155 hp) and torque (from 161 lb.-ft. to 158 lb.-ft.).
[19] 2007 EPA mileage estimates. Actual mileage may vary.

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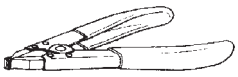
RECOMMENDED TOOLS

	09011-12301	Socket Wrench 30 mm	
	09905-00012	Snap Ring No. 1 Expander	

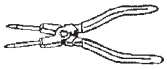
EQUIPMENT

Torque wrench	

LUBRICANT

Item	Capacity
Outboard joint grease	190 to 200 g (6.7 to 7.1 oz.)
Inboard joint grease	175 to 185 g (6.2 to 6.5 oz.)

RECOMMENDED TOOLS

	09011-12301	Socket Wrench 30 mm	
	09905-00013	Snap Ring Pliers	

EQUIPMENT

Torque wrench	
Dial indicator with magnetic base	

EQUIPMENT

Torque wrench	
Dial indicator with magnetic base	
Tire pressure gauge	
Alignment tester	
Toe-in gauge	
Angle gauge	
Slide Calipers	
Wooden block	
Camber-caster-kingpin gauge	
Drill (Safety equipment: protective goggles, etc.)	Shock absorber disposal

LUBRICANT

Item	Capacity	Classification
Brake fluid	-	SAE J1703 or FMVSS No. 116 DOT 3

LUBRICANT

Item	Capacity	Classification
Brake fluid	-	SAE J1703 or FMVSS No. 116 DOT 3

SSM

Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent	

EQUIPMENT

Torque wrench	

EQUIPMENT

Vinyl tape	
Hexagon wrench 4mm	
Hexagon wrench 12 mm	
Gas leak detector	
Dial indicator with magnetic base	
Insulated gloves	
Torque wrench	

LUBRICANT

Item	Capacity	Classification
Compressor oil	-	ND-OIL 11 or equivalent

EQUIPMENT

Torque wrench	
Feeler gauge	
Battery	
Tape	
Bolt Length: 35.0 mm (1.378 in.) Diameter: 6.0 mm (0.236 in.) Pitch: 1.0 mm (0.039 in.)	Airbag disposal
Tire Width: 185 mm (7.28 in.) Inner diameter: 360 mm (14.17 in.)	Airbag disposal
Tire with disc wheel Width: 185 mm (7.28 in.) Inner diameter: 360 mm (14.17 in.)	Airbag disposal
Wire harness	Airbag disposal
Cardboard Box	Airbag disposal
Plastic bag	Airbag disposal

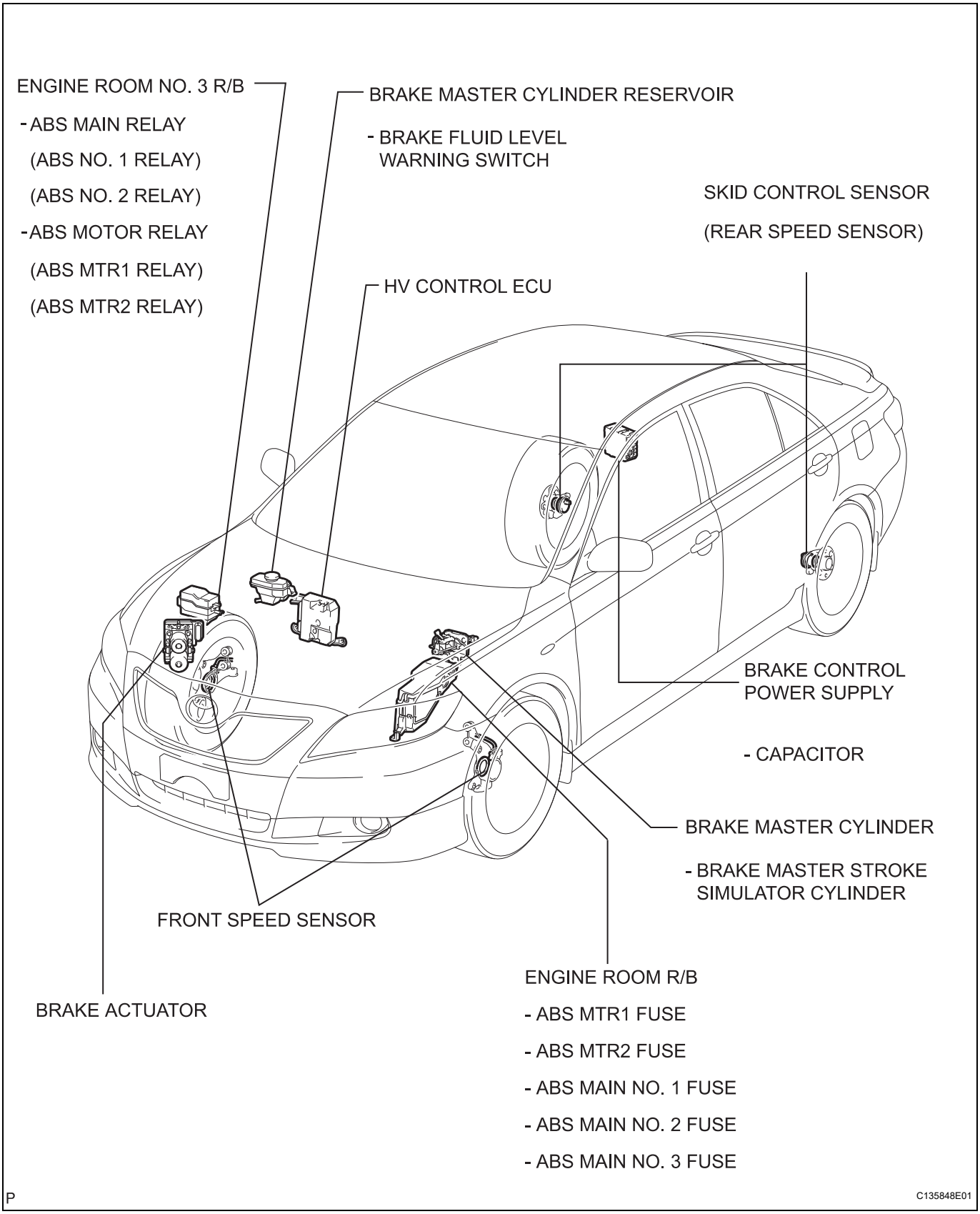
EQUIPMENT

Torque wrench	
Protective tape	

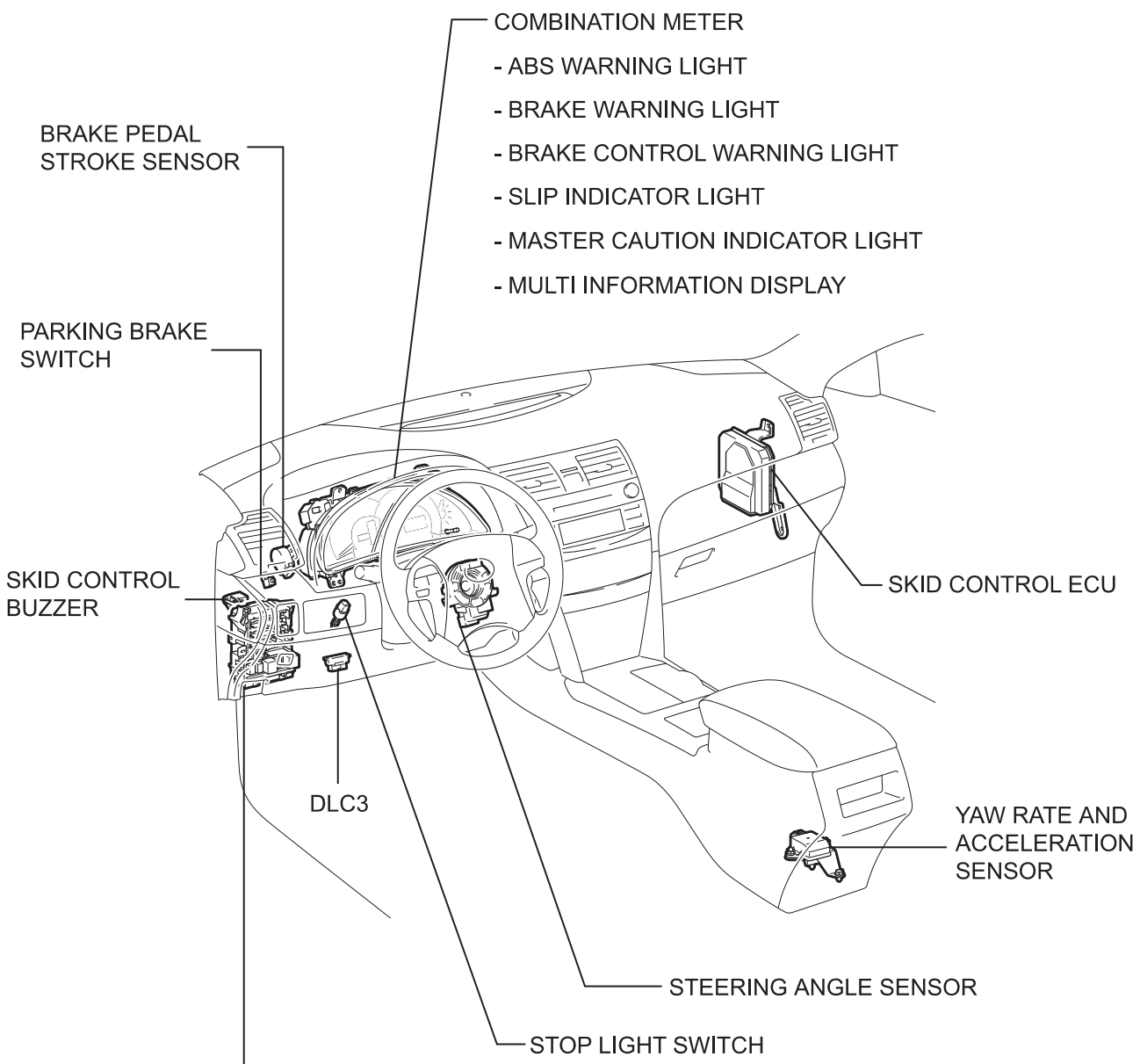
EQUIPMENT

Protective goggle	
Metal saw	
Torque wrench	
MP grease	
Clip remover	
Protective tape	

PARTS LOCATION



BC



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C135849E01

BC

INSPECTION

1. INSPECT BRAKE PEDAL STROKE SENSOR

(a) Inspect the brake pedal stroke sensor. If any of the following occurs, replace the brake pedal stroke sensor with a new one:

- The surface of the brake pedal stroke sensor is cracked, dented, or chipped off.
- The connector is scratched, cracked, or damaged.
- The brake pedal stroke sensor has been dropped.

INSTALLATION

1. INSTALL BRAKE PEDAL STROKE SENSOR

(a) New brake pedal stroke sensor.

(1) Install a new brake pedal stroke sensor with the 2 bolts.

Torque: 8.5 N*m (87 kgf*cm, 75 in.*lbf)

NOTICE:

- **Engage the brake pedal stroke sensor lever with the brake pedal hole.**
- **Check that there is no foreign matter attached to the contact surface of the brake pedal stroke sensor.**

(2) Strongly depress the brake pedal to break the brake pedal stroke sensor lever set pin.

(3) Remove the broken lever set pin.

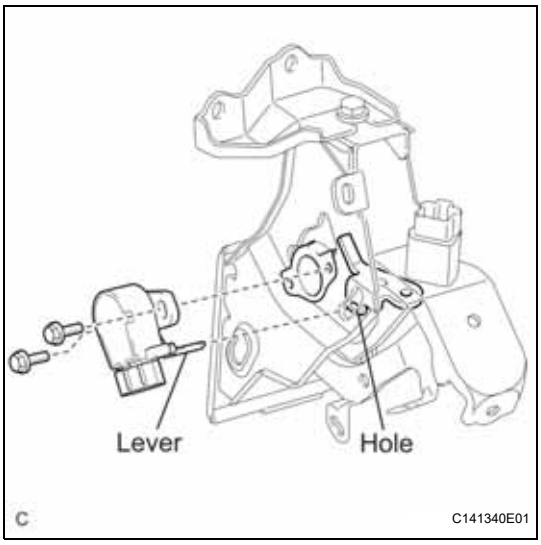
(4) Connect the brake pedal stroke sensor connector.

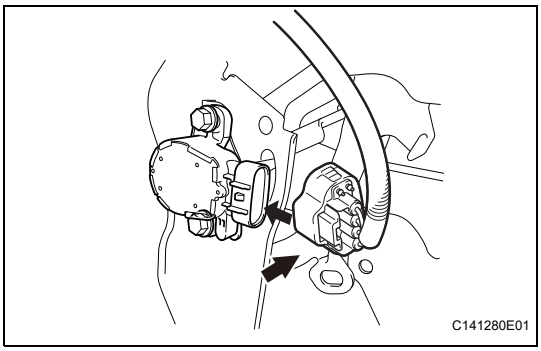
(b) Reuse of the brake pedal stroke sensor.

(1) Temporarily install the brake pedal stroke sensor with the 2 bolts.

NOTICE:

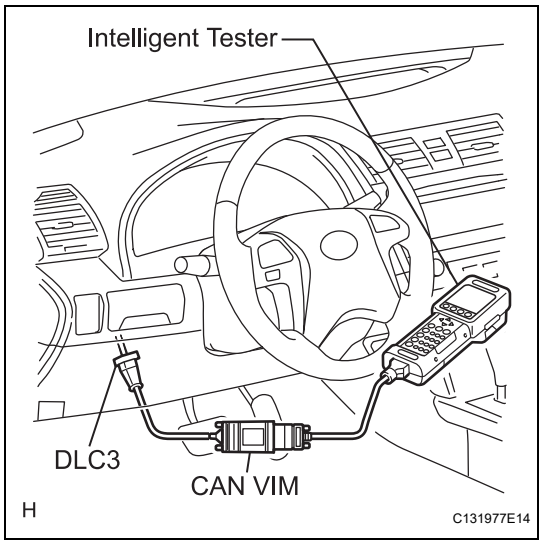
- **Engage the brake pedal stroke sensor lever with the brake pedal hole.**
- **Check that there is no foreign matter attached to the contact surface of the brake pedal stroke sensor.**



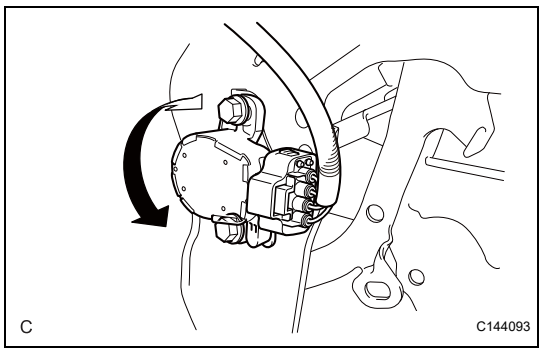


(2) Connect the connector to the brake pedal stroke sensor.

(3) Connect the cable to the negative battery terminal.



(4) Connect the intelligent tester to the DLC3 with the power switch off as shown in the illustration.
(5) Turn the power switch on (IG).
(6) Turn on the intelligent tester.



(7) Reading the stroke sensor 1 value shown in the data list, slowly turn the brake pedal stroke sensor to the right and left to adjust the value to the standard voltage.
Standard voltage:
0.8 to 1.2 V
(8) Fully tighten the 2 bolts.
Torque: 8.5 N*m (87 kgf*cm, 75 in.*lbf)
NOTICE:
Do not depress the brake pedal after turning the power switch on (IG).
(9) Turn off the intelligent tester and turn the power switch off.
(10) Disconnect the intelligent tester from the DLC3.

2. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-35)**

3. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-41)**

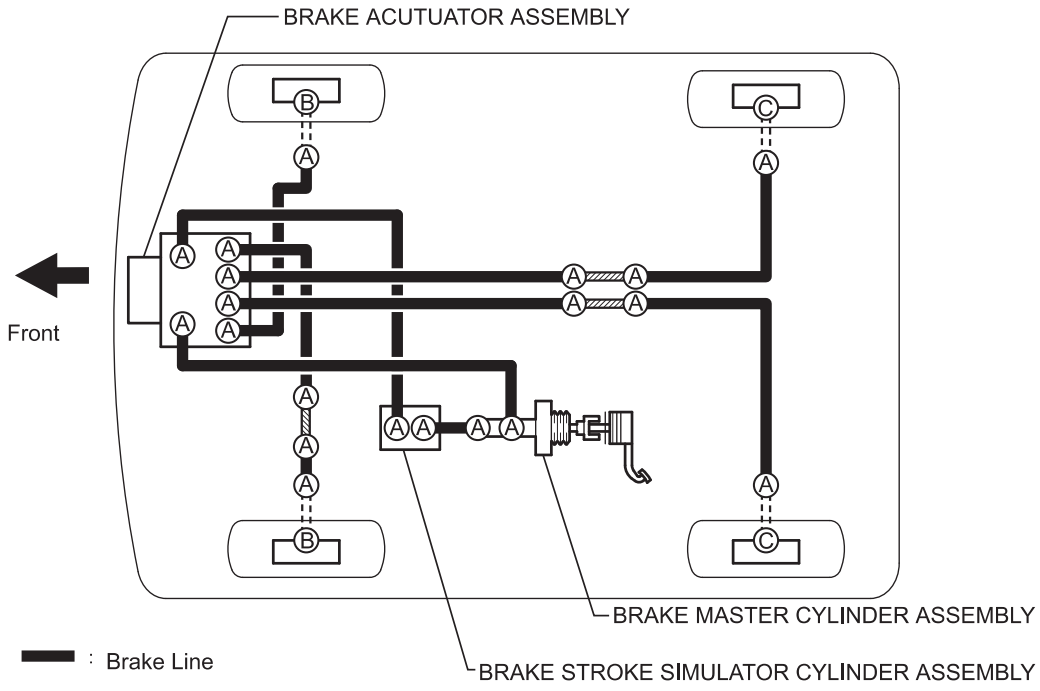
4. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-41)**

5. **PREFORM LINEAR VALVE OFFSET LEARNING**
HINT:
Refer the procedures up to "ELECTRONICALLY CONTROLLED BRAKE SYSTEM". (See page BC-25)

6. **CHECK AND CLEAR DTC**
HINT:
Refer the procedures up to "ELECTRONICALLY CONTROLLED BRAKE SYSTEM". (See page BC-57)

7. **PERFORM INITIALIZATION**
NOTICE:
Some systems need initialization after reconnecting the cable to the negative battery terminal. (See page IN-43)

SYSTEM DIAGRAM



: Brake Line

: Flexible Hose

: Brake Tube Way

Ⓐ : Union Nut Torque : 15 N*m (155 kgf*cm, 11 ft.*lbf)

Ⓑ : Union Bolt Torque : 29 N*m (300 kgf*cm, 21 ft.*lbf)

Ⓒ : Union Bolt Torque : 33 N*m (337 kgf*cm, 24 ft.*lbf)

C141350E01

PROBLEM SYMPTOMS TABLE

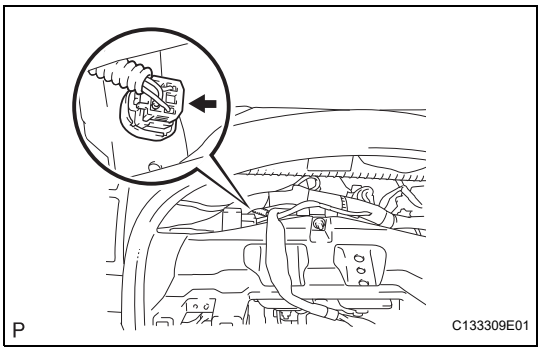
Use the table below to determine the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

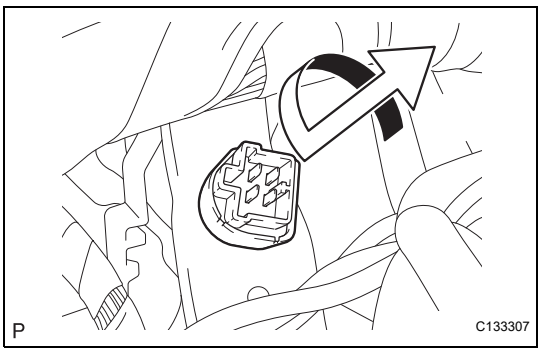
BRAKE SYSTEM

Symptom	Suspected Area	See page
Low pedal or spongy pedal	1. Fluid leakage in brake system	BR-5
	2. Air in brake system	BR-5
	3. Front piston seal (Worn or damaged)	BR-47
	4. Rear piston seal (Worn or damaged)	BR-61
	5. Push rod (Out of adjustment)	BR-18
	6. Brake master cylinder (Faulty)	BR-26
Brake drag	1. Brake pedal free play (Minimum)	BR-18
	2. Parking brake pedal travel (Out of adjustment)	PB-1
	3. Parking brake cable (Sticking)	PB-24
	4. Parking brake shoe clearance (Out of adjustment)	PB-1
	5. Front pad (Cracked or distorted)	BR-50
	6. Rear pad (Cracked or distorted)	BR-63
	7. Front disc brake piston (Stuck)	BR-47
	8. Rear disc brake piston (Stuck)	BR-61
	9. Front disc brake piston (Frozen)	BR-47
	10. Rear disc brake piston (Frozen)	BR-61
	11. Push rod (Out of adjustment)	BR-18
	12. Brake master cylinder (Faulty)	BR-26
Brake pull	1. Front disc brake piston (Stuck)	BR-47
	2. Rear disc brake piston (Stuck)	BR-61
	3. Front pad (Oily)	BR-47
	4. Rear pad (Oily)	BR-61
	5. Front disc brake piston (Frozen)	BR-47
	6. Rear disc brake piston (Frozen)	BR-61
	7. Front disc (Scored)	BR-50
	8. Rear disc (Scored)	BR-63
	9. Front pad (Cracked or distorted)	BR-50
	10. Rear pad (Cracked or distorted)	BR-63
Firm pedal but braking inefficient	1. Fluid leakage in brake system	BR-5
	2. Air in brake system	BR-5
	3. Front disc brake piston (Stuck)	BR-47
	4. Rear disc brake piston (Stuck)	BR-61
	5. Front pad (Cracked or distorted)	BR-50
	6. Rear pad (Cracked or distorted)	BR-63
	7. Front pad (Oily)	BR-47
	8. Rear pad (Oily)	BR-61
	9. Front pad (Glazed)	BR-47
	10. Rear pad (Glazed)	BR-61
	11. Front disc (Scored)	BR-50
	12. Rear disc (Scored)	BR-63
	13. Push rod (Out of adjustment)	BR-18

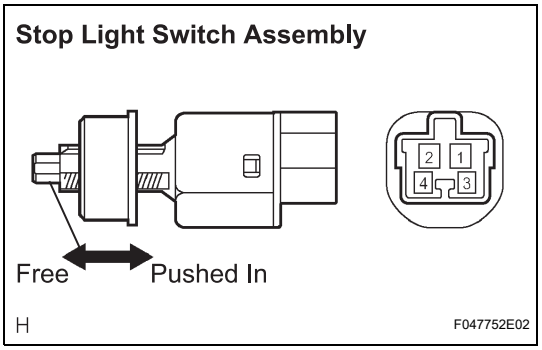
REMOVAL

1. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-13)**
2. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-14)**
3. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-11)**
4. **REMOVE INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-12)**
5. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-12)**
6. **REMOVE INSTRUMENT CLUSTER FINISH PANEL (See page IP-13)**
7. **REMOVE COMBINATION METER ASSEMBLY (See page IP-13)**
8. **REMOVE STOP LIGHT SWITCH ASSEMBLY**
   (a) Disconnect the stop light switch assembly connector from the stop light switch assembly.





   (b) Turn the stop light switch assembly counterclockwise and remove the stop light switch assembly.



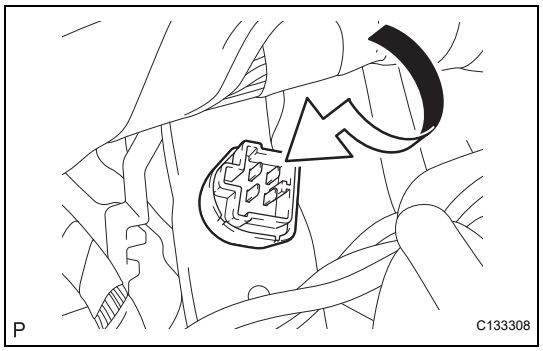
INSPECTION

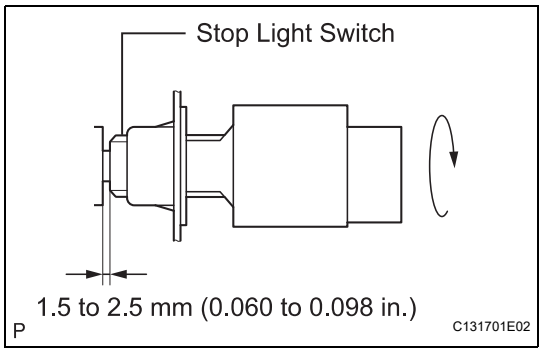
1. **INSPECT STOP LIGHT SWITCH**
   (a) Measure the resistance according to the value(s) in the table below.
   Standard resistance

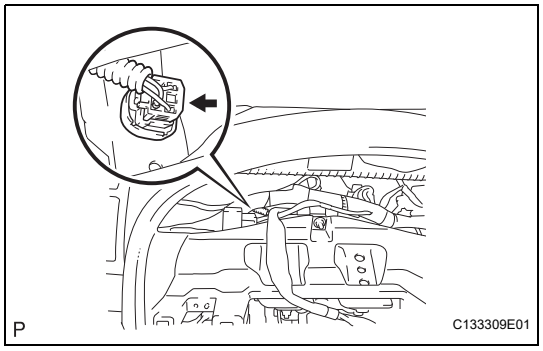
Tester Connection	Switch Condition	Specified Condition
1 - 2	Switch pin free	Below 1 Ω
1 - 2	Switch pin pushed in	10 kΩ or higher

   If the measurement result is not normal, replace the stop light switch assembly.

BR







INSTALLATION

1. **INSTALL STOP LIGHT SWITCH ASSEMBLY**
   (a) Insert the stop light switch assembly until the body hits the cushion.
   NOTICE:
   When inserting the stop light switch assembly, support the pedal from behind so that the pedal is not pushed in.

   (b) Make a quarter turn clockwise to install the stop light switch assembly.
   Torque: 1.5 N*m (15 kgf*cm, 13 in.*lbf) or less
   NOTICE:
   When inserting the stop light switch assembly, support the pedal from behind so that the pedal is not pushed in.

   (c) Connect the stop light switch connector to the stop light switch assembly.
   (d) Check the protrusion of the rod (See page BR-73).
2. **INSTALL COMBINATION METER ASSEMBLY (See page IP-33)**
3. **INSTALL INSTRUMENT CLUSTER FINISH PANEL (See page IP-34)**
4. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-34)**
5. **INSTALL INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-34)**
6. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-35)**
7. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-41)**
8. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-41)**

REMOVAL

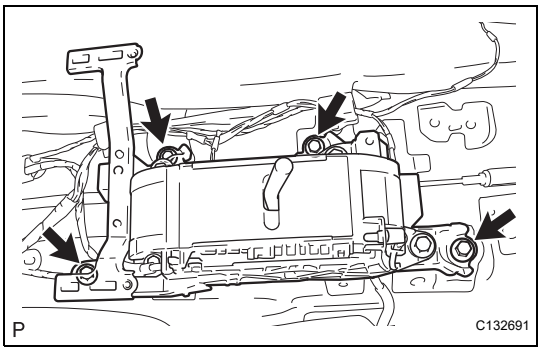
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent the airbag working.
2. REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-13)
3. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-14)
4. REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-15)
5. REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-15)
6. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-11)
7. REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY (See page RS-363)
8. REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-13)
9. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-14)
10. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-14)
11. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-14)
12. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-14)
13. REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-15)
14. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-15)
15. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-16)
16. REMOVE CONSOLE BOX POCKET (See page IP-17)
17. REMOVE CONSOLE BOX CARPET (See page IP-17)
18. REMOVE CONSOLE BOX ASSEMBLY (See page IP-17)
19. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (See page IP-18)
20. REMOVE NO. 1 CONSOLE BOX INSERT FRONT (See page IP-18)
21. REMOVE NO. 1 CONSOLE BOX DUCT (See page AC-188)

22. **REMOVE FLOOR CARPET BRACKET LH (See page AC-188)**

23. **REMOVE FLOOR CARPET BRACKET RH (See page AC-189)**

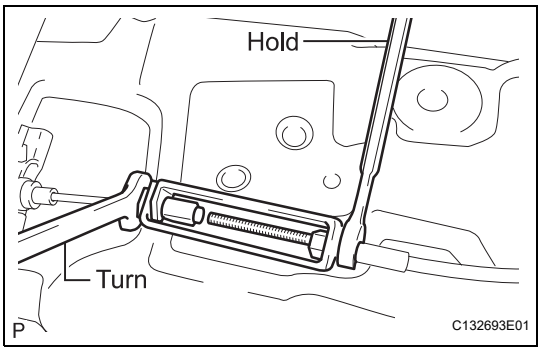
24. **REMOVE YAW RATE AND ACCELERATION SENSOR (See page BC-283)**

25. **REMOVE FLOOR SHIFT LEVER ASSEMBLY**
    (a) Remove the 4 bolts and the floor shift lever assembly.

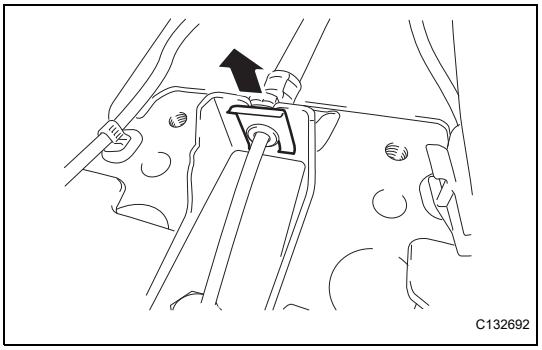


26. **REMOVE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-424)**

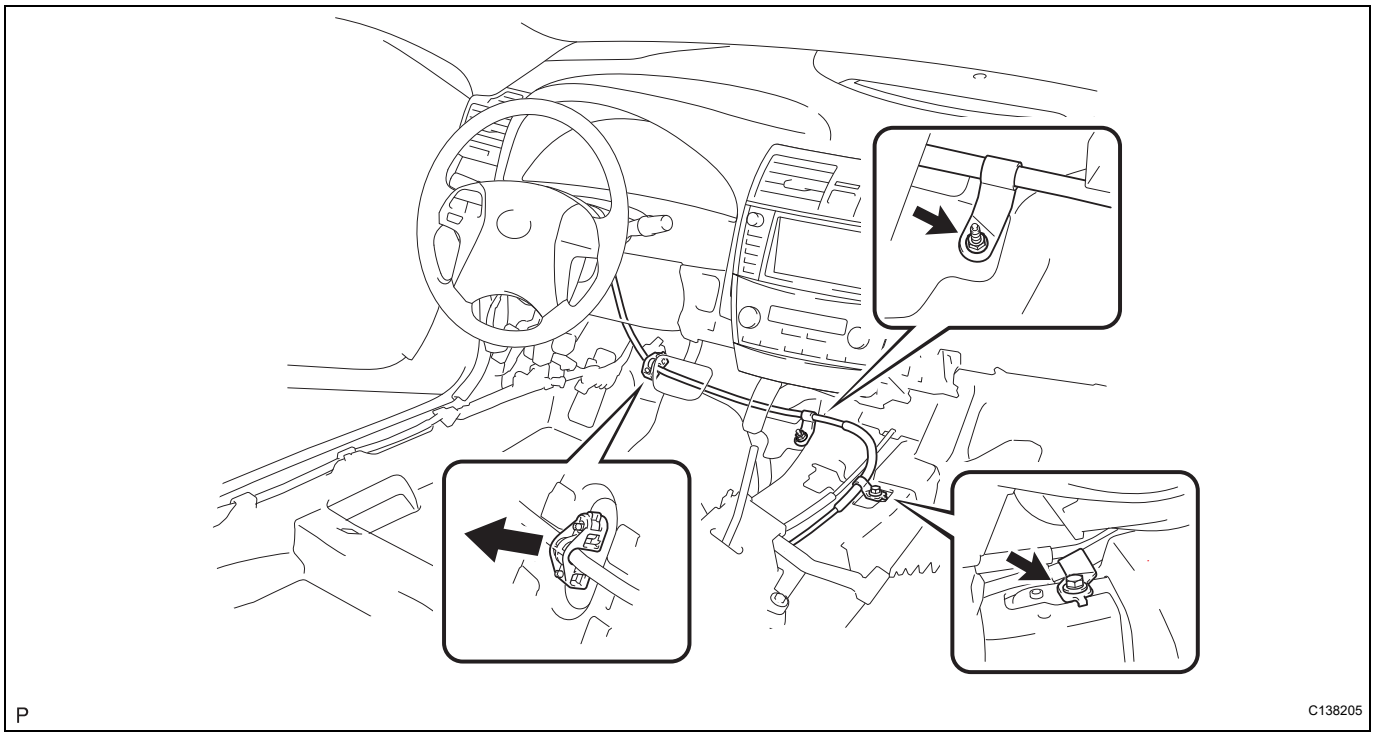
27. **DISCONNECT NO. 4 PARKING BRAKE CABLE ASSEMBLY**
    (a) Using a wrench, hold the lock nut and loosen the turnbuckle.
    (b) Disconnect the No. 4 parking brake cable assembly from the No. 1 parking brake cable assembly.



28. **REMOVE PARKING BRAKE PEDAL ASSEMBLY**
    (a) Using needle-nose pliers, remove the clip from the No. 1 parking brake cable assembly.



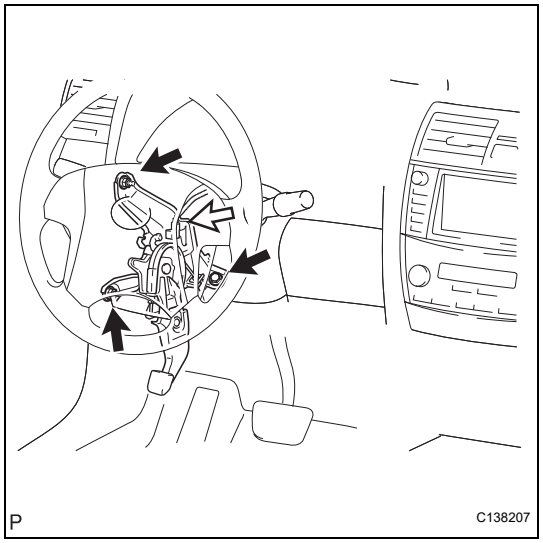
(b) Remove the bolt, nut, and the No. 1 parking brake cable clamp.

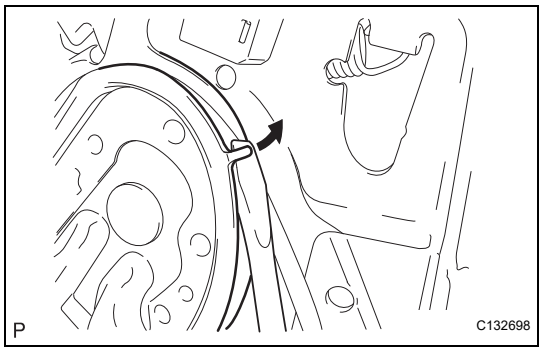


(c) Separate the No. 1 parking brake cable assembly from the body.

(d) Disconnect the parking brake switch connector.

(e) Remove the bolt, 2 nuts, and the parking brake pedal assembly with the No. 1 parking brake cable assembly from the body.



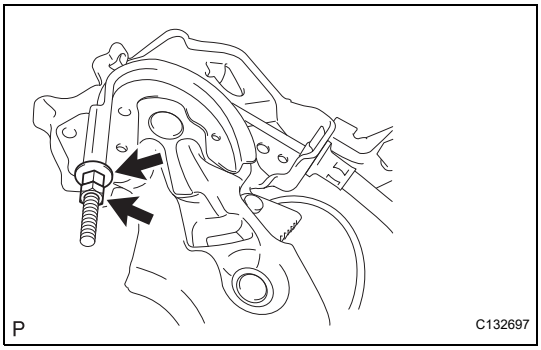


DISASSEMBLY

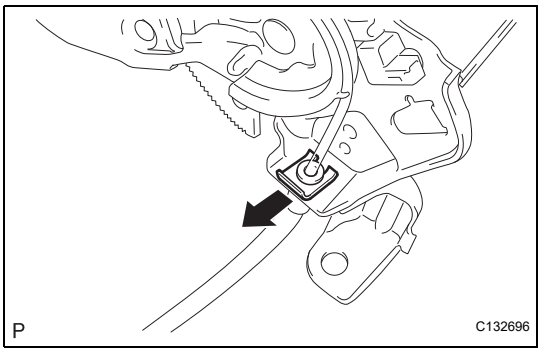
1. REMOVE NO. 1 PARKING BRAKE CABLE ASSEMBLY

(a) Using a screwdriver, pull up the parking brake pedal claw.

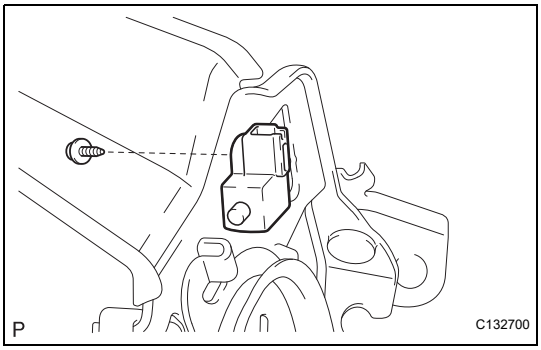
PB



(b) Remove the lock nut and the No. 1 wire adjusting nut.



(c) Using needle-nose pliers, remove the clip and the No. 1 parking brake cable from the parking brake pedal assembly.



2. REMOVE PARKING BRAKE SWITCH ASSEMBLY

(a) Remove the screw and the parking brake switch assembly.

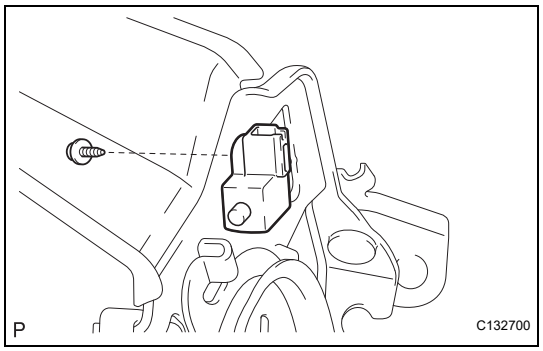
3. REMOVE PARKING PEDAL PAD

(a) Remove the parking pedal pad.

REASSEMBLY

1. INSTALL PARKING PEDAL PAD

(a) Install the parking pedal pad to the parking brake pedal assembly.

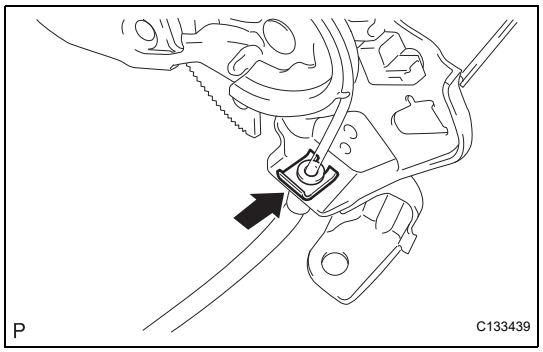


2. INSTALL PARKING BRAKE SWITCH ASSEMBLY

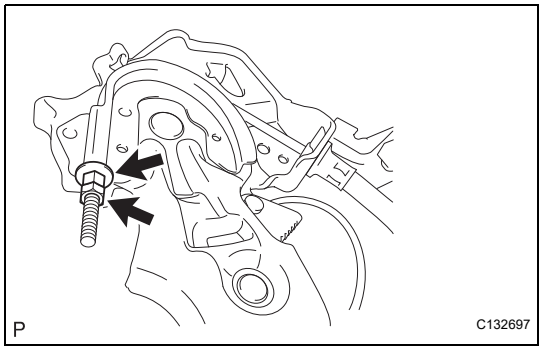
(a) Install the parking brake switch assembly with the screw.

3. INSTALL NO. 1 PARKING BRAKE CABLE ASSEMBLY

(a) Pass the No. 1 parking brake cable assembly through the pedal guide.

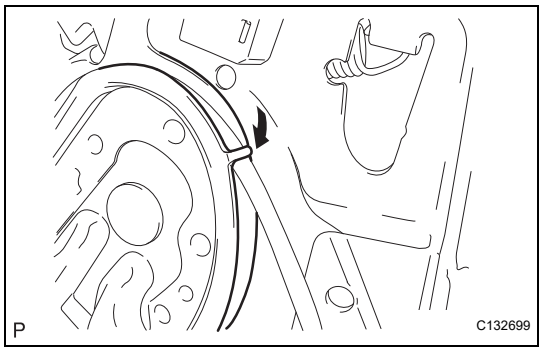


(b) Using a brass bar and a hammer, install the clip to the No. 1 parking brake cable assembly.

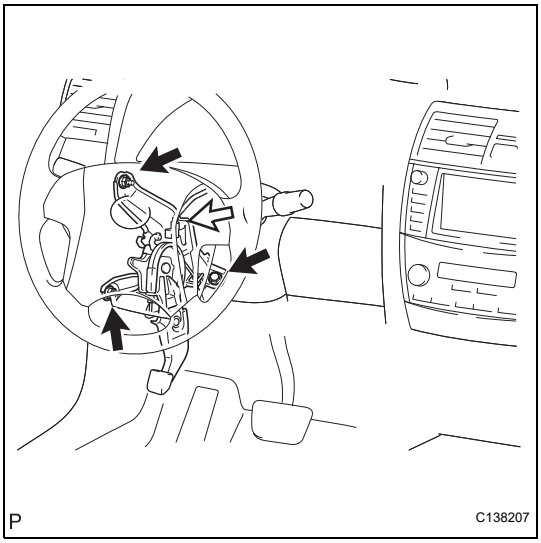


(c) Temporarily tighten the the lock nut and No. 1 wire adjusting nut.

NOTICE:
Fully tighten the lock nut and the No. 1 wire adjusting nut when adjusting the parking brake pedal travel.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



(d) Bend the parking brake pedal claw.



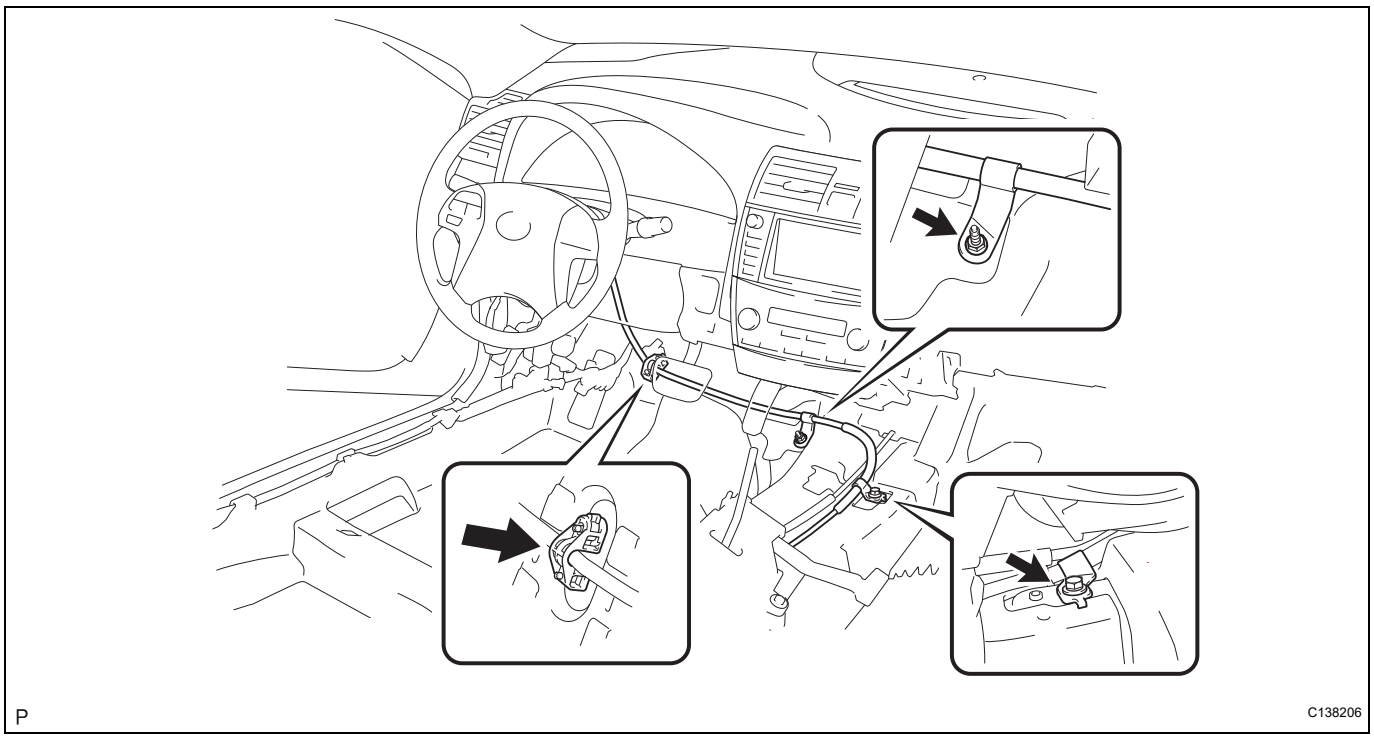
INSTALLATION

1. INSTALL PARKING BRAKE PEDAL ASSEMBLY

(a) Install the parking brake pedal assembly with the bolt and 2 nuts.
Torque: 39 N*m (398 kgf*cm, 29 ft.*lbf)

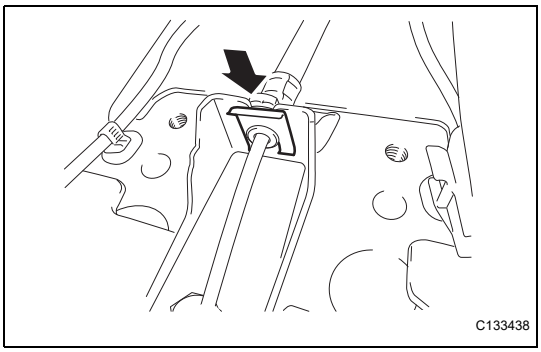
(b) Connect the parking brake switch connector.

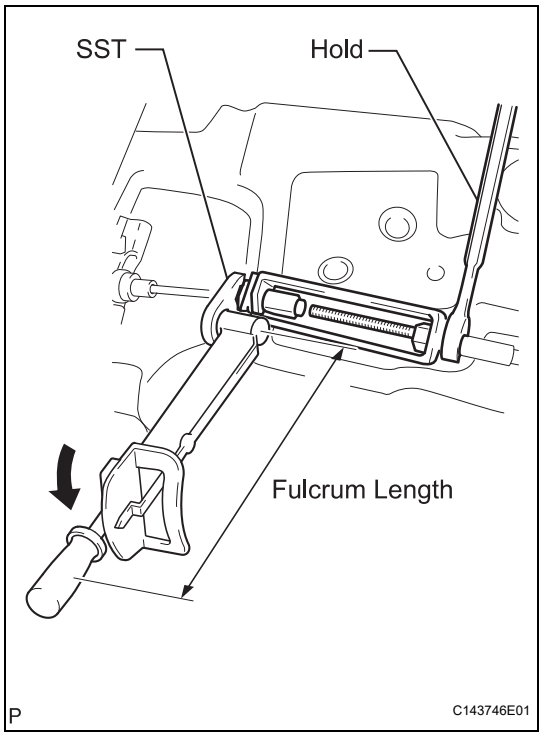
(c) Install the No. 1 parking brake cable assembly to the body with the bolt, the nut, and a new No. 1 parking brake cable clamp.



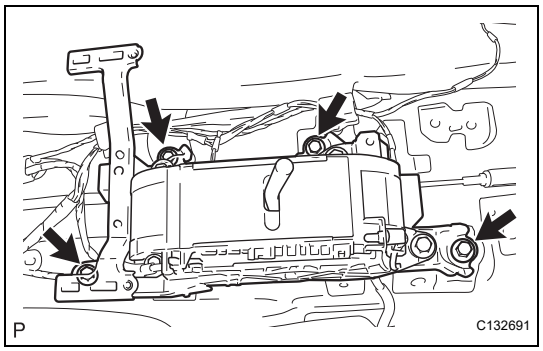
Torque: Bolt
15 N*m (153 kgf*cm, 11 ft.*lbf)
Nut
5.4 N*m (55 kgf*cm, 48 in.*lbf)

(d) Using a brass bar and a hammer, install the clip to the No. 1 parking brake cable assembly.





2. **CONNECT NO. 4 PARKING BRAKE CABLE ASSEMBLY**
   (a) Connect the No. 4 parking brake cable assembly to the No. 1 parking brake cable assembly.
   (b) Using SST and a wrench, hold the lock nut of the No. 1 parking brake cable and tighten the turnbuckle of the No. 4 parking brake cable.
   SST 09023-00101
   Torque: without SST
   5.4 N*m (55 kgf*cm, 48 in.*lbf)
   with SST
   5.0 N*m (51 kgf*cm, 44 in.*lbf)
   NOTICE:
   - **Use a torque wrench with a fulcrum length of 250 mm (9.84 in.).**
   - **This torque is effective when SST is parallel to a torque wrench.**
3. **INSTALL CENTER AIRBAG SENSOR ASSEMBLY (See page RS-424)**



4. **INSTALL FLOOR SHIFT LEVER ASSEMBLY**
   (a) Install the floor shift lever assembly with the 4 bolts.
   Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)
5. **INSTALL YAW RATE AND ACCELERATION SENSOR (See page BC-283)**
6. **INSTALL FLOOR CARPET BRACKET LH**
7. **INSTALL FLOOR CARPET BRACKET RH**
8. **INSTALL NO. 1 CONSOLE BOX DUCT (See page AC-204)**
9. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (See page IP-30)**
10. **INSTALL NO. 1 CONSOLE BOX INSERT FRONT (See page IP-29)**
11. **INSTALL CONSOLE BOX ASSEMBLY (See page IP-30)**
12. **INSTALL CONSOLE BOX CARPET (See page IP-30)**
13. **INSTALL CONSOLE BOX POCKET (See page IP-30)**
14. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-31)**
15. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-31)**
16. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-31)**
17. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-32)**

18. INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-32)
19. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-32)
20. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-33)
21. INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-33)
22. INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY (See page RS-363)
23. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-35)
24. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-41)
25. INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-41)
26. INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-42)
27. INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-42)
28. INSPECT PARKING BRAKE PEDAL TRAVEL (See page PB-1)
29. ADJUST PARKING BRAKE PEDAL TRAVEL (See page PB-1)
30. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL
31. PERFORM INITIALIZATION
    NOTICE:
    Some systems need initialization after reconnecting the cable to the negative battery terminal. (See page IN-43)
32. INSPECT SRS WARNING LIGHT (See page RS-433)
33. INSPECT SENSOR SIGNAL (See page BC-284)

ON-VEHICLE INSPECTION

1. INSPECT STEERING WHEEL FREE PLAY

(a) Stop the vehicle and align the tires facing straight ahead.

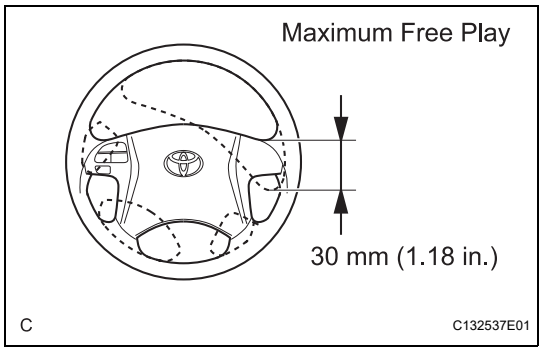
(b) Gently turn the steering wheel right and left by hand, and check the steering wheel free play.

Maximum free play:

30 mm (1.18 in.)

HINT:

If the free play exceeds the maximum, check the steering column, steering intermediate shaft, steering sliding yoke, or steering gear.



ADJUSTMENT

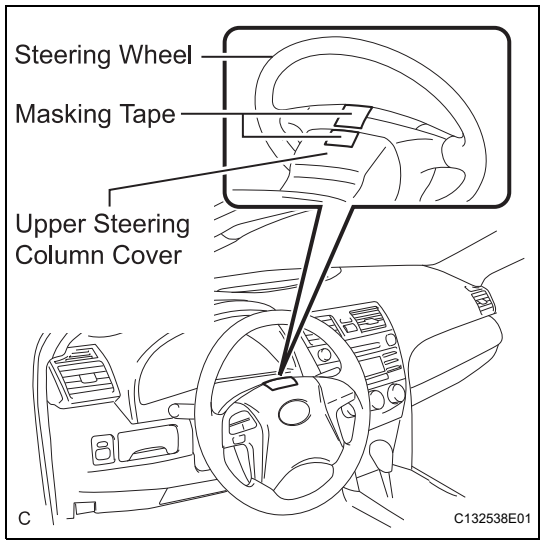
1. STEERING OFF CENTER ADJUSTMENT PROCEDURE

HINT:
This is the adjustment procedure for steering off center.

(a) Inspect steering wheel off center.

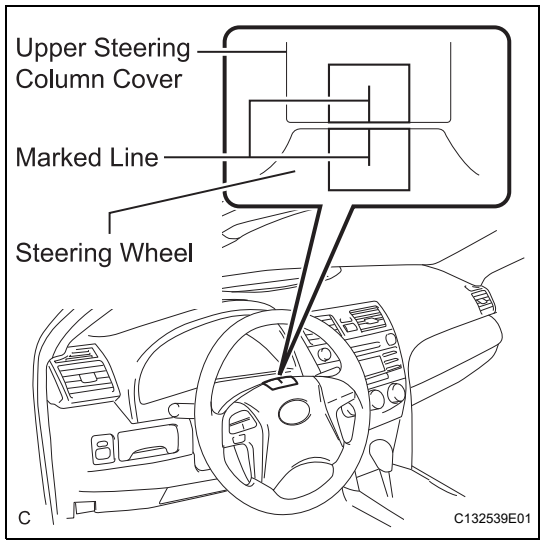
(1) Apply masking tape on the top center of the steering wheel and steering column upper cover.

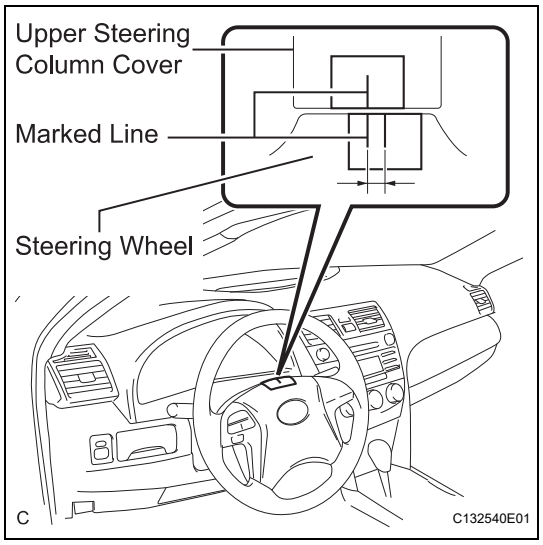
(2) Drive the vehicle in a straight line for 100 meters at a constant speed of 35 mph (56 km/h), and hold the steering wheel to maintain the course.



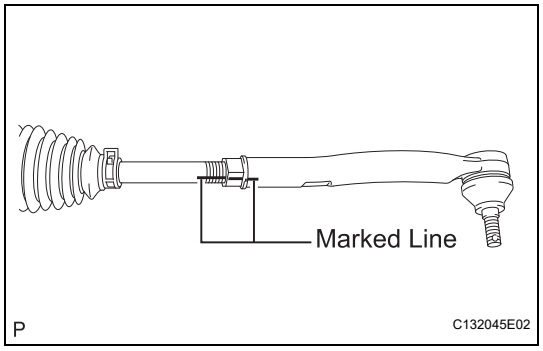
(3) Draw a line on the masking tape as shown in the illustration.

(4) Turn the steering wheel to the center position.
HINT:
Look at the upper surface of the steering wheel, steering spoke, and SRS airbag line to find the center position.

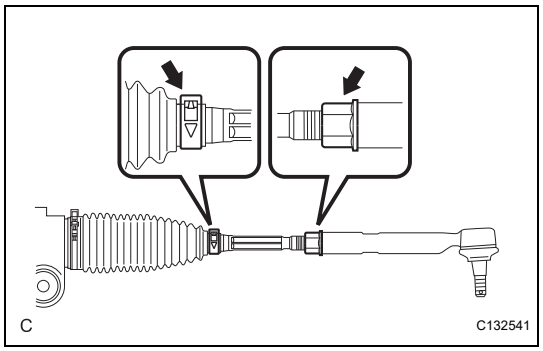




(5) Draw a new line on the masking tape on the steering wheel as shown in the illustration.
(6) Measure the distance between the 2 lines on the masking tape on the steering wheel.
(7) Convert the measured distance to steering angle.
HINT:
- Measured distance 1 mm (0.04 in.) = Steering angle of approximately 1 degree.
- Make a note of the steering angle.



(b) Adjust steering angle.
(1) Draw a line on the RH and LH tie rod ends and rack ends respectively where it can be easily seen.
(2) Using a paper gauge, measure the distance from the RH and LH tie rod ends to the rack end screws.
HINT:
- Measure both the RH and LH sides.
- Make a note of the measured values.



(3) Remove the RH and LH boot clips from the rack boots.
(4) Loosen the RH and LH lock nuts.
(5) Turn the RH and LH rack ends by the same amount (but in different directions) according to the steering angle.
HINT:
One 360 degree turn of the rack end (1.5 mm (0.059 in.) horizontal movement) equals to 12 degrees of steering angle.
(6) Tighten the RH and LH lock nuts to the specified torque.
Torque: 74 N*m (755 kgf*cm, 55 ft.*lbf)
NOTICE:
Make sure that the difference in length between the RH and LH tie rod ends and rack end screws is 1.5 mm (0.059 in.) or less.
(7) Install the RH and LH boot clips.

ON-VEHICLE INSPECTION

1. **CHECK STEERING EFFORT (TORQUE)**

NOTICE:

Some service operations affect the SRS airbags. Be sure to read the precautionary notice for the SRS airbags before servicing (See page RS-1).

(a) Stop the vehicle on a level, paved surface and align the wheels straight ahead.

(b) Disconnect the cable from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

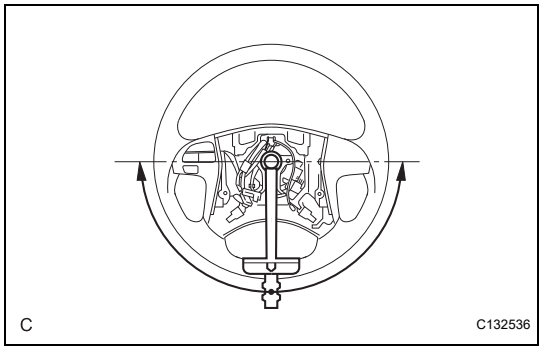
(c) Remove the steering pad (See page RS-344).

(d) Connect the cable to the negative (-) battery terminal.

(e) Using a torque wrench, check if the steering wheel set nut is properly tightened.

Torque: 50 N*m (510 kgf*cm, 37 ft.*lbf)

(f) Turn the power switch on (READY) so that the power steering is available.



(g) Turn the steering wheel 90 degrees to the right and check steering effort (torque) while turning. Check in the opposite direction using the same manner.

Steering effort (Reference):

6.0 N*m (60 kgf*cm, 53 in.*lbf) or less

Inspect the power steering system if the value is not within the specified range (See page PS-1).

(h) Align the front wheels straight ahead.

(i) Disconnect the cable from the negative (-) battery terminal.

(j) Install the steering pad (See page RS-346).

(k) Connect the cable to the negative (-) battery terminal.

(l) Clear the DTCs (See page RS-41).

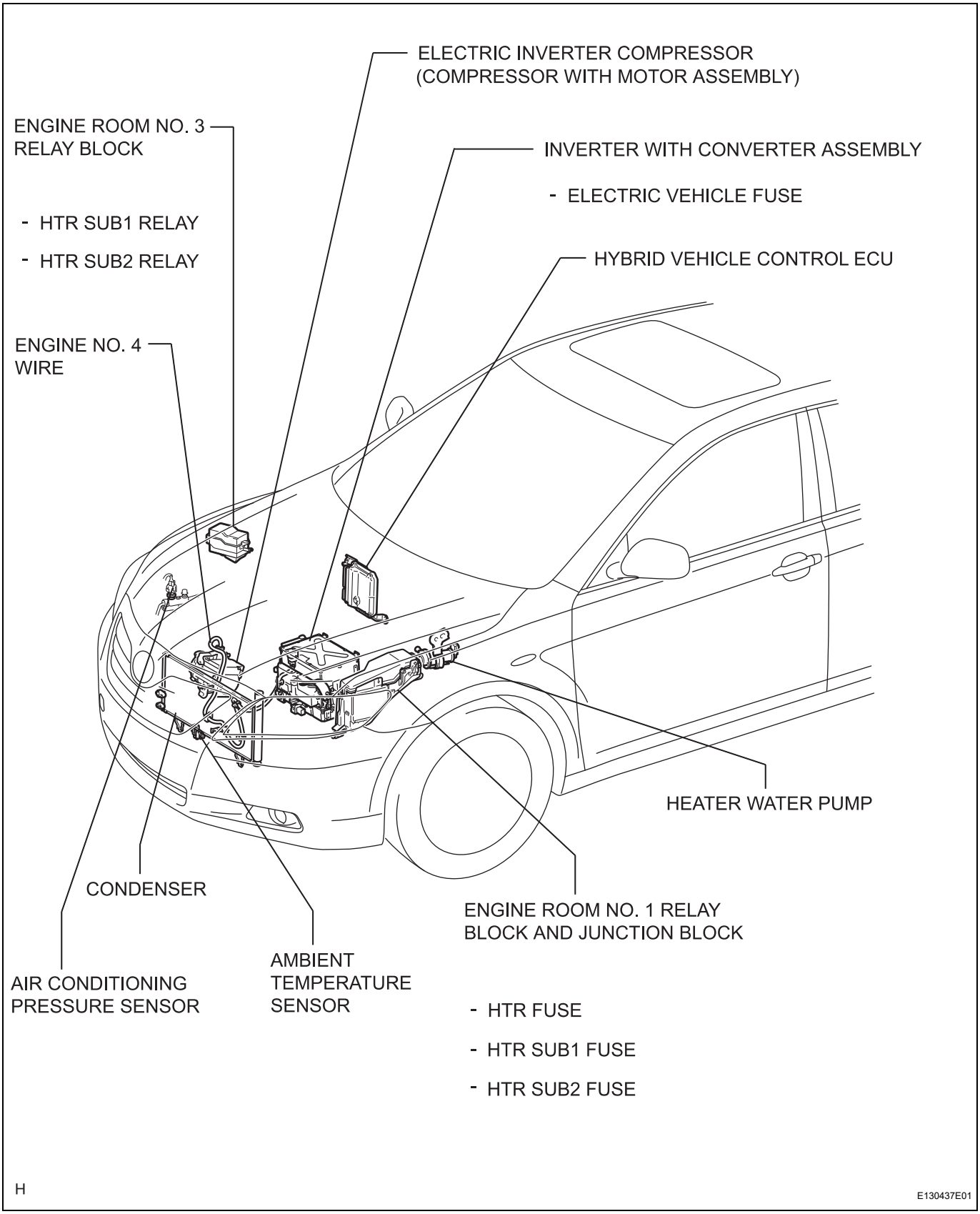
(m) Perform initialization.

NOTICE:

Some systems need initialization after reconnecting the cable to the negative battery terminal (See page IN-43).

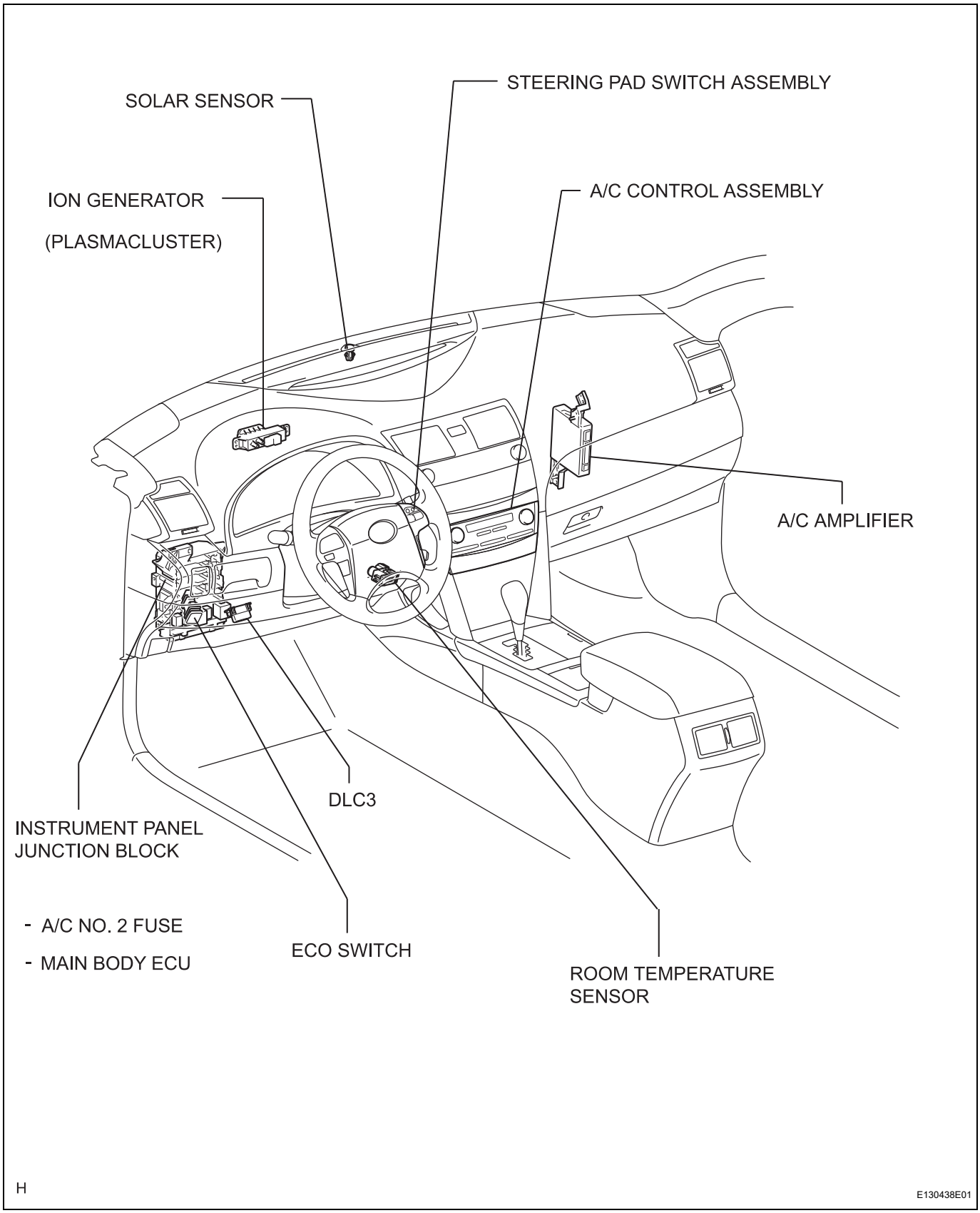
(n) Inspect the airbag warning light (See Page RS-33).

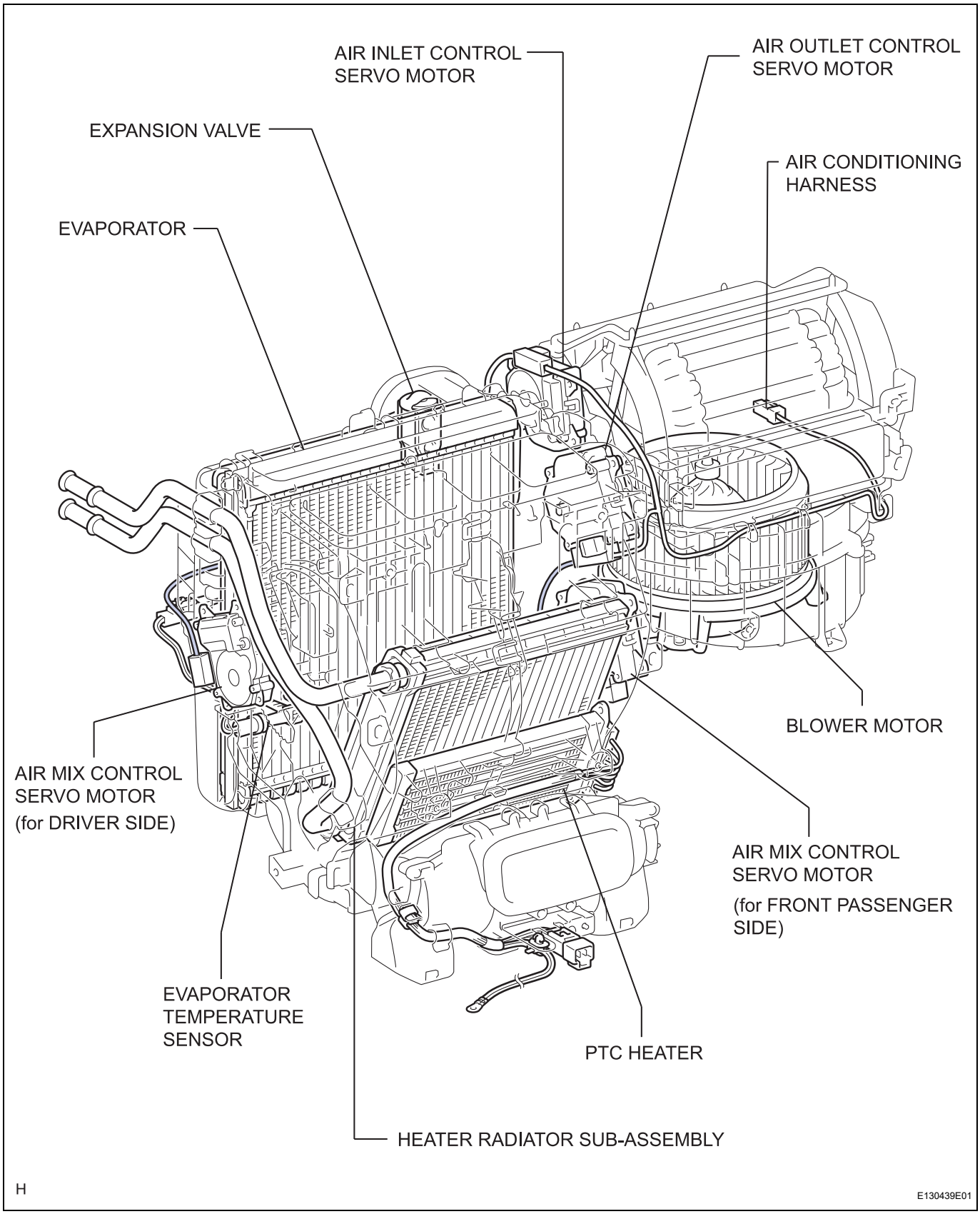
PARTS LOCATION



H

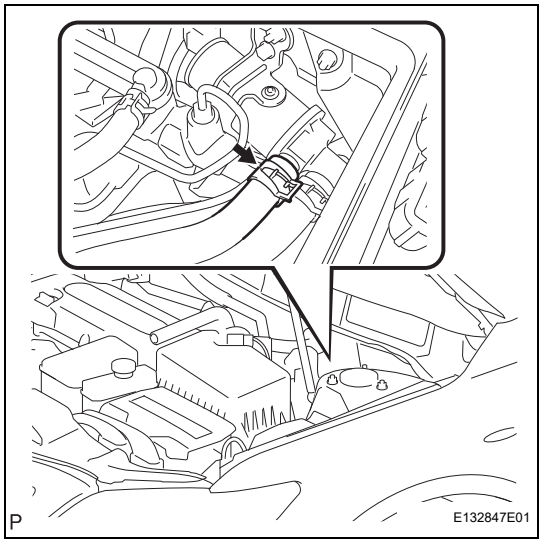
E130437E01


SOLAR SENSOR
STEERING PAD SWITCH ASSEMBLY
ION GENERATOR
(PLASMACLUSTER)
A/C CONTROL ASSEMBLY
A/C AMPLIFIER
DLC3
INSTRUMENT PANEL
JUNCTION BLOCK
- A/C NO. 2 FUSE
- MAIN BODY ECU
ECO SWITCH
ROOM TEMPERATURE
SENSOR
H
E130438E01

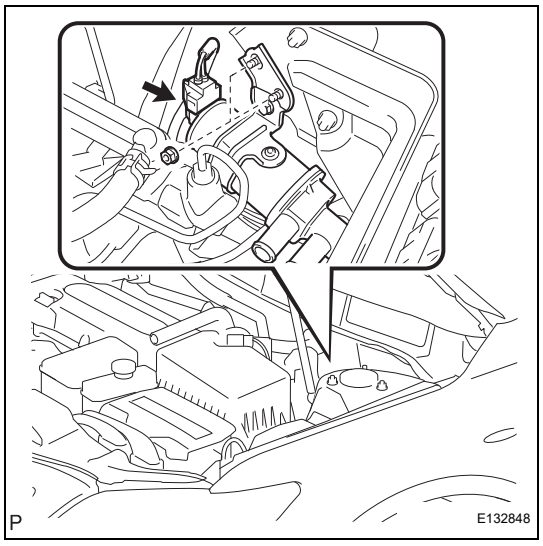

AIR INLET CONTROL SERVO MOTOR
AIR OUTLET CONTROL SERVO MOTOR
EXPANSION VALVE
AIR CONDITIONING HARNESS
EVAPORATOR
BLOWER MOTOR
AIR MIX CONTROL SERVO MOTOR (for DRIVER SIDE)
AIR MIX CONTROL SERVO MOTOR (for FRONT PASSENGER SIDE)
EVAPORATOR TEMPERATURE SENSOR
PTC HEATER
HEATER RADIATOR SUB-ASSEMBLY
H
E130439E01

REMOVAL

1. **SEPARATE BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY (See page BR-27)**
2. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-9)**
3. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-9)**
4. **REMOVE FRONT FENDER TO COWL SIDE SEAL LH (See page WW-9)**
5. **REMOVE FRONT FENDER TO COWL SIDE SEAL RH (See page WW-9)**
6. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-10)**
7. **REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-10)**
8. **REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-403)**
9. **REMOVE HEATER WATER OUTLET HOSE**
   (a) Using pliers, grip the claws of the clip and slide the clip to disconnect the heater water outlet hose.

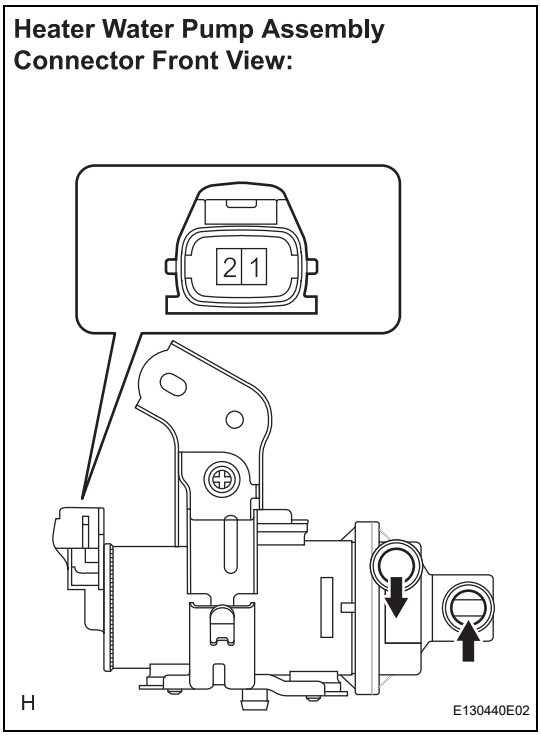


10. **REMOVE HEATER WATER INLET HOSE**
    HINT:
    Disconnection procedure for the heater water inlet hose is the same as that for the heater water outlet hose.
11. **REMOVE HEATER WATER PUMP**
    (a) Disconnect the connector.
    (b) Remove the 2 nuts and heater water pump.



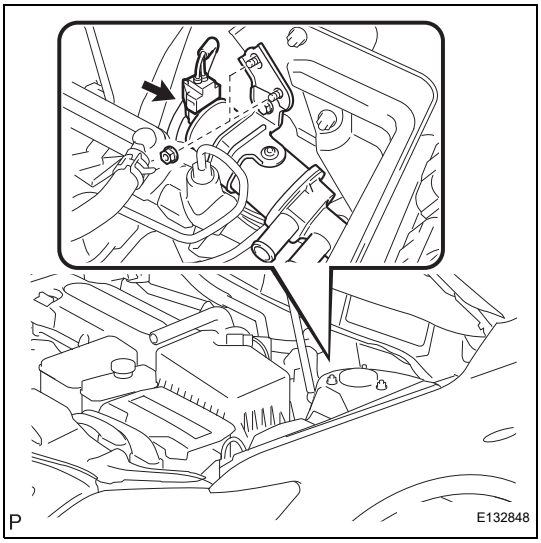
AC

Heater Water Pump Assembly Connector Front View:



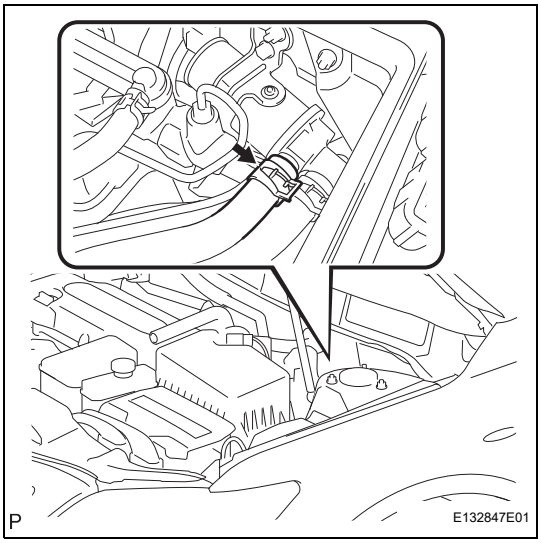
INSPECTION

1. **INSPECT HEATER WATER PUMP ASSEMBLY**
   (a) Connect the positive (+) lead terminal 1 of the heater water pump assembly connector and the negative (-) lead to terminal 2.
   OK:
   Heater water pump operates smoothly.
   NOTICE:
   Complete operation within 10 seconds if there is no water in the heater water pump assembly.
   If the result is not as specified, replace the heater water pump assembly.



INSTALLATION

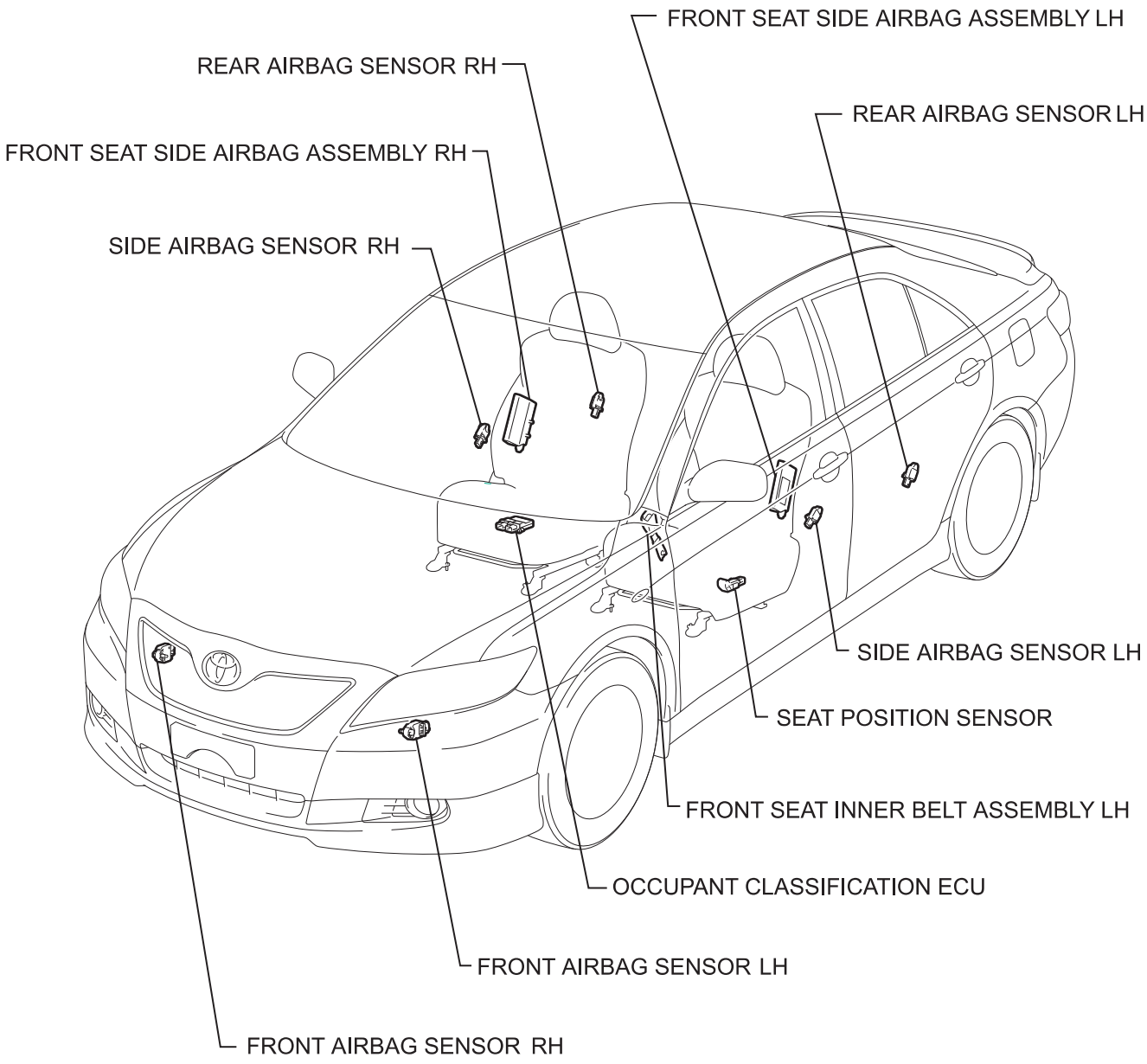
1. **INSTALL HEATER WATER PUMP**
   (a) Install the heater water pump with the 2 nuts.
   Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)
   (b) Connect the connector.
2. **INSTALL HEATER WATER INLET HOSE**
   (a) Install the water hose and attach the clip.

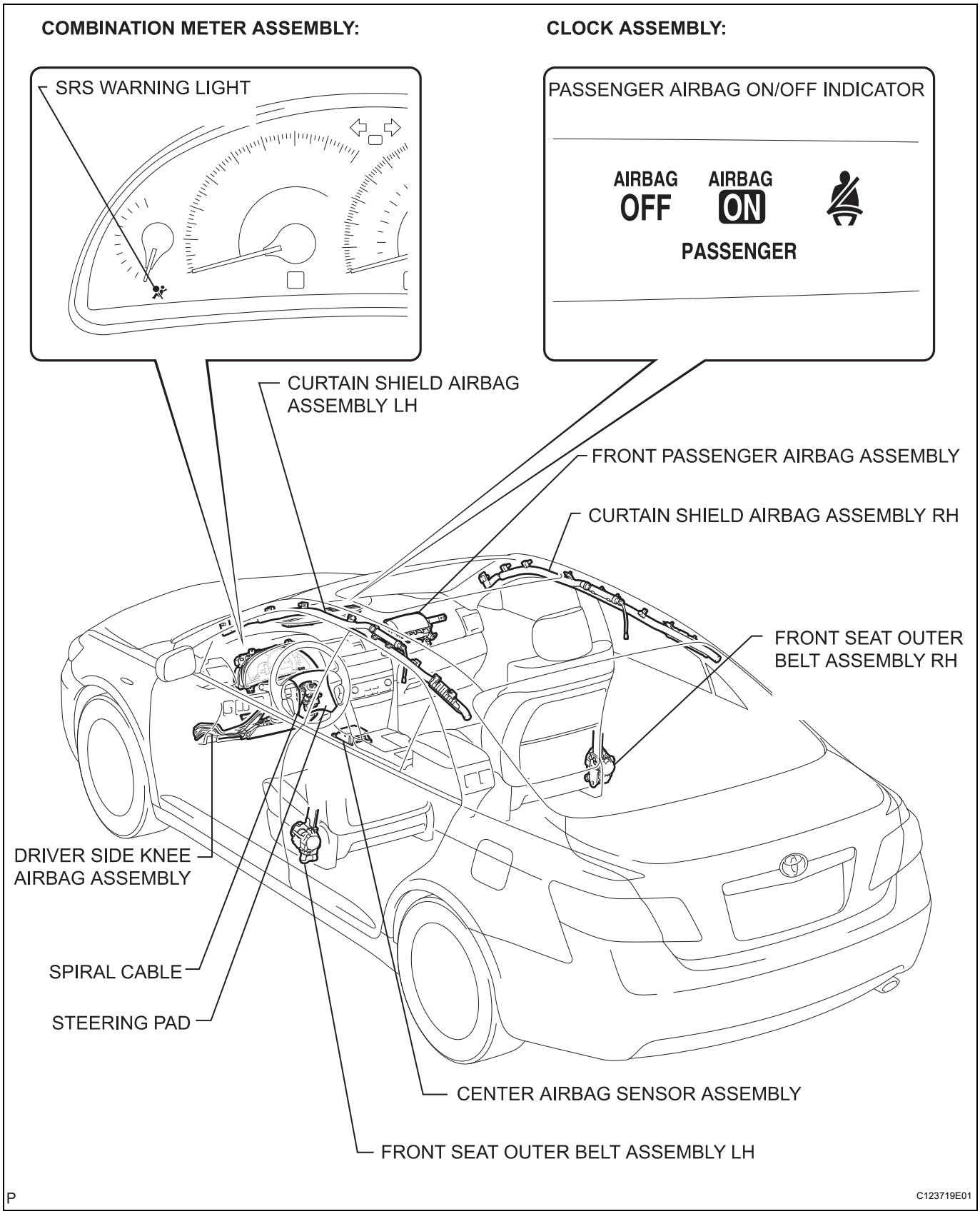


3. **INSTALL HEATER WATER OUTLET HOSE**
   (a) Install the water hose and attach the clip.
4. **INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-405)**
5. **INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-13)**
6. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-14)**
7. **INSTALL FRONT FENDER TO COWL SIDE SEAL RH (See page WW-14)**
8. **INSTALL FRONT FENDER TO COWL SIDE SEAL LH (See page WW-14)**
9. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-15)**

10. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-14)**
11. **INSTALL BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY (See page BR-33)**

PARTS LOCATION

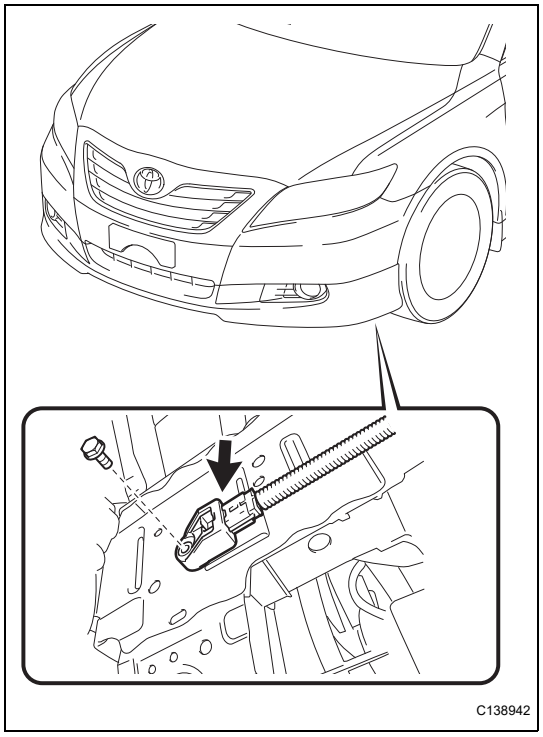



COMBINATION METER ASSEMBLY:
CLOCK ASSEMBLY:
SRS WARNING LIGHT
PASSENGER AIRBAG ON/OFF INDICATOR
AIRBAG OFF
AIRBAG ON
PASSENGER
CURTAIN SHIELD AIRBAG ASSEMBLY LH
FRONT PASSENGER AIRBAG ASSEMBLY
CURTAIN SHIELD AIRBAG ASSEMBLY RH
FRONT SEAT OUTER BELT ASSEMBLY RH
DRIVER SIDE KNEE AIRBAG ASSEMBLY
SPIRAL CABLE
STEERING PAD
CENTER AIRBAG SENSOR ASSEMBLY
FRONT SEAT OUTER BELT ASSEMBLY LH
P
C123719E01

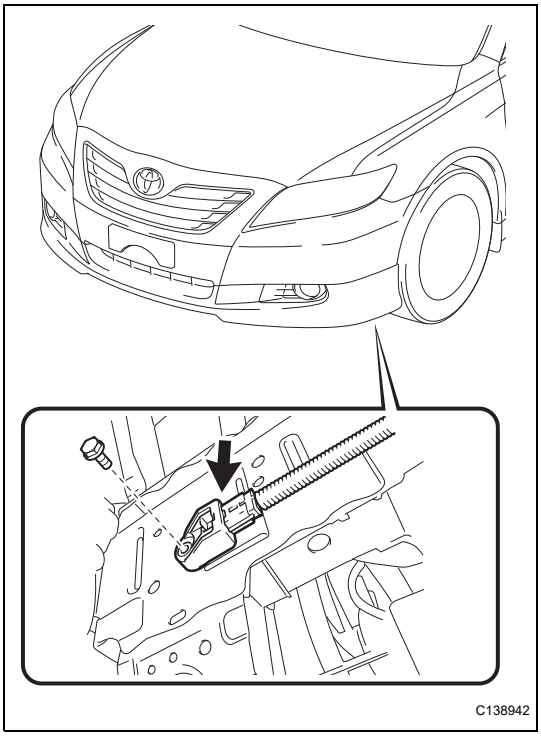
REMOVAL

HINT:
- Use the same procedure for the RH side and the LH side.
- The procedure listed below are for the LH side.

1. **PRECAUTION**
   CAUTION:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
3. **REMOVE ENGINE UNDER COVER RH**
4. **REMOVE ENGINE UNDER COVER LH**
5. **REMOVE FRONT AIRBAG SENSOR**
   (a) Remove the bolt and front airbag sensor from the body.
   (b) Disconnect the connector from the front airbag sensor.
   NOTICE:
   When handling the airbag connector, take care not to damage the airbag wire harness.

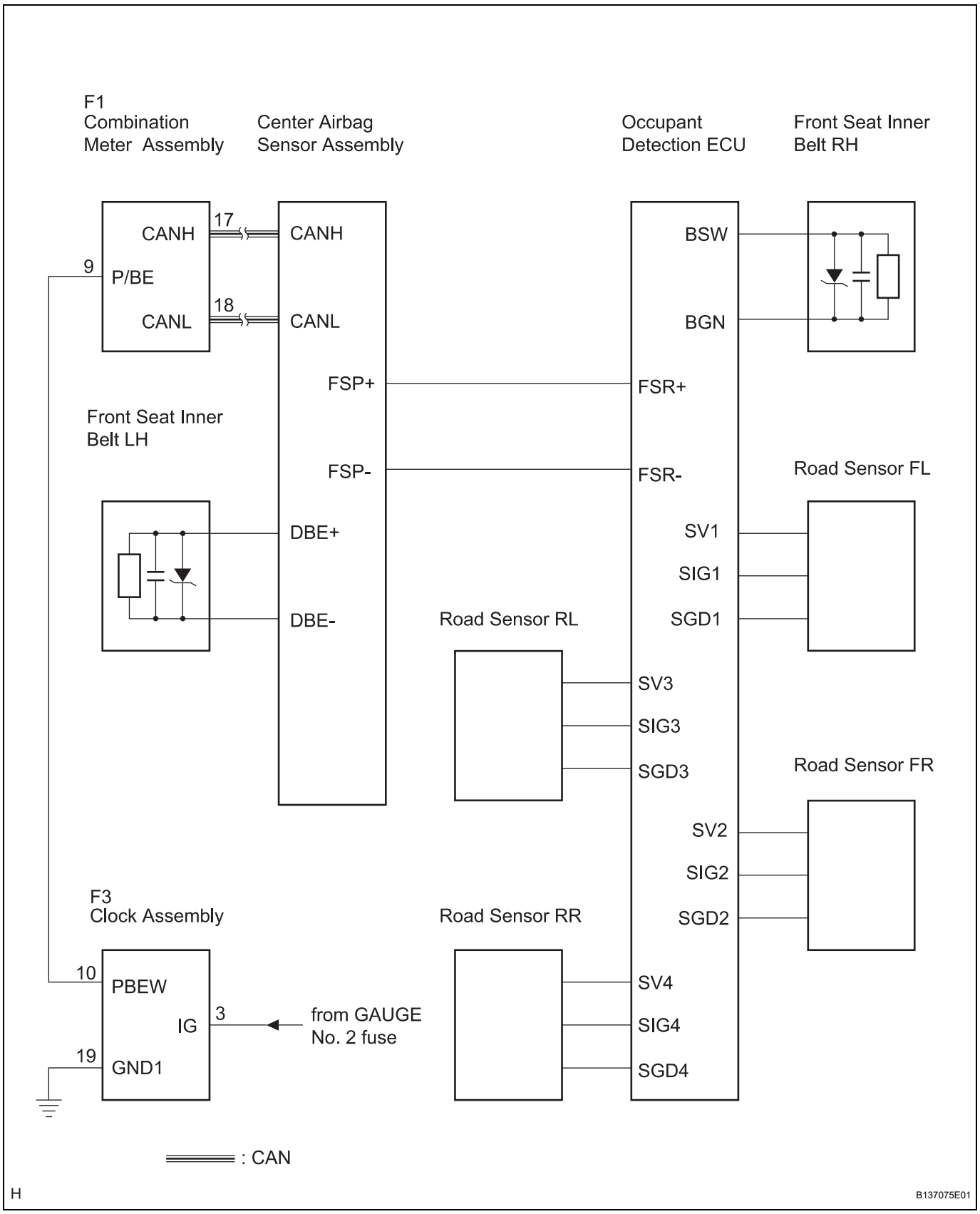

C138942

INSTALLATION



1. **INSTALL FRONT AIRBAG SENSOR**
   (a) Check that the power switch is turned off.
   (b) Check that the battery negative (-) cable is disconnected.
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
   (c) Connect the connector.
   NOTICE:
   When handling the airbag connector, take care not to damage the airbag wire harness.
   (d) Install the front airbag sensor with the bolt.
   Torque: 17.5 N*m (179 kgf*cm, 13 ft.*lbf)
   NOTICE:
   - **If the front airbag sensor has been dropped, or there are any cracks, dents or other defects in the case, bracket or connector, replace it with a new one.**
   - **When installing the front airbag sensor, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**
   (e) Check that there is no looseness in the installation parts of the front airbag sensor.
2. **INSTALL ENGINE UNDER COVER LH**
3. **INSTALL ENGINE UNDER COVER RH**
4. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
5. **PERFORM INITIALIZATION**
   (a) Perform initialization (See page IN-43).
   NOTICE:
   Some systems need initialization after reconnecting the cable to the negative battery terminal.
6. **INSPECT SRS WARNING LIGHT**
   (a) Inspect the SRS warning light (See page RS-33).

SYSTEM DIAGRAM



SB

SYSTEM DESCRIPTION

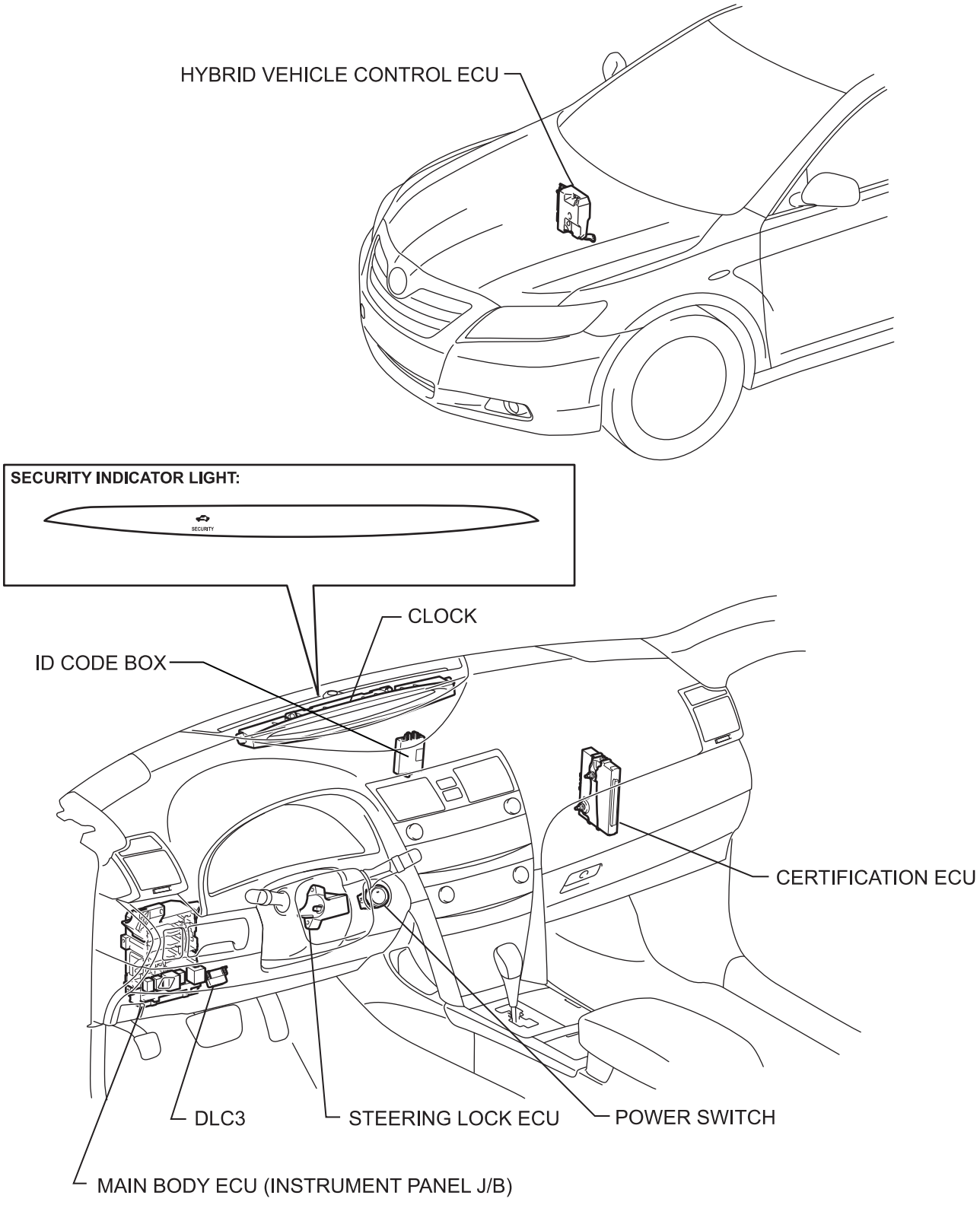
1. Driver seat belt warning light

(a) When the driver seat belt is not fastened with the power switch in the ON position, the driver seat belt warning light on the combination meter assembly comes on to inform the driver. The center airbag assembly detects the driver seat belt condition and sends signals to the body ECU and the meter assembly via CAN communication.

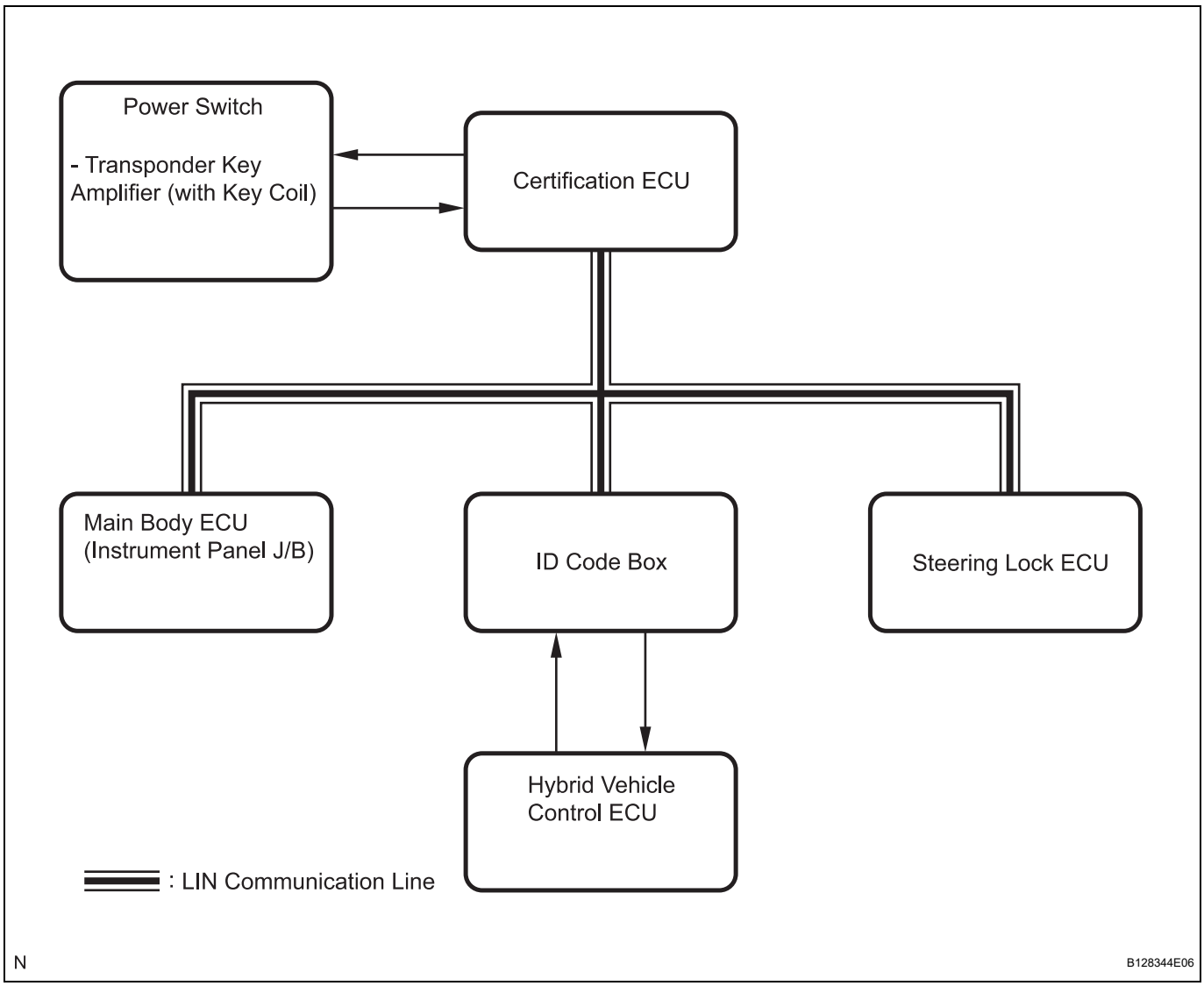
2. Passenger seat belt warning

(a) When the passenger seat belt is not fastened with the ignition switch in the ON position and the passenger seat occupied, check that the passenger seat belt warning light on the clock display blinks. The occupant detection sensor detects if the passenger seat is occupied and sends signals to the meter assembly. The inner belt detects the passenger seat belt condition and sends signals to the meter assembly. After receiving the signals from the occupant detection sensor and inner belt, the meter assembly sends signals to the clock assembly to request the passenger seat belt warning light to blink or go off.

PARTS LOCATION



SYSTEM DIAGRAM



Communication table:

Transmitting ECU (Transmitter)	Receiving ECU (Receiver)	Signals	Communication method
Main body ECU (Instrument panel J/B)	Certification ECU	Key code recognition signal	LIN
ID code box	Certification ECU	DTC (B2791) signal	LIN
ID code box	Steering lock ECU	• Steering lock release signal • Matching request random number signal	LIN
ID code box	Certification ECU	Matching request random number signal	LIN

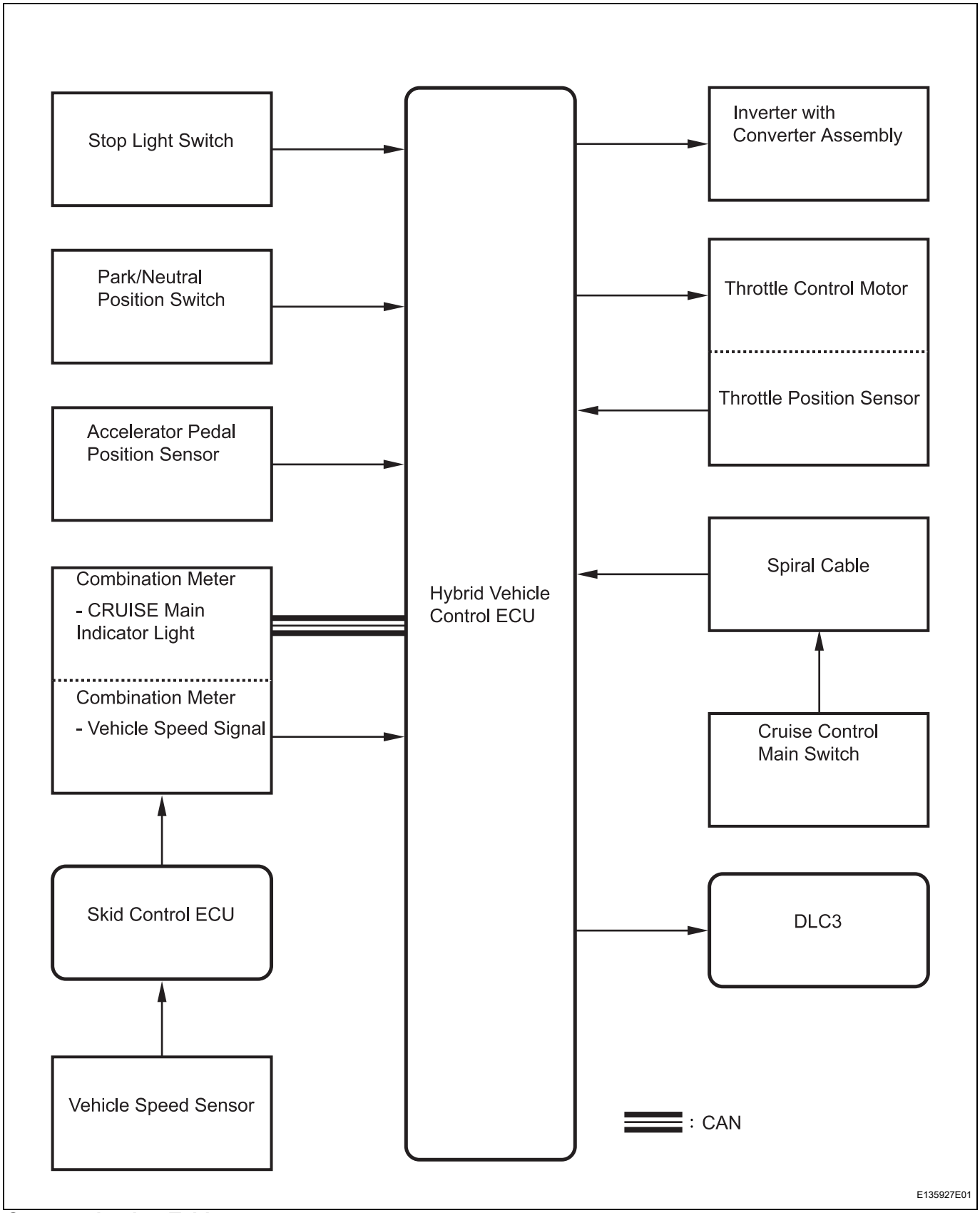
TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Engine mounting bracket No. 2 RH x Timing chain cover		52	531	38
Engine mounting bracket RH x Cylinder block		54	551	40
Engine moving control rod with bracket x Engine mounting bracket No. 2 RH		64	653	47
Engine moving control rod with bracket x Fender apron RH		64	653	47
Engine mounting stay No. 2 RH x Cylinder head		64	653	47
Engine mounting stay No. 2 RH x Engine mounting bracket No. 2 RH		64	653	47
Engine hanger No. 1 x Cylinder head		38	387	28
Engine hanger No. 2 x Cylinder head		38	387	28
ECT sensor x Cylinder head		20	204	15
Knock sensor x Cylinder block		20	204	15
Engine oil pressure switch assembly x Cylinder head		15	153	11
Water by-pass pipe No. 1 x Cylinder block		9.0	92	80 in.*lbf
Transverse engine engine mounting bracket x Cylinder block		54	551	40
Drive shaft bearing bracket x Cylinder block		64	653	47
V-ribbed belt tensioner assembly x V-ribbed belt tensioner cover assembly		9.0	92	80 in.*lbf
Idler pulley bracket x Chain tensioner cover assembly		60	607	44
V-ribbed belt tensioner assembly x Timing chain cover	Bolt A	52	531	38
	Bolt B	21	214	15
Ignition coil assembly x Cylinder head		9.0	92	80 in.*lbf
Engine cover x Cylinder head cover		7.0	71	62 in.*lbf
Exhaust manifold converter x Cylinder head		37	378	27
Exhaust manifold stay x Exhaust manifold converter		44	449	32
Manifold converter insulator No. 1 x Exhaust manifold converter		12	122	9
Oil level gauge guide x Water by-pass pipe No. 1		9.0	92	80 in.*lbf
Intake manifold x Cylinder head		30	306	22
Transmission control cable assembly x Control shaft		13	133	10
Transmission input damper assembly x Crankshaft		30	306	22
Flywheel sub-assembly x Crankshaft		130	1,330	96
Engine mounting insulator LH x Automatic transaxle assembly		95	969	70
Engine mounting insulator LH x Manual transaxle assembly		143	1,459	105
Engine mounting insulator RH x Engine mounting bracket RH	Nut A	95	969	70
Engine mounting insulator RH x Frame	Nut B	87	888	64
Engine mounting insulator FR x Engine mounting bracket FR		87	888	64
Frame side plate x Front frame assembly	Bolt A	85	867	63
Frame side plate x Body	Bolt B	32	326	24
Front suspension member brace rear x Front frame assembly	Bolt C	85	867	63
Front suspension member brace rear x Body	Bolt D	32	326	24
Electric inverter compressor x Cylinder block		25	250	18
Speed sensor front LH x Steering knuckle		8.0	82	71 in.*lbf
Speed sensor front RH x Steering knuckle		8.0	82	71 in.*lbf
Air cleaner assembly x Body		5.0	51	44 in.*lbf
Air cleaner inlet assembly x Body		5.0	51	44 in.*lbf
Balanceshaft housing x Stiffening crankcase assembly	1st	22	220	16
	2nd	Turn 90°	Turn 90°	Turn 90°
Stiffening crankcase assembly x Cylinder block		24	245	18
with head taper screw plug No. 1 x Cylinder block		26	265	19
No. 1 oil nozzle sub-assembly x Cylinder block		7.0	71	62 in.*lbf
Oil control valve filter x Cylinder block		30	306	22

Part Tightened		N*m	kgf*cm	ft.*lbf
Cylinder block water drain cock x Stiffening crankcase assembly		25 13	255 130	18 9
Cylinder head x Cylinder block	1st	79	806	58
	2nd	Turn 90°	Turn 90°	Turn 90°
Camshaft timing gear assembly x Camshaft		54	551	40
Camshaft timing sprocket x Camshaft		54	551	40
Camshaft bearing cap No. 1 x Cylinder head		30	301	22
Camshaft bearing cap No. 2 x Cylinder head		30	301	22
Camshaft bearing cap No. 3 x Cylinder head		9.0	92	80 in.*lbf
Oil pump assembly x Stiffening crankcase assembly		19	194	14
Chain tensioner plate x Stiffening crankcase assembly		12	122	9
Oil pump drive gear x Oil pump		30	301	22
Chain vibration damper No. 1 x Cylinder head		9.0	92	80 in.*lbf
Chain vibration damper No. 1 x Cylinder block		9.0	92	80 in.*lbf
Chain tensioner slipper x Cylinder block		19	194	14
Timing chain guide x Crankshaft bearing cap No. 1		9.0	92	80 in.*lbf
Oil pan x Stiffening crankcase assembly		9.0	92	80 in.*lbf
Oil pan drain plug x Oil pan		25	255	18
Timing chain cover x Cylinder block, Cylinder head	Bolt A	9.0	92	80 in.*lbf
	Bolt B	25	255	18
	Bolt C	55	561	41
	Nut	11	112	8
Crankshaft position sensor x Timing chain cover		9.0	92	80 in.*lbf
Crankshaft pulley x Crankshaft		170	1,733	125
Chain tensioner assembly No. 1 x Timing chain cover		9.0	92	80 in.*lbf
Camshaft position sensor x Cylinder head		9.0	92	80 in.*lbf
Radio setting condenser x Cylinder head		10	102	7
Cylinder head cover x Cylinder head	Bolt A	11	112	8
	Bolt B	14	143	10
	Nut	11	112	8
Cylinder head cover x Engine wire		8.4	86	74 in.*lbf
Oil filter union x Stiffening crankcase assembly	Oil filter union	79	806	58
	Nut	9.0	92	80 in.*lbf
	Union bolt	25	255	18
Oil filter x Oil filter union		13	133	10
Spark plug x Cylinder head		19	194	14
Ventilation valve x Cylinder head cover		19	194	14
No. 1 exhaust pipe support bracket x Body		19	194	14
Stud bolt (cylinder head)	Bolt A	5	51	44 in.*lbf
	Bolt B	5	51	44 in.*lbf
	Bolt C	9.5	97	84 in.*lbf
	Bolt D	9.5	97	84 in.*lbf
Stud bolt (cylinder block)	Bolt A	5.0	51	44 in.*lbf
	Bolt B	22	220	16
	Bolt C	9.5	97	84 in.*lbf
	Bolt D	5.0	51	44 in.*lbf
Crankshaft bearing cap x Cylinder block	1st	20	204	15
	2nd	40	408	29
	3rd	Turn 90°	Turn 90°	Turn 90°

Part Tightened		N*m	kgf*cm	ft.*lbf
Connecting rod cap x Connecting rod	1st	25	250	18
	2nd	Turn 90°	Turn 90°	Turn 90°

SYSTEM DIAGRAM



Communication Table:

Sender	Receiver	Signal	Line
Hybrid Vehicle Control ECU	Combination Meter ECU	CRUISE main indicator operation signal	CAN

SYSTEM DESCRIPTION

1. CRUISE CONTROL SYSTEM

The cruise control system maintains constant vehicle speed. It enables the driver to adjust the vehicle speed by operating the cruise control main switch without using the accelerator pedal.

The hybrid vehicle control ECU receivers signals from each switch and sensor, and maintains constant vehicle speed by optimizing the use of the engine and motor driving force.

- The hybrid vehicle control ECU receives signals such as ON-OFF, - (COAST)/SET, + (ACCEL)/RES (RESUME), and CANCEL from the cruise control main switch and executes the appropriate command.
- The hybrid vehicle control ECU illuminates the combination meter's CRUISE main indicator light when it receives a cruise control main switch ON signal.
- The hybrid vehicle control ECU cancels the cruise control system when the brake pedal is depressed and the hybrid vehicle control ECU receives a stop light switch signal.
- The hybrid vehicle control ECU receives a park/ neutral position switch signal and cancels the cruise control system when the shift lever is moved from the D to the N or B position.

2. LIMIT CONTROL

(a) Low speed limit

The lowest possible limit of the speed setting range is approximately 40 km/h (25 mph). The cruise control system cannot be set when the driving vehicle speed is below the low speed limit. Cruise control operation will be automatically canceled but the stored vehicle speed will be retained when the vehicle speed drops below the low speed limit 40 km/h (25 mph) while the cruise control is in operation.

(b) High speed limit

The highest possible limit of the speed setting range is approximately 200 km/h (125 mph). The cruise control system cannot be set when the driving vehicle speed exceeds the high speed limit. Also, + (ACCEL)/RES (RESUME) cannot be used to increase speed beyond the high speed limit.

3. OPERATION OF CRUISE CONTROL

The cruise control main switch operates 7 functions: SET, - (COAST), TAP-DOWN, RES (RESUME), + (ACCEL), TAP-UP, and CANCEL. The SET, TAP-DOWN, and - (COAST) functions, and the RES (RESUME), TAP-UP, and + (ACCEL) functions are operated with the same switch. The cruise control main switch is an automatic return type switch which turns on only while operating it in the direction of each arrow and turns off after releasing it.

(a) SET CONTROL

The vehicle speed is stored and constant speed control is maintained when pushing the cruise control main switch to - (COAST)/SET while driving with the main switch on (the CRUISE main indicator light is on), and the vehicle speed is within the set speed range (between the low and high speed limits).

(b) - (COAST) CONTROL

The hybrid vehicle control ECU decreases the cruise control demand speed and controls the engine and motor driving force to decelerate the vehicle when -/SET on the cruise control main switch is pressed and held while the cruise control system is in operation. When the cruise control main switch is released from -/SET, vehicle speed is stored and constant speed control is maintained.

(c) TAP-DOWN CONTROL

When tapping down the cruise control main switch to - (COAST)/SET (for approximately 0.6 seconds) while the cruise control system is in operation, the stored vehicle speed decreases by approximately 1.6 km/h (1.0 mph) at each tap. When the cruise control main switch is released from - (COAST)/SET and the difference between the driving and stored vehicle speed is more than 5 km/h (approximately 3 mph), the driving vehicle speed is stored and constant speed control is maintained.

(d) ACCELERATION CONTROL

The hybrid vehicle control ECU increases the cruise control demand speed and controls the engine and motor driving force to accelerate the vehicle when +/RES on the cruise control main switch is pressed and held while the cruise control system is in operation.

When the cruise control main switch is released from +/RES, vehicle speed is stored and constant speed control is maintained.

(e) TAP-UP CONTROL
When tapping up the cruise control main switch to + (ACCEL)/RES (RESUME) (for approximately 0.6 seconds) while the cruise control system is in operation, the stored vehicle speed increases by approximately 1.6 km/h (1.0 mph) at each tap. However, when the difference between the driving and the stored vehicle speed is more than 5 km/h (approximately 3 mph), the stored vehicle speed will not be changed.

(f) RESUME CONTROL
If cruise control operation was canceled under any of the manual cancel conditions (other than turning the cruise control main switch off), and if the driving speed is above the low speed limit, pushing the cruise control main switch to + (ACCEL)/RES (RESUME) restores the vehicle speed memorized at the time of cancellation, and maintains constant speed control.

(g) MANUAL CANCEL CONTROL
Performing any of the following will cancel the cruise control system while in operation (the stored vehicle speed in the hybrid vehicle control ECU will be maintained).

- Pulling the cruise control main switch to CANCEL
- Depressing the brake pedal
- Moving the shift lever from the D to the N or B position.
- Turning the cruise control main switch off (the stored vehicle speed in the hybrid vehicle control ECU will not be maintained).

4. AUTO CANCEL (FAIL-SAFE)
This system has an automatic cancellation function (fail-safe) (See page CC-17).

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the cruise control system.
- *: Use the intelligent tester.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 PROBLEM SYMPTOM CONFIRMATION

NEXT

3 CHECK CAN COMMUNICATION SYSTEM*

Refer to PRECAUTION (See page CA-1).

(a) Check for output DTCs.

Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

HINT:

The hybrid vehicle control ECU of this system is connected to the CAN communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN communication system.

B → **PROCEED TO "CAN COMMUNICATION SYSTEM"**

A

4 DTC CHECK AND CLEAR*

Refer to DTC CHECK / CLEAR (See page CC-17).

NEXT

5 DTC CHECK (OTHER THAN CAN SYSTEM DTC)*

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

A → GO TO STEP 7

B

6	DTC CHART

Refer to DIAGNOSTIC TROUBLE CODE CHART (See page CC-19).

CC

NEXT

GO TO STEP 10

7	PROBLEM SYMPTOM CONFIRMATION

Result

Result	Proceed to
Symptom occurs	A
Symptom does not occur	B

A → GO TO STEP 9

B

8	SYMPTOM SIMULATION

Refer to ELECTRONIC CIRCUIT INSPECTION PROCEDURE (See page IN-67).

NEXT

Go to step 7

9	PROBLEM SYMPTOMS TABLE

Refer to PROBLEM SYMPTOMS TABLE (See page CC-12).

NEXT

10	CIRCUIT INSPECTION*

NEXT

11	TERMINALS OF ECU

Refer to TERMINALS OF ECU (See page TW-23).

NEXT

12	IDENTIFICATION OF PROBLEM

NEXT

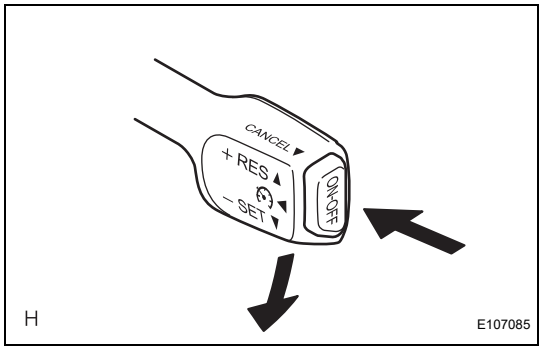
13	REPAIR OR REPLACE

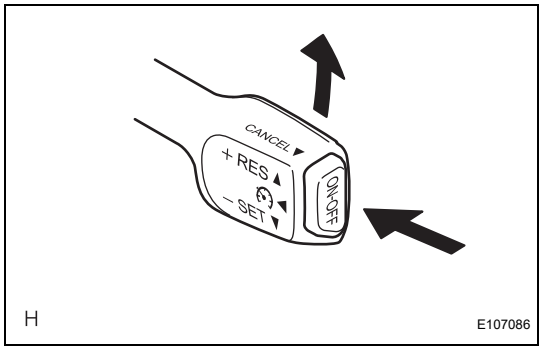
NEXT

14	CONFIRMATION TEST

NEXT

END



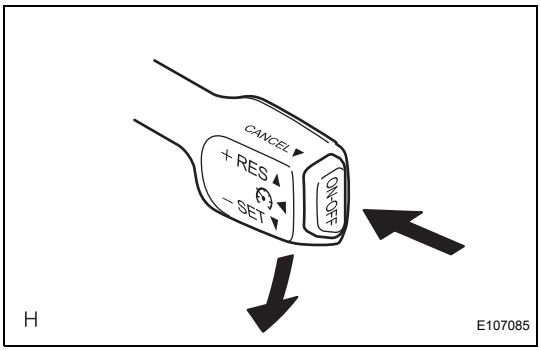


ROAD TEST

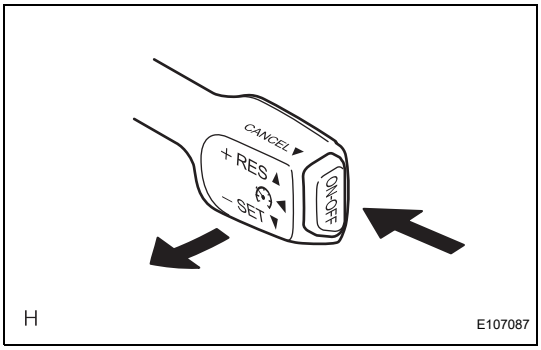
1. PROBLEM SYMPTOM CONFIRMATION

(a) Inspect the SET function.
  (1) Turn the cruise control main switch on.
  (2) Drive at the required speed between 40 km/h (25 mph) and 200 km/h (125 mph).
  (3) Push the cruise control main switch to - (COAST)/SET.
  (4) After releasing the switch, check that the vehicle cruises at the set speed.

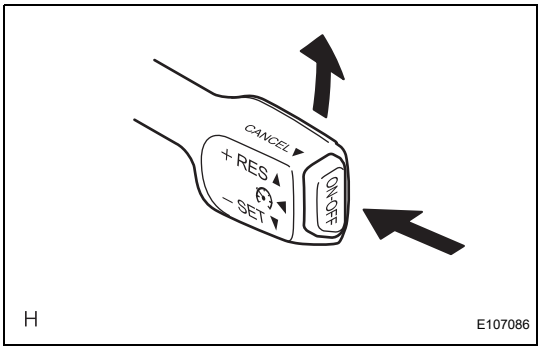
(b) Inspect the + (ACCEL) function.
  (1) Turn the cruise control main switch on.
  (2) Drive at the required speed between 40 km/h (25 mph) and 200 km/h (125 mph).
  (3) Push the cruise control main switch to - (COAST)/SET.
  (4) Check that vehicle speed increases while the cruise control main switch is pushed to + (ACCEL)/RES (RESUME), and that the vehicle cruises at the newly set speed when the switch is released.
  (5) Push the cruise control main switch to + (ACCEL)/RES (RESUME) and then release it immediately. Check that vehicle speed increases by approximately 1.6 km/h (1.0 mph) (tap-up control).



(c) Inspect the - (COAST) function.
(1) Turn the cruise control main switch on.
(2) Drive at the required speed between 40 km/h (25 mph) and 200 km/h (125 mph).
(3) Push the cruise control main switch to - (COAST)/SET.
(4) Check that vehicle speed decreases while the cruise control main switch is pushed to - (COAST)/SET, and the vehicle cruises at the newly set speed when the switch is released.
(5) Push the cruise control main switch to - (COAST)/SET, and then release it immediately. Check that vehicle speed decreases by approximately 1.6 km/h (1.0 mph) (tap-down control).



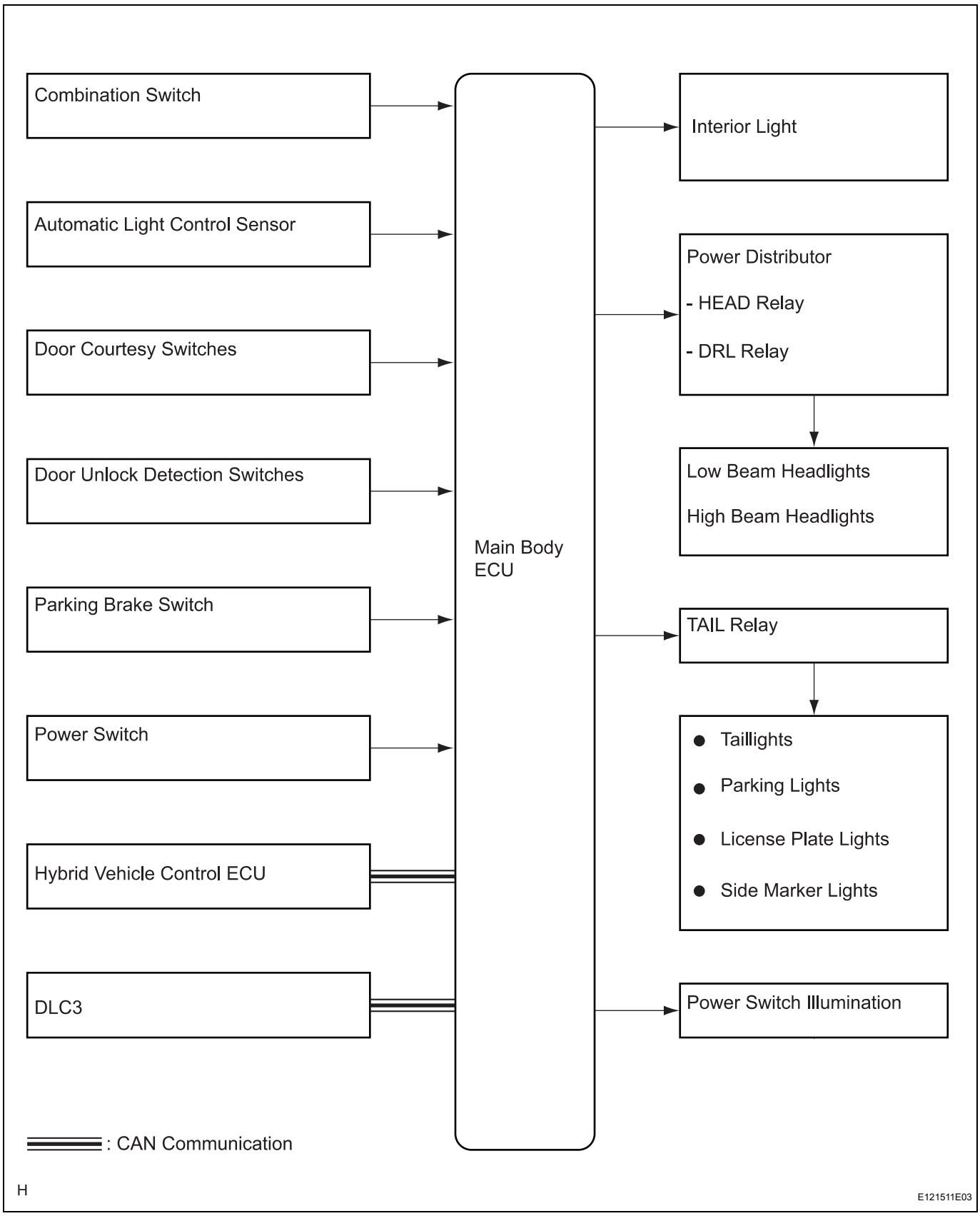
(d) Inspect the CANCEL function.
(1) Turn the cruise control main switch on.
(2) Drive at the required speed between 40 km/h (25 mph) and 200 km/h (125 mph).
(3) Push the cruise control main switch to - (COAST)/SET.
(4) When performing any one of the following, check that the cruise control system is canceled and that the normal driving mode is reset.
- Pulling the cruise control main switch to CANCEL
- Depressing the brake pedal
- The shift lever is moved from the D to the N or B position.
- Turning the cruise control main switch off



(e) Inspect the RES (RESUME) function.
(1) Turn the cruise control main switch on.
(2) Drive at the required speed between 40 km/h (25 mph) and 200 km/h (125 mph).
(3) Push the cruise control main switch to - (COAST)/SET.
(4) Cancel the cruise control system by performing any of the above operations (other than turning the main switch off).
(5) After pushing the cruise control main switch to + (ACCEL)/RES (RESUME) at a driving speed of more than 40 km/h (25 mph), check that the vehicle resumes the speed set prior to the cancellation.

CC

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

1. MANUAL LIGHT CONTROL SYSTEM

This system functions if the lights such as the headlights and taillights come on by manual operation of the light control switch.

(a) The main body ECU controls this system based on the signals listed below.

Input	Output	Lights that illuminate
Light control switch TAIL signal	Taillight relay drive signal	• Taillights • License plate lights • Side marker lights • Parking lights
Light control switch HEAD signal	Headlight relay drive signal	Low beam headlights

2. AUTOMATIC LIGHT CONTROL SYSTEM

When the light control switch is in the AUTO position, the automatic light control sensor detects ambient light, converts it into an electrical signal, and outputs it to the main body ECU. The main body ECU automatically turns the headlights and taillights on or off according to the signal.

(a) The main body ECU controls this system based on the signals listed below.

Input	Output	Lights that illuminate
• Light control switch AUTO signal • Automatic light control sensor signal	• Headlight relay drive signal • Taillight relay drive signal	• Low beam headlights • Taillights • License plate lights • Side marker lights • Parking lights

3. LIGHT AUTO TURN OFF SYSTEM

When the headlights and taillights are on through the operation of the automatic light control system or through the light control switch, if the power switch is turned off and all doors are closed, this system continues to illuminate the headlights and taillights for approximately 30 seconds, and then turns off the headlights and taillights.

However, if the power switch is turned off and all doors are locked, this system turns off the headlights and taillights immediately.

(a) The main body ECU controls this system based on the signals listed below.

Input	Output	Lights that operate
• Door courtesy switch signal • Power switch signal	• Headlight relay OFF demand • Taillight relay OFF demand • DRL relay OFF demand	• Low beam headlights • Taillights, license plate lights, parking lights, and side marker lights • High beam headlights

4. DAYTIME RUNNING LIGHT SYSTEM

This function is designed to automatically illuminate the headlights (dimmed HI beams), during the daytime to make the car more visible to other vehicles.

- The main body ECU and power distributor control this system. The main body ECU transmits a turn ON signal to the power distributor and the power distributor illuminates the HI beams using a duty control.
- This system is enabled when the conditions given below are met:
  - Power switch is on (IG).
  - READY condition signal is received.
  - Light control switch is in OFF*, TAIL or AUTO position (if headlight-on control is not being performed by the automatic light control).
    HINT:
    *: only for Canadian package models.
  - Parking brake switch is OFF.

5. ILLUMINATED ENTRY SYSTEM

When a door is unlocked through a key or transmitter operation, or if a door is opened, the illuminated entry system turns on the interior light and the power switch illumination.

(a) The main body ECU controls this system. The operation and condition of the illuminated entry system are described below.

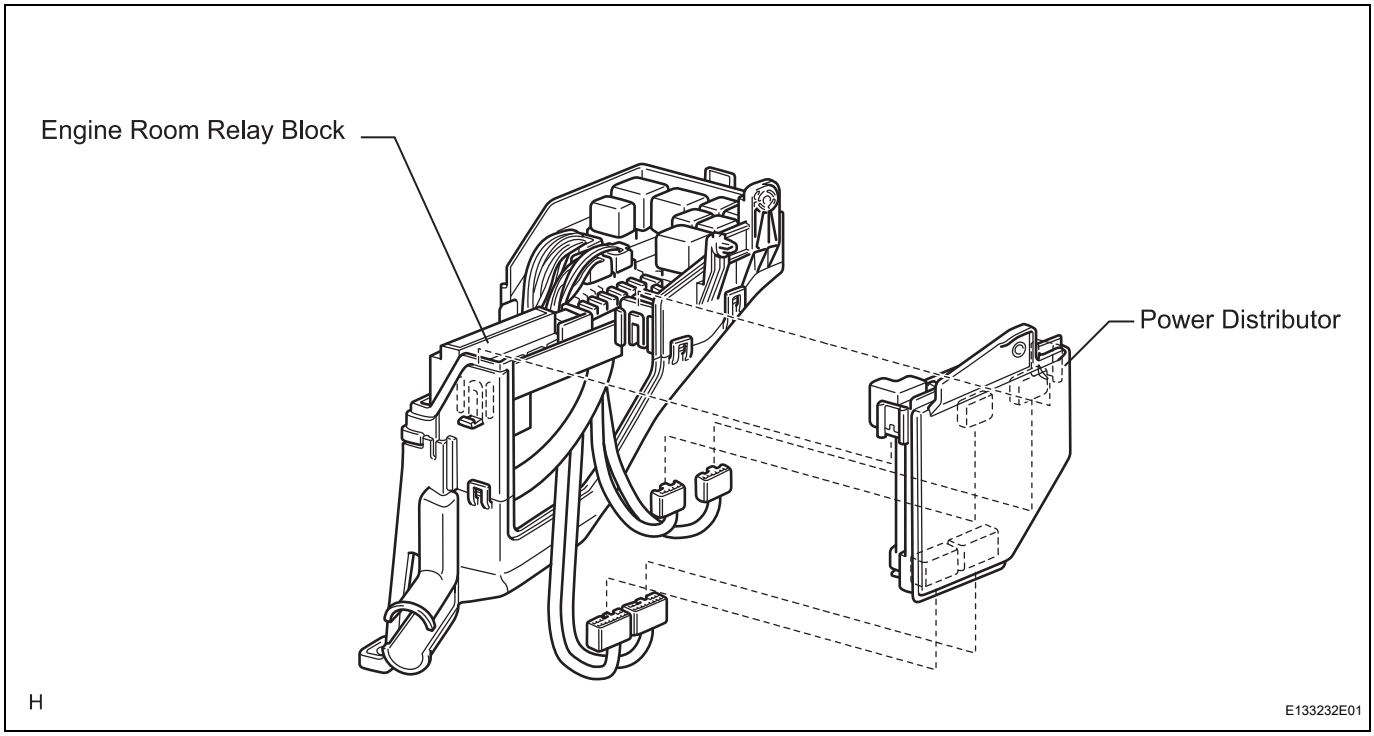
Operation	Condition
Fade in	When any of the following conditions is met, the interior light and power switch illumination fade in. • Any door is opened. • Any door is unlocked when the power switch is off and all doors are closed. • Power switch is turned from on (ACC) to off when all doors are closed.
Fade out immediately	When either of the following conditions is met, the interior light and ignition key cylinder light fade out immediately. • Power switch is turned from off to on (ACC or IG) when all doors are closed. • All doors are locked when the power switch is off.
Illuminate for approximately 15 seconds, and then fade out	All doors are closed when the power switch is off.
Fade out (Battery saving)	When the following conditions are met, the interior light and power switch illumination fade out. • A key is not in the actuation area (with smart key system). • There are no changes in the condition of the doors for 20 minutes.

6. POWER DISTRIBUTOR

(a) General

- The power distributor is built into the engine room relay block, and uses a small mechanical relay and semiconductor relay for a compact and lightweight design.
- The power distributor has a headlight control function. This function dims the high beam headlights in accordance with operation signals from the main body ECU while the daytime running light system is operating.
- The power distributor dims the high beam headlights using a duty control.

- When a short circuit occurs between the power distributor and high beam headlight bulb, a fail-safe function operates to stop the DRL relay operation.



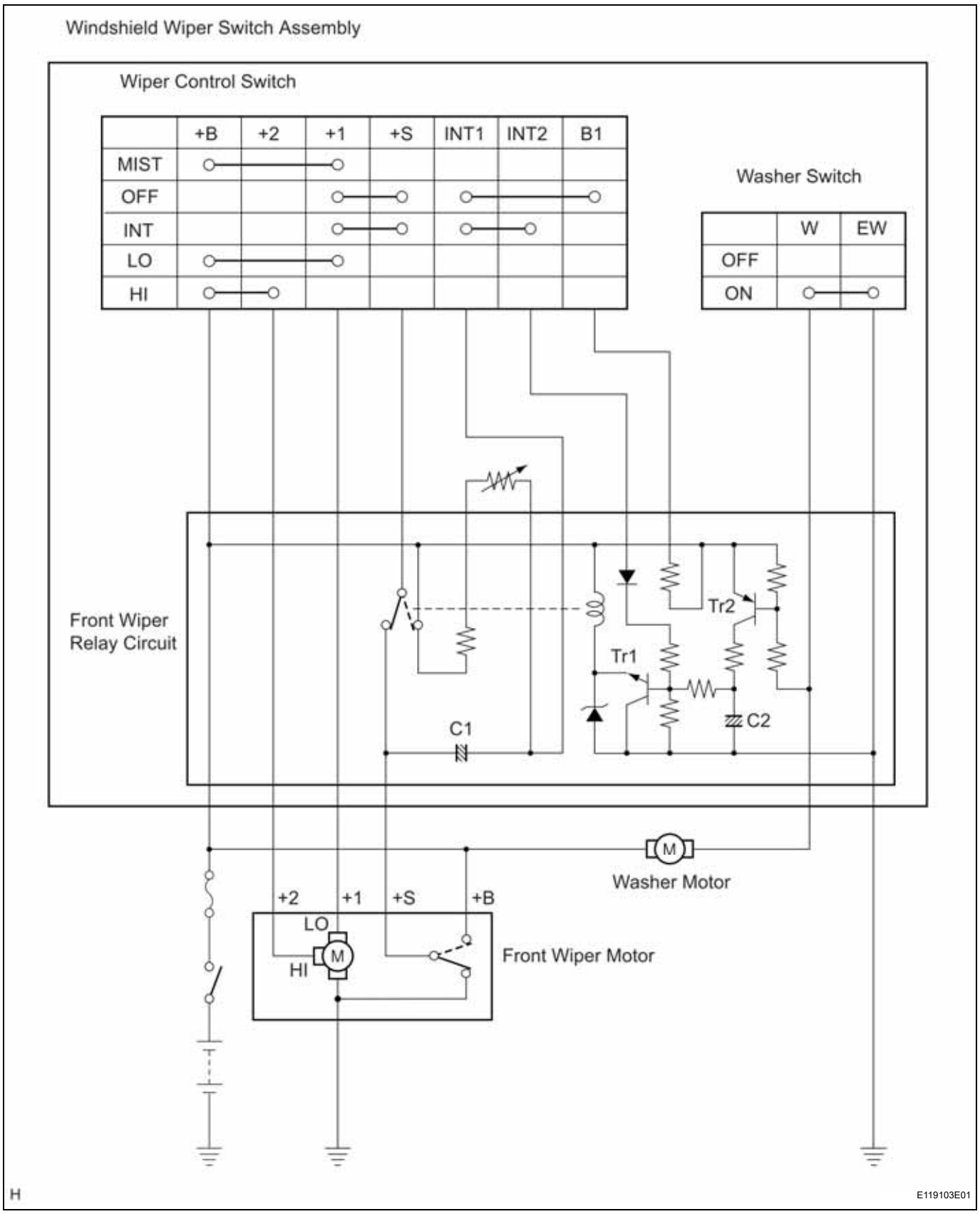
(b) The components of the power distributor are shown below.

Component	Relay
Mechanical Relay	• Horn Relay • A/F Relay • Security Horn Relay • EFI Relay • Circuit Opening Relay • Headlight Relay RH • Headlight Relay LH
Semiconductor Relay	• Daytime Running Light Relay

INSTALLATION

1. **INSTALL VANITY LIGHT ASSEMBLY (See page IR-29)**

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

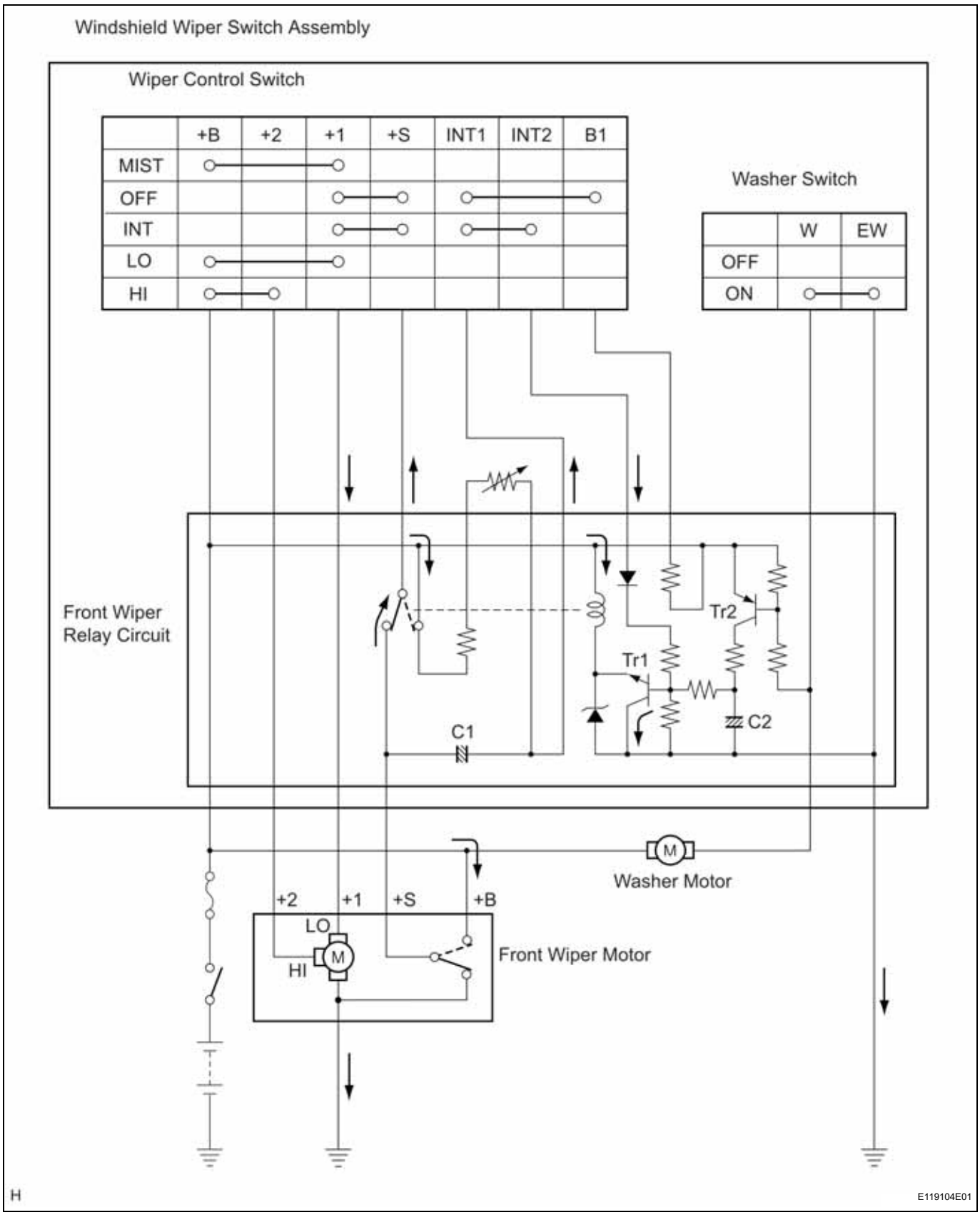
1. WASHER LINKED OPERATION

(a) This system operates the front wipers at a low speed immediately after a jet of washer fluid when the front washer switch is turned on for approximately 0.3 seconds or more. If the switch is turned off within approximately 1.5 seconds, the system stops the wipers when the switch is turned off. If the switch is turned on for approximately 1.5 seconds or more, the system stops the wipers approximately 2.2 seconds after the switch is turned off.

2. INTERMITTENT OPERATION

(a) The system operates the front wipers once in approximately 1.6 to 10.7 seconds when the front wiper switch is turned to the INT position. The intermittent time can be adjusted between 1.6 and 10.7 seconds.

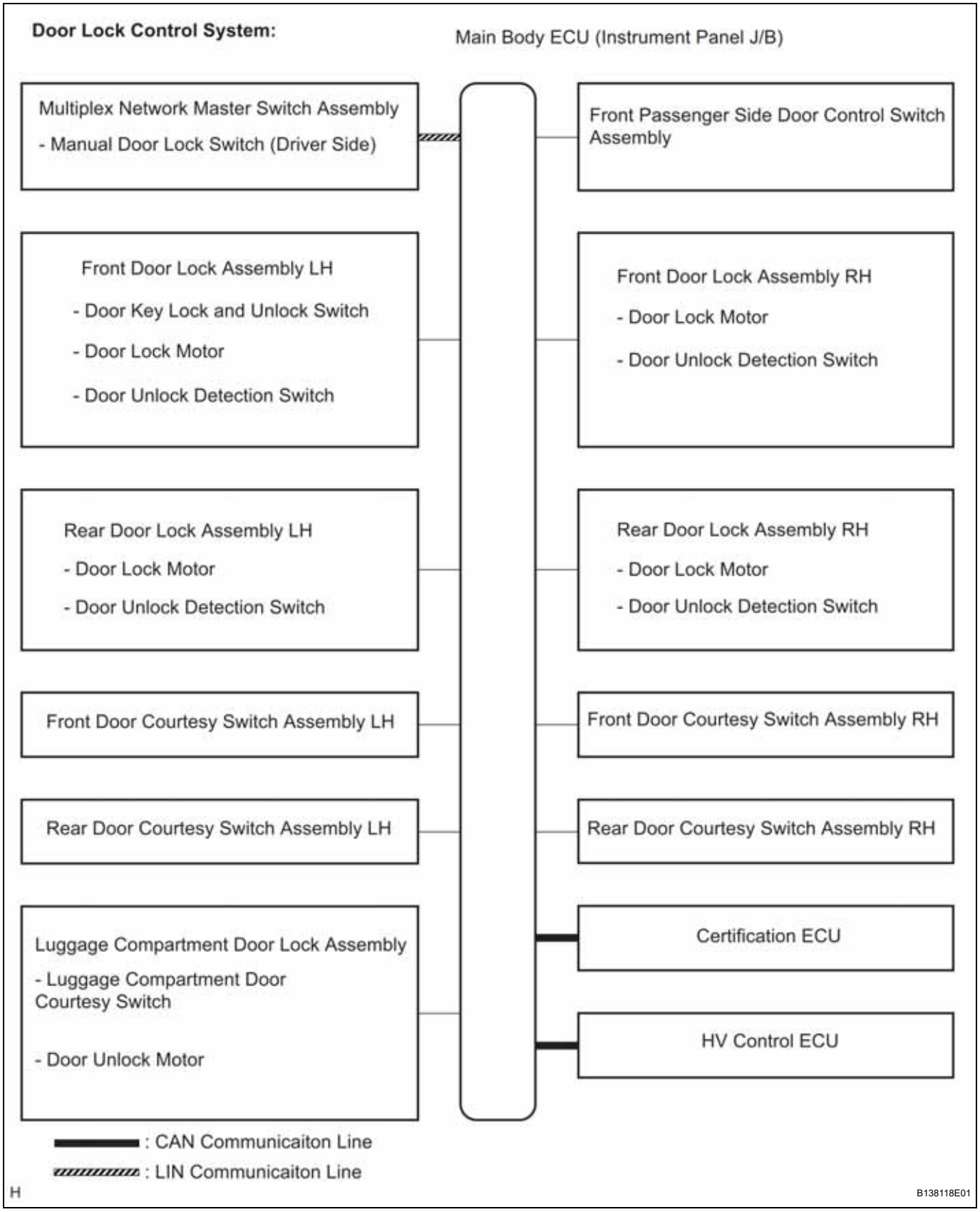
(b) If the wiper control switch is turned to the INT position, current flows from the already charged capacitor C1 to Tr1 (transistor) through terminals INT1 and INT2 of the wiper control switch. When Tr1 turns on, current flows from terminal +S of the wiper control switch to terminal +1 of the wiper control switch, to terminal +1 of the wiper motor, to the wiper motor and finally to the ground, causing the wiper motor to operate. At the same time, current flows from capacitor C1 to terminal INT1 of the wiper control switch and then INT2. When the current flow from capacitor C1 ends, Tr1 turns off to stop the relay contact point and halt the wiper motor. When the relay contact point turns off, capacitor C1 begins to charge again and Tr1 remains off until charging has been completed. This period corresponds to the intermittent time. When capacitor C1 is fully charged, Tr1 turns on and then the relay contact point activates, causing the motor to operate. This cycle is the intermittent operation. The intermittent time can be adjusted by using the intermittent time adjust dial (variable resistor) to change the charge time of capacitor C1.


Windshield Wiper Switch Assembly
Wiper Control Switch
+B
+2
+1
+S
INT1
INT2
B1
MIST
OFF
INT
LO
HI
Washer Switch
W
EW
OFF
ON
Front Wiper
Relay Circuit
Tr2
Tr1
C1
C2
M
Washer Motor
+2
+1
+S
+B
LO
HI
M
Front Wiper Motor
H
E119104E01

3. WASHER FLUID LEVEL WARNING

(a) When the volume of washer fluid decreases to below a certain level (when the washer fluid level warning switch is turned ON), the combination meter assembly warns the driver through the master warning light illumination, the buzzer and the warning message on the multi-information display.

SYSTEM DIAGRAM



Transmitting ECU (Transmitter)	Receiving ECU (Receiver)	Signals	Communication method
HV control ECU	Main Body ECU	Shift Position Switch Signal	CAN
Certification ECU	Main Body ECU	Door lock/unlock request signal	LIN

SYSTEM DESCRIPTION

1. POWER DOOR LOCK CONTROL SYSTEM DESCRIPTION

(a) The power door lock system locks/unlocks all the doors.

The master switch and the door control switch on the passenger door send "lock/unlock" request signals to the main body ECU. Then, the main body ECU sends these request signals to the lock motors in each door to lock/unlock all the doors at once in response to the inputs.

Operating the driver's door lock using a mechanical key sends request signals to lock/unlock the doors to the main body ECU. "2-step unlock function" is optional for unlocking procedures of the key-linked lock for the driver side door.

2. FUNCTION OF MAIN COMPONENT

Components	Function
Multiplex network master switch assembly (Manual door lock switch)	Door control switch on master switch assembly locks/unlocks all doors.
Door control switch	Door control switch on passenger side door locks/unlocks all doors.
Door courtesy switch	Placed on each door. Detects door status (open or closed) and outputs data to main body ECU. Turns on when door is open and turns off when door is closed.
Driver side door lock	• Built-in motor locks/unlocks door. • Built-in door control switch (key-linked) detects door key operation's door status (locked or unlocked) and outputs data to main body ECU. • Built-in position switch detects door status (locked or unlocked) and outputs data to main body ECU. This switch turns off when door is locked and turns on when door is unlocked.
Front passenger side door lock, luggage compartment door lock, rear LH and RH door locks	• Built-in motor locks/unlocks door. • Built-in position switch detects door status (locked or unlocked) and outputs data to main body ECU. This switch turns off when door is locked and turns on when door is unlocked.

3. SYSTEM FUNCTION

HINT:

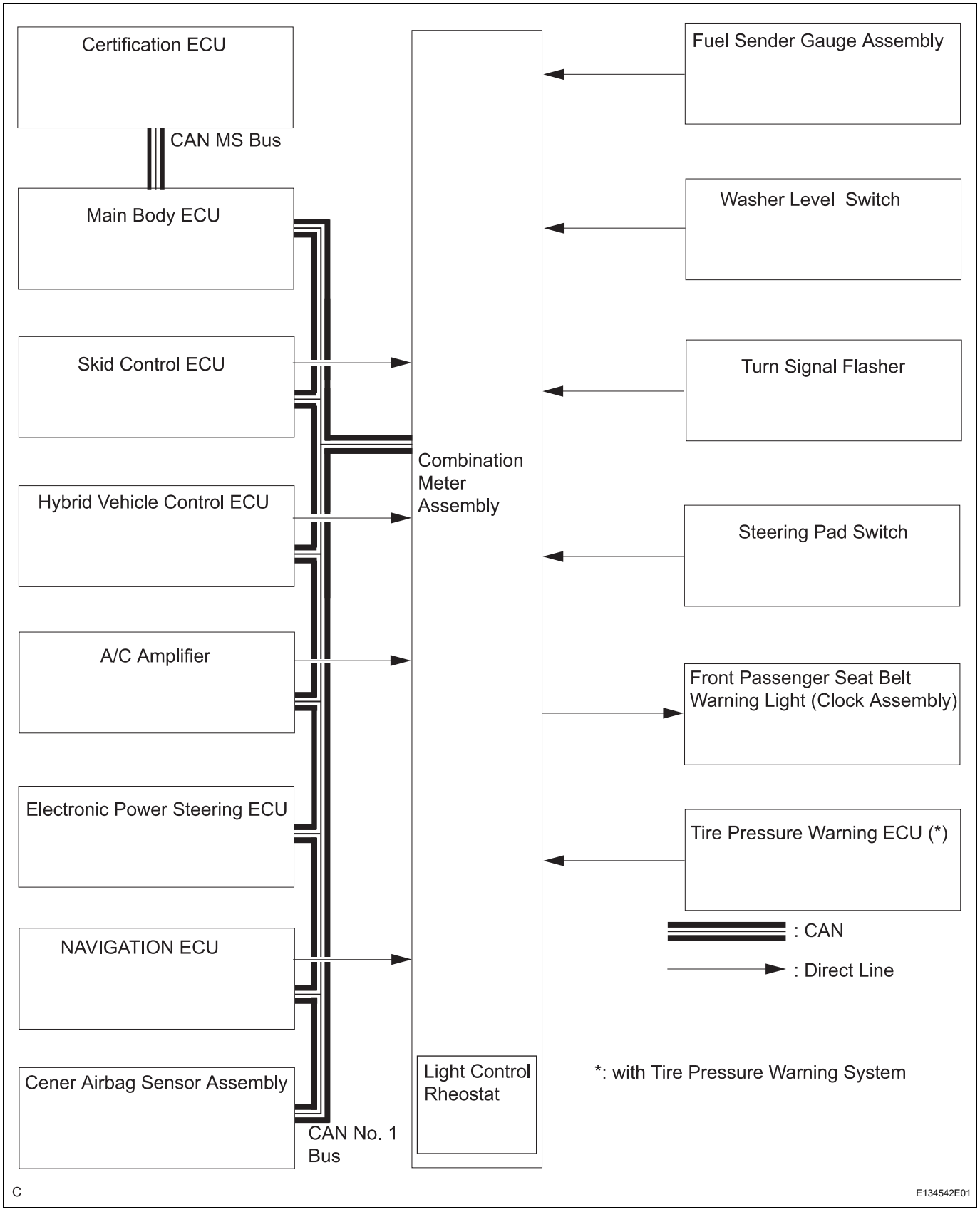
The following functions' default settings are ON. Some of these functions can be customized (See page DL-10).

(a) This system is controlled by the main body ECU. The main body ECU outputs signals to each door lock motor. The door lock control system of the CAMRY HV has the following functions:

Function	Outline
Manual lock and unlock function	This function can lock or unlock all doors by the door lock control switch operation.
Key-linked lock and unlock function	This function, which is linked with the key cylinder, can lock or unlock all the doors when a lock or unlock operation is effected.
Manual unlock prohibition function	Performing the door lock operation with an electrical key or a mechanical key will prohibit the unlock operation by the door lock control switch.
Key lock-in prevention function	If a each door lock operation is performed when the electrical key or mechanical key is in the cabin, all the doors will be unlocked.

Function	Outline
Shift-linked automatic door lock function	When the conditions listed below are met consecutively, this function causes all the doors to be automatically locked. • The power switch is on (IG). • All doors are closed. • The shift lever is moved out of the P position. • Any of the doors are unlocked.
Shift-linked automatic door unlock function	When the power switch is on (IG), if moving the shift lever to the P position from any other position, all the doors will be automatically unlocked.
One-motion open	When the door is locked, this function enables the door to be unlocked by pulling the inside handle of the door.
2-step unlock function	This function is provided to unlock the driver's door by turning the key cylinder once and to unlock the remaining doors by turning it the second time.

SYSTEM DIAGRAM



ME

INPUT AND OUTPUT SIGNALS OF THE COMBINATION METER ASSEMBLY:

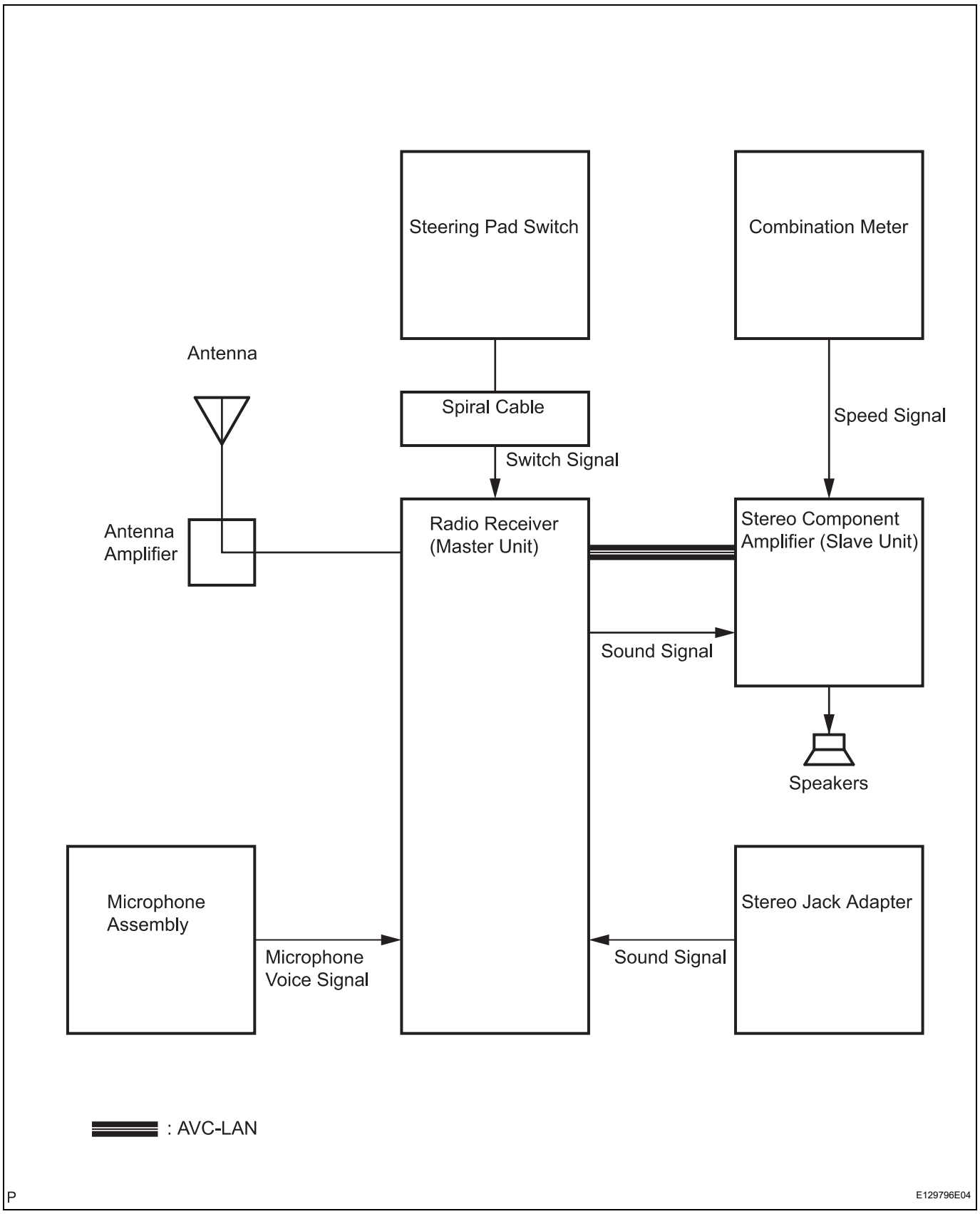
Sender	Receiver	Communication Signal	Communication Line
Combination Meter Assembly	• A/C Amplifier • Center Airbag Sensor Assembly • Main Body ECU	Vehicle speed signal	CAN (CAN No. 1 Bus)
	Certification ECU		CAN (CAN MS Bus)
	• Hybrid Vehicle Control ECU • Navigation ECU • Tire Pressure Warning ECU (*1)		Direct Line
	• Main Body ECU • A/C Amplifier	Rheostat duty signal	CAN (CAN No. 1 Bus)
		Tail cancel signal	
	Main Body ECU	Lounge illumination signal	CAN (CAN No. 1 Bus)
	• Center Airbag Sensor Assembly • Hybrid Vehicle Control ECU	Vehicle specification signal (Destination/Handle code)	CAN (CAN No. 1 Bus)
	Certification ECU	Odometer signal	CAN (CAN MS Bus)
	Clock Assembly	Passenger seat belt warning light signal	Direct Line
Hybrid Vehicle Control ECU	Combination Meter Assembly	Starter signal	CAN (CAN No. 1 Bus)
		Test mode signal	
		Cruise operation indicator	
		Cruise control warning	
		Charge light indicator	
		Engine coolant temperature signal	
		Engine type information	
		Shift position signal	
		Engine RPM data	
		P position request signal (When starting)	
		Hybrid system warning signal	
		Motor inverter high temperature warning signal	
		Hybrid battery warning signal	
		NDB warning signal (When parking)	
		The state of the hybrid battery signal	
		DC/DC converter abnormal signal	
		READY signal	
		READY buzzer signal	
		Certification mode signal	
		Maintenance mode signal	
		Energy flow signal	
		Hybrid battery charge request warning	
		Engine oil pressure warning display signal	

ME

Sender	Receiver	Communication Signal	Communication Line
Main Body ECU	Combination Meter Assembly	Auto dimmer signal	
		ACC switch signal	
		Each door courtesy switch signal	
		Slide roof signal (*2)	
		Smart key signal	
		Driver side seat belt switch signal	
		Parking brake switch signal	
		High beam indicator light signal	
		Head (*3)/Tail (*4) indicator light signal	
• Main Body ECU • Certification ECU	Combination Meter Assembly	Hood courtesy switch signal	CAN (CAN MS Bus)
Certification ECU	Combination Meter Assembly	Meter buzzer request signal	CAN (CAN MS Bus)
		Each door open display signal	
		Key lose warning signal	
		Low key battery warning signal	
		Shift position warning signal	
		Steering lock abnormal warning signal	
		Steering lock unlock warning signal	
		Immobiliser key identification completion signal	
Skid Control ECU	Combination Meter Assembly	Vehicle speed signal	CAN (CAN No. 1 Bus)
		Brake warning light control flag	
		ABS warning light signal	
		Slip indicator light signal	
		ECB Warning light signal	
		VSC warning signal	
		Stop light signal	
• Hybrid Vehicle Control ECU • Skid Control ECU	Combination Meter Assembly	Diagnosis signal	CAN (CAN No. 1 Bus)
A/C Amplifier	Combination Meter Assembly	Ambient temperature display signal	CAN (CAN No. 1 Bus)
Center Airbag Sensor Assembly	Combination Meter Assembly	Airbag warning light signal	CAN (CAN No. 1 Bus)
		Front passenger seat condition signal	
		Front passenger seat belt condition signal	
Steering Pad Switch	Combination Meter Assembly	Steering pad switch operation signal	Direct Line
Fuel Sender Gauge Assembly	Combination Meter Assembly	Fuel level signal	Direct Line
Turn Signal flasher	Combination Meter Assembly	Turn LH/RH indicator light signal	Direct Line
Tire Pressure Warning ECU (*1)	Combination Meter Assembly	Tire pressure warning light signal	Direct Line
Washer Level Switch	Combination Meter Assembly	Washer fluid level warning display signal	Direct Line
Hybrid Vehicle Control ECU	Combination Meter Assembly	Fuel lid signal	Direct Line

*1: with Tire Pressure Warning System
*2: with Sliding Roof
*3: for U.S.A.
*4: for Canada

SYSTEM DIAGRAM



AV

SYSTEM DESCRIPTION

1. DISC PLAYER OUTLINE

(a) A CD player uses a laser pickup to read digital signals recorded on CDs. By converting the digital signals to analog, music and other content can be played.

CAUTION:

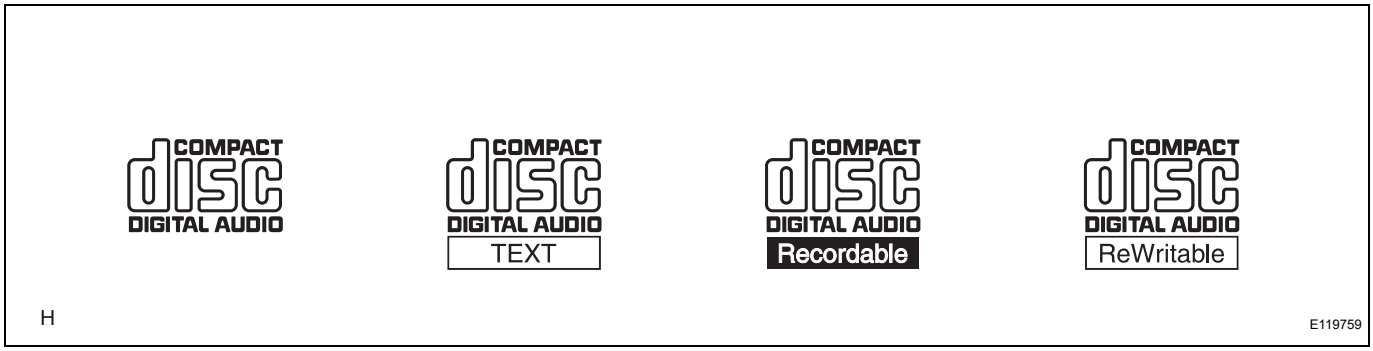
Do not look directly at the laser pickup because the CD player uses an invisible laser beam. Be sure to operate the player only as instructed.

NOTICE:

- **Do not disassemble any part of the CD player.**
- **Do not apply oil to the CD player.**
- **Do not insert anything but a CD into the CD player.**

(b) Usable discs

(1) The CD player can only play audio CDs, CD-Rs (CD-Recordable), and CD-RWs (CD-ReWritable) that have any of the following marks:



(c) Precautions for use of discs

NOTICE:

- **Copy-protected CDs cannot be played.**
- **CD-Rs and CD-RWs may not be played depending on the recording conditions or characteristics of the discs, or due to damage, dirt, or deterioration caused by leaving the discs in the cabin for a long time.**
- **Unfinalized CD-Rs and CD-RWs cannot be played.**
- **Keep the discs away from dirt. Be careful not to damage the discs or leave your fingerprints on them.**
- **Hold discs by the outer edge and center hole with the label side up.**
- **Leaving the disc exposed halfway out of the slot for a long time after pressing the disc eject button may cause deformation of the disc, making the disc unusable.**
- **If discs have adhesive tape, stickers, CDR labels, or any traces of such labels attached, the discs may not be ejected or player malfunctions may result.**

- **Keep the discs away from direct sunlight. (Exposure to direct sunlight may cause deformation of the disc, making the disc unusable.)**
- **Do not use odd-shaped CDs because these may cause player malfunctions.**
- **Do not use discs whose recording portion is transparent or translucent because they may not be inserted, ejected, or played normally.**

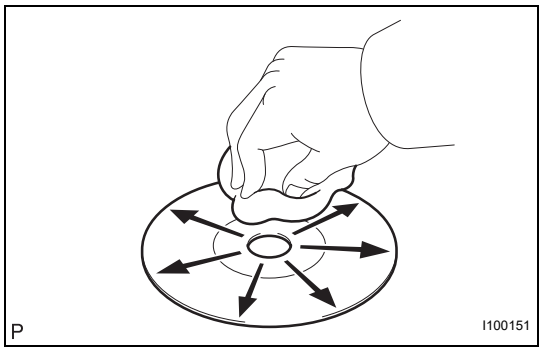
HINT:

- When it is cold or it is raining, if the windows mist up, mist and also dew may form in the player. In such a case, the CD may skip or the CD may stop in the middle of play. Ventilate or dehumidify the cabin for a while before using the player.
- The CD may skip if the player experiences strong vibrations when the vehicle is driven on rough road or similar uneven surface(s).

(d) Cleaning

NOTICE:

Do not use a lens cleaner because it may cause a malfunction in the pickup portion of the player.



(1) If dirt is on the disc surface, wipe it clean with a soft dry cloth such as an eyeglass cleaner for plastic lenses from the inside to the outside in a radial direction.

NOTICE:

- **Pressing on the disc by hand or rubbing the disc with a hard cloth may scratch the disc surface.**
- **Use of solvent such as a record spray, antistatic agent, alcohol, benzine, and thinner, or a chemical cloth may cause damage to the disc, making the disc unusable.**

2. MP3/WMA OUTLINE

(a) Playable MP3 file standards

Compatible standard	MP3 (MPEG1 LAYER3, MPEG2 LSF LAYER 3)
Compatible sampling frequency	• MPEG1 LAYER3: 32, 44.1, 48 (kHz) • MPEG2 LSF LAYER3: 16, 22.05, 24 (kHz)
Compatible bit rate	• MPEG1 LAYER3: 64, 80, 96, 112, 128, 160, 192, 224, 256, 320 (kbps) • MPEG2 LSF LAYER3: 64, 80, 96, 112, 128, 144, 160 (kbps) • Compatible with VBR
Compatible channel mode	Stereo, joint stereo, dual channel, monaural

(b) Playable WMA file standards

Compatible standard	WMA Ver. 7, 8, and 9
Compatible sampling frequency	32, 44.1, 48 (kHz)
Compatible bit rate	• Ver. 7, 8: CBR48, 64, 80, 96, 128, 160, 192 (kbps) • Ver. 9: CBR48, 64, 80, 96, 128, 160, 192, 256, 320 (kbps) • Compatible with playback of channel 2 only

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(c) ID3 tag and WMA tag
(1) Additional textual information called ID3 tag can be input to MP3 files. Information such as song titles and artist names can be stored.
HINT:
This player is compatible with the ID3 tags of ID3 Ver. 1.0 and 1.1, and ID3 Ver. 2.2 and 2.3. (Number of characters complies with ID3 Ver. 1.0 and 1.1.)
(2) Additional textual information called WMA tag can be input to WMA files. Information such as song titles and artist names can be stored.

(d) Usable media
(1) Only CD-ROMs, CD-Rs (CD-Recordable), and CD-RWs (CD-ReWritable) can be used to play MP3/WMA files.
NOTICE:
- **CD-Rs and CD-RWs are more easily affected by a hot and humid environment than discs used for normal audio CDs. For this reason, some CD-Rs and CD-RWs may not be played.**
- **If there are fingerprints or scratches on the disc, the disc may not be played or the CD may skip.**
- **Some CD-Rs and CD-RWs deteriorate if they are left in the cabin for a long time.**
- **Keep CD-Rs and CD-RWs in a storage case that is impenetrable to light.**

(e) Usable media format
(1) Usable media format

Disc format	CD-ROM Mode 1, CD-ROM XA Mode 2 Form1
File format	ISO9660 Level 1 and Level 2 (Joliet, Romeo)

HINT:
- As for MP3/WMA files written in any format other than those above, the contents of the files may not be played normally or the file names or folder names may not be displayed correctly.
- This player is compatible with multi-session discs and can play CD-Rs and CD-RWs on which MP3/WMA files are added. However, only the first session can be played.
- Discs whose first session includes both music data and MP3 or WMA format data cannot be played.

(2) Standard and restrictions

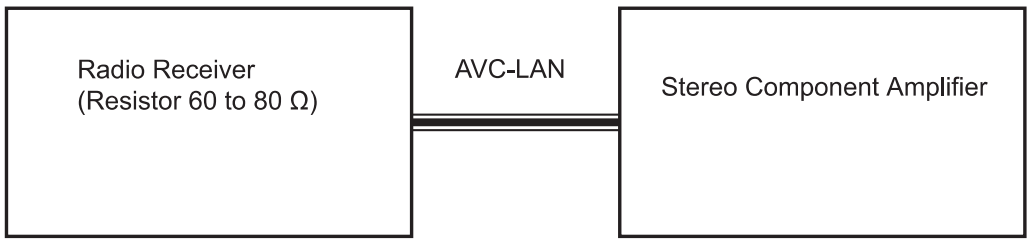
Maximum directory levels	8 levels
Maximum number of characters for a folder name/file name	32 characters
Maximum number of folders	192 (Including empty folders, route folders, and folders that do not contain MP3/WMA files)
Maximum number of files in a disc	255 (Including non-MP3/WMA files)

(f) File names
(1) Only files with an extension of ".mp3" or ".wma" can be recognized and played as MP3 or WMA files.
(2) Save MP3 or WMA files with an extension of ".mp3" or ".wma".
NOTICE:
If saving non-MP3 or non-WMA files with an extension of ".mp3" or ".wma", those files are wrongly recognized as MP3 or WMA files and played. A loud noise may occur and damage to the speaker may result.

3. AVC-LAN DESCRIPTION

(a) What is AVC-LAN?

Example:



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AVC-LAN, an abbreviation for "Audio Visual Communication Local Area Network", is a united standard developed by the manufacturers in affiliation with Toyota Motor Corporation. This standard pertains to audio and visual signals as well as switch and communication signals.

(b) Purpose:
Recently, car audio systems have rapidly developed and the functions have vastly changed. The conventional car audio system is being integrated with multi-media interfaces similar to those in navigation systems. At the same time, customers are demanding higher quality from their audio systems. This is merely an overview of the standardization background. The specific purposes are as follows:
(1) To solve sound problems, etc. caused by using components of different manufacturers through signal standardization.
(2) To allow each manufacturer to concentrate on developing products they do best. From this, reasonably priced products can be produced.
HINT:
- If a short to +B or short to ground is detected in the AVC-LAN circuit, communication is interrupted and the audio system will stop functioning.

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- If the audio system has a navigation system installed, the multi-display unit acts as the master unit. If the navigation system is not installed, the audio head unit acts as the master unit instead. If the radio and navigation assembly is installed, it is the master unit.
- The radio receiver contains a resistor that is necessary to enable communication on the different AVC-LAN circuits.
- The car audio system with an AVC-LAN circuit has a diagnostic function.
- Each component has a specified number (3-digit) called a physical address. Each function has a number (2-digit) called a logical address.

4. COMMUNICATION SYSTEM OUTLINE

(a) Components of the audio system communicate with each other via the AVC-LAN.

(b) The master component of the AVC-LAN is a radio receiver with a 60 to 80 Ω resistor. This is essential for communication.

(c) If a short circuit or open circuit occurs in the AVC-LAN circuit, communication is interrupted and the audio system will stop functioning.

5. DIAGNOSTIC FUNCTION OUTLINE

(a) The audio system has a diagnostic function (the result is indicated on the master unit).

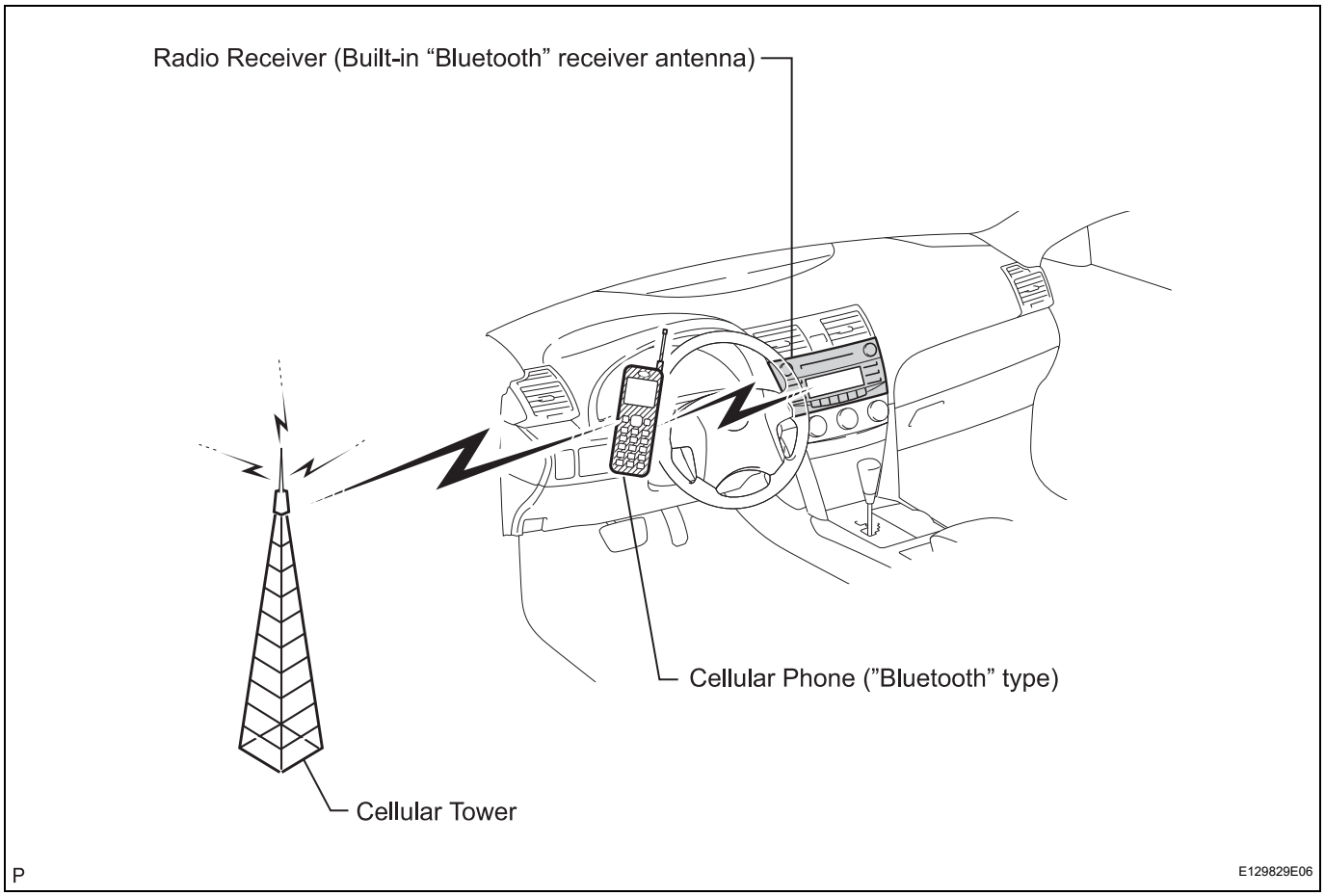
(b) A 3-digit hexadecimal component code (physical address) is allocated to each component on the AVC-LAN. Using this code, the component in the diagnostic function can be displayed.

6. "BLUETOOTH" OUTLINE

(a) "Bluetooth" is a trademark owned by Bluetooth SIG. Inc.

(b) "Bluetooth" is a new wireless connection technology that uses the 2.4 GHz frequency band. This makes it possible to connect a cellular phone ("Bluetooth" compatible phone *1) to the radio receiver (the "Bluetooth" system is built-in), and use the handsfree function of the cellular phone, even if it is in a pocket or bag. As a result, it is not necessary to use a connector attached directly to the cellular phone.

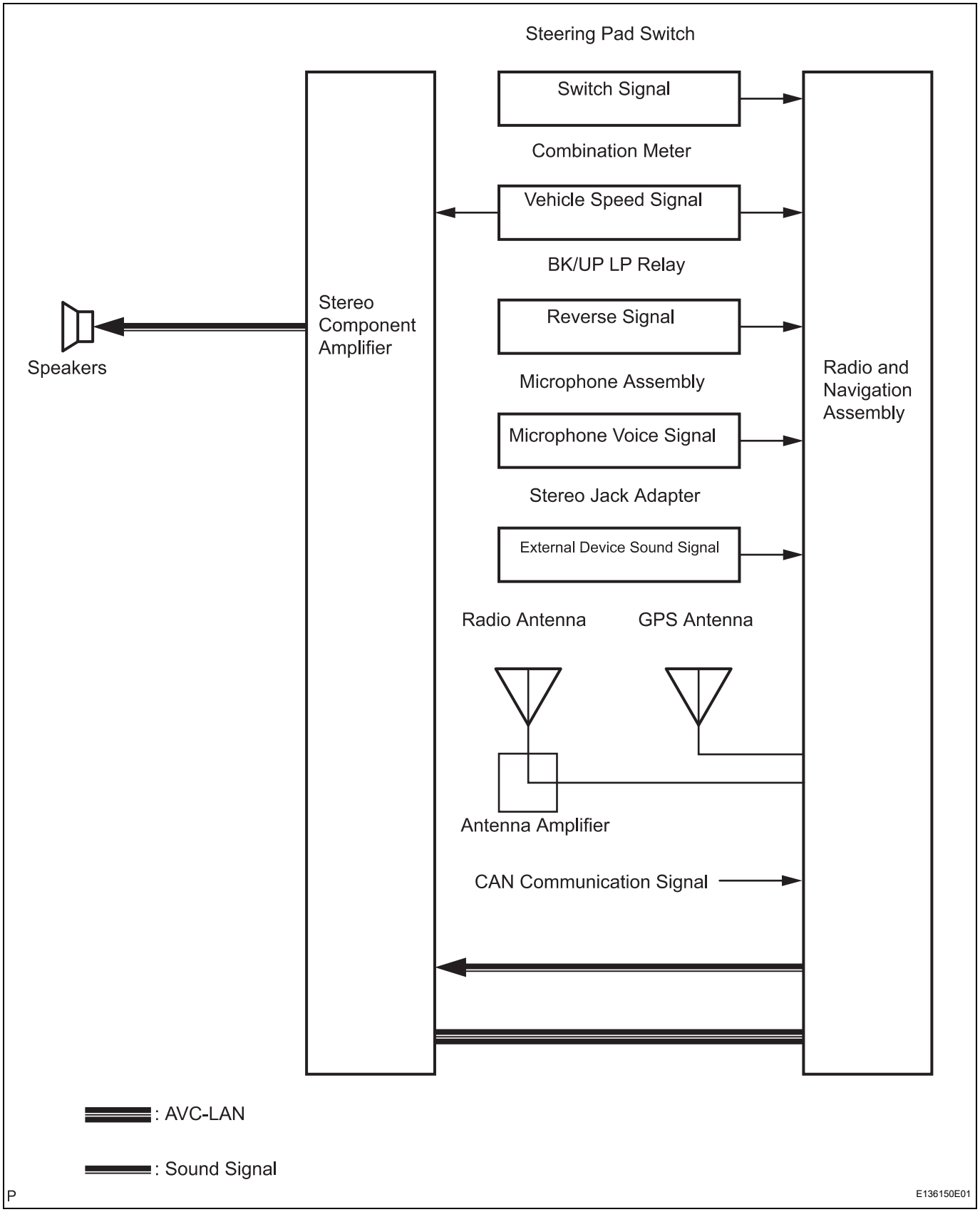
*1: Some versions of "Bluetooth" compatible cellular phones may not function.



HINT:

The communication performance of "Bluetooth" may vary depending on obstructions or radio wave conditions between communication devices, electromagnetic radiation, communication device sensitivity, or antenna capacity.

SYSTEM DIAGRAM



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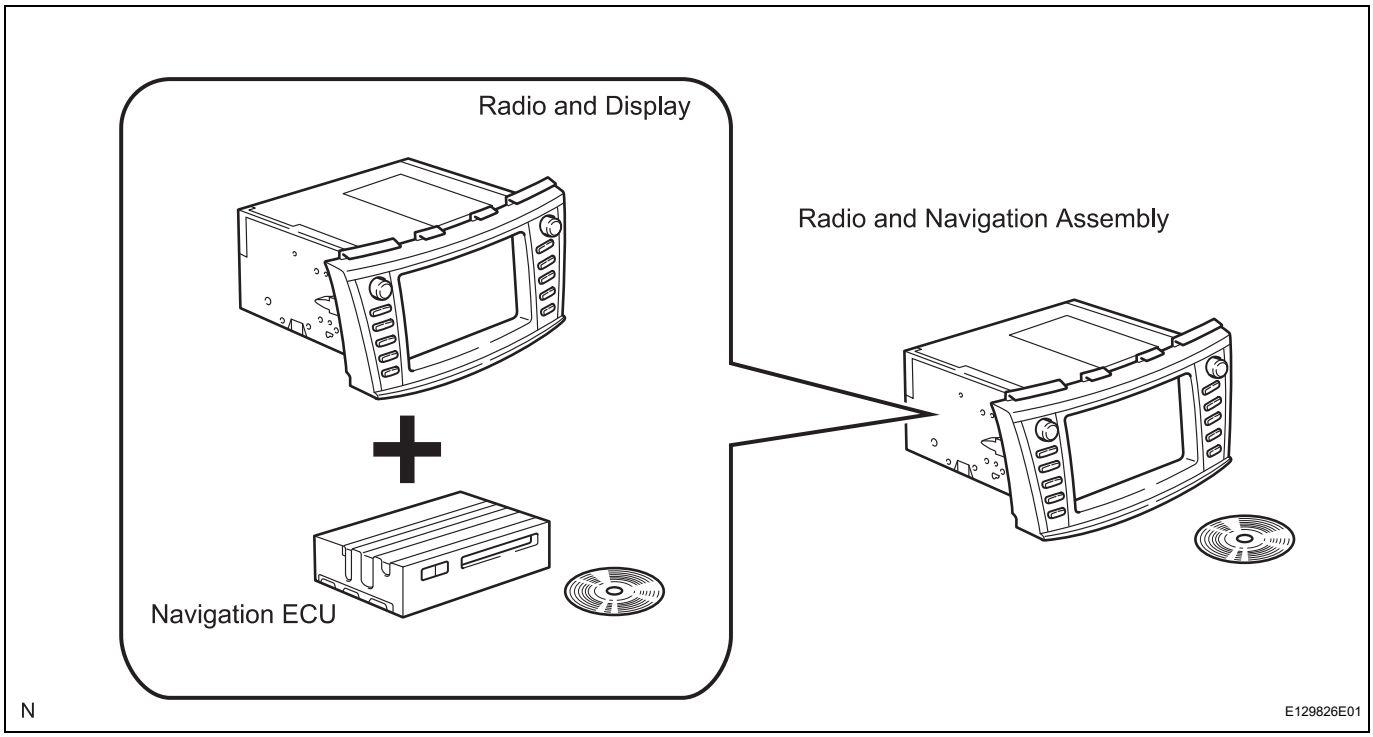
SYSTEM DESCRIPTION

1. Radio and navigation assembly outline

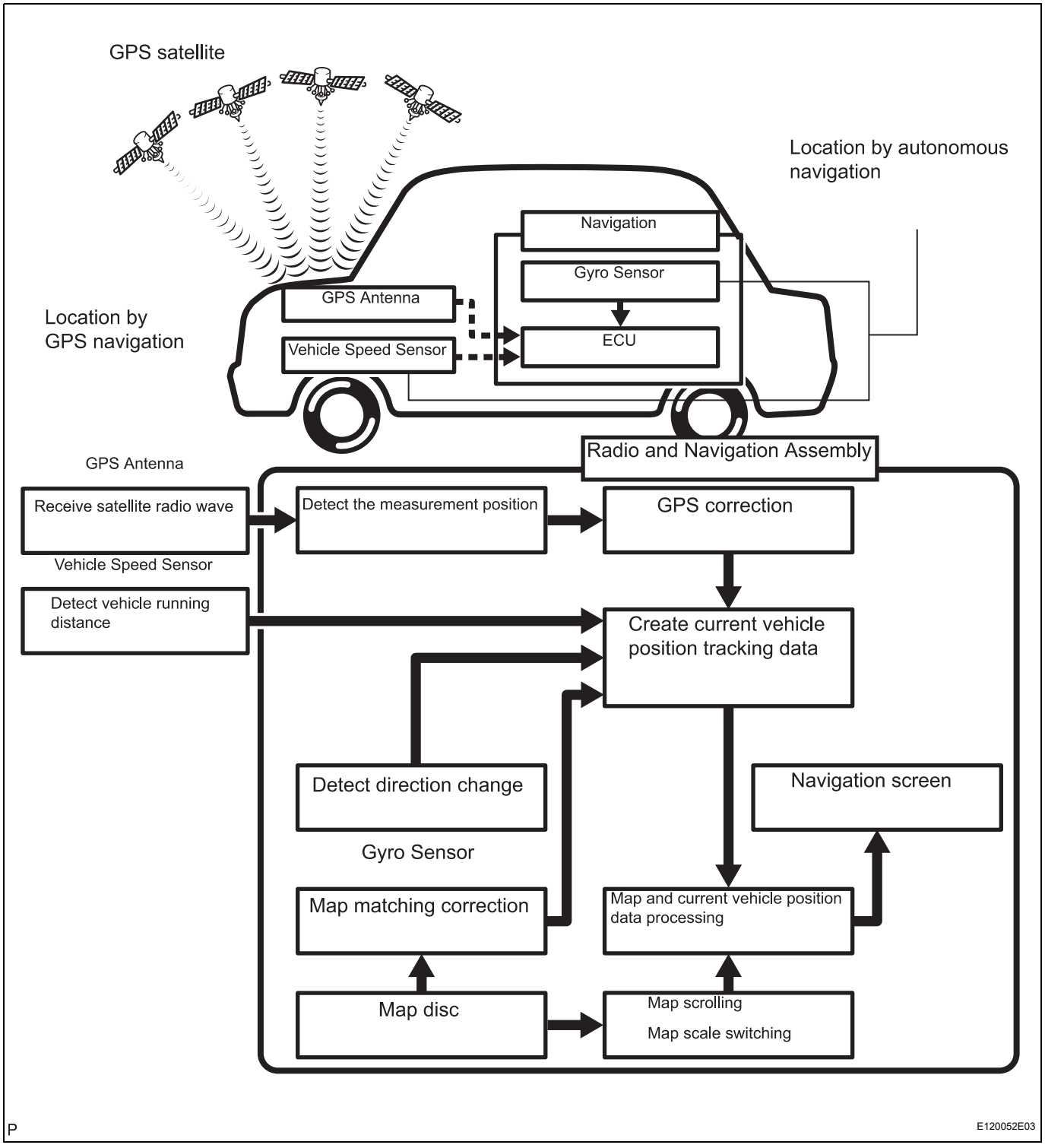
(a) Conventionally, 2 separate devices, a "radio and display" and a "navigation ECU" are used. This model has adopted a new type, combining these devices into a single unit.



2. Navigation system outline

(a) Vehicle position tracking methods

It is essential that the navigation system correctly tracks the current vehicle position and displays it on the map. There are 2 methods to track the current vehicle position: autonomous (dead reckoning) and GPS* (satellite) navigation. Both navigation methods are used in conjunction with each other.
*GPS (Global Positioning System)



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Operation	Description
Vehicle Position Calculation	The radio and navigation assembly calculates the current vehicle position (direction and current position) using the direction deviation signal from the gyro sensor and the running distance signal from the vehicle speed sensor and creates the driving route.
Map Display Processing	The radio and navigation assembly displays the vehicle track on the map by processing the vehicle position data, vehicle running track, and map data from the map disc.
Map Matching	The map data from the map disc is compared to the vehicle position and running track data. Then, the vehicle position is matched with the nearest road.
GPS Correction	The vehicle position is matched to the position measured by GPS. Then, the measurement position data from the GPS unit is compared with the vehicle position and running track data. If the position is widely different, the GPS measurement position is used.
Distance Correction	The running distance signal from the vehicle speed sensor includes the error caused by tire wear and slippage between the tires and road surface. Distance correction is performed to account for this. The radio and navigation assembly automatically offsets the running distance signal to make up for the difference between it and the distance data of the map. The offset is automatically updated.

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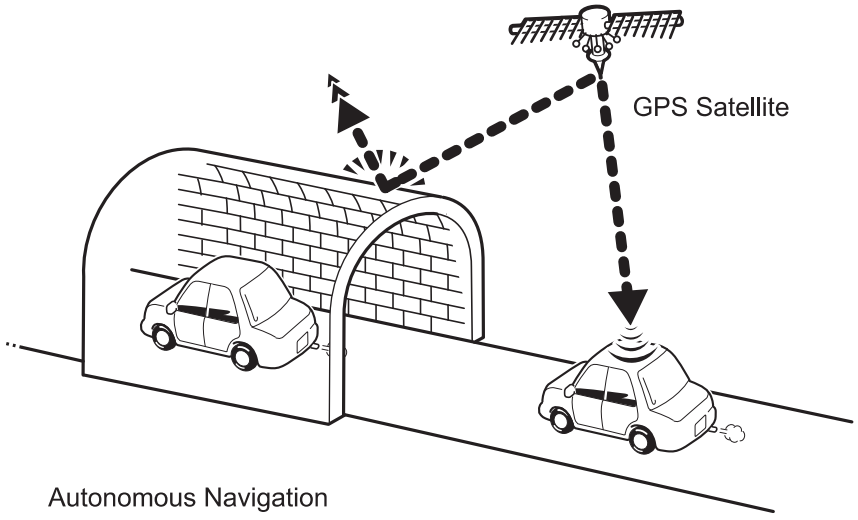
Navigation is performed even where the GPS radio wave does not reach.

- In a tunnel
- In an indoor parking lot
- Between tall buildings
- Under an overpass
- On a forest or tree-lined path



Autonomous Navigation

Autonomous Navigation and GPS Wave Navigation

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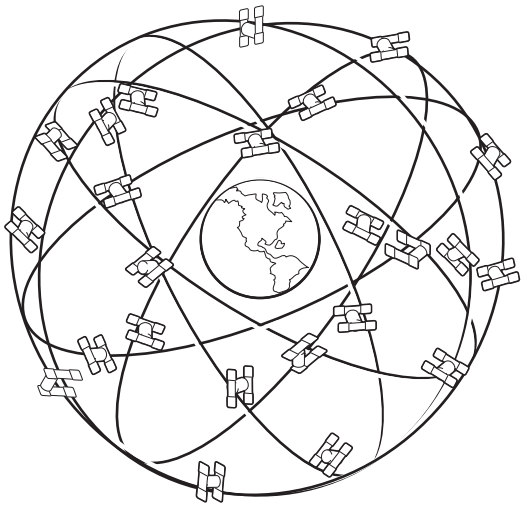
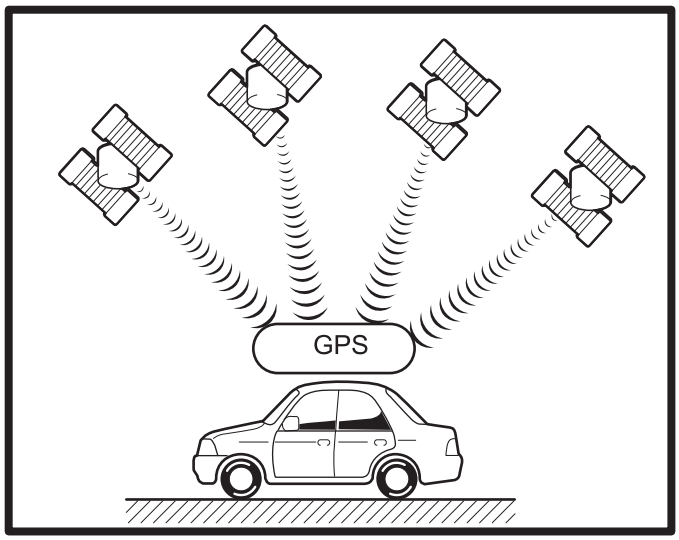
HINT:
The combination of autonomous and GPS navigation makes it possible to display the vehicle position even when the vehicle is in places where the GPS radio wave cannot receive a signal. When only autonomous navigation is used, however, the mapping accuracy may slightly decline.

(b) Autonomous navigation
This method determines the relative vehicle position based on the running track determined by the gyro and vehicle speed sensors located in the radio and navigation assembly.
(1) Gyro sensor
Calculates the direction by detecting angular velocity. It is located in the radio and navigation assembly.
(2) Vehicle speed sensor
Used to calculate the vehicle running distance.

(c) GPS navigation (Satellite navigation)
This method detects the absolute vehicle position using radio waves from GPS satellites.
* GPS satellites were launched by the U.S. Department of Defence for military purposes.

Current longitude/latitude/altitude is determined using the radio wave arrival time from four satellites.





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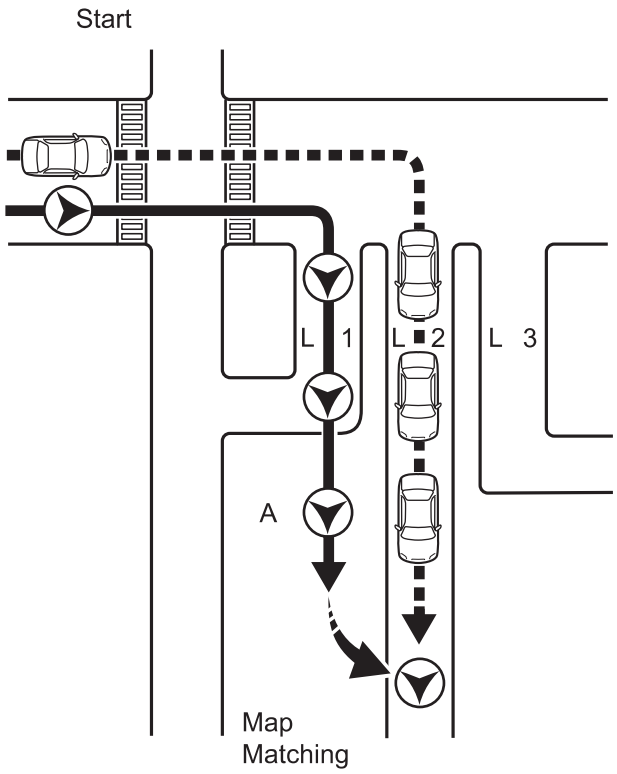
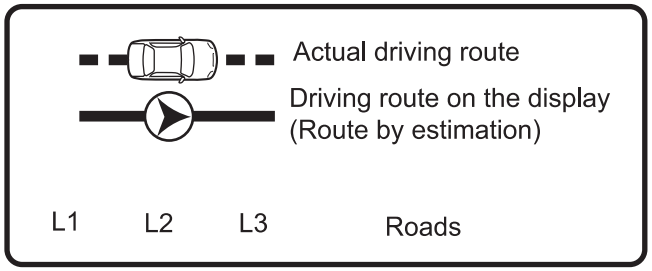
Number of satellites	Measurement	Description
2 or less	Measurement impossible	Vehicle position cannot be obtained because the number of satellites is not enough.
3	2-dimensional measurement is possible	Vehicle position is obtained based on the current longitude and latitude. (This is less precise than 3-dimensional measurement.)
4	3-dimensional measurement is possible	Vehicle position is obtained based on the current longitude, latitude and altitude.

(d) Map matching
The current driving route is calculated by autonomous navigation (according to the gyro sensor and vehicle speed sensor) and GPS navigation. This information is then compared with possible road shapes from the map data in the map disc and the vehicle position is set onto the most appropriate road.





The system compares the shape of the roads L1, L2 and L3 to the estimated running track after the vehicle makes a right turn. At point A, the vehicle position differs enough from the shape of L1 that the display switches to the road L2.

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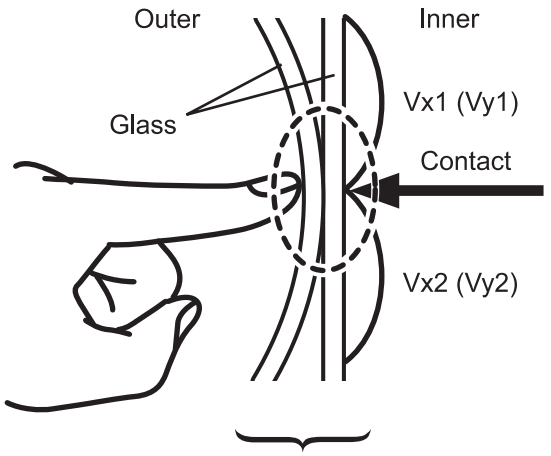
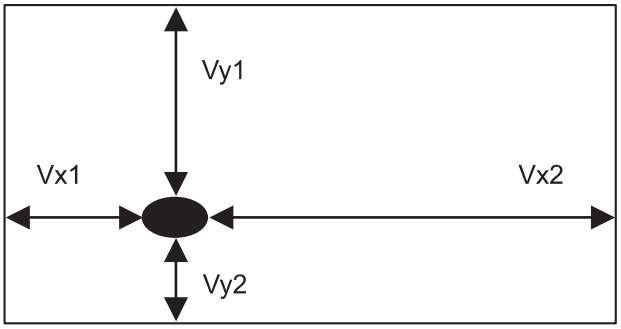
(e) Touch switch
Touch switches are touch-sensitive (interactive) switches operated by touching the screen. When a switch is pressed, the outer glass bends in to contact the inner glass at the pressed position. By doing this, the voltage ratio is measured and the pressed position is detected.



Touch-sensitive switch position



The touch switch detects the voltage ratio and calculates the position on the screen.

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3. DVD (Digital Versatile Disc) player outline (for navigation map)

(a) The radio and navigation assembly (built-in navigation ECU) uses a laser pickup to read the digital signals recorded on a DVD.
HINT:
- Do not disassemble any part of the radio and navigation assembly (built-in navigation ECU).
- Do not apply oil to the radio and navigation assembly (built-in navigation ECU).
- Do not insert anything but a DVD into the radio and navigation assembly (built-in navigation ECU).

CAUTION:
Do not look directly at the laser pickup because the radio and navigation assembly (built-in navigation ECU) uses an invisible laser beam. Be sure to only operate the navigation system as instructed.

4. CD (Compact Disc) player outline

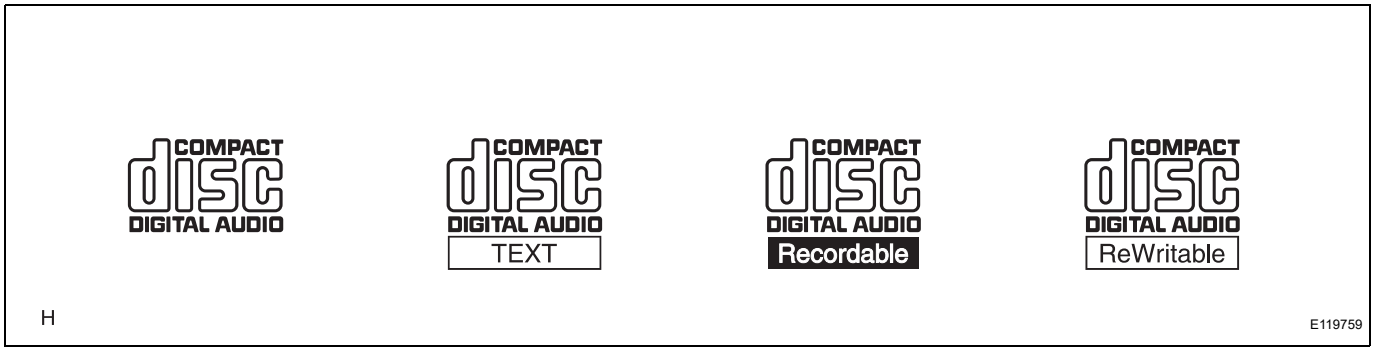
(a) A compact disc player uses a laser pickup to read digital signals recorded on a compact disc (CD). By converting the digital signals to analog, it can play music and other content.

NOTICE:
- **Do not disassemble any part of the CD player.**
- **Do not apply oil to the CD player.**
- **Do not insert anything but a CD into the CD player.**

CAUTION:
Do not look directly at the laser pickup because the CD player uses an invisible laser beam. Be sure to only operate the player as instructed.

(b) Usable discs

(1) This player can only play audio CDs, CD-Rs (CD-Recordable), and CD-RWs (CD-ReWritable) that have any of the following marks:



(c) Precautions for use of discs

NOTICE:
- **Copy-protected CDs cannot be played.**
- **CD-Rs and CD-RWs may not be played depending on the recording conditions or characteristics of the discs, or due to damage, dirt, or deterioration caused by leaving the discs in the cabin for a long time.**
- **Unfinalized CD-Rs and CD-RWs cannot be played.**
- **DualDiscs that mate DVD recorded material on one side with CD digital audio material on the other cannot be played.**
- **Keep the discs away from dirt. Be careful not to damage the discs or leave your fingerprints on them.**
- **Hold discs by the outer edge and center hole with the label side up.**

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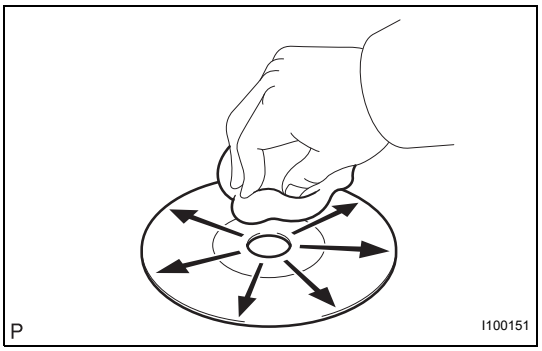
- **Leaving the disc exposed halfway out of the slot for a long time after pressing the disc eject button may cause deformation of the disc, making the disc unusable.**
- **If discs have adhesive tape, stickers, CDR labels, or any traces of such labels attached, the discs may not be ejected or player malfunctions may result.**
- **Keep the discs away from direct sunlight. (Exposure to direct sunlight may cause deformation of the disc, making the disc unusable.)**
- **Do not use odd-shaped CDs because these may cause player malfunctions.**
- **Do not use discs whose recording portion is transparent or translucent because they may not be inserted, ejected, or played normally.**

HINT:

- When it is cold or it is raining, if the windows mist up, mist and also dew may form in the player. In such a case, the CD may skip or the CD may stop in the middle of play. Ventilate or dehumidify the cabin for a while before using the player.
- The CD may skip if the player experiences strong vibrations when the vehicle is driven on rough road or similar uneven surface(s).



(d) Cleaning

NOTICE:

Do not use a lens cleaner because it may cause a malfunction in the pickup portion of the player.

(1) If dirt is on the disc surface, wipe it clean with a soft dry cloth such as an eyeglass cleaner for plastic lenses from the inside to the outside in a radial direction.

NOTICE:

- **Pressing on the disc by hand or rubbing the disc with a hard cloth may scratch the disc surface.**
- **Use of solvent such as a record spray, antistatic agent, alcohol, benzine, and thinner, or a chemical cloth may cause damage to the disc, making the disc unusable.**

5. MP3/WMA OUTLINE

(a) Playable MP3 file standards

Compatible standard	MP3 (MPEG1 LAYER3, MPEG2 LSF LAYER 3)
Compatible sampling frequency	• MPEG1 LAYER3: 32, 44.1, 48 (kHz) • MPEG2 LSF LAYER3: 16, 22.05, 24 (kHz)
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Compatible channel mode	Stereo, joint stereo, dual channel, monaural

(b) Playable WMA file standards

Compatible standard	WMA Ver. 7, 8, and 9
Compatible sampling frequency	32, 44.1, 48 (kHz)
Compatible bit rate	• Ver. 7, 8: CBR48, 64, 80, 96, 128, 160, 192 (kbps) • Ver. 9: CBR48, 64, 80, 96, 128, 160, 192, 256, 320 (kbps) • Compatible with playback of channel 2 only

(c) ID3 tag and WMA tag

(1) Additional textual information called ID3 tag can be input to MP3 files. Information such as song titles and artist names can be stored.

HINT:

This player is compatible with the ID3 tags of ID3 Ver. 1.0 and 1.1, and ID3 Ver. 2.2 and 2.3. (Number of characters complies with ID3 Ver. 1.0 and 1.1.)

(2) Additional textual information called WMA tag can be input to WMA files. Information such as song titles and artist names can be stored.

(d) Usable media

(1) Only CD-ROMs, CD-Rs (CD-Recordable), and CD-RWs (CD-ReWritable) can be used to play MP3/WMA files.

NOTICE:

- **CD-Rs and CD-RWs are more easily affected by a hot and humid environment than discs used for normal audio CDs. For this reason, some CD-Rs and CD-RWs may not be played.**
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- **Keep CD-Rs and CD-RWs in a storage case that is impenetrable to light.**

(e) Usable media format

(1) Usable media format

Disc format	CD-ROM Mode 1, CD-ROM XA Mode 2 Form 1
File format	ISO9660 Level 1 and Level 2 (Joliet, Romeo)

HINT:

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(f) File names

(1) Only files with an extension of ".mp3" or ".wma" can be recognized and played as MP3 or WMA files.

(2) Save MP3 or WMA files with an extension of ".mp3" or ".wma".

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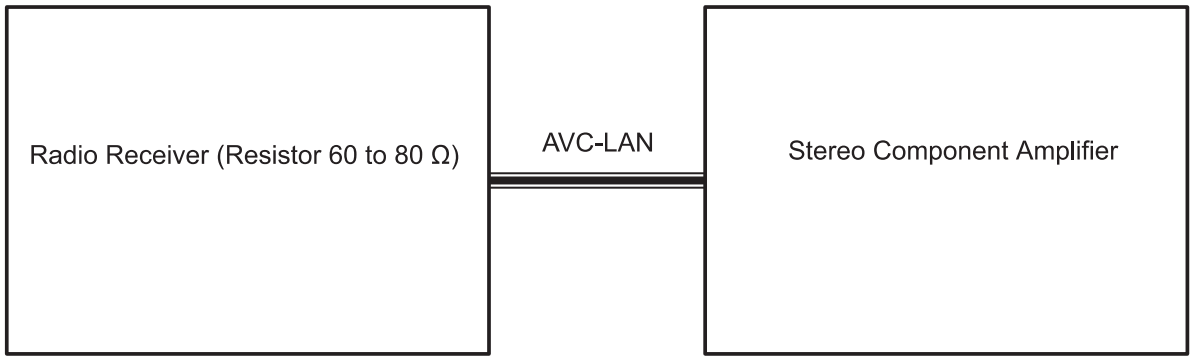

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- Each component has a specified number (3-digit) called a physical address. Each function has a number (2-digit) called a logical address.

7. Communication system outline
(a) Components of the navigation system communicate with each other via the AVC-LAN.
(b) The radio and navigation assembly has enough resistance (60 to 80 Ω) necessary for communication.
(c) If a short circuit or open circuit occurs in the AVC-LAN circuit, communication is interrupted and the navigation system will stop functioning.

8. Diagnostic function outline
(a) The audio system has a diagnostic function (the result is indicated on the master unit).
(b) A 3-digit hexadecimal component code (physical address) is allocated to each component on the AVC-LAN. Using this code, the component in the diagnostic function can be displayed.

9. "Bluetooth" outline

(a) "Bluethooth" is a trademark owned by Bluetooth SIG. Inc.

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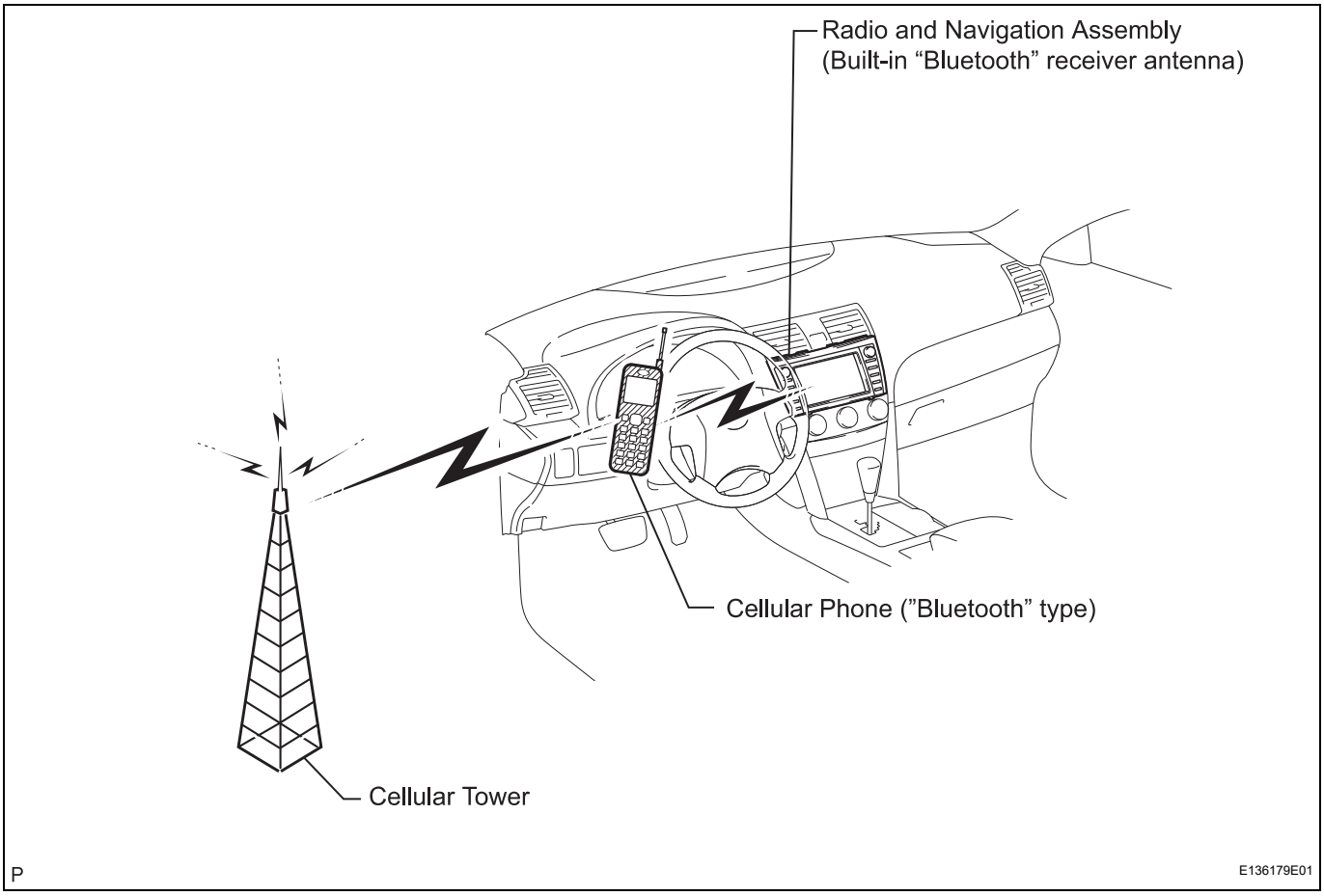

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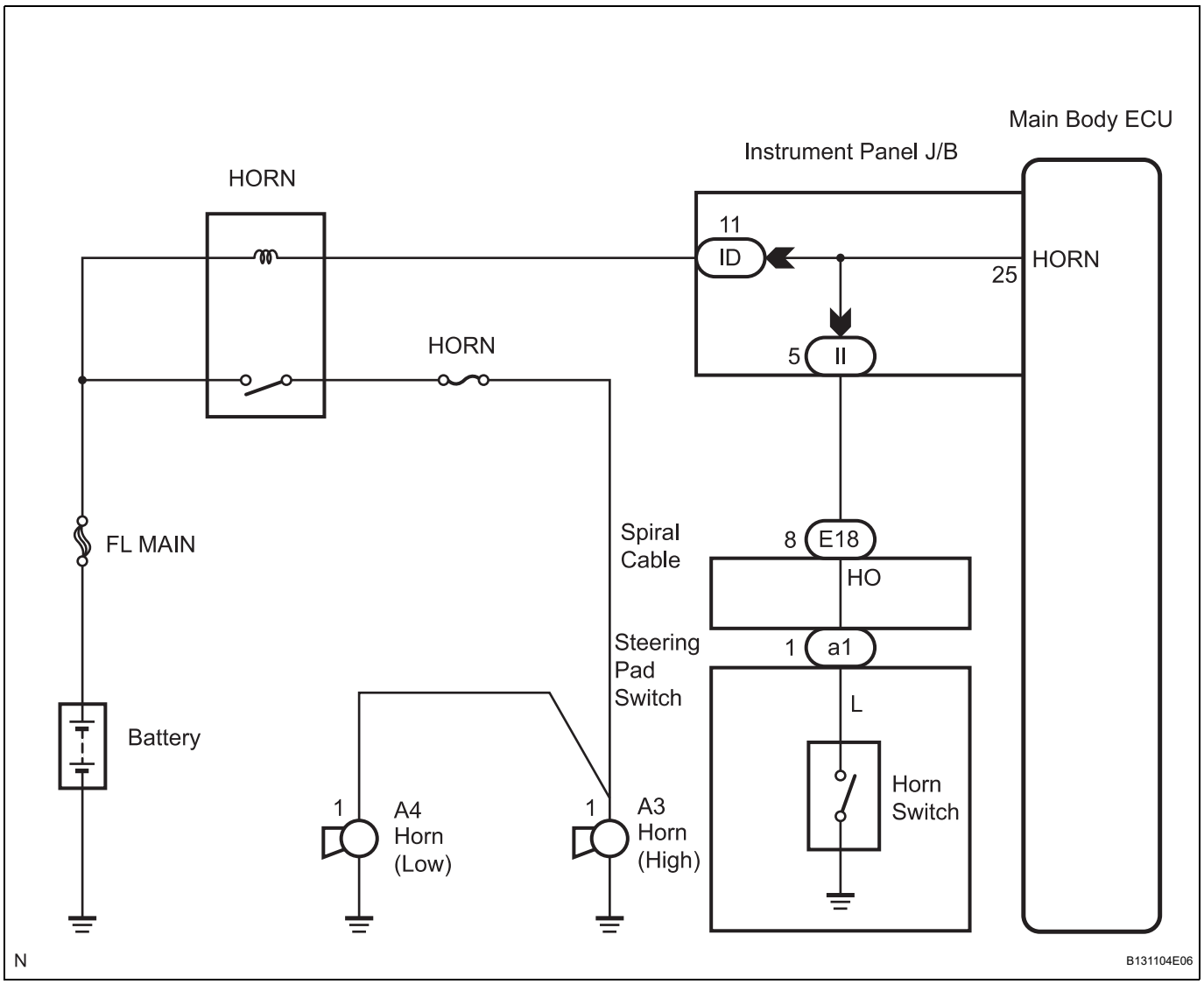
SYSTEM DIAGRAM



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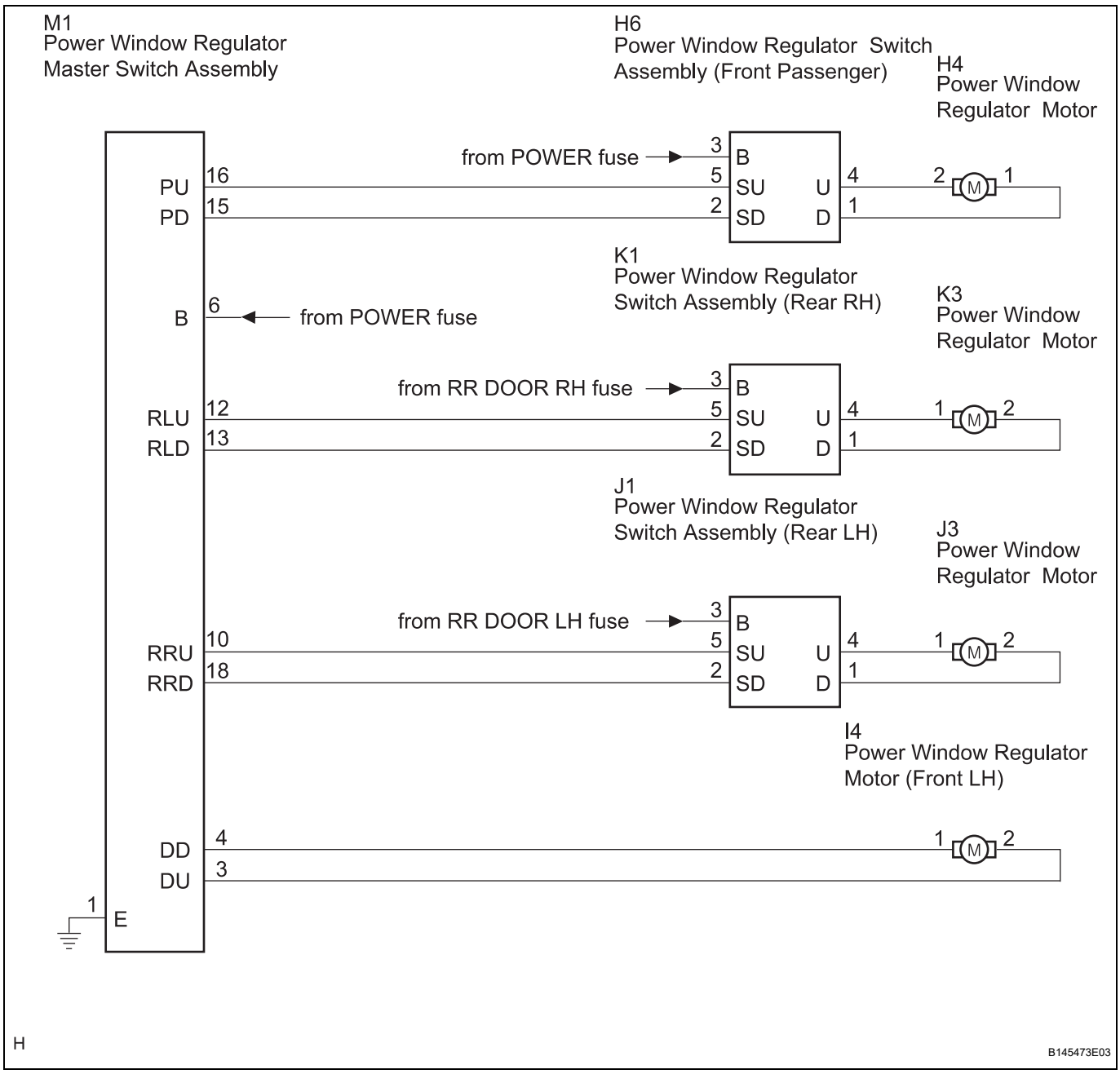
PROBLEM SYMPTOMS TABLE

HORN SYSTEM

Symptom	Suspected Area	See page
Horn does not sound	1. HORN fuse	HO-4
	2. Horn relay	HO-4
	3. Steering pad switch	RS-343
	4. Spiral cable	RS-358
	5. Wire harness	-
Horn blows all the time	1. Horn relay	HO-4
	2. Steering pad switch	RS-343
	3. Wire harness	-
Low pitched horn operates but high pitched horn does not operate	1. High pitched horn	HO-8
	2. Wire harness	-
High pitched horn operates but low pitched horn does not operate	1. Low pitched horn	HO-6
	2. Wire harness	-

SYSTEM DIAGRAM



WS

SYSTEM DESCRIPTION

1. POWER WINDOW CONTROL SYSTEM DESCRIPTION

(a) The power window control system controls the power window operation using the power window regulator motors. The main controls of this system are the power window regulator master switch, which is mounted on the driver side door, and the power window regulator switches, which are mounted on the passenger side door and rear doors. Operating a window switch results in electrical power being transmitted to the corresponding power window regulator motor.

(b) The power window control system has the following functions:

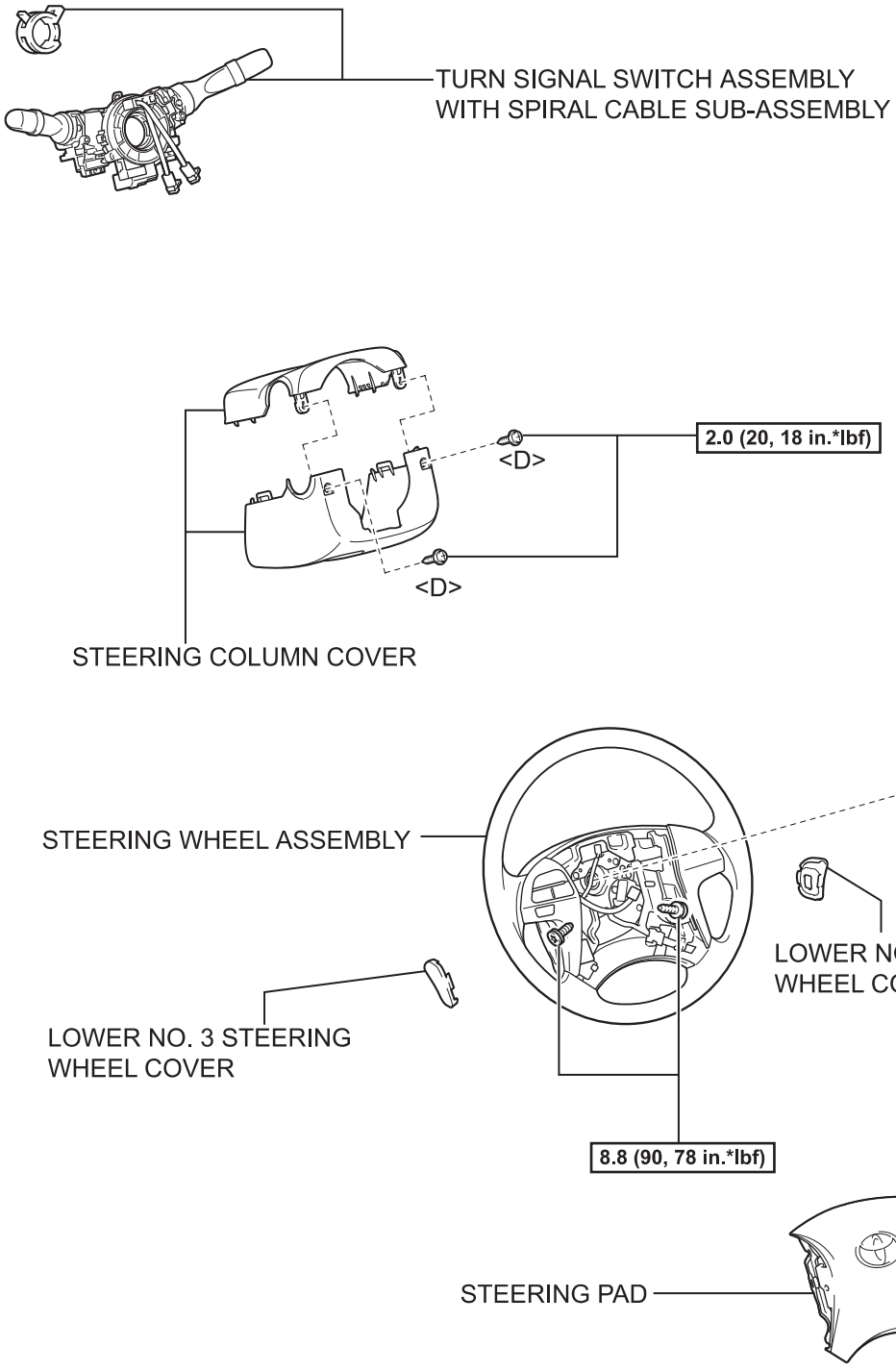
Function	Outline
Manual up-and-down function	Function that causes window to go up while power window switch is being pulled halfway up and to go down while pushed halfway down. Window stops as soon as the switch is released.
Remote control function	Function that allows power window master switch to control MANUAL up-and-down operations of front passenger door window and rear door windows.
Key-off operation function	Function that makes it possible to operate power window for approx. 43 seconds after power switch is on (ACC) or off, if either front door is not opened.

PROBLEM SYMPTOMS TABLE

Power Mirror Control System

Symptom	Suspected Area	See page
Power mirrors cannot be adjusted manually	1. ECU-ACC fuse	-
	2. Outer mirror switch	MI-18
	3. Outer rear view mirror LH/RH	MI-14
	4. Wire harness	-
Mirror heater does not operate	1. MIR HTR, A/C No. 2, RR DEF fuses	-
	2. Heater control panel assembly	-
	3. A/C amplifier assembly	-
	4. RR DEF relay	WS-84
	5. Outer rear view mirror LH/RH	MI-14
	6. Wire harness	-

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

P

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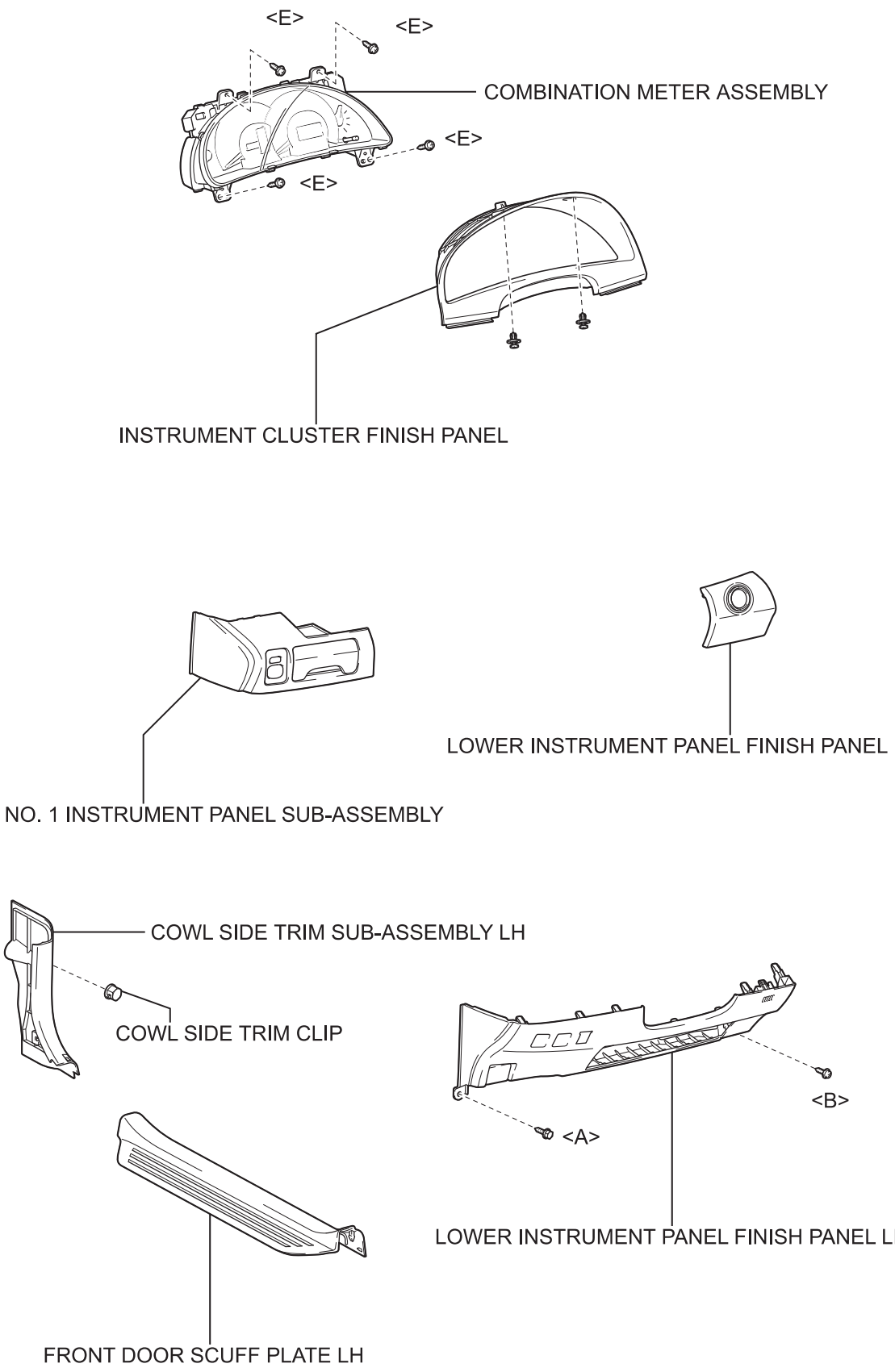
IP



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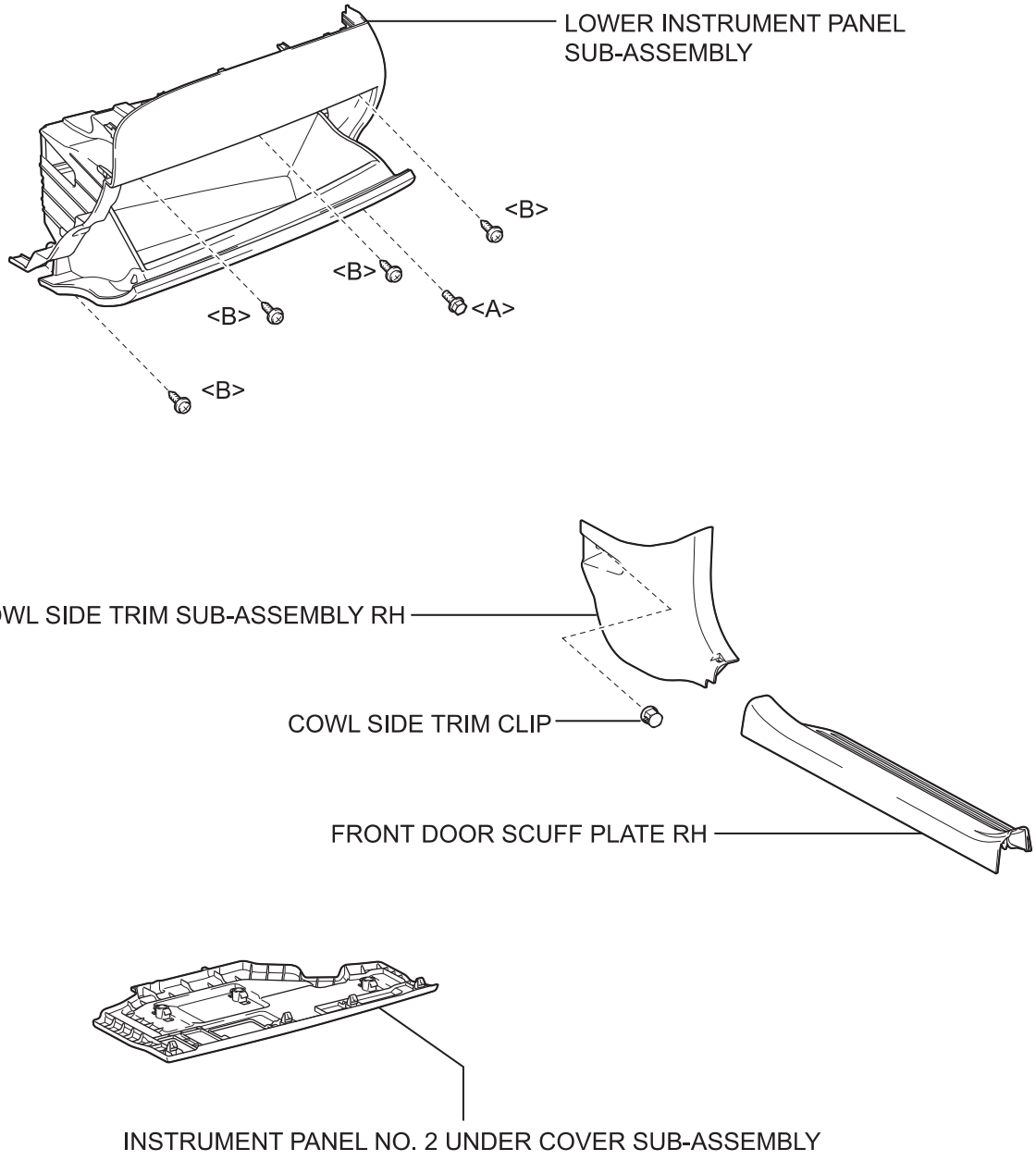
LOWER INSTRUMENT PANEL SUB-ASSEMBLY
<B>
<B>
<A>
<B>
<B>
COWL SIDE TRIM SUB-ASSEMBLY RH
COWL SIDE TRIM CLIP
FRONT DOOR SCUFF PLATE RH
INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY
P
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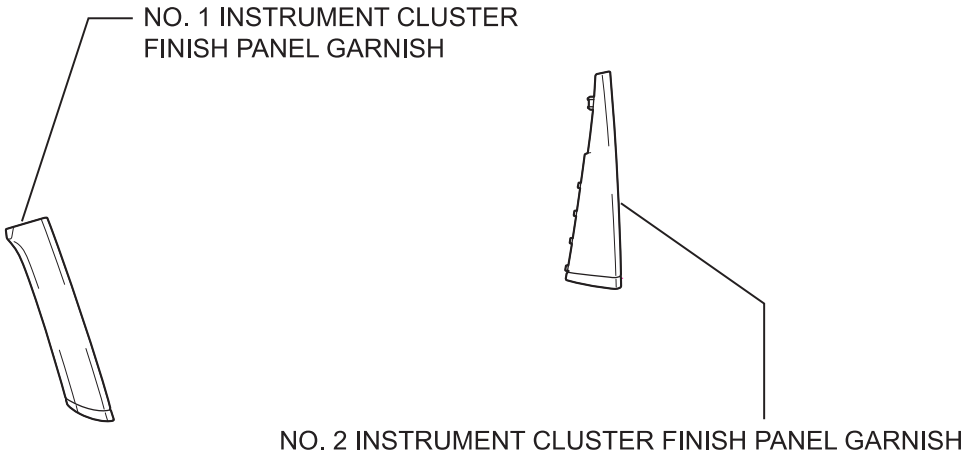
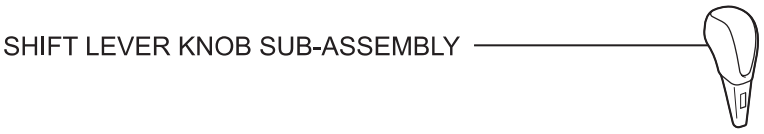
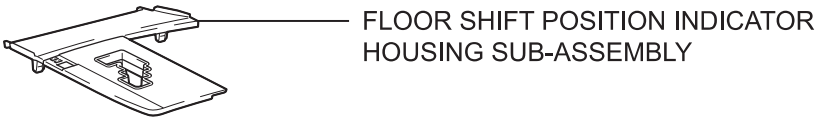
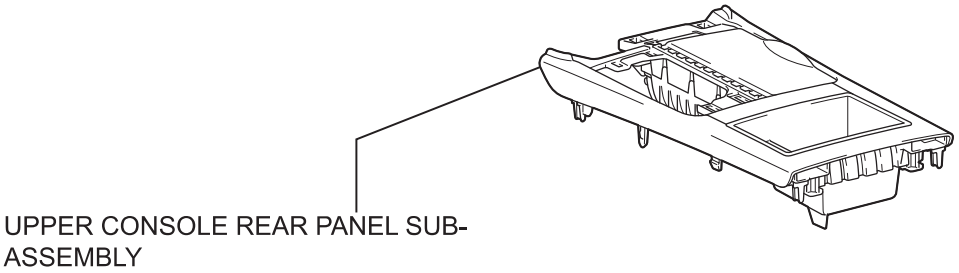
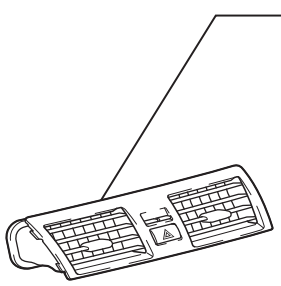

NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH
NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH

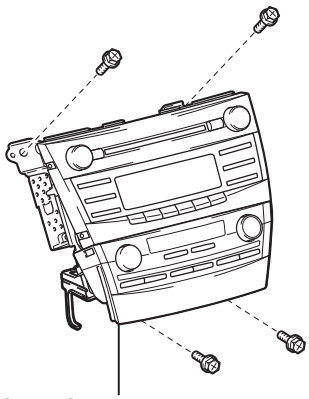

SHIFT LEVER KNOB SUB-ASSEMBLY


FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY

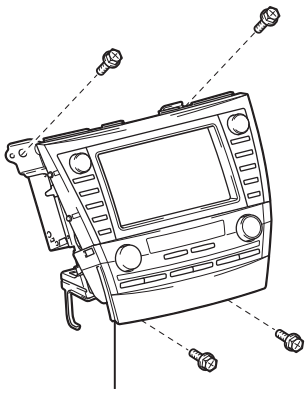

UPPER CONSOLE REAR PANEL SUB-ASSEMBLY

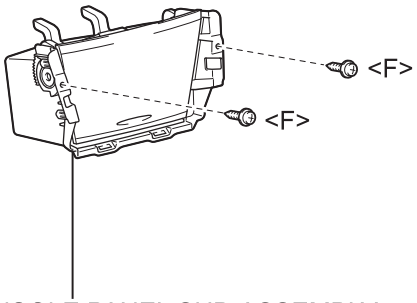


without Navigation System:



with Navigation System:





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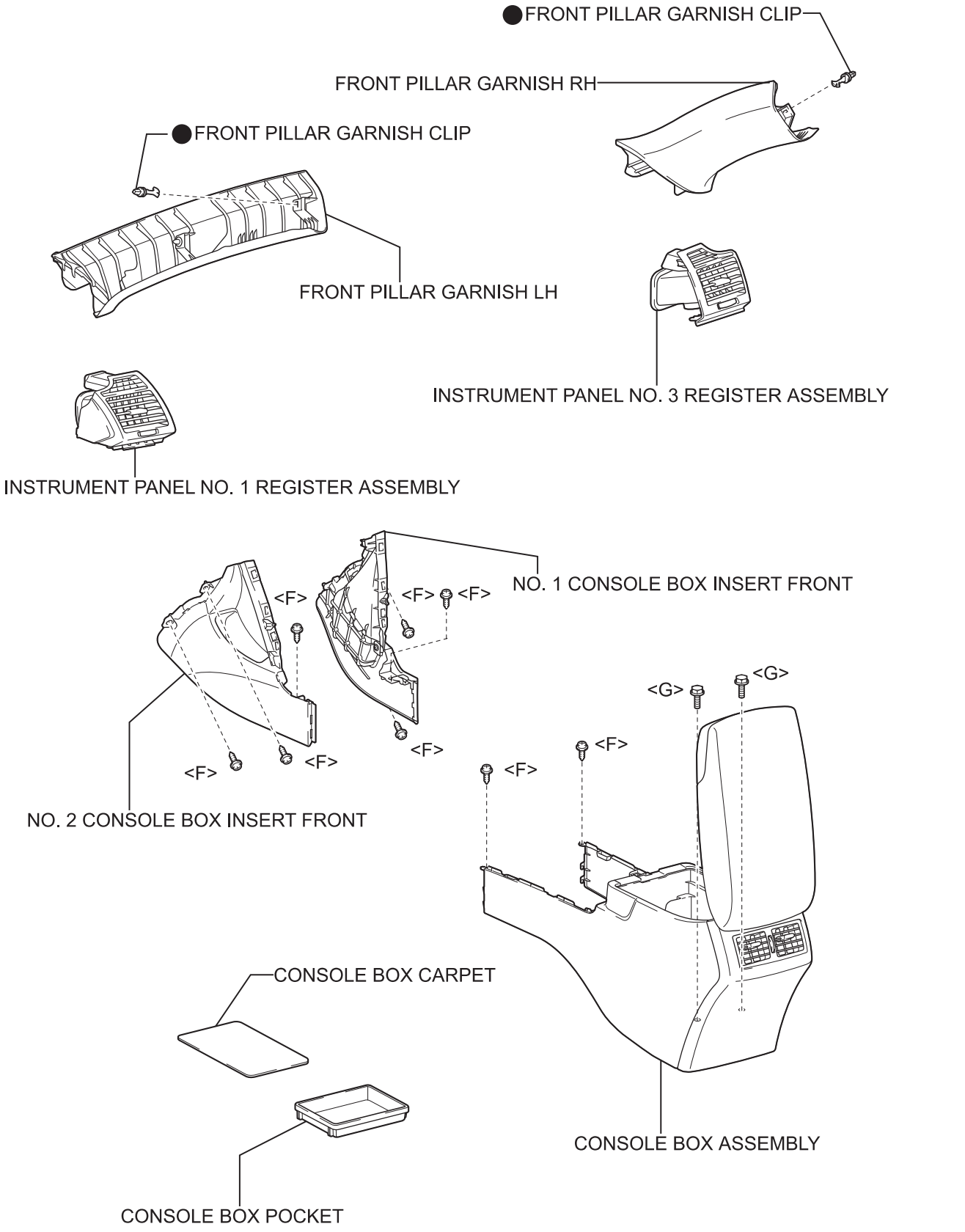

● Non-reusable part

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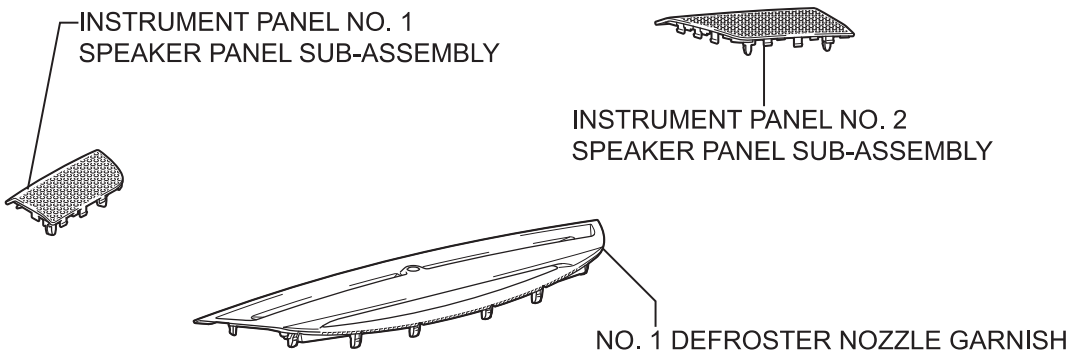
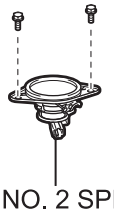
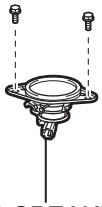
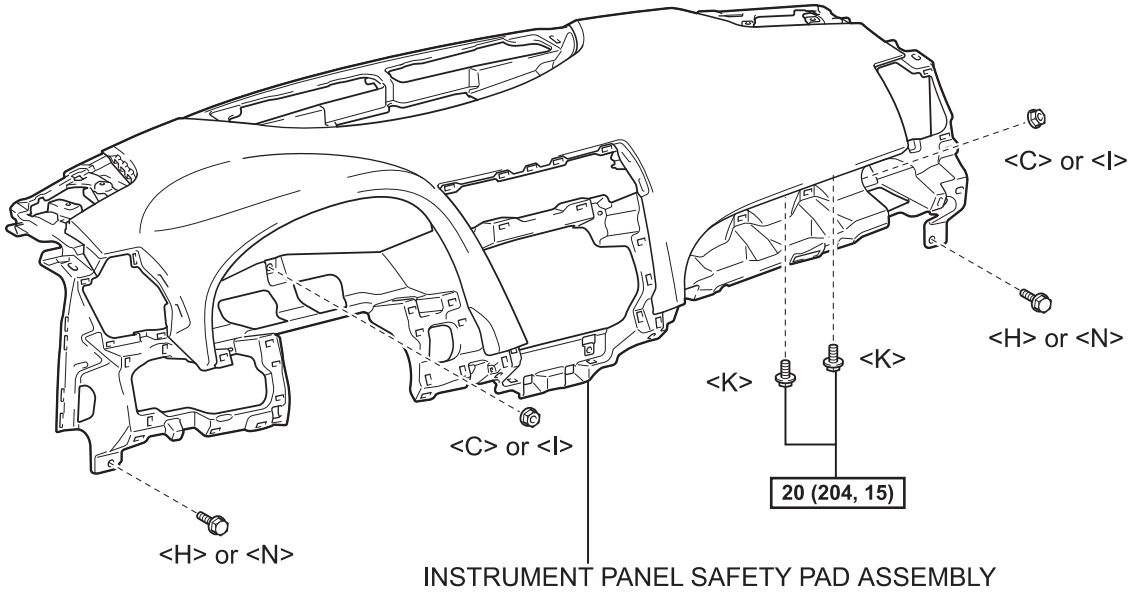


for LH Side:



for RH Side:





N*m (kgf*cm, ft.*lbf) : Specified torque

P

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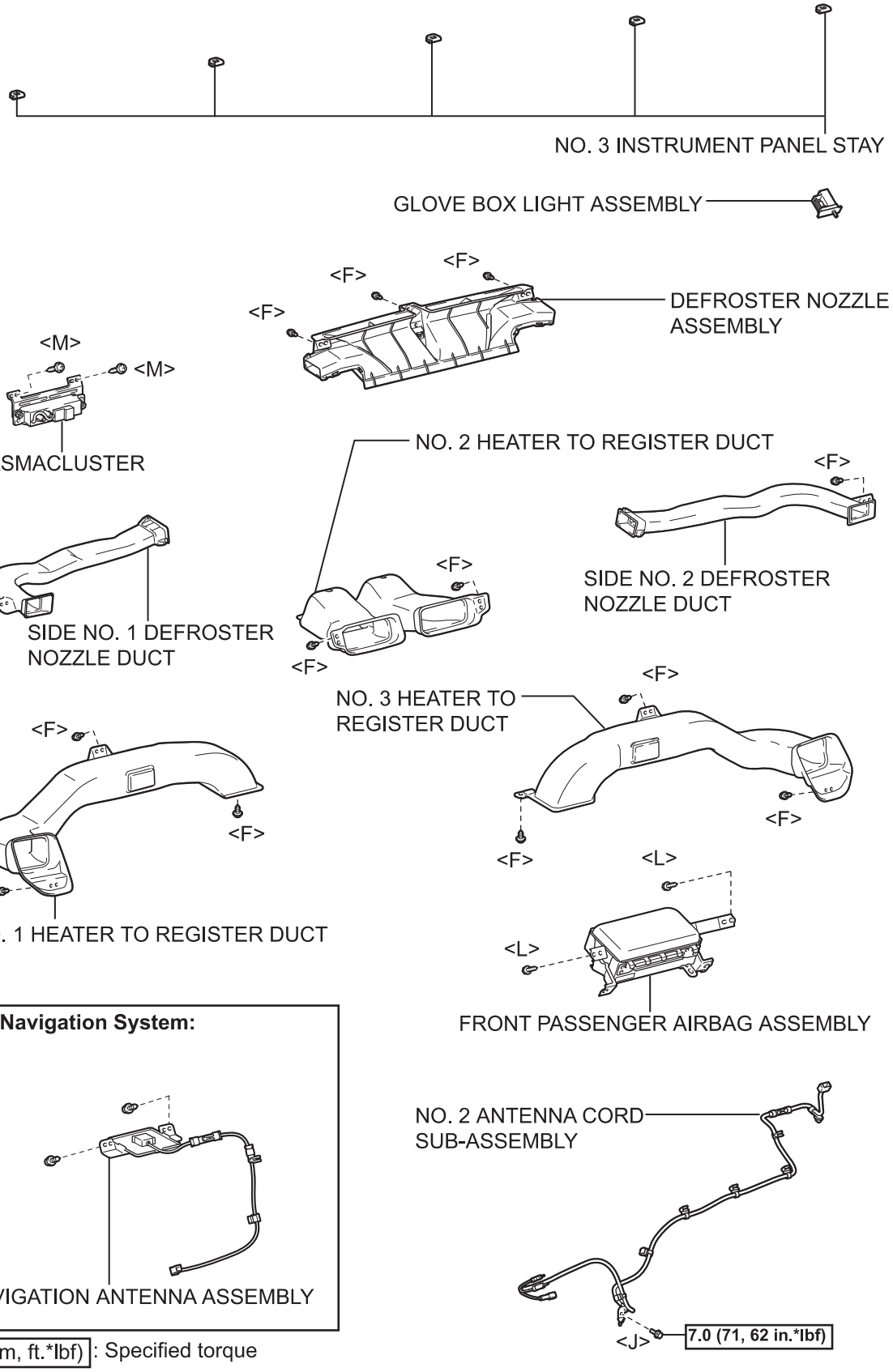

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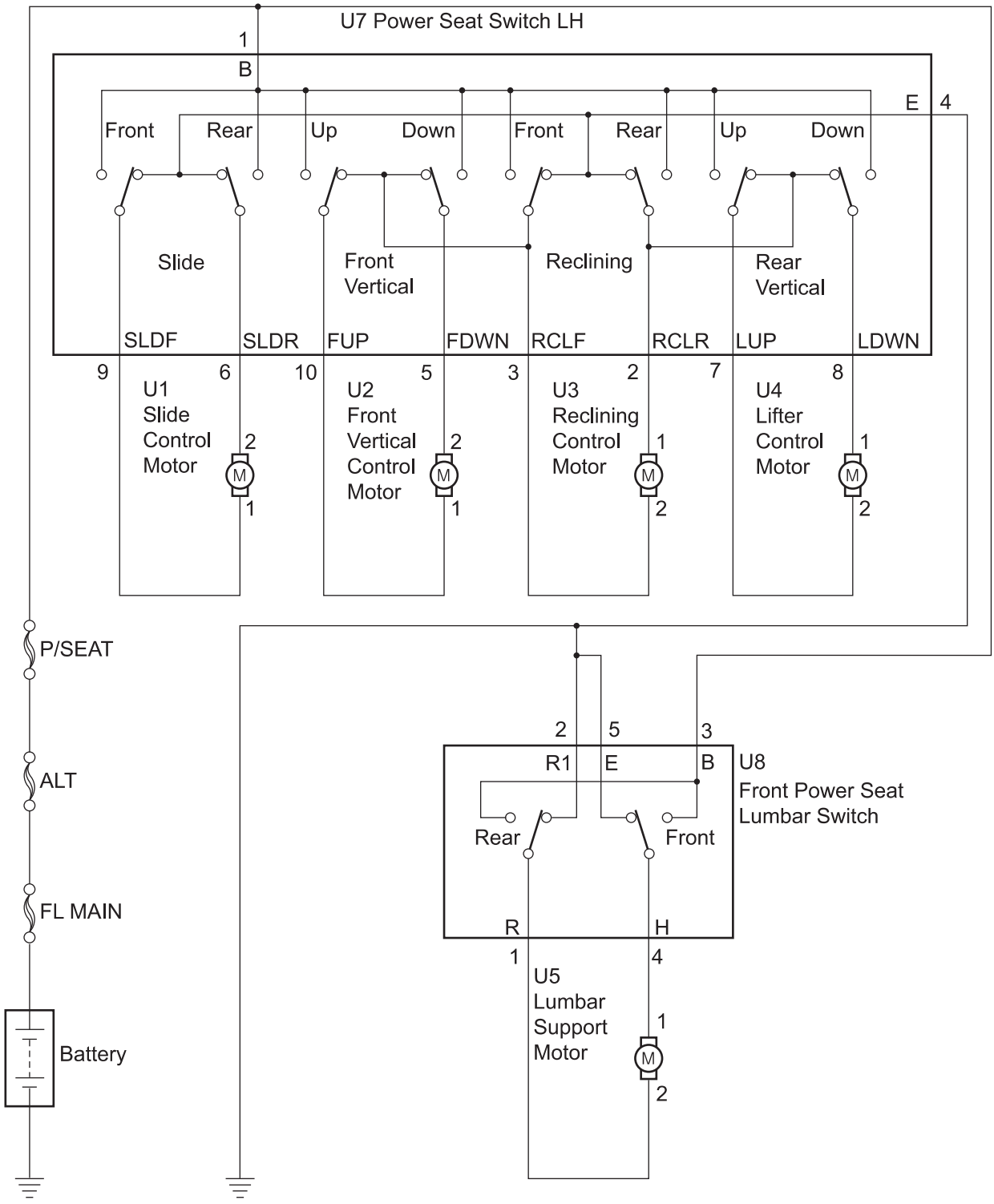
SYSTEM DIAGRAM

Driver Side:



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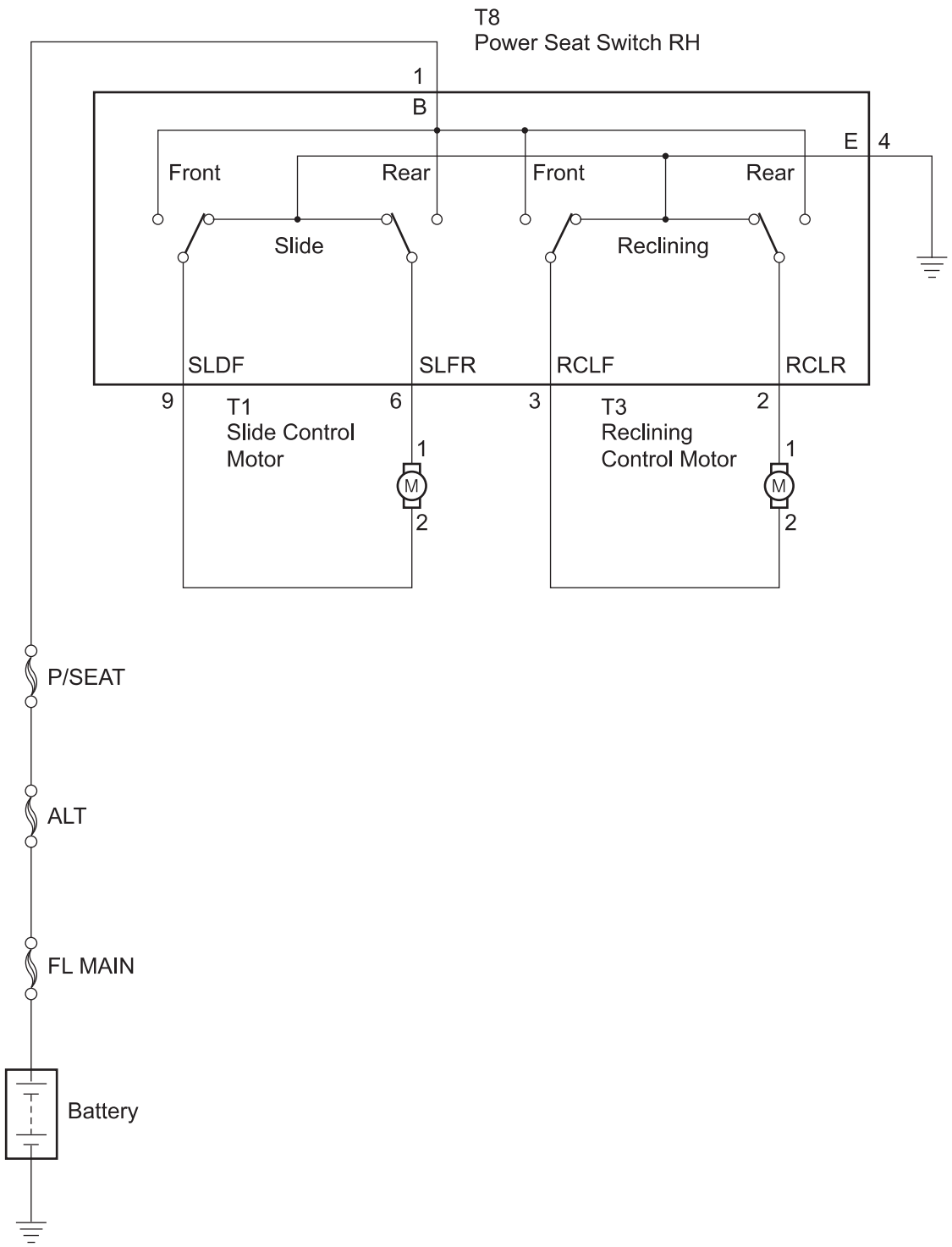
SE

Front Passenger Side:



SE

H

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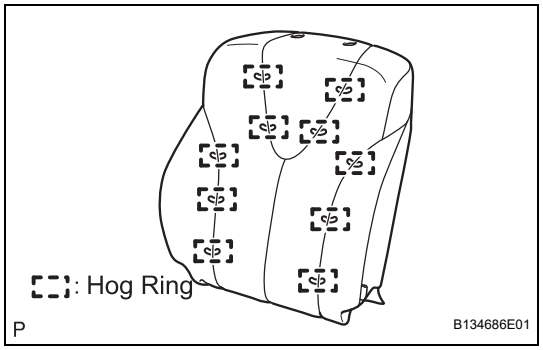
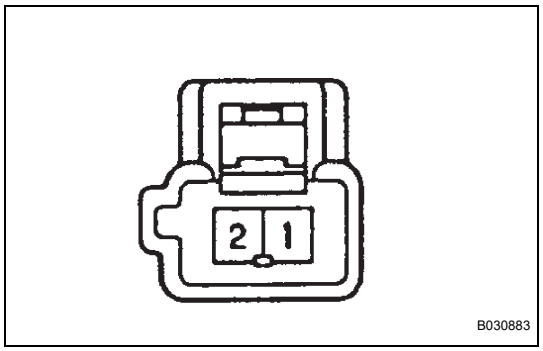
REMOVAL

1. REMOVE FRONT SEAT HEADREST ASSEMBLY
2. REMOVE SEAT TRACK COVER (See page SE-29)
3. REMOVE INNER SEAT TRACK BRACKET COVER (See page SE-29)
4. REMOVE FRONT SEAT ASSEMBLY (See page SE-29)
5. REMOVE RECLINING POWER SEAT SWITCH KNOB (See page SE-30)
6. REMOVE SLIDE AND VERTICAL POWER SEAT SWITCH KNOB (See page SE-30)
7. REMOVE FRONT SEAT CUSHION SHIELD ASSEMBLY (See page SE-30)
8. REMOVE FRONT SEAT INNER BELT ASSEMBLY (See page SB-17)
9. REMOVE FRONT INNER SEAT CUSHION SHIELD (See page SE-31)
10. REMOVE FRONT SEATBACK BOARD SUB-ASSEMBLY (See page SE-33)
11. REMOVE FRONT SEAT HEADREST SUPPORT (See page SE-34)
12. REMOVE FRONT SEAT HEADREST SUPPORT
13. REMOVE SEPARATE TYPE FRONT SEATBACK ASSEMBLY (See page SE-34)
14. REMOVE FRONT SEPARATE TYPE SEATBACK COVER
    (a) Remove the 10 hog rings and front separate type seatback cover from the seatback pad.



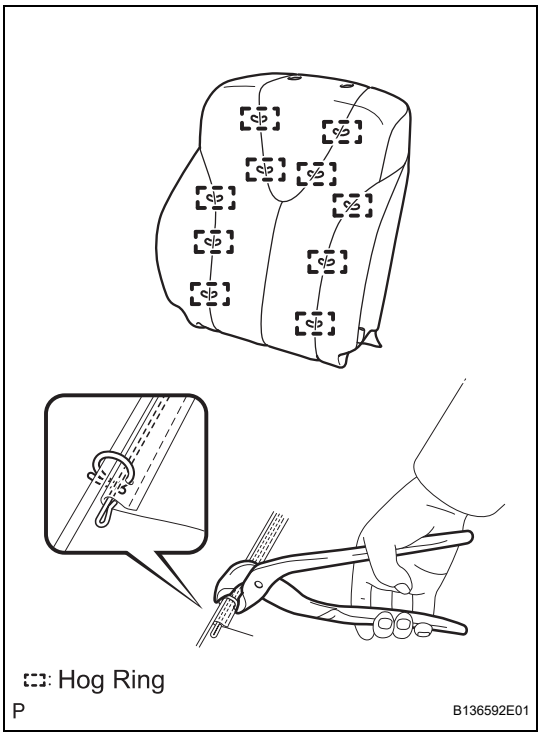


INSPECTION

1. INSPECT FRONT SEAT BACK HEATER
   (a) Measure the resistance according to the value(s) in the table below.
   Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Always	Below 1 Ω

SE

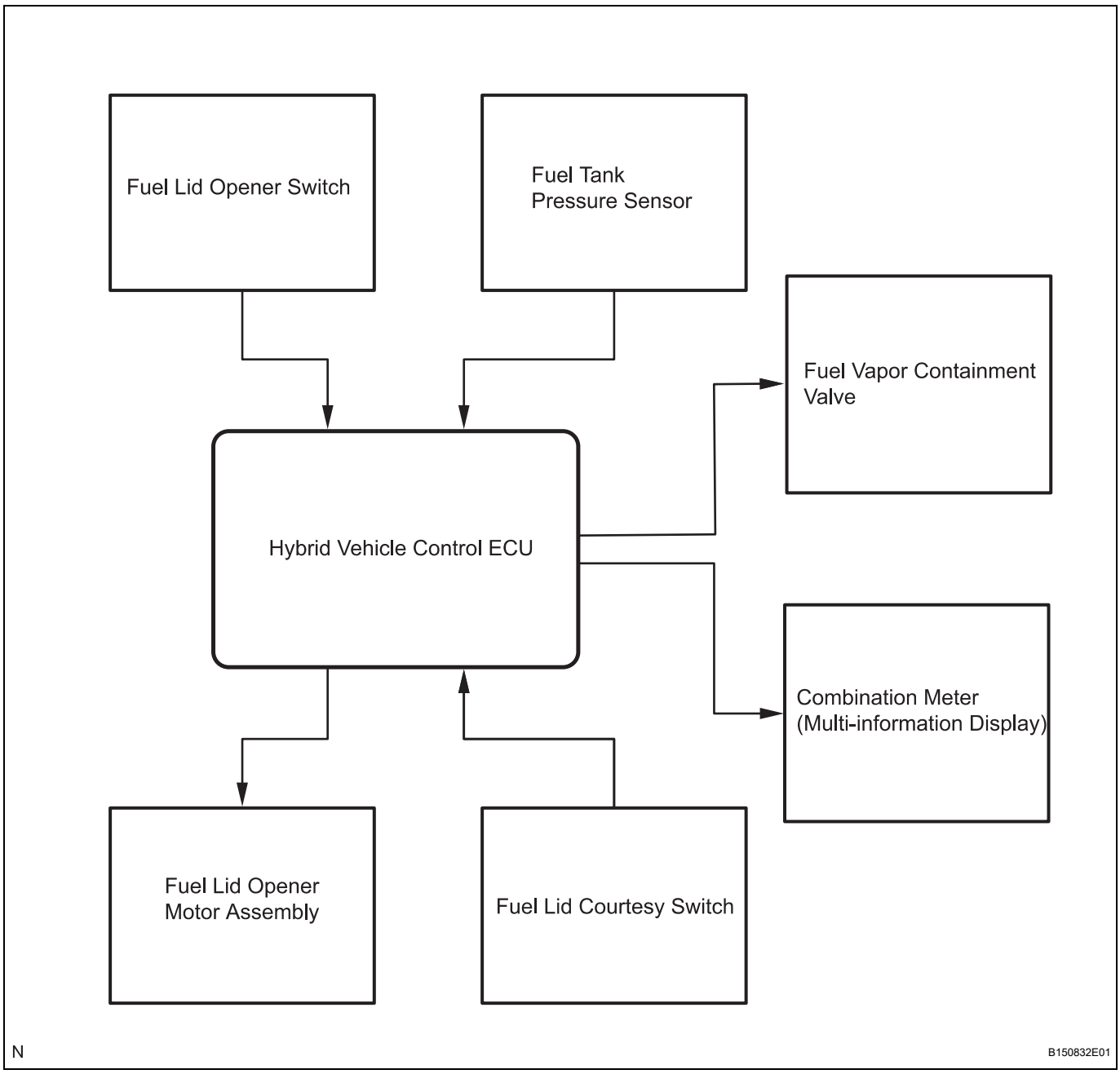


INSTALLATION

1. **INSTALL FRONT SEPARATE TYPE SEATBACK COVER**
   (a) Using hog ring pliers, install the front separate type seatback cover to the front seatback pad with 10 new hog rings.
   NOTICE:
   - **Be careful not to damage the cover.**
   - **When installing the hog rings, take care to minimize wrinkles as much as possible.**
2. **INSTALL SEPARATE TYPE FRONT SEATBACK ASSEMBLY (See page SE-36)**
3. **INSTALL FRONT SEAT HEADREST SUPPORT**
4. **INSTALL FRONT SEAT HEADREST SUPPORT**
5. **INSTALL FRONT SEATBACK BOARD SUB-ASSEMBLY**
6. **INSTALL FRONT INNER SEAT CUSHION SHIELD**
7. **INSTALL FRONT SEAT INNER BELT ASSEMBLY (See page SB-18)**
8. **INSTALL FRONT SEAT CUSHION SHIELD ASSEMBLY**
9. **INSTALL SLIDE AND VERTICAL POWER SEAT SWITCH KNOB**
10. **INSTALL RECLINING POWER SEAT SWITCH KNOB**
11. **INSTALL FRONT SEAT ASSEMBLY (See page SE-38)**
12. **INSTALL INNER SEAT TRACK BRACKET COVER (See page SE-39)**
13. **INSTALL SEAT TRACK COVER (See page SE-39)**
14. **INSTALL FRONT SEAT HEADREST ASSEMBLY**
15. **PERFORM INITIALIZATION**
    NOTICE:
    Some systems need initialization after reconnecting the cable to the negative battery terminal (See page IN-43).
16. **PERFORM ZERO POINT CALIBRATION AND SENSITIVITY CHECK (for Front Passenger Seat)** (See page RS-239)
17. **INSPECT SRS WARNING LIGHT**
    Inspect SRS warning light. (See page RS-33)
18. **INSPECT FRONT SEAT ASSEMBLY (See page SE-39)**

SE

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

1. FUEL LID OPENER COMPONENT

Fuel Lid Opener Switch	Detects fuel lid opener switch operation and sends fuel lid open request signal to hybrid vehicle control ECU.
Fuel Lid Courtesy Switch	The fuel lid courtesy switch detects the fuel lid open/close condition signal to hybrid vehicle control ECU.
Fuel Lid Opener Motor Assembly	Actuates to open fuel lid according to signal from hybrid vehicle control ECU.
Hybrid Vehicle Control ECU	When the hybrid vehicle control ECU receives signal from the fuel lid opener switch, it actuates the fuel lid opener motor. • Inputs signal from fuel tank pressure sensor. • When difference between atmospheric pressure and fuel tank internal pressure exceeds specification, hybrid vehicle control ECU operates fuel vapor containment valve. • Detects status of fuel lid courtesy switch.
Combination Meter (Multi-information Display)	The operating state of fuel lid opener system is displayed on the multi-information display.

2. FUEL LID OPENER SYSTEM FUNCTION

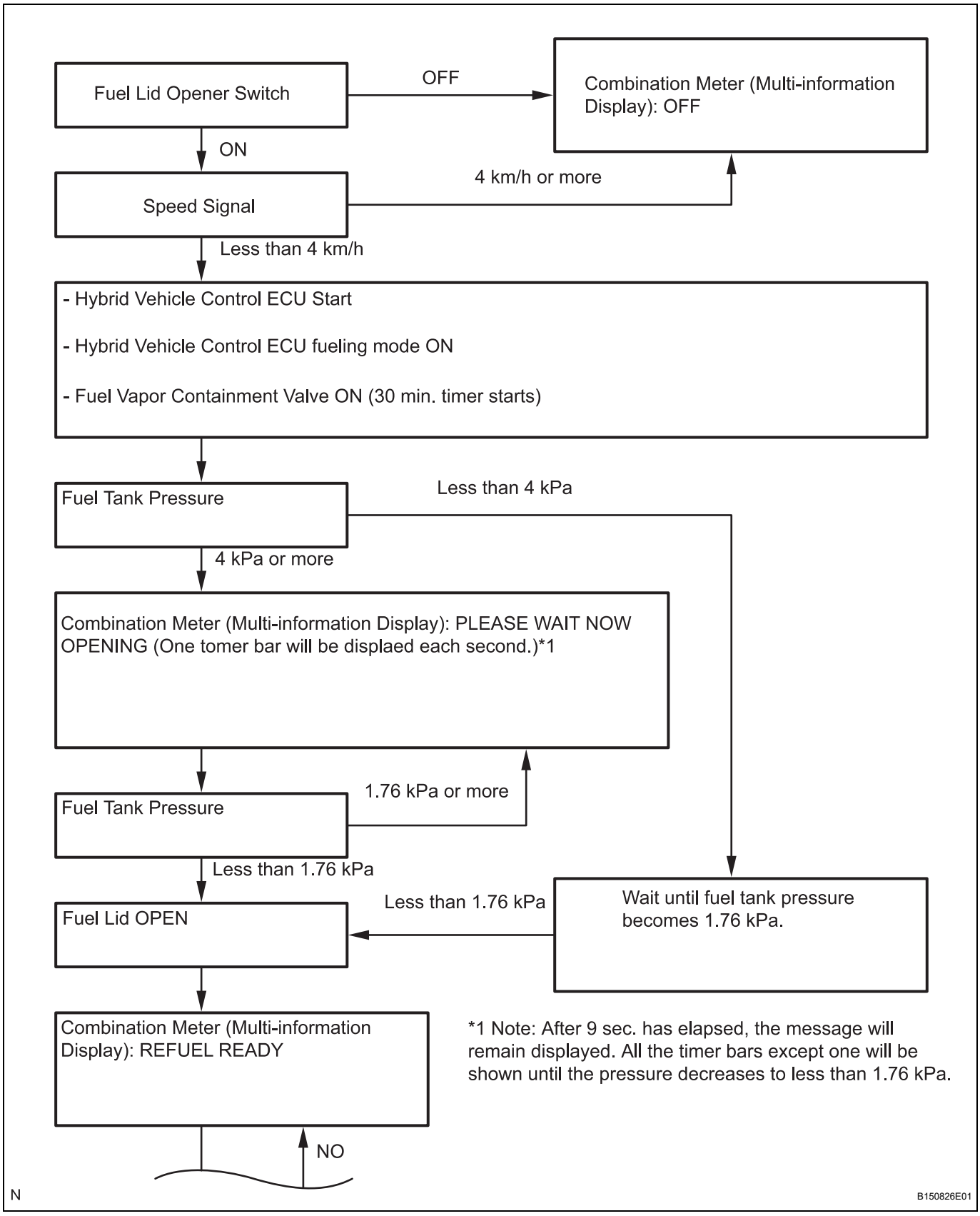
(a) When pressing the fuel lid opener switch, a fuel lid open request signal is sent to the hybrid control ECU, and the fuel lid opener motor actuates to open the fuel lid.

HINT:

When the difference between atmospheric pressure and fuel tank internal pressure exceeds the specification, fuel vapor containment valve is used to adjust the pressure. During the adjustment, "PLEASE WAIT NOW OPENING" is displayed on the multi-information display.

NOTICE:

- **If the fuel tank pressure sensor or fuel vapor containment valve is malfunctioning, the fuel lid does not open.**
- **If the fuel lid courtesy switch is malfunctioning, "CLOSE FUEL LID" is displayed on the multi-information display even if the fuel lid is closed.**


Fuel Lid Opener Switch
OFF
Combination Meter (Multi-information Display): OFF
ON
Speed Signal
4 km/h or more
Less than 4 km/h
- Hybrid Vehicle Control ECU Start
- Hybrid Vehicle Control ECU fueling mode ON
- Fuel Vapor Containment Valve ON (30 min. timer starts)
Fuel Tank Pressure
Less than 4 kPa
4 kPa or more
Combination Meter (Multi-information Display): PLEASE WAIT NOW OPENING (One tomer bar will be displaed each second.)*1
1.76 kPa or more
Fuel Tank Pressure
Less than 1.76 kPa
Less than 1.76 kPa
Fuel Lid OPEN
Wait until fuel tank pressure becomes 1.76 kPa.
Combination Meter (Multi-information Display): REFUEL READY
NO
*1 Note: After 9 sec. has elapsed, the message will remain displayed. All the timer bars except one will be shown until the pressure decreases to less than 1.76 kPa.
N
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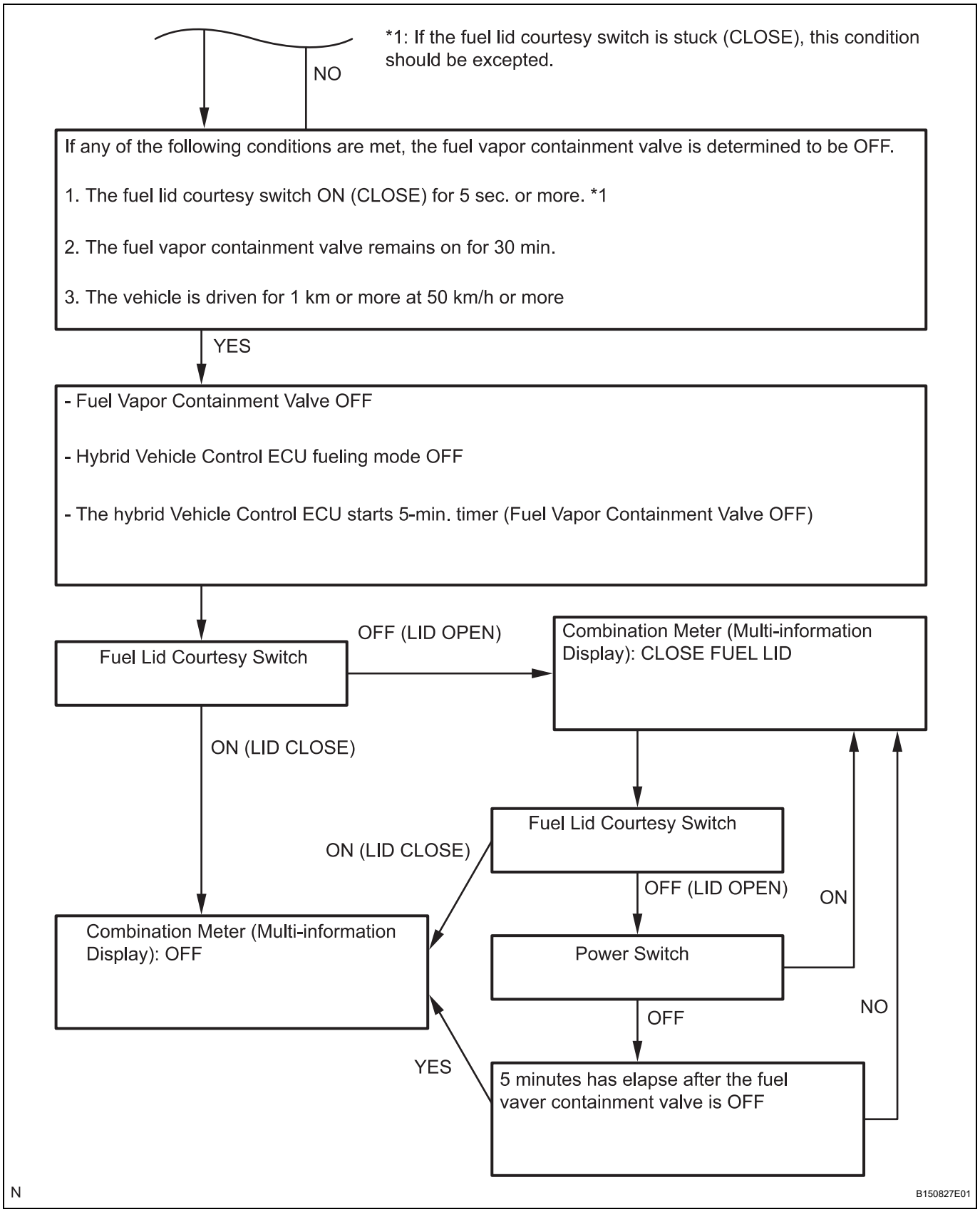
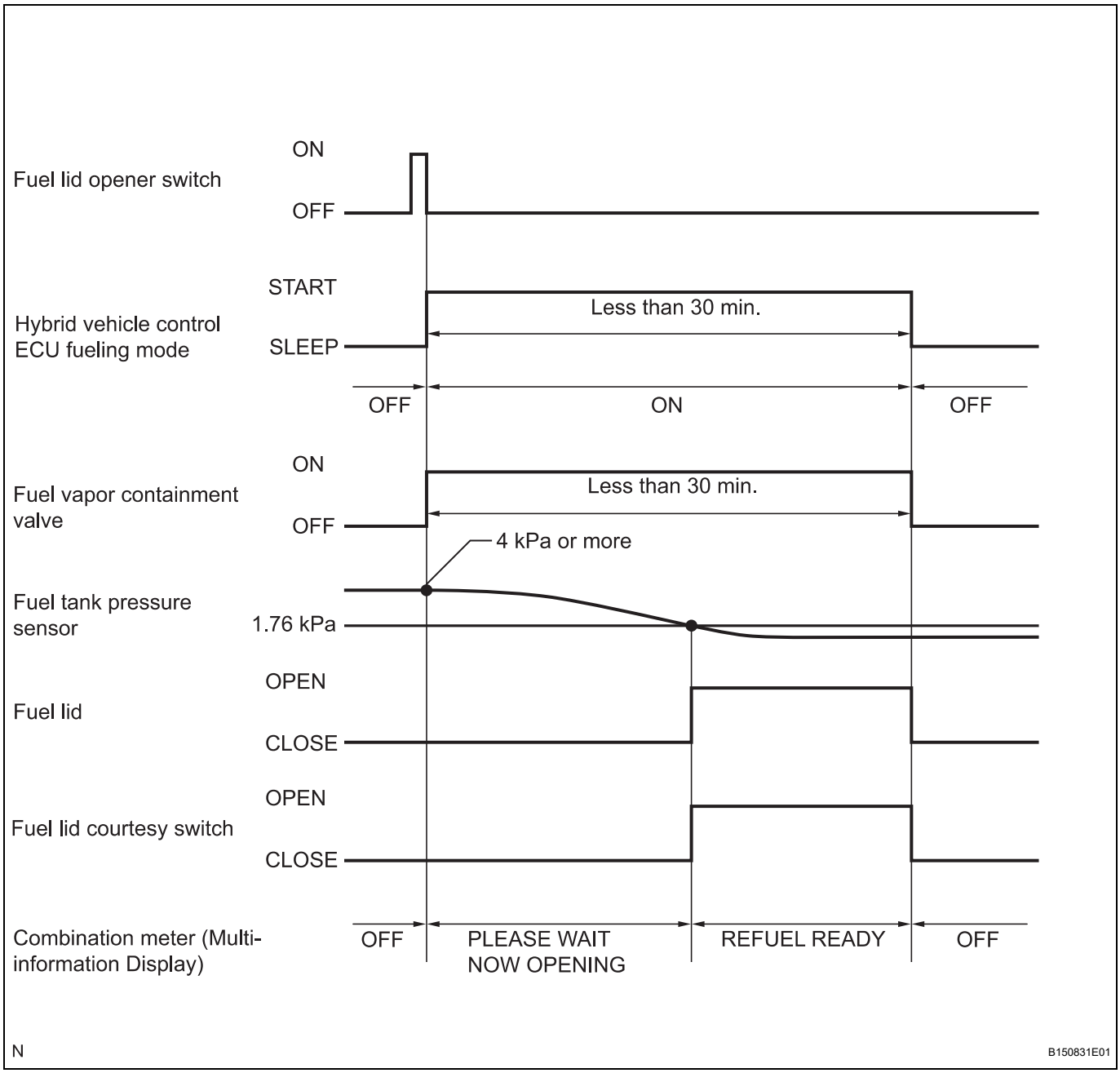
ED


*1: If the fuel lid courtesy switch is stuck (CLOSE), this condition should be excepted.
NO
If any of the following conditions are met, the fuel vapor containment valve is determined to be OFF.
1. The fuel lid courtesy switch ON (CLOSE) for 5 sec. or more. *1
2. The fuel vapor containment valve remains on for 30 min.
3. The vehicle is driven for 1 km or more at 50 km/h or more
YES
- Fuel Vapor Containment Valve OFF
- Hybrid Vehicle Control ECU fueling mode OFF
- The hybrid Vehicle Control ECU starts 5-min. timer (Fuel Vapor Containment Valve OFF)
Fuel Lid Courtesy Switch
OFF (LID OPEN)
Combination Meter (Multi-information Display): CLOSE FUEL LID
ON (LID CLOSE)
Fuel Lid Courtesy Switch
ON (LID CLOSE)
OFF (LID OPEN)
ON
Combination Meter (Multi-information Display): OFF
Power Switch
OFF
NO
YES
5 minutes has elapse after the fuel vaver containment valve is OFF
N
B150827E01

ED

(1) Normal operation (Fuel tank pressure 4 kPa or more):



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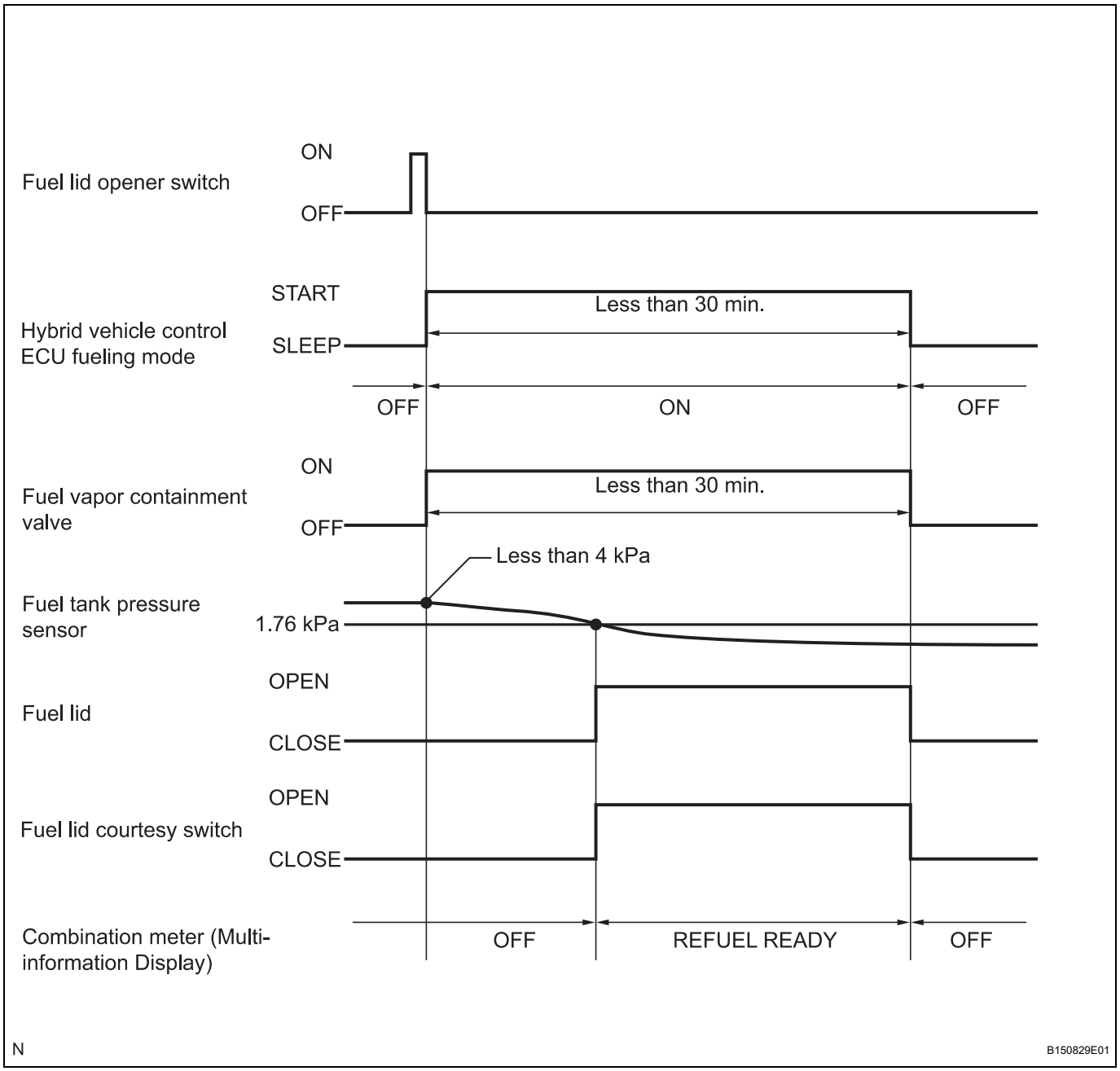
(2) Normal operation (Fuel tank pressure less than 4 kPa)



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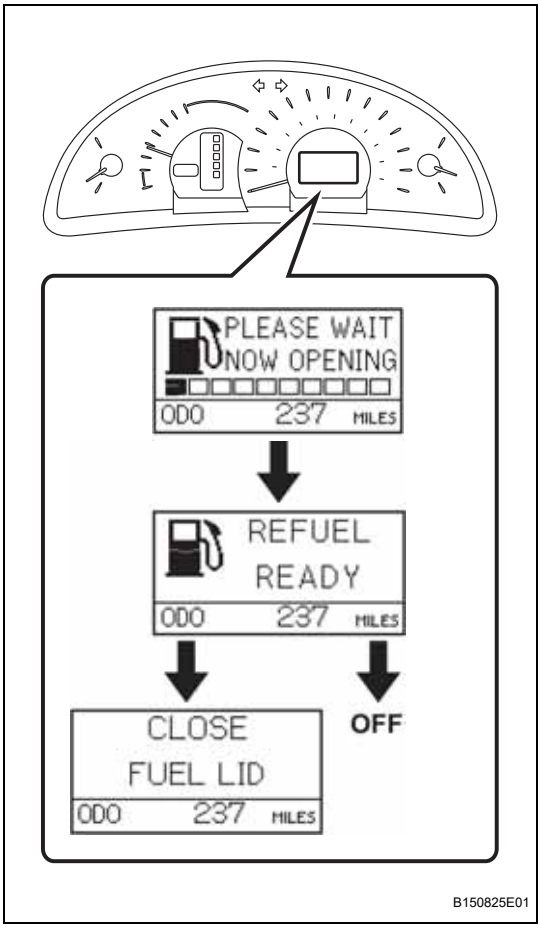
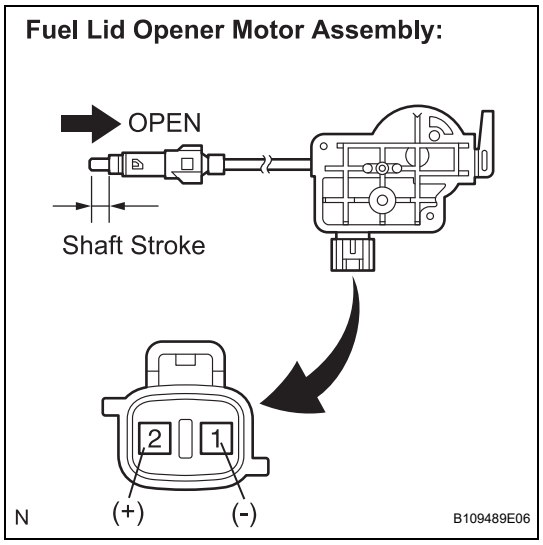


3. COMBINATION METER DISPLAY AND OBJECTIVES

(a) Multi-information display :

Display	Details	Condition	Condition to switch to next display	Next display
PLEASE WAIT NOW OPENING	• Wait time until the fuel tank pressure drops to the specified value • Wait time until the fuel lid is opened	• Fuel lid opener switch ON • Fuel vapor containment valve open • Fuel tank pressure 4 kPa or more (Initial value)	Fuel tank pressure less than 1.76 kPa	REFUEL READY
REFUEL READY	Ready for refueling	Until any of the conditions listed on the right are met.	When 5 seconds or more elapse after fuel lid CLOSE (Fuel lid courtesy switch ON)	OFF
			• The fuel vapor containment valve remains ON for 30 min. • The vehicle is driven for 1 km or more at 50 km/h or more	CLOSE FUEL LID
CLOSE FUEL LID	Fuel lid open	Fuel lid open: • While the power switch is on • For 5 min. after the power switch is turned off	Fuel lid CLOSE (Door control switch ON)	OFF

ED



INSPECTION

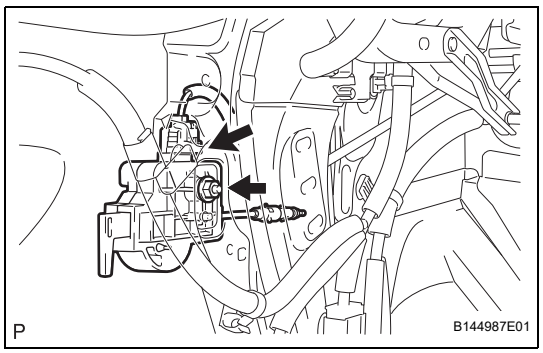
1. **INSPECT FUEL LID MOTOR ASSEMBLY**
   (a) Apply battery voltage to the lock control and check the motor operates in the open direction.
   Standard

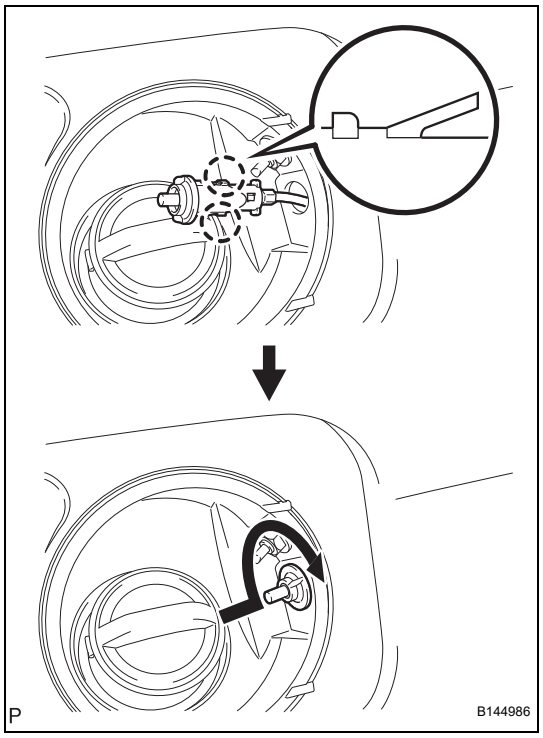
Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 1	Motor operates and shaft moves in open direction

   If the result is not as specified, replace the fuel lid opener motor assembly.
   (b) Check the shaft stroke.
   Standard:
   10.3 mm (0.406 in.) or more
   If the result is not as specified, replace the fuel lid opener motor assembly.

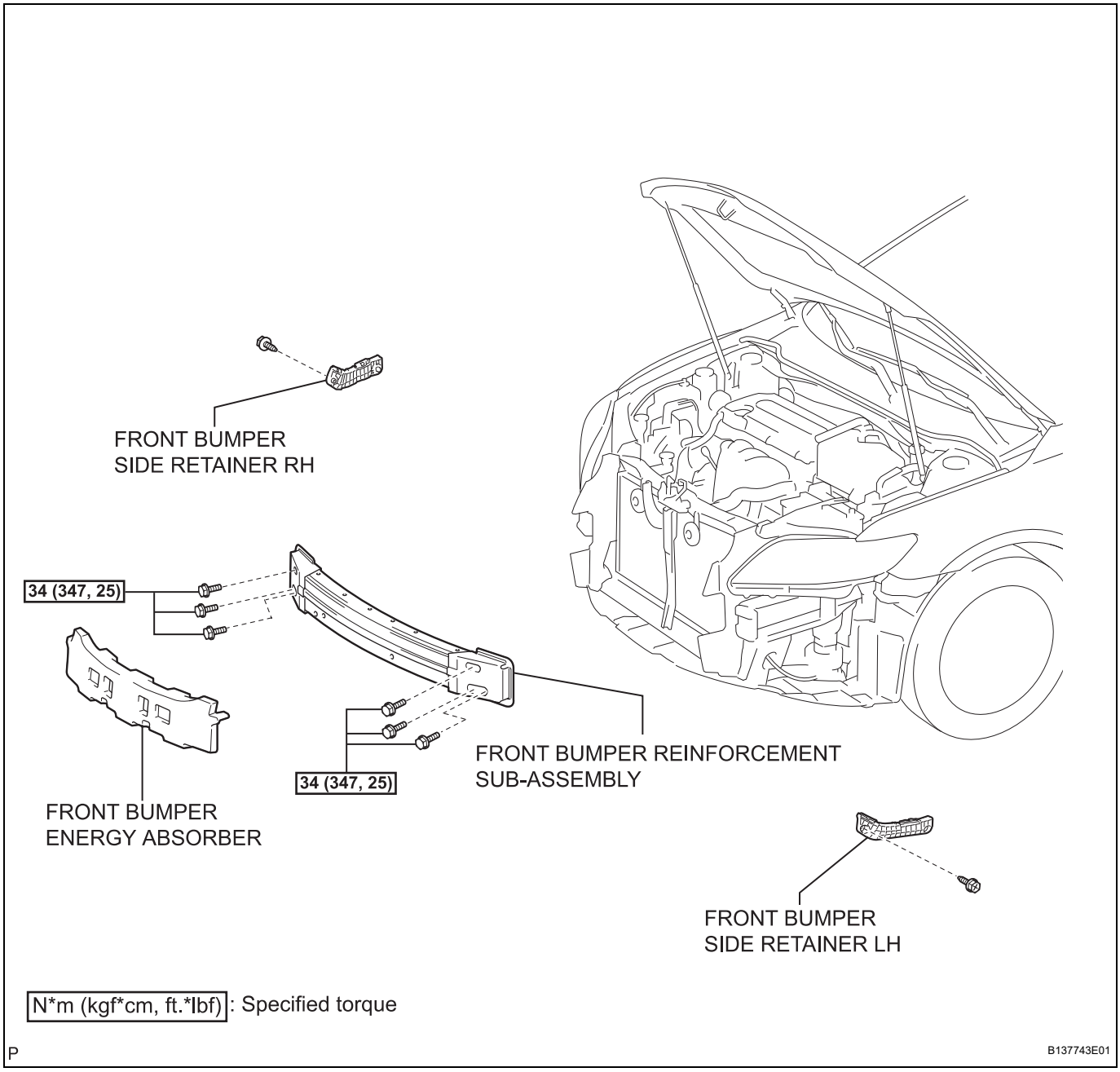
INSTALLATION

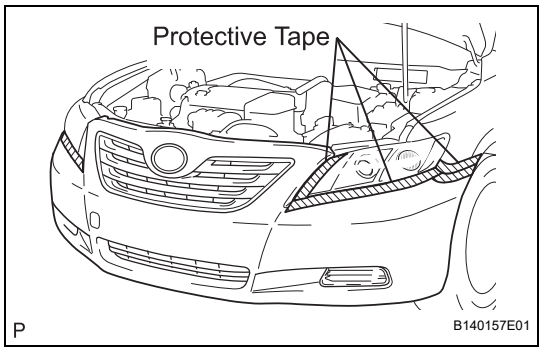
1. **INSTALL FUEL LID OPENER MOTOR ASSEMBLY**
   (a) Connect the connector.
   (b) Install the fuel lid opener motor assembly with the nut.
   Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)





2. **INSTALL FUEL FILLER OPENING LID LOCK RETAINER**
   (a) Engage the 2 claws.
   (b) Install the fuel filler opening lid lock retainer as shown in the illustration.
3. **INSTALL LUGGAGE COMPARTMENT INNER TRIM COVER LH (See page ED-102)**
4. **INSTALL LUGGAGE COMPARTMENT REAR TRIM COVER (See page ED-102)**
5. **INSTALL REAR FLOOR FINISH PLATE (See page ED-103)**
6. **INSTALL NO. 1 LUGGAGE COMPARTMENT TRIM HOOK (See page ED-103)**
7. **INSTALL SPARE WHEEL COVER ASSEMBLY**
8. **INSTALL SPARE WHEEL COVER CLAMP**
9. **INSTALL LUGGAGE COMPARTMENT FLOOR MAT**



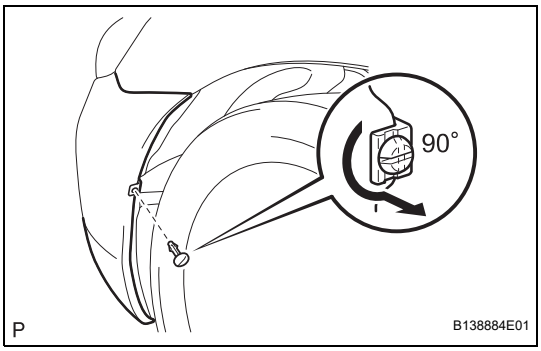


REMOVAL

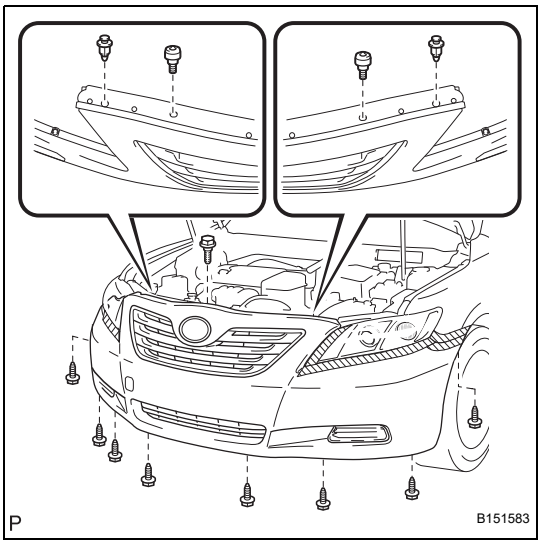
1. REMOVE FRONT BUMPER ASSEMBLY

(a) Put protective tape around the front bumper assembly.

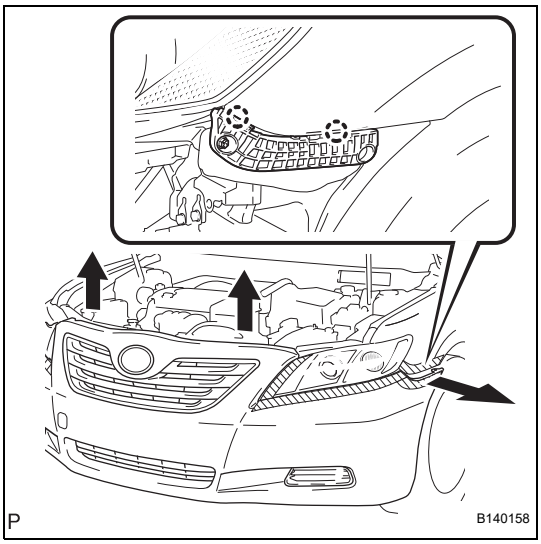
ET



(b) Using a screwdriver, turn the pin 90 degrees and remove the pin hold clip.
HINT:
Use the same procedures for the RH side and LH side.



(c) Remove the 8 screws, 2 clips, 2 radiator grille protectors and bolt.



(d) Disengage the 2 claws and disconnect the front bumper assembly as shown in the illustration.
HINT:
Use the same procedures for the RH side and LH side.
(e) Remove the front bumper assembly.

ET

INSTALLATION

1. INSTALL SYMBOL EMBLEM

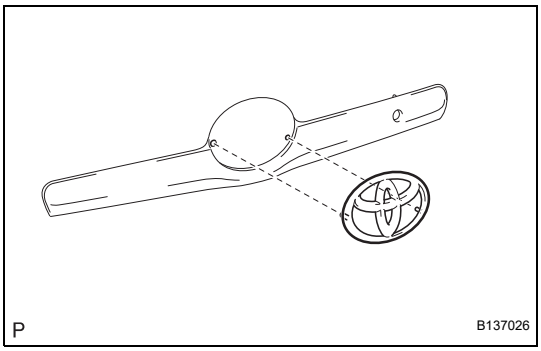
HINT:
When installing the symbol emblem, heat the luggage compartment door outside garnish and symbol emblem using a heat light.

Heating temperature

Item	Temperature
Luggage Compartment Door Outside Garnish	40 to 60°C (104 to 140°F)
Symbol Emblem	20 to 30°C (68 to 86°F)

NOTICE:
Do not heat the luggage compartment door outside garnish and symbol emblem excessively.

(a) Clean the luggage compartment door outside garnish surface.
  (1) Using a heat light, heat the luggage compartment door outside garnish surface.
  (2) Remove the double-sided tape from the luggage compartment door outside garnish.
  (3) Wipe off any tape adhesive residue with cleaner.

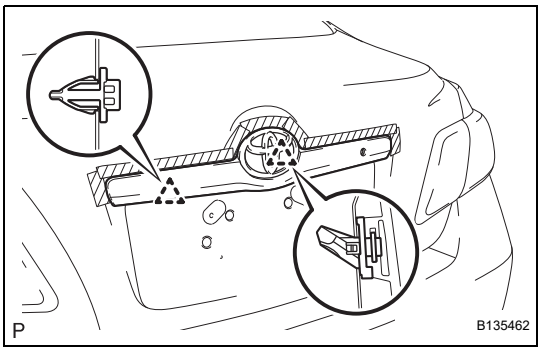


(b) Clean the symbol emblem. (If reusing the symbol emblem)
  (1) Using a heat light, heat the symbol emblem.
  (2) Remove the double-sided tape from the symbol emblem.
  (3) Wipe off any tape adhesive residue with cleaner.
  (4) Apply new double-sided tape to the symbol emblem.

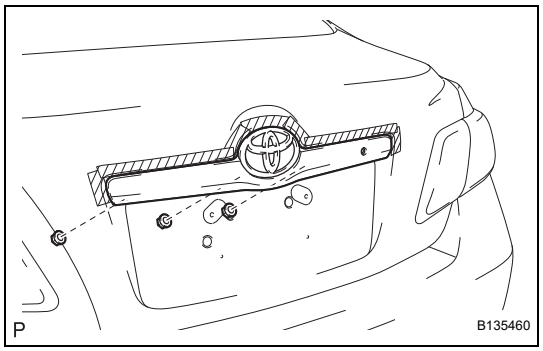
(c) Install the symbol emblem.
  (1) Using a heat light, heat the luggage compartment door outside garnish and symbol emblem.
  (2) Remove the release paper from the symbol emblem.
  HINT:
  After removing the release paper, keep the exposed adhesive free from foreign matter.
  (3) Install the symbol emblem.

2. INSTALL LUGGAGE COMPARTMENT DOOR OUTSIDE GARNISH

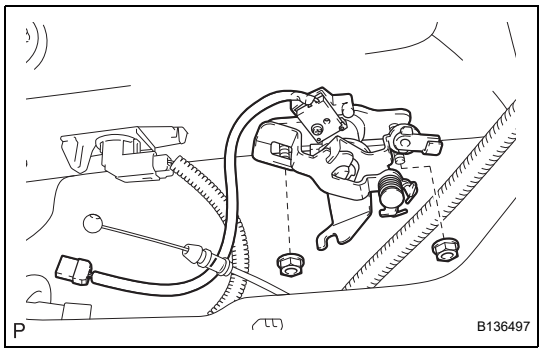
(a) Engage the 2 clips and install the luggage compartment door outside garnish.



ET

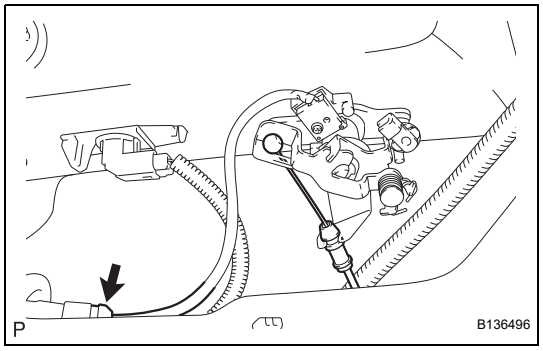


(b) Install the 3 nuts.

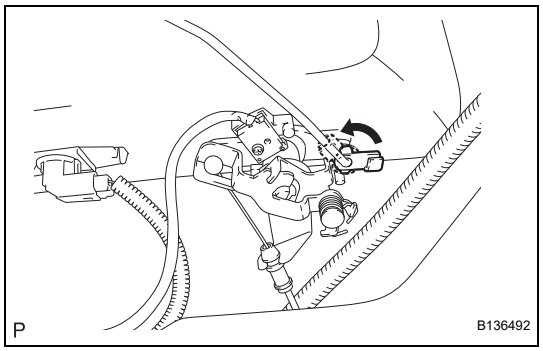


3. INSTALL LUGGAGE COMPARTMENT DOOR LOCK CYLINDER ASSEMBLY

(a) Install the luggage compartment door lock cylinder with the 2 nuts.
Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)

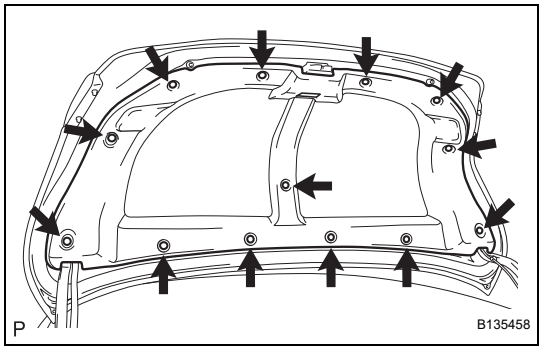


(b) Connect the cable and connector.



(c) Connect the rod.

4. INSTALL LUGGAGE DOOR OPENING SWITCH ASSEMBLY (See page DL-193)



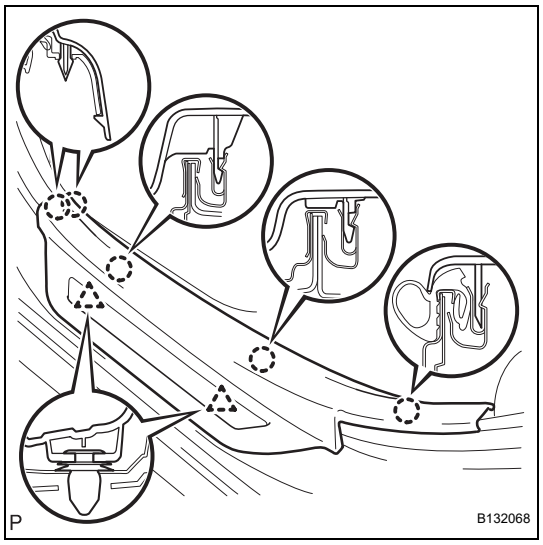
5. INSTALL LUGGAGE COMPARTMENT DOOR COVER

(a) Install the luggage compartment door cover with the 13 clips.

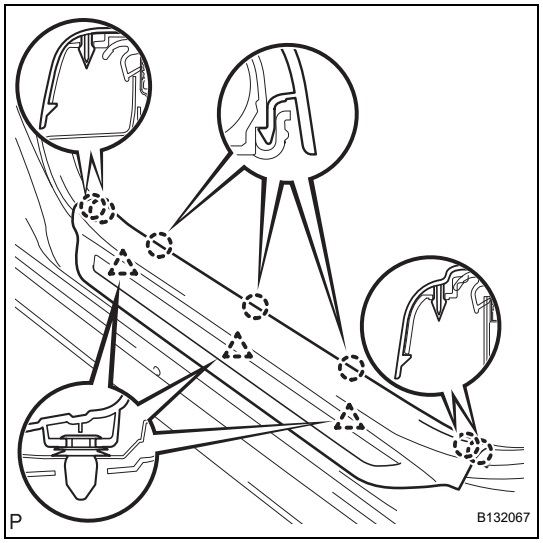
ET

REMOVAL

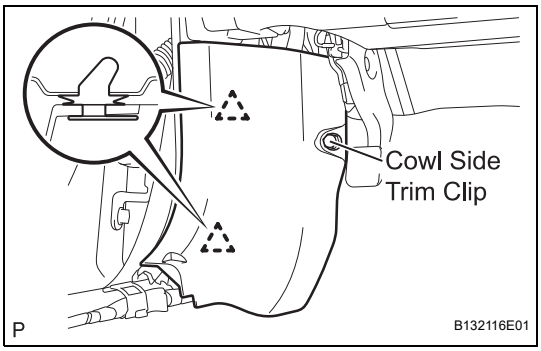
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (for Manual Seat)**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See page RS-1).
2. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**
3. **REMOVE SEAT TRACK COVER LH (for Power Seat) (See page SE-29)**
4. **REMOVE INNER SEAT TRACK BRACKET COVER LH (for Power Seat) (See page SE-29)**
5. **REMOVE FRONT SEAT ASSEMBLY LH (for Power Seat) (See page SE-29)**
6. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**
   HINT:
   Use the same procedure for the RH side and the LH side.
7. **REMOVE SEAT TRACK COVER RH (for Power Seat)**
   HINT:
   Use the same procedure for the RH side and the LH side.
8. **REMOVE INNER SEAT TRACK BRACKET COVER RH (for Power Seat)**
   HINT:
   Use the same procedure for the RH side and the LH side.
9. **REMOVE FRONT SEAT ASSEMBLY RH (for Power Seat)**
   HINT:
   Use the same procedure for the RH side and the LH side.
10. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**
11. **REMOVE SEAT TRACK COVER RH (for Manual Seat) (See page SE-16)**
12. **REMOVE INNER SEAT TRACK BRACKET COVER RH (for Manual Seat) (See page SE-16)**
13. **REMOVE FRONT SEAT ASSEMBLY RH (for Manual Seat) (See page SE-16)**



14. **REMOVE REAR DOOR SCUFF PLATE LH**
    (a) Disengage the 5 claws and 2 clips, and remove the rear door scuff plate LH.
15. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP LH**
16. **REMOVE REAR DOOR SCUFF PLATE RH**
    HINT:
    Use the same procedure for the RH side and the LH side.
17. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH**
18. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-44)**
19. **REMOVE REAR SEAT HEADREST ASSEMBLY**
20. **REMOVE REAR CENTER SEAT HEADREST ASSEMBLY**
21. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-44)**
22. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-44)**
23. **REMOVE REAR SIDE SEATBACK ASSEMBLY LH (See page SE-45)**
24. **REMOVE REAR SIDE SEATBACK ASSEMBLY RH (See page SE-45)**
25. **REMOVE REAR DOOR INSIDE HANDLE BEZEL PLUG LH (See page ED-64)**
26. **REMOVE DOOR ASSIST GRIP COVER LH (See page ED-64)**
27. **REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY LH (See page ED-65)**
28. **REMOVE REAR DOOR INNER GLASS WEATHERSTRIP LH (See page ED-66)**



29. **REMOVE FRONT DOOR SCUFF PLATE LH**
    (a) Disengage the 7 claws and 3 clips, and remove the front door scuff plate LH.

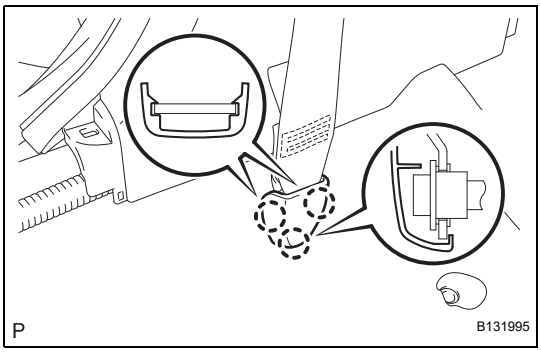


30. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH

(a) Remove the cowl side trim clip.

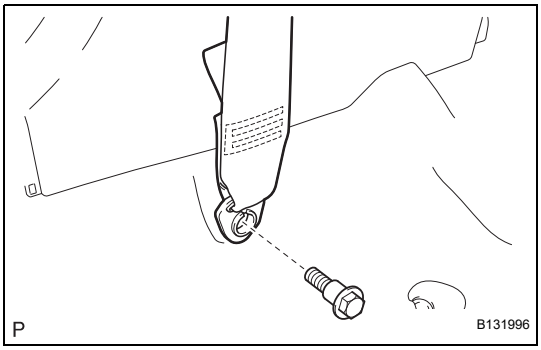
(b) Disengage the 2 clips and remove the cowl side trim sub-assembly LH.

31. REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP LH



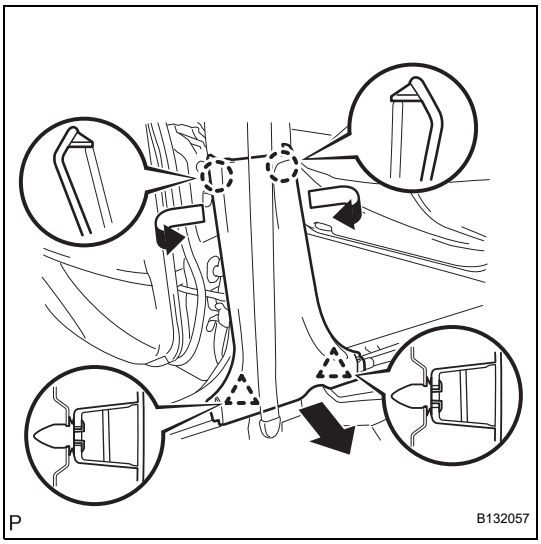
32. REMOVE LAP BELT OUTER ANCHOR COVER (for LH Side)

(a) Disengage the 3 claws and remove the lap belt outer anchor cover.



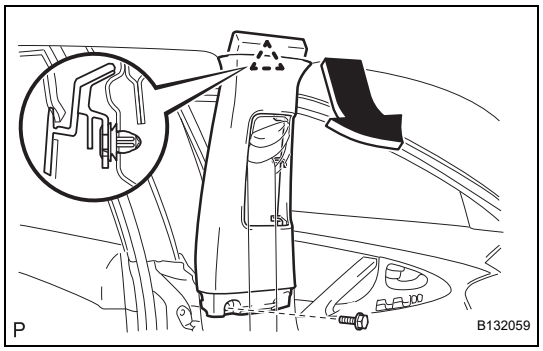
33. DISCONNECT FRONT SEAT OUTER BELT ASSEMBLY LH

(a) Remove the bolt and disconnect the floor end of the front seat outer belt assembly LH.



34. REMOVE LOWER CENTER PILLAR GARNISH LH

(a) Disengage the 2 claws and 2 clips, and remove the lower center pillar garnish LH.



35. REMOVE UPPER CENTER PILLAR GARNISH LH

(a) Remove the bolt.

(b) Disengage the clip and remove the upper center pillar garnish LH.

36. REMOVE FRONT DOOR SCUFF PLATE RH

HINT:

Use the same procedure for the RH side and the LH side.

37. REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH

HINT:

Use the same procedure for the RH side and the LH side.

38. REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP RH

39. REMOVE LAP BELT OUTER ANCHOR COVER (for RH Side)

HINT:

Use the same procedure for the RH side and the LH side.

40. DISCONNECT FRONT SEAT OUTER BELT ASSEMBLY RH

HINT:

Use the same procedure for the RH side and the LH side.

41. REMOVE LOWER CENTER PILLAR GARNISH RH

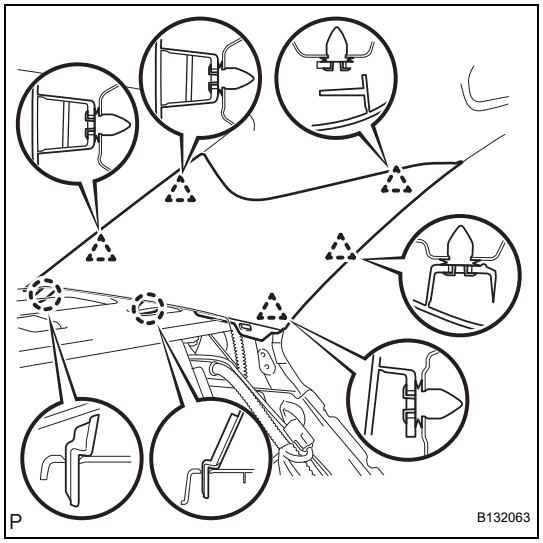
HINT:

Use the same procedure for the RH side and the LH side.

42. REMOVE UPPER CENTER PILLAR GARNISH RH

HINT:

Use the same procedure for the RH side and the LH side.



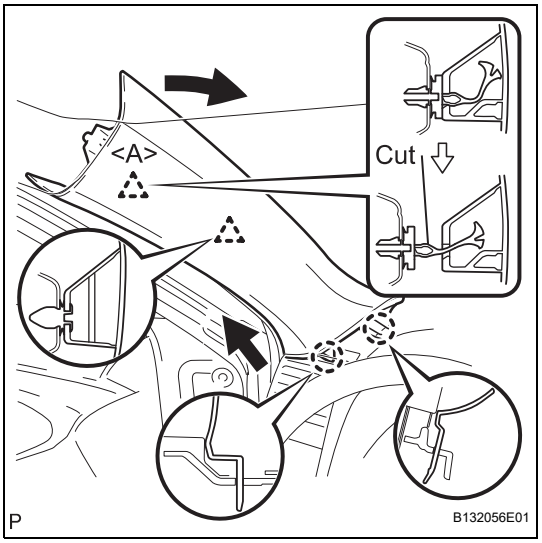
43. REMOVE ROOF SIDE INNER GARNISH LH

(a) Disengage the 5 clips and 2 claws, and remove the roof side inner garnish LH.

44. REMOVE ROOF SIDE INNER GARNISH RH

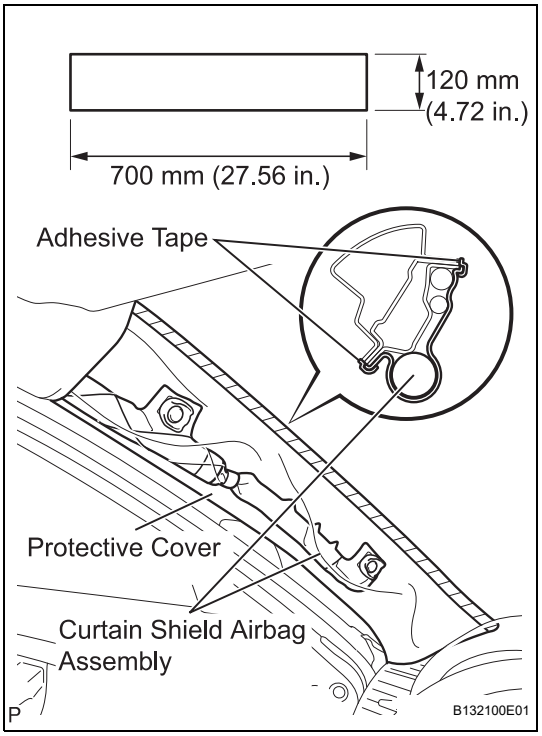
HINT:

Use the same procedure for the RH side and the LH side.

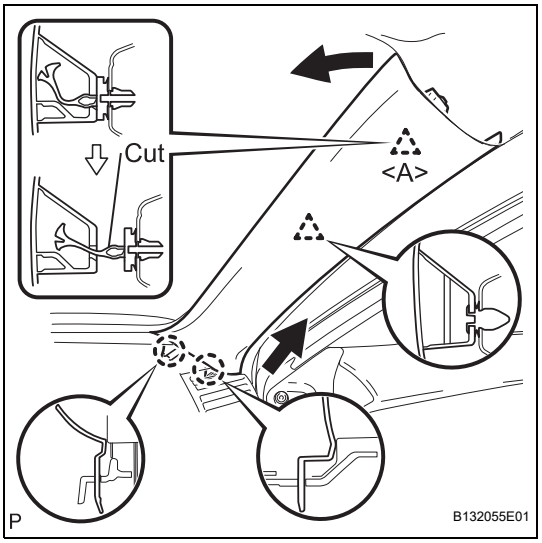


45. REMOVE FRONT PILLAR GARNISH LH

(a) Pull the upper part of the garnish toward the inside of the cabin and disengage the 2 clips.
(b) Cut off the clip <A>.
(c) Disengage the 2 claws and remove the front pillar garnish LH.
(d) Remove the clip <A> from the vehicle body.

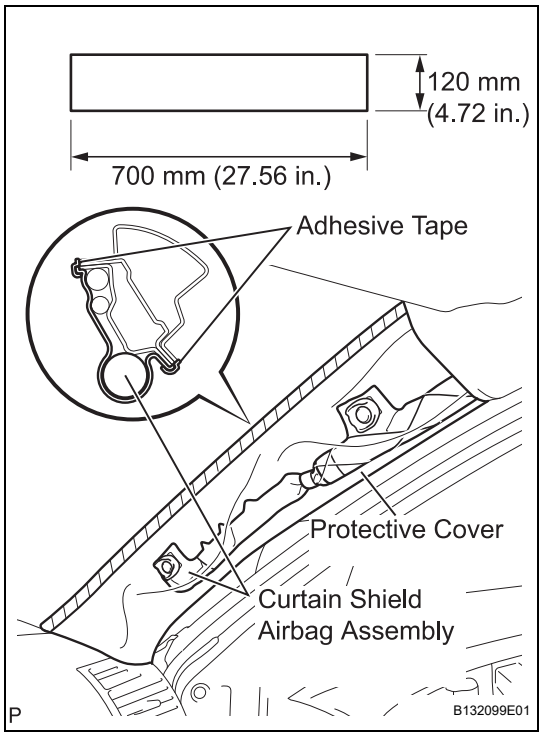


(e) Protect the curtain shield airbag assembly.
(1) Cover the airbag with a piece of nylon cloth of 700 mm (27.56 in.) x 120 mm (4.72 in.) and fix the ends of the cover with tape, as shown in the illustration.
NOTICE:
Cover the curtain shield airbag with a protective cover as soon as the front pillar garnish is removed.

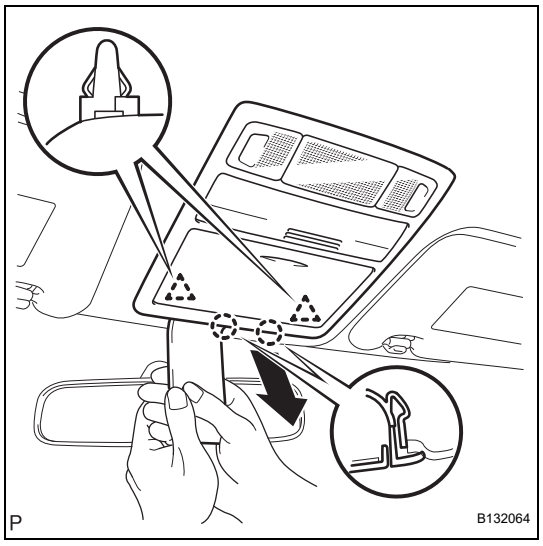


46. REMOVE FRONT PILLAR GARNISH RH

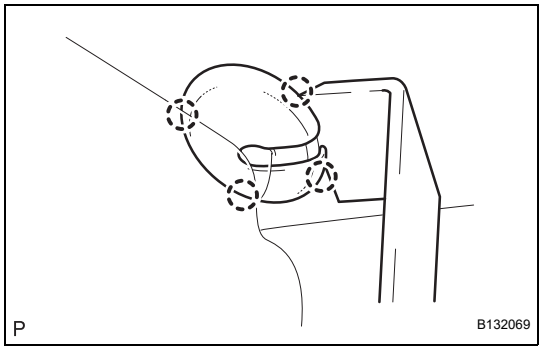
(a) Pull the upper of the garnish towards the inside of the cabin and disengage the 2 clips.
(b) Cut off the clip <A>.
(c) Disengage the 2 claws and remove the front pillar garnish RH.
(d) Remove the clip <A> from the vehicle body.



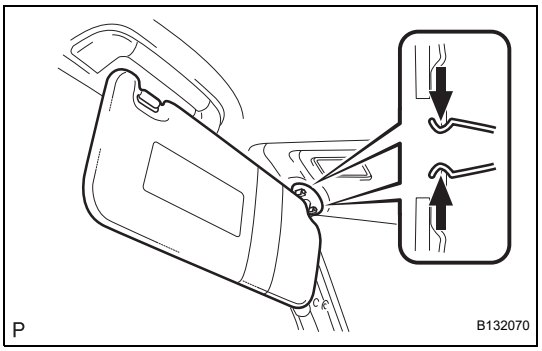
(e) Protect the curtain shield airbag assembly.
(1) Cover the airbag with a piece of nylon cloth of 700 mm (27.56 in.) x 120 mm (4.72 in.) and fix the ends of the cover with tape, as shown in the illustration.
NOTICE:
Cover the curtain shield airbag with a protective cover as soon as the front pillar garnish is removed.



47. REMOVE ROOF CONSOLE BOX ASSEMBLY
(a) Using a moulding remover, disengage the 2 clips and 2 claws.
(b) Disconnect the connectors and remove the roof console box assembly.



48. REMOVE VISOR ASSEMBLY LH
(a) Using a moulding remover, disengage the 4 claws and remove the visor bracket cover.



(b) Disengage the 2 clips and remove the visor assembly LH.

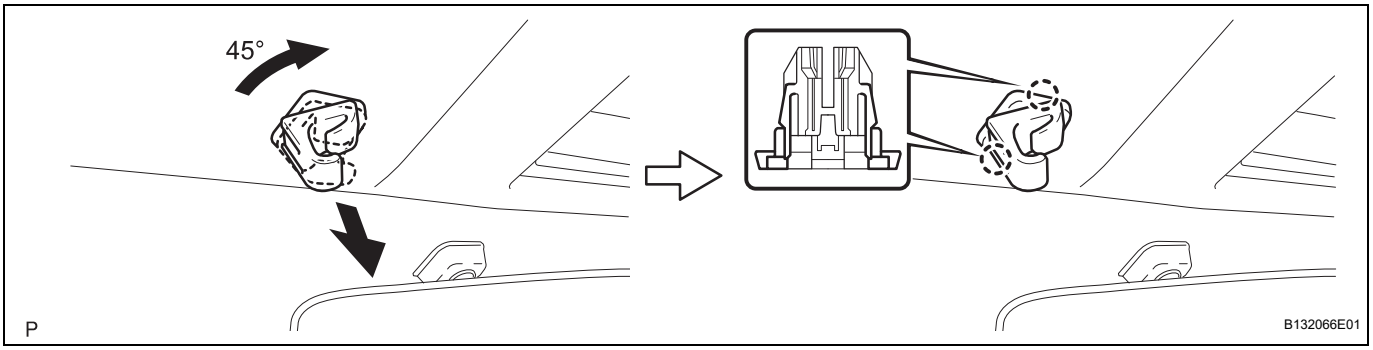
49. REMOVE VISOR ASSEMBLY RH

HINT:
Use the same procedure for the RH side and the LH side.

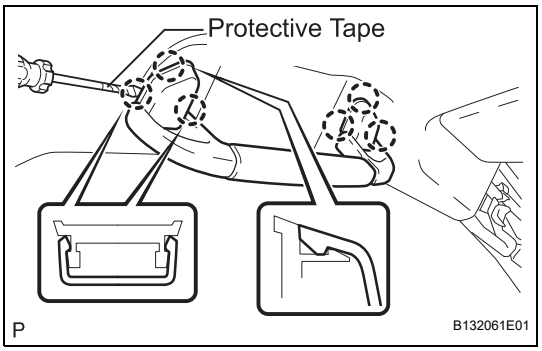
50. REMOVE VISOR HOLDER

(a) Turn the visor holder approximately 45° and pull it out as shown in the illustration.

(b) Disengage the 2 claws and remove the visor holder.

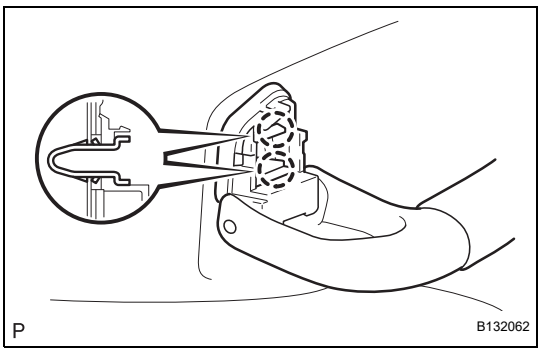


HINT:
Use the same procedure for the RH side and the LH side.



51. REMOVE FRONT ASSIST GRIP SUB-ASSEMBLY

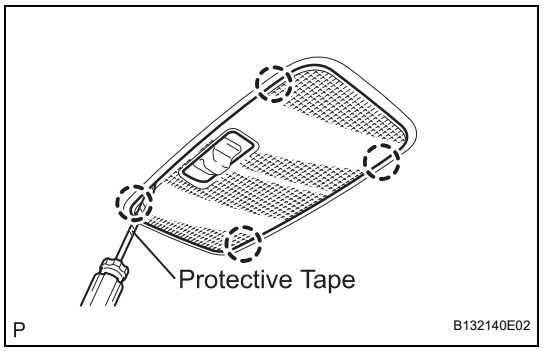
(a) Using a screwdriver, disengage the 6 claws and remove the 2 assist grip covers.
HINT:
Tape the screwdriver tip before use.



(b) Disengage the 2 clips and remove the front assist grip sub-assembly.
HINT:
Use the same procedure for the RH side and the LH side.

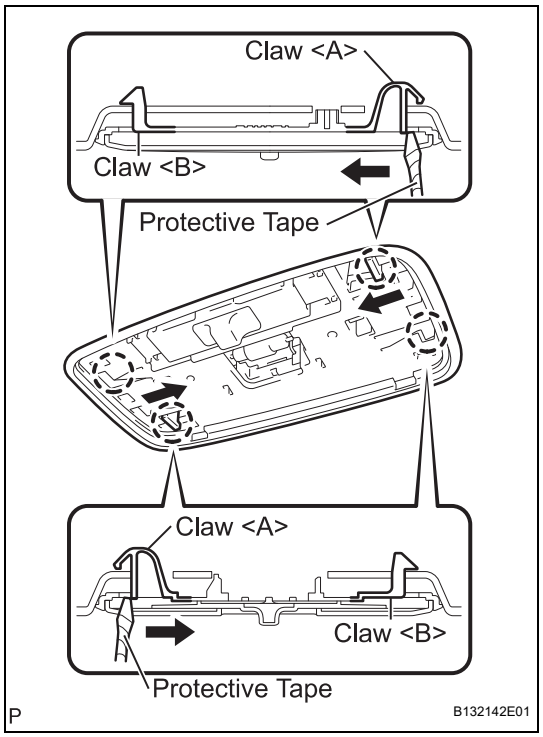
52. REMOVE REAR ASSIST GRIP SUB-ASSEMBLY

HINT:
Use the same procedure for the rear side and the front side.

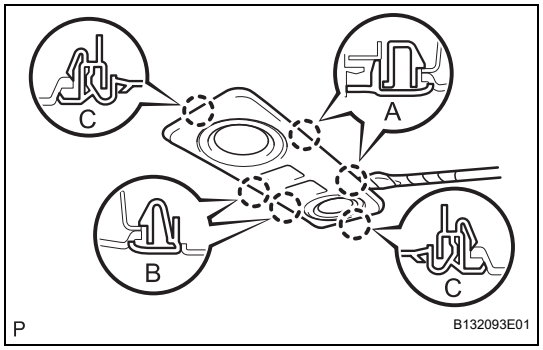


53. REMOVE NO. 1 ROOM LIGHT ASSEMBLY (w/o Sliding Roof)

(a) Using a screwdriver, disengage the 4 claws and remove the lens cover.
HINT:
Tape the screwdriver tip before use.

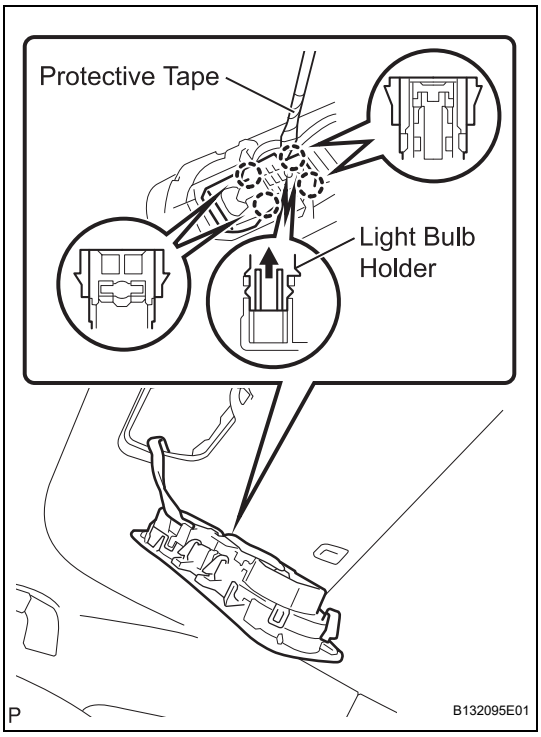


(b) Using a screwdriver, disengage the 2 claws <A> as shown in the illustration.
HINT:
Tape the screwdriver tip before use.
(c) Disengage the 2 claws <B> and remove the No. 1 room light assembly.
(d) Disconnect the room light connector.



54. REMOVE SPOT LIGHT ASSEMBLY (w/ Sliding Roof)

(a) Using a screwdriver, disengage the 2 claws labeled A and 2 claws labeled B from the vehicle body.
HINT:
Tape the screwdriver tip before use.
(b) Using a screwdriver, disengage the 2 claws labeled C and remove the spot light assembly from the headlining.
HINT:
Tape the screwdriver tip before use.



(c) Using a screwdriver, disengage the 4 claws.
HINT:
Tape the screwdriver tip before use.
(d) Pull the light bulb holder in the direction indicated by the arrow in the illustration to detach the claw. Then remove the spot light assembly from the light bulb holder.

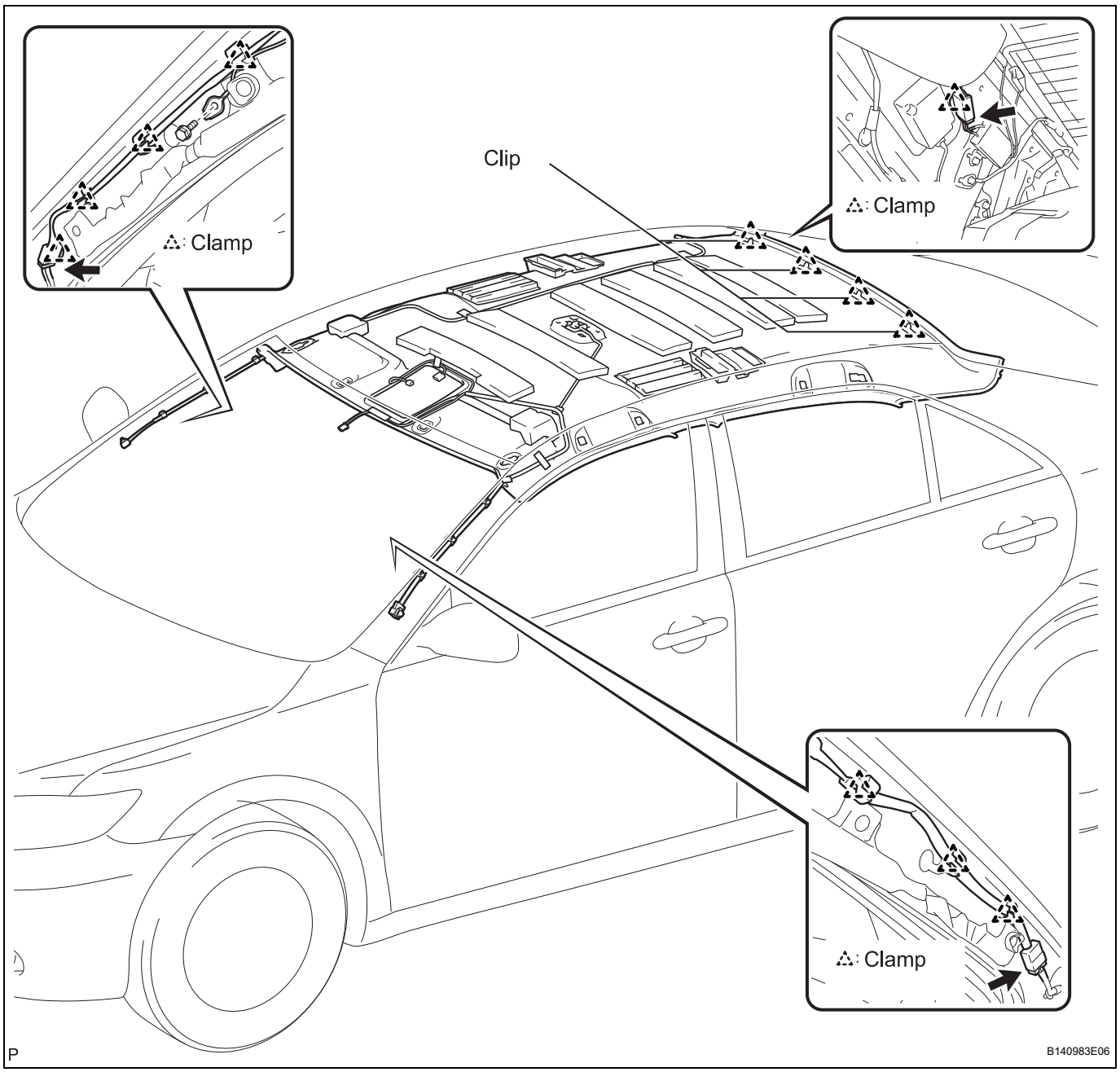
55. REMOVE SUN ROOF OPENING TRIM MOULDING (w/ Sliding Roof)

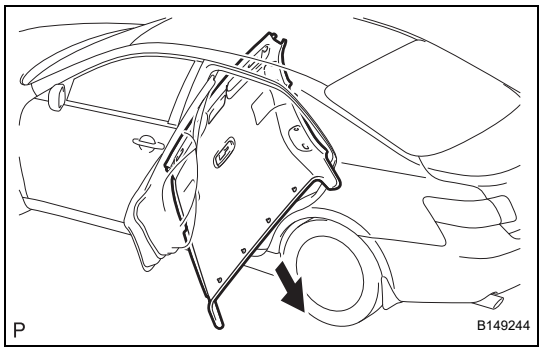
(a) Remove the sun roof opening trim moulding.

56. REMOVE ROOF HEADLINING ASSEMBLY (w/o Sliding Roof)

(a) Disconnect the No. 1 roof wire connector and disengage each clamp from the front pillar LH.
(b) Remove the bolt and disconnect the radio setting condenser from the front pillar RH.
(c) Disconnect the antenna cord sub-assembly connector and disengage each clamp from the front pillar RH.
(d) Disconnect the antenna cord sub-assembly connector and disengage the clamp from the rear pillar RH.

(e) Disengage the 4 clips.



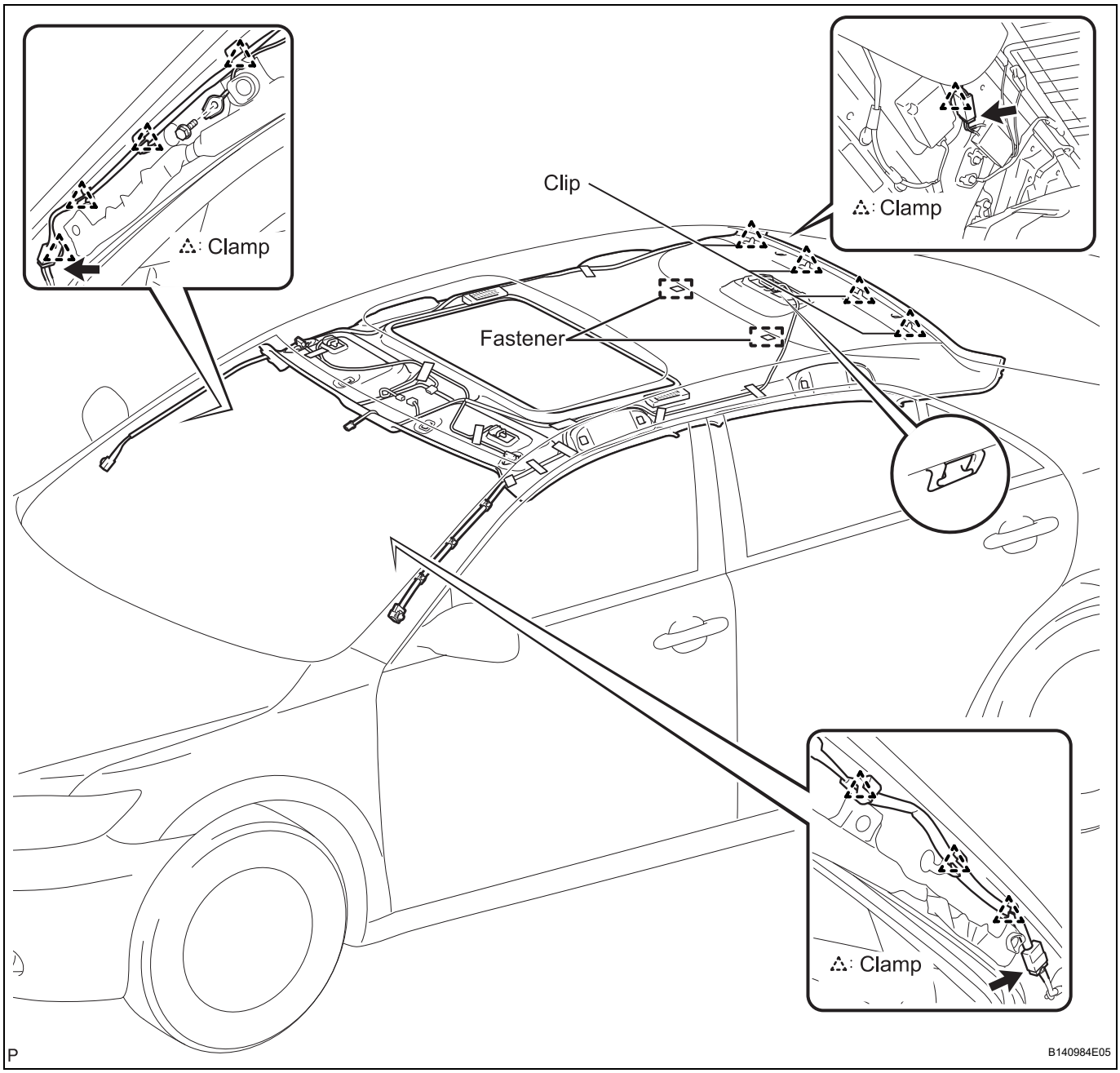


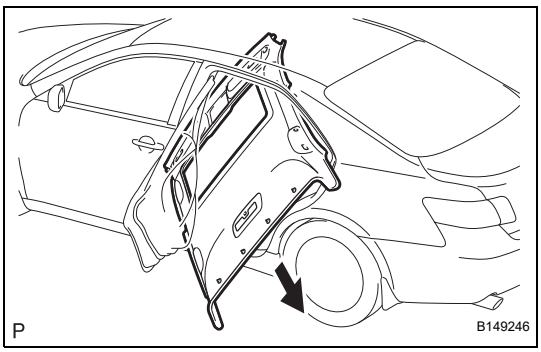
(f) Remove the roof headlining assembly from the vehicle through the rear left door.

57. REMOVE ROOF HEADLINING ASSEMBLY (w/ Sliding Roof)

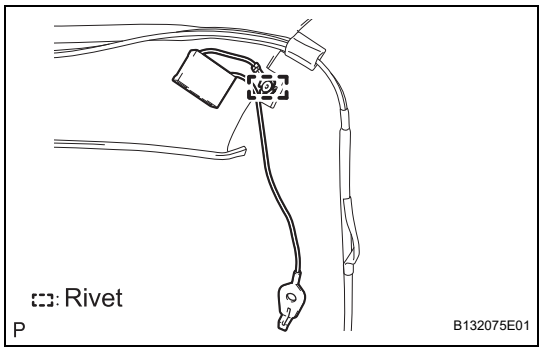
(a) Disconnect the No. 1 roof wire connector and disengage each clamp from the front pillar LH.
(b) Remove the bolt and disconnect the radio setting condenser from the front pillar RH.
(c) Disconnect the antenna cord sub-assembly connector and disengage each clamp from the front pillar RH.
(d) Disconnect the antenna cord sub-assembly connector and disengage the clamp from the rear pillar RH.

(e) Disconnect the sliding roof drive gear connector.
(f) Disengage the hook, 4 clips, and 2 fasteners.



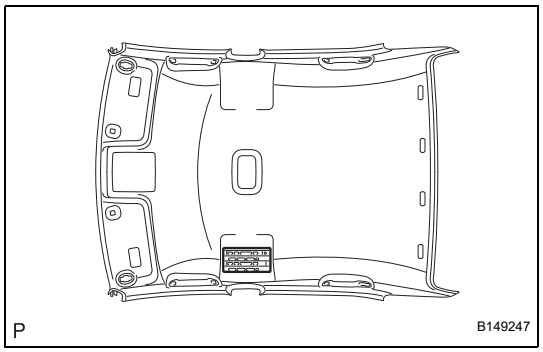


(g) Remove the roof headlining assembly from the vehicle through the rear left door.



58. REMOVE RADIO SETTING CONDENSER

(a) Remove the rivet and radio setting condenser.



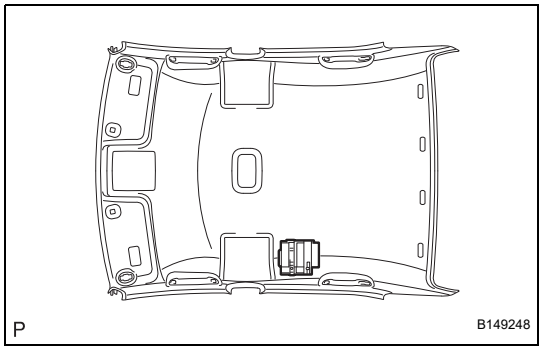
59. REMOVE NO. 2 REAR SIDE RAIL SPACER LH (w/o Sliding Roof)

(a) Remove the No. 2 rear side rail spacer LH.

60. REMOVE NO. 2 REAR SIDE RAIL SPACER RH (w/o Sliding Roof)

HINT:

Use the same procedure for the RH side and the LH side.



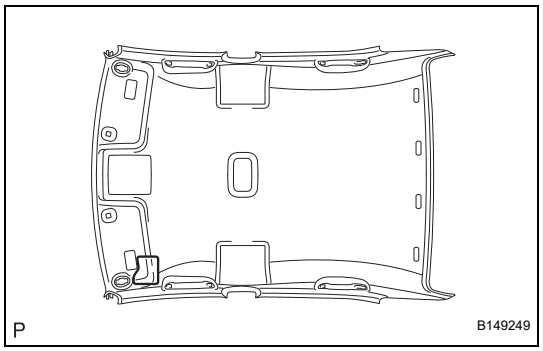
61. REMOVE NO. 3 REAR SIDE RAIL SPACER LH (w/o Sliding Roof)

(a) Remove the No. 3 rear side rail spacer LH.

62. REMOVE NO. 3 REAR SIDE RAIL SPACER RH (w/o Sliding Roof)

HINT:

Use the same procedure for the RH side and the LH side.



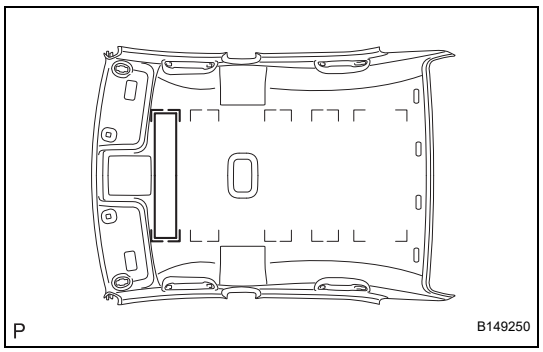
63. REMOVE ROOF SIDE RAIL SILENCER PAD LH (w/o Sliding Roof)

(a) Remove the roof side rail silencer pad LH.

64. REMOVE ROOF SIDE RAIL SILENCER PAD RH (w/o Sliding Roof)

HINT:

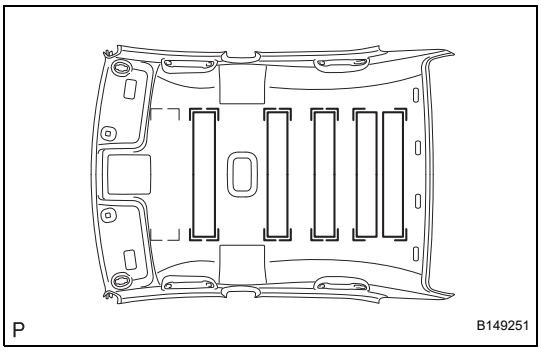
Use the same procedure for the RH side and the LH side.



65. REMOVE NO. 2 ROOF SILENCER PAD (w/o Sliding Roof)

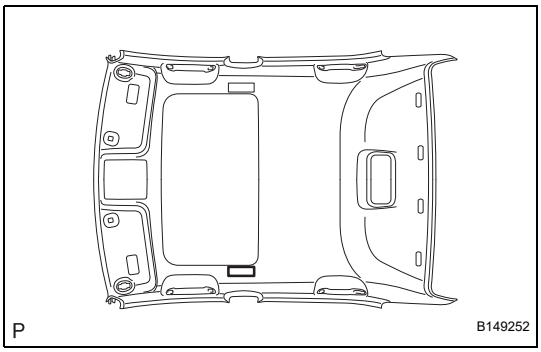
(a) Remove the No. 2 roof silencer pad.

IR



66. REMOVE NO. 4 ROOF SILENCER PAD (w/o Sliding Roof)

(a) Remove the No. 4 roof silencer pads.

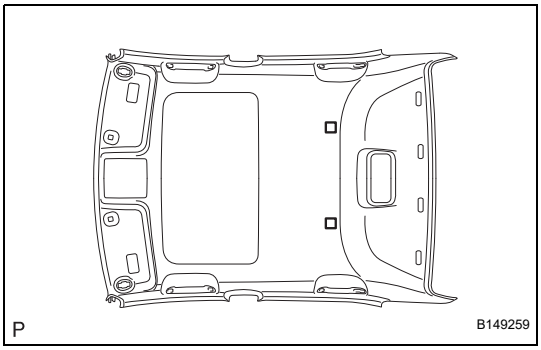


67. REMOVE NO. 2 REAR SIDE RAIL SPACER LH (w/ Sliding Roof)

(a) Remove the No. 2 rear side rail spacer LH.

68. REMOVE NO. 2 REAR SIDE RAIL SPACER RH (w/ Sliding Roof)

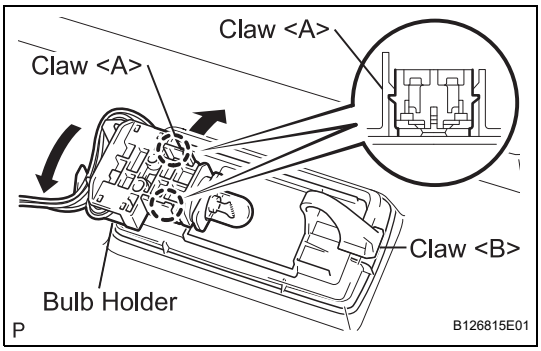
HINT:
Use the same procedure for the RH side and the LH side.



69. REMOVE FASTENER HOOK (w/ Sliding Roof)

(a) Remove the fastener hook.

70. REMOVE ANTENNA CORD SUB-ASSEMBLY (See page AV-176)



71. REMOVE VANITY LIGHT ASSEMBLY (w/ Sliding Roof)

(a) Disengage the 2 claws <A> and separate the bulb holder from the vanity light assembly as shown in the illustration.

(b) Disengage the claw <B> and remove the vanity light assembly.
HINT:
Use the same procedure to remove the light on the other side.

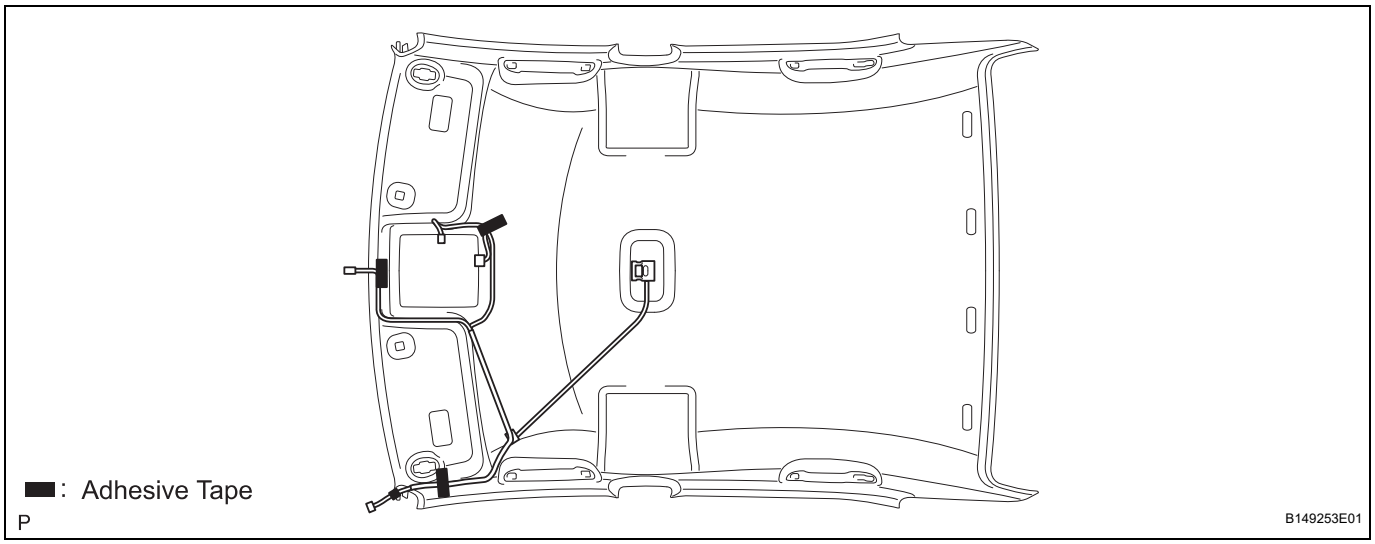
72. REMOVE NO. 1 ROOF WIRE (w/o Sliding Roof)

(a) Remove the adhesive tape from the roof headlining assembly.

(b) Remove the No. 1 roof wire from the roof headlining assembly.

IR

(c) Remove the double-sided tape from the roof headlining assembly.



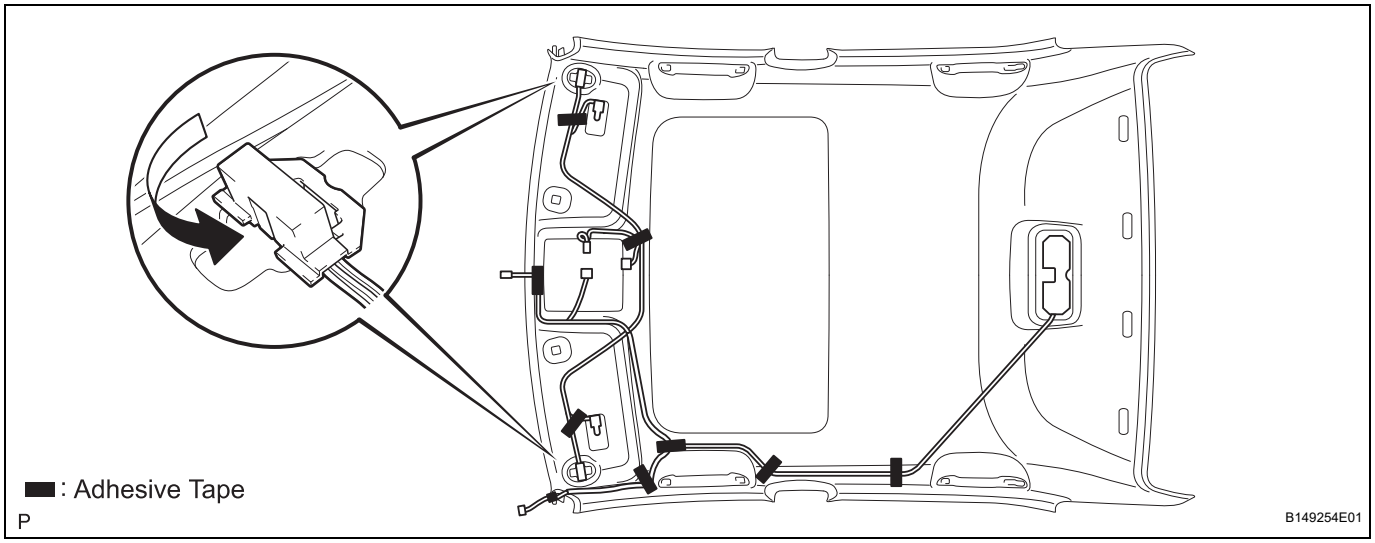
73. REMOVE NO. 1 ROOF WIRE (w/ Sliding Roof)

(a) Turn the visor connectors counterclockwise approximately 90° and separate the connectors from the roof headlining assembly.

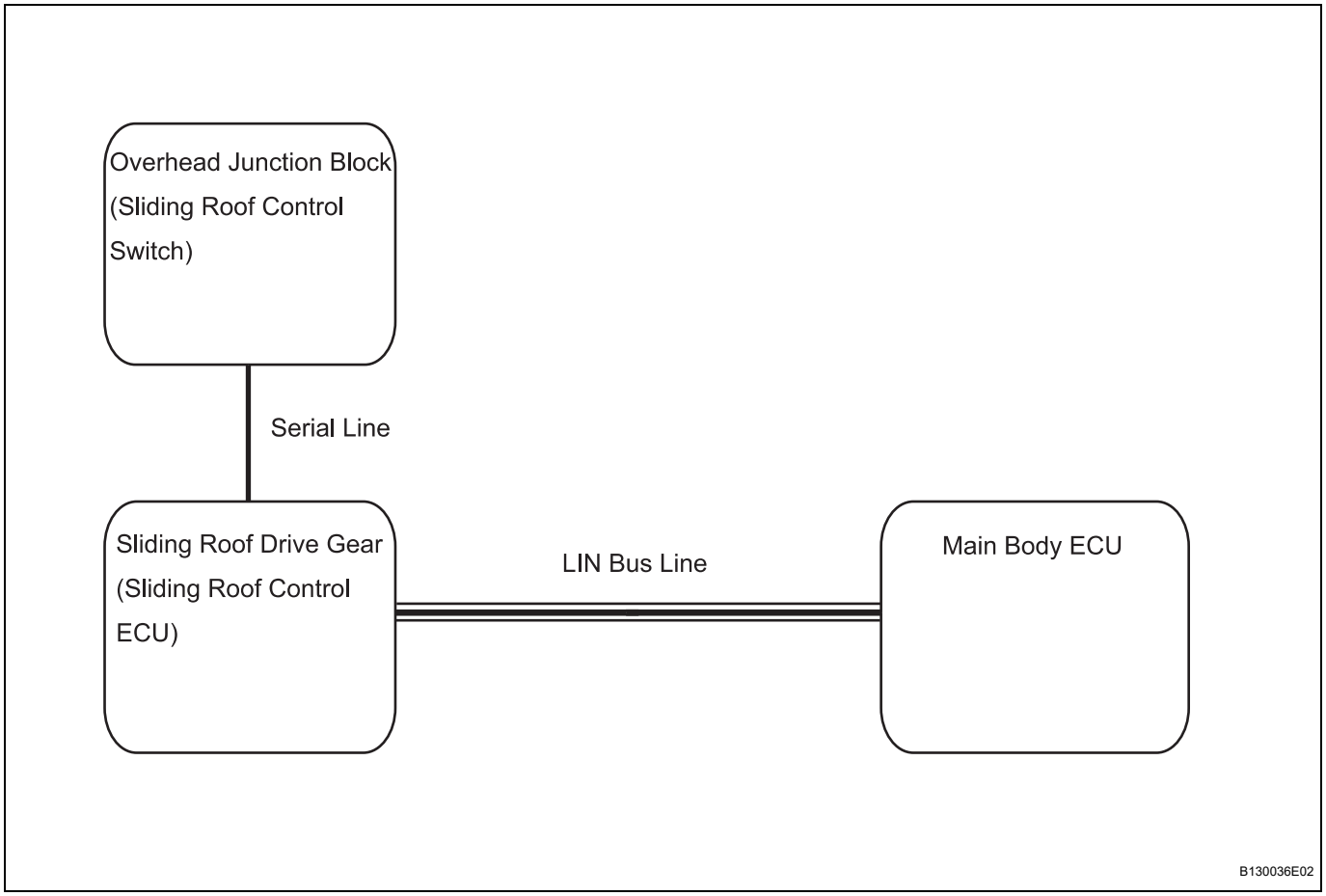
(b) Remove the adhesive tape from the roof headlining assembly.

(c) Remove the No. 1 roof wire from the roof headlining assembly.

(d) Remove the double-sided tape from the roof headlining assembly.



SYSTEM DIAGRAM



Communication table

Sender	Receiver	Signal	Line
Main Body ECU	Sliding Roof Control ECU	Key-off sliding roof operation signal	LIN

SYSTEM DESCRIPTION

1. GENERAL

This system has the following functions: manual slide open and close; auto slide open and close; manual tilt up and down; auto tilt up and down, jam protection; and key off operation.

2. FUNCTION OF MAIN COMPONENT

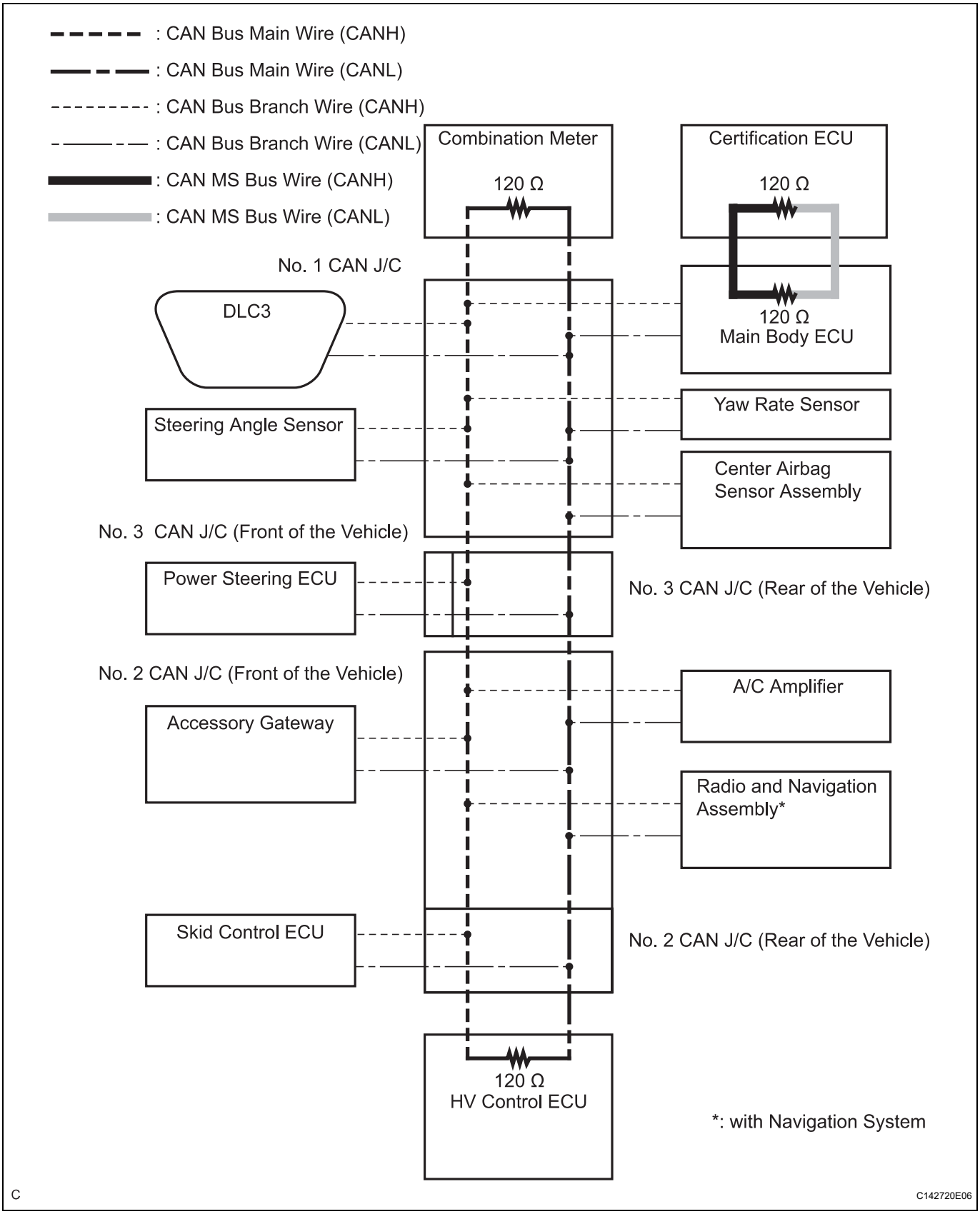
Component	Outline
Sliding Roof Drive Gear Sub-assembly (Sliding roof control ECU)	Sliding roof control ECU controls sliding roof motor to rotate forward and backward, which tilts or slides sliding roof glass.
Overhead Junction Block	Output of operation signals from built-in sliding roof switch to sliding roof control ECU is handled by overhead junction block.

3. SYSTEM OPERATION

The sliding roof has the following features:

Function	Outline
Manual slide open and close	This function causes sliding roof to open (or close) when OPEN/CLOSE switch is pressed for a maximum of 0.3 seconds. Sliding roof stops as soon as the switch is released.
Auto slide open and close	This function causes sliding roof to fully open (or close) when OPEN/CLOSE switch is pressed for a minimum of 0.3 seconds.
Manual tilt up and down	This function causes sliding roof to tilt up (or tilt down) when UP/DOWN switch is pressed for a maximum of 0.3 seconds.
Auto tilt up and down	This function enables sliding roof to tilt up (or down) when UP/DOWN switch is pressed for a minimum of 0.3 seconds.
Jam protection	The jam protection function automatically stops sliding roof, or stops sliding roof and makes it open halfway (or fully tilted up) if a foreign object gets jammed in sliding roof during auto close operation (or auto tilt down operation).
Key off operation	Key off operation function makes it possible to operate sliding roof for approximately 43 seconds after power switch is turned off, if front doors are not opened.

SYSTEM DIAGRAM

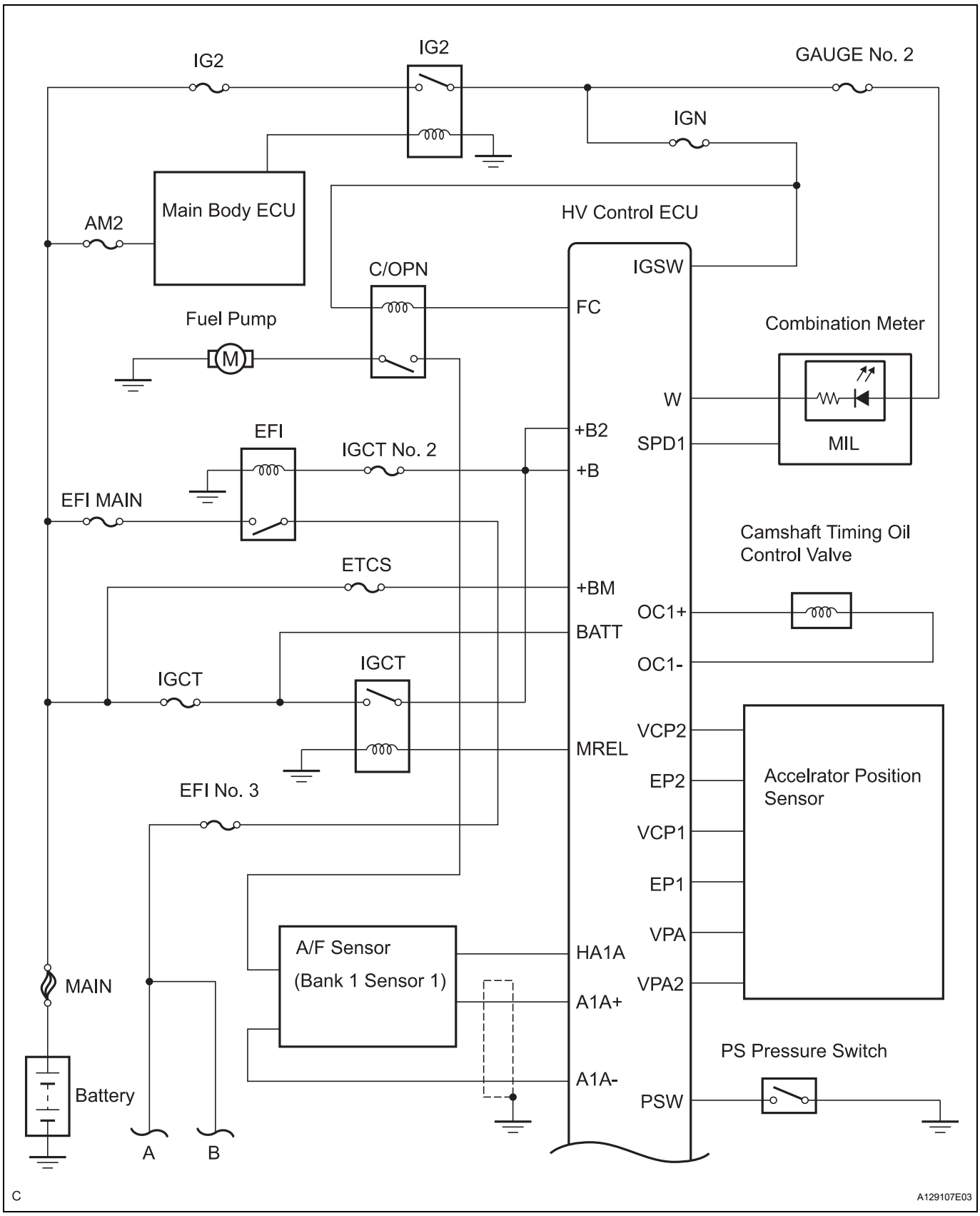


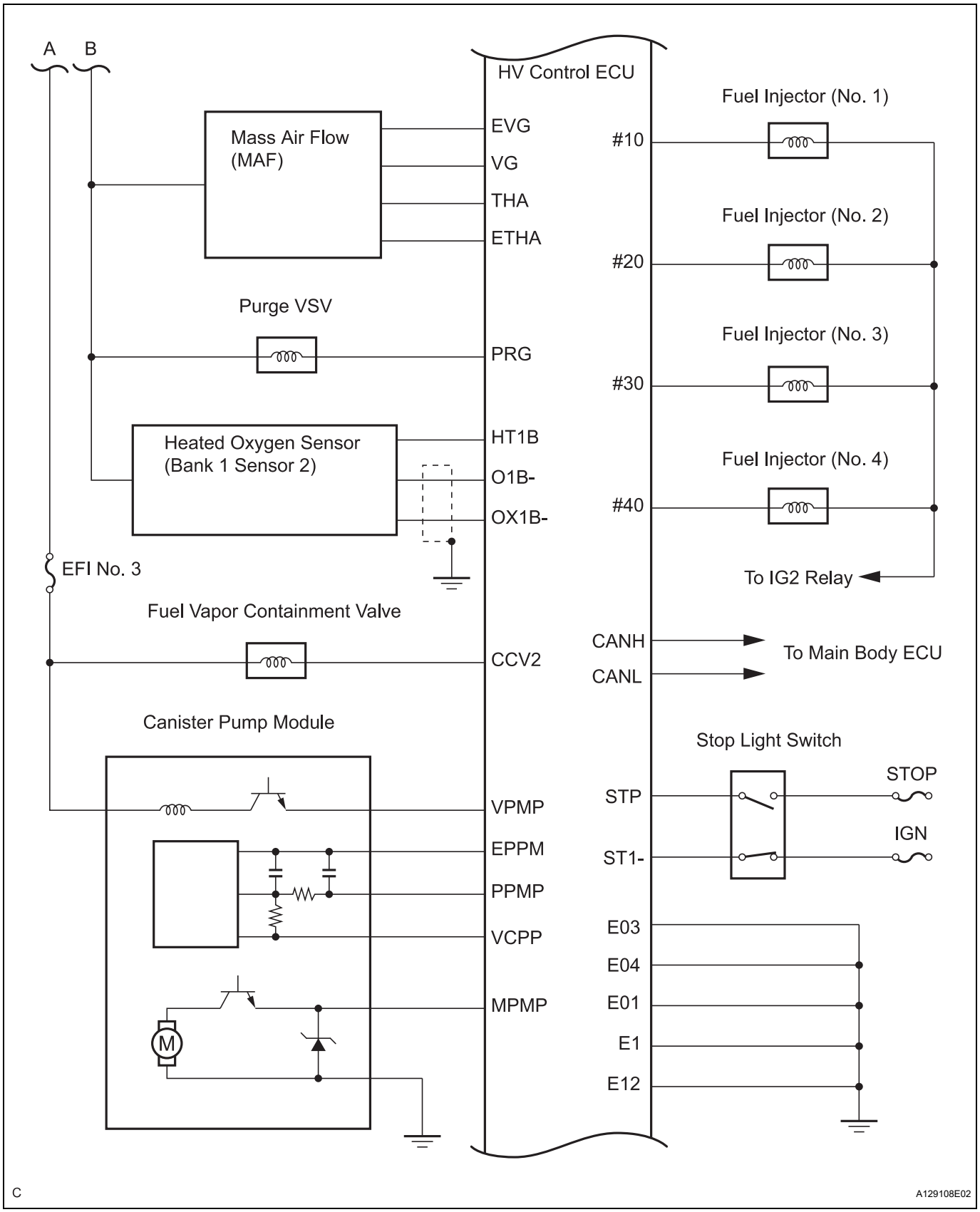
CA

HINT:

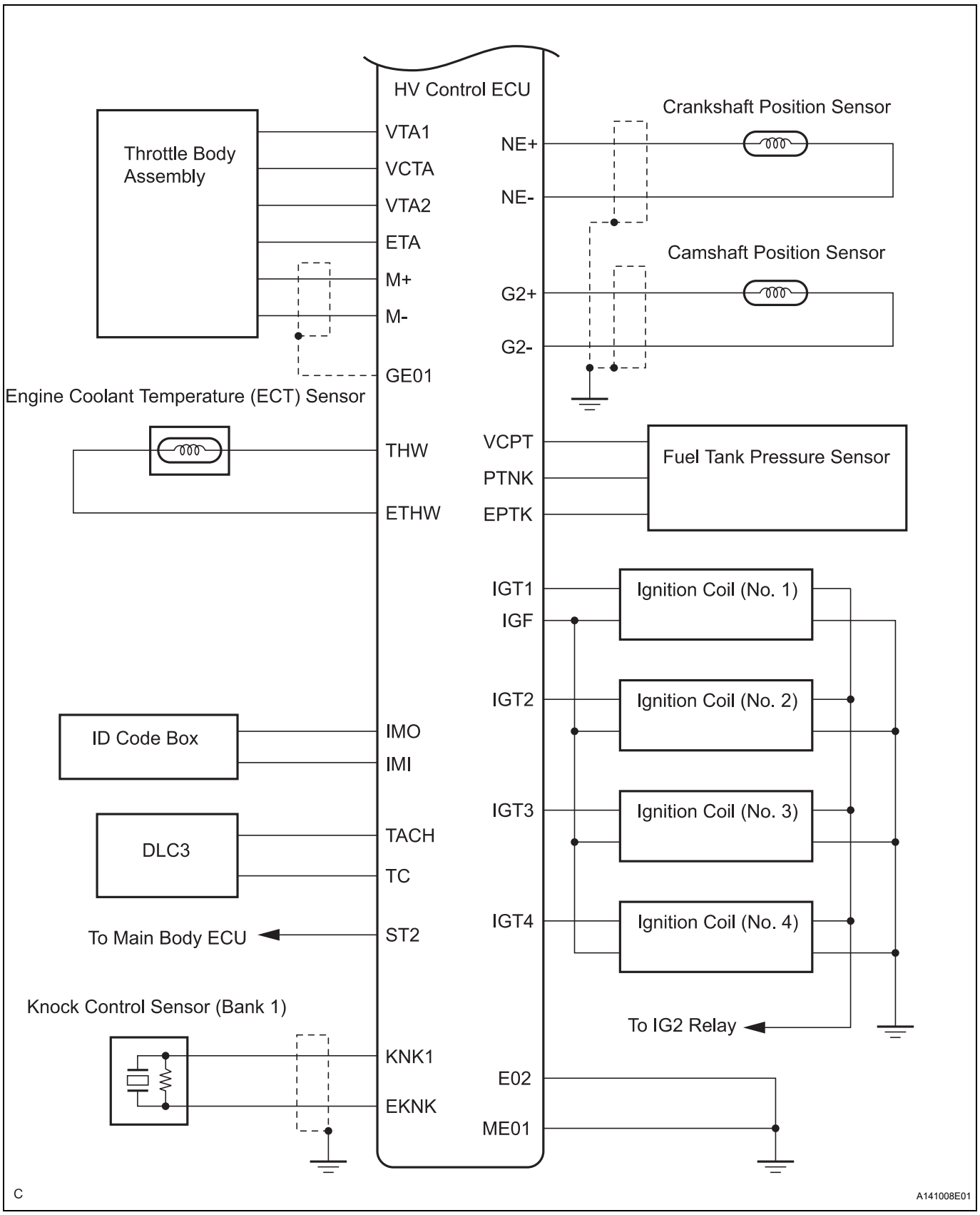
- The skid control ECU detects and stores steering angle sensor and yaw rate sensor DTCs and allows DTC communication by receiving information from the steering angle sensor and yaw rate sensor.

SYSTEM DIAGRAM




A
B
HV Control ECU
Mass Air Flow
(MAF)
EVG
VG
THA
ETHA
Purge VSV
PRG
Heated Oxygen Sensor
(Bank 1 Sensor 2)
HT1B
O1B-
OX1B-
EFI No. 3
Fuel Vapor Containment Valve
CCV2
Canister Pump Module
VPMP
EPPM
PPMP
VCPP
MPMP
M
Fuel Injector (No. 1)
#10
Fuel Injector (No. 2)
#20
Fuel Injector (No. 3)
#30
Fuel Injector (No. 4)
#40
To IG2 Relay
CANH
CANL
To Main Body ECU
Stop Light Switch
STP
STOP
IGN
ST1-
E03
E04
E01
E1
E12
C
A129108E02

ES


HV Control ECU
Throttle Body Assembly
VTA1
VCTA
VTA2
ETA
M+
M-
GE01
Engine Coolant Temperature (ECT) Sensor
THW
ETHW
ID Code Box
IMO
IMI
DLC3
TACH
TC
To Main Body ECU
ST2
Knock Control Sensor (Bank 1)
KNK1
EKNK
Crankshaft Position Sensor
NE+
NE-
Camshaft Position Sensor
G2+
G2-
VCPT
PTNK
EPTK
Fuel Tank Pressure Sensor
IGT1
IGF
Ignition Coil (No. 1)
IGT2
Ignition Coil (No. 2)
IGT3
Ignition Coil (No. 3)
IGT4
Ignition Coil (No. 4)
To IG2 Relay
E02
ME01
C
A141008E01

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
The intelligent tester should be used in steps 3, 4, 5, 7 and 10.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

NEXT

3	CONNECT INTELLIGENT TESTER TO THE DLC3

HINT:
If the display indicates a communication fault in the tester, inspect the DLC3.

NEXT

4	CHECK DTC AND FREEZE FRAME DATA

HINT:
Record or print DTCs and freeze frame data, if necessary.

NEXT

5	CLEAR DTC AND FREEZE FRAME DATA

NEXT

6	CONDUCT VISUAL INSPECTION

NEXT

7	SET CHECK MODE DIAGNOSIS

NEXT

8	CONFIRM PROBLEM SYMPTOMS

HINT:
If the engine does not start, perform steps 10 and 12 first.

Result

Result	Proceed to
Malfunction does not occur	A
Malfunction occurs	B

B → GO TO STEP 10

A

9	SIMULATE SYMPTOMS

ES

NEXT

10	CHECK FOR DTC

Result

Result	Proceed to
Trouble code	A
No code	B

B → GO TO STEP 12

A

11	REFER TO DTC CHART

NEXT

GO TO STEP 14

12	CONDUCT BASIC INSPECTION

Result

Result	Proceed to
Malfunctioning parts not confirmed	A
Malfunctioning parts confirmed	B

B → GO TO STEP 17

A

13	REFER TO PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Malfunctioning circuit confirmed	A

Result	Proceed to
Malfunctioning parts confirmed	B

B → GO TO STEP 17

A

14	CHECK ECM POWER SOURCE CIRCUIT

NEXT

15	CONDUCT CIRCUIT INSPECTION

ES

Result

Result	Proceed to
Malfunction not confirmed	A
Malfunction confirmed	B

B → GO TO STEP 18

A

16	CHECK FOR INTERMITTENT PROBLEMS

NEXT

GO TO STEP 18

17	CONDUCT PARTS INSPECTION

NEXT

18	IDENTIFY PROBLEM

NEXT

19	ADJUST AND/OR REPAIR

NEXT

20	CONDUCT CONFIRMATION TEST

NEXT

END

CHECK FOR INTERMITTENT PROBLEMS

HINT:
Inspect the vehicle's ECM using check mode. Intermittent problems are easier to detect with an intelligent tester when the ECM is in check mode. In check mode, the ECM uses 1-trip detection logic, which is more sensitive to malfunctions than normal mode (default), which uses 2-trip detection logic.

1. Clear the DTCs (See page ES-31).
2. Switch the ECM from normal mode to check mode using an intelligent tester (See page ES-34).
3. Perform a simulation test (See page IN-67).
4. Check and wiggle the harness(es), connector(s) and terminal(s).

BASIC INSPECTION

When the malfunction is not confirmed by the DTC check, troubleshooting should be carried out in all circuits considered to be possible causes of the problem. In many cases, by carrying out the basic engine check shown in the following flowchart, the location of the problem can be found quickly and efficiently. Therefore, using this check is essential when engine troubleshooting.

ES

1 CHECK BATTERY VOLTAGE

NOTICE:
Carry out this check with the engine stopped and power switch off.
Result

Result	Proceed to
11 V or more	OK
Below 11 V	NG

NG → **CHARGE OR REPLACE BATTERY**

OK

2 CHECK WHETHER ENGINE CRANKS

NG → **PROCEED TO PROBLEM SYMPTOMS TABLE**

OK

3 CHECK WHETHER ENGINE STARTS

NG → **GO TO STEP 6**

OK

4 CHECK AIR FILTER

(a) Visually check that the air filter is not excessively contaminated with dirt or oil.

NG → **REPLACE AIR FILTER**

OK

5 CHECK IDLING SPEED

NG → **PROCEED TO PROBLEM SYMPTOMS TABLE**

OK

6	CHECK FUEL PRESSURE

NG → PROCEED TO PAGE AND CONTINUE TO TROUBLESHOOT

OK

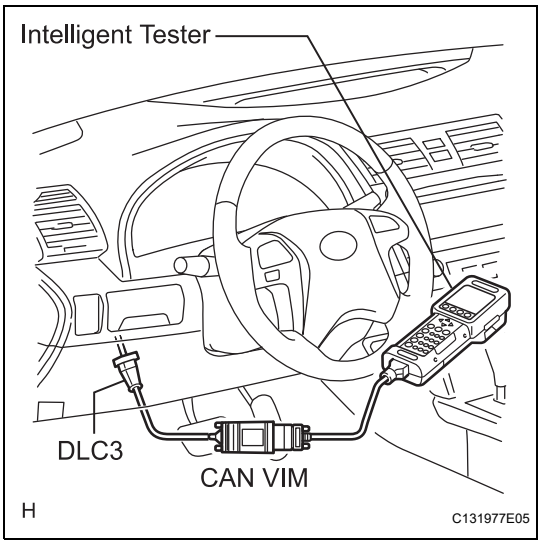
7	CHECK FOR SPARKS

NG → PROCEED TO PAGE AND CONTINUE TO TROUBLESHOOT

OK

PROCEED TO PROBLEM SYMPTOMS TABLE

INITIALIZATION



1. PERFORM INITIALIZATION

(a) Apply the parking brake and chock the vehicle.

(b) Connect the intelligent tester to the DLC3.

(c) Put the engine in the inspection mode (See page ES-35).

(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.

(e) Warm up the engine with the A/C switch off until the coolant temperature becomes 83°C (181°F) or more.

(f) Select the following menu items: DIAGNOSIS / OBD/MOBD /HV ECU / DATA LIST / SOC.

(g) Move the shift lever to the N position, set the A/C switch to MAX cool or turn on the front defroster, and leave the vehicle until the SOC value becomes below 40%.
HINT:
If the SOC is substantially below 40%, the auxiliary battery may go dead. Therefore, do not allow the SOC to reach substantially below 40%.

(h) Move the shift lever to the P position and turn the power switch off.

(i) Disconnect the negative terminal from the auxiliary battery and leave it for 1 minute or more.

(j) Reconnect the negative terminal to the auxiliary battery and turn the power switch on (IG).

(k) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.

(l) Check that the engine coolant temperature is 83°C (181°F) or more.
HINT:
If the engine coolant temperature is below 83°C (181°F), start the engine by depressing the accelerator pedal with the shift lever in the P position to increase the coolant temperature.

(m) Select the following menu items: DIAGNOSIS / ENHANCED OBDII / DATA LIST / PRIMARY / CALCLOAD.

(n) Move the shift lever to the D position while depressing the brake pedal with your left foot.

(o) Depress the accelerator pedal with your right foot while firmly depressing the brake pedal with your left foot, and maintain an engine load value of 45% or more (60 to 70% of full acceleration) for approximately 30 seconds.
NOTICE:
Do not perform this step for 40 seconds or more.

(p) Shift the shift lever to the P position. Turn the power switch off and then wait for 5 seconds before putting the vehicle into the READY-on state again.
(q) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / USER DATA / ISC LEARNING.
(r) Check that the air conditioner is off. Lightly depress the accelerator pedal and release it when the engine starts.
(s) Check that "COMPLETE" is displayed on the intelligent tester screen.
HINT:
- If "ISC LEARNING" is not completed within 1 minute, repeat steps (o) through (r).
- The engine will usually stop when "ISC LEARNING" is completed. However, the engine will not stop even when "ISC LEARNING" is completed in such cases when the charge level of the auxiliary battery is decreased.

ES

CHECKING MONITOR STATUS

The purpose of the monitor result (mode 06) is to allow access to the results for on-board diagnostic monitoring tests of specific components/systems that are not continuously monitored. Examples are catalyst, evaporative emission (EVAP) and thermostat.

The monitor result allows the OBD II scan tool to display the monitor status, test value, minimum test limit and maximum test limit. These data are displayed after the vehicle has been driven to run the monitor.

When the test value is not between the minimum test limit and maximum test limit, the ECM (included in hybrid vehicle control ECU) interprets this as a malfunction. When the component is not malfunctioning, if the difference of the test value and test limit is very small, the component will malfunction in the near future.

Perform the following instructions to view the monitor status. Although this instruction refers to the Lexus/Toyota diagnostic tester, it can be checked using a generic OBD II scan tool. Refer to your scan tool operator's manual for specific procedures.

1. PERFORM MONITOR DRIVE PATTERN

The monitor results and test values can be checked with the OBD II scan tool or the intelligent tester. The engine control module (ECM) (included in hybrid vehicle control ECU) monitors the emissions-related components such as the thermostat, catalyst converter and evaporative emissions (EVAP), and determines whether they are functioning normally or not. When monitoring is finished, the ECM stores the monitor results and the test values. The monitor result indicates whether the component is functioning normally or not. The test value is the value that was used to determine the monitor result. If the test value is outside of the test limit (malfunction criterion), the ECM determines the component is malfunctioning. Some emissions-related components have multiple test values to determine the monitor result. If one of these test values is outside of the test limit, the ECM determines that the component is malfunctioning.

(a) Connect the intelligent tester to the DLC3.

(b) Put the engine in inspection mode (See page ES-35).

(c) Turn the tester ON.

(d) Clear the DTCs.

(e) Run the vehicle in accordance with the applicable drive pattern described in READINESS MONITOR DRIVE PATTERN (See page ES-17). Do not turn the power switch off.

NOTICE:

The test results will be lost if the power switch is turned off.

2. ACCESS MONITOR RESULT

(a) Select the following intelligent tester menus: DIAGNOSIS / ENHANCED OBD II / MONITOR INFO and MONITOR RESULT. The monitor status appears after the component name.
- INCMPL: The component has not been monitored yet.
- PASS: The component is functioning normally.
- FAIL: The component is malfunctioning.

(b) Confirm that the component is either PASS or FAIL.

(c) Select the component and press ENTER. The accuracy test value appears if the monitor status is either PASS or FAIL.

HINT:

The monitor result might on rare occasions be PASS even if the Malfunction Indicator Lamp (MIL) is illuminated. This indicates that the system was malfunctioning in the previous driving cycle. This might be caused by an intermittent problem.

3. CHECK COMPONENT STATUS

(a) Compare the test value with the minimum test limit (MIN LIMIT) and maximum test limit (MAX LIMIT).

(b) If the test value is between the minimum test limit and maximum test limit, the component is functioning normally. If not, the component is malfunctioning. The test value is usually significantly higher or lower than the test limit. If the test value is on the borderline of the test limit, the component will malfunction in the near future.

HINT:

The monitor result may on rare occasions be PASS even if the Malfunction Indicator Lamp (MIL) is illuminated. This indicates that the system was malfunctioning in the previous driving cycle. This might be caused by an intermittent problem.

4. MONITOR RESULT INFORMATION

If you use a generic scan tool, multiply the test value by the scaling value listed below.

A/F Sensor Bank 1 Sensor 1:

Monitor ID	Test ID	Scaling	Unit	Description
$01	$8E	Multiply by 0.001	V	A/F sensor deterioration level
$01	$91	Multiply by 0.004	mA	A/F sensor current

HO2S Bank 1 Sensor 2:

Monitor ID	Test ID	Scaling	Unit	Description
$02	$07	Multiply by 0.001	V	Minimum sensor voltage
$02	$08	Multiply by 0.001	V	Maximum sensor voltage
$02	$8F	Multiply by 0.0003	g	Maximum oxygen storage capacity

Catalyst-Bank 1:

Monitor ID	Test ID	Scaling	Unit	Description
$21	$A9	Multiply by 0.0003	No dimension	Oxygen storage capacity of catalyst bank 1

EVAP:

Monitor ID	Test ID	Scaling	Unit	Description
$3D	$CB	Multiply by 0.001	kPa	Test value for leak detection pump OFF stuck (P2401)
$3D	$CD	Multiply by 0.001	kPa	Test value for leak detection pump ON stuck (P2402)
$3D	$CE	Multiply by 0.001	kPa	Test value for vent valve OFF stuck (P2420)
$3D	$CF	Multiply by 0.001	kPa	Test value for vent valve ON stuck (P2419)
$3D	$D0	Multiply by 0.001	kPa	Test value for reference orifice low flow (P043E)
$3D	$D1	Multiply by 0.001	kPa	Test value for reference orifice high flow (P043F)
$3D	$D4	Multiply by 0.001	kPa	Test value for purge VSV close stuck (P0441)
$3D	$D5	Multiply by 0.001	kPa	Test value for purge VSV open stuck (P0441)
$3D	$D7	Multiply by 0.001	kPa	Test value for purge flow insufficient (P0441)
$3D	$D8	Multiply by 0.001	kPa	Test value for canister small leak (P1420)
$3D	$D9	Multiply by 0.001	kPa	Test value for canister gross leak (P1421)
$3D	$DA	Multiply by 0.001	kPa	Test value for fuel tank small leak (P1422)
$3D	$DB	Multiply by 0.001	kPa	Test value for fuel tank gross leak (P1423)
$3D	$DC	Multiply by 0.001	kPa	Test value for fuel vapor-containment valve close stuck (P2451)
$3D	$DD	Multiply by 0.001	kPa	Test value for fuel vapor-containment valve open stuck (P2450)

Misfire:

Monitor ID	Test ID	Scaling	Unit	Description
$A1	$0B	Multiply by 1	Time	Exponential Weighted Moving Average (EWMA) misfire for all cylinders: Misfire counts for last 10 driving cycles-Total
$A1	$0C	Multiply by 1	Time	Misfire rate for all cylinders: Misfire counts for last/current driving cycles-Total
$A2	$0B	Multiply by 1	Time	EWMA misfire for cylinder 1: Misfire counts for last 10 driving cycles-Total
$A2	$0C	Multiply by 1	Time	Misfire rate for cylinder 1: Misfire counts for last/current driving cycle-Total
$A3	$0B	Multiply by 1	Time	EWMA misfire for cylinder 2: Misfire counts for last 10 driving cycles-Total
$A3	$0C	Multiply by 1	Time	Misfire rate for cylinder 2: Misfire counts for last/current driving cycle-Total
$A4	$0B	Multiply by 1	Time	EWMA misfire for cylinder 3: Misfire counts for last 10 driving cycles-Total
$A4	$0C	Multiply by 1	Time	Misfire rate for cylinder 3: Misfire counts for last/current driving cycle-Total
$A5	$0B	Multiply by 1	Time	EWMA misfire for cylinder 4: Misfire counts for last 10 driving cycles-Total
$A5	$0C	Multiply by 1	Time	Misfire rate for cylinder 4: Misfire counts for last/current driving cycle-Total
$A6	$0B	Multiply by 1	Time	EWMA misfire for cylinder 5: Misfire counts for last 10 driving cycles-Total
$A6	$0C	Multiply by 1	Time	Misfire rate for cylinder 5: Misfire counts for last/current driving cycle-Total
$A7	$0B	Multiply by 1	Time	EWMA misfire for cylinder 6: Misfire counts for last 10 driving cycles-Total
$A7	$0C	Multiply by 1	Time	Misfire rate for cylinder 6: Misfire counts for last/current driving cycle-Total

READINESS MONITOR DRIVE PATTERN

1. PURPOSE OF READINESS TESTS

- The On-Board Diagnostic (OBD II) system is designed to monitor the performance of emission related components, and indicate any detected abnormalities with DTC (Diagnostic Trouble Codes). Since various components need to be monitored during different driving conditions, the OBD II system is designed to run separate monitoring programs called Readiness Monitors.
- The intelligent tester's software must be version 9.0 or newer to view the Readiness Monitor Status. To view the status, enter the following menus: DIAGNOSIS / ENHANCED OBD II / MONITOR INFO / MONITOR STATUS.
- When the Readiness Monitor status reads COMPL (complete), the necessary conditions have been met for running the performance tests for that Readiness Monitor.
- A generic OBD II scan tool can also be used to view the Readiness Monitor status.

HINT:

Many state Inspection and Maintenance (I/M) programs require a vehicle's Readiness Monitor status to show COMPL before beginning emission tests.

The Readiness Monitor will be reset to INCMPL (incomplete) if:

- The ECM (included in hybrid vehicle control ECU) has lost battery power or blown a fuse.
- DTCs have been cleared.
- The conditions for running the Readiness Monitor have not been met.

If the Readiness Monitor status shows INCMPL, follow the appropriate Readiness Monitor Drive Pattern to change the status to COMPL.

CAUTION:

Strictly observe posted speed limits, traffic laws, and road conditions when performing these drive patterns.

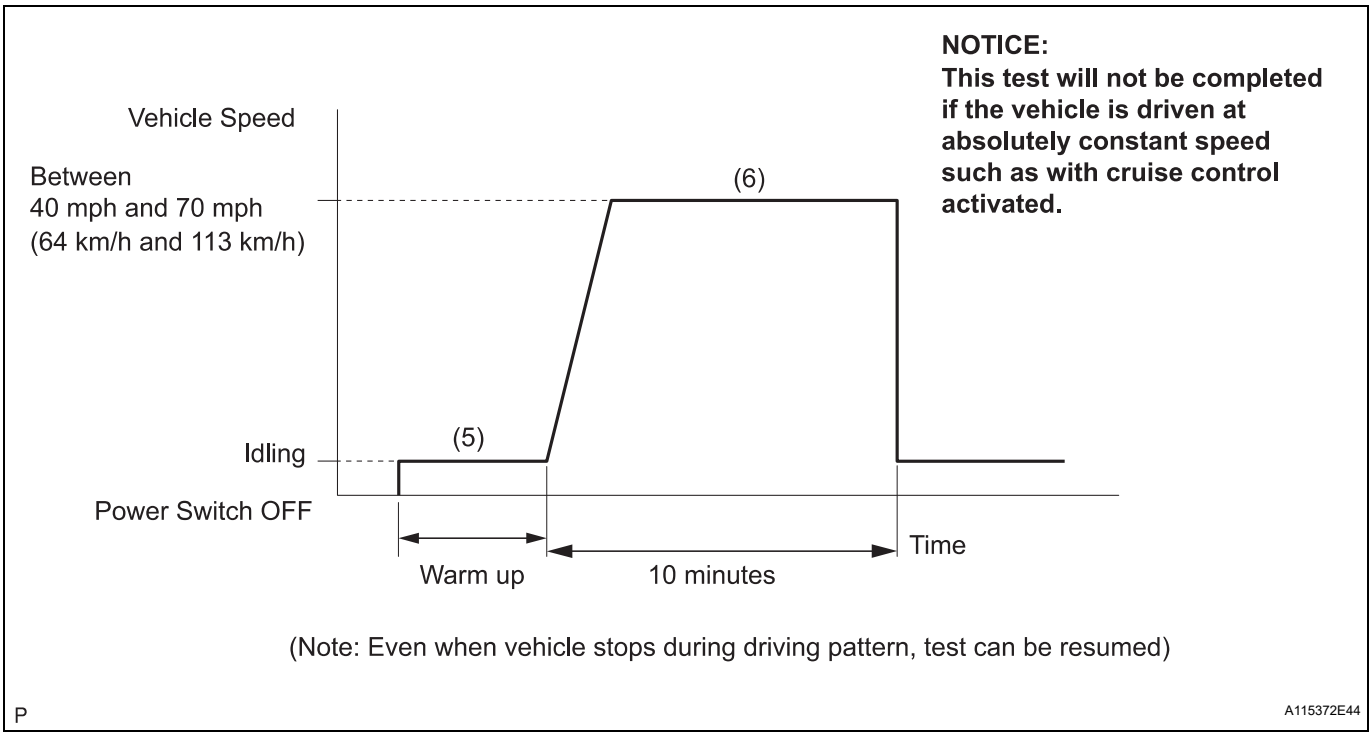
NOTICE:

These drive patterns represent the fastest method of satisfying all conditions necessary to achieve complete status for each specific Readiness Monitor.

In the event of a drive pattern being interrupted (possibly due to factors such as traffic conditions), the drive pattern can be resumed. In most cases, the Readiness Monitor will still achieve complete status upon completion of the drive pattern.

To ensure completion of the Readiness Monitors, avoid sudden changes in vehicle load and speed (driving up and down hills and/or sudden acceleration).

2. CATALYST MONITOR (ACTIVE AIR-FUEL RATIO CONTROL TYPE)



(a) Preconditions
The monitor will not run unless:
- The MIL is OFF.

(b) Drive Pattern
(1) Connect an intelligent tester to the DLC3.
(2) Turn the power switch on (IG).
(3) Turn the tester on.
(4) Clear the DTCs (if set) (See page ES-31).
(5) Put the engine in inspection mode (See page ES-35), and warm it up.
(6) Drive the vehicle at between 40 mph and 70 mph (64 km/h and 113 km/h) for at least 10 minutes.

(c) Monitor Status
Check the Readiness Monitor status displayed on the tester.
If the status does not switch to COMPL (complete), extend the driving time.

3. EVAP SYSTEM MONITOR (KEY OFF TYPE)

(a) Preconditions
The monitor will not run unless:
– The fuel tank is less than 90% full.
– The altitude is less than 8,000 ft (2,450 m).
– The vehicle is stationary.
– The engine coolant temperature is between 4.4°C and 35°C (40°F and 95°F).
– The intake air temperature is between 4.4°C and 35°C (40°F and 95°F).
– Vehicle was driven in the city area (or on free-way) for 10 minutes or more.

(b) Monitor Conditions
(1) Turn the power switch off and wait for 6 hours.
HINT:
Do not start the engine until checking Readiness Monitor status. If the engine is started, the step described above must be repeated.

(c) Monitor Status
(1) Connect an intelligent tester to the DLC3.
(2) Turn the power switch on (IG).
(3) Turn the tester on.
(4) Check the Readiness Monitor status displayed on the tester.

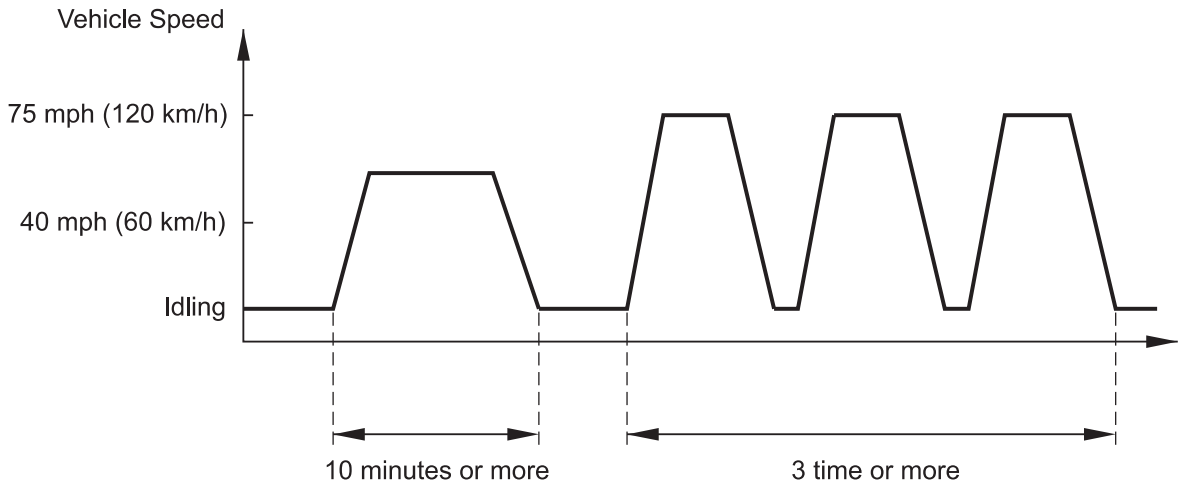
If the status does not switch to COMPL (complete), restart the engine, make sure that the preconditions have been met, and then perform the Monitor Conditions again.

ES

4. AIR-FUEL RATIO (A/F) AND HEATED OXYGEN (HO2) SENSOR MONITORS (ACTIVE AIR-FUEL RATIO CONTROL TYPE)

Monitor Driving Pattern

Engine Coolant Temperature: 75°C (167°F) or more

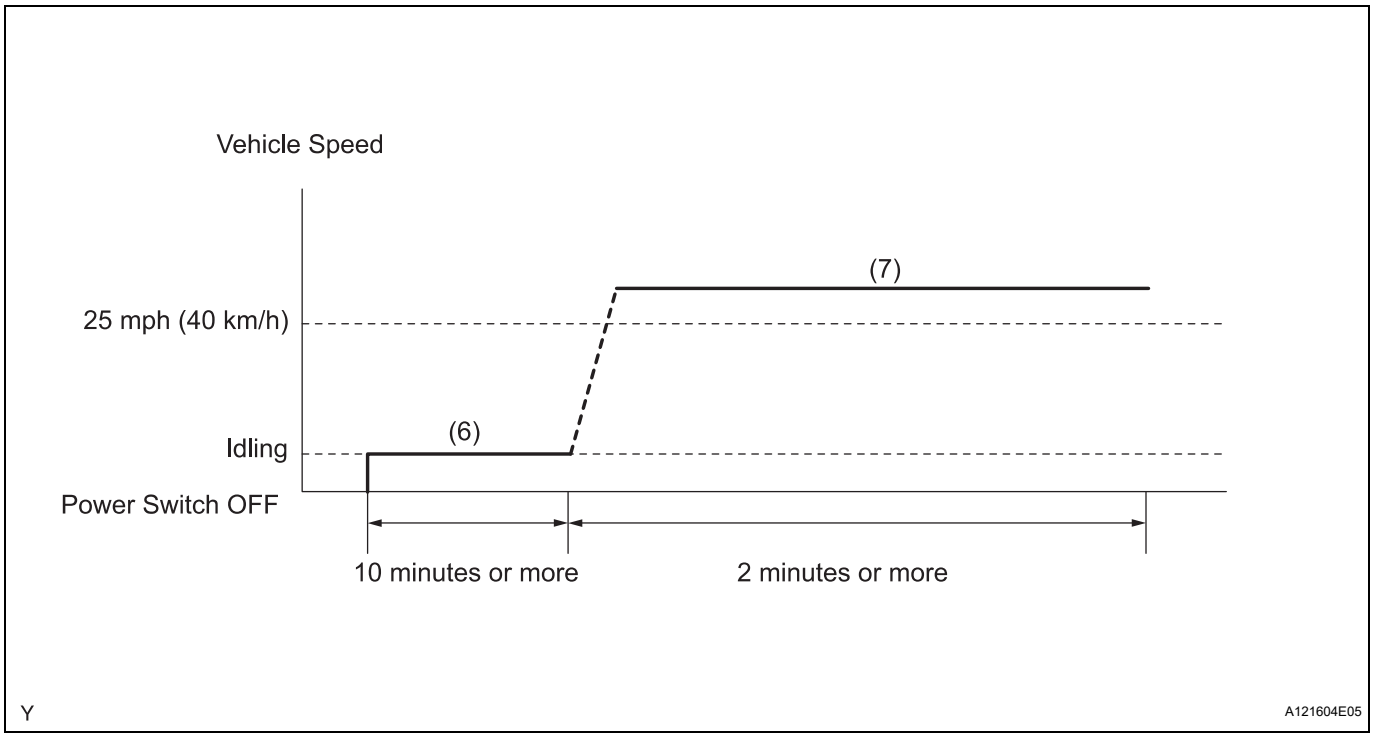


A142099E01

(a) Drive Pattern for front A/F sensor and HO2 sensor
(1) Connect an intelligent tester to the DLC3.
(2) Turn the power switch on (READY).
(3) Turn the tester on.
(4) Clear the DTCs (See page ES-31).
(5) Warm up the engine until the engine coolant temperature reaches 75°C (167°F) or higher.
(6) Drive the vehicle at between 40 mph (60 km/h) and 75 mph (120 km/h) for 10 minutes or more.
(7) Repeat the following drive pattern 3 times or more:
- Drive the vehicle at 75 mph (120 km/h).
- Release the accelerator pedal and stop the vehicle.

(b) Monitor Status
(1) Check the Readiness Monitor status displayed on the tester.
(2) If the status does not switch to COMPL (complete), perform the Drive Pattern above.

5. AIR-FUEL RATIO (A/F) AND HEATED OXYGEN (HO2) SENSOR HEATER MONITORS (FRONT A/F AND REAR HO2 SENSOR TYPE)



(a) Preconditions
The monitor will not run unless:
– The MIL is OFF.
(b) Drive Pattern
(1) Connect an intelligent tester to the DLC3.
(2) Turn the power switch on (IG).
(3) Turn the tester on.
(4) Clear the DTCs (if set) (See page ES-31).
(5) Put the engine in inspection mode (See page ES-35).
(6) Allow the engine to idle for 10 minutes or more.
(7) Drive the vehicle at 25 mph (40 km/h) or more for at least 2 minutes.
(c) Monitor Status
(1) Check the Readiness Monitor status displayed on the tester.
If the status does not switch to COMPL (complete), make sure that the preconditions have been met, and repeat steps through (5) to (7) described in the Drive Pattern above.

PROBLEM SYMPTOMS TABLE

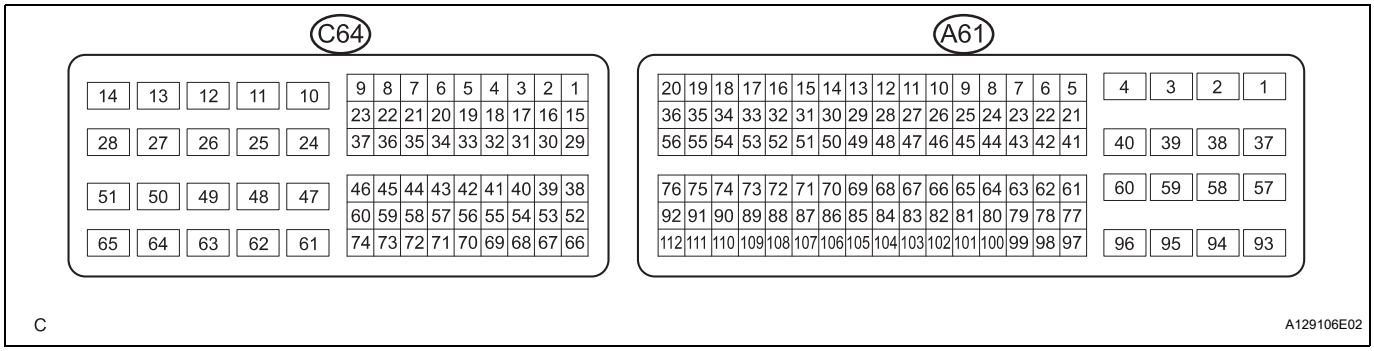
When the malfunction is not confirmed in the diagnostic trouble code check and the problem still cannot be confirmed in the basic inspection, use this table and troubleshoot according to the priority order given below.

SFI SYSTEM:

Symptom	Suspected Area	See page
Engine does not crank (Does not start)	1. Immobilizer system	EI-7
	2. Generator	HV-157
	3. Hybrid system	HV-15
	4. Park/neutral position switch	HV-90
No initial combustion (Does not start)	1. ECM (Included in HV Control ECU) power source circuit	ES-356
	2. Fuel pump control circuit	ES-368
	3. ECM (Included in HV Control ECU)	-
Engine cranks normally but difficult to start	1. Fuel pump control circuit	ES-368
	2. Compression	EM-3
Difficult to start with cold engine	1. Ignition system	IG-3
	2. Spark plug	IG-5
	3. Fuel pump control circuit	ES-368
	4. Injector	FU-14
Difficult to start with warm engine	1. Injector	FU-14
	2. Ignition system	IG-3
	3. Spark plug	IG-5
	4. Fuel pump control circuit	ES-368
High engine idle speed (Poor idling)	1. ECM (Included in HV Control ECU) power source circuit	ES-356
	2. Electronic throttle control system	ES-395
	3. Air induction system	-
	4. PCV hose	EC-4
Low engine idle speed (Poor idling)	1. Fuel pump control circuit	ES-368
	2. Electronic throttle control system	ES-395
	3. Air induction system	-
	4. PCV hose	EC-4
Rough idling (Poor idling)	1. Compression	EM-3
	2. Fuel pump control circuit	ES-368
	3. Electronic throttle control system	ES-395
	4. Air induction system	-
	5. PCV hose	EC-4
Hunting (Poor idling)	1. ECM (Included in HV Control ECU) power source circuit	ES-356
	2. Fuel pump control circuit	ES-368
	3. Spark plug	IG-5
	4. Ignition system	IG-3
	5. Injector	FU-14
	6. Electronic throttle control system	ES-395
	7. Air induction system	-
	8. PCV hose	EC-4
Hesitation/ Poor acceleration (Poor driveability)	1. Fuel pump control circuit	ES-368
	2. Spark plug	IG-5
	3. Ignition system	IG-3
	4. Injector	FU-14

Symptom	Suspected Area	See page
Surging (Poor driveability)	1. Spark plug	IG-5
	2. Fuel pump control circuit	ES-368
	3. Ignition system	IG-3
	4. Injector	FU-14
Engine stalls soon after starting	1. Fuel pump control circuit	ES-368
	2. Spark plug	IG-5
	3. Ignition system	IG-3
	4. Injector	FU-14
Unable/difficult to refuel	Refueling valve (canister)	EC-10

TERMINALS OF ECM



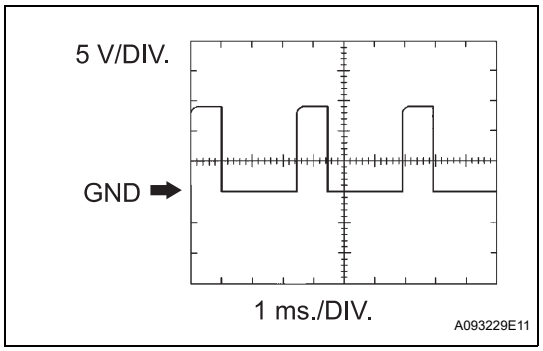
HINT:
The standard normal voltage between each pair of the ECM (included in hybrid vehicle control ECU) terminals is shown in the table below. The appropriate conditions for checking each pair of the terminals are also indicated. The result of checks should be compared with the standard normal voltage for that pair of the terminals, displayed in the "Specified Condition" column. The illustration above can be used as a reference to identify the ECM terminal locations.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BATT (A61-4) - E1 (C64-14)	W - W-B	Battery (for measuring battery voltage and for ECM memory)	Always	9 to 14 V
+BM (A61-3) - E1 (C64-14)	LG - W-B	Power source of throttle motor	Always	9 to 14 V
IGSW (A61-57) - E1 (C64-14)	Y - W-B	Power switch	Power switch ON (IG)	9 to 14 V
+B (A61-2) - E1 (C64-14)	Y - W-B	Power source of ECM	Power switch ON (IG)	9 to 14 V
+B2 (A61-1) - E1 (C64-14)	Y - W-B	Power source of ECM	Power switch ON (IG)	9 to 14 V
OC1+ (C64-16) - OC1- (C64-15)	W - R	Camshaft timing oil control valve (OCV) (Intake side (bank 1))	Power switch ON (IG)	Pulse generation (See waveform 1)
MREL (A61-93) - E1 (C64-14)	B - W-B	EFI MAIN relay	Power switch ON (IG)	9 to 14 V
VCTA (C64-71) - ETA (C64-72)	B - P	Power source for sensors (specific voltage)	Power switch ON (IG)	4.5 to 5.0 V
VCPT (A61-75) - EPTK (A61-81)	LG - BR	Power source for sensors (specific voltage)	Power switch ON (IG)	4.5 to 5.0 V
VCPP (A61-64) - EPPM (C64-76)	Y - BR	Power source for sensors (specific voltage)	Power switch ON (IG)	4.5 to 5.0 V
VG (C64-74) - EVG (C64-73)	SB - W	Mass air flow meter	Idling, Shift lever position P or N, A/C switch OFF	0.5 to 3.0 V
THA (C64-59) - ETHA (C64-45)	P - B	Intake air temperature sensor	Idling, Intake air temperature 20°C (68°F)	0.5 to 3.4 V
THW (C64-60) - ETHW (C64-46)	B - P	Engine coolant temperature sensor	Idling, Engine coolant temperature 80°C (176°F)	0.2 to 1.0 V
VTA1 (C64-58) - ETA (C64-72)	Y - P	Throttle position sensor (for engine control)	Power switch ON (IG), Throttle valve fully closed	0.5 to 1.2 V
VTA1 (C64-58) - ETA (C64-72)	Y - P	Throttle position sensor (for engine control)	Power switch ON (IG), Throttle valve fully open	3.2 to 4.8 V
VTA2 (C64-57) - ETA (C64-72)	W - P	Throttle position sensor (for sensor malfunction detection)	Power switch ON (IG), Accelerator pedal released	2.1 to 3.1 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
VTA2 (C64-57) - ETA (C64-72)	W - P	Throttle position sensor (for sensor malfunction detection)	Power switch ON (IG), Accelerator pedal depressed	4.5 to 5.0 V
VPA (A61-106) - EP1 (A61-88)	R - G	Accelerator pedal position sensor (for engine control)	Power switch ON (IG), Accelerator pedal released	0.5 to 1.1 V
VPA (A61-106) - EP1 (A61-88)	R - G	Accelerator pedal position sensor (for engine control)	Power switch ON (IG), Accelerator pedal depressed	2.6 to 4.5 V
VPA2 (A61-105) - EP2 (A61-87)	L - Y	Accelerator pedal position sensor (for sensor malfunctioning detection)	Power switch ON (IG), Accelerator pedal released	1.2 to 2.0 V
VPA2 (A61-105) - EP2 (A61-87)	L - Y	Accelerator pedal position sensor (for sensor malfunctioning detection)	Power switch ON (IG), Accelerator pedal depressed	3.4 to 5.0 V
VCP1 (A61-108) - EP2 (A61-87)	BR - Y	Power source of accelerator pedal position sensor (for VPA)	Power switch ON (IG)	4.5 to 5.0 V
VCP2 (A61-107) - EP2 (A61-87)	W - Y	Power source of accelerator pedal position sensor (for VPA2)	Power switch ON (IG)	4.5 to 5.0 V
HA1A (C64-62) - E04 (C64-48)	G - W	A/F sensor heater	Idling	Below 3.0 V
HA1A (C64-62) - E04 (C64-48)	G - W	A/F sensor heater	Power switch ON (IG)	9 to 14 V
A1A+ (C64-39) - E1 (C64-14)	L - W-B	A/F sensor	Power switch ON (IG)	3.3 V*
A1A- (C64-38) - E1 (C64-14)	P - W-B	A/F sensor	Power switch ON (IG)	3.0 V*
HT1B (C64-37) - E1 (C64-14)	LG - W-B	Heated oxygen sensor heater	Idling	Below 3.0 V
HT1B (C64-37) - E1 (C64-14)	LG - W-B	Heated oxygen sensor heater	Power switch ON (IG)	9 to 14 V
OX1B (C64-53) - O1B- (C64-52)	W - BR	Heated oxygen sensor	Maintain engine speed at 2,500 rpm for 2 minutes after warming up sensor	Pulse generation (See waveform 2)
#10 (C64-50) - E1 (C64-14) #20 (C64-54) - E1 (C64-14) #30 (C64-49) - E1 (C64-14) #40 (C64-63) - E1 (C64-14)	R - W-B R - W-B Y - W-B L - W-B	Injector	Power switch ON (IG)	0 to 5 V
#10 (C64-50) - E1 (C64-14) #20 (C64-54) - E1 (C64-14) #30 (C64-49) - E1 (C64-14) #40 (C64-63) - E1 (C64-14)	R - W-B R - W-B Y - W-B L - W-B	Injector	Idling	Pulse generation (See waveform 3)
KNK1 (C64-67) - EKNK (C64-66)	G - R	Knock sensor	Maintain engine speed at 4,000 after warming up	Pulse generation (See waveform 4)
G2+ (C64-55) - G2 (C64-54)	Y - BR	Variable valve timing (VVT) sensor (Intake side (bank 1))	Idling	Pulse generation (See waveform 5)
NE+ (C64-69) - NE- (C64-68)	G - R	Crankshaft position sensor	Idling	Pulse generation (See waveform 5)
IGT1 (C64-5) - E1 (C64-14) IGT2 (C64-4) - E1 (C64-14) IGT3 (C64-3) - E1 (C64-14) IGT4 (C64-2) - E1 (C64-14)	W - W-B L - W-B G - W-B LG - W-B	Ignition coil (ignition signal)	Idling	Pulse generation (See waveform 6)
IGF (C64-1) - E1 (C64-14)	BR - W-B	Ignition coil (ignition confirmation signal)	Power switch ON (IG)	4.5 to 5.0 V
IGF (C64-1) - E1 (C64-14)	BR - W-B	Ignition coil (ignition confirmation signal)	Idling	Pulse generation (See waveform 6)
PRG (C64-17) - E1 (C64-14)	O - W-B	Purge VSV	Power switch ON (IG)	9 to 14 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
PRG (C64-17) - E1 (C64-14)	O - W-B	Purge VSV	Idling	Pulse generation (See waveform 7)
SPDI (A61-21) - E1 (C64-14)	L - W-B	Speed signal from combination meter	Power switch ON (IG), Rotate driving wheel slowly	Pulse generation (See waveform 8)
ST2 (A61-57) - E1 (C64-14)	R - W-B	Starter signal	Power switch on (READY)	9 to 14 V
STP (A61-56) - E1 (C64-14)	W - W-B	Stop light switch	Brake pedal depressed	7.5 to 14 V
STP (A61-56) - E1 (C64-14)	W - W-B	Stop light switch	Brake pedal released	Below 1.5 V
ST1- (A61-55) - E1 (C64-14)	GR - W-B	Stop light switch (opposite to STP terminal)	Power switch ON (IG), Brake pedal depressed	Below 1.5 V
ST1- (A61-55) - E1 (C64-14)	GR - W-B	Stop light switch (opposite and STP terminal)	Power switch ON (IG), Brake pedal released	7.5 to 14 V
M+ (C64-10) - ME01 (C64-13)	G - B	Throttle actuator	Idling with warm engine	Pulse generation (See waveform 9)
M- (C64-11) - ME01 (C64-13)	R - B	Throttle actuator	Idling with warm engine	Pulse generation (See waveform 10)
FC (A61-94) - E1 (C64-14)	Y - W-B	Fuel pump control	Power switch ON (IG)	9 to 14 V
FC (A61-94) - E1 (C64-14)	Y - W-B	Fuel pump control	Idling	0 to 3 V
W (A61-22) - E1 (C64-14)	BR - W-B	MIL	Power switch ON (IG)	Below 3.0 V
W (A61-22) - E1 (C64-14)	BR - W-B	MIL	Idling	0 to 3 V
TC (A61-3) - E1 (C64-14)	P - W-B	Terminal TC of DLC 3	Power switch ON (IG)	9 to 14 V
VPMP (A61-42) - E1 (C64-14)	W - W-B	Vent valve (built into pump module)	Power switch ON (IG)	9 to 14 V
MPMP (A61-45) - E1 (C64-14)	G - W-B	Vacuum pump (built into pump module)	Vacuum pump OFF	0 to 3 V
MPMP (A61-45) - E1 (C64-14)	G - W-B	Vacuum pump (built into pump module)	Vacuum pump ON	9 to 14 V
PPMP (A61-66) - EPPM (C64-76)	B - BR	Pressure sensor (built into pump module)	Power switch ON (IG)	3 to 3.6 V
CANH (A61-20) - E1 (C64-14)	B - W-B	CAN communication line	Power switch ON (IG)	Pulse generation (See waveform 11)
CANL (A61-19) - E1 (C64-14)	W - W-B	CAN communication line	Power switch ON (IG)	Pulse generation (See waveform 12)
PTNK (A61-35) - EPTK (A61-81)	GR - BR	Fuel tank pressure sensor	Power switch ON (IG)	0.5 to 4.5 V
CCV2 (A61-45) - E1 (C64-14)	V - W-B	Fuel vapor-containment valve	Close valve ON (Open)	Below 1.0 V
			Close valve OFF (Close)	10 to 14 V

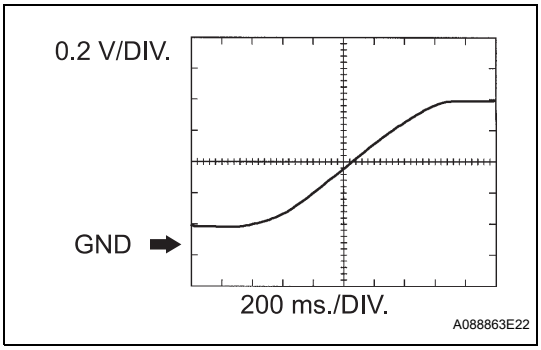
HINT:
*: The ECM terminal voltage is constant regardless of the output voltage from the sensor.



1. WAVEFORM 1
Camshaft timing oil control valve (OCV):

ECM Terminal Name	Between OC1+ and OC1-
Tester Range	5 V/DIV., 1 ms./DIV.
Condition	Idling

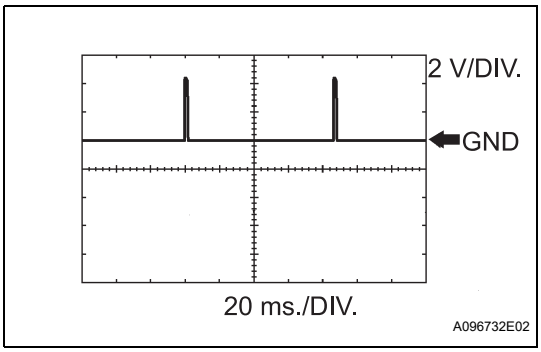
HINT:
The wavelength becomes shorter as the engine rpm increases.



2. WAVEFORM 2
Heated oxygen sensor:

ECM Terminal Name	Between OX1B and O1B-
Tester Range	0.2 V/DIV., 200 ms./DIV.
Condition	Engine speed maintained at 2,500 rpm for 2 minutes after warming up engine

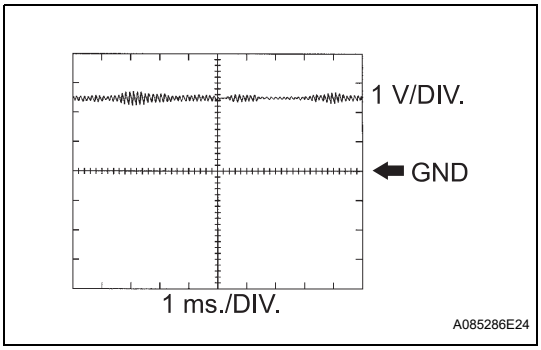
HINT:
In DATA LIST, item O2S B1 S2 shows the values input to the ECM from the heated oxygen sensor.



3. WAVEFORM 3
Injector No. 1 (to No. 6) injection signal:

ECM Terminal Name	Between #10 (to #40) and E1
Tester Range	2 V/DIV., 20 ms./DIV.
Condition	Idling

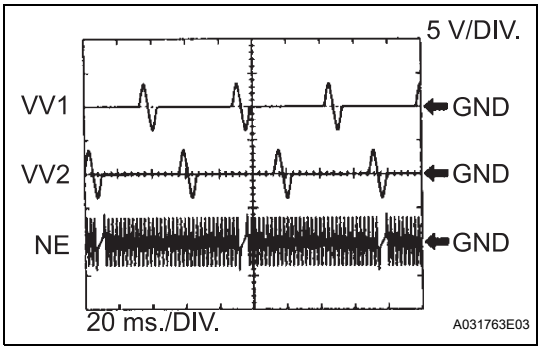
HINT:
The wavelength becomes shorter as the engine rpm increases.



4. WAVEFORM 4
Knock sensor:

ECM Terminal Name	Between KNK1 and EKNK
Tester Range	0.01 to 10 V/DIV., 0.01 to 10 ms./DIV.
Condition	Engine speed maintained a 4,000 rpm after warming up engine

HINT:
- The wavelength becomes shorter as the engine rpm increases.
- The waveforms and amplitudes displayed differ slightly depending on the vehicle.

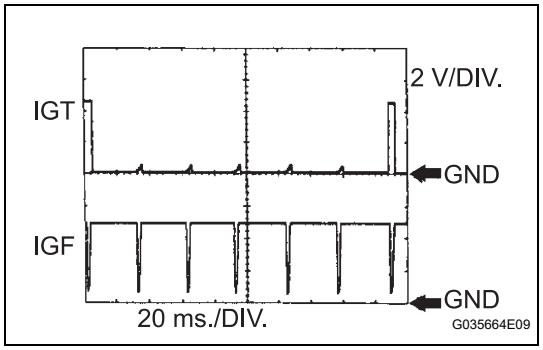


5. WAVEFORM 5
Crankshaft position sensor and VVT:

ECM Terminal Name	Between G2+ and G2- Between NE+ and NE-
Tester Range	5 V/DIV., 20 ms./DIV.
Condition	Idling

HINT:
The wavelength becomes shorter as the engine rpm increases.

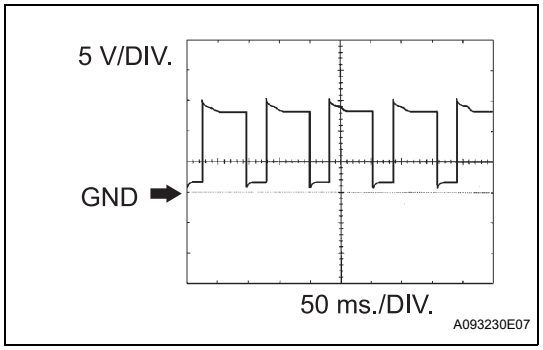
ES



6. WAVEFORM 6
Igniter IGT signal (from ECM to igniter) and Igniter IGF signal (from igniter to ECM):

ECM Terminal Name	Between IGT (1 to 4) and E1 Between IGF and E1
Tester Range	2 V/DIV., 20 ms./DIV.
Condition	Idling

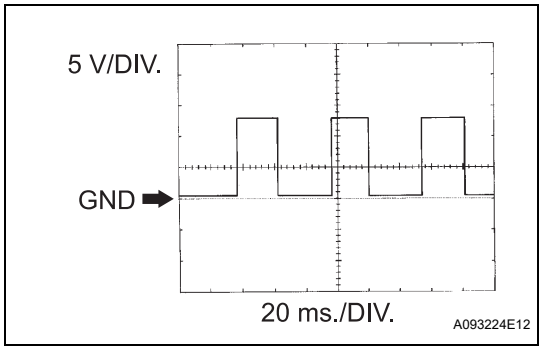
HINT:
The wavelength becomes shorter as the engine rpm increases.



7. WAVEFORM 7
Purge VSV:

ECM Terminal Name	Between PRG and E1
Tester Range	5 V/DIV., 50 ms./DIV.
Condition	Idling

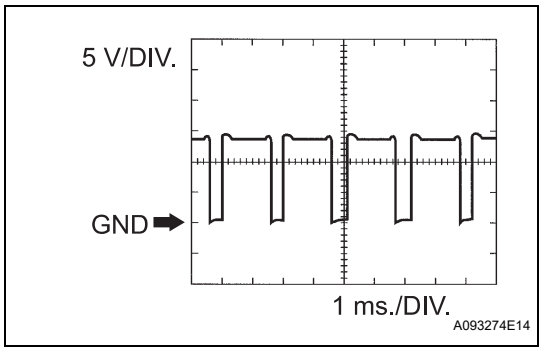
HINT:
If the waveform is not similar to the illustration, check the waveform again after idling for 10 minutes or more.



8. WAVEFORM 8
Vehicle speed signal:

ECM Terminal Name	Between SPDI and E1
Tester Range	2 V/DIV., 20 ms./DIV.
Condition	Driving at 12 mph (20 km/h)

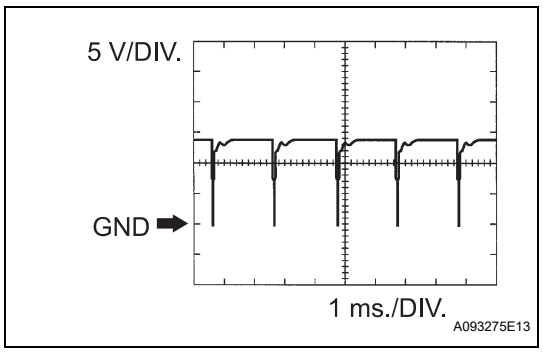
HINT:
The wavelength becomes shorter as the vehicle speed increases.



9. WAVEFORM 9
Throttle actuator positive terminal:

ECM Terminal Name	Between M+ and ME01
Tester Range	5 V/DIV., 1 ms./DIV.
Condition	Idling with warm engine

HINT:
The duty ratio varies depending on the throttle actuator operation.

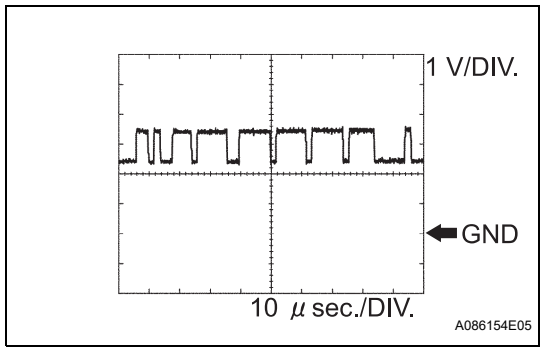


10. WAVEFORM 10
Throttle actuator negative terminal:

ECM Terminal Name	Between M- and ME01
Tester Range	5 V/DIV., 1 ms./DIV.
Condition	Idling with warm engine

HINT:
The duty ratio varies depending on the throttle actuator operation.

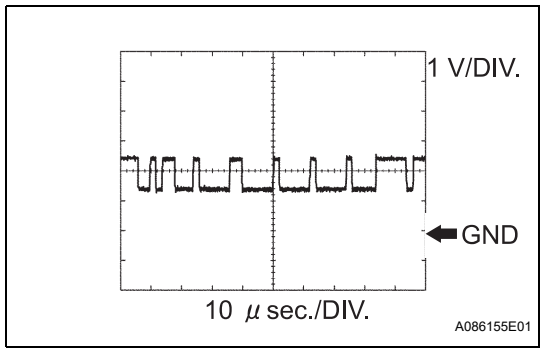
ES



11. WAVEFORM 11
CAN communication signal:

ECM Terminal Name	Between CANH and E1
Tester Range	1 V/DIV., 10 μs/DIV.
Condition	Stop engine and Power switch ON (IG)

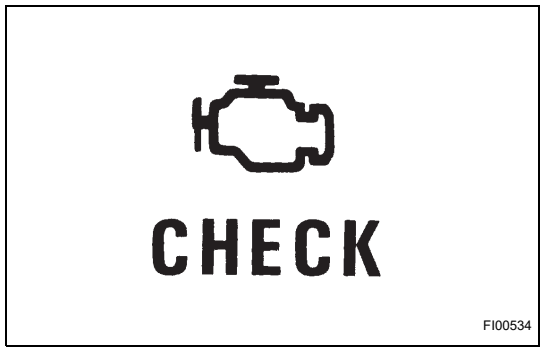
HINT:
The waveform varies depending on the CAN communication signal.



12. WAVEFORM 12
CAN communication signal:

ECM Terminal Name	Between CANL and E1
Tester Range	1 V/DIV., 10 μs/DIV.
Condition	Stop engine and Power switch ON (IG)

HINT:
The waveform varies depending on the CAN communication signal.



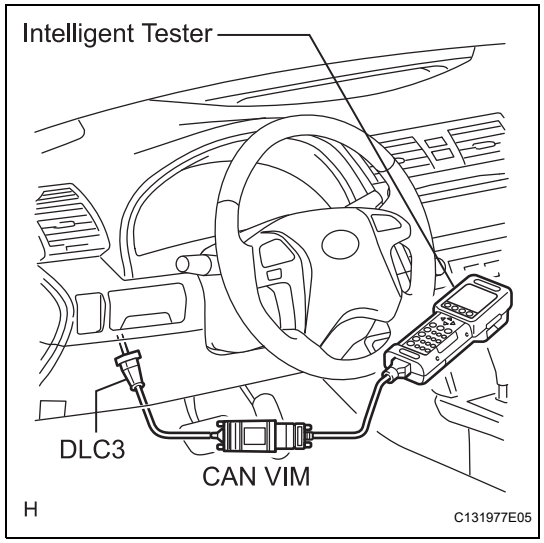
DIAGNOSIS SYSTEM

1. DESCRIPTION

When troubleshooting OBD II (On-Board Diagnostics) vehicles, the intelligent tester (complying with SAE J1987) must be connected to the DLC3 (Data Link Connector 3) of the vehicle. Various data in the vehicle's ECM (Included in Hybrid Vehicle Control ECU) can be then read.

OBD II regulations require that the vehicle's on-board computer illuminates the MIL (Malfunction Indicator Lamp) on the instrument panel when the computer detects a malfunction in:

(a) The emission control systems components.
(b) The power train control components (which affect vehicle emissions).



(c) The computer itself.
In addition, the applicable DTCs (Diagnostic Trouble Codes) prescribed by SAE J2012 are recorded on 3 consecutive trips, the MIL turns off automatically but the DTCs remain recorded in the ECM (Included in Hybrid Vehicle Control ECU) memory.
To check for DTCs, connect the intelligent tester to the DLC3. The tester displays DTCs, freeze frame data, and a variety of the engine data. The DTCs and freeze frame data can be erased with the tester.
In order to enhance OBD function on vehicles and develop the Off-Board diagnosis system, CAN communication is introduced in this system (CAN: Controller Area Network). It minimizes a gap between technician skills and vehicle technology. CAN is a network, which uses a pair of data transmission lines, spanning multiple computers

and sensors. It allows a high speed communication between the systems and simplification of the wire harness connection. Since this system is equipped with the CAN communication, connecting the CAN VIM (VIM: Vehicle Interface Module) with the intelligent tester is necessary to display any information from the ECM (Included in Hybrid Vehicle Control ECU). (Also the communication between the intelligent tester and the ECM (Included in Hybrid Vehicle Control ECU) uses CAN communication signal). When confirming the DTCs and any data of the ECM (Included in Hybrid Vehicle Control ECU), connect the CAN VIM between the DLC3 and the intelligent tester.

2. NORMAL MODE AND CHECK MODE

The diagnosis system operates in normal mode during normal vehicle use. In normal mode, 2-trip detection logic is used to ensure accurate detection of malfunctions. Check mode is also available as an option for technicians. In check mode, 1-trip detection logic is used for simulating malfunction symptoms and increasing the system's ability to detect malfunctions, including intermittent problems (intelligent tester only).

3. 2-TRIP DETECTION LOGIC

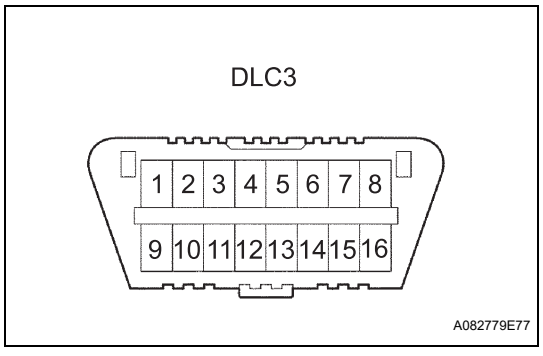
When a malfunction is first detected, the malfunction is temporarily stored in the ECM (Included in Hybrid Vehicle Control ECU) memory (1st trip). If the same malfunction is detected during the next subsequent drive cycle, the MIL is illuminates (2nd trip).

4. FREEZE FRAME DATA

The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freezer frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

5. DLC3 (Data link Connector 3)

The vehicle's ECM uses ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.



Symbols	Terminal No.	Names	Reference Terminal	Results	Condition
SIL	7	Bus "+" line	5 - Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	1 Ω or less	Always
SG	5	Signal ground	Body ground	1 Ω or less	Always
BAT	16	Battery ground	Body ground	9 to 14 V	Always

Symbols	Terminal No.	Names	Reference Terminal	Results	Condition
CANH	6	CAN "High" line	CANL	54 to 69 Ω	Power switch OFF
CANH	6	CAN "High" line	Battery positive	1 MΩ or higher	Power switch OFF
CANH	6	CAN "High" line	CG	1 kΩ or higher	Power switch OFF
CANL	14	CAN "Low" line	Battery positive	1 MΩ or higher	Power switch OFF
CANL	14	CAN "Low" line	CG	1 kΩ or higher	Power switch OFF

HINT:
The DLC3 is the interface prepared for reading various data from the vehicle's ECM (included in Hybrid Vehicle Control ECU). After connecting the cable of an intelligent tester, turn the power switch on (IG) and turn the tester on. If a communication failure message is displayed on the tester screen (on the tester: UNABLE TO CONNECT TO VEHICLE), a problem exists in either the vehicle or tester. In order to identify the location of the problem, connect the tester to another vehicle.

- If communication is normal: Inspect the DLC3 on the original vehicle.
- If communication is still not possible: The problem is probably in the tester itself. Consult the Service Department listed in the instruction manual.

6. BATTERY VOLTAGE

Battery voltage:
11 to 14 V

If the voltage is below 11 V, replace or recharge the battery before proceeding to the next step.

7. MIL (Malfunction Indicator Lamp)

(a) The MIL is illuminated when the power switch is first turned on (the engine is not running).

(b) The MIL should turn OFF when the engine is started. If the MIL remains illuminated, the diagnosis system has detected malfunctions or abnormalities in the system.
HINT:
If the MIL is not illuminated when the power switch is first turned on, check the MIL circuit (See page ES-373).

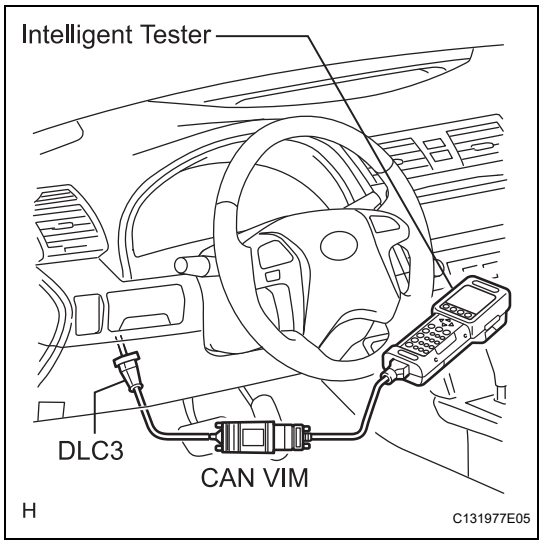
DTC CHECK / CLEAR

NOTICE:

When the diagnosis system is changed from the normal mode to check mode or vice versa, all DTCs and freeze frame data recorded in normal mode are erased. Before changing modes, always check and make a note of DTCs and freeze frame data.

HINT:

- DTCs which are stored in the ECM (Included in Hybrid Vehicle Control ECU) can be displayed on an intelligent tester. An intelligent tester can display current and pending DTCs.
- The same DTCs are not set if the ECM (Included in Hybrid Vehicle Control ECU) dose not detect the same malfunction again during a second consecutive driving cycle. However, such malfunctions, detected on only one occasion, are stored as pending DTCs.



1. **CHECK DTC (Using an intelligent tester)**
   (a) Connect an intelligent tester to the DLC3.
   (b) Turn the power switch on (IG).
   (c) Turn the tester on.
   (d) Enter the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
   (e) Check for DTC(s) and freeze frame data, and then write them down.
   (f) Check the details of the DTC(s) (See page ES-45).
2. **CLEAR DTC**
   (a) Connect an intelligent tester to the DLC3.
   (b) Turn the power switch on (IG).
   (c) Turn the tester on.
   (d) Enter the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES.
   (e) Press the YES button.

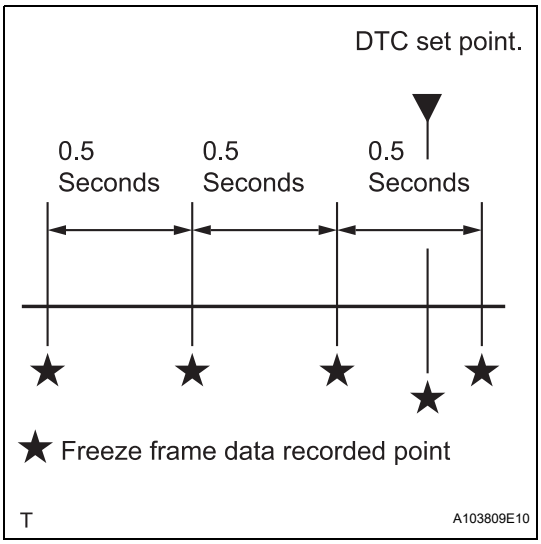
FREEZE FRAME DATA

1. DESCRIPTION

The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air/fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

The intelligent tester displays freeze frame data recorded at five different points: 1) 3 times before the DTC is set, 2) once when the DTC is set, and 3) once after the DTC is set. The data can be used to simulate the vehicle's condition around the time of the malfunction. The data may be helpful in determining the cause of a malfunction. It may also be helpful in determining whether a DTC is being caused by a temporary malfunction.

The ECM records engine conditions in the form of freeze frame data every 0.5 seconds. Using the intelligent tester, five separate sets of freeze frame data, including the data values at the time when the DTC was set, can be checked.



2. LIST OF FREEZE FRAME DATA

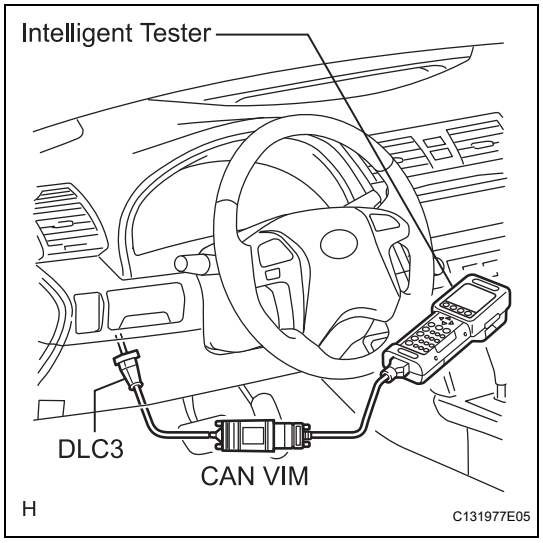
Tester Display	Measurement Item/Range	Diagnostic Note
IGN ADVANCE	Ignition advance	-
CALC LOAD	Calculate load	Calculated load by ECM (Included in HV control ECU)
VEHICLE LOAD	Vehicle load	-
MAF	Mass air flow volume	If value approximately 0.0 g/s: • Mass air flow meter power source circuit open or short • VG circuit open or short If value 160.0 g/s or more: • E2G circuit open
ENGINE SPD	Engine speed	-
VEHICLE SPD	Vehicle speed	Speed indicated on speedometer
COOLANT TEMP	Engine coolant temperature	If value -40°C, sensor circuit open If value 140°C, sensor circuit shorted
INTAKE AIR	Intake air temperature	If value -40°C, sensor circuit open If value 140°C, sensor circuit shorted
AIR-FUEL PATIO	Air-fuel ratio	-
AMBIENT TEMP	Ambient temperature	-
PURGE DENSITY	Learning value of purge density	-
PURGE FLOW	Purge flow	-
EVAP PURGE VSV	EVAP purge VSV duty ratio	-
KNOCK CRRT VAL	Correction learning value of knocking	-
KNOCK FB VAL	Feedback value of knocking	-
THROTTLE POS	Throttle position	Read value with power switch ON (IG) (Do not start engine)
THROTTLE POS	Throttle sensor positioning	Read value with power switch ON (IG) (Do not start engine)
THROTTLE POS #2	Throttle sensor positioning #2	-

Tester Display	Measurement Item/Range	Diagnostic Note
THROTTLE MOT	Throttle motor	-
O2S B1 S2	Heated oxygen sensor output	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables technician to check output voltage of sensor
AFS B1 S1	A/F sensor output	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables technician to check output voltage of sensor
TOTAL FT #1	Total fuel trim	-
SHORT FT #1	Short-term fuel trim	Short-term fuel compensation used to maintain air-fuel ratio at stoichiometric air-fuel ratio
LONG FT #1	Long-term fuel trim	Overall fuel compensation carried out in long-term to compensate for a continual deviation of short-term fuel trim from central value
FUEL SYS #1	Fuel system status (Bank 1)	• OL (Open Loop): Has not yet satisfied conditions to go closed loop • CL (Closed Loop): Using heated oxygen sensor as feedback for fuel control • OL DRIVE: Open loop due to driving conditions (fuel enrichment) • OL FAULT: Open loop due to detected system fault • CL FAULT: Closed loop but heated oxygen sensor, which used for fuel control, malfunctioning
O2FT B1 S2	Fuel trim at heated oxygen sensor	Same as SHORT FT #1
AF FT B1 S1	Fuel trim at A/F sensor	-
CAT TEMP B1 S1	Catalyst temperature	-
CAT TEMP B1 S2	Catalyst temperature	-
INI COOL TEMP	Initial engine coolant temperature	-
INI INTAKE TEMP	Initial intake air temperature	-
INJ VOL	Injection volume	-
INJECTOR	Injection period of No.1 cylinder	-
CTP SW	Closed throttle position switch	-
STOP LIGHT SW	Stop light switch	-
ENG OIL PRES SW	Engine oil pressure switch signal	Always ON while engine is running
BATTERY VOLTAGE	Battery voltage	-
ATM PRESSURE	Atmospheric pressure	-
EVAP (Purge) VSV	EVAP Purge VSV	-
FUEL PUMP/SPD	Fuel pump/speed status	-
VVT CTRL B1	VVT control status (bank 1)	-
TANK BYPASS VSV	Tank bypass VSV	-
TC/TE1	TC and TE1 terminals of DLC3	-
VVTL AIM ANGL#1	VVT aim angle (bank1)	-
VVT CHNG ANGL#1	VVT change angle (bank 1)	-
VVT OCV D B1	VVT OCV operation duty (bank 1)	-
FC IDL	Idle fuel cut	ON: when throttle valve fully closed and engine speed over 1,500 rpm
FC TAU	FC TAU	Fuel cut being performed under very light load to prevent incomplete engine combustion
IGNITION	Ignition	-
CYL #1	Cylinder #1 misfire rate	Displayed only during idling
CYL #3	Cylinder #3 misfire rate	Displayed only during idling
CYL #4	Cylinder #4 misfire rate	Displayed only during idling
CYL ALL	All cylinder misfire rate	Displayed only during idling

Tester Display	Measurement Item/Range	Diagnostic Note
MISFIRE RPM	Misfire RPM	-
MISFIRE RPM	Misfire RPM	-
MISFIRE LOAD	Misfired load	-
MISFIRE MARGIN	Misfire monitoring	-
ENG RUN TIME	Accumulated engine running time	-
TIME DTC CLEAR	Cumulative time after DTC cleared	-
DIST DTC CLEAR	Accumulated distance from DTC cleared	-
WU CYC DTC CLEAR	Warm-up cycle after DTC cleared	-
VACUUM PUMP	Vacuum pump	ON: Operate
EVAP VENT VAL	EVAP system vent valve	ON: Close
FAN MOTOR	Electric fan motor	ON: Operate
FUEL FILLER OPN	Fuel filler opener	ON: Open
FVCV	Fuel vapor-containment valve	ON: Open
REQ ENG TRQ	Requested engine torque	-
HV TRGT ENG SPD	HV target engine speed	-
ACT ENGINE TRQ	Actual engine torque	-
EST ENGINE TRQ	Estimated engine torque	-
ENG RUN TIME	Engine run time	-
ENGINE RUN TIME	Request engine run time	-
IGNITION TIME	Judge time engine ignition	-
OUTPUT TIME	Judge time engine output	-
FUEL. LEVEL	Fuel level	-
ISC LEARNING	ISC learning	-
FUEL CUT	Fuel cut for engine stop request	-
INDPNDNT OPR	Engine Independent operation	-
RACING	Racing operation	-
WARM UP	Request warm-up	-
INDPNDNT CNTRL	Engine independent control	-
ISC LEARN VAL	ISC learning control	-
FUEL LID	Fuel lid	-
FUEL LID SW	Fuel lid switch	ON: Open
MODEL CODE	Identifying the model code	AUH40L
ENGINE TYPE	Identifying the engine type	2AZFXE
CYLINDER NUMBER	Identifying the cylinder number	4
DESTINATION	Identifying the destination	A (America)
MODEL YEAR	Identifying the model year	200#
SYSTEM	Identifying the engine system	HV

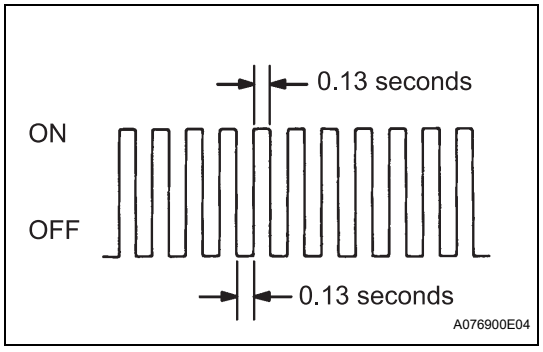
CHECK MODE PROCEDURE

HINT:
Intelligent tester only:
Compared to the normal mode, check mode is more sensitive to malfunctions. Therefore, check mode can detect the malfunctions that cannot be detected in normal mode.
NOTICE:
All the stored DTCs and freeze frame data are erased if: 1) the ECM is changed from normal mode to check mode or vice versa; or 2) the power switch is turned from on (ON) to on (ACC) or off while in check mode. Before changing modes, always check and make a note of any DTCs and freeze frame data.



1. CHECK MODE PROCEDURE (Using an intelligent tester)

(a) Check and ensure the following conditions:
(1) Battery positive voltage 11 V or more.
(2) Throttle valve fully closed.
(3) Transmission in the P or N positions.
(4) A/C switched OFF.
(b) Turn the power switch off.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the power switch on (IG).
(e) Turn the tester on.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / CHECK MODE.
(g) Switch the ECM (Included in Hybrid Vehicle Control ECU) from normal mode to check mode.



(h) Make sure that the MIL flashes as shown in the illustration.
(i) Start the engine.
(j) Make sure that the MIL turns OFF.
(k) Simulate the conditions of the malfunction described by the customer.
(l) Check for DTCs and freeze frame data using the tester.

INSPECTION MODE PROCEDURE

HINT:
Before performing the DATA LIST and ACTIVE TEST of the engine with the intelligent tester, be sure to put the system into the inspection mode using the following procedures.

1. ACTIVATING INSPECTION MODE

(a) Perform the following steps (1) through (4) in 60 seconds.
  (1) Turn the power switch on (IG).
  (2) Fully depress the accelerator pedal twice with the transmission in the P position.
  (3) Fully depress the accelerator pedal twice with the transmission in the N position.
  (4) Fully depress the accelerator pedal twice with the transmission in the P position.
  (5) Check that "FWD MAINTENANCE MODE" on the multi-information display and master warning light is illuminated in the combination meter.
  (6) Start the engine.

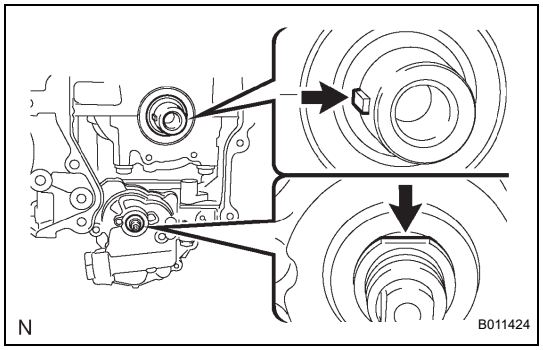
INSPECTION

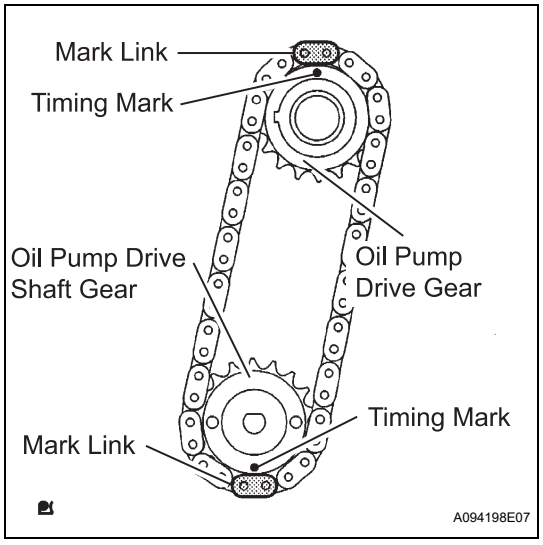
1. **INSPECT CHAIN SUB-ASSEMBLY (See page EM-131)**
2. **INSPECT NO. 2 CHAIN SUB-ASSEMBLY (See page EM-131)**
3. **INSPECT OIL PUMP DRIVE GEAR (See page EM-131)**
4. **INSPECT OIL PUMP DRIVE SHAFT GEAR (See page EM-132)**
5. **INSPECT CHAIN TENSIONER SLIPPER (See page EM-133)**
6. **INSPECT NO. 1 CHAIN VIBRATION DAMPER (See page EM-133)**
7. **INSPECT CHAIN TENSIONER PLATE (See page EM-133)**
8. **INSPECT NO. 1 CHAIN TENSIONER (See page EM-133)**

EM

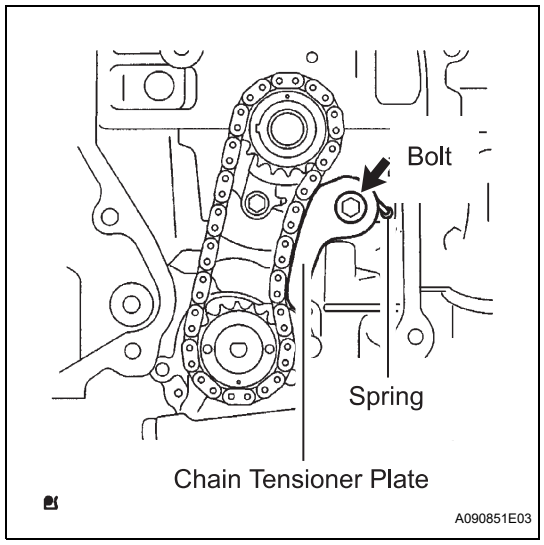
INSTALLATION

1. **INSTALL NO. 2 CHAIN SUB-ASSEMBLY**
   (a) Set the crankshaft key into the left horizontal position.
   (b) Turn the drive shaft so that the cutout faces upward.

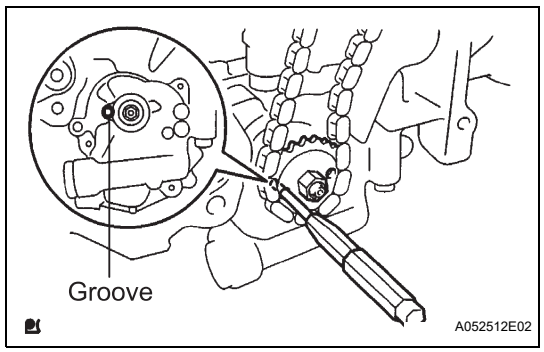




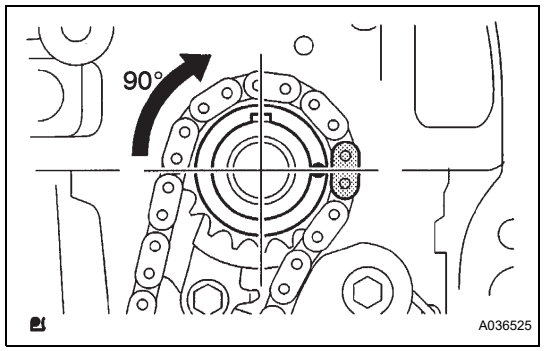
   (c) Align the yellow mark links with the timing marks of each gear as shown in the illustration.
   (d) Install the sprockets onto the crankshaft and oil pump shaft with the chain on the gears.
   (e) Temporarily tighten the oil pump drive shaft gear with the nut.



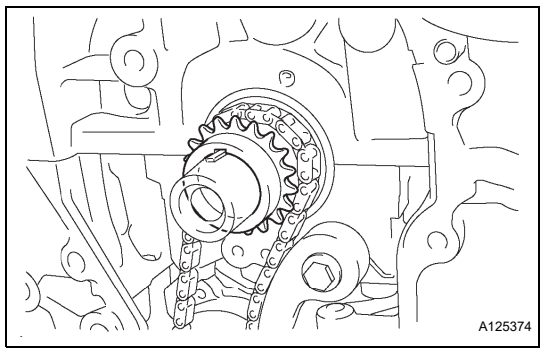
(f) Insert the damper spring into the adjusting hole, and then install the chain tensioner plate with the bolt.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)



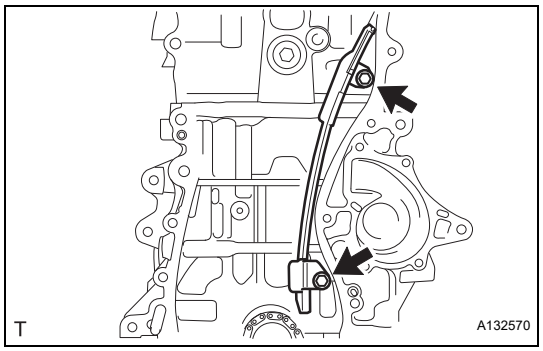
(g) Align the adjusting hole of the oil pump drive shaft gear with the groove of the oil pump.
(h) Insert a 4 mm diameter bar into the adjusting hole of the oil pump drive shaft gear to lock the gear in position, and then tighten the nut.
Torque: 30 N*m (301 kgf*cm, 22 ft.*lbf)



(i) Rotate the crankshaft clockwise 90°, and position the crankshaft key to face up as shown in the illustration.

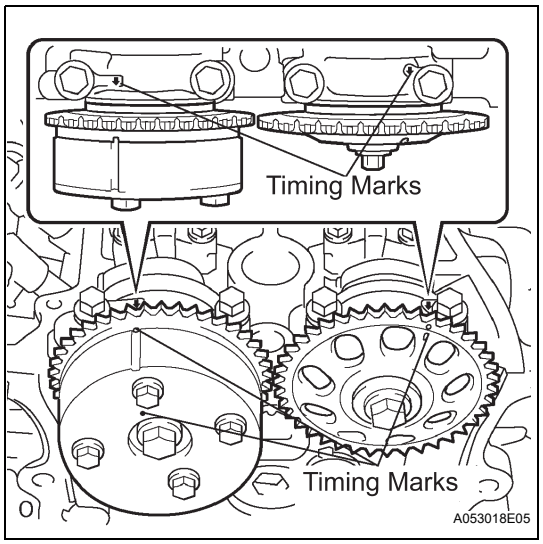


2. INSTALL CRANKSHAFT TIMING SPROCKET
(a) Install the crankshaft timing sprocket.



3. INSTALL NO. 1 CHAIN VIBRATION DAMPER

(a) Install the chain vibration damper with the 2 bolts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

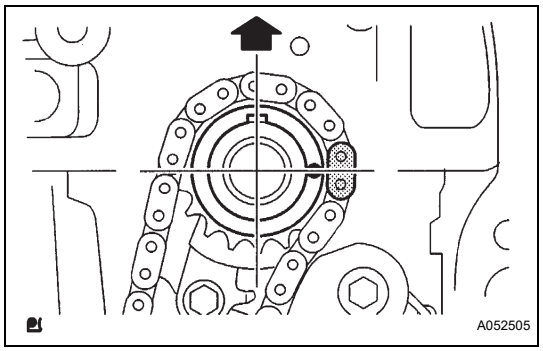


4. INSTALL CHAIN SUB-ASSEMBLY

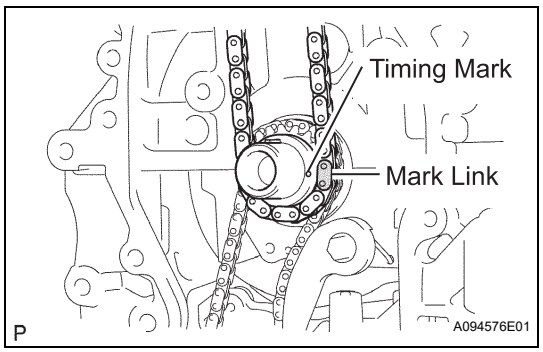
(a) Set the No. 1 cylinder to TDC/compression.

(1) Turn the camshafts with a wrench (using the hexagonal lobe) to align the timing marks of the camshaft timing gear with each timing mark located on the No. 1 and No. 2 bearing caps as shown in the illustration.

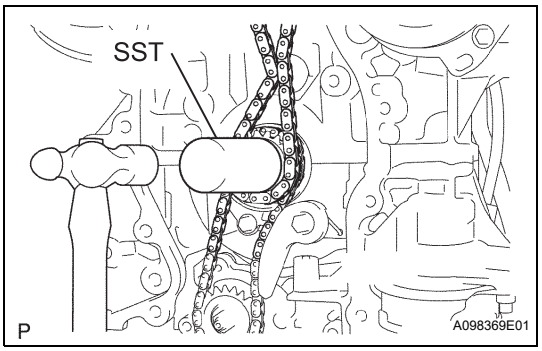
EM



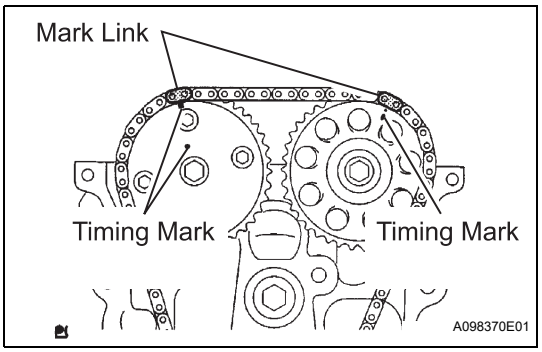
(2) Using the crankshaft pulley bolt, turn the crankshaft to position the crankshaft key to face up as shown in the illustration.



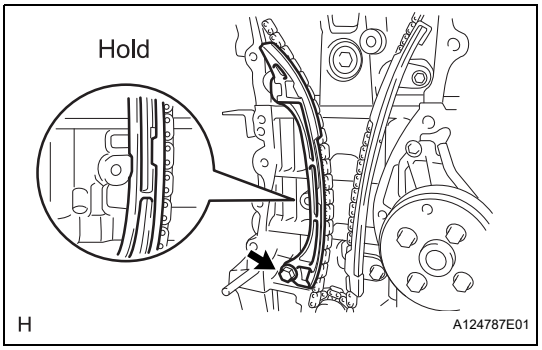
(b) Install the chain onto the crankshaft timing sprocket with the gold or pink mark link aligned with the timing mark on the crankshaft.



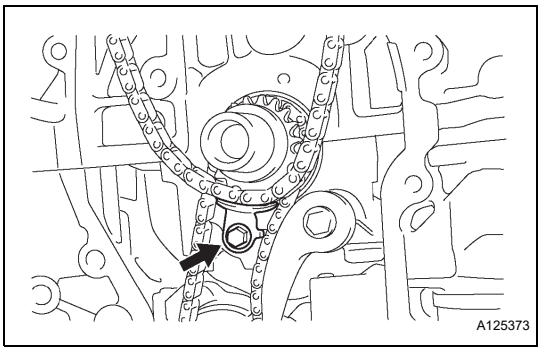
(c) Using SST and a hammer, tap in the crankshaft timing sprocket.
SST 09309-37010



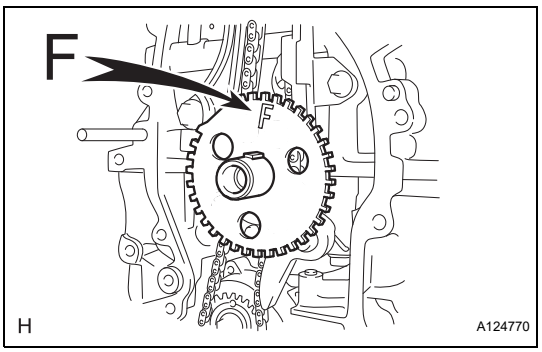
(d) Align the gold or yellow mark link with each timing mark located on the camshaft timing gear and sprocket, then install the chain.



5. INSTALL CHAIN TENSIONER SLIPPER
(a) Install the chain tensioner slipper with the bolt.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)



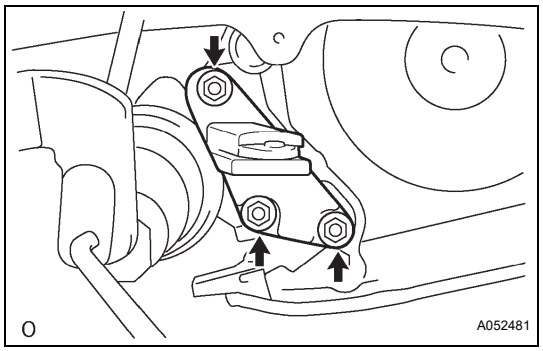
6. INSTALL TIMING CHAIN GUIDE
(a) Install the timing chain guide with the bolt.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)



7. INSTALL NO. 1 CRANKSHAFT POSITION SENSOR PLATE
(a) Install the sensor plate with the "F" mark facing forward.

8. INSTALL TIMING CHAIN CASE OIL SEAL (See page LU-15)

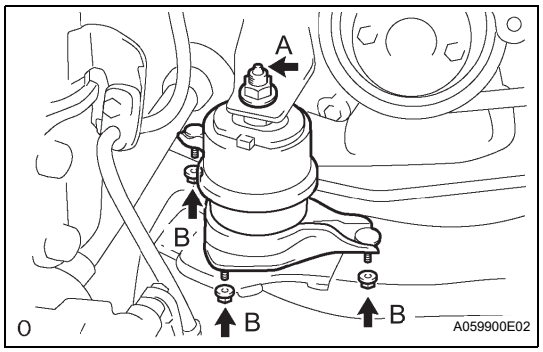
9. INSTALL TIMING CHAIN COVER SUB-ASSEMBLY (See page LU-15)



10. INSTALL ENGINE MOUNTING BRACKET RH

(a) Install the engine mounting bracket RH with the 3 bolts.

Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)

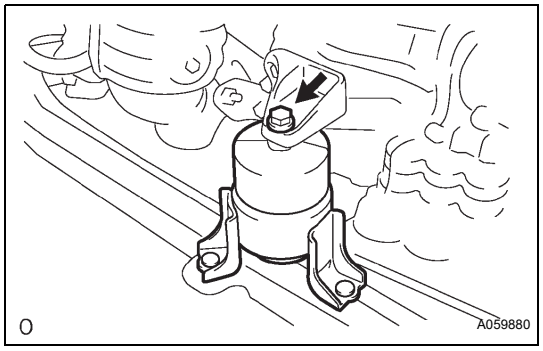


11. INSTALL ENGINE MOUNTING INSULATOR

(a) Raise the engine and install the engine mounting insulator RH.

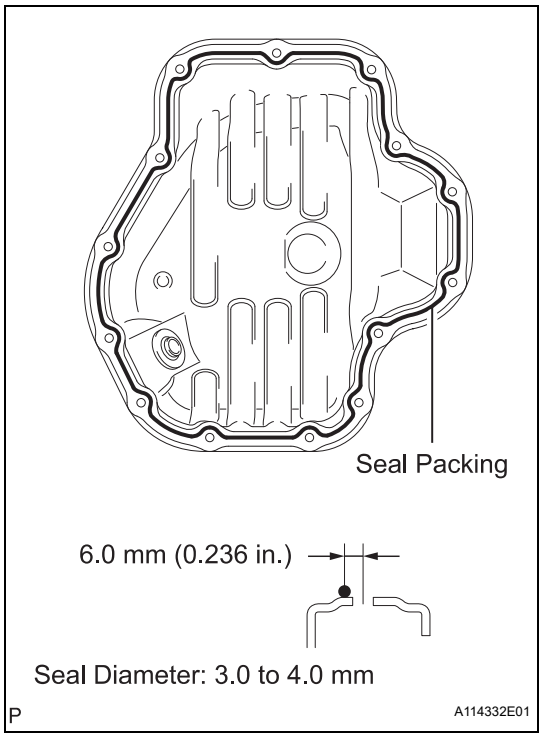
(b) Install the engine mounting insulator RH with the 4 nuts.

Torque: Nut A
95 N*m (969 kgf*cm, 70 ft.*lbf)
Nut B
87 N*m (888 kgf*cm, 64 ft.*lbf)



(c) Install the engine mounting insulator FR with the bolt.

Torque: 87 N*m (888 kgf*cm, 64 ft.*lbf)



12. INSTALL OIL PAN SUB-ASSEMBLY

(a) Remove any old packing material and be careful not to drop any oil on the contact surfaces of the cylinder block and oil pan.

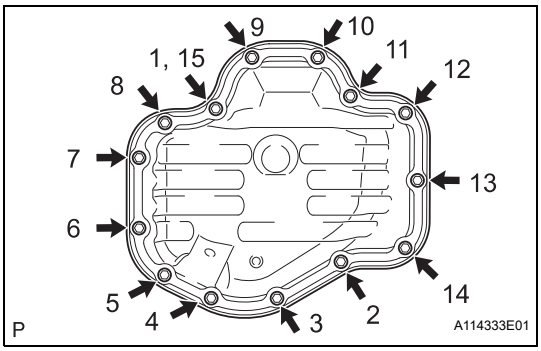
(b) Apply a continuous bead of seal packing (Diameter 3.0 to 4.0 mm (0.118 to 0.157 in.)) as shown in the illustration.

Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

NOTICE:

- **Remove any oil from the contact surfaces.**
- **Install the oil pan within 3 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing the oil pan.**

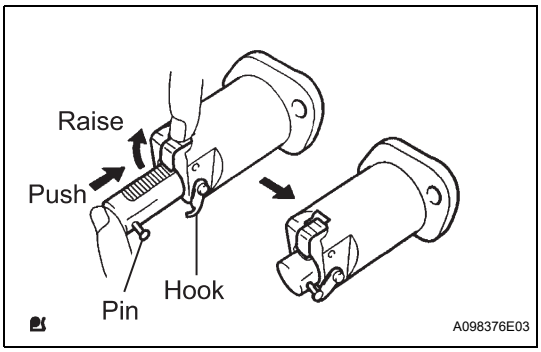
(c) Install the oil pan to the cylinder block.



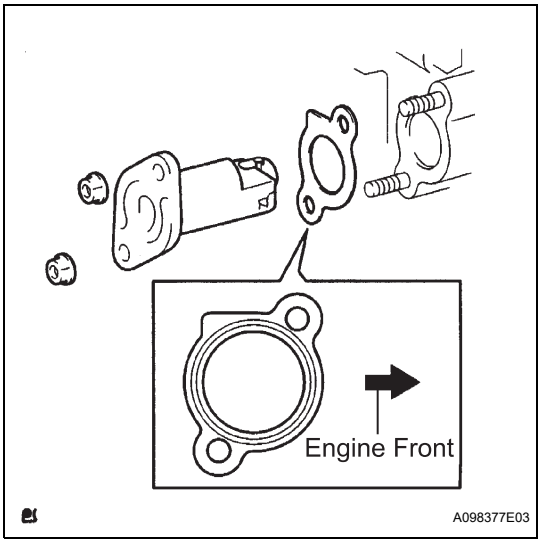
(d) Uniformly tighten the 12 bolts and 2 nuts in the sequence shown in the illustration.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

13. **INSTALL CRANK POSITION SENSOR (See page ES-389)**

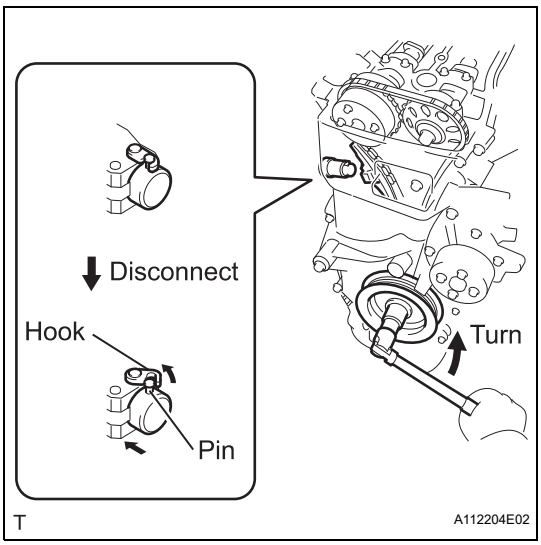
14. **INSTALL CRANKSHAFT PULLEY (See page EM-75)**



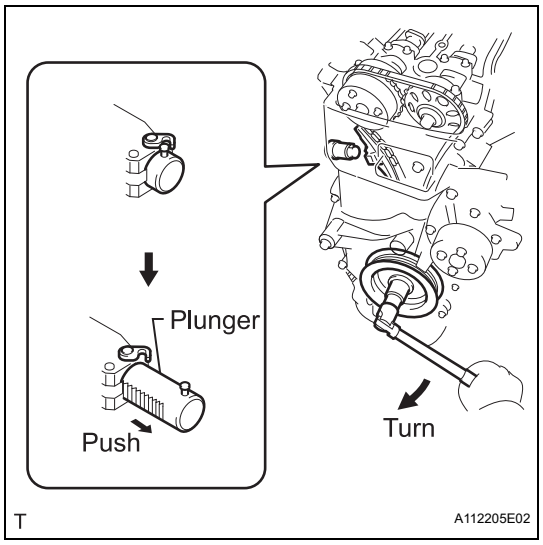
15. **INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY**
(a) Release the ratchet pawl, then fully push in the plunger and hook the hook to the pin so that the plunger is in the position shown in the illustration.



(b) Install a new gasket and the chain tensioner with the 2 nuts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
NOTICE:
If the hook releases the plunger while the chain tensioner is being installed, set the hook again.



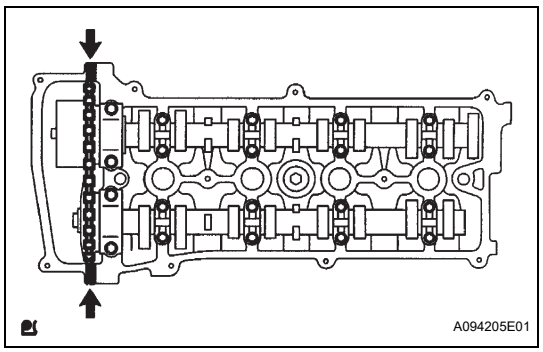
(c) Turn the crankshaft counterclockwise, then disconnect the plunger knock pin from the hook.



(d) Turn the crankshaft clockwise, then check that the plunger is extended.

16. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY

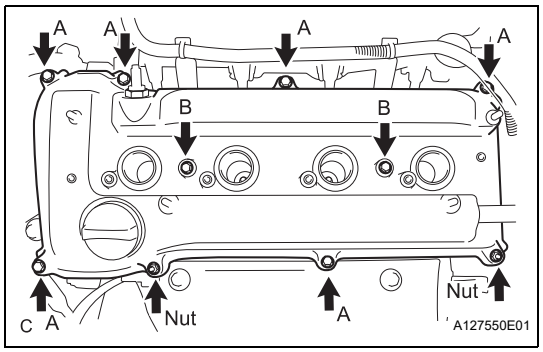
(a) Remove any old packing material from the contact surface.



(b) Apply seal packing to the 2 locations shown in the illustration.

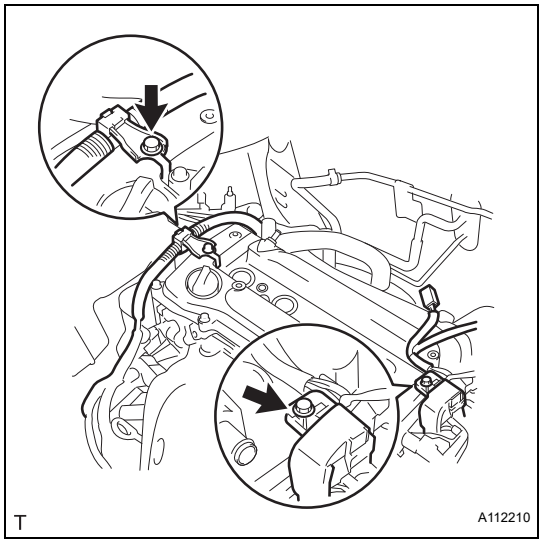
Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

NOTICE:
- **Remove any oil from the contact surface.**
- **Install the cylinder head cover within 3 minutes of applying seal packing.**
- **Do not add engine oil for at least 2 hours after installing the cylinder head cover.**



(c) Install the cylinder head cover with the 8 bolts and 2 nuts.

Torque: Bolt A
11 N*m (112 kgf*cm, 8 ft.*lbf)
Bolt B
14 N*m (143 kgf*cm, 10 ft.*lbf)
Nut
11 N*m (112 kgf*cm, 8 ft.*lbf)



(d) Install the 2 engine wires with the 2 bolts.
Torque: 8.4 N*m (86 kgf*cm, 74 in.*lbf)

17. INSTALL NO. 2 VENTILATION HOSE

18. INSTALL VENTILATION HOSE

19. INSTALL IGNITION COIL ASSEMBLY

(a) Install the 4 ignition coils with the 4 bolts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

20. INSTALL IDLER PULLEY BRACKET (See page EM-103)

21. INSTALL V-RIBBED BELT TENSIONER ASSEMBLY (See page EM-103)

22. INSTALL V-RIBBED BELT (See page EM-6)

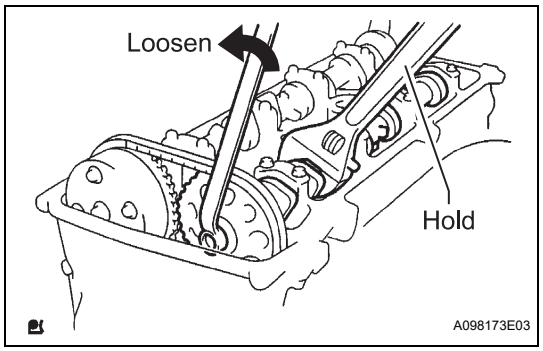
EM

23. **INSTALL V-RIBBED BELT TENSIONER COVER SUB-ASSEMBLY (See page EM-7)**
24. **INSTALL NO. 2 ENGINE MOUNTING BRACKET RH (See page EM-112)**
25. **INSTALL ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-112)**
26. **INSTALL NO. 2 ENGINE MOUNTING STAY RH (See page EM-112)**
27. **INSTALL FRONT EXHAUST PIPE ASSEMBLY**
    HINT:
    See page EX-3.
28. **ADD ENGINE OIL**
29. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-113)**
30. **INSTALL LUGGAGE TRIM SERVICE HOLE COVER**
31. **CHECK FOR ENGINE OIL LEAKS**
32. **CHECK FOR EXHAUST GAS LEAKS**
33. **CHECK IGNITION TIMING (See page EM-1)**
34. **INSTALL FRONT FENDER APRON SEAL RH**
35. **INSTALL ENGINE UNDER COVER LH**
36. **INSTALL ENGINE UNDER COVER RH**
37. **INSTALL FRONT WHEEL RH**
38. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-114)**
39. **PERFORM INITIALIZATION**
    (a) Perform initialization procedure (See page IN-43).
    HINT:
    Some vehicle systems require initialization after reconnecting the cable to the negative battery terminal.

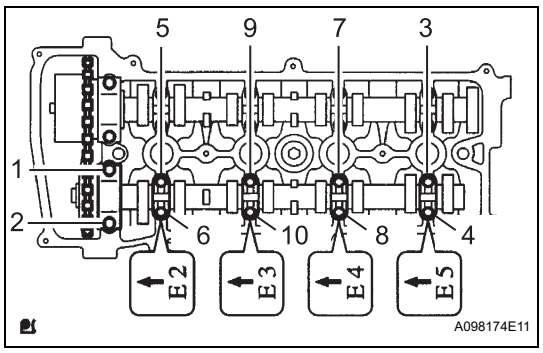
EM

REMOVAL

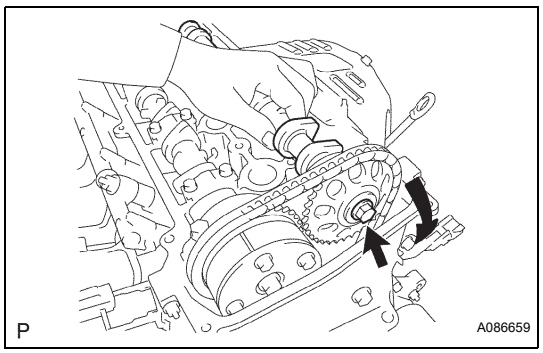
1. REMOVE FRONT WHEEL RH
2. REMOVE ENGINE UNDER COVER LH
3. REMOVE ENGINE UNDER COVER RH
4. REMOVE FRONT FENDER APRON SEAL RH
5. REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-90)
6. REMOVE IGNITION COIL ASSEMBLY (See page EM-100)
7. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY (See page EM-22)
8. SET NO. 1 CYLINDER TO TDC/COMPRESSION (See page EM-8)
9. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY (See page EM-23)
10. REMOVE NO. 2 CAMSHAFT



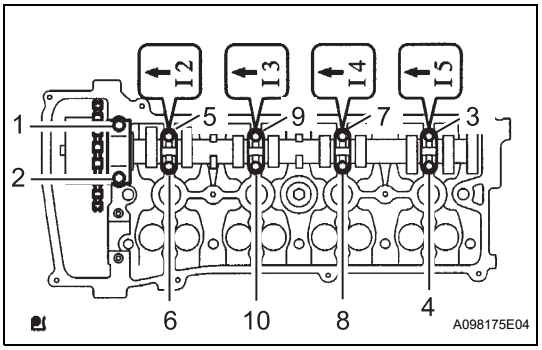
(a) While holding the camshaft with a wrench, loosen the camshaft timing set bolt.



(b) Using several steps, uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.
(c) Remove the 5 bearing caps.

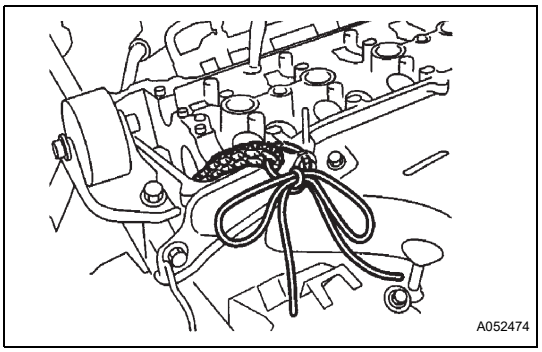


(d) While holding the No. 2 camshaft by hand, remove the camshaft timing sprocket set bolt.
(e) Remove the camshaft timing sprocket from the No. 2 camshaft with the timing chain on the sprocket.
(f) Remove the camshaft timing sprocket from the timing chain.

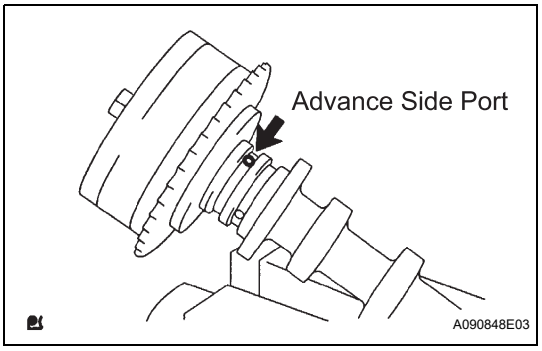


11. REMOVE CAMSHAFT

(a) Using several steps, uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.
(b) Remove the 5 bearing caps.
(c) Remove the camshaft and camshaft timing gear while holding the timing chain by hand.

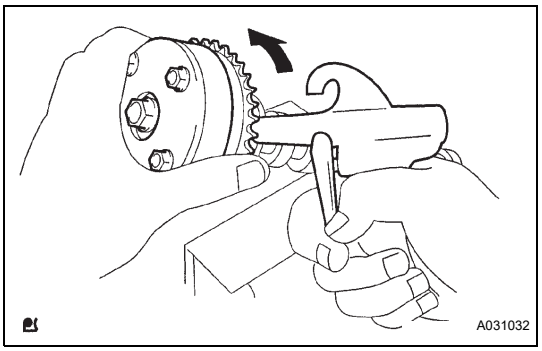


(d) Tie the timing chain with a string as shown in the illustration.
NOTICE:
Be careful not to drop anything inside the timing chain cover.

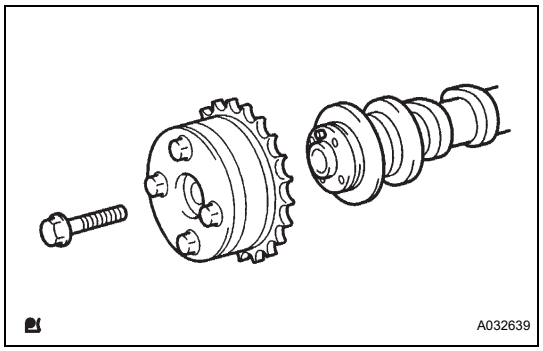


12. REMOVE CAMSHAFT TIMING GEAR ASSEMBLY

(a) Clamp the camshaft in a vise, and make sure that the camshaft timing gear does not rotate.
(b) Cover all the oil ports except the advance side port shown in the illustration with electrical tape.



(c) Apply air pressure of 100 kPa (1.0 kgf/cm^2, 14 psi) to the oil path, then turn the camshaft timing gear in the advance direction (counterclockwise) by hand.
CAUTION:
Cover the paths with a shop rag or piece of cloth to keep oil from splashing.
HINT:
Depending on the air pressure, the camshaft timing gear will turn to the advance angle side without applying force by hand. Also, if the pressure is difficult to apply because of air leakage from the port, the lock may be difficult to release.



(d) Remove the flange bolt of the camshaft timing gear.
NOTICE:
- **Be sure not to remove the other 4 bolts.**
- **If planning to reuse the gear, be sure to release the straight pin lock before installing the gear.**

INSPECTION

1. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY

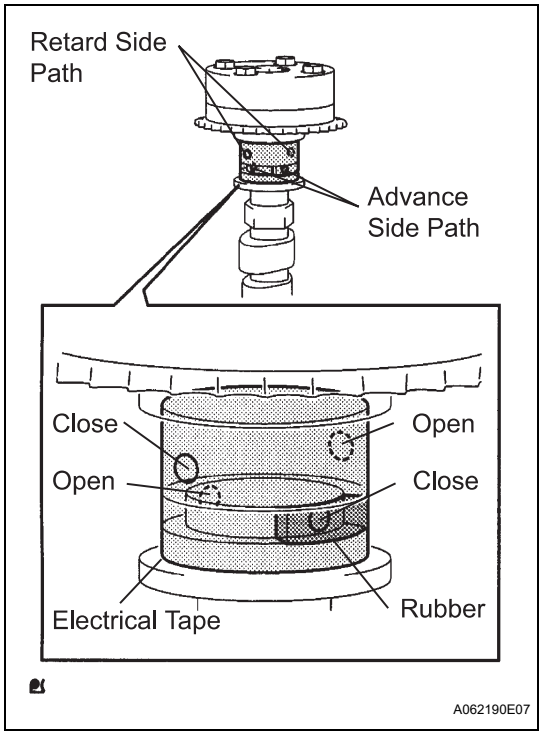
(a) Check the lock of the camshaft timing gear.

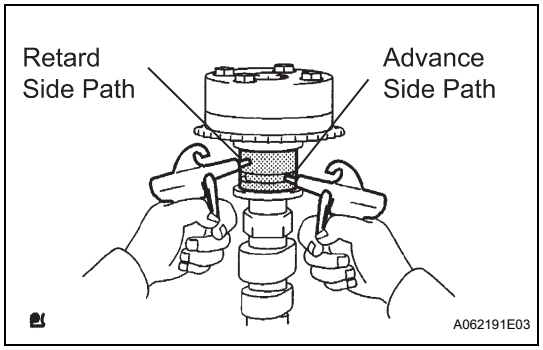
(1) Clamp the camshaft in a vise, and confirm that the camshaft timing gear is locked.
NOTICE:
Be careful not to damage the camshaft.

(b) Release the lock pin.

(1) Cover the 4 oil paths of the cam journal with electrical tape as shown in the illustration.
HINT:
The 2 advance side paths are provided in the groove of the camshaft. Plug one of the paths with a rubber piece.

(2) Prick a hole in the tape placed on the advance side, prick a hole in the tape placed on the retard side path, on the opposite side to that of the advance side path, as shown in the illustration.





(3) Apply approximately 200 kPa (2.0 kgf/cm^2, 28 psi) of air pressure to the two broken paths.
CAUTION:
Cover the paths with a piece of cloth when applying pressure to keep oil from splashing.

(4) Check that the camshaft timing gear revolves in the advance direction when reducing the air pressure of the retard side path.
OK:
Gear rotates in the advance direction.
HINT:
This operation releases the lock pin for the most retarded position.

(5) When the camshaft timing gear reaches the most advanced position, remove the air gun from the retard side path and advance side path, in that order.

NOTICE:

Do not remove the air gun from the advance side path first. The gear may abruptly shift in the retard direction and break the lock pin.

(c) Check for smooth rotation.

(1) Rotate the camshaft timing gear within its movable range several times, but do not turn it to the most retarded position. Check that the gear rotates smoothly.

OK:

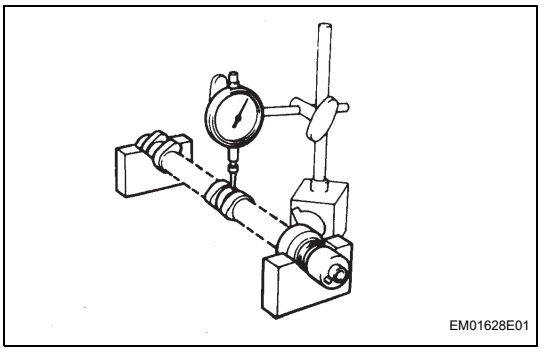
Gear rotates smoothly.

NOTICE:

Do not use an air gun to check for smooth operation.

(d) Check the lock in the most retarded position.

(1) Confirm that the camshaft timing gear is locked at the most retarded position.



2. INSPECT CAMSHAFT

(a) Inspect the camshaft for runout.

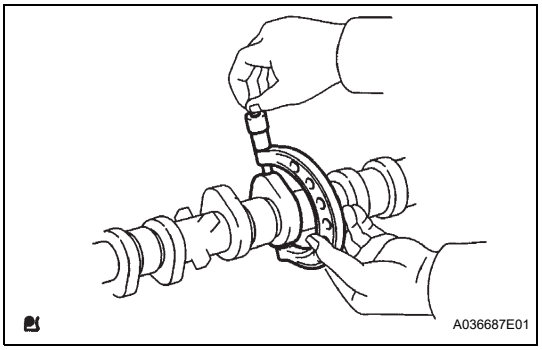
(1) Place the camshaft on V-blocks.

(2) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout:

0.03 mm (0.0012 in.)

If the circle runout is greater than the maximum, replace the camshaft.



(b) Inspect the cam lobes.

(1) Using a micrometer, measure the cam lobe height.

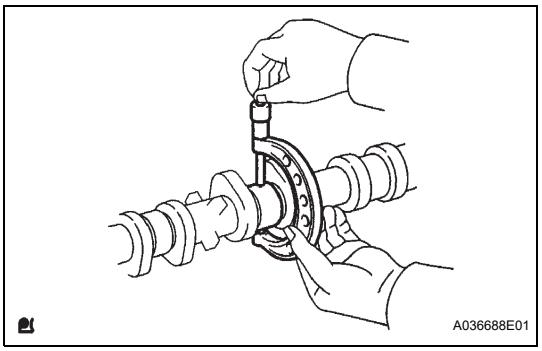
Standard cam lobe height:

44.516 to 44.616 mm (1.7526 to 1.7565 in.)

Minimum cam lobe height:

44.406 mm (1.7483 in.)

If the cam lobe height is less than the minimum, replace the camshaft.



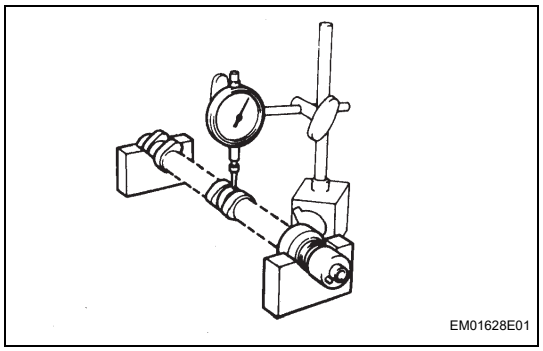
(c) Inspect the camshaft journals.

(1) Using a micrometer, measure the journal diameter.

Standard journal diameter

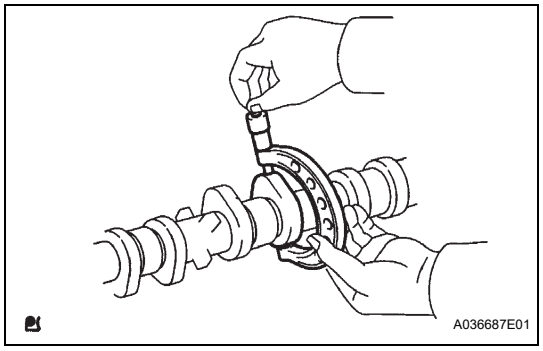
Journal Position	Specified Condition
No. 1	35.971 to 35.985 mm (1.4162 to 1.4167 in.)
Other	22.959 to 22.975 mm (0.9039 to 0.9045 in.)

If the journal diameter is not as specified, check the oil clearance.

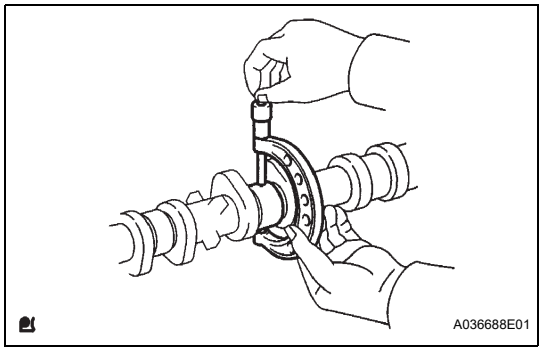


3. INSPECT NO. 2 CAMSHAFT

(a) Inspect the camshaft for runout.
(1) Place the camshaft on V-blocks.
(2) Using a dial indicator, measure the circle runout at the center journal.
Maximum circle runout:
0.03 mm (0.0012 in.)
If the circle runout is greater than the maximum, replace the No. 2 camshaft.



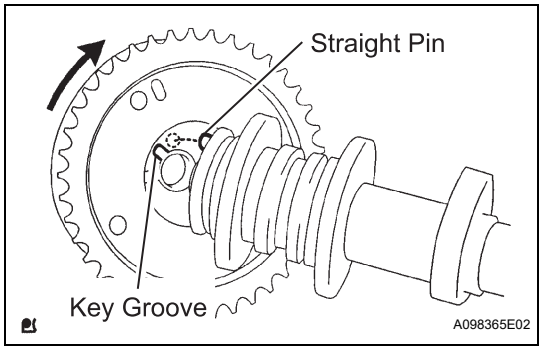
(b) Inspect the cam lobes.
(1) Using a micrometer, measure the cam lobe height.
Standard cam lobe height:
45.983 to 46.083 mm (1.8104 to 1.8143 in.)
Minimum cam lobe height:
45.873 mm (1.8060 in.)
If the cam lobe height is less than the minimum, replace the No. 2 camshaft.



(c) Inspect the camshaft journals.
(1) Using a micrometer, measure the journal diameter.
Standard journal diameter

Journal Position	Specified Condition
No. 1	35.971 to 35.985 mm (1.4162 to 1.4167 in.)
Other	22.959 to 22.975 mm (0.9039 to 0.9045 in.)

If the journal diameter is not as specified, check the oil clearance.



INSTALLATION

1. INSTALL CAMSHAFT TIMING GEAR ASSEMBLY

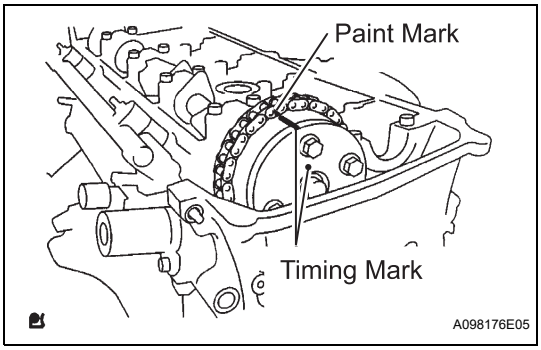
(a) Put the camshaft timing gear and camshaft together with the straight pin and key groove misaligned, as shown in the illustration.
(b) Turn the camshaft timing gear as shown in the illustration while pushing it gently against the camshaft. Push further at the position where the pin fits into the groove.
NOTICE:
Be sure not to turn the camshaft timing gear to the retard angle side (the right angle).
(c) Check that there is no clearance between the gear and camshaft.
(d) Tighten the flange bolt with the camshaft timing gear fixed in place.
Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)

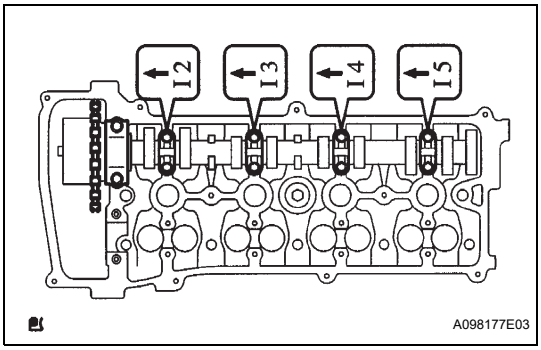
(e) Check that the camshaft timing gear can move to the retard angle side (the right direction) and is locked in the most retarded position.

2. INSTALL CAMSHAFT

(a) Apply a light coat of engine oil to the journal portion of the camshaft.

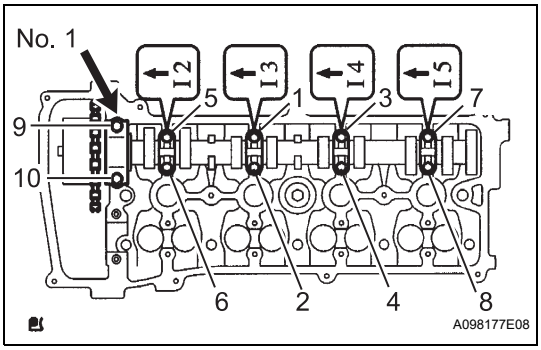
(b) Install the timing chain onto the camshaft timing gear with the paint mark aligned with the timing mark in the camshaft timing gear as shown in the illustration.





(c) Examine the front marks and numbers, and check that the order is as shown in the illustration. Then install the bearing caps into the cylinder head.

(d) Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts.



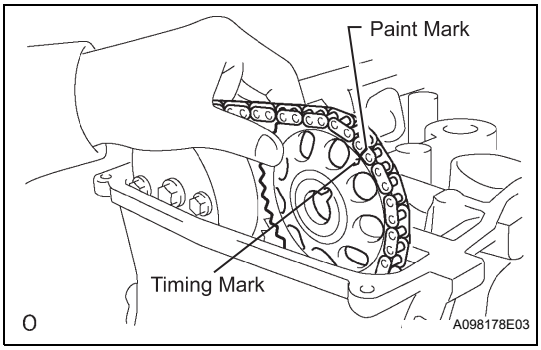
(e) Using several steps, uniformly tighten the 10 bearing cap bolts in the sequence shown in the illustration.

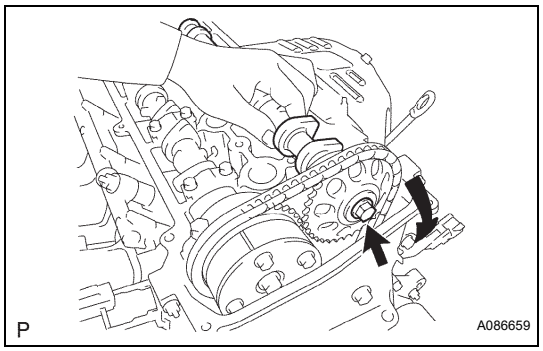
Torque: No. 1 bearing cap
30 N*m (301 kgf*cm, 22 ft.*lbf)
No. 3 bearing cap
9.0 N*m (92 kgf*cm, 80 in.*lbf)

3. INSTALL NO. 2 CAMSHAFT

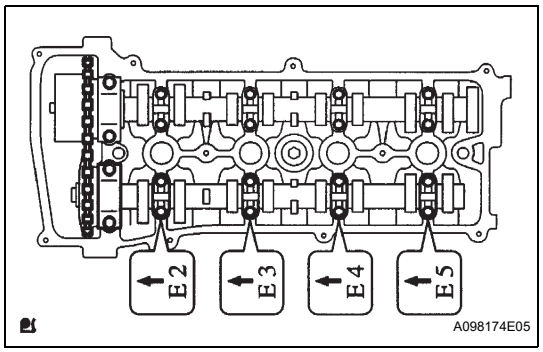
(a) Apply a light coat of engine oil to the journal portion of the No. 2 camshaft.

(b) Put the No. 2 camshaft on the cylinder head with the paint mark of the chain aligned with the timing mark on the camshaft timing sprocket.





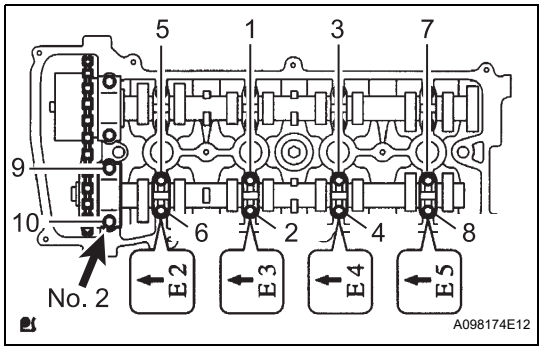
(c) While holding the No. 2 camshaft by hand, temporarily tighten the camshaft timing sprocket set bolt.



(d) Examine the front marks and numbers, and check that the order is as shown in the illustration. Then install the bearing caps onto the cylinder head.

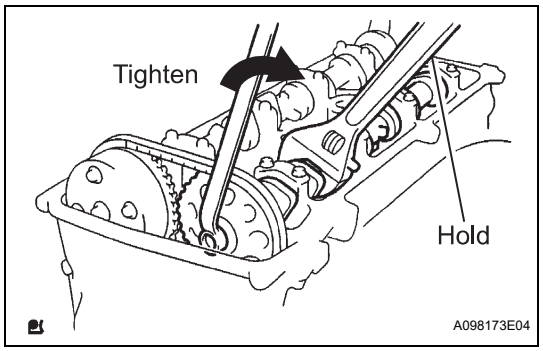
(e) Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts.

EM



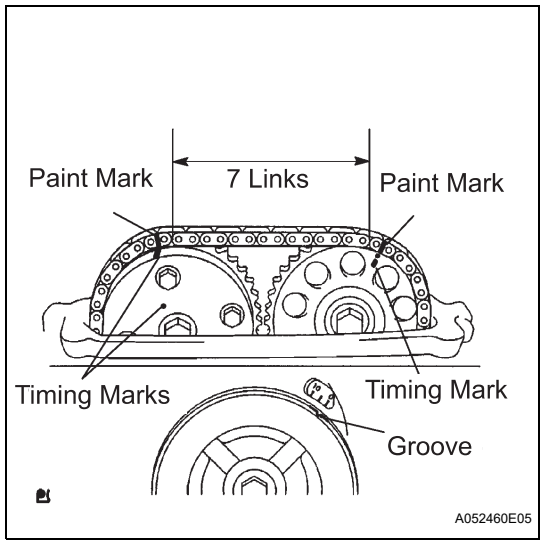
(f) Using several steps, uniformly tighten the 10 bearing cap bolts in the sequence shown in the illustration.

Torque: No. 2 bearing cap
30 N*m (301 kgf*cm, 22 ft.*lbf)
No. 3 bearing cap
9.0 N*m (92 kgf*cm, 80 in.*lbf)



(g) While holding the camshaft with a wrench, tighten the camshaft timing sprocket set bolt.

Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)



(h) Check that the paint marks on the chain are aligned with the timing marks on the camshaft timing gear and camshaft timing sprocket. Also, check that the crankshaft pulley groove is aligned with the timing mark "0" of the timing chain cover.

4. **INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY (See page EM-31)**
5. **CHECK VALVE CLEARANCE (See page EM-8)**
6. **INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY (See page EM-32)**
7. **INSTALL IGNITION COIL ASSEMBLY (See page EM-32)**
8. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-114)**
9. **INSTALL FRONT FENDER APRON SEAL RH**
10. **INSTALL ENGINE UNDER COVER LH**
11. **INSTALL ENGINE UNDER COVER RH**
12. **INSTALL FRONT WHEEL RH**
13. **CHECK FOR ENGINE OIL LEAKS**

REMOVAL

1. **DISCHARGE FUEL SYSTEM PRESSURE**
   HINT:
   See page FU-1.
2. **REMOVE LUGGAGE TRIM SERVICE HOLE COVER**
3. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (See page HV-560)**
4. **REMOVE ENGINE UNDER COVER LH**
5. **REMOVE ENGINE UNDER COVER RH**
6. **REMOVE FRONT FENDER APRON SEAL RH**
7. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-90)**
8. **DRAIN ENGINE COOLANT (See page CO-5)**
9. **DRAIN ENGINE OIL (See page LU-4)**
10. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-9)**
11. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-9)**
12. **REMOVE FRONT FENDER TO COWL SIDE SEAL LH (See page WW-9)**
13. **REMOVE FRONT FENDER TO COWL SIDE SEAL RH (See page WW-9)**
14. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-10)**
15. **REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-10)**
16. **SEPARATE BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY**
17. **REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-403)**
18. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-90)**
19. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-395)**
20. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-90)**
21. **REMOVE THROTTLE BODY ASSEMBLY (See page ES-396)**
22. **DISCONNECT FUEL TUBE SUB-ASSEMBLY (See page EM-94)**
23. **REMOVE FUEL DELIVERY PIPE WITH INJECTOR (See page FU-13)**
24. **REMOVE INTAKE MANIFOLD (See page ES-403)**

25. **REMOVE NO. 1 INTAKE MANIFOLD INSULATOR (See page EM-98)**

26. **REMOVE FRONT EXHAUST PIPE ASSEMBLY**
HINT:
See page EX-2.

27. **REMOVE NO. 2 ENGINE MOUNTING STAY RH (See page EM-91)**

28. **REMOVE ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-91)**

29. **REMOVE NO. 2 ENGINE MOUNTING BRACKET RH (See page EM-91)**

30. **REMOVE V-RIBBED BELT TENSIONER COVER SUB-ASSEMBLY (See page EM-6)**

31. **REMOVE V-RIBBED BELT (See page EM-6)**

32. **REMOVE OIL LEVEL GAUGE SUB-ASSEMBLY**

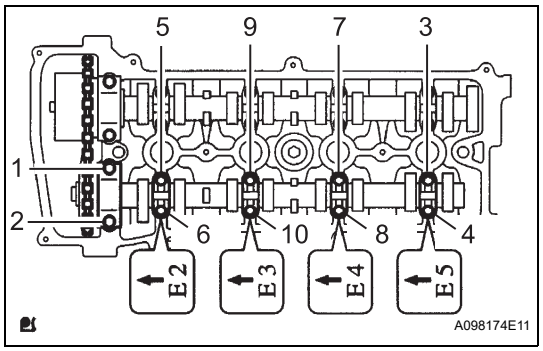
33. **REMOVE OIL LEVEL GAUGE GUIDE (See page EM-99)**

34. **REMOVE MANIFOLD STAY (See page EM-99)**

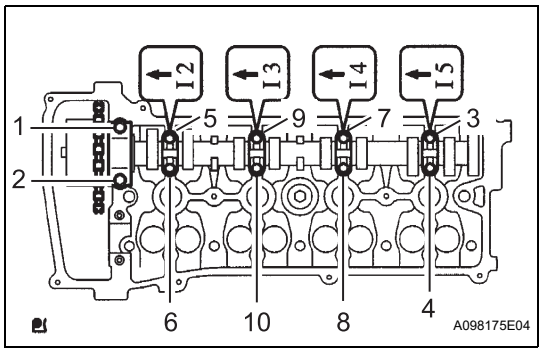
35. **REMOVE NO. 2 MANIFOLD STAY (See page EM-99)**

36. **REMOVE EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY (See page EM-99)**

37. **REMOVE CHAIN SUB-ASSEMBLY**
HINT:
See page EM-21.



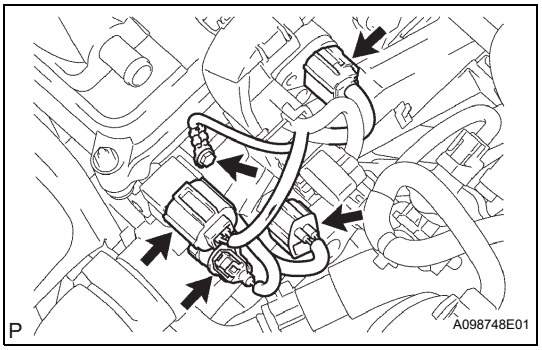
38. **REMOVE NO. 2 CAMSHAFT**
(a) Using several steps, uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.
(b) Remove the 5 bearing caps and No. 2 camshaft.



39. **REMOVE CAMSHAFT**
(a) Using several steps, uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.
(b) Remove the 5 bearing caps and camshaft.

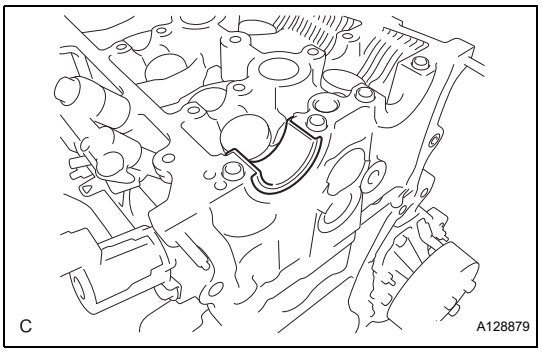
40. **REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (See page ES-381)**

41. **DISCONNECT RADIATOR HOSE INLET (See page EM-91)**



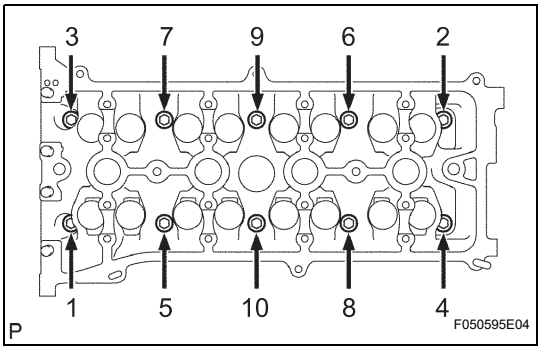
42. DISCONNECT ENGINE WIRE

(a) Disconnect the radio setting condenser connector.
(b) Disconnect the engine oil pressure switch connector.
(c) Disconnect the engine coolant temperature sensor connector.
(d) Disconnect the camshaft position sensor connector.
(e) Remove the bolt and ground cable.



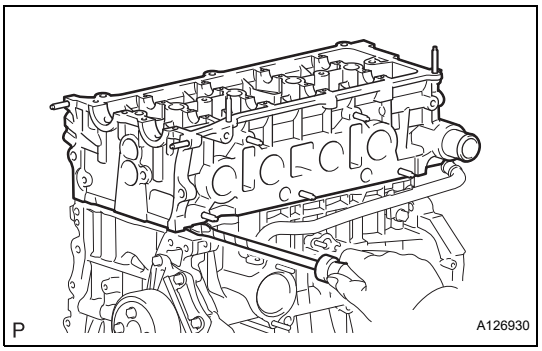
43. REMOVE NO. 2 CAMSHAFT BEARING

(a) Remove the No. 2 camshaft bearing.

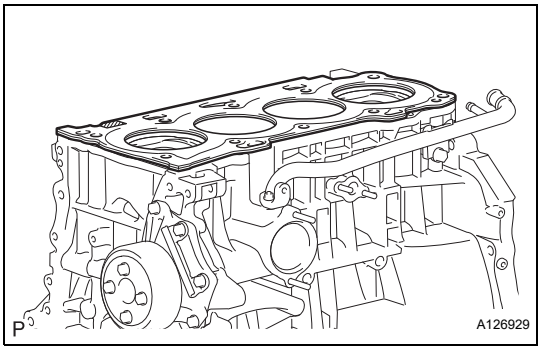


44. REMOVE CYLINDER HEAD SUB-ASSEMBLY

(a) Using several steps, uniformly loosen and remove the 10 cylinder head bolts and 10 plate washers with a 10 mm bi-hexagon wrench in the sequence shown in the illustration.
NOTICE:
Head warpage or cracking could result from removing the bolts in the wrong order.

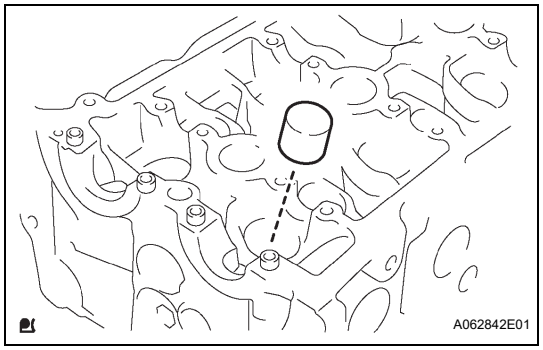


(b) Using a screwdriver with its tip wrapped with tape, pry between the cylinder head and cylinder block, and remove the cylinder head.
NOTICE:
Be careful not to damage the contact surfaces of the cylinder head and cylinder block.



45. REMOVE CYLINDER HEAD GASKET

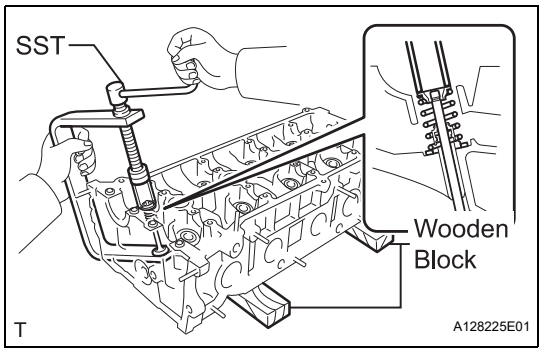
(a) Remove the cylinder head gasket.



DISASSEMBLY

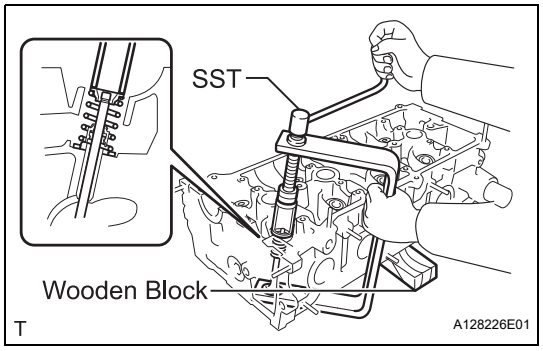
1. REMOVE VALVE LIFTER

(a) Remove the valve lifters.
HINT:
Arrange the valve lifters in the correct order.



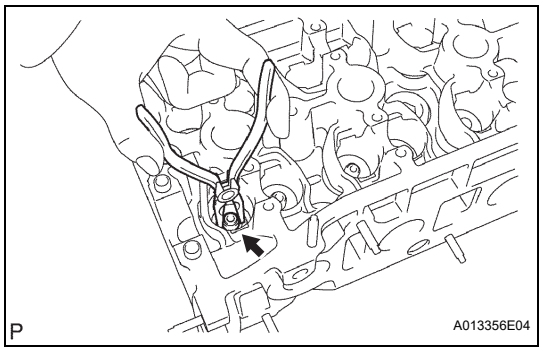
2. REMOVE INTAKE VALVE

(a) Using SST and wooden blocks, compress and remove the valve retainer locks.
SST 09202-70020 (09202-00010)
(b) Remove the retainer, valve spring and valve.
HINT:
Arrange the removed parts in the correct order.



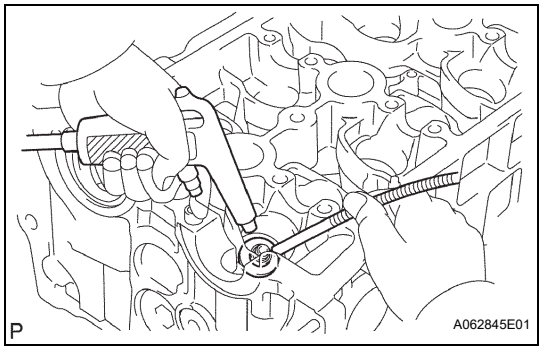
3. REMOVE EXHAUST VALVE

(a) Using SST and wooden blocks, compress and remove the valve retainer locks.
SST 09202-70020 (09202-00010)
(b) Remove the retainer, valve spring and valve.
HINT:
Arrange the removed parts in the correct order.



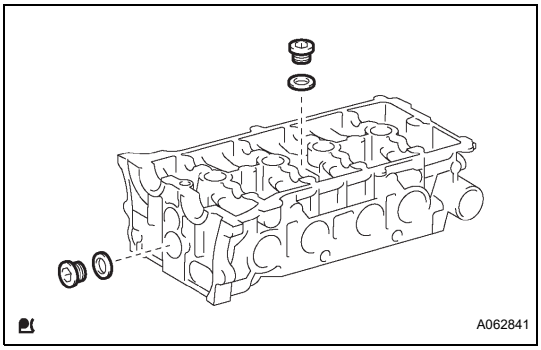
4. REMOVE VALVE STEM OIL SEAL

(a) Using needle-nose pliers, remove the oil seals.



5. REMOVE VALVE SPRING SEAT

(a) Using compressed air and a magnetic finger, remove the valve spring seats by blowing air onto them.



6. REMOVE NO. 1 STRAIGHT SCREW PLUG

(a) Using a 14 mm straight hexagon wrench, remove the 2 screw plugs and 2 gaskets.

NOTICE:
If water leaks from the straight screw plug or the plug corrodes, replace it.

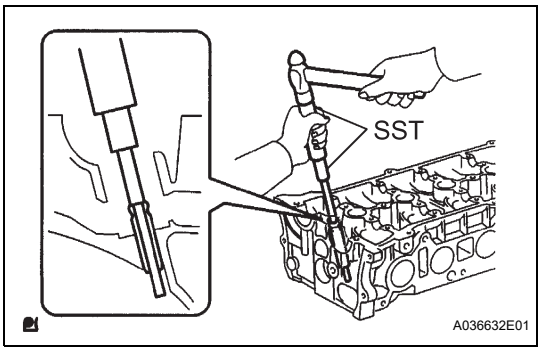
7. REMOVE STUD BOLT

8. REMOVE RING PIN

9. REMOVE INTAKE VALVE GUIDE BUSH

(a) Heat the cylinder head to 80 to 100°C (176 to 212°F).

(b) Place the cylinder head on wooden blocks.



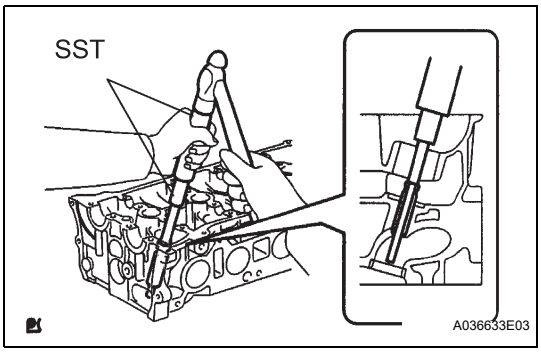
(c) Using SST and a hammer, tap out the guide bush.

SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)

10. REMOVE EXHAUST VALVE GUIDE BUSH

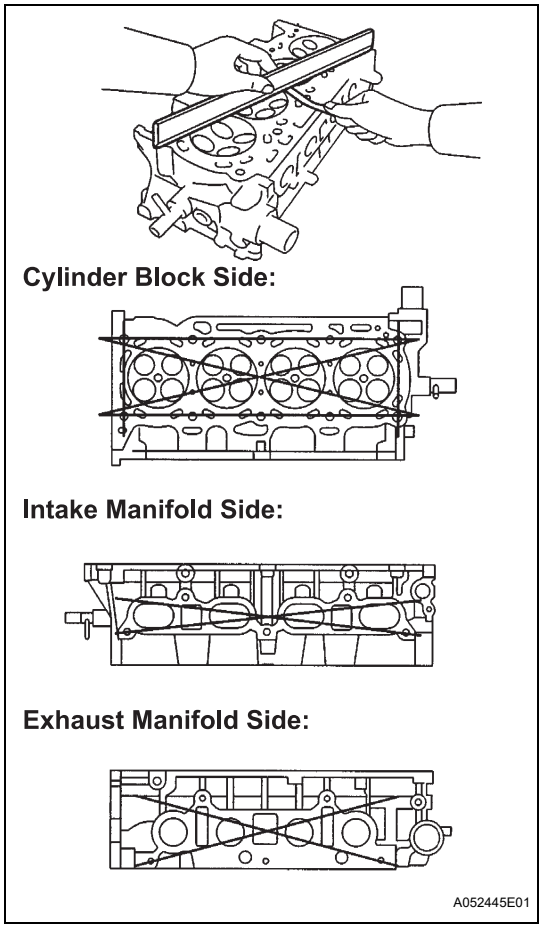
(a) Heat the cylinder head to 80 to 100°C (176 to 212°F).

(b) Place the cylinder head on wooden blocks.



(c) Using SST and a hammer, tap out the guide bush.

SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)



INSPECTION

1. INSPECT CYLINDER HEAD FOR FLATNESS

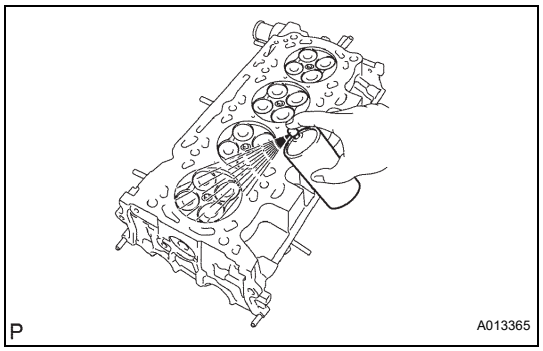
(a) Using a precision straight edge and a feeler gauge, measure the surface contacting the cylinder block and the manifolds for warpage.

Maximum warpage

Item	Specified Condition
Cylinder block side	0.05 mm (0.0020 in.)
Intake manifold side	0.08 mm (0.0031 in.)
Exhaust manifold side	0.08 mm (0.0031 in.)

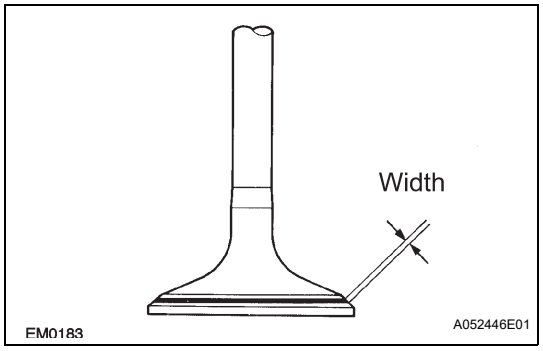
If the warpage is greater than the maximum, replace the cylinder head.

EM



2. INSPECT CYLINDER HEAD FOR CRACKS

(a) Using a dye penetrant, check the intake ports, exhaust ports and cylinder surface for cracks.
If cracked, replace the cylinder head.



3. INSPECT VALVE SEATS

(a) Apply a light coat of Prussian blue to the valve face.
(b) Lightly press the valve face against the valve seat.
(c) Check the valve face and valve seat according to the following procedure:
  (1) If prussian blue appears 360° around the valve face, the valve face is concentric. If not, replace the valve.
  (2) If prussian blue appears 360° around the valve seat, the guide and valve face are concentric. If not, resurface the valve seat.
  (3) Check that the valve seat contact is in the middle of the valve face with the valve seat width between 1.0 and 1.4 mm (Intake side (0.039 to 0.055 in.)).

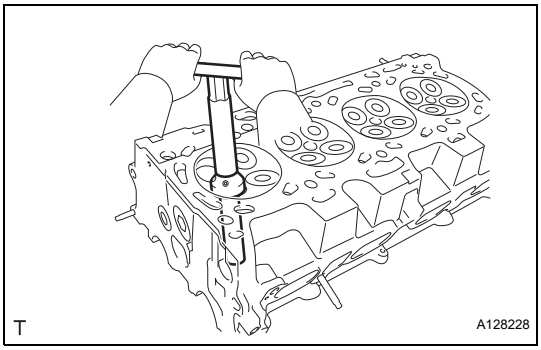
(4) Check that the valve seat contact is in the middle of the valve face with the valve seat width between 1.2 and 1.6 mm (Exhaust side (0.047 to 0.063 in.)).

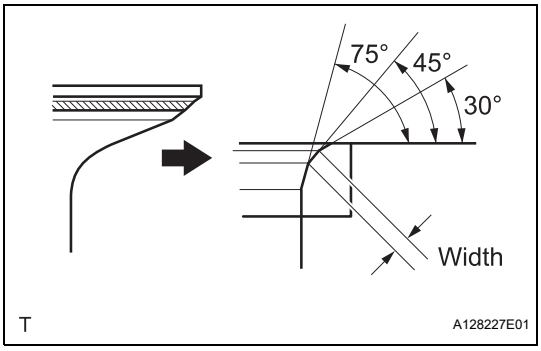
4. REPAIR VALVE SEATS

NOTICE:

- **Repair the seat while checking the seating position.**
- **Keep the lip free from foreign matter.**

(a) Using a 45° cutter, resurface the valve seat so that the valve seat width is more than the specification.





(b) Using 30° and 75° cutters, correct the valve seat so that the valve contacts the entire circumference of the seat. The contact should be in the center of the valve seat, and the valve seat width should be maintained within the specified range around the entire circumference of the seat.

Valve seat width

Item	Specified Condition
Intake Side	1.0 to 1.4 mm (0.039 to 0.055 in.)
Exhaust Side	1.2 to 1.6 mm (0.047 to 0.063 in.)

(c) Handrub the valve and valve seat with an abrasive compound.

(d) Check the valve seating position.

5. INSPECT CAMSHAFT THRUST CLEARANCE

(a) Install the camshafts (See page EM-69).

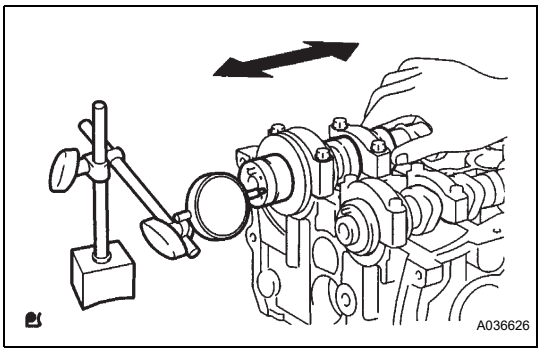
(b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.

Standard thrust clearance

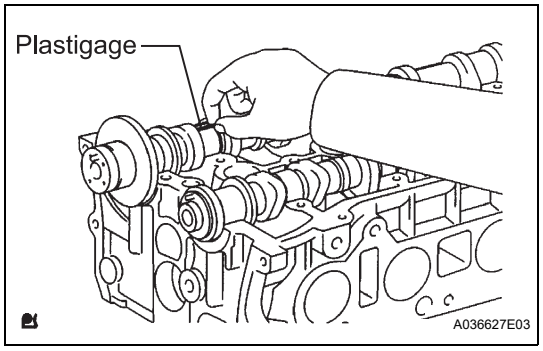
Item	Specified Condition
Intake	0.040 to 0.095 mm (0.0016 to 0.0037 in.)
Exhaust	0.080 to 0.135 mm (0.0032 to 0.0053 in.)

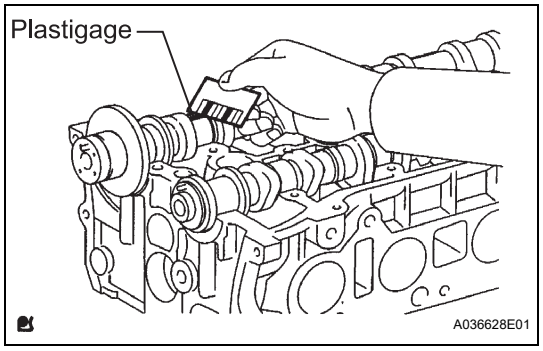
Maximum thrust clearance

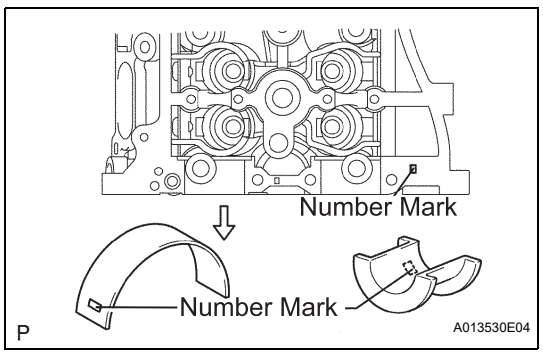
Item	Specified Condition
Intake	0.110 mm (0.0043 in.)
Exhaust	0.150 mm (0.0059 in.)



If the thrust clearance is greater than the maximum, replace the cylinder head. If the thrust surface is damaged, replace the camshaft.







6. INSPECT CAMSHAFT OIL CLEARANCE

(a) Clean the bearing caps and camshaft journals.

(b) Place the camshafts on the cylinder head.

(c) Lay a strip of Plastigage across each of the camshaft journals.

(d) Install the bearing caps (See page EM-69).

NOTICE:
Do not turn the camshaft.

(e) Remove the bearing caps (See page EM-52).

(f) Measure the Plastigage at its widest point.

Standard oil clearance

Item	Specified Condition
Camshaft No. 1 journal bearing mark 1	0.007 to 0.038 mm (0.0003 to 0.0015 in.)
Camshaft No. 1 journal bearing mark 2	0.008 to 0.038 mm (0.0003 to 0.0015 in.)
Camshaft No. 1 journal bearing mark 3	0.008 to 0.038 mm (0.0003 to 0.0015 in.)
Camshaft other journals	0.025 to 0.062 mm (0.0010 to 0.0024 in.)
No. 2 camshaft No. 1 journal	0.015 to 0.054 mm (0.0006 to 0.0021 in.)
No. 2 camshaft other journals	0.025 to 0.062 mm (0.0010 to 0.0024 in.)

Maximum oil clearance

Item	Specified Condition
Intake	0.070 mm (0.0028 in.)
Exhaust	0.100 mm (0.0039 in.)

NOTICE:
Completely remove the Plastigage after the inspection.

- If the oil clearance is greater than the maximum, replace the camshaft. If necessary, replace the cylinder head.
- If the oil clearance on the camshaft No. 1 journal is greater than the maximum, choose a new bearing and install it.

(1) Check the number mark shown in the illustration.

Cylinder head journal bore diameter

Mark 1	Mark 2	Mark 3
40.000 to 40.008 mm (1.5748 to 1.5752 in.)	40.009 to 40.017 mm (1.5752 to 1.5755 in.)	40.018 to 40.025 mm (1.5755 to 1.5758 in.)

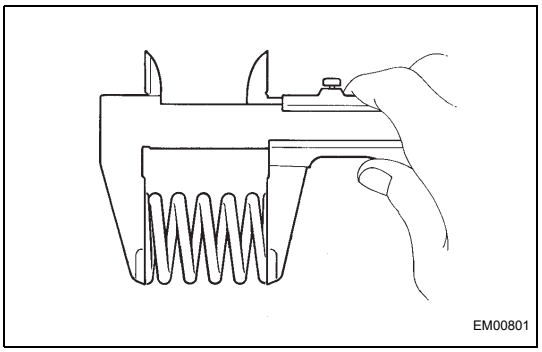
Standard bearing center wall thickness

Mark 1	Mark 2	Mark 3
2.000 to 2.004 mm (0.0787 to 0.0789 in.)	2.005 to 2.008 mm (0.0789 to 0.0791 in.)	2.009 to 2.012 mm (0.0791 to 0.0792 in.)

EM

Camshaft journal diameter

Mark 1	Mark 2	Mark 3
35.971 to 35.985 mm (1.4162 to 1.4167 in.)	35.971 to 35.985 mm (1.4162 to 1.4167 in.)	35.971 to 35.985 mm (1.4162 to 1.4167 in.)



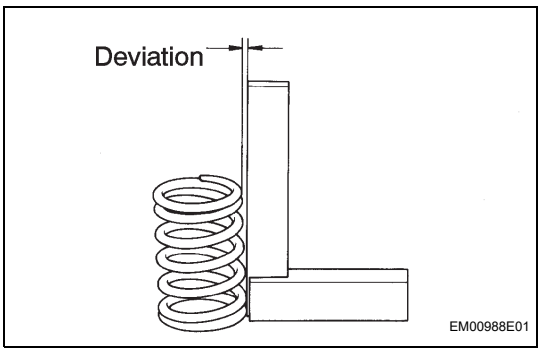
7. INSPECT INNER COMPRESSION SPRING

(a) Using vernier calipers, measure the free length of the valve spring.

Free length:

47.43 mm (1.867 in.)

If the free length is not as specified, replace the valve spring.

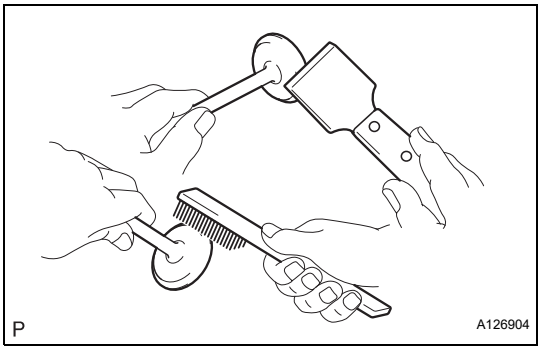


(b) Using steel squares, measure the deviation of the valve spring.

Maximum deviation:

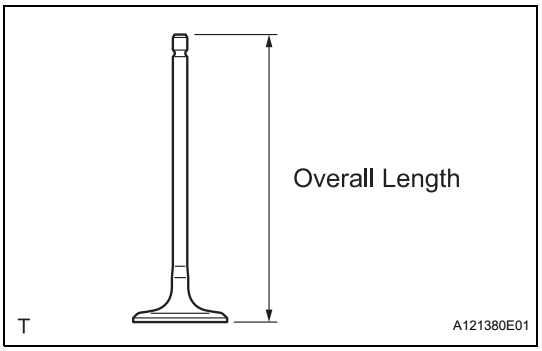
1.6 mm (0.063 in.)

If the deviation is greater than the maximum, replace the valve spring.



8. INSPECT INTAKE VALVE

(a) Using a gasket scraper, scrape off any carbon on the valve head.



(b) Using vernier calipers, measure the overall length of the valve.

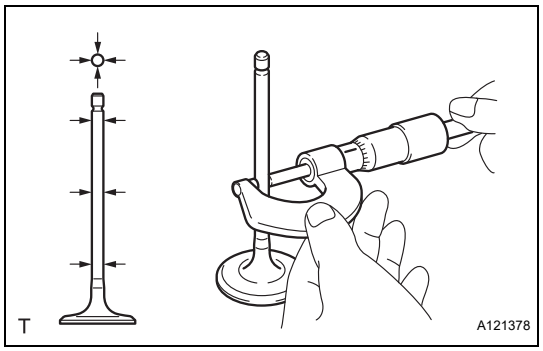
Standard overall length:

101.71 mm (4.0043 in.)

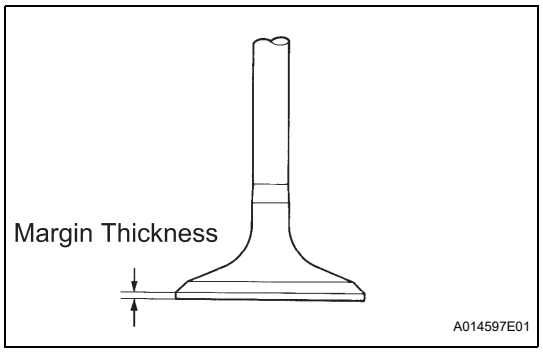
Minimum overall length:

101.21 mm (3.9846 in.)

If the overall length is less than the minimum, replace the valve.

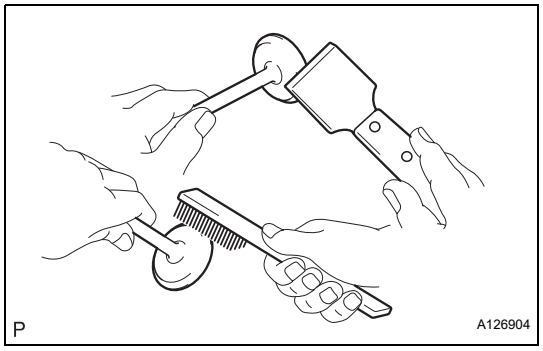


(c) Using a micrometer, measure the diameter of the valve stem.
Valve stem diameter:
5.470 to 5.485 mm (0.2154 to 0.2159 in.)
If the valve stem diameter is not as specified, check the oil clearance.



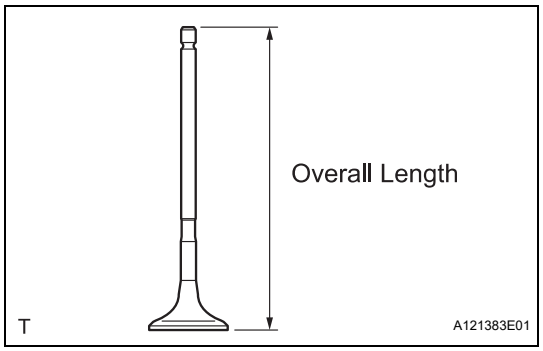
(d) Using vernier calipers, measure the valve head margin thickness.
Standard margin thickness:
1.05 to 1.45 mm (0.0413 to 0.0571 in.)
Minimum margin thickness:
0.50 mm (0.0197 in.)
If the margin thickness is less than the minimum, replace the valve.

EM

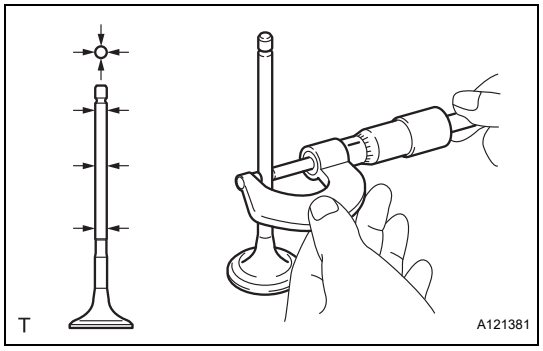


9. INSPECT EXHAUST VALVE

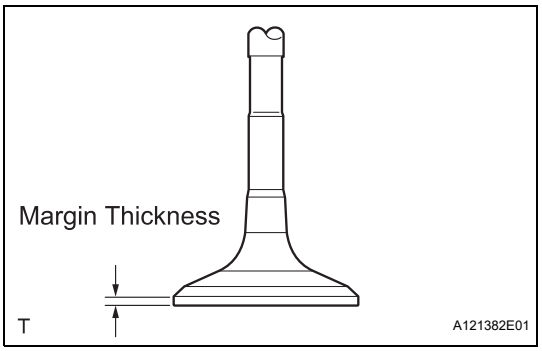
(a) Using a gasket scraper, scrape off any carbon on the valve head.



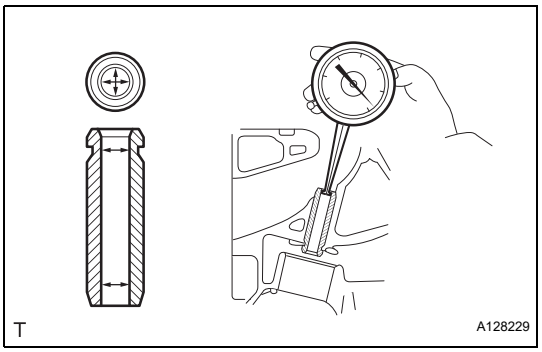
(b) Using vernier calipers, measure the overall length of the valve.
Standard overall length:
101.15 mm (3.9823 in.)
Minimum overall length:
100.70 mm (3.9646 in.)
If the overall length is less than the minimum, replace the valve.



(c) Using a micrometer, measure the diameter of the valve stem.
Valve stem diameter:
5.465 to 5.480 mm (0.2152 to 0.2157 in.)
If the valve stem diameter is not as specified, check the oil clearance.



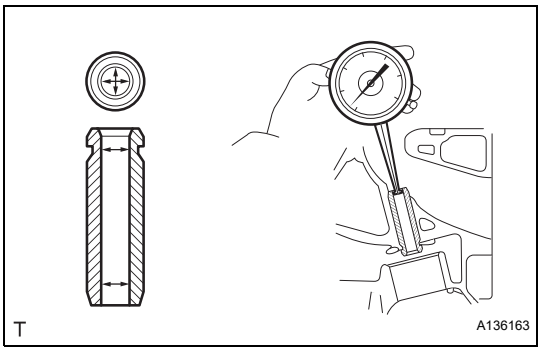
(d) Using vernier calipers, measure the valve head margin thickness.
Standard margin thickness:
1.20 to 1.60 mm (0.0472 to 0.0630 in.)
Minimum margin thickness:
0.50 mm (0.0197 in.)
If the margin thickness is less than the minimum, replace the valve.



10. INSPECT INTAKE VALVE GUIDE BUSH

(a) Using a caliper gauge, measure the inside diameter of the guide bush.
Bushing inside diameter:
5.510 to 5.530 mm (0.2169 to 0.2177 in.)

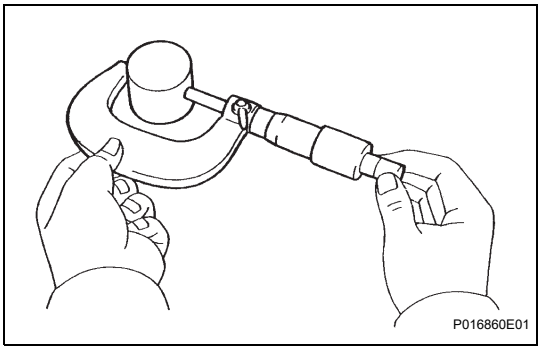
(b) Subtract the valve stem diameter measurement from the guide bush inside diameter measurement.
Standard oil clearance:
0.025 to 0.060 mm (0.0010 to 0.0024 in.)
Maximum oil clearance:
0.080 mm (0.0031 in.)
If the clearance is greater than the maximum, replace the valve and guide bush.



11. INSPECT EXHAUST VALVE GUIDE BUSH

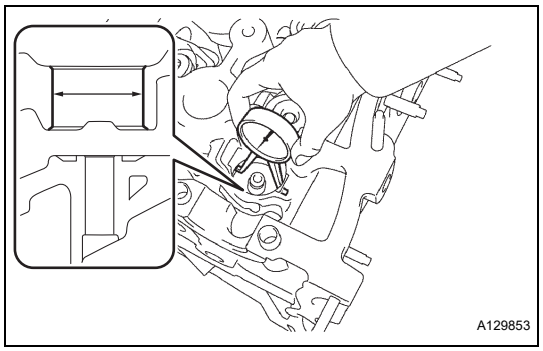
(a) Using a caliper gauge, measure the inside diameter of the guide bush.
Bushing inside diameter:
5.510 to 5.530 mm (0.2169 to 0.2177 in.)

(b) Subtract the valve stem diameter measurement from the guide bushing inside diameter measurement.
Standard oil clearance:
0.030 to 0.065 mm (0.0012 to 0.0026 in.)
Maximum oil clearance:
0.100 mm (0.0039 in.)
If the clearance is greater than the maximum, replace the valve and guide bush.



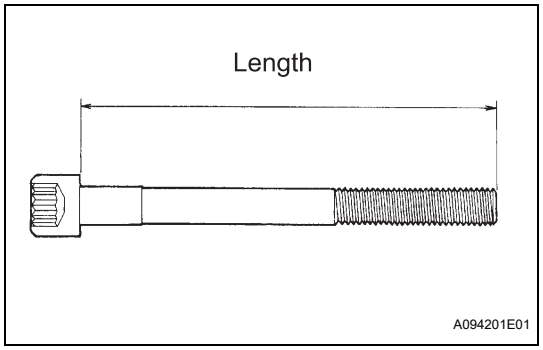
12. INSPECT VALVE LIFTER

(a) Using a micrometer, measure the lifter diameter.
Lifter diameter:
30.966 to 30.976 mm (1.2191 to 1.2195 in.)



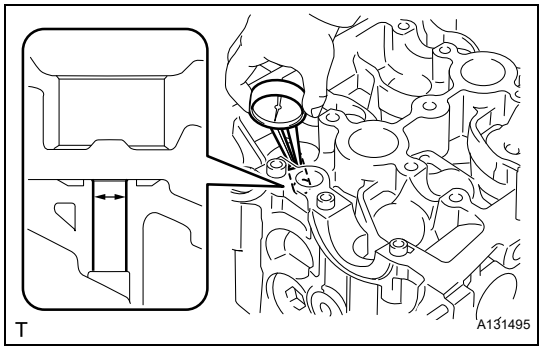
(b) Using a caliper gauge, measure the lifter bore diameter of the cylinder head.
Standard lifter bore diameter:
31.009 to 31.025 mm (1.2208 to 1.2215 in.)

(c) Subtract the lifter diameter measurement from the lifter bore diameter measurement.
Standard oil clearance:
0.033 to 0.059 mm (0.0013 to 0.0023 in.)
Maximum oil clearance:
0.070 mm (0.0028 in.)
If the oil clearance is greater than the maximum, replace the lifter. If necessary, replace the cylinder head.



13. INSPECT CYLINDER HEAD SET BOLT

(a) Using vernier calipers, measure the length of the cylinder head set bolt from the seat to the end.
Standard bolt length:
141.3 to 142.7 mm (5.563 to 5.618 in.)
Maximum bolt length:
144.2 mm (5.677 in.)
If the bolt length is greater than the maximum, replace the cylinder head set bolt.



REASSEMBLY

1. INSTALL INTAKE VALVE GUIDE BUSH

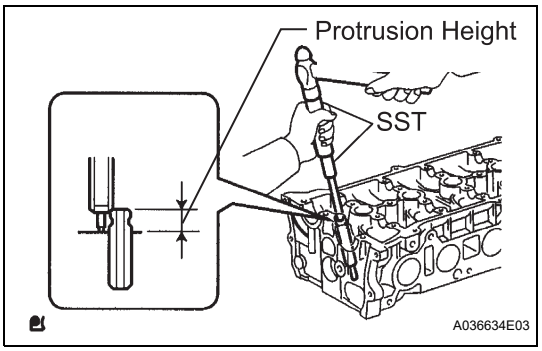
(a) Using a caliper gauge, measure the bush bore diameter of the cylinder head.
Cylinder bore diameter:
10.285 to 10.306 mm (0.4049 to 0.4057 in.)
Select a new guide bush (STD or O/S 0.05).

Bush size	Bush bore diameter
STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)

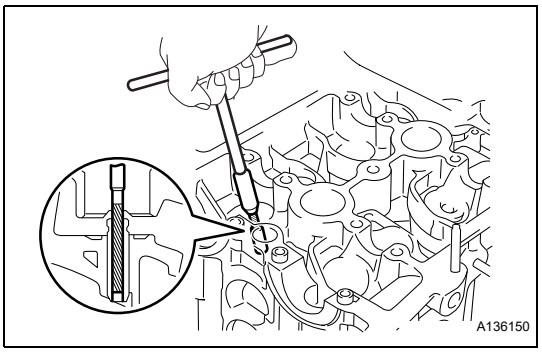
If the bush bore diameter of the cylinder head is greater than 10.306 mm (0.4057 in.), machine the bush bore to the dimension of 10.335 to 10.356 mm (0.4069 to 0.4077 in.) to install an O/S 0.05 valve guide bush. If the bush bore diameter of the cylinder head is greater than 10.356 mm (0.4077 in.), replace the cylinder head.

(b) Heat the cylinder head to 80 to 100°C (176 to 212°F).

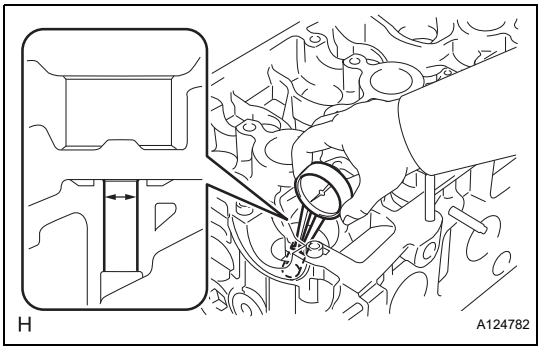
(c) Place the cylinder head on wooden blocks.



(d) Using SST and a hammer, tap in a new guide bush to the specified protrusion height.
SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)
Protrusion height:
9.6 to 10.0 mm (0.3779 to 0.3937 in.)



(e) Using a sharp 5.5 mm reamer, ream the guide bush to obtain the standard specified clearance between the guide bush and valve stem.
Standard oil clearance:
0.025 to 0.060 mm (0.0010 to 0.0024 in.)



2. INSTALL EXHAUST VALVE GUIDE BUSH

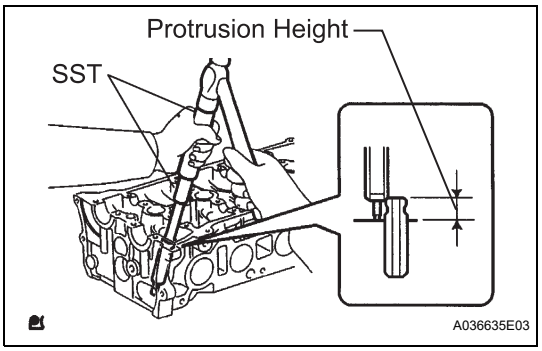
(a) Using a caliper gauge, measure the bush bore diameter of the cylinder head.
Diameter:
10.285 to 10.306 mm (0.4049 to 0.4057 in.)
Select a new guide bush (STD or O/S 0.05).

Bush size	Bush bore diameter
STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)

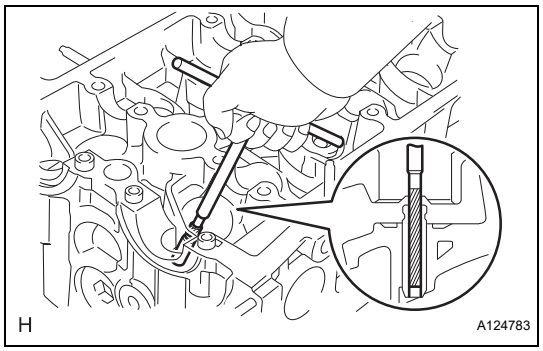
If the bush bore diameter of the cylinder head is greater than 10.306 mm (0.4057 in.), machine the bush bore to the dimension of 10.335 to 10.356 mm (0.4069 to 0.4077 in.) to install an O/S 0.05 valve guide bush. If the bush bore diameter of the cylinder head is greater than 10.356 mm (0.4077 in.), replace the cylinder head.

(b) Heat the cylinder head to 80 to 100°C (176 to 212°F).

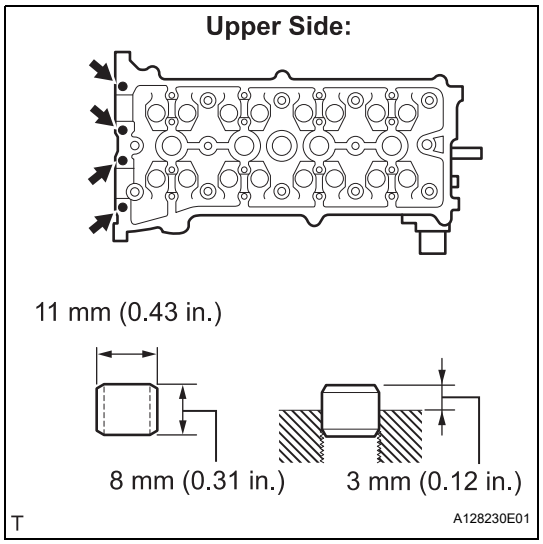
(c) Place the cylinder head on wooden blocks.



(d) Using SST and a hammer, tap in a new guide bush to the specified protrusion height.
SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)
Protrusion height:
9.6 to 10.0 mm (0.3779 to 0.3937 in.)



(e) Using a sharp 5.5 mm reamer, ream the guide bush to obtain the standard specified clearance between the guide bush and valve stem.
Standard oil clearance:
0.030 to 0.065 mm (0.0012 to 0.0026 in.)



3. INSTALL RING W/HEAD PIN

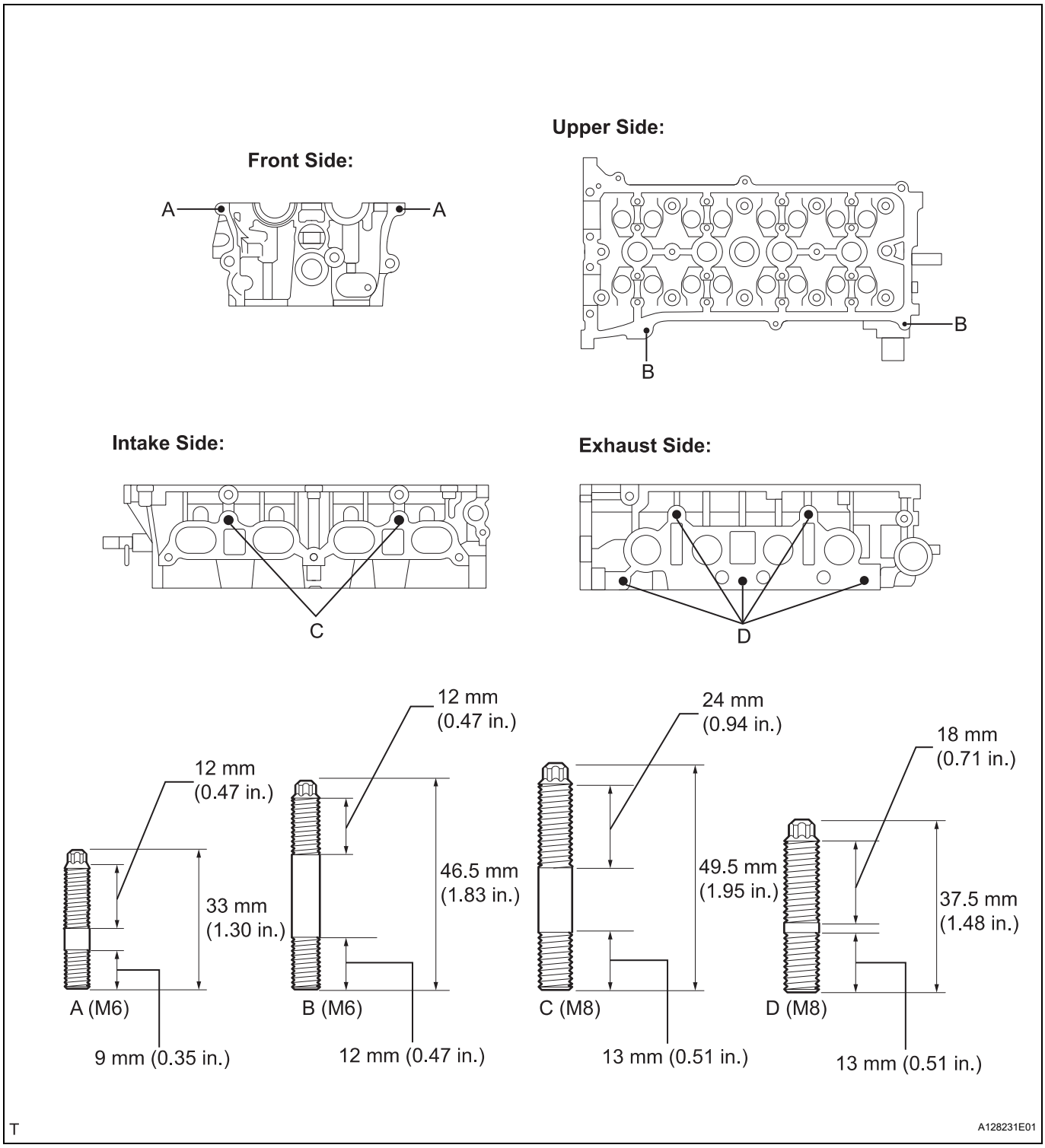
(a) Using a plastic-faced hammer, tap in a new ring pin to the specified protrusion height.
Protrusion height:
3 mm (0.12 in.)

4. INSTALL STUD BOLT

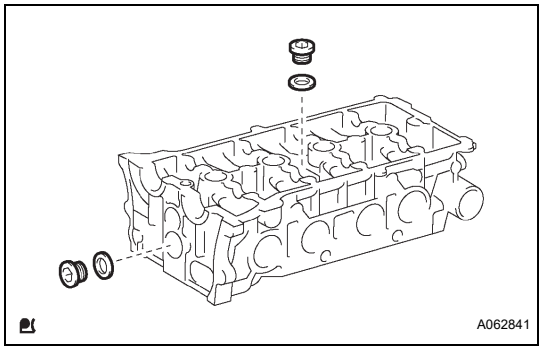
NOTICE:
If the stud bolt is deformed or the threads are damaged, replace it.

EM

(a) Using E5 and E7 "TORX" sockets, install the stud bolts.

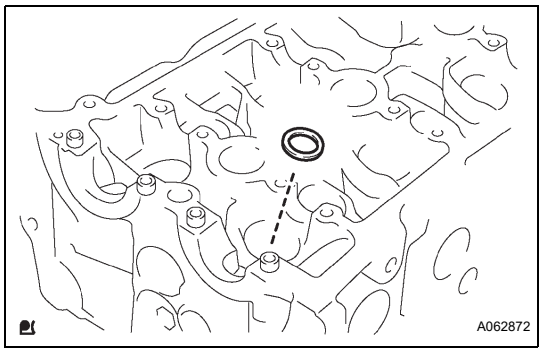


Torque: Bolt A
5.0 N*m (51 kgf*cm, 44 in.*lbf)
Bolt B
5.0 N*m (51 kgf*cm, 44 in.*lbf)
Bolt C
9.5 N*m (97 kgf*cm, 84 in.*lbf)
Bolt D
9.5 N*m (97 kgf*cm, 84 in.*lbf)



5. INSTALL NO. 1 STRAIGHT SCREW PLUG

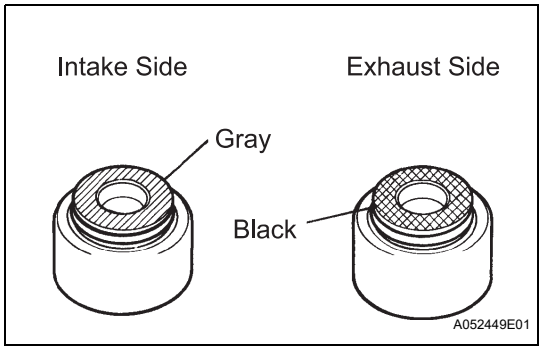
(a) Using a 14 mm straight hexagon wrench, install 2 new gaskets and the 2 straight screw plugs.



6. INSTALL VALVE SPRING SEAT

(a) Install the valve spring seats to the cylinder head.

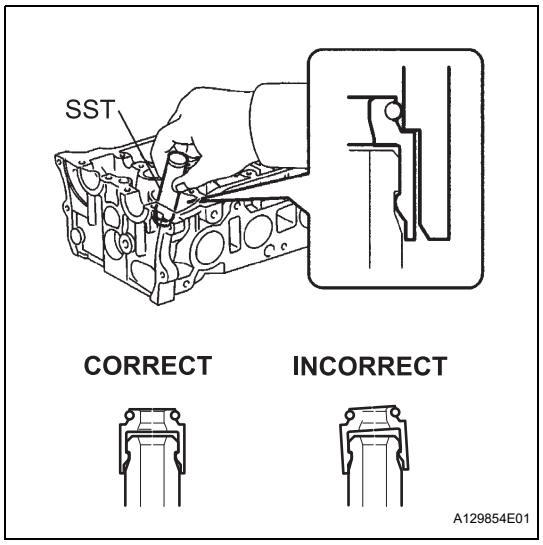
EM

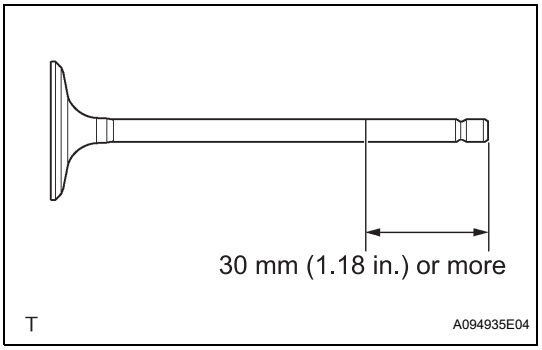


7. INSTALL VALVE STEM OIL SEAL

(a) Apply a light coat of engine oil to a new oil seal.
NOTICE:
Pay close attention when installing the intake and exhaust oil seals. For example, installing the intake oil seal into the exhaust side or installing the exhaust oil seal to the intake side can cause installation problems later.
HINT:
The intake valve oil seal is gray and the exhaust valve oil seal is black.

(b) Using SST, push in the oil seal.
SST 09201-41020
NOTICE:
Failure to use SST will cause the seal to be damaged or improperly seated.



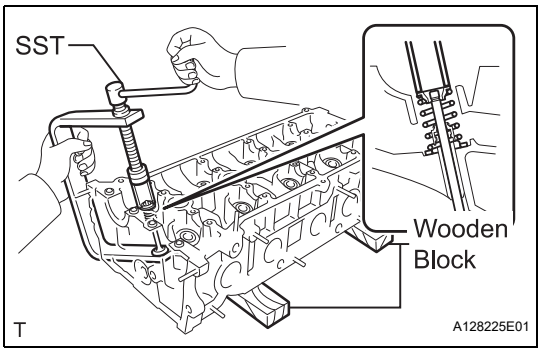


8. INSTALL INTAKE VALVE

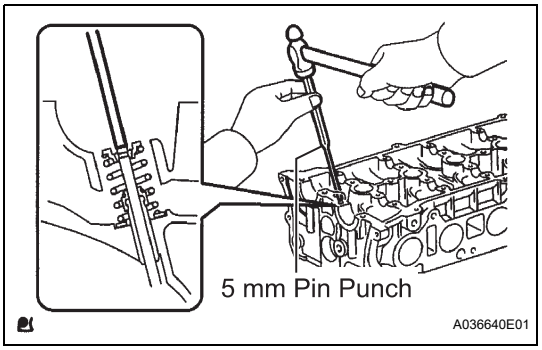
(a) Sufficiently apply engine oil to the tip area of the intake valve shown in the illustration.

(b) Install the valve, compression spring and spring retainer to the cylinder head.

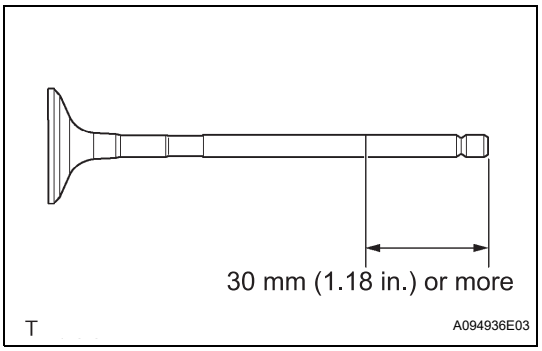
NOTICE:
Install the same parts in the same combination to the original locations.



(c) Using SST and wooden blocks, compress the spring and install the 2 retainer locks.
SST 09202-70020 (09202-00010)



(d) Using a 5 mm pin punch and plastic hammer, lightly tap the valve stem tip to ensure a proper fit.
NOTICE:
Be careful not to damage the valve stem tip.

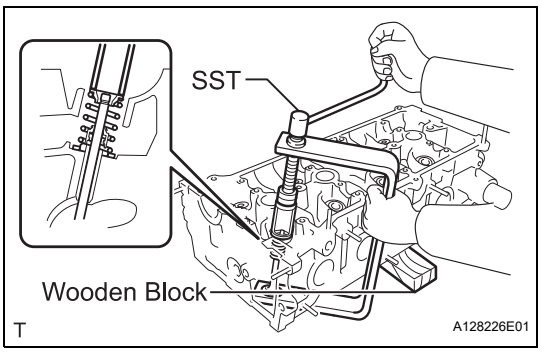


9. INSTALL EXHAUST VALVE

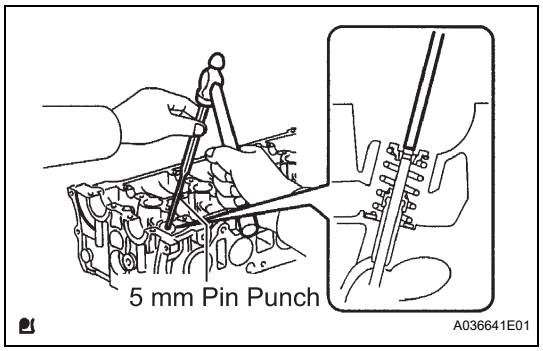
(a) Sufficient apply engine oil to the tip area of the exhaust valve shown in the illustration.

(b) Install the valve, compression spring and spring retainer to the cylinder head.

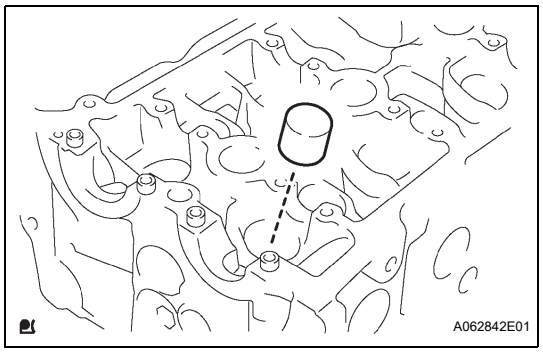
NOTICE:
Install the same parts in the same combination to the original locations.



(c) Using SST and wooden blocks, compress the spring and install the 2 retainer locks.
SST 09202-70020 (09202-00010)



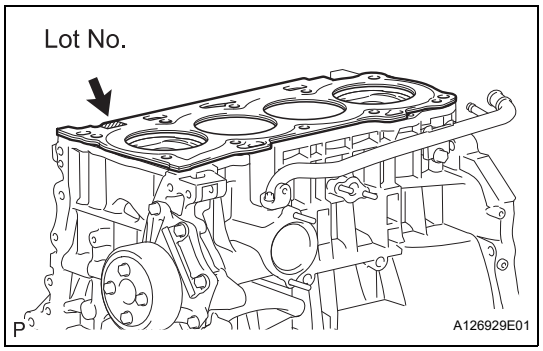
(d) Using a 5 mm pin punch and plastic hammer, lightly tap the valve stem tip to ensure a proper fit.
NOTICE:
Be careful not to damage the valve stem tip.



10. INSTALL VALVE LIFTER

(a) Apply a light coat of engine oil to the tip of each valve stem.

(b) Install the valve lifters.
NOTICE:
Install the valve lifters in their original places.



INSTALLATION

1. INSTALL CYLINDER HEAD GASKET

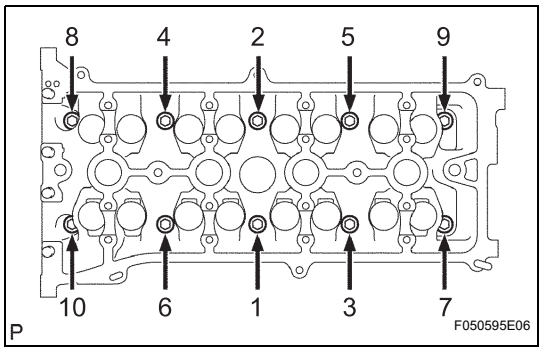
(a) Place a new gasket on the cylinder block surface with the Lot No. stamp facing upward.
NOTICE:
- **Remove any oil from the contact surface.**
- **Make sure that the gasket is installed in the correct direction.**

2. INSTALL CYLINDER HEAD SUB-ASSEMBLY

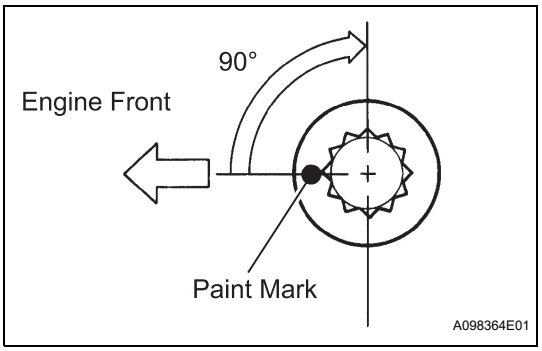
HINT:
The cylinder head bolts are tightened in 2 progressive steps.

(a) Apply a light coat of engine oil to the bolt threads and the area beneath the bolt heads that come in contact with the washers.

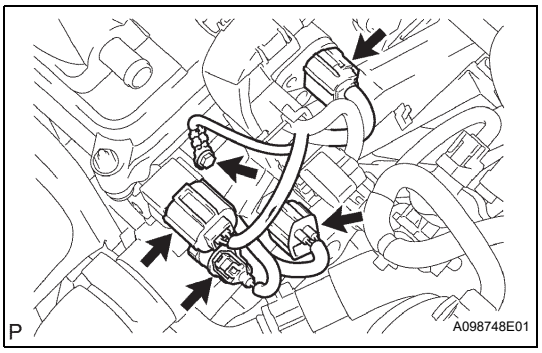
(b) Install the bolts and plate washers to the cylinder head.
NOTICE:
Do not drop the washers into the cylinder head.



(c) Using several steps, uniformly install and tighten the 10 cylinder head set bolts and plate washers with a 10 mm bi-hexagon wrench in the order shown in the illustration.
Torque: 70 N*m (714 kgf*cm, 52 ft.*lbf)

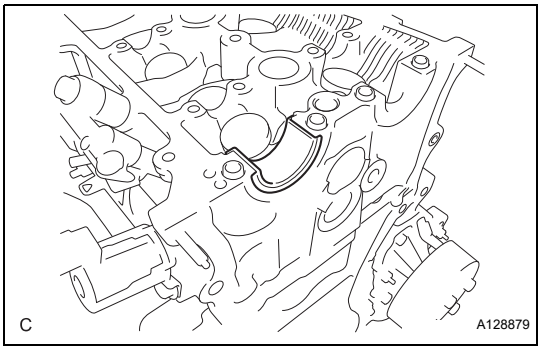


(d) Mark the front side of the cylinder head bolt with paint.
(e) Retighten the cylinder head bolts 90° in the sequence shown in the illustration.
(f) Check that the paint mark is now at a 90° angle to the front.



3. CONNECT ENGINE WIRE
(a) Connect the ground cable with the bolt.
Torque: 8.4 N*m (86 kgf*cm, 74 in.*lbf)
(b) Connect the camshaft position sensor connector.
(c) Connect the engine coolant temperature sensor connector.
(d) Connect the engine oil pressure switch connector.
(e) Connect the radio setting condenser connector.

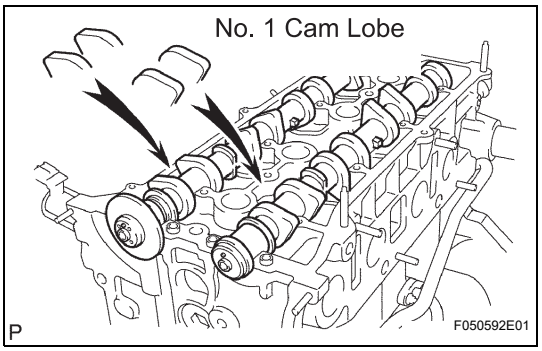
4. CONNECT RADIATOR HOSE INLET (See page EM-111)



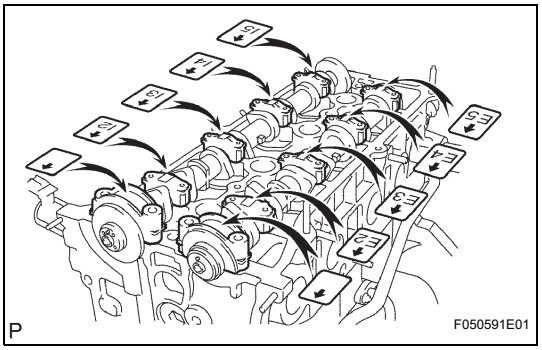
5. INSTALL NO. 2 CAMSHAFT BEARING
(a) Install the No. 2 camshaft bearing.

6. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (See page ES-382)

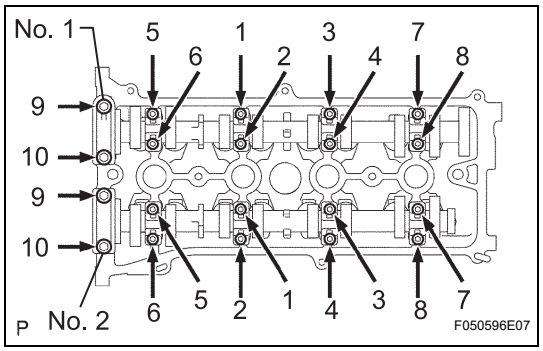
7. INSTALL CAMSHAFTS
(a) Apply a light coat of engine oil to the journal portion of the camshaft.



(b) Place the 2 camshafts on the cylinder head with the No. 1 cam lobes facing the directions shown in the illustration.



(c) Examine the front marks and numbers, and check that the order is as shown in the illustration. Then install the bearing caps onto the cylinder head.
(d) Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts.



(e) Using several steps, uniformly tighten the 20 bearing cap bolts in the sequence shown in the illustration.
Torque: No. 1 and No. 2 bearing cap
30 N*m (301 kgf*cm, 22 ft.*lbf)
No. 3 bearing cap
9.0 N*m (92 kgf*cm, 80 in.*lbf)

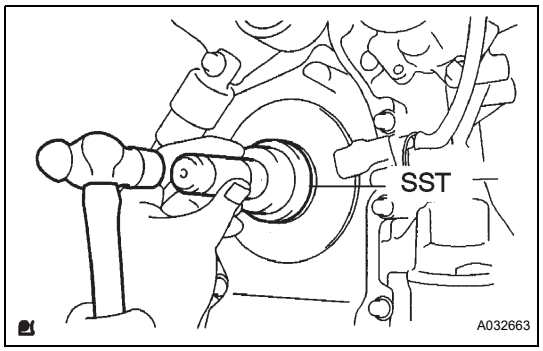
8. **INSTALL CHAIN SUB-ASSEMBLY**
HINT:
See page EM-26.
9. **INSTALL EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY (See page EM-103)**
10. **INSTALL NO. 2 MANIFOLD STAY (See page EM-104)**
11. **INSTALL MANIFOLD STAY (See page EM-104)**
12. **INSTALL OIL LEVEL GAUGE GUIDE (See page EM-105)**
13. **INSTALL OIL LEVEL GAUGE SUB-ASSEMBLY**
14. **INSTALL V-RIBBED BELT (See page EM-6)**
15. **INSTALL V-RIBBED BELT TENSIONER COVER SUB-ASSEMBLY (See page EM-7)**
16. **INSTALL NO. 2 ENGINE MOUNTING BRACKET RH (See page EM-112)**
17. **INSTALL ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-112)**
18. **INSTALL NO. 2 ENGINE MOUNTING STAY RH (See page EM-112)**
19. **INSTALL FRONT EXHAUST PIPE ASSEMBLY**
HINT:
See page EX-3.
20. **INSTALL NO. 1 INTAKE MANIFOLD INSULATOR (See page EM-105)**
21. **INSTALL INTAKE MANIFOLD (See page ES-405)**
22. **INSTALL FUEL DELIVERY PIPE WITH INJECTOR (See page FU-15)**
23. **CONNECT FUEL TUBE SUB-ASSEMBLY (See page EM-109)**
24. **INSTALL THROTTLE BODY ASSEMBLY (See page ES-397)**
25. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-113)**
26. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-398)**
27. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-113)**

28. **INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-405)**
29. **INSTALL BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY**
30. **INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-13)**
31. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-14)**
32. **INSTALL FRONT FENDER TO COWL SIDE SEAL LH (See page WW-14)**
33. **INSTALL FRONT FENDER TO COWL SIDE SEAL RH (See page WW-14)**
34. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-14)**
35. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-15)**
36. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-113)**
37. **INSTALL LUGGAGE TRIM SERVICE HOLE COVER**
38. **ADD ENGINE OIL**
39. **CHECK FOR FUEL LEAKS (See page FU-9)**
40. **ADD COOLANT (See page CO-5)**
41. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**
42. **CHECK FOR ENGINE OIL LEAKS**
43. **CHECK FOR EXHAUST GAS LEAKS**
44. **INSPECT IGNITION TIMING (See page EM-1)**
45. **INSPECT IDLE SPEED (See page EM-2)**
46. **INSPECT COMPRESSION (See page EM-3)**
47. **INSPECT CO/HC (See page EM-4)**
48. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-114)**
49. **INSTALL FRONT FENDER APRON SEAL RH**
50. **INSTALL ENGINE UNDER COVER LH**
51. **INSTALL ENGINE UNDER COVER RH**
52. **INSTALL FRONT WHEEL RH (See page EM-113)**
53. **PERFORM INITIALIZATION**
    (a) Perform initialization procedure (See page IN-43).
    HINT:
    Some vehicle systems require initialization after reconnecting the cable to the negative battery terminal.

INSTALLATION

1. INSTALL TIMING CHAIN CASE OIL SEAL

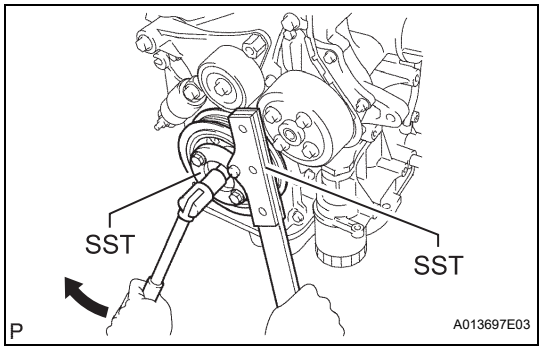
(a) Apply MP grease to a new oil seal lip.
NOTICE:
Keep the lip free from foreign matter.



(b) Using SST and a hammer, tap in the oil seal until its surface is flush with the front oil seal retainer edge.
SST 09223-22010
NOTICE:
Wipe off extra grease from the crankshaft.

2. INSTALL CRANKSHAFT PULLEY

(a) Align the pulley set key with the key groove of the pulley.



(b) Using SST, hold the pulley in place and tighten the bolt.
SST 09213-54015 (91651-60855), 09330-00021
Torque: 170 N*m (1,734 kgf*cm, 125 ft.*lbf)

3. INSTALL V-RIBBED BELT (See page EM-6)

4. INSTALL V-RIBBED BELT TENSIONER COVER SUB-ASSEMBLY (See page EM-7)

5. INSTALL ENGINE UNDER COVER LH

6. INSTALL ENGINE UNDER COVER RH

7. INSTALL FRONT FENDER APRON SEAL RH

8. INSTALL FRONT WHEEL RH

9. CHECK FOR ENGINE OIL LEAKS

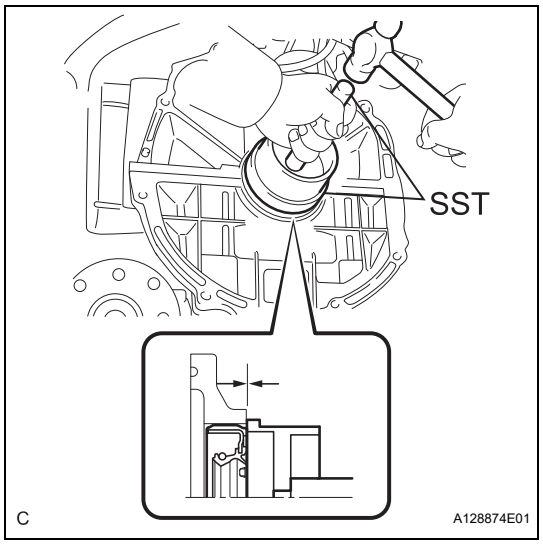
EM

INSTALLATION

1. INSTALL ENGINE REAR OIL SEAL

(a) Apply MP grease to a new oil seal lip.
NOTICE:
Keep the lip free from foreign matter.

(b) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223-15030, 09950-70010 (09951-07100)
NOTICE:
Wipe off extra grease from the crankshaft.

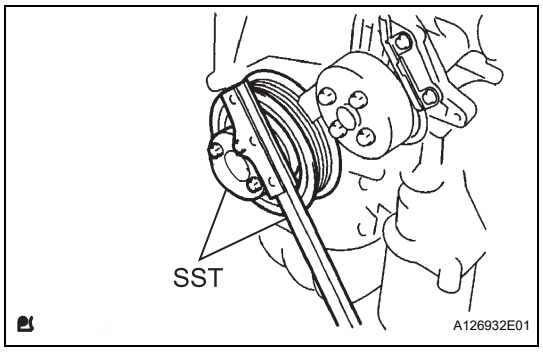


2. INSTALL FLYWHEEL SUB-ASSEMBLY

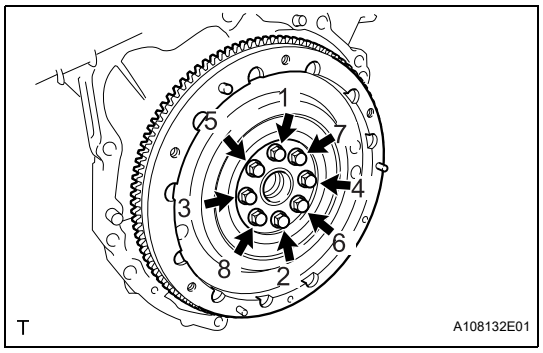
(a) Using SST, hold the crankshaft.
SST 09213-54015 (91651-60855), 09330-00021

(b) Clean the bolt and the bolt hole.

(c) Apply adhesive to 2 or 3 threads of the bolt end.
Adhesive:
Part No. 08833-00070, Three Bond or equivalent



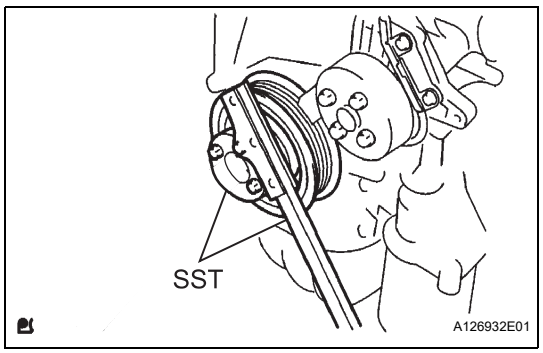
(d) Install the flywheel with the 8 bolts. Uniformly tighten the 8 bolts in the sequence shown in the illustration.
Torque: 130 N*m (1,330 kgf*cm, 96 ft.*lbf)

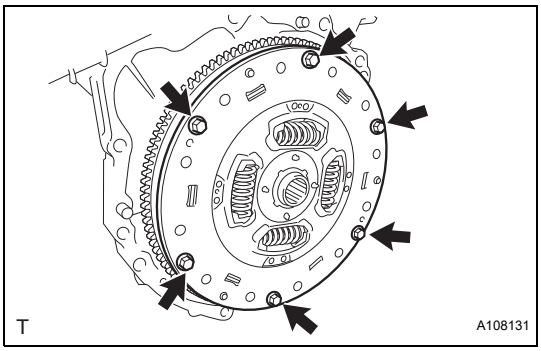


3. INSTALL TRANSMISSION INPUT DAMPER ASSEMBLY

(a) Using SST, hold the crankshaft.
SST 09213-54015 (91651-60855), 09330-00021

(b) Clean the bolt hole.



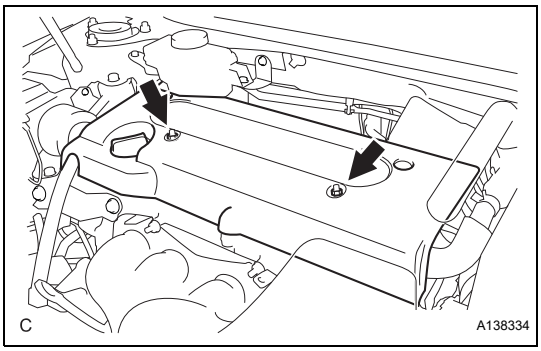


(c) Install new 6 bolts and transmission input damper.
Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)
HINT:
Take care not to insert the transmission input damper in the wrong direction.

4. INSTALL HYBRID VEHICLE TRANSAXLE ASSEMBLY
HINT:
See page HX-15.

REMOVAL

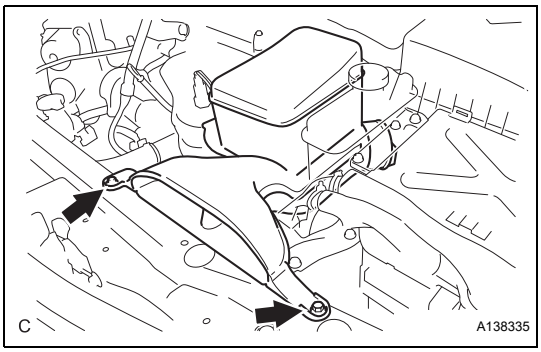
1. **PRECAUTION**
   HINT:
   See page HV-1.
2. **REMOVE LUGGAGE TRIM SERVICE HOLE COVER**
3. **DISCHARGE FUEL SYSTEM PRESSURE**
   HINT:
   See page FU-1.
4. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (See page HV-560)**
5. **REMOVE SERVICE PLUG GRIP (See page HB-86)**
6. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
7. **REMOVE FRONT WHEELS**
8. **REMOVE ENGINE UNDER COVER LH**
9. **REMOVE ENGINE UNDER COVER RH**
10. **REMOVE FRONT FENDER APRON SEAL RH**
11. **DRAIN ENGINE OIL (See page LU-4)**
12. **DRAIN ENGINE COOLANT (See page CO-5)**
13. **REMOVE COOLANT (for Inverter) (See page HV-556)**
14. **DRAIN HYBRID TRANSAXLE FLUID (See page HX-2)**
15. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-9)**
16. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-9)**
17. **REMOVE FRONT FENDER TO COWL SIDE SEAL LH (See page WW-9)**
18. **REMOVE FRONT FENDER TO COWL SIDE SEAL RH (See page WW-9)**
19. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-10)**
20. **REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-10)**
21. **SEPARATE BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY**
22. **REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-403)**



23. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY**
    (a) Remove the 2 nuts and cover.

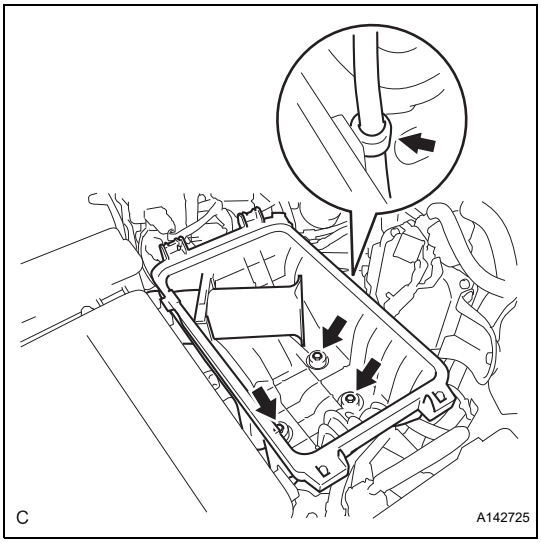
24. **REMOVE V-RIBBED BELT TENSIONER COVER SUB-ASSEMBLY (See page EM-6)**

25. **REMOVE V-RIBBED BELT (See page EM-6)**



26. **REMOVE AIR CLEANER INLET ASSEMBLY**
    (a) Remove the 2 bolts, clamp and air cleaner inlet.

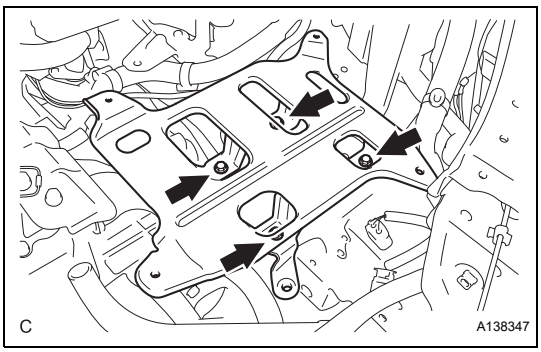
27. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-395)**



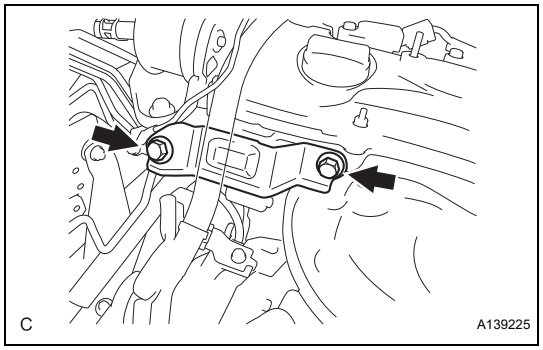
28. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY**
    (a) Disconnect the hose clamp.
    (b) Remove the 3 bolts and air cleaner case.

29. **REMOVE INVERTER WITH CONVERTER ASSEMBLY**
    HINT:
    See page HV-559.

30. **SEPARATE WATER WITH MOTOR AND BRACKET PUMP ASSEMBLY (See page HV-575)**

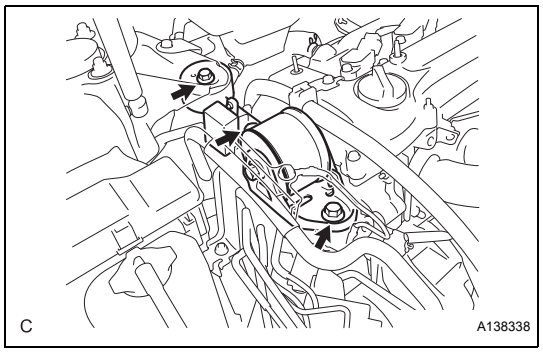


31. **REMOVE INVERTER TRAY BRACKET**
    (a) Remove the 4 bolts and inverter tray bracket.



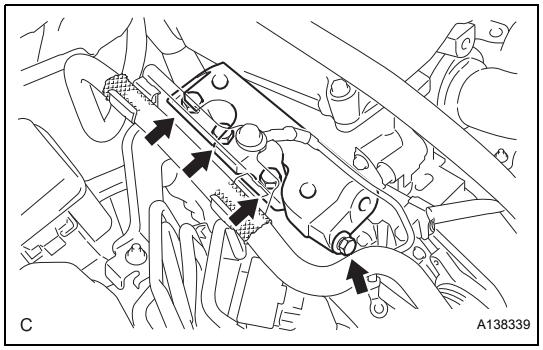
32. REMOVE NO. 2 ENGINE MOUNTING STAY RH

(a) Remove the 2 bolts and No. 2 engine mounting stay RH.



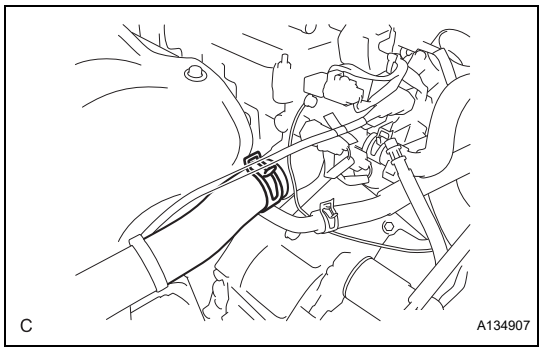
33. REMOVE ENGINE MOVING CONTROL ROD SUB-ASSEMBLY

(a) Remove the 3 bolts and the engine moving control rod with bracket.



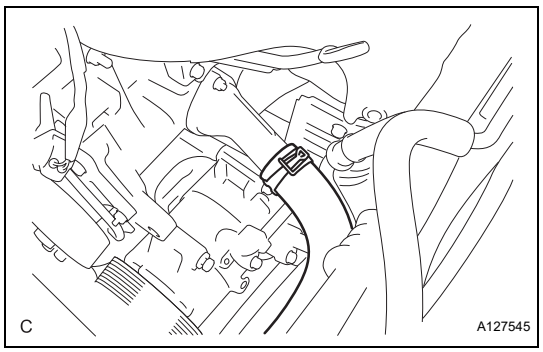
34. REMOVE NO. 2 ENGINE MOUNTING BRACKET RH

(a) Remove the bolt and disconnect the ground cable.
(b) Remove the 3 bolts and No. 2 engine mounting bracket RH.



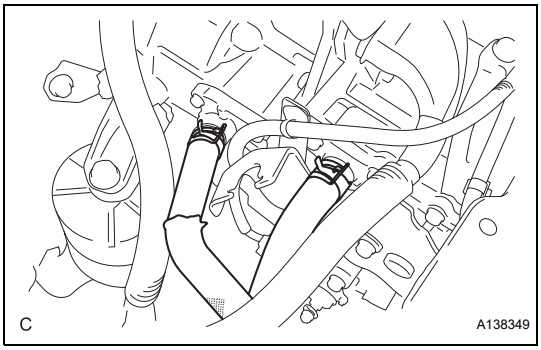
35. DISCONNECT RADIATOR HOSE INLET

(a) Remove the clamp and disconnect the radiator hose inlet.



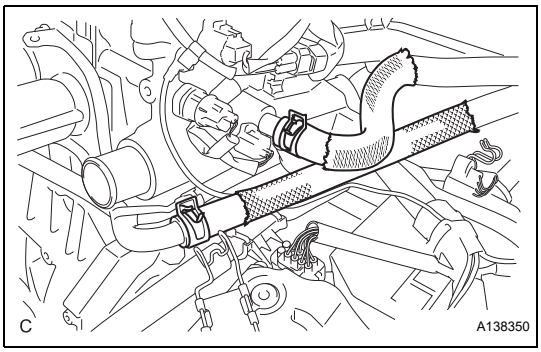
36. DISCONNECT RADIATOR HOSE OUTLET

(a) Remove the clamp and disconnect the radiator hose outlet.



37. DISCONNECT WATER HOSE

(a) Remove the 2 clamps and disconnect the 2 water hoses.



38. DISCONNECT HEATER INLET WATER HOSE

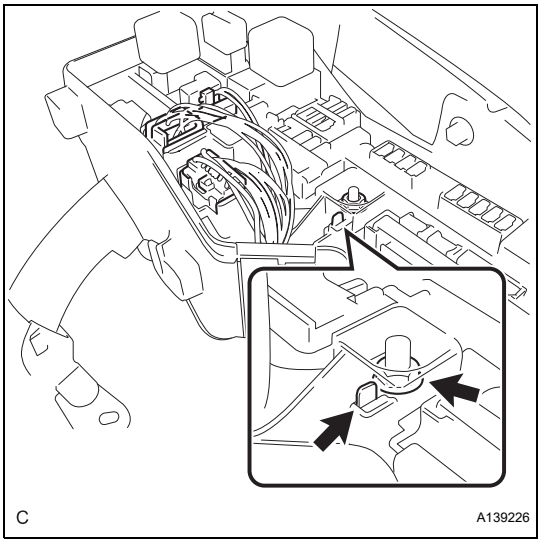
(a) Disconnect the heater inlet water hose.

39. DISCONNECT HEATER OUTLET WATER HOSE

(a) Disconnect the heater outlet water hose.

40. REMOVE HYBRID VEHICLE CONTROL ECU (See page HV-570)

41. REMOVE POWER STEERING ECU ASSEMBLY (See page PS-69)

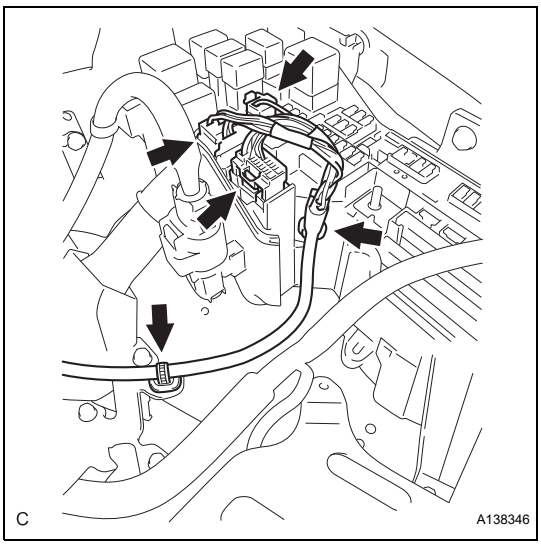


42. DISCONNECT ENGINE WIRE

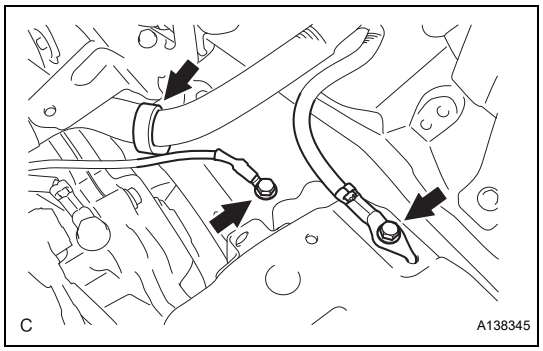
(a) Disconnect the engine wire from the engine room relay block.

(1) Remove the nut and separate the wire harness.

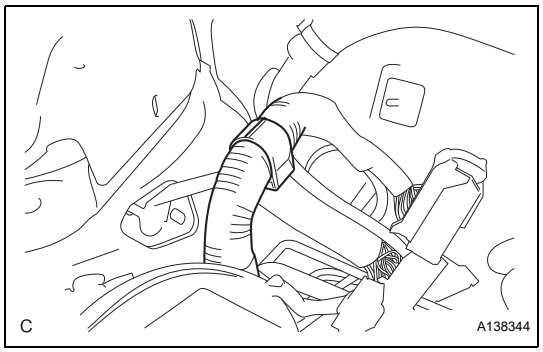
(2) Using a screwdriver, unlock the engine room R/B. Pull the engine room R/B upward.



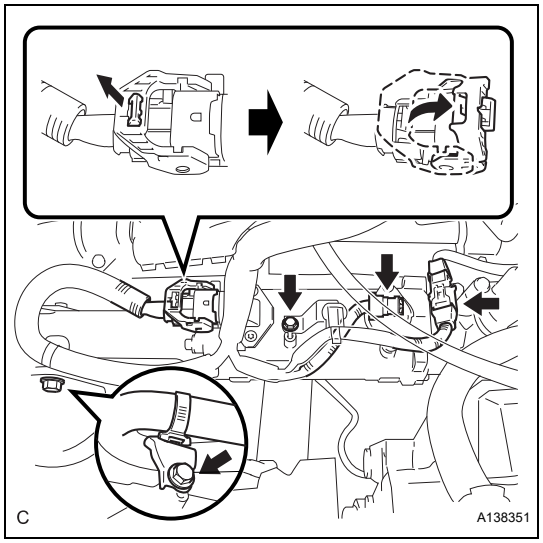
(3) Disconnect the clamps and engine wire connectors.



(b) Remove the 2 bolts and clamp from the body.

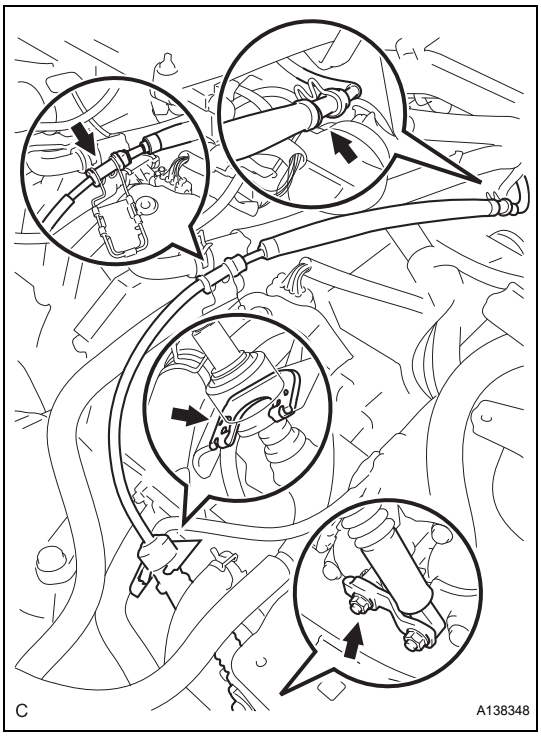


(c) Remove the clamp from the bracket.



(d) Release the lock lever of the connector as shown in the illustration.
(e) Disconnect the 3 connectors from the power steering link assembly.
(f) Remove the 2 bolts and power steering wire from the power steering link assembly.

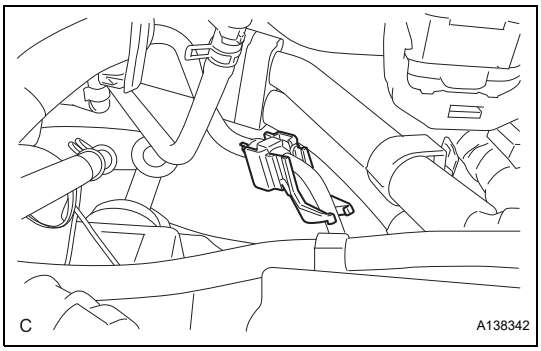
EM



43. DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY

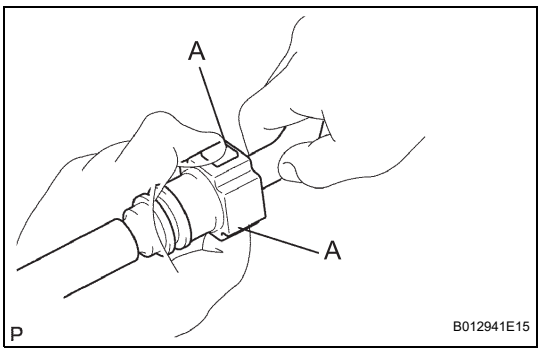
(a) Remove the clip and nut, and separate the control lever.

(b) Disconnect the cable from the clamp.



44. DISCONNECT FUEL TUBE SUB-ASSEMBLY

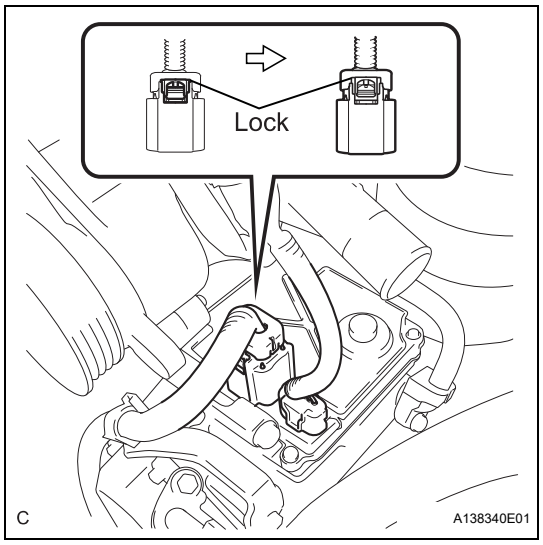
(a) Remove the No. 1 fuel pipe clamp.



(b) Disconnect the connector from the tube while pinching part A with your fingers as shown in the illustration.

NOTICE:

- **Check for contamination in the pipe and around the connector. Clean if necessary and then disconnect the connector.**
- **Disconnect the connector by hand.**
- **Do not bend, fold or rotate the nylon tube.**
- **If the pipe and connector are stuck together, push and pull the connector until it becomes free.**
- **Put the pipe and connector ends in vinyl bags to prevent damage and contamination.**



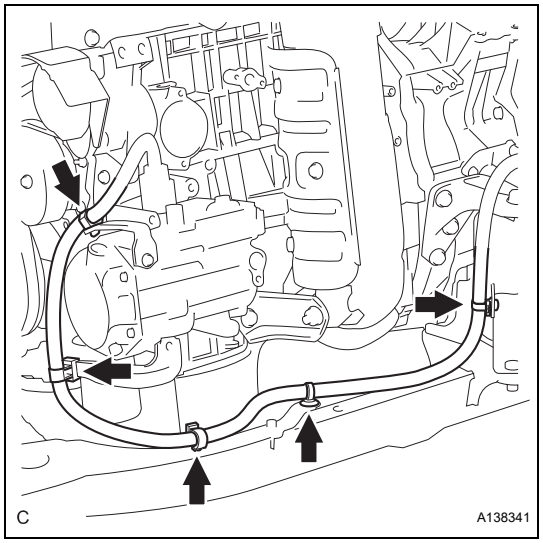
45. SEPARATE ELECTRIC INVERTER COMPRESSOR

(a) Release the green-colored lock.

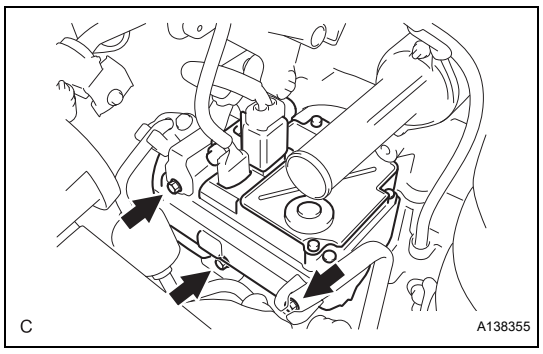
CAUTION:
Wear insulated gloves when performing the procedures.

(b) Disconnect the 2 connectors.

NOTICE:
Insulate the connector by sealing it with tape.



(c) Disconnect the No.4 engine wire clamps.



(d) Remove the 3 bolts and separate the compressor.
HINT:
Hang up the hoses instead of detaching them.

46. REMOVE FRONT EXHAUST PIPE ASSEMBLY
HINT:
See page EX-2.

47. REMOVE FRONT AXLE HUB NUT LH (See page DS-5)

48. REMOVE FRONT AXLE HUB NUT RH
HINT:
Use the same procedures described for the LH side.

49. REMOVE FRONT STABILIZER LINK ASSEMBLY LH (See page DS-5)

50. REMOVE FRONT STABILIZER LINK ASSEMBLY RH
HINT:
Use the same procedures described for the LH side.

51. REMOVE FRONT SPEED SENSOR LH (See page DS-5)

EM

52. REMOVE FRONT SPEED SENSOR RH
HINT:
Use the same procedures described for the LH side.

53. DISCONNECT TIE ROD ASSEMBLY LH (See page DS-6)

54. DISCONNECT TIE ROD ASSEMBLY RH
HINT:
Use the same procedures described for the LH side.

55. DISCONNECT FRONT SUSPENSION LOWER NO. 1 ARM LH (See page DS-6)

56. DISCONNECT FRONT SUSPENSION LOWER NO. 1 ARM RH
HINT:
Use the same procedures described for the LH side.

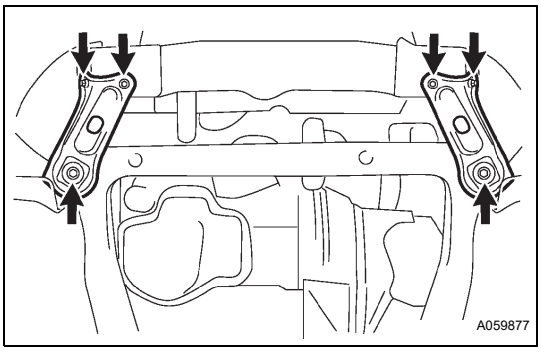
57. SEPARATE FRONT AXLE ASSEMBLY LH (See page DS-6)

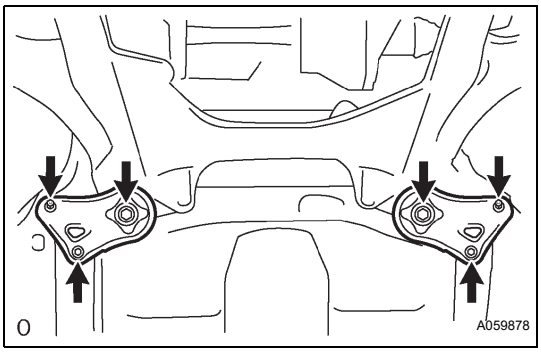
58. SEPARATE FRONT AXLE ASSEMBLY RH
HINT:
Use the same procedures described for the LH side.

59. REMOVE NO. 1 EXHAUST PIPE SUPPORT BRACKET
(a) Remove the 2 bolts and No. 1 exhaust pipe support bracket.

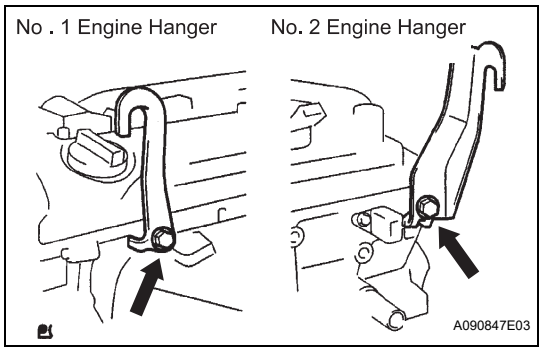
60. SEPARATE STEERING INTERMEDIATE SHAFT ASSEMBLY (See page PS-58)

61. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE
(a) Set the engine lifter.
(b) Remove the 4 bolts, 2 nuts and frame side rail plate RH and LH.





(c) Remove the 4 bolts, 2 nuts and front suspension member brace rear RH and LH.
(d) Carefully remove the engine assembly from the vehicle.

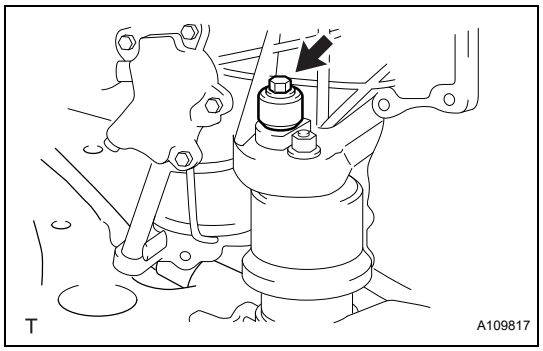


(e) Install the 2 engine hangers as shown in the illustration.
Parts No.:

Parts	Parts No.
No. 1 engine hanger	12281-28010
No. 2 engine hanger	12282-28010
Bolt	91512-61020

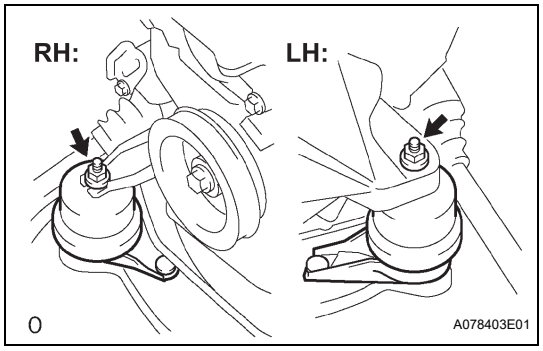
Torque: 38 N*m (387 kgf*cm, 28 ft.*lbf)

(f) Using a chain block and an engine sling device, hang the engine assembly.



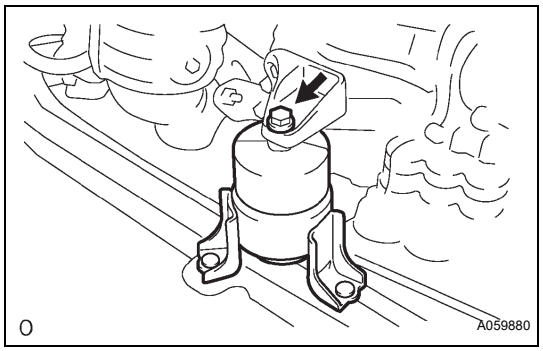
62. REMOVE HV TRANSAXLE MASS DAMPER

(a) Remove the bolt and transaxle mass damper.



63. REMOVE FRONT FRAME ASSEMBLY

(a) Remove the 2 nuts and separate the engine mounting insulators RH and LH.



(b) Remove the bolt from the engine mounting insulator FR.

(c) Raise the engine assembly and separate the front frame.

64. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-6)

65. REMOVE FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-7)

66. REMOVE ENGINE WIRE

67. SEPARATE HYBRID VEHICLE TRANSAXLE ASSEMBLY

HINT:
See page HX-12.

68. REMOVE TRANSMISSION INPUT DAMPER ASSEMBLY (See page EM-77)

69. REMOVE FLYWHEEL SUB-ASSEMBLY (See page EM-77)

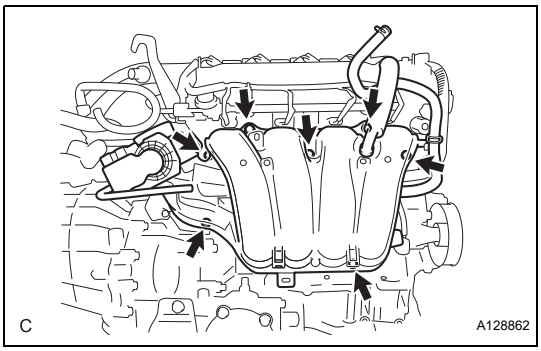
EM

70. INSTALL ENGINE STAND

(a) Fix the engine onto an engine stand with the bolts.

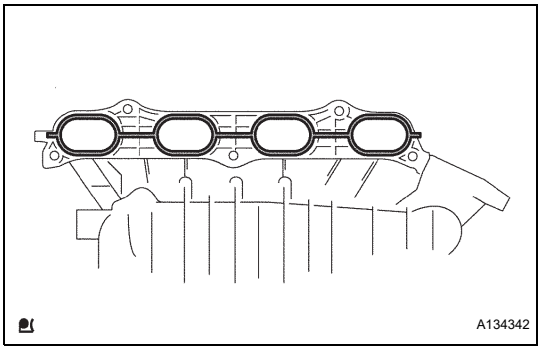
71. REMOVE FUEL DELIVERY PIPE WITH INJECTOR (See page FU-13)

72. REMOVE INTAKE MANIFOLD

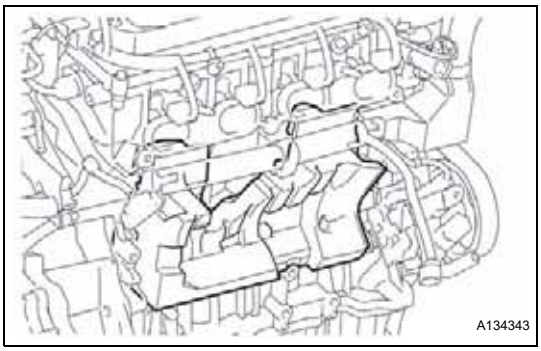


(a) Remove the 5 bolts, 2 nuts, and intake manifold.

(b) Remove the gasket from the intake manifold.

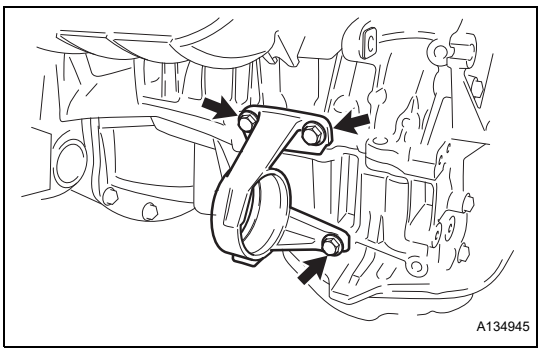


73. REMOVE NO. 2 VENTILATION HOSE



74. REMOVE NO. 1 INTAKE MANIFOLD INSULATOR

(a) Remove the No. 1 intake manifold insulator from the cylinder block.

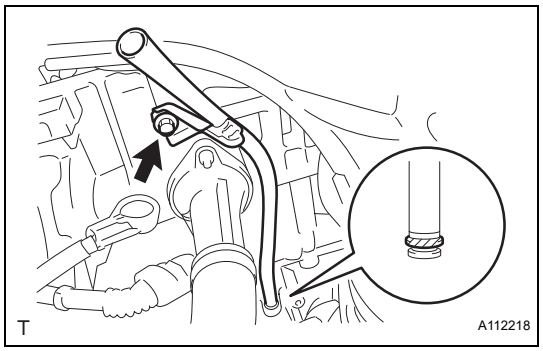


75. REMOVE DRIVE SHAFT BEARING BRACKET

(a) Remove the 3 bolts and drive shaft bearing bracket.

76. REMOVE OIL LEVEL GAUGE SUB-ASSEMBLY

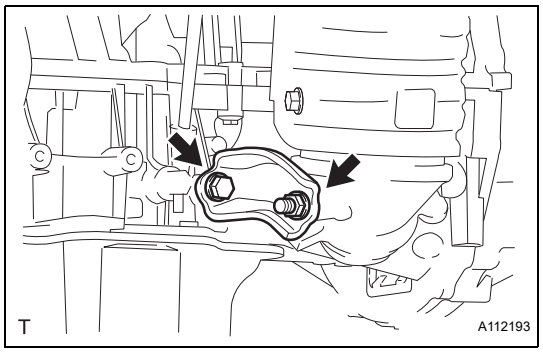
EM



77. REMOVE OIL LEVEL GAUGE GUIDE

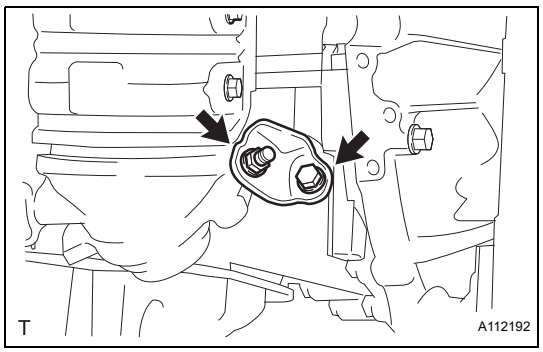
(a) Remove the bolt and oil level gauge guide.

(b) Remove the O-ring from the oil level gauge guide.



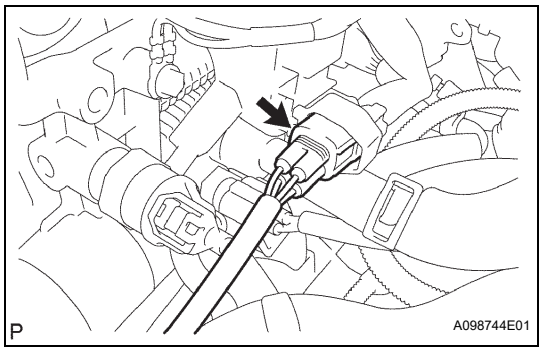
78. REMOVE MANIFOLD STAY

(a) Remove the bolt, nut and stay.



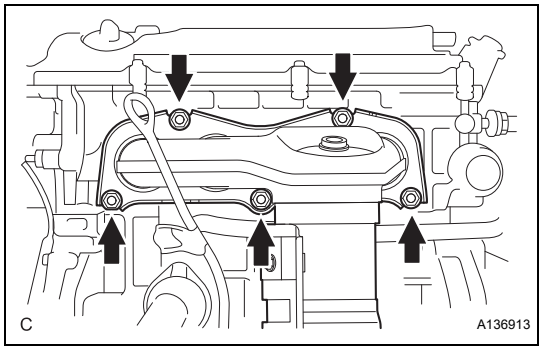
79. REMOVE NO. 2 MANIFOLD STAY

(a) Remove the bolt, nut and stay.



80. REMOVE EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY

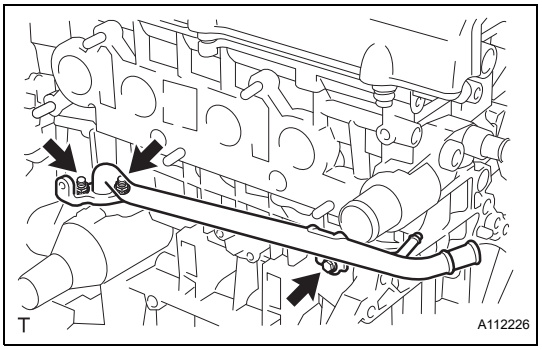
(a) Disconnect the air-fuel ratio sensor connector.



(b) Remove the 5 nuts, manifold converter and gasket.

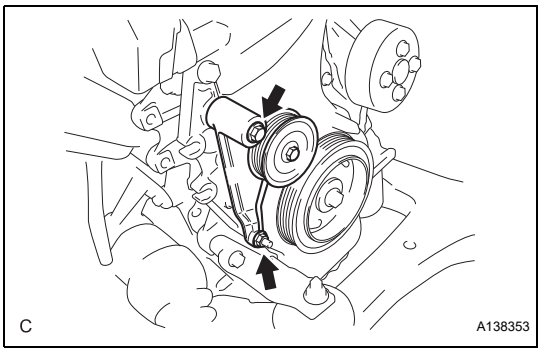
81. REMOVE WATER INLET (See page CO-13)

82. REMOVE THERMOSTAT (See page CO-13)



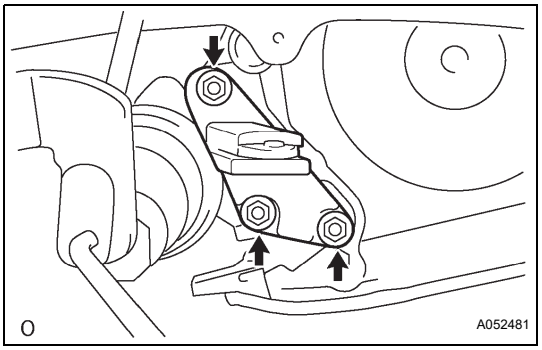
83. REMOVE NO. 1 WATER BY-PASS PIPE

(a) Remove the bolt, 2 nuts and No. 1 water by-pass pipe with the gasket.



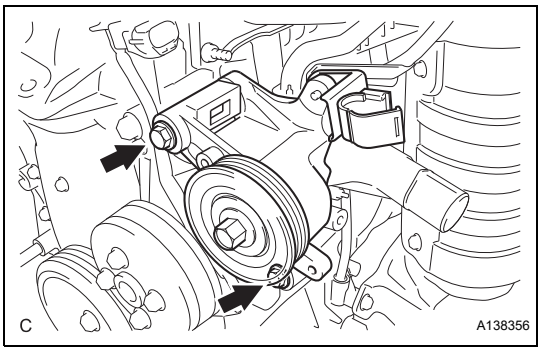
84. REMOVE IDLER PULLEY BRACKET

(a) Loosen the 2 bolts and remove the idler pulley bracket from the engine.



85. REMOVE ENGINE MOUNTING BRACKET RH

(a) Remove the 3 bolts and engine mounting bracket RH.



86. REMOVE V-RIBBED BELT TENSIONER ASSEMBLY

(a) Remove the 2 bolts and belt tensioner.

87. REMOVE IGNITION COIL ASSEMBLY

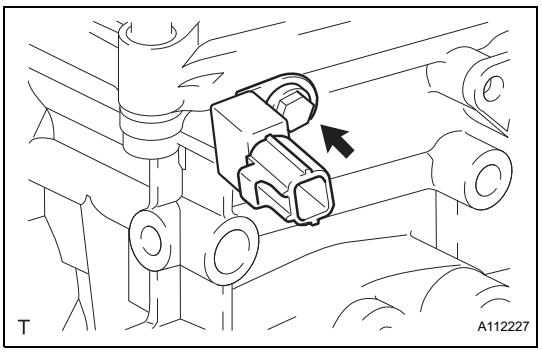
(a) Remove the 4 bolts and 4 ignition coils.

88. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (See page ES-381)

89. REMOVE KNOCK SENSOR

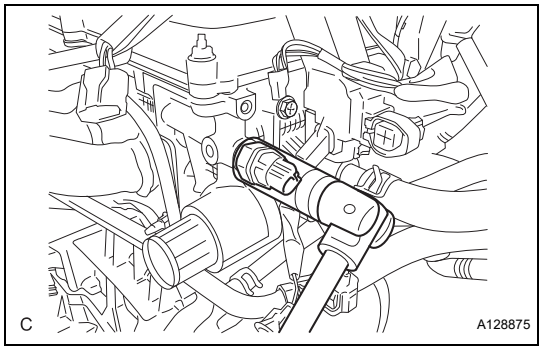
(a) Disconnect the sensor connector.

(b) Remove the nut and sensor.



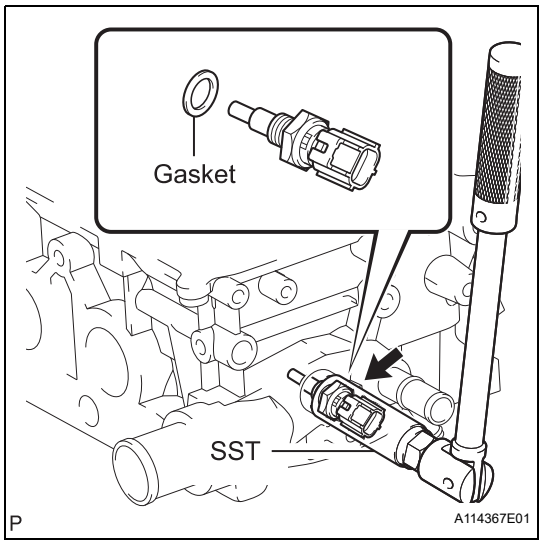
90. REMOVE RADIO SETTING CONDENSER

(a) Remove the bolt and radio setting condenser.



91. REMOVE ENGINE OIL PRESSURE SWITCH ASSEMBLY

(a) Using a 24 mm deep socket wrench, remove the engine oil pressure switch assembly.

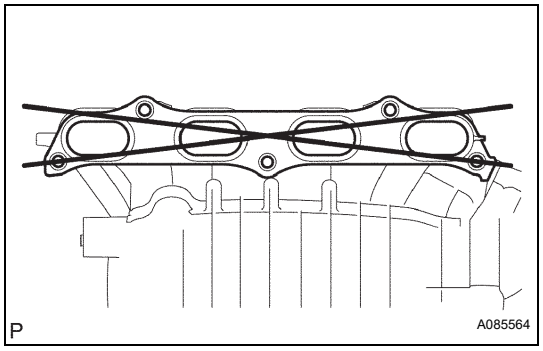


92. REMOVE ENGINE COOLANT TEMPERATURE SENSOR

(a) Using SST, remove the sensor and gasket.
SST 09817-33190

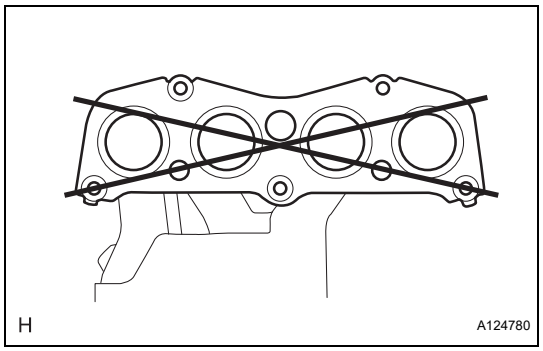
EM

INSPECTION



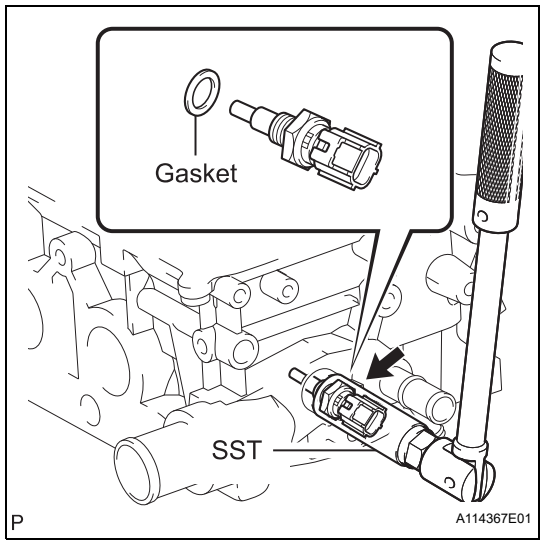
1. INSPECT INTAKE MANIFOLD

(a) Using a precision straight edge and feeler gauge, measure the surface contacting the cylinder head for warpage.
Maximum warpage:
0.20 mm (0.0079 in.)
If the warpage is greater than the maximum, replace the manifold.



2. INSPECT EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY

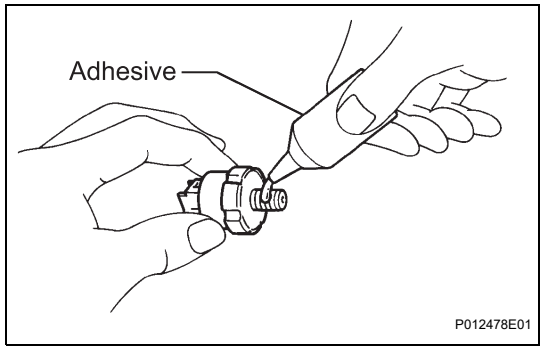
(a) Using a precision straight edge and feeler gauge, measure the surface contacting the cylinder head for warpage.
Maximum warpage:
0.70 mm (0.0276 in.)
If the warpage is greater than the maximum, replace the manifold.



INSTALLATION

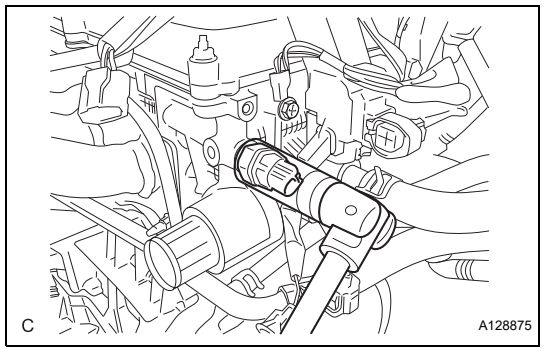
1. INSTALL ENGINE COOLANT TEMPERATURE SENSOR

(a) Using SST, install a new gasket and the ECT sensor.
SST 09817-33190
Torque: 20 N*m (208 kgf*cm, 15 ft.*lbf)

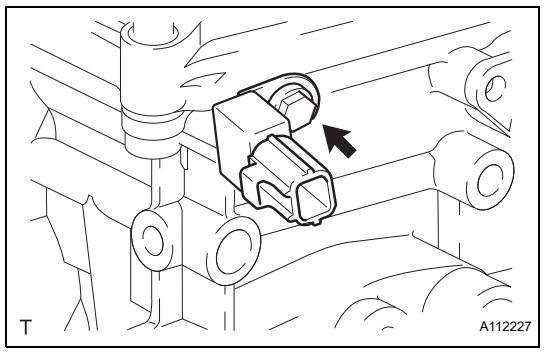


2. INSTALL ENGINE OIL PRESSURE SWITCH ASSEMBLY

(a) Clean the threads of the oil pressure switch. Apply adhesive to 2 or 3 threads of the oil pressure switch.
Adhesive:
Part No. 08833-00080 THREE BOND 1344 or equivalent



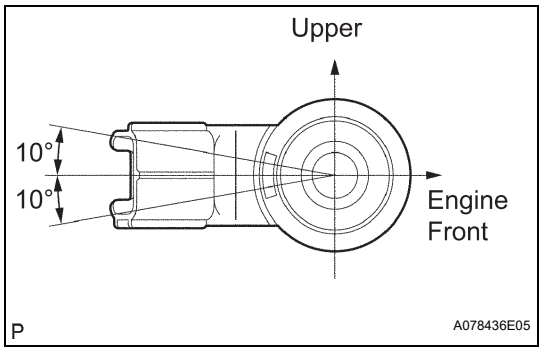
(b) Using a 24 mm deep socket wrench, install the oil pressure switch.
Torque: 15 N*m (153 kgf*cm, 11 ft.*lbf)



3. INSTALL RADIO SETTING CONDENSER

(a) Install the condenser with the bolt.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

EM



4. INSTALL KNOCK SENSOR

(a) Install the sensor with the nut as shown in the illustration.

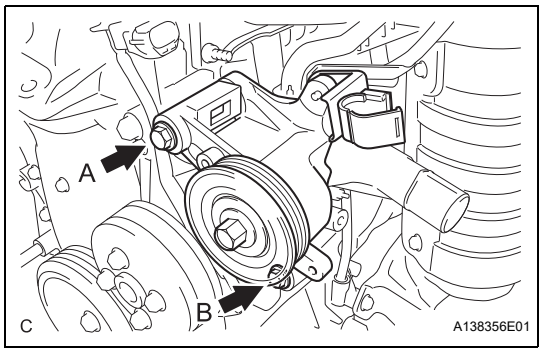
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)

5. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (See page ES-382)

6. INSTALL IGNITION COIL ASSEMBLY

(a) Install the 4 ignition coils with the 4 bolts.

Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

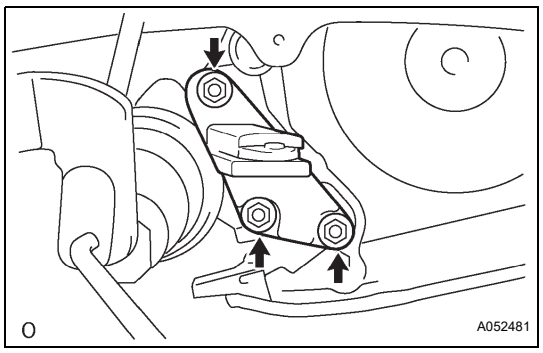


7. INSTALL V-RIBBED BELT TENSIONER ASSEMBLY

(a) Install the V-ribbed belt tensioner with the 2 bolts.

Torque: Bolt A
52 N*m (530 kgf*cm, 38 ft.*lbf)
Bolt B
21 N*m (214 kgf*cm, 16 ft.*lbf)

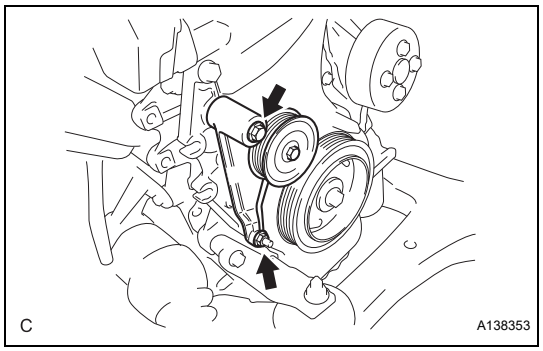
EM



8. INSTALL ENGINE MOUNTING BRACKET RH

(a) Install the engine mounting bracket RH with the 3 bolts.

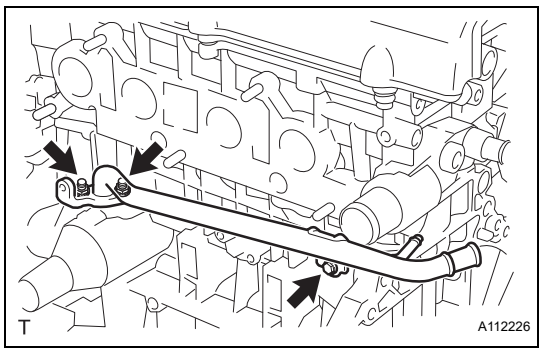
Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)



9. INSTALL IDLER PULLEY BRACKET

(a) Install the idler pulley bracket to the engine with the 2 bolts.

Torque: 60 N*m (607 kgf*cm, 44 ft.*lbf)



10. INSTALL NO. 1 WATER BY-PASS PIPE

(a) Install a new gasket and the pipe with the bolt and 2 nuts.

Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

11. INSTALL THERMOSTAT (See page CO-13)

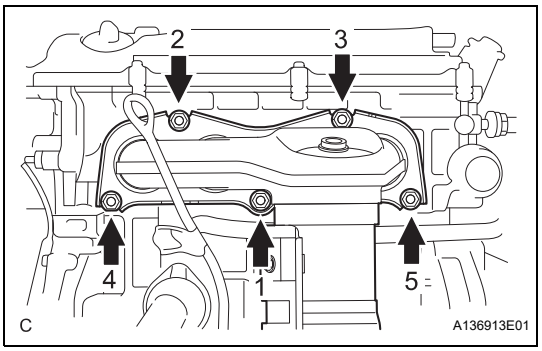
12. INSTALL WATER INLET (See page CO-14)

13. INSTALL EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY

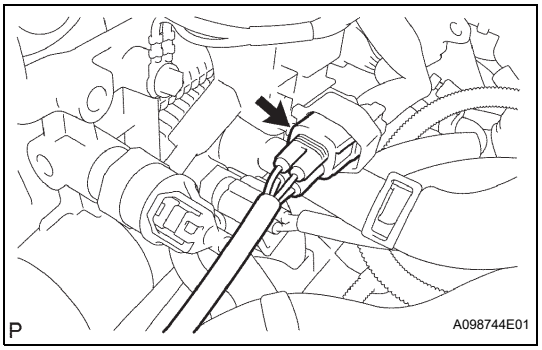
(a) Install a new gasket onto the cylinder head.

(b) Temporarily tighten the exhaust manifold converter with the 5 nuts.

(c) Tighten the 5 nuts in the sequence shown in the illustration.
Torque: 37 N*m (378 kgf*cm, 27 ft.*lbf)

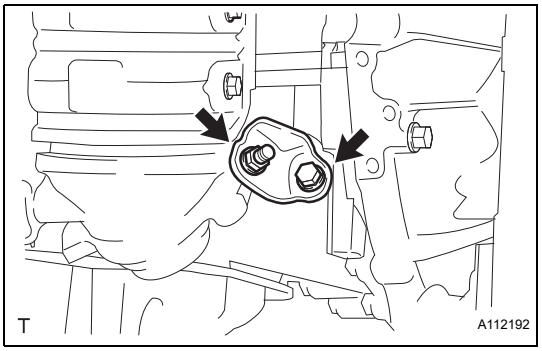


(d) Connect the air-fuel ratio sensor connector.



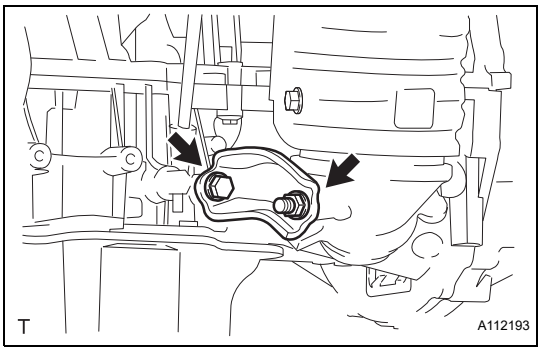
14. INSTALL NO. 2 MANIFOLD STAY

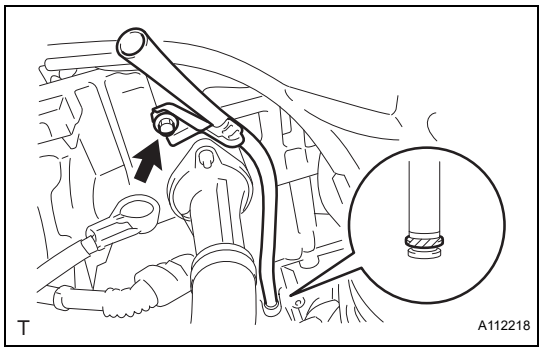
(a) Install the stay with the bolt and nut.
Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf)



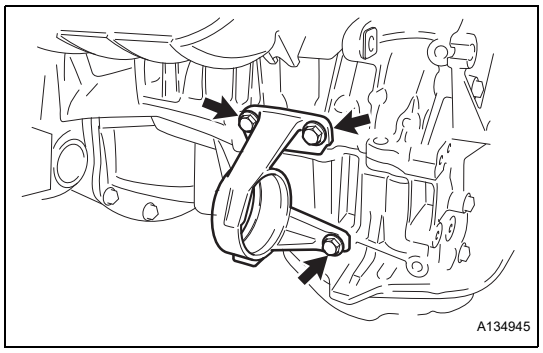
15. INSTALL MANIFOLD STAY

(a) Install the stay with the bolt and nut.
Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf)

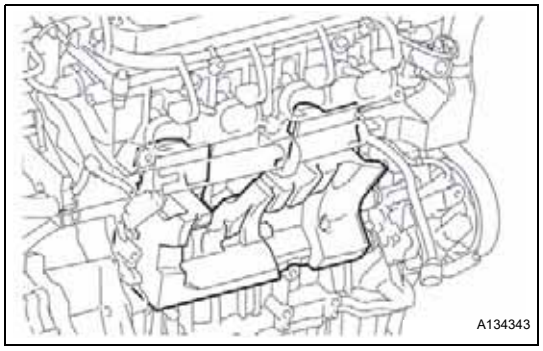




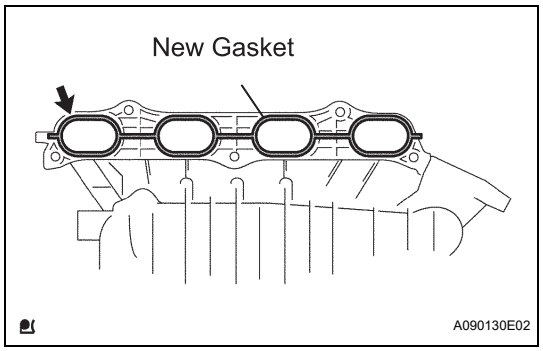
16. **INSTALL OIL LEVEL GAUGE GUIDE**
    (a) Apply a light coat of engine oil to a new O-ring and install it to the guide.
    (b) Install the oil level gauge guide with the bolt.
    Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
17. **INSTALL OIL LEVEL GAUGE SUB-ASSEMBLY**



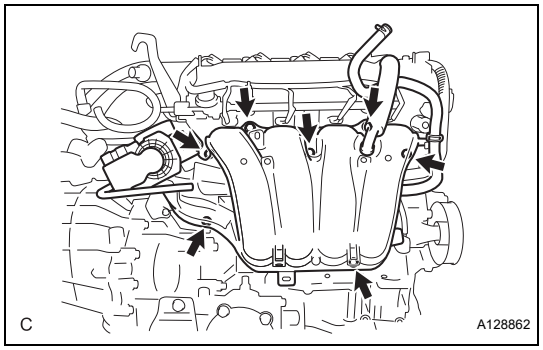
18. **INSTALL DRIVE SHAFT BEARING BRACKET**
    (a) Install the bracket with the 3 bolts.
    Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)



19. **INSTALL NO. 1 INTAKE MANIFOLD INSULATOR**
    (a) Install the No. 1 intake manifold insulator onto the cylinder block.
20. **INSTALL NO. 2 VENTILATION HOSE**



21. **INSTALL INTAKE MANIFOLD**
    (a) Install a new gasket into the intake manifold.



    (b) Install the intake manifold with the 5 bolts and 2 nuts.
    Torque: 30 N*m (305 kgf*cm, 22 ft.*lbf)
22. **INSTALL FUEL DELIVERY PIPE WITH INJECTOR (See page FU-15)**
23. **REMOVE ENGINE STAND**
24. **INSTALL FLYWHEEL SUB-ASSEMBLY (See page EM-78)**

25. INSTALL TRANSMISSION INPUT DAMPER ASSEMBLY (See page EM-78)

26. INSTALL HYBRID VEHICLE TRANSAXLE ASSEMBLY
HINT:
See page HX-15.

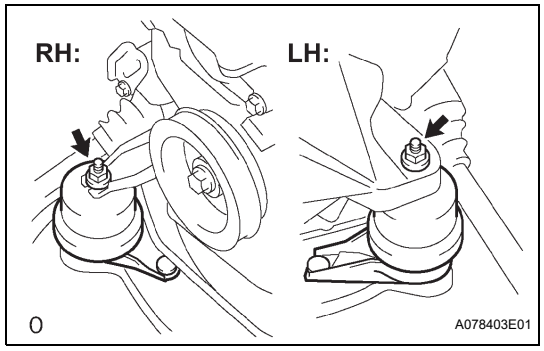
27. INSTALL ENGINE WIRE

28. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-17)

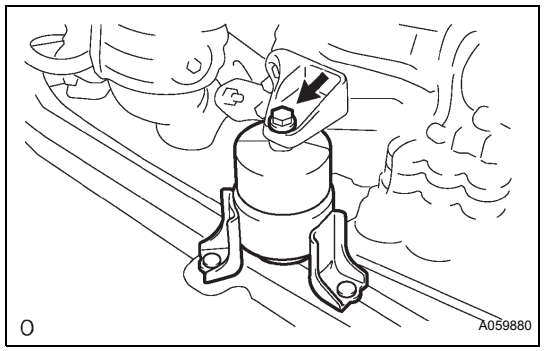
29. INSTALL FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-17)

30. INSTALL FRONT FRAME ASSEMBLY

(a) Install the engine mounting insulators RH and LH with the 2 nuts.
Torque: 95 N*m (969 kgf*cm, 70 ft.*lbf)

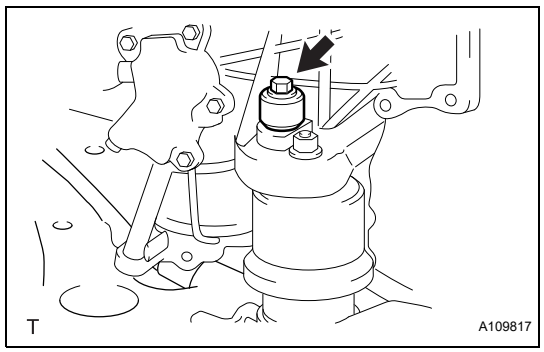


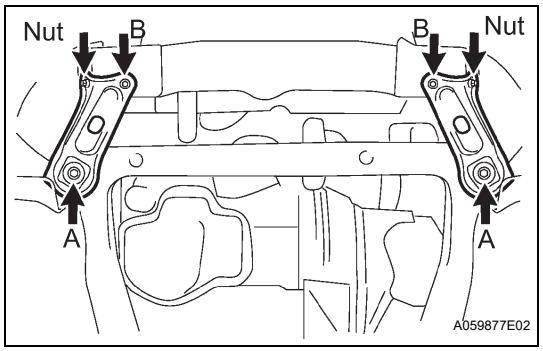
(b) Install the engine mounting insulator FR with the bolt.
Torque: 87 N*m (888 kgf*cm, 64 ft.*lbf)

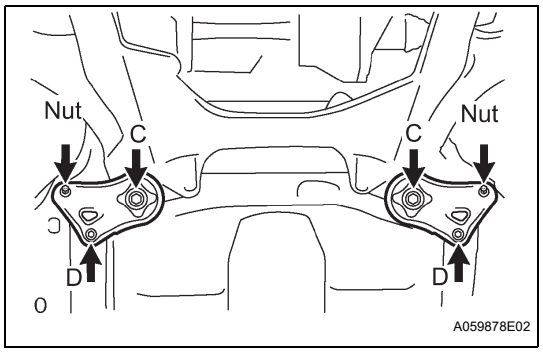


31. INSTALL HV TRANSAXLE MASS DAMPER

(a) Install the bolt and transaxle mass damper.
Torque: 14 N*m (140 kgf*cm, 10 ft.*lbf)







32. **INSTALL ENGINE ASSEMBLY WITH TRANSAXLE**
    (a) Set the engine assembly with transaxle on the engine lifter.
    (b) Install the engine assembly to the vehicle.
    (c) Install the frame side plate LH and RH with the 4 bolts and 2 nuts.
    Torque: Bolt A
    85 N*m (867 kgf*cm, 63 ft.*lbf)
    Bolt B and nut
    32 N*m (326 kgf*cm, 24 ft.*lbf)

    (d) Install the front suspension member brace rear RH and LH with the 4 bolts and 2 nuts.
    Torque: Bolt C
    85 N*m (867 kgf*cm, 63 ft.*lbf)
    Bolt D and nut
    32 N*m (326 kgf*cm, 24 ft.*lbf)

33. **INSTALL STEERING INTERMEDIATE SHAFT ASSEMBLY (See page PS-66)**

34. **INSTALL NO. 1 EXHAUST PIPE SUPPORT BRACKET**
    (a) Install the No. 1 exhaust pipe support bracket with the 2 bolts.
    Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)

35. **INSTALL FRONT AXLE ASSEMBLY LH (See page DS-18)**

36. **INSTALL FRONT AXLE ASSEMBLY RH**
    HINT:
    Use the same procedures described for the LH side.

37. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM LH (See page DS-18)**

38. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM RH**
    HINT:
    Use the same procedures described for the LH side.

39. **INSTALL TIE ROD ASSEMBLY LH (See page DS-18)**

40. **INSTALL TIE ROD ASSEMBLY RH**
    HINT:
    Use the same procedures described for the LH side.

41. **INSTALL FRONT SPEED SENSOR LH (See page DS-18)**

42. **INSTALL FRONT SPEED SENSOR RH**
    Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

43. **INSTALL FRONT STABILIZER LINK ASSEMBLY LH (See page DS-19)**

44. **INSTALL FRONT STABILIZER LINK ASSEMBLY RH**
    HINT:
    Use the same procedures described for the LH side.

45. **INSTALL FRONT AXLE HUB NUT LH (See page DS-19)**

46. INSTALL FRONT AXLE HUB NUT RH

HINT:

Use the same procedures described for the LH side.

47. INSTALL FRONT EXHAUST PIPE ASSEMBLY

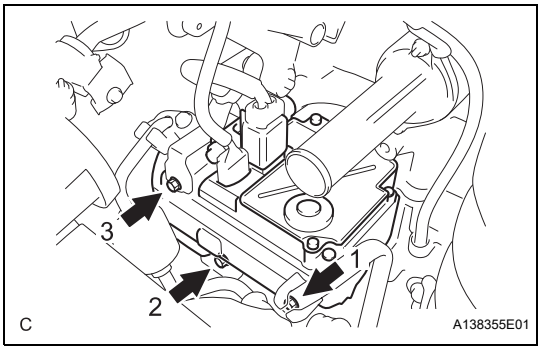
HINT:

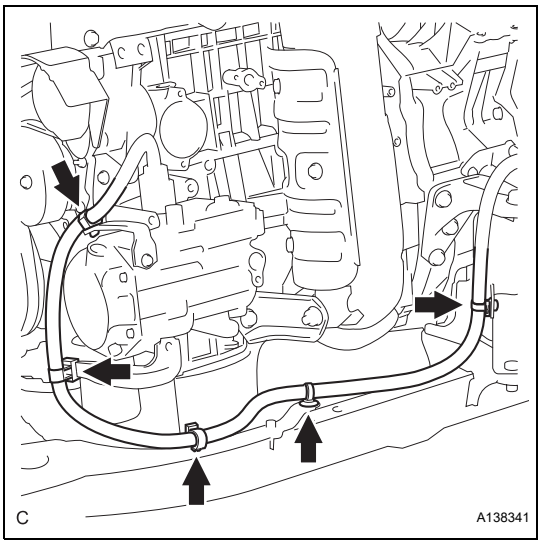
See page EX-3.

48. INSTALL COMPRESSOR AND MAGNETIC CLUTCH

(a) Temporarily install the compressor with the 3 bolts.

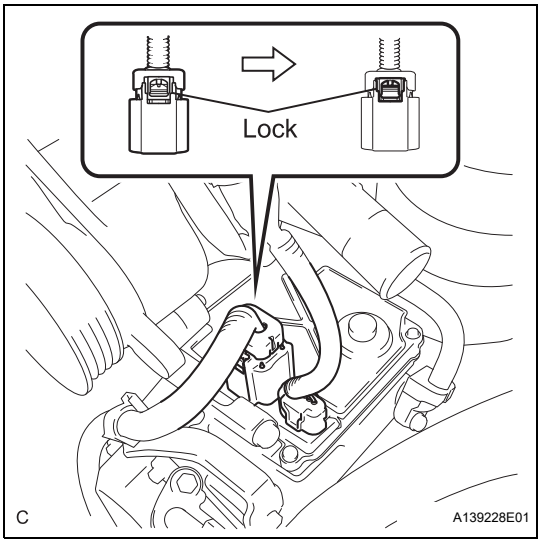
(b) Install the compressor with the 3 bolts by tightening the bolts in the order shown in the illustration.
Torque: 25 N*m (250 kgf*cm, 18 ft.*lbf)
NOTICE:
Tighten the bolts in the order shown in the illustration to install the compressor.



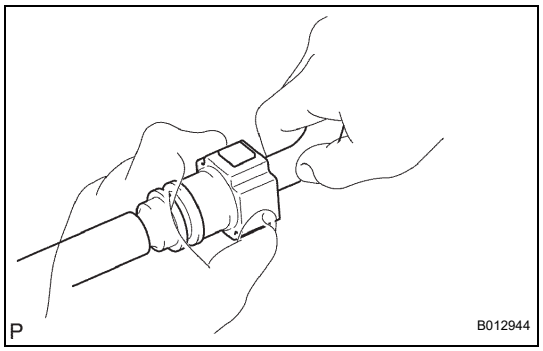


(c) Connect the No. 4 engine wire clamps.
CAUTION:
Wear insulated gloves when performing the procedures.

(d) Connect the 2 connectors.



(e) Lock the green-colored lock.

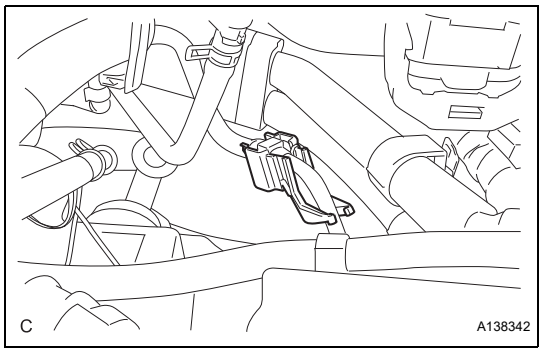


49. CONNECT FUEL TUBE SUB-ASSEMBLY

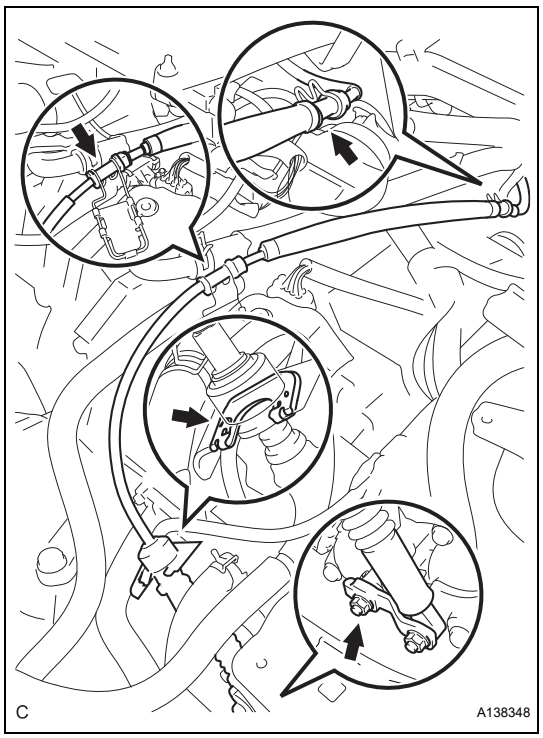
(a) Push in the fuel tube connector to the fuel pipe until the connector makes a "click" sound.

NOTICE:

- **Check for damage or contamination on the connected part of the pipe.**
- **Check if the pipe and the connector are securely connected by trying to pull them apart.**



(b) Install the No. 1 fuel pipe clamp.



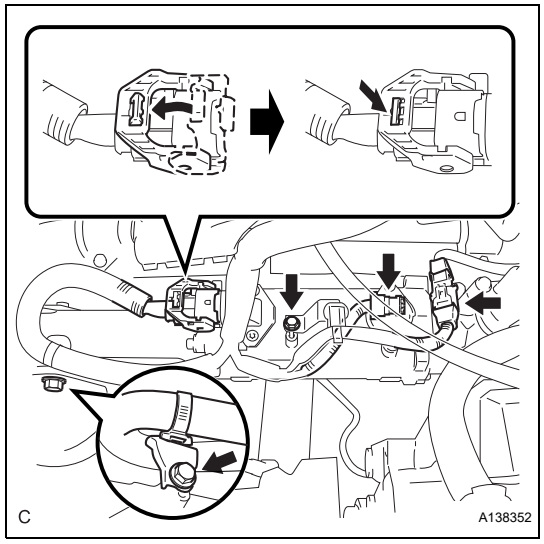
50. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Install a new clip and nut, and connect the control lever.

Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)

(b) Connect the cable to the 2 clamps.

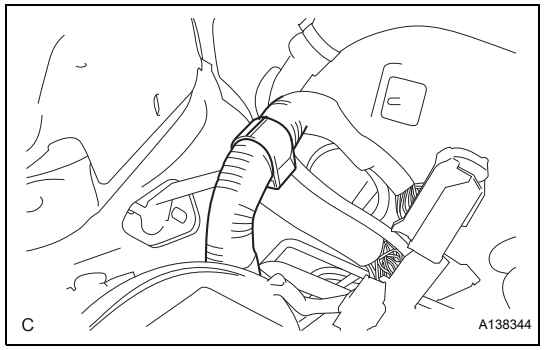
EM



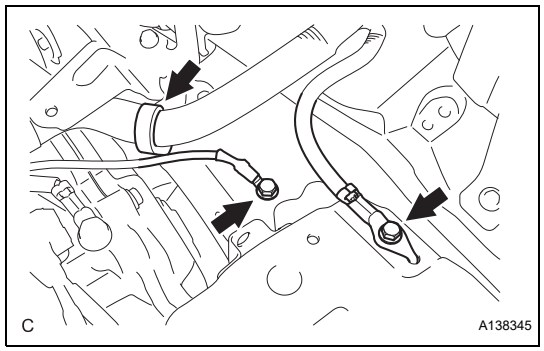
51. CONNECT ENGINE WIRE

(a) Install the 2 bolts and power steering wire to the power steering link assembly.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

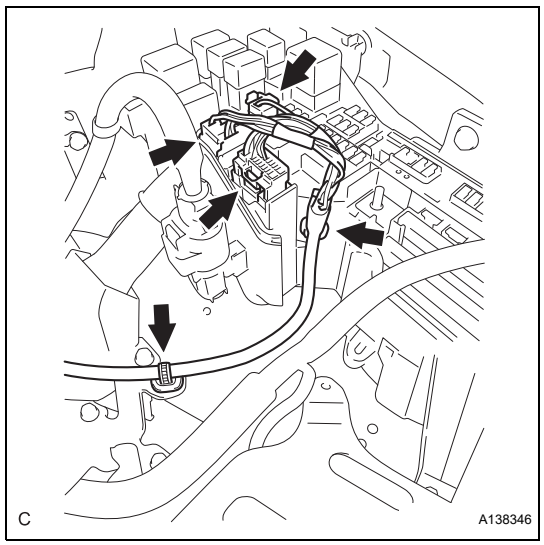
(b) Connect the 3 wire harness connectors to the power steering link assembly and securely lock the connector.



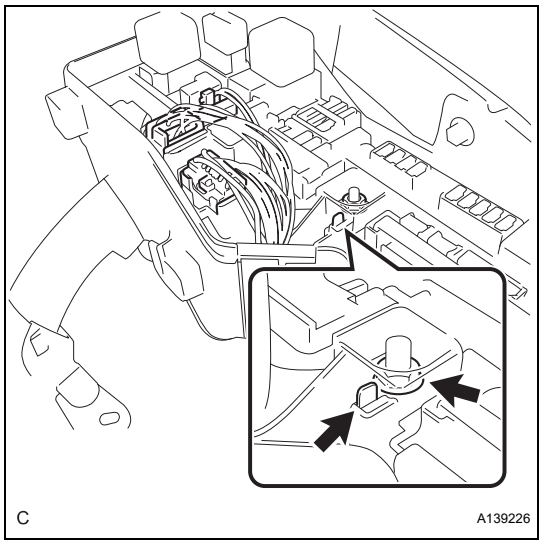
(c) Connect the clamp to the bracket.



(d) Install the 2 bolts and clamp to the body.
Torque: 8.4 N*m (85 kgf*cm, 74 in.*lbf)



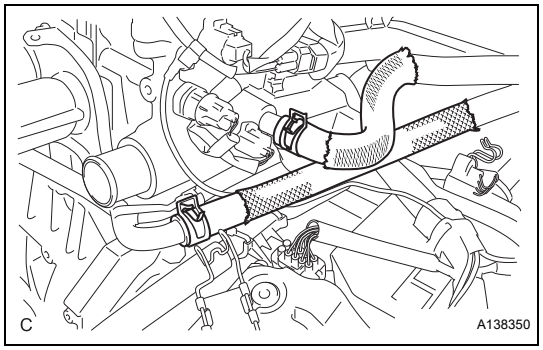
(e) Connect the 3 connectors and 2 clamps to the engine room junction block.



(f) Connect the wire to the engine room junction block. Then, install it with the nut and 3 connectors.
Torque: 8.4 N*m (85 kgf*cm, 74 in.*lbf)

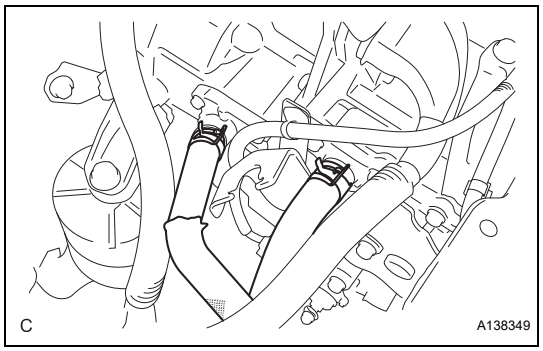
52. INSTALL POWER STEERING ECU ASSEMBLY (See page PS-71)

53. INSTALL HYBRID VEHICLE CONTROL ECU (See page HV-571)

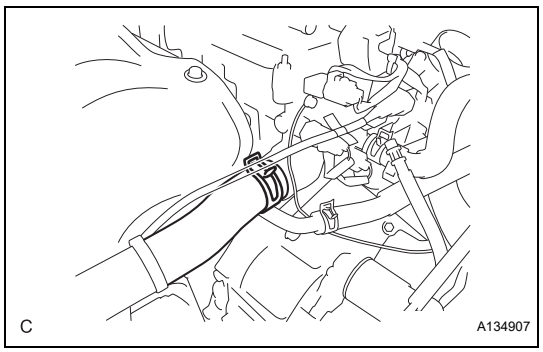


54. CONNECT HEATER INLET WATER HOSE
(a) Connect the heater inlet water hose.

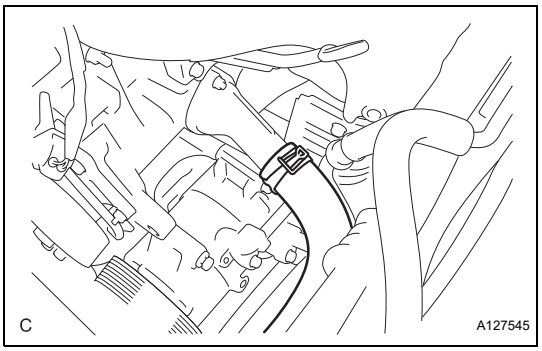
55. CONNECT HEATER OUTLET WATER HOSE
(a) Connect the heater outlet water hose.



56. CONNECT WATER HOSE
(a) Install the 2 clamps and connect the 2 water hoses.

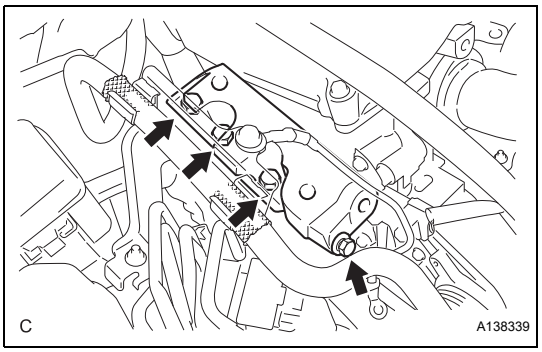


57. CONNECT RADIATOR HOSE INLET
(a) Install the clamp and connect the radiator hose inlet.



58. CONNECT RADIATOR HOSE OUTLET

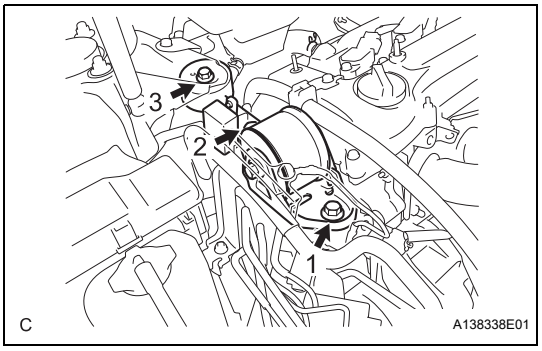
(a) Install the clamp and connect the radiator hose outlet.



59. INSTALL NO. 2 ENGINE MOUNTING BRACKET RH

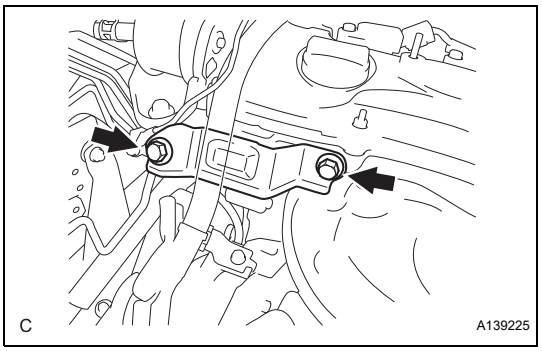
(a) Install the 3 bolts and No. 2 engine mounting bracket RH.
Torque: 52 N*m (531 kgf*cm, 38 ft.*lbf)

(b) Install the ground cable with the bolt.
Torque: 8.4 N*m (85 kgf*cm, 74 in.*lbf)



60. INSTALL ENGINE MOVING CONTROL ROD SUB-ASSEMBLY

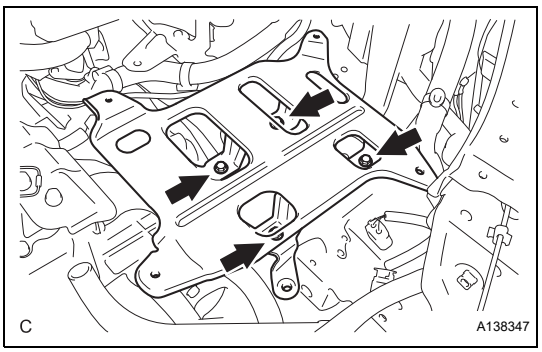
(a) Install the engine moving control rod by tightening the 3 bolts in the order shown in the illustration.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)



61. INSTALL NO. 2 ENGINE MOUNTING STAY RH

(a) Install the No. 2 engine mounting stay RH with the 2 bolts.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)

62. INSTALL WATER WITH MOTOR AND BRACKET PUMP ASSEMBLY (See page HV-575)

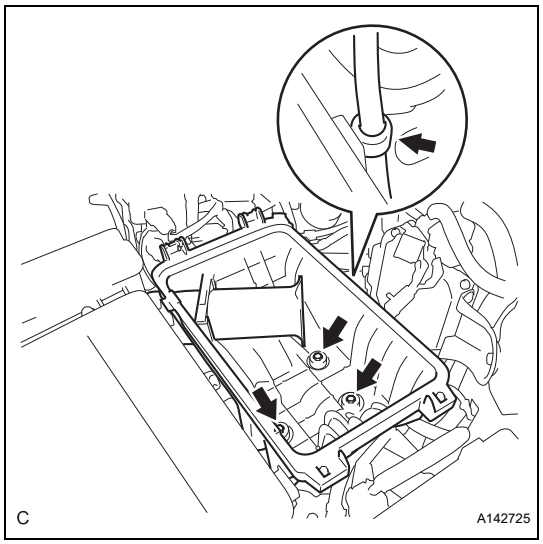


63. INSTALL INVERTER TRAY BRACKET

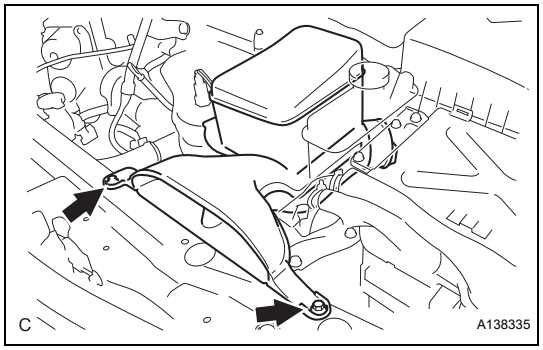
(a) Install the inverter tray bracket with the 4 bolts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

64. INSTALL INVERTER WITH CONVERTER ASSEMBLY

HINT:
See page HV-564.

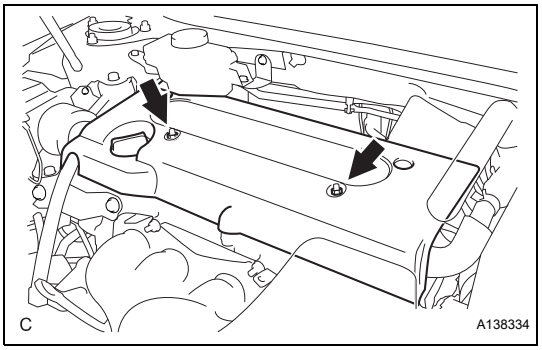


65. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY**
    (a) Install the air cleaner case with the 3 bolts.
    Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
    (b) Connect the hose clamp.
66. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-398)**



67. **INSTALL AIR CLEANER INLET ASSEMBLY**
    (a) Install the air cleaner inlet with the 2 bolts.
    Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
68. **INSTALL V-RIBBED BELT (See page EM-6)**
69. **INSTALL V-RIBBED BELT TENSIONER COVER SUB-ASSEMBLY (See page EM-7)**
70. **INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-405)**
71. **INSTALL BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY**
72. **INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-13)**
73. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-14)**
74. **INSTALL FRONT FENDER TO COWL SIDE SEAL LH (See page WW-14)**
75. **INSTALL FRONT FENDER TO COWL SIDE SEAL RH (See page WW-14)**
76. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-14)**
77. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-15)**
78. **INSTALL FRONT WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
79. **ADD ENGINE OIL**
80. **INSTALL SERVICE PLUG GRIP (See page HB-97)**
81. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
    Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
82. **INSTALL LUGGAGE TRIM SERVICE HOLE COVER**
83. **ADD ENGINE COOLANT (See page CO-5)**

84. **ADD COOLANT (for Inverter) (See page HV-556)**
85. **ADD AND INSPECT HYBRID TRANSAXLE FLUID (See page HX-2)**
86. **CHECK FOR FUEL LEAKS (See page FU-9)**
87. **CHECK FOR ENGINE OIL LEAKS**
88. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**
89. **CHECK FOR COOLANT LEAKS (for Inverter) (See page HV-555)**
90. **CHECK FOR EXHAUST GAS LEAKS**
91. **CHECK SHIFT LEVER POSITION (See page HX-24)**
92. **ADJUST FRONT WHEEL ALIGNMENT**
    HINT:
    See page SP-4.
93. **CHECK IGNITION TIMING (See page EM-1)**
94. **CHECK ENGINE IDLE SPEED (See page EM-2)**
95. **INSPECT CO/HC (See page EM-4)**
96. **INSTALL FRONT FENDER APRON SEAL RH**
97. **INSTALL ENGINE UNDER COVER LH**
98. **INSTALL ENGINE UNDER COVER RH**
99. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY**
    (a) Install the No. 1 engine cover with the 2 nuts.
    Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

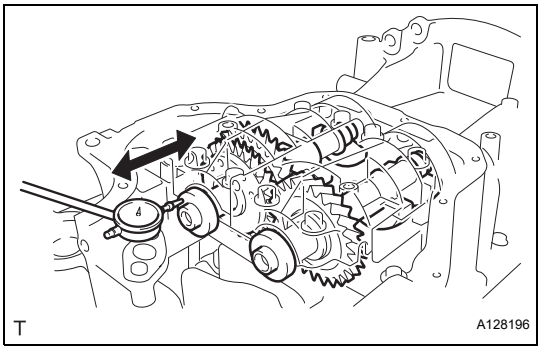


100. **CHECK ABS SPEED SENSOR SIGNAL**
    HINT:
    See page BC-35.
101. **PERFORM INITIALIZATION**
    (a) Perform initialization procedure (See page IN-43).
    HINT:
    Some vehicle systems require initialization after reconnecting the cable to the negative battery terminal.

INSPECTION

1. INSPECT BALANCESHAFT THRUST CLEARANCE

(a) Install the balanceshafts (See page EM-142).



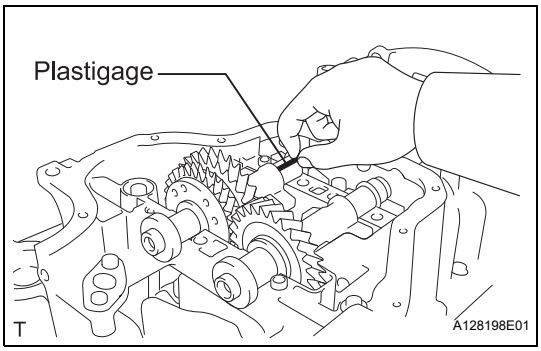
(b) Using a dial indicator, measure the thrust clearance while moving the balanceshaft back and forth.
Standard thrust clearance:
0.05 to 0.09 mm (0.0020 to 0.0035 in.)
Maximum thrust clearance:
0.09 mm (0.0035 in.)
If the thrust clearance is greater than the maximum, replace the balanceshaft housing and bearings. If necessary, replace the balanceshaft.

2. INSPECT BALANCESHAFT OIL CLEARANCE

(a) Clean each bearing and journal.

(b) Check each bearing and journal for pitting and scratches.
If a bearing or journal is damaged, replace the bearings. If necessary, replace the balanceshaft.

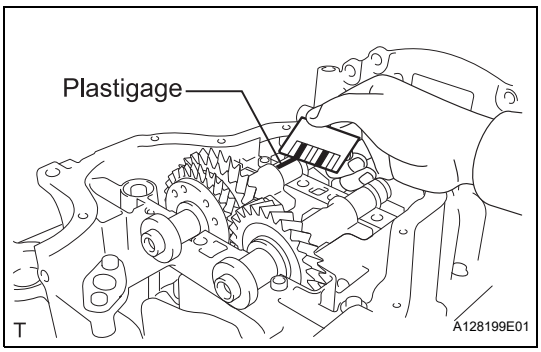
(c) Place the No. 1 and No. 2 balanceshafts onto the crankcase.



(d) Lay a strip of Plastigage across each journal.

(e) Install the balanceshaft housing (See page EM-142).
NOTICE:
Do not turn the balanceshafts.

(f) Remove the balanceshafts (See page EM-120).



(g) Measure the Plastigage at its widest point.
Standard oil clearance:
0.004 to 0.049 mm (0.0002 to 0.0019 in.)
Maximum oil clearance:
0.049 mm (0.0019 in.)
NOTICE:
Remove the Plastigage completely after the measurement.
If the oil clearance is greater than the maximum, replace the bearing. If necessary, replace the balanceshaft.

(h) If replacing a bearing, select a new one with the same number.
Standard balanceshaft housing journal bore diameter

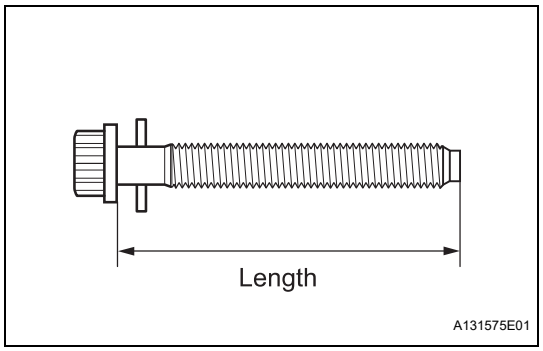
Item	Specified Condition
Mark 1	26.000 to 26.006 mm (1.0236 to 1.0239 in.)
Mark 2	26.007 to 26.012 mm (1.0239 to 1.0241 in.)
Mark 3	26.013 to 26.018 mm (1.0241 to 1.0243 in.)

Standard bearing center wall thickness

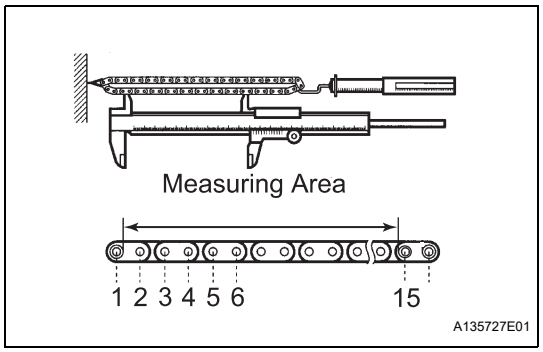
Item	Specified Condition
Mark 1	1.486 to 1.489 mm (0.05850 to 0.05862 in.)
Mark 2	1.490 to 1.492 mm (0.05866 to 0.05874 in.)
Mark 3	1.493 to 1.495 mm (0.0588 to 0.0589 in.)

Standard balanceshaft journal diameter

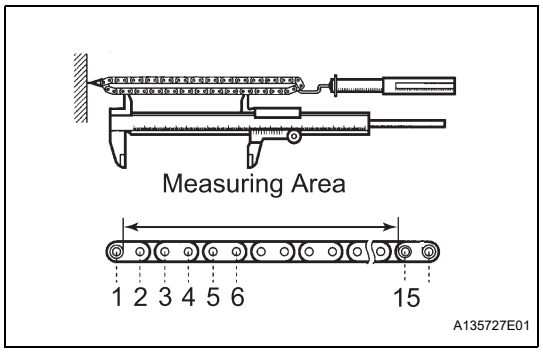
Item	Specified Condition
Mark 1	22.985 to 23.000 mm (0.9049 to 0.9055 in.)
Mark 2	22.985 to 23.000 mm (0.9049 to 0.9055 in.)
Mark 3	22.985 to 23.000 mm (0.9049 to 0.9055 in.)



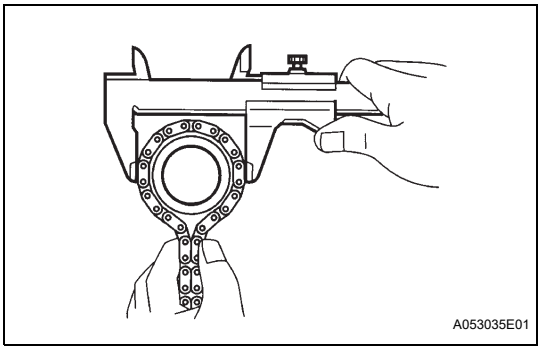
(i) Inspect the balanceshaft housing bolts.
(1) Using vernier calipers, measure the length of the bolts from the seat to the end.
Standard bolt length:
58.3 to 59.7 mm (2.295 to 2.350 in.)
Maximum bolt length:
60.3 mm (2.374 in.)
If the bolt length is greater than the maximum, replace the balanceshaft housing bolt.



3. INSPECT CHAIN SUB-ASSEMBLY
(a) Pull the chain with a force of 140 N (14.3 kgf, 31.5 lbf) as shown in the illustration.
(b) Using vernier calipers, measure the length of 15 links.
Maximum chain elongation:
114.5 mm (4.508 in.)
NOTICE:
Perform the measurement at 3 random places.
Use the average of the measurements.
If the average elongation is greater than the maximum, replace the chain.



4. INSPECT NO. 2 CHAIN SUB-ASSEMBLY
(a) Pull the chain with a force of 140 N (14.3 kgf, 31.5 lbf) as shown in the illustration.
(b) Using vernier calipers, measure the length of 15 links.
Maximum chain elongation:
102.2 mm (4.024 in.)
NOTICE:
Perform the measurement at 3 random places.
Use the average of the measurements.
If the average elongation is greater than the maximum, replace the No. 2 chain.



5. INSPECT OIL PUMP DRIVE GEAR

(a) place the chain around the gear.

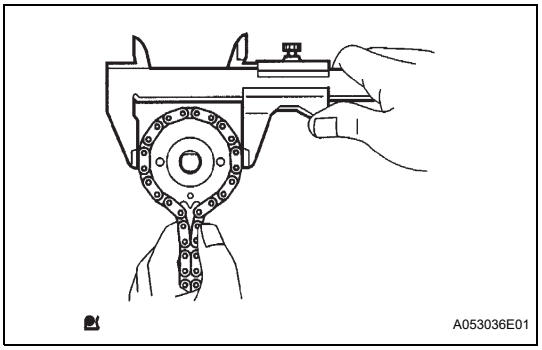
(b) Using vernier calipers, measure the diameter of the gear and chain.

Minimum gear diameter (with chain):
48.2 mm (1.898 in.)

NOTICE:

The vernier calipers must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and gear.



6. INSPECT OIL PUMP DRIVE SHAFT GEAR

(a) Place the chain around the gear.

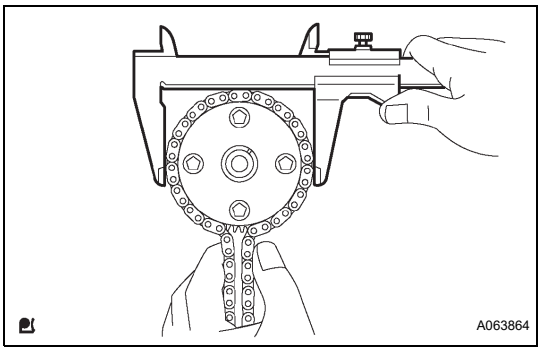
(b) Using vernier calipers, measure the diameter of the gear and chain.

Minimum gear diameter (with chain):
48.2 mm (1.898 in.)

NOTICE:

The vernier calipers must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and gear.



7. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY

(a) Place the chain around the timing gear.

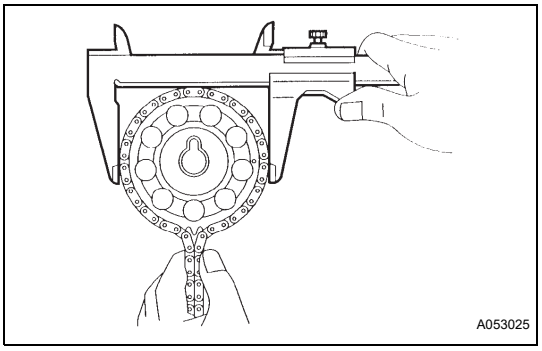
(b) Using vernier calipers, measure the diameter the timing gear and chain.

Minimum gear diameter (with chain):
97.3 mm (3.831 in.)

NOTICE:

The vernier calipers must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and gear.



8. INSPECT CAMSHAFT TIMING SPROCKET

(a) Place the chain around the sprocket.

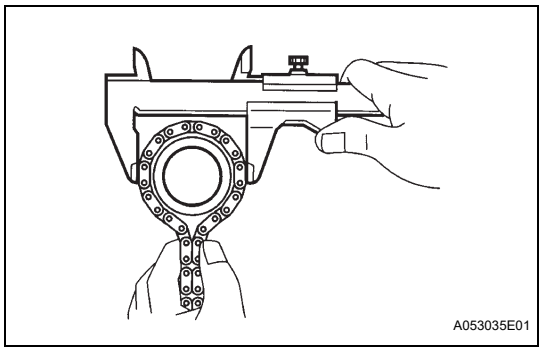
(b) Using vernier calipers, measure the diameter of the sprocket and chain.

Minimum sprocket diameter (with chain):
97.3 mm (3.831 in.)

NOTICE:

The vernier calipers must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and sprocket.



9. INSPECT CRANKSHAFT TIMING GEAR

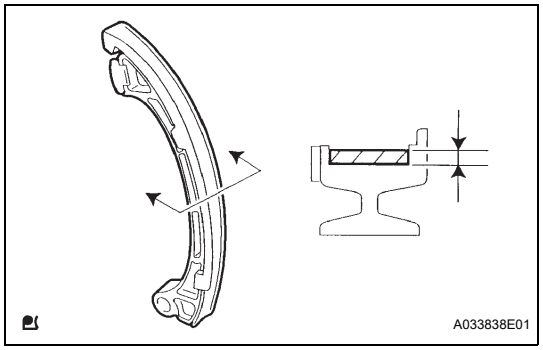
(a) Place the chain around the timing gear.

(b) Using vernier calipers, measure the diameter of the timing gear and chain.

Minimum gear diameter (with chain):
51.6 mm (2.031 in.)

NOTICE:
The vernier calipers must be in contact with the chain rollers when measuring.

If the gear diameter is less than the minimum, replace the chain sub-assembly and crankshaft timing gear.

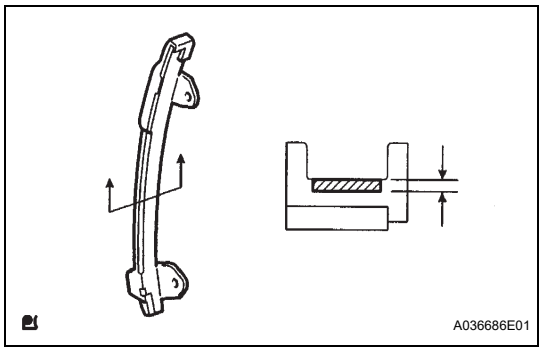


10. INSPECT CHAIN TENSIONER SLIPPER

(a) Using vernier calipers, measure the tensioner slipper wear.

Maximum wear:
1.0 mm (0.039 in.)

If the wear is greater than the maximum, replace the chain tensioner slipper.

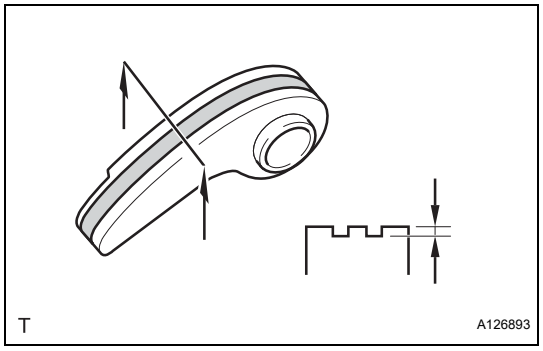


11. INSPECT NO. 1 CHAIN VIBRATION DAMPER

(a) Using vernier calipers, measure the vibration damper wear.

Maximum wear:
1.0 mm (0.039 in.)

If the wear is greater than the maximum, replace the No. 1 chain vibration damper.

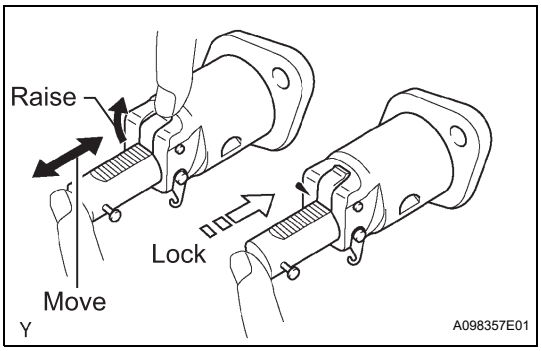


12. INSPECT CHAIN TENSIONER PLATE

(a) Using vernier calipers, measure the vibration damper wear.

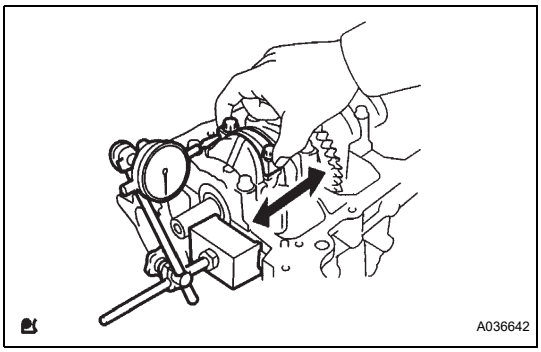
Maximum wear:
0.5 mm (0.020 in.)

If the wear is greater than the maximum, replace the chain tensioner plate.



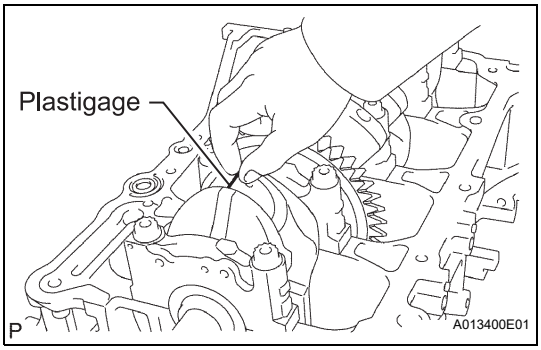
13. **INSPECT NO. 1 CHAIN TENSIONER**
   (a) Check that the plunger moves smoothly when the ratchet pawl is raised with your finger.
   (b) Release the ratchet pawl, then check that the plunger is locked in place by the ratchet pawl and does not move when pushed with your finger.

14. **INSPECT CONNECTING ROD THRUST CLEARANCE**
   (a) Install the connecting rod cap (See page EM-142).

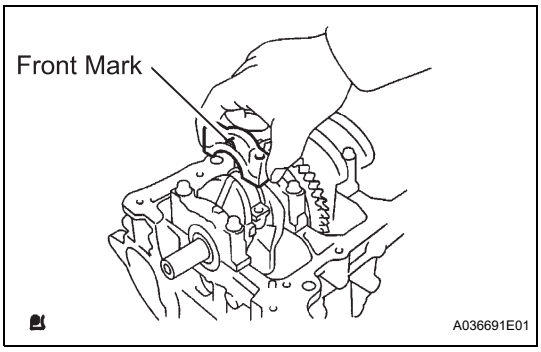


   (b) Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth.
   Standard thrust clearance:
   0.160 to 0.362 mm (0.0063 to 0.0143 in.)
   Maximum thrust clearance:
   0.362 mm (0.0143 in.)
   If the thrust clearance is greater than the maximum, replace the connecting rod assemblies as necessary. If necessary, replace the crankshaft.

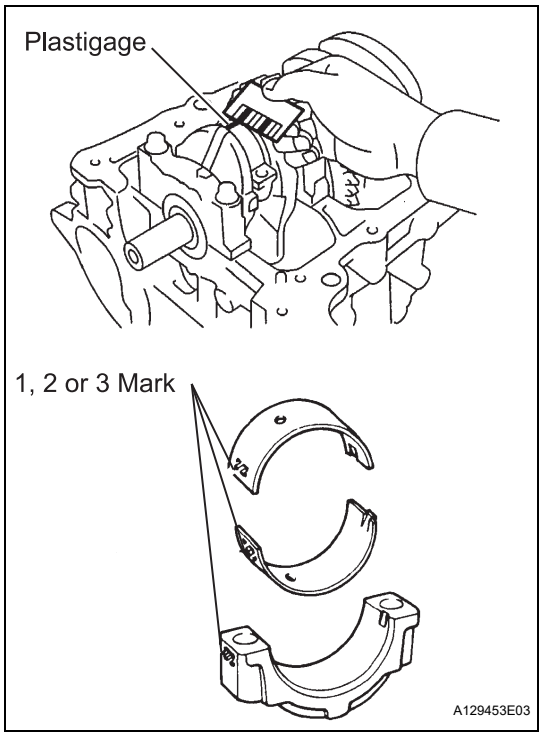
15. **INSPECT CONNECTING ROD OIL CLEARANCE**
   (a) Clean the crank pin and bearing.
   (b) Check the crank pin and bearing for pitting and scratches.



   (c) Lay a strip of Plastigage on the crank pin.



   (d) Check that the front mark of the connecting rod cap is facing forward.
   (e) Install the connecting rod cap (See page EM-142).
   NOTICE:
   Do not turn the crankshaft.
   (f) Remove the 2 bolts and connecting rod cap (See page EM-120).



(g) Measure the Plastigage at its widest point.

Standard oil clearance:

0.032 to 0.063 mm (0.0013 to 0.0025 in.)

Maximum oil clearance:

0.063 mm (0.0025 in.)

If the oil clearance is greater than the maximum, replace the connecting rod bearings. If necessary, inspect the crankshaft.

NOTICE:

Completely remove the Plastigage after the measurement.

HINT:

If replacing a bearing, replace it with one that has the same number as its respective connecting rod cap. Each bearing's standard thickness is indicated by a 1, 2, or 3 mark on its surface.

Standard connecting rod large end bore diameter

Mark	Specified Condition
Mark 1	51.000 to 51.007 mm (2.0079 to 2.0082 in.)
Mark 2	51.008 to 51.013 mm (2.0082 to 2.0084 in.)
Mark 3	51.014 to 51.020 mm (2.0084 to 2.0087 in.)

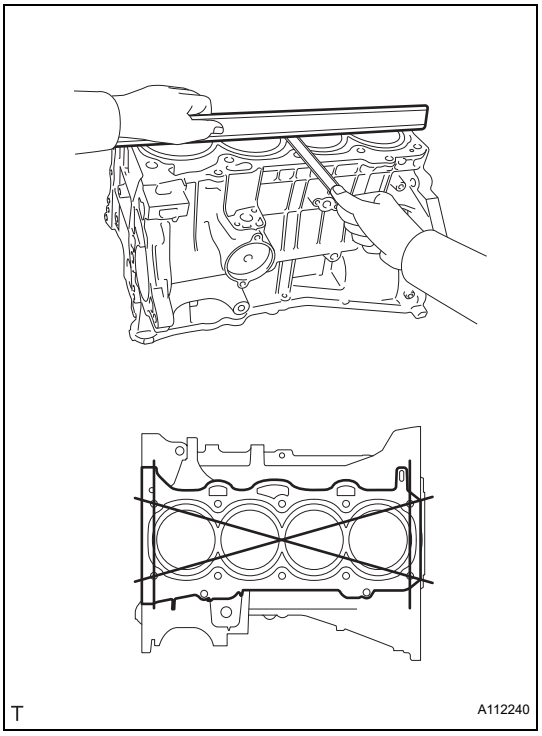
Standard connecting rod bearing thickness

Mark	Specified Condition
Mark 1	1.485 to 1.488 mm (0.0585 to 0.0586 in.)
Mark 2	1.489 to 1.491 mm (0.0586 to 0.0587 in.)
Mark 3	1.492 to 1.494 mm (0.0587 to 0.0588 in.)

Standard crankshaft pin diameter

Mark	Specified Condition
Mark 1	47.990 to 48.000 (1.8894 to 1.8898 in.)
Mark 2	47.990 to 48.000 (1.8894 to 1.8898 in.)
Mark 3	47.990 to 48.000 (1.8894 to 1.8898 in.)

EM



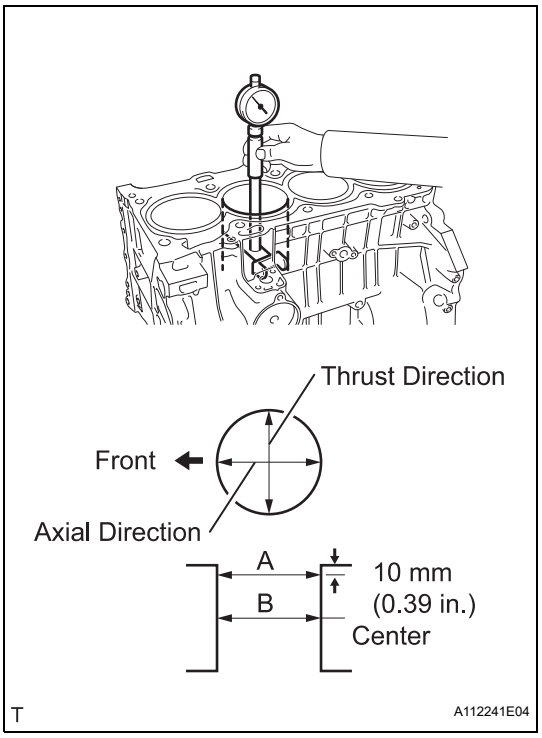
16. INSPECT CYLINDER BLOCK FOR WARPAGE

(a) Using a precision straightedge and feeler gauge, measure the warpage of the surface that is in contact with the cylinder head gasket.

Maximum warpage:

0.05 mm (0.0020 in.)

If the warpage is greater than the maximum, replace the cylinder block.



17. INSPECT CYLINDER BORE

(a) Using a cylinder gauge, measure the cylinder bore diameter at positions A and B in both thrust and axial directions.

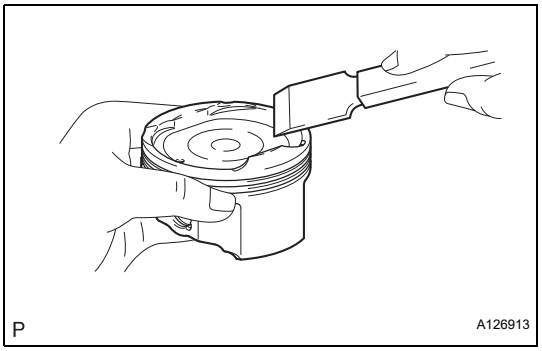
Standard diameter:

88.500 to 88.513 mm (3.4843 to 3.4847 in.)

Maximum diameter:

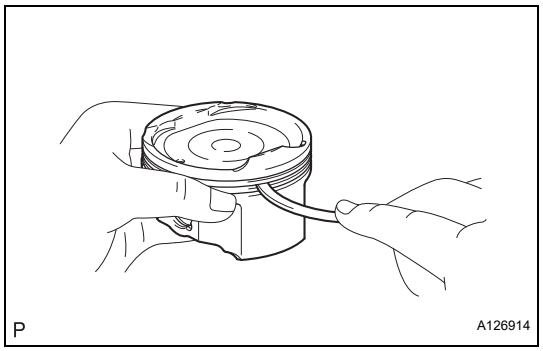
88.633 mm (3.4894 in.)

If the average diameter of the 4 positions is greater than the maximum, replace the cylinder block.

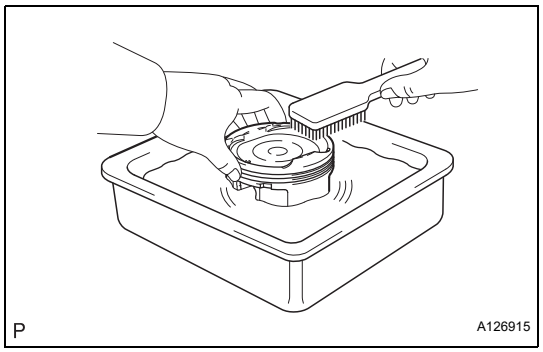


18. INSPECT PISTON

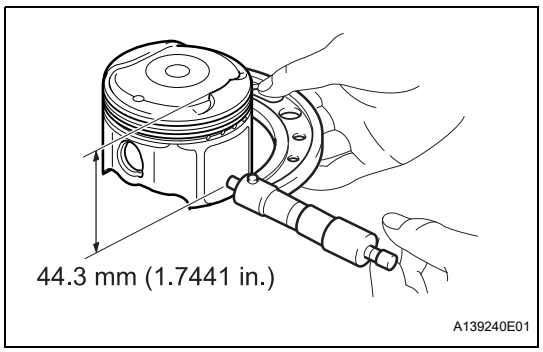
(a) Using a gasket scraper, remove the carbon from the piston top.



(b) Using a groove cleaning tool or broken ring, clean the piston ring grooves.



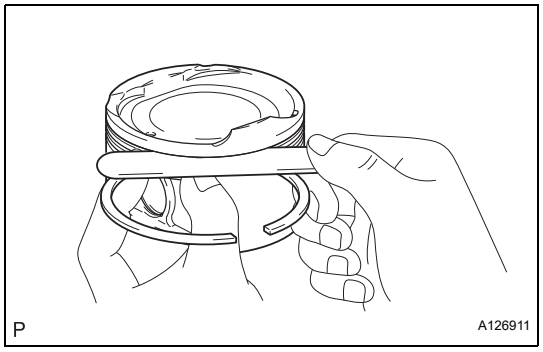
(c) Using a brush and solvent, thoroughly clean the piston.
NOTICE:
Do not use a wire brush.



(d) Using a micrometer, measure the piston diameter at right angles to the piston pin hole, and at a point 44.3 mm (1.7441 in.) from the piston head.
Standard piston diameter:
88.469 to 88.479 mm (3.4830 to 3.4834 in.)
If the diameter is not as specified, replace the piston.

19. INSPECT PISTON OIL CLEARANCE

(a) Subtract the piston diameter measurement from the cylinder bore diameter measurement.
Standard oil clearance:
0.021 to 0.044 mm (0.0008 to 0.0017 in.)
Maximum oil clearance:
0.10 mm (0.0039 in.)
If the oil clearance is greater than the maximum, replace all the pistons. If necessary, replace the cylinder block.

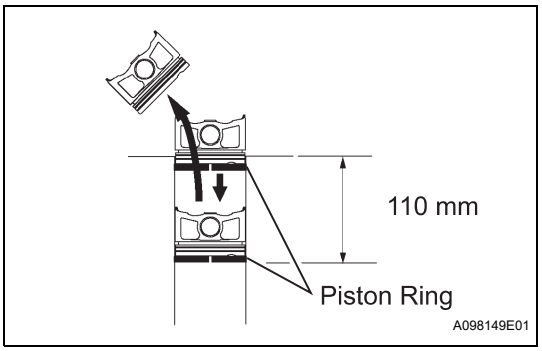


20. INSPECT RING GROOVE CLEARANCE

(a) Using a feeler gauge, measure the clearance between a new piston ring and the wall of the ring groove.
Standard ring groove clearance

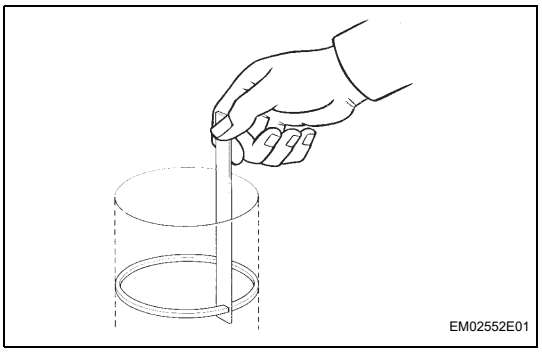
Item	Specified Condition
No. 1 Ring	0.020 to 0.070 mm (0.0008 to 0.0028 in.)
No. 2 Ring	0.020 to 0.060 mm (0.0008 to 0.0024 in.)
Oil Ring	0.020 to 0.070 mm (0.0008 to 0.0028 in.)

If the groove clearance is not as specified, replace the piston.



21. INSPECT PISTON RING END GAP

(a) Using a piston, push the piston ring a little beyond the bottom of the ring travel, 110 mm (4.33 in.) from the top of the cylinder block.



(b) Using a feeler gauge, measure the end gap.

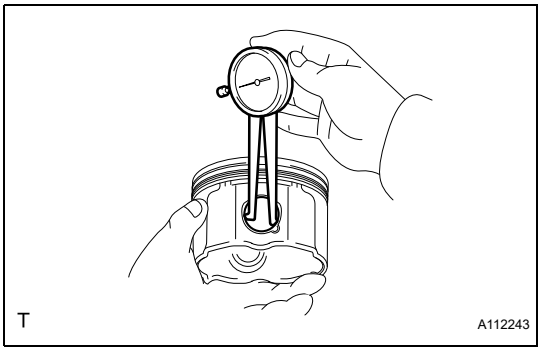
Standard end gap

Item	Specified Condition
No. 1 Ring	0.24 to 0.31 mm (0.0094 to 0.0122 in.)
No. 2 Ring	0.33 to 0.43 mm (0.0130 to 0.0169 in.)
Oil Ring	0.10 to 0.30 mm (0.0040 to 0.0119 in.)

Maximum end gap

Item	Specified Condition
No. 1 Ring	0.89 mm (0.0350 in.)
No. 2 Ring	1.37 mm (0.0539 in.)
Oil Ring	0.73 mm (0.0287 in.)

If the end gap is greater than the maximum, replace the piston ring. If the end gap is greater than the maximum, even with a new piston ring, replace the cylinder block.



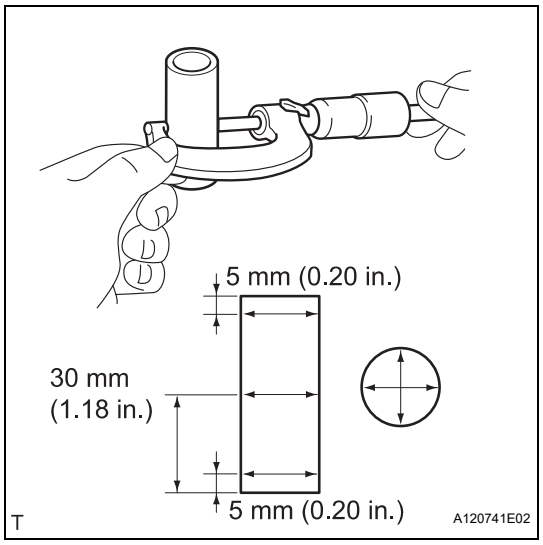
22. INSPECT PISTON PIN OIL CLEARANCE

(a) Using a caliper gauge, measure the piston pin bore diameter.

Standard piston pin bore diameter:
22.001 to 22.010 mm (0.8662 to 0.8665 in.)

Item	Specified Condition
A	22.001 to 22.004 mm (0.8662 to 0.8663 in.)
B	22.005 to 22.007 mm (0.8663 to 0.8664 in.)
C	22.008 to 22.010 mm (0.8665 to 0.8665 in.)

If the diameter is not as specified, replace the piston.



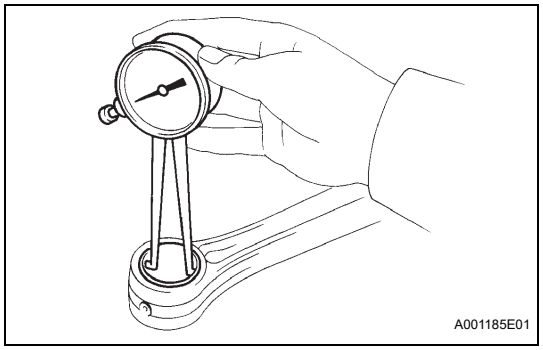
(b) Using a micrometer, measure the piston pin diameter.

Standard piston pin diameter:
21.997 to 22.006 mm (0.8660 to 0.8664 in.)

Item	Specified Condition
A	21.997 to 22.000 mm (0.8660 to 0.8661 in.)
B	22.001 to 22.003 mm (0.8662 to 0.8663 in.)
C	22.004 to 22.006 mm (0.8663 to 0.8664 in.)

If the diameter is not as specified, replace the piston pin.

EM

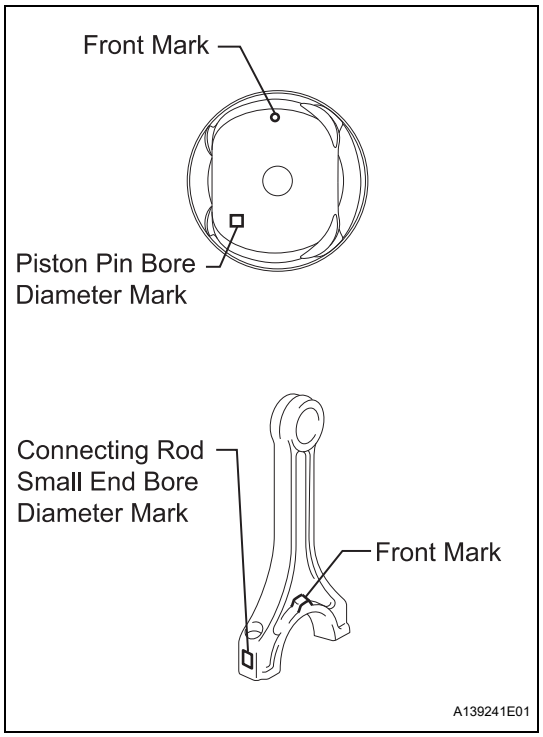


(c) Using a caliper gauge, measure the connecting rod small end bore diameter.

Standard connecting rod small end bore diameter:
22.005 to 22.014 mm (0.8663 to 0.8667 in.)

Item	Specified Condition
A	22.005 to 22.008 mm (0.8663 to 0.8665 in.)
B	22.009 to 22.011 mm (0.8665 to 0.8666 in.)
C	22.012 to 22.014 mm (0.8666 to 0.8667 in.)

If the diameter is not as specified, replace the connecting rod.



(d) Subtract the piston pin diameter measurement from the piston pin bore diameter measurement.

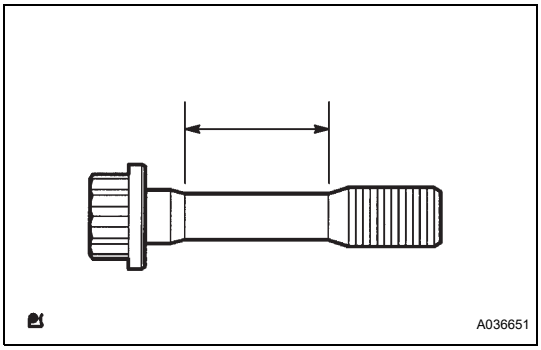
Standard oil clearance:
0.001 to 0.007 mm (0.00004 to 0.0003 in.)
Maximum oil clearance:
0.010 mm (0.0004 in.)

If the oil clearance is greater than the maximum, replace the connecting rod. If necessary, replace the piston and piston pin as a set.

(e) Subtract the piston pin diameter measurement from the connecting rod small end bore diameter measurement.

Standard oil clearance:
0.005 to 0.011 mm (0.0002 to 0.0004 in.)
Maximum oil clearance:
0.011 mm (0.0004 in.)

If the oil clearance is greater than the maximum, replace the connecting rod. If necessary, replace the connecting rod and piston pin as a set.

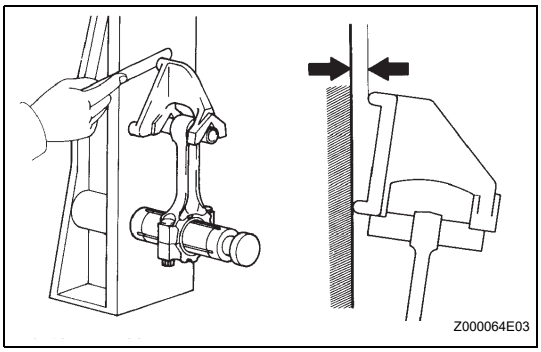


23. INSPECT CONNECTING ROD BOLT

(a) Using vernier calipers, measure the tension portion diameter of the bolt.

Standard diameter:
7.2 to 7.3 mm (0.283 to 0.287 in.)
Minimum diameter:
7.0 mm (0.276 in.)

If the diameter is less than the minimum, replace the connecting rod bolt.



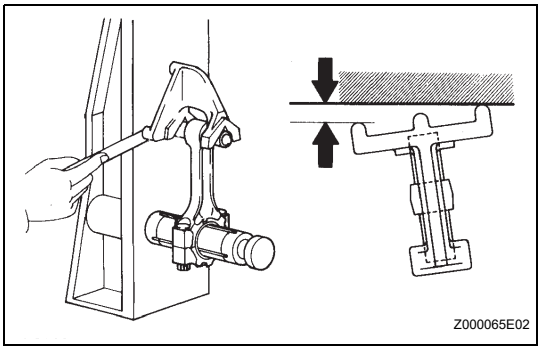
24. INSPECT CONNECTING ROD SUB-ASSEMBLY

(a) Using a connecting rod aligner and feeler gauge, check the connecting rod alignment.

(1) Check for misalignment.

Maximum misalignment:
0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

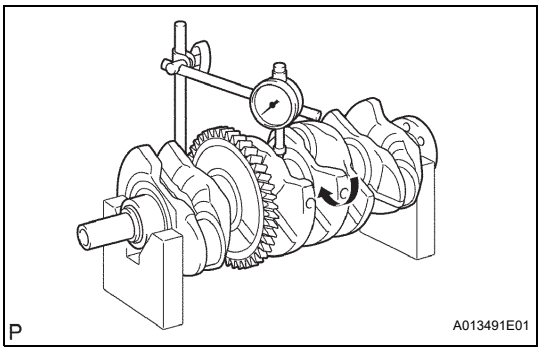
If the misalignment is greater than the maximum, replace the connecting rod.



(2) Check for twist.

Maximum twist:
0.15 mm (0.0059 in.) per 100 mm (3.94 in.)

If the twist is greater than the maximum, replace the connecting rod.

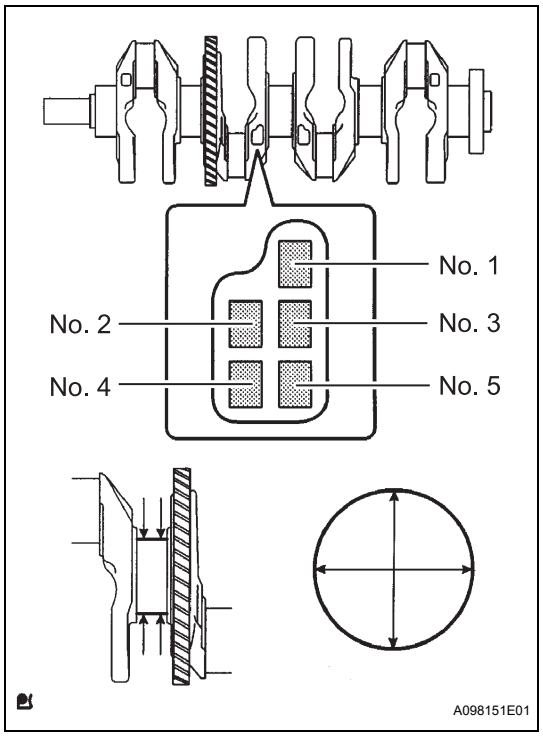


25. INSPECT CRANKSHAFT

(a) Using a dial indicator and V-blocks, measure the circle runout as shown in the illustration.

Maximum circle runout:
0.03 mm (0.0012 in.)

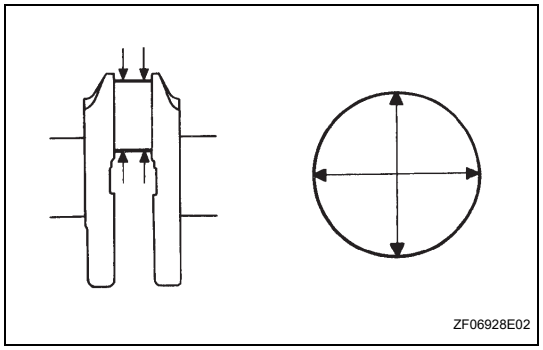
If the taper and distortion are greater than the maximum, replace the crankshaft.



(b) Using a micrometer, measure the diameter of each main journal.
Standard diameter:
54.988 to 55.000 mm (2.1649 to 2.1654 in.)
If the diameter is not as specified, check the crankshaft oil clearance.

(c) Check each main journal for taper and distortion as shown in the illustration.
Maximum taper and distortion:
0.003 mm (0.0001 in.)
If the taper and distortion are greater than the maximum, replace the crankshaft.
Standard diameter (Reference)

Mark	Specified Condition
0	54.999 to 55.000 mm (2.1653 to 2.1654 in.)
1	54.997 to 54.998 mm (2.1652 to 2.1653 in.)
2	54.995 to 54.996 mm (2.1652 to 2.1652 in.)
3	54.993 to 54.994 mm (2.1651 to 2.1651 in.)
4	54.991 to 54.992 mm (2.1650 to 2.1650 in.)
5	54.988 to 54.990 mm (2.1649 to 2.1650 in.)

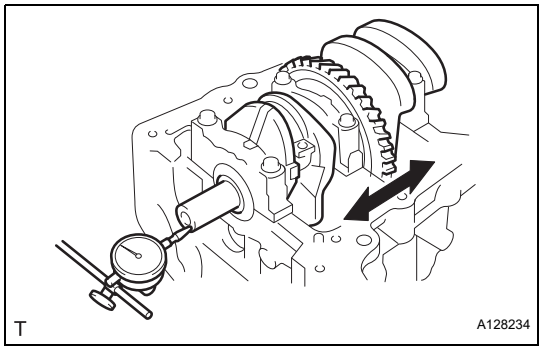


(d) Using a micrometer, measure the diameter of each crank pin.
Standard diameter:
47.990 to 48.000 mm (1.8894 to 1.8898 in.)
If the diameter is not as specified, check the connecting rod oil clearance.

(e) Inspect each crank pin for taper and distortion as shown in the illustration.
Maximum taper and distortion:
0.003 mm (0.0001 in.)
If the taper and distortion are greater than the maximum, replace the crankshaft.

26. INSPECT CRANKSHAFT THRUST CLEARANCE

(a) Install the main bearing cap (See page EM-142).



(b) Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.
Standard thrust clearance:
0.04 to 0.24 mm (0.0016 to 0.0095 in.)
Maximum thrust clearance:
0.30 mm (0.0118 in.)
If the thrust clearance is greater than the maximum, replace the thrust washers as a set.
HINT:
The thrust washer thickness is 1.93 to 1.98 mm (0.0760 to 0.0780 in.).

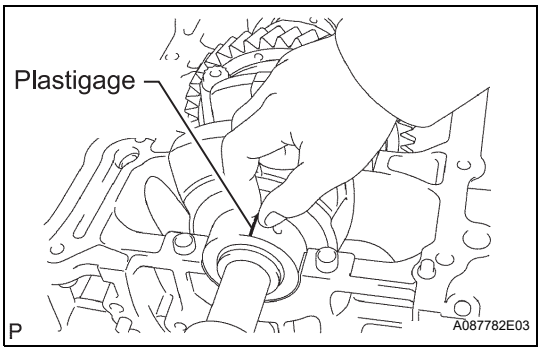
27. INSPECT CRANKSHAFT OIL CLEARANCE

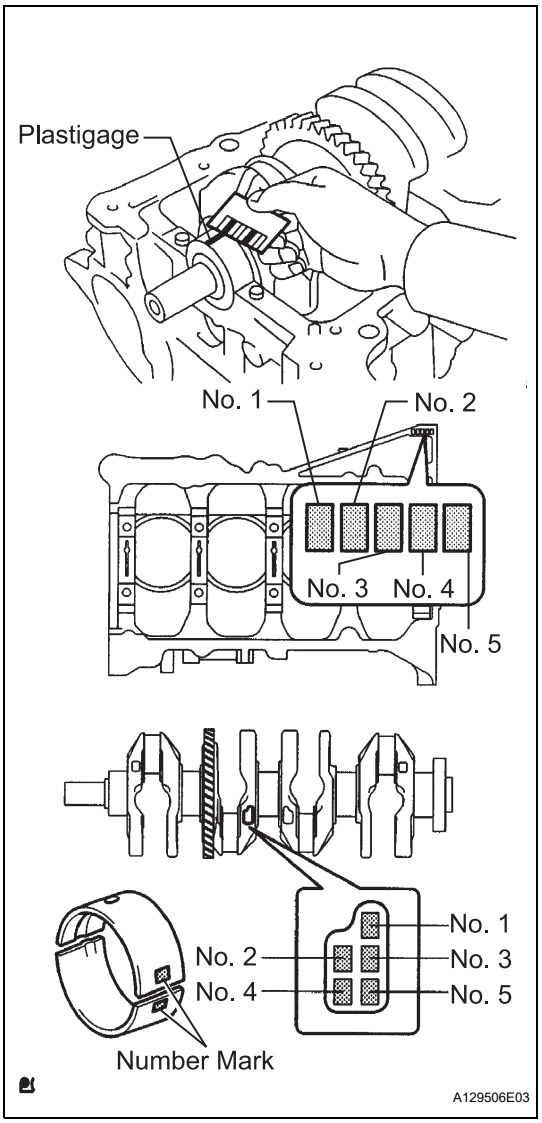
(a) Check the crank journal and bearing for pitting and scratches.

(b) Install the crankshaft bearing (See page EM-142).

(c) Place the crankshaft on the cylinder block.

EM





(d) Lay a strip of Plastigage across each journal.
(e) Examine the front marks and numbers and install the bearing caps on the cylinder block.
HINT:
A number is marked on each main bearing cap to indicate the installation position.
(f) Install the main bearing cap (See page EM-142).
NOTICE:
Do not turn the crankshaft.
(g) Remove the main bearing caps (See page EM-120).

(h) Measure the Plastigage at its widest point.
Standard oil clearance:
0.017 to 0.040 mm (0.0007 to 0.0016 in.)
Maximum oil clearance:
0.060 mm (0.0024 in.)
If the oil clearance is greater than the maximum, replace the crankshaft bearing. If necessary, replace the crankshaft.
NOTICE:
Remove the Plastigage completely after the measurement.
HINT:
- If replacing a bearing, select a new one with the same number. If the number of the bearing cannot be determined, calculate the correct bearing number by adding together the numbers imprinted on the cylinder block and crankshaft. Then select a new bearing with the calculated number according to the chart below. There are 4 sizes of standard bearings, marked "1", "2", "3" and "4" accordingly.
- EXAMPLE: Cylinder block "3" + Crankshaft "5" = Total number 8 (Use bearing "3")

Cylinder block + Crankshaft	0 to 2	3 to 5	6 to 8	9 to 11
Bearing to be used	"1"	"2"	"3"	"4"

Standard cylinder block journal bore diameter

Mark	Specified Condition
0	59.000 to 59.002 mm (2.3228 to 2.3229 in.)
1	59.003 to 59.004 mm (2.3230 to 2.3230 in.)
2	59.005 to 59.006 mm (2.3230 to 2.3231 in.)
3	59.007 to 59.009 mm (2.3231 to 2.3232 in.)
4	59.010 to 59.011 mm (2.3232 to 2.3233 in.)
5	59.012 to 59.013 mm (2.3233 to 2.3234 in.)
6	59.014 to 59.016 mm (2.3234 to 2.3235 in.)

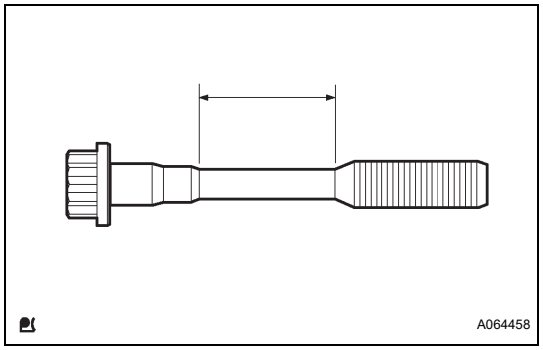
Standard crankshaft journal diameter

Mark	Specified Condition
0	54.999 to 55.000 mm (2.1653 to 2.1654 in.)
1	54.997 to 54.998 mm (2.1652 to 2.1653 in.)
2	54.995 to 54.996 mm (2.1652 to 2.1652 in.)
3	54.993 to 54.994 mm (2.1651 to 2.1651 in.)

Mark	Specified Condition
4	54.991 to 54.992 mm (2.1650 to 2.1650 in.)
5	54.988 to 54.990 mm (2.1649 to 2.1650 in.)

Standard bearing center wall thickness

Mark	Specified Condition
1	1.993 to 1.996 mm (0.0785 to 0.0786 in.)
2	1.997 to 1.999 mm (0.0786 to 0.0787 in.)
3	2.000 to 2.002 mm (0.0787 to 0.0788 in.)
4	2.003 to 2.005 mm (0.0789 to 0.0789 in.)



28. INSPECT CRANKSHAFT BEARING CAP SET BOLT

(a) Using vernier calipers, measure the tension portion diameter of the bolts.

Standard diameter:

7.3 to 7.5 mm (0.287 to 0.295 in.)

Minimum diameter:

7.2 mm (0.284 in.)

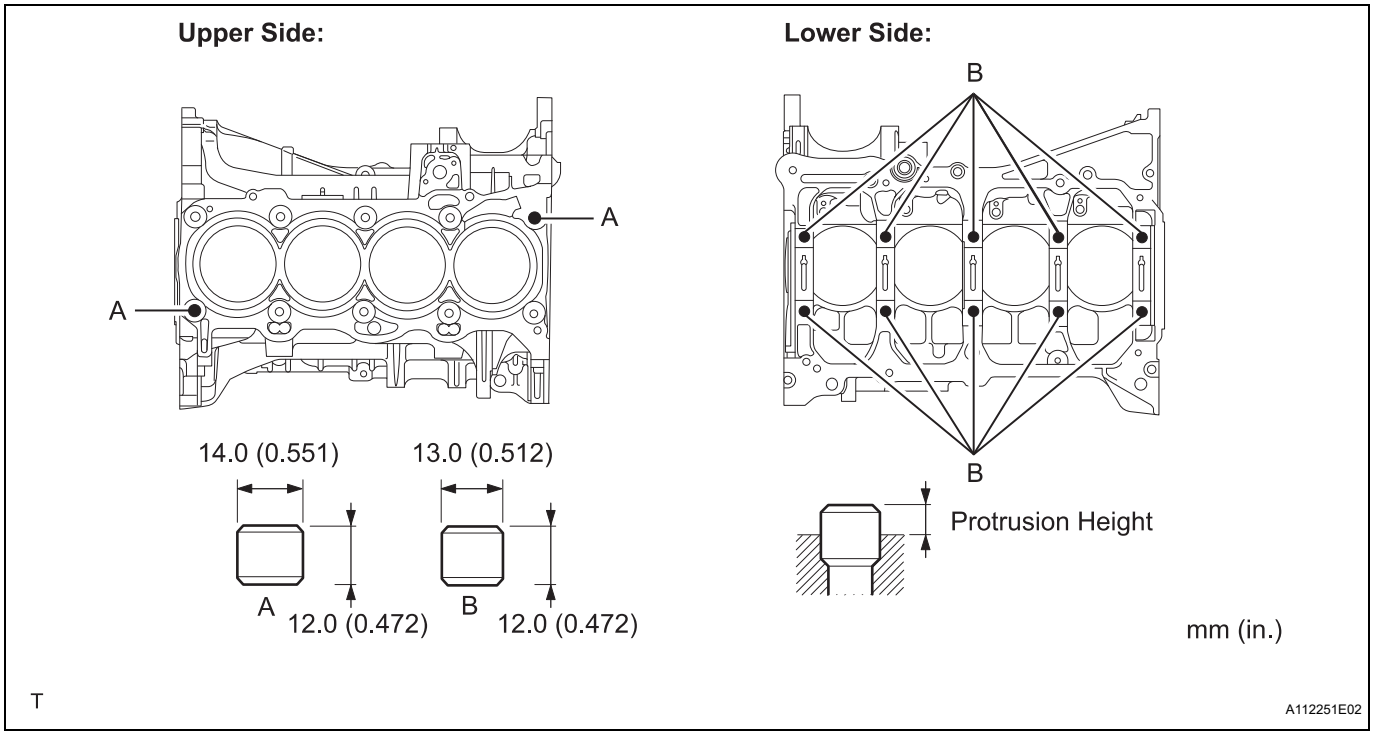
If the diameter is less than the minimum, replace the bolt.

EM

REASSEMBLY

1. INSTALL RING PIN

(a) Using a plastic hammer, tap in the ring pin.

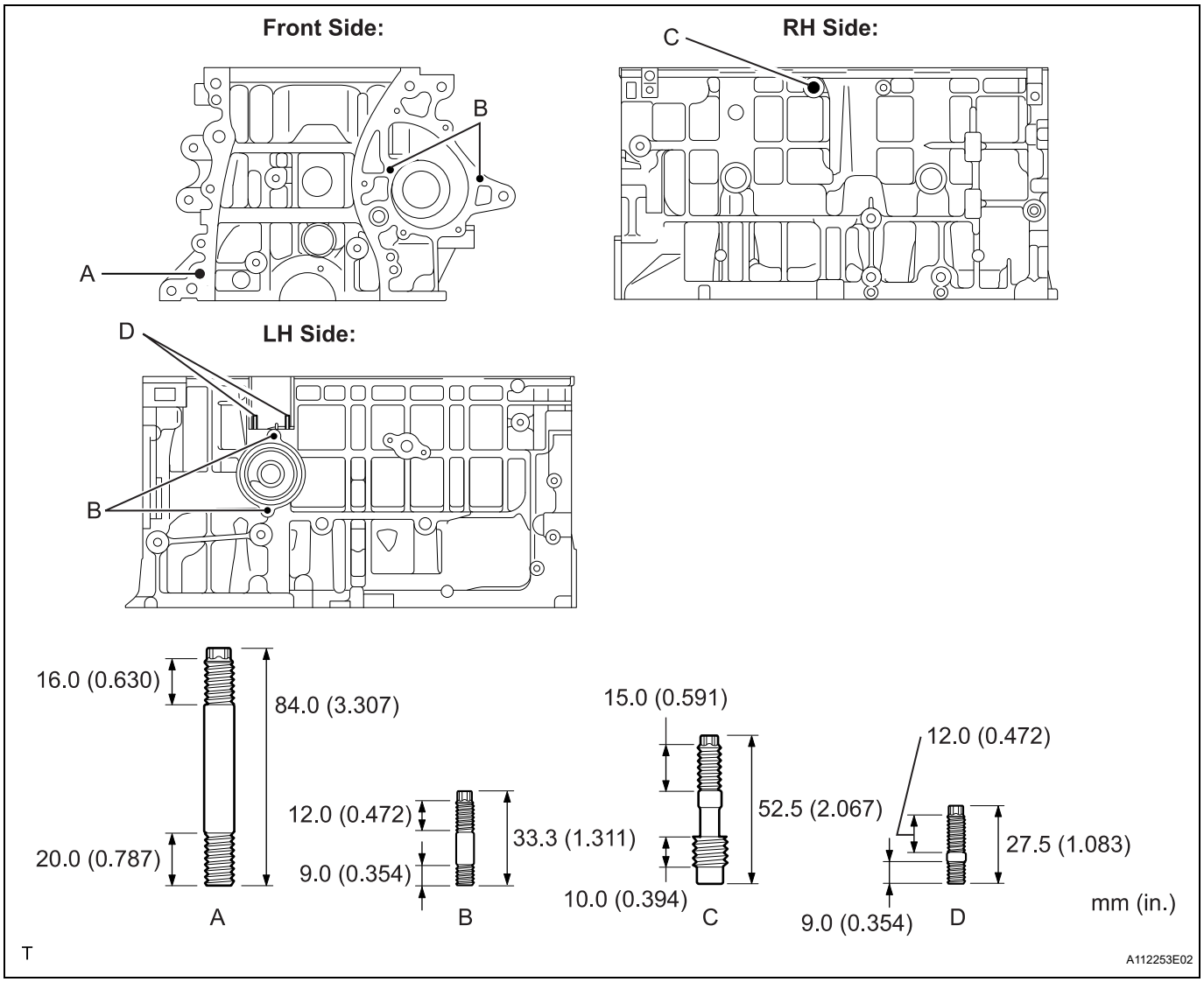


Standard protrusion

Item	Protrusion
Pin A	6 mm (0.236 in.)
Pin B	5 mm (0.197 in.)

2. INSTALL STUD BOLT

(a) Install the stud bolts as shown in the illustration.

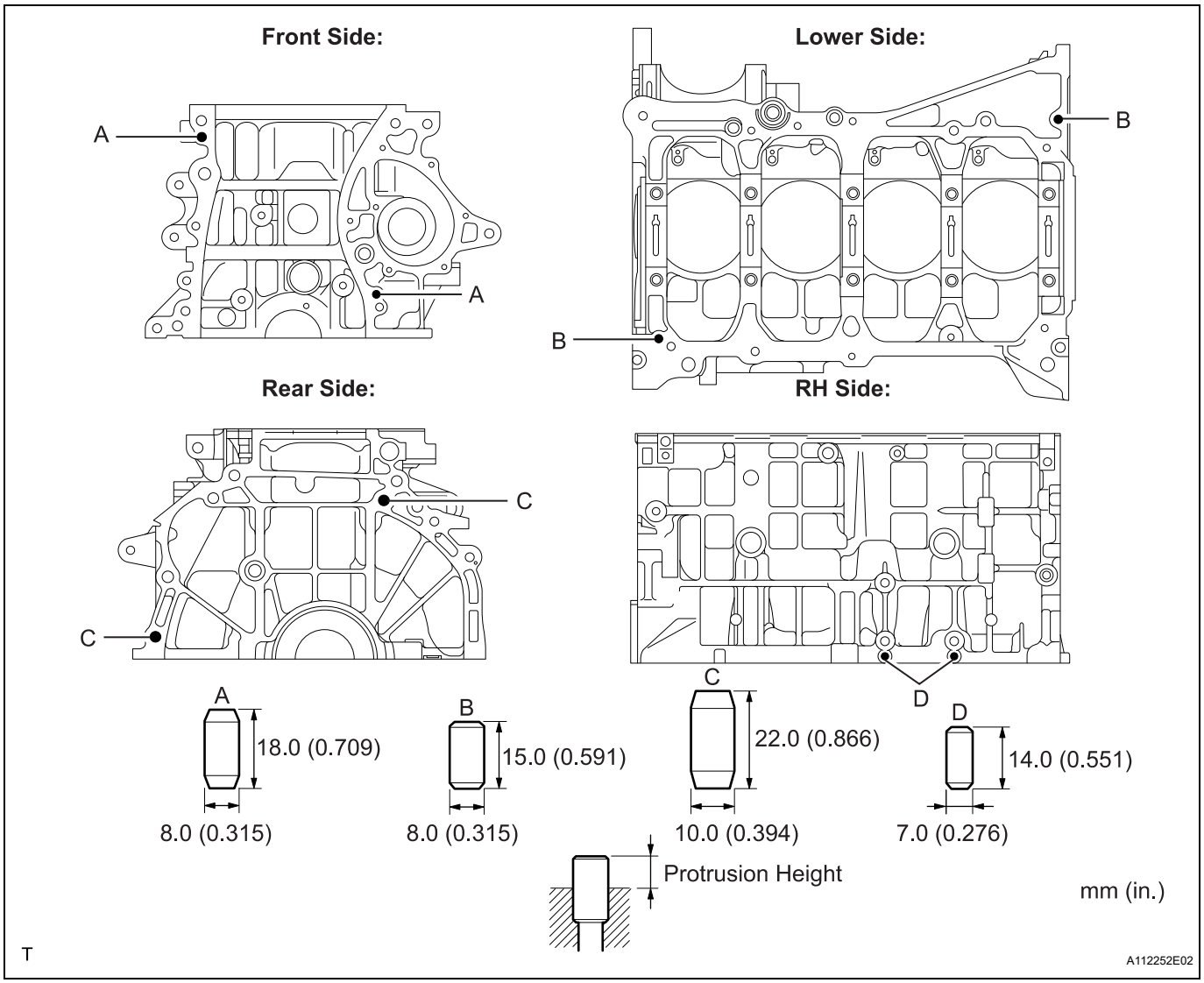


Torque: Stud Bolt A
5.0 N*m (51 kgf*cm, 44 in.*lbf)
Stud Bolt B
22 N*m (220 kgf*cm, 16 ft.*lbf)
Stud Bolt C
9.5 N*m (97 kgf*cm, 84 in.*lbf)
Stud Bolt D
5.0 N*m (51 kgf*cm, 44 in.*lbf)

EM

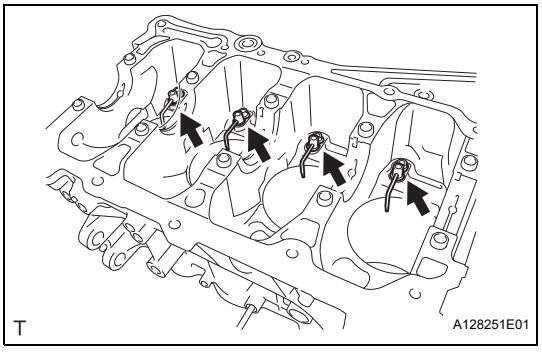
3. INSTALL STRAIGHT PIN

(a) Using a plastic hammer, tap in the straight pin.



Standard protrusion

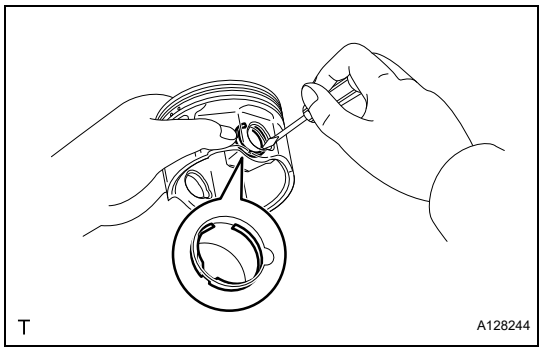
Item	Protrusion
Pin A	8 mm (0.315 in.)
Pin B	7.5 mm (0.295 in.)
Pin C	12 mm (0.472 in.)
Pin D	5 mm (0.197 in.)



4. INSTALL NO. 1 OIL NOZZLE SUB-ASSEMBLY

(a) Using a 5 mm hexagon wrench, install the oil nozzles with the bolts.

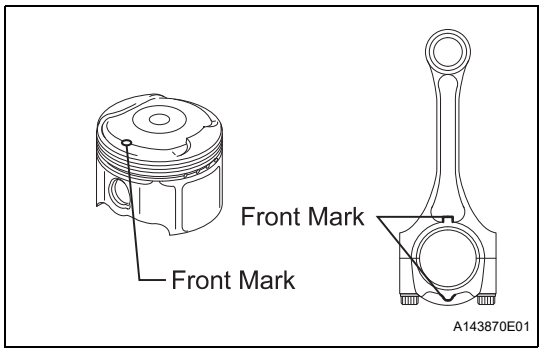
Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf)



5. INSTALL PISTON

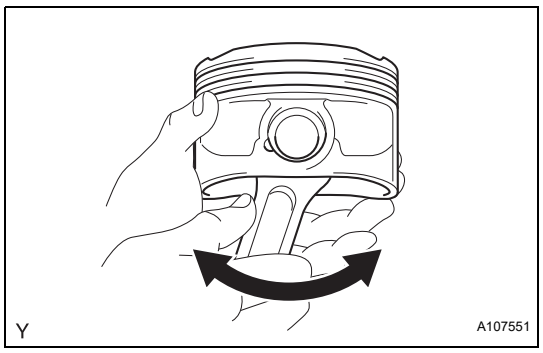
(a) Using a screwdriver, install a new snap ring at one end of the piston pin hole.
HINT:
Make sure that the end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.

(b) Gradually heat the piston to approximately 80 to 90°C (176 to 194°F).

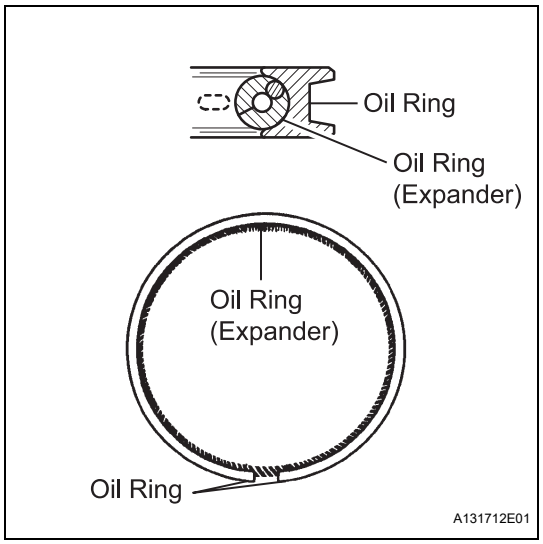


(c) Align the front marks of the piston and connecting rod, and push in the piston with your thumb.

(d) Using a screwdriver, install a new snap ring on the other end of the piston pin hole.
HINT:
Make sure that the end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.



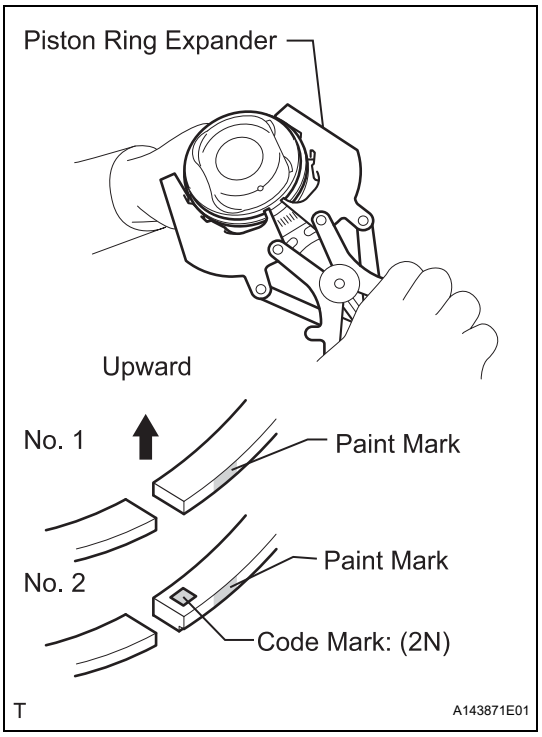
(e) Check the fitting condition between the piston and piston pin by trying to move the piston back and forth on the piston pin.



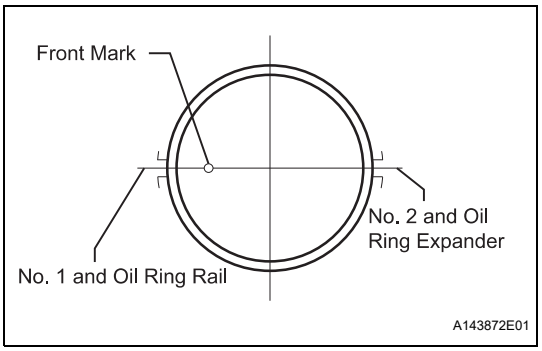
6. INSTALL PISTON RING SET

(a) Install the oil ring expander and oil ring rail by hand.
NOTICE:
- **Install the expander and oil ring so that their ring ends are at opposite sides.**
- **Securely install the expander to the inner groove of the oil ring.**

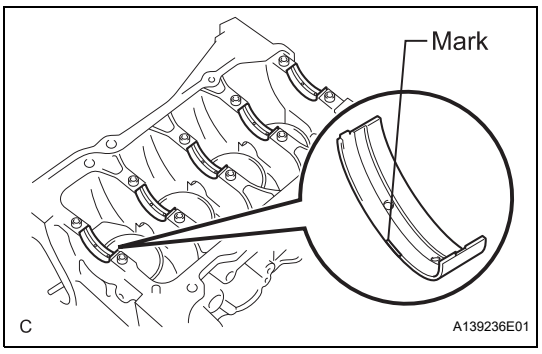
EM



(b) Using a piston ring expander, install the 2 compression rings so that the paint marks are positioned as shown in the illustration.
NOTICE:
Install the compression ring No. 2 with the code mark (2N) facing upward.

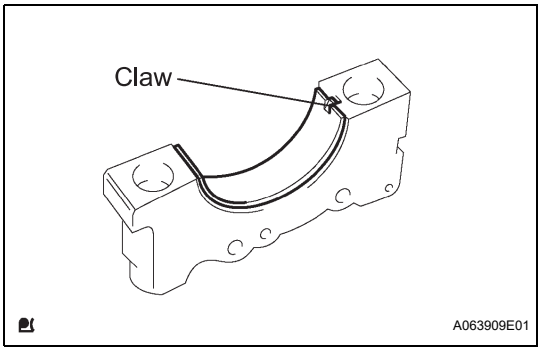


(c) Position the piston rings so that the ring ends are as shown in the illustration.



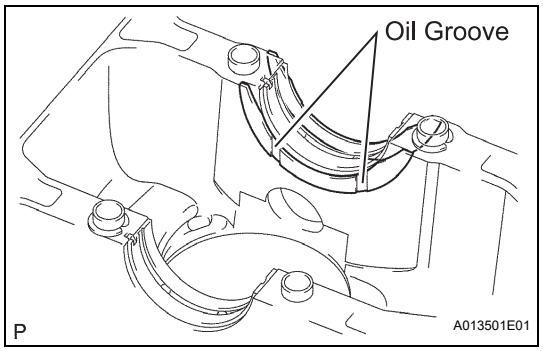
7. INSTALL CRANKSHAFT BEARING

(a) Install the upper bearing with an oil groove on the cylinder block.
NOTICE:
- **Do not apply engine oil to the bearings and the contact surfaces.**
- **There is an identification mark on the crankshaft bearing No. 1 UPR only.**



8. INSTALL NO. 2 CRANKSHAFT BEARING

(a) Install the lower bearing onto the bearing cap.
NOTICE:
Clean the backside of the bearing and the bearing surface of the connecting rod. The surface should be free of dust and oil.



9. INSTALL UPPER CRANKSHAFT THRUST WASHER

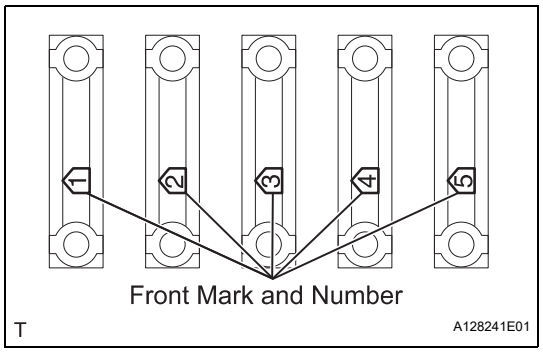
(a) Install the 2 thrust washers under the No. 3 journal of the cylinder block with the oil grooves facing outward.

(b) Apply engine oil to the crankshaft thrust washer.

10. INSTALL CRANKSHAFT

(a) Apply engine oil to the upper bearing and install the crankshaft on the cylinder block.

(b) Apply engine oil to the lower bearing.

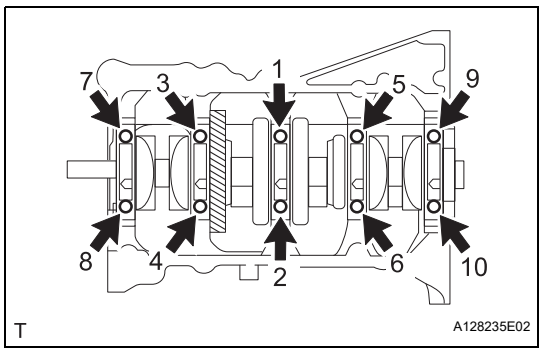


(c) Examine the front marks and install the bearing caps on the cylinder block.

(d) Apply a light coat of engine oil to the threads and under the bearing cap bolts.

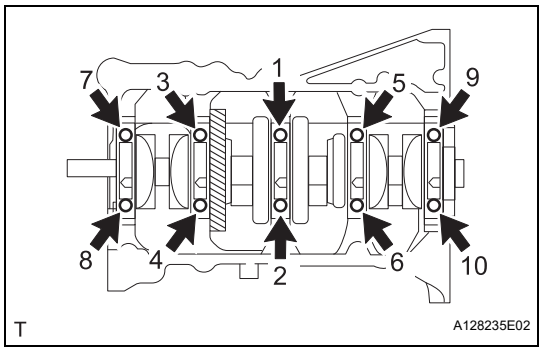
(e) Install the crankshaft bearing cap bolts.

NOTICE:
The main bearing cap bolts are tightened in 2 progressive steps.

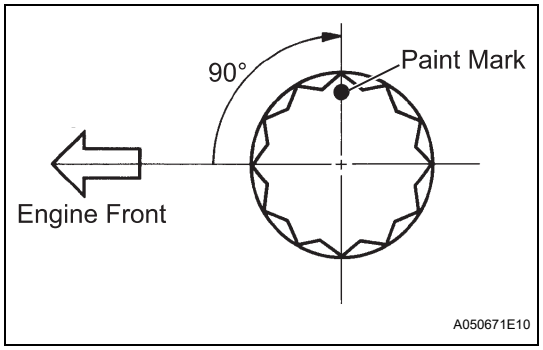


(f) Step 1

(1) Install and uniformly tighten the 10 main bearing cap bolts in the sequence shown in the illustration.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)



(2) Further tighten the 10 main bearing cap bolts in the sequence shown in the illustration.
Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)



(g) Step 2

(1) Mark the front of the bearing cap bolts with paint.

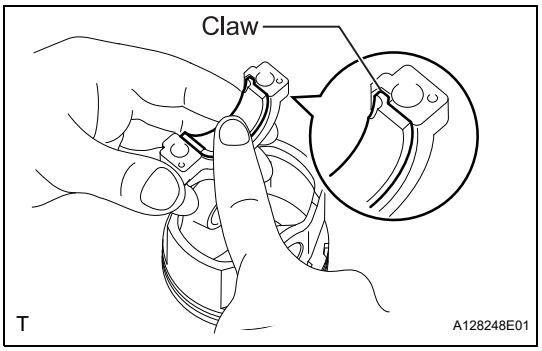
(2) Further tighten the bearing cap bolts by 90° in the numerical order shown in the previous illustration.

(h) Check that the paint mark is now at a 90° angle to the front.

(i) Check that the crankshaft turns smoothly.

(j) Check the crankshaft thrust clearance (See page EM-140).

EM



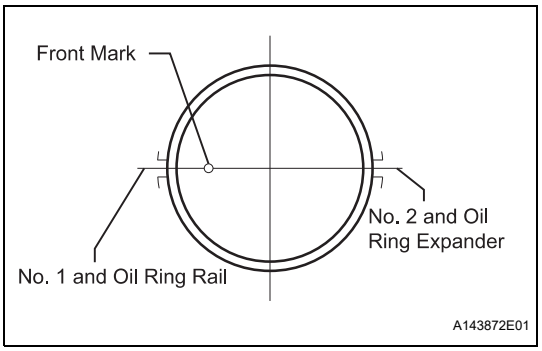
11. INSTALL CONNECTING ROD BEARING

(a) Align the bearing claw with the groove of the connecting rod or connecting cap.
NOTICE:
Do not apply engine oil to the bearings or the contact surfaces.

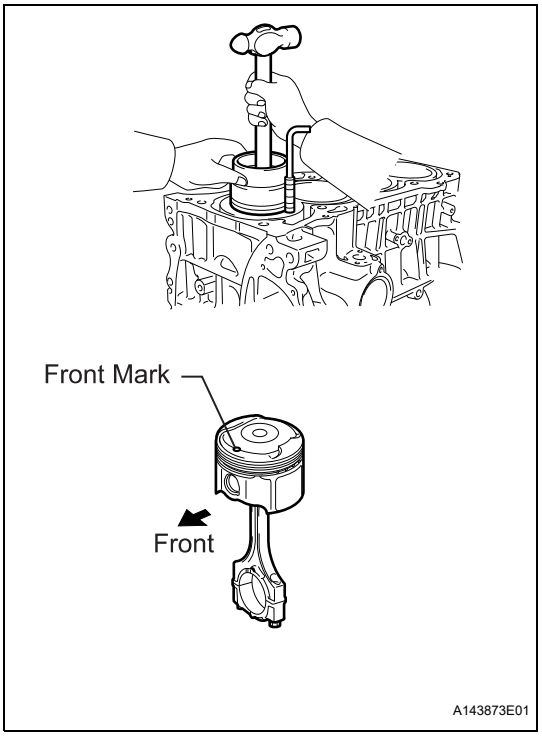
12. INSTALL PISTON SUB-ASSEMBLY WITH CONNECTING ROD
NOTICE:
The connecting rod cap bolts are tightened in 2 progressive steps.

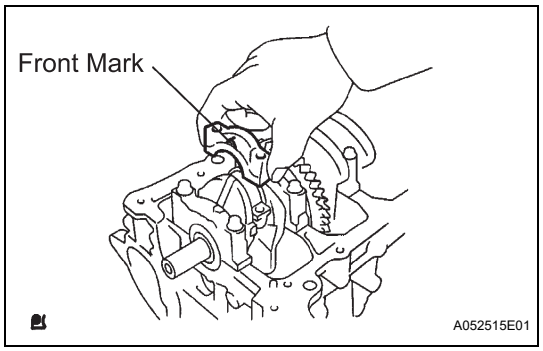
(a) Apply engine oil to the cylinder walls, the pistons, and the surfaces of connecting rod bearings.

(b) Check the position of the piston ring ends.

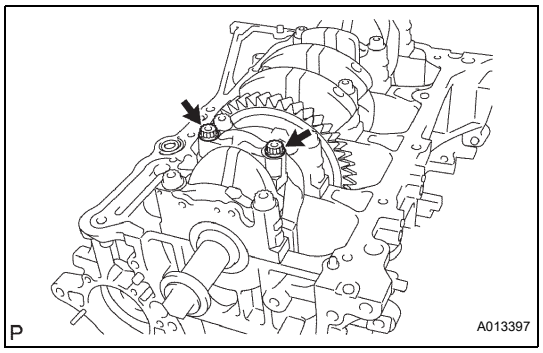


(c) Using a piston ring compressor, push the correctly numbered piston and connecting rod assemblies into each cylinder with the front mark of the piston facing forward.
NOTICE:
Match the numbered connecting rod cap with the connecting rod.

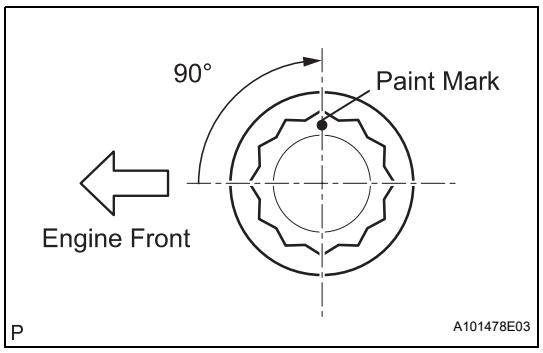




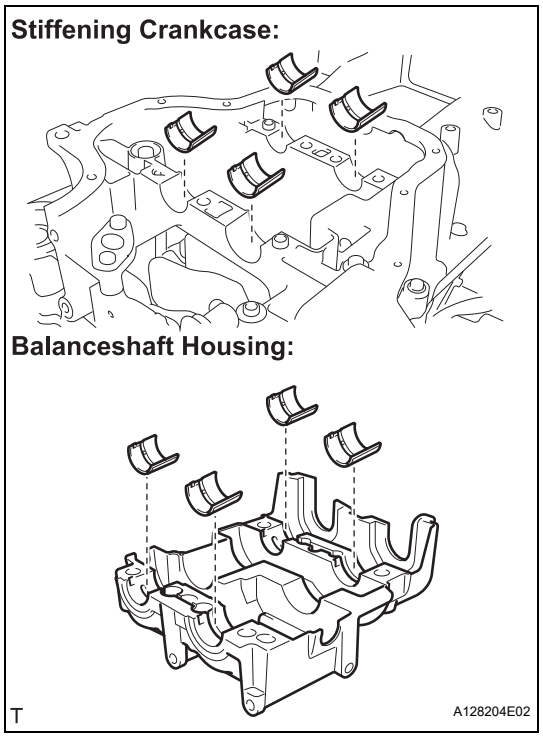
(d) Check that the protrusion of the connecting rod cap is facing in the correct direction.
(e) Apply a light coat of engine oil to the threads and under the heads of the connecting rod cap bolts.
(f) Install the connecting cap bolts.
NOTICE:
The connecting cap bolts should be tightened in 2 progressive steps.



(g) Step 1
(1) Install and alternately tighten the bolts of the connecting rod cap in several steps.
Torque: 25 N*m (250 kgf*cm, 18 ft.*lbf)

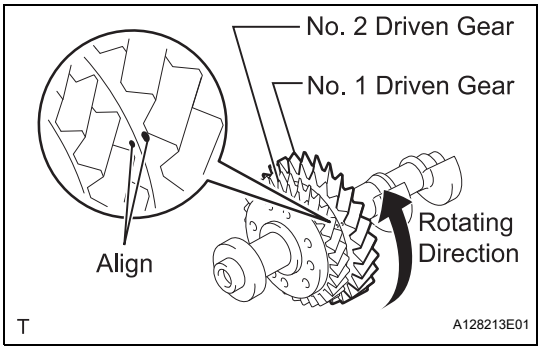


(h) Step 2
(1) Mark the front of the connecting rod cap bolts with paint.
(2) Further tighten the cap bolts by 90° as shown in the illustration.
(i) Check that the crankshaft turns smoothly.
(j) Check the connecting rod thrust clearance (See page EM-133).



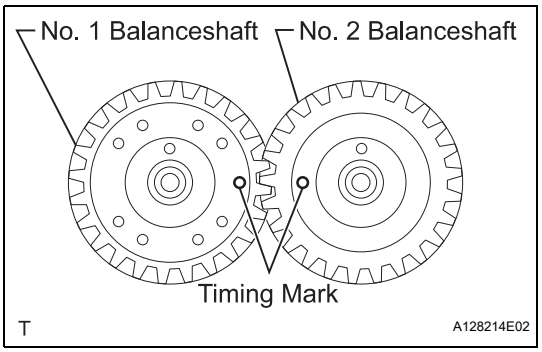
13. INSTALL NO. 1 BALANCESHAFT BEARING
(a) Install the bearings in the crankcase and balanceshaft housing.
NOTICE:
Do not apply engine oil to the bearings and the contact surfaces.
(b) Apply a light coat of engine oil to the bearings.

EM

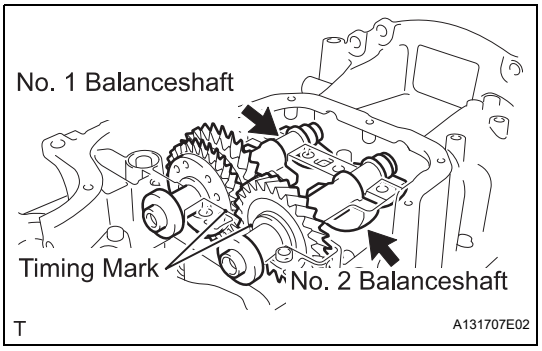


14. INSTALL NO. 1 AND NO. 2 BALANCESHAFT SUB-ASSEMBLY

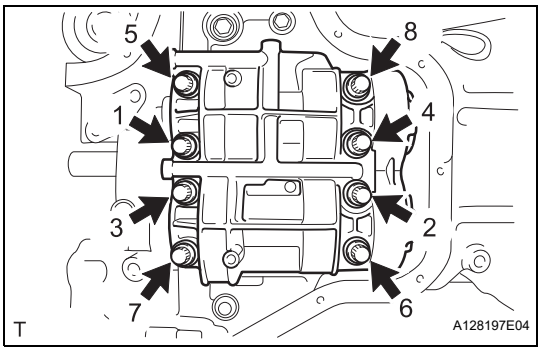
(a) Rotate the No. 1 driven gear of the No. 1 balanceshaft in the rotating direction until it hits the stopper.
NOTICE:
Confirm that the matchmarks on the No. 1 and No. 2 driven gears are matched.



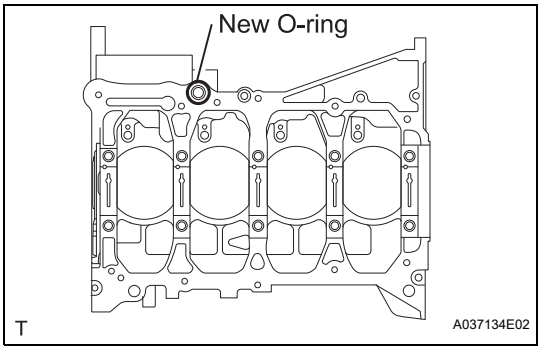
(b) Align the timing marks of the No. 1 and No. 2 balanceshafts as shown in the illustration.



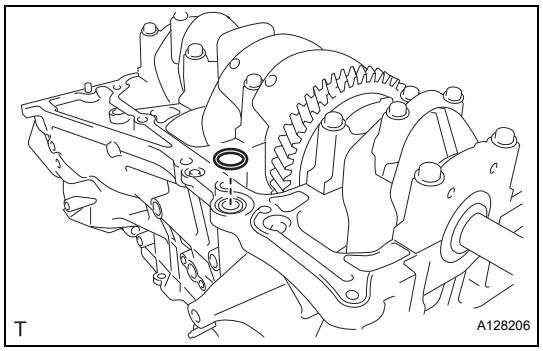
(c) Place the No. 1 and No. 2 balanceshafts on the crankcase.
(d) Apply a light coat of engine oil under the heads of the balanceshaft housing bolts.
(e) Install the balanceshaft housing bolts.
NOTICE:
The balance shaft housing bolts are tightened in 2 progressive steps.



(f) Step 1
(1) Install and uniformly tighten the 8 bolts in the sequence shown in the illustration.
Torque: 22 N*m (220 kgf*cm, 16 ft.*lbf)



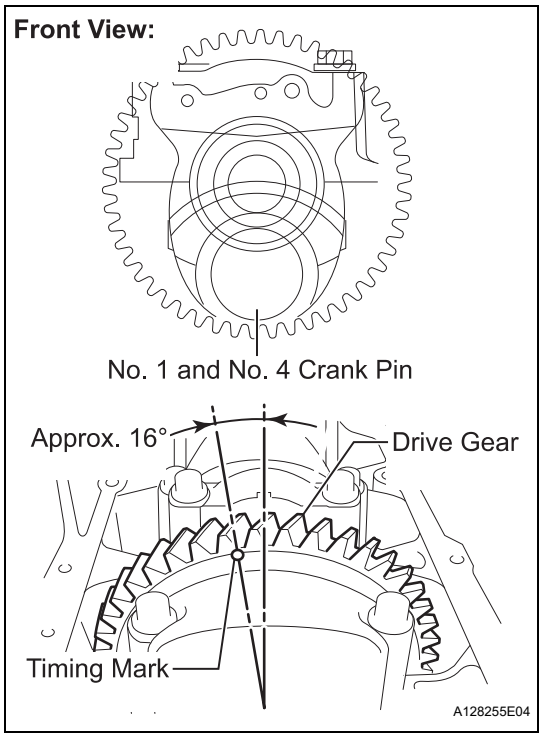
(g) Step 2
(1) Mark the front side of each balanceshaft housing bolt head with paint.
(2) Further tighten the bolts by 90° as shown in the illustration.
(3) Check that the paint marks are now at a 90° angle to the front.



15. INSTALL STIFFENING CRANKCASE ASSEMBLY

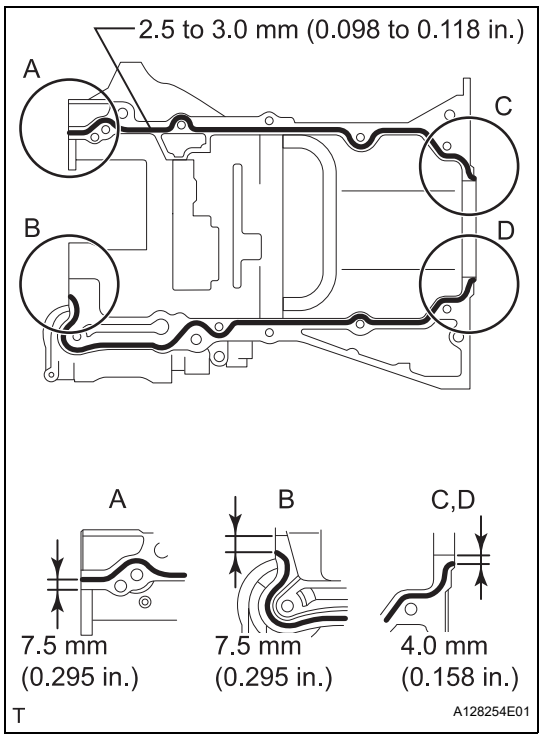
(a) Place a new O-ring on the cylinder block, as shown in the illustration.

(b) Temporarily tighten the pulley set bolt.



(c) Turn the crankshaft to set the crank pins of the No. 1 and No. 4 cylinders to the bottom.
HINT:
Make sure that the timing mark on the balanceshaft drive gear is positioned as shown in the illustration.

EM



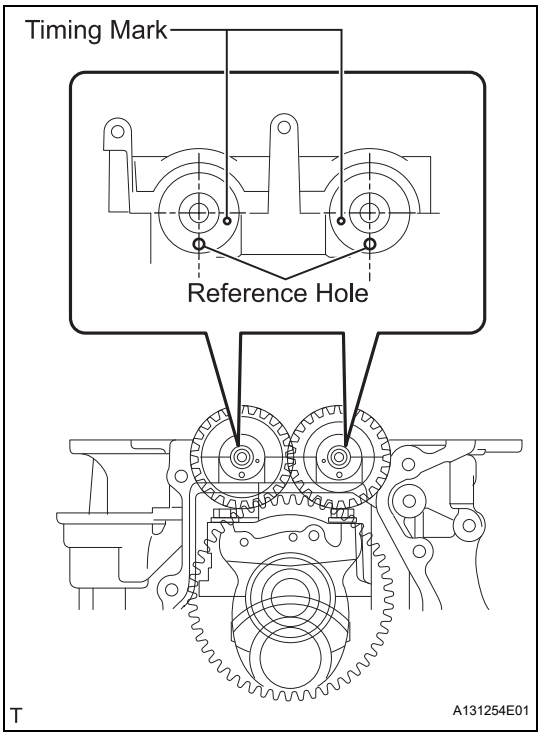
(d) Apply seal packing in a continuous bead (diameter: 2.5 to 3.0 mm (0.098 to 0.118 in.)) to the places shown in the illustration.

Seal packing:

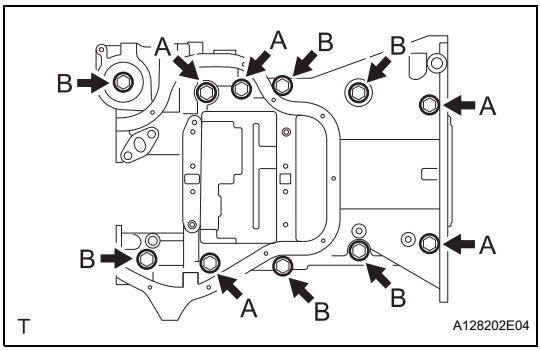
Toyota Genuine Seal Packing Black, Three bond 1207B or equivalent

NOTICE:

- **Remove any oil from the contact surface.**
- **Install the crankcase within 3 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing the stiffening crankcase.**

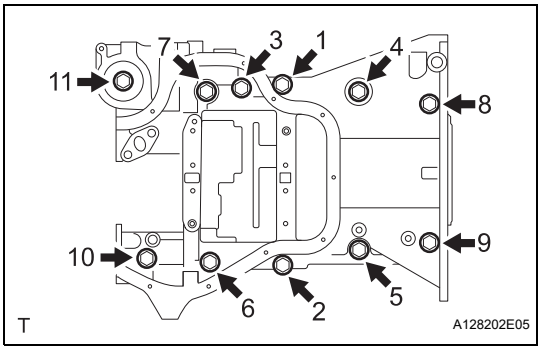


(e) Install the stiffening crankcase so that the reference holes on the balanceshafts are positioned as shown in the illustration.



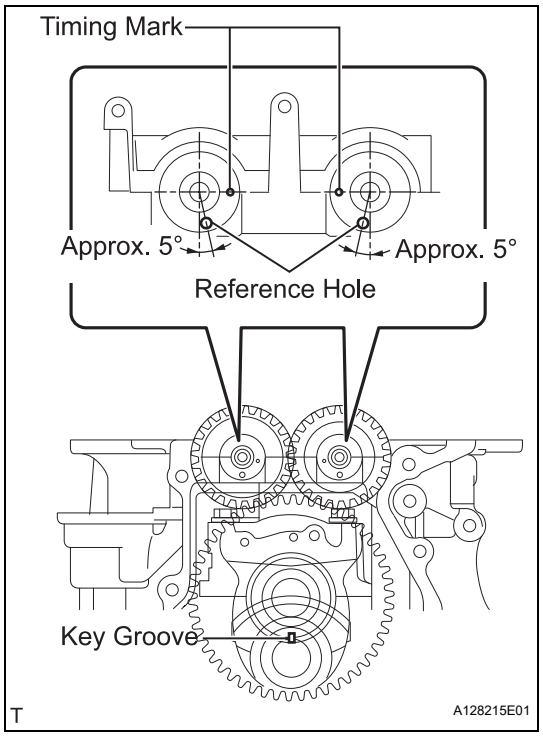
(f) Temporarily install the crankcase with the 11 bolts.
Bolt length

Item	Length
Bolt A	122 mm (4.803 in.)
Bolt B	45 mm (1.772 in.)



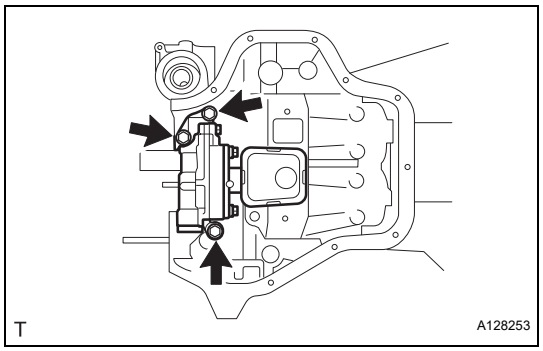
(g) Uniformly tighten the 11 bolts in the sequence shown in the illustration.
Torque: 24 N*m (245 kgf*cm, 18 ft.*lbf)

(h) Wipe off any excess seal packing with a clean piece of cloth.



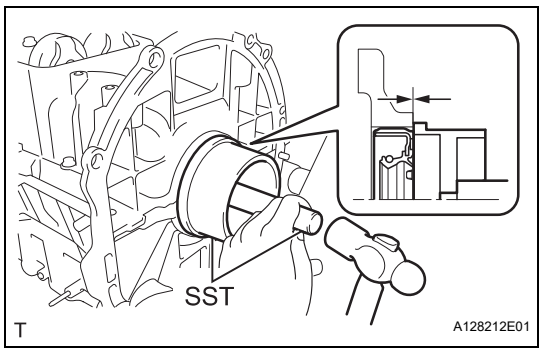
(i) Turn the crankshaft again to set the key groove to the bottom. Make sure that the timing marks are aligned as shown in the illustration.
HINT:
A 'O' is stamped as a timing mark.

(j) Remove the pulley set bolt.



16. INSTALL OIL PUMP ASSEMBLY

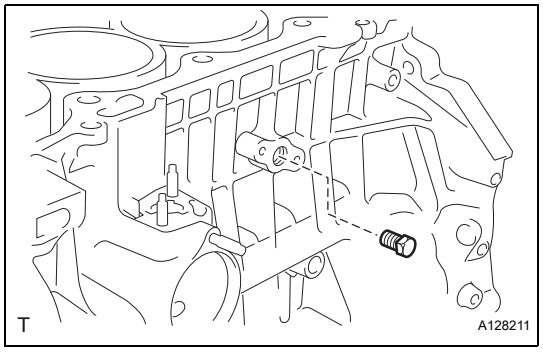
(a) Install a new gasket and oil pump with the 3 bolts.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)



17. INSTALL ENGINE REAR OIL SEAL

(a) Using SST and a hammer, evenly tap the oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223-15030, 09950-70010 (09951-07100)
NOTICE:
Keep the lip free from foreign materials.

(b) Apply MP grease to a new oil seal lip.
NOTICE:
Wipe off extra grease on the crankshaft.



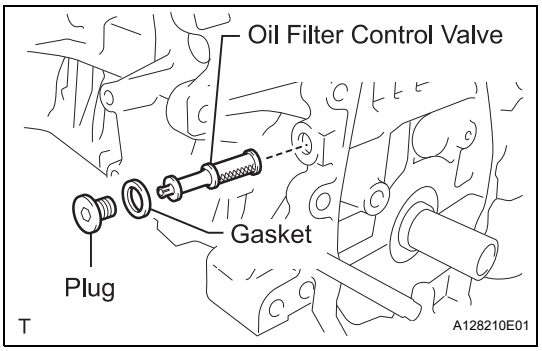
18. INSTALL NO. 1 TAPER SCREW PLUG

(a) Apply adhesive to 2 or 3 threads of the plug, and install the plug.
Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)
Adhesive:
Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent

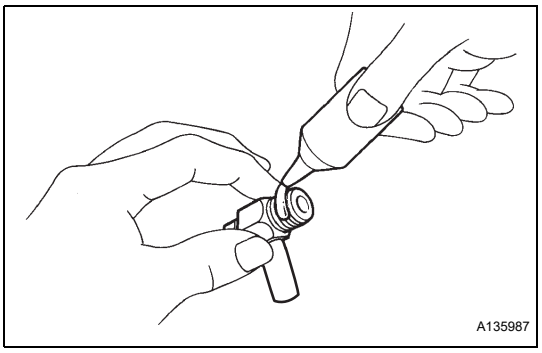
19. INSTALL OIL CONTROL VALVE FILTER

(a) Check that no foreign matter is on the mesh part of the filter.

EM

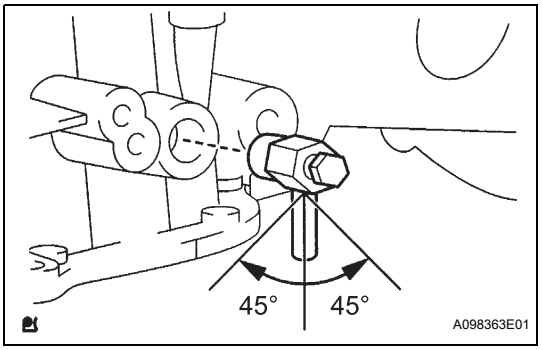


(b) Using an 8 mm socket hexagon wrench, install a new gasket and the oil control valve filter with the screw plug.
Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)
NOTICE:
Do not touch the mesh when installing the oil control valve filter.



20. INSTALL CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY

(a) Apply adhesive to the threads of the drain cock.
Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

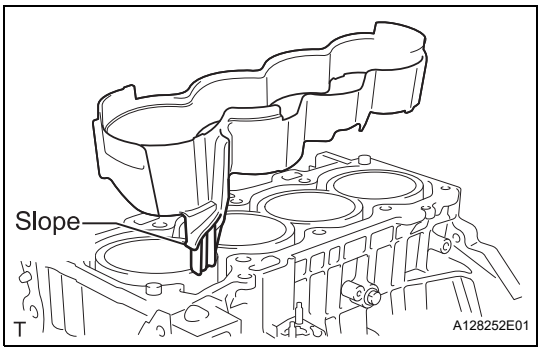


(b) Install the water drain cock within the range shown in the illustration.
Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)
NOTICE:
Do not rotate the drain cock more than 1 revolution (360°) after tightening it to the specified torque.

(c) Install the water drain cock plugs to the water drain cocks.
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)

21. INSTALL CYLINDER BLOCK WATER JACKET SPACER

(a) Install the water jacket spacer as shown in the illustration.
HINT:
Be sure to face the slope to the front of the engine.

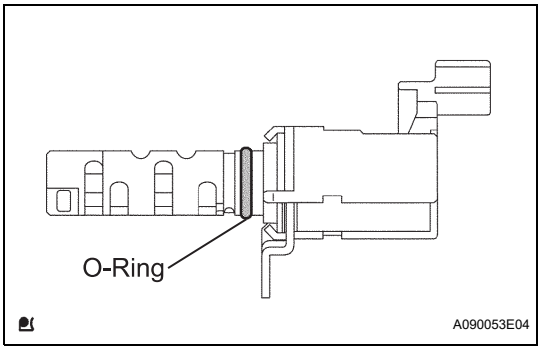


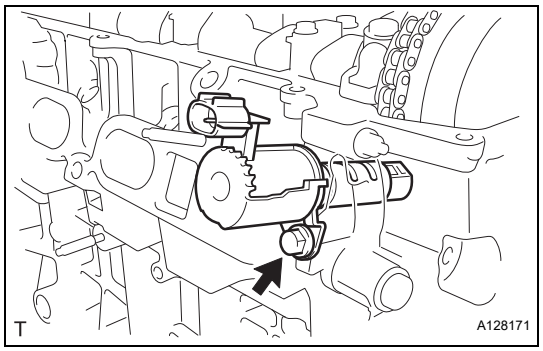
22. INSTALL CYLINDER HEAD GASKET (See page EM-69)

23. INSTALL CYLINDER HEAD SUB-ASSEMBLY (See page EM-69)

24. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

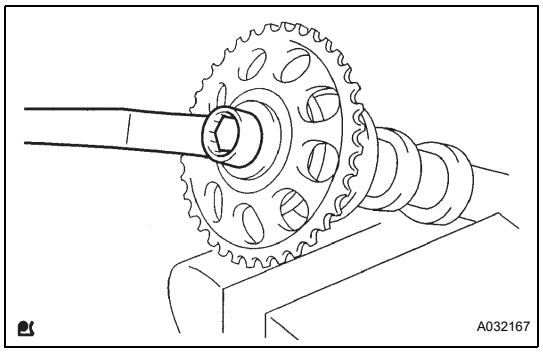
(a) Apply a light coat of engine oil to a new O-ring, then install it onto the camshaft timing oil control valve.





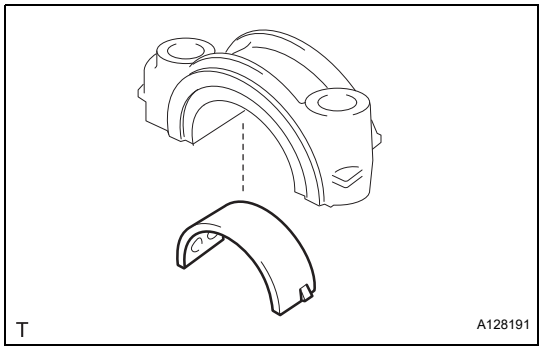
(b) Install the camshaft timing oil control valve with the bolt.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

25. INSTALL CAMSHAFT TIMING GEAR ASSEMBLY (See page EM-41)



26. INSTALL CAMSHAFT TIMING SPROCKET
(a) Clamp the camshaft in a vise.
(b) Tighten the flange bolt with the camshaft timing sprocket fixed.
Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)

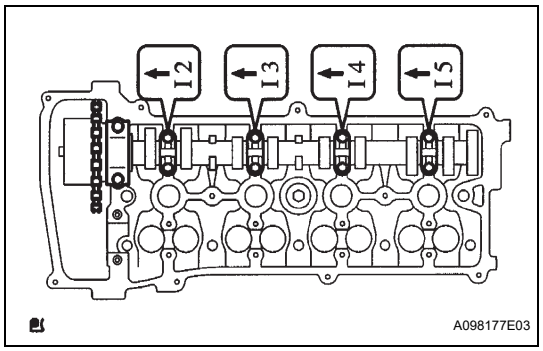
EM



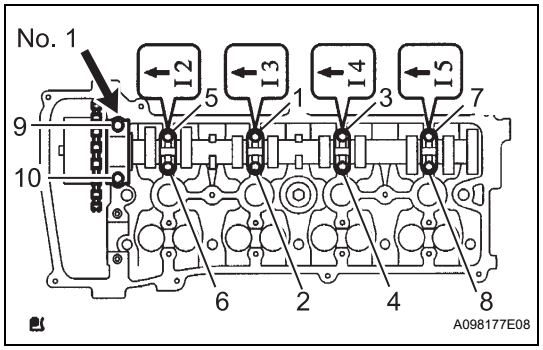
27. INSTALL NO. 1 CAMSHAFT BEARING
(a) Install the No. 1 camshaft bearing.

28. INSTALL NO. 2 CAMSHAFT BEARING (See page EM-70)

29. INSTALL CAMSHAFT
(a) Apply a light coat of engine oil to the journal portion of the camshaft.

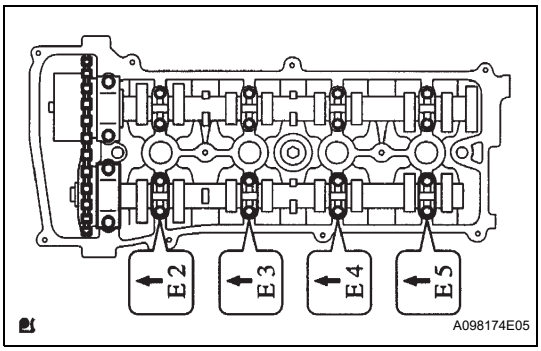


(b) Examine the front marks and numbers, and check that the order is as shown in the illustration. Then install the bearing caps into the cylinder head.
(c) Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts.



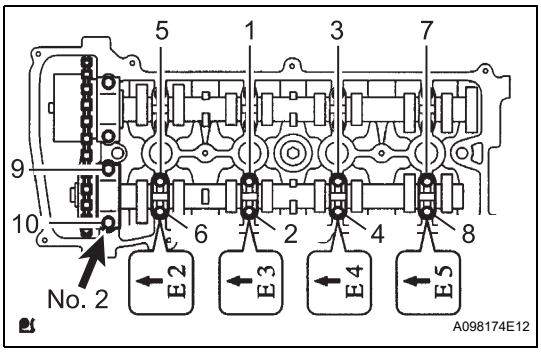
(d) Using several steps, uniformly tighten the 10 bearing cap bolts in the sequence shown in the illustration.
Torque: No. 1 bearing cap
30 N*m (301 kgf*cm, 22 ft.*lbf)
No. 3 bearing cap
9.0 N*m (92 kgf*cm, 80 in.*lbf)

30. INSTALL NO. 2 CAMSHAFT
(a) Apply a light coat of engine oil to the journal portion of the No. 2 camshaft.



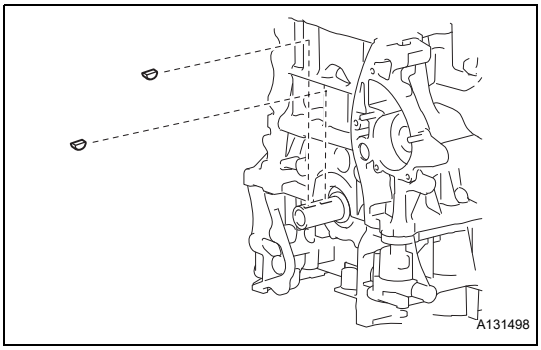
(b) Examine the front marks and numbers, and check that the order is as shown in the illustration. Then install the bearing caps onto the cylinder head.

(c) Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts.



(d) Using several steps, uniformly tighten the 10 bearing cap bolts in the sequence shown in the illustration.

Torque: No. 1 bearing cap
30 N*m (301 kgf*cm, 22 ft.*lbf)
No. 3 bearing cap
9.0 N*m (92 kgf*cm, 80 in.*lbf)



31. INSTALL KEYS

(a) Install the 2 keys.

32. INSTALL NO. 2 CHAIN SUB-ASSEMBLY (See page EM-26)

33. INSTALL CRANKSHAFT TIMING SPROCKET (See page EM-27)

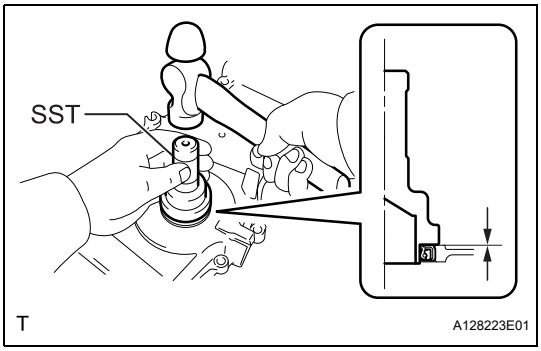
34. INSTALL NO. 1 CHAIN VIBRATION DAMPER (See page EM-28)

35. INSTALL CHAIN SUB-ASSEMBLY (See page EM-28)

36. INSTALL CHAIN TENSIONER SLIPPER (See page EM-29)

37. INSTALL TIMING CHAIN GUIDE (See page EM-29)

38. INSTALL NO. 1 CRANKSHAFT POSITION SENSOR PLATE (See page EM-29)



39. INSTALL TIMING CHAIN CASE OIL SEAL

(a) Using SST, tap in a new oil seal until its surface is flush with the timing chain cover edge.
SST 09223-22010

(b) Apply a light coat of MP grease to the lip of the oil seal.
NOTICE:
- **Keep the lip free from foreign matter.**
- **Do not tap on the oil seal at an angle.**
- **Make sure that the oil seal edge does not stick out of the timing chain case.**

NOTICE:
Keep the gap between the timing chain cover edge and the oil seal free of foreign matter.

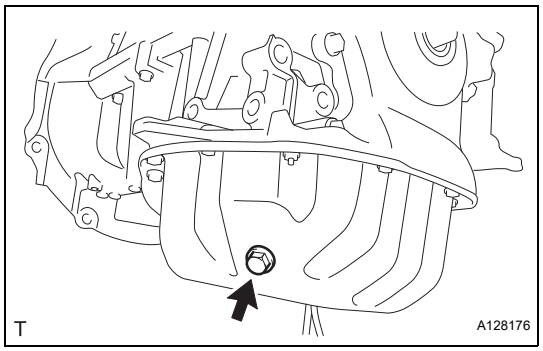
40. **INSTALL TIMING CHAIN COVER SUB-ASSEMBLY (See page LU-15)**

41. **INSTALL OIL PAN SUB-ASSEMBLY (See page EM-30)**

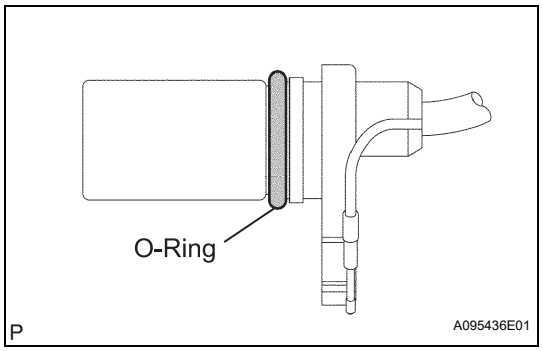
42. **INSTALL OIL PAN DRAIN PLUG**
    (a) Install a new gasket and oil pan drain plug.
    Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)

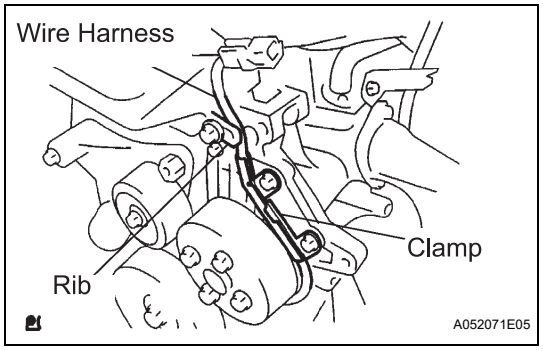
43. **INSTALL WATER PUMP ASSEMBLY (See page CO-10)**

44. **INSTALL WATER PUMP PULLEY (See page CO-11)**

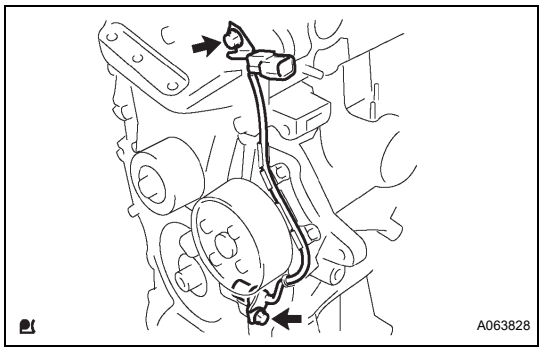


45. **INSTALL CRANKSHAFT POSITION SENSOR**
    (a) Apply a light coat of engine oil to the O-ring of the sensor.



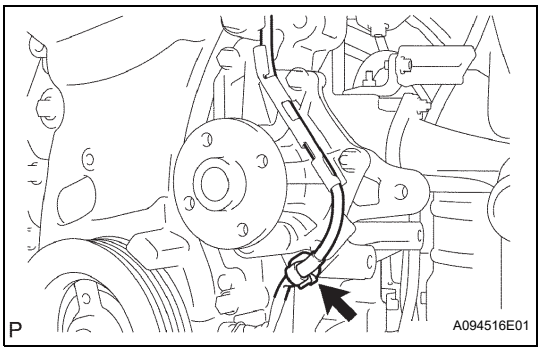


(b) Confirm that the wire harness of the sensor is placed as shown in the illustration.



(c) Install the sensor with the 2 bolts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

EM



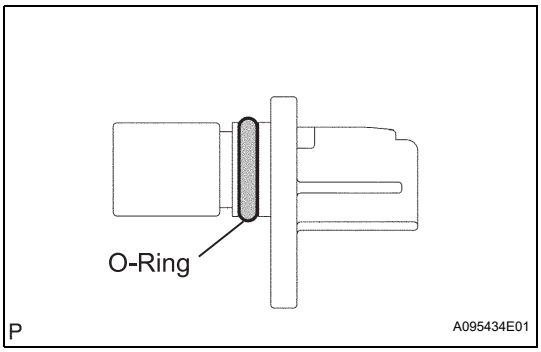
(d) Install the clamp of the crankshaft position sensor onto the water pump.

46. INSTALL CRANKSHAFT PULLEY (See page EM-75)

47. INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY (See page EM-31)

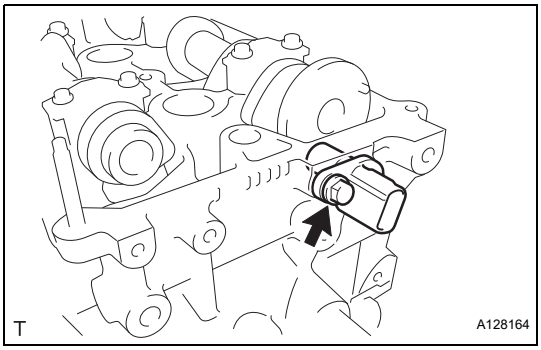
48. INSPECT VALVE CLEARANCE (See page EM-8)

49. ADJUST VALVE CLEARANCE (See page EM-9)

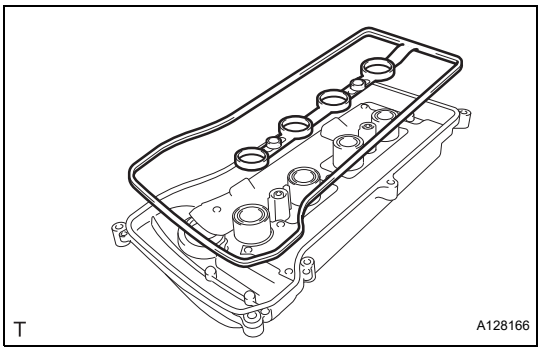


50. INSTALL CAMSHAFT POSITION SENSOR

(a) Apply a light coat of engine oil to the O-ring of the sensor.



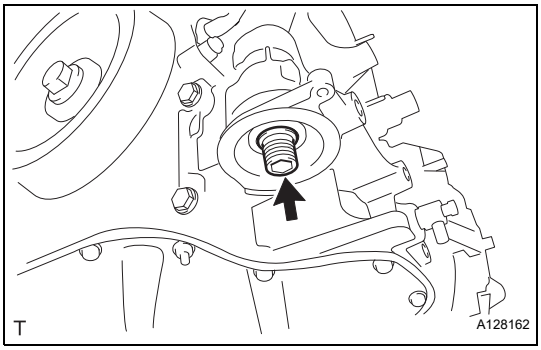
(b) Install the sensor with the bolt.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)



51. INSTALL CYLINDER HEAD COVER GASKET

(a) Install the gasket to the cylinder head cover.
NOTICE:
Remove any oil from the contact surface.

52. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY (See page EM-32)

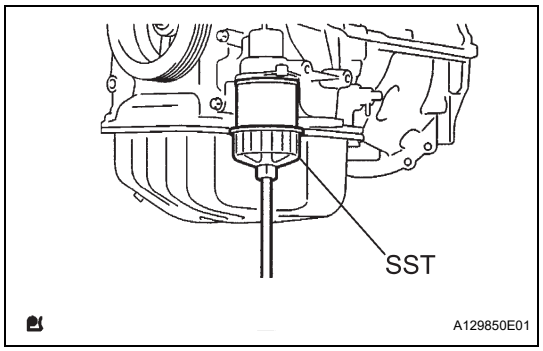


53. INSTALL OIL FILTER UNION

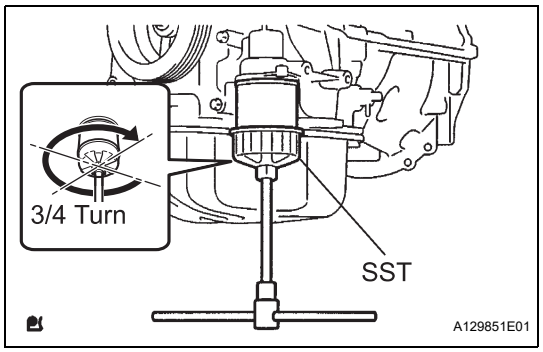
(a) Using a 12 mm hexagon wrench, install the oil filter union.
Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)

54. INSTALL OIL FILTER SUB-ASSEMBLY

(a) Check and clean the oil filter installation surface.
(b) Apply clean engine oil to the gasket of a new oil filter.
(c) Lightly screw the oil filter into place, and tighten it until the gasket contacts the seat.

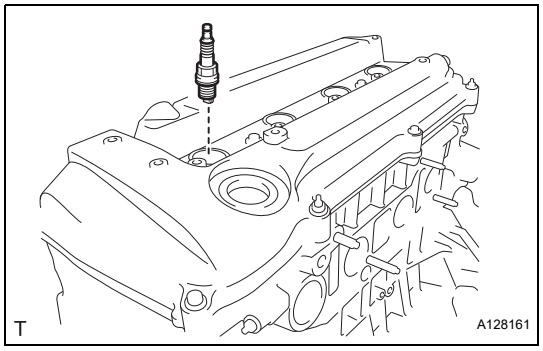


(d) When using a torque wrench:
(1) Using SST, tighten the oil filter.
SST 09228-06501
Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)

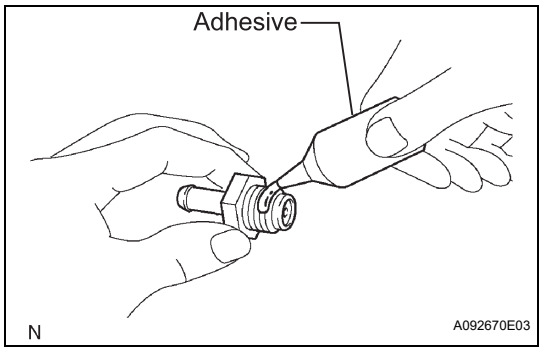


(e) When not using a torque wrench:
(1) Using SST, tighten it an additional 3/4 turn.
SST 09228-06501

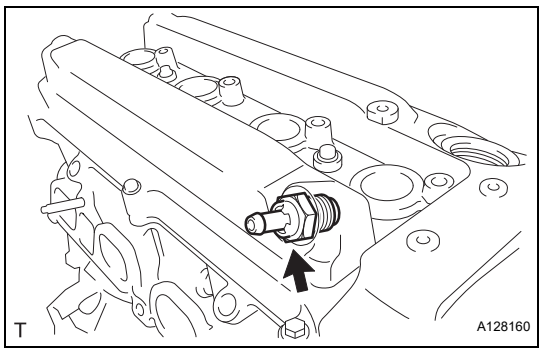
EM



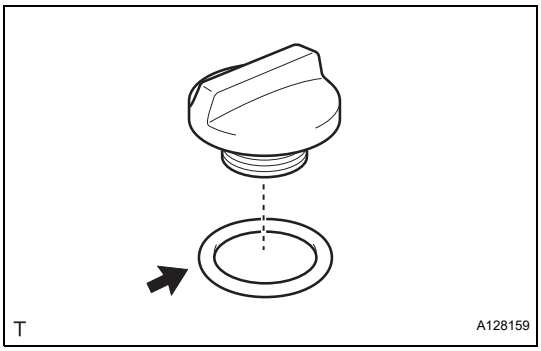
55. INSTALL SPARK PLUG
(a) Install the spark plugs.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)



56. INSTALL VENTILATION VALVE SUB-ASSEMBLY
(a) Apply adhesive to the threads of the ventilation valve.

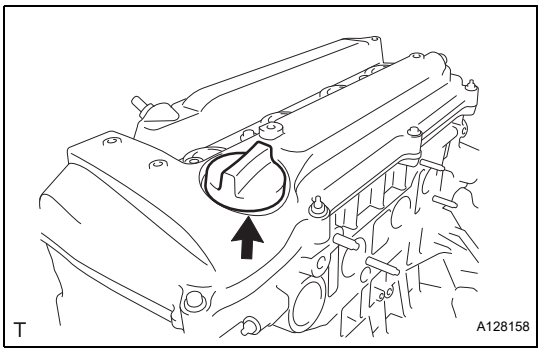


(b) Install the ventilation valve.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)
Adhesive:
Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent



57. INSTALL OIL FILLER CAP GASKET

(a) Install a new gasket to the cap.



58. INSTALL OIL FILLER CAP SUB-ASSEMBLY

(a) Install the oil filler cap.

ON-VEHICLE INSPECTION

1. CHECK FUEL PUMP OPERATION AND FOR FUEL LEAKS

(a) Check fuel pump operation.
  (1) Connect the intelligent tester to the DLC3.
  (2) Turn the power switch on (IG) and turn the intelligent tester main switch on.
  NOTICE:
  Do not start the engine.
  (3) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / FUEL PUMP / SPD.

(b) Check the fuel pump operation.
  (1) Check for pressure in the fuel inlet tube from the fuel line. Check that sound of fuel flowing in the fuel tank can be heard. If no sound can be heard, check the integration relay, fuel pump, ECM and wiring connector.

(c) Check for fuel leaks.
  (1) Check that there are no fuel leaks from any part of the fuel system after performing maintenance. If there is a fuel leak, repair or replace the parts as necessary.

(d) Turn the power switch off.

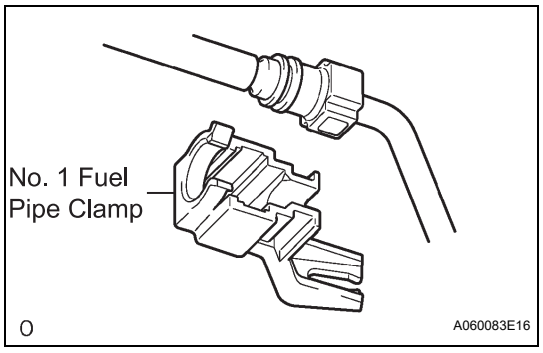
(e) Disconnect the intelligent tester from the DLC3.

2. CHECK FUEL PRESSURE

(a) Check that the battery positive voltage is above 12 V.

(b) Discharge the fuel system pressure (See page FU-1).

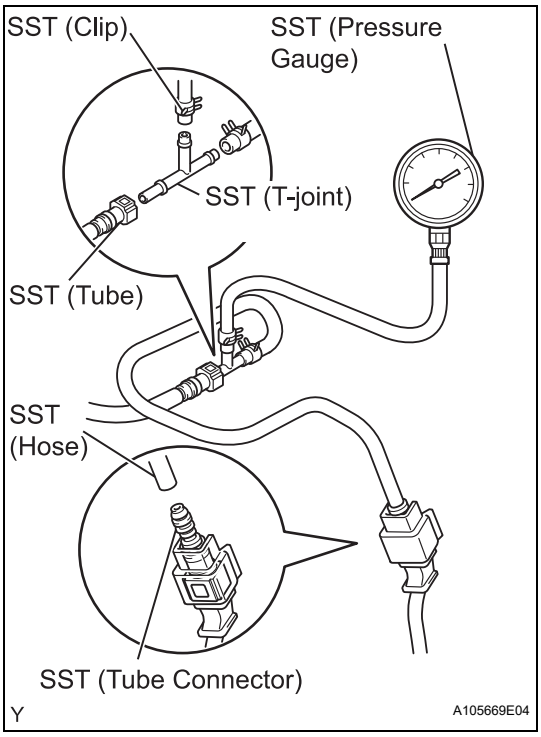
(c) Disconnect the cable from the negative (-) battery terminal.



(d) Remove the No. 1 fuel pipe clamp from the fuel tube connector.

(e) Disconnect the fuel hose from the fuel main tube.
CAUTION:
- **Always read the precautions (See page FU-1) before disconnecting the fuel tube connector (quick type).**
- **Fuel may be sprayed from the fuel pipe line as a result of retained pressure that remains in the line. Do not allow fuel to be sprayed in the engine compartment.**

FU



(f) Install SST (pressure gauge) and the fuel tube connector using SST as shown in the illustration.
SST 09268-31011 (09268-41500, 90467-13001, 95336-08070), 09268-45014 (09268-41200, 09268-41220, 09268-41250)

(g) Wipe up any gasoline.

(h) Connect the cable to the negative (-) battery terminal.

(i) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / FUEL PUMP / SPD.

(j) Measure the fuel pressure.
Fuel pressure:

304 to 343 kPa (3.1 to 3.5 kgf/cm^2, 44.1 to 49.7 psi)

If the pressure is high, replace the fuel pressure regulator.
If the pressure is low, check the fuel hoses and connections, fuel pump, fuel filter and fuel pressure regulator.

(k) Disconnect the intelligent tester from the DLC3.

(l) Start the engine.

(m) Measure the fuel pressure at idle.
Fuel pressure:

304 to 343 kPa (3.1 to 3.5 kgf/cm^2, 44.1 to 49.7 psi)

(n) Stop the engine.

(o) Check that the fuel pressure remains as specified for 5 minutes after the engine has stopped.
Fuel pressure:

147 kPa (1.5 kgf/cm^2, 21 psi) or more

If the pressure is not as specified, check the fuel pump, pressure regulator and/or injectors.

(p) After checking the fuel pressure, disconnect the cable from the negative (-) battery terminal and carefully remove the SST to prevent gasoline from splashing.

(q) Reconnect the fuel main tube (fuel tube connector).
CAUTION:
Always read the precautions (See page FU-1) before connecting the fuel tube connector (quick type).

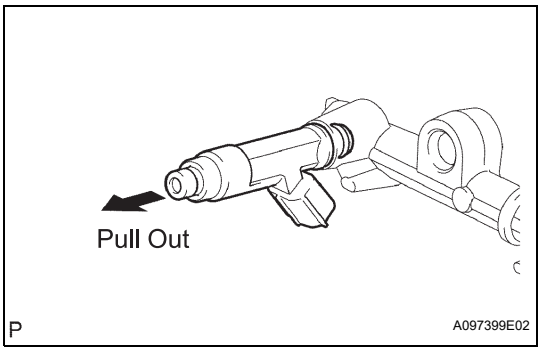
(r) Install the No. 1 fuel pipe clamp to the fuel tube connector.

(s) Check for fuel leaks (Step 1).

3. PERFORM INITIALIZATION

(a) Perform initialization procedure (See page IN-43).
HINT:
Some systems need initialization after reconnecting the cable to the negative battery terminal.

FU



8. REMOVE FUEL INJECTOR ASSEMBLY

(a) Pull out the 4 injectors from the delivery pipe.

(b) Remove the 4 O-rings from the injectors.

INSPECTION

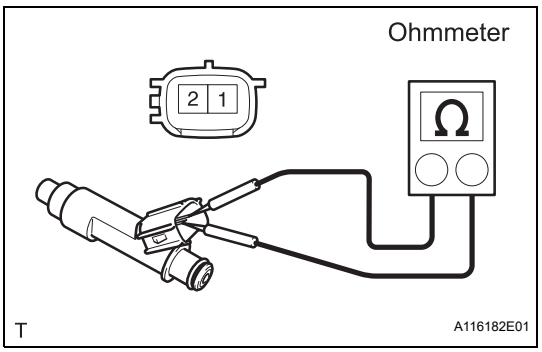
1. INSPECT FUEL INJECTOR ASSEMBLY

(a) Measure the resistance between the injector terminals.

Standard resistance:

11.6 to 12.4 Ω at 20°C (68°F)

If the result is not as specified, replace the injector.



(b) Inspect the injector injection volume.

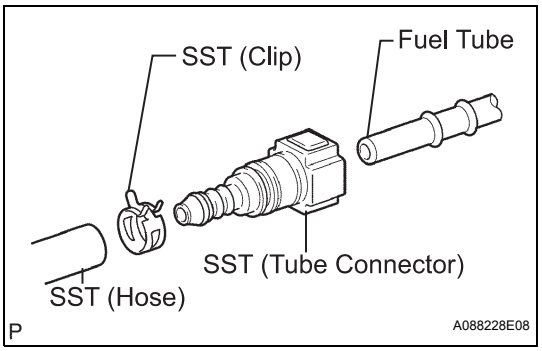
CAUTION:

Keep the injector away from sparks during this test.

(1) Connect SST (fuel tube connector) to SST (hose), then connect them to the fuel pipe (vehicle side).

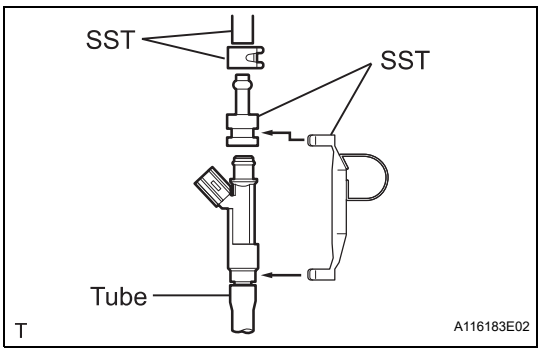
SST 09268-31011 (09268-41500, 90467-13001, 95336-08070)

(2) Install the O-ring to the fuel injector.



(3) Connect SST (adapter and hose) to the injector, and hold the injector and union with SST (clamp).

SST 09268-31011 (09268-41110, 09268-41300, 90467-13001)



(4) Put the injector into the graduated cylinder.

CAUTION:

Install a suitable vinyl tube onto the injector to contain gasoline spray.

(5) Operate the fuel pump.

(6) Connect SST (wire) to the injector and the battery for 15 seconds, and measure the injection volume with the graduated cylinder. Test each injector 2 or 3 times.

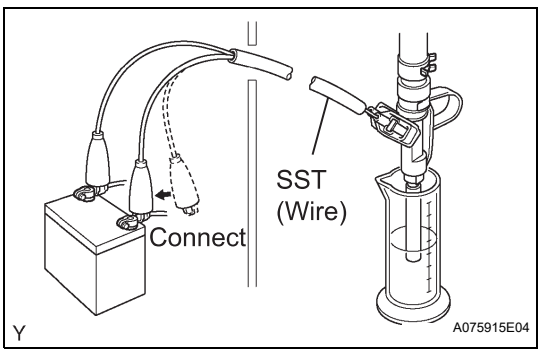
SST 09842-30080

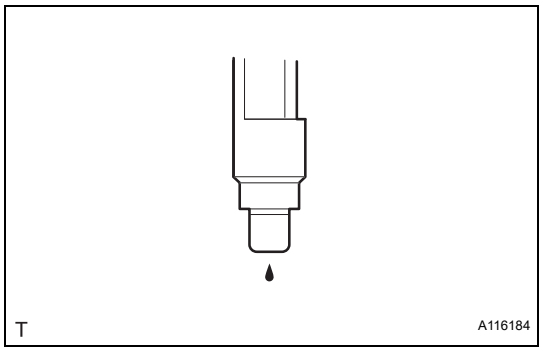
Standard injection volume:

76 to 92 cm^3 (4.6 to 5.6 cu in.) per 15 seconds

Standard difference between each injector:

16 cm^3 (0.98 cu in.) or less



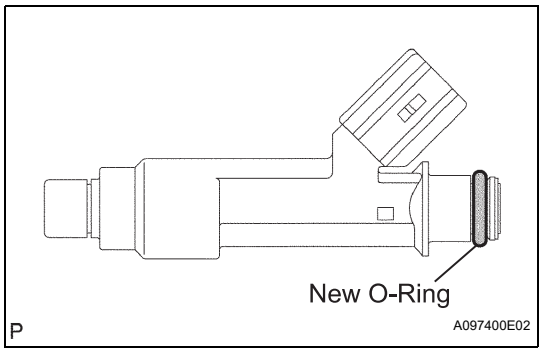


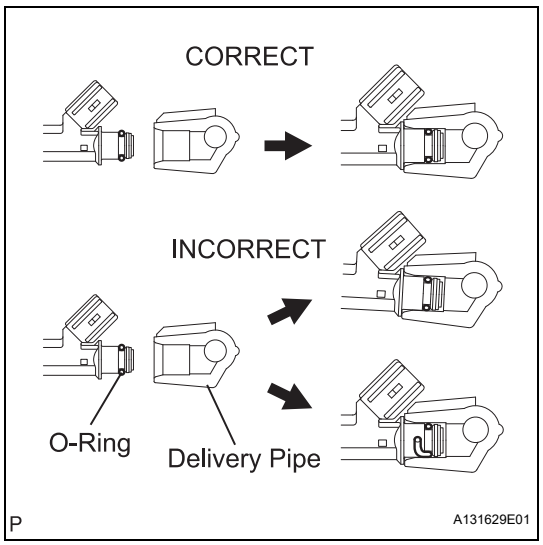
(c) Inspect the fuel leakage.
(1) Disconnect the SST (wire) tester probes from the battery and check the fuel leakage from the injector.
Standard fuel drop:
1 drop or less per 12 minutes
(2) Turn the power switch off.
(3) Disconnect the cable from the negative (-) battery terminal.
(4) Remove the SST.
(5) Disconnect the intelligent tester from the DLC3.
(6) Reconnect the fuel inlet hose (rear fuel pipe) to the fuel main tube.

INSTALLATION

1. INSTALL FUEL INJECTOR ASSEMBLY

(a) Apply a light coat of gasoline or spindle oil to new O-rings, then install them to each fuel injector.

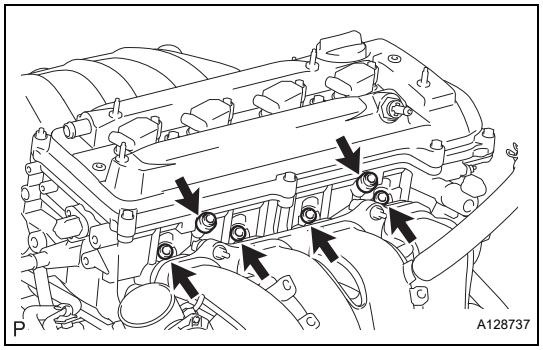


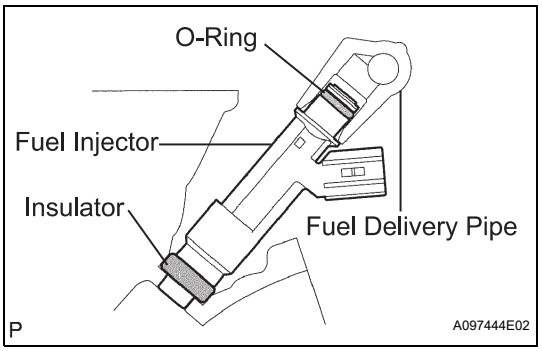


(b) Apply a light coat of gasoline or spindle oil to the part of the fuel delivery pipe which comes into contact with the O-ring of the fuel injector.
(c) Apply a light coat of gasoline or spindle oil to the O-ring again, then install the right and left fuel injectors onto the fuel delivery pipe.
NOTICE:
Make sure that the O-ring is not cracked or jammed before installing the injector.
(d) Check that the fuel injector rotates smoothly. If the fuel injector does not rotate, replace the O-ring.

2. INSTALL FUEL DELIVERY PIPE WITH INJECTOR

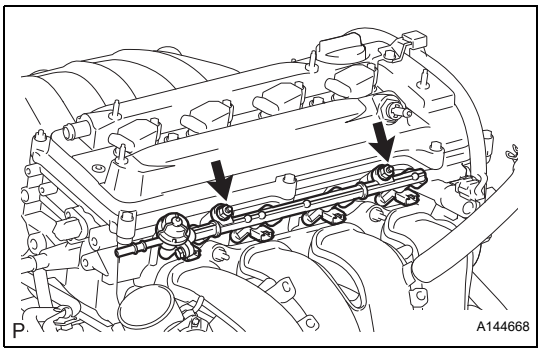
(a) Install 4 new insulators into the cylinder head.
(b) Install the 2 delivery pipe spacers onto the cylinder head.



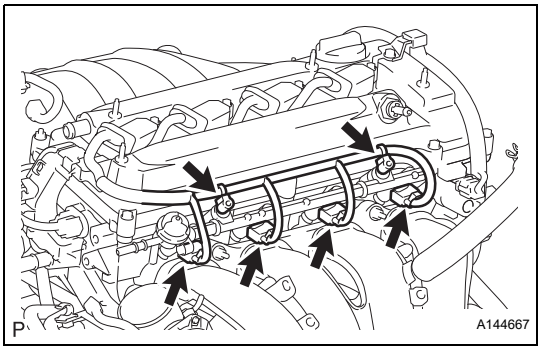


(c) Install the fuel delivery pipe together with the 4 fuel injectors, then temporarily tighten the 2 bolts.
NOTICE:
Be careful not to drop the fuel injectors when installing the fuel delivery pipe.

(d) Check that the fuel injector rotates smoothly.
If the fuel injector does not rotate smoothly, replace the O-ring.

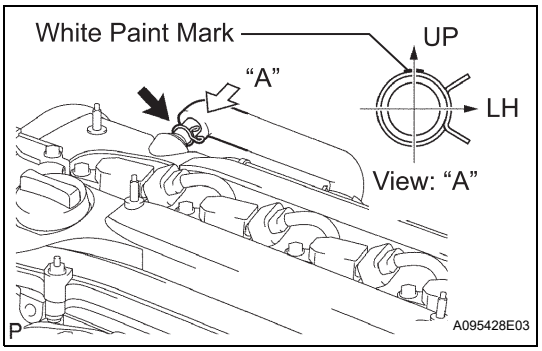


(e) Tighten the 2 bolts to the specified torque.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)



(f) Connect the 4 fuel injector connectors.

(g) Install the 2 wire harness clamps.

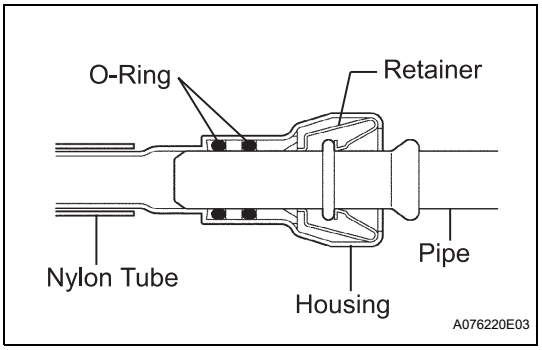


3. INSTALL NO. 2 VENTILATION HOSE

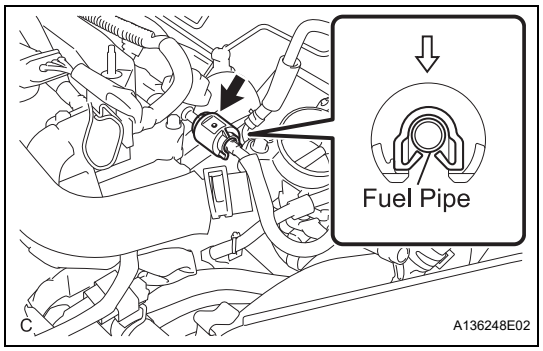
(a) Connect the ventilation hose to the ventilation valve.
NOTICE:
Make sure that the paint mark and hose clamp are positioned as shown in the illustration after connecting the hose.

4. CONNECT FUEL TUBE SUB-ASSEMBLY

(a) Connect the fuel tube.



(b) Push the fuel tube connector until it makes a "click" sound.



(c) Install the No. 2 fuel pipe clamp.
(d) Install the fuel tube to the fuel hose clamp.

5. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-398)**

6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

7. **INSPECT FOR FUEL LEAK**
HINT:
See page FU-9.

8. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-114)**

9. **PERFORM INITIALIZATION**
(a) Perform initialization procedure (See page IN-43).
HINT:
Some systems need initialization after reconnecting the cable to the negative battery terminal.

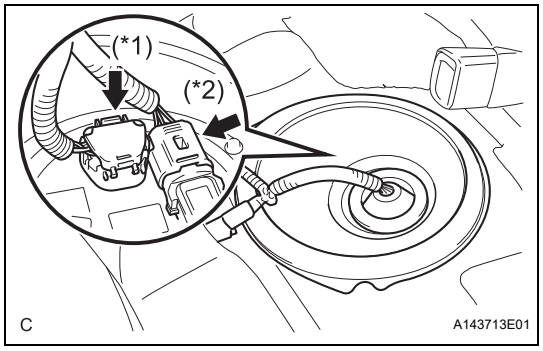
REMOVAL

1. **DISCHARGE FUEL SYSTEM PRESSURE**
   HINT:
   See page FU-1.

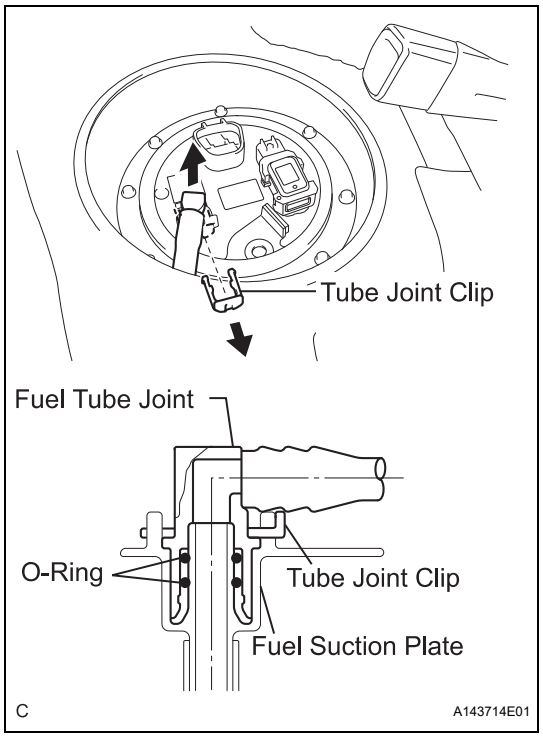
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

3. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-44)**

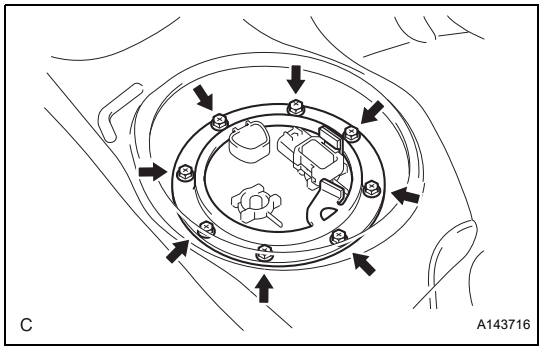
4. **REMOVE REAR FLOOR SERVICE HOLE COVER**
   (a) Remove the rear floor service hole cover.
   (b) Disconnect the fuel pump connector (*1).
   (c) Disconnect the vapor pressure sensor connector (*2).

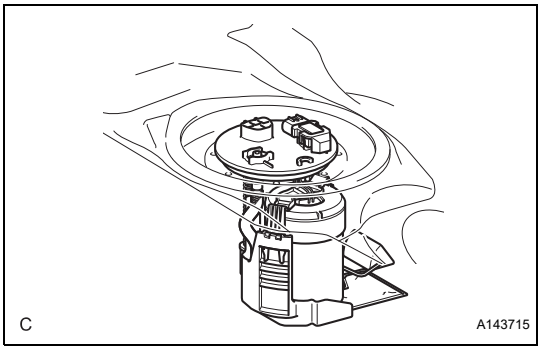


5. **SEPARATE FUEL PUMP TUBE SUB-ASSEMBLY**
   (a) Remove the tube joint clip, and pull out the fuel pump tube.
   NOTICE:
   - **Check that there is no dirt around the fuel tube joint before removing it. Clean any dirt away.**
   - **It is necessary to prevent mud or dirt from entering the fuel tube joint. If mud or dirt gets in the joint, the O-rings may not seal the fuel tube connector and fuel suction plate properly.**
   - **Do not use any tools for this work.**
   - **Do not bend, kink or twist the nylon tubes.**
   - **After disconnecting, protect the fuel tube joint by connecting it with a plastic bag.**
   - **If the fuel tube joint and fuel suction plate are stuck, pinch the fuel tank tube between fingers, and turn it carefully to release it. Disconnect the fuel tank tube.**



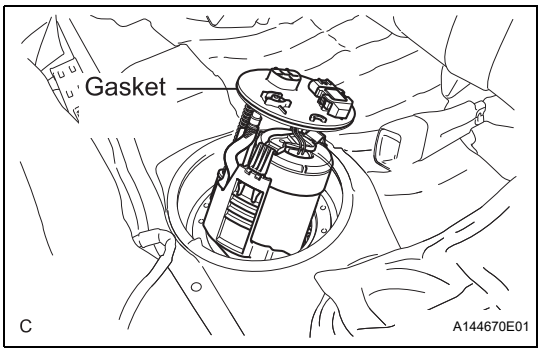
6. **REMOVE FUEL TANK VENT TUBE SET PLATE**
   (a) Remove the 8 bolts and vent tube set plate.





7. REMOVE FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE

(a) Pull out the fuel suction tube from the fuel tank.
NOTICE:
- **Do not damage the fuel pump filter.**
- **Be careful that the arm of the sender gauge does not bend.**



(b) Remove the gasket from the fuel suction tube.

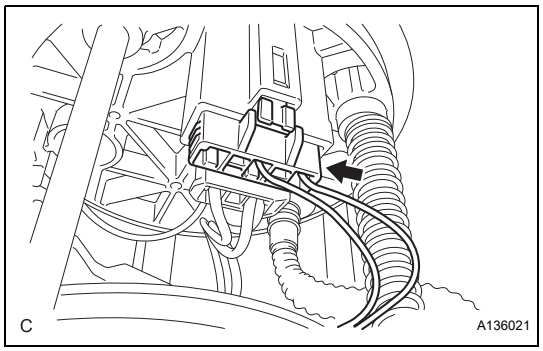
FU

DISASSEMBLY

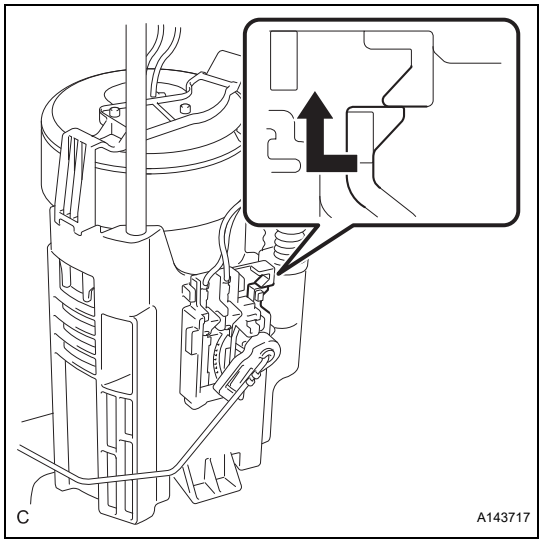
1. REMOVE VAPOR PRESSURE SENSOR ASSEMBLY

2. REMOVE FUEL SENDER GAUGE ASSEMBLY

(a) Disconnect the fuel sender gauge connector.

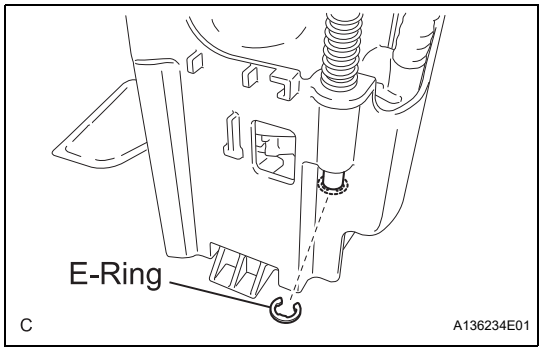


(b) Unlock the fuel sender gauge, and slide it to remove.

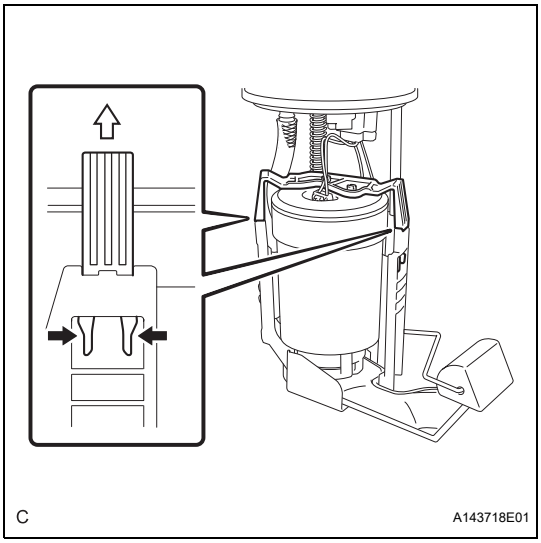


3. REMOVE FUEL NO. 1 TANK BAND BRACKET

(a) Using needle nozzle pliers, remove the E-ring.

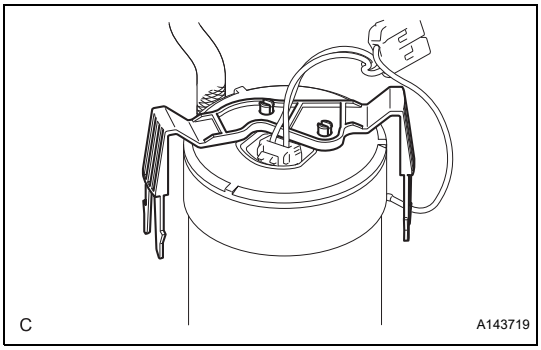


FU



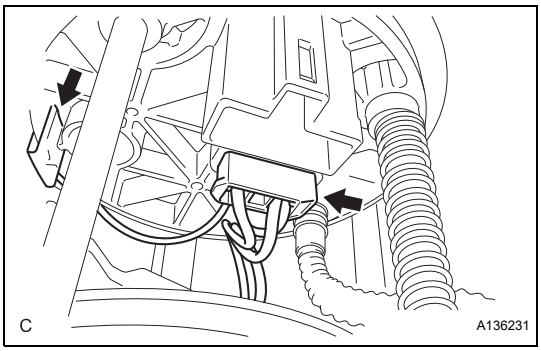
(b) Disengage the 4 claws of the fuel No. 1 suction support and remove the fuel No. 1 tank band bracket from the fuel suction plate with the fuel filter.
(c) Remove the spring from the fuel suction plate.

FU



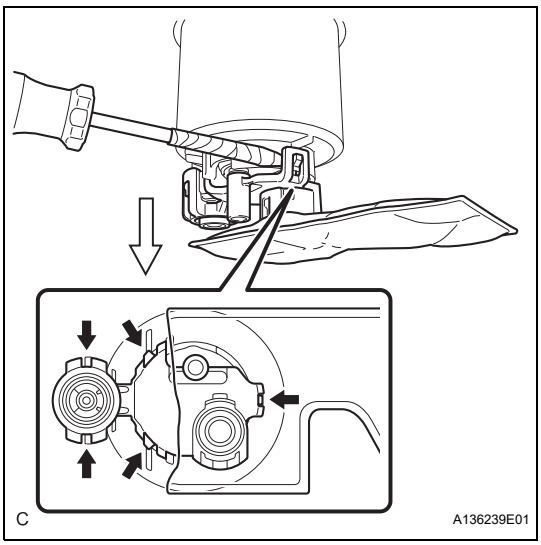
4. REMOVE FUEL NO. 1 SUCTION SUPPORT

(a) Using a screwdriver with its tip taped, disengage the claw and remove the fuel No. 1 suction support.



5. DISCONNECT FUEL PUMP HARNESS

(a) Disconnect the fuel pump harness connector from the fuel suction plate.

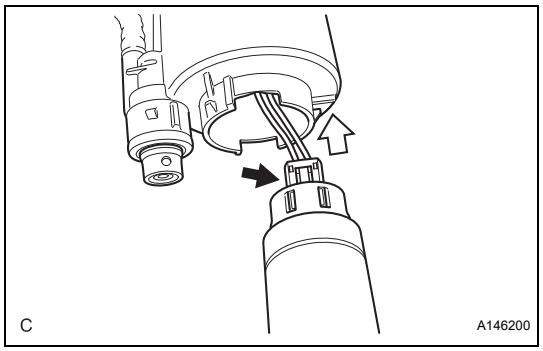


6. REMOVE FUEL PUMP

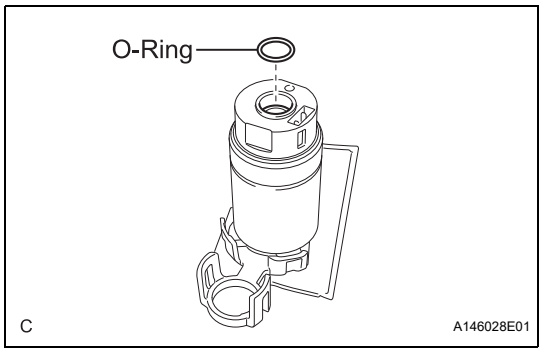
(a) Using a screwdriver with its tip taped, disengage the 5 claws and pull out the fuel pump from the fuel filter assembly.

NOTICE:

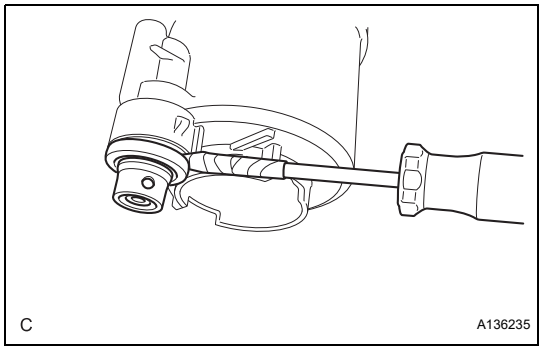
- **Do not damage the fuel pump filter.**
- **Do not remove the suction filter.**



(b) Remove the fuel pump harness connector.

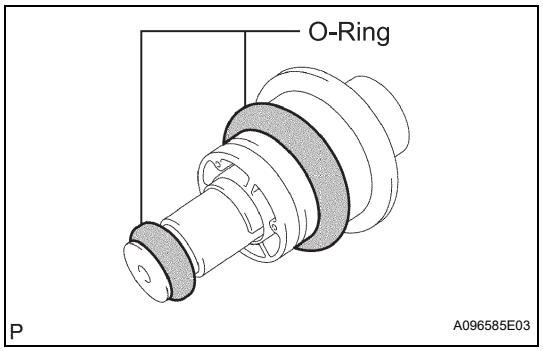


(c) Remove the O-ring from the fuel pump.

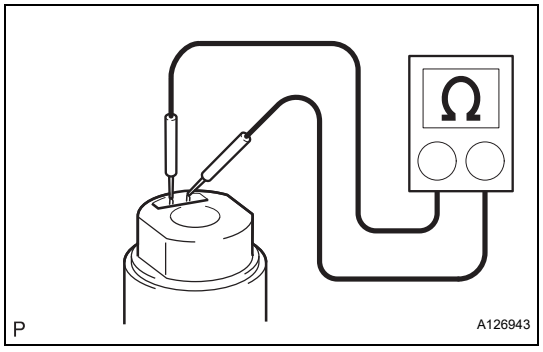


7. REMOVE FUEL PRESSURE REGULATOR ASSEMBLY

(a) Using a screwdriver with its tip taped, remove the fuel pressure regulator from the fuel filter.



(b) Remove the 2 O-rings from the fuel pressure regulator.



INSPECTION

1. INSPECT FUEL PUMP

(a) Check the fuel pump resistance.

(1) Measure the resistance between terminals 1 and 2.

Standard resistance:

0.2 to 3.0 Ω at 20°C (68°F)

If the result is not as specified, replace the fuel pump.

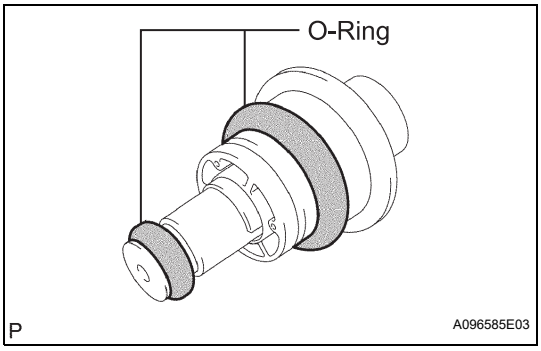
(b) Check fuel pump operation.
(1) Apply battery voltage to terminals 1 and 2. Check that the pump operates.
NOTICE:
- **These tests must be completed within 10 seconds to prevent the coil from burning out.**
- **Keep the fuel pump as far away from the battery as possible.**
- **Always switch the voltage on and off on the battery side, not on the fuel pump side.**

If the pump does not operate, replace the fuel pump.

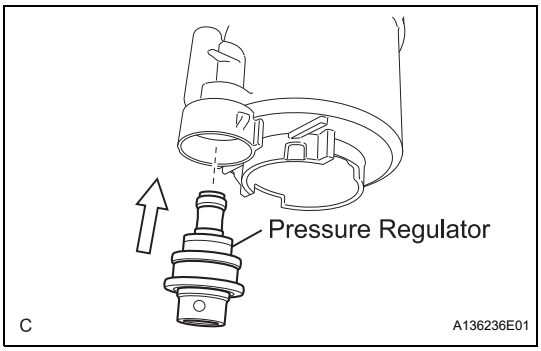
REASSEMBLY

1. INSTALL FUEL PRESSURE REGULATOR ASSEMBLY

(a) Apply a light coat of gasoline to 2 new O-rings, and install them to the fuel pressure regulator.

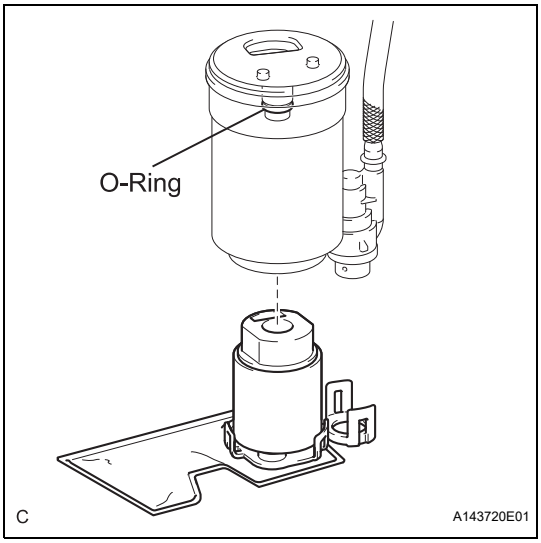


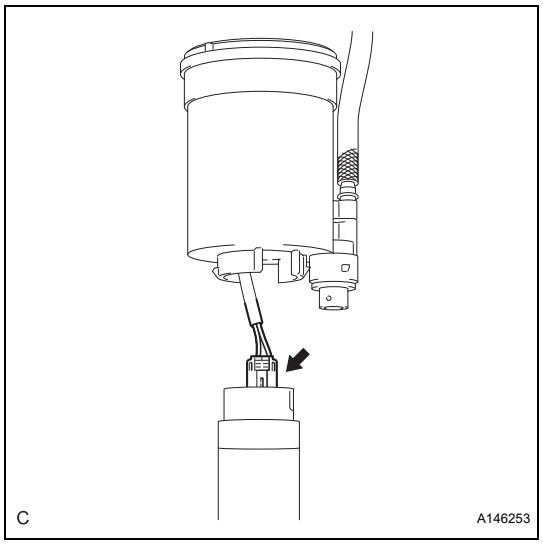
(b) Install the fuel pressure regulator to the fuel filter.



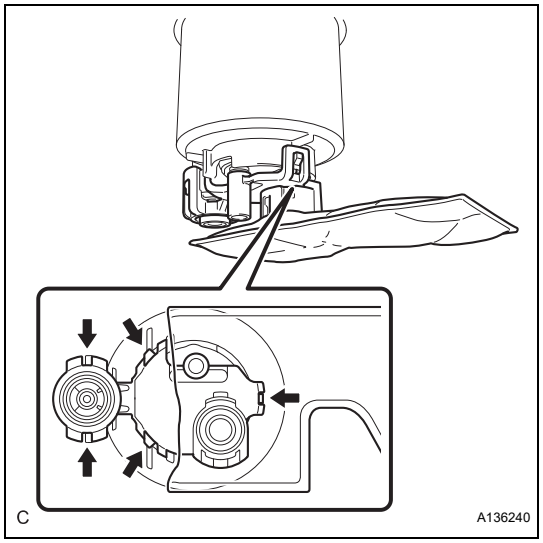
2. INSTALL FUEL PUMP

(a) Apply gasoline to a new O-ring and install it to the fuel filter.



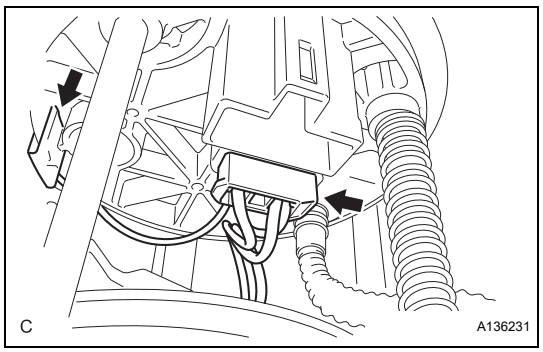


(b) Connect the fuel pump harness connector.



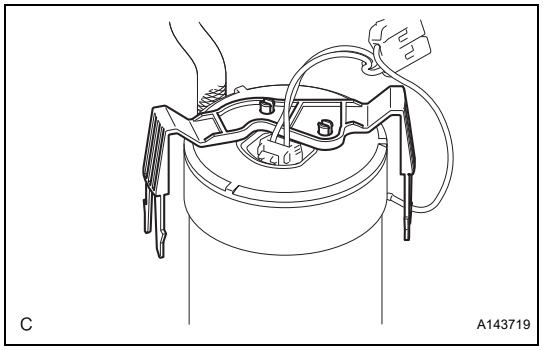
(c) Engage the 5 claws on the fuel filter and install the fuel pump with the pump filter.

FU



3. CONNECT FUEL PUMP HARNESS

(a) Connect the fuel pump harness connector to the fuel suction plate.

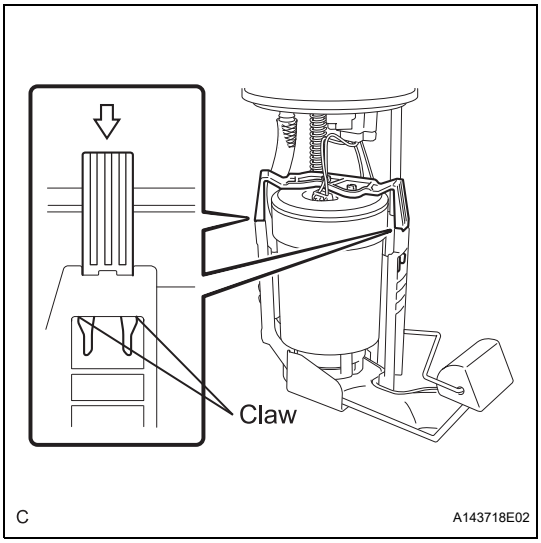


4. INSTALL FUEL NO. 1 SUCTION SUPPORT

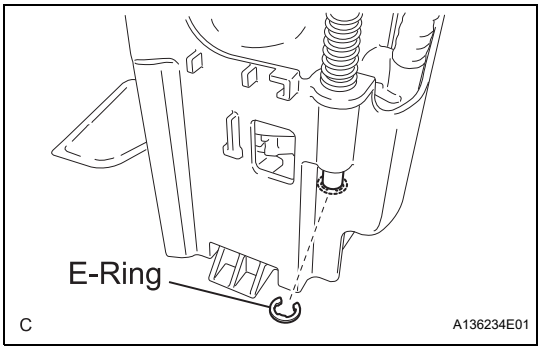
(a) Install the fuel No. 1 suction support to the fuel filter.

5. INSTALL FUEL NO. 1 TANK BAND BRACKET

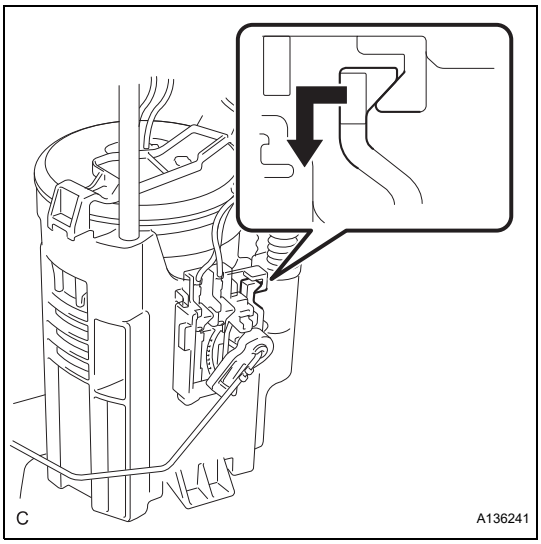
(a) Install the spring to the fuel suction plate shaft and install them to the fuel No. 1 tank band bracket.



(b) Engage the 4 claws of the fuel No. 1 suction support and install the fuel No. 1 tank band bracket to the fuel suction plate with the fuel filter.

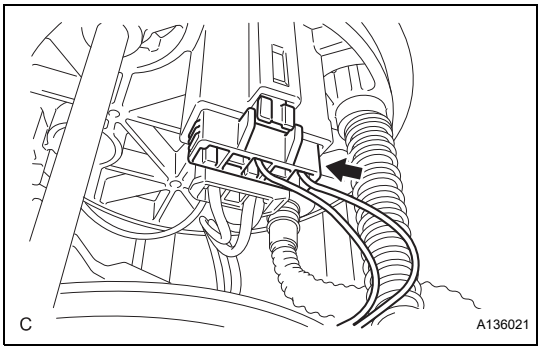


(c) Install a new E-ring.



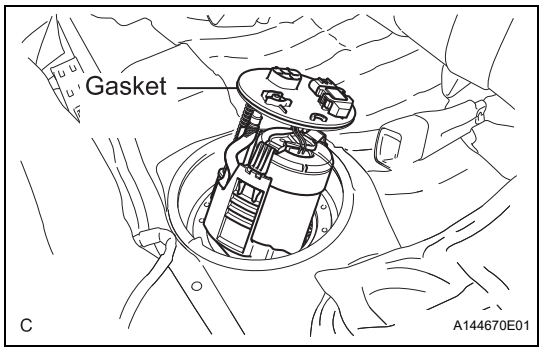
6. INSTALL FUEL SENDER GAUGE ASSEMBLY

(a) Slide the fuel sender gauge to engage the claw.



(b) Connect the fuel sender gauge connector.

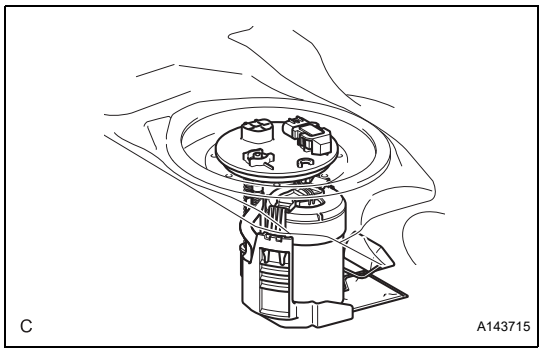
7. INSTALL VAPOR PRESSURE SENSOR ASSEMBLY



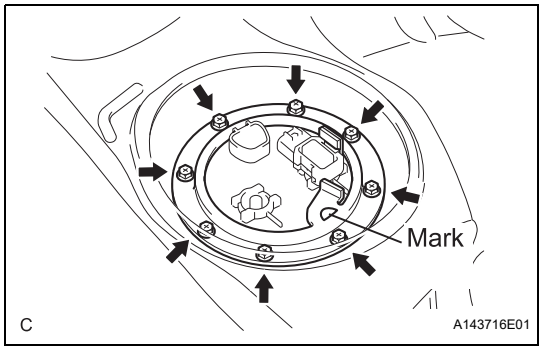
INSTALLATION

1. INSTALL FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE

(a) Install a new gasket to the fuel suction tube.



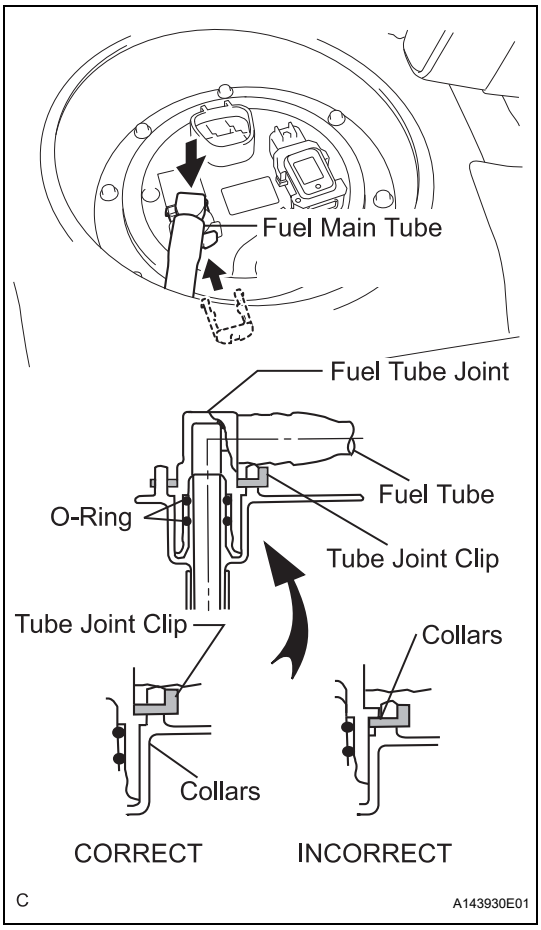
(b) Install the fuel suction tube.
NOTICE:
- **Do not damage the fuel pump filter.**
- **Be careful that the arm of the sender gauge does not bend.**



2. INSTALL FUEL TANK VENT TUBE SET PLATE

(a) Align the mark of the set plate with the fuel suction tube.

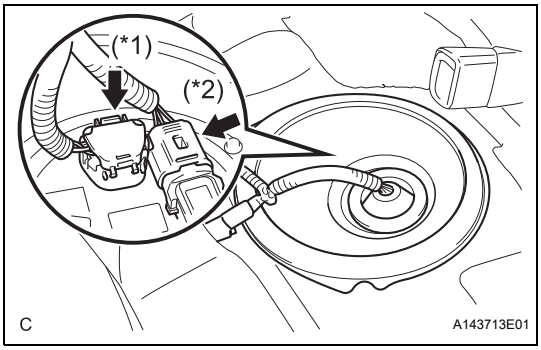
(b) Install the set plate with the 8 bolts.
Torque: 5.9 N*m (60 kgf*cm, 52 in.*lbf)



3. **CONNECT FUEL PUMP TUBE SUB-ASSEMBLY**
   (a) Install the fuel pump tube with the tube joint clip.
   NOTICE:
   - **Check that there are no scratches or foreign objects on the connecting part.**
   - **Check that the fuel tube joint is inserted securely.**
   - **Check that the tube joint clip is on the collar of the fuel tube joint.**
   - **After installing the tube joint clip, check that the fuel tube joint is pulled off.**

4. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

5. **INSPECT FOR FUEL LEAK (See page FU-9)**



6. **INSTALL REAR FLOOR SERVICE HOLE COVER**
   (a) Connect the vapor pressure sensor connector (*2).
   (b) Connect the fuel pump connector (*1).
   (c) Install the rear floor service hole cover with new butyl tape.

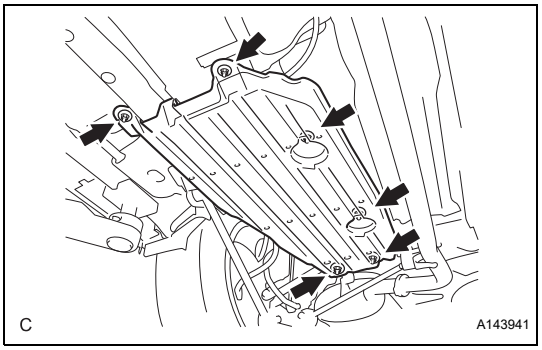
7. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-55)**

8. **PERFORM INITIALIZATION**
   (a) Perform initialization procedure (See page IN-43).
   HINT:
   Some vehicle systems require initialization after reconnecting the cable to the negative battery terminal.

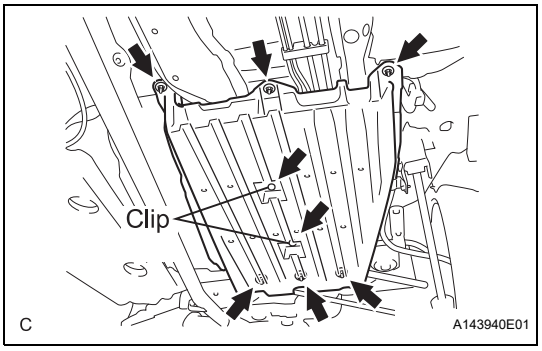
FU

REMOVAL

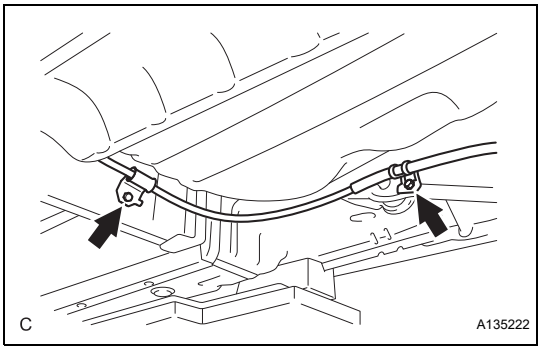
1. **DISCHARGE FUEL SYSTEM PRESSURE**
   HINT:
   See page FU-1.
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
3. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-44)**
4. **REMOVE REAR FLOOR SERVICE HOLE COVER (See page FU-23)**
5. **SEPARATE FUEL PUMP TUBE SUB-ASSEMBLY (See page FU-23)**
6. **REMOVE FUEL TANK VENT TUBE SET PLATE (See page FU-23)**
7. **REMOVE FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE (See page FU-24)**
8. **DRAIN FUEL**
9. **REMOVE NO. 1 FLOOR UNDER COVER**
   (a) Loosen the 6 grommets and remove the No. 1 floor under cover.

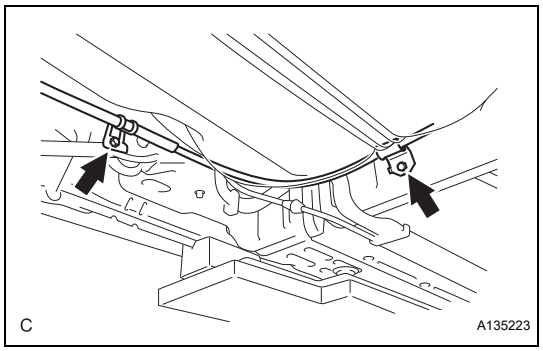


10. **REMOVE NO. 2 FLOOR UNDER COVER**
    (a) Remove the 2 clips.
    (b) Loosen the 6 grommets and remove the No. 2 floor under cover.
11. **REMOVE CENTER EXHAUST PIPE ASSEMBLY**
    HINT:
    See page EX-2.



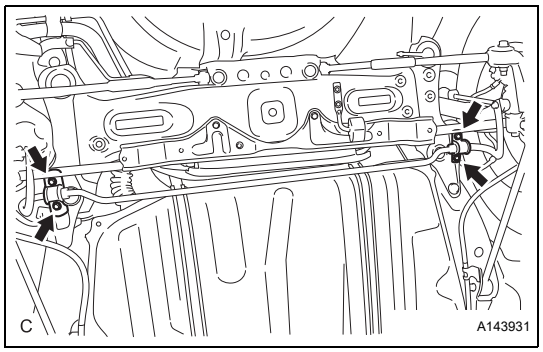
12. **DISCONNECT NO. 2 PARKING BRAKE CABLE ASSEMBLY**
    (a) Remove the set bolt and set nut of the No. 2 parking brake cable assembly.





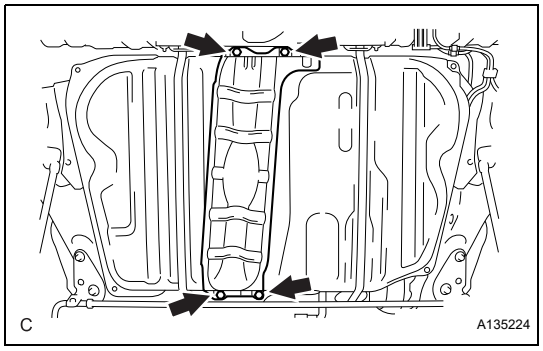
13. DISCONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY

(a) Remove the set bolt and set nut of the No. 3 parking brake cable assembly.



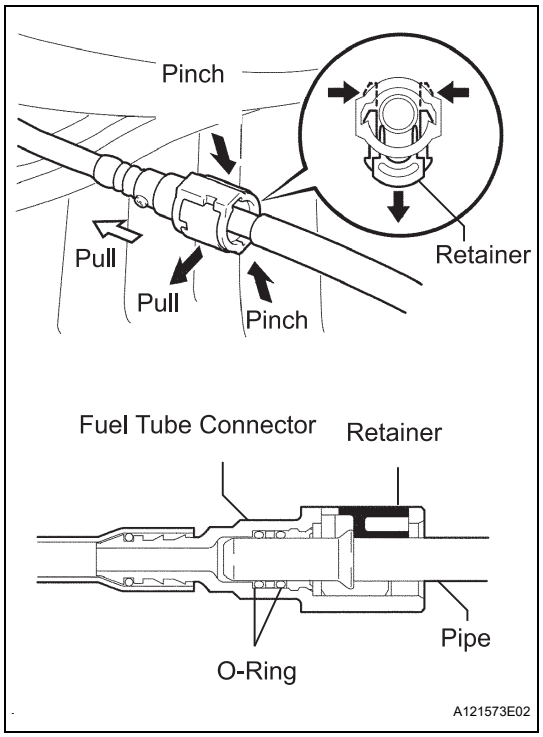
14. REMOVE REAR STABILIZER BAR NO. 1 BRACKET

(a) Remove the 4 bolts and 2 rear stabilizer bar No. 1 brackets.



15. REMOVE FUEL TANK PROTECTOR LOWER CENTER

(a) Remove the 4 bolts and fuel tank protector lower center.



16. REMOVE FUEL TANK ASSEMBLY

(a) Disconnect the fuel pump tube.

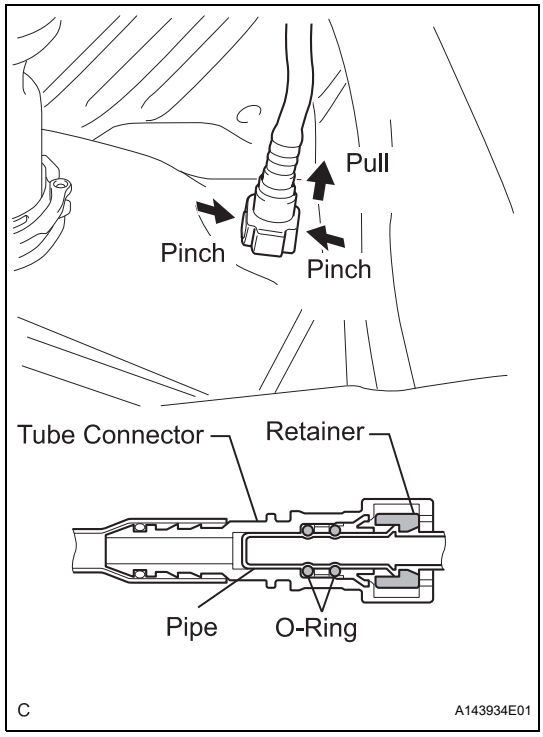
(1) Pinch the tab of the retainer to disengage the lock claws and pull it down as shown in the illustration.

(2) Pull out the fuel tank main tube.

NOTICE:

- **Check that there is no dirt or other foreign objects around the connector before disconnecting it. Clean the connector as necessary.**
- **It is necessary to prevent mud or dirt from entering the quick connector. If mud or dirt gets in the connector, the O-rings may not seal properly.**
- **Remove the quick connector by hand.**
- **Do not bend, kink or twist the nylon tubes. Protect the connector by covering it with a plastic bag.**

- **If the pipe and connector are stuck, carefully try wiggling or pushing and pulling on the connector to release it. Pull the connector off the pipe carefully.**

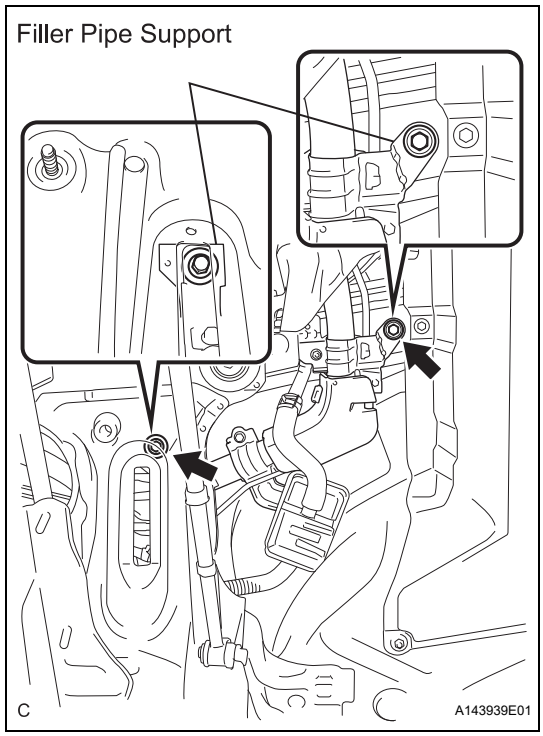


(b) Disconnect the No. 1 fuel tube.

(1) Pinch the tube connector and then pull out the No. 1 fuel tube.

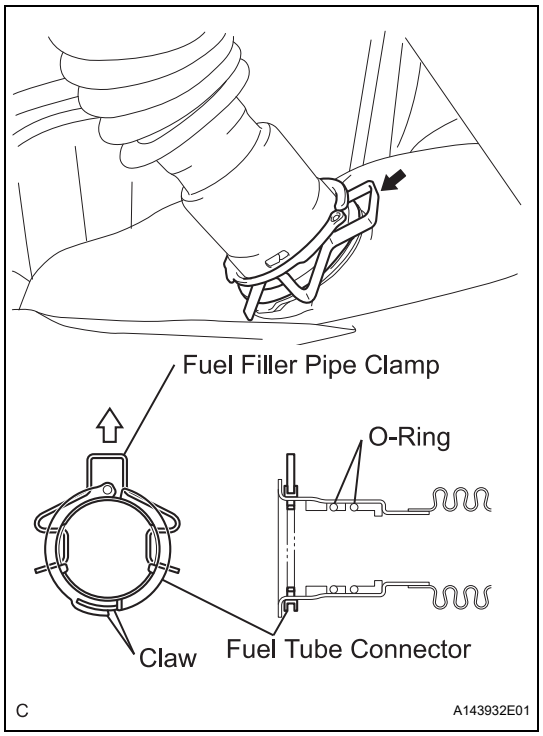
NOTICE:

- **Check that there is no dirt or other foreign objects around the connector before disconnecting it. Clean the connector as necessary.**
- **It is necessary to prevent mud or dirt from entering the quick connector. If mud or dirt gets in the connector, the O-rings may not seal properly.**
- **Remove the quick connector by hand.**
- **Do not bend, kink or twist the nylon tubes. Protect the connector by covering it with a plastic bag.**
- **If the pipe and connector are stuck, carefully try wiggling or pushing and pulling on the connector to release it. Pull the connector off the pipe carefully.**



(c) Disconnect the fuel filler pipe.

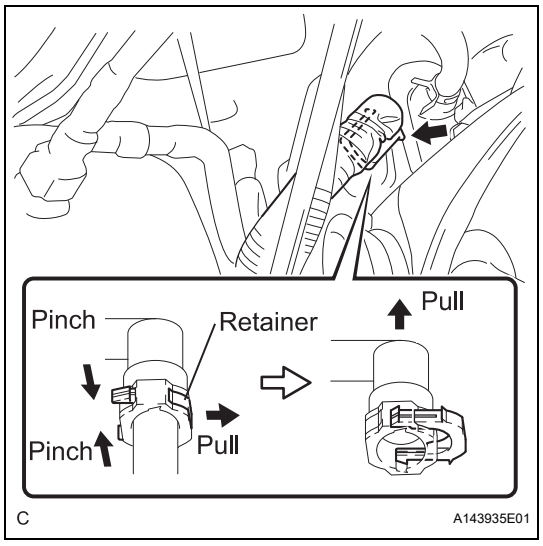
(1) Remove the 2 bolts from the fuel tank filler pipe support.



(2) Remove the fuel filler pipe clamp.

NOTICE:

- **Check that there is no dirt or other foreign objects around the connector before disconnecting it. Clean the connector if necessary.**
- **It is necessary to prevent mud or dirt from entering the fuel filler pipe. If mud or dirt gets in the fuel filler pipe, the O-rings may not seal properly.**
- **Remove the fuel filler pipe by hand.**
- **Protect the fuel filler pipe by covering it with a plastic bag.**
- **If the fuel filler pipe and fuel tank are stuck, carefully try wiggling or pushing and pulling on the fuel filler pipe to release it. Pull the fuel filler pipe off the fuel tank carefully.**



(d) Disconnect the fuel tank vent hose from the charcoal canister.

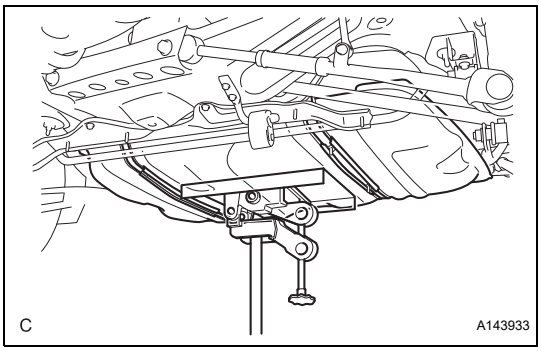
(1) Pinch the tab of the retainer to disengage the lock claws and pull it down as shown in the illustration.

(2) Pull out the fuel tank vent hose from the charcoal canister.

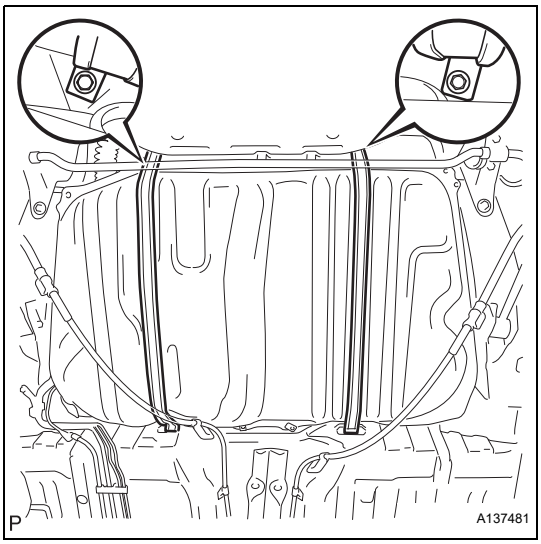
NOTICE:

- **Check that there is no dirt or other foreign objects around the connector before disconnecting it. Clean the connector as necessary.**
- **It is necessary to prevent mud or dirt from entering the quick connector. If mud or dirt gets in the connector, the O-rings may not seal properly.**
- **Remove the quick connector by hand.**
- **Do not bend, kink or twist the nylon tubes. Protect the connector by covering it with a plastic bag.**
- **If the pipe and connector are stuck, carefully try wiggling or pushing and pulling on the connector to release it. Pull the connector off the pipe carefully.**

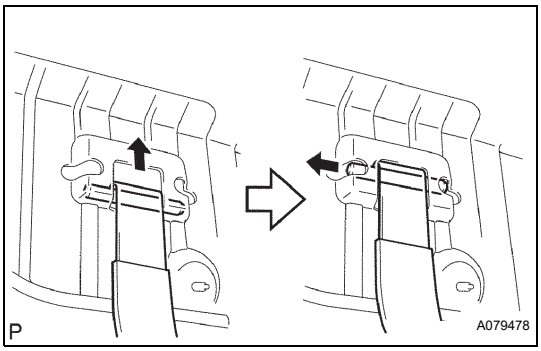
FU



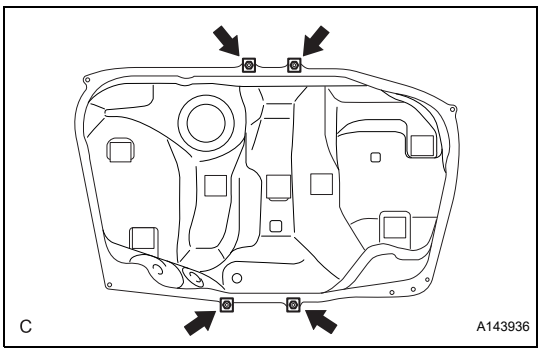
(e) Place an engine lifter under the fuel tank assembly.



(f) Remove the 2 set bolts of the fuel tank bands.
(g) Slightly lower the transmission jack.
(h) Remove the fuel tank.

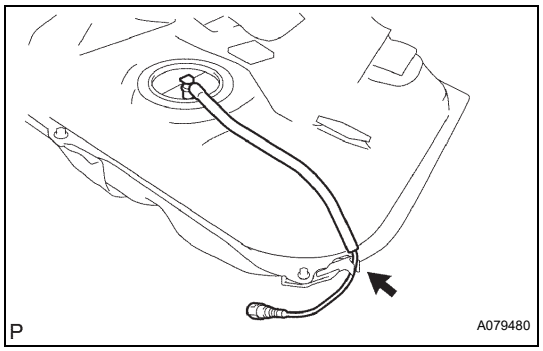


(i) Remove the 2 pins and 2 fuel tank bands as shown in the illustration.



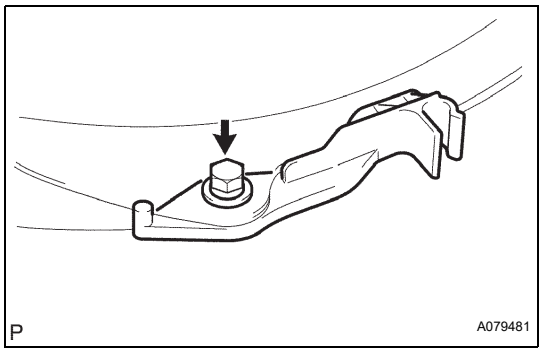
(j) Remove the 4 clip nuts.

17. **REMOVE FUEL VAPOR CONTAINMENT VALVE (See page EC-29)**
18. **REMOVE FUEL SOLENOID VALVE RETURN BRACKET (See page EC-30)**
19. **REMOVE NO. 1 FUEL TUBE CLAMP (See page EC-30)**



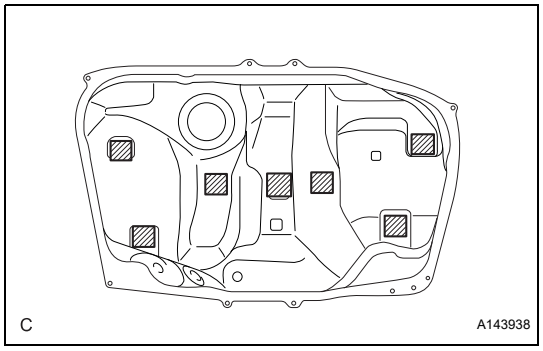
20. REMOVE FUEL PUMP TUBE SUB-ASSEMBLY

(a) Remove the fuel pump tube from the fuel main tube support.



21. REMOVE FUEL MAIN TUBE SUPPORT

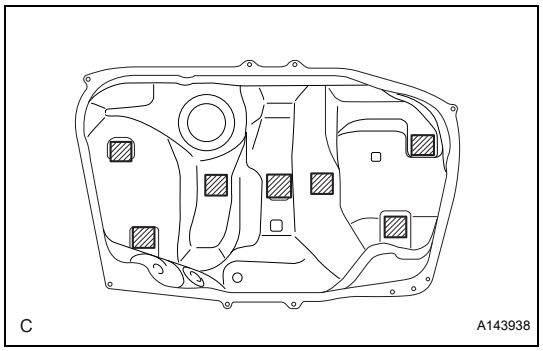
(a) Remove the bolt and tube support.



22. REMOVE NO. 2 FUEL TANK CUSHION

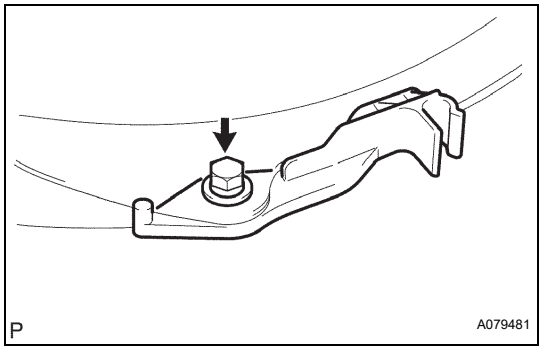
(a) Remove the 7 No. 2 fuel tank cushions.

INSTALLATION



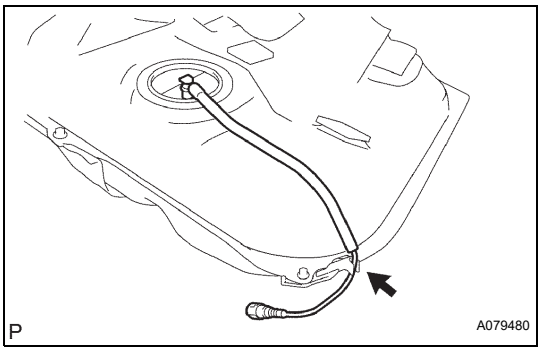
1. INSTALL NO. 2 FUEL TANK CUSHION

(a) Install 7 new No. 2 fuel tank cushions to the fuel tank.

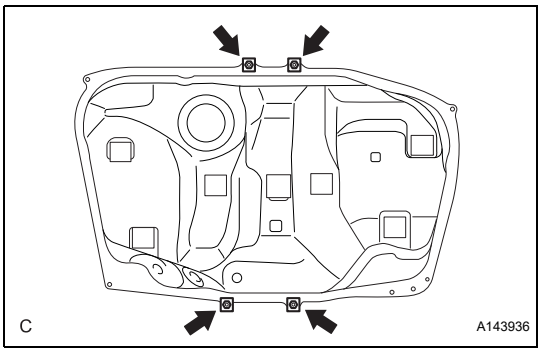


2. INSTALL FUEL MAIN TUBE SUPPORT

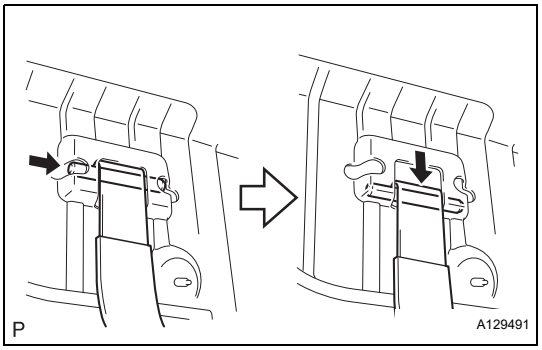
(a) Install the fuel main tube support with the bolt.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



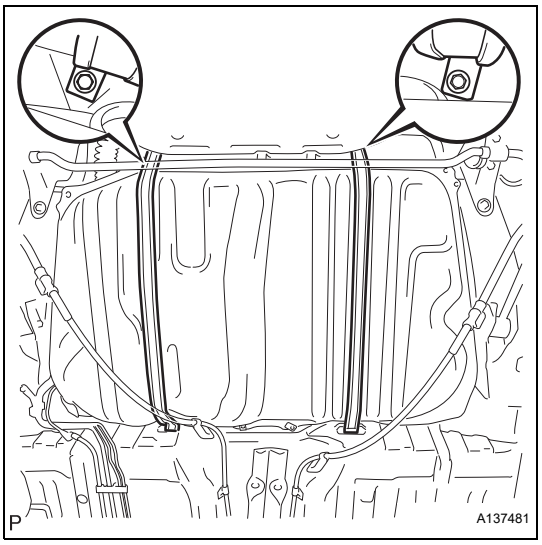
3. **INSTALL FUEL PUMP TUBE SUB-ASSEMBLY**
   (a) Install the fuel pump tube to the fuel main tube support.
4. **INSTALL NO. 1 FUEL TUBE CLAMP (See page EC-30)**
5. **INSTALL FUEL SOLENOID VALVE RETURN BRACKET (See page EC-30)**
6. **INSTALL FUEL VAPOR CONTAINMENT VALVE (See page EC-31)**



7. **INSTALL FUEL TANK ASSEMBLY**
   (a) Install the 4 clip nuts.

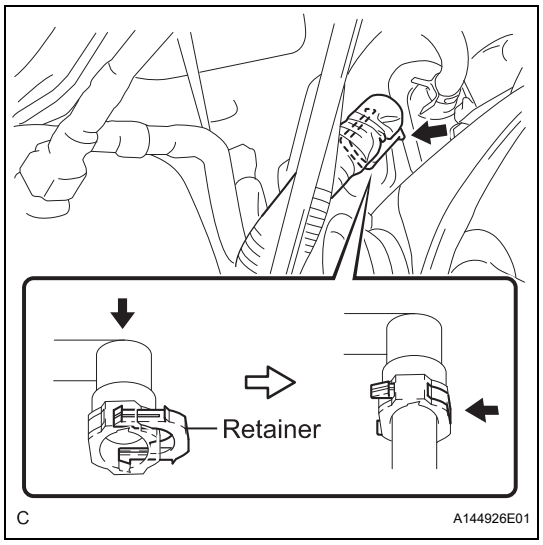


   (b) Install the 2 fuel tank bands with the 2 pins.
   (c) Set the fuel tank assembly onto the transmission jack.
   (d) Raise the transmission jack.
   NOTICE:
   Slowly raise the jack to prevent the fuel tank assembly from dropping.

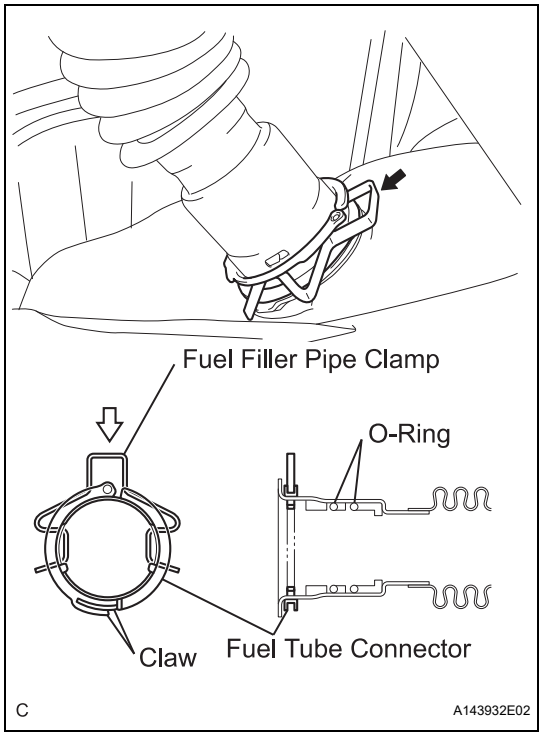


   (e) Tighten the 2 set bolts of the fuel tank bands.
   Torque: 39 N*m (400 kgf*cm, 29 ft.*lbf)

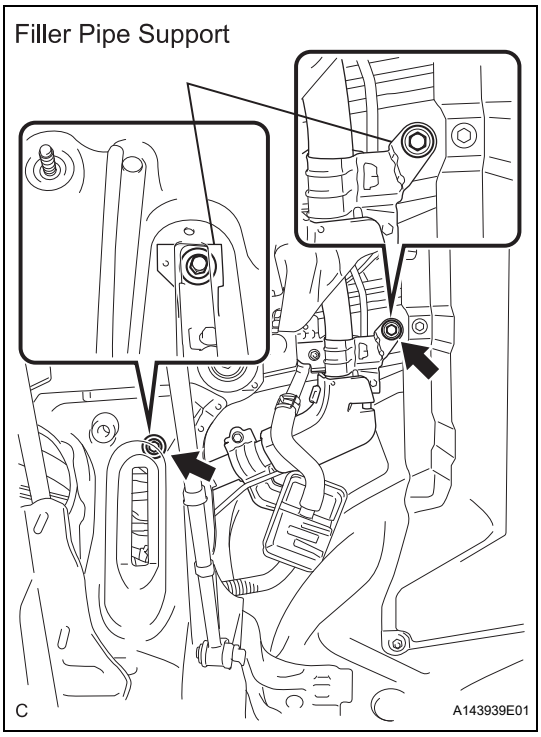
FU



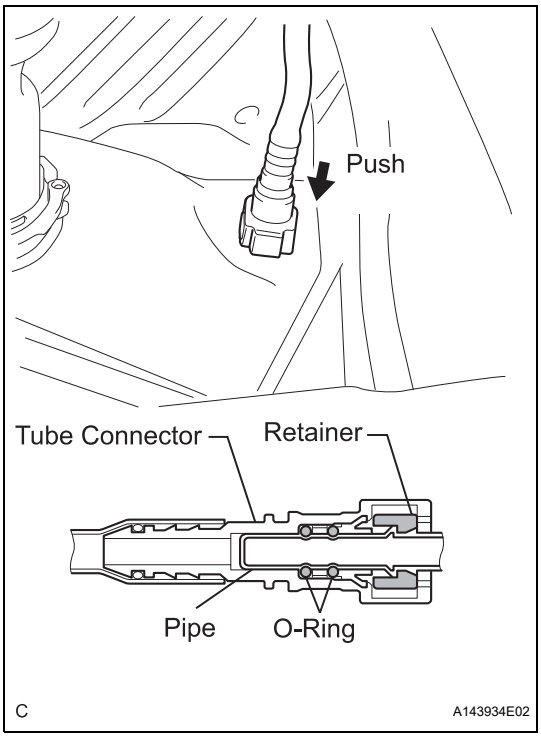
(f) Connect the fuel tank vent hose to the charcoal canister.
(1) Push the quick connector into the pipe and push up the retainer so that the claws engage.
NOTICE:
- **Before connecting the tube, make sure that it is not damaged. Make sure that there is no dirt present on the connecting surfaces.**
- **After connecting, check if the quick connector and the charcoal canister are securely connected by pulling on them.**



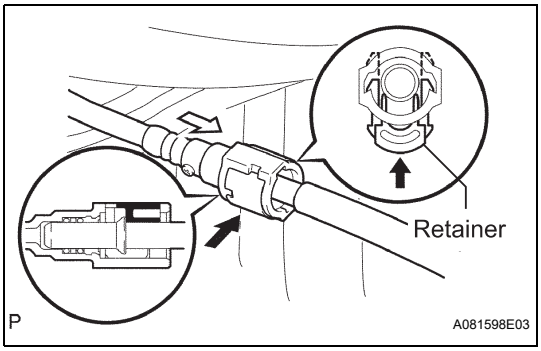
(g) Connect the fuel filler pipe.
(1) Install the fuel tube connector to the fuel filler pipe.
(2) Install the fuel filler pipe clamp.
NOTICE:
- **Before connecting the pipe, make sure that it is not damaged. Make sure that there is no dirt present on the connecting surfaces.**
- **After connecting, check if the fuel filler pipe and the fuel tank are securely connected by pulling on them.**



(3) Install the 2 bolts to the fuel tank filler pipe support.
Torque: 18 N*m (185 kgf*cm, 13 ft.*lbf)

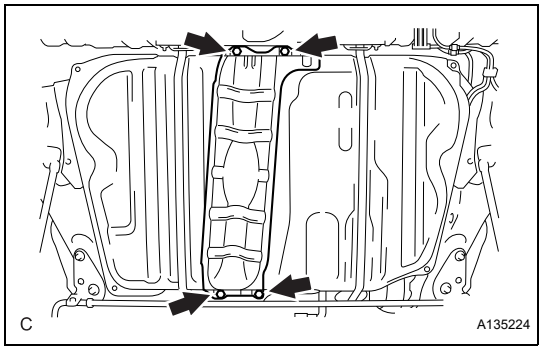


(h) Connect the No. 1 fuel tube.
(1) Push the fuel tube connector into the pipe until the fuel tube connector makes a "click" sound.
NOTICE:
- **Before connecting the tube, make sure that it is not damaged. Make sure that there is no dirt present on the connecting surfaces.**
- **After connecting, check if the fuel tube connector and the fuel tank are securely connected by pulling on them.**



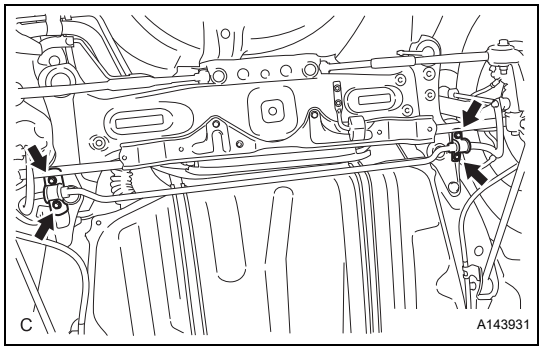
(i) Connect the fuel pump tube.
(1) Push the fuel connector into the pipe and push up the retainer so that the claws engage.
NOTICE:
- **Before connecting the tube, make sure that it is not damaged. Make sure that there is no dirt present on the connecting surfaces.**

- **After connecting, check if the fuel tube connector and the pipe are securely connected by pulling on them.**



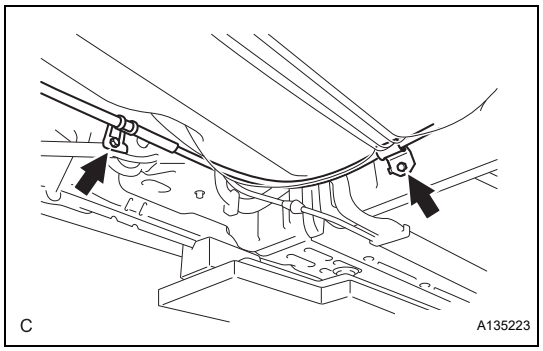
8. INSTALL FUEL TANK PROTECTOR LOWER CENTER

(a) Install the 4 bolts and fuel tank protector lower center.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



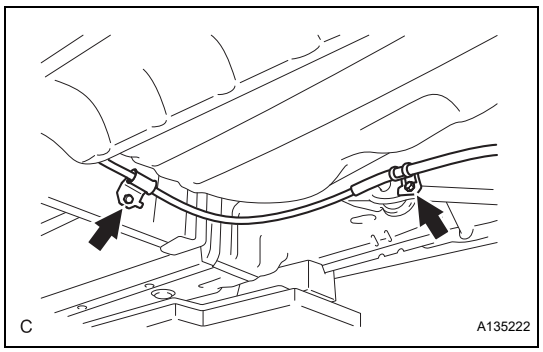
9. INSTALL REAR STABILIZER BAR NO. 1 BRACKET

(a) Install the 2 rear stabilizer bar No. 1 brackets with the 4 bolts.
Torque: 31 N*m (316 kgf*cm, 23 ft.*lbf)



10. INSTALL NO. 3 PARKING BRAKE CABLE ASSEMBLY

(a) Install the No. 3 parking brake cable assembly with the bolt and nut.
Torque: Bolt
6.0 N*m (61 kgf*cm, 53 in.*lbf)
Nut
8.5 N*m (87 kgf*cm, 75 in.*lbf)

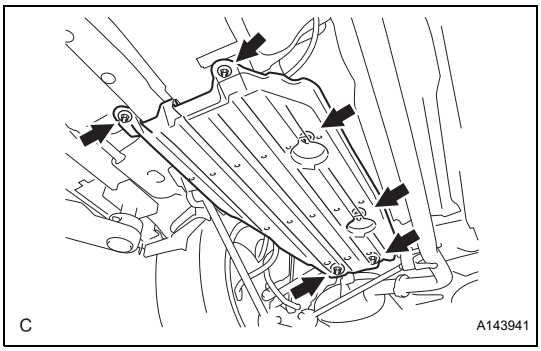


11. INSTALL NO. 2 PARKING BRAKE CABLE ASSEMBLY

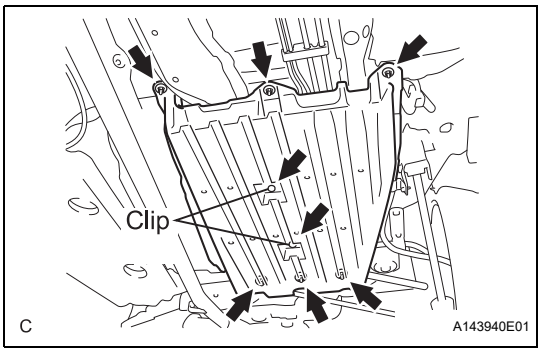
(a) Install the No. 2 parking brake cable assembly with the bolt and nut.
Torque: Bolt
6.0 N*m (61 kgf*cm, 53 in.*lbf)
Nut
8.5 N*m (87 kgf*cm, 75 in.*lbf)

12. INSTALL CENTER EXHAUST PIPE ASSEMBLY

HINT:
See page EX-4.

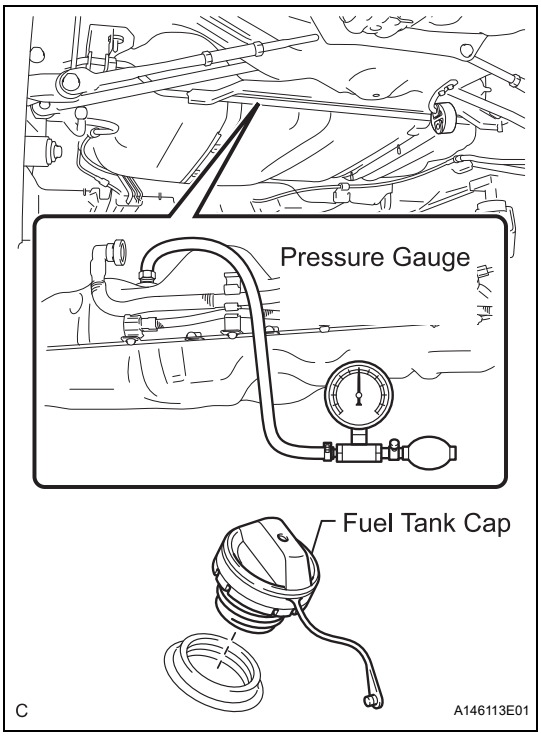


13. **INSTALL NO. 1 FLOOR UNDER COVER**
    (a) Install the No. 1 floor under cover with the 6 grommets.

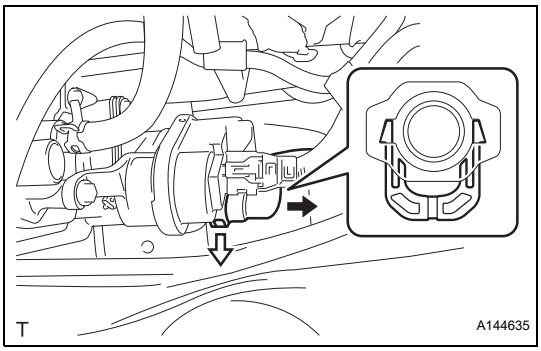


14. **INSTALL NO. 2 FLOOR UNDER COVER**
    (a) Install the No. 2 floor under cover with the 2 clips and 6 grommets.
15. **INSTALL FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE (See page FU-30)**
16. **INSTALL FUEL TANK VENT TUBE SET PLATE (See page FU-31)**
17. **CONNECT FUEL PUMP TUBE SUB-ASSEMBLY (See page FU-31)**
18. **ADD FUEL**
19. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
20. **INSPECT FOR FUEL LEAK (See page FU-9)**
21. **INSPECT FOR EXHAUST GAS LEAK**
22. **INSTALL REAR FLOOR SERVICE HOLE COVER (See page FU-32)**
23. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-55)**
24. **PERFORM INITIALIZATION**
    (a) Perform initialization procedure (See page IN-43).
    HINT:
    Some vehicle systems require initialization after reconnecting the cable to the negative battery terminal.

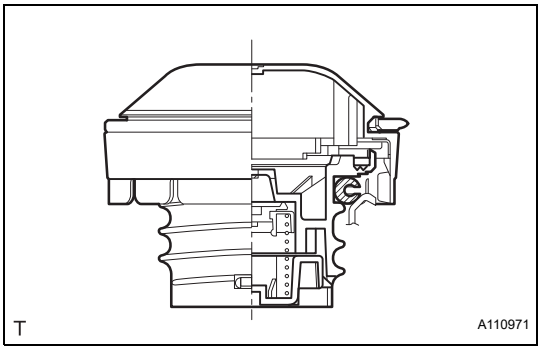
FU



(c) Disconnect the vent line hose from the fuel tank.
(d) Connect the pressure gauge to the fuel tank.
(e) Fill the fuel tank with fuel.
(f) Apply pressure of 4 kPa (41 gf/cm^2, 0.58 psi) to the vent port of the fuel tank.
HINT:
Check the amount of fuel in the fuel tank. When the fuel tank is full, the float valve of the fill check valve is closed and no air can pass through.
(g) Remove the fuel tank cap, and check that the pressure drops.
If the pressure does not drop, replace the fuel tank assembly.
(h) Reconnect the vent line hose to the fuel tank.



7. CHECK AIR INLET LINE
(a) Disconnect the air inlet line hose from the charcoal canister.
(b) Check that air can flow freely into the air inlet line.
If air cannot flow freely into the air inlet line, repair or replace it.
(c) Reconnect the air inlet line hose to the charcoal canister.



INSPECTION

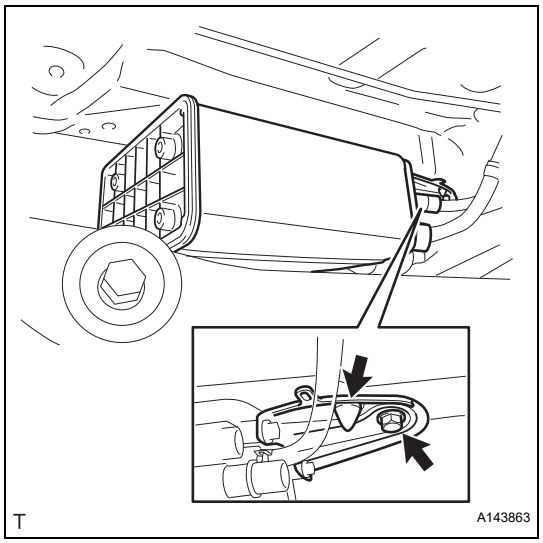
1. INSPECT FUEL TANK CAP ASSEMBLY
(a) Visually check if the cap and gasket are deformed or damaged.
If necessary, replace the cap.

INSTALLATION

1. INSTALL CHARCOAL CANISTER ASSEMBLY

(a) Install the charcoal canister bracket with the 2 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

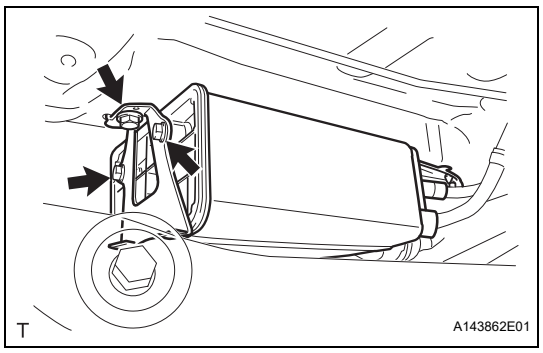
(b) Install the charcoal canister with the bolt and clip.
Torque: 39 N*m (398 kgf*cm, 29 ft.*lbf)



(c) Install the charcoal canister bracket with the 3 bolts.
Torque: Body side
39 N*m (398 kgf*cm, 29 ft.*lbf)
Charcoal canister side
5.4 N*m (55 kgf*cm, 48 in.*lbf)

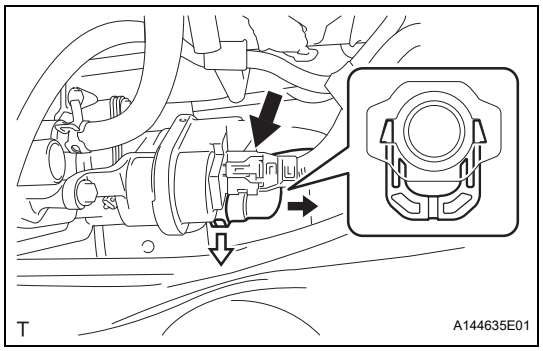
(d) Connect the purge line hose.

(e) Connect the wire harness clamp.



(f) Connect the vapor pressure sensor connector.

(g) Connect the charcoal canister filter sub-assembly.



2. INSTALL FUEL TANK ASSEMBLY

HINT:
(See page FU-41)

3. INSPECT FOR EXHAUST GAS LEAK

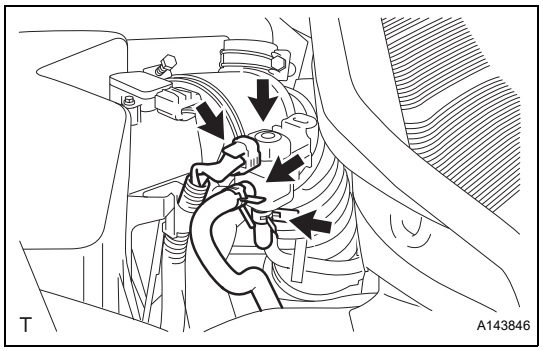
INSTALLATION

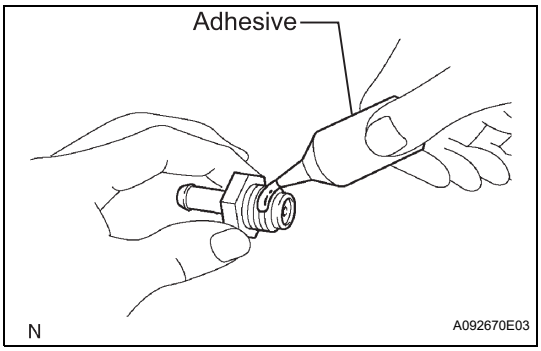
1. INSTALL VACUUM SWITCHING VALVE

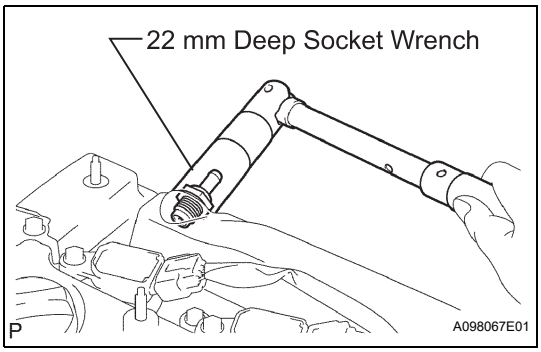
(a) Install the vacuum switching valve onto the air cleaner hose.

(b) Connect the 2 purge line hoses to the vacuum switching valve.

(c) Connect the vacuum switching valve connector.





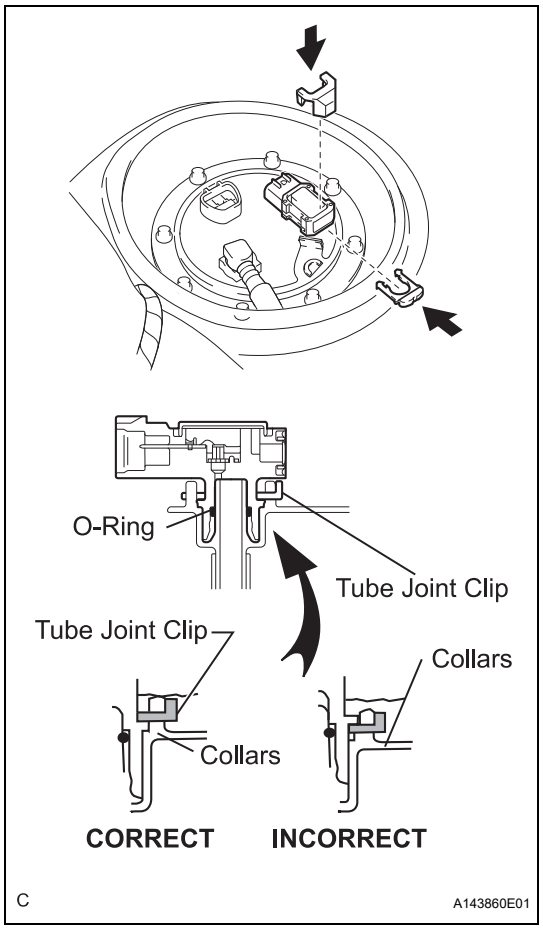


INSTALLATION

1. **INSTALL VENTILATION VALVE SUB-ASSEMBLY**
   (a) Apply adhesive to 2 or 3 threads of the ventilation valve.
   Adhesive:
   Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent

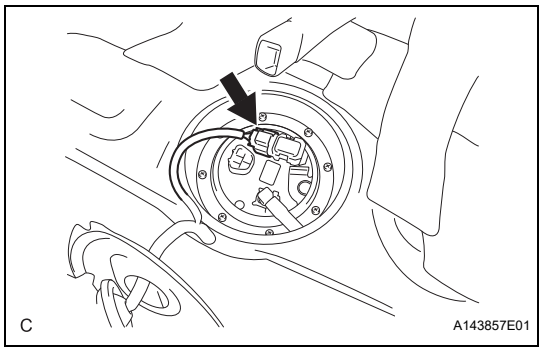
   (b) Using a 22 mm deep socket wrench, install the ventilation valve.
   Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)
   NOTICE:
   Do not start the engine within 1 hour after installation.
   (c) Connect the ventilation hose.
2. **INSPECT FOR EXHAUST GAS LEAK**
3. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-114)**
4. **INSTALL BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY (See page ES-383)**

EC



INSTALLATION

1. **INSTALL VAPOR PRESSURE SENSOR ASSEMBLY**
   (a) Install the vapor pressure sensor assembly with the tube joint clip and cover.
   NOTICE:
   - **Check that there are no scratches or foreign objects on the connecting part.**
   - **Check that the vapor pressure sensor assembly is inserted securely.**
   - **Check that the tube joint clip is on the collar of the vapor pressure sensor assembly.**
   - **After installing the tube joint clip, check that the fuel tube joint is pulled off.**



   (b) Connect the connector.

2. **INSTALL REAR FLOOR SERVICE HOLE COVER (See page FU-32)**
3. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-55)**
4. **INSTALL FUEL TANK CAP ASSEMBLY**
   HINT:
   (See page FU-41)

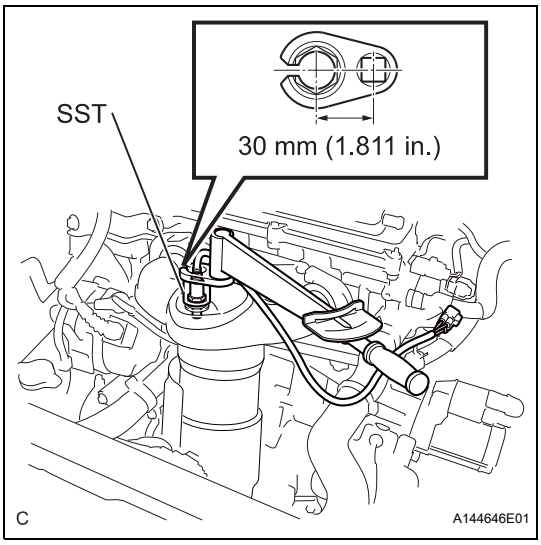
EC

INSTALLATION

1. INSTALL AIR FUEL RATIO SENSOR

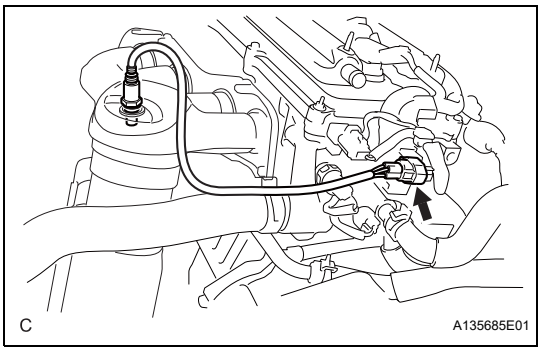
(a) Temporarily tighten the air fuel ratio sensor.

NOTICE:
Do not damage the air fuel ratio sensor.



(b) Using SST, fully tighten the air fuel ratio sensor.

SST 09224-00010
Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf)
NOTICE:
The torque shown above should be used for tightening without using SST. When the SST is used for tightening, the torque should be calculated based on the length of the SST (See page IN-5).



(c) Connect the air fuel ratio sensor connector.

2. INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-113)

3. INSPECT FOR EXHAUST GAS LEAK

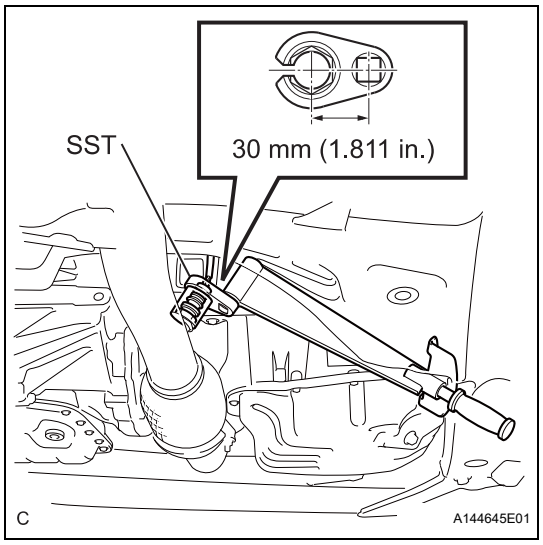
EC

INSTALLATION

1. INSTALL HEATED OXYGEN SENSOR

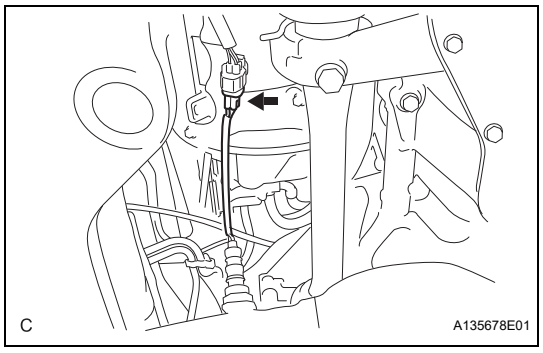
(a) Temporarily tighten the heated oxygen sensor.

NOTICE:
Do not damage the heated oxygen sensor.



(b) Using SST, fully tighten the heated oxygen sensor.

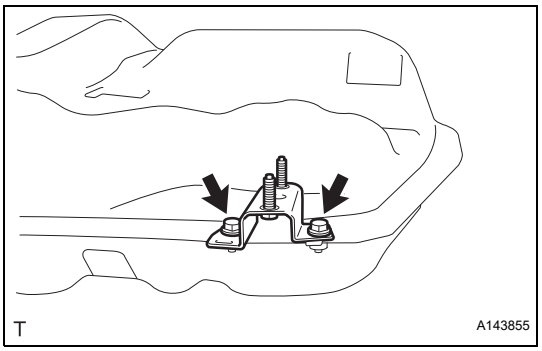
SST 09224-00010
Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf)
NOTICE:
The torque shown above should be used for tightening without using SST. When the SST is used for tightening, the torque should be calculated based on the length of the SST (See page IN-5).



(c) Connect the heated oxygen sensor connector.

2. INSPECT FOR EXHAUST GAS LEAK

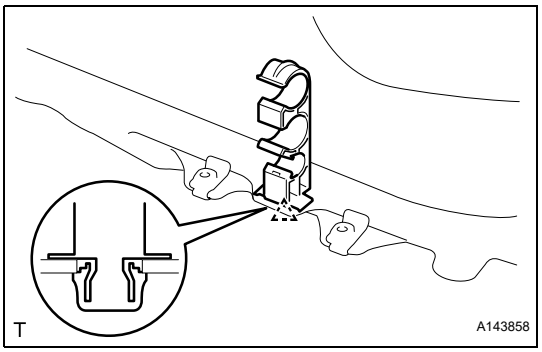
EC



3. REPLACE FUEL SOLENOID VALVE RETURN BRACKET

(a) Remove the 2 bolts and fuel solenoid valve return bracket.

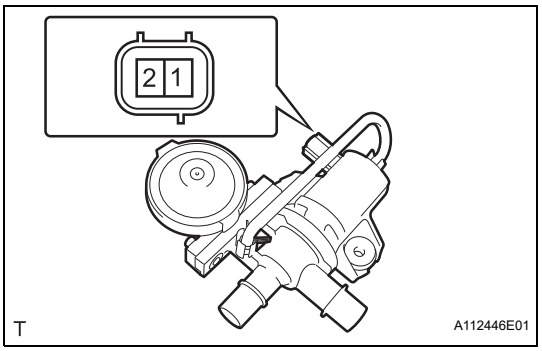
(b) Remove the 2 clip nuts.



4. REMOVE NO. 1 FUEL TUBE CLAMP

(a) Disconnect the clamp to remove the No. 1 fuel tube clamp.

EC



INSPECTION

1. INSPECT FUEL VAPOR CONTAINMENT VALVE

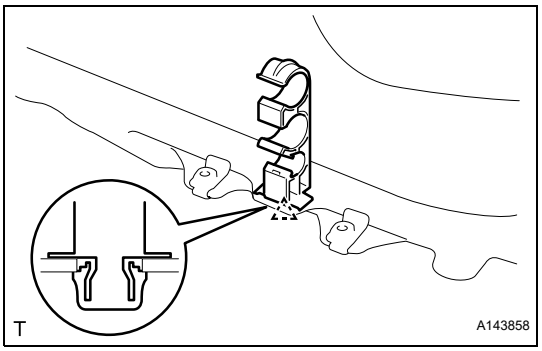
(a) Check the fuel vapor containment valve.

(1) Measure the resistance.

Standard resistance

Tester connection	Specified Condition
1 - 2	25 to 30 Ω at 20°C (68°F)

If the resistance is not as specified, replace the fuel vapor containment valve.



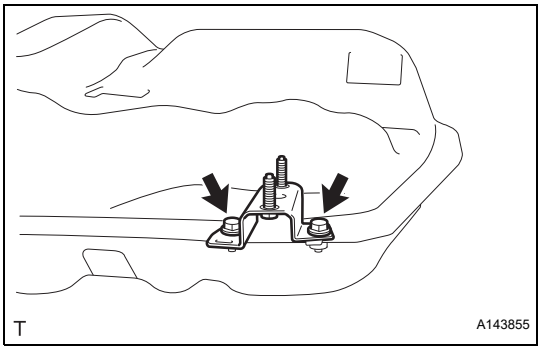
INSTALLATION

1. INSTALL NO. 1 FUEL TUBE CLAMP

(a) Connect the clamp to install the No. 1 fuel tube clamp.

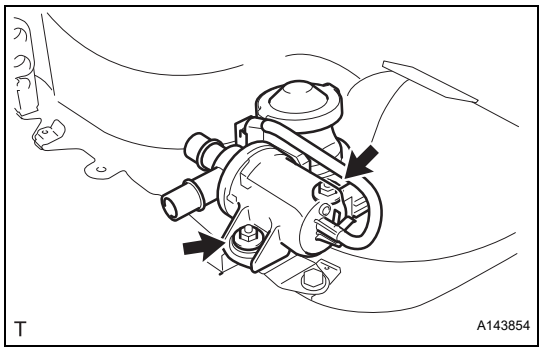
2. INSTALL FUEL SOLENOID VALVE RETURN BRACKET

(a) Install the 2 clip nuts.



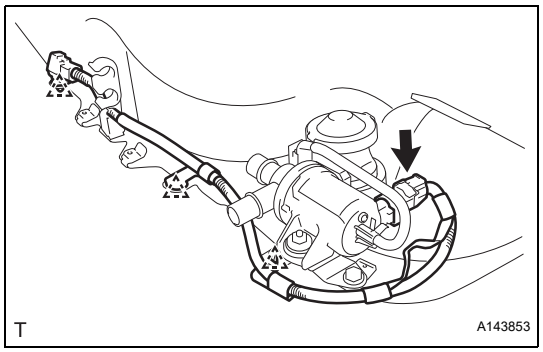
(b) Install the fuel solenoid valve return bracket with the 2 bolts.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

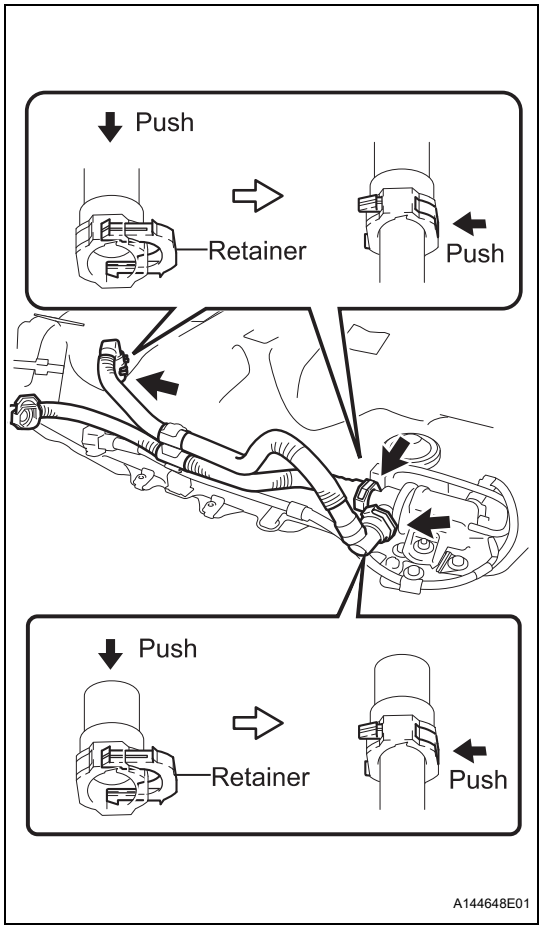


3. INSTALL FUEL VAPOR CONTAINMENT VALVE

(a) Install the fuel vapor containment valve with the 2 nuts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)



(b) Connect the fuel vapor containment valve connector and 3 clips to install the wire harness.



(c) Connect the 2 fuel tank vent hoses.
(1) Push the quick connector into the pipe and push up the retainer so that the claws engage.
NOTICE:
- **Before connecting the tube, make sure that it is not damaged. Make sure that there is no dirt present on the connecting surfaces.**
- **After connecting, check if the quick connector and the charcoal canister are securely connected by pulling on them.**

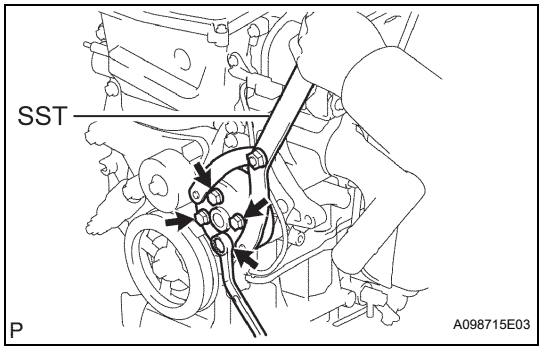
4. INSTALL FUEL TANK ASSEMBLY

HINT:
(See page FU-41)

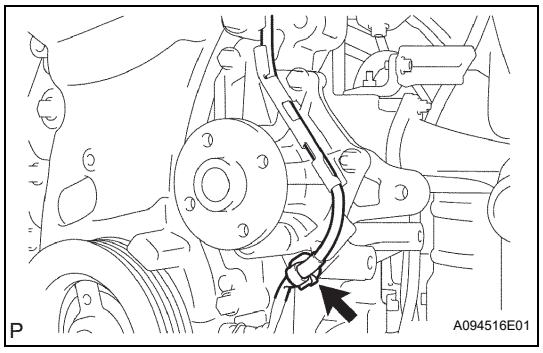
EC

REMOVAL

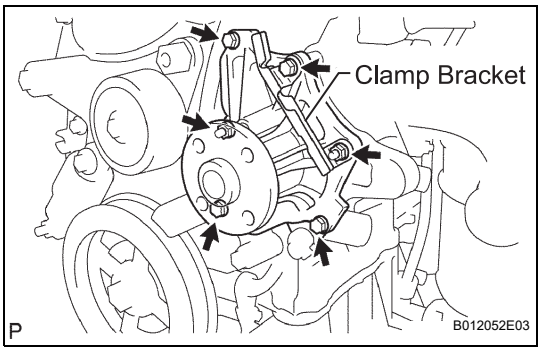
1. **REMOVE FRONT WHEEL OPENING EXTENSION PAD RH**
2. **REMOVE FRONT WHEEL OPENING EXTENSION PAD LH**
3. **REMOVE ENGINE UNDER COVER RH**
4. **REMOVE ENGINE UNDER COVER LH**
5. **DRAIN ENGINE COOLANT (See page CO-5)**
6. **REMOVE FRONT FENDER APRON SEAL RH**
7. **REMOVE NO. 2 ENGINE MOUNTING STAY RH (See page EM-91)**
8. **REMOVE ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-91)**
9. **REMOVE NO. 2 ENGINE MOUNTING BRACKET RH (See page EM-91)**
10. **REMOVE V-RIBBED BELT TENSIONER COVER SUB-ASSEMBLY (See page EM-6)**
11. **REMOVE V-RIBBED BELT (See page EM-6)**
12. **REMOVE V-RIBBED BELT TENSIONER ASSEMBLY (See page EM-100)**
13. **REMOVE WATER PUMP PULLEY**
    (a) Using SST, remove the 4 bolts and water pump pulley.
    SST 09960-10010 (09962-01000, 09963-00700)



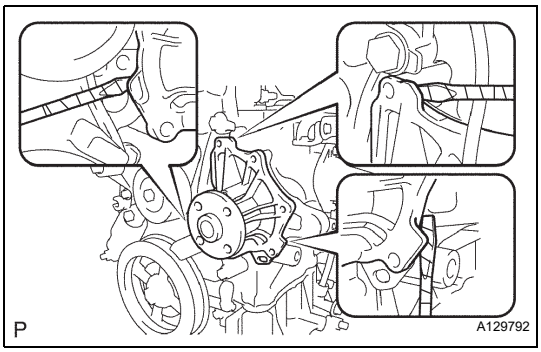
14. **REMOVE WATER PUMP ASSEMBLY**
    (a) Remove the clamp of the crankshaft position sensor from the water pump.
    (b) Disconnect the wire of the crankshaft position sensor from the clamp bracket.



CO

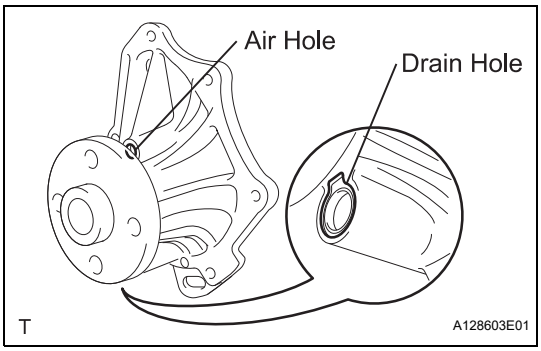


(c) Remove the 4 bolts, 2 nuts and clamp bracket.



(d) Using a screwdriver, pry between the water pump and cylinder block, and then remove the water pump.
HINT:
Tape the screwdriver tip before use.
NOTICE:
Be careful not to damage the contact surfaces of the water pump and cylinder block.

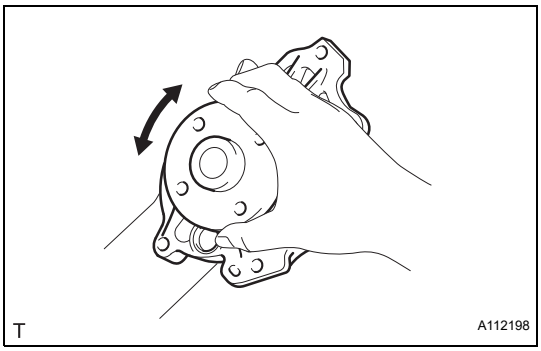
CO



INSPECTION

1. INSPECT WATER PUMP ASSEMBLY

(a) Visually check the drain hole and air hole for coolant leakage.
If leakage is found, replace the water pump assembly.



(b) Turn the pulley, and then check that the water pump bearing moves smoothly without making a "click" sound.
If it does not move smoothly, replace the water pump assembly.

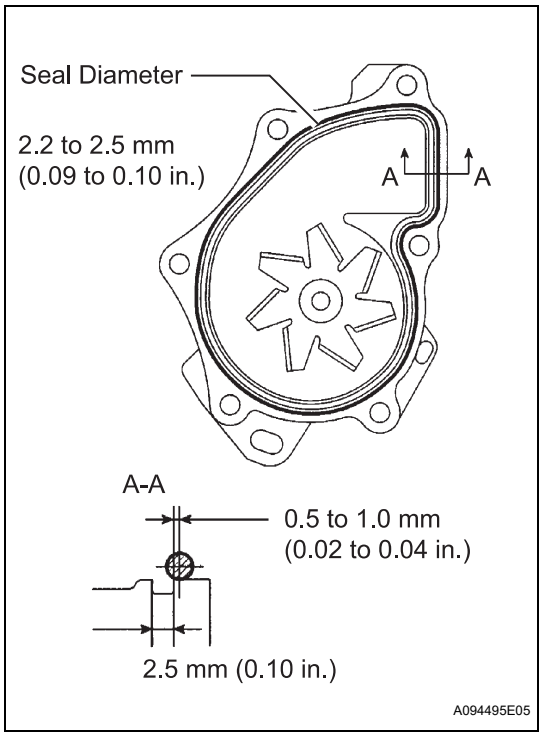
INSTALLATION

1. INSTALL WATER PUMP ASSEMBLY

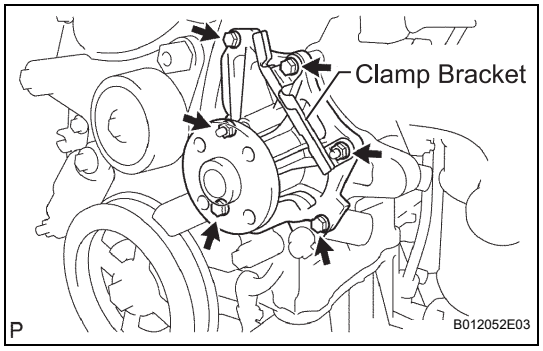
(a) Remove any old seal packing material from the contact surface.

(b) Apply a continuous line of seal packing as shown in the illustration.

Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent
Standard seal diameter:
2.2 to 2.5 mm (0.09 to 0.10 in.)
NOTICE:
- **Remove any oil from the contact surface.**
- **The parts must be set within 3 minutes after applying seal packing. Otherwise, the material must be removed and reapplied.**

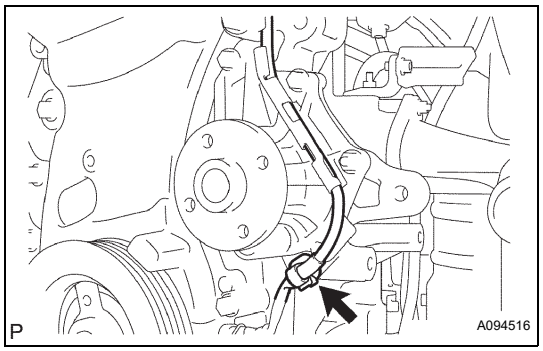


(c) Install the water pump and clamp bracket with the 4 bolts and 2 nuts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

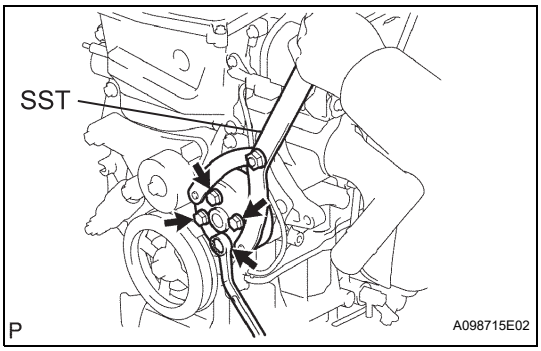


(d) Install the wire of the crankshaft position sensor onto the clamp bracket.

(e) Install the clamp of the crankshaft position sensor onto the water pump.



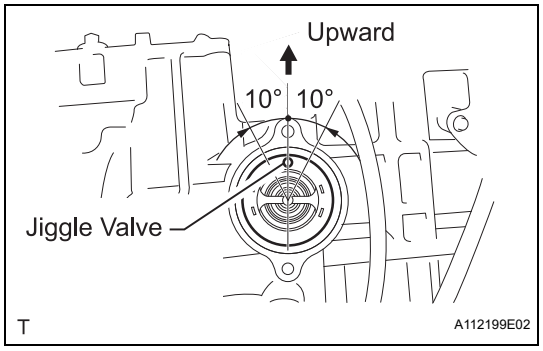
CO

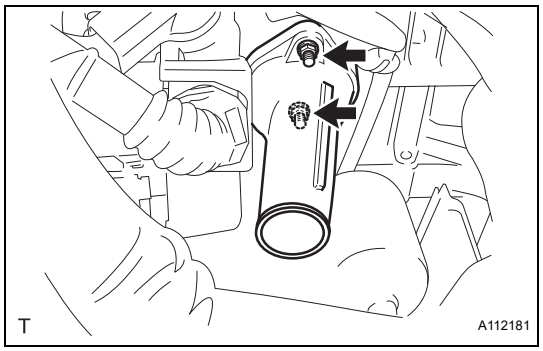


2. **INSTALL WATER PUMP PULLEY**
   (a) Using SST, install the water pump pulley with the 4 bolts.
   SST 09960-10010 (09962-01000, 09963-00700)
   Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)
3. **INSTALL V-RIBBED BELT TENSIONER ASSEMBLY (See page EM-103)**
4. **INSTALL V-RIBBED BELT (See page EM-6)**
5. **INSTALL V-RIBBED BELT TENSIONER COVER SUB-ASSEMBLY (See page EM-7)**
6. **INSTALL NO. 2 ENGINE MOUNTING BRACKET RH (See page EM-30)**
7. **INSTALL ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-112)**
8. **INSTALL NO. 2 ENGINE MOUNTING STAY RH (See page EM-112)**
9. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-113)**
10. **ADD ENGINE COOLANT (See page CO-5)**
11. **INSPECT FOR ENGINE COOLANT LEAK (See page CO-1)**
12. **INSTALL ENGINE UNDER COVER LH**
13. **INSTALL ENGINE UNDER COVER RH**
14. **INSTALL FRONT WHEEL OPENING EXTENSION PAD RH**
15. **INSTALL FRONT WHEEL OPENING EXTENSION PAD LH**

INSTALLATION

1. **INSTALL THERMOSTAT**
   (a) Install a new gasket onto the thermostat.
   (b) Install the thermostat with the jiggle valve facing upward.
   HINT:
   The jiggle valve may be set to within 10° on either side of the prescribed position.

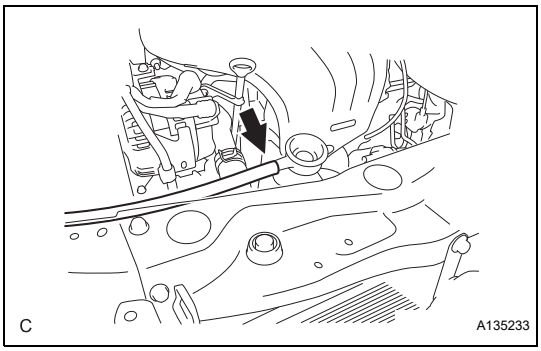


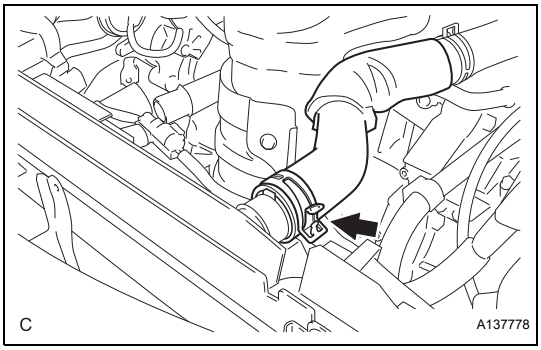


2. **INSTALL WATER INLET**
   (a) Install the water inlet with the 2 nuts.
   Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
3. **CONNECT RADIATOR HOSE OUTLET (See page EM-112)**
4. **ADD ENGINE COOLANT (See page CO-5)**
5. **INSPECT FOR ENGINE COOLANT LEAK (See page CO-1)**
6. **INSTALL ENGINE UNDER COVER LH**
7. **INSTALL ENGINE UNDER COVER RH**
8. **INSTALL FRONT WHEEL OPENING EXTENSION PAD LH**
9. **INSTALL FRONT WHEEL OPENING EXTENSION PAD RH**

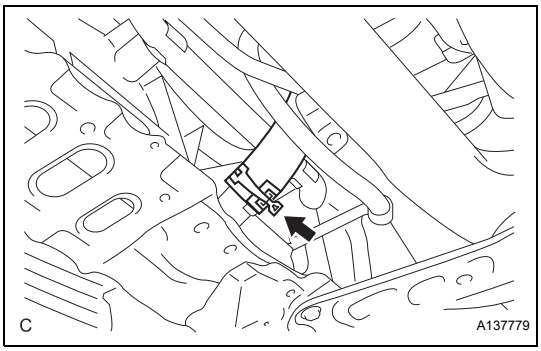
REMOVAL

1. **DRAIN ENGINE COOLANT (See page CO-5)**
2. **REMOVE FRONT WHEEL OPENING EXTENSION PAD LH**
3. **REMOVE FRONT WHEEL OPENING EXTENSION PAD RH**
4. **REMOVE ENGINE UNDER COVER RH**
5. **REMOVE ENGINE UNDER COVER LH**
6. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-90)**
7. **REMOVE FRONT BUMPER ASSEMBLY (See page ET-3)**
8. **REMOVE FRONT BUMPER ENERGY ABSORBER (See page ET-6)**
9. **SEPARATE RADIATOR RESERVOIR TANK HOSE**
   (a) Separate the radiator reservoir tank hose from the radiator assembly.

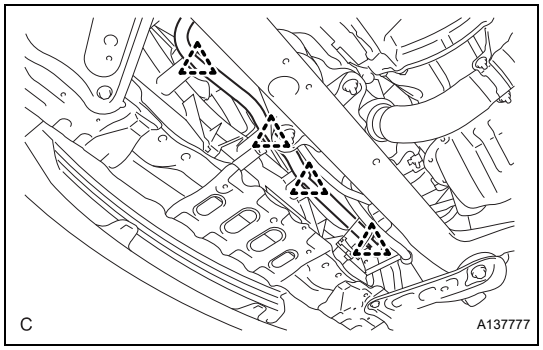




10. **DISCONNECT RADIATOR HOSE INLET**
    (a) Disconnect the radiator hose inlet from the radiator assembly.

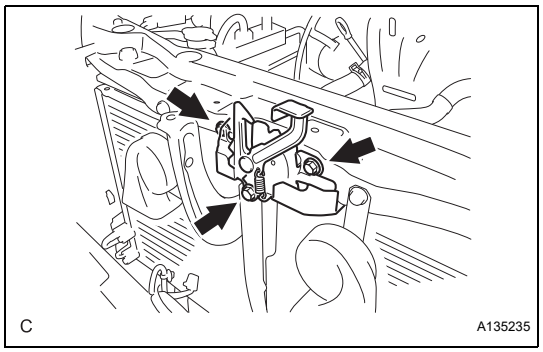


11. **DISCONNECT RADIATOR HOSE OUTLET**
    (a) Disconnect the radiator hose outlet from the radiator assembly.



12. SEPARATE WATER HOSE

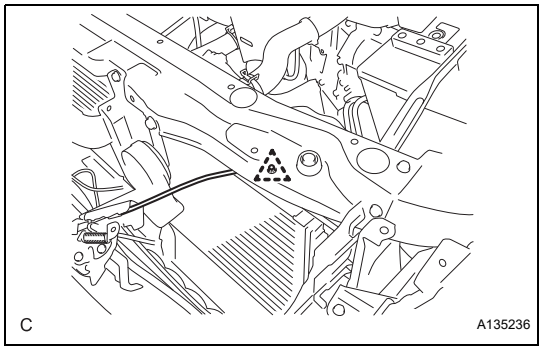
(a) Separate the 4 clamps and water hose.



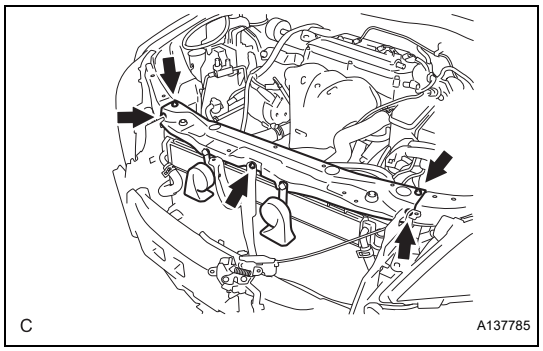
13. REMOVE RADIATOR SUPPORT UPPER

(a) Disconnect the horn connector.

(b) Remove the 3 bolts and separate the hood lock assembly from the radiator support upper.



(c) Remove the clamp and separate the hood lock control cable from the radiator support upper.

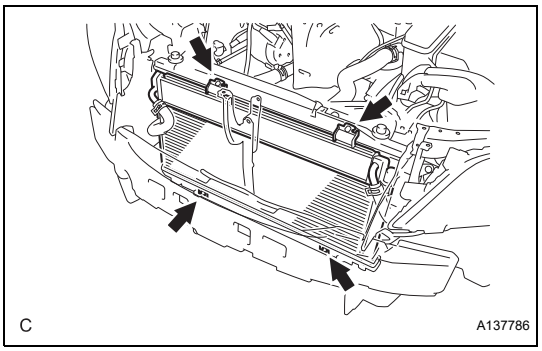


(d) Remove the 5 bolts and radiator support upper.

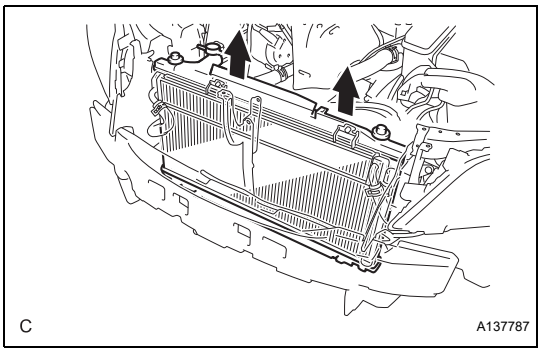
14. REMOVE RADIATOR ASSEMBLY

(a) Remove the 4 clamps and 2 connectors.

CO

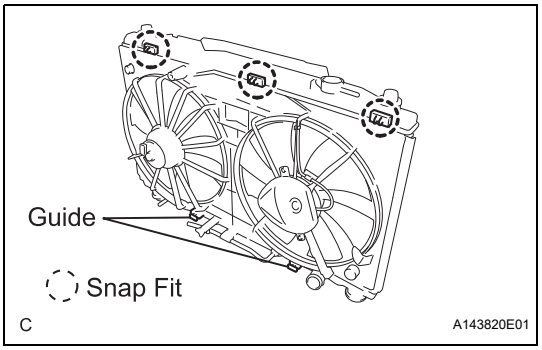


(b) Remove the 4 bolts and separate the condenser assembly from the radiator assembly.



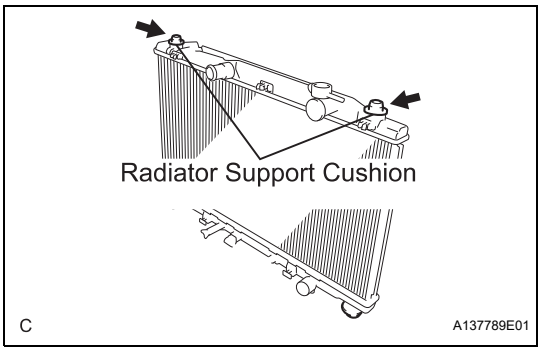
(c) Remove the radiator assembly from the body.

CO



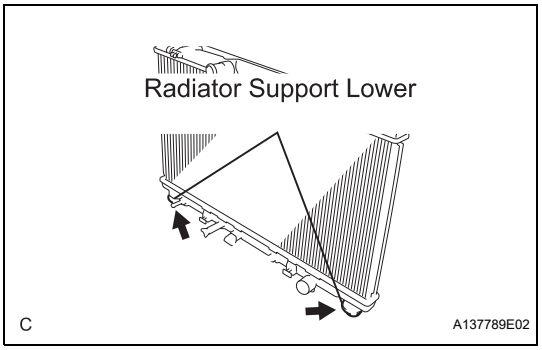
15. REMOVE FAN ASSEMBLY WITH MOTOR

(a) Release the 3 snap fits and lift the fan assembly with motor from the radiator.



16. REMOVE RADIATOR SUPPORT CUSHION

(a) Remove the 2 radiator support cushions from the radiator assembly.



17. REMOVE RADIATOR SUPPORT LOWER

(a) Remove the 2 radiator support lowers from the radiator assembly.

DISASSEMBLY

1. REMOVE DRAIN PLUG

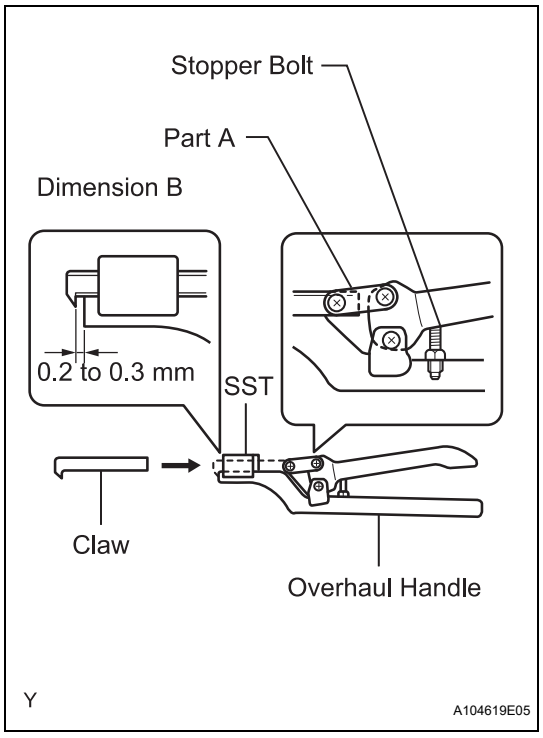
(a) Remove the drain plug.

(b) Remove the O-ring.

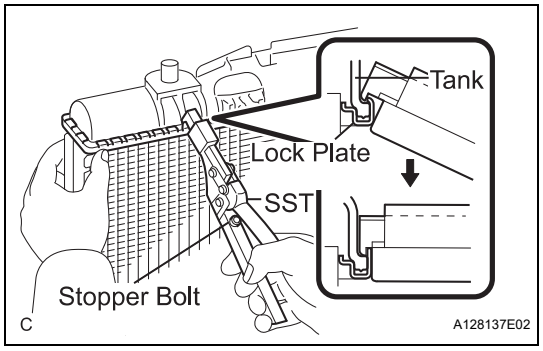
2. REMOVE RADIATOR TANK UPPER

(a) Install the claw to the overhaul handle, inserting it in the hole in part A as shown in the illustration.
SST 09230-01010 (09231-01010, 09231-01030)

(b) While gripping the handle, adjust the stopper bolt so that dimension B is as shown in the illustration.
Dimension B:
0.2 to 0.3 mm (0.008 to 0.012 in.)
NOTICE:
If the stopper bolt is not adjusted, the claw may be damaged.

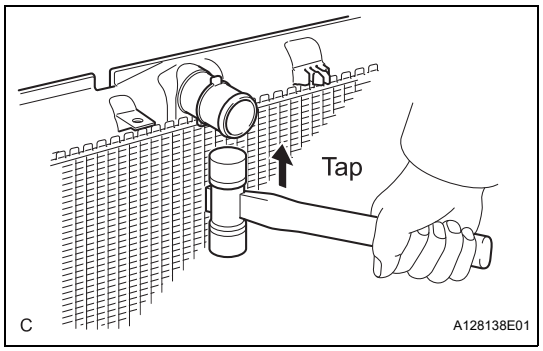


(c) Using SST to release the caulking, grip the handle until stopped by the stopper bolt.
SST 09230-01010 (09231-01010, 09231-01030)



(d) Lightly tap the bracket of the radiator (or radiator hose inlet or outlet) with a soft-faced hammer and remove the tank.

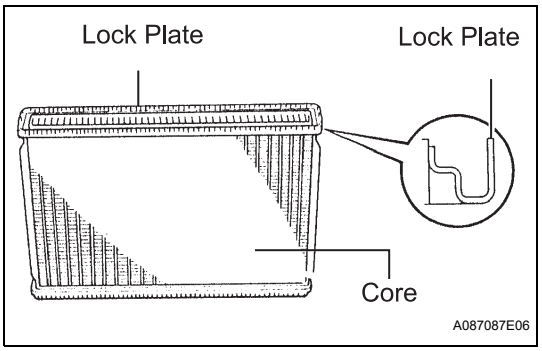
(e) Remove the O-ring.



3. REMOVE RADIATOR TANK LOWER

HINT:
Removal procedure of the radiator tank lower is the same as that of the radiator tank upper.

CO



INSPECTION

1. INSPECT LOCK PLATE

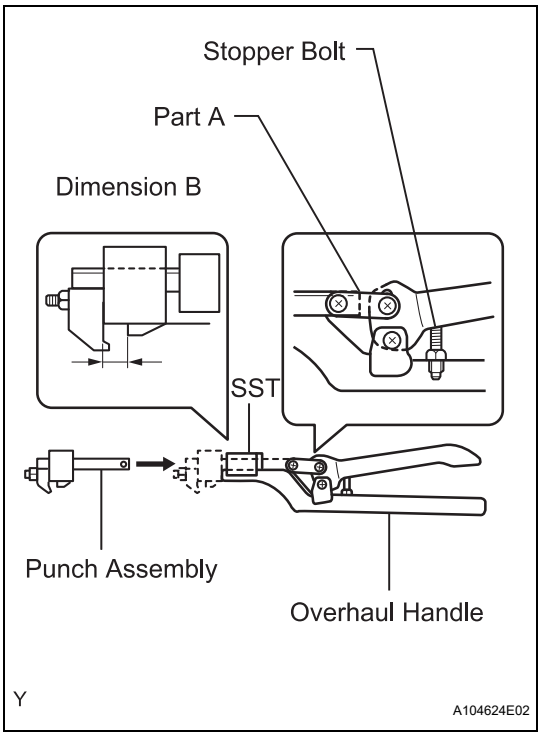
(a) Inspect the lock plate for damage.

HINT:

- If the sides of the lock plate groove are deformed, reassembly of the tank will be impossible. Therefore, first correct the shape of the lock plate groove with pliers or a similar object, if necessary.
- Water leakage will result if the bottom of the lock plate groove is damaged or dented. Repair or replace the lock plate if necessary.

NOTICE:

The radiator can only be recaulked 2 times. After recaulking 2 times. the radiator core must be replaced.



REASSEMBLY

1. INSTALL RADIATOR TANK UPPER

(a) Install the punch assembly to the overhaul handle, inserting it in the hole in part A as shown in the illustration.

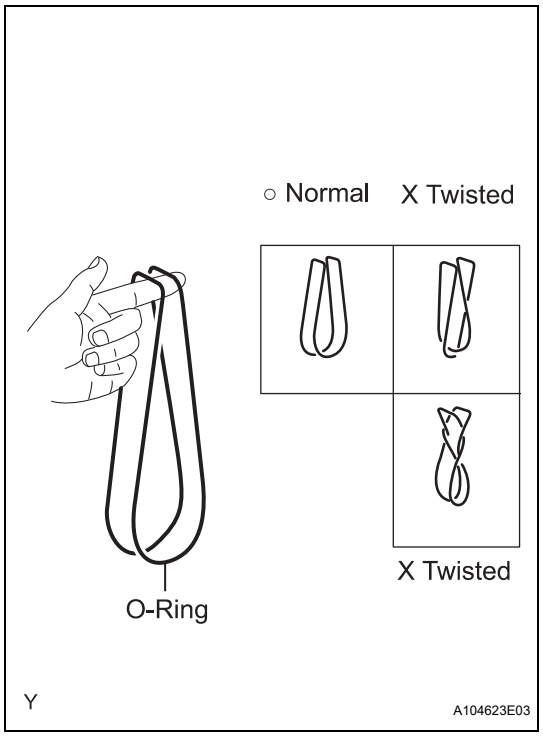
SST 09230-01010, 09231-14010

(b) While gripping the handle, adjust the stopper bolt so that dimension B is as shown in the illustration.

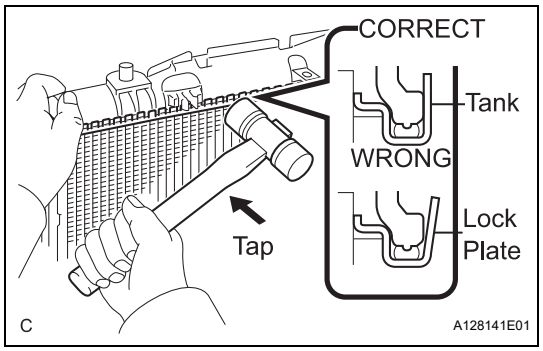
Dimension B:

8.4 mm (0.331 in.)

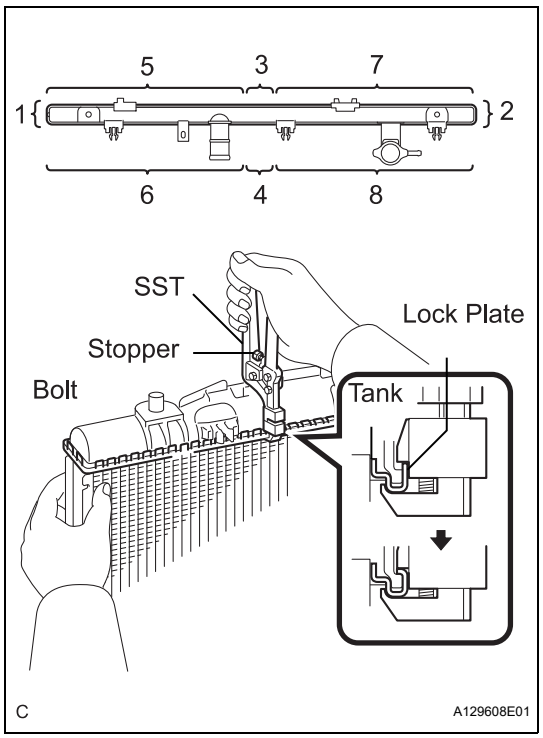
CO



(c) After checking that there are no foreign objects in the lock plate groove, install a new O-ring without twisting it.
HINT:
When cleaning the lock plate groove, lightly rub it with sandpaper without scratching it.

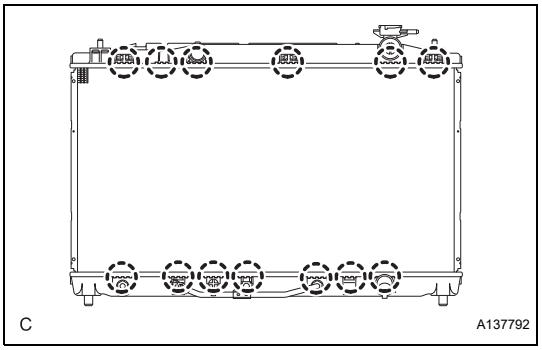


(d) Install the tank without damaging the O-ring.
(e) Tap the lock plate with a soft-faced hammer so that there is no gap between the lock plate and the tank.

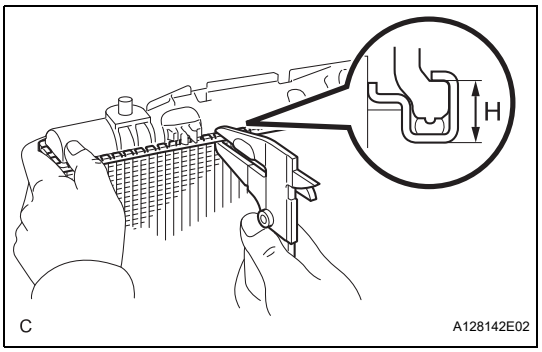


(f) Lightly press SST against the lock plate in the order shown in the illustration. After repeating this a few times, fully caulk the lock plate by gripping the handle until stopped by the stopper plate.
HINT:
For the areas where cannot be tapped with SST, use pliers or similar objects and be careful not to damage the core plates.

CO



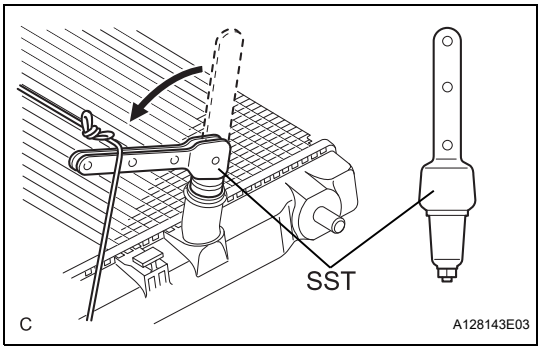
(g) Do not tap the areas indicated by dotted circles in the illustration.



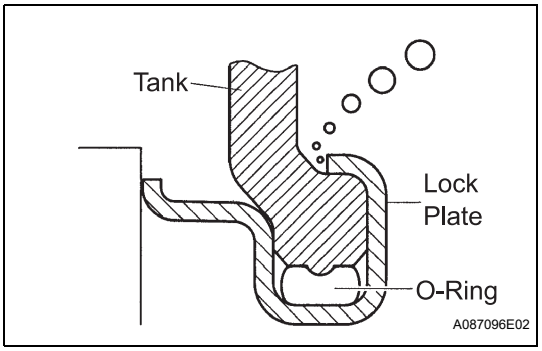
(h) Check the lock plate height (H) after completing caulking.
Plate height (H):
7.40 to 7.80 mm (0.2913 to 0.3071 in.)
If not within the specified height range, adjust the stopper bolt of the handle and caulk again.

2. INSTALL RADIATOR TANK LOWER
SST 09230-01010, 09231-14010
HINT:
Removal procedure of the radiator tank lower is the same as that of the upper radiator tank.

3. INSTALL DRAIN PLUG
(a) Install a new O-ring to the drain plug.
(b) Install the drain plug.



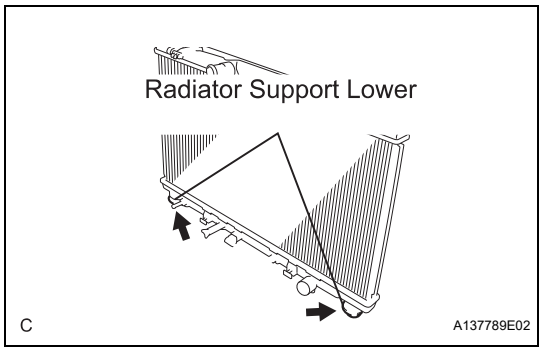
4. INSPECT FOR WATER LEAK
(a) Plug the inlet and outlet pipes of the radiator with SST.
SST 09230-01010
(b) Using the radiator cap tester, apply pressure to the radiator.
Test pressure:
177 kPa (1.8 kgf/cm^2, 26 psi)
(c) Submerge the radiator in water.



(d) Inspect for leaks.
HINT:
On radiators with resin tanks, there is clearance between the tank and lock plate where a minute amount of air will remain, giving the appearance of an air leak when the radiator is submerged in water. Therefore, before doing the water leak test, first swish the radiator around in the water until all air bubbles disappear.

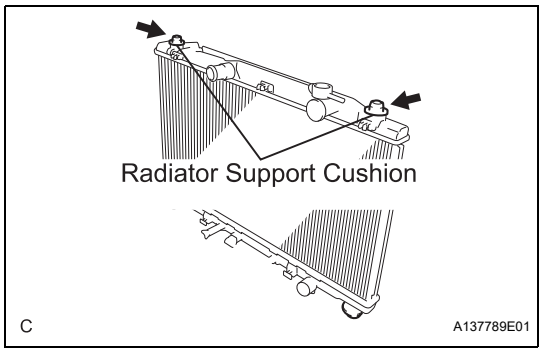
CO

INSTALLATION



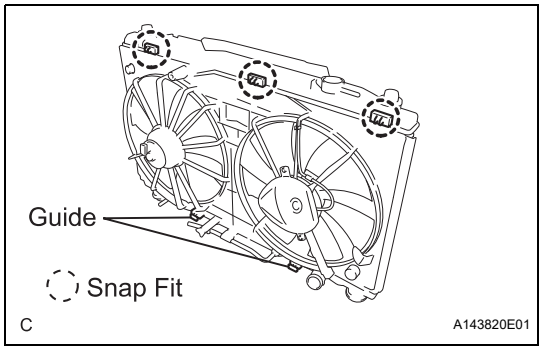
1. INSTALL RADIATOR SUPPORT LOWER

(a) Install the 2 radiator support lowers to the radiator assembly.



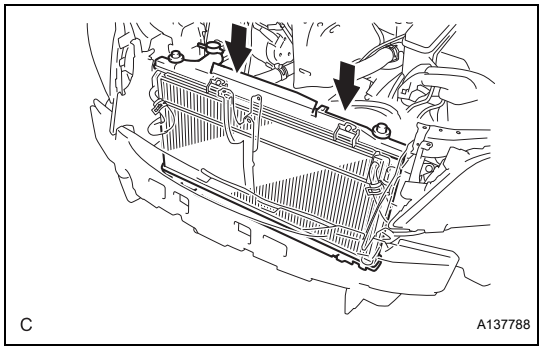
2. INSTALL RADIATOR SUPPORT CUSHION

(a) Install the 2 radiator support cushions to the radiator assembly.



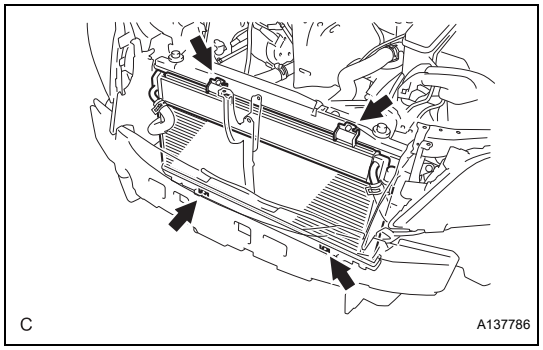
3. INSTALL FAN ASSEMBLY WITH MOTOR

(a) Install the fan assembly with motor to the radiator with the 2 guides at the bottom and 3 snap fits on the top.



4. INSTALL RADIATOR ASSEMBLY

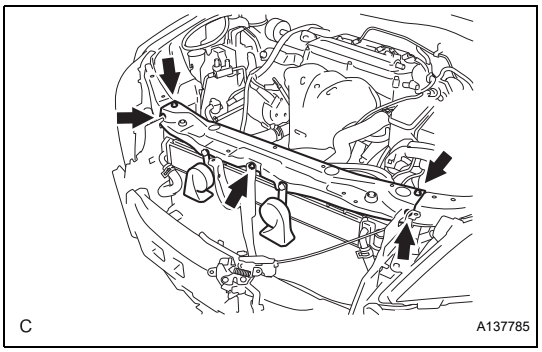
(a) Install the radiator to the body.



(b) Install the condenser assembly with the 4 bolts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

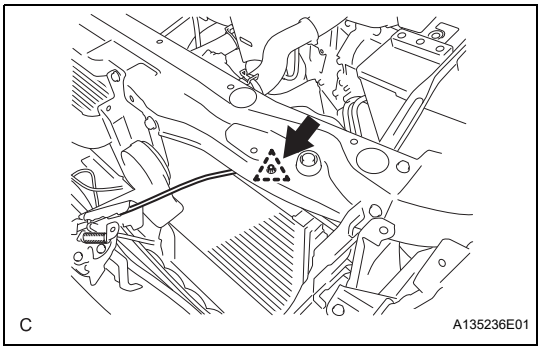
CO

(c) Connect the 2 fan motor connectors and the 4 clamps.

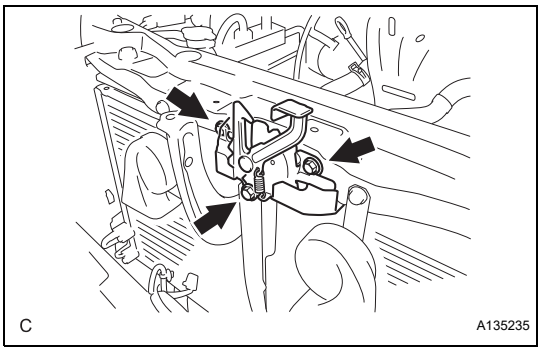


5. INSTALL RADIATOR SUPPORT UPPER

(a) Install the radiator support upper with the 5 bolts.
Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf)

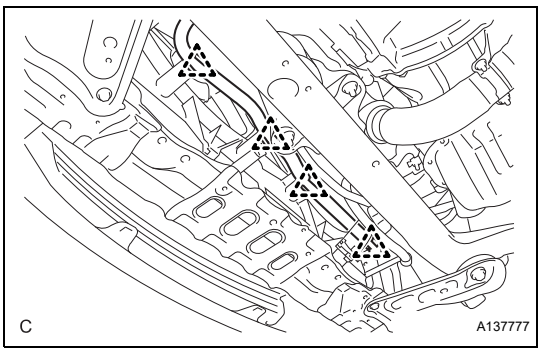


(b) Install the hood lock control cable assembly to the radiator support upper with the clamp.



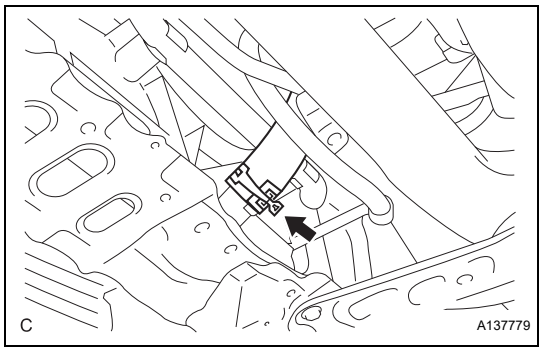
(c) Install the hood lock assembly to the radiator support upper with the 3 bolts.
Torque: 7.5 N*m (77 kgf*cm, 66 in.*lbf)

(d) Connect the horn connector.

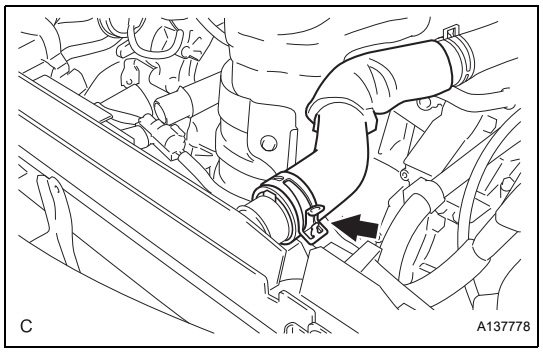


6. CONNECT WATER HOSE

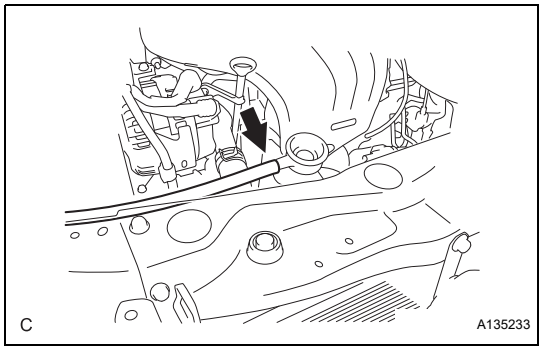
(a) Connect the water hose with the 4 clamps.



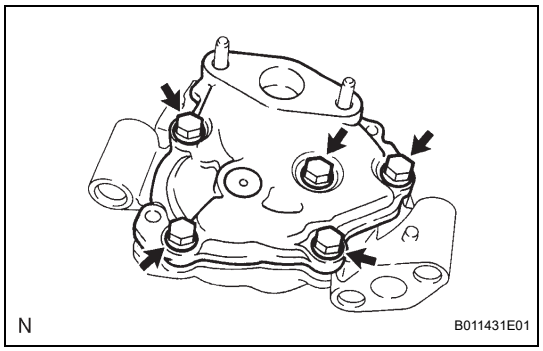
7. **CONNECT RADIATOR HOSE OUTLET**
   (a) Connect the radiator hose outlet to the radiator assembly.



8. **CONNECT RADIATOR HOSE INLET**
   (a) Connect the radiator hose inlet to the radiator assembly.



9. **CONNECT RADIATOR RESERVOIR TANK HOSE**
   (a) Connect the radiator reservoir tank hose to the radiator assembly.
10. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-113)**
11. **INSTALL FRONT BUMPER ENERGY ABSORBER (See page ET-7)**
12. **INSTALL FRONT BUMPER ASSEMBLY (See page ET-9)**
13. **ADD ENGINE COOLANT (See page CO-5)**
14. **INSPECT FOR ENGINE COOLANT LEAK (See page CO-1)**
15. **INSTALL ENGINE UNDER COVER LH**
16. **INSTALL ENGINE UNDER COVER RH**
17. **INSTALL FRONT WHEEL OPENING EXTENSION PAD RH**
18. **INSTALL FRONT WHEEL OPENING EXTENSION PAD LH**

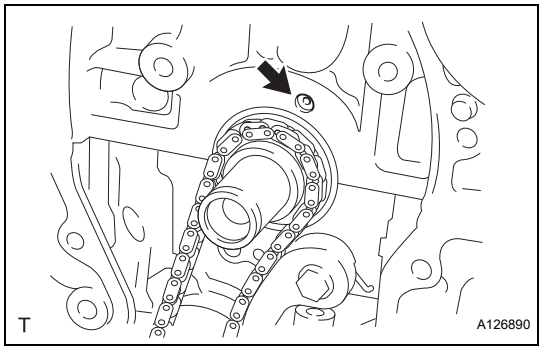


3. REMOVE OIL PUMP COVER

(a) Remove the 5 bolts and oil pump cover.

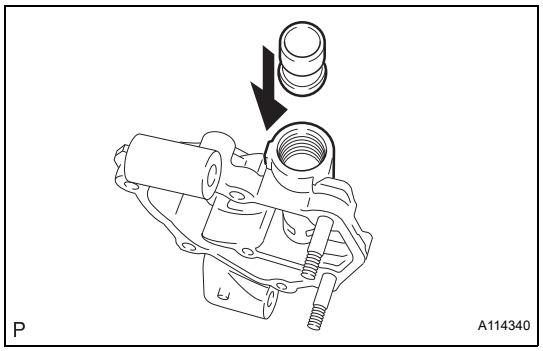
(b) Remove the oil pump rotor.

INSPECTION



1. INSPECT OIL JET

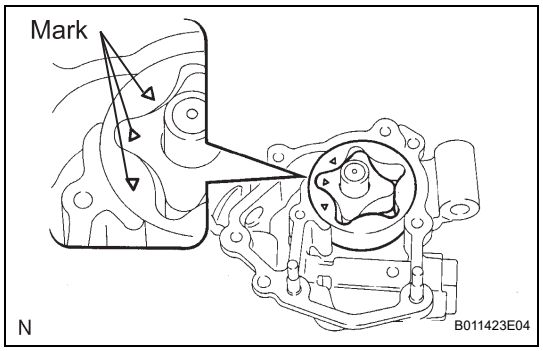
(a) Check the oil jet for damage or clogging.
If necessary, repair the cylinder block.



2. INSPECT OIL PUMP RELIEF VALVE

(a) Check the relief valve.

(1) Coat the valve with engine oil, and then check that the valve falls smoothly into the valve hole under its own weight.
If the valve does not fall smoothly, replace the relief valve. If necessary, replace the oil pump assembly.

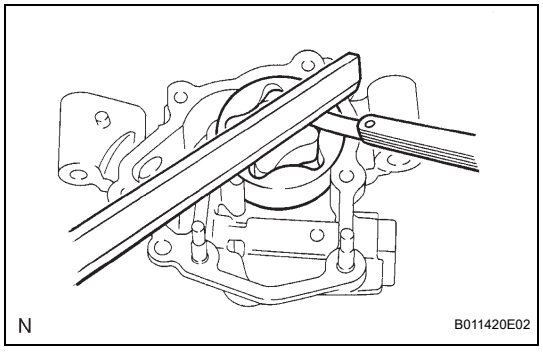


3. INSPECT OIL PUMP ROTOR

(a) Install the oil pump rotor.

(1) Coat the drive rotor and driven rotor with engine oil.

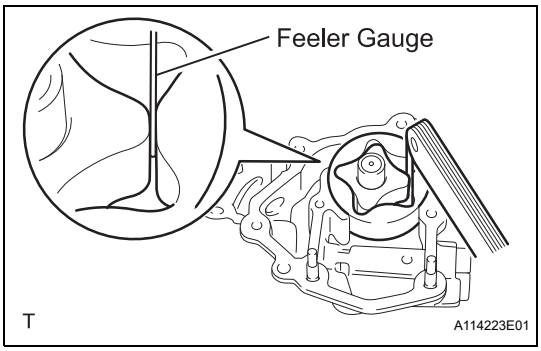
(2) Place the drive and driven rotors into the oil pump with the marks facing the pump cover side.



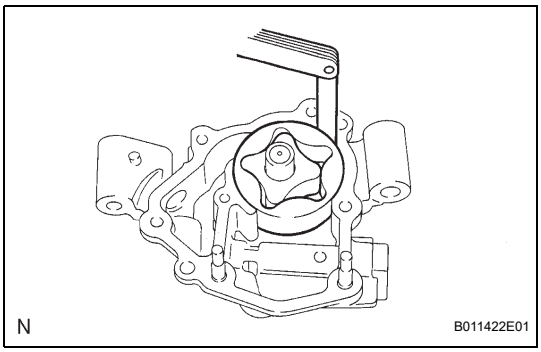
(b) Check the side clearance.

(1) Using a feeler gauge and precision straightedge, measure the clearance between the rotors and precision straightedge.
Standard clearance:
0.030 to 0.085 mm (0.0012 to 0.0033 in.)
Maximum clearance:
0.16 mm (0.0063 in.)
If the side clearance is greater than the maximum, replace the oil pump assembly.

LU



(c) Check the tip clearance.
(1) Using a feeler gauge, measure the clearance between the drive and driven rotor tips.
Standard clearance:
0.080 to 0.160 mm (0.0031 to 0.0063 in.)
Maximum clearance:
0.35 mm (0.0138 in.)
If the tip clearance is greater than the maximum, replace the oil pump assembly.



(d) Check the body clearance.
(1) Using a feeler gauge, measure the clearance between the driven rotor and pump body.
Standard clearance:
0.100 to 0.170 mm (0.0039 to 0.0067 in.)
Maximum clearance:
0.325 mm (0.0128 in.)
If the body clearance is greater than the maximum, replace the oil pump assembly.

4. **INSPECT NO. 2 CHAIN SUB-ASSEMBLY (See page EM-131)**

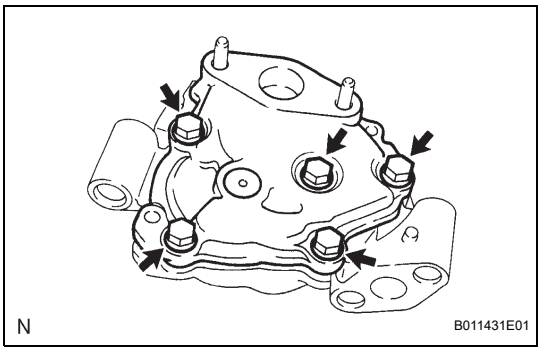
5. **INSPECT OIL PUMP DRIVE GEAR (See page EM-131)**

6. **INSPECT OIL PUMP DRIVE SHAFT GEAR (See page EM-132)**

7. **INSPECT CHAIN TENSIONER PLATE (See page EM-133)**

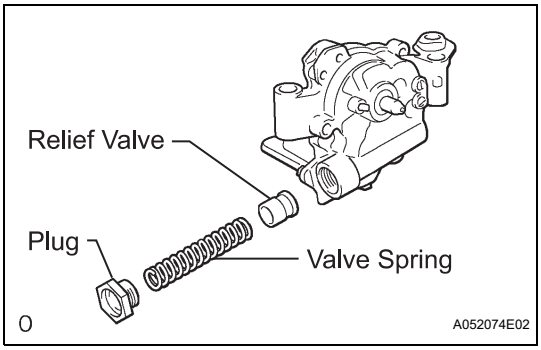
LU

REASSEMBLY

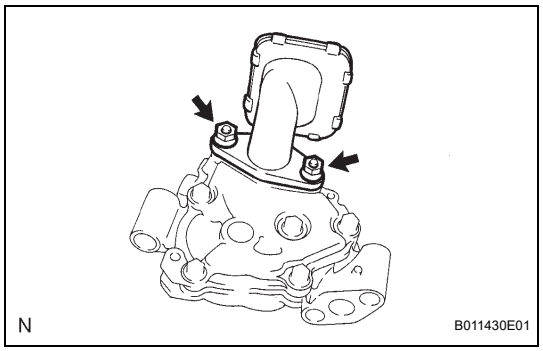


1. **INSTALL OIL PUMP COVER**
(a) Install the oil pump cover with the 5 bolts.
Torque: 8.8 N*m (90 kgf*cm, 78 in.*lbf)

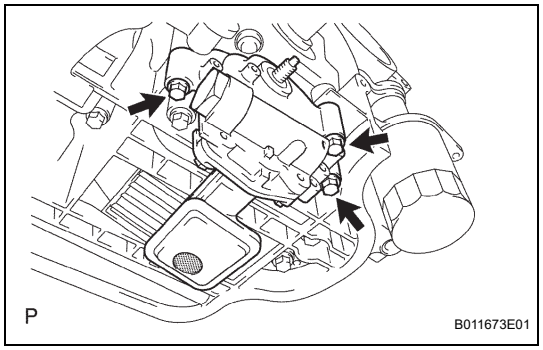
2. **INSTALL OIL PUMP RELIEF VALVE**
(a) Coat the relief valve with engine oil.



(b) Insert the relief valve and spring into the pump body hole.
(c) Using a 27 mm socket wrench, install the plug.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

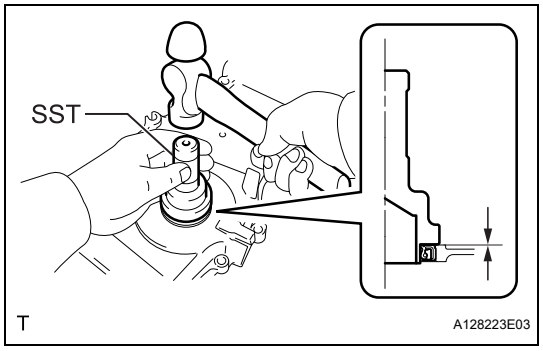


3. **INSTALL OIL PUMP STRAINER**
   (a) Install a new gasket and the oil pump strainer with the 2 nuts.
   Torque: 8.8 N*m (90 kgf*cm, 78 in.*lbf)



INSTALLATION

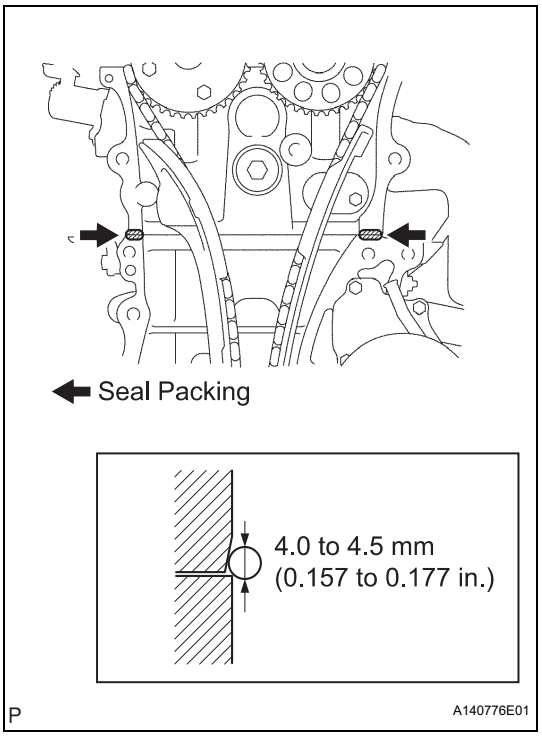
1. **INSTALL OIL PUMP ASSEMBLY**
   (a) Install a new gasket and the oil pump with the 3 bolts.
   Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)
2. **INSTALL NO. 2 CHAIN SUB-ASSEMBLY (See page EM-26)**
3. **INSTALL CRANKSHAFT TIMING SPROCKET (See page EM-27)**
4. **INSTALL NO. 1 CHAIN VIBRATION DAMPER (See page EM-28)**
5. **INSTALL CHAIN SUB-ASSEMBLY (See page EM-28)**
6. **INSTALL CHAIN TENSIONER SLIPPER (See page EM-29)**
7. **INSTALL TIMING CHAIN GUIDE (See page EM-29)**
8. **INSTALL NO. 1 CRANKSHAFT POSITION SENSOR PLATE (See page EM-29)**



9. **INSTALL TIMING CHAIN CASE OIL SEAL**
   (a) Using SST, tap in a new oil seal until its surface is flush with the timing chain cover edge.
   SST 09223-22010
   (b) Apply a light coat of MP grease to the lip of the oil seal.
   NOTICE:
   - **Keep the lip free of foreign matter.**
   - **Do not tap on the oil seal at an angle.**
   - **Make sure that the oil seal does not stick out of the timing chain cover.**

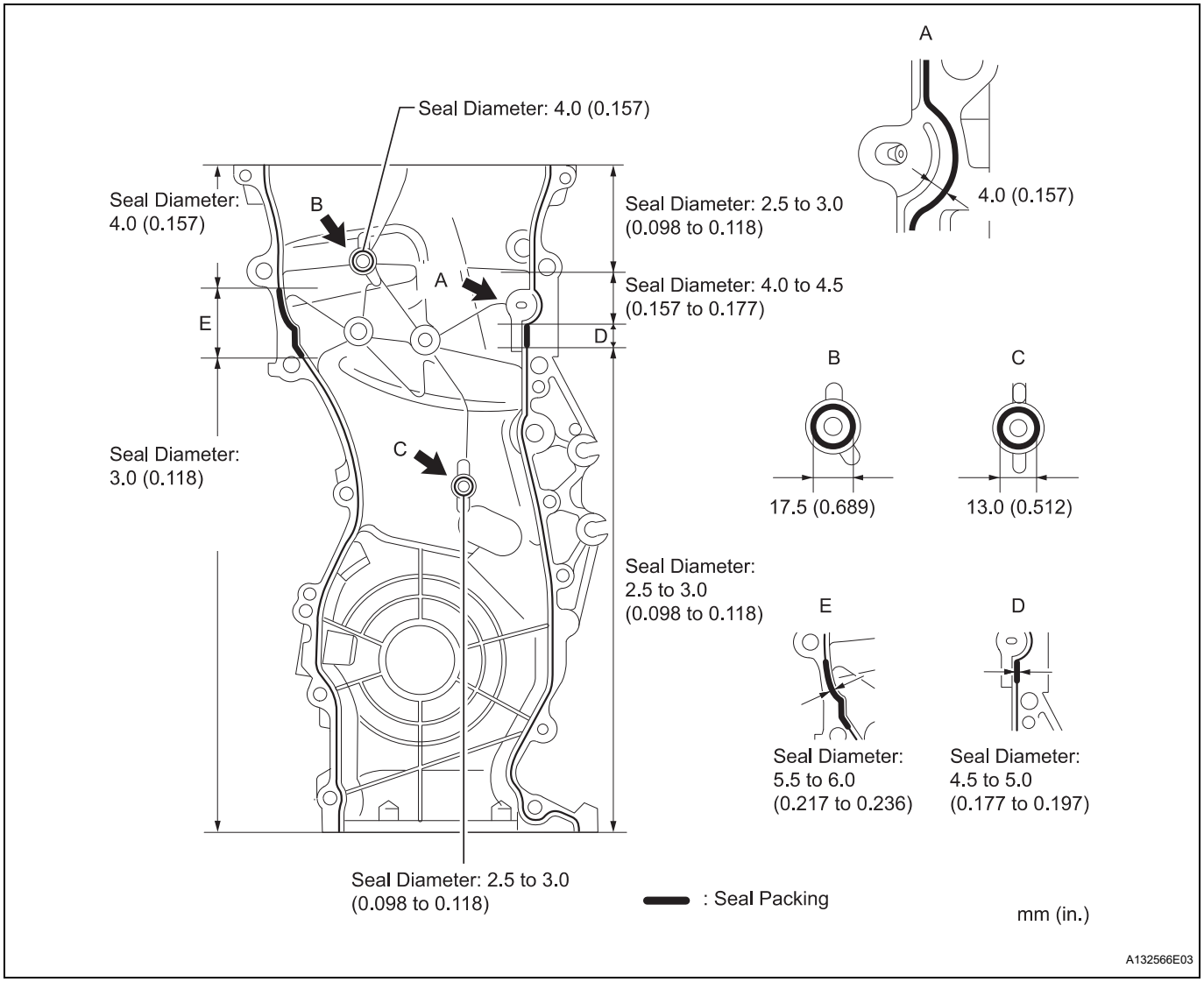
   NOTICE:
   Keep the gap between the timing chain cover edge and the oil seal free of foreign matter.
10. **INSTALL TIMING CHAIN COVER SUB-ASSEMBLY**
   (a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the timing chain cover, cylinder head and cylinder block.

LU

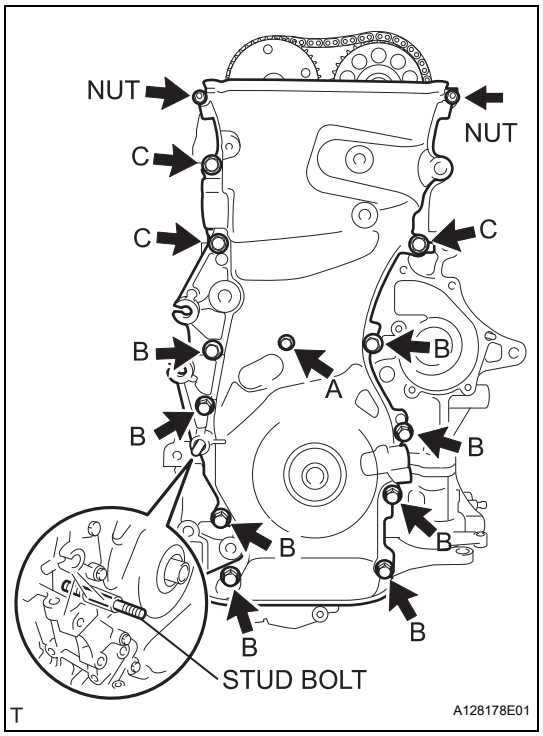


(b) Apply seal packing (diameter: 4.0 to 4.5 mm (0.157 to 0.177 in.)) as shown in the illustration.
Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or Equivalent

(c) Apply seal packing in a continuous bead as shown in the illustration.



Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or Equivalent
NOTICE:
- **Remove any oil from the contact surface.**
- **Install the chain cover within 3 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing the timing chain cover.**



(d) Install the timing chain cover with the 12 bolts and 2 nuts.
Torque: Bolt A
9.0 N*m (92 kgf*cm, 80 in.*lbf)
Bolt B
25 N*m (255 kgf*cm, 18 ft.*lbf)
Bolt C
55 N*m (561 kgf*cm, 41 ft.*lbf)
Nut
11 N*m (112 kgf*cm, 8 ft.*lbf)
Bolt length

Item	Length
Bolt A	30 mm (1.18 in.) length for 10 mm head
Bolt B	30 mm (1.18 in.) length for 12 mm head
Bolt C	40 mm (1.57 in.) length for 14 mm head

(e) Using an E10 "TORX" socket, install the stud bolt to the drive belt tensioner.
Torque: 22 N*m (220 kgf*cm, 16 ft.*lbf)

11. **INSTALL ENGINE MOUNTING BRACKET RH (See page EM-30)**
12. **INSTALL ENGINE MOUNTING INSULATOR (See page EM-30)**
13. **INSTALL OIL PAN SUB-ASSEMBLY (See page EM-30)**
14. **INSTALL CRANK POSITION SENSOR (See page ES-389)**
15. **INSTALL CRANKSHAFT PULLEY (See page EM-75)**
16. **INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY (See page EM-31)**
17. **INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY (See page EM-32)**
18. **INSTALL NO. 2 VENTILATION HOSE**
19. **INSTALL VENTILATION HOSE**
20. **INSTALL IGNITION COIL ASSEMBLY (See page EM-32)**
21. **INSTALL IDLER PULLEY BRACKET (See page EM-103)**
22. **INSTALL V-RIBBED BELT TENSIONER ASSEMBLY (See page EM-103)**

23. **INSTALL V-RIBBED BELT (See page EM-6)**
24. **INSTALL V-RIBBED BELT TENSIONER COVER SUB-ASSEMBLY (See page EM-7)**
25. **INSTALL NO. 2 ENGINE MOUNTING BRACKET RH (See page EM-112)**
26. **INSTALL ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-112)**
27. **INSTALL NO. 2 ENGINE MOUNTING STAY RH (See page EM-112)**
28. **INSTALL FRONT EXHAUST PIPE ASSEMBLY** (See page EX-3)
29. **ADD ENGINE OIL (See page LU-4)**
30. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-113)**
31. **INSTALL LUGGAGE TRIM SERVICE HOLE COVER (See page HB-98)**
32. **CHECK FOR ENGINE OIL LEAKS**
33. **CHECK FOR EXHAUST GAS LEAKS**
34. **CHECK IGNITION TIMING (See page EM-1)**
35. **INSTALL FRONT FENDER APRON SEAL RH**
36. **INSTALL ENGINE UNDER COVER LH**
37. **INSTALL ENGINE UNDER COVER RH**
38. **INSTALL FRONT WHEEL RH (See page EM-113)**
39. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-114)**
40. **PERFORM INITIALIZATION**
    (a) Perform initialization procedure (See page IN-43).
    HINT:
    Some vehicle systems require initialization after reconnecting the cable to the negative battery terminal.

SYSTEM DESCRIPTION

1. PUSH-BUTTON START FUNCTION DESCRIPTION

(a) The push-button start function uses a push-type power switch, which the driver can operate by merely carrying the electrical key. This system consists primarily of the main body ECU, power switch, ID code box, steering lock ECU, electrical key, ACC relay, IG1 relay, IG2 relay and certification ECU. The main body ECU controls the function. This function operates in cooperation with the smart key system.

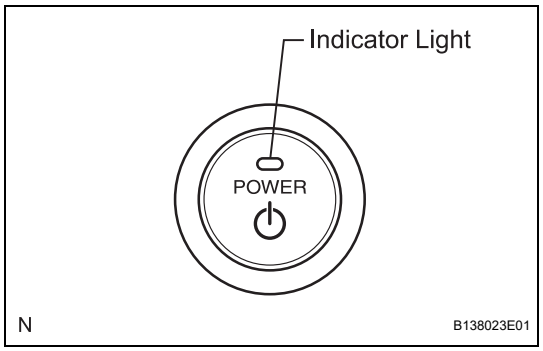
2. FUNCTION OF COMPONENT

Component	Function
Power Switch • Transponder Key Amplifier	• Transmits power switch signal to main body ECU. • Informs driver of power source mode or system abnormality with illumination of indicator light. • Receives ID code and transmits it to certification ECU when key battery is low.
Electrical Key	Receives signals from oscillators and returns ID code to door control receiver.
Electrical Key Oscillator • Console and Rear Seat	Receives request signals from certification ECU and forms detection area in vehicle interior.
Steering Lock ECU	Receives lock/unlock request signals from certification ECU and main body ECU.
Door Control Receiver	Receives ID code from electrical key and transmits it to certification ECU.
Main body ECU	• Changes power source mode in 4 stages (off, on (ACC), on (IG), on (READY)) in accordance with shift position and state of stop light switch. • Controls push-button start function in accordance with signals received from switches and certification ECU and HV control ECU.
Certification ECU	Certifies ID code received from door control receiver and transmits certification results to main body ECU.
Stop Light Switch	Outputs state of brake pedal to main body ECU.
ID Code Box	Receives steering unlock or engine immobiliser unset signals from certification ECU, certifies them, and transmits each unset signal to steering lock ECU or HV control ECU.
HV control ECU	Receives signal from ID code box and main body ECU and performs HV control system is on (READY).

3. SYSTEM FUNCTION

The electric controls of the push-button start function are described below:

Control	Outline
Power switch control	• When driver operates power switch with electrical key in driver's possession, certification ECU starts indoor electrical key oscillator, which transmits request signal to electrical key. Upon receiving this signal, the electrical key transmits ID code signal to door control receiver. • Certification ECU verifies check results received from door control receiver and sends them to main body ECU. Based on these results, main body ECU authorizes operation of power switch.
Diagnosis	When main body ECU detects malfunction, main body ECU diagnoses and memorizes failed section.



4. CONSTRUCTION AND OPERATION

(a) Power Switch

The power switch consists of a momentary type switch, 3 color (amber, green, greenish white) LEDs, and a transponder key amplifier.

- The greenish white LED is for illumination.
- The amber and green LEDs are for the indicator lights. The driver can check the present power source mode and whether the HV control system can start in accordance with the illumination state of the indicator light.
- When the main body ECU detects an abnormality in the push-button start function, it makes the amber indicator light flash. If the HV control system stopped in this state, it may not be possible to restart it.

(b) Indicator Light Condition

Power switch indicator light condition:

Power Source Mode/Condition	Indicator Light Condition	
	Brake pedal released	Brake pedal depressed, shift lever in P
off	OFF	ON (Green) (when key and vehicle IDs match)
on (ACC, IG)	ON (Amber)	ON (Green)
HV control system on (READY)	OFF	OFF
Steering lock not unlocked	Flashes (Green) for 15 sec.	Flashes (Green) for 15 sec.
System malfunction	Flashes (Amber) for 15 sec.	Flashes (Amber) for 15 sec.

(c) Main body ECU

The main body ECU consists of the IG1 and IG2 relay actuation circuits and CPU.

HINT:

Before removing the battery, make sure to turn the power switch off. The main body ECU constantly stores the present power source mode in its memory. Therefore, if the main body ECU is interrupted by disconnecting the battery, the main body ECU restores the power source mode after the battery is reconnected. For this reason, if the battery is disconnected when the power switch is not off, the power will be restored to the vehicle at the same time the power is restored to the main body ECU (by reconnecting the battery).

5. PUSH-BUTTON START FUNCTION OPERATION

(a) This system has different power source mode patterns depending on the brake pedal condition and shift lever position.

Brake Pedal	Shift Lever	Power Source Mode Pattern
Depressed	P position	When the power switch is pushed once. • off → HV control system on (READY) • on (ACC) → HV control system on (READY) • on (IG) → HV control system on (READY)

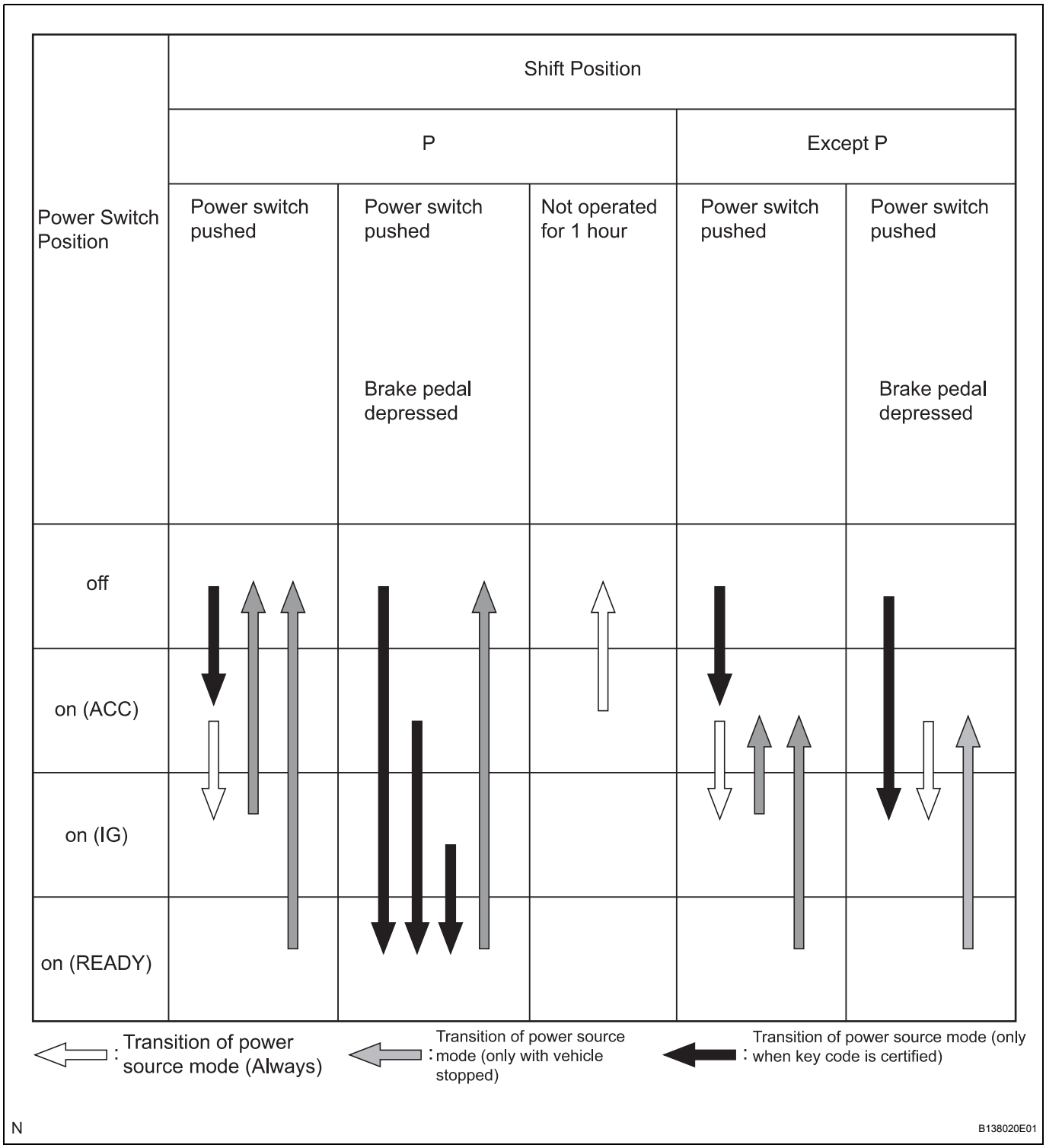
ST

Brake Pedal	Shift Lever	Power Source Mode Pattern
Not depressed	P position	Each time the power switch is pushed. • off → on (ACC) → on (IG) → off
	Except P position	Each time the power switch is pushed. • off → on (ACC) → on (IG) → on (ACC)
-	P position	When the power switch is pushed with power source mode on (READY). • HV control system on (READY) → off
-	Except P position	When the power switch is pushed with power source mode on (READY). • HV control system on (READY) → on (ACC)

When the battery of the key is low, the push-button start function can be operated by holding the key against the power switch.

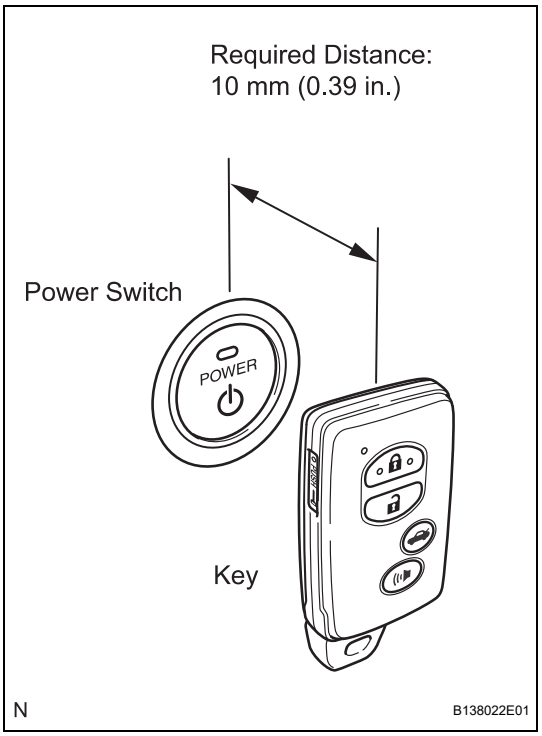
- After approximately 1 hour has passed with the power switch on (ACC) and the shift position in P, the main body ECU will automatically cut the power supply (the power source mode changes to off).

- The illustration below shows the transition of power source modes.
  Transition of power source mode:



ST

HINT:
While the vehicle is being driven normally, operation of the power switch is disabled. However, if the HV control system must be stopped in an emergency while the vehicle is being driven, pressing the power switch for 3 seconds or more stops the HV control system. Power source mode changes from on (READY) to on (ACC).



6. WHEN KEY BATTERY IS LOW

(a) To operate the push-button start function when the key battery is low, hold the key close to the power switch with the brake pedal depressed.
(b) The main body ECU transmits a key verification request signal from the stop light switch to the certification ECU.
(c) The certification ECU does not receive an ID code response from the entry door control receiver, so it actuates the transponder key amplifier built into the power switch.
(d) The transponder key amplifier outputs an engine immobiliser radio wave to the key.
(e) The key receives the radio wave, and returns a radio wave response to the transponder key amplifier.
(f) The transponder key amplifier combines the key ID codes with the radio wave response, and transmits it to the certification ECU.
(g) The certification ECU judges and verifies the ID code, and transmits a key verification OK signal to the main body ECU. The buzzer in the combination meter sounds at the same time.
(h) After the buzzer sounds, if the power switch is pressed within 5 seconds with the brake pedal not depressed, the power source mode changes to on (ACC) or on (IG), the same as in the normal condition.

7. DIAGNOSIS

The main body ECU can detect malfunctions in the push-button start function when the power source mode is on (IG). When the ECU detects a malfunction, the amber indicator light of the power switch flashes to warn the driver. At the same time, the ECU stores a 5-digit DTC (Diagnostic Trouble Code) in the memory.

- The indicator light warning continues for 15 seconds even after the power source mode is changed to off.
- The DTC can be read by connecting the intelligent tester to the DLC3.
- The push-button start function cannot be operated if a malfunction occurs.

ST

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the push-button start function.
- The intelligent tester should be used in steps 4, 5 and 8.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS CHECK

HINT:

- In troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.
- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.
- The following 5 items are important points in the problem analysis:

What	Vehicle model, system name
When	Date, time, occurrence frequency
Where	Road conditions
Under what conditions?	Running conditions, driving conditions, weather conditions
How did it happen?	Problem symptoms

NEXT

3	INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

4	INSPECT COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM

(a) Use the intelligent tester to check if the CAN Communication System is functioning normally (See page CA-7).

ST

Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → **GO TO CAN COMMUNICATION SYSTEM**

A

5 CHECK FOR DTC

(a) Check for DTCs and note any codes that are output (See page ST-21).
(b) Delete DTCs.
(c) Recheck for DTCs.

Result

Result	Proceed to
DTC does not reoccur	A
DTC reoccurs	B

B → **GO TO DIAGNOSTIC TROUBLE CODE CHART**

A

ST

6 INSPECT BASIC OPERATION

(a) Turn the power switch on (READY) and check that the HV control system starts normally. Make sure the brake pedal is depressed and the shift position is P at this time.
(b) Check that the power switch mode can be changed by pushing the power switch.
HINT:
Without depressing the brake pedal, push the power switch repeatedly. Power switch mode should turn from off to on (ACC) to on (IG) and back to off.
With the brake pedal depressed, push the power switch repeatedly. Power switch mode should turn to on (READY) from any status.
OK:
HV control system can be on (READY) normally.

NEXT

7 PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Fault is not listed in the problem symptoms table	A
Fault is listed in the problem symptoms table	B

B → Go to step 9

A

8	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) Terminals of ECU (See page ST-14)
(b) DATA LIST/ACTIVE TEST (See page ST-22)

NEXT

9	REPAIR OR REPLACE

NEXT

10	CONFIRMATION TEST

NEXT

END

CUSTOMIZE PARAMETERS

1. CUSTOMIZING FUNCTION WITH INTELLIGENT TESTER

HINT:

The items in the table below can be customized.

NOTICE:

- **When the customer requests a change in a function, first make sure that the function can be customized.**
- **Be sure to make a note of the current setting before customizing.**
- **When troubleshooting a function, first make sure that the function is set to the default setting.**

SMART:

Display (Item)	Default	Contents	Setting
IGNITION AREA (SMART ignition available area)	ALL	Function to choose the available area for electrical key to start HV control system and cancel the steering lock.	FRONT / ALL

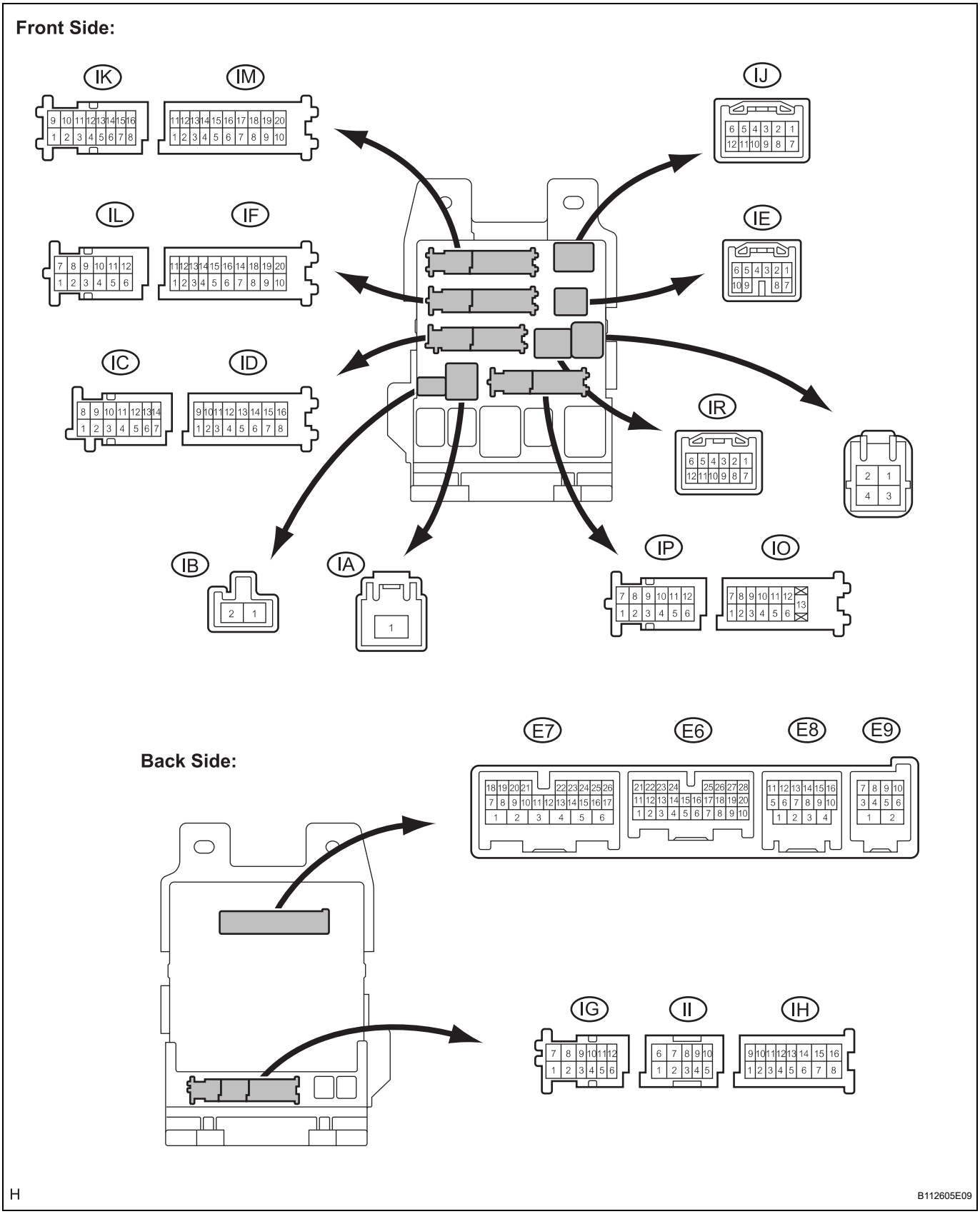
PROBLEM SYMPTOMS TABLE

PUSH-BUTTON START FUNCTION:

Symptom	Suspected Area	See page
Power mode does not change (neither ACC nor IG is possible).	1. AM2 Fuse	ST-91
	2. Power Switch	-
	3. Wire Harness or Connector	-
	4. Main Body ECU (Instrument Panel J/B)	-
	5. Certification ECU	-
	6. Smart Key System (Entry Function)	-
Power is not turned on (only ACC is not turned on).	1. AM2 Fuse	ST-108
	2. Wire Harness or Connector	-
	3. Main Body ECU (Instrument Panel J/B)	-
Power is not turned on (only IG is not turned on).	1. AM2 Fuse	ST-99
	2. IG1 Relay	-
	3. IG2 Relay	-
	4. Wire Harness or Connector	-
	5. Main Body ECU (Instrument Panel J/B)	-
Power is not turned on (READY).	1. Power Switch	ST-116
	2. Certification ECU	-
	3. Shift Lock Control ECU	-
	4. ID Code Box	-
	5. STOP Fuse	-
	6. Stop Light Switch	-
	7. Electrical Steering Lock Function	-
	8. HV Control System	-
	9. Engine Immobiliser System	-
	10. Main Body ECU (Instrument Panel J/B)	-
	11. Smart Key System (Entry Function)	-
	12. Wire Harness or Connector	-
Power switch indicator light does not come on.	Power Switch Indicator Light Circuit	ST-87

TERMINALS OF ECU

1. CHECK MAIN BODY ECU (INSTRUMENT PANEL J/B)



(a) Disconnect the IR, IA, IK, ID, IF, IM E6, E7 and E8 ECU connectors.

(b) Measure the voltage and resistance of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AM1 (E7-6) - Body ground	L - Body ground	+B power supply	Always	10 to 14 V
AM2 (E6-1) - Body ground	L - Body ground	+B power supply	Always	10 to 14 V
SSW1 (E7-17) - Body ground	L - Body ground	Power switch signal	Power switch pushed	Below 1 Ω
SSW1 (E7-17) - Body ground	L - Body ground	Power switch signal	Power switch not pushed	10 kΩ or higher
SSW2 (E7-16) - Body ground	V - Body ground	Power switch signal	Power switch pushed	Below 1 Ω
SSW2 (E7-16) - Body ground	V - Body ground	Power switch signal	Power switch not pushed	10 kΩ or higher
GND3 (E8-1) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
LIN1 (IR-9) - Body ground	O - Body ground	LIN line	Always	10 kΩ or higher
BATB (IA-1) - Body ground	B - Body ground	+B Power supply	Always	10 to 14 V
GND1 (IF-10) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
GND2 (IM-9) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
CANN (E8-15) - Body ground	W - Body ground	CAN Line	Always	10 kΩ or higher
CANP (E8-16) - Body ground	B - Body ground	CAN Line	Always	10 kΩ or higher
CANH (E8-5) - Body ground	B - Body ground	CAN Line	Always	10 kΩ or higher
CANL (E8-6) - Body ground	W - Body ground	CAN Line	Always	10 kΩ or higher

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the ECU connectors.

(d) Measure the voltage of the connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
ACC (IF-2) - Body ground	L - Body ground	ACC power supply	Power switch on (ACC)	10 to 14 V
IG (IF-11) - Body ground	B - Body ground	IG power supply	Power switch on (IG)	10 to 14 V
ACCD (E7-22) - GND3 (E8-1)	W - W-B	ACC signal	Power switch on (ACC)	Output voltage at terminal AM1 or AM2 is -2 V or more.
ACCD (E7-22) - GND3 (E8-1)	W - W-B	ACC signal	Power switch off	Below 1 V
IG1D (E7-3) - GND3 (E8-1)	P - W-B	IG1 signal	Power switch on (IG)	Output voltage at terminal AM1 or AM2 is -2 V or more.
IG1D (E7-3) - GND3 (E8-1)	P - W-B	IG1 signal	Power switch on (ACC)	Below 1 V
IG2D (E6-11) - GND3 (E8-1)	LG - W-B	IG2 signal	Power switch on (IG)	Output voltage at terminal AM1 or AM2 is -2 V or more.
IG2D (E6-11) - GND3 (E8-1)	LG - W-B	IG2 signal	Power switch on (ACC)	Below 1 V
STP (IL-7) - GND3 (E8-1)	L - W-B	Stop light signal	Brake pedal depressed	Output voltage at terminal AM1 or AM2 is -2 V or more.
STP (IL-7) - GND3 (E8-1)	L - W-B	Stop light signal	Brake pedal released	Below 1 V
SLR+ (E7-19) - GND3 (E8-1)	BR - W-B	Steering lock motor signal	Steering lock motor operating	Below 1 V
SLR+ (E7-19) - GND3 (E8-1)	BR - W-B	Steering lock motor signal	Steering lock motor does not operate	Output voltage at terminal AM1 or AM2 is -2 V or more.
SLP (E7-18) - GND3 (E8-1)	P - W-B	Steering lock actuator position signal	Steering lock is locked	Pulse generation (See waveform 3)
SLP (E7-18) - GND3 (E8-1)	P - W-B	Steering lock actuator position signal	Steering lock is released	Pulse generation (See waveform 3)
SPD (E8-9) - GND3 (E8-1)	V - W-B	Vehicle speed signal	Power switch on (IG), rotate rear wheel slowly	Pulse generation (See waveform 1)
RDY (E8-8) - GND3 (E8-1)	SB - W-B	Power switch on (READY) signal	Power switch on (READY)	Pulse generation (See waveform 2)

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
P (E9-2) - GND3 (E8-1)	G - W-B	Shift lock signal	Shift lever P position	Below 1 V
P (E9-2) - GND3 (E8-1)	G - W-B	Shift lock signal	Shift lever not P position	Output voltage at terminal AM1 or AM2 is -2 V or more.
STSW (E9-4) - GND3 (E8-1)	GR - W-B	HV control system activation request signal	Brake pedal depressed, shift lever P position, power switch is pushed once	Output voltage at terminal AM1 or AM2 is -2 V or more.
INDS (E7-15) - GND3 (E8-1)	LG - W-B	Vehicle condition signal	Brake pedal depressed, shift lever P position.	Output voltage at terminal AM1 or AM2 is -3 V or more.
INDW (E7-14) - GND3 (E8-1)	P - W-B	Warning signal	Power switch on (ACC, IG)	Output voltage at terminal AM1 or AM2 is -3 V or more.
SWIL (E7-25) - GND3 (E8-1)	O - W-B	Illumination signal	Light control switch TAIL or HEAD	Output voltage at terminal AM1 or AM2 is -2 V or more.

If the result is not as specified, the ECU may have a malfunction.

(e) Using an oscilloscope, check the signal waveform of the ECU.

(1) Waveform 1

Waveform 1 (Reference):

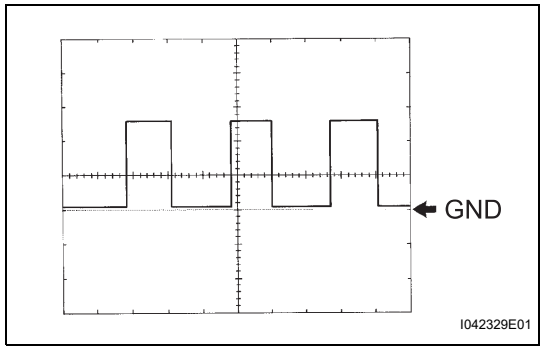
Terminal No.	SPD (E8-9) - GND3 (E8-1)
Tool Setting	5 V/DIV., 10 ms./DIV.
Vehicle Condition	Driving at approx. 20 km/h (12 mph)

HINT:
As the vehicle speed increases, the wavelength shortens.

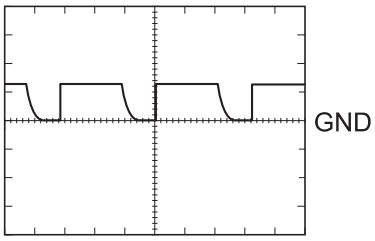
(2) Waveform 2

Waveform 2 (Reference):

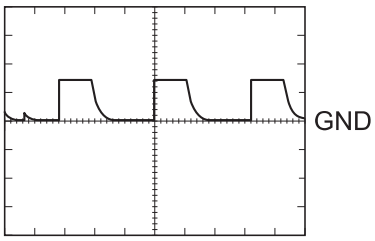
Terminal No.	RDY (E8-8) - GND3 (E8-1)
Tool Setting	10 V/DIV., 10 ms./DIV.
Vehicle Condition	Power switch on (IG) or on (READY)



Waveform:



Power switch ON (IG)



Power switch ON (READY)

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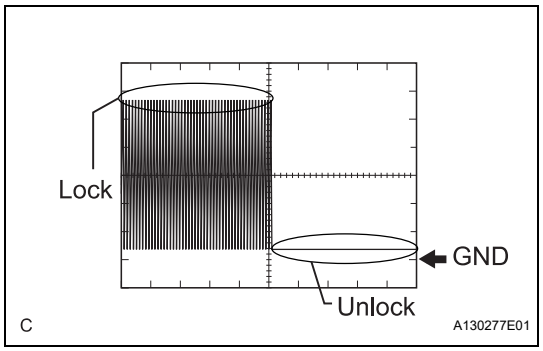
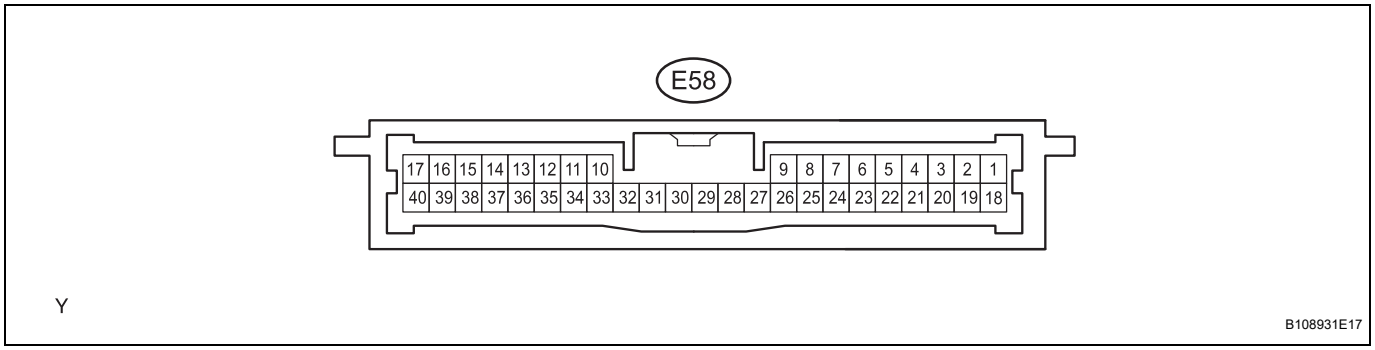


(3) Waveform 3

Waveform 3 (Reference):

Terminal No.	SLP (E7-18) - GND3 (E8-1)
Tool Setting	2 V/DIV., 100 ms./DIV.
Vehicle Condition	Steering lock/unlock

2. CHECK CERTIFICATION ECU



(a) Disconnect the E58 ECU connector.
(b) Measure the voltage and resistance of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B (E58-1) - Body ground	W - Body ground	+B power supply	Always	10 to 14 V
LIN (E58-10) - Body ground	O - Body ground	LIN line	Always	10 kΩ or higher
E (E58-17) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

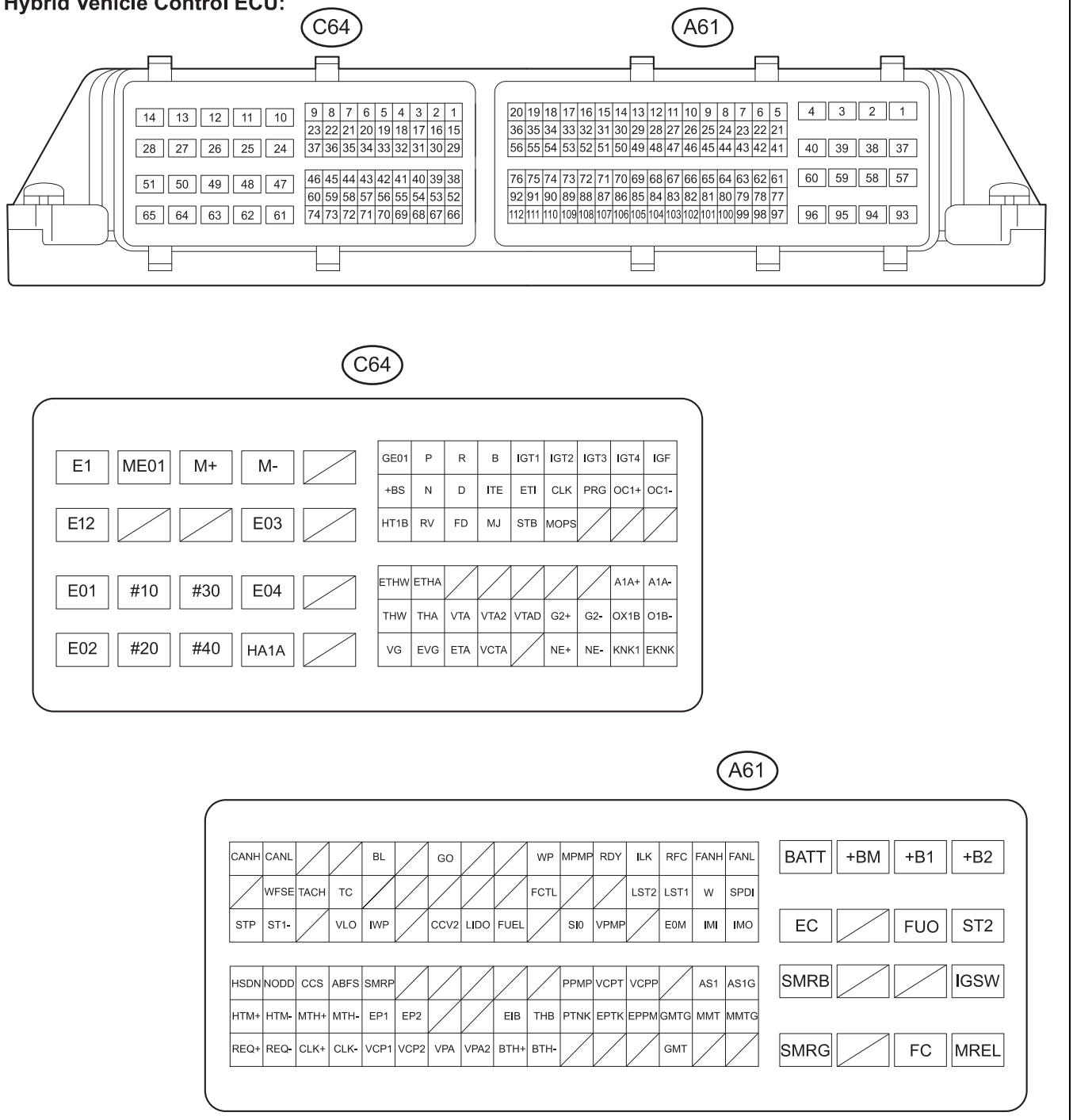
(c) Reconnect the E58 ECU connector.
(d) Measure the voltage of the connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IG (E58-18) - Body ground	LG - Body ground	Ignition power supply	Power switch on (IG)	10 to 14 V
IG (E58-18) - Body ground	LG - Body ground	Ignition power supply	Power switch off	Below 1 V

If the result is not as specified, the main body ECU may have malfunction.

3. CHECK HV CONTROL ECU

Hybrid Vehicle Control ECU:



C

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(a) Disconnect the A61 and C64 ECM connectors.
(b) Measure the voltage and resistance of the wire harness side connectors.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B1 (A61-2) - Body ground	Y - Body ground	Power source of ECU	Power switch on (IG)	10 to 14 V
+B2 (A61-1) - Body ground	Y - Body ground	Power source of ECU	Power switch on (IG)	10 to 14 V
IGSW (A61-57) - Body ground	Y - Body ground	Ignition power supply	Power switch on (IG)	10 to 14 V
E01 (C64-51) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
E02 (C64-65) - Body ground	B-W - Body ground	Ground	Always	Below 1 Ω

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
E03 (C64-25) - Body ground	B - Body ground	Ground	Always	Below 1 Ω
E04 (C64-48) - Body ground	W - Body ground	Ground	Always	Below 1 Ω
E1 (C64-14) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
ME01 (C64-13) - Body ground	B - Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the ECU connectors.

(d) Measure the voltage of the connectors.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
RDY (A61-9) - E1 (C64-14)	V - W-B	HV control system on (READY) signal (output)	Power switch on (READY)	Pulse generation (see waveform 1)
STP (A61-56) - E1 (C64-14)	W - W-B	Stop light switch signal (input)	Brake pedal depressed	7.5 to 14 V
STP (A61-56) - E1 (C64-14)	W - W-B	Stop light switch signal (input)	Brake pedal released	Below 1.5 V
ST2 (A61-37) - E1 (C64-14)	R - W-B	HV control system activation request signal	Brake pedal depressed, shift lever P position, power switch is pushed once	Output voltage at terminal AM1 or AM2 is -2 V or more.

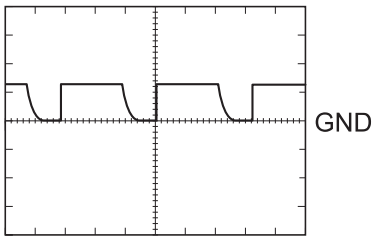
If the result is not as specified, the ECU may have a malfunction.

(e) Using an oscilloscope, check the signal waveform of the ECU.

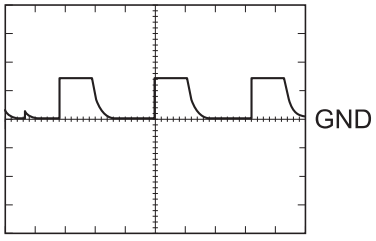
Waveform 1 (Reference):

Terminal No.	RDY (A61-9) - E1 (C64-14)
Tool Setting	10 V/DIV., 10 ms./DIV.
Vehicle Condition	Power switch on (IG) or on (READY)

Waveform:



Power switch ON (IG)



Power switch ON (READY)

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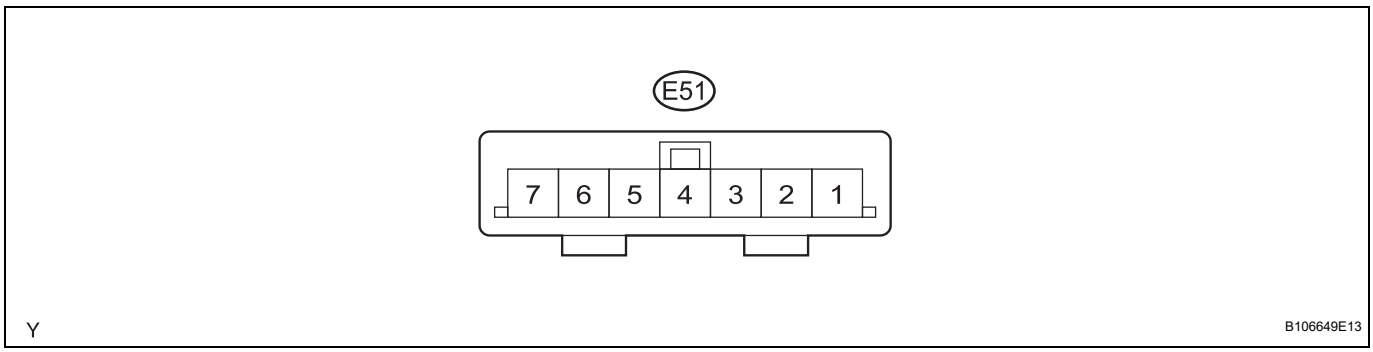
4. CHECK STEERING LOCK ECU



(a) Disconnect the E51 ECU connector.
(b) Measure the voltage and resistance of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
B (E51-7) - Body ground	P - Body ground	+B power supply	Always	10 to 14 V
IG2 (E51-6) - Body ground	B - Body ground	Ignition power supply	Power switch on (IG)	10 to 14 V
IG2 (E51-6) - Body ground	B - Body ground	Ignition power supply	Power switch off	Below 1 V
GND (E51-1) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
SGND (E51-2) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the E51 ECU connector.
(d) Measure the voltage of the connector.

ST

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SLP1 (E51-4) - GND (E51-1)	P - W-B	Steering lock actuator position signal	Steering is locked	10 to 14 V
SLP1 (E51-4) - GND (E51-1)	P - W-B	Steering lock actuator position signal	Steering is released	Below 1 V

If the result is not as specified, the ECU may have a malfunction.

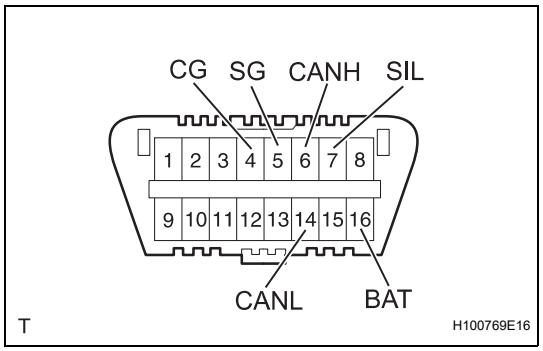
DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) Push-button start function data and the Diagnostic Trouble Codes (DTCs) can be read through the Data Link Connector 3 (DLC3) of the vehicle. When the function seems to be malfunctioning, use the intelligent tester to check for malfunctions and perform repairs.

2. CHECK DLC3

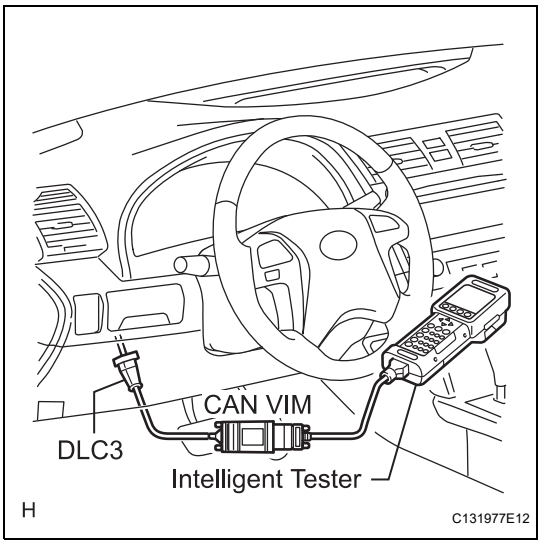
HINT:
The ECU uses ISO 15765-4 communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.



Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Power Switch OFF*	56 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Power Switch OFF*	200 Ω or more
CANL (14) - CG (4)	LOW-level CAN bus line	Power Switch OFF*	200 Ω or more
CANH (6) - BAT (16)	HIGH-level CAN bus line	Power Switch OFF*	6 kΩ or more
CANL (14) - BAT (16)	LOW-level CAN bus line	Power Switch OFF*	6 kΩ or more

NOTICE:
***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors.**
If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

ST



HINT:
Connect the cable of the intelligent tester to the DLC3, turn the power switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

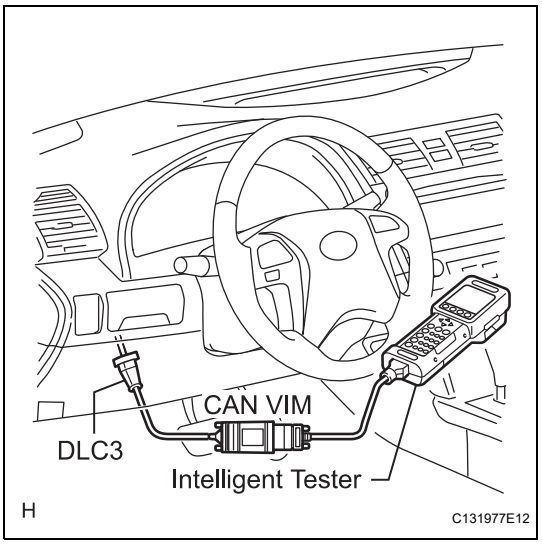
- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

3. INSPECT BATTERY VOLTAGE

Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding.



DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Enter the following menu items: DIAGNOSIS / OBD/ MOBD / DTC INFO / CURRENT CODES.
(d) Read the DTC by following the prompts on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

2. CLEAR DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Enter the following menu items: DIAGNOSIS / OBD/ MOBD / DTC INFO / CLEAR CODES.
(d) Erase the DTC by following the directions on the tester screen.

HINT:
Refer to the intelligent tester operator's manual for further details.

ST

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful as intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the DATA LIST information early in troubleshooting is one way to save diagnostic time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
When using the intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 or less second intervals until communication between the tester and vehicle starts.

(b) Turn the power switch on (IG).

(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / DATA LIST.

(d) Read the DATA LIST.

MAIN BODY:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
ACC SW	Power switch on (ACC) / ON or OFF	ON: Power switch on (ACC) OFF: Power switch off	-
IG SW	Power switch on (IG) / ON or OFF	ON: Power switch on (IG) OFF: Power switch off	-
SHIFT P SIG	Shift P position signal / ON or OFF	ON: Shift position is P OFF: Shift position is not P	-
STR UNLOCK SW	Steering lock condition / ON or OFF	ON: Steering is unlocked (Power switch on (ACC)) OFF: Steering is locked (Power switch off)	-
STOP LAMP SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
STSW1	Start switch 1 / ON or OFF	ON: Power switch is pushed OFF: Power switch is not pushed	-
START SW2	Start switch 2 / ON or OFF	ON: Power switch is pushed OFF: Power switch is not pushed	-
RATCH CIRCUIT	Ratch circuit / ON or OFF	ON: Power switch on (IG) or on (READY) OFF: Power switch off, or on (ACC)	-
IG1 RELAY MON1	IG1 outer relay monitor / ON or OFF	ON: Power switch on (IG) OFF: Power switch off	-
IG1 RELAY MON2	IG1 inner relay monitor / ON or OFF	ON: Power switch on (IG) OFF: Power switch off	-
IG2 RELAY MON1	IG2 outer relay monitor / ON or OFF	ON: Power switch on (IG) OFF: Power switch off	-
IG2 RELAY MON2	IG2 inner relay monitor / ON or OFF	ON: Power switch on (IG) OFF: Power switch off	-
READY SIG	HV control system on (READY) request signal monitor / ON or OFF	ON: System (READY) is ON OFF: System (READY) is OFF	Power switch pressed and held with shift lever in P or N
ACC RELAY MON	ACC relay monitor / ON or OFF	ON: Power switch on (ACC) OFF: Power switch off	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
VEHICLE SPD SIG	Vehicle speed signal / STOP or RUN	STOP: Vehicle is stopped RUN: Vehicle is running	-
PWR COND	Power supply condition / ALL, ACC ON, IG1 IG2, ST ON	ALL: All relays are OFF ACC ON: ACC relay is ON IG1: IG1 relay is ON IG2: IG2 relay is ON ST ON: ST request signal is ON	-
COM ENTRY&STRT	Communication for certification ECU / OK or STOP	OK: Communication STOP: No communication	-

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows the relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3
(b) Turn the power switch on (IG).
(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / ACTIVE TEST.
(d) Perform the ACTIVE TEST according to the display on the tester.

MAIN BODY:

Tester Display	Test Part	Control Range	Diagnostic Note
LIGHTING IND	Indicator for lighting	ON / OFF	-
IND CONDITION	Power switch indicator	Green / Amber / No Sig	-
STR LOCK PWR	Power supply for steering lock ECU	ON / OFF	-

DIAGNOSTIC TROUBLE CODE CHART

PUSH-BUTTON START FUNCTION:

DTC Code	Detection Item	Trouble Area	See page
B2271	Ignition Hold Monitor Malfunction	1. AM2 fuse 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-26
B2272	Ignition 1 Monitor Malfunction	1. IG1 relay 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-28
B2273	Ignition 2 Monitor Malfunction	1. IG2 relay 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-33
B2274	ACC Monitor Malfunction	1. ACC relay 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-37
B2275	STSW Monitor Malfunction	1. HV control ECU 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-42
B2277	Detecting Vehicle Submersion	Main body ECU (Instrument panel J/B)	ST-45
B2278	Power Switch Circuit Malfunction	1. Power switch 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-46
B2281	"P" Signal Malfunction	1. Main body ECU (Instrument panel J/B) 2. Shift lock control ECU 3. Wire harness or connector	ST-51
B2282	Vehicle Speed Signal Malfunction	1. CAN communication system 2. Combination meter system 3. Main body ECU (Instrument panel J/B) 4. Wire harness or connector	ST-54
B2283	Vehicle Speed Sensor Malfunction	1. DTC B2282 detection area 2. Combination meter 3. Speed sensor 4. Skid control ECU 5. Main body ECU (Instrument panel J/B) 6. Wire harness or connector	ST-60
B2284	Brake Signal Malfunction	1. Stop light switch 2. CAN communication system 3. HV control ECU 4. Main body ECU (Instrument panel J/B) 5. Wire harness or connector	ST-65
B2285	Steering Lock Position Signal Circuit Malfunction	1. Main body ECU (Instrument panel J/B) 2. Steering lock ECU 3. Wire harness or connector	ST-70
B2286	Runnable Signal Malfunction	1. CAN communication system 2. HV control ECU 3. Main body ECU (Instrument panel J/B) 4. Wire harness or connector	ST-74
B2287	LIN Communication Master Malfunction	1. Main body ECU (Instrument panel J/B) 2. Certification ECU 3. Wire harness or connector	ST-77

DTC Code	Detection Item	Trouble Area	See page
B2288	Steering Lock Signal Circuit Malfunction	1. Main body ECU (Instrument panel J/B) 2. Steering lock ECU 3. Wire harness or connector	ST-80
B2289	Key Collation Waiting Time Over	1. Main body ECU (Instrument panel J/B) 2. Engine immobiliser system 3. Wire harness or connector 4. Certification ECU	ST-83

ON-VEHICLE INSPECTION

1. CHECK POWER SOURCE MODE CHANGE FUNCTION

(a) Check the function of the power switch.

(1) Check that power source mode changes in accordance with the conditions of the shift position and brake pedal.

Brake Pedal	Shift Lever	Power Source Mode Pattern
Depressed	P Position	When the power switch is pushed once. • off → HV control system on (READY) • on (ACC) → HV control system on (READY) • on (IG) → HV control system on (READY)
Not depressed	P position	Each time the power switch is pushed. • off → on (ACC) → on (IG) → off
	Except P Position	Each time the power switch is pushed. • off → on (ACC) → on (IG) → on (ACC)
-	P Position	When the power switch is pushed with power source mode on (READY). • HV control system on (READY) → off
-	Except P Position	When the power switch is pushed with power source mode on (READY). • HV control system on (READY) → on (ACC)

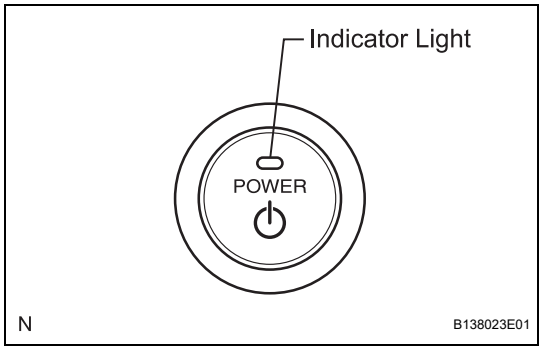
(b) Check if power source mode changes without pressing the power switch.

(1) With power source mode on (ACC) and the shift position in P, wait for at least 1 hour. Check that power source mode changes from on (ACC) to off automatically.

2. CHECK INDICATOR CONDITION

(a) Check the indicator on the power switch.

(1) Check that the power switch indicator turns on and changes color according to the table below.



Power Source Mode/Condition	Indicator Light Condition	
	Brake pedal released	Brake pedal depressed, shift lever in P
off	OFF	ON (Green) (When key and vehicle IDs match)
on (ACC, IG)	ON (Amber)	ON (Green)
HV control system on (READY)	OFF	OFF
Steering lock not unlocked	Flashes (Green) for 15 sec.	Flashes (Green) for 15 sec.
System malfunction	Flashes (Amber) for 15 sec.	Flashes (Amber) for 15 sec.

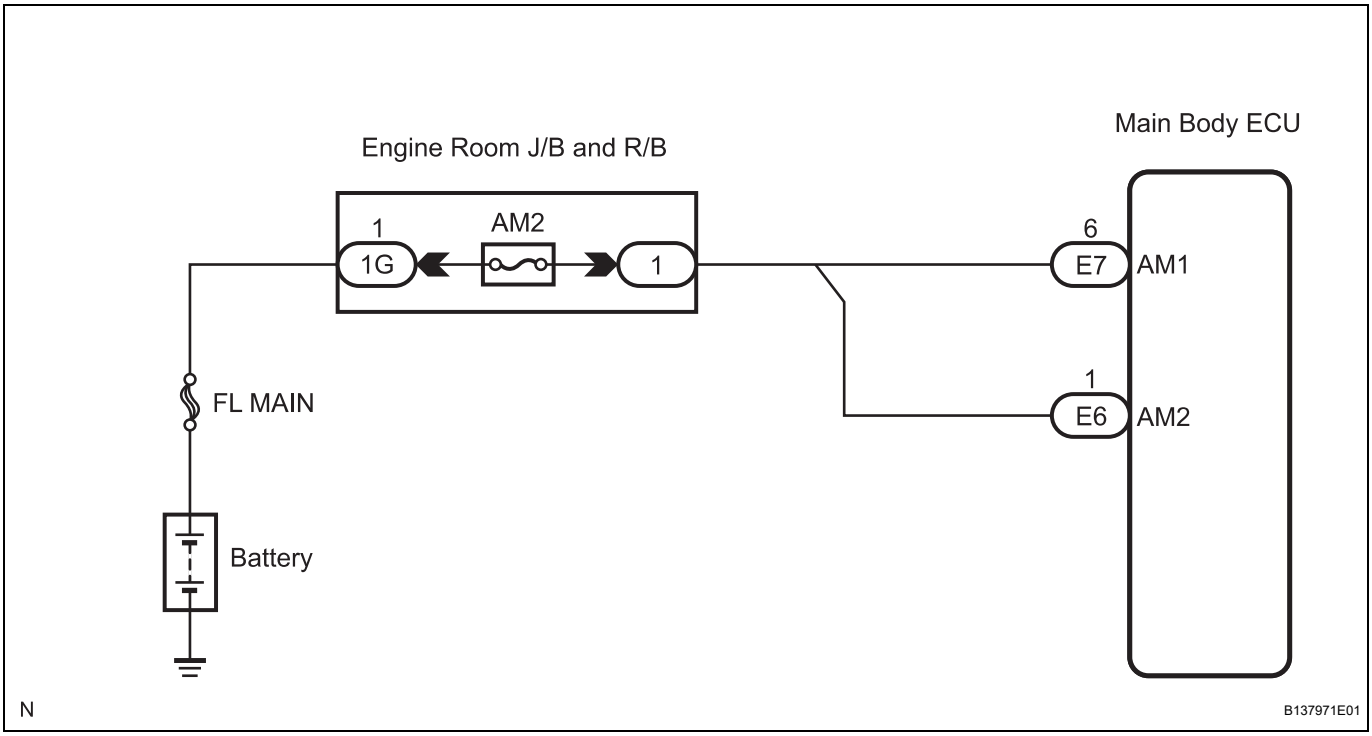
DTC	B2271	Ignition Hold Monitor Malfunction

DESCRIPTION

This DTC is output when a problem such as an open in the AM2 fuse, an open or short in the wire harness between the fuse and main body ECU, a short in the IG output circuit inside the main body ECU, a short between the main body ECU and relay, and a short in the relay is detected.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2271	Hold circuit, IG1 relay actuation circuit or IG2 relay actuation circuit inside main body ECU is open or shorted	• AM2 fuse • Main body ECU • Wire harness or connector

WIRING DIAGRAM



ST

INSPECTION PROCEDURE

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page ST-21).
HINT:
After all DTCs are cleared, check if the trouble occurs again 6 seconds after the power switch is turned on (IG).
(b) Check for DTCs again.
OK:
No DTC is output.

NG → Go to step 2

OK

CHECK INTERMITTENT PROBLEMS

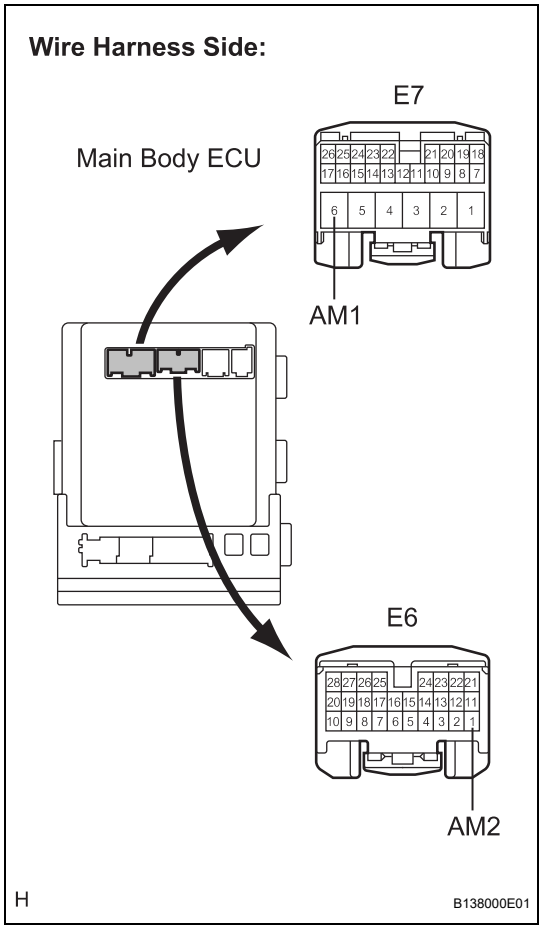
2 INSPECT FUSE (AM2)

(a) Remove the AM2 fuse from the engine room J/B.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

3 CHECK WIRE HARNESS (MAIN BODY ECU - BATTERY)



(a) Disconnect the E6 and E7 ECU connectors.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

Terminal No. (Symbol)	Condition	Specified Condition
E7-6 (AM1) - Body ground	Always	10 to 14 V
E6-1 (AM2) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MAIN BODY ECU

ST

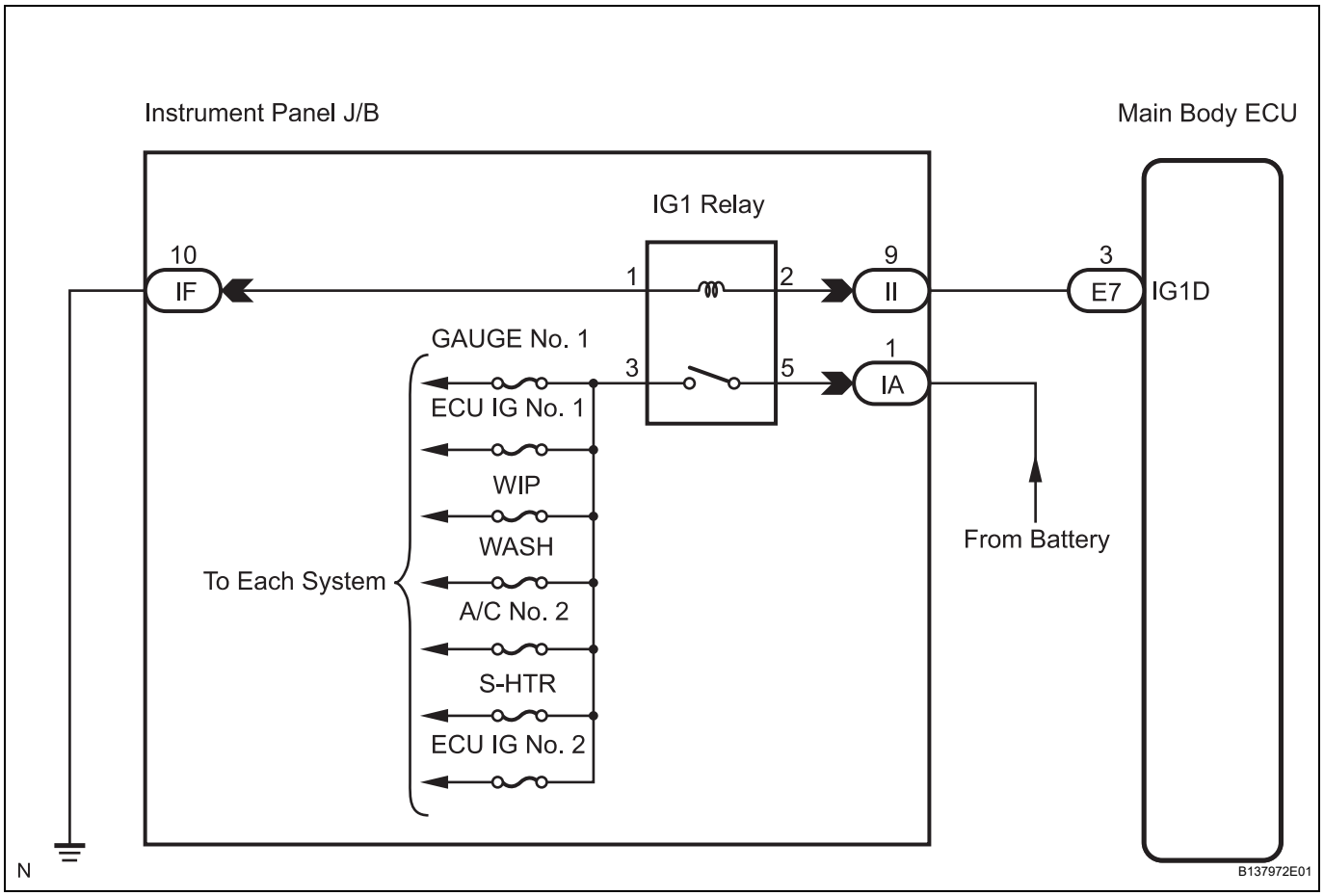
DTC	B2272	Ignition 1 Monitor Malfunction

DESCRIPTION

This DTC is output when there is a problem in the IG1D output circuit, which is from the inside of the main body ECU to the IG1 relay.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2272	IG1 relay actuation circuit inside main body ECU or other related circuit is malfunctioning	• Main body ECU • IG1 relay • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Select the item below in the Data List, and read the display on the tester.
HINT:
When using the intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
IG1 RELAY MON1	Status of IG1 relay monitor (outer) / ON or OFF	ON: Power switch on (IG) (IG1 relay is ON) OFF: Power switch off (IG1 relay is OFF)	-

OK:
"ON" (power switch on (IG)) appears on the screen.

NG → **Go to step 3**

OK

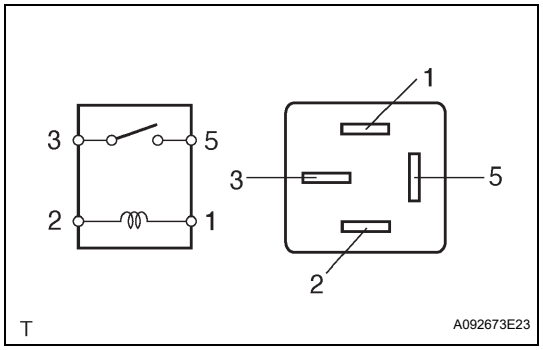
2 CHECK POWER SWITCH CONDITION

(a) Check the power source mode change.
(1) When the key is inside the vehicle and the shift lever is in the P position, check that pressing the power switch causes the power source mode to change as follows:
OK:
off → on (ACC) → on (IG) → off
HINT:
- If power mode does not change to ON (IG and ACC) (See page ST-91).
- If power mode does not change to ON (IG) (See page ST-99).

NG → **GO TO OTHER PROBLEM**

OK

3 INSPECT RELAY (IG1 RELAY)



(a) Remove the IG1 relay from the instrument panel J/B.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

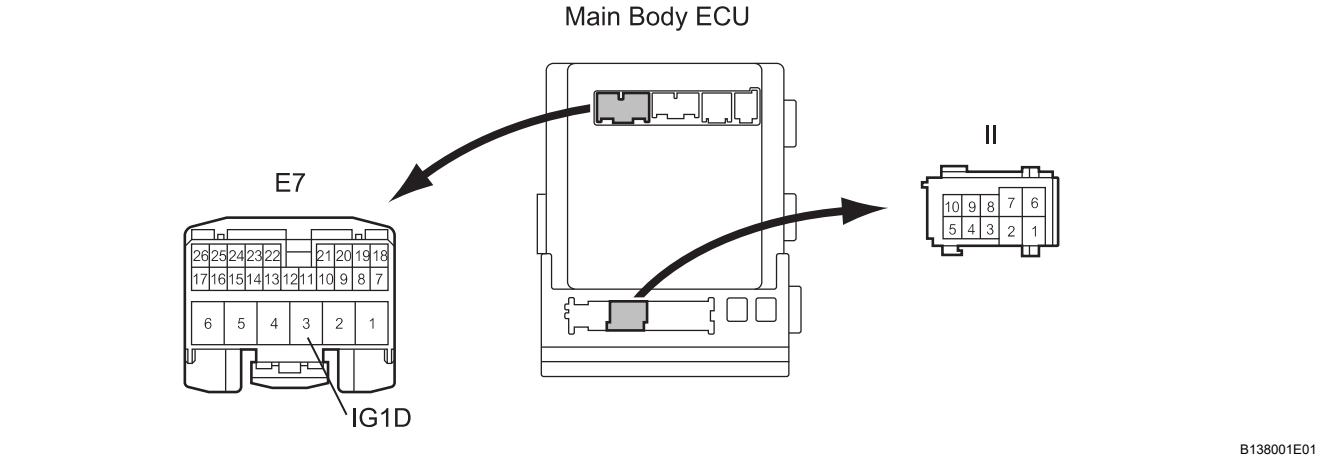
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

4	CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - MAIN BODY ECU)

(a) Disconnect the II J/B connector.



(b) Disconnect the E7 ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

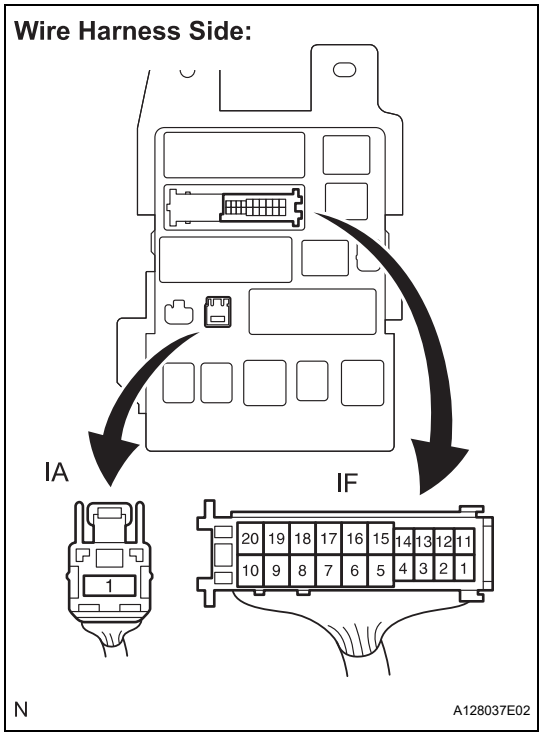
Terminal No. (Symbol)	Condition	Specified Condition
II-9 - E7-3 (IG1D)	Always	Below 1 Ω
E7-3 (IG1D) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

ST

5 CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - BATTERY AND BODY GROUND)



(a) Disconnect the IF and IA J/B connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminal No.	Condition	Specified value
IF-10 - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

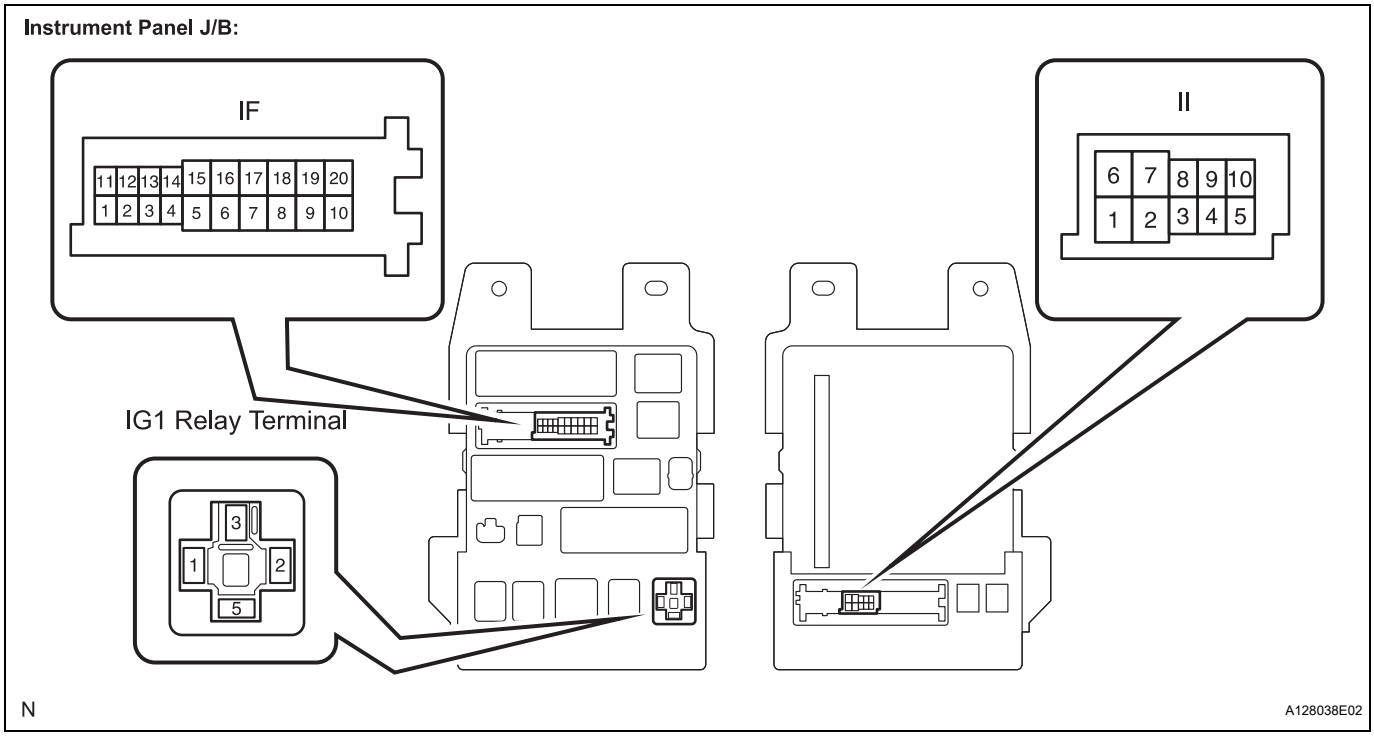
Terminal No.	Condition	Specified value
IA-1 - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 INSPECT INSTRUMENT PANEL J/B

(a) Measure the resistance according to the value(s) in the table below.



Standard resistance

Terminal No.	Condition	Specified Value
IF-10 - IG1 relay terminal-1	Always	Below 1 Ω
II-9 - IG1 relay terminal-2	Always	Below 1 Ω
IF-10 - Body ground	Always	10 kΩ or higher
II-9 - Body ground	Always	10 kΩ or higher

NG → **REPLACE INSTRUMENT PANEL J/B**

OK

REPLACE MAIN BODY ECU

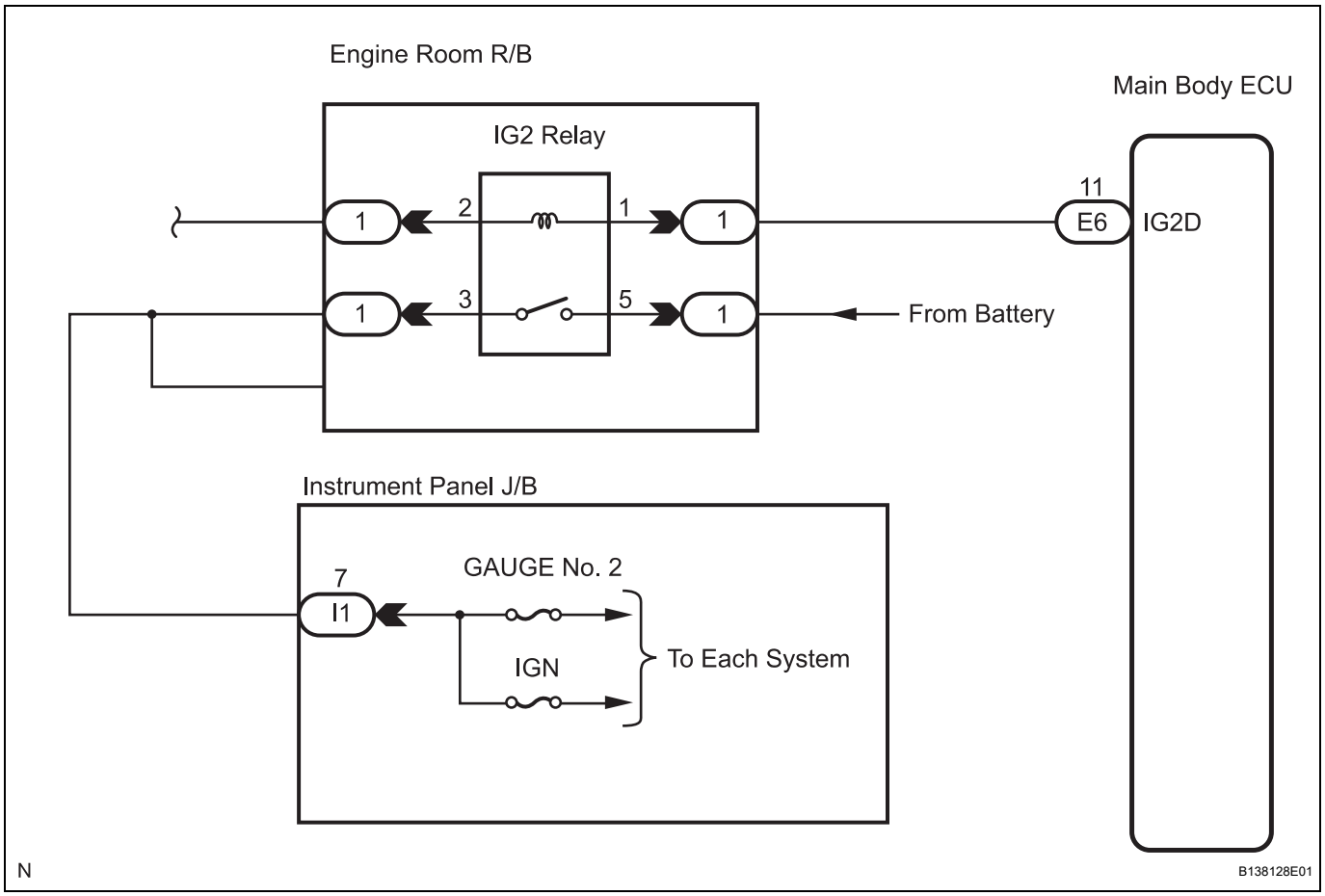
DTC	B2273	Ignition 2 Monitor Malfunction

DESCRIPTION

This DTC is output when there is a problem in the IG2D output circuit, which is from the inside of the main body ECU to the IG2 relay.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2273	IG2 relay actuation circuit inside main body ECU or other related circuit is malfunctioning	• Main body ECU • IG2 relay • Wire harness or connector

WIRING DIAGRAM



ST

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Read the Data List according to the displays on the tester.
HINT:
When using the intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
IG2 RELAY MON1	Status of IG2 relay monitor (outer) / ON or OFF	ON: Power switch on (IG) (IG2 relay is ON) OFF: Power switch off (IG2 relay is OFF)	-

OK:
"ON" (Power switch on (IG)) appears on the screen.

NG → **Go to step 3**

OK

2 CHECK POWER SWITCH CONDITION

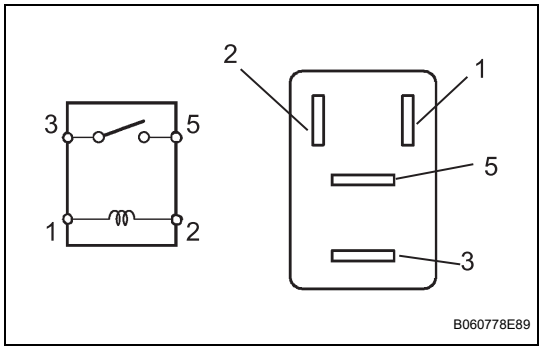
(a) Check the power source mode change.
(1) When the key is inside the vehicle and the shift lever is in the P position, check that pressing the power switch causes the power source mode to change as follows:
OK:
off → on (ACC) → on (IG) → off
HINT:
- If power mode does not change to ON (IG and ACC) (See page ST-91).
- If power mode does not change to ON (IG) (See page ST-99).
- If power mode does not change to ON (ACC) (See page ST-108).

NG → **GO TO OTHER PROBLEM**

OK

ST

3	INSPECT RELAY (IG2 RELAY)



(a) Remove the IG2 relay from the engine room R/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

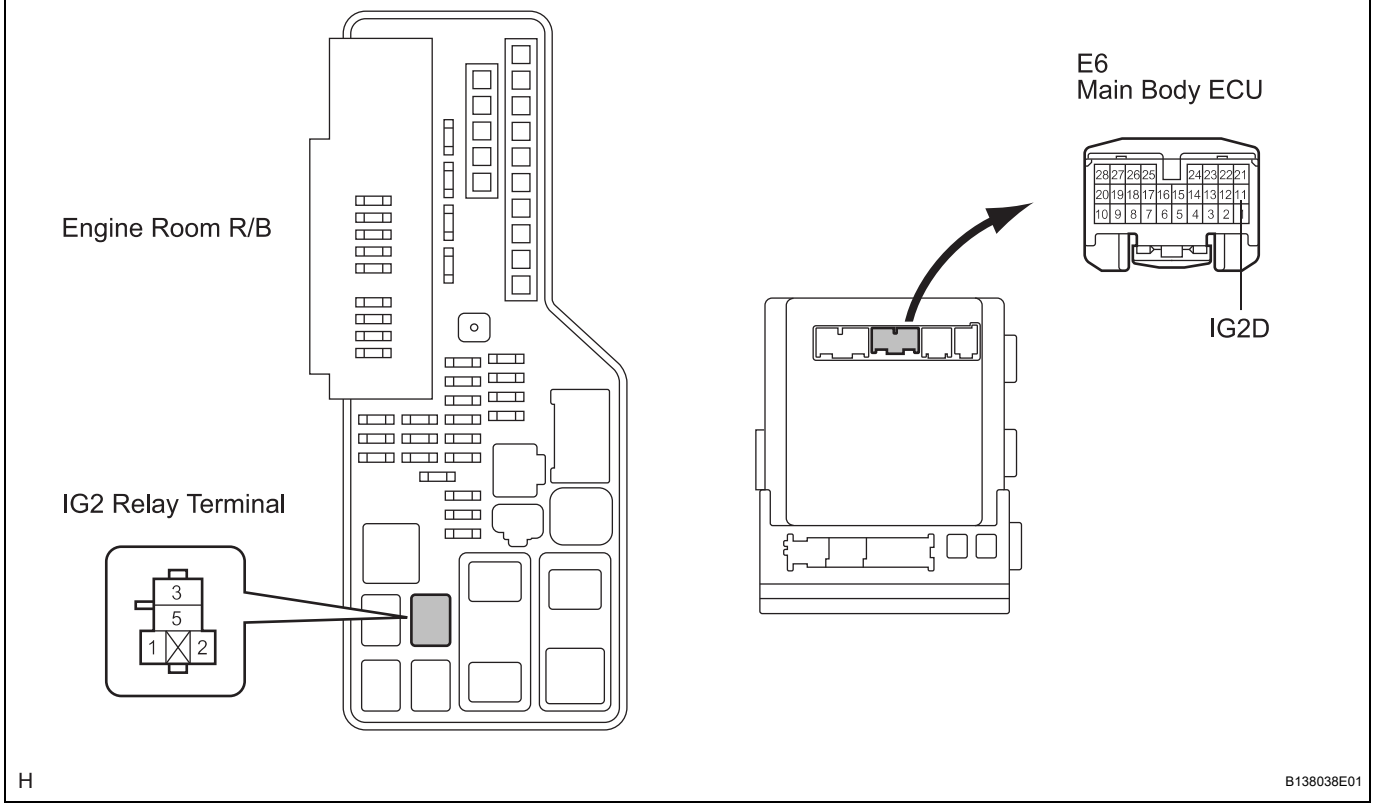
NG → REPLACE RELAY

OK

4	CHECK WIRE HARNESS (ENGINE ROOM R/B - MAIN BODY ECU AND BODY GROUND)

(a) Remove the IG2 relay from the engine room R/B.

Wire Harness Side:



(b) Disconnect the E6 ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

ST

Standard resistance

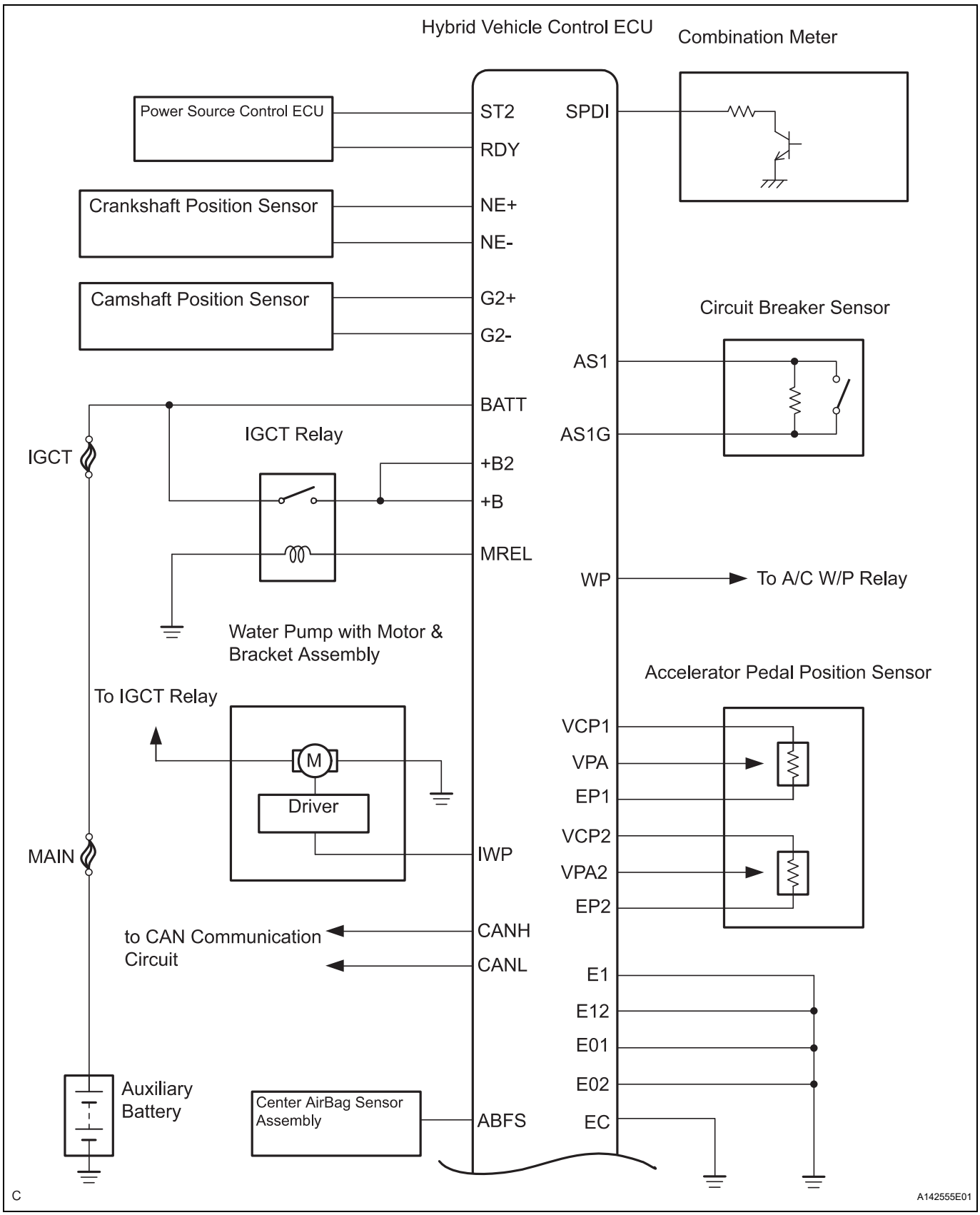
Terminal No. (Symbol)	Condition	Specified Condition
Engine Room R/B IG2 relay terminal 1 - E6-11 (IG2D)	Always	Below 1 Ω
Engine Room R/B IG2 relay terminal 2 - Body ground	Always	Below 1 Ω
E6-11 (IG2D) - Body ground	Always	10 kΩ or higher

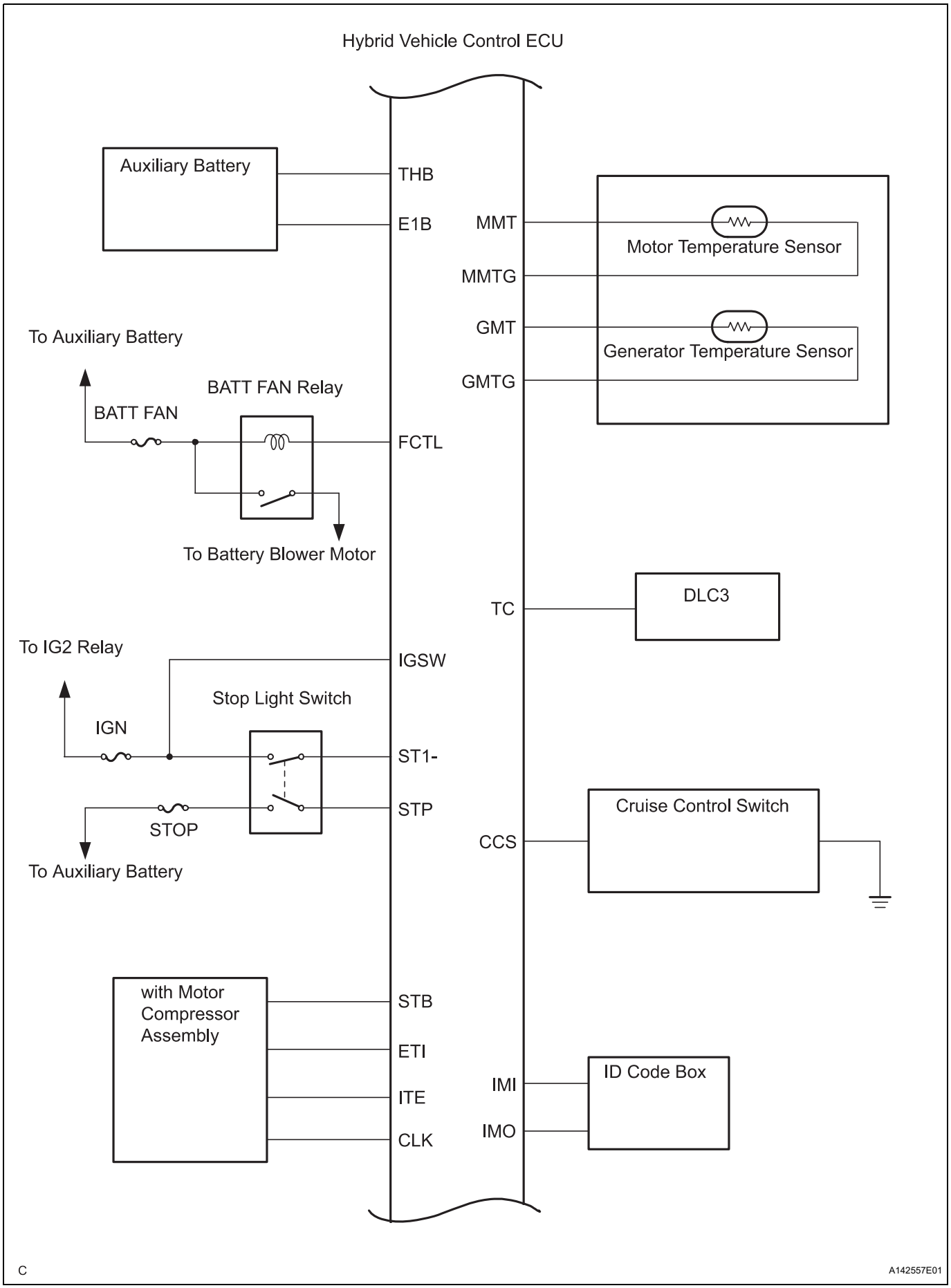
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

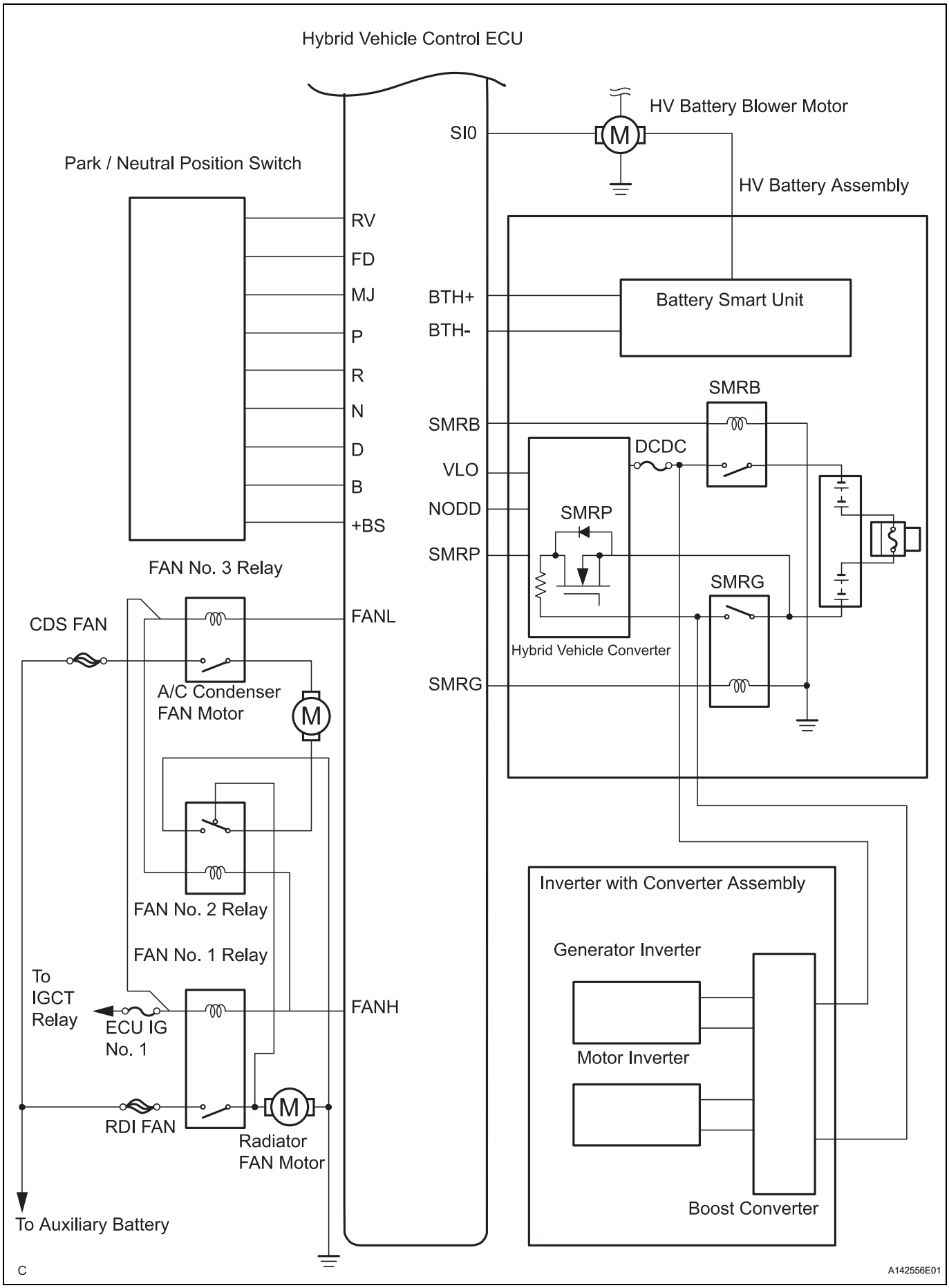
REPLACE MAIN BODY ECU

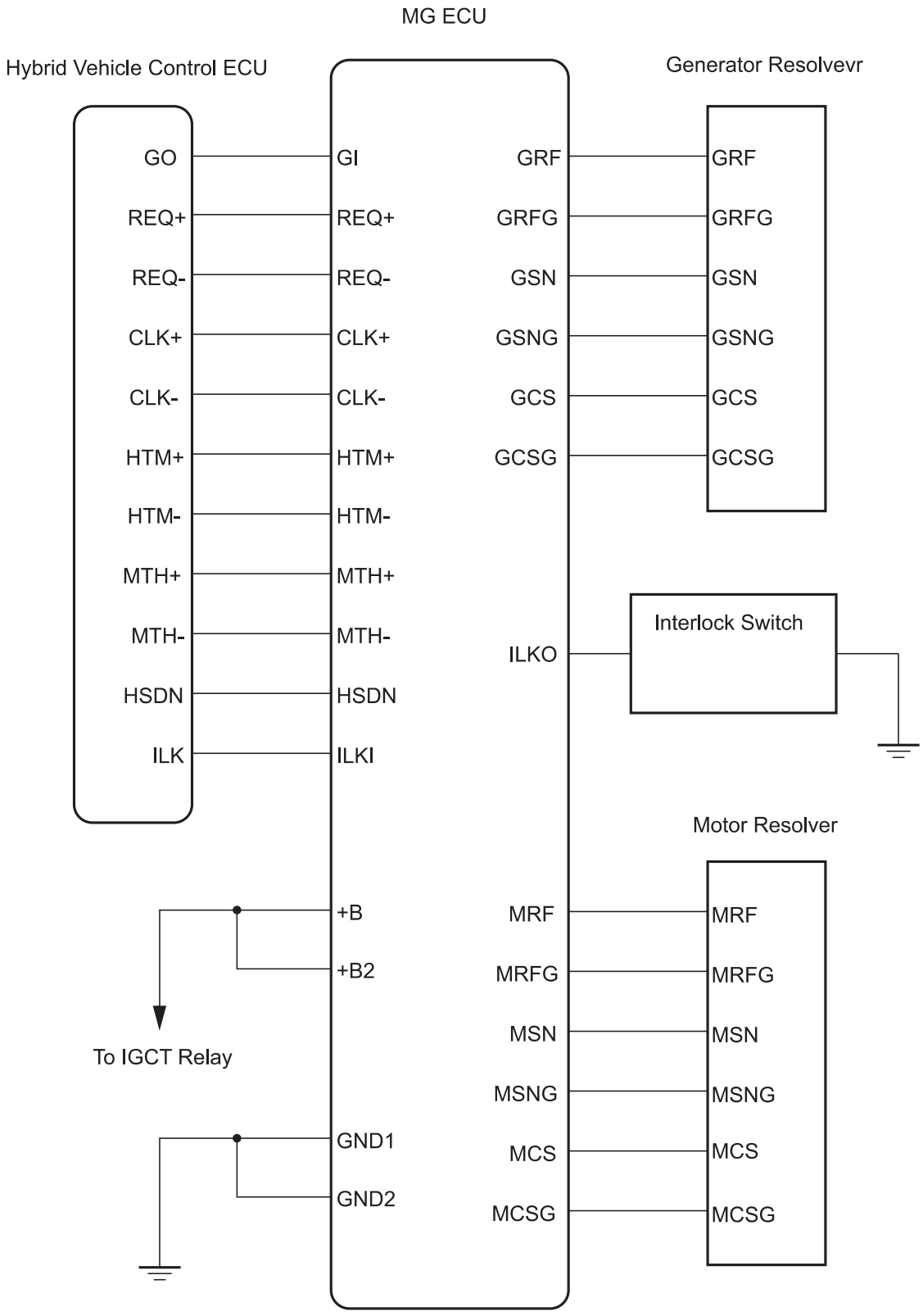
SYSTEM DIAGRAM




Hybrid Vehicle Control ECU
Auxiliary Battery
THB
E1B
MMT
MMTG
GMT
GMTG
Motor Temperature Sensor
Generator Temperature Sensor
To Auxiliary Battery
BATT FAN Relay
BATT FAN
FCTL
To Battery Blower Motor
TC
DLC3
To IG2 Relay
IGSW
Stop Light Switch
IGN
ST1-
STP
STOP
To Auxiliary Battery
CCS
Cruise Control Switch
with Motor
Compressor
Assembly
STB
ETI
ITE
CLK
IMI
IMO
ID Code Box
C
A142557E01

HV


Hybrid Vehicle Control ECU
SI0
HV Battery Blower Motor
M
Park / Neutral Position Switch
HV Battery Assembly
RV
FD
MJ
P
R
N
D
B
+BS
BTH+
BTH-
Battery Smart Unit
SMRB
SMRB
DCDC
VLO
NODD
SMRP
SMRP
SMRG
Hybrid Vehicle Converter
FAN No. 3 Relay
CDS FAN
FANL
A/C Condenser
FAN Motor
SMRG
HV
FAN No. 2 Relay
FAN No. 1 Relay
Inverter with Converter Assembly
Generator Inverter
To
IGCT
Relay
ECU IG
No. 1
FANH
Motor Inverter
RDI FAN
Radiator
FAN Motor
Boost Converter
To Auxiliary Battery
C
A142556E01



C

A142558E01

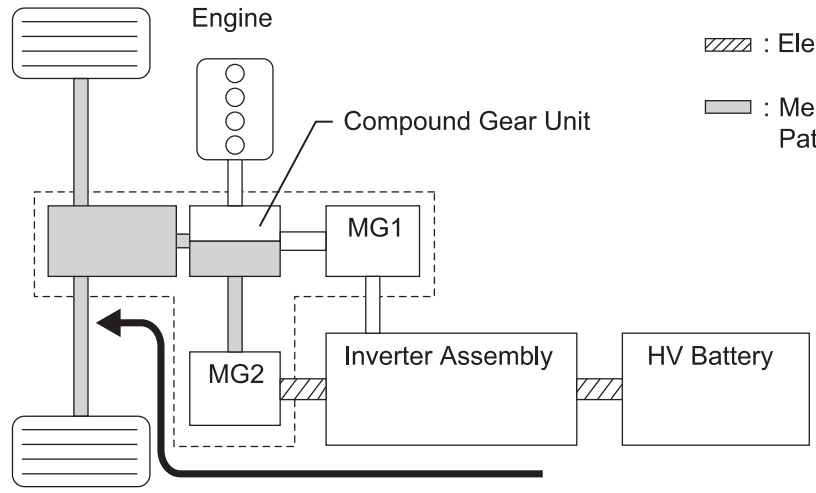
HV

SYSTEM DESCRIPTION

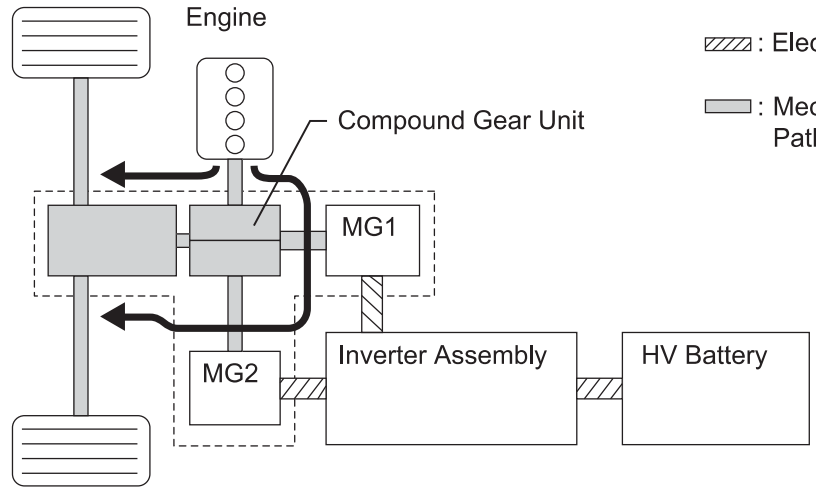
1. BASIC OPERATION

This system generates a motive force by combining the engine, MG1, and MG2 in accordance with the driving conditions. Representative examples of the various combinations are described below.

(a) Starting (Driven by MG2)
Supply of electrical power from the HV battery to MG2 provides force to drive the front wheels.

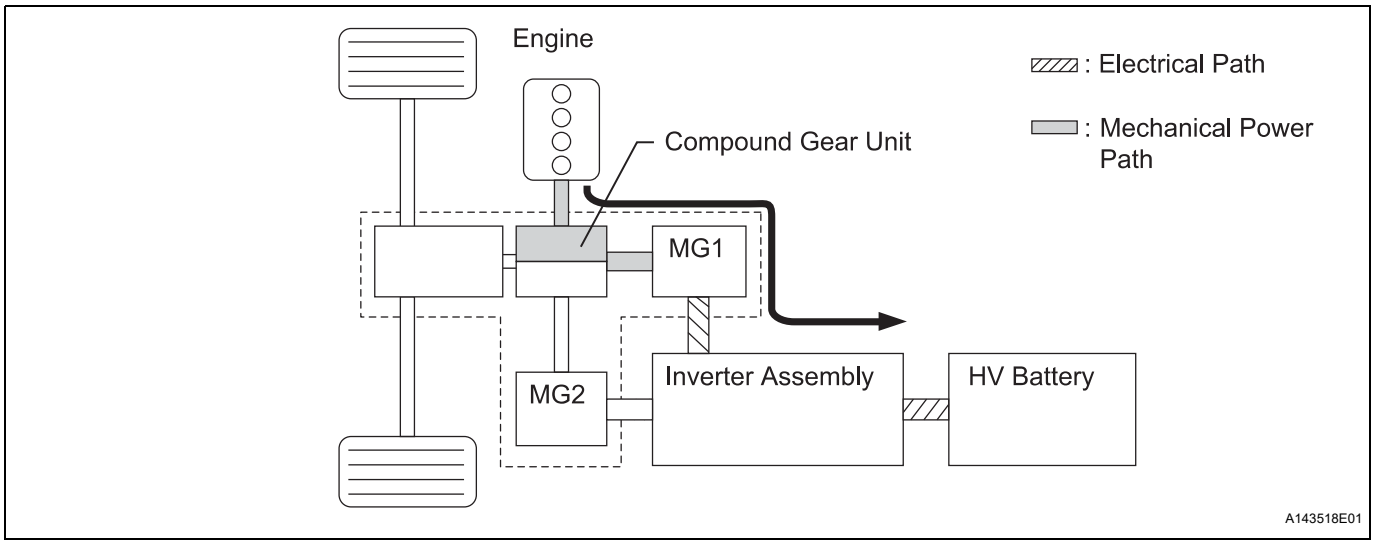


(b) During Acceleration with Engine
While the front wheels are being driven by the engine via the planetary gears, MG1 is also being driven by the engine via the planetary gears, in order to supply the electricity that MG1 generates to MG2.

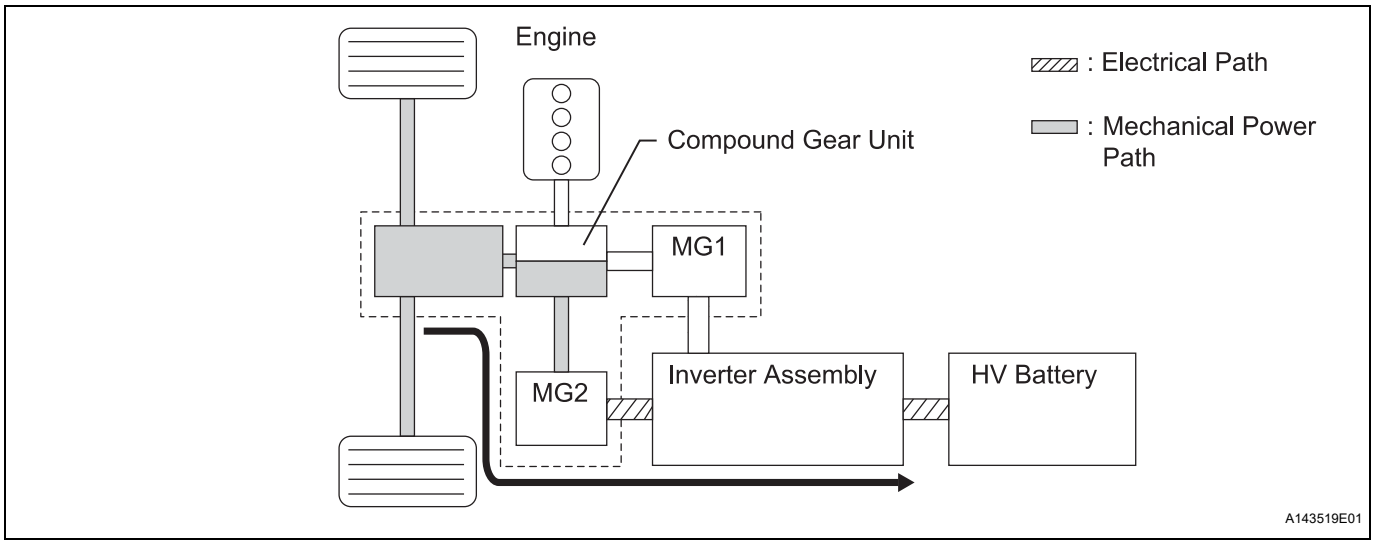


HV

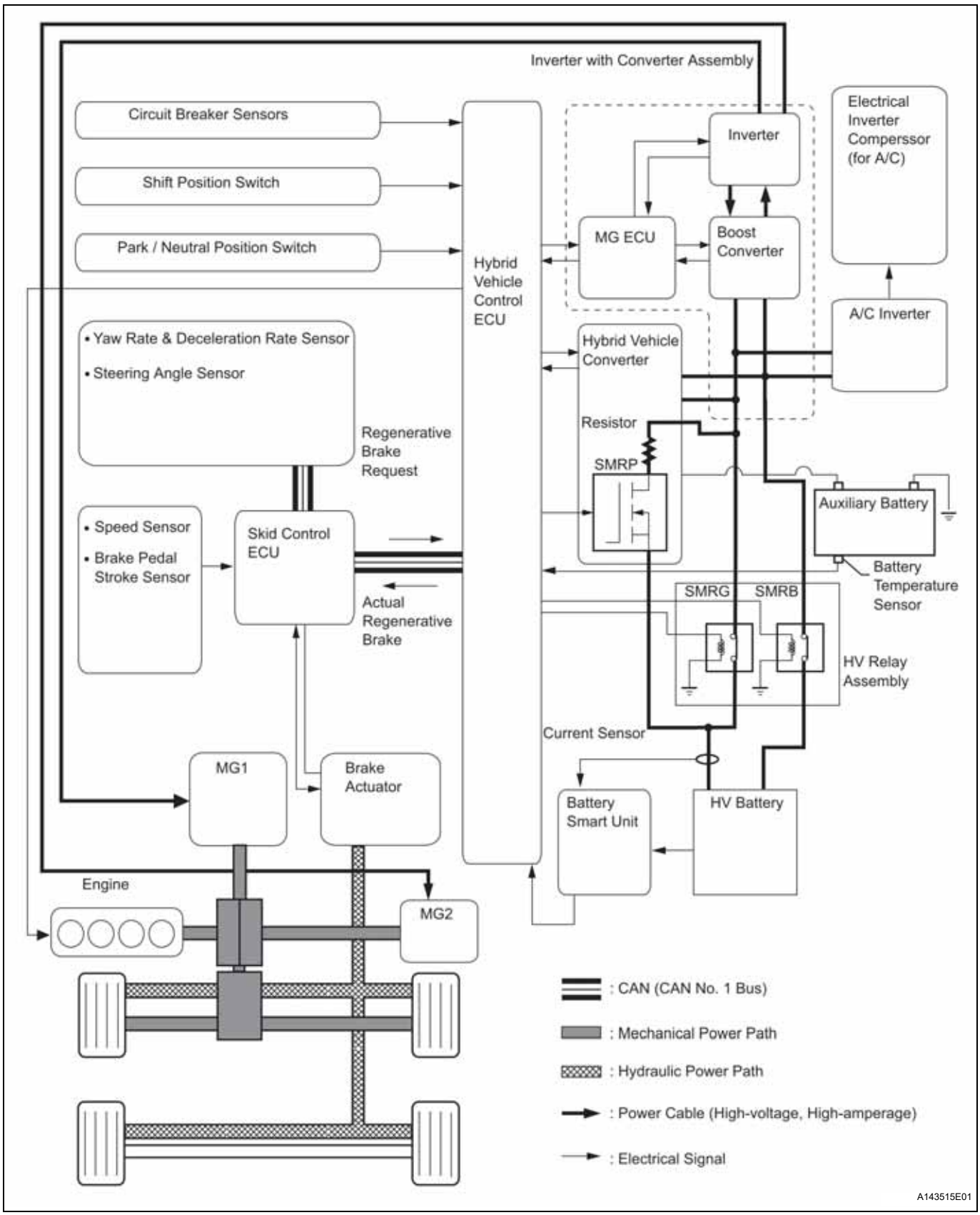
(c) Charging the HV Battery
MG1 is rotated by the engine via the planetary gears, in order to charge the HV battery.



(d) During Deceleration Driving
When the vehicle is decelerating, kinetic energy from the front wheels is recovered and converted into electrical energy by means of MG2, and used to recharge the HV battery.



2. SYSTEM DIAGRAM



HV

3. FUNCTION OF MAIN COMPONENTS

Item			Outline
Hybrid Vehicle Transaxle	MG1		• MG1, which is driven by the engine, generates high-voltage electricity in order to operate MG2 or charge the HV battery. Also, it functions as a starter to start the engine. • MG1 operates so that the gear ratio of the power split planetary gear unit will optimally suit the driving conditions of the vehicle.
	MG2		• Driven by electrical power from MG1 or the HV battery, and generates motive force for the front wheels. • During braking, or when the accelerator pedal is not depressed, it generates electricity to recharge the HV battery (Regenerative brake control).
	Compound Gear Unit	Power Split Planetary Gear	Distributes the engine's drive force as appropriate to directly drive the vehicle as well as drive MG1.
		Motor Speed Reduction Planetary Gear	Located between MG2 and the power split planetary gear, the motor speed reduction planetary gear reduces the rotational speed of MG2 in accordance with the characteristics of the planetary gear set, in order to increase torque.
HV Battery Unit	HV Battery		• Supplies electrical power to MG1 and MG2 in accordance with the driving conditions of the vehicle. • Recharged by MG1 and MG2 in accordance with the SOC and the driving conditions of the vehicle.
	Hybrid Vehicle Converter (DC/DC Converter)		Converts a voltage of DC 244.8 V into a DC voltage between 12 V and 14 V in order to supply electricity to body electrical components, as well as to recharge the auxiliary battery (DC 12 V). Contains SMRP.
	SMRP		Completes the initial connection of the high-voltage circuit through a resistor to allow a controlled precharge of the high-voltage system. SMRP is a semiconductor relay that is located in the hybrid vehicle converter (DC/DC converter.)
	Battery Smart Unit		Monitors the conditions of the HV battery and transmits this information to the hybrid vehicle control ECU.
	Service Plug Grip		Shuts off the high-voltage circuit of the HV battery when this plug grip is removed for vehicle inspection or maintenance.
Inverter with Converter Assembly	Inverter		A device that converts the high-voltage DC (HV battery) into AC (MG1 and MG2) and vice versa (converts AC into DC).
	Boost Converter		Boosts the maximum voltage of the HV battery from DC 244.8 to DC 650 V and vice versa (drops DC 650 V to DC 244.8 V).
	MG ECU		Controls the inverter and boost converter in accordance with the signals received from the hybrid vehicle control ECU, thus driving MG1 or MG2 causing them to generate electricity.
Hybrid Vehicle Control ECU			Effects comprehensive control of the THS II. • Information from each sensor as well as from the ECU (battery smart unit, skid control ECU, and EPS ECU) is received, and based on this information, the required torque and output power is calculated. The hybrid vehicle control ECU sends the calculated result to the inverter with converter assembly and skid control ECU. • Activates the ETCS-i (Electronic Throttle Control System-intelligent) in accordance with the target engine speed and required engine motive force. • Monitors the charging condition of the HV battery. • Controls the cooling fan of the HV battery. • Controls the hybrid vehicle converter.
Accelerator Pedal Position Sensor			Converts the accelerator pedal position into an electrical signal and outputs it to the hybrid vehicle control ECU.
Park / Neutral Position Switch			Converts the shift position into an electrical signal and outputs it to the hybrid vehicle control ECU.
HV Relay Assembly			Connects and disconnects the high-voltage power circuit between the HV battery and the inverter with converter assembly, through the use of a signal from the hybrid vehicle control ECU. Contains SMRB and SMRG.
Interlock Circuit (for A/C Fuse Cover and Service Plug Grip)			Verifies that the cover of both the inverter and the service plug grip have been installed.
Circuit Breaker Sensor			Detects the impact that is applied to the vehicle during a collision and transmits a signal to the hybrid vehicle control ECU. Upon receiving this signal, the hybrid vehicle control ECU operates the HV relay assembly to shut down the power supply.
Auxiliary Battery			Charged by the HV battery module power via the hybrid vehicle converter. Supplies power to the audio system, air conditioning system (except the electric inverter compressor) and the ECUs.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
*: Use the intelligent tester.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

NEXT

3	CONNECT INTELLIGENT TESTER TO THE DLC3*

HINT:
If the display on the tester indicates a communication fault, inspect the DLC3.

NEXT

4	CHECK DTC AND SAVE FREEZE FRAME DATA* (See page HV-36), (See page HV-65)

HINT:
Make sure to save freeze frame data because the data is necessary for a simulation test.

NEXT

5	CLEAR DTC* (See page HV-36)

NEXT

6	CONDUCT VISUAL INSPECTION

NEXT

7	CONFIRM PROBLEM SYMPTOMS

HINT:
If the engine does not start, perform steps 9 and 11 first.
Result

Result	Proceed to
Malfunction does not occur	A
Malfunction occurs	B

B → GO TO STEP 10

A

8	DUPLICATE CONDITIONS THAT PRODUCE SYMPTOMS

NEXT

9	CHECK FOR DTCS* (See page HV-36)

Result

Result	Proceed to
Trouble code	A
No code	B

B → GO TO STEP 11

A

10	REFER TO DTC CHART (See page HV-46)

NEXT

GO TO STEP 13

11	CONDUCT BASIC INSPECTION

Result

Result	Proceed to
Malfunctioning parts not confirmed	A
Malfunctioning parts confirmed	B

B → GO TO STEP 15

A

12	CHECK ECU POWER SOURCE CIRCUIT

NEXT

13	CONDUCT CIRCUIT INSPECTION

Result

Result	Proceed to
Malfunction not confirmed	A

Result	Proceed to
Malfunction confirmed	B

B → GO TO STEP 16

A

14	CHECK FOR INTERMITTENT PROBLEMS (See page HV-17)

NEXT

GO TO STEP 16

15	CONDUCT PARTS INSPECTION

NEXT

16	IDENTIFY PROBLEM

NEXT

17	ADJUST AND/OR REPAIR

NEXT

18	CONDUCT CONFIRMATION TEST

NEXT

END

CHECK FOR INTERMITTENT PROBLEMS

1. CHECK FOR INTERMITTENT PROBLEMS

(a) Perform a simulation test (See page IN-72).

(1) For the simulation test, reproduce the driving conditions that were present when the trouble occurred. These conditions should be based on the customer's comments and freeze frame data that is recorded with DTCs, such as the opening angle of the accelerator pedal, SOC, engine coolant temperature, engine rpm, and MG1/MG2 rpm and torque.

(b) Check the connector(s) and terminal(s) (See page IN-67).

(c) Wiggle the harness and connector(s) (See page IN-72).

(d) Heat or cool suspected parts (See page IN-72).

NOTICE:

Do not directly heat or cool the MG ECU with the inverter cover removed.

REGISTRATION

NOTICE:
The Vehicle Identification Number (VIN) must be input into the replacement HV control ECU.
HINT:
The VIN is a 17-digit alphanumeric vehicle identification number. The intelligent tester is required to register the VIN.

1. INPUT INSTRUCTIONS

(a) General VIN input instructions for use with the intelligent tester are as follows.
  (1) Intelligent Tester
  The arrow buttons (UP, DOWN, RIGHT, and LEFT) and number buttons (0 to 9) are used to input the VIN.
  (2) Cursor Operation
  To move the cursor around the tester screen, press the RIGHT and LEFT buttons.

(b) Input of Letters
  (1) Press the UP and DOWN buttons to select the desired letter.
  (2) After selection, the cursor should move.

(c) Input of Numbers
  (1) Press the number button that corresponds to the number that you want to input.
  (2) Select or input the correct character using the UP and DOWN buttons, or the number buttons.
  HINT:
  Numbers can be selected using the UP and DOWN buttons.

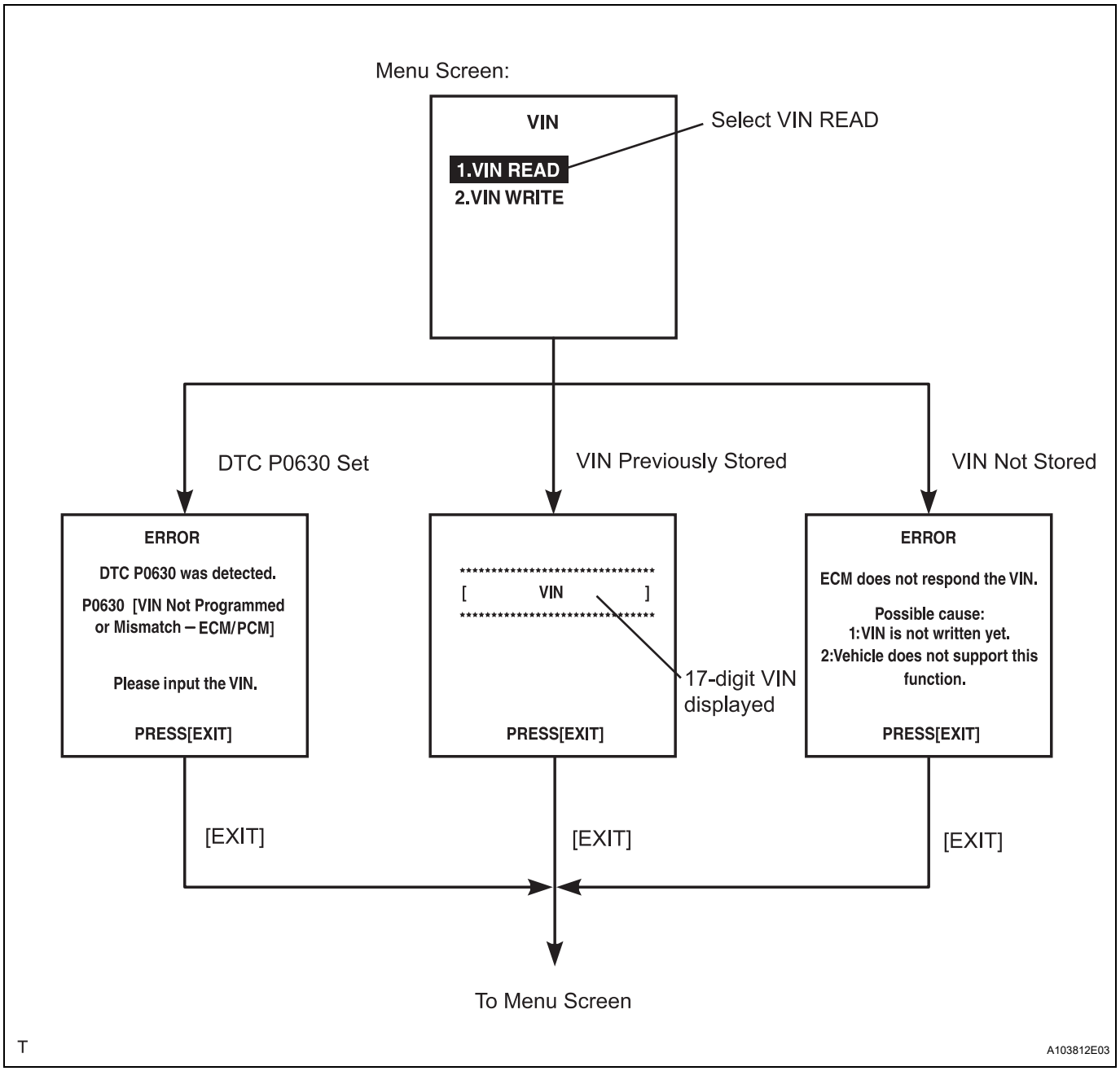
(d) Correction
  (1) After input, the cursor should move.
  (2) When correcting a character that has been input, put the cursor on the character using the RIGHT and LEFT buttons.

(e) Finishing Input Operation
  (1) Make sure that the VIN input using the tester matches the vehicle's VIN.
  (2) Press the ENTER button on the tester.

2. READ VIN (Vehicle Identification Number)

(a) The VIN reading process is explained using a flowchart as shown. Reading the VIN stored in the HV control ECU is necessary when comparing it to the VIN of the vehicle.
  (1) Read the VIN using the intelligent tester.
  (2) Check the vehicle's VIN.
  (3) Connect the intelligent tester to the DLC3.
  (4) Turn the power switch on (IG).
  (5) Turn the tester on.

(6) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / VIN.



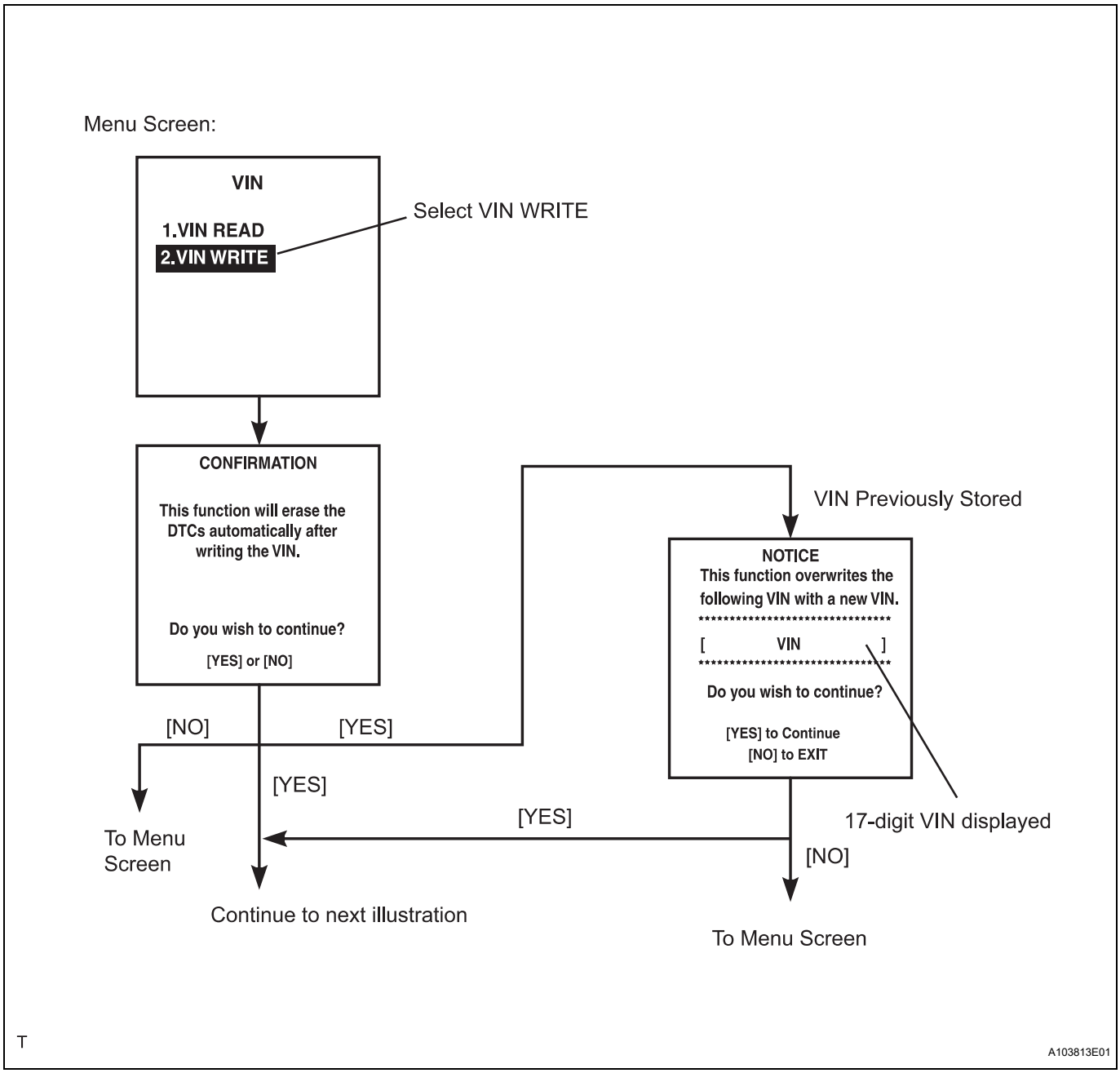
3. WRITE VIN

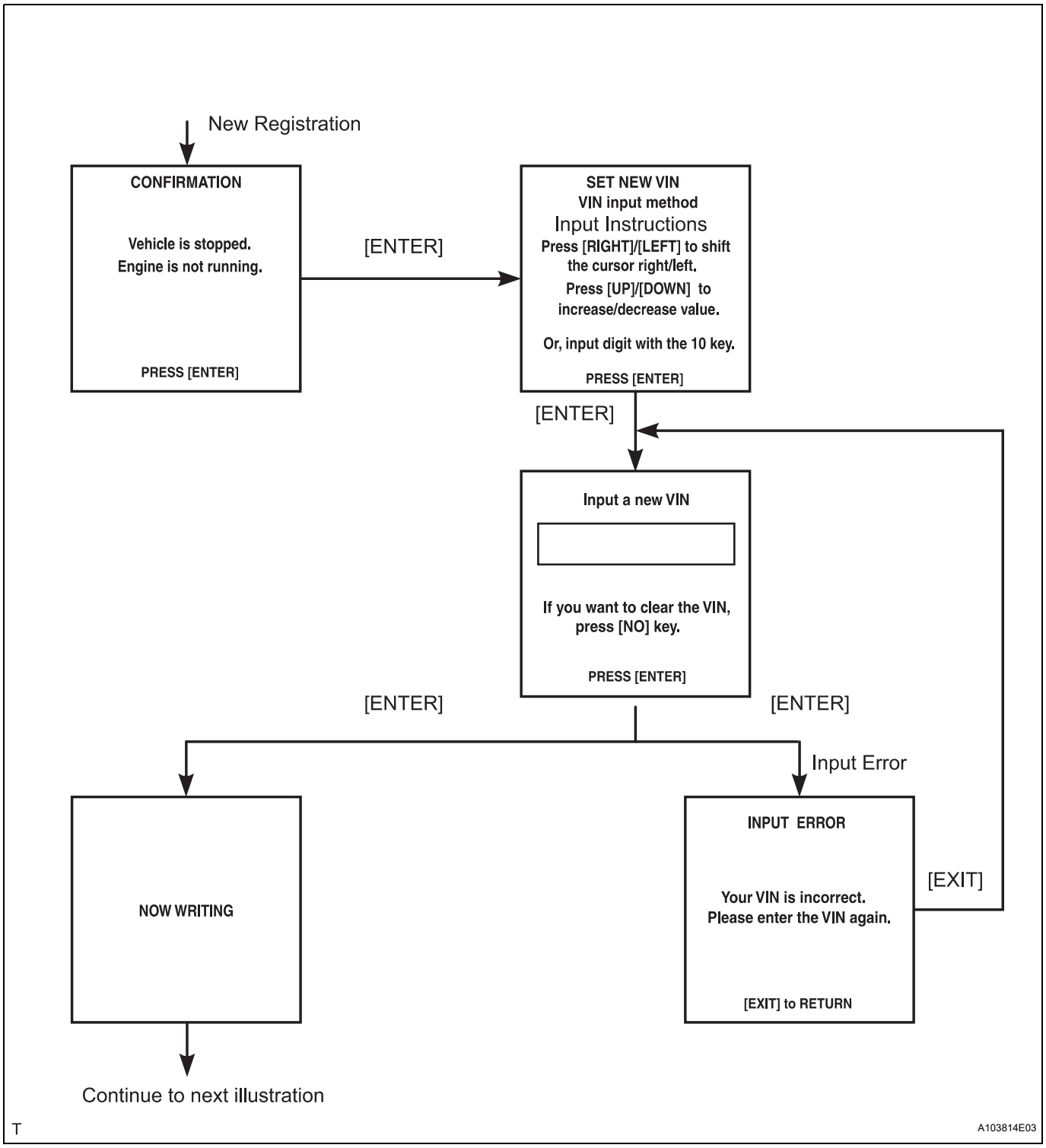
(a) The VIN writing process is explained using a flowchart as shown. This process allows the VIN to be input into the HV control ECU. If the HV control ECU is changed, or the HV control ECU VIN and the vehicles's VIN do not match, the VIN can be registered, or overwritten in the HV control ECU by following this procedure.

(1) Write VIN using the intelligent tester.
(2) Connect the intelligent tester to the DLC3.
(3) Turn the power switch on (IG).
(4) Turn the tester on.

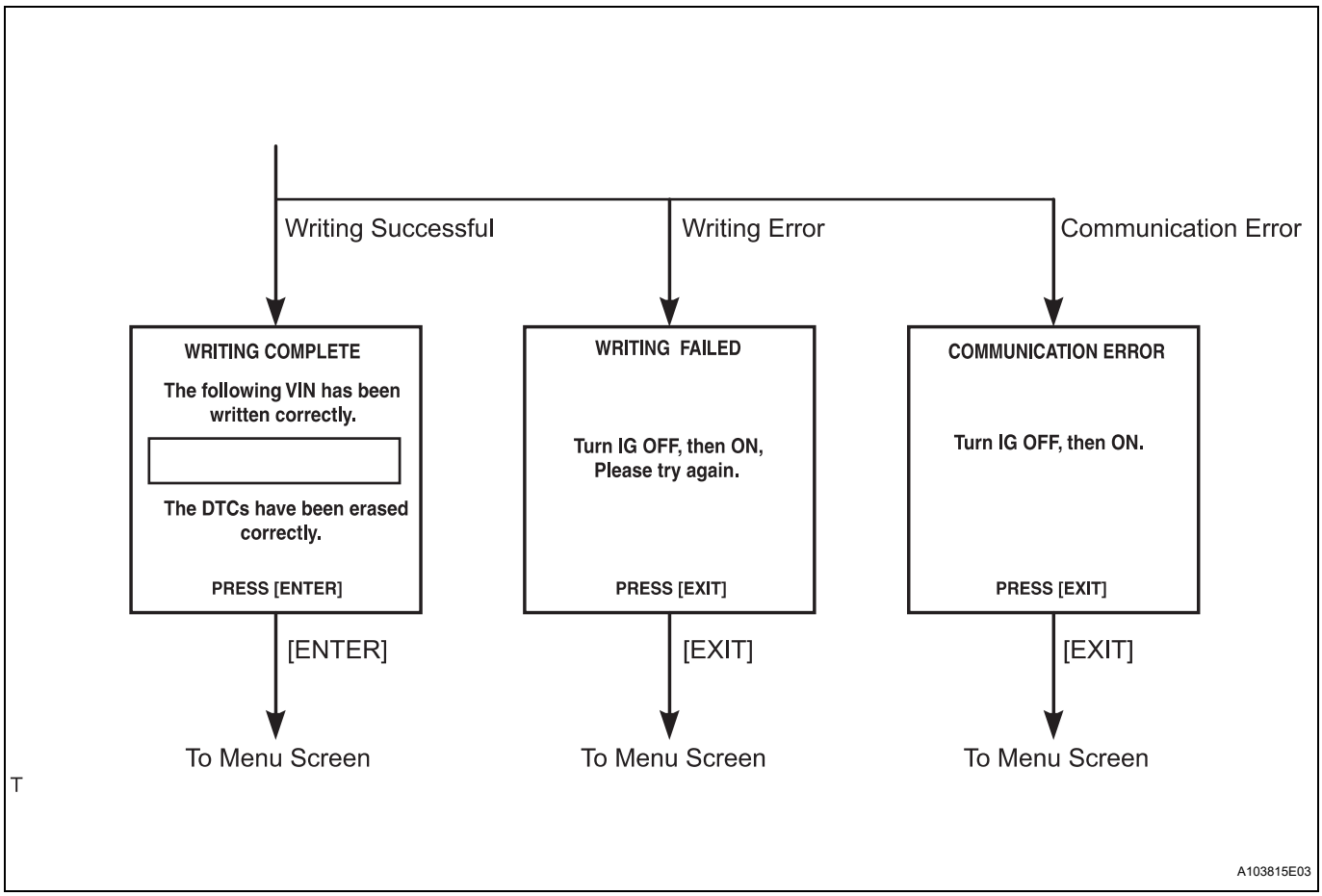
HV

(5) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / VIN.




New Registration
CONFIRMATION
Vehicle is stopped.
Engine is not running.
PRESS [ENTER]
[ENTER]
SET NEW VIN
VIN input method
Input Instructions
Press [RIGHT]/[LEFT] to shift the cursor right/left.
Press [UP]/[DOWN] to increase/decrease value.
Or, input digit with the 10 key.
PRESS [ENTER]
[ENTER]
Input a new VIN
If you want to clear the VIN, press [NO] key.
PRESS [ENTER]
[ENTER]
[ENTER]
Input Error
NOW WRITING
INPUT ERROR
Your VIN is incorrect.
Please enter the VIN again.
[EXIT] to RETURN
[EXIT]
Continue to next illustration
T
A103814E03

HV


Writing Successful
Writing Error
Communication Error
WRITING COMPLETE
The following VIN has been written correctly.
The DTCs have been erased correctly.
PRESS [ENTER]
WRITING FAILED
Turn IG OFF, then ON, Please try again.
PRESS [EXIT]
COMMUNICATION ERROR
Turn IG OFF, then ON.
PRESS [EXIT]
[ENTER]
[EXIT]
[EXIT]
To Menu Screen
To Menu Screen
To Menu Screen
A103815E03

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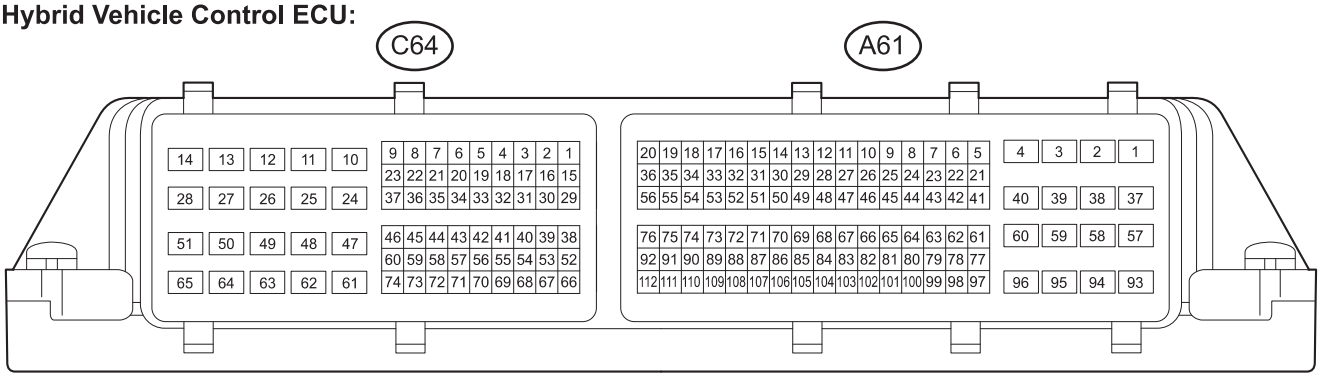
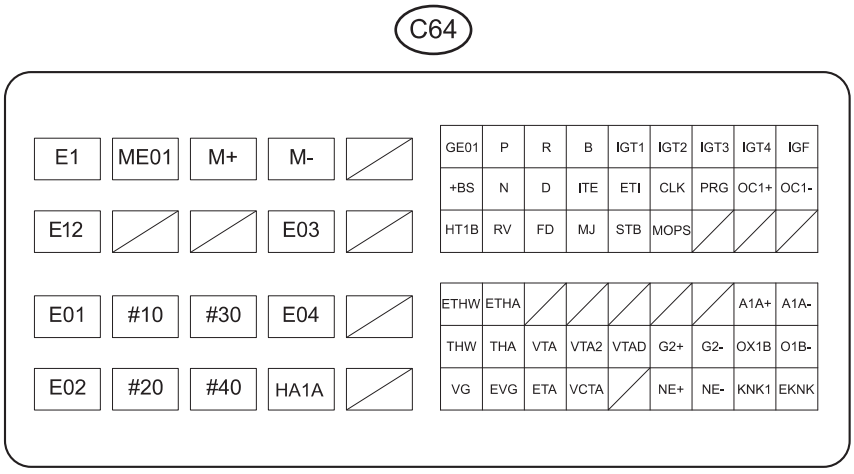
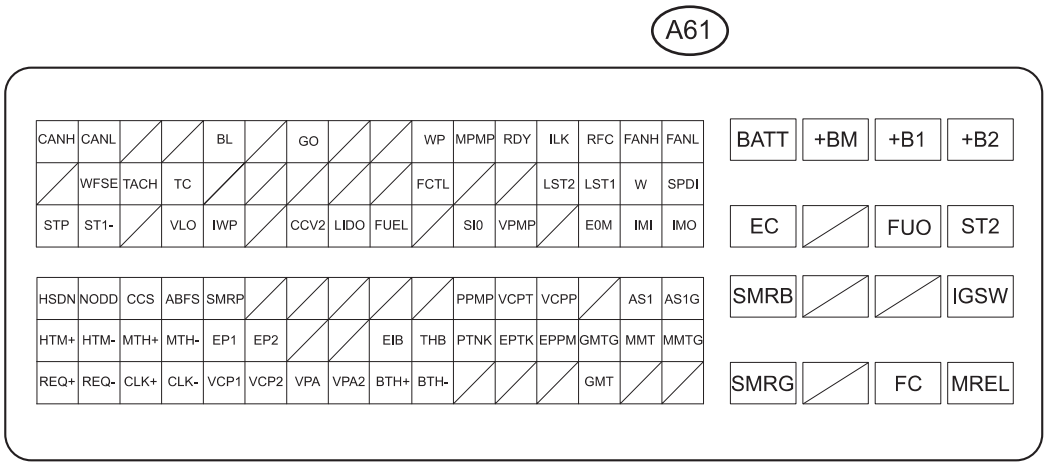
HV

TERMINALS OF ECU

Hybrid Vehicle Control ECU:







C

A142563E01

HV

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Standard Voltage
SMRP (A61-72) - E1 (C64-14)	BR - W-B	System main relay	Power switch on (IG) to on (READY)	Pulse generation (Waveform 1)
BATT (A61-4) - E1 (C64-14)	W - W-B	Constant power source	Always	10 to 14
MREL (A61-93) - E1 (C64-14)	B - W-B	Main relay	Power switch on (IG)	10 to 14
ST2 (A61-37) - E1 (C64-14)	R - W-B	Starter signal	Power switch on (IG)	0 to 1.5
IMI (A61-74) - E1 (C64-14)	W - W-B	Immobilizer communication	Immobilizer communicating	Pulse generation (Waveform 2)

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Standard Voltage
IMO (A61-41) - E1 (C64-14)	G - W-B	Immobilizer communication	Immobilizer communicating	Pulse generation (Waveform 2)
ILK (A61-8) - E1 (C64-14)	SB - W-B	Interlock switch	Power switch on (IG), A/C fuse cover and service plug grip installed correctly	0 to 1.5
ILK (A61-8) - E1 (C64-14)	SB - W-B	Interlock switch	Power switch on (IG), A/C fuse cover and service plug grip detached	10 to14
SMRB (A61-60) - E1 (C64-14)	G - W-B	System main relay	Power switch off to on (READY)	Pulse generation (Waveform 1)
CANL (A61-19) - E1 (C64-14)	W - W-B	CAN communication system	Power switch on (IG)	Pulse generation (Waveform 3)
CANH (A61-20) - E1 (C64-14)	B - W-B	CAN communication system	Power switch on (IG)	Pulse generation (Waveform 3)
+B1 (A61-2) - E1 (C64-14)	Y - W-B	Power source	Power switch on (IG)	10 to 14
SPDI (A61-21) - E1 (C64-14)	L - W-B	Vehicle speed signal	Approximately 20 km/h (12 mph)	Pulse generation (Waveform 4)
NODD (A61-75) - E1 (C64-14)	O - W-B	DC/DC operation	Converter operating normally	5 to 7
NODD (A61-75) - E1 (C64-14)	O - W-B	DC/DC operation	Converter not operating normally	2 to 4
NODD (A61-75) - E1 (C64-14)	O - W-B	DC/DC operation	Power switch on (IG)	0.1 to 0.5
VLO (A61-53) - E1 (C64-14)	V - W-B	DC/DC operation monitor / voltage change signal	Power switch on (IG)	Pulse generation (Waveform 5)
SIO (A61-46) - E1 (C64-14)	V - W-B	HV battery blower fan	Power switch on (IG), during active test	Pulse generation (Waveform 6)
IWP (A61-52) - E1 (C64-14)	O - W-B	HV water pump signal	Power switch on (READY)	Pulse generation (Waveform 7)
TC (A61-3) - E1 (C64-14)	P - W-B	Diagnosis terminal	Power switch on (IG)	10 to 14
VCP2 (A61-107) - E1 (C64-14)	W - W-B	Accelerator pedal position sensor power source (for VPA2)	Power switch on (IG)	4.5 to 5.5
VCP1 (A61-108) - E1 (C64-14)	BR - W-B	Accelerator pedal position sensor power source (for VPA1)	Power switch on (IG)	4.5 to 5.5
ST1- (A61-55) - E1 (C64-14)	GR - W-B	Brake cancel switch	Power switch on (IG), brake pedal depressed	0 to 1.5
ST1- (A61-55) - E1 (C64-14)	GR - W-B	Brake cancel switch	Power switch on (IG), brake pedal released	10 to 14
HSDN (A61-76) - E1 (C64-14)	L - W-B	MG shutdown signal	Power switch on (READY)	0 to 1.5
SMRG (A61-96) - E1 (C64-14)	P - W-B	System main relay	Power switch on (IG) to on (READY)	Pulse generation (Waveform 1)
HTM- (A61-91) - E1 (C64-14)	W - W-B	Communication signal from HV to MG	Power switch on (READY)	Pulse generation (Waveform 8)
MTH- (A61-89) - E1 (C64-14)	W - W-B	Communication signal from MG to HV	Power switch on (READY)	Pulse generation (Waveform 9)
CLK- (A61-109) - E1 (C64-14)	W - W-B	MG communication clock signal	Power switch on (READY)	Pulse generation (Waveform 10)
REQ- (A61-111) - E1 (C64-14)	W - W-B	MG communication request signal	Power switch on (READY)	Pulse generation (Waveform 11)
IGSW (A61-57) - E1 (C64-14)	Y - W-B	IG signal	Power switch on (IG)	10 to 14
BTH+ (A61-104) - E1 (C64-14)	R - W-B	Communication signal from battery to HV	Power switch on (IG)	Pulse generation (Waveform 12)
ABFS (A61-73)- E1 (C64-14)	Y - W-B	Airbag activation signal	Power switch on (READY) (2 seconds after ACC ON)	Pulse generation (Waveform 13)
HTM+ (A61-92) - E1 (C64-14)	B - W-B	Communication signal from HV to MG	Power switch on (READY)	Pulse generation (Waveform 8)

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Standard Voltage
MTH+ (A61-90) - E1 (C64-14)	B - W-B	Communication signal from MG to HV	Power switch on (READY)	Pulse generation (Waveform 9)
CLK+ (A61-110) - E1 (C64-14)	B - W-B	MG communication clock signal	Power switch on (READY)	Pulse generation (Waveform 10)
REQ+ (A61-112) - E1 (C64-14)	B - W-B	MG communication request signal	Power switch on (READY)	Pulse generation (Waveform 11)
WP (A61-11) - E1 (C64-14)	O - W-B	A/C WP relay signal	Power switch on (READY)	Below 2
VPA2 (A61-105) - EP1 (A61-87)	L - W-B	Accelerator pedal position sensor (for accelerator pedal position detection)	Power switch on (IG), accelerator pedal released	1.0 to 2.2
VPA2 (A61-105) - E1 (C64-14)	L - W-B	Accelerator pedal position sensor (for accelerator pedal position detection)	Power switch on (IG), engine stopped, shift lever in P position, accelerator pedal fully depressed	3.4 to 5.3
VPA (A61-106) - EP2 (A61-88)	R -W-B	Accelerator pedal position sensor (for accelerator pedal position detection)	Power switch on (IG), accelerator pedal released	0.4 to 1.4
VPA (A61-106) - E1 (C64-14)	R -W-B	Accelerator pedal position sensor (for accelerator pedal position detection)	Power switch on (IG), engine stopped, shift lever in P position, accelerator pedal fully depressed	2.6 to 4.5
STP (A61-56) - E1 (C64-14)	W - W-B	Stop light switch	Brake pedal depressed	10 to 14
STP (A61-56) - E1 (C64-14)	W - W-B	Stop light switch	Brake pedal released	0 to 1.5
BTH- (A61-103) - E1 (C64-14)	W - W-B	Communication signal from battery to HV	Power switch on (IG)	Pulse generation (Waveform 12)
THB (A61-83) - EIB (A61-84)	LG - P	Auxiliary battery temperature sensor signal	Auxiliary battery temperature 25 °C (77°F)	1.8 to 2.5
THB (A61-83) - EIB (A61-84)	LG - P	Auxiliary battery temperature sensor signal	Auxiliary battery temperature 60 °C (140°F)	0.7 to 1.3
RDY (A61-117) - E1 (C64-14)	W-L - W-B	READY state	Power switch on (IG) Power switch on (READY)	Pulse generation (Waveform 14)
+BS (C64-23) - E1 (C64-14)	W-L - W-B	Park / neutral position switch power source	Power switch on (IG)	10 to 14
STB (C64-33) - E1 (C64-14)	R - W-B	A/C communication signal	Power switch on (READY), air conditioning system stopped	Pulse generation (Waveform 15)
CLK (C64-18) - E1 (C64-14)	G - W-B	A/C communication signal	Power switch on (READY), air conditioning system stopped	Pulse generation (Waveform 15)
ITE (C64-20) - E1 (C64-14)	W - W-B	A/C communication signal	Power switch on (READY), air conditioning system stopped	Pulse generation (Waveform 15)
ETI (C64-19) - E1 (C64-14)	Y - W-B	A/C communication signal	Power switch on (READY), air conditioning system stopped	Pulse generation (Waveform 15)
MJ (C64-34) - E1 (C64-14)	P - W-B	Park / neutral position switch signal	Power switch on (IG), shift lever in P, R, N or D position	10 to 14
FD (C64-35) - E1 (C64-14)	W - W-B	Park / neutral position switch signal	Power switch on (IG), shift lever in D position	10 to 14
FD (C64-35) - E1 (C64-14)	W - W-B	Park / neutral position switch signal	Power switch on (IG), shift lever not in D position	0 to 1.5
RV (C64-36) - E1 (C64-14)	L - W-B	Park / neutral position switch signal	Power switch on (IG), shift lever in R position	10 to 14
RV (C64-36) - E1 (C64-14)	L - W-B	Park / neutral position switch signal	Power switch on (IG), shift lever not in R position	0 to 1.5
D (C64-21) - E1 (C64-14)	R - W-B	Park / neutral position switch signal	Power switch on (IG), shift lever in D position	10 to 14

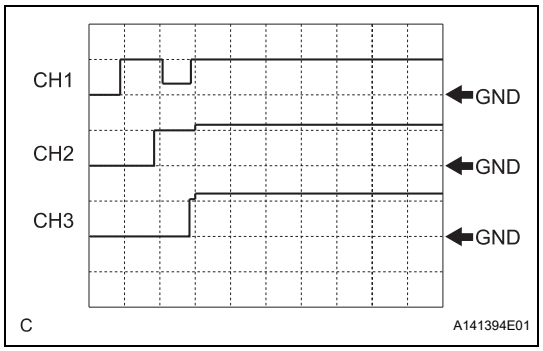
Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Standard Voltage
D (C64-21) - E1 (C64-14)	R - W-B	Park / neutral position switch signal	Power switch on (IG), shift lever not in D position	0 to 1.5
N (C64-22) - E1 (C64-14)	Y - W-B	Park / neutral position switch signal	Power switch on (IG), shift lever in N position	10 to 14
N (C64-22) - E1 (C64-14)	Y - W-B	Park / neutral position switch signal	Power switch on (IG), shift lever not in N position	0 to 1.5
R (C64-7) - E1 (C64-14)	B - W-B	Park / neutral position switch signal	Power switch on (IG), shift lever in R position	10 to 14
R (C64-7) - E1 (C64-14)	B - W-B	Park / neutral position switch signal	Power switch on (IG), shift lever not in R position	0 to 1.5
P (C64-8) - E1 (C64-14)	G - W-B	Park / neutral position switch signal	Power switch on (IG), shift lever in P position	10 to 14
P (C64-8) - E1 (C64-14)	G - W-B	Park / neutral position switch signal	Power switch on (IG), shift lever not in P position	0 to 1.5
FCTL (A61-27) - E1 (C64-14)	GR - W-B	Cooling fan relay	Power switch on (IG)	10 to 14
MMT (A61-78) - MMTG (A61-77)	G - SB	Motor temperature sensor	Power switch on (IG), ambient temperature 25°C (77°F)	1.9 to 2.8
MMT (A61-78) - MMTG (A61-77)	G - SB	Motor temperature sensor	Power switch on (IG), ambient temperature 60°C (140°F)	1.1 to 1.8
GMT (A61-99) - GMTG (A61-79)	L - V	Generator temperature sensor	Power switch on (IG), ambient temperature 25°C (77°F)	1.9 to 2.8
GMT (A61-99) - GMTG (A61-79)	L - V	Generator temperature sensor	Power switch on (IG), ambient temperature 60°C (140°F)	1.1 to 1.8
+B2 (A61-1) - E1 (C64-14)	Y - W-B	Power source	Power switch on (IG)	Power switch on (IG)
VCP2 (A61-1) - EP1 (A61-87)	W - Y	Power source of acceleration pedal position sensor	Power switch on (IG)	4.5 to 5.5
VCP1 (A61-108) - EP2 (A61-88)	BR - G	Power source of acceleration pedal position sensor	Power switch on (IG)	4.5 to 5.5
GO (A61-14) - E1 (C64-14)	B - W-B	GO signal	Engine running	Pulse generation (Waveform 16)

HV

NOTICE:
Do not measure voltage or waveform directly at the sealed side of the hybrid vehicle control ECU connectors, Doing so may damage the connectors because these connectors are waterproof.

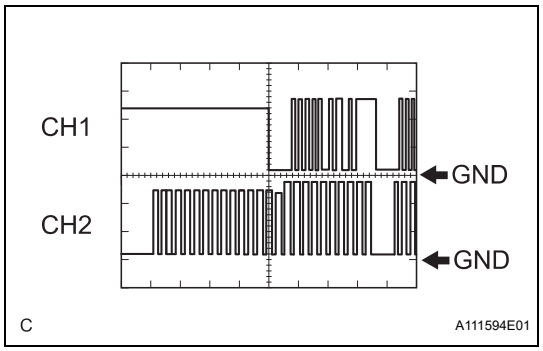
1. Oscilloscope waveforms

HINT:
Oscilloscope waveform samples are provided here for informational purposes. Noise and fluttering waveforms have been omitted.



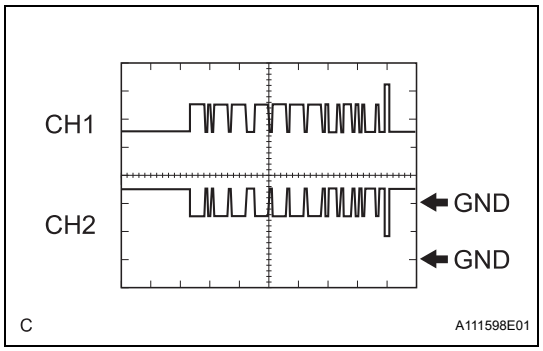
(a) Waveform 1 (System main relay operation signal)

Item	Contents
Terminal	CH1: SMRP - E1 CH2: SMRB - E1 CH3: SMRG - E1
Equipment Setting	10 V/DIV., 500 ms./DIV.
Condition	Power switch on (IG) → Power switch on (READY)



(b) Waveform 2 (Immobilizer communication signal)

Item	Contents
Terminal	CH1: IMO - E1 CH2: IMI - E1
Equipment Setting	5 V/DIV., 200 ms./DIV.
Condition	Power switch off → Power switch on (IG) → Power switch on (READY)

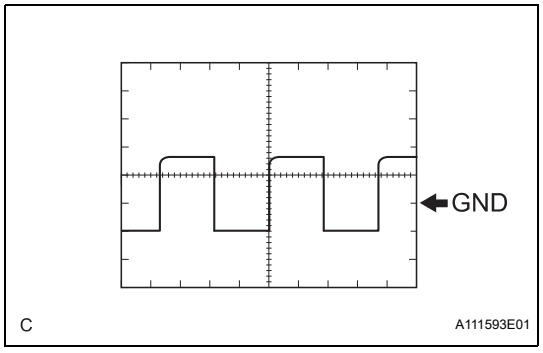


(c) Waveform 3 (CAN communication signal)

Item	Contents
Terminal	CH1: CANH - E1 CH2: CANL - E1
Equipment Setting	1 V/DIV., 20 μs./DIV.
Condition	Power switch on (IG)

HV

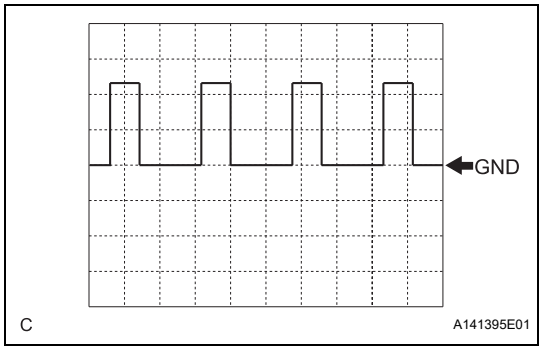
HINT:
The waveform will vary depending on the content of the digital communication (digital signal).



(d) Waveform 4 (Vehicle speed signal)

Item	Contents
Terminal	SPDI - E1
Equipment Setting	5 V/DIV., 20 ms./DIV.
Condition	Driving at approximately 20 km/h (12 mph) with power switch on (READY)

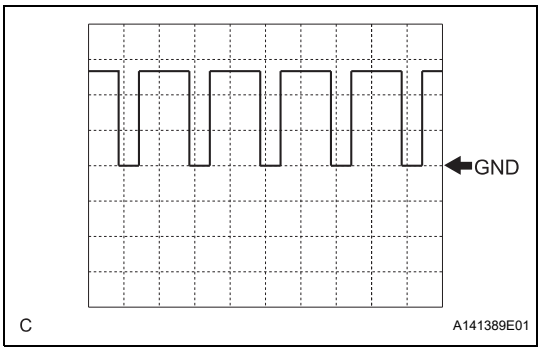
HINT:
The higher the vehicle speed, the shorter the cycle.



(e) Waveform 5 (VLO signal)

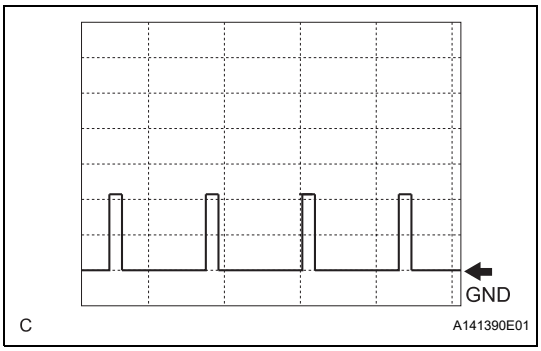
Item	Contents
Terminal	VLO - E1
Equipment Setting	5 V/DIV., 50 ms./DIV.
Condition	Power switch on (IG)

HINT:
The cycle will vary depending on the specified voltage of the hybrid vehicle converter.



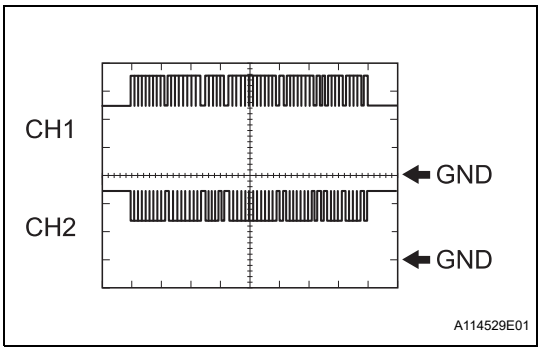
(f) Waveform 6 (HV battery blower fan operation signal)

Item	Contents
Terminal	SI0 - E1
Equipment Setting	5 V/DIV., 100 ms./DIV.
Condition	Power switch on (IG) during active test



(g) Waveform 7 (HV water pump signal)

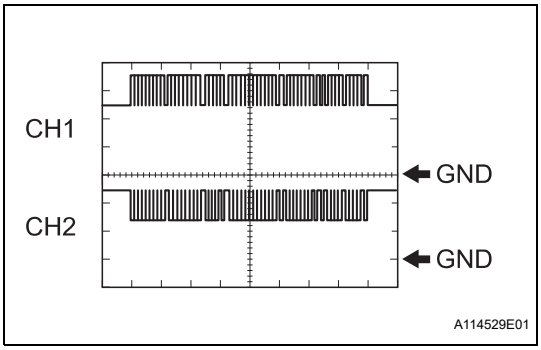
Item	Contents
Terminal	IWP - E1
Equipment Setting	5 V/DIV., 100 ms./DIV.
Condition	Power switch on (READY)



(h) Waveform 8 (Communication signal from HV control ECU to MG ECU)

Item	Contents
Terminal	CH1: HTM+ - E1 CH2: HTM- - E1
Equipment Setting	1 V/DIV., 200 μs./DIV.
Condition	Power switch on (READY)

HINT:
The waveform will vary depending on the content of the digital communication (digital signal).

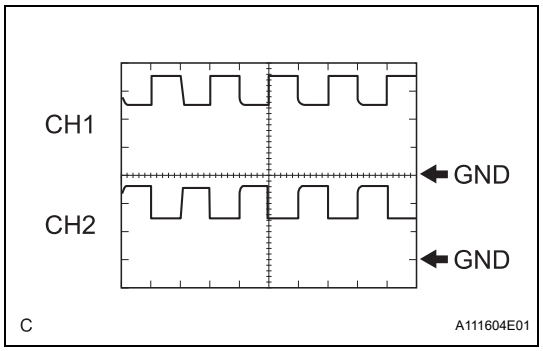


(i) Waveform 9 (Communication signal from MG ECU to HV control ECU)

Item	Contents
Terminal	CH1: HTM+ - E1 CH2: HTM- - E1
Equipment Setting	1 V/DIV., 200 μs./DIV.
Condition	Power switch on (READY)

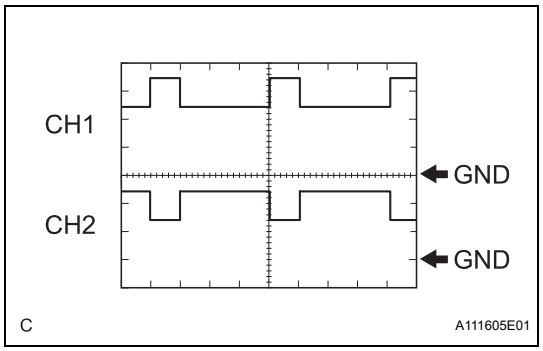
HINT:
The waveform will vary depending on the content of the digital communication.

HV



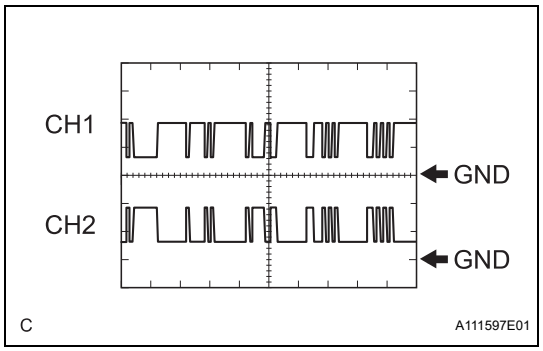
(j) Waveform 10 (MG communication clock signal)

Item	Contents
Terminal	CH1: CLK+ - E1 CH2: CLK- - E1
Equipment Setting	1 V/DIV., 1 μs./DIV.
Condition	Power switch on (READY)



(k) Waveform 11 (MG communication request signal)

Item	Contents
Terminal	CH1: REQ+ - E1 CH2: REQ- - E1
Equipment Setting	1 V/DIV., 1 ms./DIV.
Condition	Power switch on (READY)

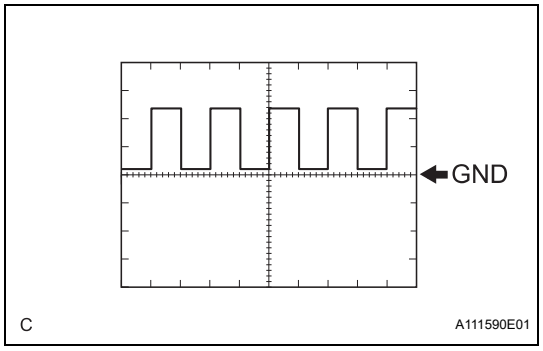


(l) Waveform 12 (Communication signal from battery smart unit to HV control ECU)

Item	Contents
Terminal	CH1: BTH+ - E1 CH2: BTH- - E1
Equipment Setting	2 V/DIV., 500 μs./DIV.
Condition	Power switch on (IG)

HV

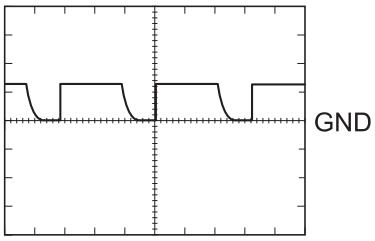
HINT:
The waveform will vary depending on the content of the digital communication (digital signal).



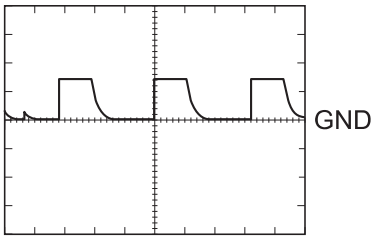
(m) Waveform 13 (Airbag deployment signal)

Item	Contents
Terminal	ABFS - E1
Equipment Setting	5 V/DIV., 500 ms./DIV.
Condition	Power switch on (READY)

Waveform:



Power switch ON (IG)

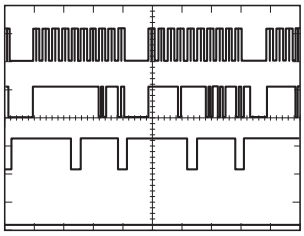


Power switch ON (READY)

C A111591E03

(n) Waveform 14 (READY signal)

Item	Contents
Terminal	RDY - E1
Equipment Setting	10 V/DIV., 10 ms./DIV.
Condition	Power switch on (IG) / Power switch on (READY)

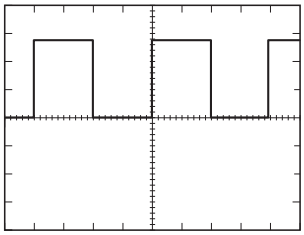


C A111607

(o) Waveform 15 (A/C communication signal)

Item	Contents
Terminal	CH1: CLK - E1 CH2: ITE - E1 CH3: ETI - E1 CH4: STB - E1
Equipment Setting	10 V/DIV., 100 ms./DIV.
Condition	Power switch on (READY) with air conditioning system stopped

HINT:
The waveform will vary depending on the content of the digital communication (digital signal).



C A111600

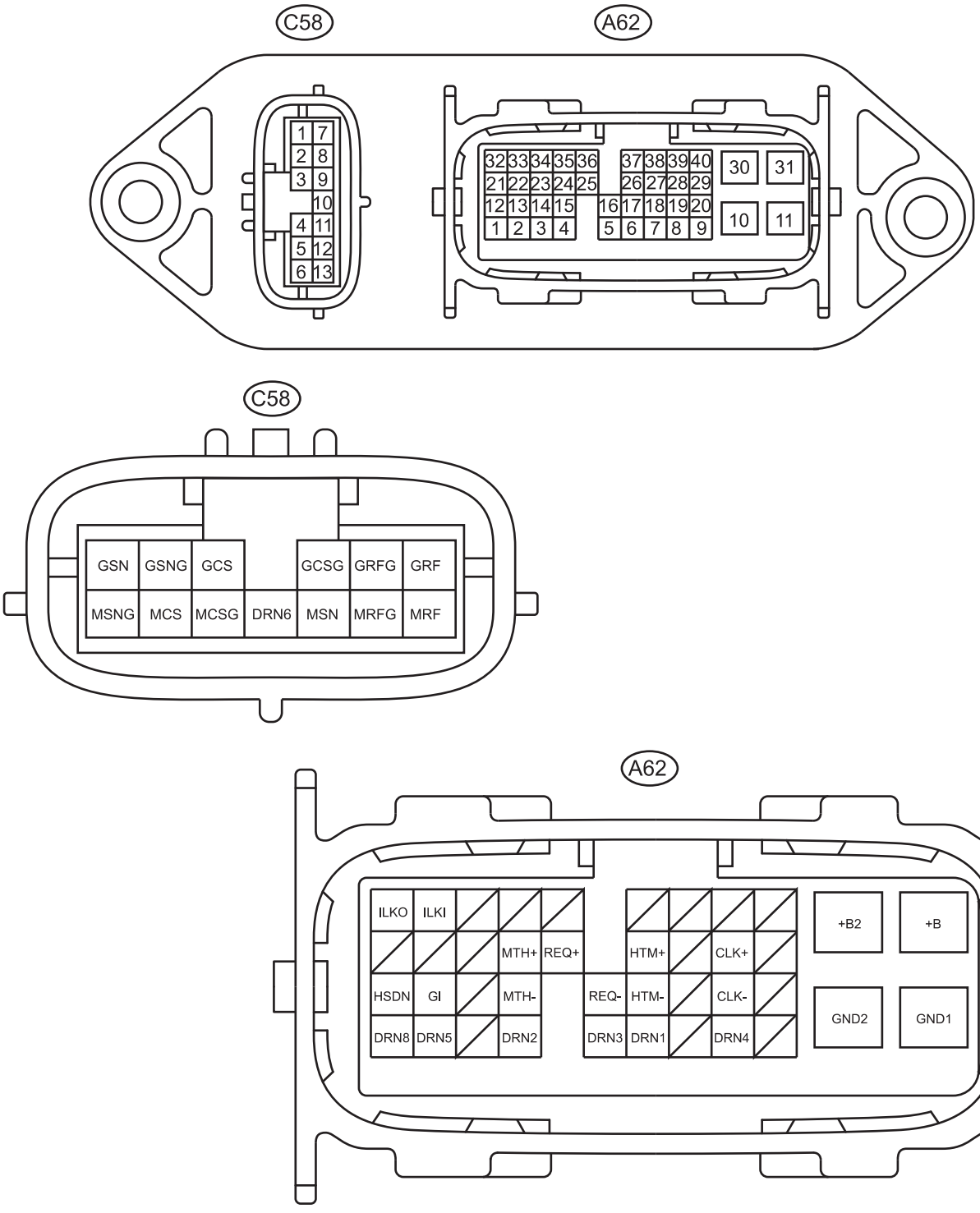
(p) Waveform 16 (GO signal)

Item	Contents
Terminal	GO - E1
Equipment Setting	5 V/DIV., 20 ms../DIV.
Condition	Power switch on (READY) with engine running

HINT:
The pulse cycle becomes shorter as the engine speed increases.

HV

Inverter with Converter Assembly (MG ECU):



A142541E01

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Standard Voltage (V)
+B (A62-31) - GND1 (A62-11)	Y - W	MG ECU power source	Power switch on (IG)	10 to 14
+B2 (A62-30) - GND1 (A62-11)	Y - W	MG ECU power source	Power switch on (IG)	10 to 14

HV

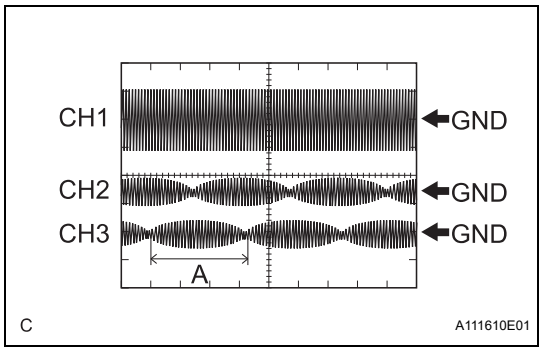
Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Standard Voltage (V)
CLK+ (A62-28) - GND1 (A62-11)	B - W	Communication clock signal	Power switch on (IG)	10 to 14
CLK- (A62-19) - GND1 (A62-11)	W - W	Communication clock signal	Power switch on (IG)	10 to 14
ILKO (A62-32) - GND1 (A62-11)	B - W	Interlock switch signal	Power switch on (IG), A/C fuse cover and service plug grip installed correctly	Below 1
ILKO (A62-32) - GND1 (A62-11)	B - W	Interlock switch signal	Power switch on (IG), A/C fuse cover and service plug grip detached	10 to 14
REQ+ (A62-25) - GND1 (A62-11)	B - W	Communication request signal	Power switch on (IG)	Pulse generation (Waveform 2)
MTH+ (A62-24) - GND1 (A62-11)	B - W	Communication signal from MG to HV	Power switch on (IG)	Pulse generation (Waveform 3)
MTH- (A62-15) - GND1 (A62-11)	W - W	Communication signal from MG to HV	Power switch on (IG)	Pulse generation (Waveform 3)
ILKI (A62-33) - GND1 (A62-11)	SB - W	Interlock switch signal	Power switch on (IG), A/C fuse cover and service plug grip installed correctly	Below 1
ILKI (A62-33) - GND1 (A62-11)	SB - W	Interlock switch signal	Power switch on (IG), A/C fuse cover and service plug grip detached	10 to 14
REQ- (A62-16) - GND1 (A62-11)	W - W	Communication request signal	Power switch on (IG)	Pulse generation (Waveform 2)
GI (A62-13) - GND1 (A62-11)	B - W	GI signal	Power switch on (READY), engine started	Pulse generation (Waveform 4)
HTM+ (A62-26) - GND1 (A62-11)	B - W	Communication signal from HV to MG	Generator resolver stopped or running	Pulse generation (Waveform 6
HTM- (A62-17) - GND1 (A62-11)	W - W	Communication signal from HV to MG	Generator resolver stopped or running	Pulse generation (Waveform 6)
HSDN (A62-12) - GND1 (A62-11)	L - W	MG shutdown signal	Generator resolver stopped or running	0 to 1
GRF (C58-6) - GRFG (C58-5)	BR - G	Generator resolver signal	Generator resolver stopped or running	Pulse generation (Waveform 5)
MRF (C58-13) - MRFG (C58-12)	BR - G	Motor resolver signal	Motor resolver stopped or running	Pulse generation (Waveform 1)
MCS (C58-8) - MCSG (C58-9)	W - Y	Motor resolver signal	Motor resolver stopped or running	Pulse generation (Waveform 1)
MSN (C58-11) - MSNG (C58-7)	L - R	Motor resolver signal	Motor resolver stopped or running	Pulse generation (Waveform 1)
GSN (C58-1) - GSNG (C58-2)	L - R	Generator resolver signal	Generator resolver stopped or running	Pulse generation (Waveform 5)
GCS (C58-3) - GCSG (C58-4)	W - Y	Generator resolver signal	Generator resolver stopped or running	Pulse generation (Waveform 5)

HV

NOTICE:
Do not measure voltage or waveform directly at the sealed side of the inverter with converter assembly connectors. Doing so may damage the connectors because these connectors are waterproof.

2. Oscilloscope waveforms

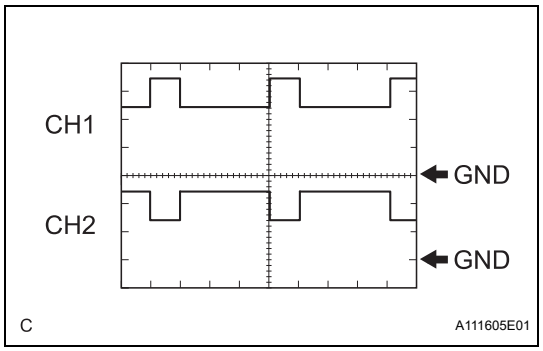
HINT:
Oscilloscope waveform samples are provided here for informational purposes. Noise and fluttering waveforms have been omitted.



(a) Waveform 1 (Motor resolver signal)

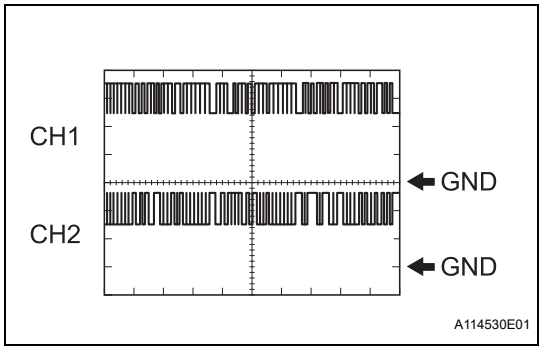
Item	Contents
Terminal	CH1: MRF - MRFG CH2: MSN - MSNG CH2: MCS - MCSG
Equipment Setting	CH1: 10 V/DIV., 1 ms./DIV. CH2, CH3: 5 V/DIV., 1 ms./DIV.
Condition	Resolver running

HINT:
Pulse cycle A becomes shorter as the rotor speed increases.



(b) Waveform 2 (MG ECU communication request signal)

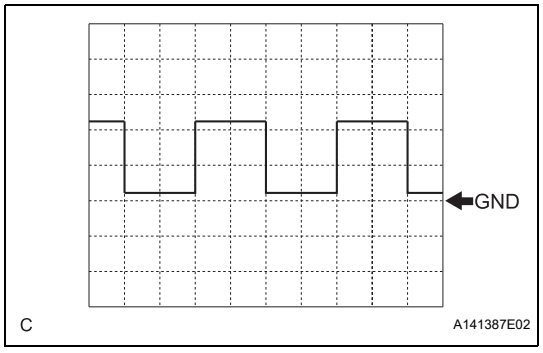
Item	Contents
Terminal	CH1: REQ+ - GND1 CH2: REQ- - GND11
Equipment Setting	1 V/DIV., 1 ms./DIV.
Condition	Power switch on (IG)



(c) Waveform 3 (Communication signal from MG ECU to HV control ECU)

Item	Contents
Terminal	CH1: MTH+ - GND1 CH2: MTH- - GND1
Equipment Setting	1 V/DIV., 200 μs./DIV.
Condition	Power switch on (IG)

HINT:
The waveform will vary depending on the content of the digital communication (digital signal).

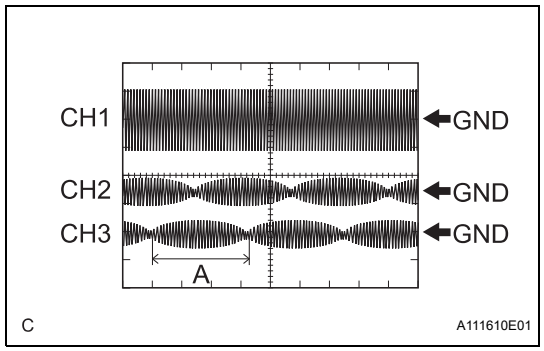


(d) Waveform 4 (GI signal)

Item	Contents
Terminal	CH1: GI - E1
Equipment Setting	5 V/DIV., 20 ms./DIV.
Condition	Power switch on (READY) with engine running

HINT:
The pulse cycle becomes shorter as the engine speed increases.

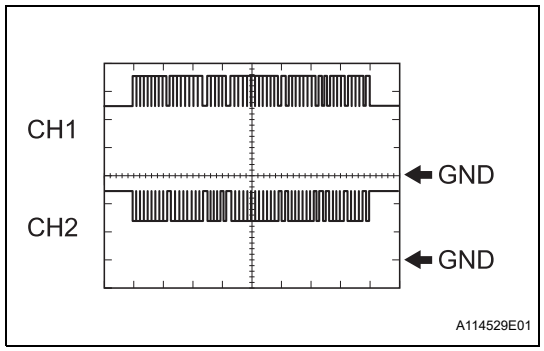
HV



(e) Waveform 5 (Generator resolver signal)

Item	Contents
Terminal	CH1: RRF - RRFG CH2: RSN - RSNG CH2: RCS - RCSG
Equipment Setting	CH1: 10 V/DIV., 1 ms./DIV. CH2, CH3: 5 V/DIV., 1 ms./DIV.
Condition	Resolver running

HINT:
Pulse cycle A becomes shorter as the rotor speed increases.



(f) Waveform 6 (Communication signal from HV control ECU to MG ECU)

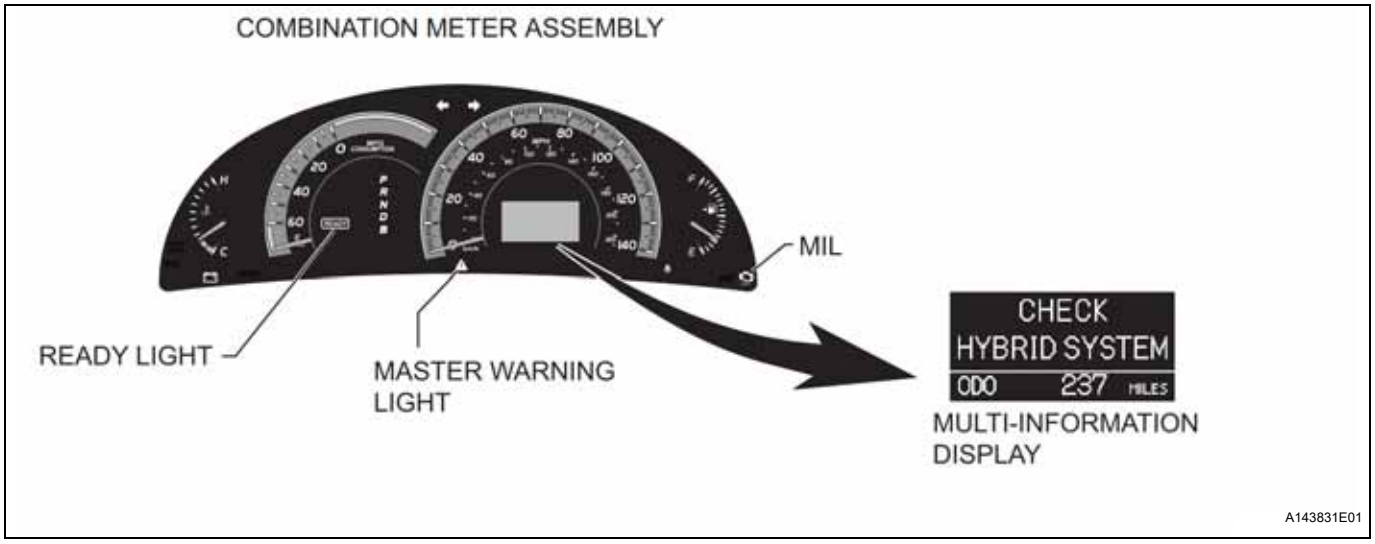
Item	Contents
Terminal	CH1: HTM+ - GND1 CH2: HTM- - GND1
Equipment Setting	1 V/DIV., 200 ms./DIV.
Condition	Power switch on (IG)

HINT:
The waveform will vary depending on the content of the digital communication (digital signal).

DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) The HV control ECU has a self-diagnosis system. If the computer, hybrid vehicle control system, or a component is not working properly, the ECU records the conditions that relate to the fault. The ECU also illuminates the master warning light and/or MIL in the combination meter and displays warning messages on the multi-information display.

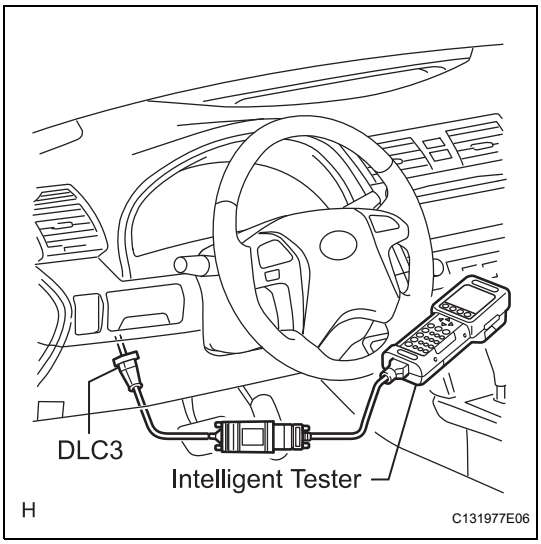


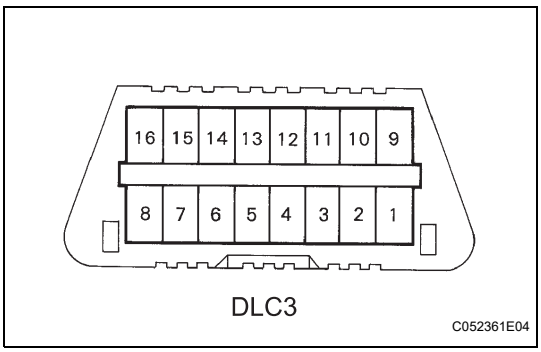
HINT:

The master warning light will illuminate when the THS II fails and the light will blink when in inspection mode.

- When troubleshooting OBD II vehicles, it is necessary to connect an OBD II scan tool that complies with SAE J1978 or connect an intelligent tester to the vehicle. Using one of these testers, it will be possible to read various data output from the vehicle's ECUs.
- OBD II regulations require that the vehicle's on-board computer illuminates the Malfunction Indicator light (MIL) in the instrument panel when the computer detects a malfunction in (1) the emission control system/ components, (2) the powertrain control components (which affect vehicle emissions), (3) the ECM and HV control ECU. In addition, applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the HV control ECU memory (See page HV-46).

If a malfunction does not recur in 3 consecutive trips, the MIL will go off automatically. However the DTCs will remain recorded in the HV control ECU memory.





- To check for DTCs, connect the intelligent tester to the Data Link Connector 3 (DLC3) with the CAN vehicle interface module (CAN VIM). The intelligent tester also allows erasing of DTCs, viewing of freeze frame data, and viewing of various forms of THS II data (for operating instructions, refer to the tester's instruction manual). The DTCs include SAE controlled codes and manufacturer controlled codes. SAE controlled codes must be set as prescribed by the SAE, while manufacturer controlled codes can be set by the manufacturer within prescribed limits (See page HV-46).

2. CHECK DLC3

(a) The HV control ECU uses the ISO 9141-2 communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

Symbol	Terminal No.	Name	Reference Terminal	Result	Condition
SIL	7	Bus "+" line	5 - Signal ground	Pulse generation	Always
CG	4	Chassis ground	Body ground	1 Ω or less	Always
SG	5	Signal ground	Body ground	1 Ω or less	Always
BATT	16	Battery positive	Body ground	11 to 14 V	Power switch off
CANH	6	HIGH-level CAN bus line	14 - LOW-level CAN bus line	54 to 69 Ω	Power switch off
CANH	6	HIGH-level CAN bus line	14 - Battery positive	1 MΩ or higher	Power switch off
CANH	6	HIGH-level CAN bus line	4 - Chassis ground	1 kΩ or higher	Power switch off
CANL	14	LOW-level CAN bus line	16 - Battery positive	1 MΩ or higher	Power switch off
CANL	14	LOW-level CAN bus line	4 - Chassis ground	1 kΩ or higher	Power switch off

HV

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the power switch on (IG), and attempt to use the tester. If the display on the tester indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If the tester is able to communicate when it is connected to another vehicle, inspect the DLC3 connector of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the tester's instruction manual for information on service or repair of the tester.

3. **INSPECT AUXILIARY BATTERY**
   (a) Measure the voltage of the auxiliary battery.
   Standard Voltage:
   10 to 14 V
   (b) Inspect the auxiliary battery, fuses, fusible links, wiring harness, connectors and ground.
4. **CHECK MIL**
   (a) The MIL will illuminate when the power switch is turned on (IG), before the "READY" light comes on. If the MIL does not illuminate, troubleshoot the MIL circuit (See page ES-373).
   (b) When the "READY" light turns on, the MIL should turn off. If the MIL remains on, the diagnosis system has detected a malfunction or abnormality in the system.

DTC CHECK / CLEAR

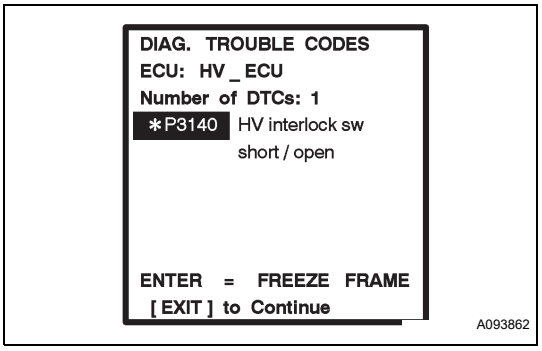
1. CHECK FOR DTCS (HV CONTROL ECU)

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG) and turn the intelligent tester on.

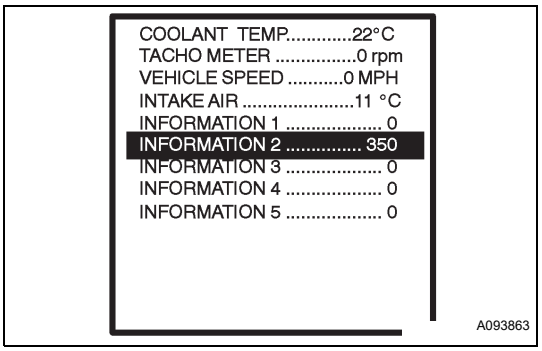
(c) Using the intelligent tester, check for DTCs and freeze frame data. If present, record or print the codes and the freeze frame data. Using the intelligent tester, enter the following menus: DIAGNOSIS / OBD/MOBD / HV ECU / DTC INFO / CURRENT CODES.

(d) Confirm the details of the DTCs. (See page HV-46)



2. CHECK FREEZE FRAME DATA AND INFORMATION

(a) If a DTC is present, select it in order to display its freeze frame data.



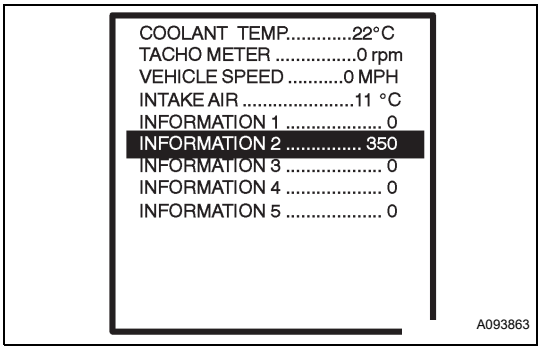
(b) Read the freeze frame data recorded when the DTC was set.

NOTICE:

An information code (INF code) will be displayed in one of the INFORMATION lines 1 to 5. Check the details by following the procedures in the following steps.

HINT:

In the case shown in the illustration, refer to troubleshooting for DTC P3140 and INF code 350.

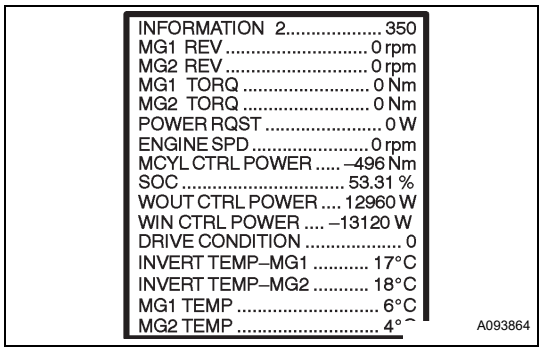


(c) Read the information.

(1) Select the item from among INFORMATION 1 to 5 that has an INF code on the freeze frame data screen.

(2) Press ENTER.

HV



(3) Additional information will be displayed as shown in the illustration.

3. CHECK FOR DTC (SYSTEMS OTHER THAN THE HV CONTROL ECU)

HINT:

The HV control ECU maintains communication with other computers, including the ECM, battery ECU, skid control ECU, and power steering ECU. Therefore, if the HV control ECU outputs a warning, it is necessary to check and record the DTCs of all the systems.

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG) and turn the intelligent tester on.

(c) On the intelligent tester, enter the following menus: DIAGNOSIS / OBD/MOBD / CODES (All).

(d) If DTCs are present, check the relevant systems.

HINT:

If DTCs for the CAN communication system are present in addition to other DTCs, first troubleshoot and repair any malfunctions in the CAN communication system.

4. CLEAR DTCS

NOTICE:

Clearing the DTCs will also clear the freeze frame data, information (see page HV-65), and operation history data (see page HV-70).

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG) and turn the intelligent tester on.

(c) Check that the P shift position has been selected.

(d) Clear DTCs and freeze frame data using the intelligent tester.

(1) Enter the following menus: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CLEAR CODES.

(2) Press YES.

DATA LIST / ACTIVE TEST

1. DATA LIST

NOTICE:

- **Some data list values may vary significantly if there are slight differences in the environment in which the vehicle is operating when measurements are obtained. Variations may also occur due to aging of the vehicle. Due to these considerations, it is not always possible to provide definite values to be used for judgment of malfunctions. It is possible that a malfunction may be present even if measured values are within the reference range.**
- **In the event of a problem with intricate symptoms, collect sample data from another vehicle of the same model operating under identical conditions in order to reach an overall judgment by comparing all the items in the data list.**

HINT:

Using the intelligent tester to read the data list allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the data list information early in troubleshooting is one way to save diagnostic time.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester on.
(c) Select the following menu items: DIAGNOSIS / OBD/MOBD / HV ECU / DATA LIST.
(d) Check the results by referring to the following table.

HV

DATA LIST:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
COOLANT TEMP (Engine coolant temperature)	Engine coolant temperature / Min.: -40°C, Max.: 140°C	After warming up: 80 to 100°C (176 to 212°F)	-
ENGINE REV (Engine revolution)	Min.: 0 rpm, Max.: 16383.75 rpm	Idling: 950 to 1,050 rpm	-
VEHICLE SPD (Vehicle SPD)	Vehicle speed / Min.: 0 km/h, Max.: 255 km/h	Vehicle stopped: 0 km/h (0 mph)	-
ENG RUN TIME (Engine run time)	Elapsed time after starting engine / Min.: 0 s, Max.: 65535 s	-	-
+B (+B)	Auxiliary battery voltage / Min.: 0 V, Max.: 65.535 V	Constant: Auxiliary battery voltage +-3 V	-
ACCEL POS #1 (Accelerator pedal position #1)	Accelerator pedal position sensor No. 1 / Min.: 0%, Max.: 100%	Accelerator pedal depressed: Changes with accelerator pedal pressure	-
ACCEL POS #2 (Accelerator pedal position #2)	Accelerator pedal position sensor No. 2 / Min.: 0%, Max.: 100%	Accelerator pedal depressed: Changes with accelerator pedal pressure	-
AMBIENT TEMP (Ambient Temperature)	Ambient air temperature / Min.: -40°C, Max.: 215°C	Power switch on (IG): Same as ambient air temperature	-
INTAKE AIR TEMP (Intake air temperature)	Intake air temperature / Min.: -40°C, Max.: 140°C	Constant: Same as ambient air temperature	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
DTC CLEAR WARM (DTC Clear Warm Up times)	The number of times engine is warmed up after clearing DTCs / Min.: 0, Max.: 255	MIL OFF, engine coolant temperature increases from below 22°C (71.6°F) before starting the engine to above 70°C (158°F) after starting the engine: Increases once	-
DTC CLEAR RUN (DTC Clear Run Distance)	Drive distance after clearing DTCs / Min.: 0 km, Max.: 65535 km	-	-
DTC CLEAR MIN (DTC Clear Min)	Elapsed time after clearing DTCs / Min.: 0 min, Max.: 65535 min	-	-
MIL ON RUN DIST (MIL ON RUN Distance)	Travel distance after a malfunction occurs / Min.: 0 km, Max.: 65535 km	-	-
MIL ON ENG TIME (MIL ON Engine Run Time)	Driving time after a malfunction occurs / Min.: 0 km, Max.: 65535 km	-	-
MIL status (MIL status)	MIL status / ON or OFF	MIL ON: ON	Constant ON: Repair in accordance with detected DTCs
MODEL CODE (MODEL CODE)	Model code	-	Identifying model code: AHV40L
ENGINE CODE (ENGINE CODE)	Engine code	-	Identifying engine code: AHV40L
ECU CODE (ECU CODE)	ECU code	-	Identifying ECU code: 33###
DESTINATION (DESTINATION)	Destination	-	Identifying destination: A (America)
Calc Load (Calculate Load)	Calculate load / Min.: 0%, Max.: 100%	• Idling (INSPECTION MODE): 11 to 22% • Driving (2,500 rpm): 12.1 to 18.2%	-
THROTTLE POS (Throttle POS)	Throttle position sensor / Min.: 0%, Max.: 100%	• Throttle valve fully closed: 10 to 24% • Throttle valve fully open: 64 to 96%	-
L-TEMP ST JUDGE (Times of low temperature start-judging)	Time of low temperature start judging / Min.: 0, Max.: 65535	-	-
L-TEMP ST TIME (Low temperature-starting accumulation time)	Low temperature starting accumulation / Min.: 0, Max.: 67107840	-	-
TAR BAT VOL (DC) (Target Battery Voltage (DCDC Converter))	Target auxiliary battery voltage / Min.: 0 V, Max.: 20 V	-	-
DCDC FAN MODE (DCDC Converter cooling fan mode)	Hybrid vehicle converter cooling fan mode / Min.: 0%, Max.: 255%	-	-
INV COOLANT TMP (Inverter Coolant Water Temperature)	Inverter coolant temperature / Min.: -128°C, Max.: 127°C	Cold start → Fully warmed up: Gradually rises	-
MG2 REV (Motor (MG2) Revolution)	Motor revolution / Min.: -16383 rpm, Max.: 16383 rpm	-	-
MG2 TORQ (Motor (MG2) Torq)	Motor torque / Min.: -500 N*m, Max.: 500 N*m	-	-
MG2 TRQ EXC VAL (Motor (MG2) Torque execute value)	MG2 torque execution value / Min.: -512 N*m, Max.: 508 N*m	After full-load acceleration with READY light ON and engine stopped: Within +-20% of MG2 TORQ	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
MG1 REV (Generator (MG1) Revolution)	Generator revolution / Min.: -16383 rpm, Max.: 16383 rpm	-	-
MG1 TORQ (Generator (MG1) Torq)	Generator torque / Min.: -500 N*m, Max.: 500 N*m	-	-
MG1 TRQ EXC VAL (Generator (MG1) Torque execute value)	MG1 torque execution value / Min.: -512 N*m, Max.: 508 N*m	After full-load acceleration with READY light ON and engine stopped: Within +-20% of MG1 TORQ	-
REGEN EXEC TORQ (Regenrative Brake Torq)	Regenerative brake execution torque / Min.: 0 N*m, Max.: 186 N*m	-	-
REGEN RQST TORQ (Request Regenerative Brake Torq)	Regenerative brake request torque / Min.: 0 N*m, Max.: 186 N*m	Vehicle speed 30 km/h (19 mph) and master cylinder hydraulic pressure -200 N*m: Changes with brake pedal pressure	-
MG1 INVERT TEMP (Inverter temperature-(MG1))	Generator inverter temperature / Min.: -50°C, Max.: 205°C	• Undisturbed for 1 day at 25°C (77°F): 25°C (77°F) • Street driving: 25 to 80°C (77 to 176°F)	• If the value is -50°C (-58°F): +B short in sensor circuit • If the value is 205°C (401°F): Open or GND short in sensor circuit
MG2 INVERT TEMP (Inverter temperature-(MG2))	Motor inverter temperature / Min.: -50°C, Max.: 205°C	• Undisturbed for 1 day at 25°C (77°F): 25°C (77°F) • Street driving: 25 to 80°C (77 to 176°F)	• If the value is -50°C (-58°F): +B short in sensor circuit • If the value is 205°C (401°F): Open or GND short in sensor circuit
MOTOR2 TEMP (Motor Temperature No2)	Motor temperature / Min.: -50°C, Max.: 205°C	• Undisturbed for 1 day at 25°C (77°F): 25°C (77°F) • Street driving: 25 to 90°C (77 to 194°F)	• If the value is -50°C (-58°F): +B short in sensor circuit • If the value is 205°C (401°F): Open or GND short in sensor circuit
MOTOR1 TEMP (Motor temperature No1)	Generator temperature / Min.: -50°C, Max.: 205°C	• Undisturbed for 1 day at 25°C (77°F): 25°C (77°F) • Street driving: 25 to 100°C (77 to 212°F)	• If the value is -50°C (-58°F): +B short in sensor circuit • If the value is 205°C (401°F): Open or GND short in sensor circuit
CONVERTER TEMP (Converter Temperature)	Boost converter temperature / Min.: -50°C, Max.: 205°C	• Undisturbed for 1 day at 25°C (77°F): 25°C (77°F) • Street driving: 25 to 60°C (77 to 140°F)	• If the value is -50°C (-58°F): +B short in sensor circuit • If the value is 205°C (401°F): Open or GND short in sensor circuit
ACCEL DEG (the difference degree of an accelerator)	Accelerator pedal depressed angle / Min.: 0%, Max.: 100%	Accelerator pedal depressed: Changes with accelerator pedal pressure	-
POWER RQST (Request Power)	Request engine power / Min.: 0 W, Max.: 320000 W	-	-
TARGET ENG SPD (Target Engine Revolution)	Target engine speed / Min.: 0 rpm, Max.: 8000 rpm	-	-
ENGINE SPD (Engine SPD)	Engine speed / Min.: 0 rpm, Max.: 8000 rpm	Idling: 950 to 1,050 rpm	-
VEHICLE SPD (RSLVR) (Vehicle SPD (Resolver))	Resolver / Min.: -256 km/h, Max.: 254 km/h	Same as vehicle speed	-
MCYL CTRL POWOR (Master Cylinder Control Torq)	Braking torque that is equivalent to master cylinder hydraulic pressure / Min.: -2040 N*m, Max.: 0 N*m	Brake pedal depressed: Changes with brake pedal pressure	-
SOC (State Of Charge)	Battery state of charge / Min.: 0%, Max.: 100%	Constant: 0 to 100%	-
WOUT CTRL POWER (Wout Control Power)	Discharge control power value / Min.: 0 W, Max.: 81600 W	26,000 W or less	-
WIN CTRL POWER (Win Control Power)	Charge control power value / Min.: -40800 W, Max.: 0 W	-25,000 W or more	-

HV

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
PWR RESOURCE VB (Power Resource VB)	HV battery voltage / Min.: 0 V, Max.: 510 V	READY light ON: 200 to 340 V	-
PWR RESOURCE IB (Power Resource IB)	HV battery current / Min.: -256 A, Max.: 254 A	-	-
VL (VL-Voltage before boosting)	High voltage before boosting / Min.: 0 V, Max.: 510 V	READY ON: Practically the same as the HV battery voltage	• If the value is 0 V: Open or GND short in sensor circuit • If the value is 510 V: +B short in sensor circuit
VH (VH-Voltage past boosting)	High voltage past boosting / Min.: 0 V, Max.: 765 V	Engine revving up in P position: HV battery voltage to 650 V	• If the value is 0 V: Open or GND short in sensor circuit • If the value is 765 V: +B short in sensor circuit
BOOST RATIO (Boosting ratio)	Boost ratio / Min.: 0%, Max.: 100%	The pre-boost and the post boost voltages are equal: 0 to 10%	-
DRIVE CONDITION ID (Drive Condition ID)	Drive condition ID / Min.: 0, Max.: 6	• Engine stopped: 0 • Engine about to be stopped: 1 • Engine about to be started: 2 • Engine operated or operating: 3 • Generating or loading movement: 4 • Revving in P position: 6	-
SHIFT POSITION (Shift sensor shift position)	Shift lever position	P, R, N, D or B	-
CRANK POS (Crank position)	Crankshaft position / Min.: -90 deg, Max.: 90 deg	-	-
A/C CONSMPT PWR (Aircon consumption power)	A/C consumption power / Min.: 0 kW, Max.: 5 kW	-	-
Load Condition (Loading Condition)	Driving condition	• Generator load: MG1 • Motor load: MG2	-
DRIVING PATTEN 1 (Driving pattern 1)	Driving pattern / Min.: 0, Max.: 3	0: Driving at a low speed 1: Driving at a medium speed 2: Driving at a medium-high speed 3: Driving at a high speed	-
DRIVING PATTEN 2 (Driving pattern 2)	Driving pattern / Min.: 0, Max.: 3	0: Driving at a low speed 1: Driving at a medium speed 2: Driving at a medium-high speed 3: Driving at a high speed	-
DRIVING PATTEN 3 (Driving pattern 3)	Driving pattern / Min.: 0, Max.: 3	0: Driving at a low speed 1: Driving at a medium speed 2: Driving at a medium-high speed 3: Driving at a high speed	-
SHORT WAVE HIGH (Short circuit wave highest value)	Waveform voltage in leak detection circuit in battery ECU / Min.: 0 V, Max.: 5 V	Left for 2 minutes in READY-on state, and pre-boost and post boost voltages are equal: 4 V or more	-
MG1 CTRL MODE (MG1 control model)	MG1 control mode	-	-
MG1 CARRIR FREQ (MG1 carrier frequency)	MG1 carrier frequency / 10 kHz / 5 kHz / 2.5 kHz / 1.25 kHz	-	-
MG2 CTRL MODE (MG2 control mode)	MG2 control mode	-	-
MG2 CARRIR FREQ (MG2 carrier frequency)	MG2 carrier frequency / 5 kHz / 2.5 kHz / 1.25 kHz	-	-
ECU TYPE (Type of ECU)	ECU TYPE	-	Identifying ECU type: HV ECU

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
CURRENT DTC (The number of current code)	The number of current DTCs/ Min.: 0, Max.: 255	-	-
HISTORY DTC (The number of history DTC)	The number of history DTCs/ Min.: 0, Max.: 255	-	-
CHECK MODE (Check mode)	Check mode: ON or OFF	ON: Check mode ON	-
ENG STOP RQST (Engine Stop Request)	Engine stop request / NO or RQST	Requesting engine stop: RQST	-
IDLING REQUEST (Engine Idling Request)	Engine idling request / NO or RQST	Requesting idle: RQST	-
HV BATT CH RQST (Main Battery Charging Request)	HV battery charging request / NO or RQST	Requesting HV battery charging: RQST	-
SHIFT SW P (Shift Sensor SW-P)	Park / Neutral position switch / ON or OFF	P position: ON Except P position: OFF	-
SHIFT SW R (Shift Sensor SW-R)	Park / Neutral position switch / ON or OFF	R position: ON Except R position: OFF	-
SHIFT SW N (Shift Sensor SW-N)	Park / Neutral position switch / ON or OFF	N position: ON Except N position: OFF	-
SHIFT SW D (Shift Sensor SW-D)	Park / Neutral position switch / ON or OFF	D position: ON Except D position: OFF	-
SHIFT SW B (Shift Sensor SW-B)	Park / Neutral position switch / ON or OFF	B position: ON Except B position: OFF	-
SHIFT SW FD (Shift Sensor SW-FD)	Park / Neutral position switch / ON or OFF	D or B position: ON Except D or B position: OFF	-
SHIFT SW RV (Shift Sensor SW-RV)	Park / Neutral position switch / ON or OFF	R position: ON Except R position: OFF	-
SHIFT SW MJ (Shift Sensor SW-MJ)	Park / Neutral position switch / ON or OFF	P, R, N, D or B position: ON	-
AIRCON REQUEST (Aircon request)	Engine starting request from A/C amplifier / NO or RQST	Requesting engine start from A/C amplifier: RQST	-
ENG WARM UP RQT (Engine Warming up request)	Engine warm-up request / NO or RQST	Requesting engine warm-up: RQST	-
SMRP (System Precharge Relay Status-SMRP)	Operating condition of system precharge relay SMRP / ON or OFF	READY ON: OFF	-
SMRB (System Main Relay Status-SMRB)	Operating condition of system main relay SMRB / ON or OFF	READY ON: ON	-
SMRG (System Main Relay Status-SMRG)	Operating condition of system main relay SMRG / ON or OFF	READY ON: ON	-
MG1 GATE (MG1 gate status)	MG1 gate status / ON or OFF	Shutting down generator inverter: ON	-
MG2 GATE (MG2 gate status)	MG2 gate status / ON or OFF	Shutting down motor inverter: ON	-
CNV GATE (Converter gate status)	Boost converter gate status / ON or OFF	Shutting down boost converter: ON	-
A/C GATE (Aircon gate status)	A/C gate status / ON or OFF	While A/C inverter is being shut off: ON	-
CNV CARIER FREQ (Converter carrier frequency)	Converter signal carrier frequency / 5kHz/10kHz	5kHz/10kHz	-
COMP MON (Comprehensive Component Monitor)	Converter monitor / NOT AVL or AVAIL	-	-
CCM ENA (Comprehensive Component Monitor ENA)	Converter monitor enable / UNABLE or ENABLE	-	-

HV

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
CCM CMPL (Comprehensive Component Monitor CMPL)	Component monitor complete / COMPL or INCMPL	-	-
BATTERY SOC (Battery State of Charge)	Battery state of charge / Min.: 0%, Max.: 127.5%	-	-
DELTA SOC (Delta SOC)	Difference between maximum and minimum values of SOC / Min.: 0%, Max.: 100%	READY light ON, engine stopped and no electrical load: 0 to 60%	-
IB BATTERY (Current value of Battery Pack)	Current value of battery pack/ Min.: - 327.68 A, Max.: 327.67 A	-	-
BATT INSIDE AIR (Inhalation-of-air temperature into a battery pack)	Battery cooling fan intake air temperature / Min.: -327.68°C, Max.: 327.67°C	-	-
VMF FAN VOLT 1 (VMF fan motor voltage 1)	Battery blower motor monitoring voltage / Min.: -25.6 V, Max.: 25.4 V	Fan mode 1 with READY light ON and P position: 0.9 to 1.1 V	-
AUX. BAT V (Auxiliary battery voltage)	Auxiliary battery voltage / Min.: -25.6 V, Max.: 25.4 V	Equivalent to auxiliary battery voltage	-
WIN (Charge control value)	Charge control wattage / Min.: -64 kW, Max.: 63.5 kW	-25 kW or more	-
WOUT (Discharge control value)	Discharge control wattage / Min.: 0 kW, Max.: 63.5 kW	26 kW or less	-
COOLING FAN1 (COOLING FANMODE1)	Battery blower motor actuation mode / Min.: 0, Max.: 40	Stopped: 0 Low to high speed actuation: 1 to 40	-
ECU CTRL MODE (ECU Control mode)	ECU control mode / Min.: 0, Max.: 4	-	-
SBLW RQST (Cooling fan stop control request (Standby Blower))	Battery blower motor stop control request (standby blower) / ON or OFF	While blower motor stop control is requested: ON	-
BATT TEMP 1 to 4 (Temperature of battery TB 1 to 4)	Temperature of HV battery / Min.: -327.68°C, Max.: 327.67°C	Undisturbed for 1 day: Same as ambient air temperature	-
NUM OF BATT (The number of Battery Block)	The number of battery blocks / Min.: 0, Max.: 255	Always: 17	-
BAT BLOCK MIN V (Battery Block Minimum Voltage)	Battery block minimum voltage / Min.: -327.68 V, Max.: 327.67 V	SOC 50 to 60%: 12 V or more	-
MIN BAT BLOCK # (Minimum Battery Block No)	Battery block number with minimum voltage / Min.: 1, Max.: 255	One of numbers 1 to 17	-
BAT BLOCK MAX V (Battery Block Max Voltage)	Battery block maximum voltage / Min.: -327.68 V, Max.: 327.67 V	SOC 55 to 60%: 18 V or less	-
MAX BAT BLOCK # (Max Battery Block No)	Battery block number with maximum voltage / Min.: 1, Max.: 255	One of numbers 1 to 17	-
V1 to V17 BATT BLOCK (Battery Block Voltage V01 to 17)	Battery block voltage / Min.: -327.68 V, Max.: 327.67 V	SOC 60% : 12 to 20 V	-
1 to 17 INTNL RESIST (Internal resistance R01 to 17)	Internal resistance of each battery block / Min.: 0 Ω, Max.: 0.255 Ω	Always: 0.01 to 0.1	-
BLOW TIME (Accumulated time of Battery LOW)	Battery low time / Min.: 0, Max.: 65535	-	-
DCIH TIME (Accumulated time of DC Inhibit)	DC inhibit time / Min.: 0, Max.: 65535	-	-
BHI TIME (Accumulated time of Battery too High)	Battery too high time / Min.: 0, Max.: 65535	-	-
HTMP TIME (Accumulated time of Hot Temperature)	Hot temperature time / Min.: 0, Max.: 65535	-	-

2. ACTIVE TEST

HINT:

Using the intelligent tester to perform active tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing active tests early in troubleshooting is one way to save diagnostic time. Data list information can be displayed while performing active tests.

NOTICE:

It is necessary to use caution, because if the intelligent tester DLC3 connector becomes disconnected or if a communication error occurs during an active test, the vehicle could become inoperative (the READY light may go off).

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG) and turn the intelligent tester on.

(c) On the system selection screen, enter the following menus: DIAGNOSIS / OBD/MOBD / HV ECU / ACTIVE TEST.

(d) According to the display on the tester, perform the appropriate active test.

ACTIVE TEST:

Tester Display	Test Part	Control Range	Test Details	Test Condition
INSPECTION MOD 1 (Inspection mode-2WD inspection)	• To check engine running operation • To release traction control while using a speedometer tester	ON or OFF	• Runs the engine continuously with the shift lever in the P position • Releases traction control that is initiated when the rotational difference between the front and rear wheels is excessive with the shift lever in any position other than P	Power switch on (IG), HV system normal, not in maintenance mode, and other active tests not being done
INSPECTION MOD 2 (Inspection mode-2WD chassis-dynamo)	To release traction control while using a speedometer tester	ON or OFF	Releases traction control that is initiated when the rotational difference between the front and rear wheels is excessive with the shift lever in any position other than P	Power switch on (IG), HV system normal, not in maintenance mode, and other active tests not being done
COMPRESS TEST (Compression Test) *1	To crank the engine continuously in order to measure the compression	ON or OFF	Allows the engine to continue cranking by activating the MG1 continuously	Power switch on (IG), HV system normal, not in cranking mode, and other active tests not being done
WATER PUMP (Activate the Water Pump)	To activate the HV water pump continuously	ON or OFF	Activates the HV water pump continuously	Power switch on (IG), HV system normal, not in maintenance mode, and other active tests not being done
COOLING FAN SPD (Driving the battery cooling fan)	To check operation of the cooling fan and if there is sufficient air flow	0 to 6	Stops the cooling fan or changes air volume mode (1 to 6)	-

Tester Display	Test Part	Control Range	Test Details	Test Condition
TC/TE1 (Connect the TC and TE1)	Batch display of warnings on combination meter	ON or OFF	TC terminal can be switched ON/OFF	Power switch on (IG), system is normal
BATTERY CHECK (Discharging battery to check weak battery cells)	-	ON or OFF	-	-

NOTICE:
For items marked with *1 in the chart, the intelligent tester will display a communication error and the vehicle's READY light will turn off when the active test is completed. If the tester will be used on the vehicle again, turn the power switch off and then on (READY) again to restart the tester.

DIAGNOSTIC TROUBLE CODE CHART

HYBRID CONTROL SYSTEM:

DTC Code	Detection Item	Trouble Area	Master Warning Light	MIL	Memory	See page
P0343-747	Camshaft Position Sensor "A" Circuit High Input	1. Wire harness or connector 2. Hybrid vehicle control ECU 3. Inverter with converter assembly	Comes on	-	DTC stored	HV-72
P0516-769	Battery Temperature Sensor Circuit Low	1. Auxiliary battery (battery temperature sensor) 2. Wire harness or connector 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-77
P0517-770	Battery Temperature Sensor Circuit High	1. Auxiliary battery (battery temperature sensor) 2. Wire harness or connector 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-77
P0560-117	System Voltage	1. Wire harness or connector 2. Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-80
P0617-142	Starter Relay Circuit High	1. Wire harness or connector 2. Hybrid vehicle control ECU 3. Main body ECU	Comes on	-	DTC stored	HV-84
P062F-143	EEPROM Malfunction	Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-87
P0630-804	VIN not Programmed or Mismatch-ECM / PCM	Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-88
P0705-757	Transmission Range Sensor Circuit	1. Wire harness or connector 2. Park / neutral position switch 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-90
P0705-758	Transmission Range Sensor Circuit	1. Wire harness or connector 2. Park / neutral position switch 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-90
P0851-775	Park / Neutral Switch Input Circuit Low	1. Wire harness or connector 2. Park / neutral position switch 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-90

DTC Code	Detection Item	Trouble Area	Master Warning Light	MIL	Memory	See page
P0A01-725	Motor Electronics Coolant Temperature Sensor Circuit Range / Performance	1. Wire harness or connector 2. Inverter cooling system 3. Cooling fan system 4. Water pump with motor & bracket assembly 5. Inverter with converter assembly 6. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-96
P0A01-726	Motor Electronics Coolant Temperature Sensor Circuit Range / Performance	1. Wire harness or connector 2. Inverter cooling system 3. Cooling fan system 4. Water pump with motor & bracket assembly 5. Inverter with converter assembly 6. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-96
P0A02-719	Motor Electronics Coolant Temperature Sensor Circuit Low	Inverter with converter assembly	Comes on	-	DTC stored	HV-99
P0A03-720	Motor Electronics Coolant Temperature Sensor Circuit High	Inverter with converter assembly	Comes on	-	DTC stored	HV-99
P0A08-101	DC / DC Converter Status Circuit	1. Duct 2. Hybrid vehicle converter (DC/DC converter) 3. Auxiliary battery	Comes on	-	DTC stored	HV-100
P0A08-264	DC / DC Converter Status Circuit	1. Wire harness or connector 2. Fusible link or fuse 3. Frame wire 4. Hybrid vehicle converter (DC/DC converter) 5. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-102
P0A09-265	DC / DC Converter Status Circuit Low Input	1. Wire harness or connector 2. Hybrid vehicle converter (DC/DC converter) 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-109
P0A09-591	DC / DC Converter Status Circuit Low Input	1. Hybrid vehicle converter (DC/DC converter) 2. Hybrid vehicle control ECU 3. Wire harness or connector	Comes on	-	DTC stored	HV-112
P0A0D-350	High Voltage System Inter-Lock Circuit High	1. Wire harness or connector 2. Hybrid vehicle control ECU 3. Service plug grip 4. Inverter with converter assembly 5. Air conditioning harness assembly	Comes on	-	DTC stored	HV-119

DTC Code	Detection Item	Trouble Area	Master Warning Light	MIL	Memory	See page
P0A0D-351	High Voltage System Inter-Lock Circuit High	1. Wire harness or connector 2. Hybrid vehicle control ECU 3. Service plug grip 4. Inverter with converter assembly 5. Air conditioning harness assembly	Comes on	-	DTC stored	HV-119
P0A0F-204	Engine Failed to Start	1. Hybrid vehicle control ECU 2. Engine control system	Comes on	-	DTC stored	HV-128
P0A0F-205	Engine Failed to Start	1. Hybrid vehicle control ECU 2. Engine control system	Comes on	-	DTC stored	HV-128
P0A0F-238	Engine Failed to Start	1. Engine 2. Hybrid vehicle transaxle assembly (shaft, gear) 3. Transmission input damper 4. Wire harness or connector 5. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-130
P0A0F-533	Engine Failed to Start	1. Hybrid vehicle control ECU 2. Engine control system	Comes on	-	DTC stored	HV-128
P0A0F-534	Engine Failed to Start	1. Hybrid vehicle control ECU 2. Engine control system	Comes on	-	DTC stored	HV-128
P0A10-263	DC / DC Converter Status Circuit High Input	1. Wire harness or connector 2. Hybrid vehicle converter (DC/DC converter) 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-136
P0A10-592	DC / DC Converter Status Circuit High Input	Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-139
P0A1A-151	Generator Control Module	Inverter with converter assembly (MG ECU)	Comes on	Comes on	DTC stored	HV-143
P0A1A-155	Generator Control Module	Inverter with converter assembly (MG ECU)	Comes on	Comes on	DTC stored	HV-143
P0A1A-156	Generator Control Module	Inverter with converter assembly (MG ECU)	Comes on	Comes on	DTC stored	HV-143
P0A1A-166	Generator Control Module	Inverter with converter assembly (MG ECU)	Comes on	Comes on	DTC stored	HV-143
P0A1A-200	Generator Control Module	1. Inverter with converter assembly (MG ECU) 2. Hybrid vehicle transaxle assembly (Generator resolver) 3. Wire harness or connector	Comes on	Comes on	DTC stored	HV-145
P0A1A-658	Generator Control Module	Inverter with converter assembly (MG ECU)	Comes on	Comes on	DTC stored	HV-143
P0A1A-659	Generator Control Module	Inverter with converter assembly (MG ECU)	Comes on	Comes on	DTC stored	HV-143
P0A1A-791	Generator Control Module	Inverter with converter assembly (MG ECU)	Comes on	Comes on	DTC stored	HV-143

DTC Code	Detection Item	Trouble Area	Master Warning Light	MIL	Memory	See page
P0A1A-792	Generator Control Module	1. Inverter with converter assembly (MG ECU) 2. Hybrid vehicle transaxle assembly (Generator resolver) 3. Wire harness or connector	Comes on	Comes on	DTC stored	HV-145
P0A1A-793	Generator Control Module	1. Inverter with converter assembly (MG ECU) 2. Hybrid vehicle transaxle assembly (Generator resolver) 3. Wire harness or connector	Comes on	Comes on	DTC stored	HV-145
P0A1B-163	Drive Motor "A" Control Module	Inverter with converter assembly (MG ECU)	Comes on	Comes on	DTC stored	HV-150
P0A1B-164	Drive Motor "A" Control Module	Inverter with converter assembly (MG ECU)	Comes on	Comes on	DTC stored	HV-150
P0A1B-168	Drive Motor "A" Control Module	1. Inverter with converter assembly (MG ECU) 2. Hybrid vehicle transaxle assembly (Motor resolver) 3. Wire harness or connector	Comes on	Comes on	DTC stored	HV-152
P0A1B-192	Drive Motor "A" Control Module	Inverter with converter assembly (MG ECU)	Comes on	Comes on	DTC stored	HV-150
P0A1B-193	Drive Motor "A" Control Module	Inverter with converter assembly (MG ECU)	Comes on	Comes on	DTC stored	HV-150
P0A1B-198	Drive Motor "A" Control Module	Inverter with converter assembly (MG ECU)	Comes on	Comes on	DTC stored	HV-150
P0A1B-511	Drive Motor "A" Control Module	Inverter with converter assembly (MG ECU)	Comes on	Comes on	DTC stored	HV-150
P0A1B-512	Drive Motor "A" Control Module	Inverter with converter assembly (MG ECU)	Comes on	Comes on	DTC stored	HV-150
P0A1B-661	Drive Motor "A" Control Module	Inverter with converter assembly (MG ECU)	Comes on	Comes on	DTC stored	HV-150
P0A1B-786	Drive Motor "A" Control Module	Inverter with converter assembly (MG ECU)	Comes on	Comes on	DTC stored	HV-150
P0A1B-788	Drive Motor "A" Control Module	1. Wire harness or connector 2. Inverter with converter assembly (MG ECU) 3. Hybrid vehicle transaxle assembly	Comes on	Comes on	DTC stored	HV-157
P0A1B-794	Drive Motor "A" Control Module	Inverter with converter assembly (MG ECU)	Comes on	Comes on	DTC stored	HV-150
P0A1B-795	Drive Motor "A" Control Module	1. Inverter with converter assembly (MG ECU) 2. Hybrid vehicle transaxle assembly (Motor resolver) 3. Wire harness or connector	Comes on	Comes on	DTC stored	HV-152
P0A1B-796	Drive Motor "A" Control Module	1. Inverter with converter assembly (MG ECU) 2. Hybrid vehicle transaxle assembly (Motor resolver) 3. Wire harness or connector	Comes on	Comes on	DTC stored	HV-152
P0A1D-103	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-163

DTC Code	Detection Item	Trouble Area	Master Warning Light	MIL	Memory	See page
P0A1D-134	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-165
P0A1D-135	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-165
P0A1D-140	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-167
P0A1D-141	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-169
P0A1D-144	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-171
P0A1D-145	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-171
P0A1D-148	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-173
P0A1D-162	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-175
P0A1D-179	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-177
P0A1D-187	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-179
P0A1D-390	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-181
P0A1D-393	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-183
P0A1D-570	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-165
P0A1D-721	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-185
P0A1D-722	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-185
P0A1D-723	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-185
P0A1D-765	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-185
P0A1D-787	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-185
P0A1D-821	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-175
P0A1D-822	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-175
P0A1D-823	Hybrid Powertrain Control Module	Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-175
P0A1F-129	Battery Energy Control Module	Battery smart unit	Comes on	Comes on	DTC stored	HV-187
P0A1F-150	Battery Energy Control Module	1. Battery smart unit 2. Wire harness or connector	Comes on	Comes on	DTC stored	HV-189
P0A1F-157	Battery Energy Control Module	1. Battery smart unit 2. Wire harness or connector	Comes on	Comes on	DTC stored	HV-189
P0A2B-248	Drive Motor "A" Temperature Sensor Circuit Range / Performance	Hybrid vehicle transaxle assembly (Motor temperature sensor)	Comes on	-	DTC stored	HV-193

DTC Code	Detection Item	Trouble Area	Master Warning Light	MIL	Memory	See page
P0A2B-250	Drive Motor "A" Temperature Sensor Circuit Range / Performance	Hybrid vehicle transaxle assembly (Motor temperature sensor)	Comes on	-	DTC stored	HV-193
P0A2C-247	Drive Motor "A" Temperature Sensor Circuit Low	1. Wire harness or connector 2. Hybrid vehicle control ECU 3. Hybrid vehicle transaxle assembly (Motor temperature sensor)	Comes on	-	DTC stored	HV-194
P0A2D-249	Drive Motor "A" Temperature Sensor Circuit High	1. Wire harness or connector 2. Hybrid vehicle control ECU 3. Hybrid vehicle transaxle assembly (Motor temperature sensor)	Comes on	-	DTC stored	HV-194
P0A37-258	Generator Temperature Sensor Circuit Range / Performance	Hybrid vehicle transaxle assembly (Generator temperature sensor)	Comes on	-	DTC stored	HV-199
P0A37-260	Generator Temperature Sensor Circuit Range / Performance	Hybrid vehicle transaxle assembly (Generator temperature sensor)	Comes on	-	DTC stored	HV-199
P0A38-257	Generator Temperature Sensor Circuit Low	1. Wire harness or connector 2. Hybrid vehicle control ECU 3. Hybrid vehicle transaxle assembly (Generator temperature sensor)	Comes on	-	DTC stored	HV-200
P0A39-259	Generator Temperature Sensor Circuit High	1. Wire harness or connector 2. Hybrid vehicle control ECU 3. Hybrid vehicle transaxle assembly (Generator temperature sensor)	Comes on	-	DTC stored	HV-200
P0A3F-243	Drive Motor "A" Position Sensor Circuit	1. Wire harness or connector 2. Hybrid vehicle transaxle assembly (Motor resolver) 3. Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-205
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance	1. Wire harness or connector 2. Hybrid vehicle transaxle assembly (Motor resolver) 3. Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-205
P0A41-245	Drive Motor "A" Position Sensor Circuit Low	1. Wire harness or connector 2. Hybrid vehicle transaxle assembly (Motor resolver) 3. Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-205
P0A4B-253	Generator Position Sensor Circuit	1. Wire harness or connector 2. Hybrid vehicle transaxle assembly (Generator resolver) 3. Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-209

DTC Code	Detection Item	Trouble Area	Master Warning Light	MIL	Memory	See page
P0A4C-513	Generator Position Sensor Circuit Range / Performance	1. Wire harness or connector 2. Hybrid vehicle transaxle assembly (Generator resolver) 3. Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-209
P0A4D-255	Generator Position Sensor Circuit Low	1. Wire harness or connector 2. Hybrid vehicle transaxle assembly (Generator resolver) 3. Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-209
P0A51-174	Drive Motor "A" Current Sensor Circuit	Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-212
P0A60-288	Drive Motor "A" Phase V Current	1. Inverter with converter assembly 2. Service plug grip	Comes on	Comes on	DTC stored	HV-213
P0A60-290	Drive Motor "A" Phase V Current	1. Inverter with converter assembly 2. Service plug grip	Comes on	Comes on	DTC stored	HV-213
P0A60-294	Drive Motor "A" Phase V Current	1. Inverter with converter assembly 2. Service plug grip	Comes on	Comes on	DTC stored	HV-213
P0A60-501	Drive Motor "A" Phase V Current	1. Inverter with converter assembly 2. Service plug grip	Comes on	Comes on	DTC stored	HV-213
P0A63-296	Drive Motor "A" Phase W Current	1. Inverter with converter assembly 2. Service plug grip	Comes on	Comes on	DTC stored	HV-213
P0A63-298	Drive Motor "A" Phase W Current	1. Inverter with converter assembly 2. Service plug grip	Comes on	Comes on	DTC stored	HV-213
P0A63-302	Drive Motor "A" Phase W Current	1. Inverter with converter assembly 2. Service plug grip	Comes on	Comes on	DTC stored	HV-213
P0A63-502	Drive Motor "A" Phase W Current	1. Inverter with converter assembly 2. Service plug grip	Comes on	Comes on	DTC stored	HV-213
P0A72-326	Generator Phase V Current	1. Inverter with converter assembly 2. Service plug grip	Comes on	Comes on	DTC stored	HV-216
P0A72-328	Generator Phase V Current	1. Inverter with converter assembly 2. Service plug grip	Comes on	Comes on	DTC stored	HV-216
P0A72-333	Generator Phase V Current	1. Inverter with converter assembly 2. Service plug grip	Comes on	Comes on	DTC stored	HV-216
P0A72-515	Generator Phase V Current	1. Inverter with converter assembly 2. Service plug grip	Comes on	Comes on	DTC stored	HV-216
P0A75-334	Generator Phase W Current	1. Inverter with converter assembly 2. Service plug grip	Comes on	Comes on	DTC stored	HV-216
P0A75-336	Generator Phase W Current	1. Inverter with converter assembly 2. Service plug grip	Comes on	Comes on	DTC stored	HV-216

DTC Code	Detection Item	Trouble Area	Master Warning Light	MIL	Memory	See page
P0A75-341	Generator Phase W Current	1. Inverter with converter assembly 2. Service plug grip	Comes on	Comes on	DTC stored	HV-216
P0A75-516	Generator Phase W Current	1. Inverter with converter assembly 2. Service plug grip	Comes on	Comes on	DTC stored	HV-216
P0A78-113	Drive Motor "A" Inverter Performance	1. Wire harness or connector 2. Hybrid vehicle transaxle assembly 3. Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-219
P0A78-121	Drive Motor "A" Inverter Performance	1. HV relay assembly 2. Inverter with converter assembly 3. Service plug grip 4. Frame wire 5. Hybrid vehicle transaxle assembly	Comes on	Comes on	DTC stored	HV-222
P0A78-128	Drive Motor "A" Inverter Performance	1. Wire harness or connector 2. Hybrid vehicle transaxle assembly 3. Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-229
P0A78-266	Drive Motor "A" Inverter Performance	Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-232
P0A78-267	Drive Motor "A" Inverter Performance	Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-232
P0A78-279	Drive Motor "A" Inverter Performance	Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-235
P0A78-282	Drive Motor "A" Inverter Performance	Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-237
P0A78-284	Drive Motor "A" Inverter Performance	1. Wire harness or connector 2. Inverter cooling system 3. Cooling fan system 4. Water pump with motor & bracket assembly 5. Hybrid vehicle transaxle assembly 6. Inverter with converter assembly 7. Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-239
P0A78-286	Drive Motor "A" Inverter Performance	1. Wire harness or connector 2. Inverter cooling system 3. Cooling fan system 4. Water pump with motor & bracket assembly 5. Hybrid vehicle transaxle assembly 6. Inverter with converter assembly 7. Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-244
P0A78-287	Drive Motor "A" Inverter Performance	Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-249

DTC Code	Detection Item	Trouble Area	Master Warning Light	MIL	Memory	See page
P0A78-306	Drive Motor "A" Inverter Performance	1. Hybrid vehicle transaxle assembly 2. Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-251
P0A78-503	Drive Motor "A" Inverter Performance	1. Wire harness or connector 2. Inverter with converter assembly 3. Hybrid vehicle transaxle assembly	Comes on	Comes on	DTC stored	HV-254
P0A78-504	Drive Motor "A" Inverter Performance	1. Wire harness or connector 2. Inverter with converter assembly 3. Hybrid vehicle transaxle assembly	Comes on	Comes on	DTC stored	HV-254
P0A78-505	Drive Motor "A" Inverter Performance	1. Wire harness or connector 2. Inverter with converter assembly 3. Hybrid vehicle transaxle assembly	Comes on	Comes on	DTC stored	HV-258
P0A78-506	Drive Motor "A" Inverter Performance	1. Wire harness or connector 2. Inverter with converter assembly 3. Hybrid vehicle transaxle assembly	Comes on	Comes on	DTC stored	HV-258
P0A78-510	Drive Motor "A" Inverter Performance	Inverter with converter assembly	Comes on until DTC is cleared	Comes on	DTC stored	HV-261
P0A78-523	Drive Motor "A" Inverter Performance	Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-263
P0A78-586	Drive Motor "A" Inverter Performance	Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-265
P0A78-806	Drive Motor "A" Inverter Performance	1. Wire harness or connector 2. Hybrid vehicle transaxle assembly 3. Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-267
P0A78-807	Drive Motor "A" Inverter Performance	1. Wire harness or connector 2. Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-270
P0A78-808	Drive Motor "A" Inverter Performance	1. Wire harness or connector 2. Hybrid vehicle transaxle assembly 3. Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-267
P0A7A-122	Generator Inverter Performance	1. Fuel level 2. Hybrid vehicle transaxle assembly 3. Engine assembly 4. Inverter with converter assembly 5. Wire harness or connector	Comes on	Comes on	DTC stored	HV-272

DTC Code	Detection Item	Trouble Area	Master Warning Light	MIL	Memory	See page
P0A7A-130	Generator Inverter Performance	1. Fuel level 2. Hybrid vehicle transaxle assembly 3. Engine assembly 4. Inverter with converter assembly 5. Wire harness or connector	Comes on	Comes on	DTC stored	HV-276
P0A7A-322	Generator Inverter Performance	1. Inverter cooling system 2. Water pump with motor & bracket assembly 3. Hybrid vehicle transaxle assembly 4. Inverter with converter assembly 5. Engine assembly 6. Fuel level 7. Cooling fan system 8. Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-280
P0A7A-324	Generator Inverter Performance	1. Inverter cooling system 2. Water pump with motor & bracket assembly 3. Hybrid vehicle transaxle assembly 4. Inverter with converter assembly 5. Engine assembly 6. Fuel level 7. Cooling fan system 8. Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-286
P0A7A-325	Generator Inverter Performance	Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-292
P0A7A-344	Generator Inverter Performance	1. Hybrid vehicle transaxle assembly 2. Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-294
P0A7A-517	Generator Inverter Performance	1. Hybrid vehicle transaxle assembly 2. Wire harness or connector 3. Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-297
P0A7A-518	Generator Inverter Performance	1. Hybrid vehicle transaxle assembly 2. Wire harness or connector 3. Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-297
P0A7A-522	Generator Inverter Performance	Inverter with converter assembly	Comes on until DTC is cleared	Comes on	DTC stored	HV-300
P0A7A-809	Generator Inverter Performance	1. Wire harness or connector 2. Hybrid vehicle transaxle assembly 3. Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-302
P0A7A-810	Generator Inverter Performance	Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-305

DTC Code	Detection Item	Trouble Area	Master Warning Light	MIL	Memory	See page
P0A7A-811	Generator Inverter Performance	1. Wire harness or connector 2. Hybrid vehicle transaxle assembly 3. Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-302
P0A90-251	Drive Motor "A" Performance	Hybrid vehicle transaxle assembly	Comes on	Comes on	DTC stored	HV-307
P0A90-509	Drive Motor "A" Performance	1. Wire harness or connector 2. Hybrid vehicle transaxle assembly 3. Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-310
P0A92-261	Hybrid Generator Performance	Hybrid vehicle transaxle assembly	Comes on	Comes on	DTC stored	HV-313
P0A92-521	Hybrid Generator Performance	1. Hybrid vehicle transaxle assembly 2. Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-316
P0A93-346	Inverter Cooling System Performance	1. Wire harness or connector 2. Inverter cooling system 3. Water pump with motor & bracket assembly 4. Hybrid vehicle control ECU 5. Inverter with converter assembly 6. Cooling fan system	Comes on	Comes on	DTC stored	HV-319
P0A94-127	DC / DC Converter Performance	1. HV relay assembly 2. Inverter with converter assembly 3. Service plug grip 4. Frame wire 5. Hybrid vehicle transaxle assembly	Comes on	Comes on	DTC stored	HV-327
P0A94-172	DC / DC Converter Performance	1. Fuel level 2. Wire harness or connector 3. Hybrid vehicle transaxle assembly 4. Inverter with converter assembly 5. Engine assembly	Comes on	Comes on	DTC stored	HV-331
P0A94-442	DC / DC Converter Performance	Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-336
P0A94-547	DC / DC Converter Performance	1. Wire harness or connector 2. Inverter with converter assembly 3. Hybrid vehicle transaxle assembly	Comes on	Comes on	DTC stored	HV-339
P0A94-548	DC / DC Converter Performance	Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-343
P0A94-549	DC / DC Converter Performance	1. Wire harness or connector 2. Inverter with converter assembly 3. Hybrid vehicle transaxle assembly	Comes on	Comes on	DTC stored	HV-339

DTC Code	Detection Item	Trouble Area	Master Warning Light	MIL	Memory	See page
P0A94-550	DC / DC Converter Performance	Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-345
P0A94-553	DC / DC Converter Performance	1. Wire harness or connector 2. Inverter cooling system 3. Water pump with motor & bracket assembly 4. Hybrid vehicle transaxle assembly 5. Inverter with converter assembly 6. Fuel level 7. Engine assembly 8. Cooling fan system	Comes on	Comes on	DTC stored	HV-347
P0A94-554	DC / DC Converter Performance	1. Wire harness or connector 2. Hybrid vehicle transaxle assembly 3. Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-354
P0A94-555	DC / DC Converter Performance	Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-358
P0A94-556	DC / DC Converter Performance	1. Wire harness or connector 2. Hybrid vehicle transaxle assembly 3. Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-354
P0A94-557	DC / DC Converter Performance	1. Wire harness or connector 2. Inverter cooling system 3. Water pump with motor & bracket assembly 4. Hybrid vehicle transaxle assembly 5. Inverter with converter assembly 6. Fuel level 7. Engine assembly 8. Cooling fan system	Comes on	Comes on	DTC stored	HV-360
P0A94-585	DC / DC Converter Performance	Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-367
P0A94-587	DC / DC Converter Performance	1. Inverter with converter assembly 2. Battery smart unit	Comes on	Comes on	DTC stored	HV-369
P0A94-589	DC / DC Converter Performance	Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-373
P0A94-590	DC / DC Converter Performance	Inverter with converter assembly	Comes on	Comes on	DTC stored	HV-373
P0AA1-231	Hybrid Battery Positive Contactor Circuit Stuck Closed	1. HV relay assembly 2. Inverter with converter assembly	Comes on until DTC is cleared	Comes on	DTC stored	HV-375
P0AA1-233	Hybrid Battery Positive Contactor Circuit Stuck Closed	HV relay assembly	Comes on until DTC is cleared	-	DTC stored	HV-377
P0AA4-232	Hybrid Battery Negative Contactor Circuit Stuck Closed	1. HV relay assembly 2. Inverter with converter assembly	Comes on until DTC is cleared	-	DTC stored	HV-379

DTC Code	Detection Item	Trouble Area	Master Warning Light	MIL	Memory	See page
P0AA6-526	Hybrid Battery Voltage System Isolation Fault	1. Hybrid vehicle transaxle assembly 2. Inverter with converter assembly 3. Frame wire 4. Air conditioning harness assembly 5. HV relay assembly 6. Compressor with motor assembly 7. HV battery 8. Battery smart unit 9. Hybrid vehicle converter (DC/DC converter)	Comes on until DTC is cleared	-	DTC stored	HV-381
P0AA6-611	Hybrid Battery Voltage System Isolation Fault	Compressor with motor assembly	Comes on until DTC is cleared	-	DTC stored	HV-381
P0AA6-612	Hybrid Battery Voltage System Isolation Fault	1. HV relay assembly 2. Battery smart unit 3. HV battery 4. Hybrid vehicle converter (DC/DC converter)	Comes on until DTC is cleared	-	DTC stored	HV-381
P0AA6-613	Hybrid Battery Voltage System Isolation Fault	1. Hybrid vehicle transaxle assembly 2. Inverter with converter assembly	Comes on until DTC is cleared	-	DTC stored	HV-381
P0AA6-614	Hybrid Battery Voltage System Isolation Fault	1. Inverter with converter assembly 2. Floor wire 3. Compressor with motor assembly 4. Air conditioning harness assembly 5. HV relay assembly 6. Hybrid vehicle converter (DC/DC converter)	Comes on until DTC is cleared	-	DTC stored	HV-381
P0AA7-727	Hybrid Battery Voltage Isolation Sensor Circuit	Battery smart unit	Comes on	-	DTC stored	HV-394
P0ADB-227	Hybrid Battery Positive Contactor Control Circuit Low	1. Wire harness or connector 2. HV relay assembly 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-395
P0ADC-226	Hybrid Battery Positive Contactor Control Circuit High	1. Wire harness or connector 2. HV relay assembly 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-395
P0ADF-229	Hybrid Battery Negative Contactor Control Circuit Low	1. Wire harness or connector 2. HV relay assembly 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-399
P0AE0-228	Hybrid Battery Negative Contactor Control Circuit High	1. Wire harness or connector 2. HV relay assembly 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-399

DTC Code	Detection Item	Trouble Area	Master Warning Light	MIL	Memory	See page
P0AE2-161	Hybrid Battery Precharge Contactor Circuit Stuck Closed	1. Wire harness or connector 2. HV relay assembly 3. Hybrid vehicle control ECU 4. Hybrid vehicle converter (DC/DC converter)	Comes on	-	DTC stored	HV-403
P0AE2-773	Hybrid Battery Precharge Contactor Circuit Stuck Closed	1. Connector connection 2. Hybrid vehicle converter (DC/DC converter)	Comes on until DTC is cleared	-	DTC stored	HV-410
P0AE6-225	Hybrid Battery Precharge Contactor Control Circuit Low	1. Wire harness or connector 2. Frame wire 3. Hybrid vehicle converter (DC/DC converter) 4. Hybrid vehicle control ECU 5. Fuse 6. Fusible link	Comes on	Comes on	DTC stored	HV-412
P0AE7-224	Hybrid Battery Precharge Contactor Control Circuit High	1. Wire harness or connector 2. Hybrid vehicle converter (DC/DC converter) 3. Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-433
P0AEE-276	Motor Inverter Temperature Sensor "A" Circuit Range / Performance	1. Inverter cooling system 2. Water pump with motor & bracket assembly 3. Inverter with converter assembly 4. Cooling fan system 5. Hybrid vehicle control ECU 6. Wire harness or connector	Comes on	-	DTC stored	HV-437
P0AEE-277	Motor Inverter Temperature Sensor "A" Circuit Range / Performance	1. Inverter cooling system 2. Water pump with motor & bracket assembly 3. Inverter with converter assembly 4. Cooling fan system 5. Hybrid vehicle control ECU 6. Wire harness or connector	Comes on	-	DTC stored	HV-437
P0AEF-275	Drive Motor Inverter Temperature Sensor "A" Circuit Low	Inverter with converter assembly	Comes on	-	DTC stored	HV-440
P0AF0-274	Drive Motor Inverter Temperature Sensor "A" Circuit High	Inverter with converter assembly	Comes on	-	DTC stored	HV-440
P1555-181	Reactor Temperature Sensor Circuit Low	Inverter with converter assembly	Comes on	-	DTC stored	HV-441
P1556-182	Reactor Temperature Sensor Circuit High	Inverter with converter assembly	Comes on	-	DTC stored	HV-441
P1606-138	Collision Detection	1. Center airbag sensor assembly 2. Hybrid vehicle control ECU 3. Vehicle has experienced a collision 4. Circuit breaker sensor No. 1	Comes on until DTC is cleared	-	DTC stored	HV-442

DTC Code	Detection Item	Trouble Area	Master Warning Light	MIL	Memory	See page
P1606-308	Collision Detection	1. Center airbag sensor assembly 2. Hybrid vehicle control ECU 3. Vehicle has experienced a collision 4. Circuit breaker sensor No. 1	Comes on until DTC is cleared	-	DTC stored	HV-442
P1606-317	Collision Detection	1. Center airbag sensor assembly 2. Hybrid vehicle control ECU 3. Vehicle has experienced a collision 4. Circuit breaker sensor No. 1	Comes on until DTC is cleared	-	DTC stored	HV-442
P2120-152	Throttle / Pedal Position Sensor / Switch "D" Circuit	1. Wire harness or connector 2. Accelerator link rod assembly 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-445
P2121-106	Throttle / Pedal Position Sensor / Switch "D" Circuit Range / Performance	1. Wire harness or connector 2. Accelerator link rod assembly 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-445
P2122-104	Throttle / Pedal Position Sensor / Switch "D" Circuit Low Input	1. Wire harness or connector 2. Accelerator link rod assembly 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-445
P2123-105	Throttle / Pedal Position Sensor / Switch "D" Circuit High Input	1. Wire harness or connector 2. Accelerator link rod assembly 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-445
P2125-153	Throttle / Pedal Position Sensor / Switch "E" Circuit	1. Wire harness or connector 2. Accelerator link rod assembly 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-445
P2126-109	Throttle / Pedal Position Sensor / Switch "E" Circuit Range / Performance	1. Wire harness or connector 2. Accelerator link rod assembly 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-445
P2127-107	Throttle / Pedal Position Sensor / Switch "E" Circuit Low Input	1. Wire harness or connector 2. Accelerator link rod assembly 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-445

DTC Code	Detection Item	Trouble Area	Master Warning Light	MIL	Memory	See page
P2128-108	Throttle / Pedal Position Sensor / Switch "E" Circuit High Input	1. Wire harness or connector 2. Accelerator link rod assembly 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-445
P2138-110	Throttle / Pedal Position Sensor / Switch "D" / "E" Voltage Correlation	1. Wire harness or connector 2. Accelerator link rod assembly 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-445
P2138-154	Throttle / Pedal Position Sensor / Switch "D" / "E" Voltage Correlation	1. Wire harness or connector 2. Accelerator link rod assembly 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-445
P2511-149	ECM/PCM Power Relay Sense Circuit Intermittent	1. Wire harness or connector 2. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-452
P2519-766	A/C Request "A" Circuit	1. Battery smart unit 2. Hybrid vehicle converter 3. Wire harness or connector	Comes on	-	DTC stored	HV-454
P2532-772	Ignition Switch Run Position Circuit High	1. Wire harness or connector 2. Main body ECU 3. IG1 relay 4. IG2 relay 5. ECU IG No. 1 fuse 6. A/C No. 1 fuse 7. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-458
P3000-388	HV Battery Malfunction	1. Fuel level 2. HV battery	Comes on	-	DTC stored	HV-467
P3000-389	HV Battery Malfunction	1. Engine assembly 2. Hybrid vehicle transaxle assembly 3. HV battery	Comes on	-	DTC stored	HV-469
P3000-603	HV Battery Malfunction	1. Hybrid vehicle control ECU 2. HV battery assembly	Comes on	-	DTC stored	HV-472
P3004-131	Power Cable Malfunction	1. HV relay assembly 2. Frame wire 3. Inverter with converter assembly 4. HV battery 5. Wire harness or connector 6. Hybrid vehicle converter (DC/DC converter)	Comes on	-	DTC stored	HV-474
P3004-132	Power Cable Malfunction	1. HV relay assembly 2. Frame wire 3. Inverter with converter assembly 4. HV battery 5. Wire harness or connector	Comes on	-	DTC stored	HV-483
P3004-133	Power Cable Malfunction	Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-181

DTC Code	Detection Item	Trouble Area	Master Warning Light	MIL	Memory	See page
P3004-800	Power Cable Malfunction	1. Wire harness or connector 2. Air conditioning harness assembly 3. Compressor with motor assembly 4. Inverter with converter assembly 5. HV relay assembly 6. Floor wire 7. Hybrid vehicle converter (DC/DC converter) 8. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-488
P3004-801	Power Cable Malfunction	1. Wire harness or connector 2. Air conditioning harness assembly 3. Compressor with motor assembly 4. Inverter with converter assembly 5. HV relay assembly 6. Floor wire 7. Hybrid vehicle converter (DC/DC converter) 8. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-488
P3004-803	Power Cable Malfunction	1. Wire harness or connector 2. HV relay assembly	Comes on	-	DTC stored	HV-496
P3107-213	Airbag ECU Communication Circuit Malfunction	1. Wire harness or connector 2. Center airbag sensor assembly 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-500
P3107-214	Airbag ECU Communication Circuit Malfunction	1. Wire harness or connector 2. Center airbag sensor assembly 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-504
P3107-215	Airbag ECU Communication Circuit Malfunction	1. Wire harness or connector 2. Center airbag sensor assembly 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-507
P3108-535	A/C Amplifier Communication Circuit Malfunction	1. Wire harness or connector 2. Compressor with motor assembly 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-510
P3108-536	A/C Amplifier Communication Circuit Malfunction	1. Wire harness or connector 2. Compressor with motor assembly 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-510

DTC Code	Detection Item	Trouble Area	Master Warning Light	MIL	Memory	See page
P3108-538	A/C Amplifier Communication Circuit Malfunction	1. Wire harness or connector 2. Compressor with motor assembly 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-510
P3110-139	IGCT Relay Malfunction	1. Wire harness or connector 2. IGCT relay 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-515
P3110-223	IGCT Relay Malfunction	1. Wire harness or connector 2. IGCT relay 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-515
P3137-348	Collision Sensor Low Input	1. Wire harness or connector 2. Circuit breaker sensor No. 1 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-519
P3138-349	Collision Sensor High Input	1. Wire harness or connector 2. Circuit breaker sensor No. 1 3. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-519
P3147-239	Transmission Malfunction	1. Engine assembly 2. Hybrid vehicle transaxle assembly (shaft, gear) 3. Transmission input damper 4. Wire harness or connector 5. Inverter with converter assembly	Comes on	-	DTC stored	HV-522
P3147-240	Transmission Malfunction	Hybrid vehicle transaxle assembly	Comes on	-	DTC stored	HV-527
P3147-241	Transmission Malfunction	1. Engine assembly 2. Hybrid vehicle transaxle assembly (shaft, gear) 3. Transmission input damper 4. Wire harness or connector 5. Inverter with converter assembly	Comes on	-	DTC stored	HV-522
P3147-242	Transmission Malfunction	Hybrid vehicle transaxle assembly	Comes on	-	DTC stored	HV-527
P3221-314	Generator Inverter Temperature Sensor Circuit Range / Performance	1. Wire harness or connector 2. Inverter cooling system 3. Water pump with motor & bracket assembly 4. Inverter with converter assembly 5. Cooling fan system 6. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-528

DTC Code	Detection Item	Trouble Area	Master Warning Light	MIL	Memory	See page
P3221-315	Generator Inverter Temperature Sensor Circuit Range / Performance	1. Wire harness or connector 2. Inverter cooling system 3. Water pump with motor & bracket assembly 4. Inverter with converter assembly 5. Cooling fan system 6. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-528
P3222-313	Generator Inverter Temperature Sensor Circuit High / Low	Inverter with converter assembly	Comes on	-	DTC stored	HV-531
P3223-312	Generator Inverter Temperature Sensor Circuit High	Inverter with converter assembly	Comes on	-	DTC stored	HV-531
P3226-562	DC/DC Boost Converter Temperature Sensor	1. Wire harness or connector 2. Inverter cooling system 3. Water pump with motor & bracket assembly 4. Inverter with converter assembly 5. Cooling fan system 6. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-532
P3226-563	DC/DC Boost Converter Temperature Sensor	1. Wire harness or connector 2. Inverter cooling system 3. Water pump with motor & bracket assembly 4. Inverter with converter assembly 5. Cooling fan system 6. Hybrid vehicle control ECU	Comes on	-	DTC stored	HV-532
P3227-583	Converter Temperature Sensor Circuit Low	Inverter with converter assembly	Comes on	-	DTC stored	HV-535
P3228-584	Converter Temperature Sensor Circuit High	Inverter with converter assembly	Comes on	-	DTC stored	HV-535
P3232-749	Open or Short to B+ in Blocking of HV Gate Connection	1. Wire harness or connector 2. Hybrid vehicle control ECU 3. Inverter with converter assembly	Comes on	-	DTC stored	HV-536
P3233-750	Short to B+ in Blocking of HV Gate Connection	1. Wire harness or connector 2. Hybrid vehicle control ECU 3. Inverter with converter assembly	Comes on	-	DTC stored	HV-538
U0100-211	Lost Communication with ECM / PCM "A"	CAN communication system	Comes on	-	DTC stored	HV-541
U0100-212	Lost Communication with ECM / PCM "A"	CAN communication system	Comes on	-	DTC stored	HV-541
U0100-530	Lost Communication with ECM / PCM "A"	CAN communication system	Comes on	-	DTC stored	HV-541
U0100-774	Lost Communication with ECM / PCM "A"	CAN communication system	Comes on	-	DTC stored	HV-541
U0100-784	Lost Communication with ECM / PCM "A"	CAN communication system	Comes on	-	DTC stored	HV-541

DTC Code	Detection Item	Trouble Area	Master Warning Light	MIL	Memory	See page
U0110-159	Lost Communication with Driver Motor Control Module	1. Wire harness or connector 2. Inverter with converter assembly (MG ECU) 3. Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-544
U0110-160	Lost Communication with Driver Motor Control Module	1. Wire harness or connector 2. Inverter with converter assembly (MG ECU) 3. Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-544
U0110-656	Lost Communication with Driver Motor Control Module	1. Wire harness or connector 2. Inverter with converter assembly (MG ECU) 3. Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-544
U0110-657	Lost Communication with Driver Motor Control Module	1. Wire harness or connector 2. Inverter with converter assembly (MG ECU) 3. Hybrid vehicle control ECU	Comes on	Comes on	DTC stored	HV-544
U0129-220	Lost Communication with Brake System Control Module	CAN communication system	Comes on	-	DTC stored	HV-541
U0129-222	Lost Communication with Brake System Control Module	CAN communication system	Comes on	-	DTC stored	HV-541
U0129-528	Lost Communication with Brake System Control Module	CAN communication system	Comes on	-	DTC stored	HV-541
U0133-147	Lost Communication with Active Roll Control Module	CAN communication system	Comes on	-	DTC stored	HV-541
U0146-146	Lost Communication with Gateway "A"	CAN communication system	Comes on	-	DTC stored	HV-541
U0146-594	Lost Communication with Gateway "A"	CAN communication system	Comes on	-	DTC stored	HV-551
U0146-827	Lost Communication with Gateway "A"	CAN communication system	Comes on	-	DTC stored	HV-551
U0151-763	Lost Communication with Airbag ECU	1. CAN communication system 2. Multiplex communication system	Comes on	-	DTC stored	HV-553
U0424-537	Lost Communication with A/C ECU	Air conditioning amplifier assembly	-	-	DTC stored	HV-554

INFORMATION / FREEZE FRAME DATA

1. FREEZE FRAME DATA

HINT:

The HV control ECU records vehicle and driving condition information as freeze frame data the moment a DTC is stored. It can be used for estimating or duplicating the vehicle conditions that were present when the malfunction occurred. To confirm the details of the hybrid control system, check the detailed information for the DTC information code in the data list (INF code).

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester on.
(c) Select the following menu items: DIAGNOSIS / OBD/MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Select a DTC in order to display its freeze frame data.
(e) Check the freeze frame data of the DTC that has been detected.
(f) Check the freeze frame information recorded with the DTC.

FREEZE FRAME DATA:

Intelligent Tester Display	Measurement Item / Range (Display)	Suspected Vehicle Status When Malfunction Occurs
FREEZE DTC (DTC with require freeze frame data storage)	DTC corresponding to displayed freeze frame data	-
INFORMATION 1 to 5 (DETAIL INFORMATION 1 to 5)	Information code	-
COOLANT TEMP (Engine coolant temperature)	Engine coolant temperature / Min.: -40°C, Max.: 140°C	Cold or warmed-up engine
ENGINE REV (Engine revolution)	Engine speed / Min.: 0 rpm, Max.: 16,383.75 rpm	Engine speed
VEHICLE SPD (Vehicle SPD)	Vehicle speed / Min.: 0 km/h, Max.: 255 km/h	Stopped, or driving (at low, medium, or high speeds)
ENG RUN TIME (Engine run time)	Elapsed time after engine start / Min.: 0 sec., Max.: 65535 sec.	Elapsed time after engine start
+B (+B)	Auxiliary battery voltage / Min.: 0 V, Max.: 65.535 V	Auxiliary battery condition
ACCEL POS #1 (Accelerator pedal position #1)	Accelerator pedal position sensor No. 1 / Min.: 0%, Max.: 100%	Idling, accelerating, or decelerating
ACCEL POS #2 (Accelerator pedal position #2)	Accelerator pedal position sensor No. 2 / Min.: 0%, Max.: 100%	Idling, accelerating, or decelerating
AMBIENT TEMP (Ambient Temperature)	Ambient air temperature / Min.: -40°C, Max.: 215°C	Hot or cold weather
INTAKE AIR TEMP (Intake air temperature)	Intake air temperature / Min.: -40°C, Max.: 140°C	Hot or cold weather
DTC CLEAR WARM (DTC Clear Warm Up Times)	The number of times engine is warmed up after clearing DTCs / Min.: 0, Max.: 255	Frequency of malfunction recurrence after clearing DTCs
DTC CLEAR RUN (DTC Clear Run Distance)	Drive distance after clearing DTCs / Min.: 0 km, Max.: 65535 km	Frequency of malfunction recurrence after clearing DTCs
DTC CLEAR MIN (DTC Clear Min)	Elapsed time after clearing DTCs / Min.: 0 min, Max.: 65535 min	Elapsed time after clearing DTCs
CALC LOAD (Calculate Load)	Calculate load / Min.: 0%, Max.: 100%	-

Intelligent Tester Display	Measurement Item / Range (Display)	Suspected Vehicle Status When Malfunction Occurs
THROTTLE POS (Throttle POS)	Throttle position sensor / Min.: 0%, Max.: 100%	Idling, accelerating, or decelerating
ECU TYPE (Type pf ECU)	ECU type	Identifying ECU type: HV ECU
BATTERY SOC (Battery State of Charge)	Battery state of charge / Min.: 0%, Max.: 100%	State of charge of HV battery
DELTA SOC (Delta SOC)	Difference between maximum and minimum value of SOC / Min.: 0%, Max.: 100%	SOC variance
IB BATTERY (Current value of Battery Pack)	Current value of battery pack / Min.: -327.68 A, Max.: 327.67 A	HV battery charge/discharge status • Amount of current during discharge is displayed with positive values • Amount of current during charge is displayed with negative values
BATT INSIDE AIR (Inhalation-of-air temperature into a battery pack)	Battery cooling fan intake air temperature Min.: -327.68°C, Max.: 327.67°C	-
VMF FAN VOLT1 (VMF fan motor voltage1)	VMF fan voltage / Min.: -25.6 V, Max.: 25.4 V	Cooling fan operation condition
AUX. BAT V (Auxiliary battery voltage)	Auxiliary battery voltage / Min.: -25.6 V, Max.: 25.4 V	Auxiliary battery voltage
WIN (Charge control value)	Charge control power value / Min.: -64 kW, Max.: 63.5 kW	Charge amount of HV battery
WOUT (Discharge control value)	Discharge control power value / Min.: -64 kW, Max.: 63.5 kW	Discharge amount of HV battery
COOLING FAN 1 (COOLING FAN MODE1)	Cooling fan mode / Min.: 0, Max.: 40	HV battery cooling fan activation condition • Stopped: 0 • Low speed drive - high speed drive: 1-40
ECU CTRL MODE (ECU control mode)	ECU control mode / Min.: 1, Max.: 5	HV battery control status
SBLW RQST (Cooling fan stop control request (Standby Blower))	Standby blower request	-
BATT TEMP 1 to 4 (Temperature of battery TB 1 to 4)	Battery temperature / Min.: -327.68°C , Max.: 327.67 °C	HV battery temperature
V1 to V17 BATT BLOCK (Battery Block Voltage V01 to V17)	Battery block voltage / Min.: -327.68 V, Max.: 327.67 V	Each HV battery block voltage variance

HV

2. INFORMATION

HINT:

Similar to freeze frame data, the HV control ECU also records vehicle and driving condition information as INFORMATION (INF code) at the moment a DTC is stored.

(a) Select the information item which has an INF code from among INFORMATION 1 to 5.

(b) Check the information for the DTC.

INFORMATION:

Intelligent Tester Display	Measurement Item / Range (Display)	Suspected Vehicle Status When Malfunction Occurs
INFORMATION n (INFORMATION n)	Information code	Indication of system with malfunction
MG1 REV (Generator (MG1) Revolution)	Generator revolution / Min.: -16,384 rpm, Max.: 16,256 rpm	Generator speed • Forward rotation appears as "+" • Backward rotation appears as "-"

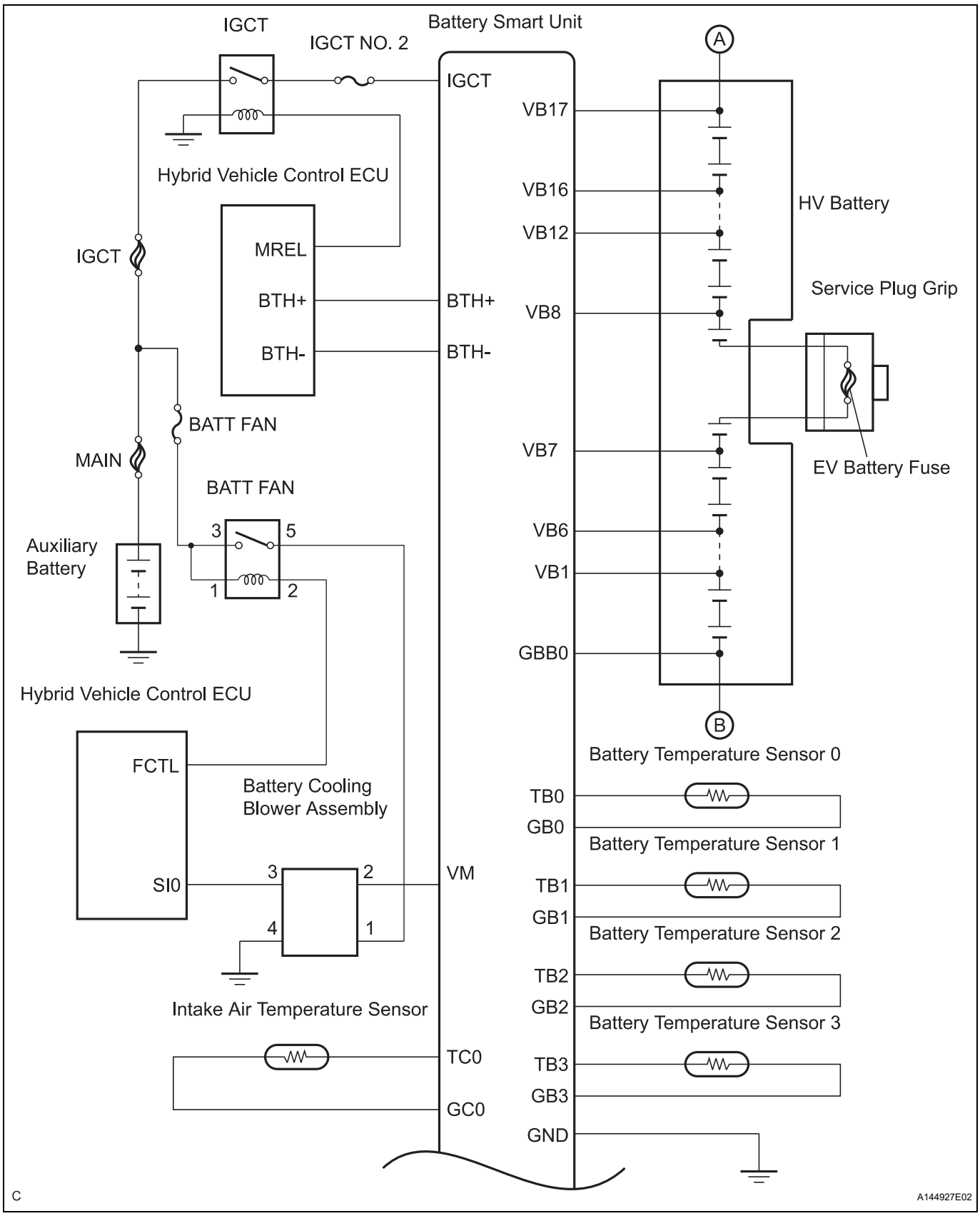
Intelligent Tester Display	Measurement Item / Range (Display)	Suspected Vehicle Status When Malfunction Occurs
MG2 REV (Motor (MG2) Revolution)	Motor revolution / Min.: -16,384 rpm, Max.: 16,256 rpm	Motor speed (proportionate to vehicle speed) • Forward rotation appears as "+" • Backward rotation appears as "-" Moving direction of vehicle • Forward rotation appears as "+" • Backward rotation appears as "-""
MG1 TORQ (Generator (MG1) Torq)	Generator torque / Min.: -512 N*m, Max.: 508 N*m	When generator rotation in "+" direction: • Torque appears as "+" while generator discharges • Torque appears as "-" while generator charges When generator rotation in "-" direction: • Torque appears as "-" while generator discharges • Torque appears as "+" while generator charges
MG2 TORQ (Motor (MG2) Torq)	Motor torque / Min.: -512 N*m, Max.: 508 N*m	When motor rotation in "+" direction: • Torque appears as "+" while motor discharges • Torque appears as "-" while motor charges When motor rotation in "-" direction: • Torque appears as "-" while motor discharges • Torque appears as "+" while motor charges
INVERT TEMP-MG1 (Inverter temperature (MG1))	Generator inverter temperature / Min.: -50°C, Max.: 205°C	Generator inverter temperature
INVERT TEMP-MG2 (Inverter temperature (MG2))	Generator inverter temperature / Min.: -50°C, Max.: 205°C	Motor inverter temperature
MG2 TEMP (No2) (Motor temperature MG2 (No2))	Generator inverter temperature / Min.: -50°C, Max.: 205°C	Generator temperature
MG2 TEMP (No1) (Motor temperature MG2 (No1)	Generator inverter temperature / Min.: -50°C, Max.: 205°C	Motor temperature
POWER RQST (Request Power)	Request engine power / Min.: 0 W, Max.: 255 W	Engine power output requested to ECM
ENGINE SPD (Engine SPD)	Engine speed / Min.: 0 rpm, Max.: 16320 rpm	Engine speed
MCYL CTRL POWER (Master Cylinder Control Torq)	Master cylinder control torque / Min.: -512 N*m, Max.: 508 N*m	Brake force requested by driver
SOC (SOC)	Battery state of charge / Min.: 0%, Max.: 100%	State of charge of HV battery
WOUT CTRL POWER (Wout Control Power)	Power value discharge control / Min.: 0 W, Max.: 81600 W	Discharge amount of HV battery
WIN CTRL POWER (Win Control Power)	Power value charge control / Min.: -40800 W, Max.: 0 W	Charge amount of HV battery
DRIVE CONDITION ID (Drive Condition ID)	Drive condition ID • Engine stopped: 0 • Engine about to be stopped: 1 • Engine about to be started: 2 • Engine operated or operating: 3 • Generating or loading movement: 4 • Revving in P position: 6	Engine operating condition
PWR RESOURCE VB (Power Resource VB)	HV battery voltage / Min.: 0 V, Max.: 510 V	HV battery voltage
PWR RESOURCE IB (Power Resource IB)	HV battery charge/discharge status / Min.: -256 A, Max.: 254 A	HV battery charge and discharge current 1. Amount of current during discharge is indicated with positive values 2. Amount of current during charge is indicated with negative values
SHIFT POSITION (Shift sensor shift position)	Shift position (P, R, N, D or B position) P: 0, R: 1, N: 2, D: 3, B: 4	Shift position

HV

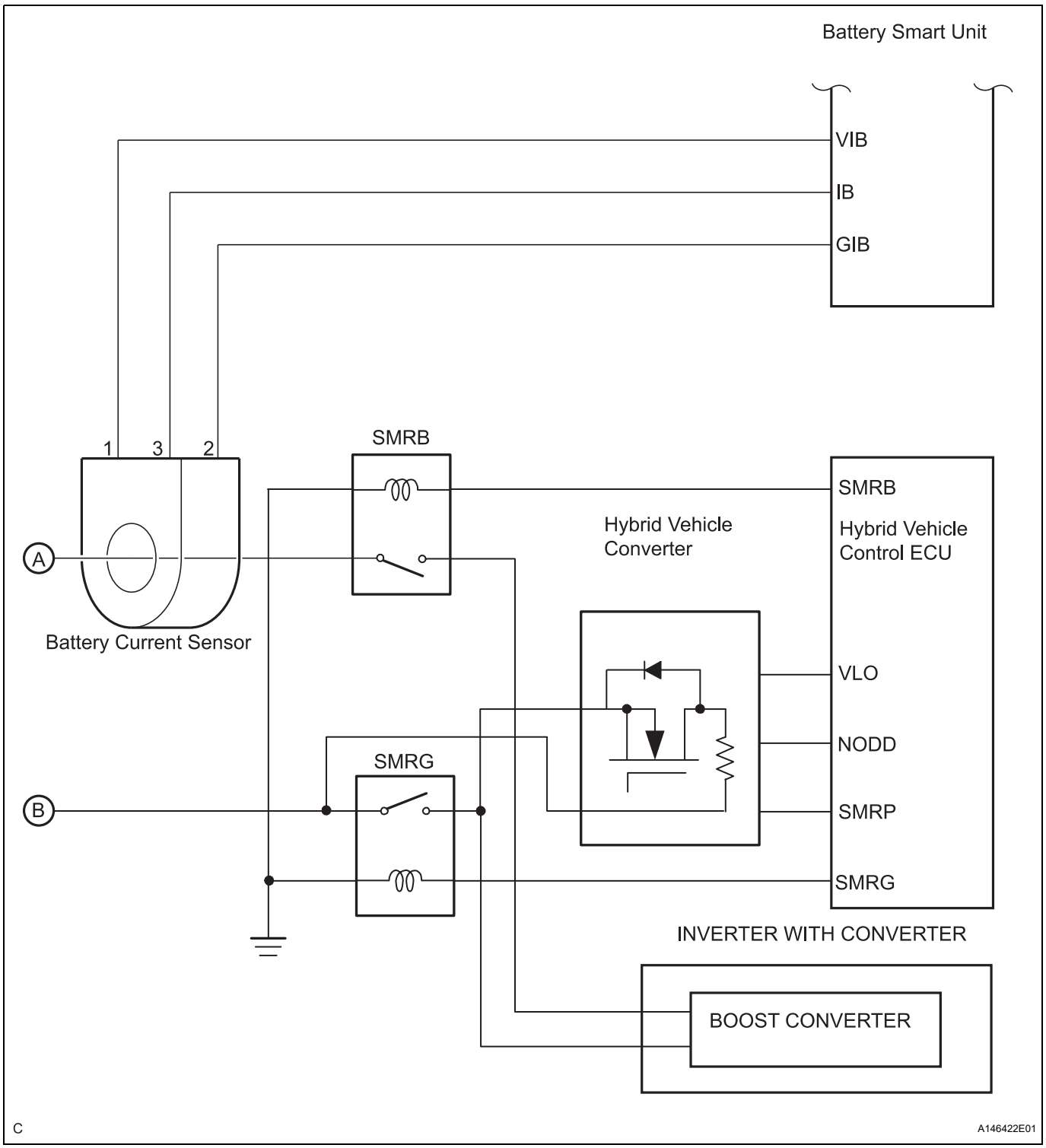
Intelligent Tester Display	Measurement Item / Range (Display)	Suspected Vehicle Status When Malfunction Occurs
ACCEL SENSOR M (Accel sensor main)	Accelerator pedal position sensor main / Min.: 0%, Max.: 100%	Idling, accelerating, or decelerating
AUX. BATT V (Auxiliary Battery Voltage)	Auxiliary battery voltage / Min.: 0 V, Max.: 20 V	Auxiliary battery voltage
CONVERTER TEMP (Converter Temperature)	Boost converter temperature / Min.: -50°C, Max.: 205°C	Boost converter temperature
VL (VL-Voltage before raising pressure)	High voltage after it is boosted / Min.: 0 V, Max.: 510 V	High voltage level before it is boosted
VH (VH-Voltage after raising pressure)	High voltage after it is boosted Min.: 0 V, Max.: 765 V	High voltage level after it is boosted
IG ON TIME (The time of Ignition ON)	The time after power switch on (IG) / Min.: 0 min, Max.: 255 min	Time elapsed with power switch on (IG)
VEHICLE SPD-MAX (Vehicle Speed (Max))	Maximum vehicle speed / Min.: -256 km/h, Max.: 254 km/h	Over-discharging of HV battery
A/C COSMPT PWR (Aircon consumption power)	A/C consumption power / Min.: 0 kW, Max.: 5 kW	A/C load
ENG STOP RQST (Engine Stop Request)	Engine stop request / NO or YES	Engine stop request
IDLING REQUEST (Engine Idling Request)	Engine idling request / NO or YES	Idle stop request
ENGINE FUEL CUT (Engine Fuel Cut)	Engine fuel cut request / NO or YES	Fuel cut request
HV BATT CH RQST (Main Battery Charging Request)	HV battery charging request	HV battery charging request
ENG WARM UP RQT (Engine Warming up Request)	Engine warming up request / NO or YES	Engine warm-up request
STOP SW COND (Stop SW)	Stop light switch ON condition / NO or YES	Brake pedal depressed or released
CRUISE CONTROL (Cruise Control)	Cruise control active condition / NO or YES	Operation under cruise control ON or OFF
EXCLUSIVE INFO 1 to 7 (Exclusive Information 1 to 7)	Exclusive information (in numerical data)	Exclusive information linked to Information
OCCURRENCE ORDR (Occurrence order)	Occurrence sequence of information	Occurrence sequence of information
INVT TMP-MG1 IG (Inverter temperature (MG1) after IG-ON)	Generator inverter temperature after power switch on (IG) / Min.: -50°C, Max.: 205°C	Generator inverter temperature soon after power switch on (IG)
INVT TMP-MG2 IG (Inverter temperature (MG2) after IG-ON)	Motor inverter temperature after power switch on (IG) / Min.: -50°C, Max.: 205°C	Motor inverter temperature soon after power switch on (IG)
MG2 TEMP IG (Motor temperature (MG2) after IG-ON))	Motor temperature after power switch on (IG) / Min.: -50°C, Max.: 205°C	Motor temperature soon after power switch on (IG)
CONVRTR TEMP IG (Converter Temperature after IG-ON)	Boost converter temperature after power switch on (IG) / Min.: -50°C, Max.: 205°C	Boost converter temperature soon after power switch on (IG)
SOC IG (Status Of Charge after IG-ON))	Battery state of charge after power switch on (IG) / Min.: 0%, Max.: 100%	Battery state of charge soon after power switch on (IG)
INVT TMP-MG1MAX (Inverter temperature (MG1) MAX)	Generator inverter maximum temperature / Min.: -50°C, Max.: 205°C	Overheating state of Generator inverter
INVT TMP-MG2MAX (Inverter temperature (MG2) MAX)	Motor inverter maximum temperature / Min.: -50°C, Max.: 205°C	Overheating state of Motor inverter
MG2 TEMP MAX (Motor temperature (MG2) MAX)	Motor maximum temperature / Min.: -50°C, Max.: 205°C	Overheating state of Motor
CONVRTR TMP MAX (Converter Temperature MAX)	Boost converter maximum temperature / Min.: -50°C, Max.: 205°C	Overheating state of boost converter

Intelligent Tester Display	Measurement Item / Range (Display)	Suspected Vehicle Status When Malfunction Occurs
SOC MAX (Status Of Charge MAX)	Maximum status of charge / Min.: 0%, Max.: 100%	Over-charging of HV battery
SOC MIN (Status Of Charge MIN)	Minimum status of charge/ Min.: 0%, Max.: 100%	Over-charging of HV battery
HV COOLANT TEMP (HV Coolant Temperature)	HV coolant temperature / Min.: -40°C , Max.: 140°C	HV coolant temperature

SYSTEM DIAGRAM



HB

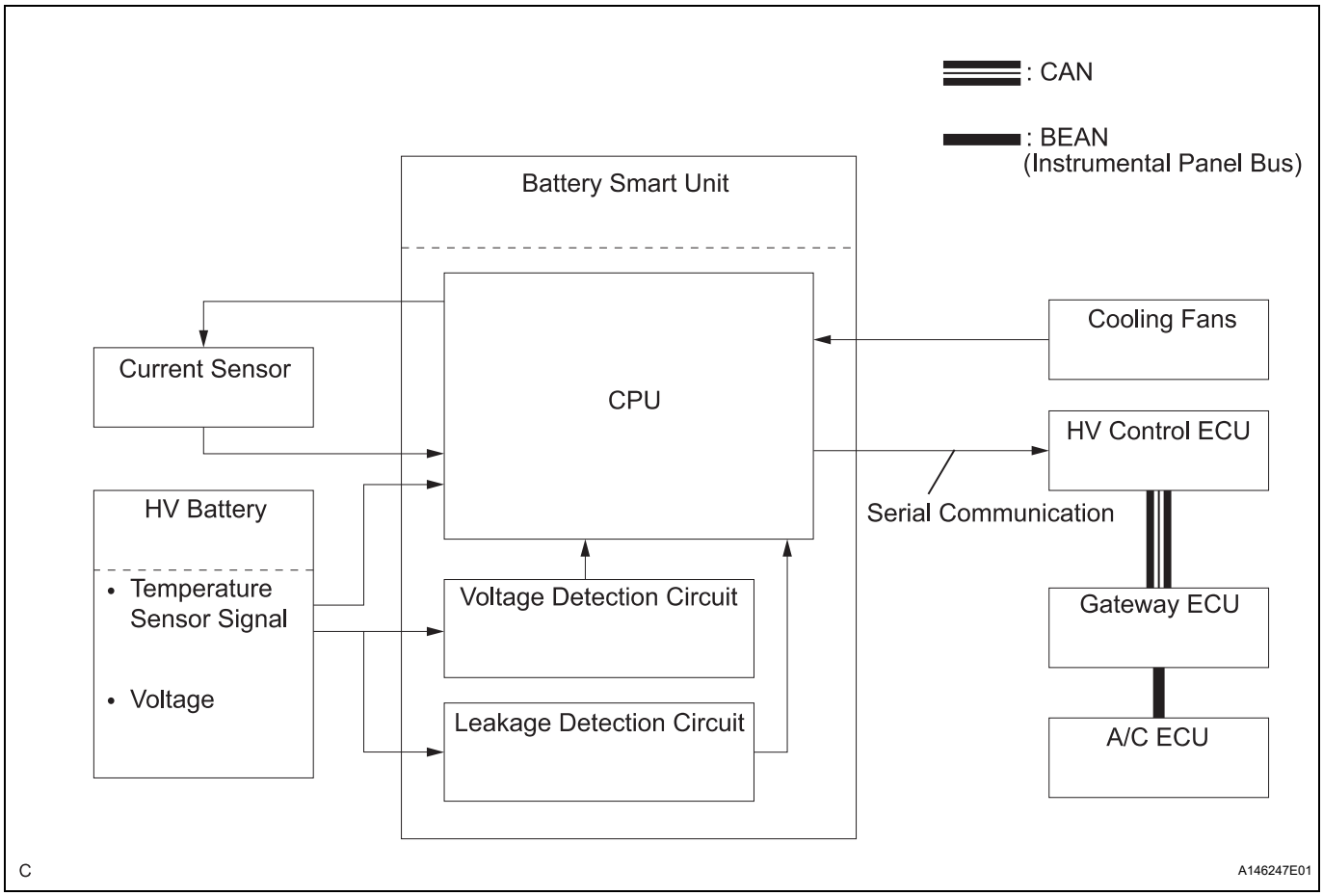

Battery Smart Unit
VIB
IB
GIB
1
3
2
SMRB
SMRB
Hybrid Vehicle Converter
Hybrid Vehicle Control ECU
A
Battery Current Sensor
VLO
NODD
SMRG
SMRP
B
SMRG
INVERTER WITH CONVERTER
BOOST CONVERTER
C
A146422E01

HB

SYSTEM DESCRIPTION

1. BATTERY SMART UNIT CONTROL

- The battery smart unit monitors the HV battery condition signals (voltage, current, and temperature), which are needed to determine the charging or discharging values that are calculated by the THS ECU and transmits them to the THS ECU via serial communication.
- A leakage detection circuit is provided in the battery smart unit in order to detect any leakage from the HV battery.
- The battery smart unit monitors the voltage of the cooling fan, which is needed by the THS ECU to effect cooling fan control, and transmits it to the THS ECU via serial communication.



HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
*: Use the intelligent tester.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

NEXT

3	CONNECT INTELLIGENT TESTER TO THE DLC3*

HINT:
If the display on the tester indicates a communication fault, inspect the DLC3.

NEXT

4	CHECK DTC AND SAVE FREEZE FRAME DATA* (See page HB-15), (See page HB-17)

HINT:
Make sure to save freeze frame data because the data is necessary for a simulation test.

NEXT

5	CLEAR DTC* (See page HB-15)

NEXT

6	CONDUCT VISUAL INSPECTION

NEXT

7	CONFIRM PROBLEM SYMPTOMS

HINT:
If the engine does not start, perform steps 9 and 11 first.
Result

Result	Proceed to
Malfunction does not occur	A
Malfunction occurs	B

B → GO TO STEP 10

A

8	DUPLICATE CONDITIONS THAT PRODUCE SYMPTOMS

NEXT

9	CHECK FOR DTCS* (See page HB-15)

Result

Result	Proceed to
Trouble code	A
No code	B

B → GO TO STEP 11

A

10	REFER TO DTC CHART (See page HB-18)

NEXT

GO TO STEP 13

HB

11	CONDUCT BASIC INSPECTION

Result

Result	Proceed to
Malfunctioning parts not confirmed	A
Malfunctioning parts confirmed	B

B → GO TO STEP 15

A

12	CHECK ECU POWER SOURCE CIRCUIT

NEXT

13	CONDUCT CIRCUIT INSPECTION

Result

Result	Proceed to
Malfunction not confirmed	A

Result	Proceed to
Malfunction confirmed	B

B → GO TO STEP 16

A

14	CHECK FOR INTERMITTENT PROBLEMS (See page HB-10)

NEXT

GO TO STEP 16

15	CONDUCT PARTS INSPECTION

NEXT

16	IDENTIFY PROBLEM

NEXT

17	ADJUST AND/OR REPAIR

NEXT

18	CONDUCT CONFIRMATION TEST

NEXT

END

CHECK FOR INTERMITTENT PROBLEMS

1. CHECK FOR INTERMITTENT PROBLEMS

(a) Perform a simulation test (See page IN-72).

(1) For the simulation test, reproduce the driving conditions that were present when the trouble occurred. These conditions should be based on the customer's comments and freeze frame data that is recorded with DTCs, such as the opening angle of the accelerator pedal, SOC, engine coolant temperature, engine rpm, and MG1/MG2 rpm and torque.

(b) Check the connector(s) and terminal(s) (See page IN-67).

(c) Wiggle the harness and connector(s) (See page IN-72).

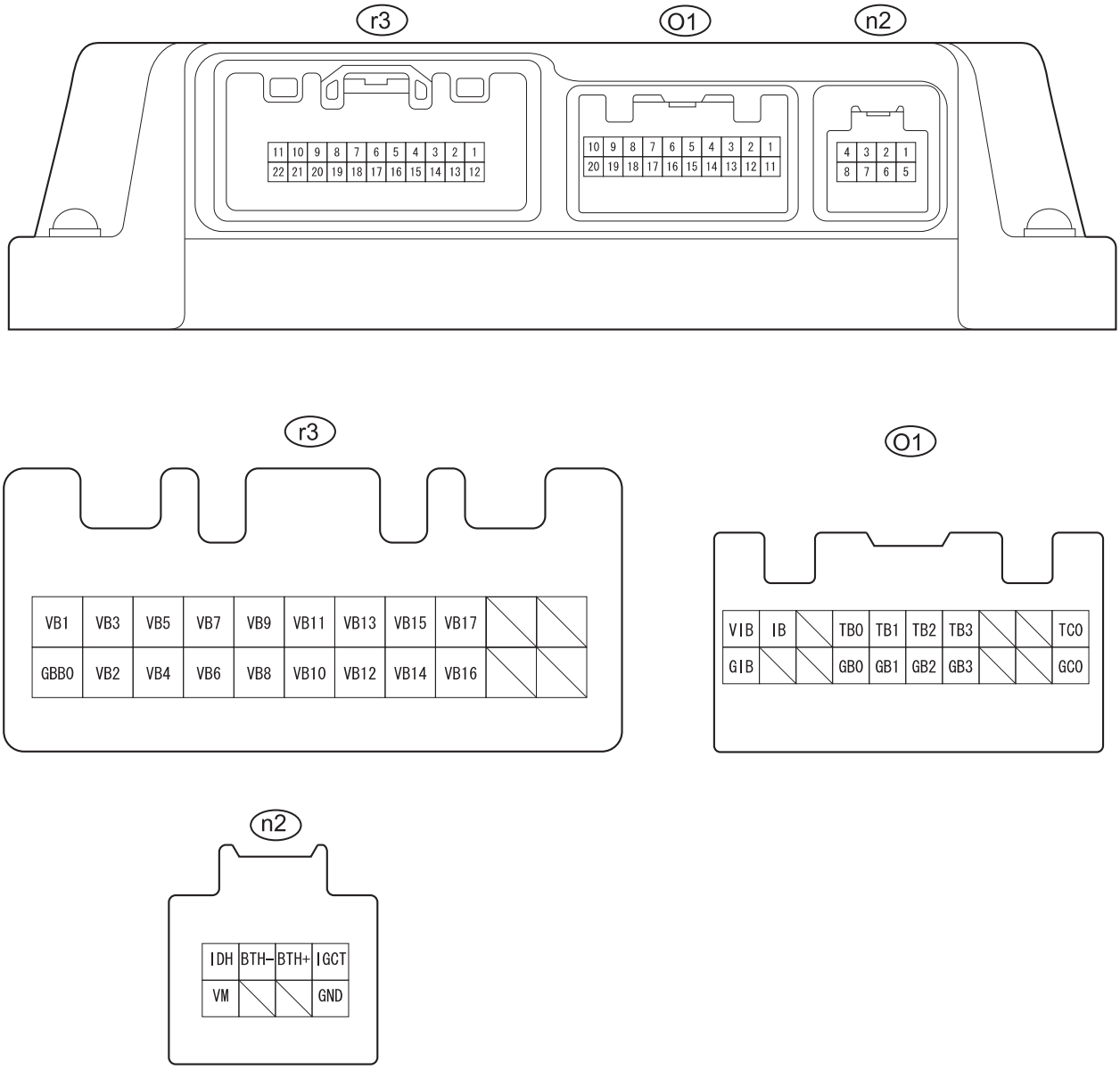
(d) Heat or cool suspected parts (See page IN-72).

NOTICE:

Do not directly heat or cool the MG ECU with the inverter cover removed.

TERMINALS OF ECU

Battery Smart Unit



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ECU TERMINAL CHART:

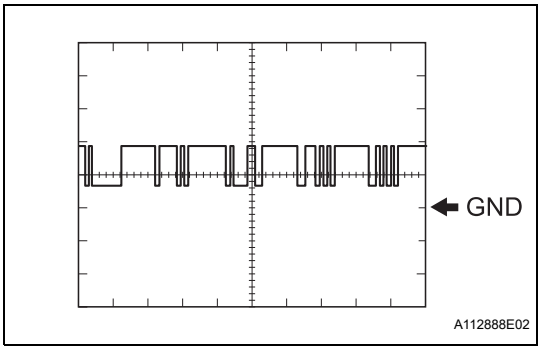
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Standard (V)
TC0 (O1-1) - GC0 (O1-11)	G - G	Intake air temperature sensor	Intake air temperature: -40 to 90°C (-40 to 194°F)	4.8 to 1.0
TB3 (O1-4) - GB3 (O1-14)	L - L	HV battery temperature sensor 3	HV battery temperature: -40 to 90°C (-40 to 194°F)	4.8 to 1.0
TB2 (O1-5) - GB2 (O1-15)	B - B	HV battery temperature sensor 2	HV battery temperature: -40 to 90°C (-40 to 194°F)	4.8 to 1.0

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Standard (V)
TB1 (O1-6) - GB1 (O1-16)	W - W	HV battery temperature sensor 1	HV battery temperature: -40 to 90°C (-40 to 194°F)	4.8 to 1.0
TB0 (O1-7) - GB0 (O1-17)	R - R	HV battery temperature sensor 0	HV battery temperature: -40 to 90°C (-40 to 194°F)	4.8 to 1.0
IB (O1-9) - GIB (O1-20)	Y - B	Battery Current	Power switch on (READY)	0.5 to 4.5
VIB (O1-10) - GIB (O1-20)	BR - B	Power source for battery current sensor	Power switch on (IG)	4.5 to 5.5
IGCT (n2-1) - GND (n2-5)	B - W-B	Control signal	Power switch on (READY)	9 to 14
BTH+ (n2-2) - GND (n2-5)	R - W-B	Serial communication	Power switch on (IG)	Pulse generation (waveform 1)
BTH- (n2-3) - GND (n2-5)	G - W-B	Serial communication	Power switch on (IG)	Pulse generation (waveform 2)
IDH (n2-4) - GND (n2-5)	P - W-B	Hybrid Vehicle Converter Cooling Fan Signal	Power switch on (IG)	Pulse generation (waveform 3)
VM (n2-8) - GND (n2-5)	G - W-B	Cooling Fan Monitor Signal	Cooling fan activated	0 to 5
GND (n2-5) - Body ground	W-B - Body ground	Ground	Always (continuity check)	Continuity (Below 6 Ω)

1. Oscilloscope waveforms

HINT:
Oscilloscope waveform samples are provided here for informational purposes. Noise and fluttering waveforms have been omitted.

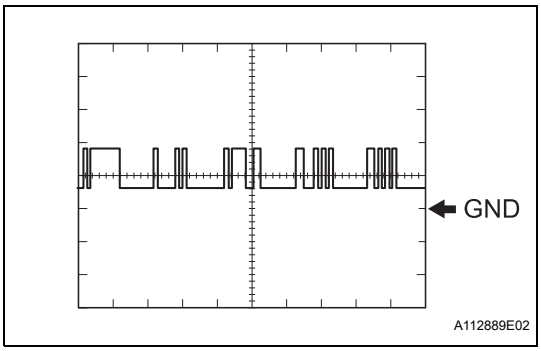
(a) Waveform 1



Item	Contents
Terminal	BTH+ (n2-2) - GND (n2-5)
Equipment Setting	2 V/DIV., 500 μs/DIV.
Condition	Power switch on (IG)

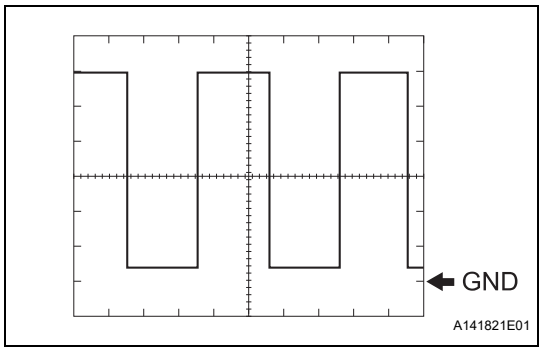
HINT:
The waveform will vary depending on the content of the digital communication (digital signal).

(b) Waveform 2



Item	Contents
Terminal	BTH- (n2-3) - GND (n2-5)
Equipment Setting	2 V/DIV., 500 μs/DIV.
Condition	Power switch on (IG)

HINT:
The waveform will vary depending on the content of the digital communication (digital signal).



(c) Waveform 3

Item	Contents
Terminal	IDH (n2-4) - GND (n2-5)
Equipment Setting	2 V/DIV., 500 2ms./DIV.
Condition	Power switch on (IG)

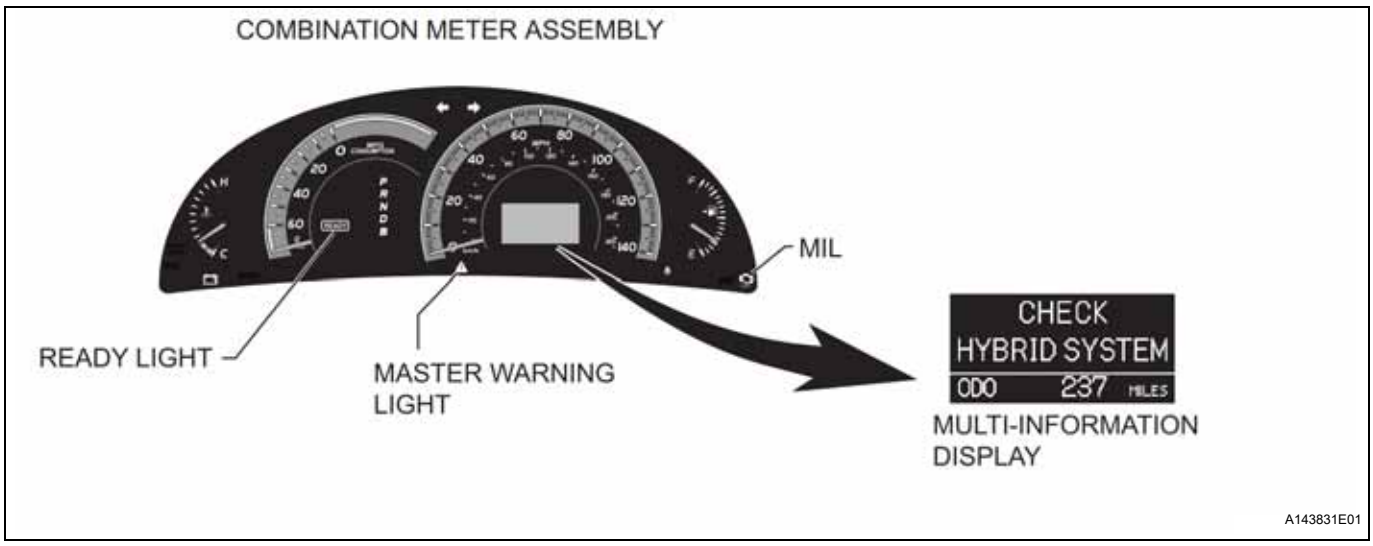
HINT:

- The frequency of the waveform differs according to operation conditions of the cooling fan of the hybrid vehicle converter.
- The frequency of the waveform differs (100 to 900 kHz, 8 to 14 V) depending on operation conditions of the cooling fan of the hybrid vehicle converter.

DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) The HV control ECU has a self-diagnosis system. If the computer, hybrid vehicle control system, or a component is not working properly, the ECU records the conditions that relate to the fault. The ECU also illuminates the master warning light and/or MIL in the combination meter and displays warning messages on the multi-information display.

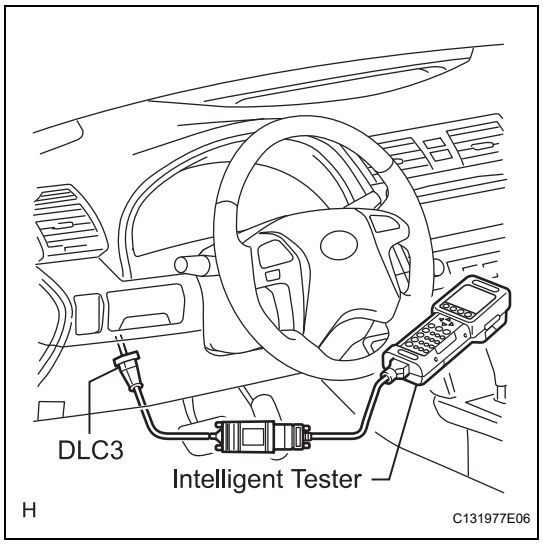


HINT:

The master warning light will illuminate when the THS II fails and the light will blink when in inspection mode.

- When troubleshooting OBD II vehicles, it is necessary to connect an OBD II scan tool that complies with SAE J1978 or connect an intelligent tester to the vehicle. Using one of these testers, it will be possible to read various data output from the vehicle's ECUs.
- OBD II regulations require that the vehicle's on-board computer illuminates the Malfunction Indicator light (MIL) in the instrument panel when the computer detects a malfunction in (1) the emission control system/ components, (2) the powertrain control components (which affect vehicle emissions), (3) the ECM and HV control ECU. In addition, applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the HV control ECU memory (See page HB-18).

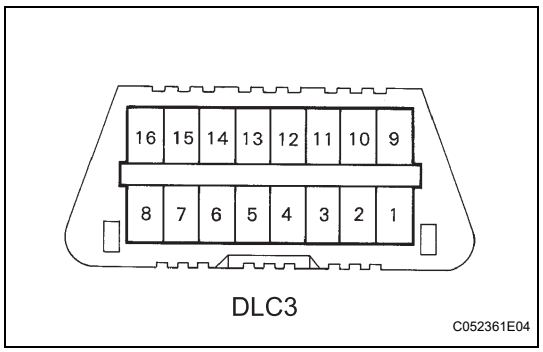
If a malfunction does not recur in 3 consecutive trips, the MIL will go off automatically. However the DTCs will remain recorded in the HV control ECU memory.



- To check for DTCs, connect the intelligent tester to the Data Link Connector 3 (DLC3) with the CAN vehicle interface module (CAN VIM). The intelligent tester also allows erasing of DTCs, viewing of freeze frame data, and viewing of various forms of THS II data (for operating instructions, refer to the tester's instruction manual). The DTCs include SAE controlled codes and manufacturer controlled codes. SAE controlled codes must be set as prescribed by the SAE, while manufacturer controlled codes can be set by the manufacturer within prescribed limits (See page HB-18).

2. CHECK DLC3

(a) The HV control ECU uses the ISO 9141-2 communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.



Symbol	Terminal No.	Name	Reference Terminal	Result	Condition
SIL	7	Bus "+" line	5 - Signal ground	Pulse generation	Always
CG	4	Chassis ground	Body ground	1 Ω or less	Always
SG	5	Signal ground	Body ground	1 Ω or less	Always
BATT	16	Battery positive	Body ground	11 to 14 V	Power switch off
CANH	6	HIGH-level CAN bus line	14 - LOW-level CAN bus line	54 to 69 Ω	Power switch off
CANH	6	HIGH-level CAN bus line	14 - Battery positive	1 MΩ or higher	Power switch off
CANH	6	HIGH-level CAN bus line	4 - Chassis ground	1 kΩ or higher	Power switch off
CANL	14	LOW-level CAN bus line	16 - Battery positive	1 MΩ or higher	Power switch off
CANL	14	LOW-level CAN bus line	4 - Chassis ground	1 kΩ or higher	Power switch off

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the power switch on (IG), and attempt to use the tester. If the display on the tester indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If the tester is able to communicate when it is connected to another vehicle, inspect the DLC3 connector of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the tester's instruction manual for information on service or repair of the tester.

HB

3. **INSPECT AUXILIARY BATTERY**
   (a) Measure the voltage of the auxiliary battery.
   Standard Voltage:
   10 to 14 V
   (b) Inspect the auxiliary battery, fuses, fusible links, wiring harness, connectors and ground.
4. **CHECK MIL**
   (a) The MIL will illuminate when the power switch is turned on (IG), before the "READY" light comes on. If the MIL does not illuminate, troubleshoot the MIL circuit (See page ES-373).
   (b) When the "READY" light turns on, the MIL should turn off. If the MIL remains on, the diagnosis system has detected a malfunction or abnormality in the system.

DTC CHECK / CLEAR

DTC CHECK / CLEAR

1. CHECK FOR DTCS (HV CONTROL ECU)

(a) Connect the intelligent tester to the DLC3.

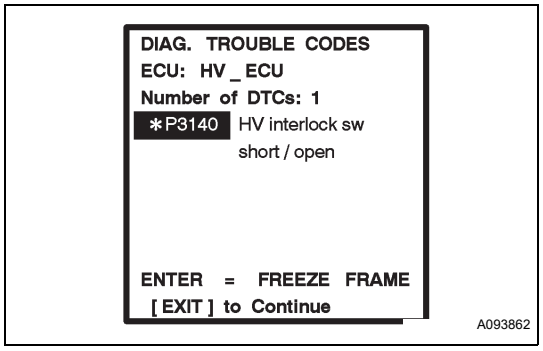
(b) Turn the power switch on (IG) and turn the intelligent tester on.

(c) Using the intelligent tester, check for DTCs and freeze frame data. If present, record or print the codes and the freeze frame data. Using the intelligent tester, enter the following menus: DIAGNOSIS / OBD/MOBD / HV ECU / DTC INFO / CURRENT CODES.

(d) Confirm the details of the DTCs. (See page HB-18)

2. CHECK FREEZE FRAME DATA AND INFORMATION

(a) If a DTC is present, select it in order to display its freeze frame data.



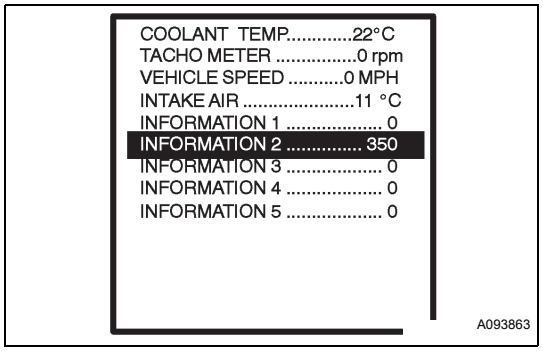
(b) Read the freeze frame data recorded when the DTC was set.

NOTICE:

An information code (INF code) will be displayed in one of the INFORMATION lines 1 to 5. Check the details by following the procedures in the following steps.

HINT:

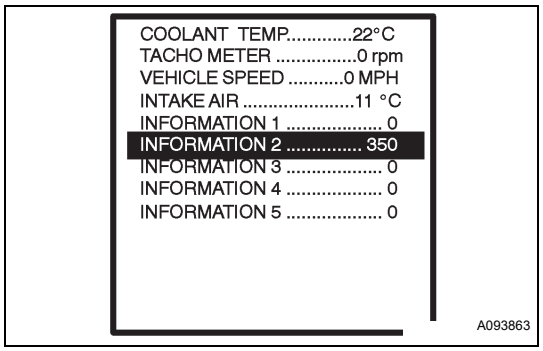
In the case shown in the illustration, refer to troubleshooting for DTC P3140 and INF code 350.



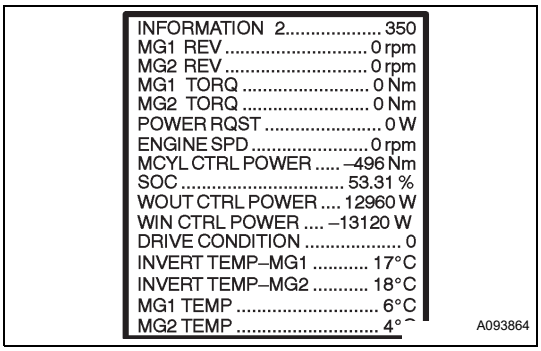
(c) Read the information.

(1) Select the item from among INFORMATION 1 to 5 that has an INF code on the freeze frame data screen.

(2) Press ENTER.



HB



(3) Additional information will be displayed as shown in the illustration.

3. CHECK FOR DTC (SYSTEMS OTHER THAN THE HV CONTROL ECU)

HINT:

The HV control ECU maintains communication with other computers, including the ECM, battery ECU, skid control ECU, and power steering ECU. Therefore, if the HV control ECU outputs a warning, it is necessary to check and record the DTCs of all the systems.

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG) and turn the intelligent tester on.

(c) On the intelligent tester, enter the following menus: DIAGNOSIS / OBD/MOBD / CODES (All).

(d) If DTCs are present, check the relevant systems.

HINT:

If DTCs for the CAN communication system are present in addition to other DTCs, first troubleshoot and repair any malfunctions in the CAN communication system.

4. CLEAR DTCS

NOTICE:

Clearing the DTCs will also clear the freeze frame data, information (see page HV-65), and operation history data (see page HV-70).

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG) and turn the intelligent tester on.

(c) Check that the P shift position has been selected.

(d) Clear DTCs and freeze frame data using the intelligent tester.

(1) Enter the following menus: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CLEAR CODES.

(2) Press YES.

FREEZE FRAME DATA

1. FREEZE FRAME DATA

HINT:
The hybrid vehicle control ECU records vehicle and driving condition information as freeze frame data the moment a DTC is stored. That data can be used for estimating or duplicating the vehicle conditions that were present when the malfunction occurred.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester on.
(c) Select DIAGNOSIS on the menu screen.
(d) Select the following menu items: OBD/MOBD / HV ECU / DTC INFO / CURRENT CODES.
(e) Check the freeze frame data of the output DTCs.
HINT:
For the freeze frame data chart, see page HV-65.

DATA LIST / ACTIVE TEST

1. **DATA LIST**

NOTICE:

- **Some data list values may vary significantly if there are slight differences in the environment in which the vehicle is operating when the measurements are obtained. Variations may also occur due to aging of the vehicle. Due to these considerations, it is not always possible to provide definite values to be used for judgment of malfunctions. It is possible that there may be a malfunction even if measured values are within the reference range.**
- **In the event of a problem with intricate symptoms, collect sample data from another vehicle of the same model operating under identical conditions in order to reach an overall judgment by comparing all the items in the data list.**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester on.
(c) Select DIAGNOSIS on the menu screen.
(d) Select the following menu items: OBD/MOBD / HV ECU / DATA LIST.
HINT:
For the data list, see page HV-38.

2. **ACTIVE TEST**

HINT:
Using the intelligent tester to perform active tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing active tests early in troubleshooting is one way to save diagnostic time. Data list information can be displayed while performing active tests.

NOTICE:

It is necessary to use caution, because if the intelligent tester connector becomes disconnected or if a communication error occurs during an active test, the vehicle could become inoperative (the READY light may go off).

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester on.
(c) Select "DIAGNOSIS" on the menu screen.
(d) Select the following menu items: OBD/MOBD / HV ECU / ACTIVE TEST.
HINT:
For the active test chart, see page HV-38.

DIAGNOSTIC TROUBLE CODE CHART

DTC Code	Detection Item	Trouble Area	MIL	Master Warning	Memory	See page
P0A1F-123	Battery Energy Control Module	1. Battery smart unit 2. Auxiliary battery 3. Wire harness or connector 4. IGCT No. 2 fuse	Comes on	Comes on	DTC stored	HB-21
P0A7F-123	Hybrid Battery Pack Deterioration	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-25
P0A80-123	Replace Hybrid Battery Pack	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-28
P0A82-123	Hybrid Battery Pack Cooling Fan 1	1. Battery cooling blower assembly 2. Battery smart unit 3. HV battery intake duct 4. Wire harness or connector	-	Comes on	DTC stored	HB-31
P0A84-123	Hybrid Battery Pack Cooling Fan 1	1. Wire harness or connector 2. BATT FAN fuse 3. Battery blower relay 4. Battery cooling blower assembly 5. Battery smart unit 6. Hybrid vehicle control ECU 7. HV battery	-	Comes on	DTC stored	HB-35
P0A85-123	Hybrid Battery Pack Cooling Fan 1	1. Wire harness or connector 2. Battery cooling blower assembly 3. Battery smart unit 4. HV battery	-	Comes on	DTC stored	HB-45
P0A95-123	High Voltage Fuse	1. Electric vehicle fuse 2. Service plug grip 3. HV battery 4. Battery smart unit	-	Comes on	DTC stored	HB-49
P0A9C-123	Hybrid Battery Temperature Sensor "A"	1. HV battery (Battery temperature sensor) 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-51
P0A9D-123	Hybrid Battery Temperature Sensor "A" Circuit Low	1. HV battery (Battery temperature sensor) 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-54
P0A9E-123	Hybrid Battery Temperature Sensor "A" Circuit High	1. HV battery (Battery temperature sensor) 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-54
P0AAC-123	Hybrid Battery Pack Air Temperature Sensor "A" Circuit	1. HV battery (Intake air temperature sensor) 2. Battery smart unit	-	Comes on	DTC stored	HB-59
P0ABF-123	Hybrid Battery Pack Current Sensor Circuit	1. HV relay assembly (battery current sensor) 2. Battery smart unit 3. Wire harness or connector	Comes on	Comes on	DTC stored	HB-62
P0AC0-123	Hybrid Battery Pack Current Sensor Circuit Range / Performance	1. HV relay assembly (battery current sensor) 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-67
P0AC1-123	Hybrid Battery Pack Current Sensor Circuit Low	1. HV relay assembly (battery current sensor) 2. Battery smart unit 3. Wire harness or connector	Comes on	Comes on	DTC stored	HB-62
P0AC2-123	Hybrid Battery Pack Current Sensor Circuit High	1. HV relay assembly (battery current sensor) 2. Battery smart unit 3. Wire harness or connector	Comes on	Comes on	DTC stored	HB-62
P0AFA-123	Hybrid Battery System Voltage Low	1. Battery smart unit 2. HV battery	Comes on	Comes on	DTC stored	HB-69

DTC Code	Detection Item	Trouble Area	MIL	Master Warning	Memory	See page
P3011-123	Battery Block 1 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3012-123	Battery Block 2 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3013-123	Battery Block 3 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3014-123	Battery Block 4 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3015-123	Battery Block 5 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3016-123	Battery Block 6 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3017-123	Battery Block 7 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3018-123	Battery Block 8 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3019-123	Battery Block 9 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3020-123	Battery Block 10 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3021-123	Battery Block 11 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3022-123	Battery Block 12 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3023-123	Battery Block 13 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3024-123	Battery Block 14 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3025-123	Battery Block 15 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3026-123	Battery Block 16 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3027-123	Battery Block 17 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3105-123	Battery Observation Communication Circuit Malfunction	1. Wire harness or connector 2. Hybrid vehicle control ECU 3. Battery smart unit	Comes on	Comes on	DTC stored	HB-75

DTC	P0A1F-123	Battery Energy Control Module

DESCRIPTION

The hybrid vehicle control ECU alerts the driver and performs fail safe control based on error signals sent from the battery smart unit.

DTC No.	DTC Detection Condition	Trouble Area
P0A1F-123	Reception of an error signal from the battery smart unit	• Battery smart unit • Auxiliary battery • Wire harness or connector • IGCT No. 2 fuse

MONITOR DESCRIPTION

If the battery smart unit detects an internal malfunction in the unit itself, the HV control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A1F (INF 123): Range check / Rationality
Required sensors / components	Battery smart unit
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	TMC's intellectual property
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

HB

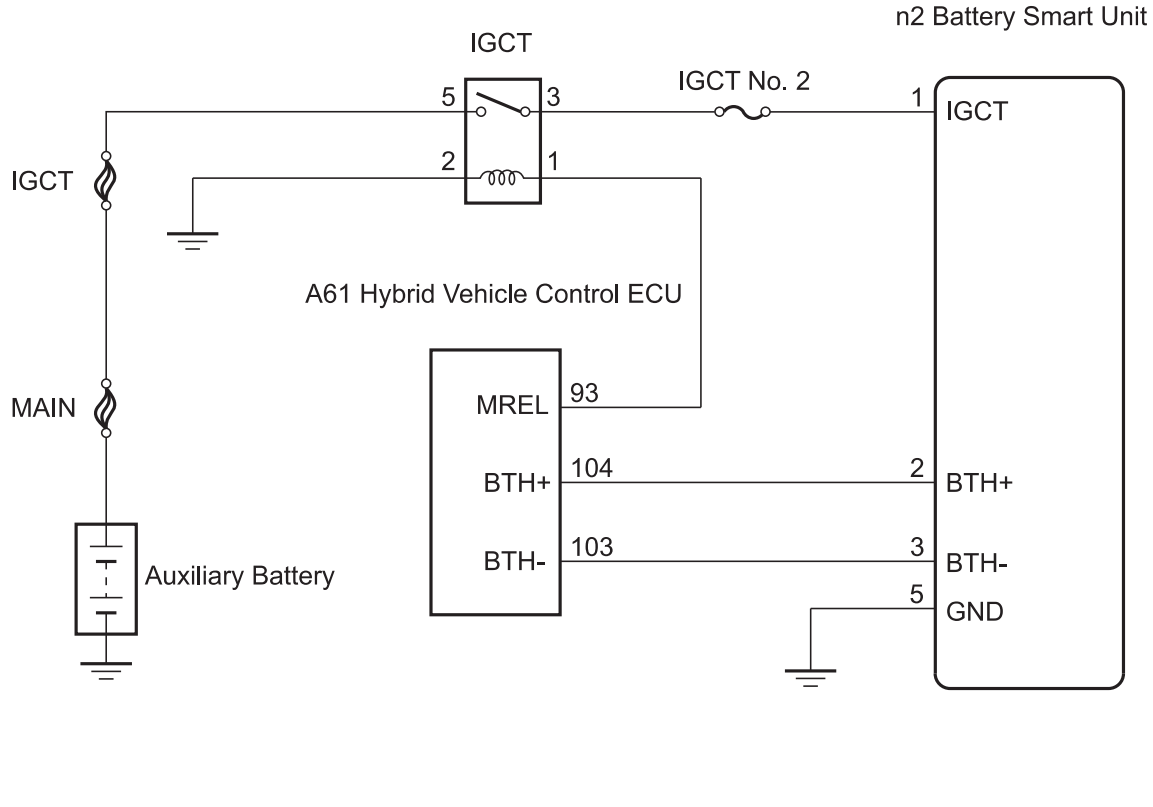
TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	DTC P0A1F (INF 123) is not detected

WIRING DIAGRAM



INSPECTION PROCEDURE

HB

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

- Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.
- After completing repairs, restart the system (turn the power switch on (READY)) and recheck for DTCs. (See page HB-15)

1	CHECK AUXILIARY BATTERY

(a) Measure the voltage between the terminals of the auxiliary battery.

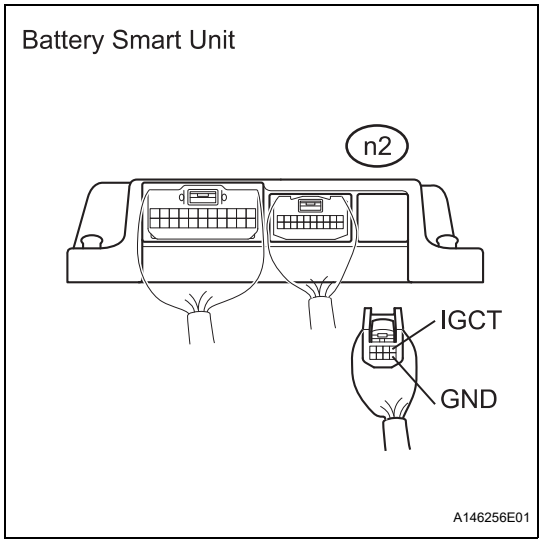
Standard voltage:

11 to 14 V

NG	CHARGE OR REPLACE AUXILIARY BATTERY

OK

2	CHECK HARNESS AND CONNECTOR (IGCT VOLTAGE)



CAUTION:
Be sure to wear insulated gloves.

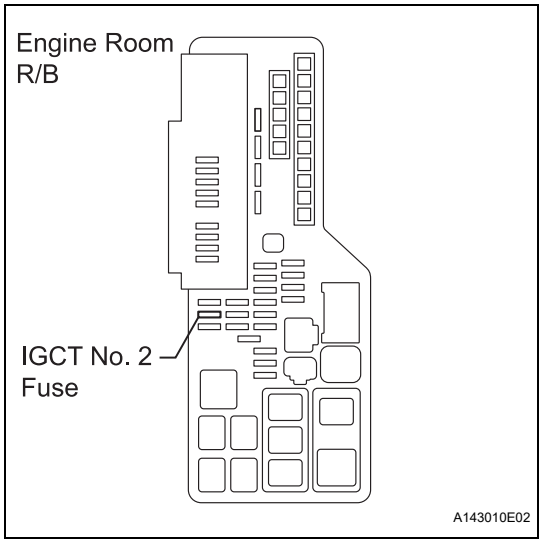
(a) Remove the service plug grip (See page HB-86).
(b) Remove the battery smart unit (See page HB-100).
HINT:
Do not disconnect the battery smart unit connectors.
(c) Disconnect connector n2 from the battery smart unit.
(d) Turn the power switch on (IG).
(e) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Specified Condition
IGCT (N2-1) - GND (N2-5)	8.6 V or higher

OK → **REPLACE BATTERY SMART UNIT (See page HB-99)**

NG

3	CHECK FUSE (IGCT NO. 2 FUSE)



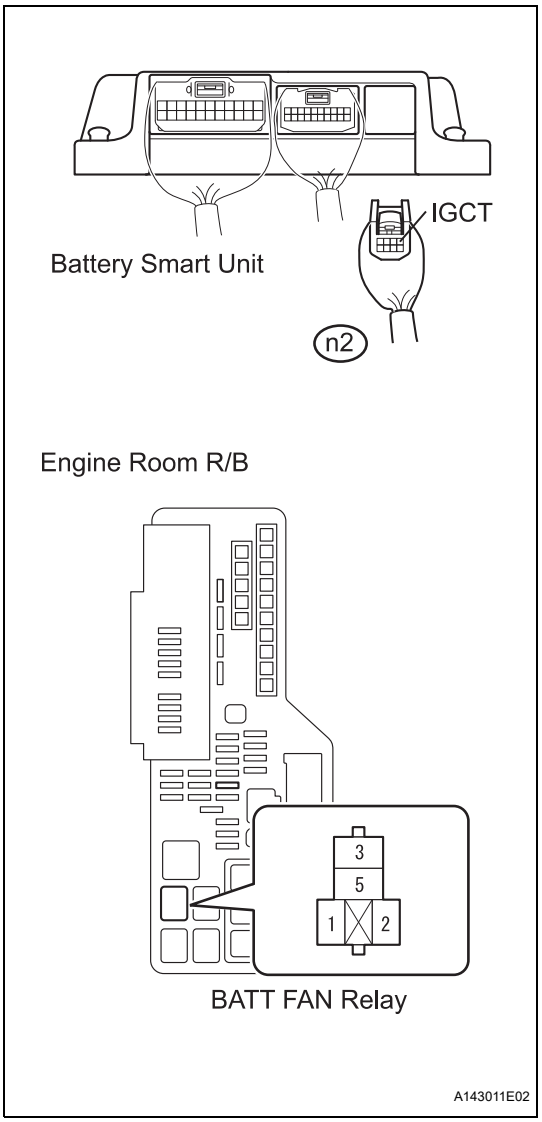
(a) Remove the IGCT No. 2 fuse from the engine room R/B.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE (IGCT NO. 2 FUSE)**

OK

HB

4	CHECK HARNESS AND CONNECTOR (BATTERY SMART UNIT - IGCT RELAY)



CAUTION:
Be sure to wear insulated gloves.

(a) Install the IGCT No. 2 fuse to the engine room R/B.
(b) Remove the IGCT relay from the engine room R/B.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
IGCT (n2-1) - 3	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

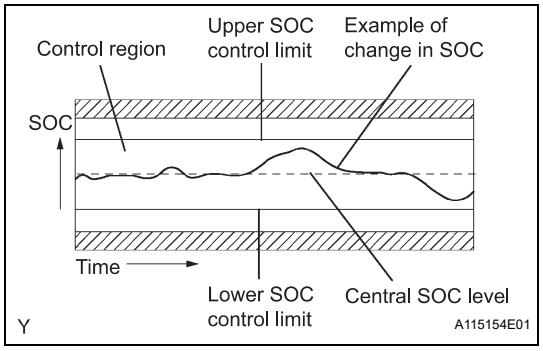
CHECK AND REPAIR POWER SOURCE CIRCUIT

HB

DTC	P0A7F-123	Hybrid Battery Pack Deterioration

DESCRIPTION

The battery smart unit and hybrid vehicle control ECU calculate the SOC (state of charge) of the HV battery based on the accumulated amperage in the HV battery. The battery smart unit sends a signal indicating the condition of the HV battery to the hybrid vehicle control ECU. The hybrid vehicle control ECU then calculates the SOC based on this information and controls HV battery charge and discharge according to the driving conditions.



DTC No.	DTC Detection Condition	Trouble Area
P0A7F-123	• Internal resistance of HV battery is higher than the standard (1 trip detection) • Difference in the capacity between battery blocks is larger than the standard (2 trip detection)	• HV battery • Battery smart unit

HINT:
P0A7F cannot be set unless the vehicle is driven for approximately 10 minutes after clearing the DTCs. (For 2 trip detection, turn the power switch off and perform a road test again after the first road test.)

HB

MONITOR DESCRIPTION

The battery smart unit calculates the resistance of the HV battery using amperage and voltage, and uses this resistance to determine the extent of deterioration of the HV battery. If the battery smart unit detects that the resistance of the HV battery has exceeded the standard, it determines that a malfunction has occurred. In addition, the battery smart unit monitors the SOC, and if the difference between the maximum and minimum SOC values exceeds the standard, it determines that a malfunction has occurred. When either of the DTC detection conditions is met, the HV control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A7F (INF 123): Rationality
Required sensors / components	Main: Battery voltage sensor inside battery smart unit, battery current sensor Sub: Battery temperature sensor
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	TMC's intellectual property
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	DTC P0A7F (INF 123) is not detected

INSPECTION PROCEDURE

1	CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

2	READ VALUE ON INTELLIGENT TESTER

HB

(a) Ensure the safety of the areas in front and at the back of the vehicle.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (READY).
(d) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DATA LIST / V1 to V17 BATT BLOCK.
(e) Fully warm up the engine and turn the air conditioning off.
(f) Firmly depress the brake pedal with your left foot.
(g) Move the shift lever to the D position.
(h) Record each battery block voltage from the data list (V1 to V17 BATT BLOCK) while fully depressing the accelerator pedal.
(i) Compare the battery block voltages (V1 to V17 BATT BLOCK) between the even and odd number groups in each combination shown in the table below.

Even number group	Odd number group	Battery block voltages to be compared
V1 BATT BLOCK	V2 BATT BLOCK	VB0←→VB1
V3 BATT BLOCK	V4 BATT BLOCK	VB2←→VB3
V5 BATT BLOCK	V6 BATT BLOCK	VB4←→VB5
V7 BATT BLOCK	V8 BATT BLOCK	VB6←→VB7
V9 BATT BLOCK	V10 BATT BLOCK	VB8←→VB9
V11 BATT BLOCK	V12 BATT BLOCK	VB10←→VB11
V13 BATT BLOCK	V14 BATT BLOCK	VB12←→VB13

Even number group	Odd number group	Battery block voltages to be compared
V15 BATT BLOCK	V16 BATT BLOCK	VB14←→VB15
V17 BATT BLOCK	V16 BATT BLOCK	VB16←→VB15

(j) Check the voltage difference in the all 9 combinations.

OK:

The difference in voltage of all combinations is 0.3 V or more.

YES → **REPLACE BATTERY SMART UNIT (See page HB-99)**

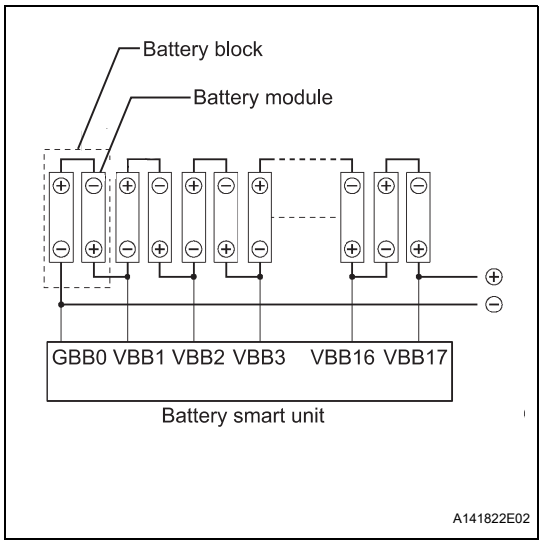
NO

REPLACE HV BATTERY (See page HB-81)

DTC	P0A80-123	Replace Hybrid Battery Pack

DESCRIPTION

The hybrid vehicle control ECU controls the SOC (state of charge) of the HV battery at a constant level while driving. The HV battery is composed of 34 modules, and each module consists of six 1.2 V cells in series. The battery smart unit monitors battery block voltage at 17 locations. Each battery block is composed of 2 modules in a set.



DTC No.	DTC Detection Condition	Trouble Area
P0A80-123	Difference in voltage between battery blocks is larger than the standard (2 trip detection)	• HV battery • Battery smart unit

HB

HINT:
P0A80-123 cannot be set unless the vehicle is driven for approximately 10 minutes after clearing the DTCs. (Turn the power switch off and perform a road test again after the first road test because this DTC is a 2 trip detection DTC.)

MONITOR DESCRIPTION

The battery smart unit, which monitors the voltage of the battery blocks, determines that a malfunction has occurred if a voltage difference between the battery blocks exceeds the standard. When the DTC detection condition is satisfied, the HV control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A80 (INF 123): Rationality
Required sensors / components	Main: Battery voltage sensor inside battery smart unit Sub: Battery current sensor, battery temperature sensor
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	TMC's intellectual property
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	DTC P0A8F (INF 123) is not detected

INSPECTION PROCEDURE

1 CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

2 READ VALUE ON INTELLIGENT TESTER

(a) Ensure the safety of the areas in front and at the back of the vehicle.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (READY).
(d) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DATA LIST / V1 to V17 BATT BLOCK.
(e) Fully warm up the engine and turn the air conditioning off.
(f) Firmly depress the brake pedal with your left foot.
(g) Move the shift lever to the D position.
(h) Record each battery block voltage from the data list (V1 to V17 BATT BLOCK) while fully depressing the accelerator pedal.
(i) Compare the battery block voltages (V1 to V17 BATT BLOCK) between the even and odd number groups in each combination shown in the table below.

Even number group	Odd number group	Battery block voltages to be compared
V1 BATT BLOCK	V2 BATT BLOCK	VB0←→VB1
V3 BATT BLOCK	V4 BATT BLOCK	VB2←→VB3
V5 BATT BLOCK	V6 BATT BLOCK	VB4←→VB5
V7 BATT BLOCK	V8 BATT BLOCK	VB6←→VB7
V9 BATT BLOCK	V10 BATT BLOCK	VB8←→VB9
V11 BATT BLOCK	V12 BATT BLOCK	VB10←→VB11
V13 BATT BLOCK	V14 BATT BLOCK	VB12←→VB13

Even number group	Odd number group	Battery block voltages to be compared
V15 BATT BLOCK	V16 BATT BLOCK	VB14←→VB15
V17 BATT BLOCK	V16 BATT BLOCK	VB16←→VB15

(j) Check the voltage difference in the all 9 combinations.

OK:

The difference in voltage of all combinations is 0.3 V or more.

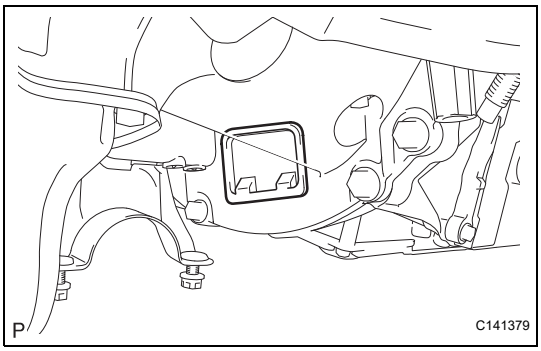
YES → **REPLACE BATTERY SMART UNIT (See page HB-99)**

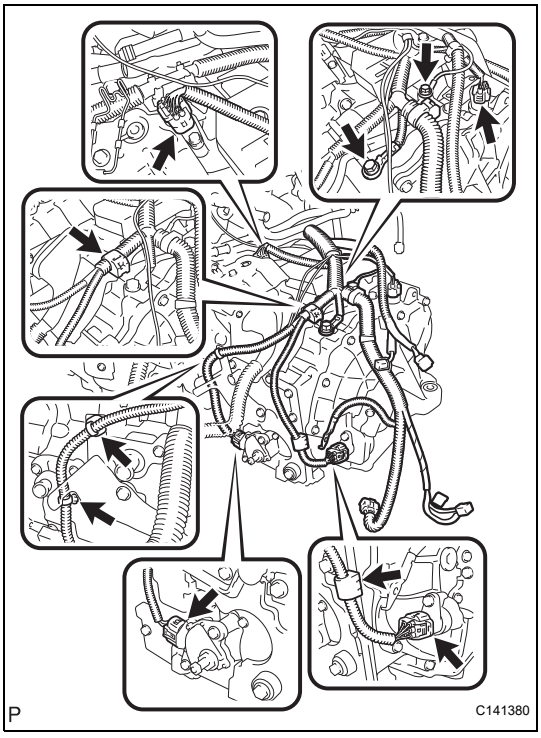
NO

REPLACE HV BATTERY (See page HB-81)

REMOVAL

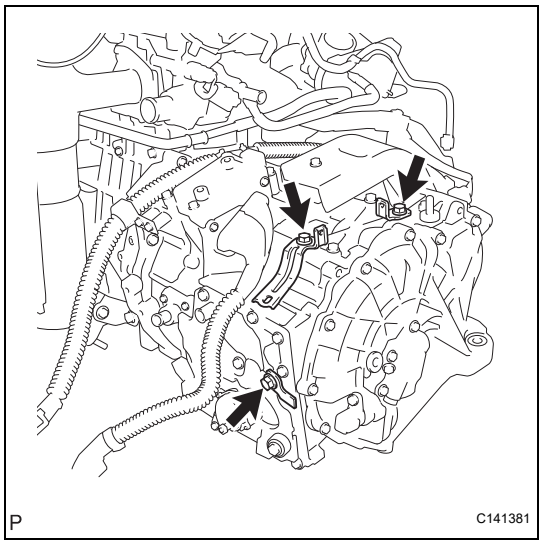
1. **REMOVE ENGINE ASSEMBLY WITH TRANSAXLE**
   HINT:
   (See page EM-89)
2. **REMOVE DYNAMIC DAMPER (See page EM-97)**
3. **REMOVE FRONT FRAME ASSEMBLY (See page EM-97)**
4. **REMOVE FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-6)**
5. **REMOVE FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-7)**
6. **REMOVE FLYWHEEL HOUSING UNDER COVER**
   (a) Remove the flywheel housing under cover from the hybrid vehicle transaxle assembly.
7. **SEPARATE ENGINE WIRE**
   (a) Remove the bolt and ground wire.
   (b) Disconnect the wire harnesses from the clamps.



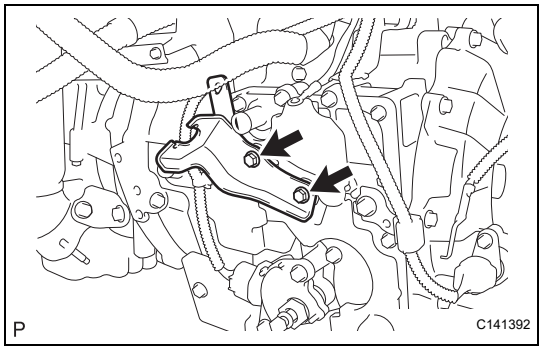


(c) Disconnect the connectors.

HX

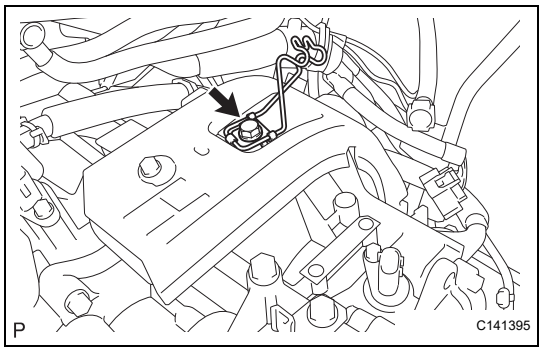


(d) Remove the 3 bolts and 3 clamps.



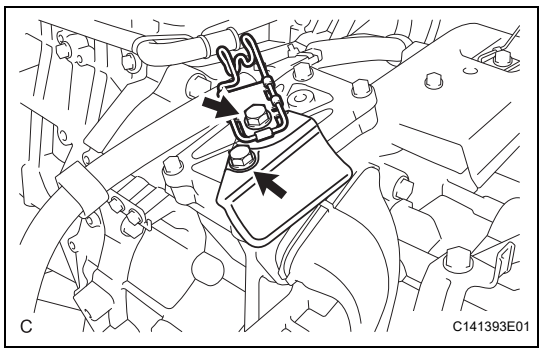
8. REMOVE NO. 1 TRANSMISSION CONTROL CABLE BRACKET

(a) Remove the 2 bolts and No. 1 transmission control cable bracket.



9. REMOVE NO. 2 TRANSMISSION CONTROL CABLE BRACKET

(a) Remove the bolt and No. 2 transmission control cable bracket.

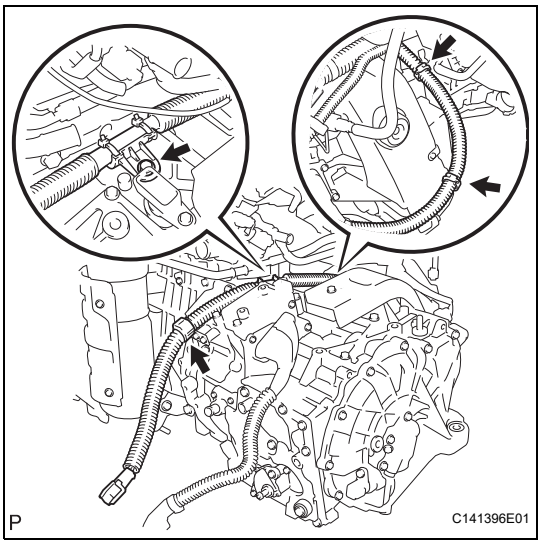


10. REMOVE NO. 3 TRANSMISSION CONTROL CABLE BRACKET

(a) Remove the bolt and No. 3 transmission control cable bracket.

(b) Remove the bolt and HV inverter protector.

HX

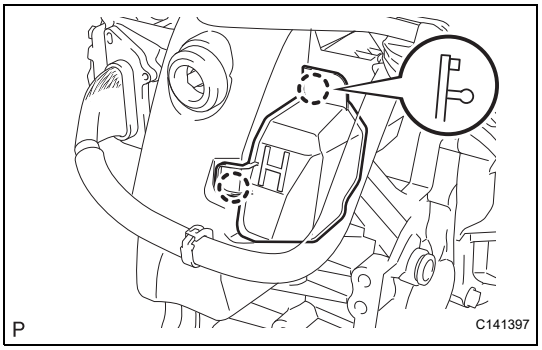


11. REMOVE AUTOMATIC TRANSMISSION CASE COVER

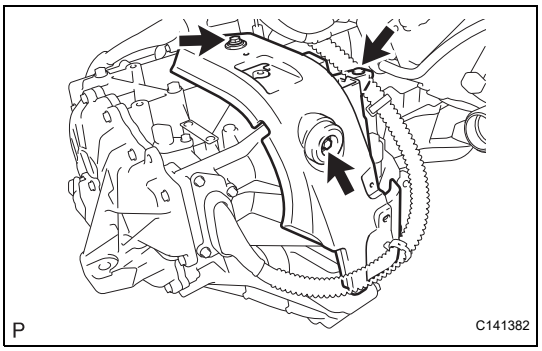
(a) Remove the bolt from the hybrid transaxle.

(b) Disconnect the 3 wire harness clamps from the automatic transmission case cover.

(c) Remove the 2 bolts, and bracket from the hybrid transaxle.



(d) Remove the transmission case cover.



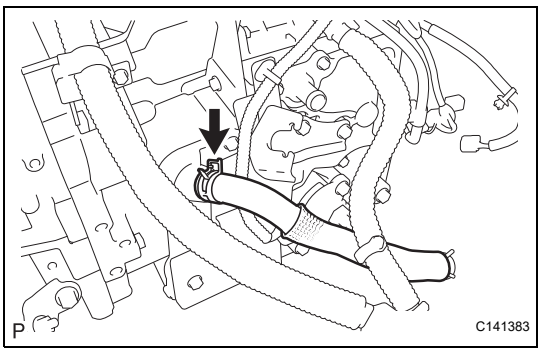
(e) Remove the 2 bolts, clip, and automatic transmission case cover from the hybrid transaxle.

12. REMOVE HV TRANSAXLE MASS DAMPER

(a) Remove the HV transaxle mass damper and gasket.

13. REMOVE TRANSMISSION OIL PUMP COVER PLUG

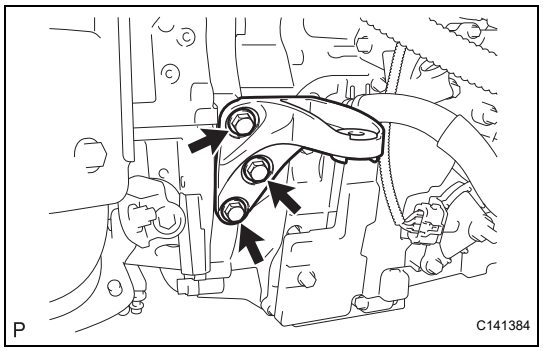
(a) Remove the 2 transmission oil pump cover plugs and 2 O-rings.



14. REMOVE WATER HOSE

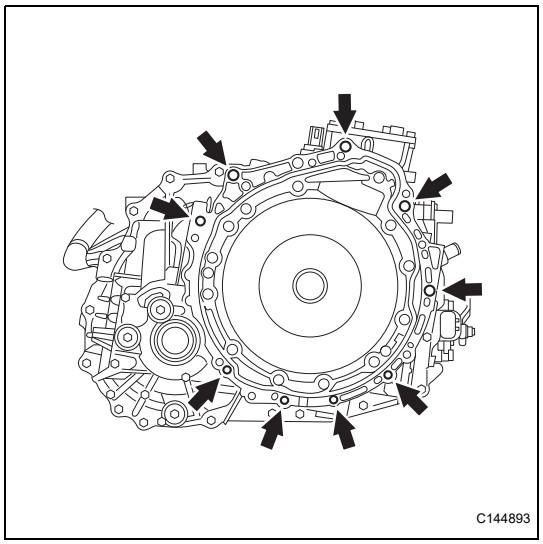
(a) Disconnect the water hose from the hybrid transaxle.

HX



15. REMOVE FRONT ENGINE MOUNTING BRACKET

(a) Remove the 3 bolts and engine mounting bracket.



16. REMOVE HYBRID VEHICLE TRANSAXLE ASSEMBLY

(a) Remove the 9 bolts.

(b) Separate and remove the hybrid vehicle transaxle.

NOTICE:

Do not pry between the transaxle assembly and engine more than necessary to prevent the knock pin from being damaged.

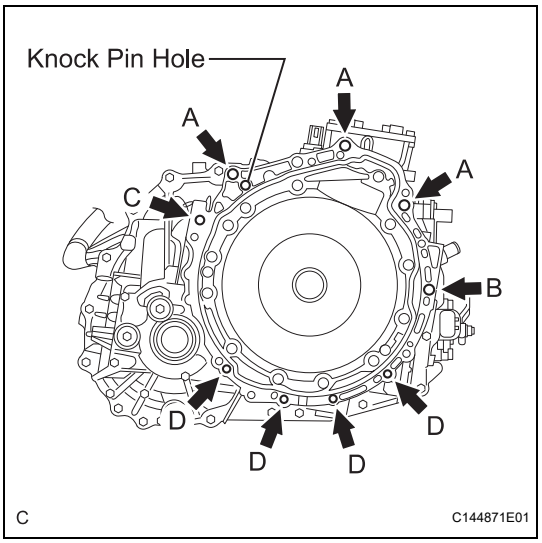
INSTALLATION

1. INSTALL HYBRID VEHICLE TRANSAXLE ASSEMBLY

(a) Make sure that the knock pins are installed on the engine.

(b) Install the hybrid vehicle transaxle and the 9 bolts shown in the illustration to the engine.

Torque: Bolt A
64 N*m (653 kgf*cm, 47 ft.*lbf)
Bolt B
46 N*m (469 kgf*cm, 34 ft.*lbf)
Bolt C
28 N*m (286 kgf*cm, 21 ft.*lbf)
Bolt D
44 N*m (450 kgf*cm, 33 ft.*lbf)



NOTICE:

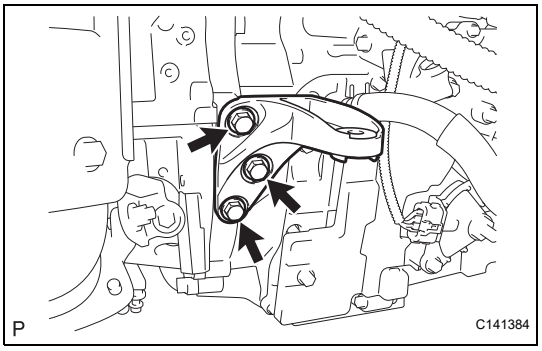
- **Do not forcibly pry on the hybrid vehicle transaxle assembly.**
- **Do not apply grease either to the spline or to the input shaft.**

Bolt	Installation direction	Diameter	Bolt length
A	From transaxle to engine	12 mm (0.47 in.)	55 mm (2.17 in.)
B	From transaxle to engine	10 mm (0.39 in.)	65 mm (2.56 in.)
C	From engine to transaxle	8 mm (0.32 in.)	38 mm (1.47 in.)
D	From engine to transaxle	10 mm (0.39 in.)	32 mm (1.26 in.)

2. INSTALL FRONT ENGINE MOUNTING BRACKET

(a) Install the front engine mounting bracket with the 3 bolts.

Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)



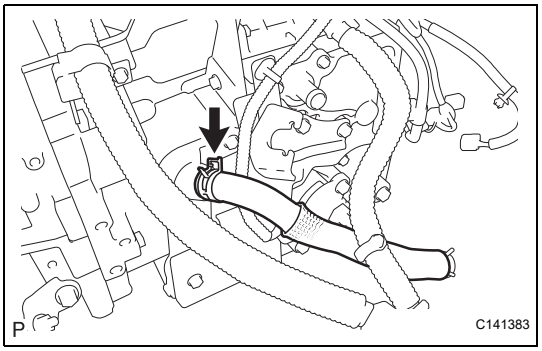
3. INSTALL WATER HOSE

(a) Install the water hose with the clamp.

4. INSTALL TRANSMISSION OIL PUMP COVER PLUG

(a) Install 2 new O-rings and the 2 transmission oil pump cover plugs.

Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)

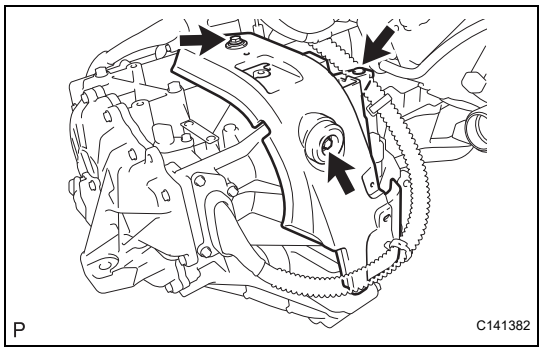


5. INSTALL HV TRANSAXLE MASS DAMPER

(a) Install a new gasket and the HV transaxle mass damper.

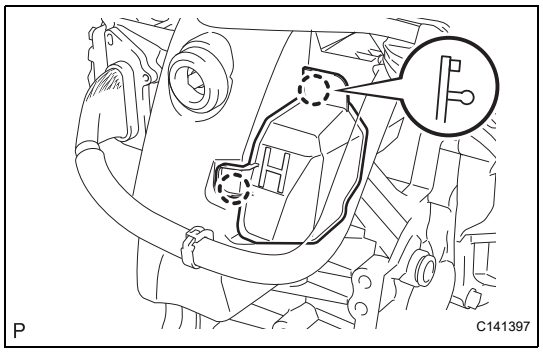
Torque: 39 N*m (398 kgf*cm, 29 ft.*lbf)

HX

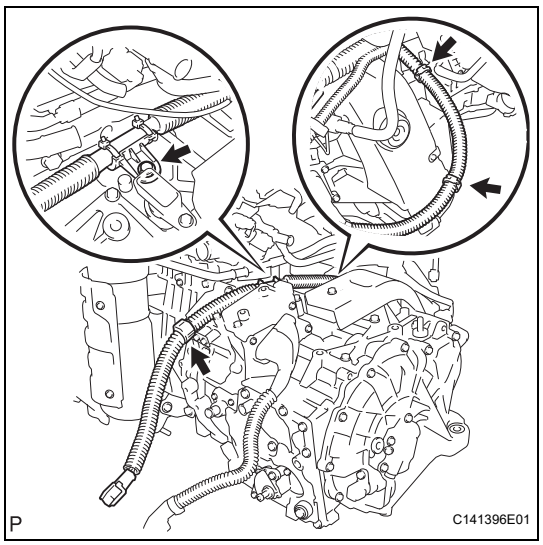


6. INSTALL AUTOMATIC TRANSMISSION CASE COVER

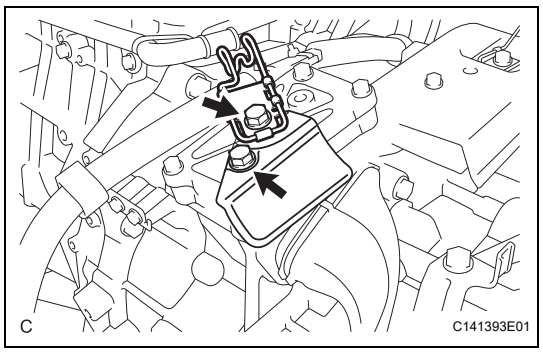
(a) Install the automatic transmission case cover with the 2 bolts and clip.
Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf)



(b) Install the transmission case cover.
(c) Install the bracket with the 2 bolts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

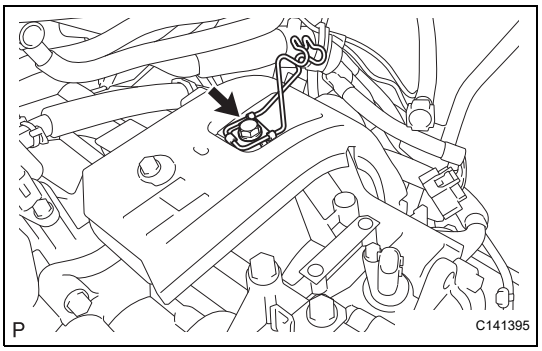


(d) Connect the wire harness with the bolt and 3 clamps.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)



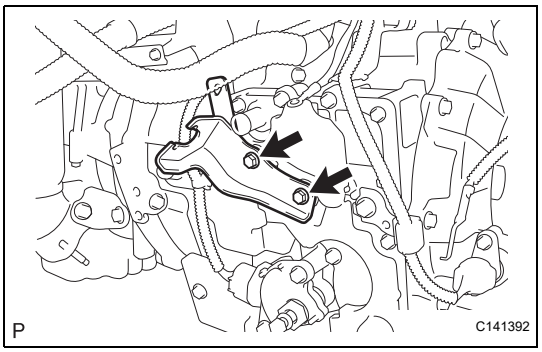
7. INSTALL NO. 3 TRANSMISSION CONTROL CABLE BRACKET

(a) Install the hybrid inverter protector with the bolt.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)
(b) Install the No. 3 transmission control cable bracket.
Torque: 14 N*m (143 kgf*cm, 10 ft.*lbf)



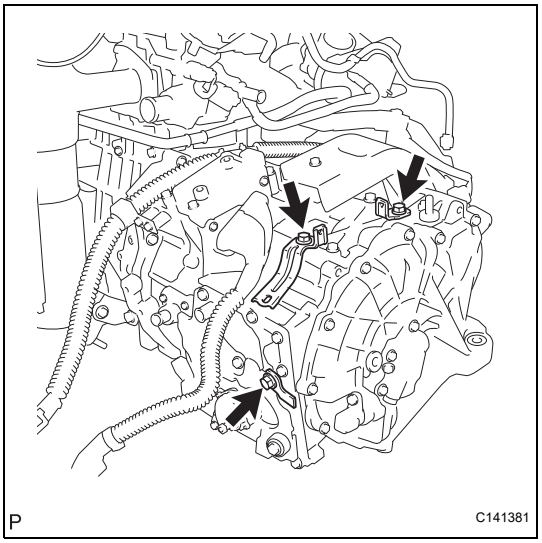
8. INSTALL NO. 2 TRANSMISSION CONTROL CABLE BRACKET

(a) Install the No. 2 transmission control cable bracket with the bolt.
Torque: 12 N*m (120 kgf*cm, 9 ft.*lbf)



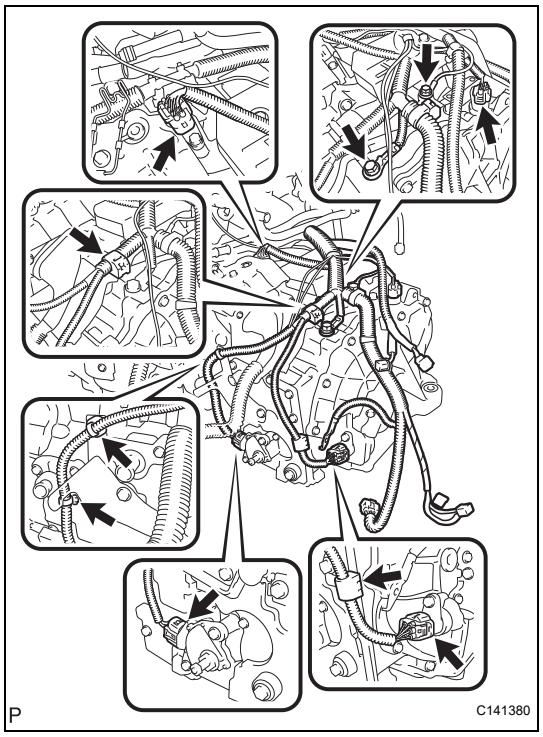
9. INSTALL NO. 1 TRANSMISSION CONTROL CABLE BRACKET

(a) Install the No. 1 transmission control cable bracket with the 2 bolts.
Torque: 12 N*m (120 kgf*cm, 9 ft.*lbf)

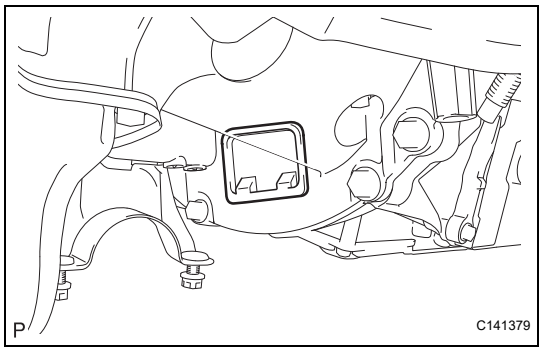


10. CONNECT ENGINE WIRE

(a) Install the 3 wire harness brackets with the 3 bolts.
Torque: 8.4 N*m (86 kgf*cm, 74 in.*lbf)



(b) Connect the connectors.
(c) Connect the wire harnesses to the wire harness clamps.
(d) Install the ground wire with the bolt.
Torque: 12 N*m (120 kgf*cm, 9 ft.*lbf)



11. INSTALL FLYWHEEL HOUSING UNDER COVER
(a) Install the flywheel housing under cover to the hybrid vehicle transaxle assembly.

12. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-17)

13. INSTALL FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-17)

14. INSTALL FRONT FRAME ASSEMBLY (See page EM-106)

15. INSTALL DYNAMIC DAMPER (See page EM-106)

16. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE
HINT:
(See page EM-107)

ON-VEHICLE INSPECTION

1. CHECK SHIFT LOCK OPERATION

(a) Move the shift lever to the P position.
(b) Turn the power switch off.
(c) Check that the shift lever cannot be adjusted to any position other than P.
(d) Turn the power switch on (READY), depress the brake pedal and check that the shift lever can be adjusted to the other positions.
(e) Check that the back-up light comes on and the reverse warning buzzer sounds when the shift lever is set in the R position, but the light and buzzer do not operate in other positions. If a failure is found, check the shift lever position sensor for continuity.

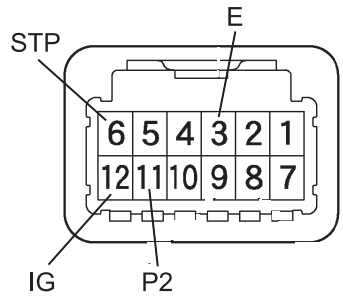
2. CHECK SHIFT LOCK RELEASE BUTTON OPERATION

(a) Using a screwdriver, remove the shift lock release cover.
(b) When operating the shift lever with the shift lock release button pressed, check that the lever can be adjusted to any position other than P.

3. INSPECT SHIFT LOCK CONTROL UNIT ASSEMBLY

(a) Measure the voltage according to the value(s) in the table below.
HINT:
Do not disconnect the shift lock control unit assembly connector.

Wire Harness Side (Connector Rear View):



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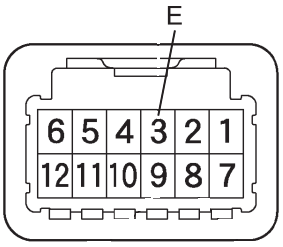
Standard voltage

Terminal	Measuring Condition	Voltage (V)
12 (IG) - 3 (E)	Power switch on (IG)	10 to 14
12 (IG) - 3 (E)	Power switch off	Below 1
6 (STP) - 3 (E)	Brake pedal depressed	10 to 14
6 (STP) - 3 (E)	Brake pedal released	Below 1
11 (P2) - 3 (E)	Shift lever in P position	10 to 14
11 (P2) - 3 (E)	Shift lever in any position except P	Below 1.5

If the result is not done as specified, replace the shift lever assembly.

HX

Wire Harness Side
(Connector Rear View):



C129009E10

(b) Measure the resistance according to the value(s) in the table below.
HINT:
Do not disconnect the shift lock control unit assembly connector.

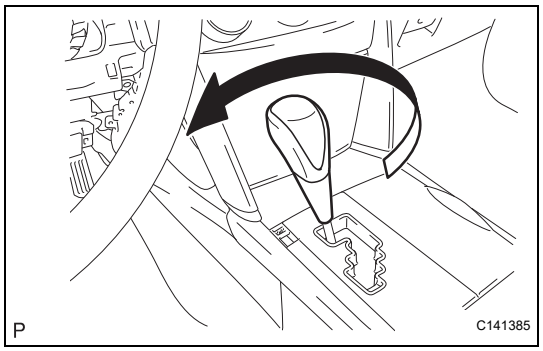
Standard resistance

Terminal	Measuring Condition	Specified Value
3 (E) - Body ground	Always	Below 1 Ω

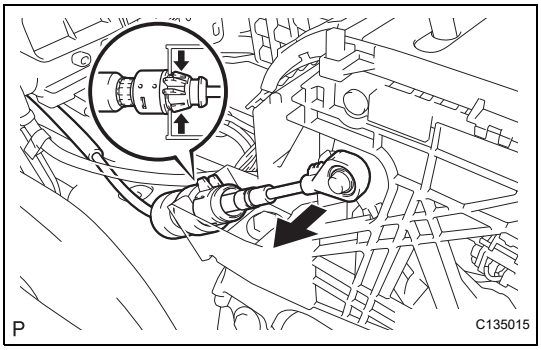
If the result is not done as specified, replace the shift lever assembly.

REMOVAL

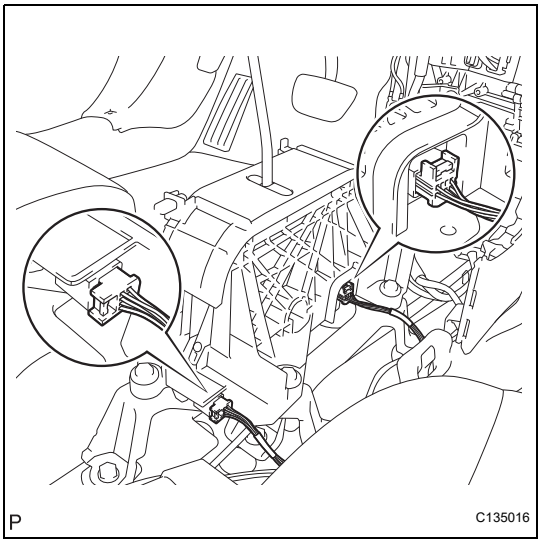
1. **REMOVE CABLE FROM NEGATIVE BATTERY TERMINAL**
   NOTICE:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See page RS-1).
2. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-13)**
3. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-14)**
4. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-11)**
5. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-12)**
6. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY**
   (a) Turn the shift lever knob counterclockwise and remove the shift lever knob sub-assembly.



7. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-14)**
8. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-14)**
9. **REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-15)**
10. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-15)**
11. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-16)**
12. **REMOVE CONSOLE BOX POCKET (See page IP-17)**
13. **REMOVE CONSOLE BOX CARPET (See page IP-17)**
14. **REMOVE CONSOLE BOX ASSEMBLY (See page IP-17)**
15. **REMOVE NO. 2 CONSOLE BOX INSERT FRONT (See page IP-18)**
16. **REMOVE FLOOR CARPET BRACKET LH (See page AC-188)**
17. **REMOVE TRANSMISSION CONTROL CABLE ASSEMBLY**
    (a) Disconnect the end of the transmission control cable assembly from the shift lock control unit.

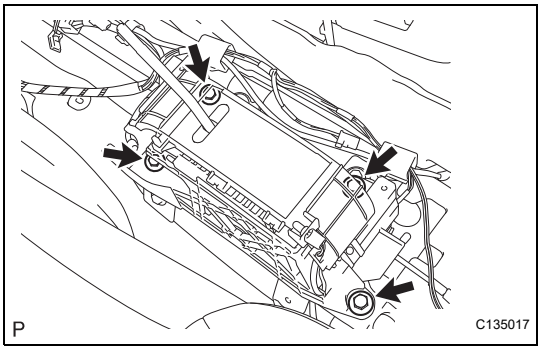


(b) Disconnect the transmission control cable assembly from the shift lock control unit.

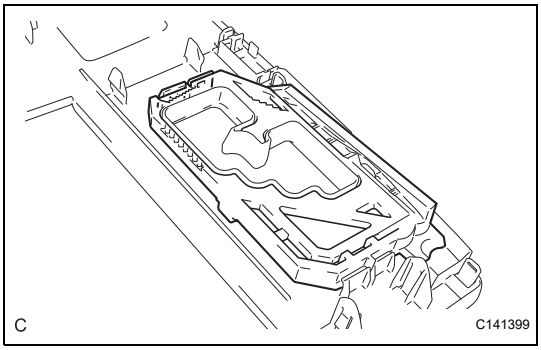


18. REMOVE SHIFT LOCK CONTROL UNIT

(a) Disconnect the shift lock control ECU connector and transmission control switch wire connector.



(b) Remove the 4 bolts and shift lever.



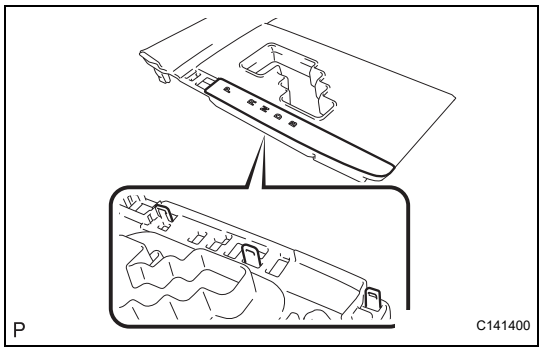
DISASSEMBLY

1. REMOVE POSITION INDICATOR LIGHT GUIDE

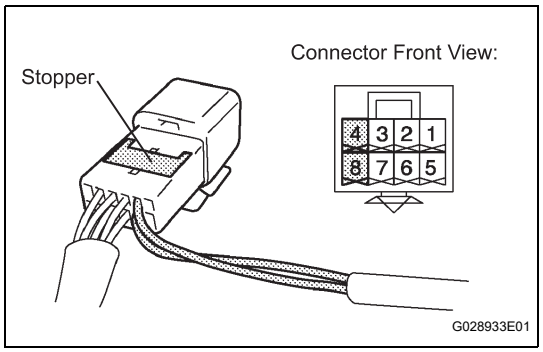
(a) Remove the position indicator light guide.

2. REMOVE CONTROL POSITION INDICATOR PLATE

(a) Remove the shift lock release button cover.

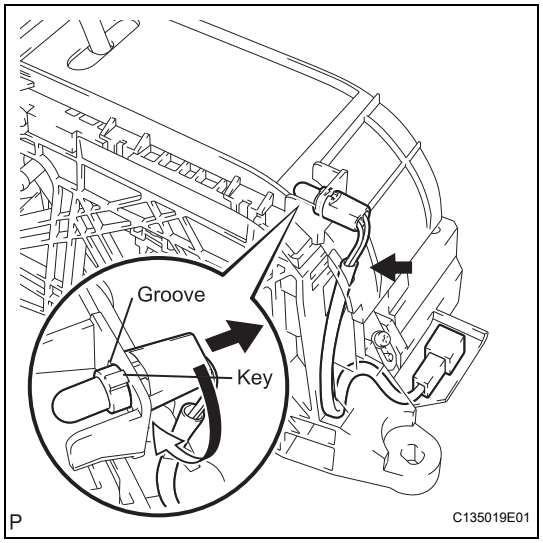


(b) Remove control position indicator plate.

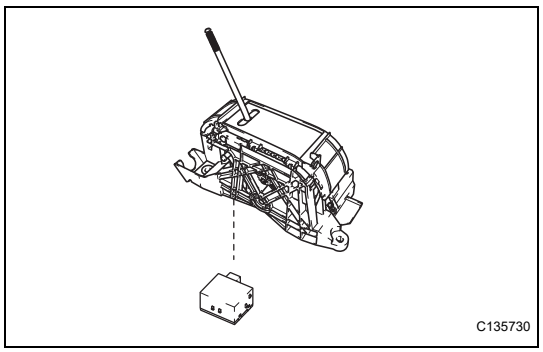


3. REMOVE INDICATOR LIGHT WIRE SUB-ASSEMBLY

(a) Using a screwdriver, release the stopper.
(b) Using a screwdriver, disengage the locking lug of terminals (4) and (8), and pull the terminals out from the rear of the connector.



(c) Release the indicator light wire from the clamp on the shift lock control unit.
(d) Turn the indicator light guide counterclockwise.
(e) Align the indicator light guide key with the groove on the shift lock control unit to remove the indicator light wire.



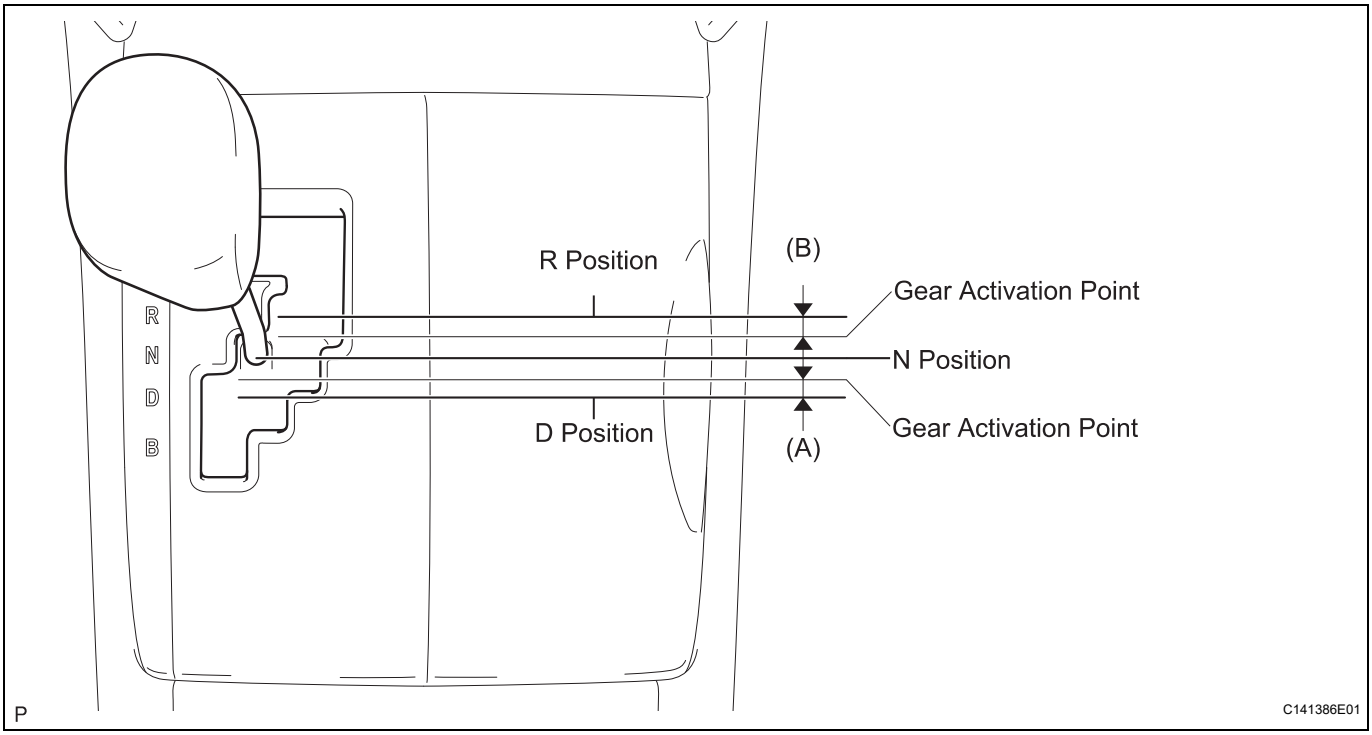
4. REMOVE SHIFT LOCK CONTROL ECU

(a) Remove the shift lock control ECU from the shift lock control unit.

ADJUSTMENT

1. INSPECT SHIFT LEVER POSITION

(a) Apply the parking brake.
(b) Lock the wheels with chocks to secure the vehicle.
(c) Put the vehicle into the READY-on state.
(d) Move the shift lever to the D position and release the brake pedal.
NOTICE:
Be sure to apply the parking brake and lock the wheels with chocks to secure the vehicle.
(e) Slowly move the shift lever to the N position and measure moving distance (A) of the shift lever from the original point to the gear activation point.
NOTICE:
Be sure to move the shift lever slowly.
(f) Move the shift lever to the R position and release the brake pedal.
NOTICE:
Be sure to apply the parking brake and lock the wheels with chocks to secure the vehicle.
(g) Slowly move the shift lever to the N position and measure moving distance (B) of the shift lever from the original point to the gear activation point.
NOTICE:
Be sure to move the shift lever slowly.
(h) Check that moving distances (A) and (B) shown in the illustration are almost the same.



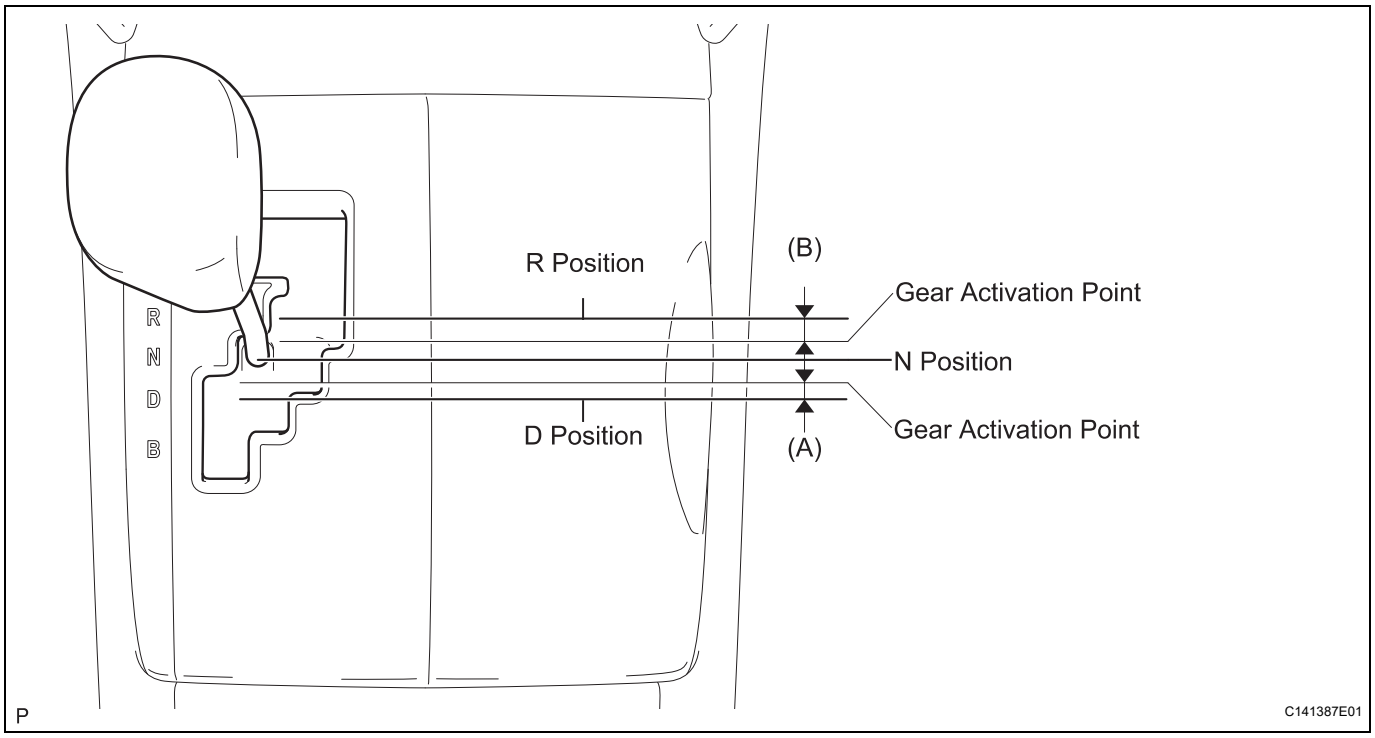
HINT:

- If moving distances (A) and (B) are almost the same, adjustment of the shift lever position is not necessary.

- If moving distance (A) is shorter than (B), perform adjustment of the shift lever position [*1].
- If moving distance (B) is shorter than (A), perform adjustment of the shift lever position [*2].

2. ADJUST SHIFT LEVER POSITION

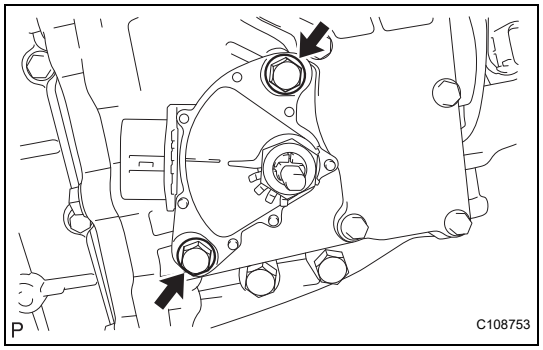
(a) If moving distance (A) is shorter than (B) [*1]:



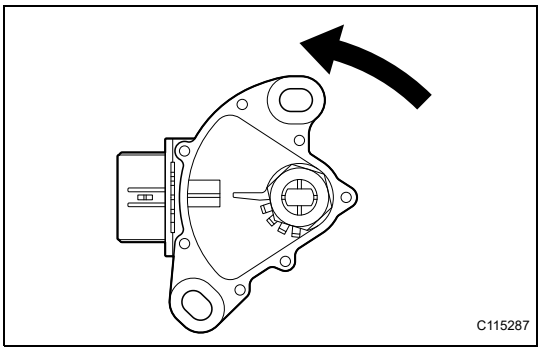
HINT:
If the shift lever is moved from the R to the N position, the moving distance of the shift lever from the original point to the gear activation point becomes longer.

(1) Move the shift lever to the N position.

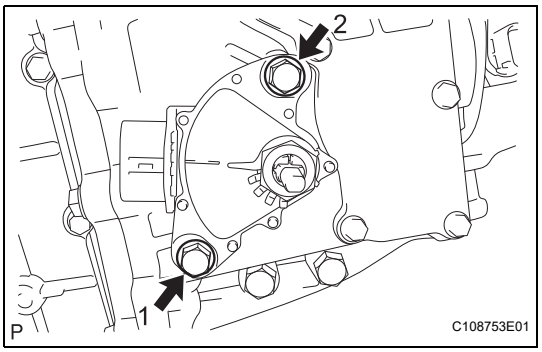
(2) Loosen the 2 bolts.



HX

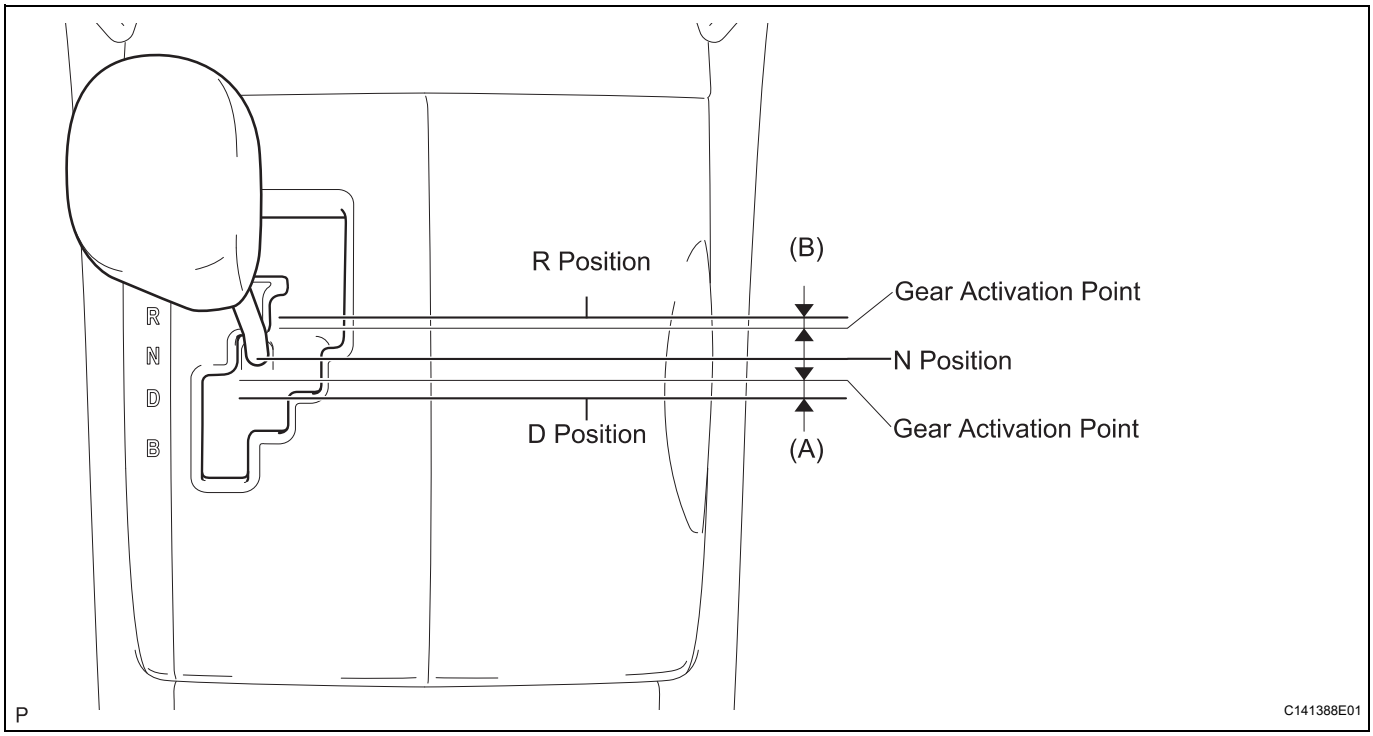


(3) Slightly turn the shift lever position switch counterclockwise.



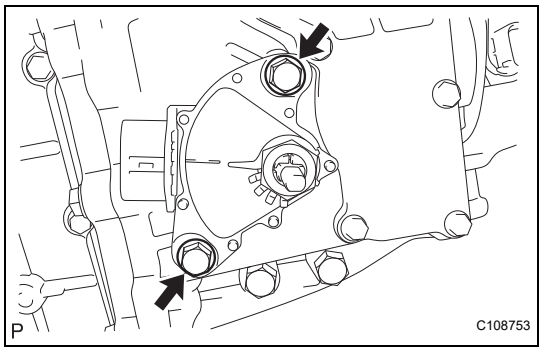
(4) Tighten the 2 bolts in the order shown in the illustration.
Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)
(5) Recheck the shift lever position.

(b) If moving distance (B) is shorter than (A) [*2]:

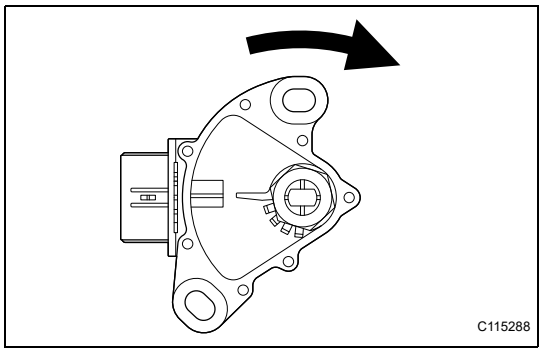


HINT:
If the shift lever is moved from the D to the N position, the moving distance of the shift lever from the original point to the gear activation point becomes longer.

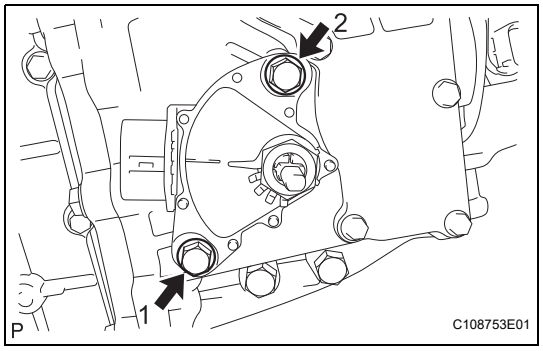
(1) Move the shift lever to the N position.



(2) Loosen the 2 bolts.



(3) Slightly turn the shift lever position switch clockwise.



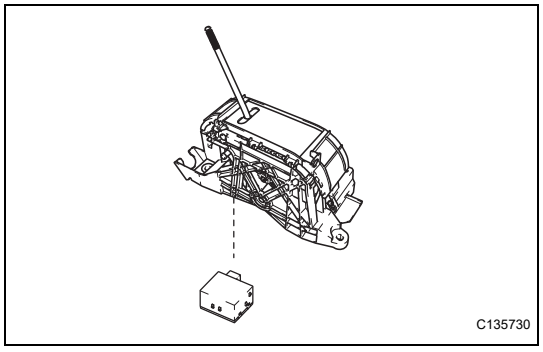
(4) Tighten the 2 bolts in the order shown in the illustration.
Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)
(5) Recheck the shift lever position.

3. INSPECT SHIFT LEVER OPERATION

(a) While moving the shift lever from the N position to each position, check that the lever moves smoothly and that the shift position indicator comes on properly according to the shift lever position.
(b) Turn the power switch on (READY) and check the following:
(1) When the shift lever is moved to the D position, the vehicle moves forward.
(2) When the shift lever is moved to the R position, the buzzer sounds and the vehicle moves in reverse.
NOTICE:
The vehicle should not move when the shift position indicator is off.

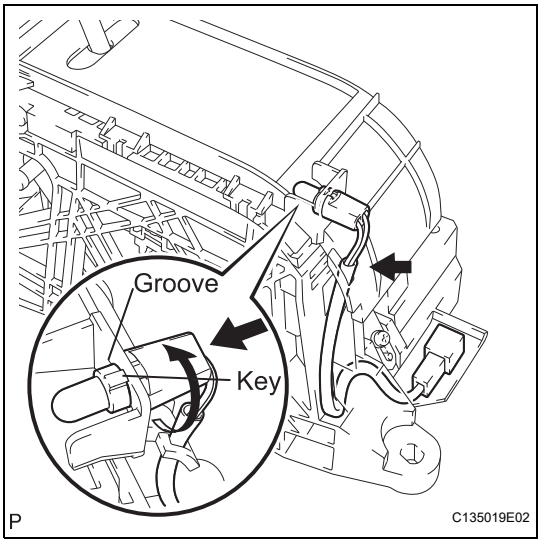
HX

REASSEMBLY



1. INSTALL SHIFT LOCK CONTROL ECU

(a) Install the shift lock control ECU to the shift lever.

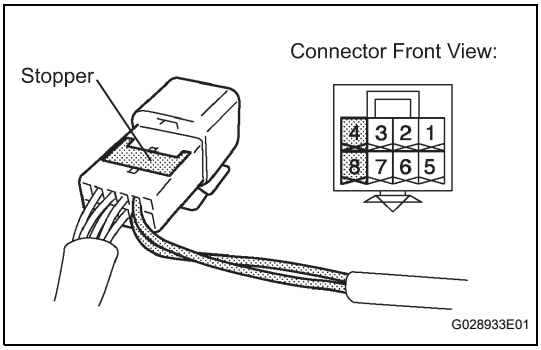


2. INSTALL INDICATOR LIGHT WIRE SUB-ASSEMBLY

(a) Insert the indicator light wire into the shift lock control unit while aligning the groove on the unit with the indicator light guide key.

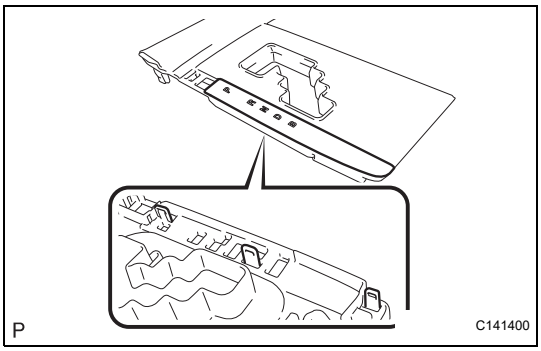
(b) Install the indicator light guide by turning it clockwise until it securely locks.

(c) Install the indicator light wire to the clamp on the shift lock control unit.



(d) Connect terminals (4) and (8) of the indicator light wire.

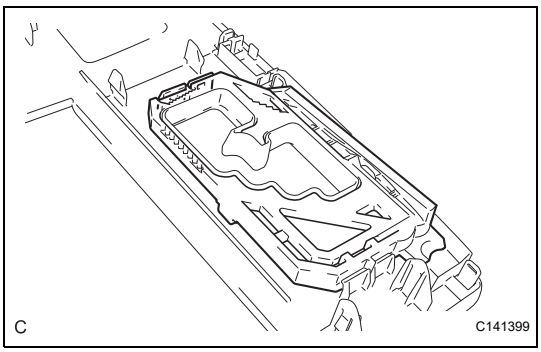
(e) Push the stopper.



3. INSTALL CONTROL POSITION INDICATOR PLATE

(a) Install the control position indicator plate.

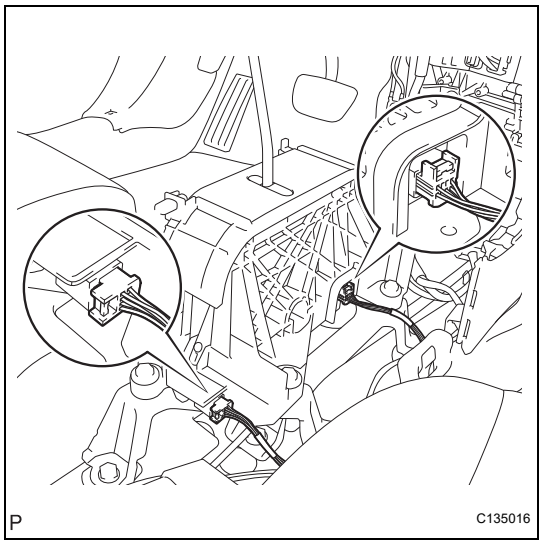
(b) Install the shift lock release button cover.



4. INSTALL POSITION INDICATOR LIGHT GUIDE

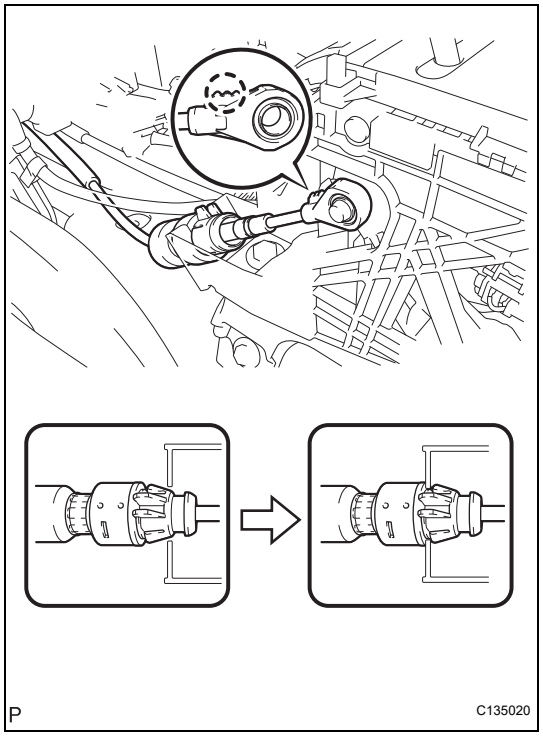
(a) Install the position indicator light guide.

HX

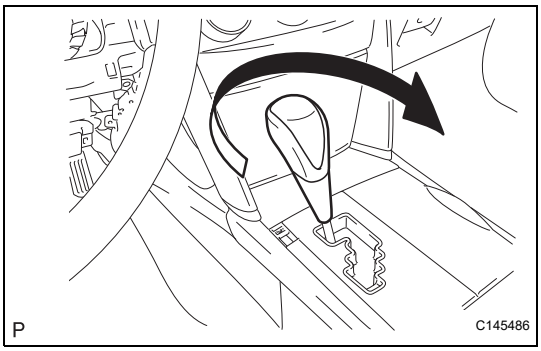


INSTALLATION

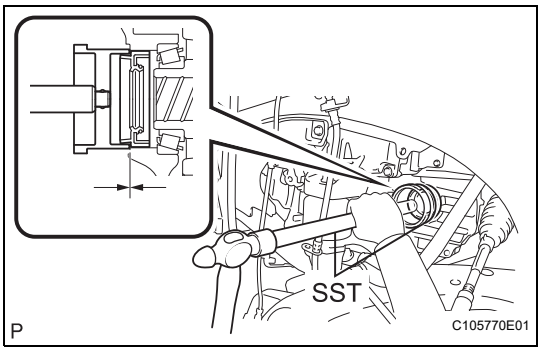
1. **INSTALL SHIFT LOCK CONTROL UNIT**
   (a) Connect the shift lock ECU connector and transmission control switch wire connector.
   (b) Install the shift lock control unit with the 4 bolts.
   Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

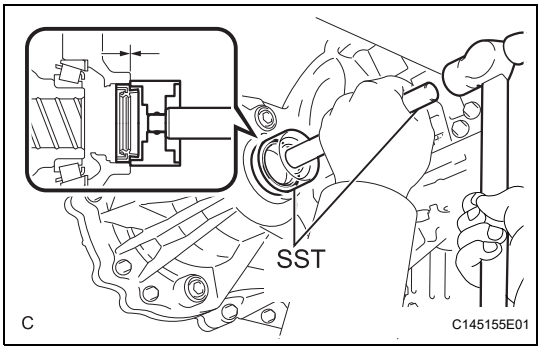


2. **INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY**
   (a) Install the transmission control cable assembly as shown in the illustration.
   HINT:
   - Install the floor shift cable with the uneven surface facing up.
   - Securely engage the claws of the floor shift cable.
3. **INSTALL FLOOR CARPET BRACKET LH**
4. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (See page IP-30)**
5. **INSTALL CONSOLE BOX ASSEMBLY (See page IP-30)**
6. **INSTALL CONSOLE BOX CARPET (See page IP-30)**
7. **INSTALL CONSOLE BOX POCKET (See page IP-30)**
8. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-31)**
9. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-31)**
10. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-31)**
11. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-32)**
12. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-32)**



13. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY**
    (a) Install the shift lever knob sub-assembly.
14. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-34)**
15. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-35)**
16. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-41)**
17. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-41)**
18. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
    Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
19. **INSPECT SHIFT LEVER POSITION (See page HX-24)**
20. **ADJUST SHIFT LEVER POSITION (See page HX-26)**
21. **ADJUST TRANSMISSION CONTROL CABLE ASSEMBLY (See page HX-42)**
22. **INSPECT SHIFT LEVER OPERATION (See page HX-28)**
23. **PERFORM INITIALIZATION**
    (a) Perform initialization (See page IN-43).
    NOTICE:
    Certain systems need to be initialized after reconnecting the cable to the negative (-) battery terminal.



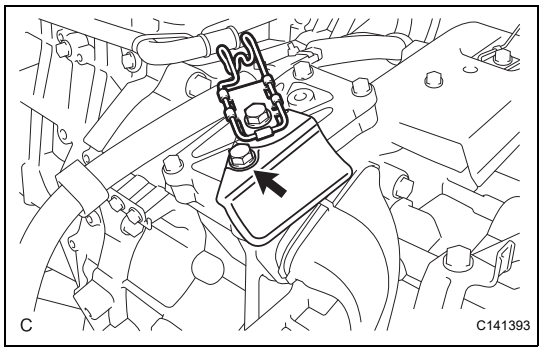


INSTALLATION

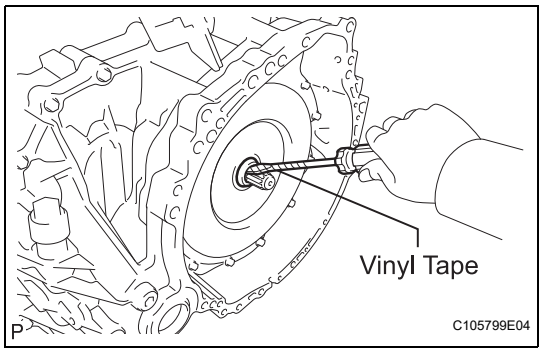
1. **REMOVE HYBRID VEHICLE TRANSAXLE OIL SEAL**
   (a) Install the oil seal LH side.
      (1) Using SST and a hammer, tap in a new oil seal until its surface is flush with the case edge.
      SST 09223-15020, 09950-70010 (09951-07150)
      Oil seal installation depth:
      -0.5 to 0.5 mm (-0.020 to 0.020 in.)
      (2) Coat the lip of the oil seal with MP grease.
   (b) Install the oil seal RH side.
      (1) Using SST and a hammer, tap in a new oil seal until its surface is flush with the case edge.
      SST 09950-70010 (09951-07150), 09710-30050
      Oil seal installation depth:
      -0.5 to 0.5 mm (-0.020 to 0.020 in.)
      (2) Coat the lip of the oil seal with MP grease.
2. **INSTALL FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-17)**
3. **INSTALL FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-17)**
4. **INSTALL FRONT AXLE ASSEMBLY (See page DS-18)**
5. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM (See page DS-18)**
6. **INSTALL TIE ROD SUB-ASSEMBLY (See page DS-18)**
7. **INSTALL FRONT SPEED SENSOR (See page DS-18)**
8. **INSTALL FRONT STABILIZER LINK ASSEMBLY (See page DS-19)**
9. **INSTALL FRONT AXLE HUB NUT (See page DS-19)**
10. **INSTALL FRONT WHEEL (See page DS-19)**
11. **ADD HYBRID TRANSAXLE FLUID (See page HX-2)**
12. **INSPECT HYBRID TRANSAXLE FLUID (See page HX-2)**
13. **ADJUST FRONT WHEEL ALIGNMENT**
    HINT:
    (See page SP-4).
14. **CHECK ABS SPEED SENSOR SIGNAL**
    HINT:
    (See page BC-35).

REMOVAL

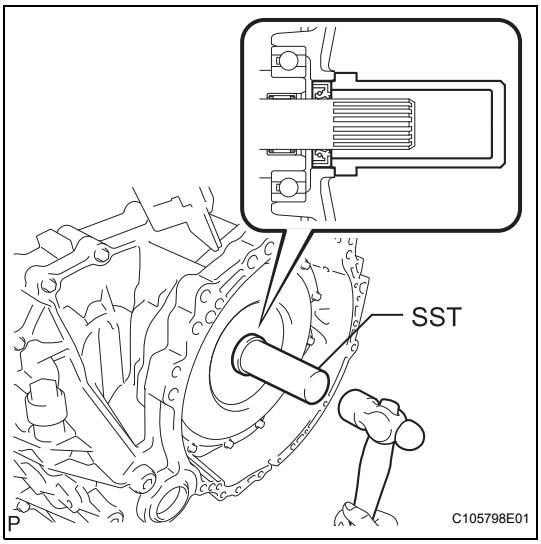
1. **REMOVE ENGINE ASSEMBLY WITH TRANSAXLE**
   HINT:
   (See page EM-89).
2. **REMOVE DYNAMIC DAMPER (See page EM-97)**
3. **REMOVE FRONT FRAME ASSEMBLY (See page EM-97)**
4. **REMOVE FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-6)**
5. **REMOVE FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-7)**
6. **REMOVE FLYWHEEL HOUSING UNDER COVER (See page HX-12)**
7. **SEPARATE ENGINE WIRE (See page HX-12)**
8. **REMOVE NO. 2 TRANSMISSION CONTROL CABLE BRACKET (See page HX-13)**
9. **REMOVE HV INVERTER PROTECTOR ASSEMBLY**
   Remove the bolt and HV inverter protector.



10. **REMOVE AUTOMATIC TRANSMISSION CASE COVER (See page HX-14)**
11. **REMOVE FRONT ENGINE MOUNTING BRACKET (See page HX-15)**
12. **REMOVE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-15)**
13. **REMOVE INPUT SHAFT OIL SEAL**
    (a) Using a screwdriver with its tip taped, remove the oil seal.

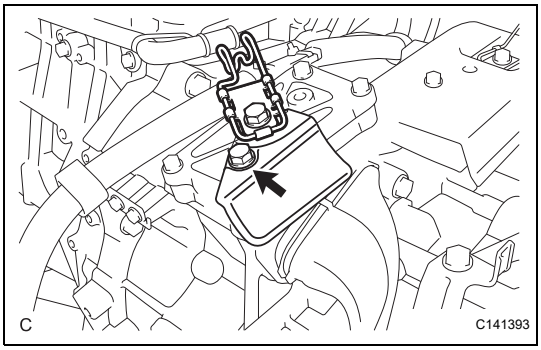


HX



INSTALLATION

1. **INSTALL INPUT SHAFT OIL SEAL**
   (a) Using SST and a hammer, drive in a new oil seal.
   SST 09388-40010
2. **INSTALL HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-15)**
3. **INSTALL FRONT ENGINE MOUNTING BRACKET (See page HX-16)**
4. **INSTALL AUTOMATIC TRANSMISSION CASE COVER (See page HX-16)**

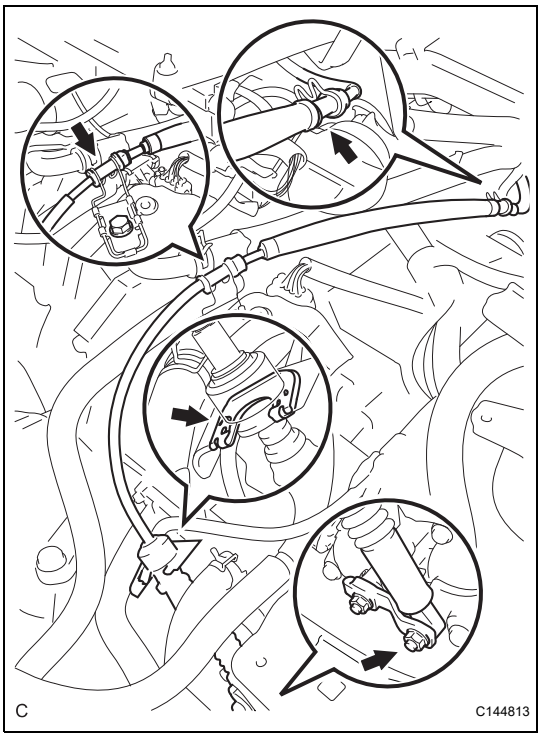


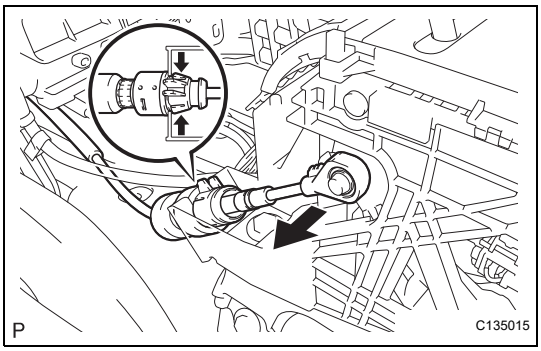
5. **INSTALL HV INVERTER PROTECTOR ASSEMBLY**
   (a) Install the HV inverter protector with the bolt.
   Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)
6. **INSTALL NO. 2 TRANSMISSION CONTROL CABLE BRACKET (See page HX-17)**
7. **CONNECT ENGINE WIRE (See page HX-18)**
8. **INSTALL FLYWHEEL HOUSING UNDER COVER (See page HX-18)**
9. **INSTALL FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-17)**
10. **INSTALL FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-17)**
11. **INSTALL FRONT FRAME ASSEMBLY (See page EM-106)**
12. **INSTALL DYNAMIC DAMPER (See page EM-106)**
13. **INSTALL ENGINE ASSEMBLY WITH TRANSAXLE**
    HINT:
    (See page EM-102).

HX

REMOVAL

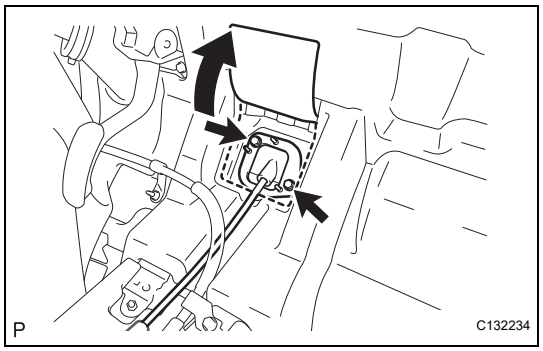
1. **REMOVE AIR CONDITIONING UNIT**
   HINT:
   (See page AC-185).
2. **REMOVE ENGINE UNDER COVER RH**
3. **REMOVE ENGINE UNDER COVER LH**
4. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-90)**
5. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-395)**
6. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-90)**
7. **SEPARATE TRANSMISSION CONTROL CABLE ASSEMBLY**
   (a) Remove the nut from the control shaft lever.
   (b) Disconnect the transmission control cable assembly from the control shaft lever.
   (c) Remove the clip and disconnect the transmission control cable assembly from the No. 1 control cable bracket.
   (d) Disconnect the transmission control cable assembly from the No. 2 transmission control cable bracket and No. 3 transmission control cable bracket.





   (e) Disconnect the transmission control cable assembly from the transmission floor shift assembly while pushing the 2 claws of the floor shift cable.

HX



8. REMOVE TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Turn back the carpet.
(b) Remove the 2 bolts and disconnect the shift cable grommet retainer.
(c) Remove the shift cable grommet retainer.
(d) Pull out the transmission control cable assembly from the body.

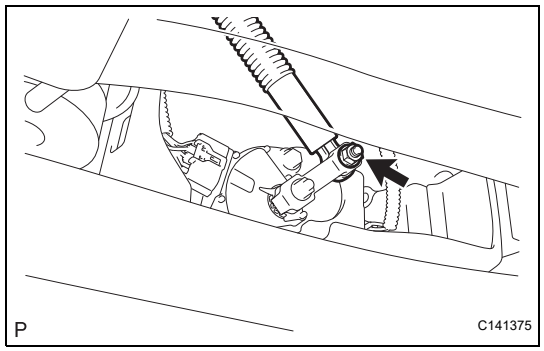
ADJUSTMENT

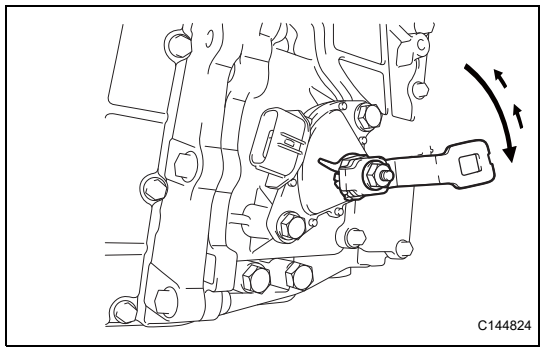
1. ADJUST TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Move the shift lever to the N position.

(b) Remove the nut from the control shaft lever.

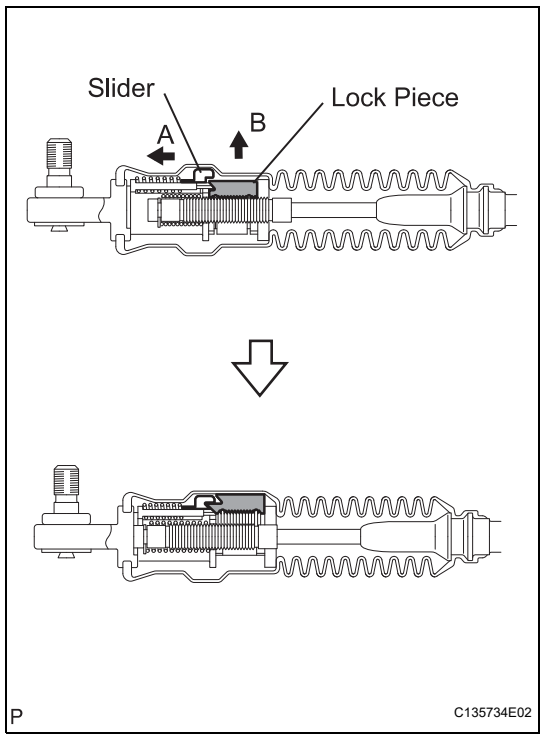
(c) Disconnect the transmission control cable assembly from the control shaft lever.





(d) Push the control shaft fully downward.

(e) Return the control shaft lever 2 notches to the N position.

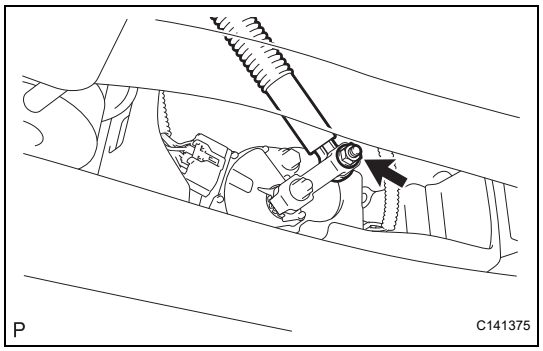


(f) Move the slider in the direction indicated by arrow A and pull up the lock piece in the direction indicated by arrow B.

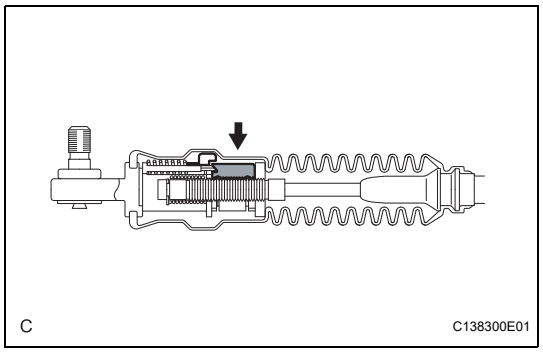
NOTICE:

Do not damage the boot.

HX



(g) Install the transmission control cable to the control shaft lever with the nut.
Torque: 15 N*m (150 kgf*cm, 11 ft.*lbf)
NOTICE:
- **If the control cable end is excessively pushed up, the shift lever cannot be adjusted.**
- **When tightening the nut, confirm that the control cable is properly stretched.**



(h) Push in the lock piece.
NOTICE:
- **Before pushing in the lock piece, make sure that the shift lever and control shaft lever are in the N position.**
- **Firmly push in the lock piece until the slider lock is engaged.**

(i) Start the engine and make sure that the vehicle moves forward when moving the lever from the N to the D position and moves rearward when moving it to the R position.
If it becomes hard to move the shift lever, readjust the shift lever position.

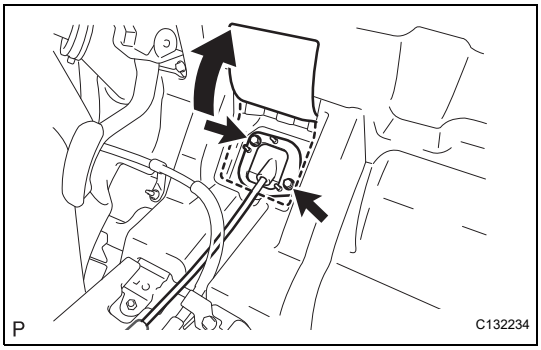
INSTALLATION

1. INSTALL NO. 2 SHIFT CABLE GROMMET RETAINER

(a) Pass the transmission control cable assembly from the cabin to the engine compartment.

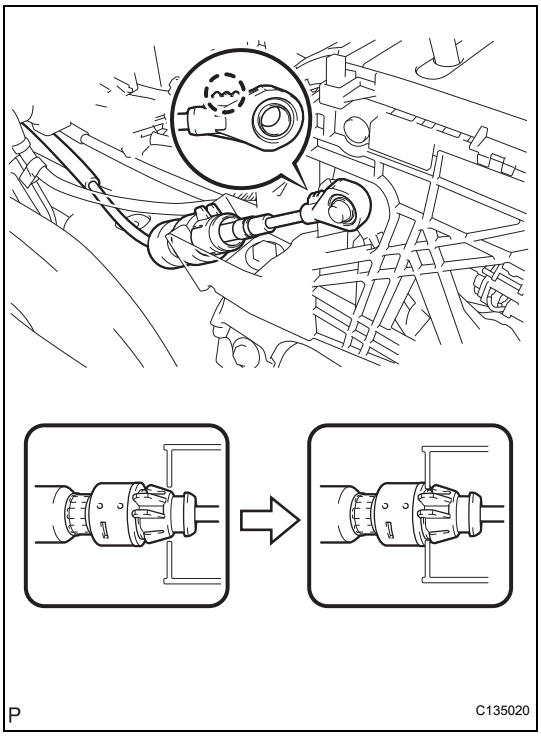
(b) Install the shift cable grommet retainer to the transmission control cable assembly.

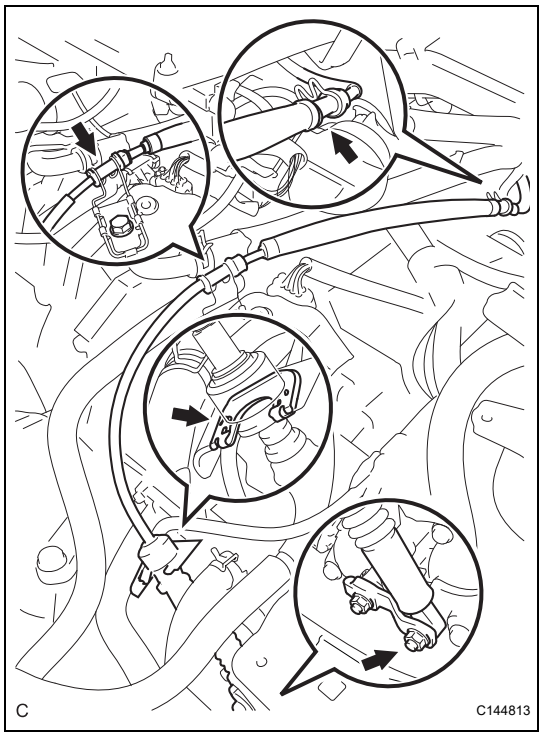
(c) Install the shift cable grommet retainer with the 2 bolts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)



2. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Install the transmission control cable assembly as shown in the illustration.
HINT:
- Install the floor shift cable with the uneven surface facing up.
- Securely engage the claws of the floor shift cable.

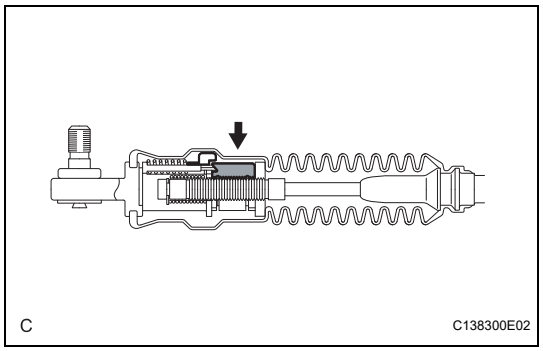




(b) Connect the transmission control cable assembly to the No. 2 transmission control cable bracket and No. 3 transmission control cable bracket.

(c) Connect the transmission control cable assembly to the transmission control cable bracket No. 1 with a new clip.

(d) Install the transmission control cable to the control shaft lever with the nut.
Torque: 15 N*m (150 kgf*cm, 11 ft.*lbf)



(e) Push in the lock piece of the transmission control cable.
NOTICE:
- **Before pushing in the lock piece, make sure that the shift lever and control shaft lever are in the N position.**
- **Firmly push in the lock piece until the slider lock is engaged.**

HINT:
After pushing in the lock piece, make sure that the boot is not deformed.

3. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-113)**
4. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-398)**
5. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-113)**
6. **INSTALL ENGINE UNDER COVER LH**
7. **INSTALL ENGINE UNDER COVER RH**
8. **INSTALL AIR CONDITIONING UNIT**
HINT:
(See page AC-200).
9. **INSPECT SHIFT LEVER POSITION (See page HX-24)**
10. **ADJUST SHIFT LEVER POSITION (See page HX-26)**
11. **INSPECT SHIFT LEVER OPERATION (See page HX-28)**

12. REMOVE PERFORM INITIALIZATION

(a) Perform initialization (See page IN-43).

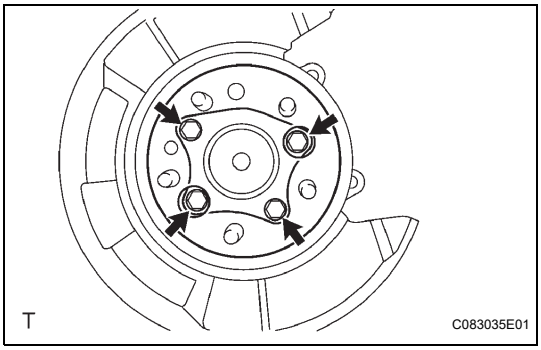
NOTICE:

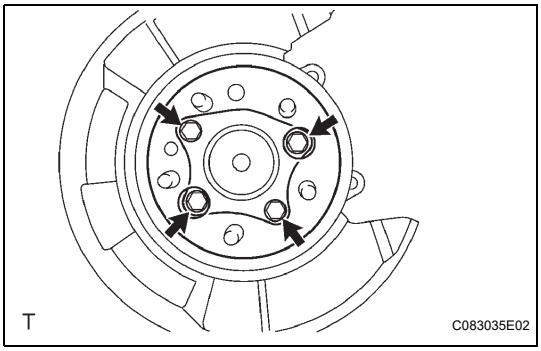
Certain systems need to be initialized after reconnecting the cable to the negative (-) battery terminal.

REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. **REMOVE REAR WHEEL**
2. **SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY (See page AH-18)**
3. **REMOVE REAR DISC (See page PB-35)**
4. **DISCONNECT SKID CONTROL SENSOR CONNECTOR (See page BC-276)**
5. **REMOVE REAR AXLE HUB AND BEARING ASSEMBLY**
   (a) Disconnect the skid control sensor connector.
   (b) Remove the 4 bolts and hub and bearing assembly.





INSTALLATION

1. **INSTALL REAR AXLE HUB AND BEARING ASSEMBLY**
   (a) Install the hub and bearing assembly with the 4 bolts.
   Torque: 80 N*m (816 kgf*cm, 59 ft.*lbf)
   (b) Connect the skid control sensor connector.
   NOTICE:
   Do not twist the sensor wire when connecting it.
2. **INSPECT REAR AXLE HUB BEARING LOOSENESS (See page AH-15)**
3. **INSPECT REAR AXLE HUB RUNOUT (See page AH-15)**
4. **INSTALL REAR DISC (See page PB-40)**
5. **INSTALL REAR DISC BRAKE CALIPER ASSEMBLY (See page AH-20)**
6. **INSTALL REAR WHEEL**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
7. **CONNECT SKID CONTROL SENSOR CONNECTOR (See page BC-278)**
8. **CHECK ABS SPEED SENSOR SIGNAL**
   HINT:
   See page BC-35.

AH

REASSEMBLY

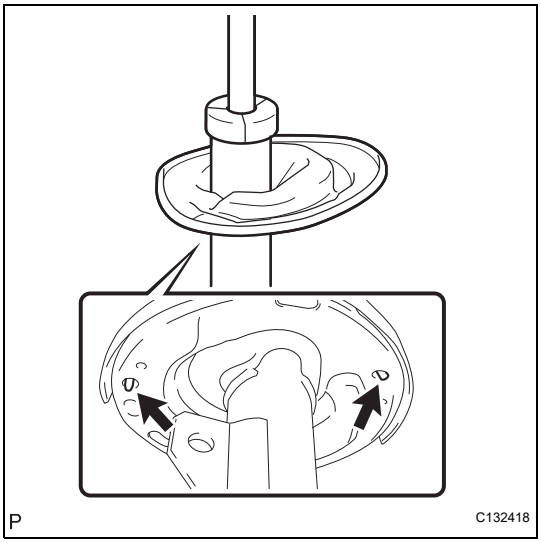
1. INSTALL FRONT SHOCK ABSORBER

(a) Install the front spring bumper to the piston rod.

(b) Install the front coil spring lower insulator onto the front shock absorber.

NOTICE:

Align the 2 protrusions of the front coil spring lower insulator and the 2 holes in the front shock absorber.



(c) Using SST, compress the front coil spring.

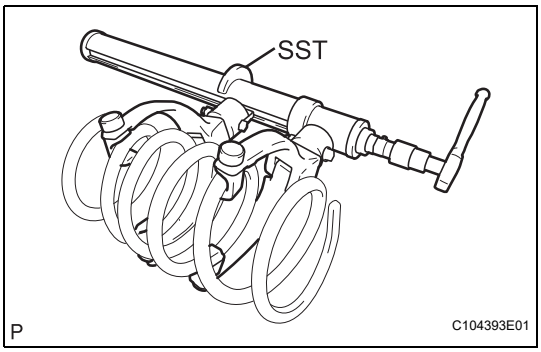
SST 09727-30021 (09727-00010, 09727-00021, 09727-00031)

NOTICE:

Do not use an impact wrench.

HINT:

If the front coil spring is compressed at an angle, using 2 SST will make the work easier.



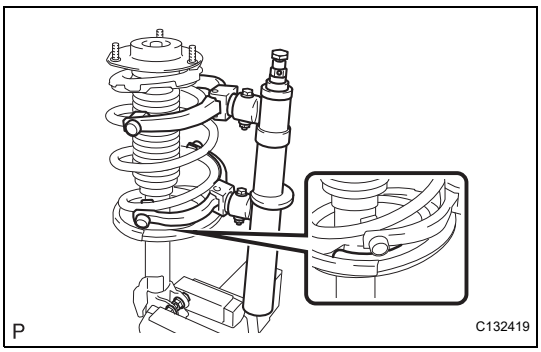
(d) Install the front coil spring to the front shock absorber.

NOTICE:

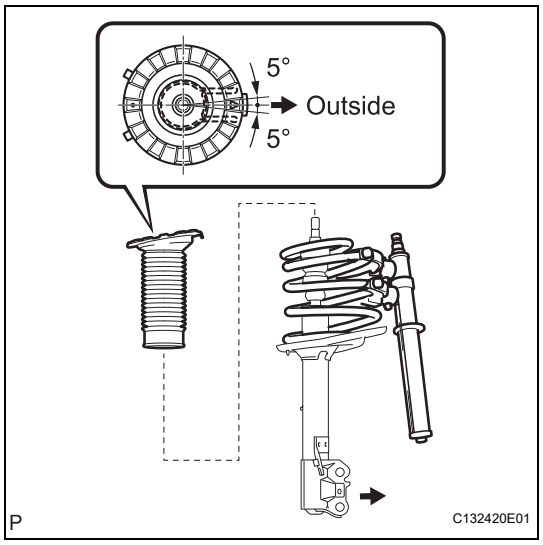
The smaller diameter end of the front coil spring must face upward.

HINT:

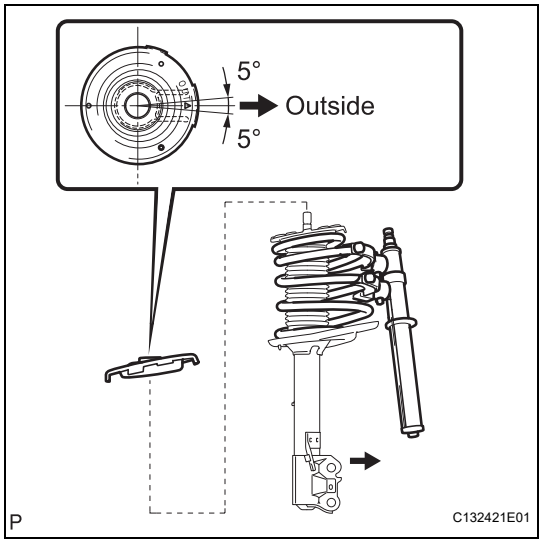
Fit the lower end of the front coil spring into the gap of the insulator.



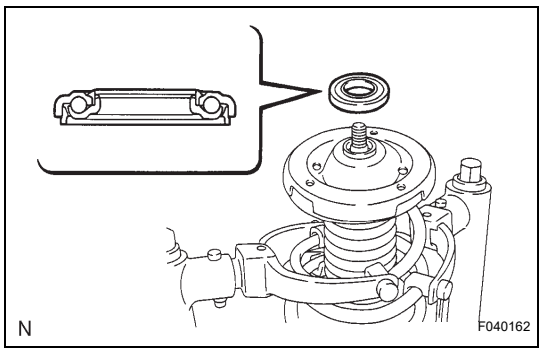
SP



(e) Install the front coil spring upper insulator as shown in the illustration.
HINT:
Any misalignment between the front shock absorber lower bracket and the matchmark must be +-5°.

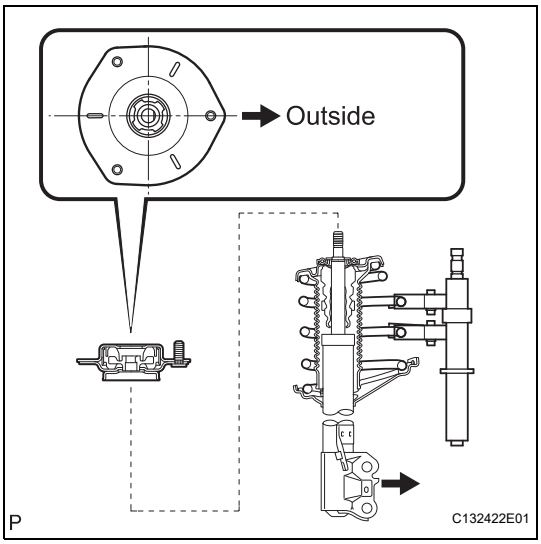


(f) Install the front coil spring upper seat with the mark facing to the outside of the vehicle.
HINT:
Any misalignment between the front shock absorber lower bracket and the matchmark must be +-5°.

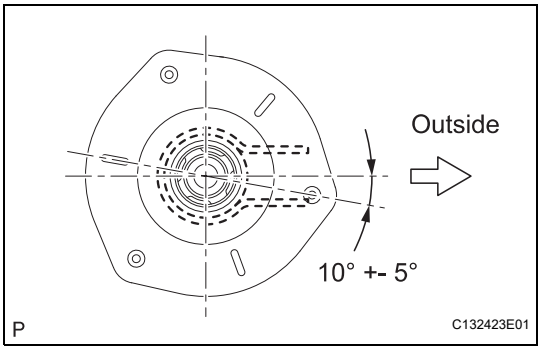


(g) Install a new front suspension support bearing as shown in the illustration.
HINT:
If there is foreign matter inside the front suspension support bearing, replace it with a new one.

SP



(h) Install the front suspension support sub-assembly. Temporarily tighten a new lock nut.
NOTICE:
Check that the flats on the piston rod and the flats on the front suspension support sub-assembly are aligned.



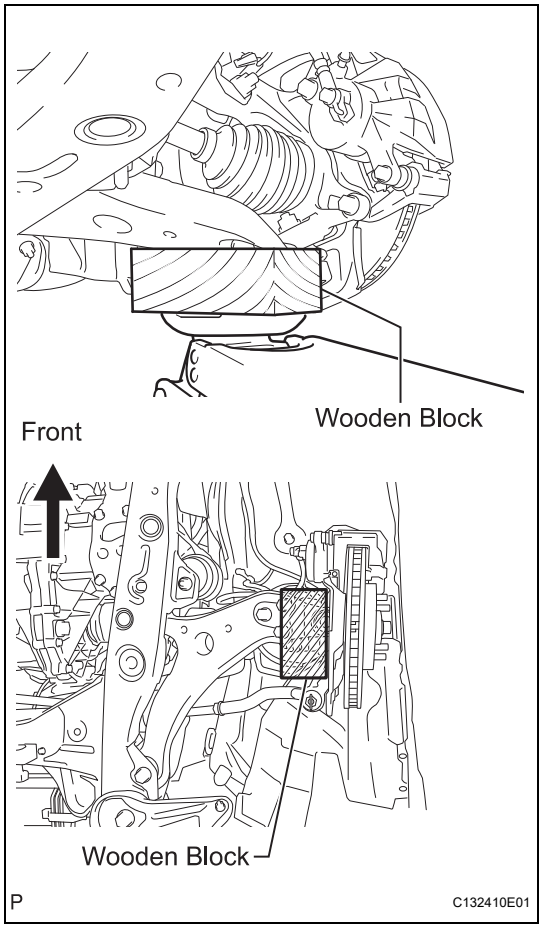
(i) Remove the SST slowly in order to release the coil spring.
NOTICE:
Do not use an impact wrench.
HINT:
Any misalignment between the front shock absorber lower bracket and the arrows must be +-5°.

INSTALLATION

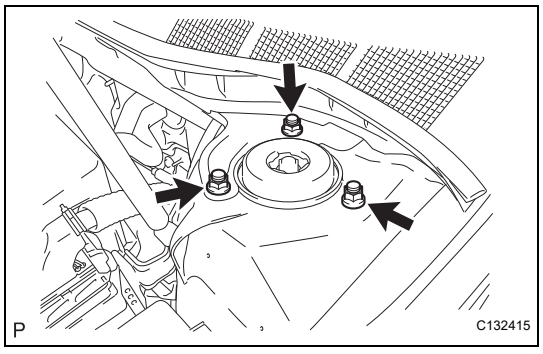
1. INSTALL FRONT SHOCK ABSORBER WITH COIL SPRING

(a) Install the front shock absorber with coil spring to the front axle assembly and insert the 2 bolts from the front side of the vehicle.

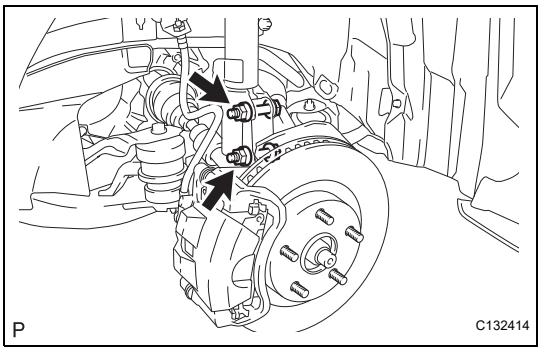
(b) Slowly jack up the vehicle using a wooden block and install the front shock absorber with coil spring (upper side) to the vehicle.



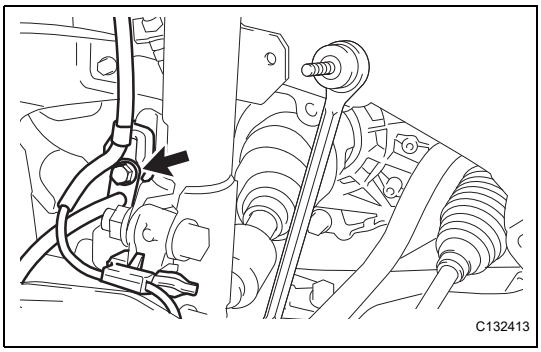
(c) Install the 3 nuts to the upper side of the front shock absorber with coil spring.
Torque: 85 N*m (867 kgf*cm, 63 ft.*lbf)



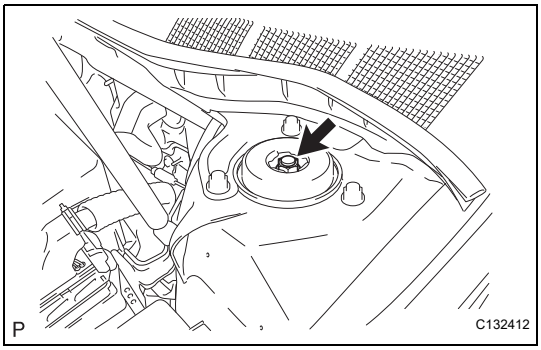
SP



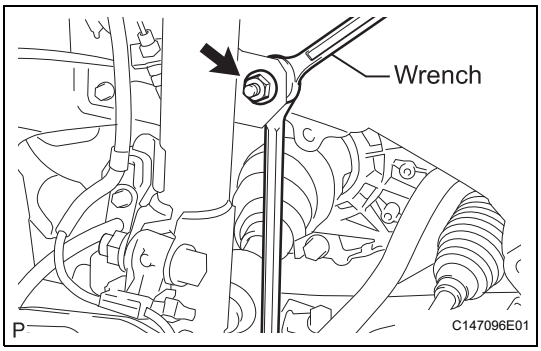
(d) Install the 2 nuts to the lower side of the front shock absorber with coil spring.
Torque: 210 N*m (2,140 kgf*cm, 155 ft.*lbf)
NOTICE:
When installing the nuts, keep the bolts from rotating.



(e) Install the front flexible hose and front speed sensor wire harness with the bolt.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)
HINT:
If the ball joint turns together with the nut, use a wrench (19 mm) to hold the stud.
NOTICE:
Do not twist the front speed sensor wire harness when installing it.



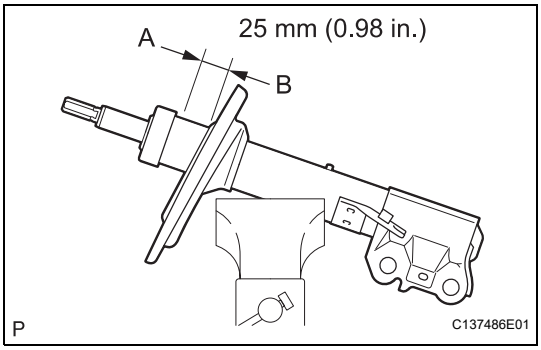
(f) Fully tighten the lock nut.
Torque: 70 N*m (714 kgf*cm, 52 ft.*lbf)



2. INSTALL FRONT STABILIZER LINK ASSEMBLY
(a) Install the front stabilizer link assembly with the nut.
Torque: 74 N*m (755 kgf*cm, 55 ft.*lbf)
HINT:
If the ball joint turns together with the nut, use a wrench (19 mm) to hold the stud.

3. INSTALL FRONT WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

4. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT
(See page SP-4)



DISPOSAL

1. DISPOSE OF FRONT SHOCK ABSORBER
(a) Fully extend the shock absorber rod.
(b) Using a drill, make a hole in the cylinder between A and B as shown in the illustration to discharge the gas inside.
CAUTION:
- **Be careful when drilling because shards of metal may fly about. Always use the proper safety equipment.**

SP

- **The gas is colorless, odorless and non-poisonous.**

INSTALLATION

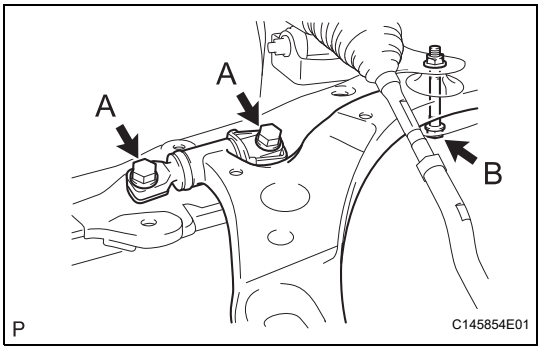
1. INSTALL FRONT SUSPENSION LOWER NO. 1 ARM

(a) Install the front lower arm bushing stopper.

(b) Install the front suspension lower No. 1 arm to the front frame assembly with the 3 bolts and the nut, but do not tighten them yet.

(c) Tighten the 3 bolts in numerical order shown in the illustration.

Torque: 200 N*m (2,040 kgf*cm, 148 ft.*lbf) (bolt A)
206 N*m (2,100 kgf*cm, 152 ft.*lbf) (bolt B)

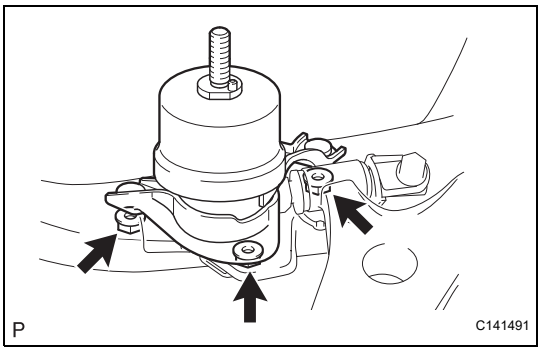


2. INSTALL ENGINE MOUNTING INSULATOR

(a) Install the engine mounting insulator with the 3 nuts.
Torque: 87 N*m (887 kgf*cm, 64 ft.*lbf)

3. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE

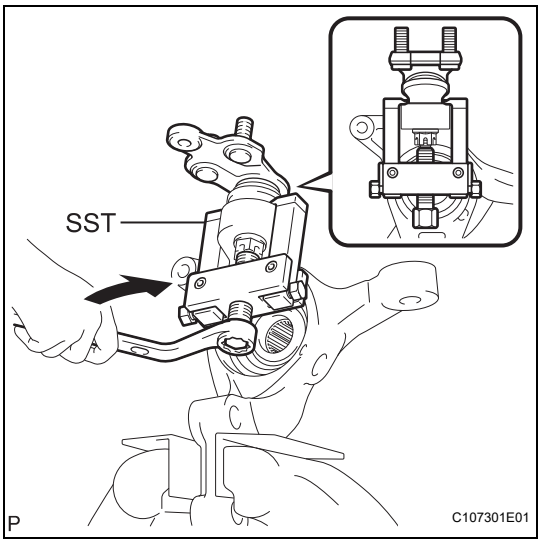
HINT:
Refer to the instructions for installation of the engine assembly (See page EM-107).



REMOVAL

HINT:
- Use the same procedures for the RH side and the LH side.
- The procedures listed below are for the LH side.

1. **REMOVE FRONT WHEEL**
2. **REMOVE FRONT AXLE HUB NUT (See page DS-5)**
3. **SEPARATE FRONT SPEED SENSOR (See page DS-5)**
4. **SEPARATE FRONT DISC BRAKE CALIPER ASSEMBLY (See page AH-6)**
5. **REMOVE FRONT DISC (See page BR-50)**
6. **SEPARATE TIE ROD END SUB-ASSEMBLY (See page DS-6)**
7. **SEPARATE FRONT SUSPENSION LOWER NO. 1 ARM (See page DS-6)**
8. **REMOVE FRONT AXLE ASSEMBLY (See page AH-6)**
9. **REMOVE FRONT WHEEL NO. 1 BEARING DUST DEFLECTOR (See page AH-7)**
10. **REMOVE FRONT AXLE HUB HOLE SNAP RING (See page AH-7)**
11. **REMOVE FRONT AXLE HUB (See page AH-7)**
12. **REMOVE FRONT DISC BRAKE DUST COVER (See page AH-8)**
13. **REMOVE FRONT AXLE HUB BEARING (See page AH-8)**
14. **REMOVE FRONT LOWER BALL JOINT**
    (a) Secure the steering knuckle in a vise using aluminum plates.
    (b) Remove the cotter pin and nut.
    (c) Using SST, remove the front lower ball joint.
    SST 09628-62011
    NOTICE:
    - **Do not damage the dust cover of the ball joint.**
    - **Do not damage the steering knuckle.**



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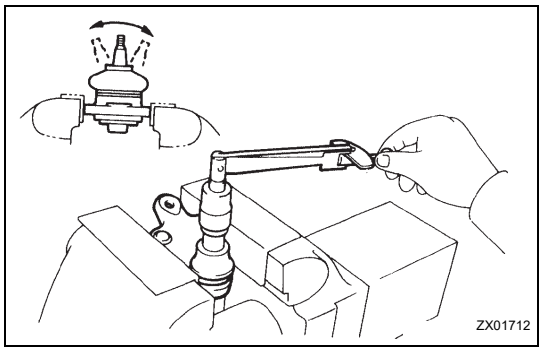


INSPECTION

1. INSPECT FRONT LOWER BALL JOINT

(a) Inspect the turning of the ball joint.

(1) Secure the front lower ball joint assembly in a vise using aluminum plates.

(2) Install the nut to the front lower ball joint assembly stud.

(3) Using a torque wrench, turn the nut continuously at a rate of 3 to 5 seconds per turn and take the torque reading on the 5th turn.

Torque: Turning torque

1.0 to 3.4 N*m (10 to 35 kgf*cm, 9 to 30 in.*lbf)

HINT:

If the turning torque is not within the specified range, replace the front lower ball joint assembly with a new one.

(b) Inspect the dust cover.

(1) Check that the dust cover is not cracked and that there is no grease on it.

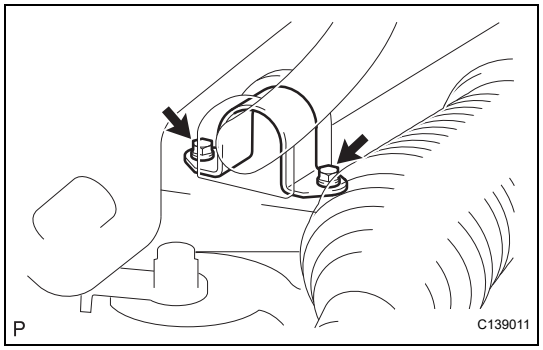
INSTALLATION

1. **INSTALL FRONT LOWER BALL JOINT**
   (a) Install the front lower ball joint to the steering knuckle with the nut.
   Torque: 123 N*m (1,250 kgf*cm, 91 ft.*lbf)
   NOTICE:
   Prevent oil from adhering to the screw and tapered parts.
   (b) Install a new cotter pin.
   NOTICE:
   If the holes for the cotter pin are not aligned, tighten the nut further up to 60°.
2. **INSTALL FRONT AXLE HUB BEARING (See page AH-9)**
3. **INSTALL FRONT DISC BRAKE DUST COVER (See page AH-9)**
4. **INSTALL FRONT AXLE HUB (See page AH-9)**
5. **INSTALL FRONT AXLE HUB HOLE SNAP RING (See page AH-9)**
6. **INSTALL FRONT WHEEL NO. 1 BEARING DUST DEFLECTOR (See page AH-10)**
7. **INSTALL FRONT AXLE ASSEMBLY (See page AH-10)**
8. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM (See page DS-18)**
9. **CONNECT TIE ROD END SUB-ASSEMBLY (See page DS-18)**
10. **INSTALL FRONT DISC (See page BR-51)**
11. **INSTALL FRONT DISC BRAKE CALIPER ASSEMBLY (See page AH-10)**
12. **INSTALL FRONT SPEED SENSOR (See page DS-18)**
13. **INSTALL FRONT AXLE HUB NUT (See page AH-11)**
14. **SEPARATE FRONT DISC BRAKE CALIPER ASSEMBLY (See page AH-11)**
15. **REMOVE FRONT DISC (See page BR-51)**
16. **INSPECT FRONT AXLE HUB BEARING LOOSENESS (See page AH-5)**
17. **INSPECT FRONT AXLE HUB RUNOUT (See page AH-6)**
18. **INSTALL FRONT DISC (See page BR-51)**
19. **INSTALL FRONT DISC BRAKE CALIPER ASSEMBLY (See page AH-11)**
20. **INSTALL FRONT AXLE HUB NUT (See page AH-11)**
21. **CHECK ABS SPEED SENSOR SIGNAL**
    (See page BC-35)

SP

22. **INSTALL FRONT WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

23. **INSPECT AND ADJUST FRONT WHEEL ALIGNMENT**
    (See page SP-4)



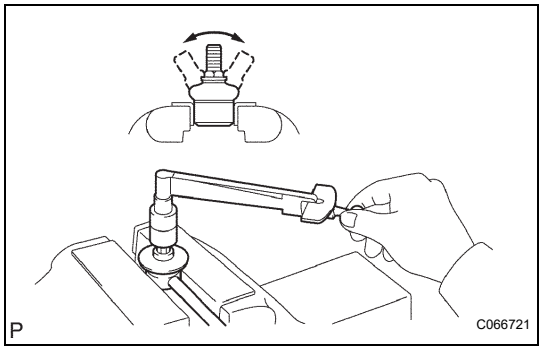
10. REMOVE FRONT NO. 1 STABILIZER BRACKET RH

(a) Remove the 2 bolts and the front No. 1 stabilizer bracket RH from the front frame assembly.

11. REMOVE FRONT NO. 1 STABILIZER BAR BUSHING

(a) Remove the 2 front No. 1 stabilizer bar bushings from the front stabilizer bar.

12. REMOVE FRONT STABILIZER BAR



INSPECTION

1. INSPECT FRONT STABILIZER LINK ASSEMBLY

(a) Inspect the turning of the ball joint.

(1) Secure the front stabilizer link assembly in a vise using aluminum plates.

(2) Install the nut to the front stabilizer link assembly stud.

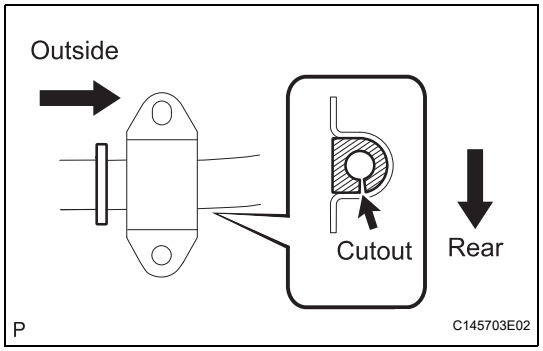
(3) Using a torque wrench, turn the nut continuously at a rate of 3 to 5 seconds per turn and take the torque reading on the 5th turn.

Torque: Turning torque
0.05 to 2.0 N*m (0.5 to 20 kgf*cm, 0.4 to 18 in.*lbf)

HINT:
If the turning torque is not within the specified range, replace the front stabilizer link assembly with a new one.

(b) Inspect the dust cover.

(1) Check that the dust cover is not cracked and that there is no grease on it.



INSTALLATION

1. INSTALL FRONT NO. 1 STABILIZER BAR BUSHING

(a) Install the 2 front No. 1 stabilizer bar bushings to the outside of the bushing stopper on the front stabilizer bar.

NOTICE:
Make sure that the cutout of the front No. 1 stabilizer bar bushing faces the rear side as shown in the illustration.

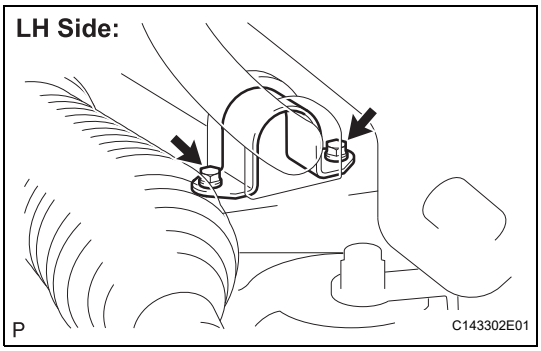
2. INSTALL FRONT NO. 1 STABILIZER BRACKET LH

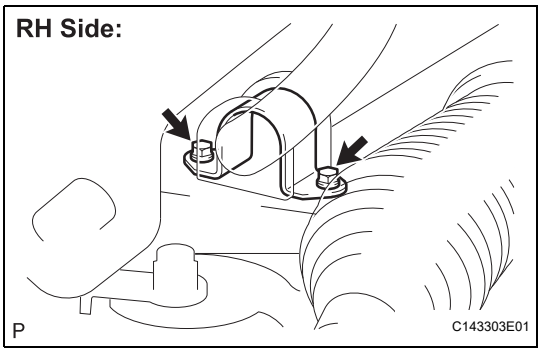
(a) Install the front No. 1 stabilizer bracket LH.

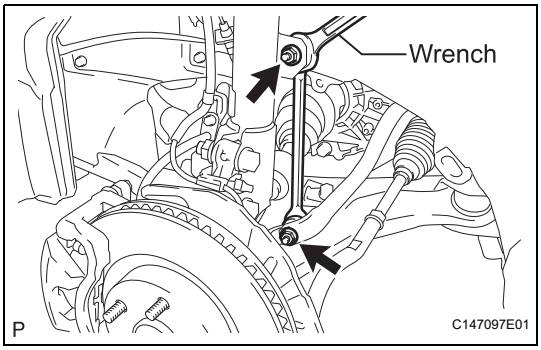
3. INSTALL FRONT NO. 1 STABILIZER BRACKET RH

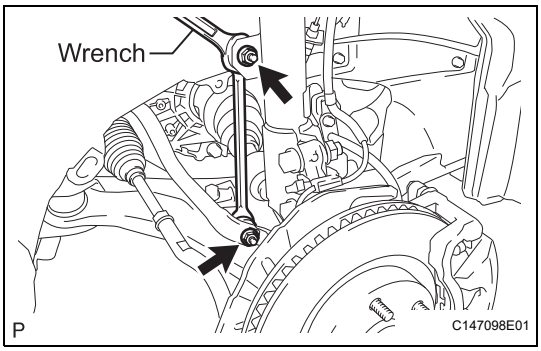
(a) Install the front No. 1 stabilizer bracket RH.

SP









4. **INSTALL FRONT STABILIZER BAR**
   (a) Install the front stabilizer bar with the 2 bolts. (LH Side)
   Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)

   (b) Install the front stabilizer bar with the 2 bolts. (RH Side)
   Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)

5. **INSTALL ENGINE ASSEMBLY WITH TRANSAXLE**
   HINT:
   Refer to the instructions for installation of the engine assembly (See page EM-107).

6. **INSTALL FRONT STABILIZER LINK ASSEMBLY LH**
   (a) Install the front stabilizer link assembly LH with the 2 nuts.
   Torque: 74 N*m (755 kgf*cm, 55 ft.*lbf)
   HINT:
   If the ball joint turns together with the nut, use a wrench (19 mm) to hold the stud.

7. **INSTALL FRONT STABILIZER LINK ASSEMBLY RH**
   (a) Install the front stabilizer link assembly RH with the 2 nuts.
   Torque: 74 N*m (755 kgf*cm, 55 ft.*lbf)
   HINT:
   If the ball joint turns together with the nut, use a wrench (19 mm) to hold the stud.

8. **CONNECT TIE ROD END SUB-ASSEMBLY (See page DS-18)**

9. **CONNECT STEERING INTERMEDIATE SHAFT ASSEMBLY (See page PS-66)**

10. **PLACE FRONT WHEELS FACING STRAIGHT**

11. **INSTALL FRONT WHEELS**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

12. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

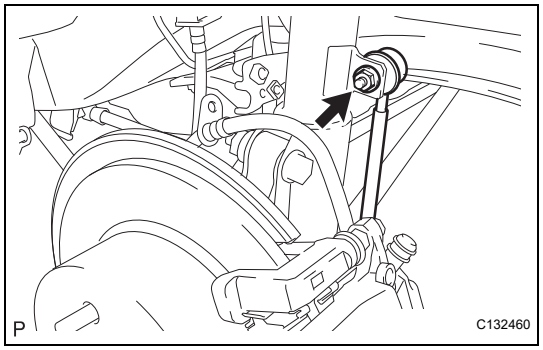
13. **INSPECT AND ADJUST FRONT WHEEL ALIGNMENT** (See page EM-107)

REMOVAL

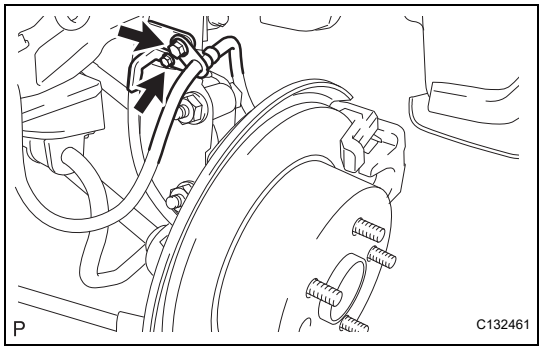
HINT:

- Use the same procedures for the RH side and the LH side.
- The procedures listed below are for the LH side.

1. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-44)**
2. **REMOVE REAR SEAT HEADREST ASSEMBLY**
3. **REMOVE REAR CENTER SEAT HEADREST ASSEMBLY**
4. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-44)**
5. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-44)**
6. **REMOVE REAR SIDE SEATBACK ASSEMBLY LH (See page SE-45)**
7. **REMOVE REAR SIDE SEATBACK ASSEMBLY RH (See page SE-45)**
8. **REMOVE REAR WHEEL**
9. **SEPARATE REAR STABILIZER LINK ASSEMBLY LH**
   (a) Remove the nut and separate the rear stabilizer link assembly LH from the front shock absorber LH.
   HINT:
   If the ball joint turns together with the nut, use a hexagon wrench (5 mm) to hold the stud.



10. **SEPARATE REAR SPEED SENSOR**
    (a) Remove the 2 bolts, and disconnect the rear brake flexible hose and rear speed sensor from the rear shock absorber with coil spring and rear axle carrier.
    NOTICE:
    Be sure to remove the rear speed sensor from the rear shock absorber with coil spring.



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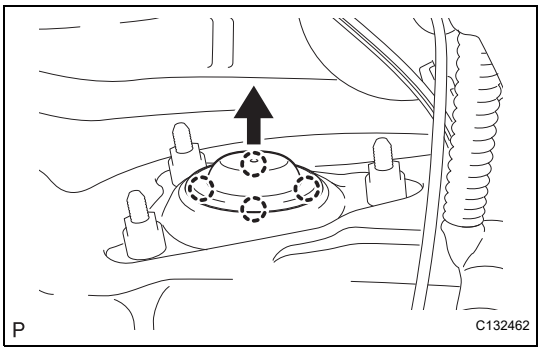
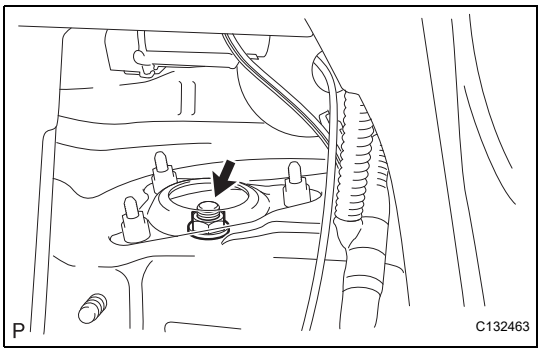


11. REMOVE REAR SUSPENSION SUPPORT NO. 1 COVER

(a) Remove the 4 claws and the rear suspension support No. 1 cover.

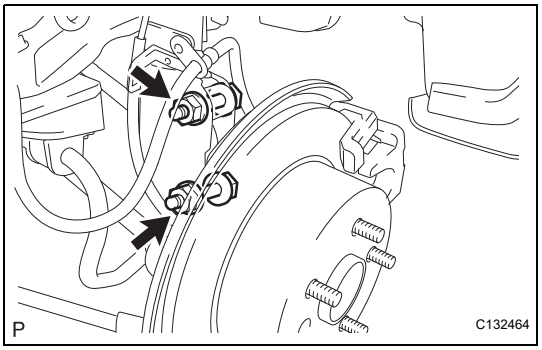


12. REMOVE REAR SHOCK ABSORBER WITH COIL SPRING

(a) Loosen the lock nut of the rear shock absorber with coil spring.

NOTICE:

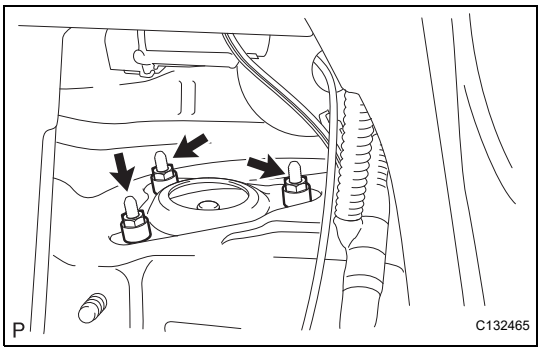
- **Do not remove the lock nut.**
- **Only loosen the nut when disassembling the rear shock absorber with coil spring.**



(b) Remove the 2 nuts and 2 bolts on the lower side of the rear shock absorber with coil spring.

NOTICE:

- **When removing the nuts, keep the bolts from rotating.**
- **Keep one bolt inserted to secure the hub and disc rotor.**



(c) Remove the 3 nuts on the upper side of the rear shock absorber with coil spring.

(d) Lower the rear axle carrier, and remove the 2 bolts on the lower side of the rear shock absorber with coil spring.

NOTICE:

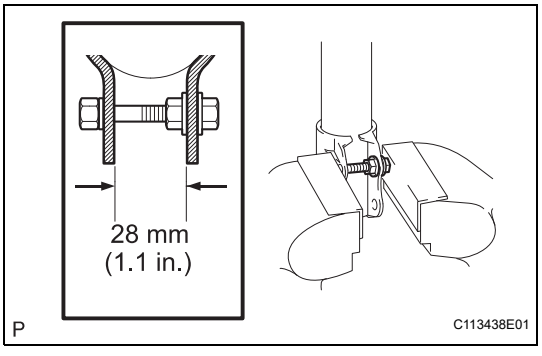
Make sure that the rear speed sensor is disconnected from the rear shock absorber with coil spring.

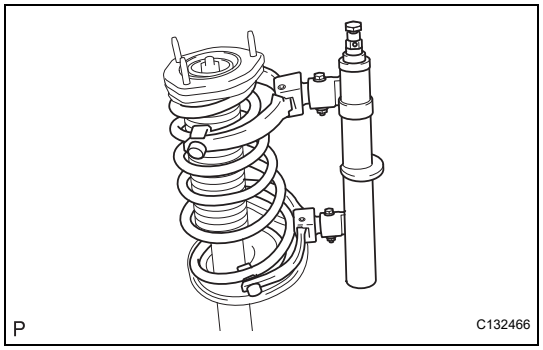
SP

DISASSEMBLY

1. FIX REAR SHOCK ABSORBER WITH COIL SPRING

(a) As shown in the illustration, secure the rear shock absorber with coil spring in a vise using aluminum plates by closing the vise onto the double nutted bolt affixed to the bracket at the bottom of the absorber.





2. REMOVE REAR SHOCK ABSORBER

(a) Using SST, compress the rear coil spring.

SST 09727-30021 (09727-00010, 09727-00021, 09727-00031)

NOTICE:

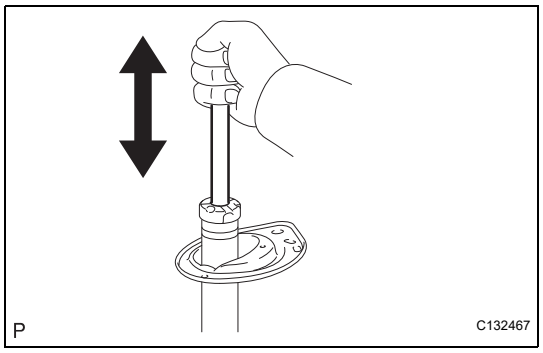
Do not use an impact wrench.

HINT:

If the front coil spring is compressed at an angle, using 2 SST will make the work easier.

(b) Remove the nut, rear shock absorber collar and rear suspension support assembly.

(c) Remove the rear coil spring, rear No. 1 spring bumper, and rear coil spring lower insulator.



INSPECTION

1. INSPECT REAR SHOCK ABSORBER

(a) Compress and extend the shock absorber rod 4 or more times.

Standard:

There is no abnormal resistance or sound and operation resistance is normal.

HINT:

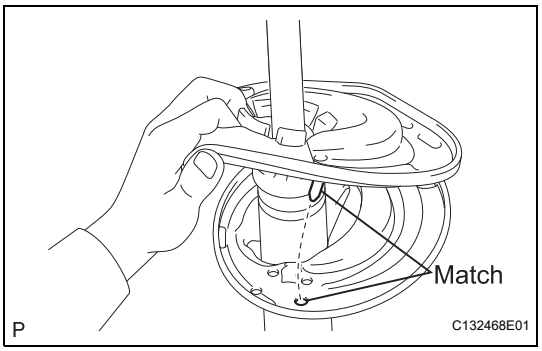
If there is any abnormality, replace the rear shock absorber with a new one.

REASSEMBLY

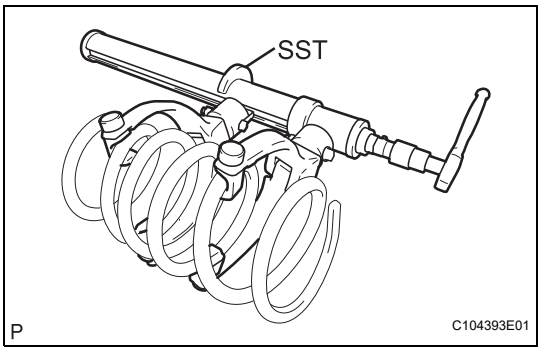
1. INSTALL REAR SHOCK ABSORBER

(a) Install the rear No. 1 spring bumper to the piston rod.

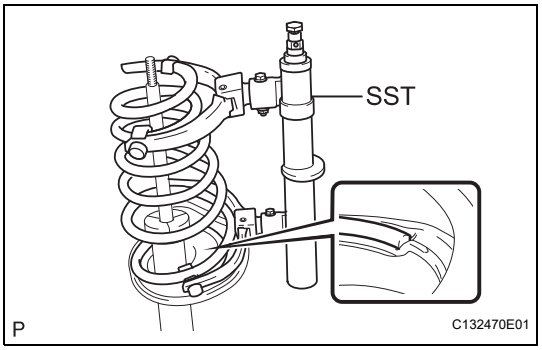
(b) Install the rear coil spring lower insulator onto the rear shock absorber.



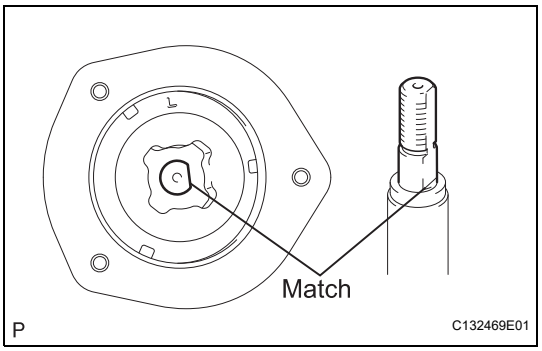
(c) Using SST, compress the rear coil spring.
SST 09727-30021 (09727-00010, 09727-00021, 09727-00031)
NOTICE:
Do not use an impact wrench.



(d) Install the rear coil spring to the rear shock absorber.
NOTICE:
The smaller diameter end must face upward.
HINT:
- Fit the lower end of the rear coil spring into the gap of the lower seat.
- If the front coil spring is compressed at an angle, using 2 SST will make the work easier.



(e) Install the rear suspension support assembly.
NOTICE:
Align the notches of the piston rod and the rear suspension support assembly as shown in the illustration before installing the rear suspension support assembly.



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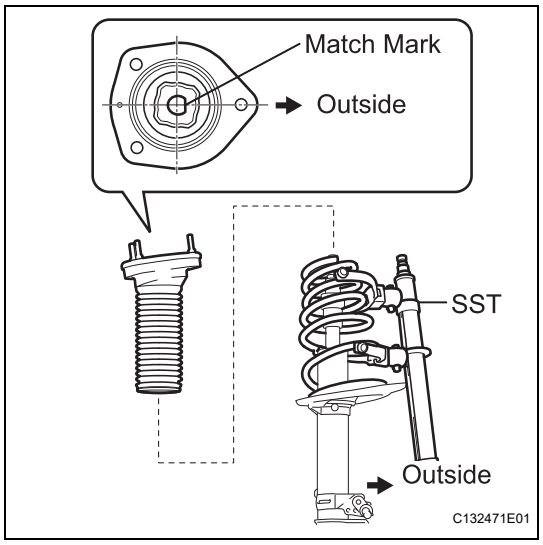
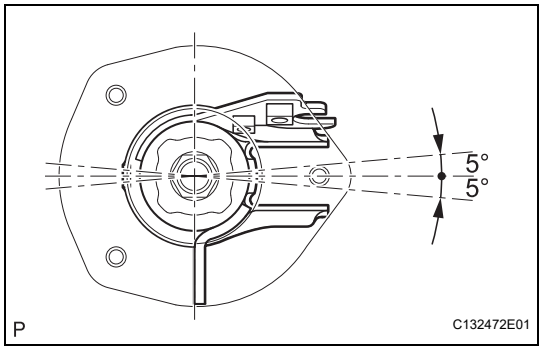


(f) Align the notches of the shock absorber with the notch of the rear suspension support assembly so that the notches face the outside of the vehicle.
(g) Install the rear shock absorber collar.
(h) Loosely tighten a new lock nut to the rear suspension piston rod.



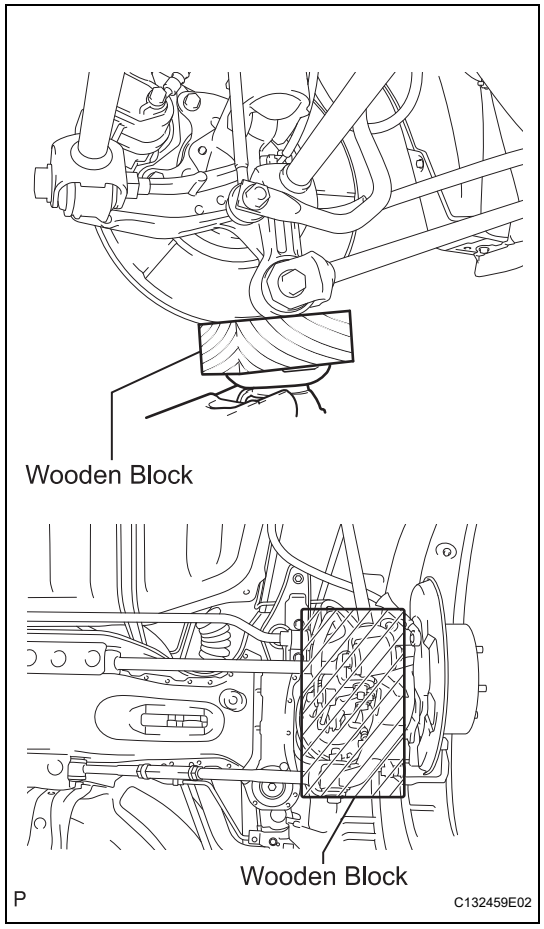
(i) Release the spring while adjusting the rear suspension support assembly to the position shown in the illustration, and remove the SST from the rear coil spring.
NOTICE:
Do not use an impact wrench.
HINT:
When lining up the rear suspension support assembly's stud bolts at the middle point between the two sides of the bracket, the maximum permissible degree of error is plus or minus 5°.

INSTALLATION

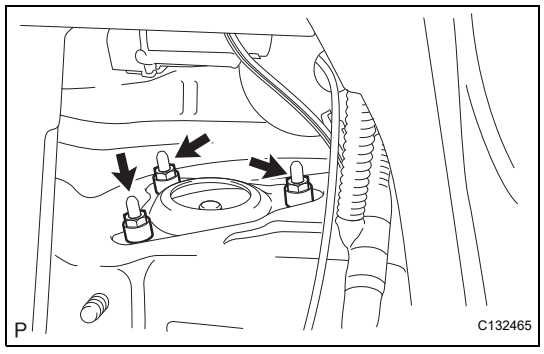
1. INSTALL REAR SHOCK ABSORBER WITH COIL SPRING

(a) Install the rear shock absorber with coil spring to the rear axle carrier assembly and insert the 2 bolts from the rear of the vehicle.

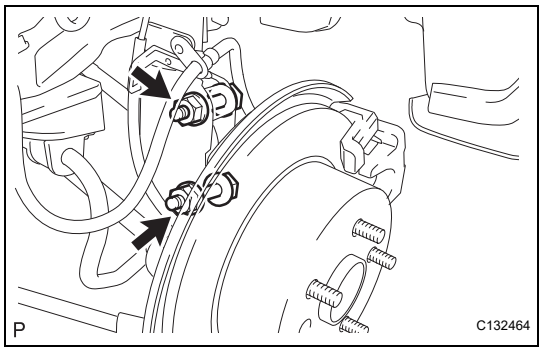
(b) Slowly jack up the vehicle using a wooden block and install the rear shock absorber with coil spring (upper side) to the vehicle.



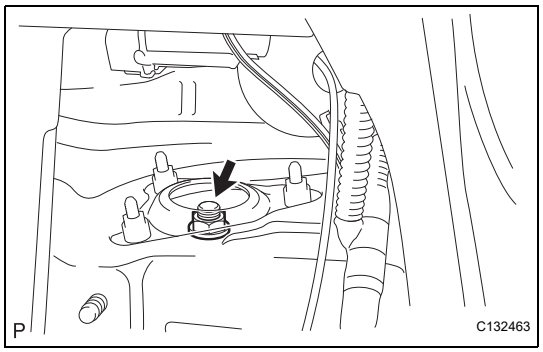
(c) Install the 3 nuts to the upper side of the rear shock absorber with coil spring.
Torque: 39 N*m (398 kgf*cm, 29 ft.*lbf)



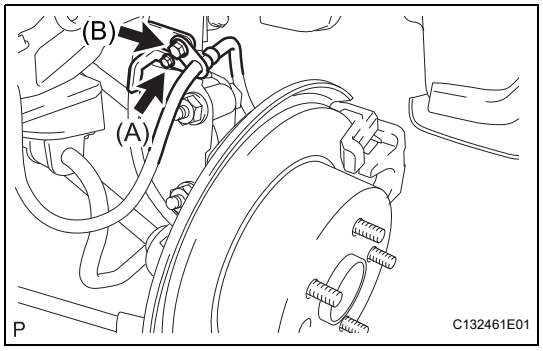
SP



(d) Install the 2 nuts and 2 bolts to the lower side of the rear shock absorber with coil spring.
Torque: 180 N*m (1,840 kgf*cm, 133 ft.*lbf)
NOTICE:
When installing the nuts, keep the bolts from rotating.

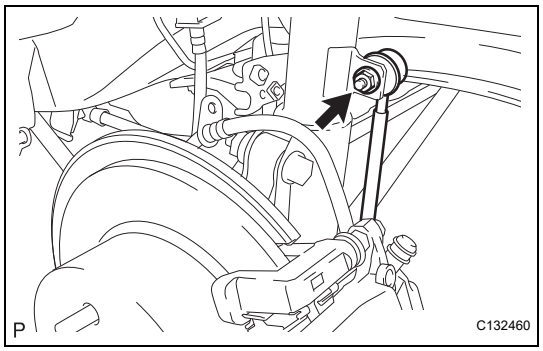


(e) Fully tighten the lock nut.
Torque: 55 N*m (561 kgf*cm, 41 ft.*lbf)



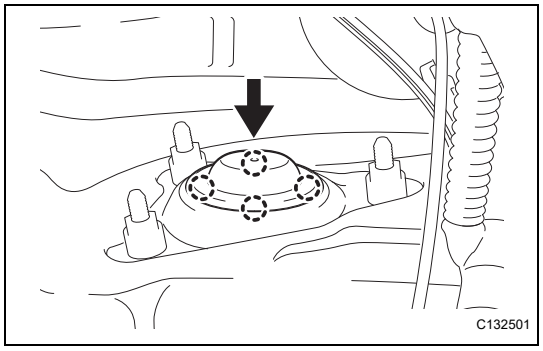
2. CONNECT REAR SPEED SENSOR

(a) Install the rear brake flexible hose and rear speed sensor wire harness with the 2 bolts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf) (bolt A)
19 N*m (194 kgf*cm, 14 ft.*lbf) (bolt B)



3. INSTALL REAR STABILIZER LINK ASSEMBLY LH

(a) Install the rear stabilizer link assembly LH to the rear shock absorber with the nut.
Torque: 39 N*m (398 kgf*cm, 29 ft.*lbf)
HINT:
If the ball joint turns together with the nut, use a hexagon wrench (5 mm) to hold the stud.



4. INSTALL REAR SUSPENSION SUPPORT NO. 1 COVER

(a) Engage the 4 claws and install the rear suspension support No. 1 cover.

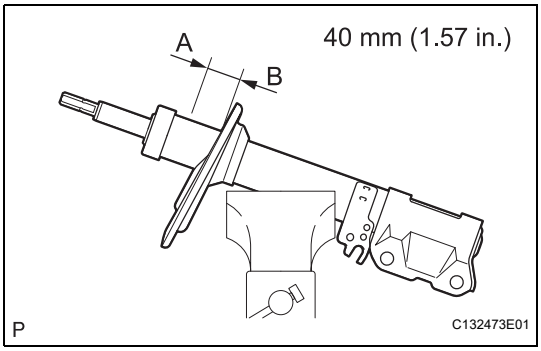
5. REMOVE REAR SIDE SEATBACK ASSEMBLY LH (See page SE-54)

6. REMOVE REAR SIDE SEATBACK ASSEMBLY RH

7. REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-54)

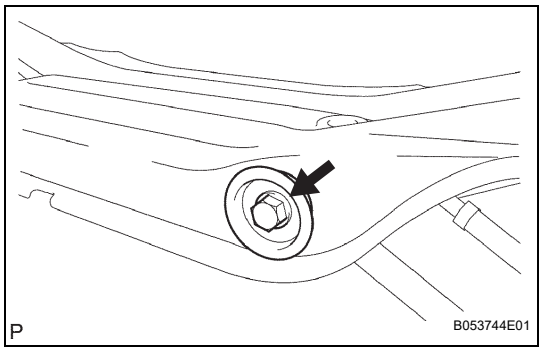
SP

8. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-54)**
9. **REMOVE REAR CENTER SEAT HEADREST ASSEMBLY**
10. **REMOVE REAR SEAT HEADREST ASSEMBLY**
11. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-55)**
12. **INSTALL REAR WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
13. **CHECK ABS SPEED SENSOR SIGNAL**
    (See page BC-35)
14. **INSPECT AND ADJUST REAR WHEEL ALIGNMENT**
    (See page SP-11)



DISPOSAL

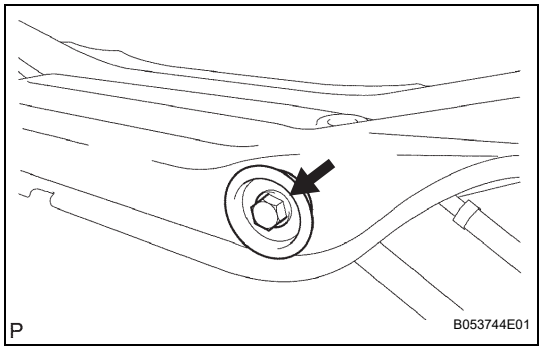
1. **DISPOSE OF REAR SHOCK ABSORBER**
   (a) Fully extend the shock absorber piston rod.
   (b) Using a drill, make a hole in the cylinder between A and B as shown in the illustration to discharge the gas inside.
   CAUTION:
   - **Be careful when drilling because shards of metal may fly about. Always use the proper safety equipment.**
   - **The gas is colorless, odorless and non-poisonous.**



18. REMOVE REAR NO. 1 SUSPENSION ARM LH

(a) Remove the bolt and rear No. 1 suspension arm assembly LH.

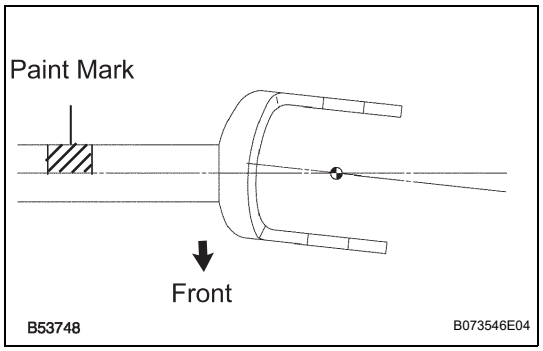
INSTALLATION



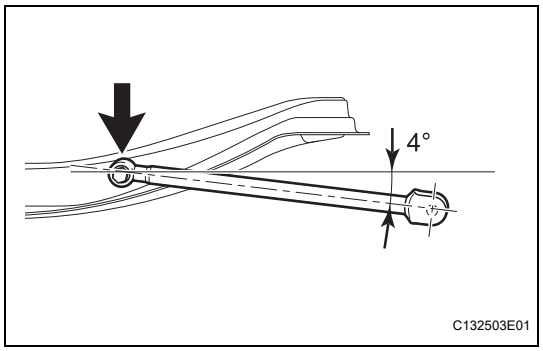
1. INSTALL REAR NO. 1 SUSPENSION ARM LH

(a) Install the rear No. 1 suspension arm (inner side) with the bolt, and temporarily tighten the bolt.

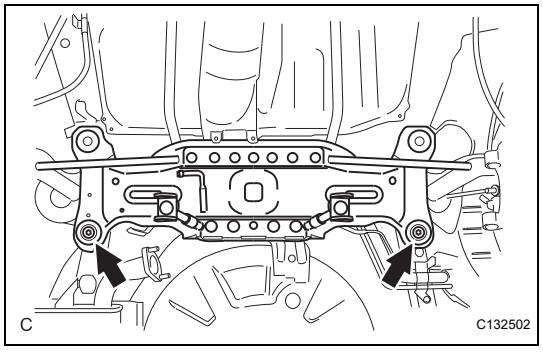
(1) Install the rear No. 1 suspension arm so that the bracket leans toward the front side of the vehicle as shown in the illustration.



(2) Ensure that the paint mark faces the rear side of the vehicle.



(b) Set the rear No.1 suspension arm in the position shown in the illustration, and fully tighten the bolt.
Torque: 100 N*m (1,020 kgf*cm, 74 ft.*lbf)

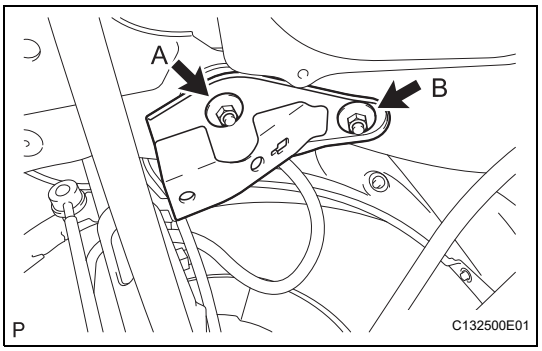


2. INSTALL REAR SUSPENSION MEMBER SUB-ASSEMBLY

(a) Raise the rear suspension member with a jack.

(b) Install the rear suspension member with the 2 bolts.
Torque: 56 N*m (571 kgf*cm, 41 ft.*lbf)

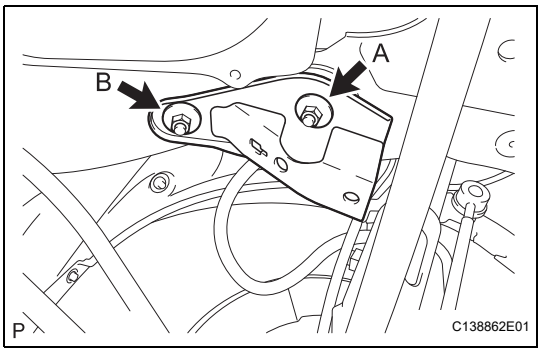
SP



3. INSTALL REAR SUSPENSION MEMBER LOWER STOPPER LH

(a) Install the rear suspension member lower stopper LH with the 2 nuts.

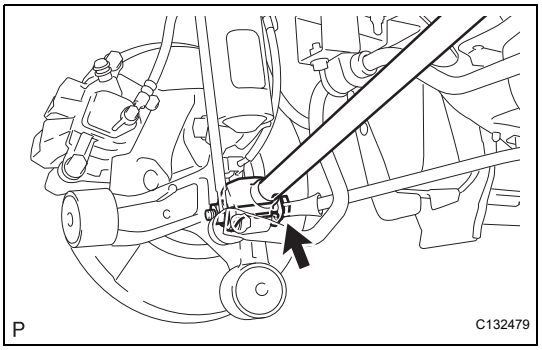
Torque: Nut A
55 N*m (561 kgf*cm, 41 ft.*lbf)
Nut B
38 N*m (388 kgf*cm, 28 ft.*lbf)



4. INSTALL REAR SUSPENSION MEMBER LOWER STOPPER RH

(a) Install the rear suspension member lower stopper RH with the 2 nuts.

Torque: Nut A
55 N*m (561 kgf*cm, 41 ft.*lbf)
Nut B
38 N*m (388 kgf*cm, 28 ft.*lbf)



5. TEMPORARILY TIGHTEN REAR NO. 1 SUSPENSION ARM LH

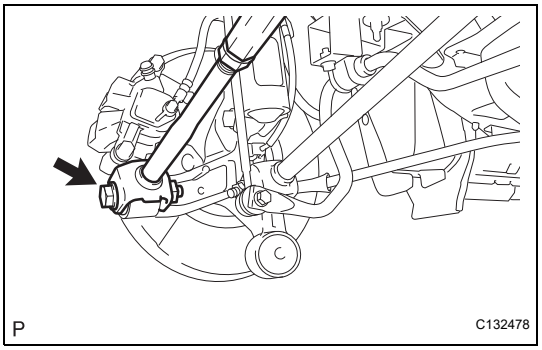
(a) Connect the rear No.1 suspension arm (outer side) to the rear axle carrier with the bolt and nut and temporarily tighten the bolt and nut.

NOTICE:
When temporarily tightening the bolt, keep the nut from rotating.

HINT:
Insert the bolt from the front of the vehicle and temporarily install the bolt.

6. TEMPORARILY TIGHTEN REAR NO. 1 SUSPENSION ARM RH

HINT:
Temporarily tighten the RH side using the same procedures as for the LH side.



7. TEMPORARILY TIGHTEN REAR NO. 2 SUSPENSION ARM LH

(a) Connect the rear No. 2 suspension arm (outer side) to the rear axle carrier with the bolt and nut and temporarily tighten the bolt.

NOTICE:
When temporarily tightening the bolt, keep the nut from rotating.

HINT:
Insert the bolt from the rear of the vehicle and temporarily install the bolt.

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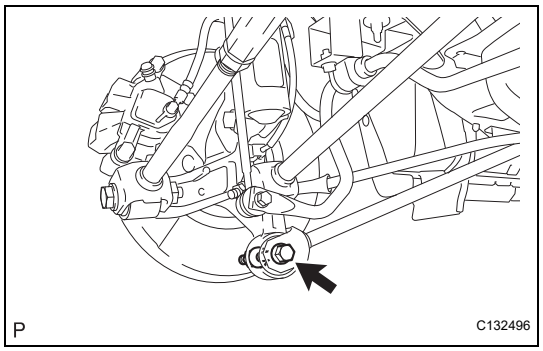
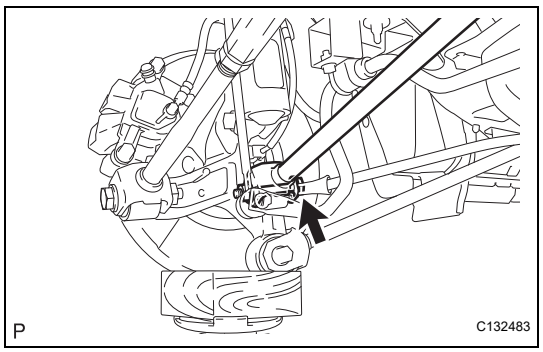
8. **TEMPORARILY TIGHTEN REAR NO. 2 SUSPENSION ARM RH**
HINT:
Temporarily tighten the RH side using the same procedures as for the LH side.



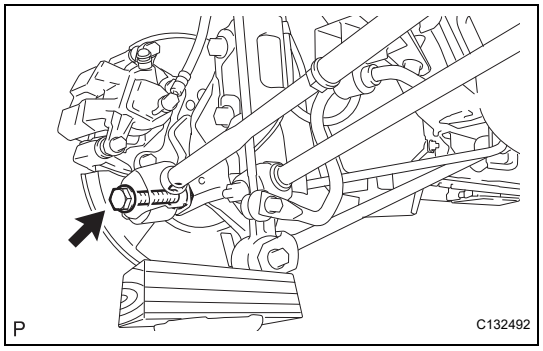
9. **TEMPORARILY TIGHTEN REAR STRUT ROD**
(a) Connect the rear strut rod assembly to the axle carrier with the bolt and nut and temporarily tighten the bolt.
NOTICE:
When temporarily tightening the bolt, keep the nut from rotating.
HINT:
Insert the bolt from the inside of the vehicle and temporarily install the bolt.

10. **STABILIZE SUSPENSION (See page SP-45)**



11. **FULLY TIGHTEN REAR NO. 1 SUSPENSION ARM LH**
(a) Fully tighten the bolt.
Torque: 100 N*m (1,020 kgf*cm, 74 ft.*lbf)

12. **FULLY TIGHTEN REAR NO. 1 SUSPENSION ARM RH**
HINT:
Fully tighten the RH side using the same procedures as for the LH side.



13. **FULLY TIGHTEN REAR NO. 2 SUSPENSION ARM LH**
(a) Fully tighten the bolt.
Torque: 100 N*m (1,020 kgf*cm, 74 ft.*lbf)

14. **FULLY TIGHTEN REAR NO. 2 SUSPENSION ARM RH**
HINT:
Fully tighten the RH side using the same procedures as for the LH side.

15. **FULLY TIGHTEN REAR STRUT ROD (See page SP-45)**

16. **INSTALL REAR STABILIZER BUSHING (See page SP-68)**

17. **INSTALL REAR STABILIZER BAR NO. 1 BRACKET (See page SP-68)**

18. **INSTALL REAR STABILIZER BAR**

19. **INSTALL REAR STABILIZER LINK ASSEMBLY LH (See page SP-68)**

20. **INSTALL REAR STABILIZER LINK ASSEMBLY RH (See page SP-69)**

21. **INSTALL CENTER EXHAUST PIPE ASSEMBLY (See page EX-4)**

22. **INSTALL FLOOR UNDER COVER NO. 1**

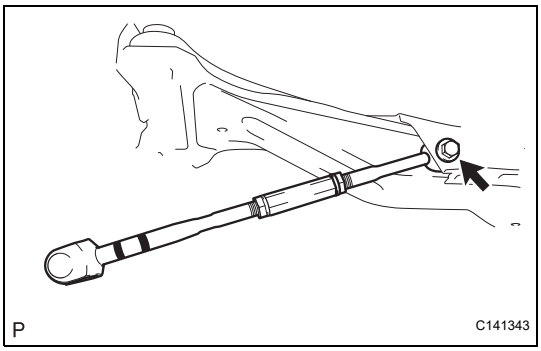
23. **INSTALL FLOOR UNDER COVER NO. 2**

24. **INSTALL REAR WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
25. **INSPECT FOR EXHAUST GAS LEAK (See page EX-5)**
26. **INSPECT AND ADJUST REAR WHEEL ALIGNMENT**
    (See page SP-11)

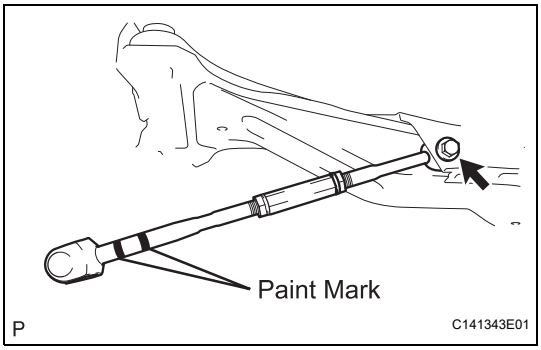
REMOVAL

NOTICE:
Check if an old gasket still remains on the pipe. If so, remove it. Also, check if any bolts or nuts are rusted. If so, replace them.

1. **REMOVE REAR WHEEL**
2. **REMOVE FLOOR NO. 1 UNDER COVER (See page SP-41)**
3. **REMOVE FLOOR NO. 2 UNDER COVER (See page SP-42)**
4. **REMOVE CENTER EXHAUST PIPE ASSEMBLY (See page EX-2)**
5. **SEPARATE REAR STABILIZER LINK ASSEMBLY LH (See page SP-51)**
6. **SEPARATE REAR STABILIZER LINK ASSEMBLY RH (See page SP-51)**
7. **REMOVE REAR STABILIZER BAR NO. 1 BRACKET (See page SP-67)**
8. **REMOVE REAR STABILIZER BAR**
9. **REMOVE REAR STABILIZER BUSHING (See page SP-67)**
10. **SEPARATE REAR STRUT ROD (See page SP-51)**
11. **SEPARATE REAR NO. 2 SUSPENSION ARM LH (See page SP-51)**
12. **SEPARATE REAR NO. 2 SUSPENSION ARM RH (See page SP-52)**
13. **SEPARATE REAR NO. 1 SUSPENSION ARM LH (See page SP-52)**
14. **SEPARATE REAR NO. 1 SUSPENSION ARM RH (See page SP-52)**
15. **REMOVE REAR SUSPENSION MEMBER LOWER STOPPER LH (See page SP-52)**
16. **REMOVE REAR SUSPENSION MEMBER LOWER STOPPER RH (See page SP-52)**
17. **REMOVE REAR SUSPENSION MEMBER SUB-ASSEMBLY (See page SP-52)**

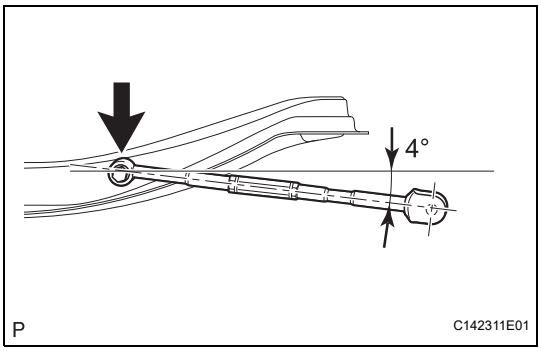


18. **REMOVE REAR NO. 2 SUSPENSION ARM LH**
    (a) Remove the bolt and the rear No. 2 suspension arm LH.



INSTALLATION

1. **INSTALL REAR NO. 2 SUSPENSION ARM LH**
    (a) Install the rear No. 2 suspension arm (inside) with the bolt, and temporarily tighten the bolt.
    HINT:
    Ensure that the paint mark faces to the rear of the vehicle.



    (b) Set the rear No. 2 suspension arm in the position shown in the illustration, and fully tighten the bolt.

2. **INSTALL REAR SUSPENSION MEMBER SUB-ASSEMBLY (See page SP-53)**
3. **INSTALL REAR SUSPENSION MEMBER LOWER STOPPER LH (See page SP-54)**
4. **INSTALL REAR SUSPENSION MEMBER LOWER STOPPER RH (See page SP-54)**
5. **TEMPORARILY TIGHTEN REAR NO. 1 SUSPENSION ARM LH (See page SP-54)**
6. **TEMPORARILY TIGHTEN REAR NO. 1 SUSPENSION ARM RH (See page SP-54)**
7. **TEMPORARILY TIGHTEN REAR NO. 2 SUSPENSION ARM LH (See page SP-54)**
8. **TEMPORARILY TIGHTEN REAR NO. 2 SUSPENSION ARM RH (See page SP-55)**
9. **TEMPORARILY TIGHTEN REAR STRUT ROD (See page SP-55)**
10. **STABILIZE SUSPENSION (See page SP-45)**
11. **FULLY TIGHTEN REAR NO. 1 SUSPENSION ARM LH (See page SP-55)**
12. **FULLY TIGHTEN REAR NO. 1 SUSPENSION ARM RH (See page SP-55)**
13. **FULLY TIGHTEN REAR NO. 2 SUSPENSION ARM LH (See page SP-55)**
14. **FULLY TIGHTEN REAR NO. 2 SUSPENSION ARM RH (See page SP-55)**

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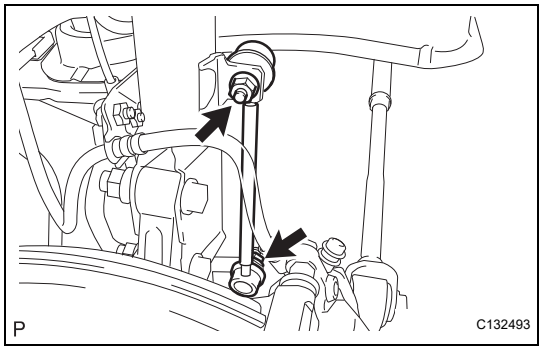
15. **FULLY TIGHTEN REAR STRUT ROD (See page SP-45)**
16. **INSTALL REAR STABILIZER BUSHING (See page SP-68)**
17. **INSTALL REAR STABILIZER BAR BRACKET NO. 1 (See page SP-68)**
18. **INSTALL REAR STABILIZER BAR (See page SP-68)**
19. **INSTALL REAR STABILIZER LINK ASSEMBLY LH (See page SP-68)**
20. **INSTALL REAR STABILIZER LINK ASSEMBLY RH (See page SP-69)**
21. **INSTALL EXHAUST CENTER PIPE ASSEMBLY (See page EX-4)**
22. **INSTALL FLOOR NO. 1 UNDER COVER (See page SP-46)**
23. **INSTALL FLOOR NO. 2 UNDER COVER (See page SP-46)**
24. **INSTALL REAR WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
25. **INSPECT AND ADJUST REAR WHEEL ALIGNMENT** (See page SP-11)
26. **INSPECT FOR EXHAUST GAS LEAK (See page EX-5)**

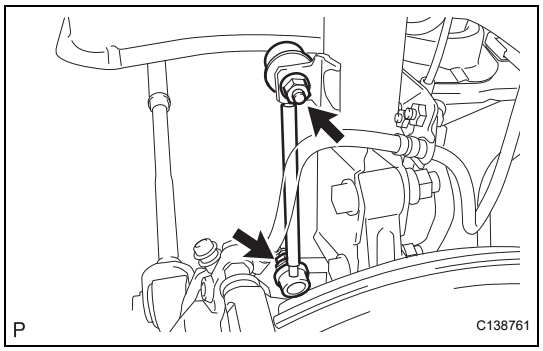
REMOVAL

NOTICE:
Check if an old gasket still remains on the pipe. If so, remove it. Also, check if any bolts or nuts are rusted. If so, replace them.

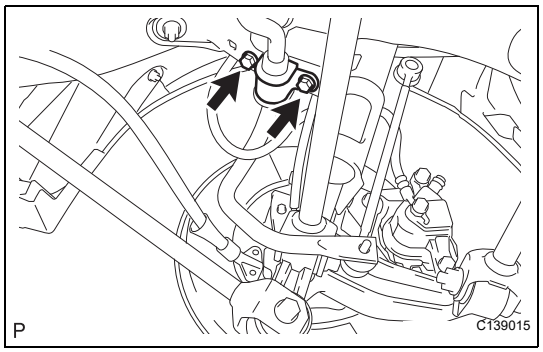
1. **REMOVE REAR WHEELS**
2. **REMOVE FLOOR NO. 1 UNDER COVER (See page SP-41)**
3. **REMOVE FLOOR NO. 2 UNDER COVER (See page SP-42)**
4. **REMOVE CENTER EXHAUST PIPE ASSEMBLY (See page EX-2)**
5. **REMOVE REAR STABILIZER LINK ASSEMBLY LH**
   (a) Remove the 2 nuts and rear stabilizer link assembly LH.
   HINT:
   If the ball joint turns together with the nut, use a hexagon wrench (5 mm) to hold the stud.



6. **REMOVE REAR STABILIZER LINK ASSEMBLY RH**
   (a) Remove the 2 nuts and rear stabilizer link assembly RH.
   HINT:
   If the ball joint turns together with the nut, use a hexagon wrench (5 mm) to hold the stud.



7. **REMOVE REAR STABILIZER BAR NO. 1 BRACKET**
   (a) Remove the 2 bolts and rear stabilizer bar No. 1 bracket.
8. **REMOVE REAR STABILIZER BUSHING**
   (a) Remove the 2 rear stabilizer bushings from the rear stabilizer bar.
9. **REMOVE REAR STABILIZER BAR**



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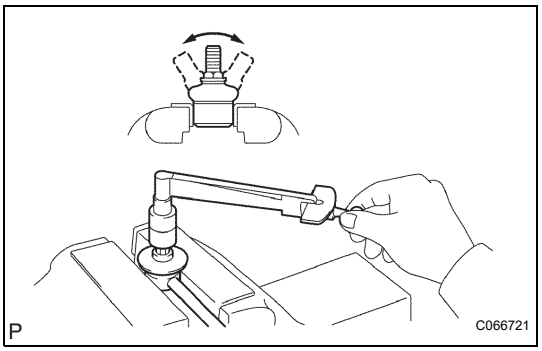


INSPECTION

1. INSPECT REAR STABILIZER LINK ASSEMBLY

(a) Inspect the turning of the ball joint.

(1) Secure the rear stabilizer link assembly in a vise using aluminum plates.

(2) Install the nut to the rear stabilizer link assembly stud.

(3) Using a torque wrench, turn the nut continuously at a rate of 3 to 5 seconds per turn and take the torque reading on the 5th turn.

Torque: Turning torque
0.05 to 1.0 N*m (0.5 to 10 kgf*cm, 0.4 to 8.9 in.*lbf)

HINT:
If the turning torque is not within the specified range, replace the rear stabilizer link assembly with a new one.

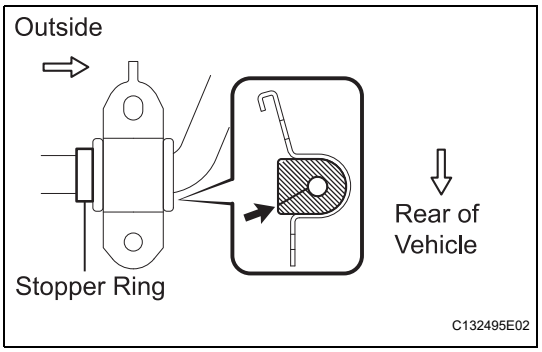
(b) Inspect the dust cover.

(1) Check that the dust cover is not cracked and that there is no grease on it.

INSTALLATION

1. INSTALL REAR STABILIZER BUSHING

(a) Install the 2 rear stabilizer bushings to the outside of the stopper ring on the stabilizer bar.



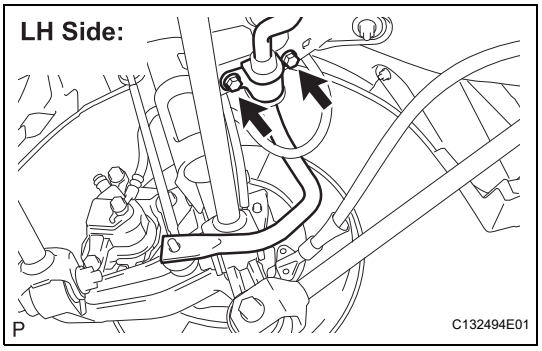
2. INSTALL REAR STABILIZER BAR NO. 1 BRACKET

(a) Install the rear stabilizer bar No. 1 bracket.

3. INSTALL REAR STABILIZER BAR

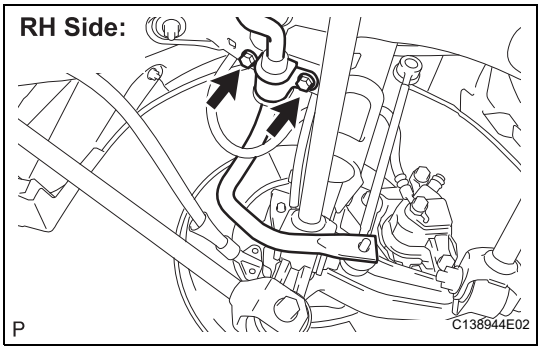
(a) Install the rear stabilizer bar with the 2 bolts. (LH Side)

Torque: 31 N*m (316 kgf*cm, 23 ft.*lbf)



(b) Install the rear stabilizer bar with the 2 bolts. (RH Side)

Torque: 31 N*m (316 kgf*cm, 23 ft.*lbf)



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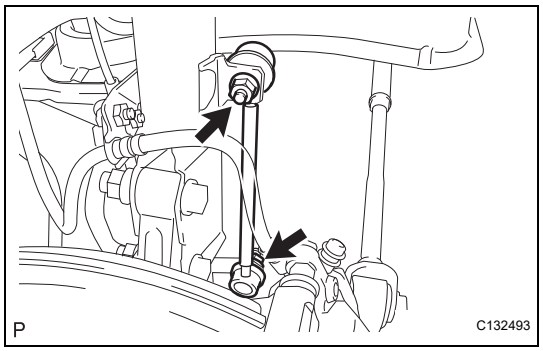
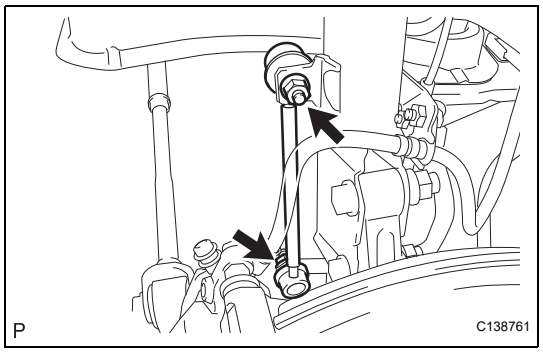
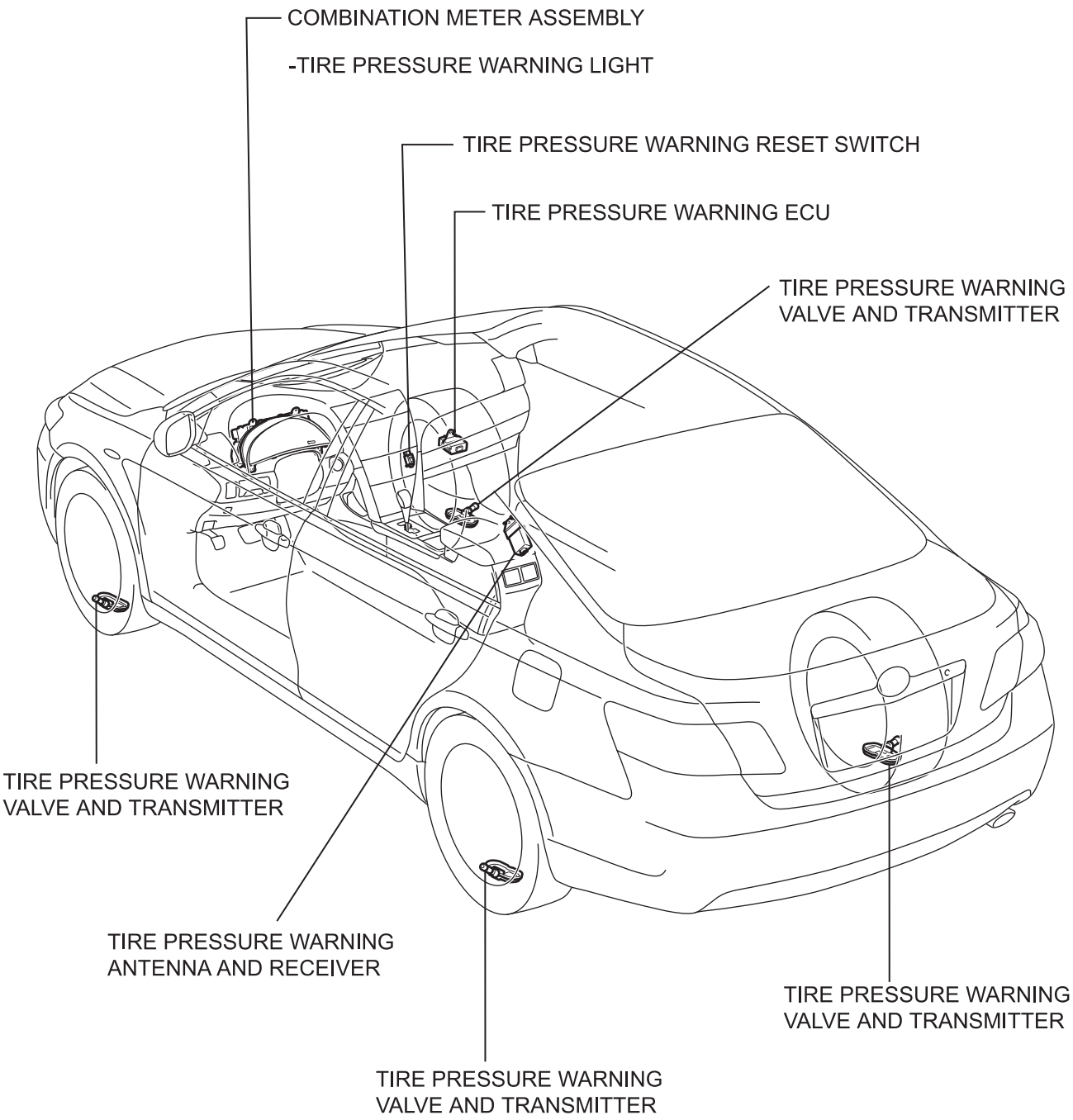


4. **INSTALL REAR STABILIZER LINK ASSEMBLY LH**
   (a) Install the rear stabilizer link assembly LH with the 2 nuts.
   Torque: 39 N*m (398 kgf*cm, 29 ft.*lbf)
   HINT:
   If the ball joint turns together with the nut, use a hexagon wrench (5 mm) to hold the stud.



5. **INSTALL REAR STABILIZER LINK ASSEMBLY RH**
   (a) Install the rear stabilizer link assembly RH with the 2 nuts.
   Torque: 39 N*m (398 kgf*cm, 29 ft.*lbf)
   HINT:
   If the ball joint turns together with the nut, use a hexagon wrench (5 mm) to hold the stud.
6. **INSTALL CENTER EXHAUST PIPE ASSEMBLY (See page EX-4)**
7. **INSTALL FLOOR NO. 1 UNDER COVER (See page SP-46)**
8. **INSTALL FLOOR NO. 2 UNDER COVER (See page SP-46)**
9. **INSTALL REAR WHEELS**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
10. **INSPECT EXHAUST GAS LEAK (See page EX-5)**

PARTS LOCATION



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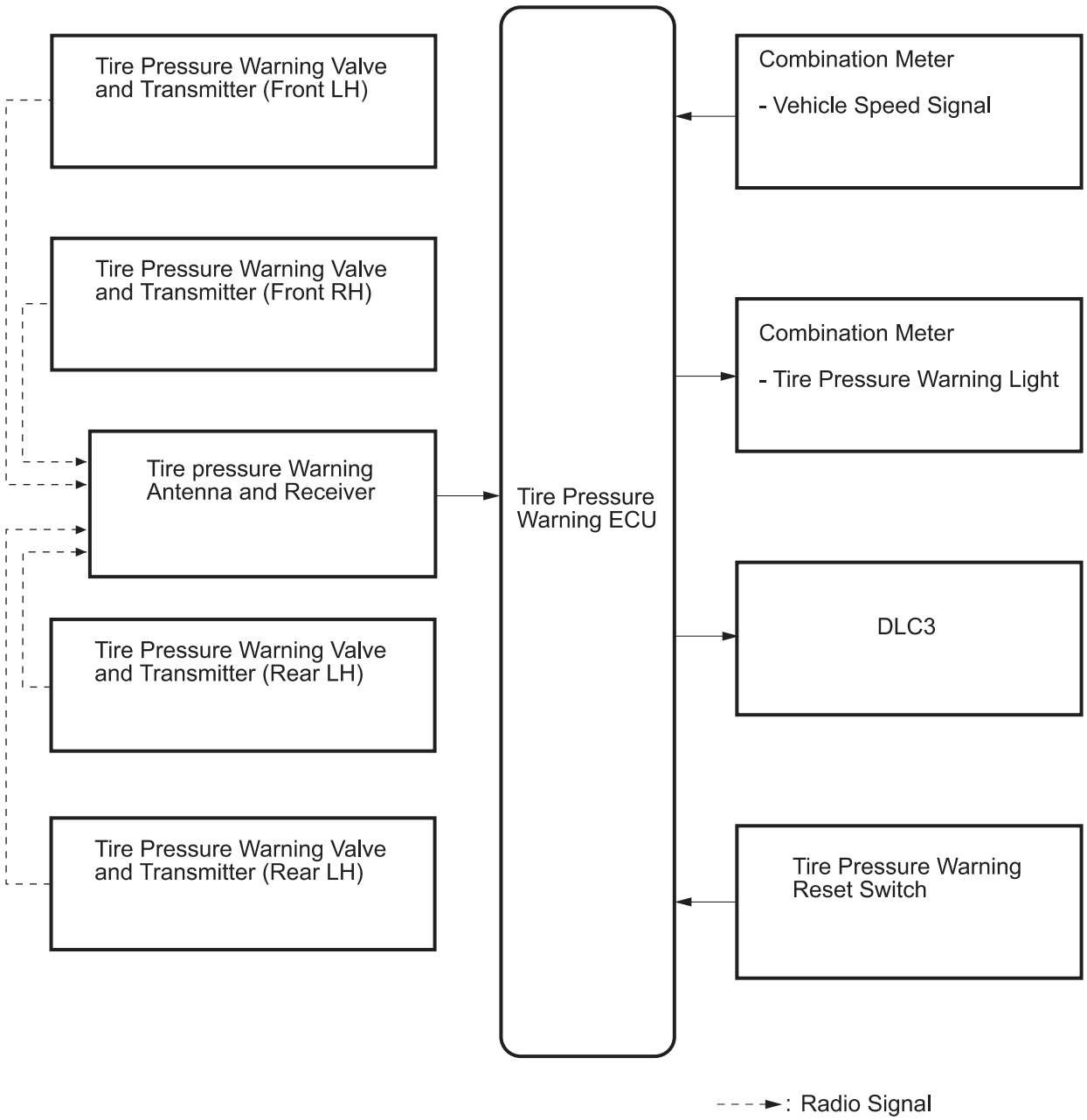
SYSTEM DIAGRAM

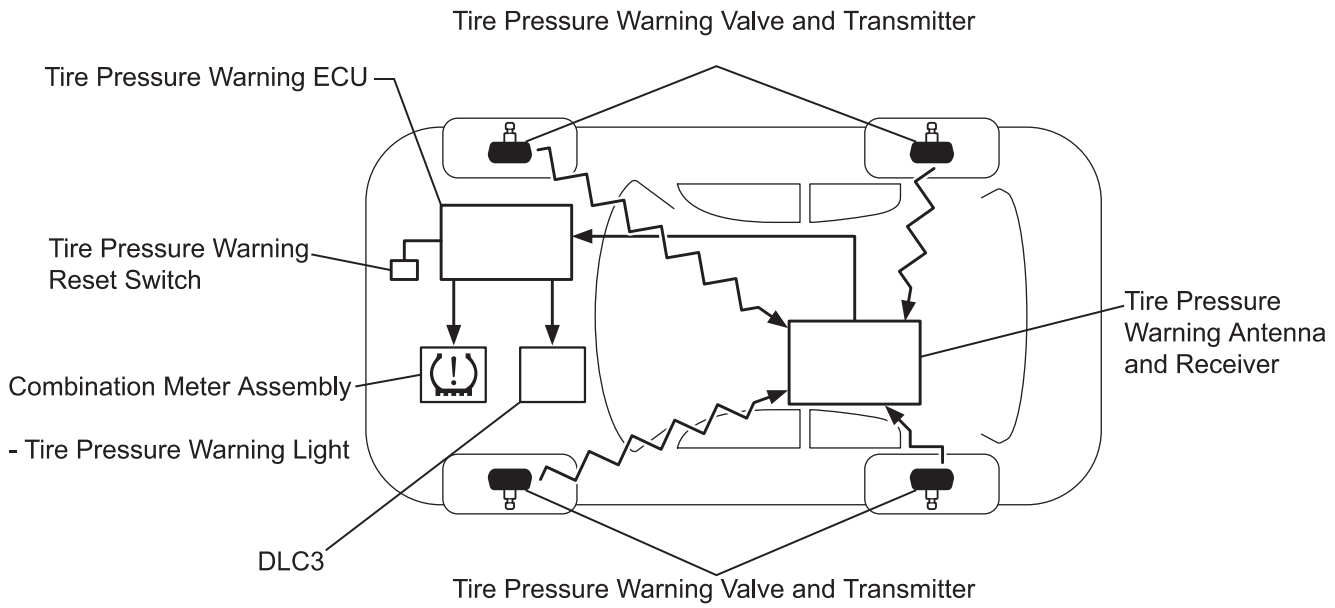


SYSTEM DESCRIPTION

1. DESCRIPTION OF SYSTEM

(a) A tire pressure warning valve and transmitter is equipped with a tire pressure sensor and a transmitter and is installed in a tire wheel assembly. The sensor measures the tire pressure. The measured value and transmitter ID are transmitted to the tire pressure warning antenna and receiver on the body as radio waves and then sent to the tire pressure warning ECU from the tire pressure warning antenna and receiver. If the transmitter ID has already been registered, the ECU compares the measured air pressure value with the standard value. When the value is less than the standard value registered in the tire pressure warning ECU, the warning light on the combination meter comes on.

- For the differences in the air pressure settings by the type of tires, a tire pressure warning reset switch has been adopted.



2. WHEN TIRE PRESSURE WARNING LIGHT IS LIT

(a) When the tire pressure warning light does not go off, or when it comes on during driving, check tire pressure. If the tire pressure warning light comes on within several hours after adjusting the tire pressure, the tire may have a slow air leak.

(b) Under the following conditions, the system may not function properly.

- Facilities or devices that use similar radio frequencies are located in the vicinity of the vehicle.

- A radio device of similar frequency is used in the vehicle.
- A large amount of snow or ice is stuck to the vehicle, especially onto the wheels and around the wheel houses.
- The battery of the sensor has been depleted.
- The tires without tire pressure warning valve and transmitter are used.
- Tire chains are used.
- If any wheels other than the specified ones are used, the system may not function properly because interference may prevent the radio waves from being correctly transmitted from the tire pressure warning valve and transmitter.
- Depending on the tire type, the system may not function properly even though the specified wheels are used.

(c) The average usage life of the grommet of the tire pressure warning valve and transmitter is approximately 5 years, at which time it must be replaced.
Re-tighten the valve nut if the valve is leaking air, although it is less than 5 years old and there is no problem with grommets.

(d) After removing and installing the ECU or a sensor, check for a diagnostic code and verify that it is a normal code.

3. FUNCTION OF COMPONENTS

Components	Function
Tire pressure warning valve and transmitter	Combined as a single unit with a disc wheel air valve, it measures tire pressure and temperature and transmits an ID number for measurement value and identification. Built-in the battery.
Tire pressure warning antenna and receiver	Receives and transmits a necessary signal from the transmitter to the tire pressure warning ECU.
Tire pressure warning ECU	Receives the signal from the receiver and identifies it as vehicle's own signal. If the measured value is equal to or lower than the specified value, it transmits a signal so that the air pressure warning light on the combination meter comes on.
Tire pressure warning light	Located in the combination meter, it informs the driver of lowered tire air pressure and system failure.
Tire pressure warning reset switch	Enters the initialization mode for tire or wheel replacement.

4. TIRE PRESSURE WARNING RESET SWITCH

- By operating the tire pressure warning reset switch, the tire pressure warning ECU can be set to issue a warning at an inflation pressure that corresponds to the type of tires.
  Therefore, the dealer must set the warning threshold to the proper value in order to comply with the local regulations.
- Operate the tire pressure warning reset switch only after the inflation pressures of all tires have been adjusted on the vehicle.

- To initialize the system, press and hold the tire pressure warning reset switch for 3 seconds or longer with the power switch on (IG). After the initialization process has started, the warning light blinks 3 times (1 second on, 1 second off).
- During initialization, the tire pressure warning valve and transmitter measures the inflation pressure of the tires, and registers the signals that are transmitted into the tire pressure warning ECU at a frequency of once per minute. The initialization process is completed when signals from the all tires have been received.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the tire pressure warning system.
- *: Use the intelligent tester.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 CUSTOMER PROBLEM ANALYSIS

NEXT

3 CHECK TIRE PRESSURE WARNING LIGHT AND INDICATOR CONDITION

(a) Turn the power switch on (IG).
(b) Record the condition of the tire pressure warning light on the combination meter assembly.
(c) Refer to the "TIRE PRESSURE WARNING LIGHT AND INDICATOR CHART" section of DIAGNOSIS SYSTEM for checking the condition of the tire pressure warning light (See page TW-24).

NEXT

4 DTC CHECK AND CLEAR*

Result

Result	Proceed to
DTC is output	A
DTC is not output	B

B → Go to step 6

A

5 DTC CHART

NEXT

Go to step 9

6	PROBLEM SYMPTOM CONFIRMATION

Result

Result	Proceed to
Symptom does not occur	A
Symptom occurs	B

B → Go to step 8

A

7	SYMPTOM SIMULATION

(a) Refer to ELECTRONIC CIRCUIT INSPECTION PROCEDURE (See page IN-67).

NEXT

Go to step 6

8	PROBLEM SYMPTOMS TABLE

NEXT

9	CIRCUIT INSPECTION*

NEXT

10	REPAIR

NEXT

11	CONFIRMATION TEST

(a) Check for a DTC (See page TW-28).
(b) Perform initialization (See page TW-17).
(c) Confirm that the initialization has been completed.

NEXT

END

REGISTRATION

1. DESCRIPTION OF CODE REGISTRATION

It is necessary to register the transmitter ID in the tire pressure warning ECU when replacing the tire pressure warning valve and transmitter and/or tire pressure warning ECU.

(a) Before registration

(1) In case of tire pressure warning ECU replacement.

- Read the registered transmitter IDs that are stored in the old ECU using the intelligent tester and note them down.
- If reading stored transmitter IDs is impossible due to malfunctions of components such as the tire pressure warning antenna and receiver, remove the tires from the wheels and check the IDs located on the tire pressure warning valves and transmitters (See page TW-5).

(2) In case of tire pressure warning valve and transmitter replacement.

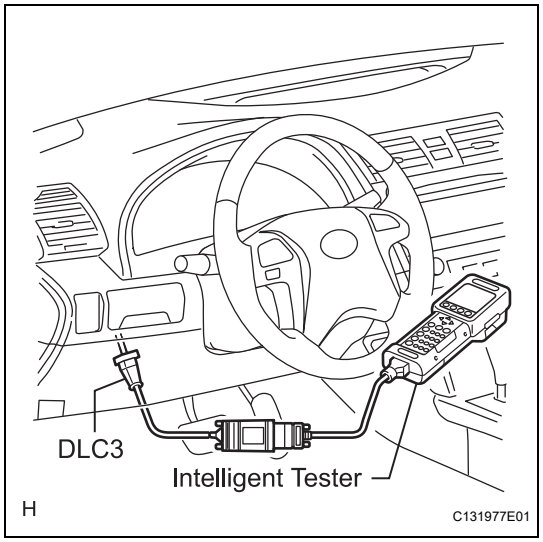
- When replacing the tire pressure warning valves and transmitters, note down the IDs written on the tire pressure warning valves and transmitters.

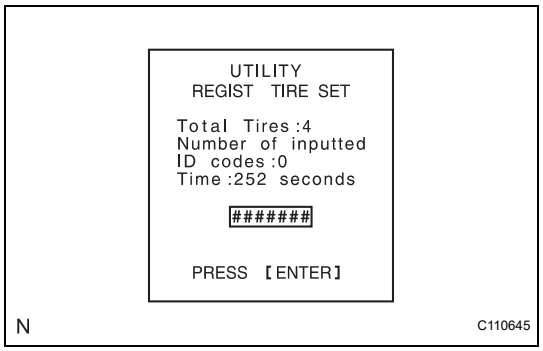
2. REGISTER TRANSMITTER ID

(a) Connect the intelligent tester to DLC3 (Procedure "A").

(b) Turn the power switch on (IG) (Procedure "B").

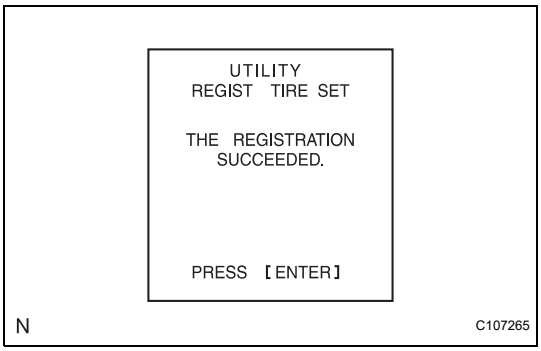
(c) Select REGIST TIRE following the intelligent tester screen (UTILITY - REGIST TIRE) (Procedure "C").





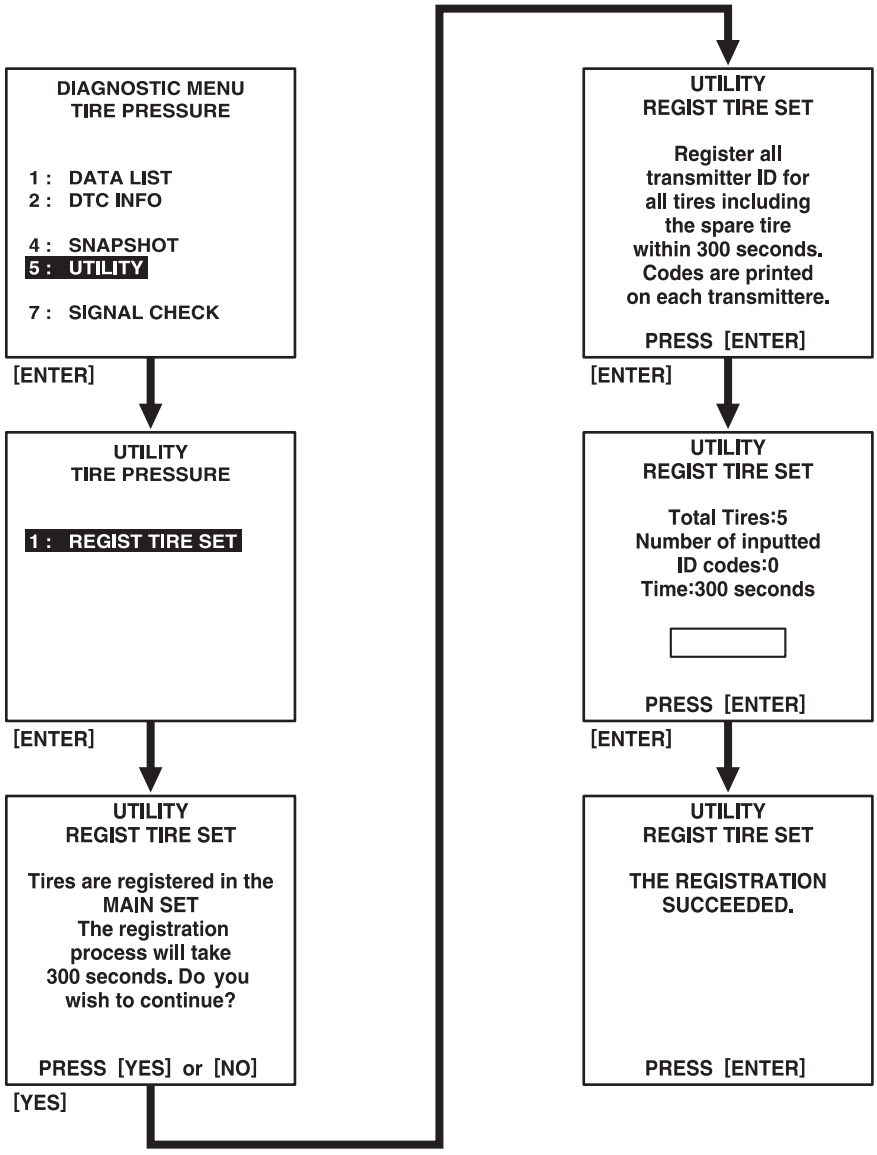
(d) Input the IDs (ID1 to ID4) using the intelligent tester and transmit them to the tire pressure warning ECU (Procedure "D").

TW



(e) Set the ID transmission condition to "ID Registration is complete" (Procedure "E").
HINT:
- The previously registered IDs will be deleted from the memory when the registration is completed.
- If the procedures "C" to "D" are not completed within 5 min. , the mode will return to the normal operation mode.
- When the system is in initialization mode after the tire pressure warning reset switch has been operated, the registration is disabled until the initialization process is canceled or completed.

Registration Procedure



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TW

3. CONFIRMATION OF TRANSMITTER ID REGISTRATION

(a) Connect the intelligent tester to DLC3 (power switch is off).
(b) Turn the power switch on (IG).
(c) Select "TIREPRESS" by following the prompts displayed on the intelligent tester.

(d) Confirm that the data of tire pressure of all tires are displayed on the intelligent tester screen.
NOTICE:
- **It may take up to 1 minute or more to update the tire pressure data.**
- **If the IDs have not been registered, some of DTC C2171/71 is set in the tire pressure warning ECU after 51 minutes or more.**

INITIALIZATION

1. DESCRIPTION OF INITIALIZATION

(a) Perform initialization in the following cases:
- Before delivery of a new vehicle.
- After replacement of the tire pressure warning ECU*.
- After replacement of the tire pressure warning valve and transmitter.
- Specified tire pressure changes depending on the size or type of the tire.

*: Perform initialization after the transmitter ID registration is completed (See page TW-14).

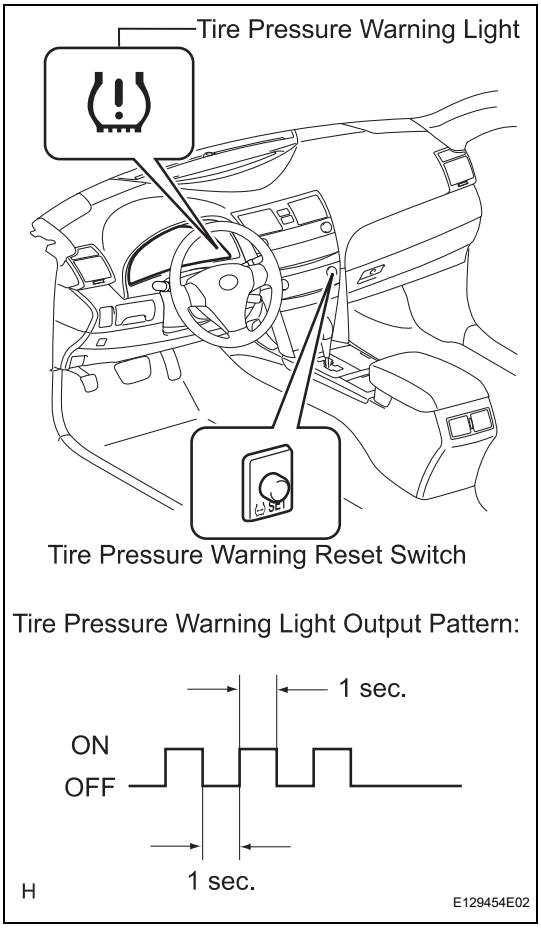
(b) Before initialization

(1) Set the air pressure of all wheels to the specified value.

Cold tire inflation pressure

Tire size	Front kPa (kgf/cm^2, psi)	Rear kPa (kgf/cm^2, psi)
P215/60R16 94V	220 (2.2, 32)	220 (2.2, 32)

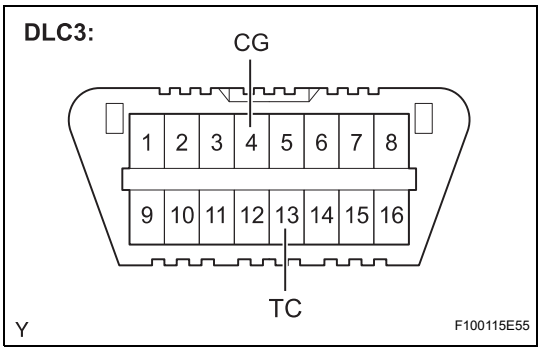
NOTICE:
Perform the tire pressure adjustment after the vehicle has sufficiently cooled down. If the vehicle is not sufficiently cooled down, increase the air pressure by 20 to 30 kPa (0.2 to 0.3 kgf/cm^2, 2.9 to 4.3 psi) above the specified value.



2. INITIALIZATION PROCEDURE

(a) Keep the tire pressure warning reset switch pressed for 3 seconds or more with the power switch on (IG).

(b) Check that the tire pressure warning light blinks 3 times (1 second ON, 1 second OFF).
HINT:
Initialization will be completed if signals are received from all wheels.



(c) Wait for 2 or 3 minutes with the power switch on (IG).
NOTICE:
- **The initialization is normally completed within 2 to 3 minutes.**
- **If the initialization has not been completed successfully, DTC C2177/77 is set approximately 20 minutes.**
- **The initialization can be terminated by making a short circuit between terminals TC and CG of the DLC3 connector.**

(d) Confirm that the initialization has been completed using the intelligent tester.
(1) Change the mode to test mode using the intelligent tester and check that the tire pressure warning light tire pressure warning light blinks at 0.125 second intervals.
HINT:
The tire pressure warning light will not blink until the system initialization is complete.
NOTICE:
The following operations can be used instead of above procedure:
1. Turn the power switch from off to on (IG).
2. Monitor the tire pressure values of all the wheels using the intelligent tester.

TW

3. If the tire pressure values cannot be displayed on the intelligent tester screen, the initialization has failed.

4. It takes 2 to 3 minutes to display the tire pressure data.

HINT:

- In winter, as the tire pressure may decrease depending on the ambient temperature, increase the tire pressure by 20 to 30 kPa (0.2 to 0.3 kgf/cm^2, 2.9 to 4.3 psi) above the specified value after confirmation that the initialization has been completed.

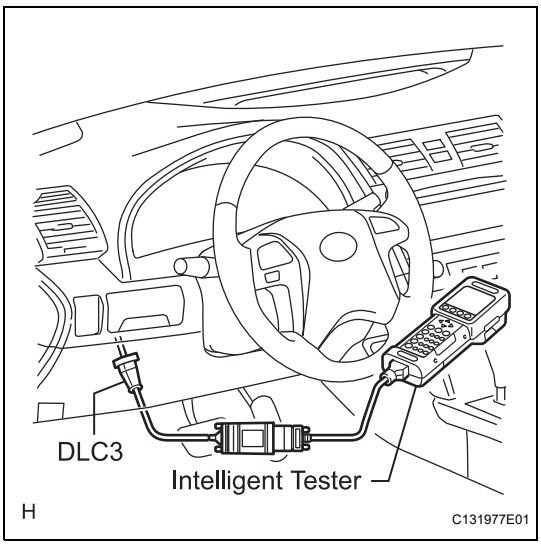
TEST MODE PROCEDURE

1. ENTER TEST MODE

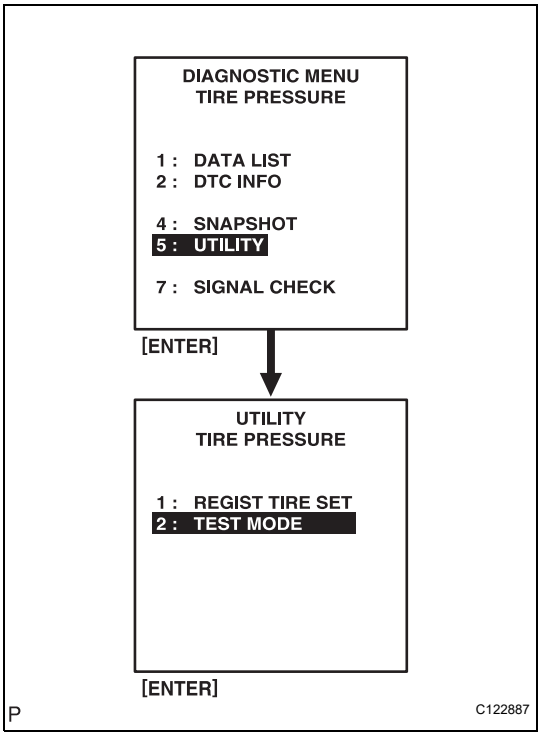
HINT:

- Operation of the tire pressure warning reset switch can be checked in TEST MODE.
- During TEST MODE, the system is not initialized by pushing the tire pressure warning reset switch. The circuit of the tire pressure warning reset switch can be inspected during this mode.

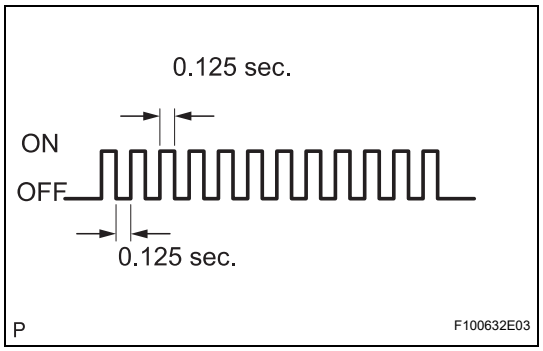
(a) Make sure that the power switch is off.
(b) Connect the intelligent tester to DLC3.
(c) Turn the power switch on (IG).
(d) Check that the tire pressure warning light comes on for 3 seconds and then goes off.



(e) Select TEST MODE on the intelligent tester.



TW



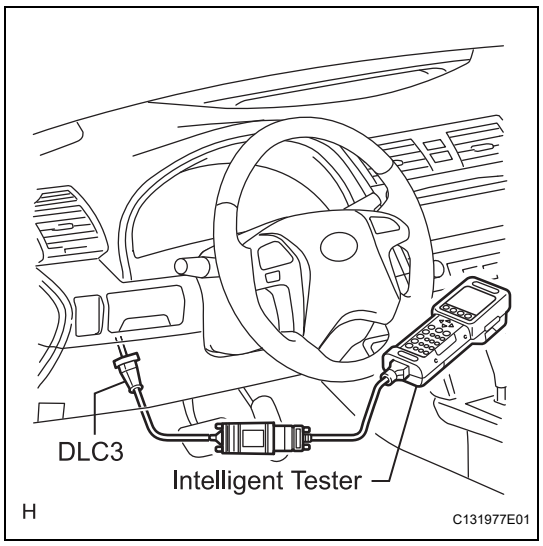
(f) Confirm that the tire pressure warning light in the combination meter blinks at 0.125 second intervals.

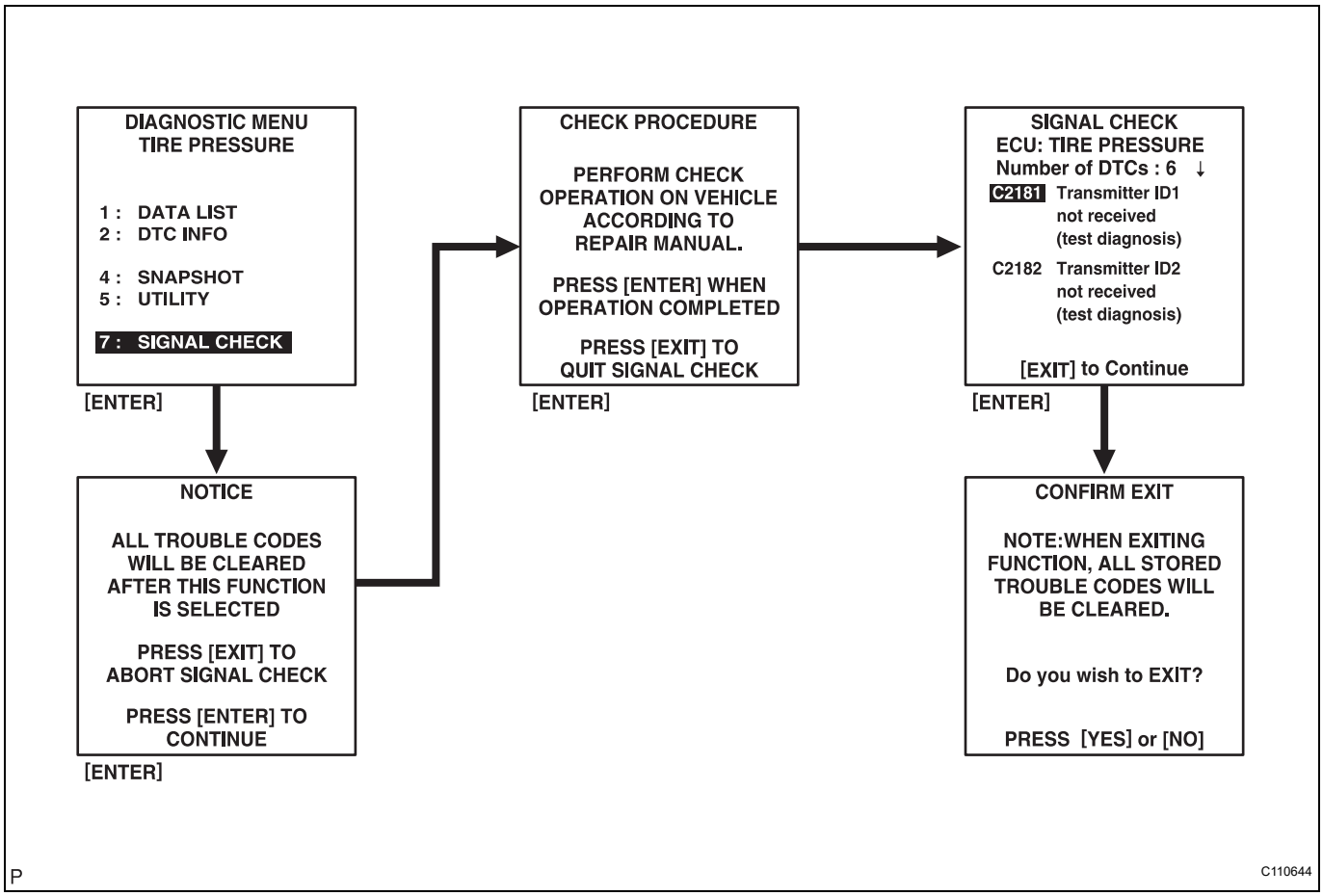
2. PERFORM SIGNAL CHECK

HINT:

- When entering signal check mode, the tire pressure warning ECU sets all the signal check DTCs first. After completing signal check for each inspection item, the DTCs for systems that are determined to be normal by the tire pressure warning ECU will be erased.
  The DTCs for other inspection items may not be erased when only a certain signal is inspected.
- When signal check returns to normal mode, all the signal check DTCs will be erased.

(a) Make sure that the power switch is off.
(b) Connect the intelligent tester to DLC3.
(c) Turn the power switch on (IG).
(d) Select SIGNAL CHECK on the intelligent tester.
HINT:
Every time the test mode DTC erasure conditions are satisfied, the tire pressure warning light comes on for 1 second. Then, the tire pressure warning light blinks at 0.125 second intervals.





(e) Drive the vehicle at 12 mph (20 km/h) or more for 10 seconds or more to check the vehicle speed signal (C2191/91).

(f) Loosen the valve core and rapidly reduce the pressure (at least 40 kPa (0.41 kg/cm^2, 5.8 psi) within 30 seconds or more) to check the transmitter data (C2181/81 to C2184/84).
HINT:
The transmitter ID can be transmitted by rapidly reducing the tire pressure.

(g) Check that the tire pressure warning system test mode DTCs are erased.

TW

SIGNAL CHECK DTC	Test Signal	Signal Check DTC Clear Condition
C2181/81 to C2184/84	Transmitter Data	Receive data from the transmitter which has a registered ID in the tire pressure warning ECU
C2191/91	Vehicle Speed Signal	Vehicle speed of 12 mph (20 km/h) or more is detected for 3 seconds or more

(h) Check the tire pressure warning reset switch.
(1) Press the tire pressure warning reset switch.
(2) Check the tire pressure warning light.

Test Signal	Normal Condition
Tire Pressure Warning Reset Switch	• Switch ON: TPWS indicator comes on • Switch OFF: TPWS indicator blinks

(i) Result
HINT:
After the signal check is completed, check for a DTC and signal check DTC to confirm the system status.

Condition	Procedure
SIGNAL CHECK DTC is output	Repair the faulty part and enter SIGNAL CHECK again
SIGNAL CHECK DTCs are cleared	No problem

(j) End of SIGNAL CHECK
After completing the test mode (SIGNAL CHECK), turn the power switch off and disconnect the intelligent tester.

DTC of SIGNAL CHECK (TEST DIAGNOSIS) function:
If a trouble code is displayed during the test mode DTC check, check the circuit listed for that code. For details of each code, refer to the relevant page listed under respective "DTC No." in the chart.

DTC No.	Detection Item	Trouble Area
C2181/81 (TW-36)	Transmitter ID1 not received	• Tire pressure warning valve and transmitter • Tire pressure warning antenna and receiver • Wire harness or connector • Tire pressure warning ECU
C2182/82 (TW-36)	Transmitter ID2 not received	• Tire pressure warning valve and transmitter • Tire pressure warning antenna and receiver • Wire harness or connector • Tire pressure warning ECU
C2183/83 (TW-36)	Transmitter ID3 not received	• Tire pressure warning valve and transmitter • Tire pressure warning antenna and receiver • Wire harness or connector • Tire pressure warning ECU
C2184/84 (TW-36)	Transmitter ID4 not received	• Tire pressure warning valve and transmitter • Tire pressure warning antenna and receiver • Wire harness or connector • Tire pressure warning ECU
C2191/91 (TW-61)	Vehicle speed signal error	• Vehicle speed sensor • Combination meter assembly • Wire harness or connector • Tire pressure warning ECU

PROBLEM SYMPTOMS TABLE

HINT:

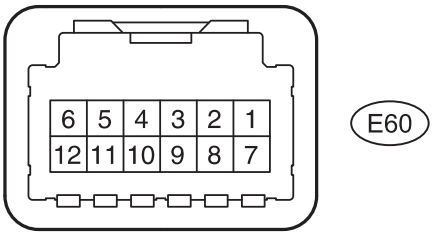
- Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

TIRE PRESSURE WARNING SYSTEM

Symptom	Suspected Area	See page
Tire pressure warning system does not operate.	1. Tire pressure warning valve and transmitter	-
	2. Tire pressure warning antenna and receiver	TW-51
	3. Power source circuit	TW-67
	4. TC and CG terminal circuit	TW-69
	5. Combination meter assembly	ME-14
	6. Tire pressure warning ECU	TW-79
DTC check cannot be done.	1. Power source circuit	TW-67
	2. TC and CG terminal circuit	TW-69
	3. Tire pressure warning ECU	TW-79
Tire pressure warning light malfunctions (Does not light up).	1. Power source circuit	TW-67
	2. Tire pressure warning light circuit	TW-65
	3. Combination meter assembly	ME-14
	4. Tire pressure warning ECU	TW-79
Tire pressure warning light malfunctions (Remains on).	1. Tire pressure check	TW-3
	2. Initialization	TW-17
	3. Tire pressure warning light circuit	TW-65
	4. Combination meter	TW-79
	5. Tire pressure warning ECU	-
Tire pressure warning light malfunctions (Blinking).	1. Check for DTC	TW-28
	2. Tire pressure warning ECU connector poorly connected	-
	3. TC and CG terminal circuit	TW-69
	4. Test mode (SIGNAL CHECK)	TW-19
	5. Tire pressure warning ECU	TW-79
Initialization cannot be done.	1. Test mode (SIGNAL CHECK)	TW-19
	2. Tire pressure reset switch	TW-63
	3. Tire pressure warning ECU	TW-79

TERMINALS OF ECU

HINT:
Inspect the connectors from the back side while the connectors are connected.



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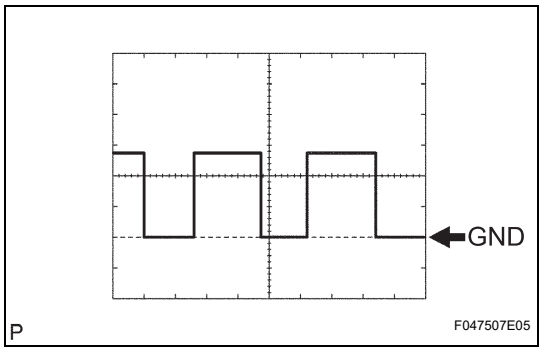
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IG (E60-7) - GND (E60-9)	B - W-B	IG power source	Power switch on (IG)	10 to 16 V
SPD (E60-2) - GND (E60-9)	V - W-B	Vehicle speed signal	Power switch on (IG)	Pulse generation (See waveform 1)
SIL (E60-10) - GND (E60-9)	GR - W-B	Diagnostic communication terminal	• Power switch on (IG) • Intelligent tester is connected to DLC3	Pulse generation (See waveform 2)
IND (E60-5) - GND (E60-9)	L - W-B	Tire pressure warning light signal	Power switch on (IG)	10 to 16 V
RF5V (E60-6) - GND (E60-9)	LC - W-B	Tire pressure warning antenna and receiver power source	Power switch on (IG)	4.5 to 5.5 V
CLSW (E60-1) - GND (E60-9)	O - W-B	Tire pressure warning reset switch	• Power switch on (IG) • Tire pressure warning reset switch on	8 to 15V
RDA (E60-12) - GND (E60-9)	G - W-B	Tire pressure warning antenna and receiver signal	• Power switch on (IG) • The tire pressure warning antenna and receiver is not connected	9 to 16 V
GND2 (E60-11) - GND (E60-9)	BR - W-B	Tire pressure warning antenna and receiver ground	Always	Below 1 Ω



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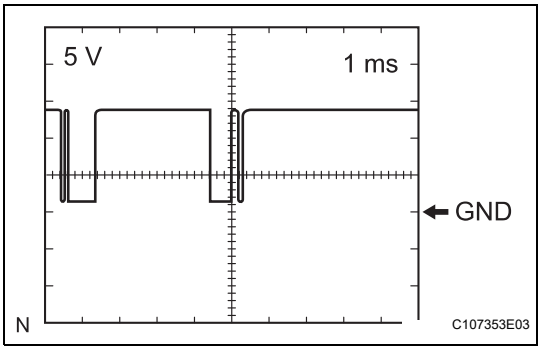
1. Waveform 1 (Reference)

(a) Waveform

Item	Contents
Terminal	SPD - GND
Tool setting	5V/DIV., 200ms/DIV.
Vehicle condition	While driving at approximately 12 mph (20 km/h).

TW



2. Waveform 2 (Reference)

(a) Waveform

Item	Contents
Terminal	SIL - Body ground
Tool setting	5 V/DIV., 1 ms./DIV.
Vehicle condition	Communicating using intelligent tester

DIAGNOSIS SYSTEM

1. CHECK BATTERY VOLTAGE

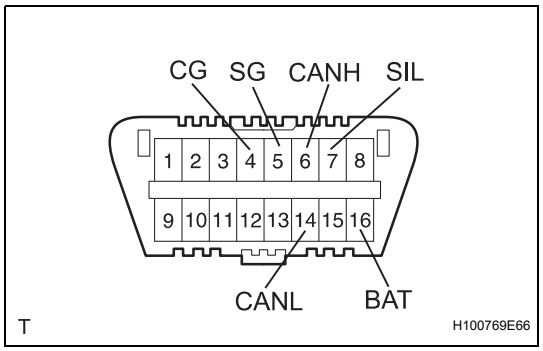
Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge the battery before proceeding to the next step.

2. CHECK DLC3

(a) The ECU uses ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.



Symbols (Terminal NO.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	CAN bus line	Power switch off*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Power switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Power switch off*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Power switch off*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Power switch off*	6 kΩ or higher

NOTICE:

***Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, or any other switches or the doors.**

(b) If the result is not as specified, DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

Connect the cable of the intelligent tester to DLC3, turn the power switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

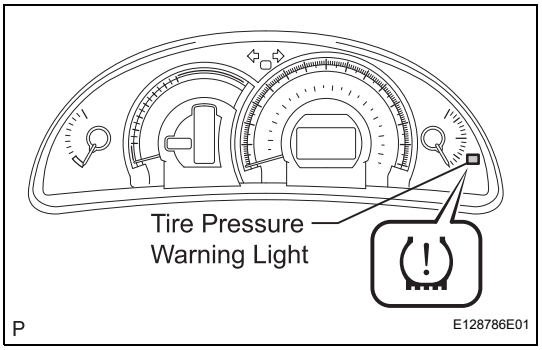
3. DIAGNOSIS SYSTEM

(a) DTCs (Normal mode)

(1) DTCs are memorized in the tire pressure warning ECU and read by the blinks of the tire pressure warning light or by using the intelligent tester (See page TW-28).

(b) Test mode

(1) By switching from normal mode into test mode (input signal check), you can inspect the tire pressure warning antenna and receiver, each tire pressure warning valve and transmitter, and vehicle speed sensor (See page TW-19).



4. CHECK WARNING LIGHT

(a) Turn the power switch on (IG).

(b) Check that the tire pressure warning light comes on for 3 seconds.

If the warning check result is not normal, proceed to the troubleshooting for the tire pressure warning light circuit.

Trouble Area	See procedure
Tire pressure warning light circuit	TW-65

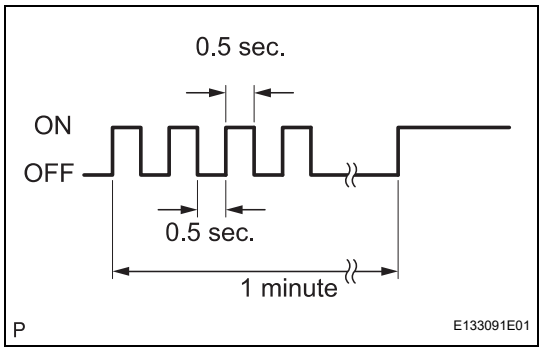
5. TIRE PRESSURE WARNING LIGHT AND INDICATOR CHART

HINT:

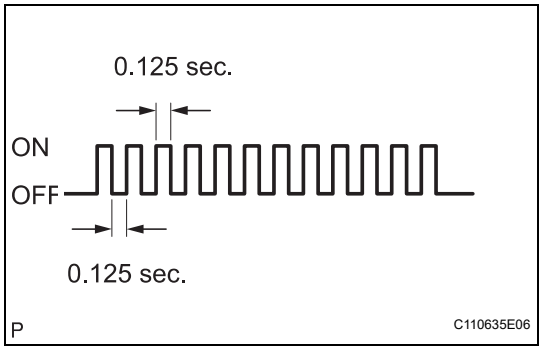
The table below indicates the state of the tire pressure warning light and indicator after the power switch is turned on (IG).

	Immediately after turning the power switch on (IG)	Always						
		Warning light output pattern						
	Comes on for 3 sec.	Goes off	Comes on	Blinks (*1)	Blinks (*2)	Blinks (*3)	Blinks (*4)	Outputs DTC
Normal	○	○	-	-	-	-	-	-
Low tire pressure	○	-	○	-	-	-	-	-
System fail	○	-	-	○	-	-	-	-
Test mode	○	-	-	-	○	-	-	-
Initialization	○	-	-	-	-	○	-	-
ECU connector poorly connected	-	-	-	○	-	-	-	-
TC ground (DTC is output)	○	-	-	-	-	-	-	○
TC ground (DTC is not output)	○	-	-	-	-	-	○	-

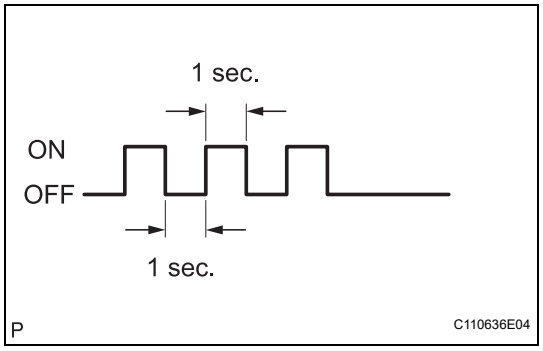
TW



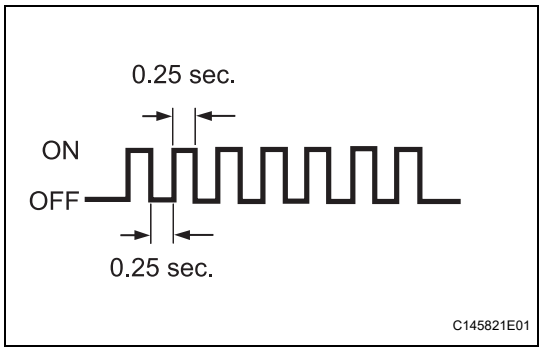
*1: Comes on and goes off repeatedly at 0.5 second intervals, and comes on after 1 minute.



*2: Comes on and goes off repeatedly at 0.125 second intervals.



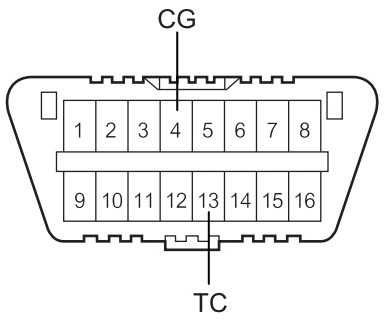
*3: Blinks 3 times (1 second on, 1 second off).

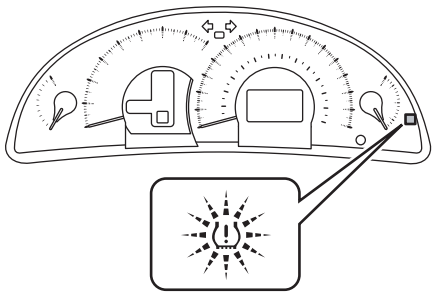


*4: Comes on and goes off repeatedly at 0.25 second intervals.

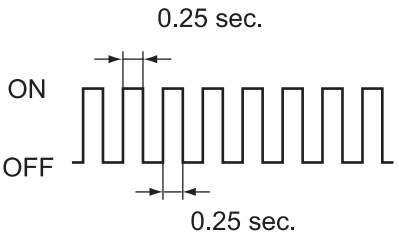
TW

DLC3:

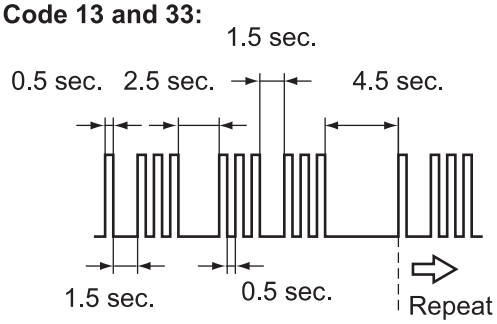




Normal System Code:



Code 13 and 33:



H

E129455E01

DTC CHECK / CLEAR

1. DTC CHECK (USING SST CHECK WIRE)

(a) Check for DTCs.

(1) Using SST, connect terminals TC and CG of DLC3.
SST 09843-18040

(2) Turn the power switch on (IG).

(3) Read and record any DTCs from the tire pressure warning light on the combination meter. Refer to the illustration on the left for examples of a normal system code and codes 13 and 33.
HINT:

- If the tire pressure warning light does not indicate any DTCs or the normal system code, inspect the tire pressure warning light circuit or TC and CG terminal circuit.

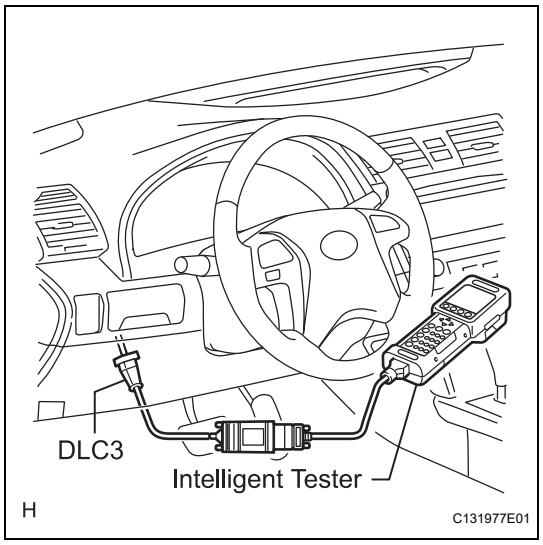
Trouble Area	See procedure
Tire pressure warning light circuit	TW-65
TC and CG terminal circuit	TW-69

- If 2 or more malfunctions are indicated at the same time, the lowest numbered DTC is displayed first.

(4) Refer to the Diagnostic Trouble Code Chart (See page TW-31) for DTC information.

(5) After completing the check, turn the power switch off and remove the SST from DLC3.
SST 09843-18040

TW



2. DTC CHECK (USING INTELLIGENT TESTER)

(a) Check for DTCs.
  (1) Connect the intelligent tester to the DLC3.
  (2) Turn the power switch on (IG).
  (3) Read the DTCs following the prompts on the tester screen.
    HINT:
    Refer to the intelligent tester operator's manual for further details.

(b) Clear the DTCs.
  HINT:
  After repairing the malfunctions, clear the DTCs.
  (1) Connect the intelligent tester to DLC3.
  (2) Turn the power switch on (IG).
  (3) Clear the DTCs following the prompts on the tester screen.
    HINT:
    Refer to the intelligent tester operator's manual for further details.

DATA LIST / ACTIVE TEST

1. DATA LIST

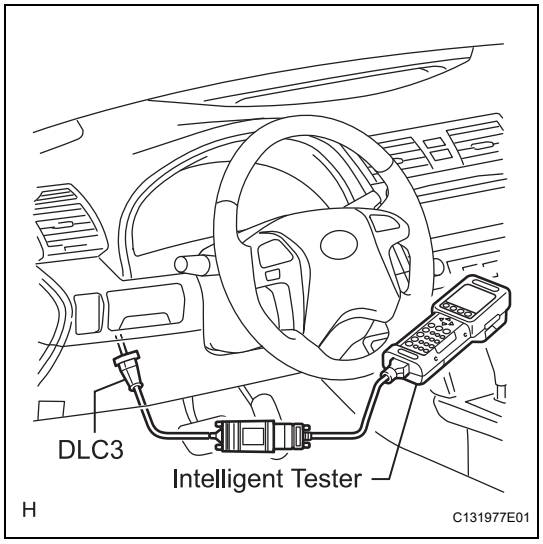
(a) Connect the intelligent tester to DLC3.
(b) Turn the power switch on (IG).
(c) Following the display on the intelligent tester, read "DATA LIST".

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
MODE STATUS	Tire pressure warning system mode/NORMAL or REG 2nd or REG M or TEST	NORMAL: Normal mode TEST: Test mode	-
MAIN TIRE	Number of main tire ID to be registered/ 0 or 1 or 2 or 3 or 4	0 to 4 should be displayed	-
INITIAL SW	Tire pressure warning reset switch/ON, OFF	ON: Switch on OFF: Switch off	-
VEHICLE SPEED	Vehicle speed reading/ min.: 0 km/h (0 mph), max.: 255 km/h (158 mph)	Actual vehicle speed	Speed indicated on the combination meter
REGIT ID1 CODE	Registered ID1 code/min.: 0, max.: FFFFFFF	The ID No. registered in the transmitter ID1 is displayed	-
REGIT ID2 CODE	Registered ID2 code/min.: 0, max.: FFFFFFF	The ID No. registered in the transmitter ID2 is displayed	-
REGIT ID3 CODE	Registered ID3 code/min.: 0, max.: FFFFFFF	The ID No. registered in the transmitter ID3 is displayed	-
REGIT ID4 CODE	Registered ID4 code/min.: 0, max.: FFFFFFF	The ID No. registered in the transmitter ID4 is displayed	-
TRANS STATUS	ID code transmission status/ FINISH or NOW	FINISH or NOW	-
TIREPRESS1	ID1 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS2	ID2 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS3	ID3 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS4	ID4 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIRE TEMP1	ID1 temperature in tire/ min.: -40°C (-40°F), max.: 215°C (419°F)	Actual tire temperature	-
TIRE TEMP2	ID2 temperature in tire/ min.: -40°C (-40°F), max.: 215°C (419°F)	Actual tire temperature	-
TIRE TEMP3	ID3 temperature in tire/ min.: -40°C (-40°F), max.: 215°C (419°F)	Actual tire temperature	-
TIRE TEMP4	ID4 temperature in tire/ min.: -40°C (-40°F), max.: 215°C (419°F)	Actual tire temperature	-
BATT VOLT1	ID1 battery voltage/ OVER or LESS	OVER	-
BATT VOLT2	ID2 battery voltage/ OVER or LESS	OVER	-
BATT VOLT3	ID3 battery voltage/ OVER or LESS	OVER	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
BATT VOLT4	ID4 battery voltage/ OVER or LESS	OVER	-
INITIAL SW INFO	Tire pressure warning reset switch setting information/ WITH or WITHOUT	WITH or WITHOUT	-
INIT THRESHOLD1	ID1 initial threshold of low-pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Tire pressure after initialization	-
INIT THRESHOLD2	ID2 initial threshold of low-pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Tire pressure after initialization	-
INIT THRESHOLD3	ID3 initial threshold of low-pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Tire pressure after initialization	-
INIT THRESHOLD4	ID4 initial threshold of low-pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Tire pressure after initialization	-
# CODES	Number of DTC recorded/ min.: 0, max.: 255	Min.: 0, Max.: -	-

METER:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
SPEED METER	Vehicle speed/Min.: 0 km/h (0 mph), Max.: 255 km/h (158 mph)	Almost same as actual vehicle speed (When driving)	-



2. ACTIVE TEST

Performing the ACTIVE TEST using the intelligent tester allows the meters, indicators and so on to operate without parts removal. Performing the ACTIVE TEST as the first step in troubleshooting is one way to save diagnostic time. It is possible to display the DATA LIST on the intelligent tester during the ACTIVE TEST.

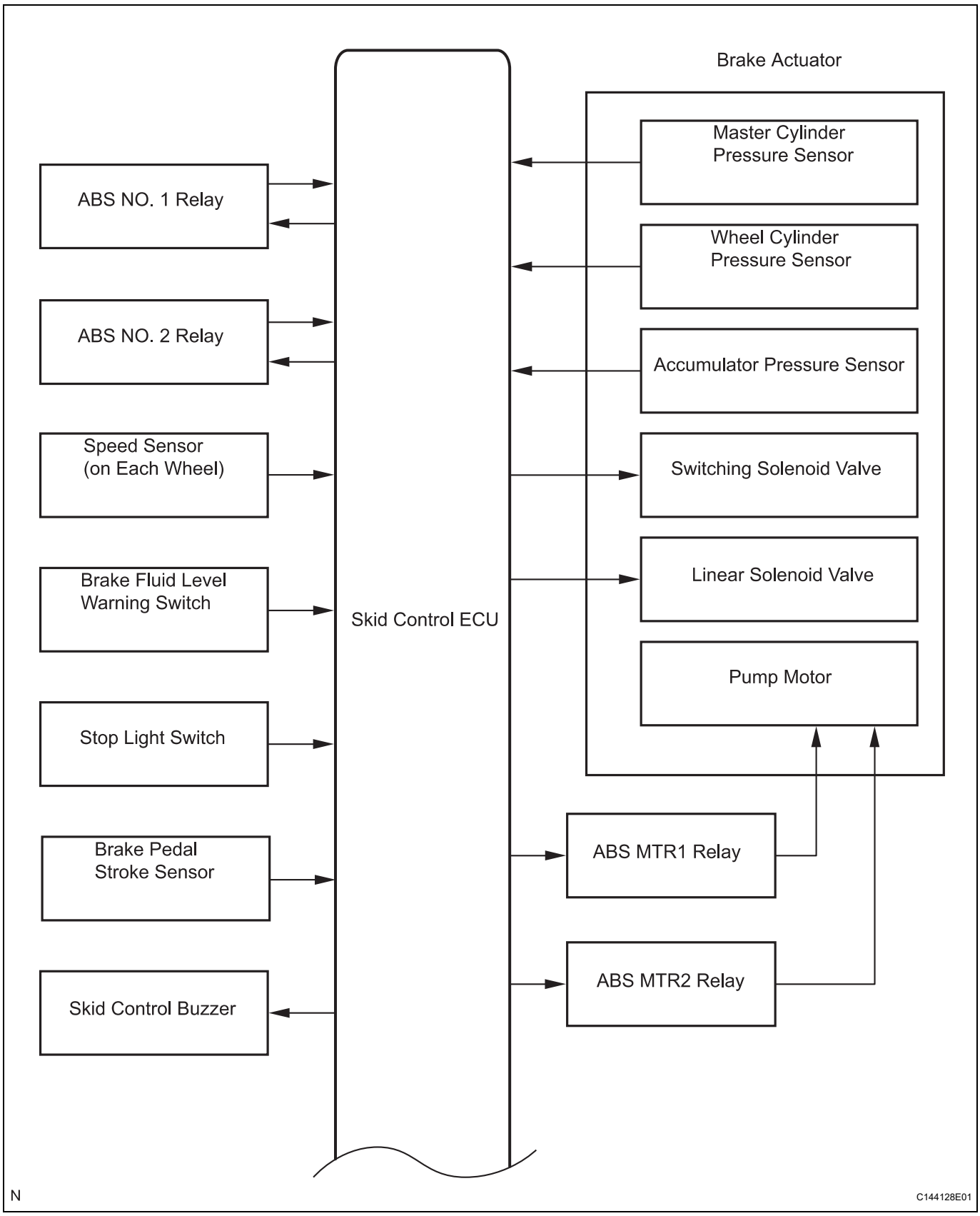
(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / METER / ACTIVE TEST.

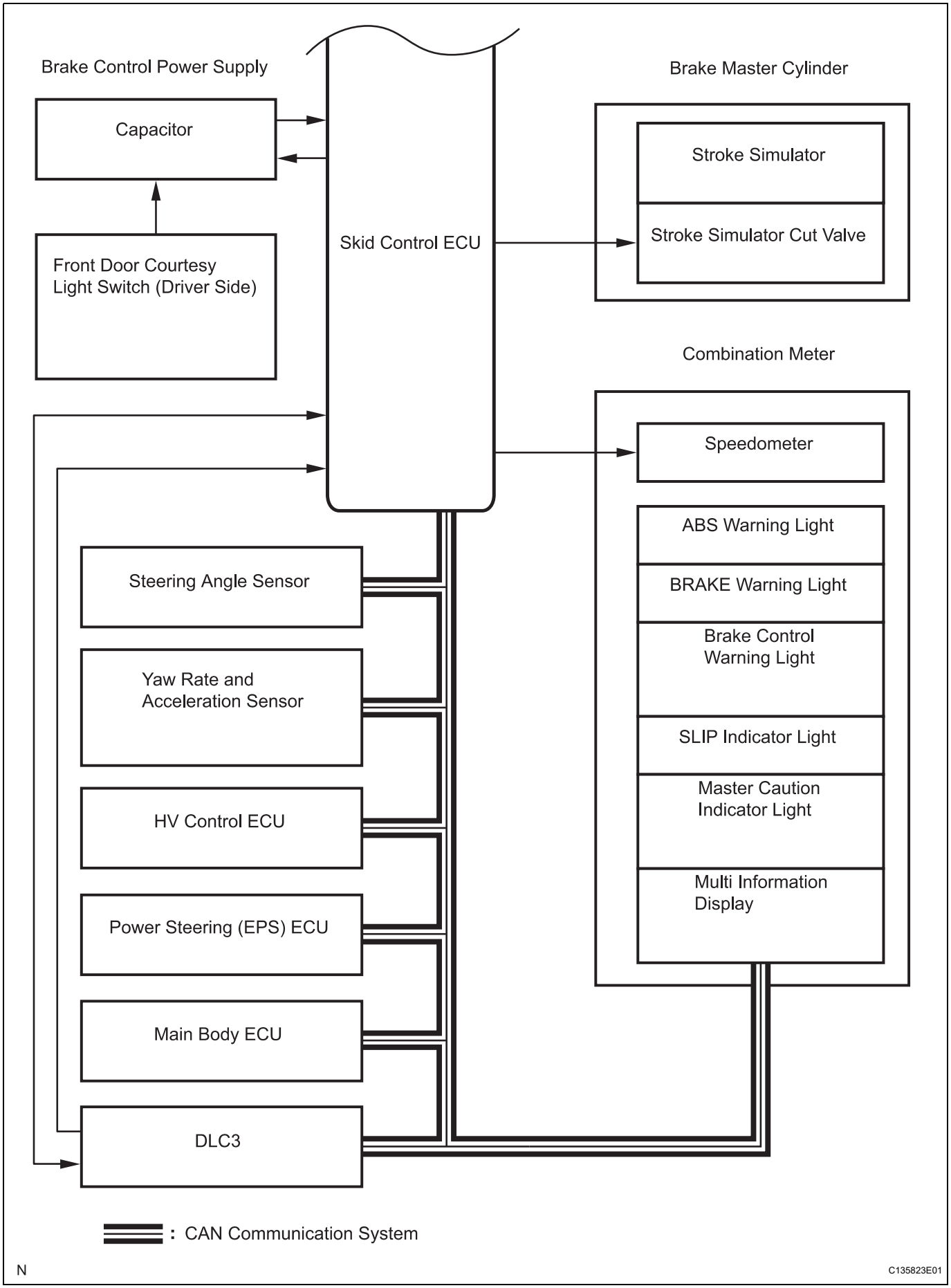
TW

METER:

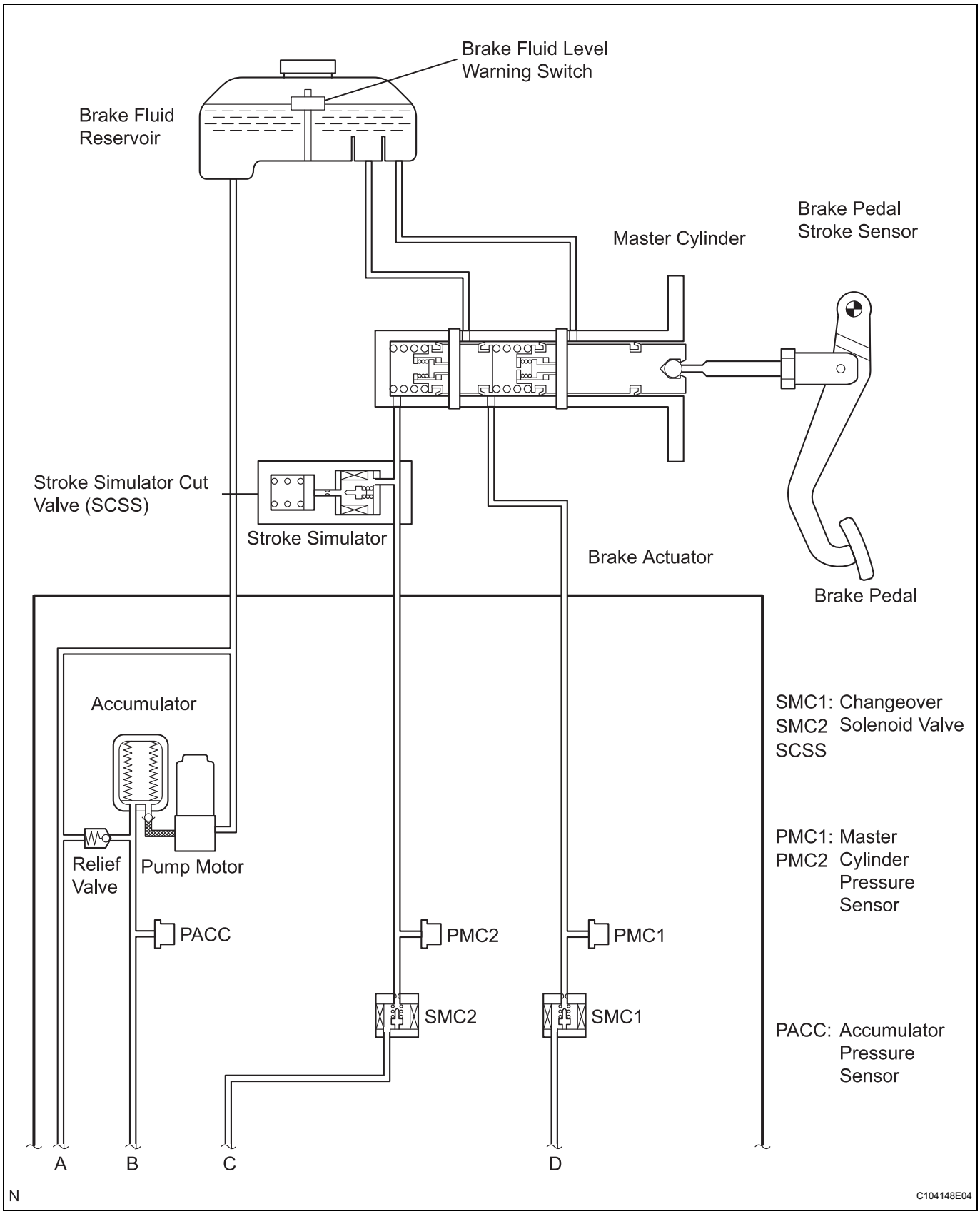
Tester Display	Test Part	Control Range	Diagnostic Note
TIRE PRESS WARN	Tire Pressure Warning Light	Tire Pressure Warning Light is OFF / ON	Confirm that the vehicle is stopped with the engine idling

SYSTEM DIAGRAM

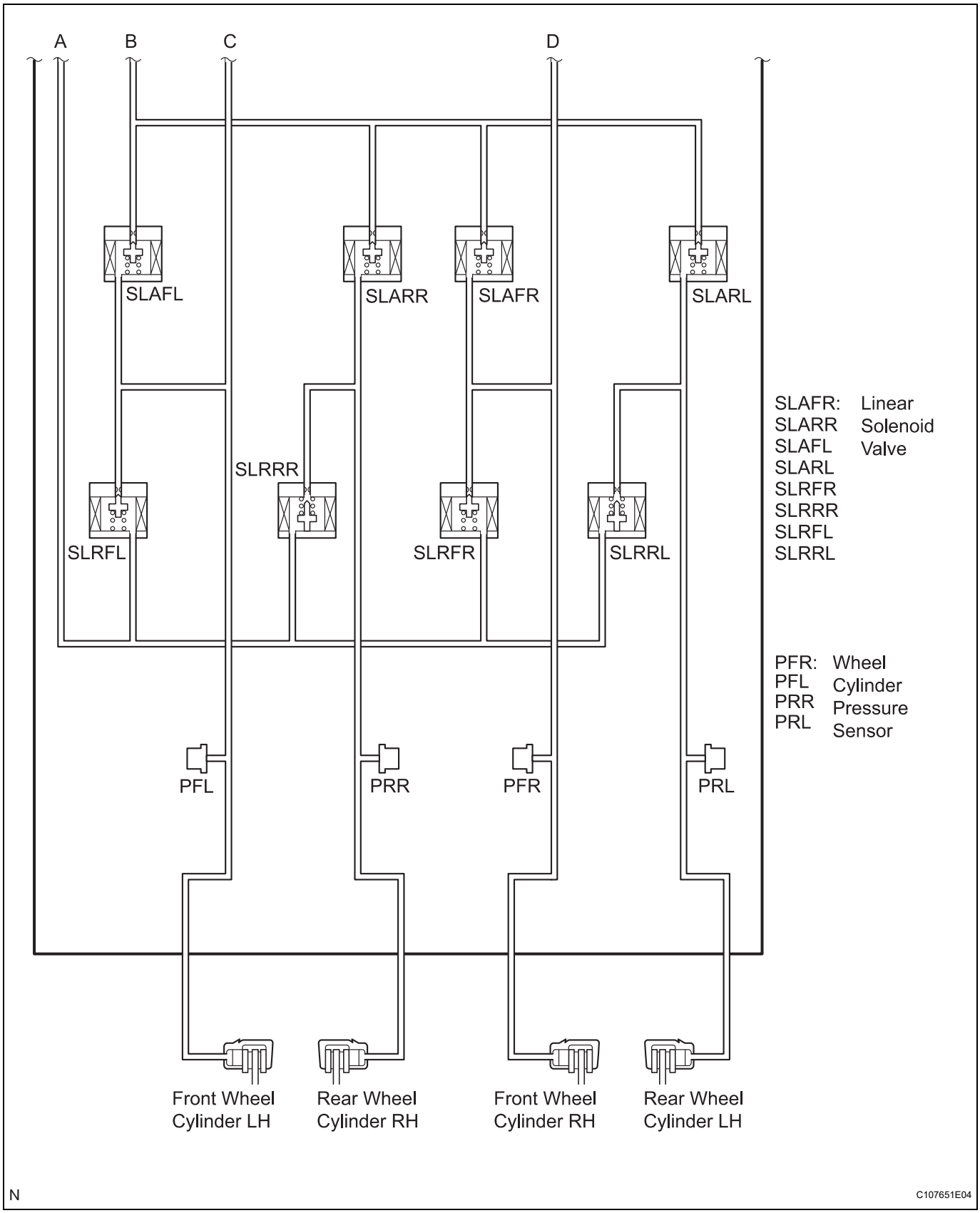



Brake Control Power Supply
Capacitor
Front Door Courtesy Light Switch (Driver Side)
Skid Control ECU
Brake Master Cylinder
Stroke Simulator
Stroke Simulator Cut Valve
Combination Meter
Speedometer
ABS Warning Light
BRAKE Warning Light
Brake Control Warning Light
SLIP Indicator Light
Master Caution Indicator Light
Multi Information Display
Steering Angle Sensor
Yaw Rate and Acceleration Sensor
HV Control ECU
Power Steering (EPS) ECU
Main Body ECU
DLC3
: CAN Communication System
N
C135823E01

BC


Brake Fluid Level Warning Switch
Brake Fluid Reservoir
Master Cylinder
Brake Pedal Stroke Sensor
Stroke Simulator Cut Valve (SCSS)
Stroke Simulator
Brake Actuator
Brake Pedal
Accumulator
Relief Valve
Pump Motor
PACC
PMC2
PMC1
SMC2
SMC1
SMC1: Changeover SMC2 Solenoid Valve SCSS
PMC1: Master PMC2 Cylinder Pressure Sensor
PACC: Accumulator Pressure Sensor
A
B
C
D
N
C104148E04

BC



Transmitting ECU (Transmitter)	Receiving ECU	Signals	Communication Method
Skid control ECU	Steering angle sensor	Steering angle sensor request signal	CAN communication system
Skid control ECU	Yaw rate and acceleration sensor	Yaw rate and acceleration request signal	CAN communication system

BC

Transmitting ECU (Transmitter)	Receiving ECU	Signals	Communication Method
Skid control ECU	HV control ECU	• Wheel speed signal • VSC data signal	CAN communication system
HV control ECU	Skid control ECU	• Shift position signal • Throttle position signal • Engine revolution signal • Intake air temperature signal • Engine torque request signal • Accelerator pedal position signal	CAN communication system
Skid control ECU	Power steering (EPS) ECU	Target additional torque signal	CAN communication system
Power steering (EPS) ECU	Skid control ECU	EPS cooperative control enabling signal	CAN communication system
Main body ECU	Skid control ECU	Parking brake switch signal	CAN communication system
Skid control ECU	Combination meter	• ABS warning light ON signal • BRAKE warning light ON signal • Brake control warning light ON signal • SLIP indicator light ON signal • Master caution indicator light ON signal • Multi information display ON signal	CAN communication system

SYSTEM DESCRIPTION

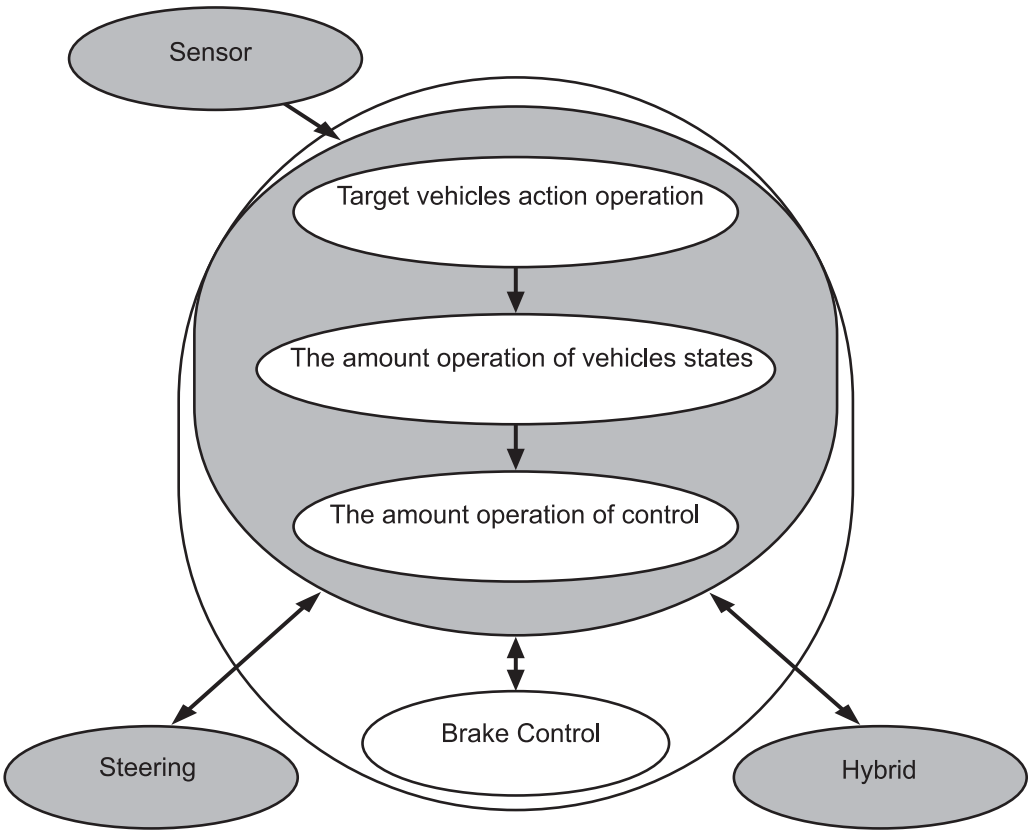
1. VDIM (Vehicle Dynamics Integrated Management) DESCRIPTION

(a) This vehicle is equipped with VDIM. It is a concept of vehicle motion control that integrates brake control, drive force control and steering control.

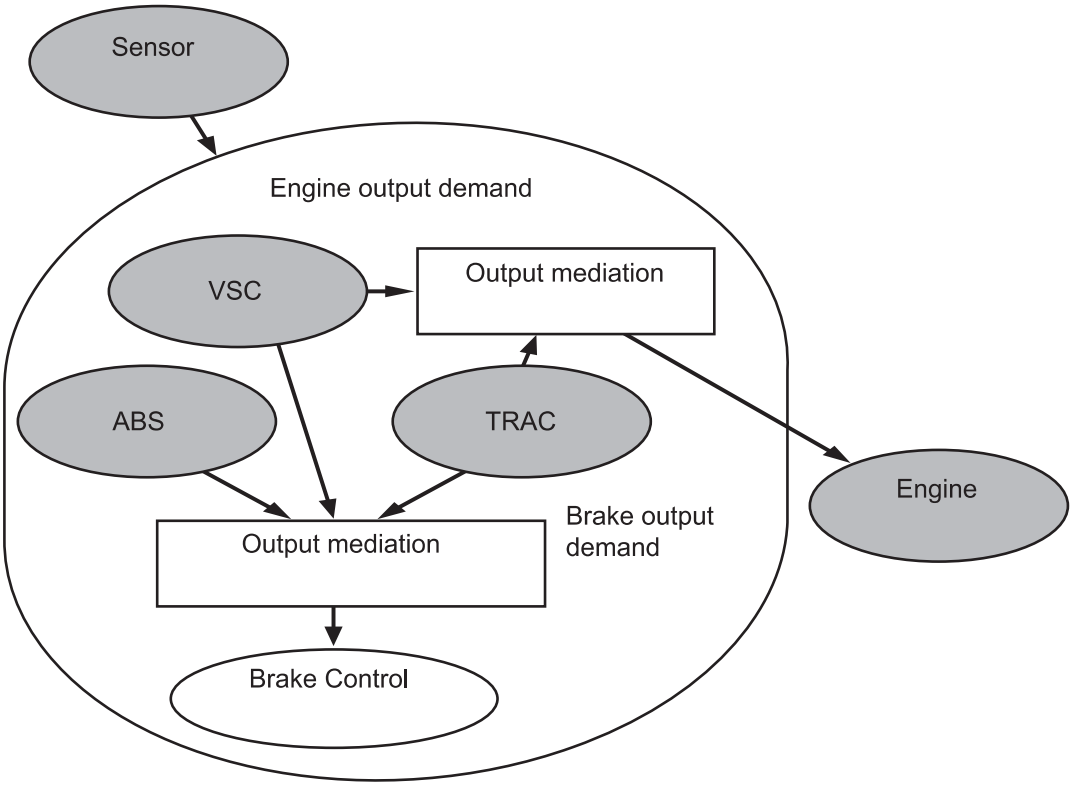
(b) Conventional vehicles use a combination of independent functions such as ABS, TRAC, VSC and EPS. However, VDIM integrates these systems to improve "drive, turn and stop," the motion performance of the vehicle in other words.

(c) In conventional vehicles, control starts at the limit of the vehicle. However, VDIM exercises control before the limit is reached, creating a smooth vehicle response. This expands the limits of the vehicle, and increases driving pleasure.

VDIM:



Conventional Control (without VDIM):



BC

N

C106641E08

(d) The VDIM manages all functions, such as the ABS with EBD, the BA, the TRAC, and the VSC. It is operated by the Electronically Controlled Brake system, which regulates a brake fluid pressure. The regenerative brake cooperative control and steering cooperative control functions are also available. Thus the VDIM is able to perform the comprehensive management.

(e) Conventional brake control systems begin to control either the braking or motive force in order to stabilize the vehicle motion when it becomes unstable due to loss of tire traction. In contrast, in order to maintain stable vehicle control, the VDIM commences controlling the brake, hybrid and steering systems in accordance with changes in balance before the vehicle becomes unstable. As a result, smooth vehicle control is achieved.

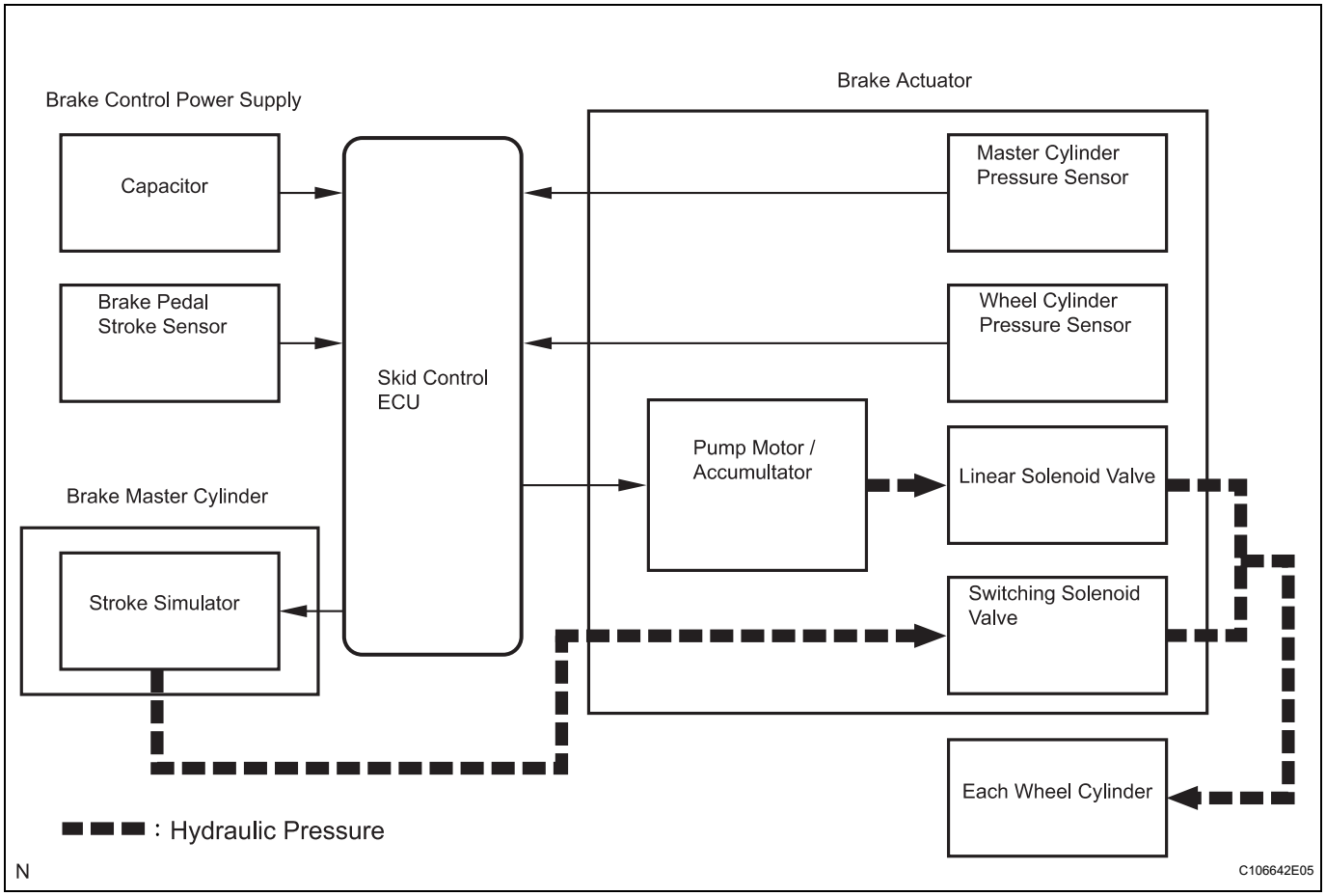
(f) Conventional brake control systems manage all related functions, such as the ABS with EBD, the BA, the TRAC and the VSC independently, according to the vehicle dynamics. In contrast, the VDIM provides smooth control by seamlessly integrating all those functions.

2. ELECTRONICALLY CONTROLLED BRAKE SYSTEM DESCRIPTION

(a) The system detects the degree of brake pedal operation with a brake pedal stroke sensor and two master cylinder pressure sensors, and calculates the optimum hydraulic brake force. The hydraulic pressure source is adjusted based on this so that the optimum hydraulic control is independently performed on all four wheels.

(b) Meanwhile, the Electronically Controlled Brake system performs control of the normal brakes, ABS, TRAC, VSC and BA in accordance with the operations of the driver.

(c) There is a hydraulic backup mechanism that applies master cylinder pressure generated by human power to the wheel cylinder when the brake control stops. In addition, as a fail safe mechanism, when the brake control is malfunctioning, the system excludes the malfunctioning sections and continues to perform brake control on the normal sections. A power backup unit (brake control power supply) is also used to ensure a stable supply of power to the system.



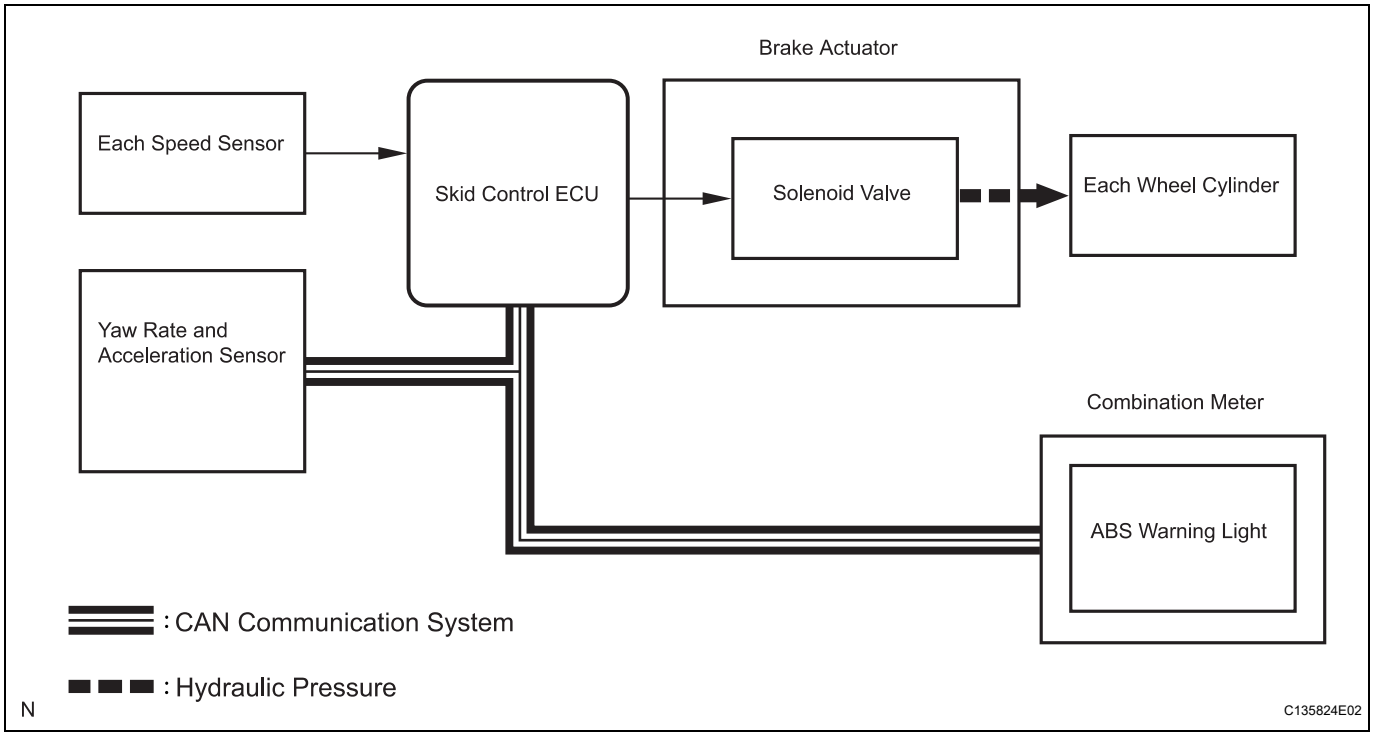
3. FUNCTION DESCRIPTION

HINT:

The yaw rate sensor and acceleration sensor are combined in a single unit. This unit communicates with the skid control ECU via CAN communication.

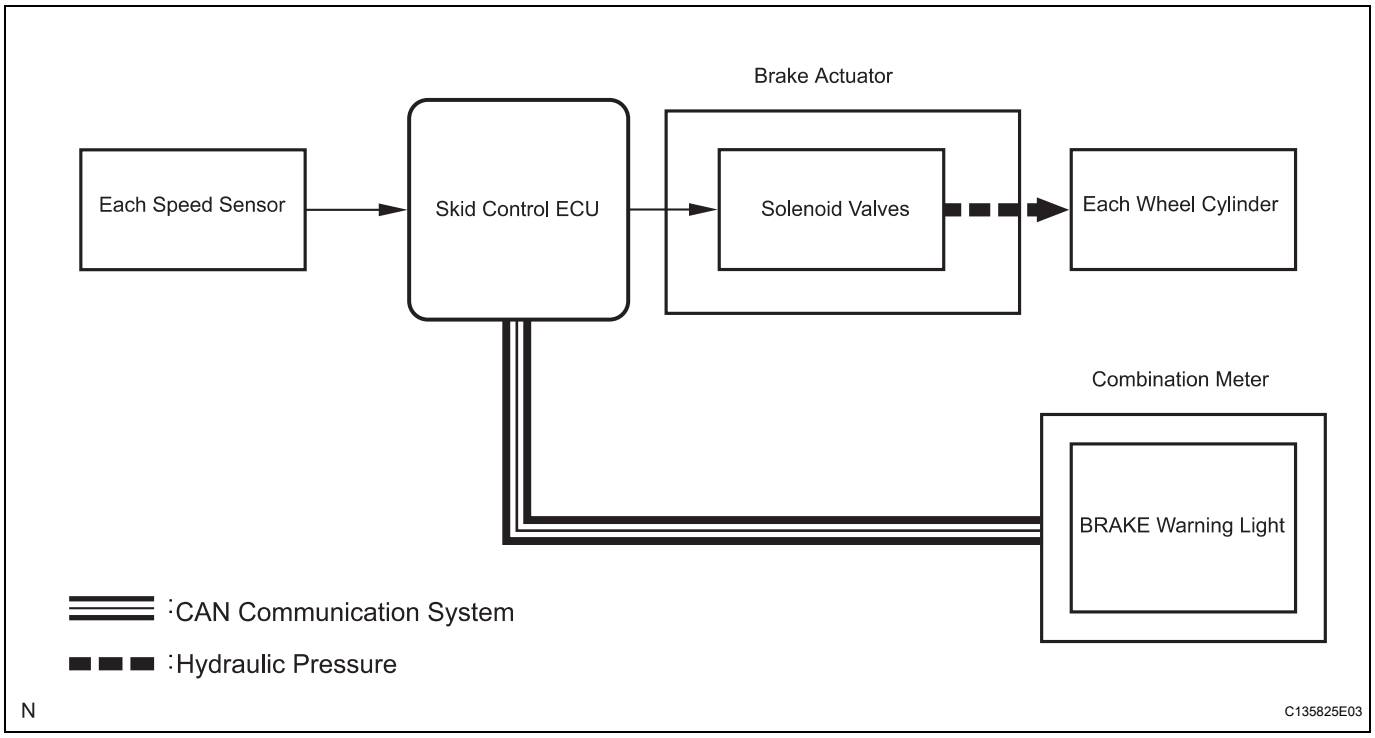
BC

(a) ABS (Anti-lock Brake System)
The ABS helps prevent the wheels from locking when the brakes are applied suddenly and firmly or applied on a slippery surface.



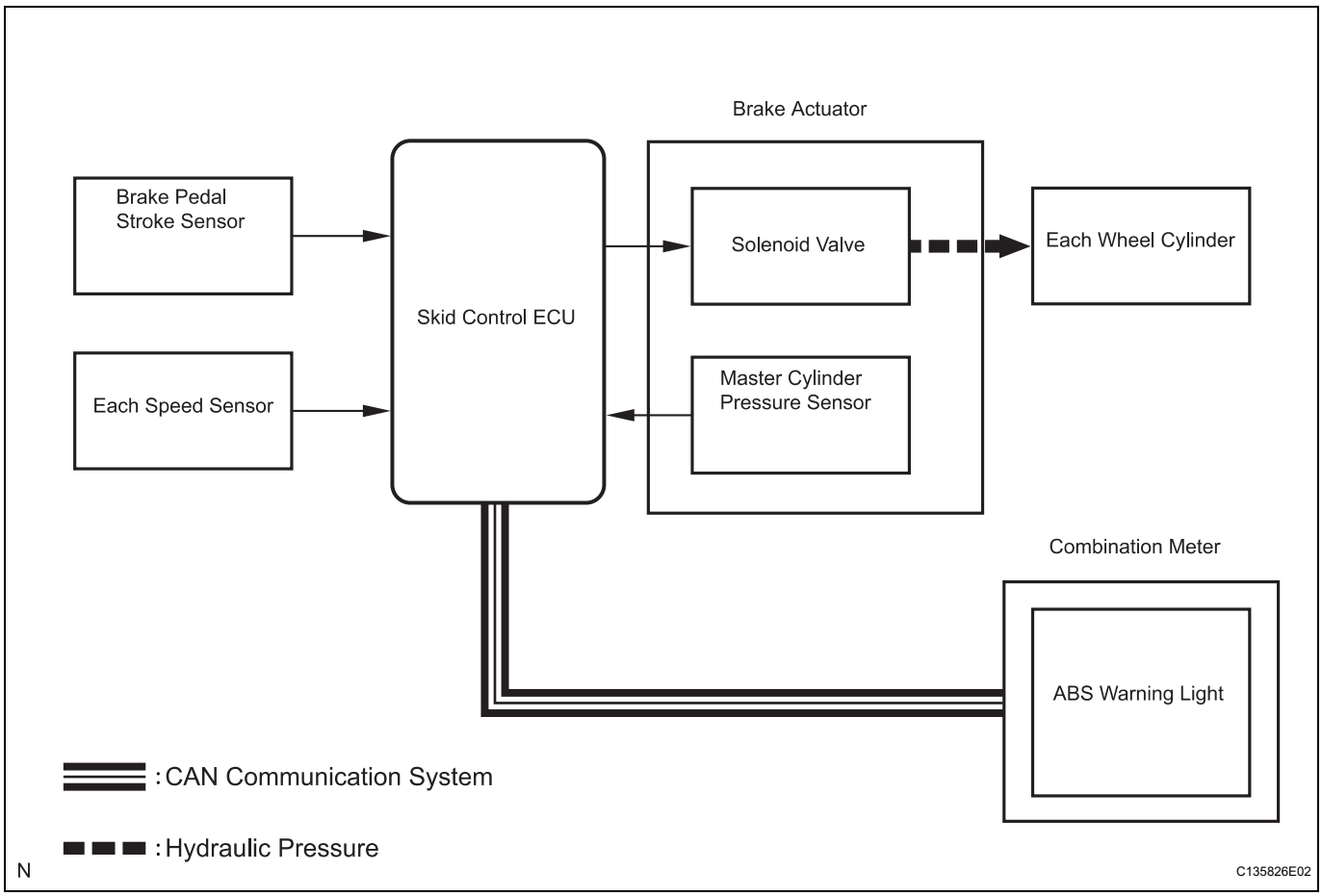
(1) Operation description
The skid control ECU detects wheel lock based on speed signals it receives from the wheel speed sensors. Based on this information, the skid control ECU controls the solenoid valves. The solenoid valves are used to prevent wheel lock by controlling the hydraulic pressure applied to the brakes at each wheel. The ABS warning light will come on when the system is malfunctioning.

(b) EBD (Electronic Brake force Distribution)
The EBD control utilizes ABS, performing proper brake force distribution between the front and rear wheels in accordance with driving conditions.
When braking while cornering, it also controls the brake forces of the right and left wheels, helping to maintain vehicle behavior.



(1) Operation description
The skid control ECU receives a speed signal from each wheel speed sensor, and uses these signals to detect locking of the wheels. The ECU uses this information in order to determine appropriate control of the solenoid valves.
The solenoid valves control the hydraulic pressure applied to the brake cylinder at each wheel. In this way, the solenoid valves are used to control the brake power split between the front and rear, and left and right wheels.
The BRAKE warning light will come on if there is a malfunction in the EBD system.

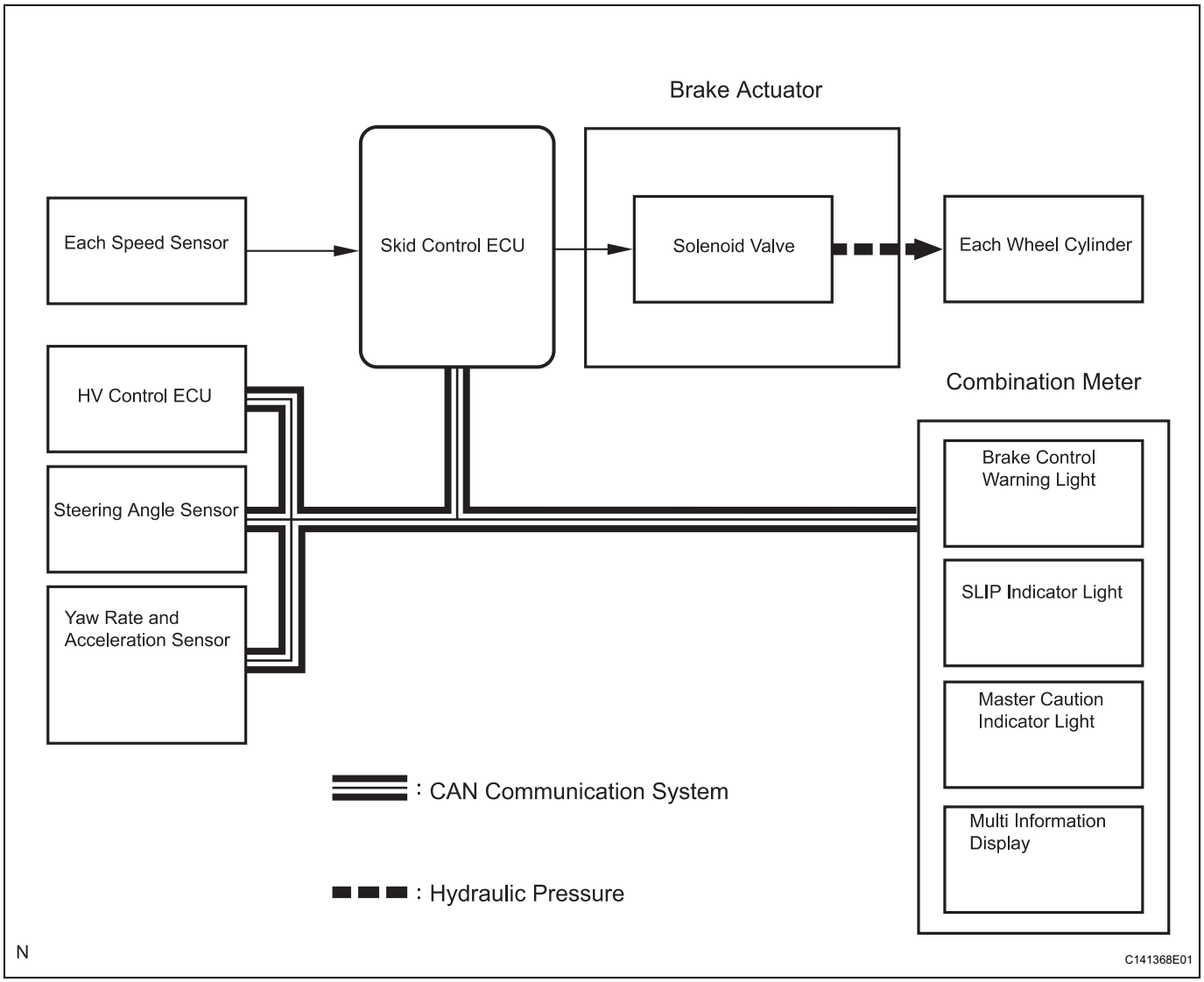
(c) BA (Brake Assist)
The primary purpose of the brake assist system is to provide auxiliary brake force to assist the driver who cannot generate a brake force large enough during emergency braking, thus helping to maximize the brake performance of the vehicle.



(1) Operation description
The skid control ECU receives the brake pedal stroke sensor signal and the oil pressure signal from the master cylinder pressure sensor to determine whether brake assist is necessary or not. If brake assist is deemed necessary, the skid control ECU will send control signals to the solenoid. The solenoid valve then controls the pressure applied to each wheel cylinder.
The ABS warning light comes on to indicate a malfunction in the BA system.

BC

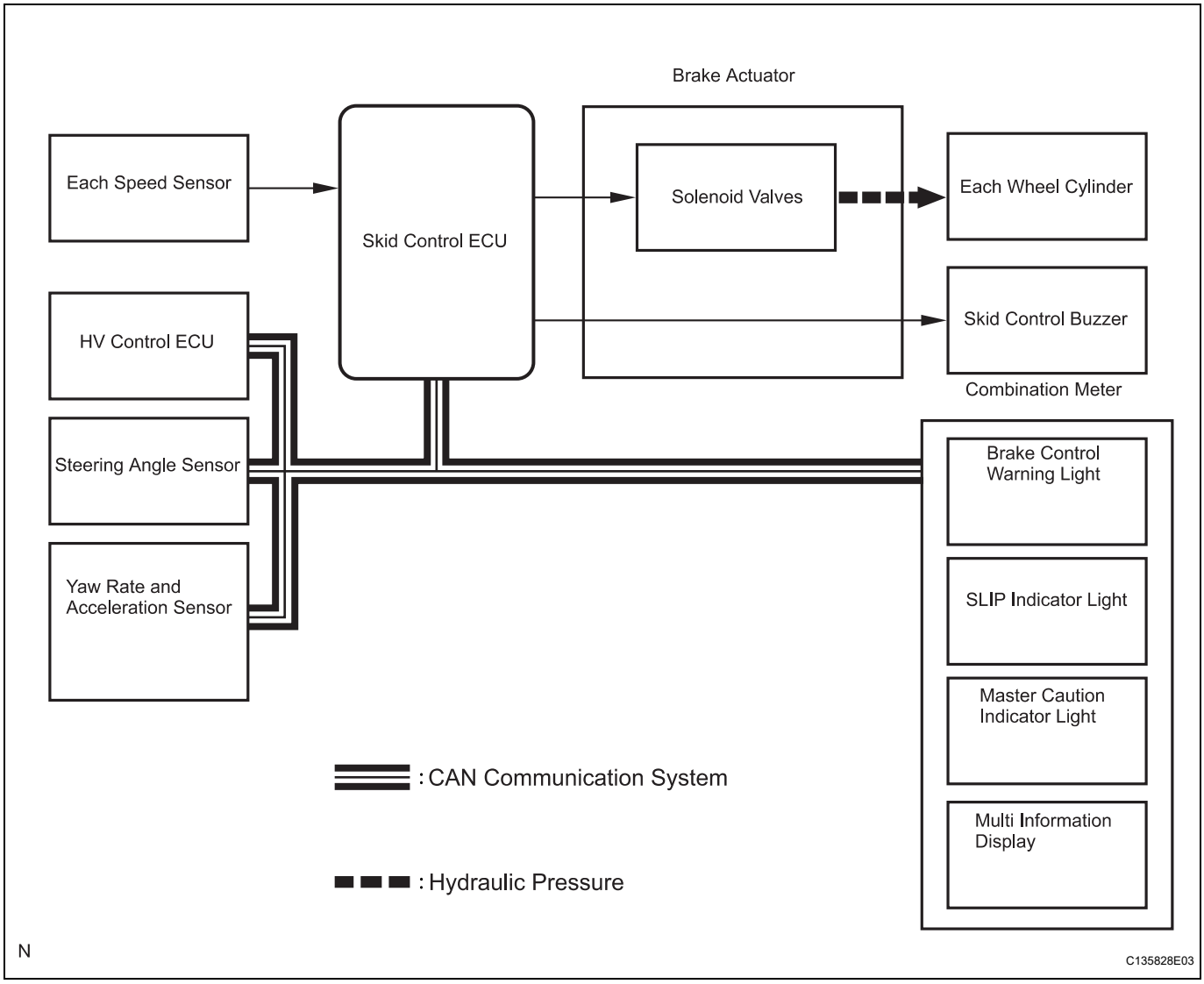
(d) TRAC (Traction Control)
The TRAC system helps prevent the drive wheels from slipping when the driver depresses the accelerator pedal excessively while starting off or accelerating on a slippery surface.



(1) Operation description
The skid control ECU detects wheelspin by receiving signals from each speed sensor and the HV control ECU via CAN communication. The skid control ECU controls engine torque with the HV control ECU via CAN communication and brake hydraulic pressure through the solenoid valve.
The SLIP indicator light blinks when the system is operating. When there is a malfunction in the TRAC system, the brake control warning, master caution indicator and SLIP indicator lights come on and DTC will appear on the multi information display.

BC

(e) VSC (Vehicle Stability Control)
The VSC system helps prevent the vehicle from slipping sideways as a result of strong front or rear wheel skid during cornering.



(1) Operation description
The skid control ECU determines the vehicle operating conditions based on signals received from the wheel speed sensors, yaw rate and acceleration sensor, and steering angle sensor. The skid control ECU sends signals via CAN communication to the HV control ECU in order to control engine torque. The skid control ECU controls brake hydraulic pressure using the solenoid valves.
The SLIP indicator light will blink, and the skid control buzzer will sound when the system is operating. If a malfunction occurs in the VSC system, both the brake control warning, master caution indicator and the SLIP indicator lights will come on. In addition, the DTC will appear on the multi information display.

4. STEERING COOPERATION CONTROL

(a) The VDIM system effects coordinated control consisting of VSC and EPS (Electronic Power Steering). By integrating these preventive safety functions, the VDIM system ensures higher driving stability and maneuverability performance.

(b) If the vehicle loses stability due to a slippage, this function effects brake control by applying hydraulic pressure to the wheels. At the same time, the EPS provides steering torque assist control to facilitate the driver's steering maneuver.

5. FAIL SAFE

(a) When a failure occurs in the ABS with BA, TRAC and VSC systems, the ABS warning, brake control warning, and SLIP indicator lights come on and the DTC will be displayed on the multi information display and ABS with BA, TRAC and VSC operations will be prohibited. In addition, when there is a failure that disables the EBD operation, the BRAKE warning light also comes on and the EBD operation is prohibited.

(b) If control is prohibited due to a malfunction during operation, control will be disabled gradually. This is to avoid sudden vehicle instability.

6. INSPECTION MODE

(a) VSC operation can be disabled by operating the intelligent tester (See page IN-5).
HINT:
Refer to the intelligent tester operator's manual for further details.

7. FUNCTION OF COMPONENTS

Components	Functions
Skid control ECU	Processes the signals from each sensor to perform brake control for ABS, TRAC, and VSC. In addition, it communicates with the HV control ECU to output a control signal.
ABS main relay (ABS NO. 1, 2 relay)	Controlled by the skid control ECU. In addition to supplying power to each solenoid, it supplies power to the skid control ECU.
ABS motor relay (ABS MTR1, 2 relay)	Controlled by the skid control ECU. Supplies power to the pump motor.
Speed sensor	Detects the wheel speed and inputs the results to the skid control ECU.
Stop light switch	Detects the brake operating conditions and inputs the results to the skid control ECU. It supplies power to the skid control ECU.
Brake pedal stroke sensor	Detects the brake pedal stroke volume and inputs the results to the skid control ECU.
Brake control power supply	Provides the system with a supplementary power supply by discharging the electric charge of the capacitor. It happens when an electric charge is accumulated in the capacitor in the unit and the vehicle power voltage (12 V) is reduced.
Skid control buzzer	• Sounds intermittently to inform the driver that the VSC is active. • Sounds continuously to warn the driver of a reduction in accumulator hydraulic pressure in the brake actuator, an abnormality in the power supply system, or a reduction in the vehicle power voltage (12 V).
HV control ECU	Controls the engine output during the operation of TRAC and VSC by communicating with the skid control ECU.
Yaw rate and acceleration sensor	Detects the yaw rate (axial rotation) and the forward, rearward and lateral acceleration, and inputs the results to the skid control ECU.

Components	Functions
Steering angle sensor	Detects the steering angle and direction, and outputs the results to the skid control ECU through CAN communication.
Master cylinder	Generates pressure in accordance with the force of the brake operation.
Brake fluid reservoir	Stores brake fluid for the master cylinder system and power supply system.
Brake fluid level warning switch	Detects a reduction in the level of the brake fluid in the reservoir.
Stroke simulator	Generates a natural pedal stroke in accordance with the pedal force of the driver during system operation (integrated with the master cylinder).
Stroke simulator cut valve (SCSS)	Sends brake fluid pressure generated in master cylinder to stroke simulator during system control.
Brake actuator	Controls the hydraulic pressure of each of the four wheel cylinders using the output signal of the skid control ECU.
Pump motor	Pumps up the brake fluid from the reservoir and supplies the accumulator with high hydraulic pressure.
Accumulator	Accumulates for the hydraulic pressure that was generated by the pump.
Accumulator pressure sensor (PACC)	Built into the brake actuator to detect the accumulator hydraulic pressure.
Relief valve	Prevents excessive high pressure in the power supply system. It relieves the system by sending brake fluid to the reservoir when the pump has operated continuously, for example, during an accumulator hydraulic pressure sensor malfunction.
Master cylinder pressure sensor (PMC1, PMC2)	Built into the brake actuator to detect the pressure of the master cylinder and input the results to the skid control ECU.
Wheel cylinder pressure sensor (PFR, PFL, PRR, PRL)	Built into the brake actuator to detect the brake hydraulic pressure of each wheel cylinder.
Switching solenoid valve (SMC1, SMC2)	Switches the brake hydraulic pressure route according to whether normal brakes are used, or VDIM (ABS, TRAC and VSC) control is used.
Linear solenoid valve (SLA##, SLR##)	Controls the wheel cylinder hydraulic pressure during normal brake operation, and VDIM (ABS, TRAC and VSC) control. SLA## are solenoids for controlling pressure increases, while SLR## are solenoids for controlling pressure decreases.
ABS warning light	• Comes on to inform the driver that a malfunction in the ABS or BA has occurred. • Blinks to output DTC.
BRAKE warning light	Comes on to inform the driver that the parking brake is on when the system is normal or the brake fluid has decreased.
Brake control warning light	Comes on to inform the driver that a malfunction in the Electronically Controlled Brake or VSC system has occurred.
SLIP indicator light	Blinks to inform the driver that TRAC and VSC are operating.
Master caution indicator light	Comes on to inform the driver that a malfunction in the Electronically Controlled Brake or VSC system has occurred.
Multi information display	• Displays to inform the driver that a malfunction in the Electronically Controlled Brake or VSC system has occurred. • Displays output DTC.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
*: Use the intelligent tester.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 CUSTOMER PROBLEM ANALYSIS

(a) Interview the customer and confirm the trouble (See page IN-72).

NEXT

3 CHECK DTC AND FREEZE FRAME DATA*

(a) Check and record a DTC and Freeze Frame Data.
(b) Clear the DTC and Freeze Frame Data (See page BC-57 for DTC Check/Clear, or BC-59 for Freeze Frame Data).
(c) Reconfirm the DTC.
(1) Reconfirm the DTC based on the recorded DTC and Freeze Frame Data (See page BC-57 for DTC Check/Clear, or BC-59 for Freeze Frame Data).
HINT:
If any of the DTCs U0123/62, U0124/95, U0126/63, and U0293/59 is output together with a CAN communication DTC, first check the appropriate sensor for a momentary open circuit (See page BC-23).

Result

Condition	Proceed to
DTC is output	A
DTC is not output (Problem symptom does not occur)	B
DTC is not output (Problem symptom occurs)	C

B → GO TO STEP 5

C → GO TO STEP 6

A

4 DIAGNOSTIC TROUBLE CODE CHART

(a) Proceed to Diagnostic Trouble Code Chart (See page BC-69).

BC

NEXT

GO TO STEP 7

5	SYMPTOM SIMULATION

(a) Proceed to Diagnosis System (See page BC-54).

NEXT

6	PROBLEM SYMPTOMS TABLE

(a) Proceed to Problem Symptoms Table (See page BC-46).

NEXT

7	CIRCUIT INSPECTION*

NEXT

8	IDENTIFICATION OF PROBLEM

NEXT

9	REPAIR OR REPLACEMENT

NEXT

10	CONFIRMATION TEST*

NEXT

END

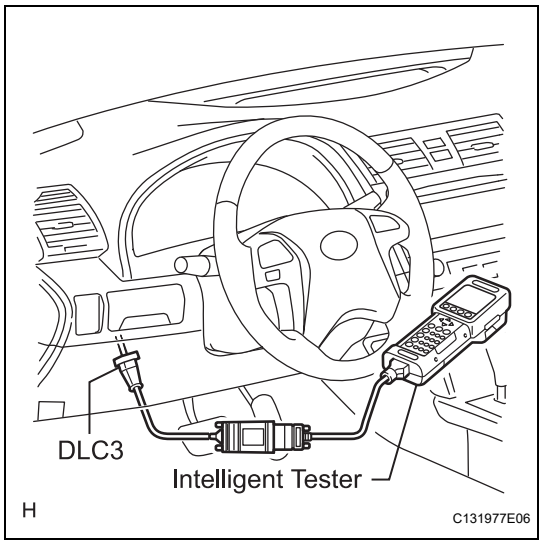
CHECK FOR INTERMITTENT PROBLEMS

1. CHECK FOR INTERMITTENT PROBLEMS

HINT:

A momentary interruption (open circuit) in the connectors and/or wire harness between the sensors and ECUs can be detected using the ECU Data List function of the intelligent tester.

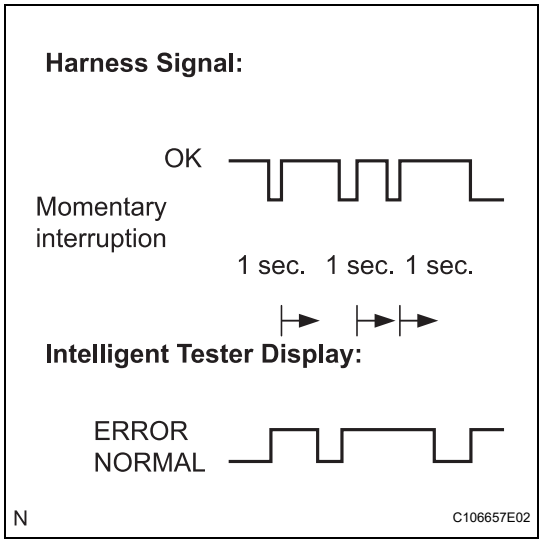
(a) Turn the power switch off and connect the intelligent tester to the DLC3.



(b) Turn the power switch on (IG). Follow the directions on the intelligent tester to display the Data List and select areas where momentary interruption should be monitored.

HINT:

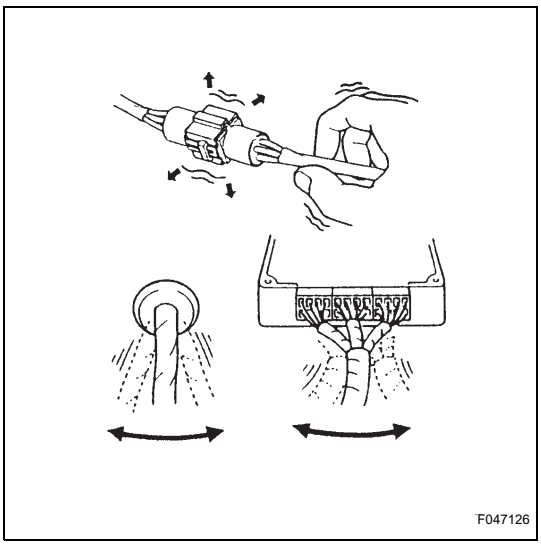
- A momentary interruption (open circuit) cannot be detected for 3 seconds after the power switch is turned on (IG) (initial check).
- If the status remains on (ERROR displayed), check the continuity between the ECU and the sensors, or between the ECUs.
- The ERROR display on the intelligent tester remains on for 1 second after the harness signal changes from momentary interruption (open circuit) to normal condition.



BC

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
FR SPD OPN	FR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
FL SPD OPN	FL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RR SPD OPN	RR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RL SPD OPN	RL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
HV COM OPN	HV communication open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
YAW RATE OPN	Yaw rate sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
DECELERAT OPN	Acceleration sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
STEERING OPN	Steering angle sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
M/C OPN	Master cylinder pressure sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
M/C2 OPN	Master cylinder pressure sensor 2 open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
STROKE OPN	Stroke sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
STROKE OPN 2	Stroke sensor 2 open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
FR W/C OPN	FR wheel cylinder pressure sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
FL W/C OPN	FL wheel cylinder pressure sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RR W/C OPN	RR wheel cylinder pressure sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RL W/C OPN	RL wheel cylinder pressure sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
ACC OPEN	Accumulator pressure sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-



(c) While observing the screen, gently jiggle the connector or wire harness between the ECU and sensors, or between the ECUs.

Result:

ERROR display does not change.

HINT:

The connector and/or wire harness will be in momentary interruption (open circuit) if the display changes. Repair or replace the connector and/or wire harness as one of them is faulty.

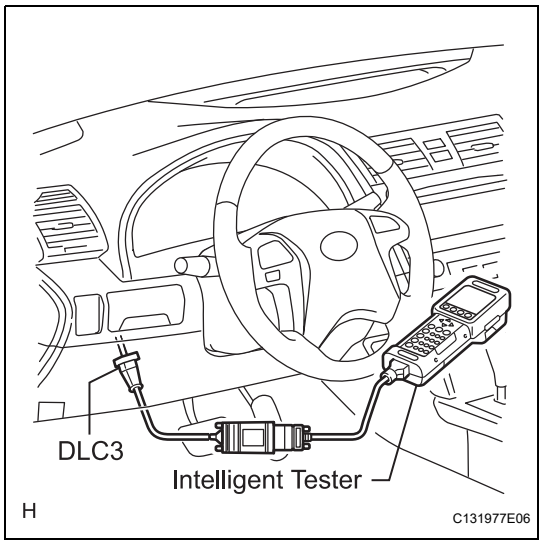
BC

INITIALIZATION

1. DESCRIPTION

(a) Perform initialization of linear solenoid valve and calibration when the skid control ECU, brake actuator or brake pedal stroke sensor is replaced. Follow the procedure to perform initialization.
HINT:
- If there is a problem with the auxiliary battery (12 V) voltage, initialization of linear solenoid valve and calibration cannot be completed normally. Make sure to check the auxiliary battery voltage before performing initialization of linear solenoid valve and calibration.
- If the actuator's temperature is high, initialization of linear solenoid valve and calibration may not be completed normally. In such a case, wait until the temperature decreases and then perform initialization of linear solenoid valve and calibration.
- If the power switch is turned off, the brake pedal is operated or vehicle speed is input while the linear solenoid valve offset learning is being performed, the learning will be cancelled.

Replacement Parts	Necessary Operation
Skid control ECU	Initialization of linear solenoid valve and calibration
Brake actuator assembly	1. Bleed air 2. Clearing stored value of linear solenoid valve and calibration data 3. Initialization of linear solenoid valve and calibration
• Brake pedal stroke sensor • Brake pedal	1. Inspection and adjustment of brake pedal height 2. Clearing stored value of linear solenoid valve and calibration data 3. Initialization of linear solenoid valve and calibration



2. PERFORM INITIALIZATION OF LINEAR SOLENOID VALVE AND CALIBRATION (INTELLIGENT TESTER)

(a) Clear the stored value of linear solenoid valve and calibration data.
(1) Turn the power switch off.
(2) Connect the intelligent tester to the DLC3.
(3) Move the shift lever to the P position.
(4) Turn the power switch on (IG) with the brake pedal released.
(5) Clear the stored value of initialization of linear solenoid valve and calibration following the screen.
HINT:
Refer to the intelligent tester operator's manual for further details.
(6) Using the intelligent tester, perform initialization of linear solenoid valve and calibration.

(b) Perform the initialization of linear solenoid valve and calibration.
(1) Turn the power switch off.
(2) Connect the intelligent tester to the DLC3.
(3) Move the shift lever to the P position.

BC

(4) Turn the power switch on (IG) with the brake pedal released.
NOTICE:
- **If the linear solenoid valve offset learning is performed without turning the power switch on (IG), the learning process may not be completed properly because of insufficient auxiliary battery voltage.**
- **When the linear solenoid valve offset learning is interrupted, or the learning process is performed with the shift lever not in the P position, DTC C1345/66 will be stored (See page BC-190).**

(5) Set the intelligent tester to Test Mode (select "ECB* UTILITY").
*: Electronically Controlled Brake
HINT:
Refer to the intelligent tester operator's manual for further details.

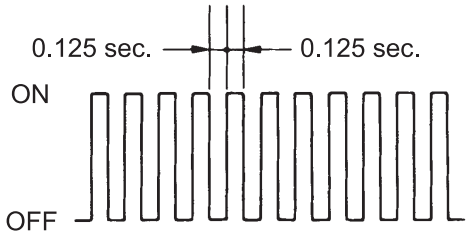
(6) Leave the vehicle stationary without depressing the brake pedal for 1 or 2 minutes.

Tester Display:

*: Electronically Controlled Brake

N C145966E01

Blinking Pattern in TEST MODE:



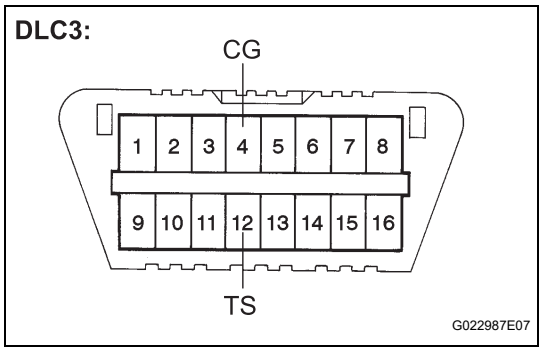
BR03904E15

(7) Check that the interval between blinks of the brake control warning light changes from 1 second to 0.25 seconds.
HINT:
- The time needed to complete initialization of linear solenoid valve and calibration varies depending on auxiliary battery voltage.
- The brake control warning light blinks at 1 second intervals during initialization of linear solenoid valve and calibration and changes to the Test Mode display.
- The brake control warning light blinks at 0.25 seconds intervals if the Test Mode is normal.

(8) Check that DTC C1345/66 which indicates trouble with stroke sensor zero point learning is not output when the brake control warning light changes to the Test Mode display upon initialization of linear solenoid valve and calibration completion.

(9) Enter the normal mode from the Test Mode following the intelligent tester prompts.
HINT:
Refer to the intelligent tester operator's manual for further details.

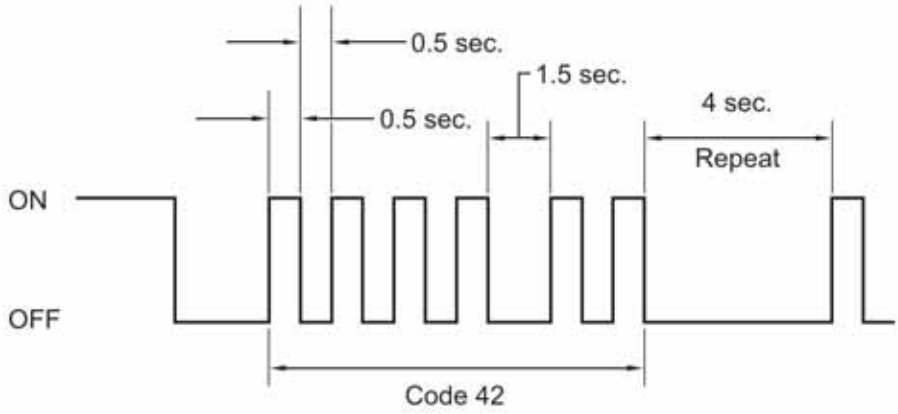
BC



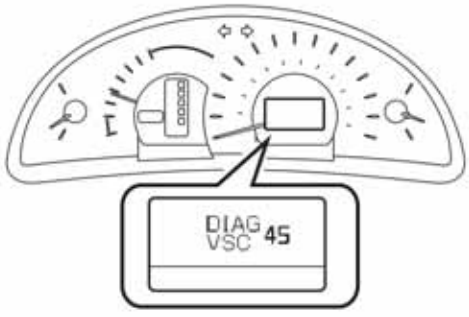
3. PERFORM INITIALIZATION OF LINEAR SOLENOID VALVE AND CALIBRATION (SST CHECK WIRE)

(a) Clear the stored value of linear solenoid valve and calibration data.
  (1) Turn the power switch off.
  (2) Move the shift lever to the P position.
  (3) Turn the power switch on (IG) with the brake pedal released.
  (4) Using SST, connect and disconnect terminals TS and CG of the DLC3 4 times or more within 8 seconds.
  SST 09843-18040
  (5) Check that no codes other than ABS code 42, VSC code 45 and Electronically Controlled Brake code 48, 66, or 95 are stored in the diagnostic system.

Blinking Pattern of ABS and Electronically Controlled Brake Code (Example Code 42):



Display of VSC Code:



N

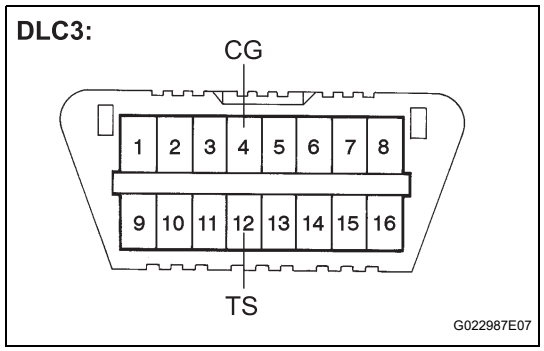
C135830E02

HINT:
The ABS warning, brake control warning lights and multi information display do not indicate the normal system code.

BC

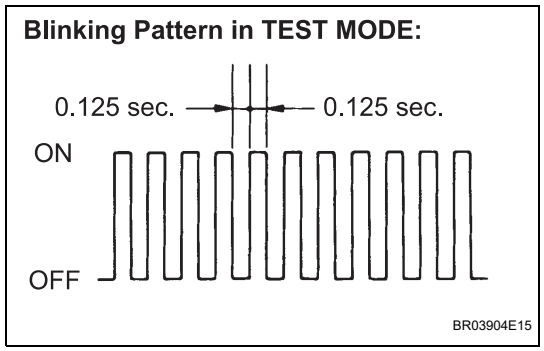
(6) Remove the SST from the terminals of the DLC3.
(7) Using the check wire, perform initialization of linear solenoid valve and calibration.

(b) Perform initialization of linear solenoid valve and calibration.
(1) Turn the power switch off.



(2) Using SST, connect terminals TS and CG of the DLC3.
SST 09843-18040
(3) Move the shift lever to the P position.
(4) Turn the power switch on (IG) with the brake pedal released.
NOTICE:
- **If the linear solenoid valve offset learning is performed without turning the power switch on (IG), the learning process may not be completed properly because of insufficient auxiliary battery voltage.**
- **When the linear solenoid valve offset learning is interrupted, or the learning process is performed with the shift lever not in the P position, DTC C1345/66 will be stored (See page BC-190).**

(5) Leave the vehicle stationary without depressing the brake pedal for 1 or 2 minutes.



(6) Check that the interval between blinks of the brake control warning light changes from 1 second to 0.25 seconds.
HINT:
- The time needed to complete initialization of linear solenoid valve and calibration varies depending on the auxiliary battery voltage.
- The brake control warning light blinks at 1 second intervals during initialization of linear solenoid valve and calibration and changes to the Test Mode display.
- The brake control warning light blinks at 0.25 seconds intervals if the Test Mode is normal.

(7) Check that DTC C1345/66 which indicates trouble with stroke sensor zero point learning is not output when the brake control warning light changes to the Test Mode display upon initialization of linear solenoid valve and calibration completion.
(8) Turn the power switch off and disconnect the SST from the DLC3.

CALIBRATION

1. DESCRIPTION

- After replacing the VSC relevant components or performing "Front wheel alignment adjustment", clear and read the sensor calibration data.
- Follow the chart to perform calibration.

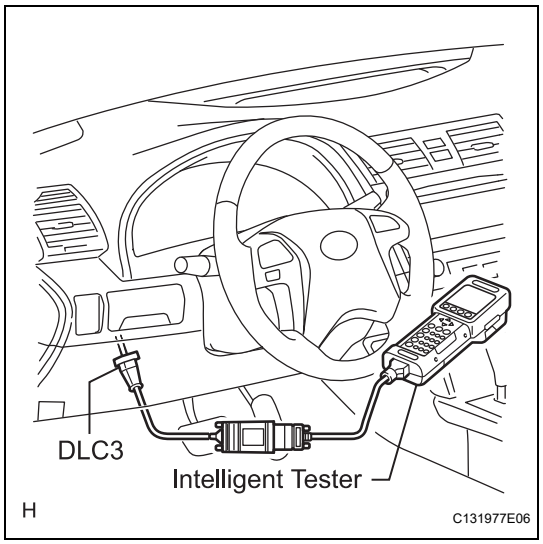
Replacing Parts / Operation	Necessary Operation
Skid control ECU	Yaw rate and acceleration sensor zero point calibration.
Yaw rate and acceleration sensor	1. Clearing zero point calibration data. 2. Yaw rate and acceleration sensor zero point calibration.
Front wheel alignment adjustment	1. Clearing zero point calibration data. 2. Yaw rate and acceleration sensor zero point calibration.

2. PERFORM ZERO POINT OF YAW RATE AND ACCELERATION SENSOR (INTELLIGENT TESTER)

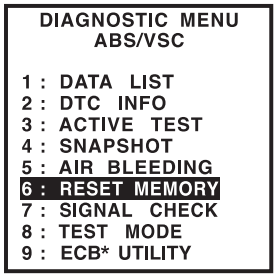
NOTICE:

- **While obtaining the zero point, keep the vehicle stationary and do not vibrate, tilt, move, or shake it. (Do not turn the power switch on (READY).)**
- **Be sure to perform this procedure on a level surface (with an inclination of less than 1 degree).**

(a) Clear the zero point calibration data.
  (1) Turn the power switch off.
  (2) Connect the intelligent tester to the DLC3.
  (3) Check that the steering wheel is centered and move the shift lever to the P position.
  (4) Turn the power switch on (IG).



Tester Display:



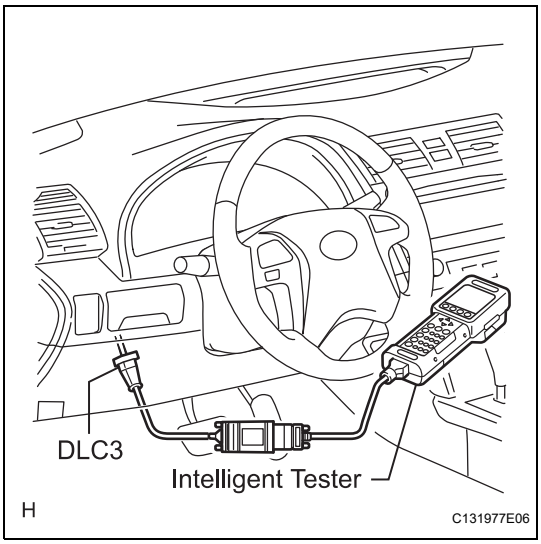
*: Electronically Controlled Brake

N C145967E01

(5) Operate the intelligent tester to erase the codes (select "RESET MEMORY").
  HINT:
  Refer to the intelligent tester operator's manual for further details.
(6) Turn the power switch off.

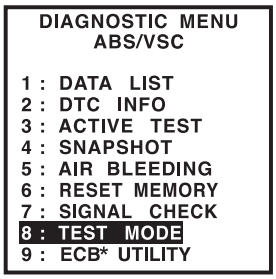
(b) Perform zero point calibration of the yaw rate and acceleration sensor.
  (1) Turn the power switch off.
  (2) Check that the steering wheel is centered and move the shift lever to the P position.
  NOTICE:
  DTCs C1210/36 and C1336/98 will be recorded if the shift lever is not in the P position (See page BC-107).

BC



(3) Connect the intelligent tester to the DLC3.
(4) Turn the power switch on (IG).

Tester Display:



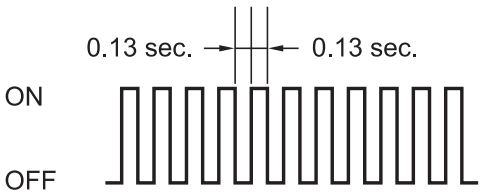
*: Electronically Controlled Brake

N C145969E01

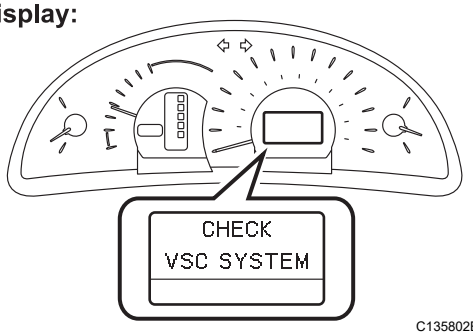
(5) Set the intelligent tester to Test Mode (select "TEST MODE").
HINT:
Refer to the intelligent tester operator's manual for further details.
(6) After the Test Mode has been entered, keep the vehicle stationary on a level surface for 2 seconds or more.

TEST MODE

Blinking Pattern:



Display:



N C135802E01

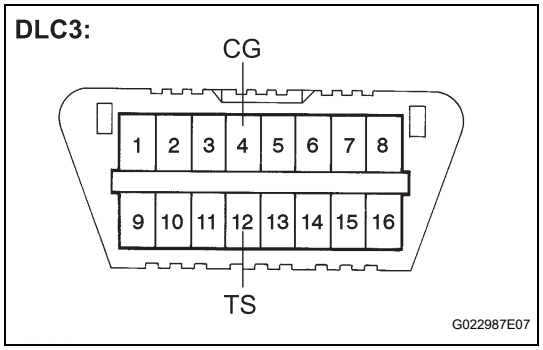
(7) Check that the ABS warning, brake control warning and master caution indicator lights blink and "CHECK VSC SYSTEM" is displayed on the multi information display (Test Mode).
HINT:
- The SLIP indicator remains on during Test Mode because TRAC is prohibited.
- If the ABS warning, brake control warning and master caution indicator lights do not blink and/or "CHECK VSC SYSTEM" is not displayed on the multi information display, perform zero point calibration again.
- The zero point calibration is performed only once after the system enters the Test Mode.
- Calibration cannot be performed again until the stored data is cleared.

(8) Turn the power switch off and disconnect the intelligent tester.

3. PERFORM ZERO POINT OF YAW RATE AND ACCELERATION SENSOR (SST CHECK WIRE)

NOTICE:

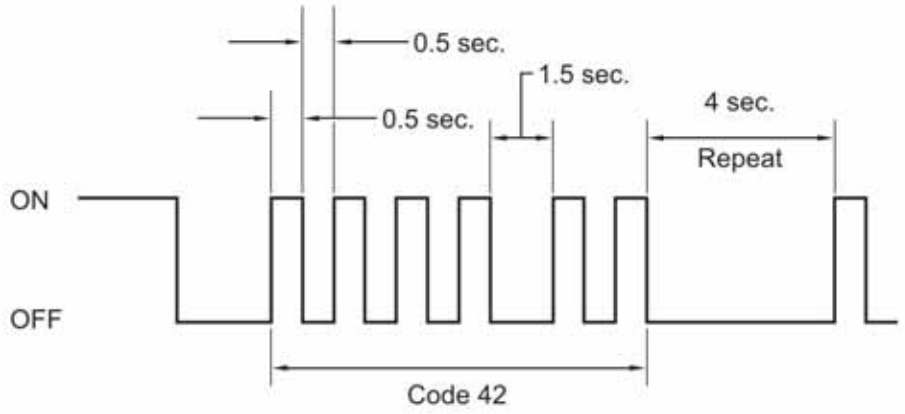
- **While obtaining the zero point, keep the vehicle stationary and do not vibrate, tilt, move, or shake it. (Do not turn the power switch on (READY).)**
- **Be sure to perform this procedure on a level surface (with an inclination of less than 1 degree).**



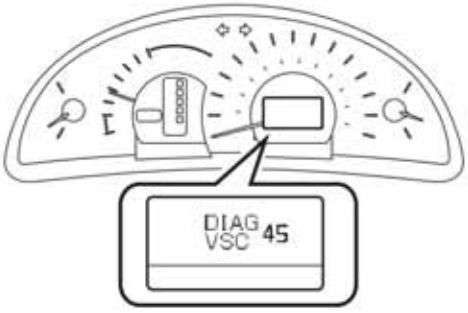
(a) Clear the zero point calibration data.
  (1) Turn the power switch off.
  (2) Check that the steering wheel is centered and move the shift lever to the P position.
  (3) Turn the power switch on (IG).
  (4) Check that the warning light and indicator light come on and remains on until the power switch is turned on (READY).
  (5) Turn the power switch on (IG).
  (6) Using SST, connect and disconnect terminals TS and CG of the DLC3 4 times or more within 8 seconds.
  SST 09843-18040

(7) Check that no codes other than ABS code 42, VSC code 45 and Electronically Controlled Brake code 48, 66, or 95 are stored in the diagnostic system.

Blinking Pattern of ABS and Electronically Controlled Brake Code (Example Code 42):



Display of VSC Code:



N

C135830E02

HINT:
The ABS warning, brake control warning lights, and multi information display do not indicate the normal system code.

(8) Remove the SST from the terminals of the DLC3.

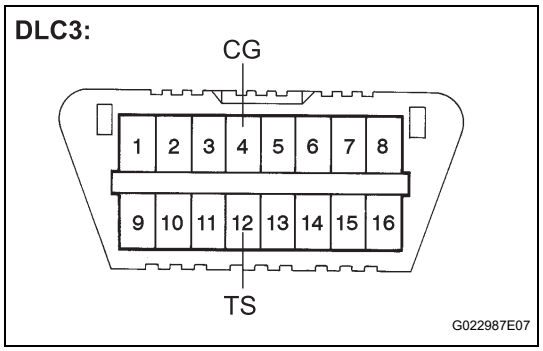
(b) Perform zero point calibration of the yaw rate and acceleration sensor.

(1) Turn the power switch off.

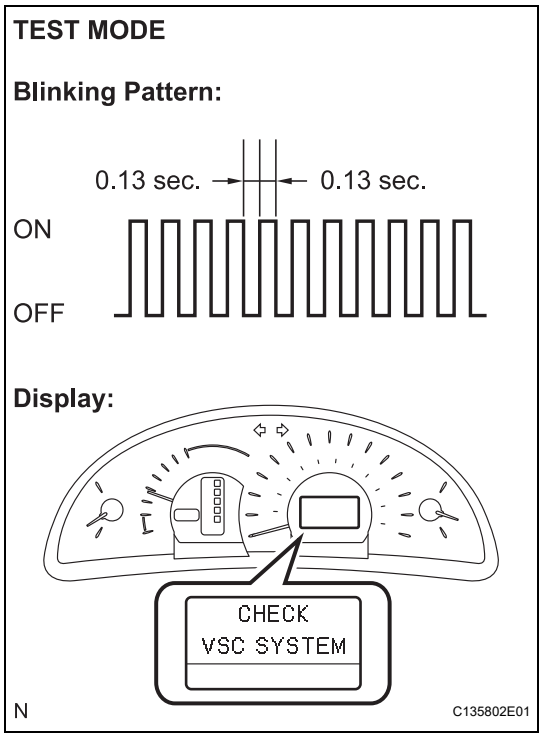
(2) Check that the steering wheel is centered and move the shift lever to the P position.

NOTICE:
DTCs C1210/36 and C1336/98 will be recorded if the shift lever is not in the P position (See page BC-107).

BC

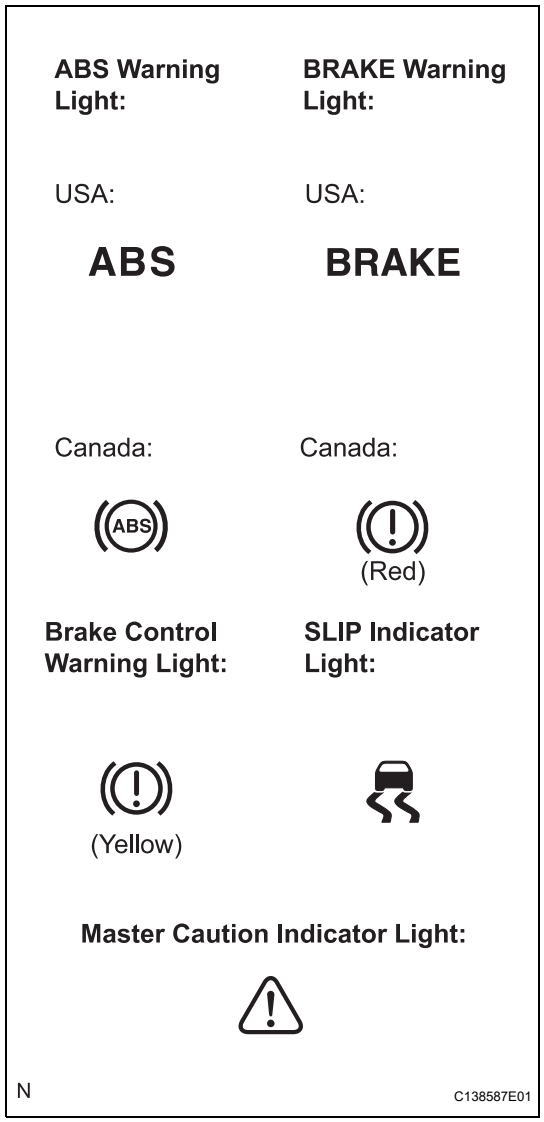


(3) Using SST, connect terminals TS and CG of the DLC3.
SST 09843-18040
(4) Turn the power switch on (IG).
(5) Keep the vehicle stationary on a level surface for 2 seconds or more.



(6) Check that the ABS warning, brake control warning and master caution indicator lights blink and "CHECK VSC SYSTEM" is displayed on the multi information display (Test Mode).
HINT:
- The SLIP indicator remains on during Test Mode because TRAC is prohibited.
- If the ABS warning, brake control warning and master caution indicator lights do not blink and/or "CHECK VSC SYSTEM" is not displayed on the multi information display, perform zero point calibration again.
- The zero point calibration is performed only once after the system enters the Test Mode.
- Calibration cannot be performed again until the stored data is cleared.

(7) Turn the power switch off and disconnect the SST from the DLC3.



TEST MODE PROCEDURE

1. WARNING LIGHT AND INDICATOR LIGHT INITIAL CHECK

(a) Release the parking brake.

NOTICE:

Before releasing the parking brake, move the shift lever to the P position for safety.

HINT:

When the parking brake is applied or the level of the brake fluid is low, the BRAKE warning light comes on.

(b) When the power switch is turned on (IG), check that the ABS warning, BRAKE warning, brake control warning, master caution indicator, and SLIP indicator lights come on and remain on until the power switch is turned on (READY).

HINT:

If the ECU stores a DTC, the ABS warning, BRAKE warning, brake control warning, master caution indicator and SLIP indicator lights come on.

If the vehicle is equipped with a multi information display, and the vehicle stores a DTC, the master caution indicator light will illuminate, and the multi information display will indicate the malfunction.

In this case, the ABS warning, BRAKE warning, brake control warning, and SLIP indicator lights will also come on.

If the indicator remains on or does not come on, proceed to troubleshooting for the light circuits listed below.

Trouble Area	See procedure
ABS warning light circuit	BC-214 or BC-219
BRAKE warning light circuit	BC-227 or BC-234
Brake control warning light circuit	BC-236 or BC-240
VSC warning light (master caution indicator light and multi information display) circuit	BC-221 or BC-225
SLIP indicator light circuit	BC-242 or BC-246

2. SENSOR CHECK USING TEST MODE (SIGNAL CHECK) (INTELLIGENT TESTER)

NOTICE:

After replacement of the brake actuator assembly and/or yaw rate and acceleration sensor, perform zero point calibration of the yaw rate and acceleration sensor.

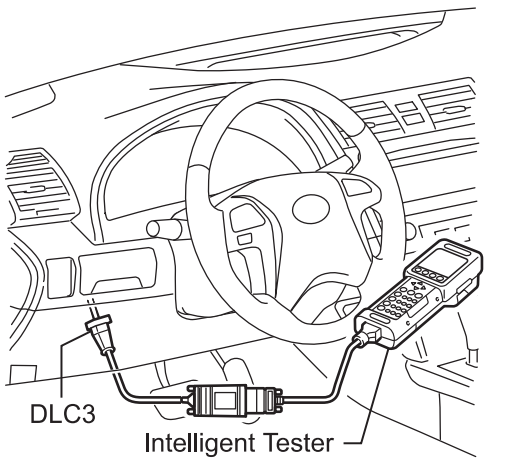
HINT:

- If the power switch is turned from on (IG) to on (ACC) or off during Test Mode (signal check), DTCs of the signal check function will be erased.

BC

- During Test Mode (signal check), the skid control ECU records all DTCs of the signal check function. By performing the Test Mode (signal check), the codes are erased if a normal condition is confirmed. The remaining codes are the codes where an abnormality was found.

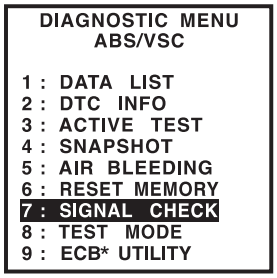
(a) Procedure to enter Test Mode.
  (1) Turn the power switch off.
  (2) Connect the intelligent tester to the DLC3.
  (3) Check that the steering wheel is centered and move the shift lever to the P position.
  (4) Turn the power switch on (IG).



H C131977E06

(5) Set the intelligent tester to Test Mode (select "SIGNAL CHECK").
  HINT:
  Refer to the intelligent tester operator's manual for further details.

Tester Display:



*: Electronically Controlled Brake

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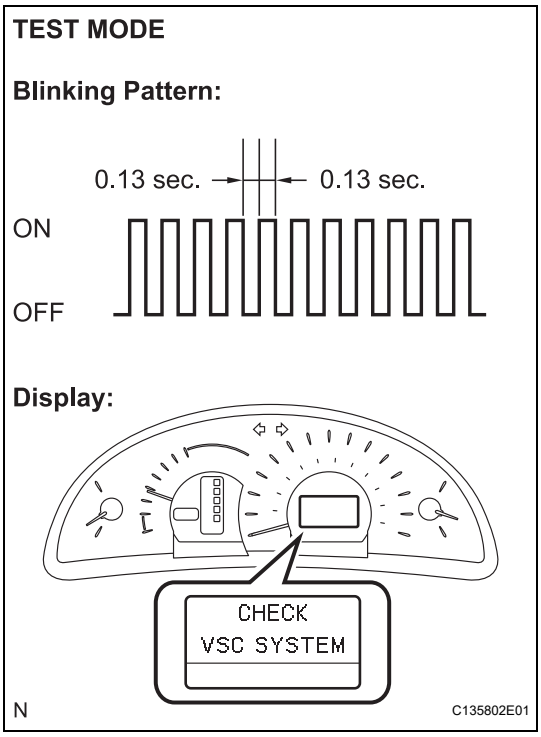
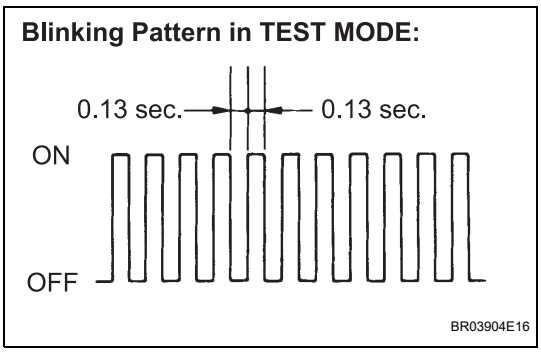
BC





(6) Check that the ABS warning, brake control warning, and master caution indicator lights blink and "CHECK VSC SYSTEM" is displayed on the multi information display (Test Mode).
HINT:
- The SLIP indicator remains on during Test Mode because TRAC is prohibited.
- If the ABS warning, brake control warning, and VSC warning (master caution indicator light and multi information display) lights do not blink, inspect the TS and CG terminal circuit, and ABS warning, brake control warning, and VSC warning (master caution indicator light and multi information display) light circuits.

Trouble Area	See procedure
TS and CG terminal circuit	BC-255
ABS warning light circuit	BC-219
Brake control warning light circuit	BC-240
VSC warning light (master caution indicator light and multi information display) circuit	BC-225

(7) Check the ABS sensor.
HINT:
Check that the ABS warning light is blinking in Test Mode and perform the check.

3. ACCELERATION SENSOR CHECK (INTELLIGENT TESTER)

(a) Keep the vehicle stationary on a level surface for 1 second or more.
HINT:
Acceleration sensor check can be performed with the master cylinder pressure sensor check below.

4. MASTER CYLINDER PRESSURE SENSOR CHECK (INTELLIGENT TESTER)

(a) Leave the vehicle in a stationary condition and release the brake pedal for 1 second or more, and quickly and continuously depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 second.

(b) Check that the ABS warning light stays on for 3 seconds.
HINT:
- Ensure that the ABS warning light comes on.
- While the ABS warning light stays on, continue to depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more.
- The ABS warning light comes on for 3 seconds every time brake pedal operation above is performed.

- If the check of the master cylinder pressure sensor is not completed, depressing the brake pedal causes further decrease in the negative pressure, making the sensor check difficult to be completed.
- If the negative pressure is insufficient, the master cylinder pressure sensor check may not be completed. In this case, run the engine at idle to obtain sufficient negative pressure.
- If the brake pedal is strongly depressed when the negative pressure is insufficient, the BRAKE warning light may come on in accordance with the booster pressure control. In this case, run the engine at idle to obtain sufficient negative pressure.

5. SPEED SENSOR CHECK (INTELLIGENT TESTER)

(a) Check the speed sensor signal.

(1) Drive the vehicle straight ahead.

Accelerate the vehicle to a speed of 45 km/h (28 mph) or more for several seconds and check that the ABS warning light goes off.

HINT:

The sensor check may not be completed if wheelspin occurs.

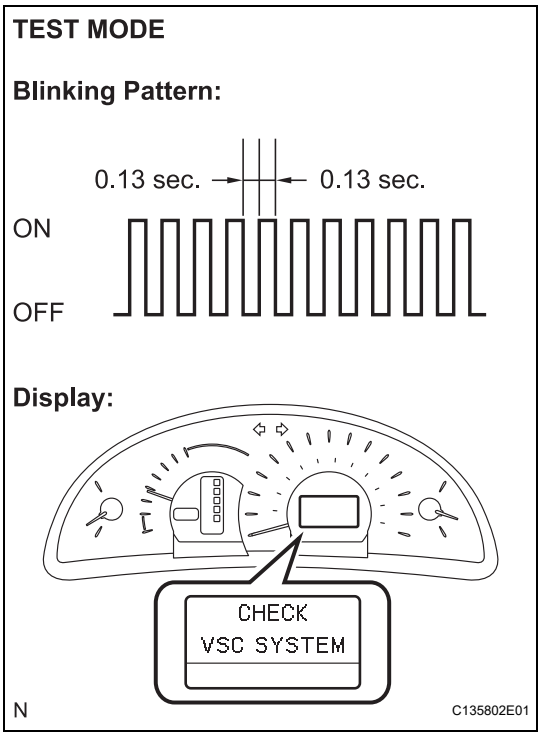
(b) Stop the vehicle.

NOTICE:

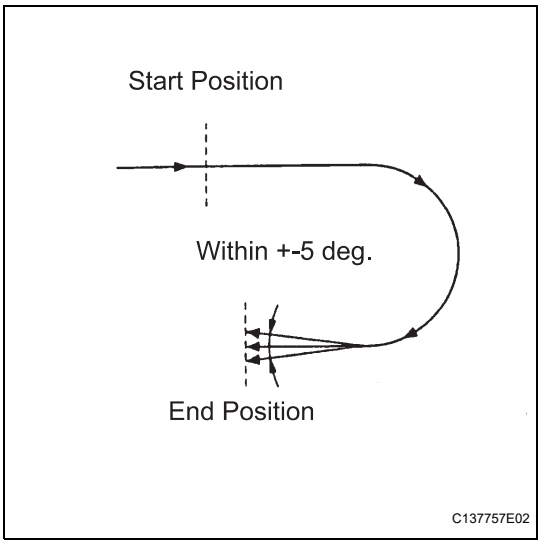
- **Before performing the speed sensor check, complete the acceleration sensor and master cylinder pressure sensor checks.**
- **The speed sensor check may not be completed if the speed sensor check is started while turning the steering wheel or spinning the wheels.**
- **After the ABS warning light goes off and if the vehicle speed exceeds 80 km/h (50 mph), a signal check code will be stored again. Accelerate or stop the vehicle before the speed reaches 80 km/h (50 mph).**
- **If the signal check has not been completed, the ABS warning light blinks while driving and the ABS system does not operate.**

HINT:

When the sensor check has been completed, the ABS warning light goes off while driving and blinks in the Test Mode pattern while stationary.



(c) Check the VSC sensor.
Check that the brake control warning, and master caution indicator lights blink and "CHECK VSC SYSTEM" is displayed on the multi information display, and perform the check.



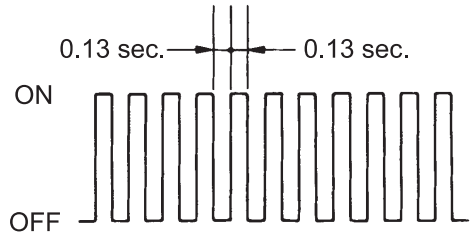
6. YAW RATE SENSOR CHECK (INTELLIGENT TESTER)

(a) Check the zero point voltage of the yaw rate sensor.
(1) Keep the vehicle in a stationary condition on a level surface for 1 second or more.

(b) Check the output of the yaw rate sensor.
(1) Move the shift lever from P to the D position and drive the vehicle at a speed of approximately 5 km/h (3 mph), and turn the steering wheel either to the left or right 90° or more until the vehicle makes a 180° turn.
(2) Stop the vehicle and move the shift lever to the P position. Check that the skid control buzzer sounds for 3 seconds.
HINT:
- If the skid control buzzer sounds, the sensor check is completed normally.
- If the skid control buzzer does not sound, check the skid control buzzer circuit (See page BC-248), then perform the sensor check again.
- If the skid control buzzer still does not sound, there is a malfunction in the yaw rate sensor, so check the DTC.
- Make a 180° turn. At the end of the turn, the direction of the vehicle should be within 180° +-5° of its start position.
- Do not spin the wheels.
- Do not turn the power switch off while turning.

- Do not move the shift lever to the P position while turning, but changing in the vehicle speed, stopping, or driving in reverse is possible.
- Complete the turn within 20 seconds.

Blinking Pattern in TEST MODE:



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7. END OF SENSOR CHECK (INTELLIGENT TESTER)

(a) If the sensor check is completed, the ABS warning light blinks (Test Mode) when the vehicle stops and the ABS warning light is off while the vehicle is driving.

NOTICE:

- **When the yaw rate sensor, acceleration sensor, speed sensor, and master cylinder pressure sensor checks are completed, the sensor check is completed.**
- **If the sensor check is not completed, the ABS warning light blinks even while the vehicle is driving and the ABS does not operate.**

8. READ DTC OF TEST MODE (SIGNAL CHECK) FUNCTION (INTELLIGENT TESTER)

(a) Read the DTC(s) by following the tester screen.

NOTICE:

- **If only the DTCs are displayed, repair the malfunction area and clear the DTCs.**
- **If the DTCs or Test Mode codes (DTC of signal check function) are displayed, repair the malfunction area, clear the DTCs and perform the Test Mode inspection.**

HINT:

See the list of DTC (See procedure "A").

9. SENSOR CHECK USING TEST MODE (SIGNAL CHECK) (SST CHECK WIRE)

NOTICE:

After replacement of the brake actuator assembly and/or yaw rate and acceleration sensor, perform zero point calibration of the yaw rate and acceleration sensor.

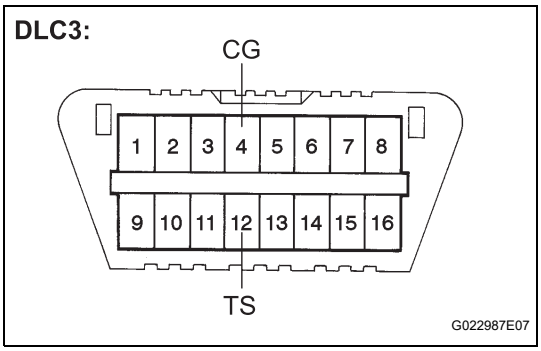
HINT:

- If the power switch is turned from on (IG) to on (ACC) or off during Test Mode (signal check), DTCs of the signal check function will be erased.
- During Test Mode (signal check), the skid control ECU records all DTCs of the signal check function. By performing the Test Mode (signal check), the codes are erased if a normal condition is confirmed. The remaining codes are the codes where an abnormality was found.

(a) Procedure to enter Test Mode.

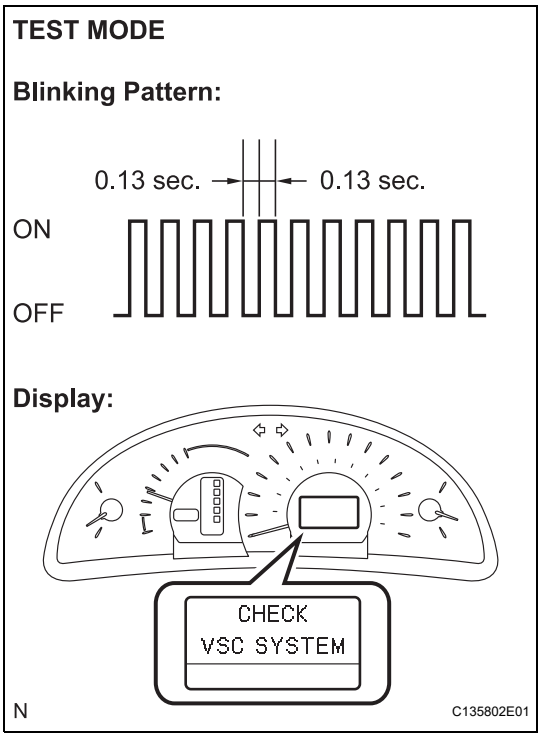
(1) Turn the power switch off.

(2) Check that the steering wheel is centered and move the shift lever to the P position.



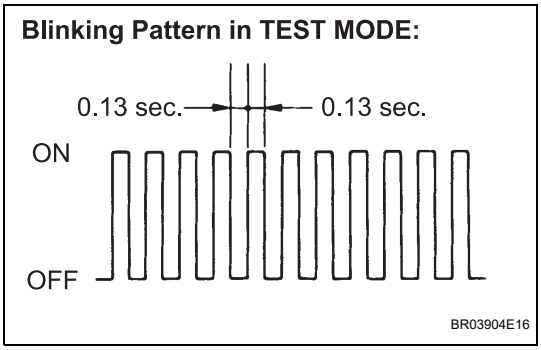
(3) Using SST, connect terminals TS and CG of the DLC3.
SST 09843-18040

(4) Turn the power switch on (IG).



(5) Check that the ABS warning, brake control warning, and master caution indicator lights blink and "CHECK VSC SYSTEM" is displayed on the multi information display (Test Mode).
HINT:
- The SLIP indicator remains on during Test Mode because TRAC is prohibited.
- If the ABS warning, brake control warning, and VSC warning (master caution indicator light and multi information display) lights do not blink, inspect the TS and CG terminal circuit, and ABS warning, brake control warning, and VSC warning (master caution indicator light and multi information display) light circuits.

Trouble Area	See procedure
TS and CG terminal circuit	BC-255
ABS warning light circuit	BC-219
Brake control warning light circuit	BC-240
VSC warning light (master caution indicator and multi information display) circuit	BC-225



(6) Check the ABS sensor.
HINT:
Check that the ABS warning light is blinking in Test Mode and perform the check.

10. ACCELERATION SENSOR CHECK (SST CHECK WIRE)

(a) Keep the vehicle stationary on a level surface for 1 second or more.
HINT:
Acceleration sensor check can be performed with the master cylinder pressure sensor check below.

11. MASTER CYLINDER PRESSURE SENSOR CHECK (SST CHECK WIRE)

(a) Leave the vehicle in a stationary condition and release the brake pedal for 1 second or more, and quickly and continuously depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 second.

BC

(b) Check that the ABS warning light stays on for 3 seconds.
HINT:
- Ensure that the ABS warning light comes on.
- While the ABS warning light stays on, continue to depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more.
- The ABS warning light comes on for 3 seconds every time the brake pedal operation above is performed.
- If the check of the master cylinder pressure sensor is not completed, depressing the brake pedal causes further decrease in the negative pressure, making the sensor check difficult to be completed.
- If the negative pressure is insufficient, the master cylinder pressure sensor check may not be completed. In this case, run the engine at idle to obtain sufficient negative pressure.
- If the brake pedal is strongly depressed when the negative pressure is insufficient, the BRAKE warning light may come on in accordance with the booster pressure control. In this case, run the engine at idle to obtain sufficient negative pressure.

12. SPEED SENSOR CHECK (SST CHECK WIRE)

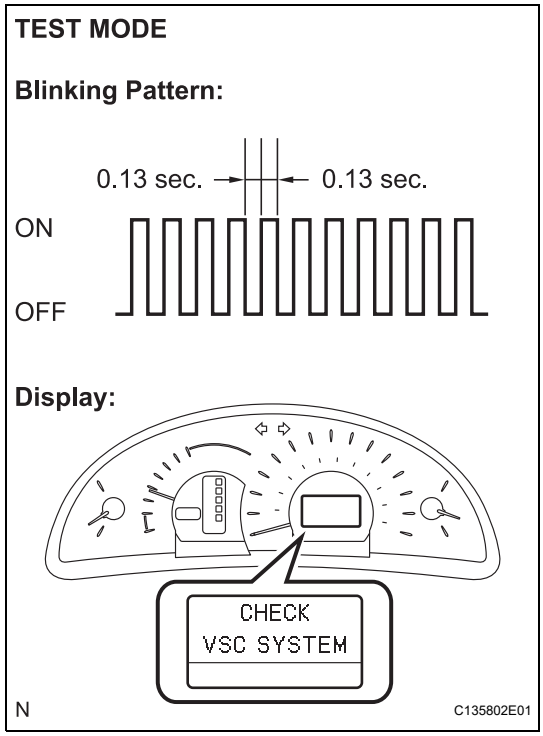
(a) Check the speed sensor signal.

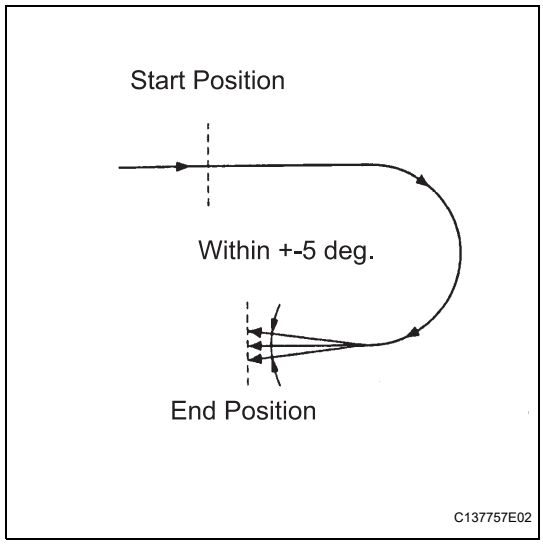
(1) Drive the vehicle straight ahead.
Accelerate the vehicle to a speed of 45 km/h (28 mph) or more for several seconds and check that the ABS warning light goes off.
HINT:
The sensor check may not be completed if wheelspin occurs.

(b) Stop the vehicle.
NOTICE:
- **Before performing the speed sensor check, complete the acceleration sensor and master cylinder pressure sensor checks.**
- **The speed sensor check may not be completed if the speed sensor check is started while turning the steering wheel or spinning the wheels.**
- **After the ABS warning light goes off, if vehicle speed exceeds 80 km/h (50 mph), a signal check code will be stored again. Accelerate or stop the vehicle before the speed reaches 80 km/h (50 mph).**
- **If the signal check has not been completed, the ABS warning light blinks while driving and the ABS system does not operate.**

HINT:
When the sensor check has been completed, the ABS warning light goes off while driving and blinks in the Test Mode pattern while stationary.

(c) Check the VSC sensor.
Check that the brake control warning, and master caution indicator lights blink and "CHECK VSC SYSTEM" is displayed on the multi information display, and perform the check.





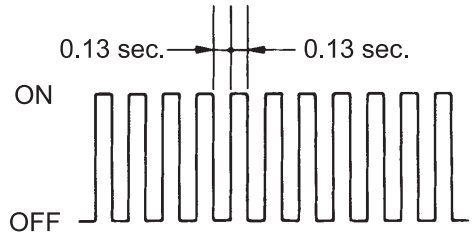
13. YAW RATE SENSOR CHECK (SST CHECK WIRE)

(a) Check the zero point voltage of the yaw rate sensor.
(1) Keep the vehicle stationary on a level surface for 1 second or more.

(b) Check the output of the yaw rate sensor.
(1) Move the shift lever from P to the D position and drive the vehicle at a vehicle speed of approximately 5 km/h (3 mph) and turn the steering wheel either to the left or right 90° or more and until the vehicle makes a 180° turn.
(2) Stop the vehicle and move the shift lever to the P position. Check that the skid control buzzer sounds for 3 seconds.
HINT:
- If the skid control buzzer sounds, the sensor check is completed normally.
- If the skid control buzzer does not sound, check the skid control buzzer circuit (See page BC-248), then perform the sensor check again.
- If the skid control buzzer still does not sound, there is a malfunction in the yaw rate sensor, so check the DTC.
- Make a 180° turn. At the end of the turn, the direction of the vehicle should be within 180° +-5° of its start position.
- Do not spin the wheels.
- Do not turn the power switch off while turning.

- Do not move the shift lever to the P position while turning, but changing in the vehicle speed, stopping, or driving in reverse is possible.
- Complete the turn within 20 seconds.

Blinking Pattern in TEST MODE:



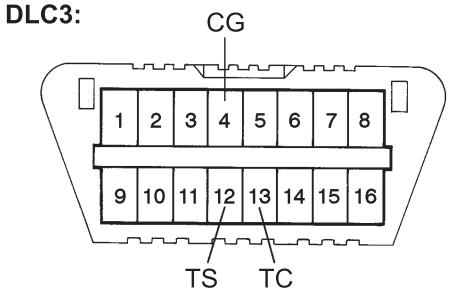
14. END OF SENSOR CHECK (SST CHECK WIRE)

(a) If the sensor check is completed, the ABS warning light blinks (Test Mode) when the vehicle stops and the ABS warning light is off while the vehicle is driving.

NOTICE:

- **When the yaw rate sensor, acceleration sensor, speed sensor, and master cylinder pressure sensor checks are completed, the sensor check is completed.**
- **If the sensor check is not completed, the ABS warning light blinks even while the vehicle is driving and the ABS does not operate.**

DLC3:

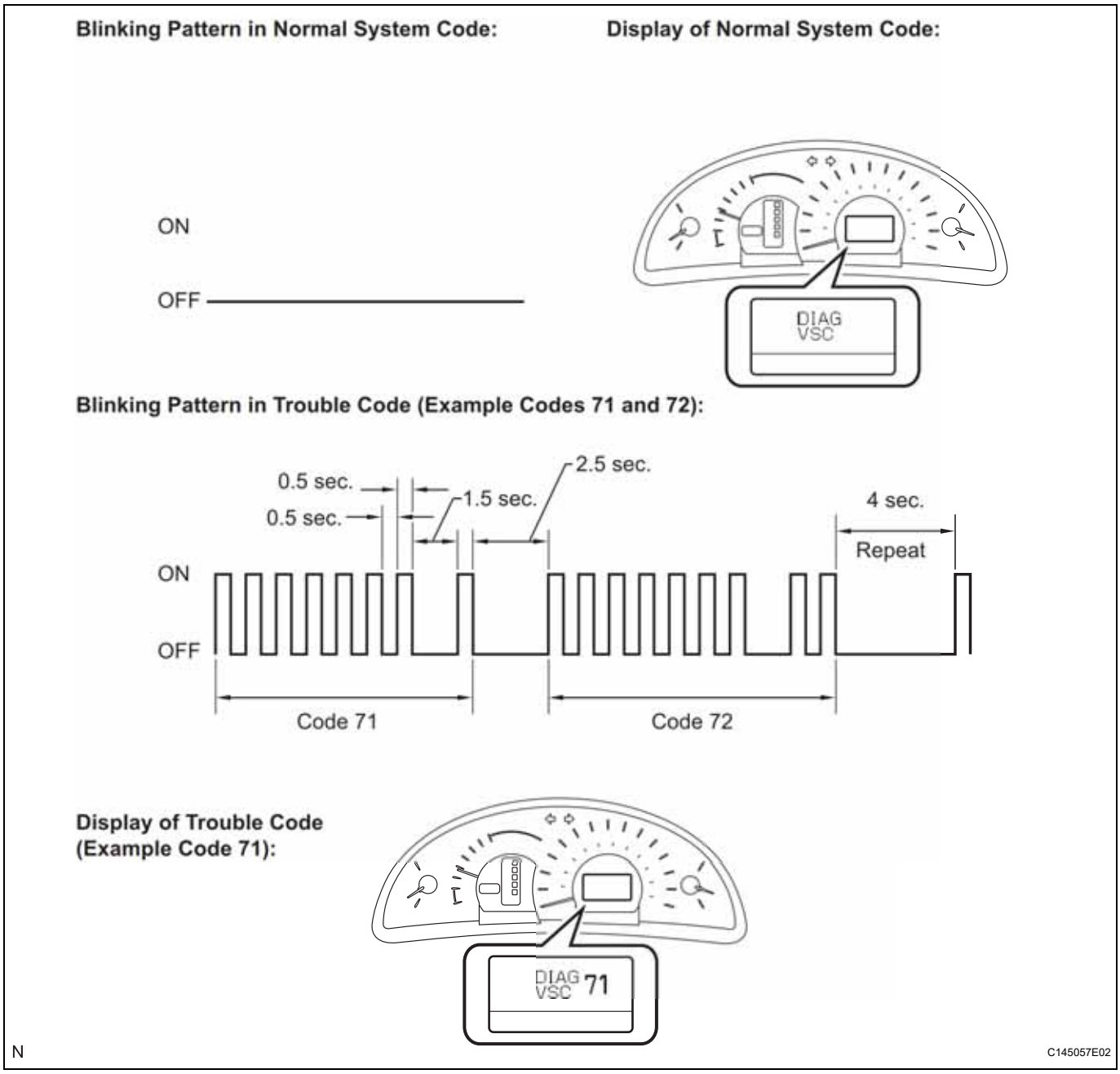


15. READ DTC OF SIGNAL CHECK FUNCTION (SST CHECK WIRE)

(a) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

(b) Count the number of blinks of the ABS warning and brake control warning lights and read "DIAG VSC" on the multi information display.



NOTICE:

- **If only the DTCs are displayed, repair the malfunction area and clear the DTCs.**
- **If the DTCs or Test Mode codes (DTC of signal check function) are displayed, repair the malfunction area, clear the DTCs and perform the Test Mode inspection.**

HINT:

- If more than 1 malfunction is detected at the same time, the lowest numbered code will be displayed first.
- See the list of DTC (See procedure "A").

BC

(c) After performing the check, disconnect the SST from terminals TS and CG, and TC and CG of the DLC3 and turn the power switch off.

(d) Turn the power switch on (IG).
HINT:
- If the power switch is not turned on (IG) after the SST is removed from the DLC3, the previous Test Mode will continue.
- If the power switch is turned on (IG) with terminals TS and CG shorted, the previous Test Mode will continue.

16. DTC OF TEST MODE (SIGNAL CHECK) FUNCTION (Procedure "A")

ABS sensor:

DTC Code	Detection Item	Trouble Area
C1271/71	Low output signal of front speed sensor RH	• Front speed sensor RH • Sensor installation • Speed sensor rotor
C1272/72	Low output signal of front speed sensor LH	• Front speed sensor LH • Sensor installation • Speed sensor rotor
C1273/73	Low output signal of rear speed sensor RH	• Rear speed sensor RH • Sensor installation • Speed sensor rotor
C1274/74	Low output signal of rear speed sensor LH	• Rear speed sensor LH • Sensor installation • Speed sensor rotor
C1275/75	Abnormal change in output signal of front speed sensor RH	Speed sensor rotor
C1276/76	Abnormal change in output signal of front speed sensor LH	Speed sensor rotor
C1277/77	Abnormal change in output signal of rear speed sensor RH	Speed sensor rotor
C1278/78	Abnormal change in output signal of rear speed sensor LH	Speed sensor rotor
C1279/79	Acceleration sensor output voltage malfunction	• Yaw rate and acceleration sensor • Sensor installation
C1281/81	Master cylinder pressure sensor output malfunction	• Stop light switch • Master cylinder pressure sensor

VSC sensor:

DTC Code	Detection Item	Trouble Area
C0371/71	Yaw rate sensor	Yaw rate and acceleration sensor

Electronically Controlled Brake sensor:

DTC Code	Detection Item	Trouble Area
C1346/71	Stroke sensor zero point learning malfunction	Brake pedal stroke sensor

HINT:
The codes in this table are output only in Test Mode (signal check).

PROBLEM SYMPTOMS TABLE

If there are no DTCs output but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

NOTICE:

When replacing the skid control ECU, sensor, etc., make sure that the power switch is turned off, the stop light switch is off, and 2 minutes have elapsed since the driver's door was closed.

HINT:

- Inspect the fuse and relay before investigating the suspected areas shown in the table below.
- Inspect each malfunctioning circuit in numerical order for the corresponding symptom.
- Since the oil passage is blocked off by the master cut solenoid during Electronically Controlled Brake control, there is no kickback (vibration) to the brake pedal, creating a quiet operating sound even while the ABS is operating.

Electronically Controlled Brake System:

Symptom	Suspected Area	See page
ABS, BA and/or EBD does not operate	1. Use a chassis dynamometer, etc. to check the Electronically Controlled Brake operation.	-
	2. Check the DTC again and make sure that the normal system code is output.	BC-57
	3. IG power source circuit	BC-121
	4. Front speed sensor circuit	BC-80
	5. Rear speed sensor circuit	BC-89
	6. Check the brake actuator assembly with the intelligent tester. (Check brake actuator assembly operation using the Active Test function.) If abnormal, check the hydraulic circuit for leakage.	BC-259
	7. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the skid control ECU.	BC-289
ABS, BA and/or EBD does not operate efficiently	1. Check the DTC again and make sure that the normal system code is output.	BC-57
	2. Front speed sensor circuit	BC-80
	3. Rear speed sensor circuit	BC-89
	4. Check the brake actuator assembly with the intelligent tester. (Check brake actuator assembly operation using the Active Test function.) If abnormal, check the hydraulic circuit for leakage.	BC-259
	5. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the skid control ECU.	BC-289
ABS warning light abnormal (Remains on)	1. ABS warning light circuit	BC-214
	2. Skid control ECU	BC-289
ABS warning light abnormal (Does not come on)	1. ABS warning light circuit	BC-219
	2. Skid control ECU	BC-289
BRAKE warning light abnormal (Remains on)	1. Brake fluid level warning switch circuit	BC-102
	2. BRAKE warning light circuit	BC-227
	3. Skid control ECU	BC-289
BRAKE warning light abnormal (Does not come on)	1. BRAKE warning light circuit	BC-234
	2. Skid control ECU	BC-289

Symptom	Suspected Area	See page
VSC and/or TRAC does not operate	1. Check that traction control has not operated by carrying out diagnosis.	-
	2. Check the DTC again and make sure that the normal system code is output.	BC-57
	3. IG power source circuit	BC-121
	4. Check the hydraulic circuit for leakage.	-
	5. Front speed sensor circuit	BC-80
	6. Rear speed sensor circuit	BC-89
	7. Yaw rate and acceleration sensor circuit	BC-98
	8. Steering angle sensor circuit	BC-109
	9. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the skid control ECU.	BC-289
Brake control warning light abnormal (Remains on)	1. Brake control warning light circuit	BC-236
	2. Skid control ECU	BC-289
Brake control warning light abnormal (Does not come on)	1. Brake control warning light circuit	BC-240
	2. Skid control ECU	BC-289
VSC warning light (master caution indicator light and multi information display) abnormal (Remains on)	1. VSC warning light circuit	BC-221
	2. Skid control ECU	BC-289
VSC warning light (master caution indicator light multi information display) abnormal (Does not come on)	1. VSC warning light circuit	BC-225
	2. Skid control ECU	BC-289
SLIP indicator light abnormal (Remains on)	1. SLIP indicator light circuit	BC-242
	2. Skid control ECU	BC-289
SLIP indicator light abnormal (Does not come on)	1. SLIP indicator light circuit	BC-246
	2. Skid control ECU	BC-289
DTC check cannot be done	1. Check the DTC again and make sure that the normal system code is output.	BC-57
	2. TC and CG terminal circuit	BC-252
	3. If the symptoms still occur even after the above circuit in suspected areas has been inspected and proved to be normal, replace the skid control ECU.	BC-289
Sensor check cannot be done	1. TS and CG terminal circuit	BC-255
	2. Skid control ECU	BC-289
Skid control buzzer abnormal	1. Skid control buzzer circuit	BC-248
	2. Skid control ECU	BC-289

TERMINALS OF ECU

1. CHECK AUXILIARY BATTERY VOLTAGE

(a) Check the auxiliary battery voltage.

Standard voltage:

11 to 14 V

2. SKID CONTROL ECU INSPECTION

(a) Measure the voltage between each terminal or between each terminal and body ground.

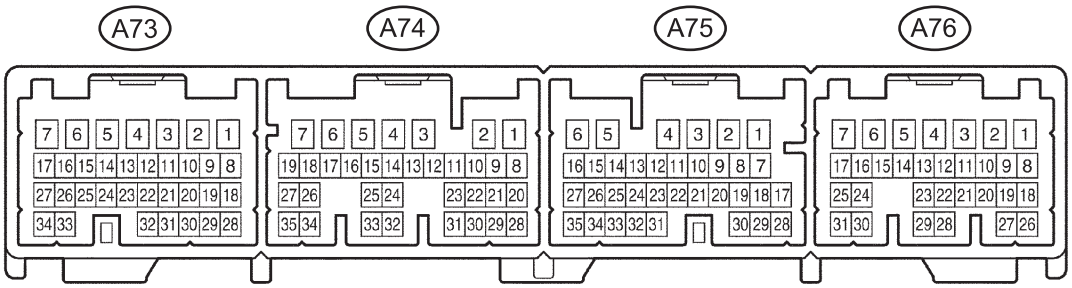
(b) Connect the intelligent tester to the DLC3, and check the communication condition with the skid control ECU.

(c) Using an oscilloscope, check that the pulse generates between each terminal or between each terminal and body ground.

NOTICE:

- **Inspection should be performed from the back of the connector with the connector connected to the skid control ECU.**
- **The voltage between the terminals of the brake actuator assembly may become 0 V due to the fail safe function when the brake control warning light comes on (malfunctioning).**

Skid Control ECU:



C138589E03

BC

HINT:

Inspect the ECU from the wire harness side while the connector is connected.

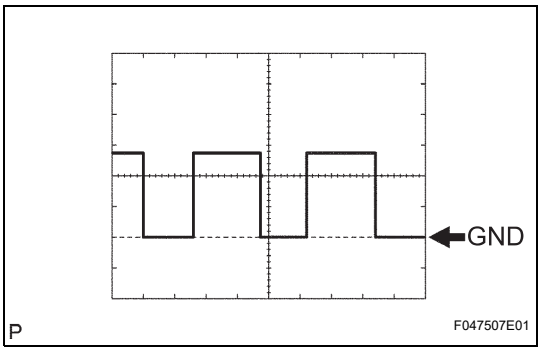
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND1 (A73-1) - Body ground	W-B - Body ground	Skid control ECU ground 1	Always	Below 1 Ω
R1+ (A73-2) - Body ground	B - Body ground	Main relay power 1	Power switch on (IG)	9.1 to 13.6 V
BS1 (A73-3) - Body ground	W - Body ground	Battery source 1	Approx. 1.5 seconds after turning power switch on (IG)	8.8 to 14 V
SMC1 (A73-4) - Body ground	W-B - Body ground	Master cut solenoid 1 output	Brake pedal depressed approx. 1.5 seconds after turning power switch on (IG)	Below 1.5 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BCTY+ (A73-5) - Body ground	LG - Body ground	Courtesy power input	Driver door open → close	Approx. 5 sec. 8 to 16 V → Below 1 V
SLAFR- (A73-6) - Body ground	R - Body ground	Front addition solenoid (-) RH output	Approx. 1.5 seconds after turning power switch on (IG)	Below 1.5 V
SLAFR+ (A73-7) - Body ground	B - Body ground	Front addition solenoid (+) RH output	Brake pedal depressed approx. 1.5 seconds after turning power switch on (IG)	Pulse generation (see waveform 1)
E (A73-8) - Body ground	R - Body ground	Pressure sensor ground	Power switch off	Below 1 Ω
VCM1 (A73-9) - Body ground	G - Body ground	Pressure sensor power	Power switch on (IG)	4.75 to 5.25 V
MR1+ (A73-11) - Body ground	B - Body ground	Motor relay power 1	Approx. 1.5 seconds after turning power switch on (IG)	8.8 to 14 V
R3+ (A73-12) - Body ground	W-B - Body ground	Main relay output 1	Approx. 1.5 seconds after turning power switch on (IG)	Below 1 V
SCSS (A73-13) - Body ground	P - Body ground	Stroke simulator cut solenoid output	Brake pedal depressed approx. 1.5 seconds after turning power switch on (IG)	Below 1.5 V
SLARL+ (A73-15) - Body ground	G - Body ground	Rear addition solenoid (+) LH output	Brake pedal depressed approx. 1.5 seconds after turning power switch on (IG)	Pulse generation (see waveform 1)
SLRRL+ (A73-16) - Body ground	L - Body ground	Rear reduction solenoid (+) LH output	Brake pedal depressed approx. 1.5 seconds after turning power switch on (IG)	Pulse generation (see waveform 1)
SLRFR+ (A73-17) - Body ground	L - Body ground	Front reduction solenoid (+) RH output	Power switch on (IG), after approx. 1.5 seconds brake pedal depressed → released	Pulse generation (see waveform 2)
PRL (A73-18) - Body ground	G - Body ground	Rear pressure sensor LH input	Power switch on (IG), brake pedal released	0.3 to 0.8 V
SG1 (A73-20) - Body ground	O - Body ground	Pressure sensor shield ground 1	Power switch off	Below 1 Ω
PACC (A73-21) - Body ground	R - Body ground	Accumulator pressure sensor input	Power switch on (IG), after pump motor operates and stops by pedal operation	3.3 to 4.7 V
FR- (A73-22) - Body ground	G - Body ground	Front sensor (-) RH input	Power switch off	Below 1 Ω
PFR (A73-23) - Body ground	Y - Body ground	Front pressure sensor RH input	Power switch on (IG), brake pedal released	0.3 to 0.8 V
MR1 (A73-25) - Body ground	LG - Body ground	Motor relay output 1	Power switch on (IG), pump motor is operating	Below 1.5 V
SLRRL- (A73-26) - Body ground	B - Body ground	Rear reduction solenoid (-) LH output	Approx. 1.5 seconds after turning power switch on (IG)	Below 1.5 V
SLARL- (A73-27) - Body ground	R - Body ground	Rear addition solenoid (-) LH output	Approx. 1.5 seconds after turning power switch on (IG)	Below 1.5 V
MTT (A73-29) - Body ground	W - Body ground	Motor test input	Power switch on (IG), pump motor is operating	3.5 V or higher
PMC1 (A73-30) - Body ground	B - Body ground	Master pressure sensor input 1	Power switch on (IG), brake pedal released	0.3 to 0.8 V
PCK1 (A73-31) - Body ground	W - Body ground	Pressure sensor check output 1	Approx. 1.5 seconds after turning power switch on (IG)	4.75 to 5.25 V
FR+ (A73-32) - Body ground	R - Body ground	Front sensor (+) RH input	Vehicle speed input	Pulse generation (see waveform 3)
SLRFR- (A73-34) - Body ground	LG - Body ground	Front reduction solenoid (-) RH output	Approx. 1.5 seconds after turning power switch on (IG)	Below 1.5 V
GND3 (A74-1) - Body ground	W-B - Body ground	Skid control ECU ground 3	Always	Below 1 Ω

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND2 (A74-2) - Body ground	W-B - Body ground	Skid control ECU ground 2	Always	Below 1 Ω
+BI1 (A74-3) - Body ground	R - Body ground	Main relay power input 1	Power switch off	10 to 14 V
+BO1 (A74-5) - Body ground	L - Body ground	Main relay power output 1	Power switch on (IG)	8.8 to 14 V
IG1 (A74-7) - Body ground	B - Body ground	IG1 power	Power switch on (IG)	10 to 14 V
BZ (A74-12) - Body ground	Y - Body ground	Skid control buzzer output	Power switch on (IG), buzzer is operating	Below 1 V
STP (A74-14) - Body ground	P - Body ground	Stop light switch signal input	Brake pedal depressed → released	8 to 14 V → Below 1.5 V
CANL (A74-18) - Body ground	W - Body ground	CAN communication (Send and receive-)	Check DTC using intelligent tester	CAN communication's DTC is not output
CANH (A74-19) - Body ground	B - Body ground	CAN communication (Send and receive+)	Check DTC using intelligent tester	CAN communication's DTC is not output
FAIL (A74-20) - Body ground	P - Body ground	Capacitor communication (Receive)	Approx. 1.5 seconds after turning power switch on (IG)	Pulse generation (see waveform 5)
SP1 (A74-22) - Body ground	L - Body ground	Speedometer output	Vehicle speed input	Pulse generation (see waveform 4)
RL- (A74-27) - Body ground	L - Body ground	Rear sensor (-) LH input	Power switch off	Below 1 Ω
ENA (A74-30) - Body ground	O - Body ground	Capacitor communication (Send)	Approx. 1.5 seconds after turning power switch on (IG)	Pulse generation (see waveform 6)
TS (A74-32) - Body ground	G - Body ground	Sensor diagnosis check input	Power switch on (IG), connect terminals TS and CG of the DLC3 → disconnect	Below 1.5 V → 9.1 to 13.6 V
VBZ (A74-33) - Body ground	B - Body ground	Skid control buzzer power	Power switch on (IG)	9.1 to 13.6 V
RL+ (A74-35) - Body ground	R - Body ground	Rear sensor (+) LH input	Vehicle speed input	Pulse generation (see waveform 3)
GND5 (A75-1) - Body ground	B - Body ground	Skid control ECU ground 5	Always	Below 1 Ω
GND4 (A75-2) - Body ground	W-B - Body ground	Skid control ECU ground 4	Always	Below 1 Ω
+BO2 (A75-4) - Body ground	R- Body ground	Main relay power output 2	Power switch on (IG)	8.8 to 14 V
+BI2 (A75-5) - Body ground	W - Body ground	Main relay power input 2	Power switch off	10 to 14 V
VCSK (A75-6) - Body ground	G - Body ground	Stroke sensor power	Power switch on (IG)	3.75 to 4.95 V
SSK (A75-7) - Body ground	BR - Body ground	Stroke sensor shield ground	Power switch off	Below 1 Ω
SKG (A75-8) - Body ground	R - Body ground	Stroke sensor ground	Power switch off	Below 1 Ω
SKS1 (A75-21) - Body ground	W - Body ground	Stroke sensor signal input 1	Power switch on (IG), brake pedal released	0.46 to 1.35 V
SKS2 (A75-22) - Body ground	B - Body ground	Stroke sensor signal input 2	Power switch on (IG), brake pedal released	2.56 to 4.35 V
RR- (A75-23) - Body ground	R - Body ground	Rear sensor (-) RH input	Power switch off	Below 1 Ω
RR+ (A75-31) - Body ground	G - Body ground	Rear sensor (+) RH input	Vehicle speed input	Pulse generation (see waveform 3)
SLAFL+ (A76-1) - Body ground	L - Body ground	Front addition solenoid (+) LH output	Brake pedal depressed approx. 1.5 seconds after turning power switch on (IG)	Pulse generation (see waveform 1)
SLAFL- (A76-2) - Body ground	B - Body ground	Front addition solenoid (-) LH output	Approx. 1.5 seconds after turning power switch on (IG)	Below 1.5 V

BC

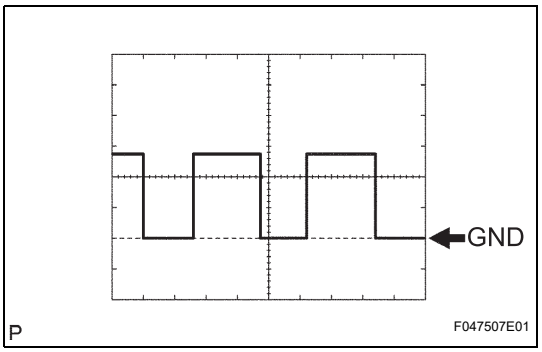
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SMC2 (A76-3) - Body ground	LG - Body ground	Master cut solenoid 2 output	Brake pedal depressed approx. 1.5 seconds after turning power switch on (IG)	Below 1.5 V
GND6 (A76-4) - Body ground	BR - Body ground	Skid control ECU ground 6	Always	Below 1 Ω
IG2 (A76-5) - Body ground	GR - Body ground	IG2 power	Power switch on (IG)	10 to 14 V
LBL (A76-6) - Body ground	LG - Body ground	Brake fluid level warning switch input	Brake fluid level warning switch OFF → ON	4 to 8 V → Below 1.5 V
BS2 (A76-7) - Body ground	G - Body ground	Battery source 2	Approx. 1.5 seconds after turning power switch on (IG)	8.8 to 14 V
SLRFL+ (A76-8) - Body ground	B - Body ground	Front reduction solenoid (+) LH output	Power switch on (IG), after approx. 1.5 seconds, brake pedal depressed → released	Pulse generation (see waveform 2)
SLARR- (A76-9) - Body ground	B - Body ground	Rear addition solenoid (-) RH output	Approx. 1.5 seconds after turning power switch on (IG)	Below 1.5 V
SG2 (A76-12) - Body ground	BR - Body ground	Pressure sensor shield ground 2	Power switch off	Below 1 Ω
VCM2 (A76-14) - Body ground	BR - Body ground	Pressure sensor power 2	Power switch on (IG)	4.75 to 5.25 V
R4+ (A76-15) - Body ground	W - Body ground	Main relay output 2	Approx. 1.5 seconds after turning power switch on (IG)	Below 1 V
R2+ (A76-17) - Body ground	G - Body ground	Main relay power 2	Power switch on (IG)	9.1 to 13.6 V
SLRRR- (A76-18) - Body ground	G - Body ground	Rear reduction solenoid (-) RH output	Approx. 1.5 seconds after turning power switch on (IG)	Below 1.5 V
SLARR+ (A76-19) - Body ground	Y - Body ground	Rear addition solenoid (+) RH output	Brake pedal depressed approx. 1.5 seconds after turning power switch on (IG)	Pulse generation (see waveform 1)
SLRRR+ (A76-20) - Body ground	R - Body ground	Rear reduction solenoid (+) RH output	Brake pedal depressed approx. 1.5 seconds after turning power switch on (IG)	Pulse generation (see waveform 1)
PCK2 (A76-21) - Body ground	L - Body ground	Pressure sensor check output 2	Power switch on (IG)	4.75 to 5.25 V
FL- (A76-22) - Body ground	V - Body ground	Front sensor (-) LH input	Power switch off	Below 1 Ω
PFL (A76-23) - Body ground	R - Body ground	Front pressure sensor LH input	Power switch on (IG), brake pedal released	0.3 to 0.8 V
MR2+ (A76-25) - Body ground	Y - Body ground	Motor relay power 2	Approx. 1.5 seconds after turning power switch on (IG)	8.8 to 14 V
SLRFL- (A76-26) - Body ground	R - Body ground	Front reduction solenoid (-) LH output	Approx. 1.5 seconds after turning power switch on (IG)	Below 1.5 V
PMC2 (A76-27) - Body ground	W - Body ground	Master pressure sensor input 2	Power switch on (IG), brake pedal released	0.3 to 0.8 V
FL+ (A76-28) - Body ground	LG - Body ground	Front sensor (+) LH input	Vehicle speed input	Pulse generation (see waveform 3)
E2 (A76-29) - Body ground	G - Body ground	Pressure sensor ground 2	Power switch off	Below 1 Ω
MR2 (A76-30) - Body ground	O - Body ground	Motor relay output 2	Power switch on (IG), pump motor is operating	Below 1.5 V
PRR (A76-31) - Body ground	Y - Body ground	Rear pressure sensor RH input	Power switch on (IG), brake pedal released	0.3 to 0.8 V



(d) Waveform 1 (Reference): Using an oscilloscope:

Item	Condition
Tool setting	5 V/DIV., 200 ms./DIV.
Vehicle condition	• While driving at approximately 20 km/h (12 mph) • Brake pedal depressed

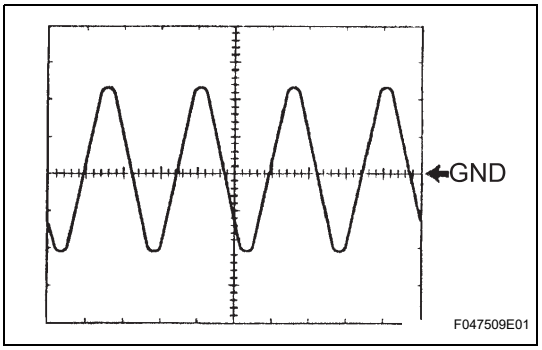
HINT:
Normal waveform is output only when BS1 and BS2 voltages are normal (10 to 14 V).



(e) Waveform 2 (Reference): Using an oscilloscope:

Item	Condition
Tool setting	5 V/DIV., 200 ms./DIV.
Vehicle condition	• While driving at approximately 20 km/h (12 mph) • Brake pedal depressed → released

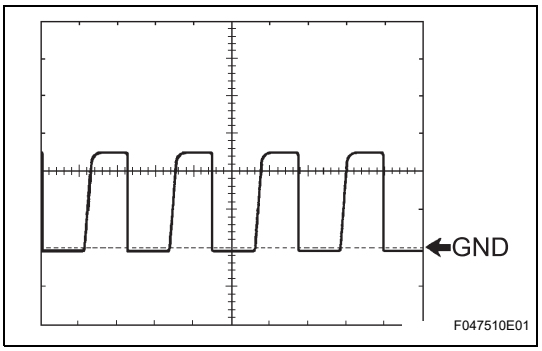
HINT:
Normal waveform is output only when BS1 and BS2 voltages are normal (10 to 14 V).



(f) Waveform 3 (Reference): Using an oscilloscope:

Item	Condition
Tool setting	1 V/DIV., 2 ms./DIV.
Vehicle condition	While driving at approximately 30 km/h (18 mph)

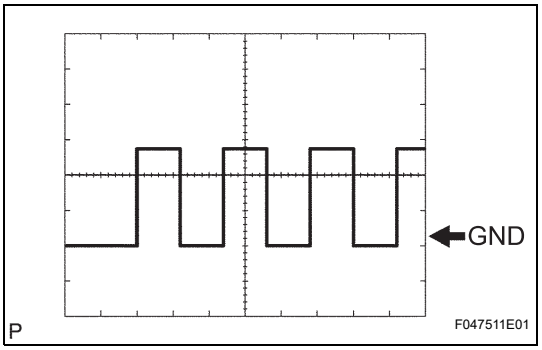
HINT:
As the vehicle speed (tire rotating speed) becomes faster, the cycle becomes shorter and the output voltage larger.



(g) Waveform 4 (Reference): Using an oscilloscope:

Item	Condition
Tool setting	5 V/DIV., 50 ms./DIV.
Vehicle condition	While driving at approximately 20 km/h (12 mph)

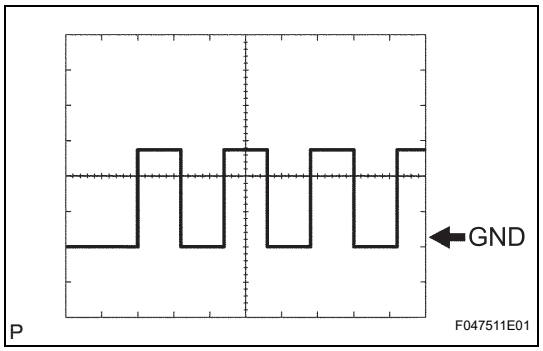
HINT:
As the vehicle speed (tire rotating speed) becomes faster, the cycle becomes shorter.



(h) Waveform 5 (Reference): Using an oscilloscope:

Item	Condition
Tool setting	5 V/DIV., 200 ms./DIV.
Vehicle condition	Turn the power switch on (IG)

BC



(i) Waveform 6 (Reference): Using an oscilloscope:

Item	Condition
Tool setting	2 V/DIV., 100 ms./DIV.
Vehicle condition	Turn the power switch on (IG)

DIAGNOSIS SYSTEM

1. DESCRIPTION

When troubleshooting a vehicle with the diagnosis system, the only difference from the usual troubleshooting procedure is connecting the intelligent tester to the vehicle and reading various data output from the vehicle's skid control ECU.

The skid control ECU records DTCs when the computer detects a malfunction in the computer itself or in its circuits.

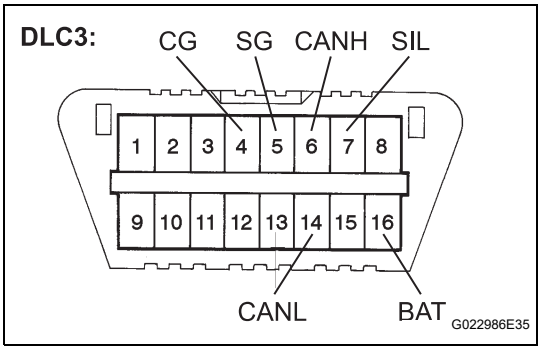
To check for DTCs, connect the intelligent tester to the DLC3 on the vehicle. The intelligent tester enables you to erase the DTCs, activate the various actuators, and check the Freeze Frame Data and Data List.

(a) Check the auxiliary battery voltage.

Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge the auxiliary battery before proceeding to the next step.



(b) Check the DLC3.

The ECU uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

Verify the conditions listed in the table below.

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	CAN bus line	Power switch off*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Power switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Power switch off*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Power switch off*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Power switch off*	6 kΩ or higher

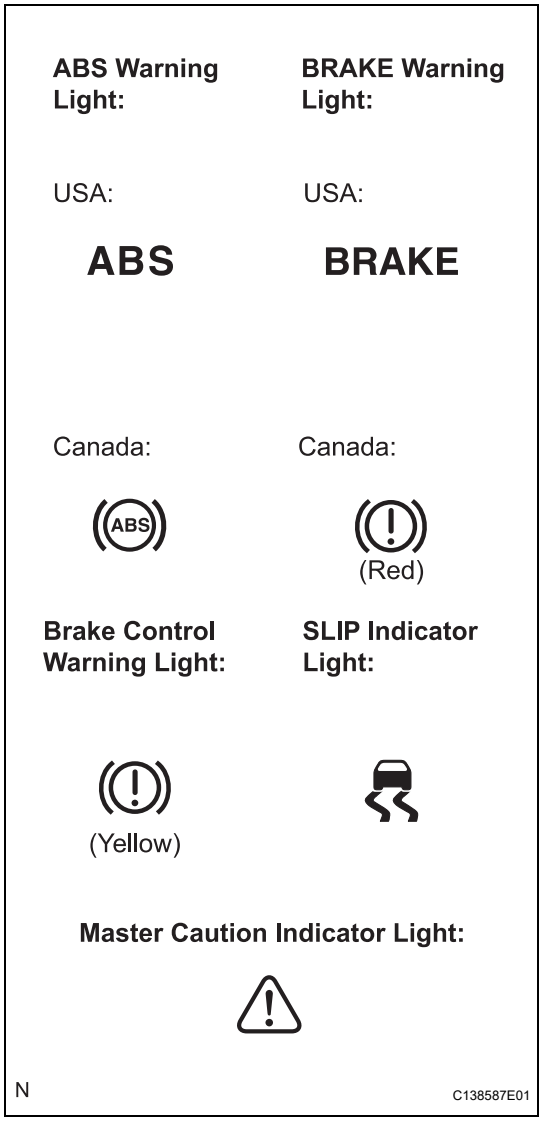
NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors.**

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the power switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester operator's manual.



2. DIAGNOSIS

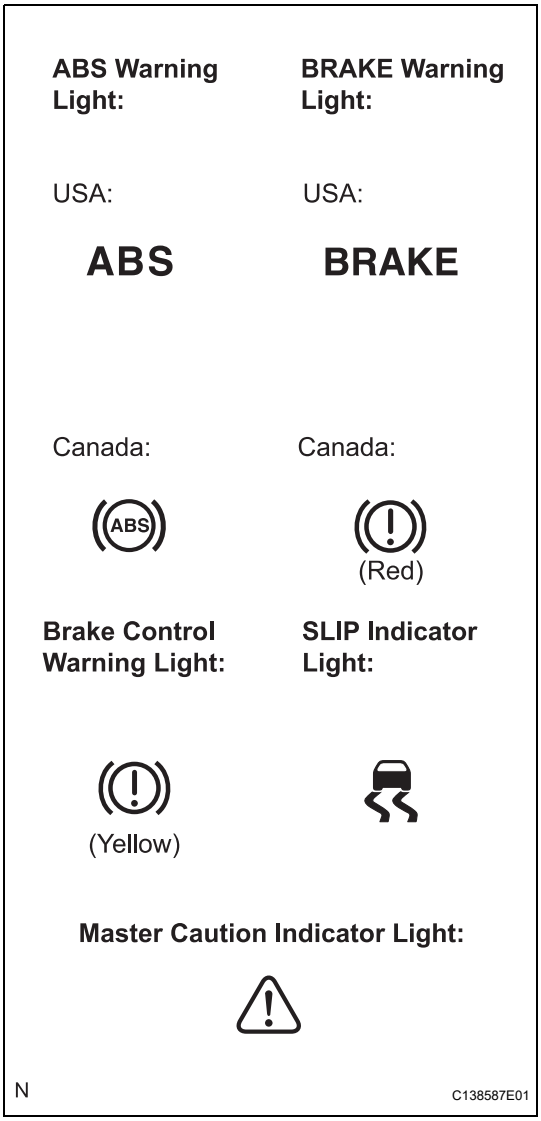
(a) If the skid control ECU detects a malfunction, the ABS warning, BRAKE warning, brake control warning, master caution indicator, and SLIP indicator lights will come on and the multi information display shows warning messages in order to warn the driver.
The table below indicates which lights will come on when there is a malfunction in a particular function.

Item / Trouble Area	ABS	EBD	BA	TRAC	VSC
ABS warning light	○	○	○	-	-
BRAKE warning light	-	○	-	-	-
Brake control warning light	○	○	○	-	-
Master caution indicator light	○	○	○	○	○
Multi information display	○	○	○	○	○
SLIP indicator light	○	○	○	○	○

BC

○: Light ON
-: Light OFF

- The DTCs are simultaneously stored in the memory. The DTCs can be read by connecting the SST between terminals TC and CG of the DLC3 and observing the blinking pattern of the ABS warning and brake control warning lights, by reading the multi information display, or by connecting the intelligent tester.
- This system has a signal check function (See page BC-35).
  The DTC can be read by connecting the intelligent tester and observing the blinking pattern of the ABS warning and brake control warning lights or by reading the multi information display.



3. WARNING LIGHT AND INDICATOR LIGHT CHECK

(a) Release the parking brake.

NOTICE:

When releasing the parking brake, move the shift lever to the P position for safety.

HINT:

When the parking brake is applied or the level of the brake fluid is low, the BRAKE warning light comes on.

(b) When the power switch is turned on (IG), check that the ABS warning, BRAKE warning, brake control warning, master caution indicator, and SLIP indicator lights come on and remain on until the power switch is turned on (READY).

HINT:

If the warning light and indicator light check result is not normal, proceed to troubleshooting for the ABS warning, BRAKE warning, brake control warning, VSC warning (master caution indicator), and SLIP indicator light circuits.

If the indicator remains on, proceed to troubleshooting for the light circuit below.

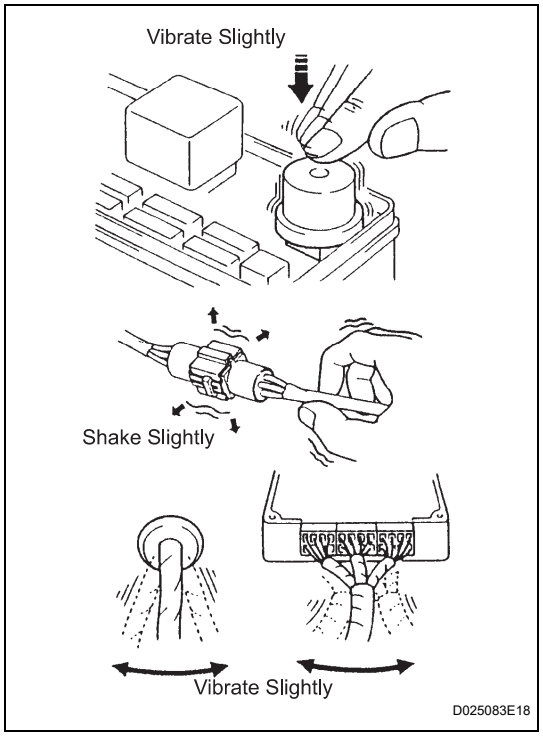
Trouble Area	See procedure
ABS warning light circuit	BC-214
BRAKE warning light circuit	BC-227
Brake control warning light circuit	BC-236
VSC warning light (master caution indicator light) circuit	BC-221
SLIP indicator light circuit	BC-242

BC

4. SYMPTOM SIMULATION

HINT:

The most difficult case in troubleshooting is when no symptoms occur. In such cases, a thorough customer problem analysis must be carried out. Then the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be reproduced. No matter how experienced or skilled a technician may be, if he proceeds to troubleshoot without confirming the problem symptoms, he will likely overlook something important and make a wrong guess at some points in the repair operation. This leads to a standstill in troubleshooting.



(a) Vibration method: When vibration seems to be the major cause.

HINT:

Perform the simulation method only during the primary check period (for approximately 6 seconds after the power switch is turned on (IG)).

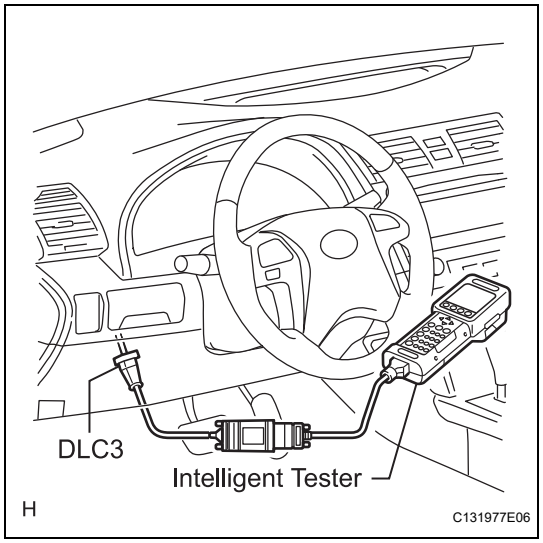
(1) Slightly vibrate the part of the sensor considered to be the problem cause with your fingers and check whether the malfunction occurs.

(2) Slightly shake the connector vertically and horizontally.

HINT:

Shaking the relays too strongly may result in open relays.

(3) Slightly shake the wire harness vertically and horizontally. The connector joint and fulcrum of the vibration are the major areas to be checked thoroughly.



DTC CHECK / CLEAR

1. DTC CHECK/CLEAR (INTELLIGENT TESTER)

(a) Check the DTC.

(1) Connect the intelligent tester to the DLC3.

(2) Turn the power switch on (IG).

(3) Read the DTCs following the prompts on the tester screen.

(b) Clear the DTC.

(1) Connect the intelligent tester to the DLC3.

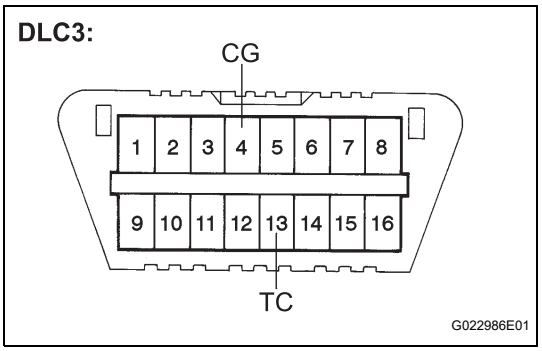
(2) Turn the power switch on (IG).

(3) Operate the intelligent tester to clear the codes.

HINT:

Refer to the intelligent tester operator's manual for further details.

BC



2. DTC CHECK/CLEAR (SST CHECK WIRE)

(a) Check the DTC.

(1) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

(2) Turn the power switch on (IG).

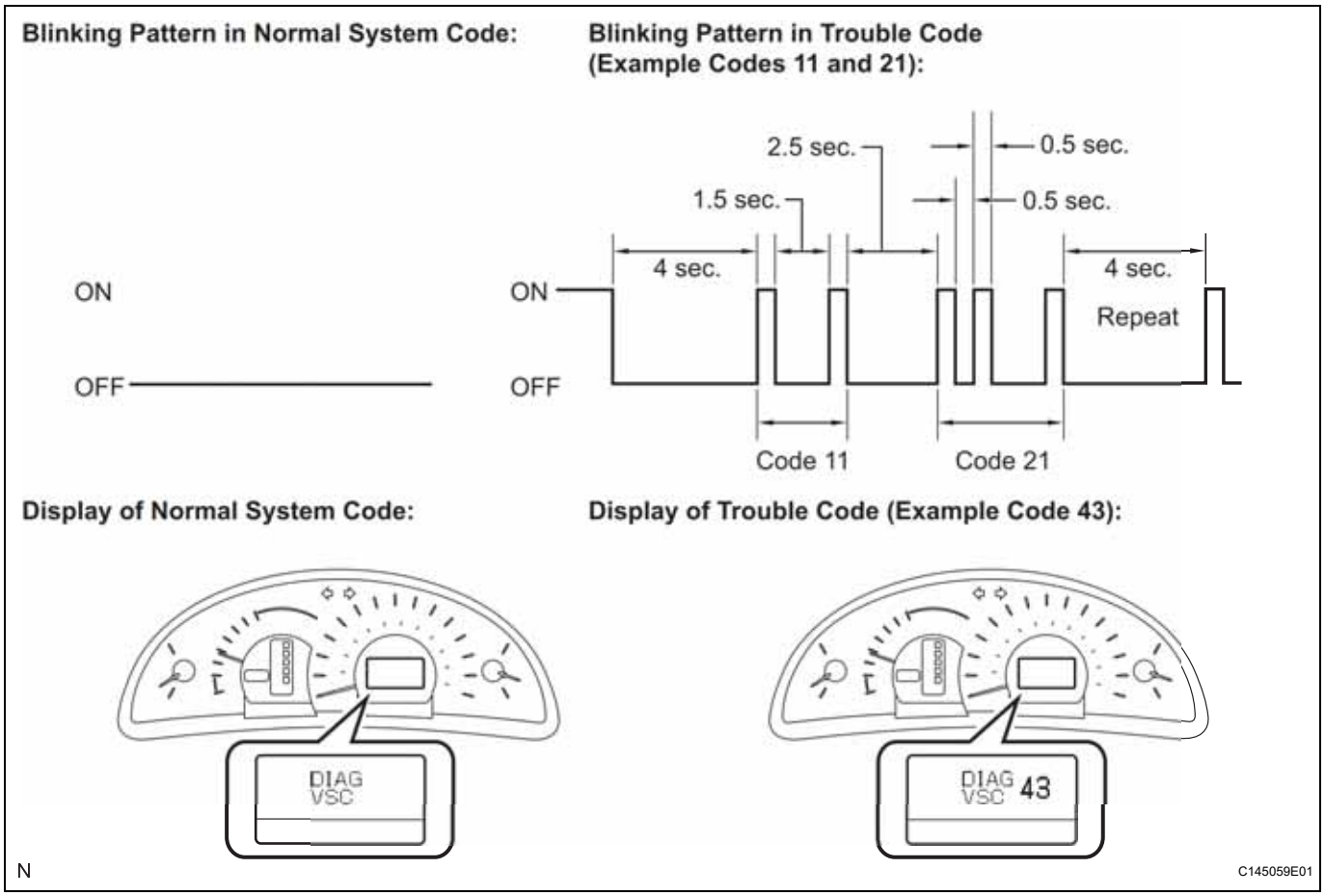
(3) Observe the blinking pattern of the ABS warning and brake control warning lights and read the multi information display in order to identify the DTC.

HINT:

If no code appears, inspect the TC and CG terminal circuit, and ABS warning and brake control warning light circuits.

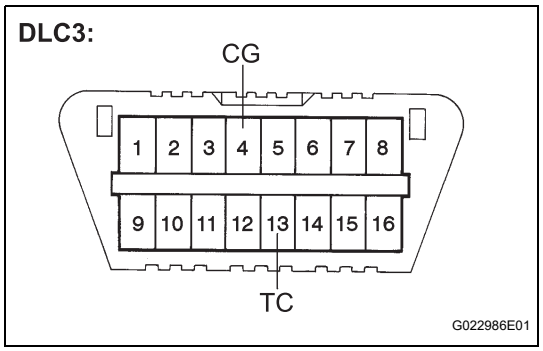
Trouble Area	See procedure
TC and CG terminal circuit	BC-252
ABS warning light circuit	BC-214 or BC-219
Brake control warning light circuit	BC-236 or BC-240
VSC warning light (multi information display) circuit	BC-221 or BC-225

(4) As an example, the illustration below shows the blinking patterns of the normal system code and trouble codes 11 and 21, and display of the normal system code and trouble code 43 on the multi information display.

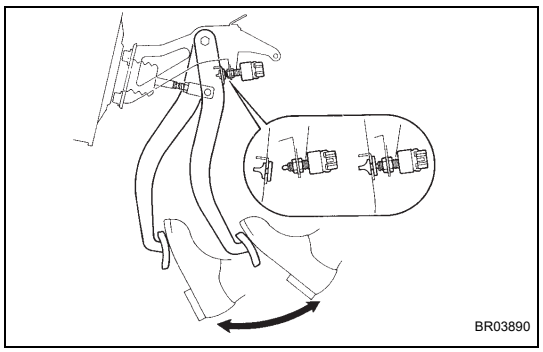


BC

(5) The codes are explained in the code table (See page BC-69).
(6) After completing the check, disconnect terminals TC and CG of the DLC3, and turn off the display. If 2 or more DTCs are detected at the same time, the DTCs will be displayed in ascending order.



(b) Clear the DTC.
(1) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040
(2) Turn the power switch on (IG).



(3) Clear the DTCs stored in the ECU by depressing the brake pedal 8 times or more within 5 seconds.
(4) Check that the warning light or multi information display indicates the normal system code.
(5) Remove the SST from the terminals of the DLC3.
HINT:
Clearing the DTCs cannot be performed by disconnecting the battery terminal or the ECU-IG NO. 2 fuse.

3. END OF DTC CHECK/CLEAR
(a) Turn the power switch on (IG).
(b) Check that the ABS warning light goes off when the power switch is turned on (READY).

REMOVAL

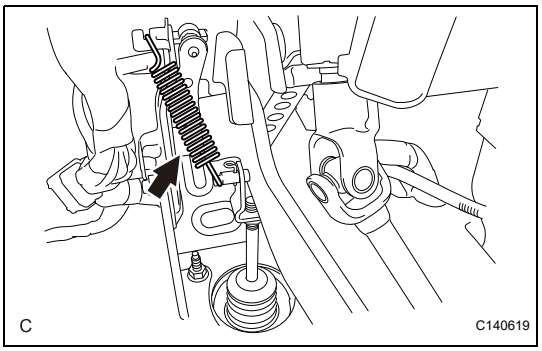
1. REMOVE INSTRUMENT PANEL REINFORCEMENT

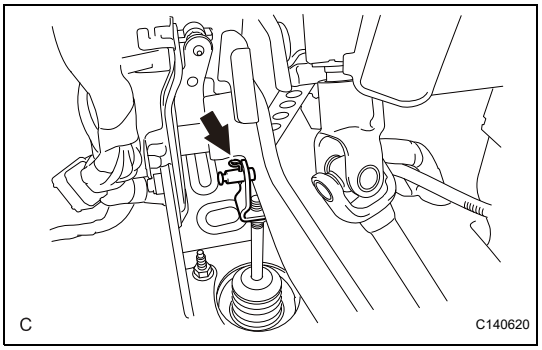
HINT:

Refer the procedures up to "REMOVE AIR CONDITIONING UNIT". (See page AC-185)

2. REMOVE BRAKE PEDAL RETURN SPRING

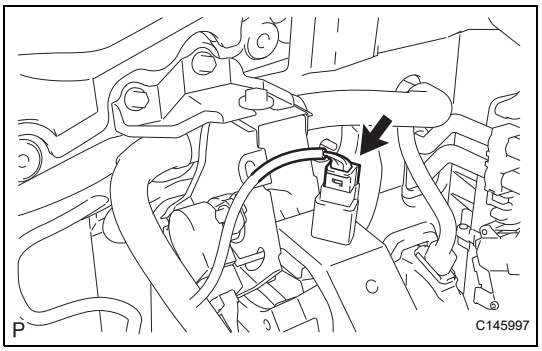
(a) Remove the brake pedal return spring.





3. DISCONNECT MASTER CYLINDER PUSH ROD CLEVIS

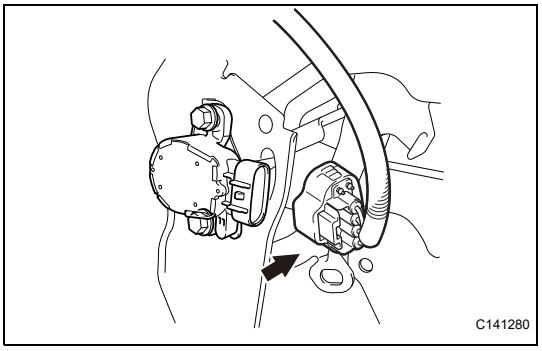
(a) Remove the clip and clevis pin and disconnect the push rod clevis from the brake pedal.

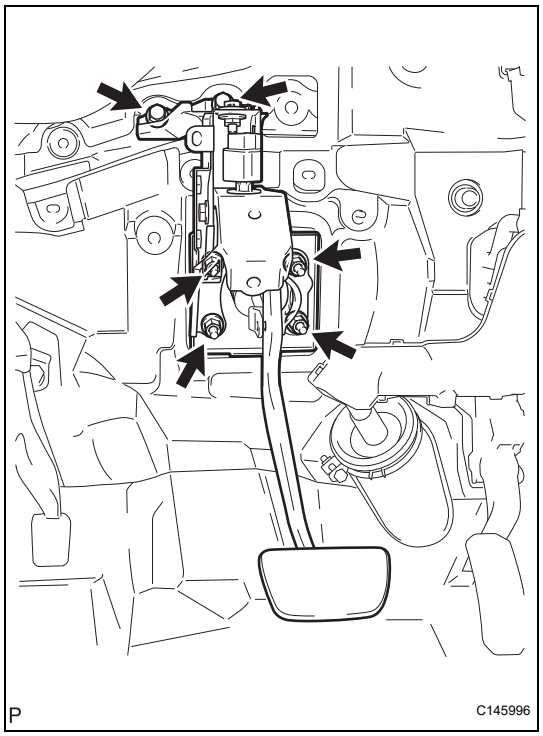


4. REMOVE BRAKE PEDAL ASSEMBLY

(a) Disconnect the connector from the stop light switch.

(b) Disconnect the connector from the pedal stroke sensor.

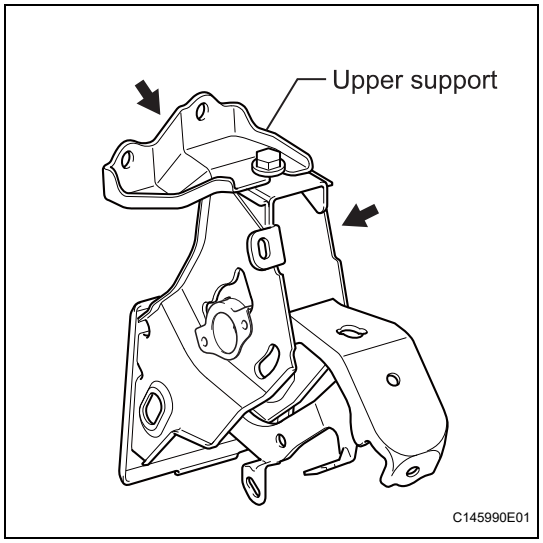




(c) Remove the 4 nuts, 2 bolts and the brake pedal assembly.

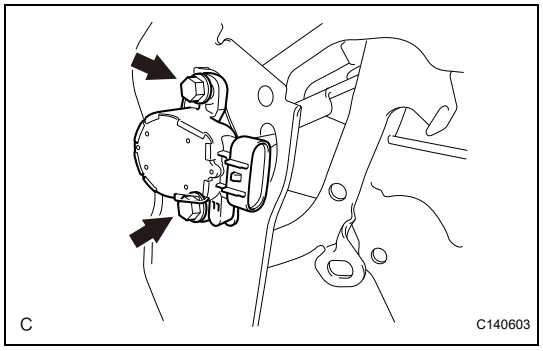
DISASSEMBLY

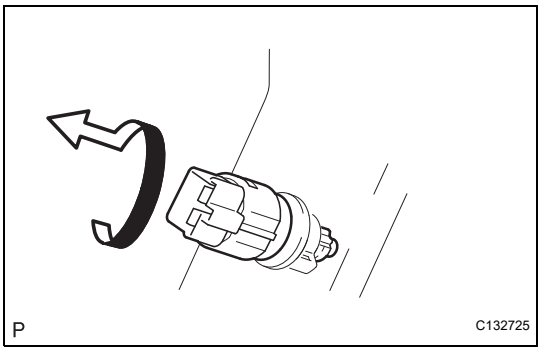
NOTICE:
Do not disassembly the upper support portion. If disassembled, be sure to replace it with new parts.



1. REMOVE BRAKE PEDAL STROKE SENSOR ASSEMBLY

(a) Remove the 2 bolts and the brake pedal stroke sensor assembly.



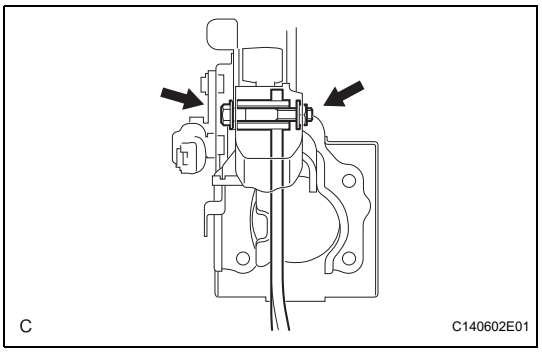


2. REMOVE STOP LIGHT SWITCH ASSEMBLY

(a) Turn the stop light switch assembly and remove it as shown in the illustration.

3. REMOVE STOP LIGHT SWITCH MOUNTING ADJUSTER

(a) Remove the stop light switch mounting adjuster.



4. REMOVE BRAKE PEDAL SUB-ASSEMBLY

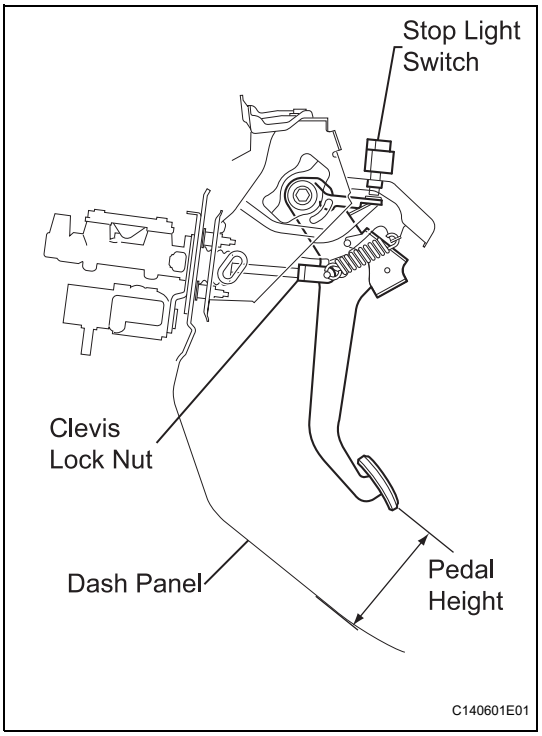
(a) Remove the bolt and the nut.

(b) Remove the 2 brake pedal bushings, brake pedal shaft collar, and the brake pedal sub-assembly.

5. REMOVE BRAKE PEDAL PAD

(a) Remove the brake pedal pad.

ADJUSTMENT



1. CHECK AND ADJUST BRAKE PEDAL HEIGHT

(a) Check the brake pedal height.

Pedal height from dash panel:
129.9 to 139.9 mm (5.114 to 5.508 in.)

(b) Adjust the brake pedal height.

(1) Disconnect the connector from the stop light switch assembly.

(2) Remove the stop light switch.

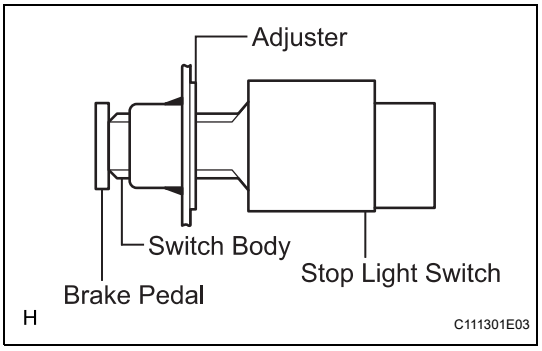
(3) Loosen the push rod clevis lock nut.

(4) Adjust the pedal height by turning the pedal push rod.

Pedal height from the dash panel:
129.9 to 139.9 mm (5.114 to 5.508 in.)

(5) Tighten the clevis lock nut.

Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)

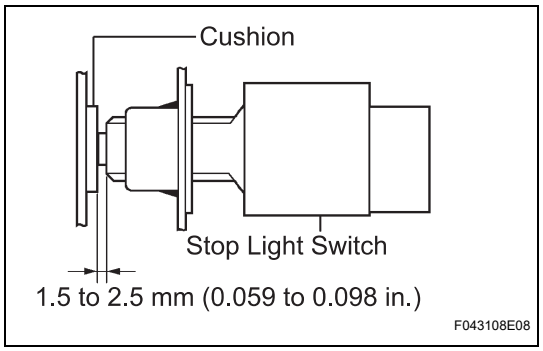


(6) Insert the switch into the adjuster until the switch body touches the pedal.

NOTICE:
Do not depress the pedal.

(7) Rotate the switch a quarter turn clockwise.

Torque: 1.5 N*m (15 kgf*cm, 13 in.*lbf)
NOTICE:
Do not depress the pedal.

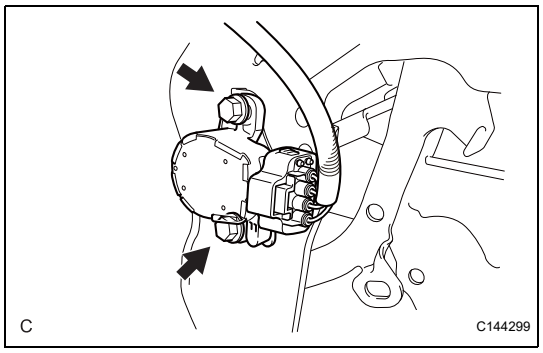


(8) Check the switch clearance.
Standard stop light switch clearance:
1.5 to 2.5 mm (0.059 to 0.098 in.)

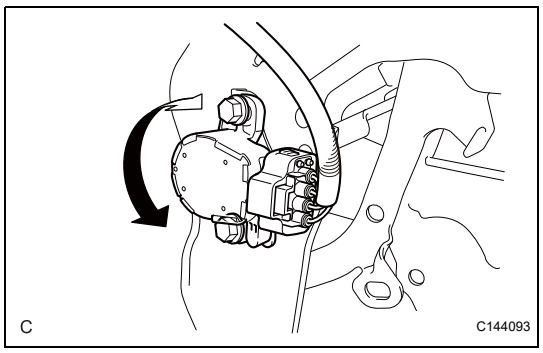
(9) Connect the connector to the stop light switch assembly.

2. ADJUST BRAKE PEDAL STROKE SENSOR ASSEMBLY

(a) Connect the intelligent tester to the DLC3 with the power switch off.



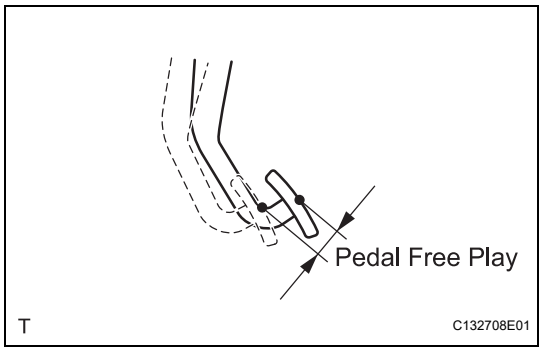
(b) Loosen the 2 bolts.
(c) Turn the power switch on (IG).
(d) Turn on the intelligent tester.



(e) Reading the stroke sensor 1 value shown on the intelligent tester screen, turn the stroke sensor slowly to the right and left to adjust it to the standard voltage.
Standard voltage:
0.8 to 1.2 V

(f) Tighten the 2 bolts.
Torque: 8.5 N*m (87 kgf*cm, 75 in.*lbf)
NOTICE:
Do not depress the brake pedal after turning the power switch on (IG).

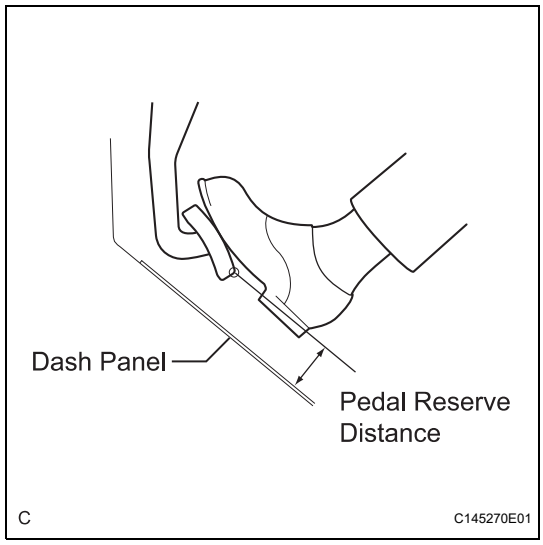
(g) Perform linear valve offset learning. (See page BC-25)



3. CHECK PEDAL FREE PLAY

(a) Depress the pedal until a slight resistance is felt. Measure the distance as shown in the illustration.
Pedal free play:
1 to 2 mm (0.039 to 0.079 in.)

(1) If the pedal free play is 1.0 mm (0.039 in.) or less, check the protrusion of the stop light switch assembly shaft.
Protrusion of the stop light switch assembly shaft:
0.5 to 2.4 mm (0.020 to 0.095 in.)
HINT:
- Adjust if the protrusion is off the specified value.
- If the protrusion is within the specified value, it is normal though brake pedal free play is 1.0 mm (0.039 in.) or less.



4. CHECK PEDAL RESERVE DISTANCE

(a) Release the parking brake pedal.

(b) With the engine running, depress the pedal and measure the pedal reserve distance as shown in the illustration.

Pedal reserve distance from the dash panel at 490 N (50 kgf, 110 lbf):

More than 80 mm (3.15 in.)

REASSEMBLY

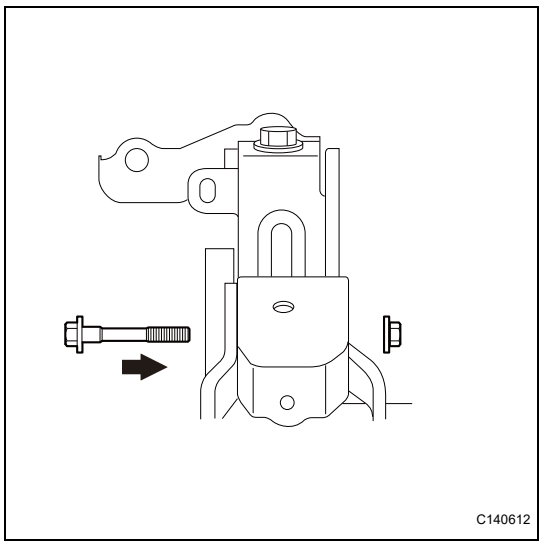
1. INSTALL BRAKE PEDAL PAD

(a) Install the brake pedal pad.

2. INSTALL BRAKE PEDAL SUB-ASSEMBLY

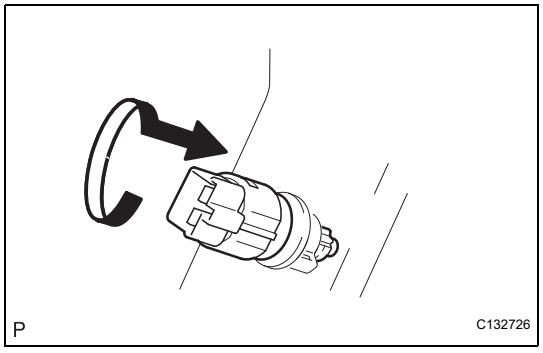
(a) Apply lithium soap base glycol grease to 2 new brake pedal bushings.

(b) Install the brake pedal sub-assembly, the 2 brake pedal bushings, and the brake pedal shaft collar to the brake pedal support assembly with the bolt and the nut as shown in the illustration.
Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)



3. INSTALL STOP LIGHT SWITCH MOUNTING ADJUSTER

(a) Install the stop light switch mounting adjuster.



4. TEMPORARILY TIGHTEN STOP LIGHT SWITCH ASSEMBLY

(a) Temporarily tighten the stop light switch assembly as shown in the illustration.
Torque: 1.5 N*m (15 kgf*cm, 13 in.*lbf)

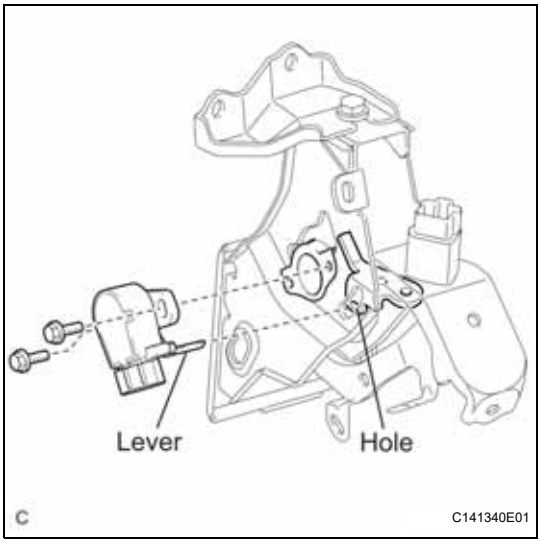
5. INSTALL BRAKE PEDAL STROKE SENSOR ASSEMBLY

(a) New brake pedal stroke sensor assembly:

(1) Install a new brake pedal stroke sensor assembly with the 2 bolts.
Torque: 8.5 N*m (87 kgf*cm, 75 in.*lbf)
NOTICE:
- **Engage the brake pedal stroke sensor assembly lever with the brake pedal hole.**
- **Check that there is no foreign matter attached to the contact surface of the brake pedal stroke sensor.**

(2) Strongly depress the brake pedal and the brake pedal stroke sensor assembly lever set pin will break.

(3) Remove the broken lever set pin.

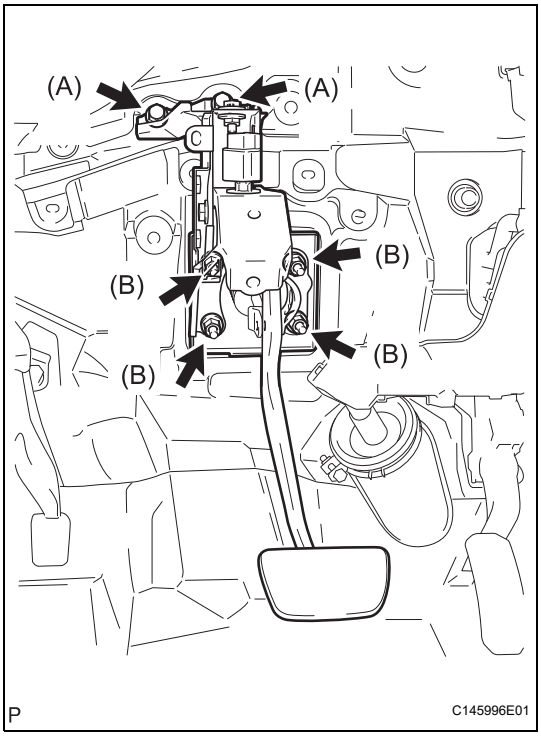


(b) Reuse of the brake pedal stroke sensor assembly:
(1) Temporarily install the brake pedal stroke sensor assembly with the 2 bolts.
NOTICE:
- **Engage the brake pedal stroke sensor assembly lever with the brake pedal hole.**
- **Check that there is no foreign matter attached to the contact surface of the brake pedal stroke sensor.**

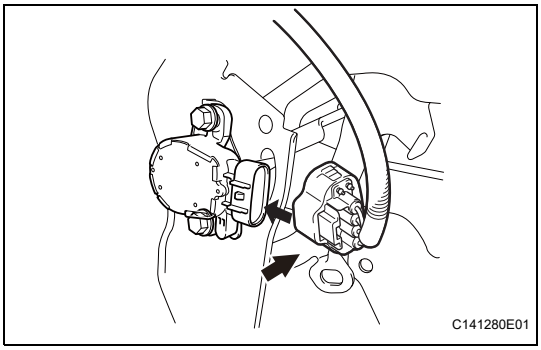
INSTALLATION

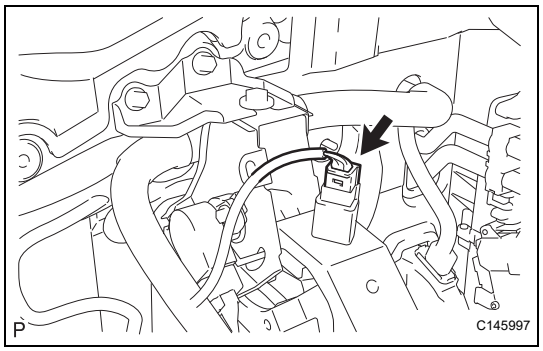
1. INSTALL BRAKE PEDAL ASSEMBLY

(a) Install the brake pedal assembly with 2 bolts (A) and 4 nuts (B).
Torque: Bolt (A)
19 N*m (194 kgf*cm, 14 ft.*lbf)
Nut (B)
13 N*m (133 kgf*cm, 10 ft.*lbf)

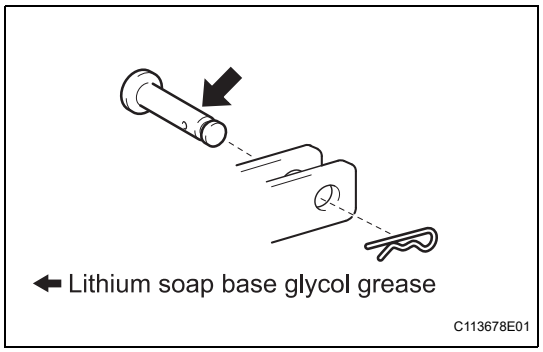


(b) Connect the brake pedal stroke sensor connector.



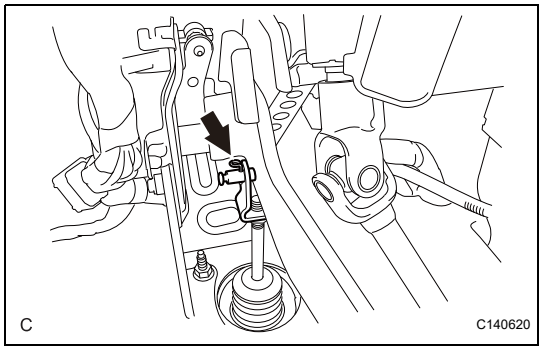


(c) Connect the stop light switch connector.

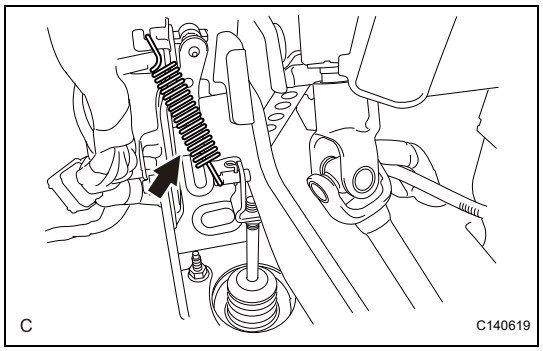


2. CONNECT MASTER CYLINDER PUSH ROD CLEVIS

(a) Apply lithium soap base glycol grease to the clevis pin.



(b) Connect the clevis pin and a new clip.



3. INSTALL BRAKE PEDAL RETURN SPRING

(a) Install the brake pedal return spring.

4. INSTALL INSTRUMENT PANEL REINFORCEMENT

HINT:
Refer to the procedures up to "INSTALL AIR CONDITIONING UNIT". (See page AC-200)

5. CLEAR DTC FOR BRAKE CONTROL SYSTEM

HINT:
Refer the procedures up to "ELECTRONICALLY CONTROLLED BRAKE SYSTEM". (See page BC-57)

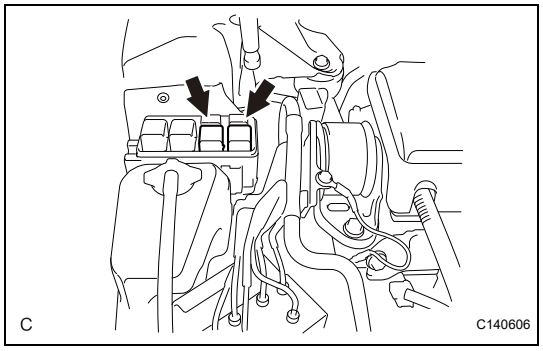
6. ADJUST BRAKE PEDAL STROKE SENSOR ASSEMBLY (See page BR-19)

7. CHECK PEDAL FREE PLAY (See page BR-19)

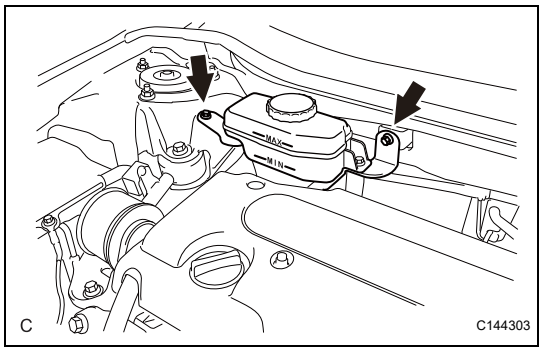
8. CHECK PEDAL RESERVE DISTANCE (See page BR-20)

REMOVAL

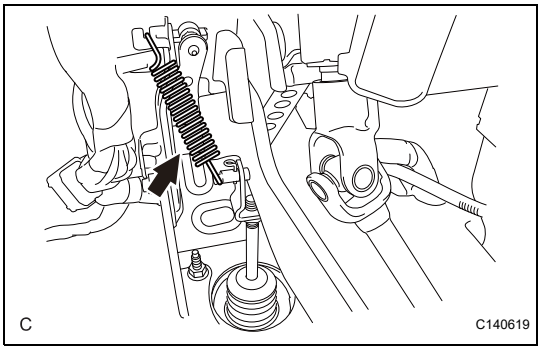
1. **DISCONNECT CABLE FROM BATTERY NEGATIVE TERMINAL**



2. **REMOVE ABS MOTOR RELAY**
   (a) In order to prohibit brake control, remove the 2 ABS motor relays with the power switch off.
   NOTICE:
   If the pump motor operates while air remains inside the brake actuator hose, the air will enter the actuator, resulting in difficulty in bleeding the brakes.
3. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-90)**
4. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-395)**
5. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-90)**

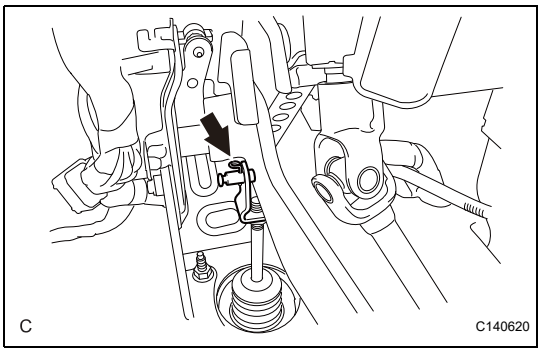


6. **SEPARATE BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY**
   (a) Remove the 2 bolts, and separate the brake master cylinder reservoir sub-assembly.
7. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-9)**
8. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-9)**
9. **REMOVE FRONT FENDER TO COWL SIDE SEAL RH (See page WW-9)**
10. **REMOVE FRONT FENDER TO COWL SIDE SEAL LH (See page WW-9)**
11. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-10)**
12. **REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-10)**
13. **REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-403)**
14. **REMOVE POWER STEERING ECU ASSEMBLY (See page PS-69)**
15. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-13)**
16. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-14)**
17. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-11)**



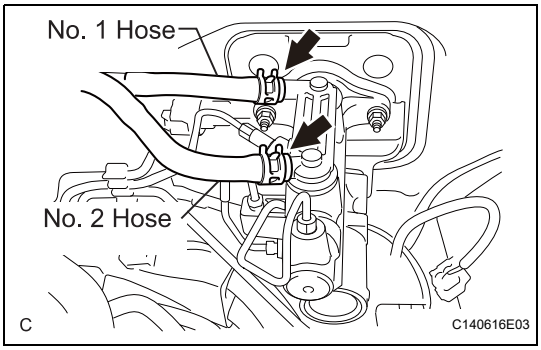
18. REMOVE BRAKE PEDAL RETURN SPRING

(a) Remove the brake pedal return spring.



19. DISCONNECT MASTER CYLINDER PUSH ROD CLEVIS

(a) Remove the clip and clevis pin and disconnect the push rod clevis from brake pedal.

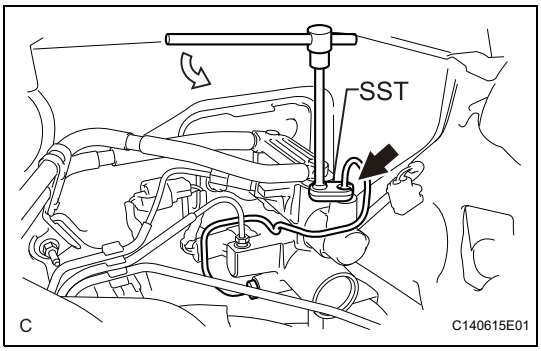


20. DISCONNECT NO. 1 RESERVOIR HOSE

(a) Move the clip, and disconnect the No. 1 reservoir hose.

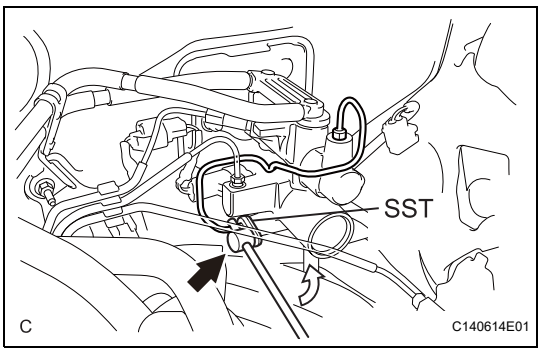
21. DISCONNECT NO. 2 RESERVOIR HOSE

(a) Move the clip, and disconnect the No. 2 reservoir hose.

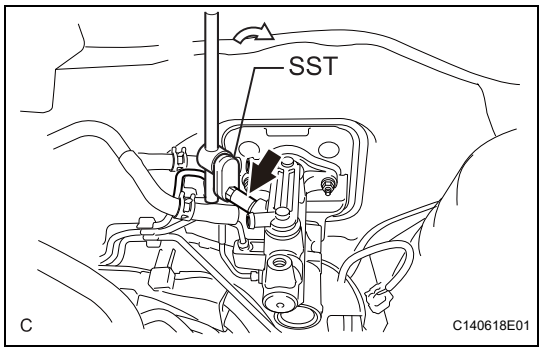


22. REMOVE BRAKE STROKE SIMULATOR LINE

(a) Using SST, disconnect the brake stroke simulator line.
SST 09023-00101

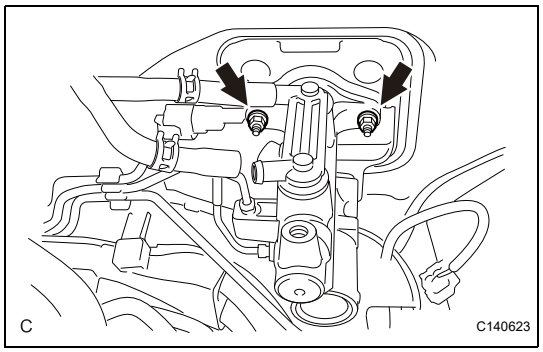


(b) Using SST, disconnect the brake stroke simulator line.
SST 09023-00101



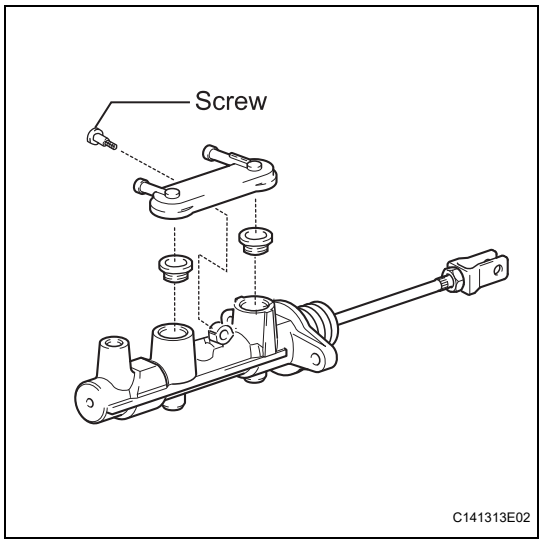
23. REMOVE BRAKE MASTER CYLINDER SUB-ASSEMBLY

(a) Using SST, disconnect the brake line.
SST 09023-00101



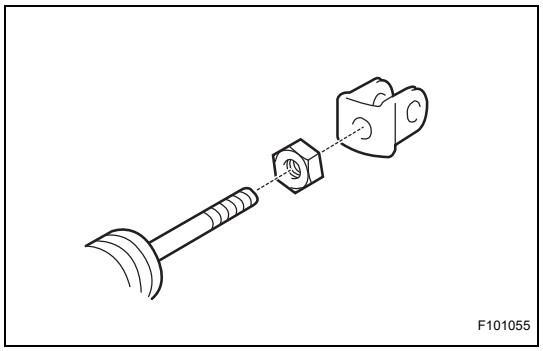
(b) Remove the 2 nuts, the 2 gaskets and the brake master cylinder sub-assembly.

DISASSEMBLY



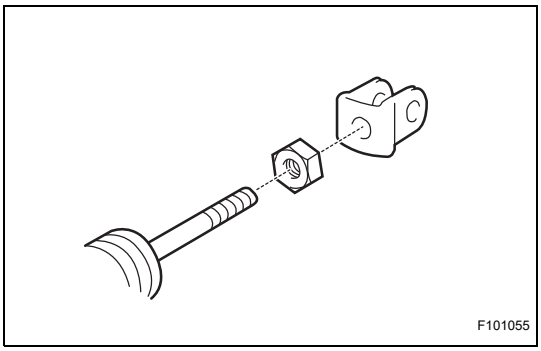
1. REMOVE MASTER CYLINDER RESERVOIR GROMMET

(a) Remove the screw, brake master cylinder union and 2 master cylinder reservoir grommets from the brake master cylinder.



2. REMOVE MASTER CYLINDER PUSH ROD CLEVIS

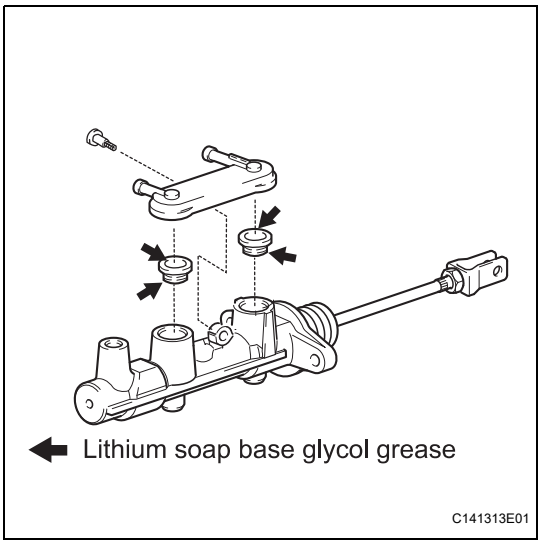
(a) Remove the push rod clevis and lock nut.
HINT:
Adjustment of brake pedal height is easier when reassembling the brake master with simulator cylinder assembly afterward, if the protrusion of the push rod from push rod clevis is measured and recorded at this stage.



REASSEMBLY

1. INSTALL MASTER CYLINDER PUSH ROD CLEVIS

(a) Temporarily install the brake master cylinder push rod clevis with the lock nut.
HINT:
After checking and adjusting the brake pedal height, tighten the lock nut firmly.



2. INSTALL MASTER CYLINDER RESERVOIR GROMMET

(a) Apply lithium soap base glycol grease to 2 new master cylinder reservoir grommets.

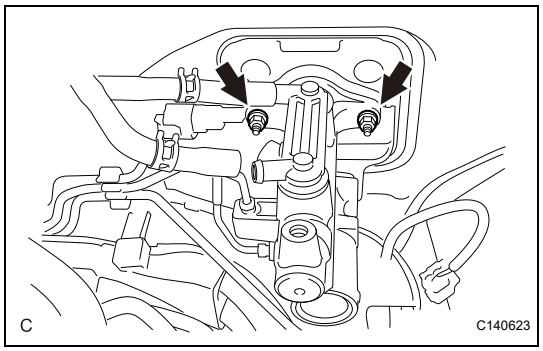
(b) Install the master cylinder union and 2 master cylinder reservoir grommets to the brake master cylinder with the screw.
Torque: 1.8 N*m (18 kgf*cm, 16 in.*lbf)

INSTALLATION

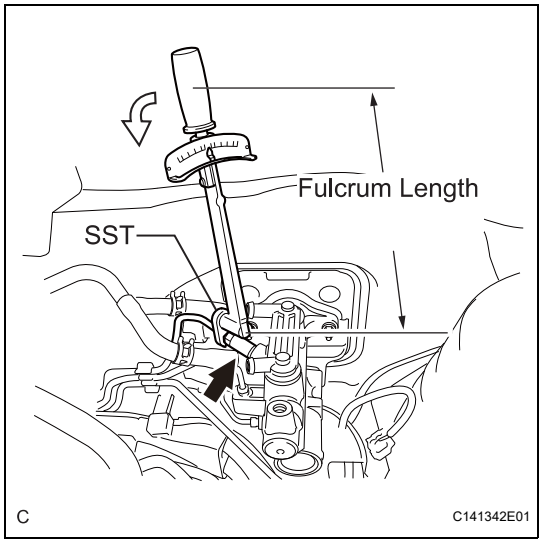
1. INSTALL BRAKE MASTER CYLINDER SUB-ASSEMBLY

NOTICE:

- **Do not bend or damage the brake line.**
- **Do not allow any foreign matter such as dirt and dust to enter the brake line from the connecting points.**
- **Use a torque wrench with a fulcrum length of 250 mm (9.84 in.).**
- **This torque value is effective when SST is parallel to a torque wrench.**



(a) Install 2 new gaskets and the brake master cylinder assembly with the 2 nuts.
Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)



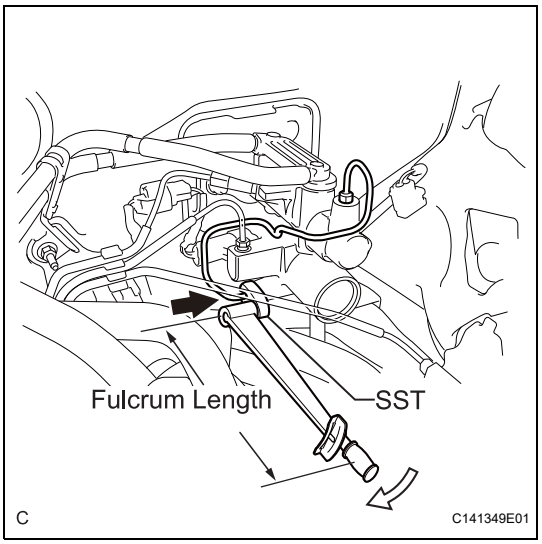
(b) Use the SST to fully tighten the brake line.
SST 09023-00101
Torque: Without SST
15 N*m (155 kgf*cm, 11 ft.*lbf)
With SST
14 N*m (143 kgf*cm, 10 ft.*lbf)

2. INSTALL BRAKE STROKE SIMULATOR LINE

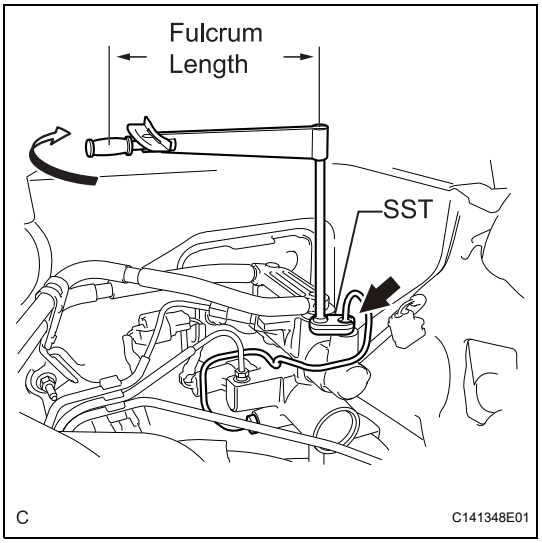
NOTICE:

- **Do not bend or damage the brake line.**
- **Do not allow any foreign matter such as dirt and dust to enter the brake line from the connecting points.**
- **Use a torque wrench with a fulcrum length of 250 mm (9.84 in.).**
- **This torque value is effective when SST is parallel to a torque wrench.**

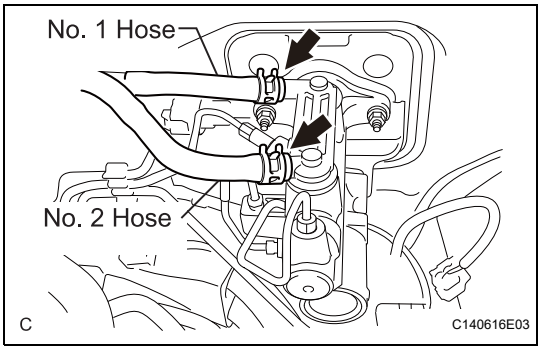
(a) Temporarily tighten the brake stroke simulator line.



(b) Use the SST to fully tighten the brake stroke simulator line.
SST 09023-00101
Torque: Without SST
15 N*m (155 kgf*cm, 11 ft.*lbf)
With SST
14 N*m (143 kgf*cm, 10 ft.*lbf)

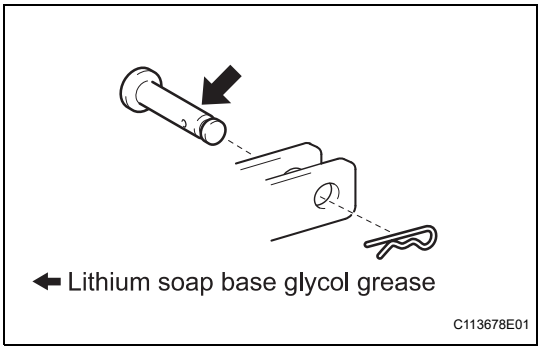


(c) Use the SST to fully tighten the brake stroke simulator line.
SST 09023-00101
Torque: Without SST
15 N*m (155 kgf*cm, 11 ft.*lbf)
With SST
14 N*m (143 kgf*cm, 10 ft.*lbf)

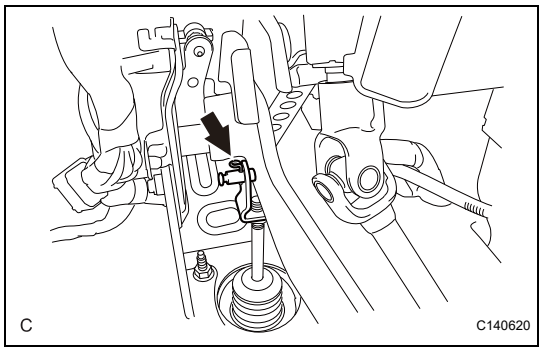


3. CONNECT NO. 1 RESERVOIR HOSE
(a) Connect the No. 1 reservoir hose to the brake master cylinder sub-assembly and move the clip.

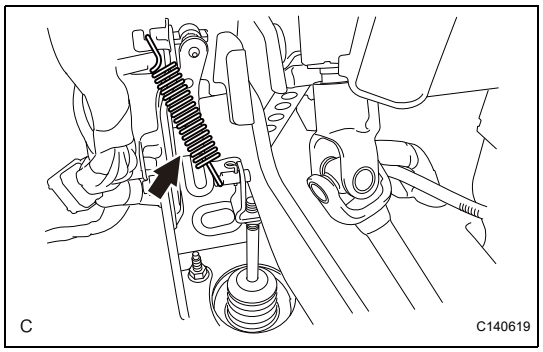
4. CONNECT NO. 2 RESERVOIR HOSE
(a) Connect the No. 2 reservoir hose to the brake master cylinder sub-assembly and move the clip.



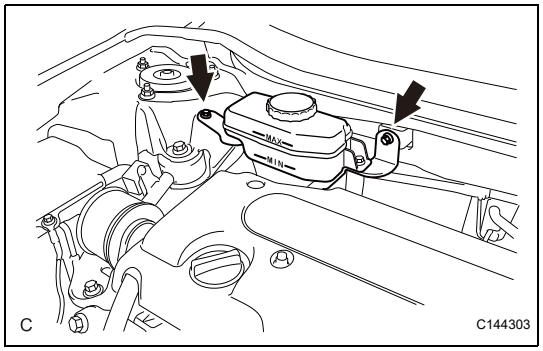
5. CONNECT MASTER CYLINDER PUSH ROD CLEVIS
(a) Apply lithium soap base glycol grease to the clevis pin.



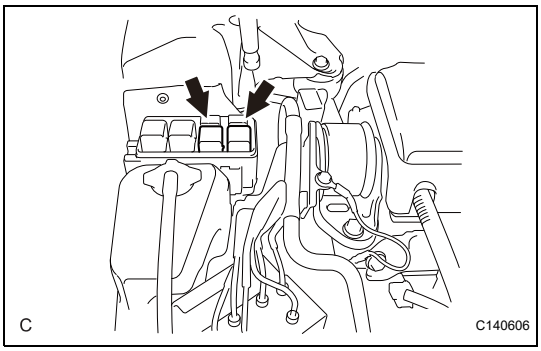
(b) Connect the clevis pin and a new clip.



6. **INSTALL BRAKE PEDAL RETURN SPRING**
   (a) Install the brake pedal return spring.
7. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-35)**
8. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-41)**
9. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-41)**
10. **INSTALL POWER STEERING ECU ASSEMBLY (See page PS-71)**
11. **INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-405)**
12. **INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-13)**
13. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-14)**
14. **INSTALL FRONT FENDER TO COWL SIDE SEAL LH (See page WW-14)**
15. **INSTALL FRONT FENDER TO COWL SIDE SEAL RH (See page WW-14)**
16. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-14)**
17. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-15)**

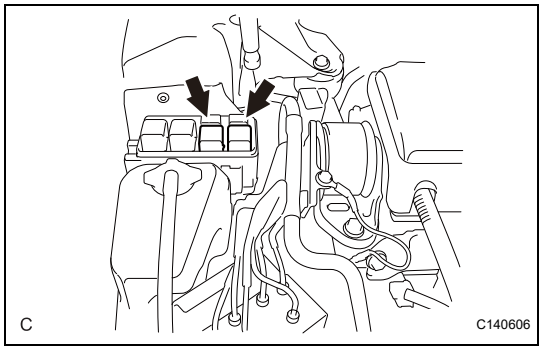


18. **INSTALL BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY**
    (a) Install the brake master cylinder reservoir sub-assembly with the 2nuts.
    Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
19. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-113)**
20. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-398)**
21. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-113)**

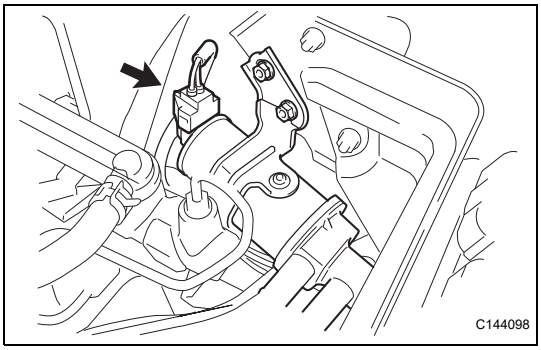


22. **CONNECT CABLE TO BATTERY NEGATIVE TERMINAL**
23. **ADD BRAKE FLUID TO RESERVOIR (See page BR-7)**
24. **BLEED BRAKE MASTER CYLINDER (See page BR-8)**
25. **BLEED BRAKE ACTUATOR HOSE (See page BR-8)**
26. **BLEED FRONT BRAKE SYSTEM (See page BR-10)**
27. **INSTALL ABS MOTOR RELAY**
    (a) Install the 2 ABS motor relays.
28. **CLEAR DTC FOR BRAKE CONTROL SYSTEM**
    HINT:
    Refer the procedures up to "ELECTRONICALLY CONTROLLED BRAKE SYSTEM". (See page BC-57)
29. **PERFORM ACCUMULATOR PRESSURE ZERO DOWN (See page BR-12)**
30. **CHECK BRAKE FLUID LEVEL IN RESERVOIR (See page BR-13)**
31. **CHECK FOR BRAKE FLUID LEAKAGE**
32. **CHECK AND ADJUST BRAKE PEDAL HEIGHT (See page BR-18)**
33. **ADJUST BRAKE PEDAL STROKE SENSOR ASSEMBLY (See page BR-19)**
34. **CHECK PEDAL FREE PLAY (See page BR-19)**
35. **CHECK PEDAL RESERVE DISTANCE (See page BR-20)**
36. **PERFORM INITIALIZATION**
    NOTICE:
    Some systems need initialization after reconnecting the cable to the negative battery terminal. (See page IN-43)

REMOVAL

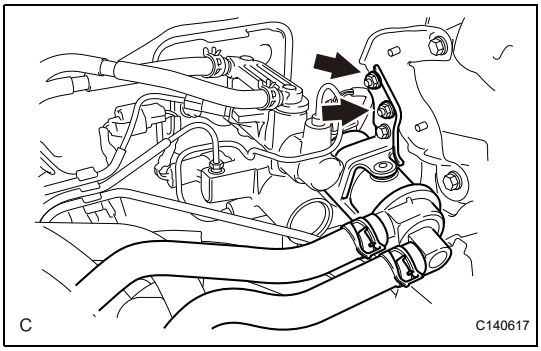


1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE ABS MOTOR RELAY**
   (a) In order to prohibit brake control, remove the 2 ABS motor relays with the power switch off.
   NOTICE:
   If the pump motor operates while air remains inside the brake actuator hose, the air will enter the actuator, resulting in difficulty in bleeding the brakes.
3. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-90)**
4. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-395)**
5. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-90)**
6. **SEPARATE BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY (See page BR-27)**
7. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-9)**
8. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-9)**
9. **REMOVE FRONT FENDER TO COWL SIDE SEAL LH (See page WW-9)**
10. **REMOVE FRONT FENDER TO COWL SIDE SEAL RH (See page WW-9)**
11. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-10)**
12. **REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-10)**
13. **REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-403)**
14. **REMOVE POWER STEERING ECU ASSEMBLY (See page PS-69)**
15. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-13)**
16. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-14)**
17. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-11)**
18. **REMOVE BRAKE PEDAL RETURN SPRING (See page BR-16)**
19. **DISCONNECT MASTER CYLINDER PUSH ROD CLEVIS (See page BR-16)**



20. SEPARATE HEATER WATER PUMP ASSEMBLY

(a) Disconnect the connector.

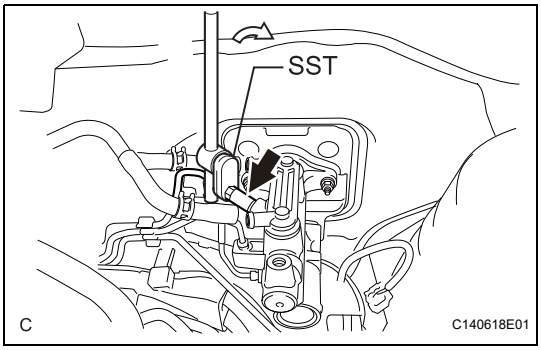


(b) Remove the 2 nuts, and separate the heater water pump assembly.

21. DISCONNECT NO. 1 RESERVOIR HOSE (See page BR-28)

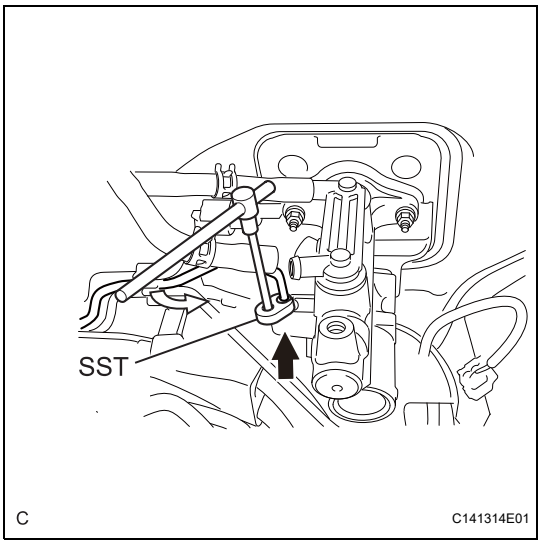
22. DISCONNECT NO. 2 RESERVOIR HOSE (See page BR-28)

23. REMOVE BRAKE STROKE SIMULATOR LINE (See page BR-28)

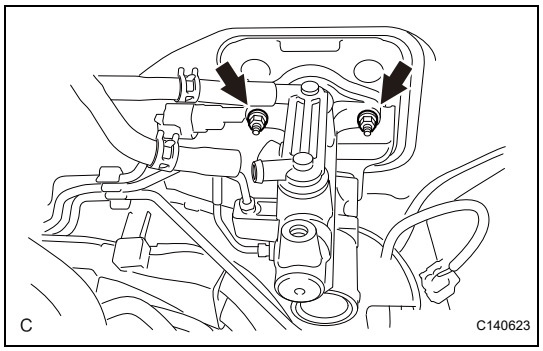


24. REMOVE BRAKE MASTER CYLINDER SUB-ASSEMBLY

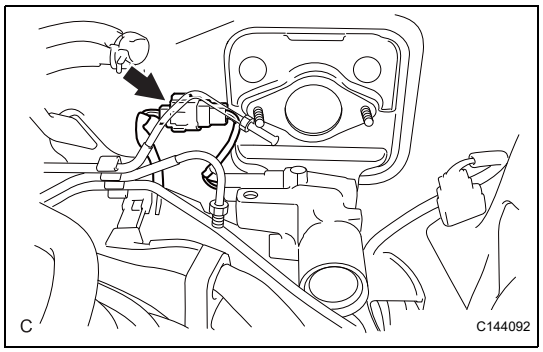
(a) Using SST, disconnect the brake line.
SST 09023-00101



(b) Using SST, disconnect the brake line.

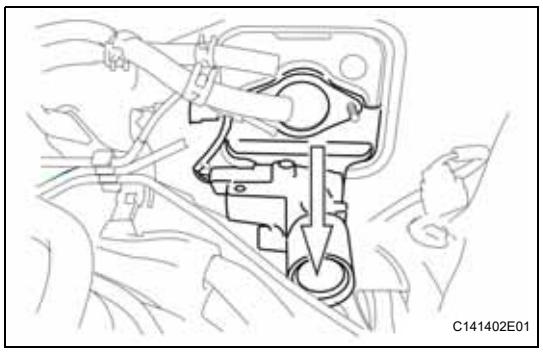


(c) Remove the 2 nuts and the brake master cylinder sub-assembly.



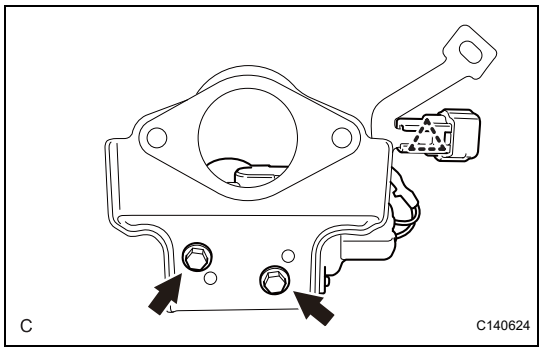
25. REMOVE BRAKE STROKE SIMULATOR CYLINDER SUB-ASSEMBLY WITH BRACKET

(a) Disconnect the connector.



(b) Remove the 2 gaskets and the brake stroke simulator cylinder sub-assembly with bracket.

DISASSEMBLY

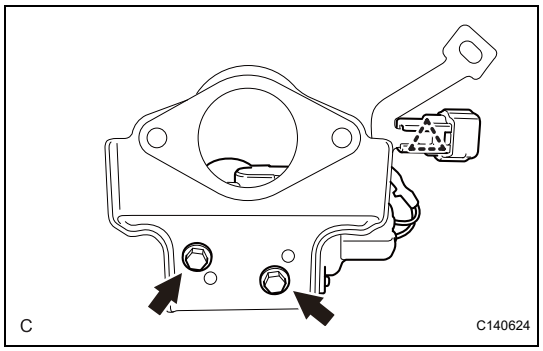


1. REMOVE BRAKE STROKE SIMULATOR CYLINDER SUB-ASSEMBLY

(a) Disconnect the connector from the brake stroke simulator bracket.

(b) Remove the 2 bolts and the brake stroke simulator cylinder sub-assembly from the brake stroke simulator bracket.

REASSEMBLY

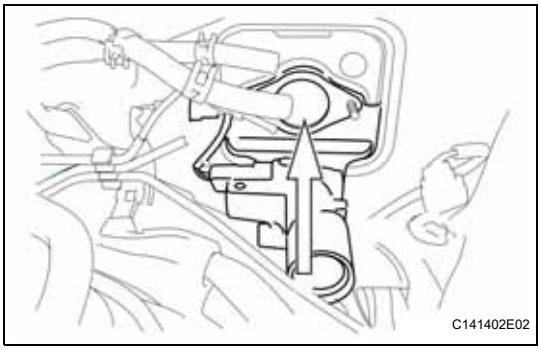


1. INSTALL BRAKE STROKE SIMULATOR CYLINDER SUB-ASSEMBLY

(a) Install the brake stroke simulator cylinder sub-assembly to the brake stroke simulator bracket with the 2 bolts.

Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

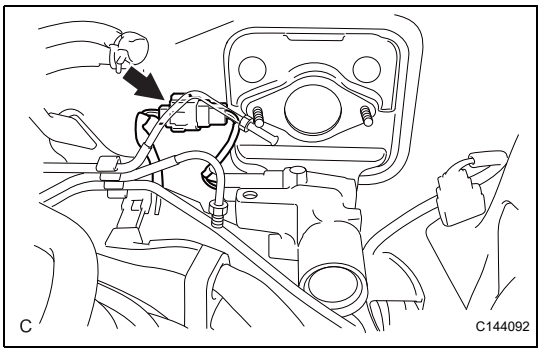
(b) Install the connector to the brake stroke simulator bracket.



INSTALLATION

1. INSTALL BRAKE STROKE SIMULATOR CYLINDER SUB-ASSEMBLY WITH BRACKET

(a) Install 2 new gaskets and brake stroke simulator cylinder sub-assembly with bracket.

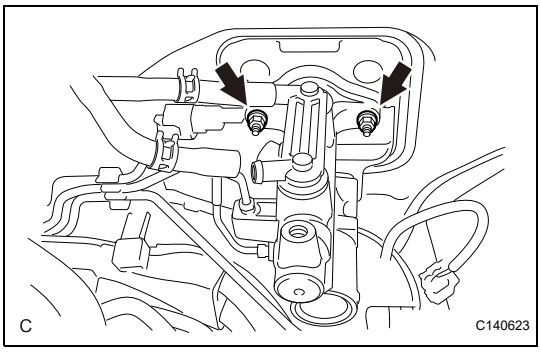


(b) Connect the connector.

2. INSTALL BRAKE MASTER CYLINDER SUB-ASSEMBLY

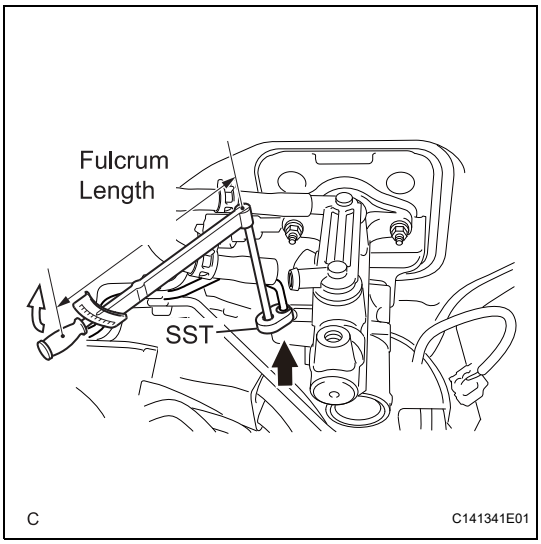
NOTICE:

- **Do not bend or damage the brake line.**
- **Do not allow any foreign matter such as dirt and dust to enter the brake line from the connecting points.**
- **Use a torque wrench with a fulcrum length of 250 mm (9.84 in.).**
- **This torque value is effective when SST is parallel to a torque wrench.**



(a) Install the brake master cylinder sub-assembly with the 2 nuts.

Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)



(b) Use the SST to fully tighten the brake line.

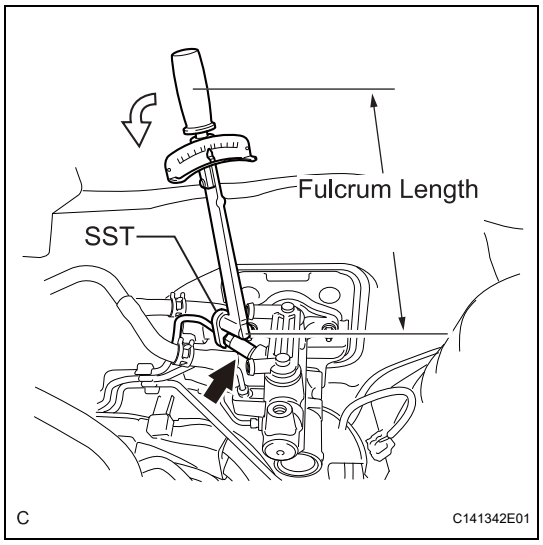
SST 09023-00101

Torque: Without SST

15 N*m (155 kgf*cm, 11 in.*lbf)

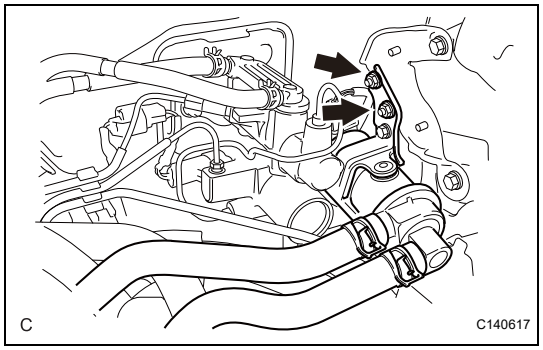
With SST

14 N*m (143 kgf*cm, 10 in.*lbf)

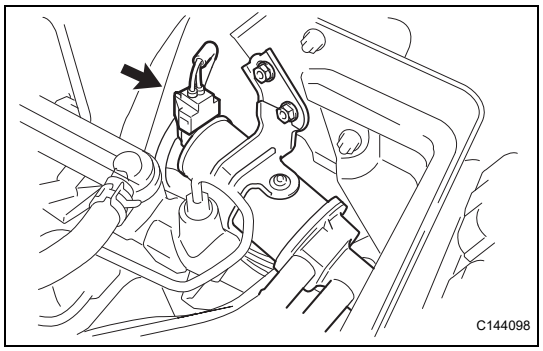


(c) Use the SST to fully tighten the brake line.
SST 09023-00101
Torque: Without SST
15 N*m (155 kgf*cm, 11 ft.*lbf)
With SST
14 N*m (143 kgf*cm, 10 ft.*lbf)

3. **INSTALL BRAKE STROKE SIMULATOR LINE (See page BR-31)**
4. **CONNECT NO. 1 RESERVOIR HOSE (See page BR-32)**
5. **CONNECT NO. 2 RESERVOIR HOSE (See page BR-32)**



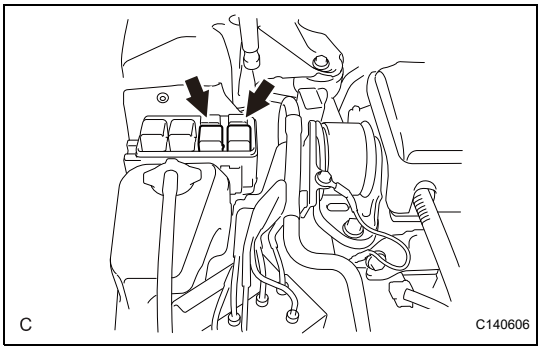
6. **INSTALL HEATER WATER PUMP ASSEMBLY**
(a) Install the heater water pump assembly with the 2 nuts.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)



(b) Connect the connector.

7. **CONNECT MASTER CYLINDER PUSH ROD CLEVIS (See page BR-22)**
8. **INSTALL BRAKE PEDAL RETURN SPRING (See page BR-22)**
9. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-35)**
10. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-41)**
11. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-41)**
12. **INSTALL POWER STEERING ECU ASSEMBLY (See page PS-71)**
13. **INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-405)**
14. **INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-13)**
15. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-14)**
16. **INSTALL FRONT FENDER TO COWL SIDE SEAL RH (See page WW-14)**

17. **INSTALL FRONT FENDER TO COWL SIDE SEAL LH (See page WW-14)**
18. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-15)**
19. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-14)**
20. **INSTALL BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY (See page BR-33)**
21. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-113)**
22. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-398)**
23. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-113)**
24. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
25. **ADD BRAKE FLUID TO RESERVOIR (See page BR-7)**
26. **BLEED BRAKE MASTER CYLINDER (See page BR-8)**
27. **BLEED BRAKE ACTUATOR HOSE (See page BR-8)**
28. **BLEED FRONT BRAKE SYSTEM (See page BR-10)**
29. **INSTALL ABS MOTOR RELAY**
    (a) Install the 2 ABS motor relays.



30. **CLEAR DTC FOR BRAKE CONTROL SYSTEM**
    HINT:
    Refer the procedures up to "ELECTRONICALLY CONTROLLED BRAKE SYSTEM". (See page BC-57)
31. **PERFORM ACCUMULATOR PRESSURE ZERO DOWN (See page BR-12)**
32. **CHECK BRAKE FLUID LEVEL IN RESERVOIR (See page BR-13)**
33. **CHECK FOR BRAKE FLUID LEAKAGE**
34. **PERFORM INITIALIZATION**
    NOTICE:
    Some systems need initialization after reconnecting the cable to the negative battery terminal. (See page IN-43)

REMOVAL

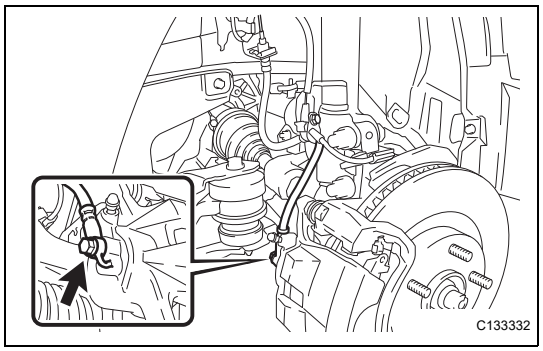
NOTICE:
When the brake caliper is removed from the brake disc, do not start the hybrid system. If the hybrid system is started, the brake fluid pressure may increase.
HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. REMOVE FRONT WHEEL

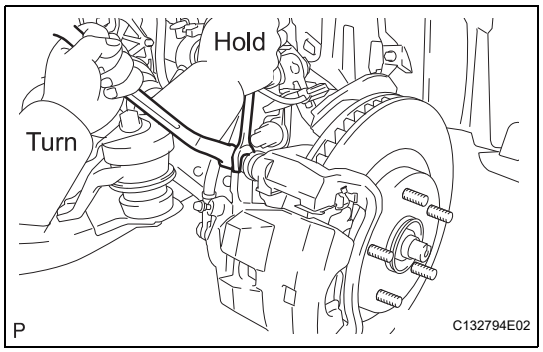
2. DRAIN BRAKE FLUID
NOTICE:
If brake fluid leaks onto any painted surface of the vehicle, wash or remove it completely.

3. REMOVE DISC BRAKE CYLINDER ASSEMBLY

(a) Remove the union bolt and gasket from the disc brake cylinder assembly, then disconnect the front brake flexible hose.

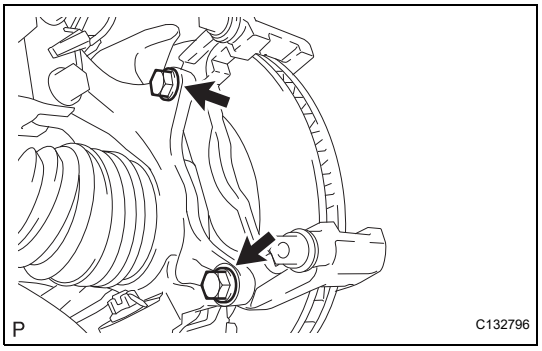


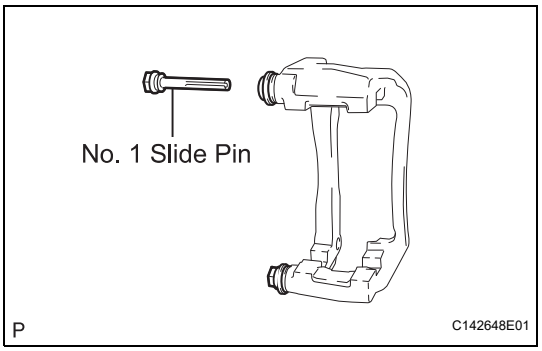
(b) Hold the front disc brake cylinder slide pin and remove the 2 bolts and disc brake cylinder assembly.



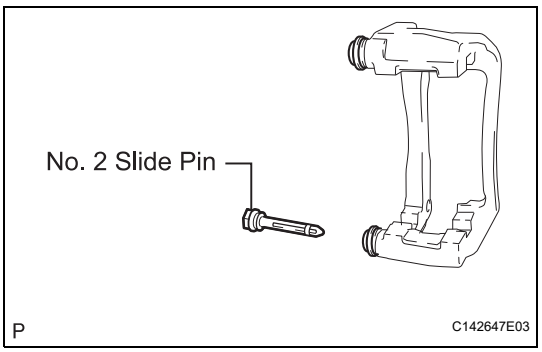
DISASSEMBLY

1. **REMOVE ANTI-SQUEAL SPRING (w/ Anti-squeal Spring)**
   (a) Remove the 2 anti-squeal springs from front brake pad.
2. **REMOVE FRONT BRAKE PAD**
   (a) Remove the 2 front brake pads from the front disc brake cylinder mounting.
3. **REMOVE FRONT ANTI-SQUEAL SHIM**
   (a) Remove the 2 front anti-squeal shims and the pad wear indicator plate from each pad.
4. **REMOVE FRONT DISC BRAKE PAD SUPPORT PLATE**
   (a) Remove the 4 front disc brake pad support plates.
5. **REMOVE FRONT DISC BRAKE CYLINDER MOUNTING**
   (a) Remove the 2 bolts and front disc brake cylinder mounting.

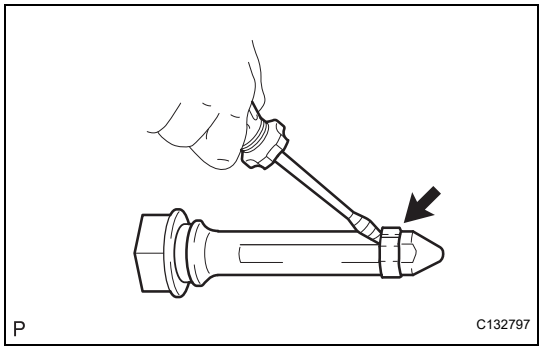




6. **REMOVE NO. 1 FRONT DISC BRAKE CYLINDER SLIDE PIN**
   (a) Remove the No. 1 front disc brake cylinder slide pin from the front disc brake cylinder mounting.



7. **REMOVE NO. 2 FRONT DISC BRAKE CYLINDER SLIDE PIN**
   (a) Remove the No. 2 front disc brake cylinder slide pin from the front disc brake cylinder mounting.



8. REMOVE FRONT DISC BRAKE CYLINDER SLIDE BUSHING

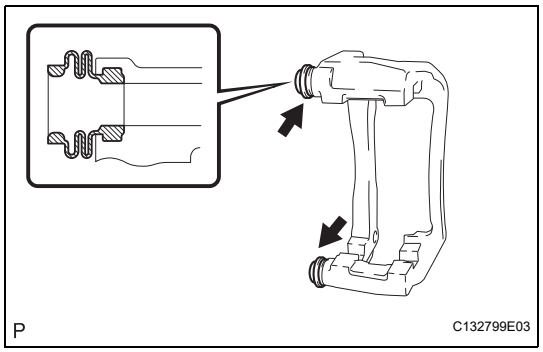
(a) Using a screwdriver, remove the front disc brake cylinder slide bushing from the No. 2 front disc brake cylinder slide pin.

NOTICE:

Do not damage the No. 2 front disc brake cylinder slide pin.

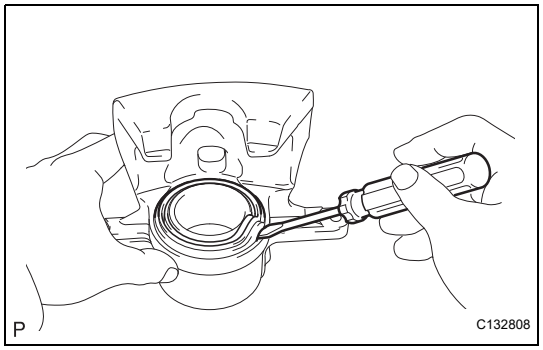
HINT:

Tape the screwdriver tip before use.



9. REMOVE FRONT DISC BRAKE BUSHING DUST BOOT

(a) Remove the 2 front disc brake bushing dust boots from the front disc brake cylinder mounting.

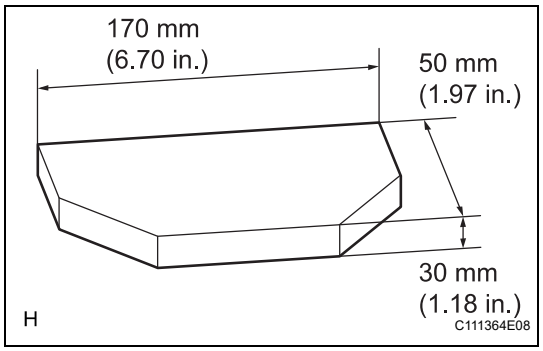


10. REMOVE CYLINDER BOOT

(a) Using a screwdriver, remove the cylinder boot set ring and the cylinder boot.

NOTICE:

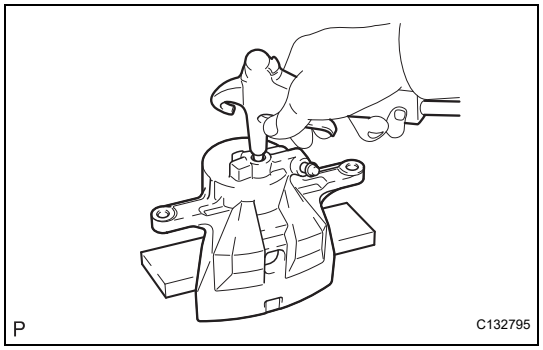
Be careful not to damage the brake piston and cylinder.



11. REMOVE FRONT DISC BRAKE PISTON

(a) Prepare a wooden plate to hold the pistons.

(b) Place the wooden plate between the front disc brake piston and the disc brake cylinder assembly.



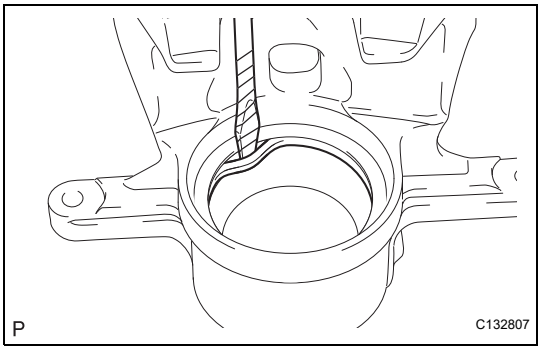
(c) Use compressed air to remove the front disc brake piston from the disc brake cylinder assembly.

CAUTION:

Do not place your fingers in front of the piston when using compressed air.

NOTICE:

Do not spatter the brake fluid.



12. REMOVE PISTON SEAL

(a) Using a screwdriver, remove the piston seal from the disc brake cylinder assembly.

NOTICE:
Do not damage the inner cylinder or cylinder groove.

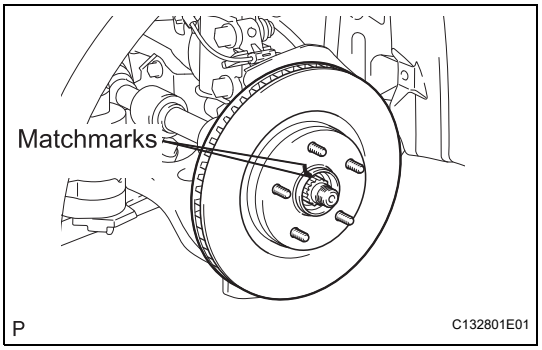
HINT:
Tape the screwdriver tip before use.

13. REMOVE FRONT DISC BRAKE BLEEDER PLUG CAP

(a) Remove the front disc brake bleeder plug cap.

14. REMOVE FRONT DISC BRAKE BLEEDER PLUG

(a) Remove the front disc brake bleeder plug.

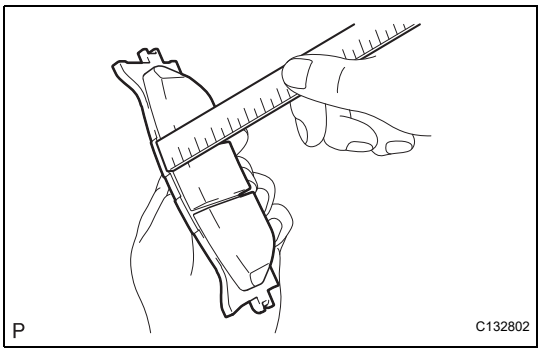


15. REMOVE FRONT DISC

(a) Remove the front disc.

HINT:
Put matchmarks on the disc and the axle hub.

INSPECTION



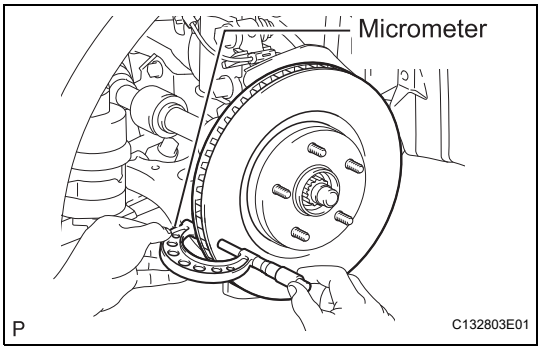
1. INSPECT PAD LINING THICKNESS

(a) Using a ruler, measure the pad lining thickness.

Standard thickness:
12.0 mm(0.472 in.)
Minimum thickness:
1.0 mm (0.039 in.)

If the pad lining thickness is less than the minimum, replace the brake pads.

HINT:
Be sure to check wear of the front disc after replacing the brake pad with a new one.



2. INSPECT DISC THICKNESS

(a) Using a micrometer, measure the disc thickness.

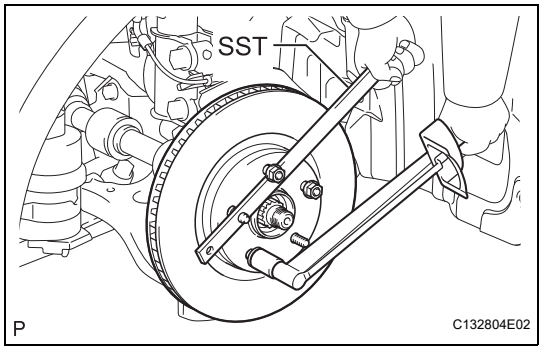
Standard thickness:
28.0 mm (1.102 in.)
Minimum thickness :
25.0 mm (0.983 in.)

If the disc thickness is less than the minimum, replace the front disc.

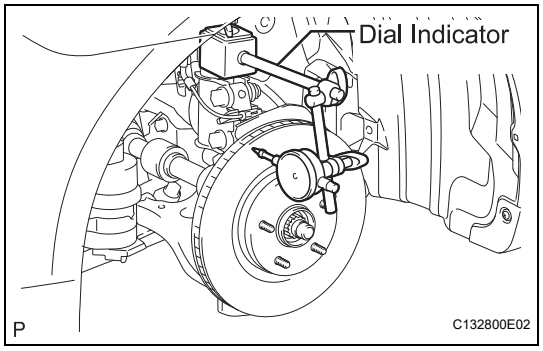
3. INSPECT BRAKE CYLINDER AND PISTON

(a) Check the cylinder bore and piston for rust or scoring. If necessary, replace the disc brake cylinder assembly.

4. **INSPECT FRONT DISC BRAKE PAD SUPPORT PLATE**
   (a) Make sure that the pad support plate has sufficient rebound, has no deformation, cracks or wear, and that all rust and dirt are cleaned off. If necessary, replace the brake pad support plate.

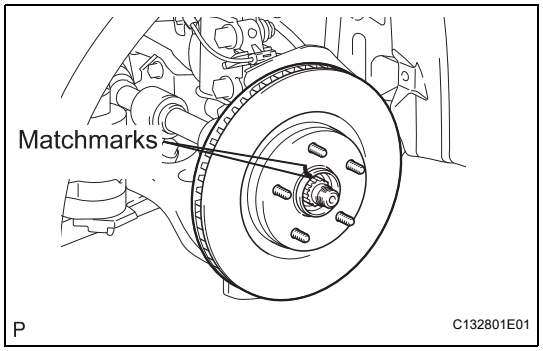


5. **INSPECT DISC RUNOUT**
   (a) Using SST to hold the disc, tighten the disc with the 3 hub nuts.
   SST 09330-00021
   HINT:
   Use the SST to hold the disc while torquing the nuts.
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)



   (b) Using a dial indicator, measure the disc runout 10 mm (0.39 in.) away from the outer edge of the disc.
   Maximum disc runout:
   0.05 mm (0.0020 in.)
   NOTICE:
   - **Keep the magnet of the dial indicator away from the axle hub and speed sensor.**
   - **Install the dial indicator to the shock absorber.**
   (c) If the runout exceeds the maximum value, change the installation positions of the disc and axle so that the runout will become minimal. If the runout exceeds the maximum even after the installation positions are changed, check the bearing play in the axial direction and the axle hub runout (See page AH-11). If the bearing play and the axle hub runout are normal and if the disc thickness is not within the specified range, grind the disc. If the disc thickness is less than the minimum, replace the disc.
   (d) Remove the 3 hub nuts.
   (e) Remove the front disc.

REASSEMBLY



1. **INSTALL FRONT DISC**
   (a) Align the matchmarks and install the front disc.
   NOTICE:
   When replacing the disc with a new one, select the installation position where the front disc has the minimum runout.

2. **TEMPORARILY TIGHTEN FRONT DISC BRAKE BLEEDER PLUG**
   (a) Temporarily tighten the front disc brake bleeder plug to the disc brake cylinder assembly.

3. **INSTALL FRONT DISC BRAKE BLEEDER PLUG CAP**
   (a) Install the front disc brake bleeder plug cap to the front disc brake bleeder plug.

4. INSTALL PISTON SEAL

(a) Apply lithium soap base glycol grease to a new piston seal.

(b) Install the piston seal to the disc brake cylinder assembly.

5. INSTALL FRONT DISC BRAKE PISTON

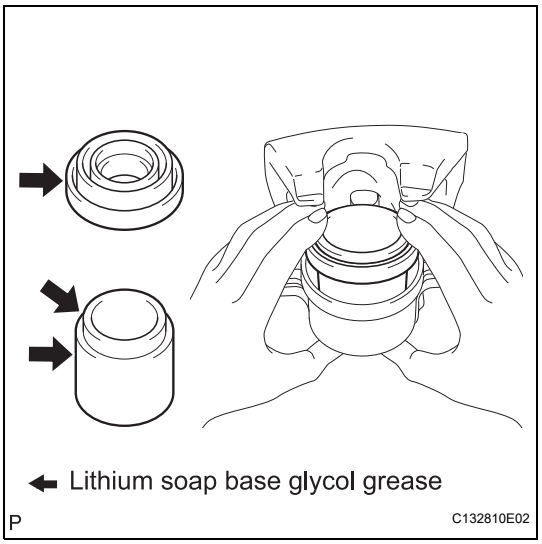
(a) Apply lithium soap base glycol grease to the front disc brake piston and a new cylinder boot.

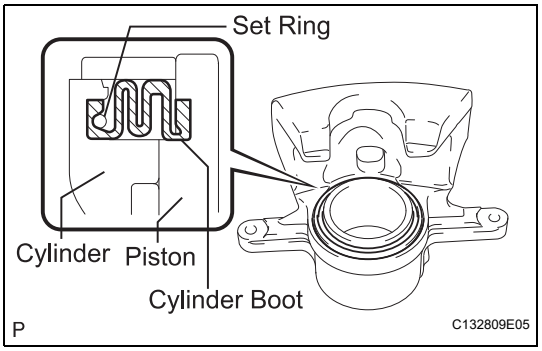
(b) Install the cylinder boot to the front disc brake piston.

(c) Install the front disc brake piston to the disc brake cylinder assembly.

NOTICE:

Do not install the piston forcibly in the cylinder assembly.





6. INSTALL CYLINDER BOOT

(a) Install the cylinder boot to the disc brake cylinder assembly.

NOTICE:

Install the boot securely to the grooves of the cylinder and piston.

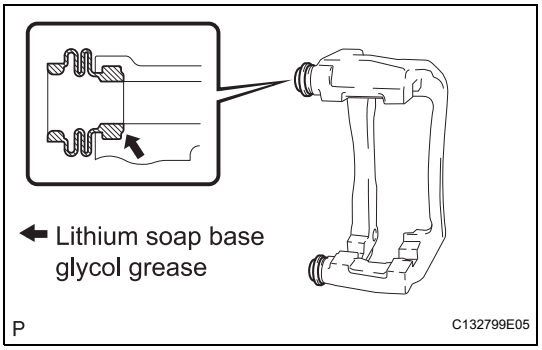
(b) Using a screwdriver, install a new cylinder boot set ring.

NOTICE:

- **Install the set ring securely to the grooves of the cylinder boot.**
- **Do not damage the cylinder boot.**

HINT:

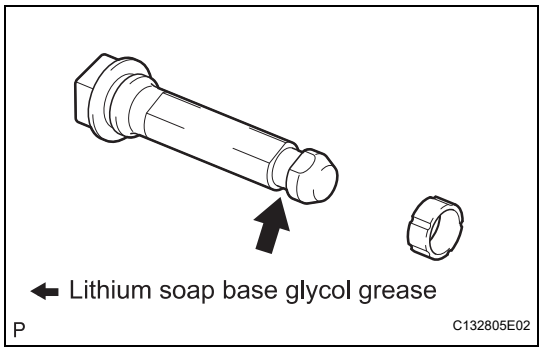
Tape the screwdriver tip before use.



7. INSTALL FRONT DISC BRAKE BUSHING DUST BOOT

(a) Apply lithium soap base glycol grease to the seal surface of 2 new front disc brake bushing dust boots.

(b) Install the 2 front disc brake bushing dust boots to the front disc brake cylinder mounting.



8. INSTALL FRONT DISC BRAKE CYLINDER SLIDE BUSHING

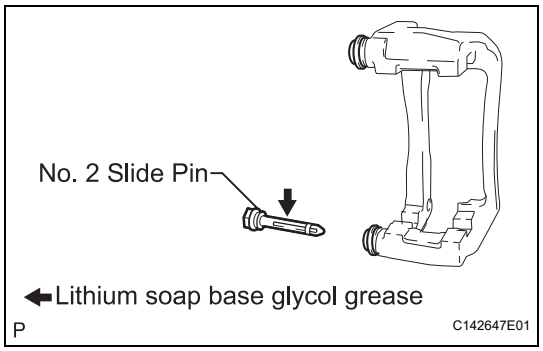
(a) Apply lithium soap base glycol grease to a new front disc brake cylinder slide bushing.

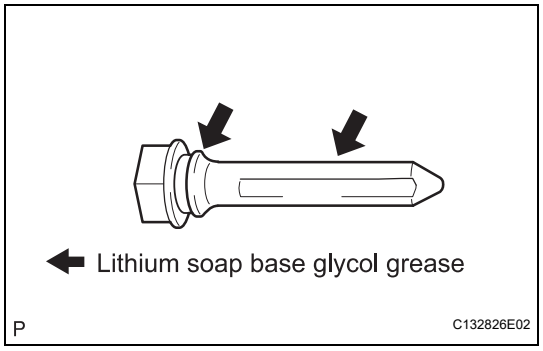
(b) Install the front disc brake cylinder slide bushing to the No. 2 front disc brake cylinder slide pin.

9. INSTALL NO. 2 FRONT DISC BRAKE CYLINDER SLIDE PIN

(a) Apply the lithium soap base glycol grease to the sliding part and the seal surface of the No. 2 front disc brake cylinder slide pin.

(b) Install the No. 2 front disc brake cylinder slide pin to the bottom side of the front disc brake cylinder mounting.

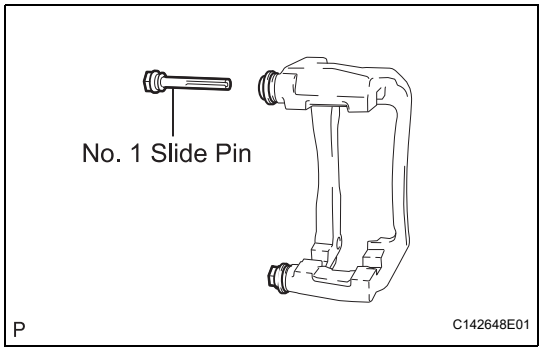


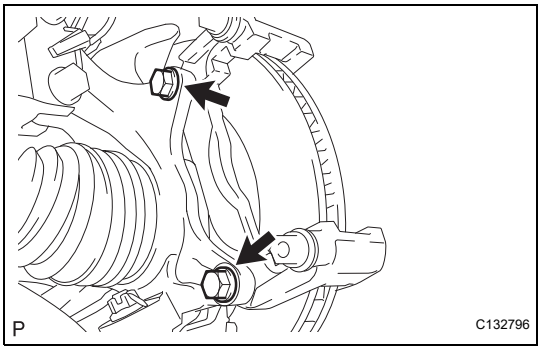


10. INSTALL NO. 1 FRONT DISC BRAKE CYLINDER SLIDE PIN

(a) Apply lithium soap base glycol grease to the sliding part and the seal surface of the No. 1 front disc brake cylinder slide pin.

(b) Install the No. 1 front disc brake cylinder slide pin.

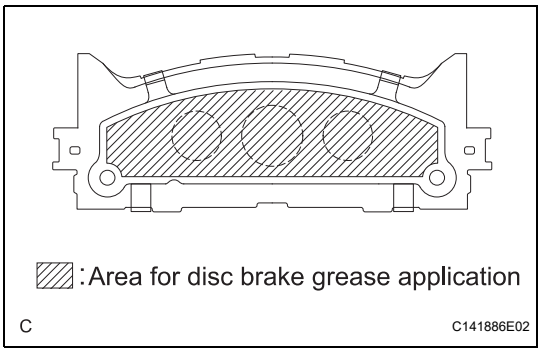




11. INSTALL FRONT DISC BRAKE CYLINDER MOUNTING

(a) Install the cylinder mounting with the 2 bolts.
Torque: 107 N*m (1,090 kgf*cm, 79 ft.*lbf)

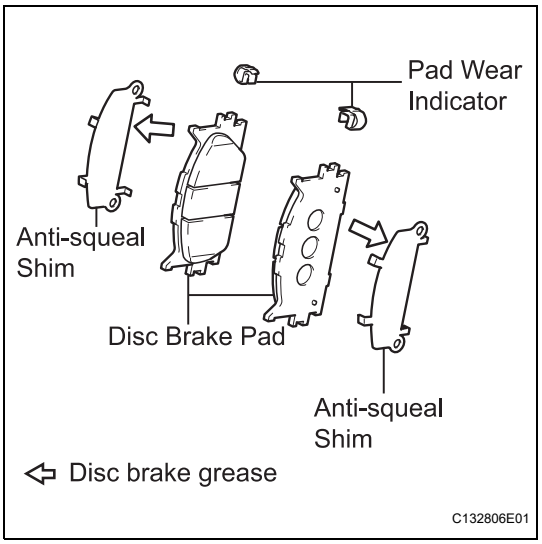
12. INSTALL FRONT DISC BRAKE PAD SUPPORT PLATE



13. INSTALL FRONT ANTI-SQUEAL SHIM

(a) Apply disc brake grease to the front anti-squeal shims and install them to each pad.
NOTICE:
- **When replacing worn pads, the anti-squeal shims must be replaced together with the pads.**
- **Install the shims in the correct positions and directions.**
- **Apply disc brake grease to the area that contacts the front anti-squeal shim.**
- **Disc brake grease can come out slightly from the area where the front anti-squeal shim is installed.**
- **Make sure that disc brake grease is not applied onto the lining surface.**

(b) Install the 2 front anti-squeal shims and the pad wear indicator to each pad.
NOTICE:
- **Install the shims in the correct positions and directions.**
- **Install the pad wear indicator in the correct positions and directions.**

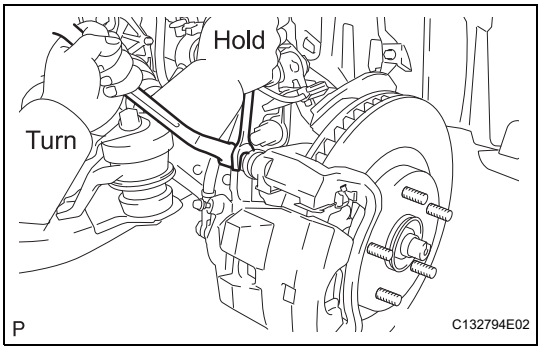


14. INSTALL FRONT BRAKE PAD

(a) Install the 2 front brake pads with front anti-squeal shims to the disc brake cylinder mounting.

15. INSTALL FRONT BRAKE PAD (w/ Anti-squeal Spring)

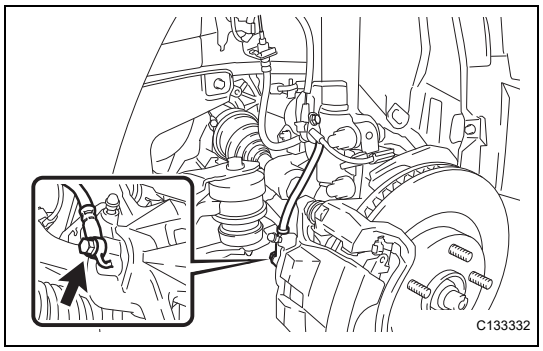
(a) Install the 2 anti-squeal springs.
NOTICE:
When replacing the front brake pads with new ones, make sure to replace the anti-squeal spring at the same time.



INSTALLATION

1. INSTALL DISC BRAKE CYLINDER ASSEMBLY

(a) Install the disc brake cylinder assembly with the 2 bolts.
Torque: 34 N*m (350 kgf*cm, 25 ft.*lbf)



(b) Connect the front flexible hose with the union bolt and a new gasket.
NOTICE:
Install the flexible hose lock securely in the lock hole in the disc brake cylinder.
Torque: 29 N*m (300 kgf*cm, 21 ft.*lbf)

2. **ADD BRAKE FLUID TO RESERVOIR (See page BR-7)**
3. **DISABLE BRAKE CONTROL (See page BR-7)**
4. **BLEED FRONT BRAKE SYSTEM (See page BR-10)**
5. **CANCEL BRAKE CONTROL DISABLE (See page BR-11)**
6. **CLEAR DTC FOR BRAKE CONTROL SYSTEM**
   HINT:
   Refer the procedures up to "ELECTRONICALLY CONTROLLED BRAKE SYSTEM". (See Page BC-57)
7. **PERFORM ACCUMULATOR PRESSURE ZERO DOWN (See page BR-12)**
8. **CHECK FOR BRAKE FLUID LEAKAGE**
9. **CHECK BRAKE FLUID LEVEL IN RESERVOIR (See page BR-13)**
10. **INSTALL FRONT WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

REMOVAL

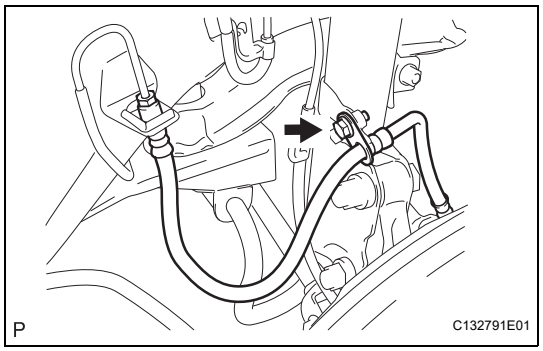
NOTICE:
When the brake caliper is removed from the brake disc, do not start the hybrid system. If the hybrid system is started, the brake fluid pressure may increase.
HINT:
- Use the same procedures for the LH side and RH side.
- The procedures listed below are for the LH side.

1. REMOVE REAR WHEEL

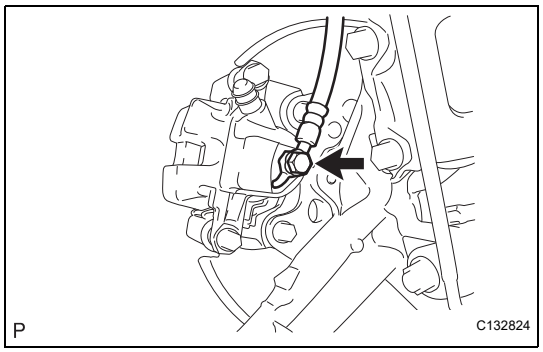
2. DRAIN BRAKE FLUID
NOTICE:
If brake fluid leaks onto any painted surface, wash or remove it completely.

3. DISCONNECT REAR BRAKE FLEXIBLE HOSE

(a) Remove the bolt and separate the rear brake flexible hose from the shock absorber.

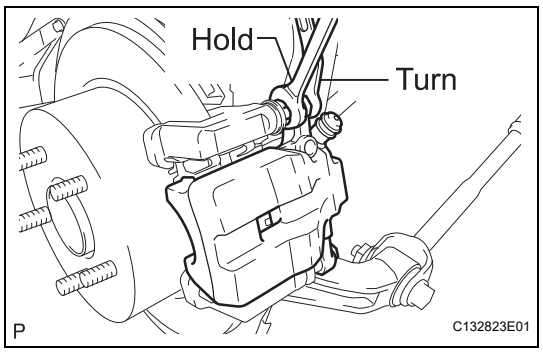


(b) Remove the union bolt and the gasket from the rear disc brake cylinder assembly, then disconnect the rear brake flexible hose.



4. REMOVE REAR DISC BRAKE CYLINDER ASSEMBLY

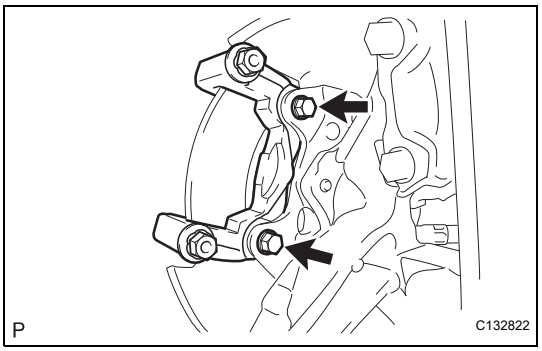
(a) Hold the 2 rear disc brake cylinder slide pins and remove the 2 bolts and rear disc brake cylinder assembly.



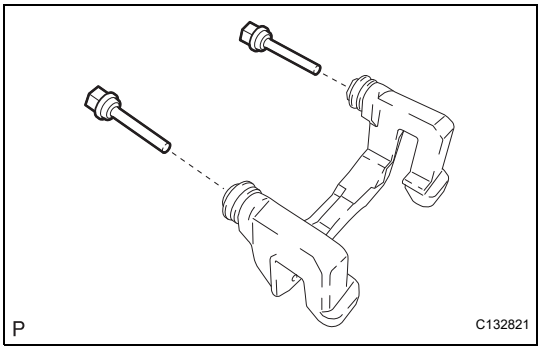
BR

DISASSEMBLY

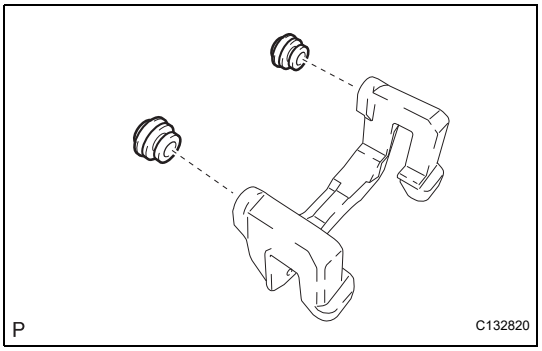
1. **REMOVE REAR DISC BRAKE PAD KIT (PAD ONLY)**
   (a) Remove the 2 rear disc brake pads with the rear anti-squeal shims.
2. **REMOVE REAR ANTI-SQUEAL SHIM**
   (a) Remove the 2 rear anti-squeal shims and the 2 pad wear indicators from each pad.
3. **REMOVE NO. 1 REAR DISC BRAKE PAD SUPPORT PLATE**
   (a) Remove the No. 1 rear disc brake pad support plate from the rear disc brake cylinder mounting.
4. **REMOVE NO. 2 REAR DISC BRAKE PAD SUPPORT PLATE**
   (a) Remove the No. 2 rear disc brake pad support plate from the rear disc brake cylinder mounting.
5. **REMOVE REAR DISC BRAKE CYLINDER MOUNTING**
   (a) Remove the 2 bolts and the rear disc brake cylinder mounting.

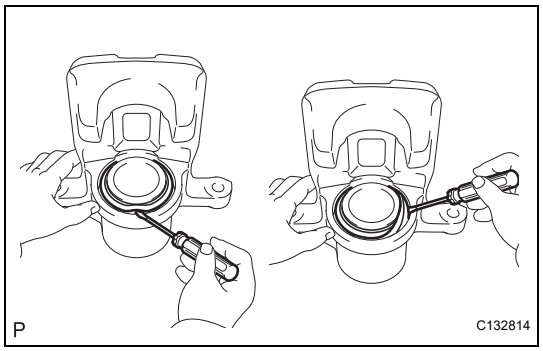


6. **REMOVE REAR DISC BRAKE CYLINDER SLIDE PIN**
   (a) Remove the 2 rear disc brake cylinder slide pins (upper and lower) from the rear brake cylinder mounting.



7. **REMOVE REAR DISC BRAKE BUSHING DUST BOOT**
   (a) Remove the 2 rear disc brake bushing dust boots from the rear disc brake cylinder mounting.





8. REMOVE CYLINDER BOOT

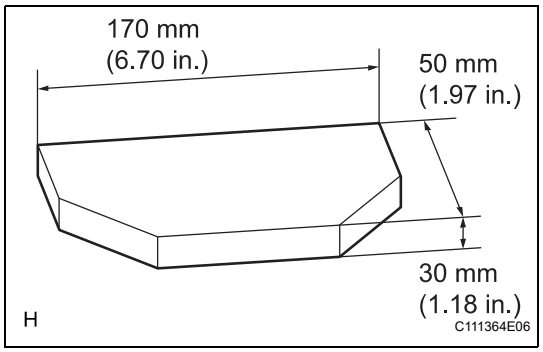
(a) Using a screwdriver, pry out the brake cylinder boot set ring or cylinder boot.

NOTICE:

Be careful not to damage the brake piston and cylinder.

HINT:

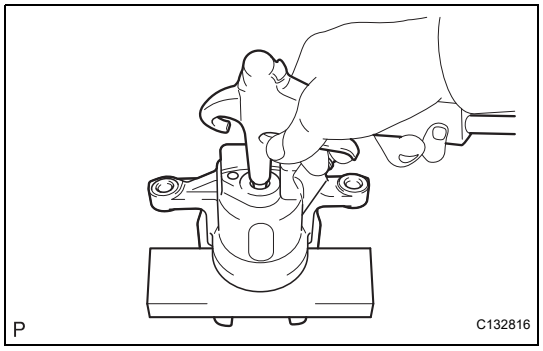
Tape the screwdriver tip before use.



9. REMOVE REAR DISC BRAKE PISTON

(a) Prepare a wooden plate to hold the rear disc brake pistons.

(b) Place the wooden plate between the rear disc brake piston and the rear disc brake cylinder assembly.



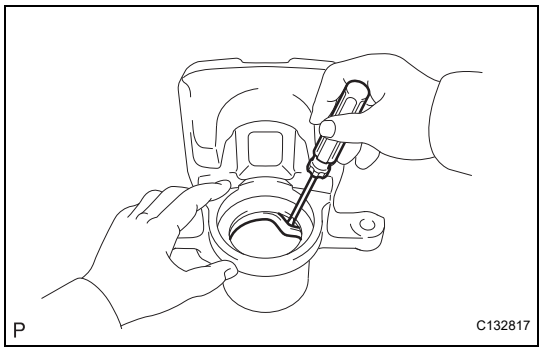
(c) Use compressed air to remove the piston from the rear disc brake cylinder assembly.

CAUTION:

Do not place your fingers in front of the brake piston when using compressed air.

NOTICE:

Do not spatter the brake fluid.



10. REMOVE PISTON SEAL

(a) Using a screwdriver, remove the piston seal from the rear disc brake cylinder assembly.

NOTICE:

Do not damage the inner cylinder or cylinder groove.

HINT:

Tape the screwdriver tip before use.

11. REMOVE REAR DISC BRAKE BLEEDER PLUG CAP

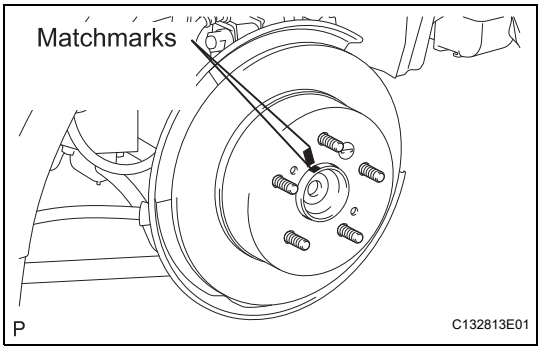
(a) Remove the bleeder plug cap from the rear disc brake bleeder plug.

12. REMOVE REAR DISC BRAKE BLEEDER PLUG

(a) Remove the rear disc brake bleeder plug from the rear disc brake cylinder assembly.

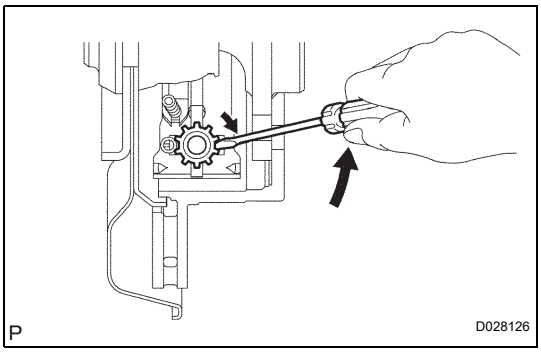
13. REMOVE PARKING BRAKE SHOE ADJUSTING HOLE PLUG

(a) Remove the parking brake shoe adjusting hole plug.



14. REMOVE REAR DISC

(a) Put matchmarks on the rear disc and the axle hub.

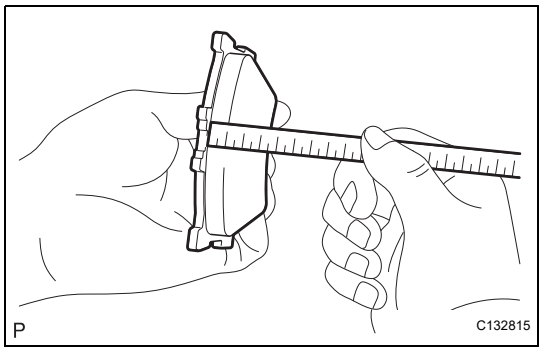


(b) Release the parking brake and remove the rear disc.
HINT:
If the disc cannot be removed easily, turn and press firmly the shoe adjuster until the wheel comes free.

INSPECTION

1. INSPECT BRAKE CYLINDER AND PISTON

(a) Inspect the cylinder bore and the piston for rust or scoring. If necessary, replace the rear disc brake cylinder assembly and piston.



2. INSPECT PAD LINING THICKNESS

(a) Using a ruler, measure the pad lining thickness.

Standard thickness:
11.0 mm (0.433 in.)
Minimum thickness:
1.0 mm (0.039 in.)

If the pad lining thickness is less than the minimum, replace the brake pads.

HINT:

Be sure to check wear of the front disc after replacing the brake pad with a new one.

3. INSPECT NO. 1 REAR DISC BRAKE PAD SUPPORT PLATE

(a) Inspect the No. 1 rear disc brake pad support plate.

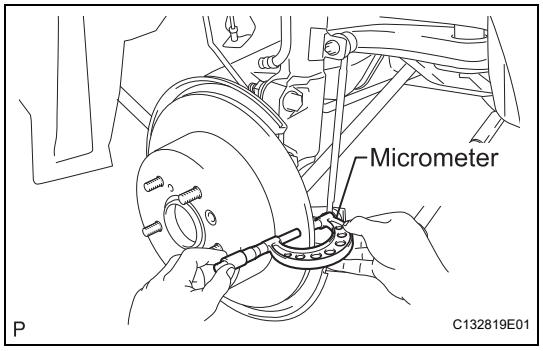
HINT:

Make sure that they have sufficient rebound, and have no deformation, cracks or wear, and all rust and dirt are cleaned off.

4. INSPECT NO. 2 REAR DISC BRAKE PAD SUPPORT PLATE

HINT:

Inspect the No. 2 rear disc brake pad support plate using the same procedure with the No. 1 rear disc brake pad support plate.



5. INSPECT DISC THICKNESS

(a) Using a micrometer, measure the disc thickness.

Standard thickness:
10.0 mm (0.390 in.)
Minimum thickness:
8.5 mm (0.334 in.)

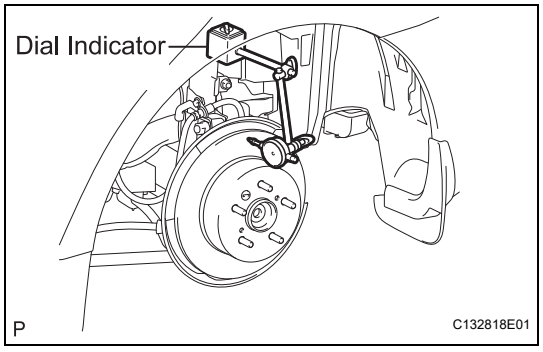
If the disc thickness is less than the minimum, replace the rear disc.

6. INSPECT DISC RUNOUT

(a) Install the rear disc.

(b) Temporarily fasten the rear disc with the 3 hub nuts.

Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

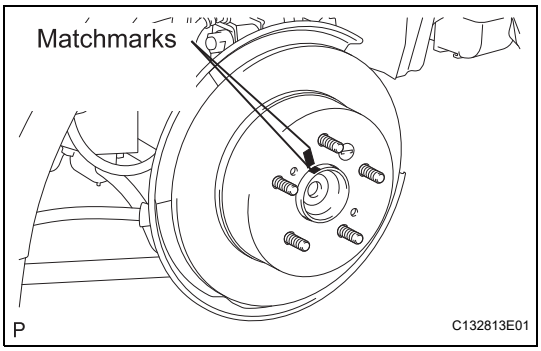


(c) Using a dial indicator, measure the disc runout 10 mm (0.39 in.) away from the outer edge of the rear disc.

Maximum disc runout:
0.15 mm (0.0059 in.)

BR

(d) If the runout exceeds the maximum value, change the installation positions of the disc and axle so that the runout will become minimal. If the runout exceeds the maximum even after the installation positions are changed, check the bearing play in the axial direction and the axle hub runout (See page AH-16). If the bearing play and the axle hub runout are normal and if the disc thickness is not within the specified range, grind the disc. If the disc thickness is less than the minimum, replace the disc.
(e) Remove the 3 hub nuts.
(f) Remove the rear disc.



REASSEMBLY

1. INSTALL REAR DISC

(a) Aligning the matchmarks, install the rear disc.
NOTICE:
When replacing the rear disc with a new one, select the installation position where the rear disc has the minimum runout.

2. ADJUST PARKING BRAKE SHOE CLEARANCE

HINT:
Hold the rear disc with hub nuts by parking brake pedal (or lever) before adjusting the parking brake shoe clearance. (See page PB-1)

3. INSTALL PARKING BRAKE SHOE ADJUSTING HOLE PLUG

(a) Install the parking brake shoe adjusting hole plug.

4. TEMPORARILY TIGHTEN REAR DISC BRAKE BLEEDER PLUG

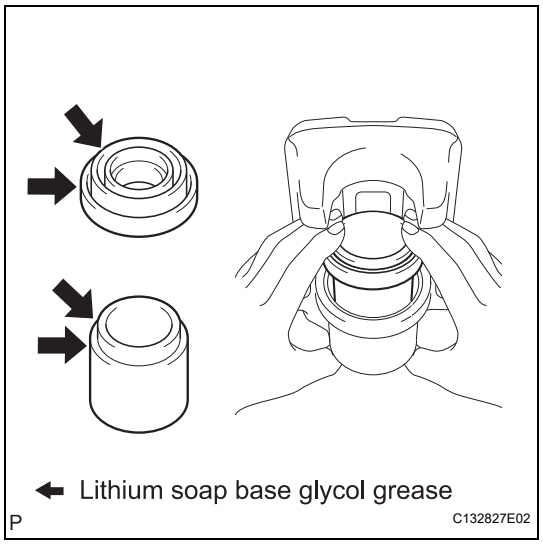
(a) Temporarily install the rear disc brake bleeder plug to the rear disc brake cylinder assembly.

5. INSTALL REAR DISC BRAKE BLEEDER PLUG CAP

(a) Install the rear disc brake bleeder plug cap to the rear disc brake bleeder plug.

6. INSTALL PISTON SEAL

(a) Apply lithium soap base glycol grease to a new piston seal.
(b) Install the piston seal to the rear disc brake cylinder assembly.



7. INSTALL REAR DISC BRAKE PISTON

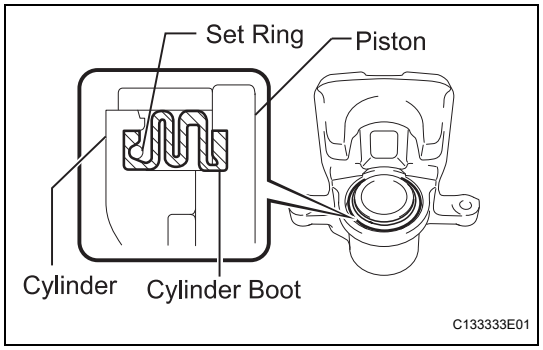
(a) Apply lithium soap base glycol grease to the rear disc brake piston and a new cylinder boot.

(b) Install the cylinder boot to the rear disc brake piston.

(c) Install the rear disc brake piston to the rear disc brake cylinder assembly.

NOTICE:

Do not install the piston forcibly in the disc brake cylinder.



8. INSTALL CYLINDER BOOT

(a) Install the cylinder boot to the rear disc brake cylinder assembly.

NOTICE:

- **Install the boot securely onto the grooves of the cylinder and the piston.**
- **Do not damage the cylinder boot.**

(b) Using a screwdriver, install the brake cylinder boot set ring.

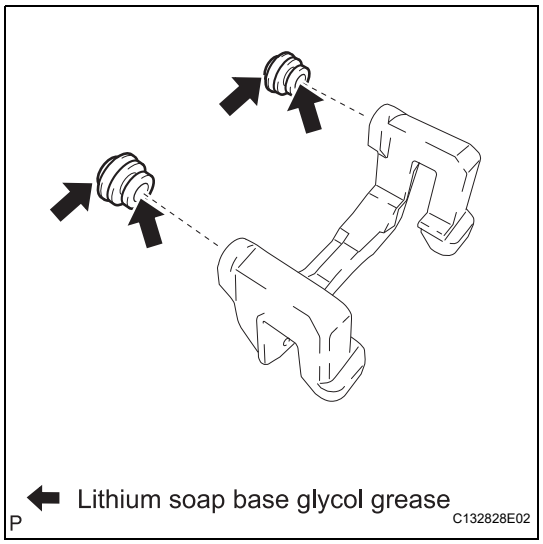
NOTICE:

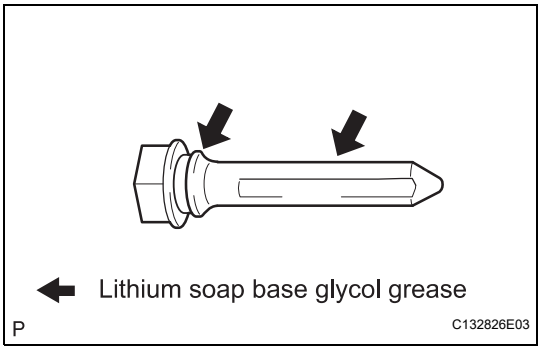
Do not damage the boot.

9. INSTALL REAR DISC BRAKE BUSHING DUST BOOT

(a) Apply lithium soap base glycol grease to the seal surface of 2 new rear disc brake bushing dust boots.

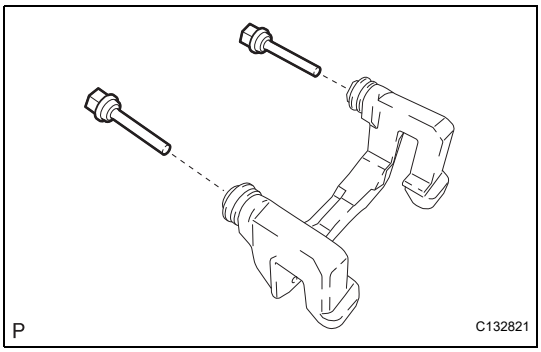
(b) Install the 2 rear disc brake bushing dust boots to the rear disc brake cylinder mounting.



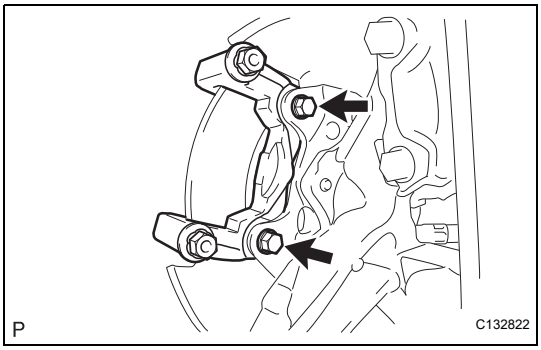


10. INSTALL REAR DISC BRAKE CYLINDER SLIDE PIN

(a) Apply lithium soap base glycol grease to the rear disc brake cylinder slide pins.



(b) Install the 2 rear disc brake cylinder slide pins (upper and lower) to the rear disc brake cylinder mounting.



11. INSTALL REAR DISC BRAKE CYLINDER MOUNTING

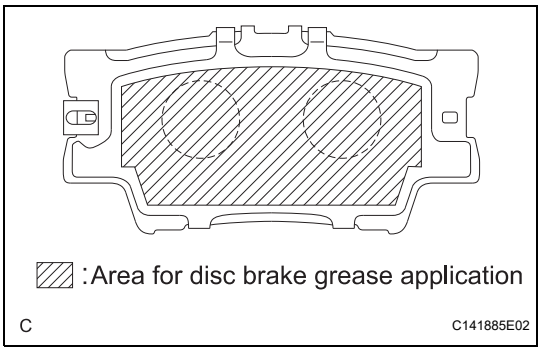
(a) Install the rear disc brake cylinder mounting with the 2 bolts.
Torque: 62 N*m (632 kgf*cm, 46 ft.*lbf)

12. INSTALL NO. 1 REAR DISC BRAKE PAD SUPPORT PLATE

(a) Install the No. 1 rear disc brake pad support plate to the rear disc brake cylinder mounting.

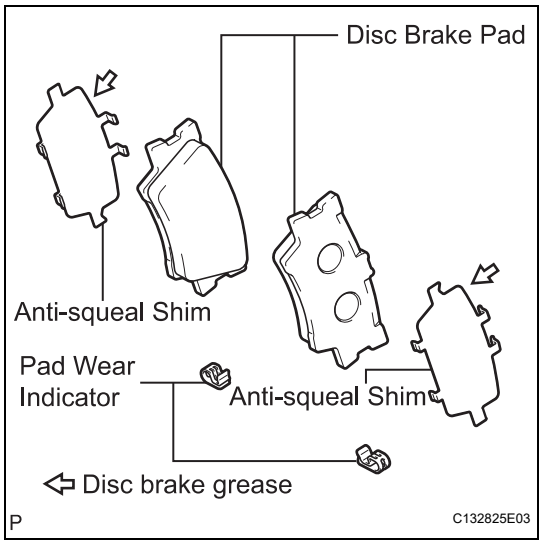
13. INSTALL NO. 2 REAR DISC BRAKE PAD SUPPORT PLATE

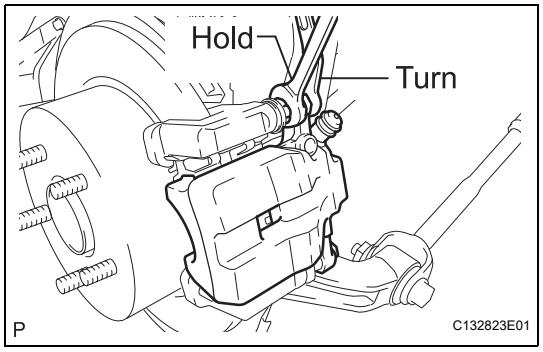
(a) Install the No. 2 rear disc brake pad support plate to the rear disc brake cylinder mounting.

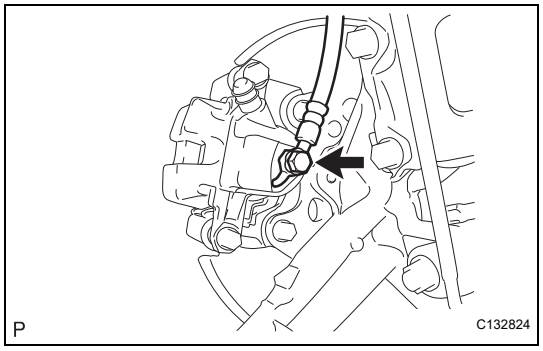


14. INSTALL REAR ANTI-SQUEAL SHIM

(a) Apply disc brake grease to the inside of the rear anti-squeal shims and install them and the pad wear indicators to each of the 2 rear disc brake pads.
NOTICE:
- **When replacing worn pads, the anti-squeal shims must be replaced together with the pads.**
- **Apply disc brake grease to the area that contacts the front anti-squeal shim.**
- **Disc brake grease can come out slightly from the area where the front anti-squeal shim is installed.**
- **Make sure that disc brake grease is not applied onto the lining surface.**







(b) Install the 2 rear anti-squeal shims and the pad wear indicator plate to each pad.
NOTICE:
Install the pad wear indicator and anti-squeal shims in the correct positions and directions.

15. INSTALL REAR BRAKE PAD

(a) Install the 2 rear brake pads with rear anti-squeal shims to the rear disc brake cylinder mounting.

INSTALLATION

1. INSTALL REAR DISC BRAKE CYLINDER ASSEMBLY

(a) Install the rear disc brake cylinder assembly with the 2 bolts.
Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)
NOTICE:
Install the rear disc brake bushing dust boot onto the groove of the rear disc brake cylinder.

(b) Connect the rear brake flexible hose with the union bolt and a new gasket.
Torque: 33 N*m (337 kgf*cm, 24 ft.*lbf)

2. ADD BRAKE FLUID TO RESERVOIR (See page BR-7)

3. BLEED REAR BRAKE SYSTEM (See page BR-11)

4. CLEAR DTC FOR BRAKE CONTROL SYSTEM
HINT:
Refer the procedures up to "ELECTRONICALLY CONTROLLED BRAKE SYSTEM". (See page BC-57)

5. PERFORM ACCUMULATOR PRESSURE ZERO DOWN (See page BR-12)

6. CHECK BRAKE FLUID LEVEL IN RESERVOIR (See page BR-13)

7. CHECK FOR BRAKE FLUID LEAKAGE

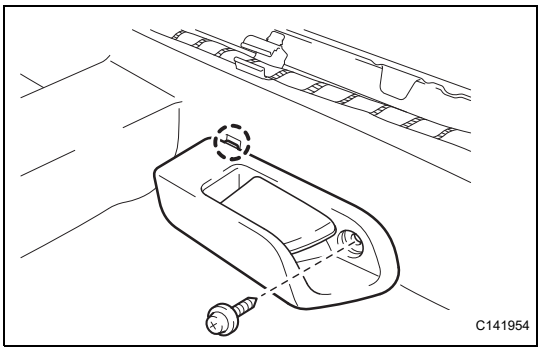
8. INSTALL REAR WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

REMOVAL

HINT:

- There is a slight difference in shape between the No. 2 parking brake cable assembly and No. 3 parking brake cable assembly.
- Use the same procedures for the No. 2 parking brake cable assembly and No. 3 parking brake cable assembly.
- The procedures listed below are for the No. 3 parking brake cable assembly.

1. **REMOVE FRONT SEAT ASSEMBLY LH**
   HINT:
   Refer to the procedures up to "REMOVE FRONT SEAT ASSEMBLY (for Power Seat)". (See page SE-29)
2. **REMOVE FRONT SEAT ASSEMBLY RH (for Manual Seat)**
   HINT:
   Refer to the procedures up to "REMOVE FRONT SEAT ASSEMBLY (for Manual Seat)". (See page SE-16)
3. **REMOVE FRONT SEAT ASSEMBLY RH (for Power Seat)**
   HINT:
   Use the same procedures for the RH side and the LH side.
4. **REMOVE PARKING BRAKE PEDAL ASSEMBLY**
   HINT:
   Refer to the procedures up to "REMOVE PARKING BRAKE PEDAL". (See page PB-7)
5. **REMOVE NO. 1 PARKING BRAKE CABLE ASSEMBLY (See page PB-9)**
6. **REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP LH**
7. **REMOVE REAR DOOR SCUFF PLATE LH (See page IR-13)**
8. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP LH**
9. **REMOVE LOWER CENTER PILLAR GARNISH LH (See page IR-14)**
10. **REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP RH**
11. **REMOVE REAR DOOR SCUFF PLATE RH (See page IR-13)**
12. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH**
13. **REMOVE LOWER CENTER PILLAR GARNISH RH (See page IR-15)**



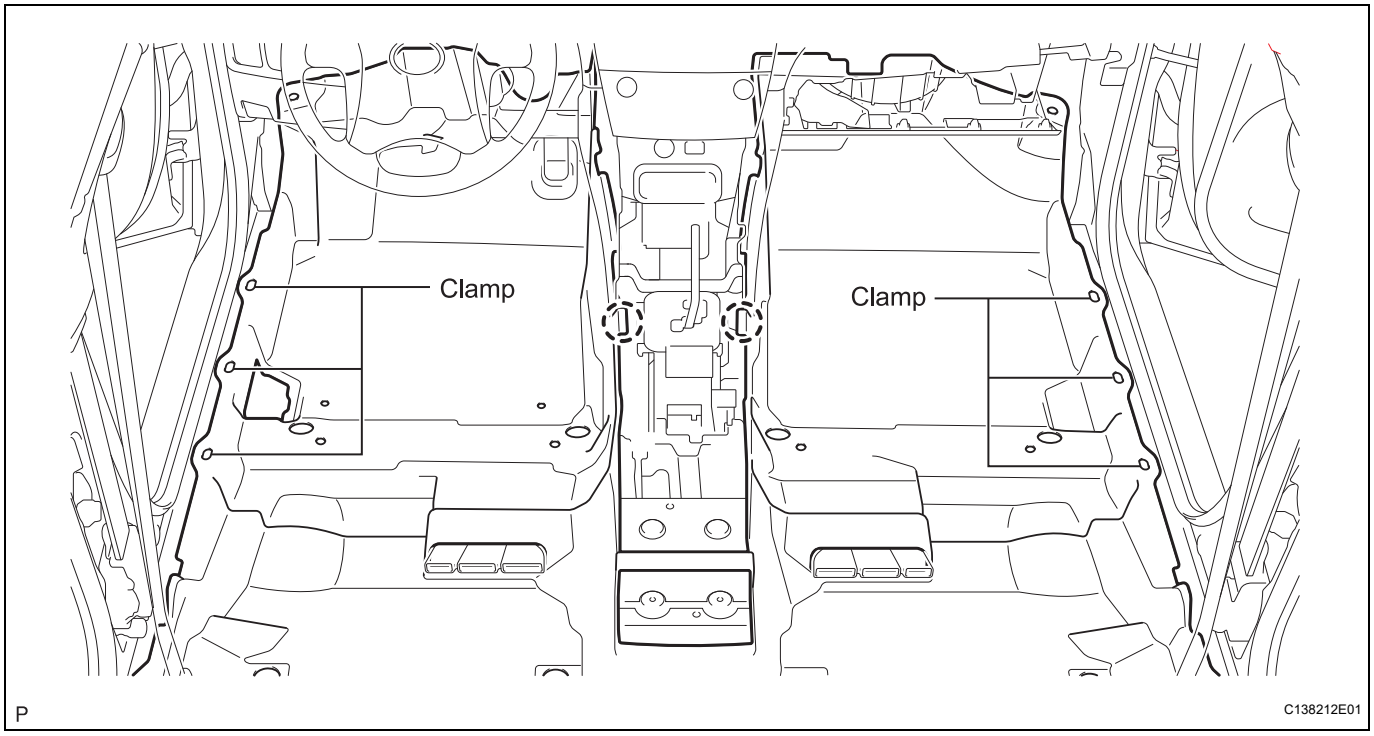
14. REMOVE LUGGAGE DOOR LOCK OPENER ASSEMBLY

(a) Remove the screw.

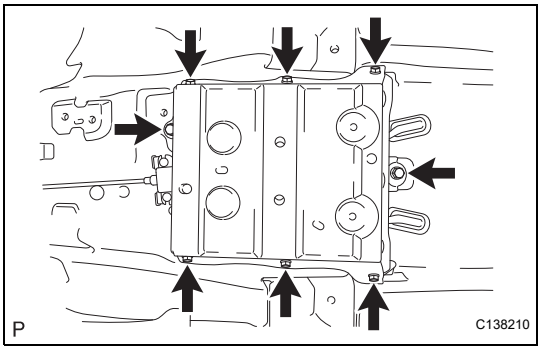
(b) Disengage the claw and remove the luggage door lock opener assembly.

15. REMOVE FRONT FLOOR CARPET ASSEMBLY

(a) Disengage the 6 clamps and the 2 claws.

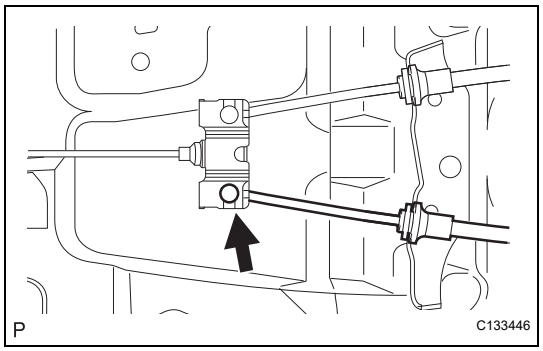


(b) Turn back the front floor carpet assembly until the bolts of the cross member No. 4 floor reinforcement sub-assembly can be seen.

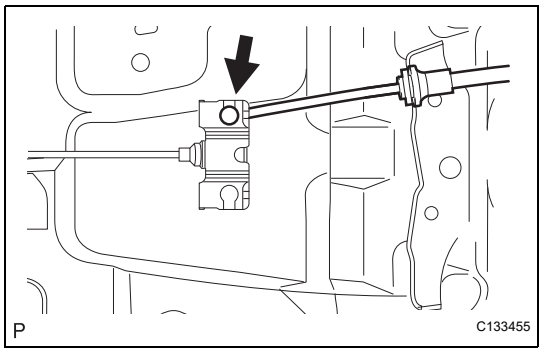


16. REMOVE CROSS MEMBER FLOOR NO. 4 REINFORCEMENT SUB-ASSEMBLY

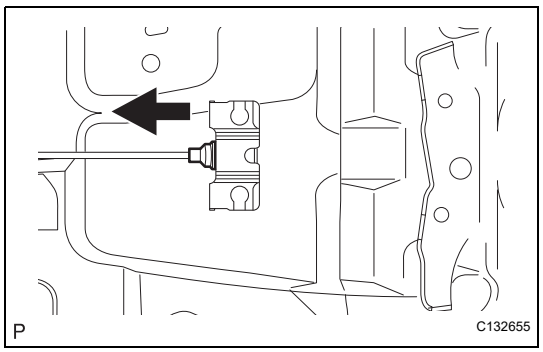
(a) Remove the 8 bolts and the cross member floor No. 4 reinforcement sub-assembly.



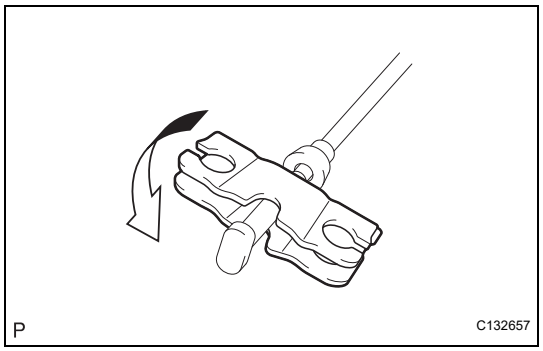
17. **SEPARATE NO. 3 PARKING BRAKE CABLE ASSEMBLY**
    (a) Separate the No. 3 parking brake cable assembly from the parking brake equalizer.



18. **SEPARATE NO. 2 PARKING BRAKE CABLE ASSEMBLY**
    (a) Separate the No. 2 parking brake cable assembly from the parking brake equalizer.



19. **REMOVE NO. 4 PARKING BRAKE CABLE ASSEMBLY**
    (a) Slide the rubber boot as shown in the illustration.

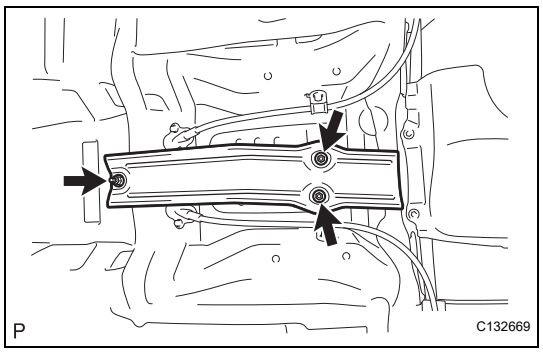


    (b) Remove the No. 4 parking brake cable assembly from the parking brake equalizer as shown in the illustration.

20. **REMOVE CENTER EXHAUST PIPE ASSEMBLY (See page EX-2)**

21. **REMOVE FLOOR NO. 1 UNDER COVER (See page SP-41)**

22. **REMOVE FLOOR NO. 2 UNDER COVER (See page SP-42)**



23. **REMOVE NO. 2 FRONT FLOOR HEAT LOWER INSULATOR**
    (a) Remove the 3 nuts and the No. 2 front floor heat lower insulator.

24. **REMOVE REAR WHEEL**

25. **SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY (See page PB-35)**

26. **REMOVE REAR DISC (See page PB-35)**

27. **REMOVE PARKING BRAKE SHOE RETURN TENSION NO. 1 SPRING (See page PB-35)**

28. **REMOVE PARKING BRAKE SHOE STRUT (See page PB-35)**

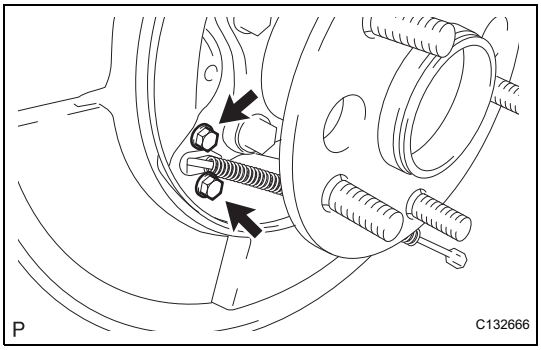
29. **REMOVE NO. 1 PARKING BRAKE SHOE ASSEMBLY (See page PB-35)**

30. **REMOVE PARKING BRAKE SHOE ADJUSTING SCREW SET (See page PB-36)**

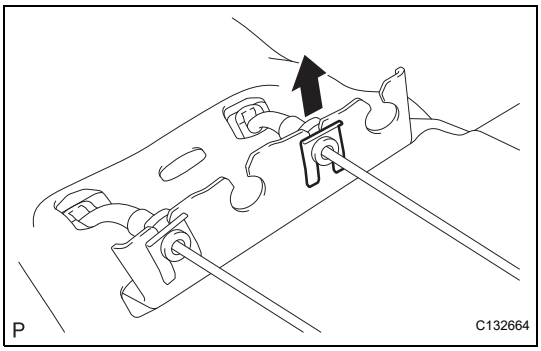
31. **REMOVE NO. 2 PARKING BRAKE SHOE ASSEMBLY (See page PB-36)**

32. **REMOVE NO. 3 PARKING BRAKE CABLE ASSEMBLY**

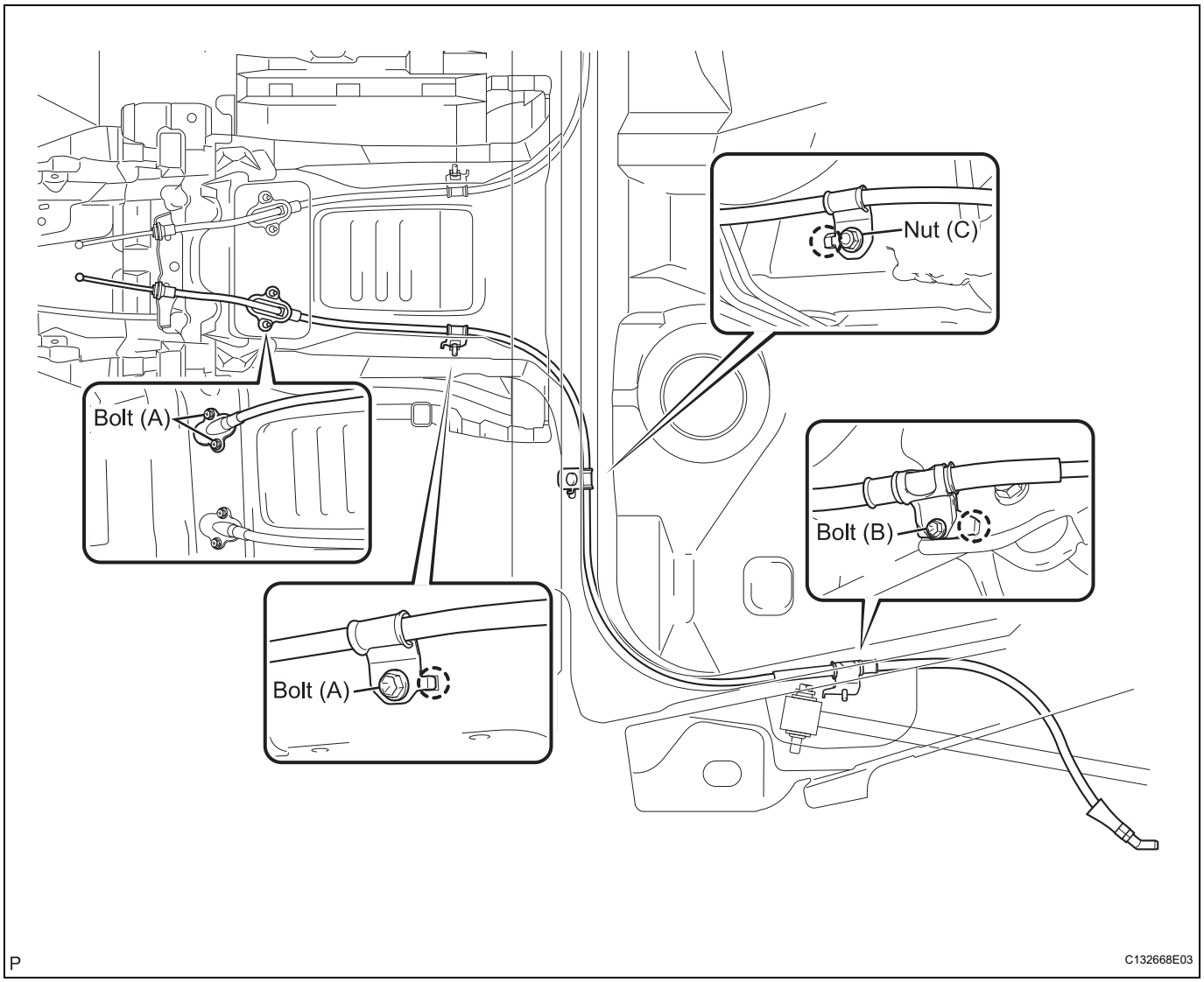
(a) Remove the 2 bolts and separate the No. 3 parking brake cable assembly from the backing plate.



(b) Using needle-nose pliers, remove the clip from the No. 3 parking brake cable assembly.

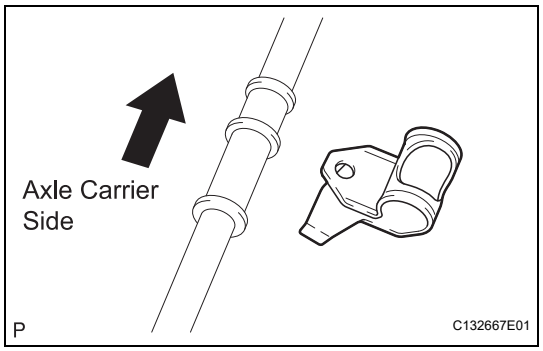


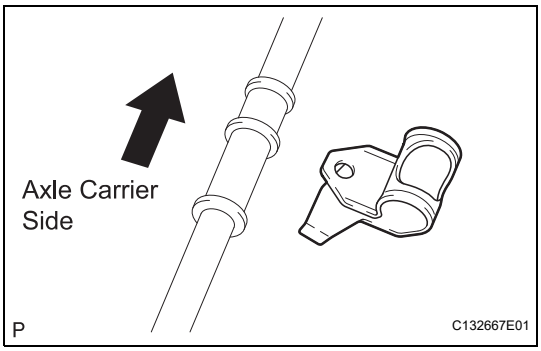
(c) Remove 3 bolts (A), bolt (B), and nut (C), and disengage each claw.



(d) Remove the No. 3 parking brake cable assembly from the body.

(e) Remove the parking brake cable clamp.





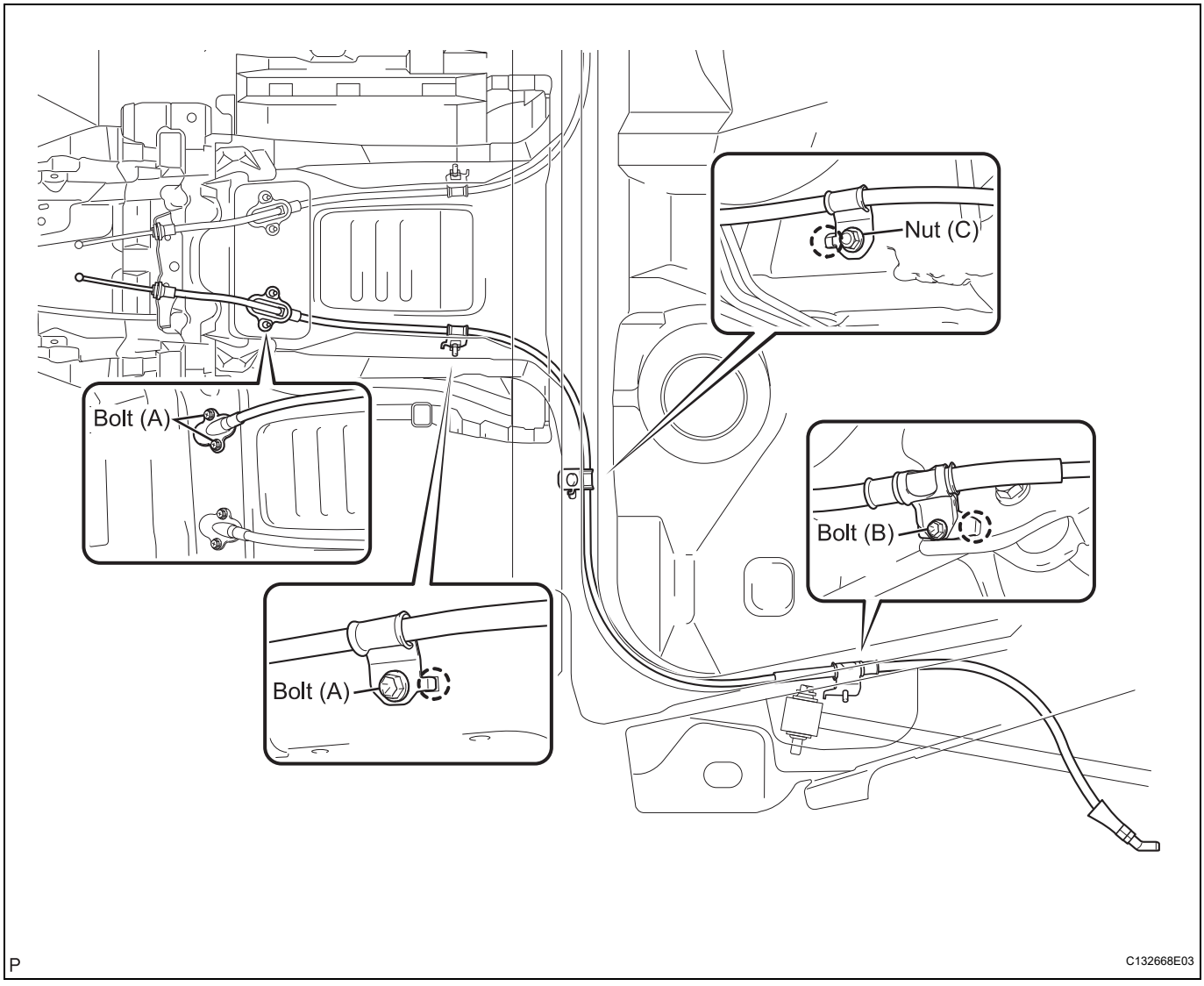
INSTALLATION

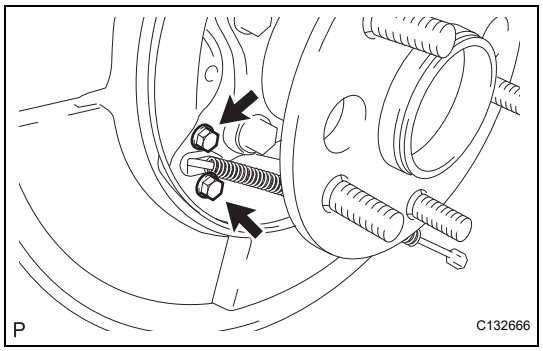
1. INSTALL NO. 3 PARKING BRAKE CABLE ASSEMBLY

(a) Install the parking brake cable clamp to the No. 3 parking brake cable assembly.

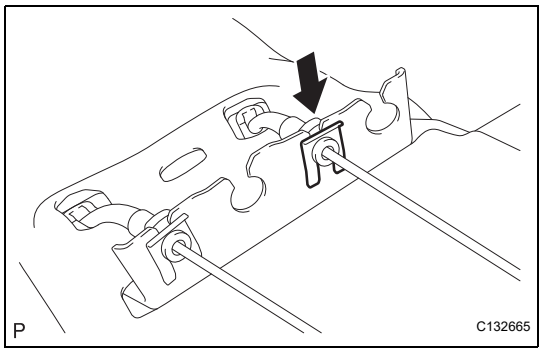
(b) Install the No. 3 parking brake cable assembly with 3 bolts (A), bolt (B) and nut (C), and engage each claw.

Torque: Bolt (A)
8.5 N*m (87 kgf*cm, 75 in.*lbf)
Bolt (B) and Nut (C)
6.0 N*m (61 kgf*cm, 53 in.*lbf)



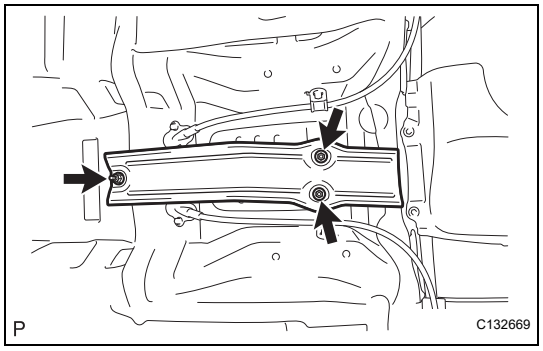


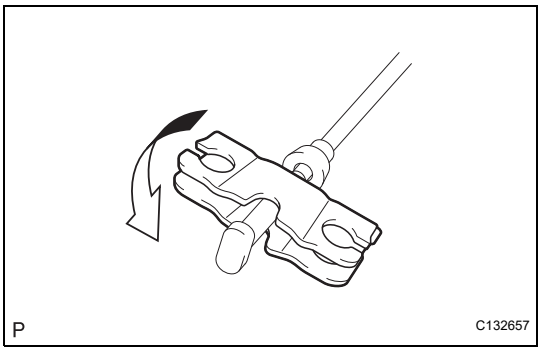
(c) Install the No. 3 parking brake cable assembly to the backing plate with the 2 bolts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)



(d) Using a brass bar and a hammer, install the clip to the No. 3 parking brake cable assembly.

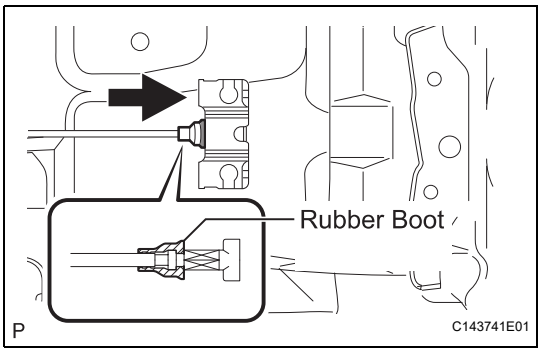
2. **INSTALL NO. 2 PARKING BRAKE SHOE ASSEMBLY (See page PB-38)**
3. **INSTALL PARKING BRAKE SHOE ADJUSTING SCREW SET (See page PB-39)**
4. **INSTALL NO. 1 PARKING BRAKE SHOE ASSEMBLY (See page PB-39)**
5. **INSTALL PARKING BRAKE SHOE STRUT (See page PB-39)**
6. **INSTALL PARKING BRAKE SHOE RETURN TENSION NO. 1 SPRING (See page PB-39)**
7. **CHECK PARKING BRAKE INSTALLATION (See page PB-40)**
8. **INSTALL REAR DISC (See page PB-40)**
9. **ADJUST PARKING BRAKE SHOE CLEARANCE (See page PB-1)**
10. **INSTALL REAR DISC BRAKE CALIPER ASSEMBLY (See page PB-40)**
11. **INSTALL REAR WHEEL**
12. **INSTALL NO. 2 FRONT FLOOR HEAT LOWER INSULATOR**
    (a) Install the No. 2 front floor heat lower insulator with the 3 nuts.
    Torque: 4.9 N*m (50 kgf*cm, 43 in.*lbf)
13. **INSTALL CENTER EXHAUST PIPE ASSEMBLY (See page EX-4)**
14. **INSTALL FLOOR NO. 1 UNDER COVER (See page SP-46)**
15. **INSTALL FLOOR NO. 2 UNDER COVER (See page SP-46)**



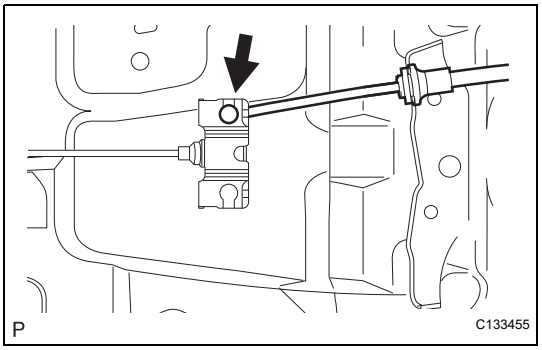


16. INSTALL NO. 4 PARKING BRAKE CABLE ASSEMBLY

(a) Install the No. 4 parking brake cable assembly to the parking brake equalizer.

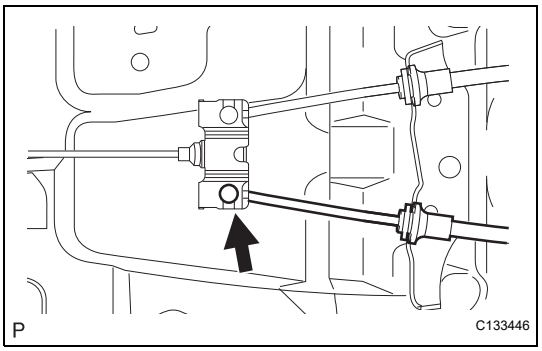


(b) Slide the rubber boot back as shown in the illustration.



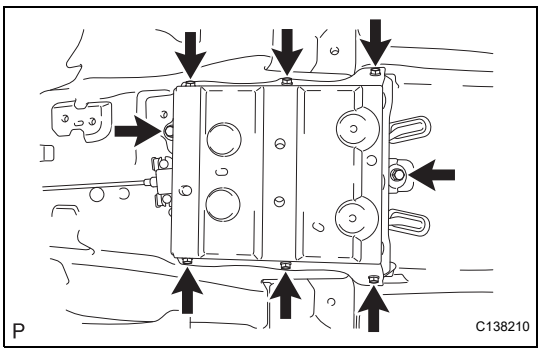
17. CONNECT NO. 2 PARKING BRAKE CABLE ASSEMBLY

(a) Connect the No. 2 parking brake cable assembly to the parking brake equalizer.



18. CONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY

(a) Connect the No. 3 parking brake cable assembly to the parking brake equalizer.

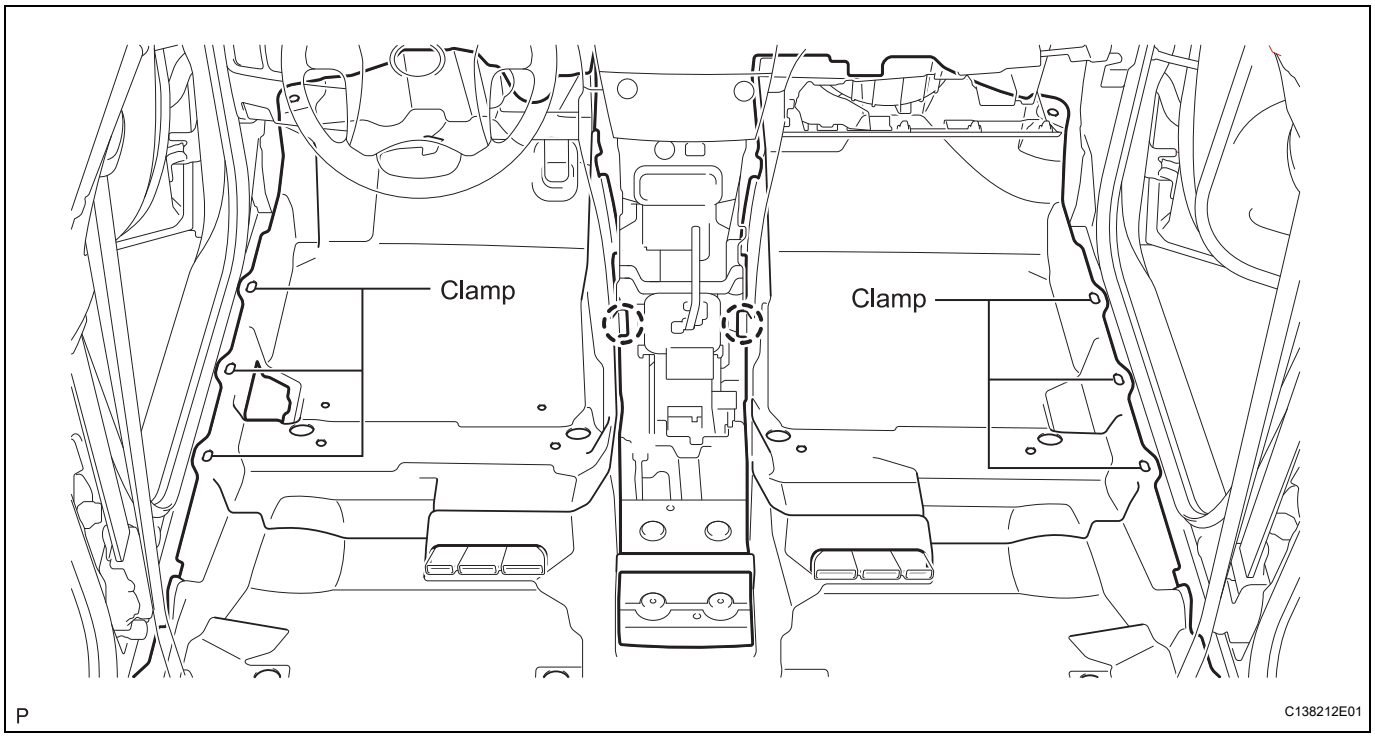


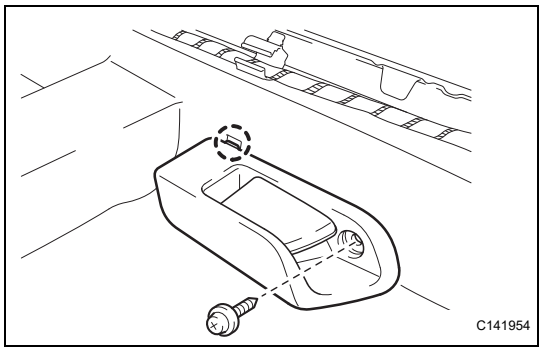
19. INSTALL CROSS MEMBER FLOOR NO. 4 REINFORCEMENT SUB-ASSEMBLY

(a) Install the cross member floor No. 4 reinforcement sub-assembly with the 8 bolts.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)

PB

20. **INSTALL FRONT FLOOR CARPET ASSEMBLY**
    (a) Engage the 6 clamps and 2 claws and install the front floor carpet assembly.





21. **INSTALL LUGGAGE DOOR LOCK OPENER ASSEMBLY**
    (a) Engage the claw and install the luggage door lock opener assembly with the screw.
22. **INSTALL LOWER CENTER PILLAR GARNISH LH (See page IR-40)**
23. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-43)**
24. **INSTALL REAR DOOR SCUFF PLATE LH (See page IR-43)**
25. **INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-41)**
26. **INSTALL LOWER CENTER PILLAR GARNISH RH (See page IR-41)**
27. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-43)**
28. **INSTALL REAR DOOR SCUFF PLATE RH (See page IR-43)**
29. **INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-42)**
30. **INSTALL NO. 1 PARKING BRAKE CABLE ASSEMBLY (See page PB-11)**

31. **INSTALL PARKING BRAKE PEDAL ASSEMBLY**
HINT:
Refer to the procedures up to "INSTALL PARKING BRAKE PEDAL". (See page PB-12)

32. **INSTALL FRONT SEAT ASSEMBLY LH**
HINT:
Refer to the procedures up to "INSTALL FRONT SEAT ASSEMBLY (for Power Seat)". (See page SE-38)

33. **INSTALL FRONT SEAT ASSEMBLY RH (for Manual Seat)**
HINT:
Refer to the procedures up to "INSTALL FRONT SEAT ASSEMBLY (for Manual Seat)". (See page SE-23)

34. **INSTALL FRONT SEAT ASSEMBLY RH (for Power Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

REASSEMBLY

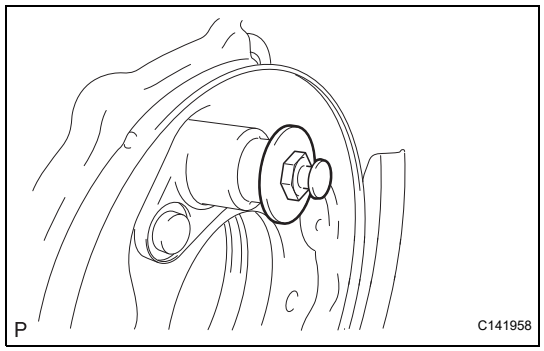
1. APPLY HIGH TEMPERATURE GREASE

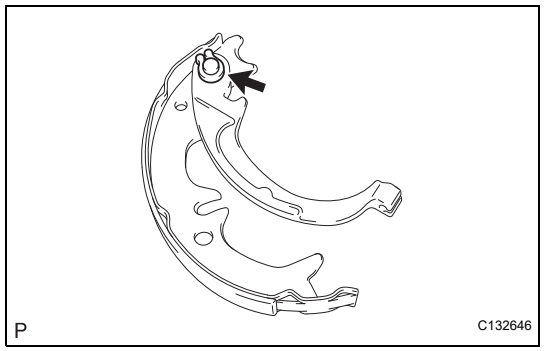
(a) Apply high temperature grease to the backing plate which makes contact with the shoe.

2. INSTALL PARKING BRAKE SHOE GUIDE PLATE

(a) Apply adhesive to the threads of the parking brake shoe guide plate set bolt.
Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

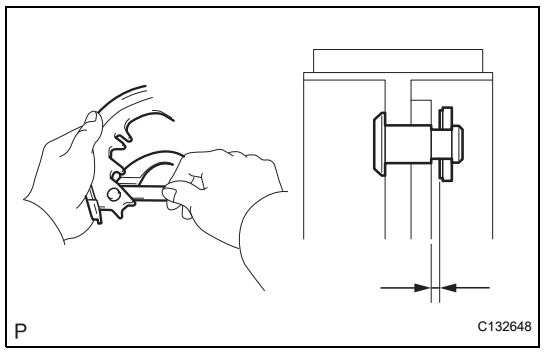
(b) Install the parking brake shoe guide plate with the parking brake shoe guide plate set bolt.
Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)





3. INSTALL PARKING BRAKE SHOE LEVER

(a) Install the parking brake shoe lever and shim to the No. 2 parking brake shoe assembly with a new C-washer.

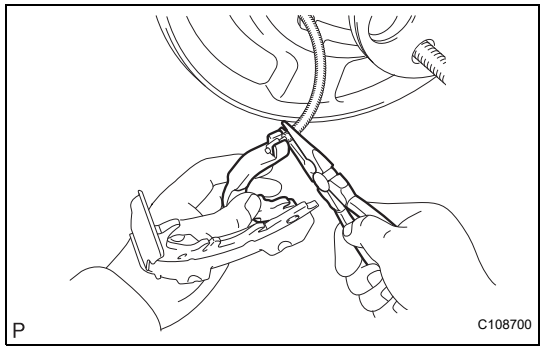


(b) Using a feeler gauge, measure the clearance between the No. 2 parking brake shoe assembly and parking brake shoe lever.
Standard clearance:
Less than 0.35 mm (0.014 in.)
If the clearance is not as specified, replace the shim with one of the correct size.

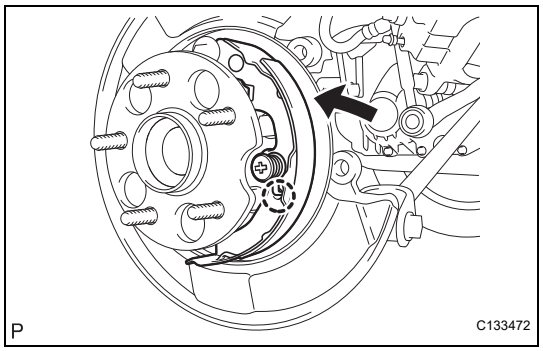
Shim Thickness	Shim Thickness
0.3 mm (0.012 in.)	0.9 mm (0.035 in.)
0.6 mm (0.024 in.)	-

4. INSTALL NO. 2 PARKING BRAKE SHOE ASSEMBLY

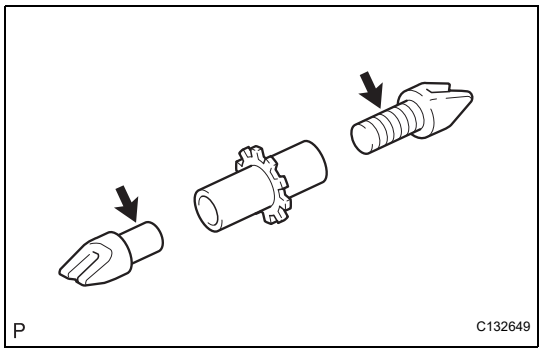
(a) Using needle-nose pliers, connect the No. 3 parking brake cable assembly to the parking brake shoe lever.



PB

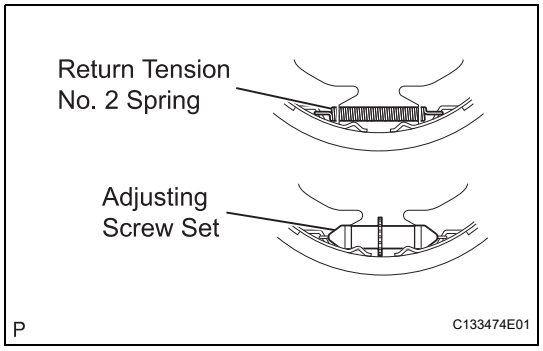


(b) Install the No. 2 parking brake shoe assembly with the parking brake shoe hold down spring No. 2 pin, the parking brake shoe hold down spring No. 2 cup, the parking brake shoe hold down spring and the parking brake shoe hold down spring No. 1 cup.
(c) Engage the claw of the parking brake shoe hold down spring No. 1 cup to the No. 2 parking brake shoe assembly.

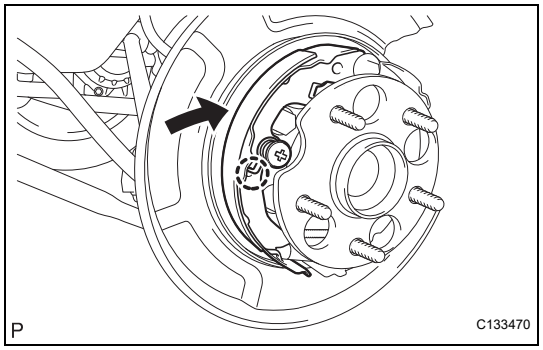


5. INSTALL PARKING BRAKE SHOE ADJUSTING SCREW SET

(a) Apply high temperature grease to the parking brake adjusting screw as shown in the illustration.



(b) Install the parking brake shoe return tension No. 2 spring to the No. 1 parking brake shoe assembly and the No. 2 parking brake shoe assembly.
(c) Install the parking brake shoe adjusting screw set to the No. 1 parking brake shoe assembly and the No. 2 parking brake shoe assembly.

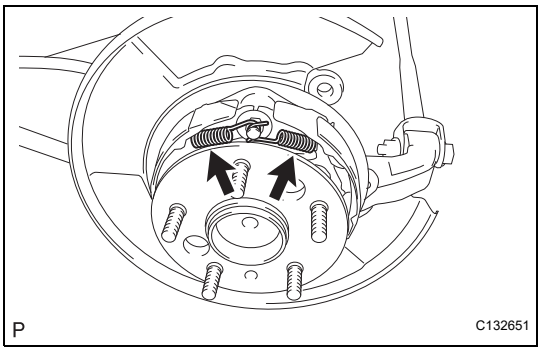


6. INSTALL NO. 1 PARKING BRAKE SHOE ASSEMBLY

(a) Install the No. 1 parking brake shoe assembly with the parking brake shoe hold down spring No. 1 pin, parking brake shoe hold down spring No. 2 cup, parking brake shoe hold down spring and parking brake shoe hold down spring No. 1 cup.
(b) Engage the claw of the parking brake shoe hold down spring No. 1 cup to the No. 1 parking brake shoe assembly.

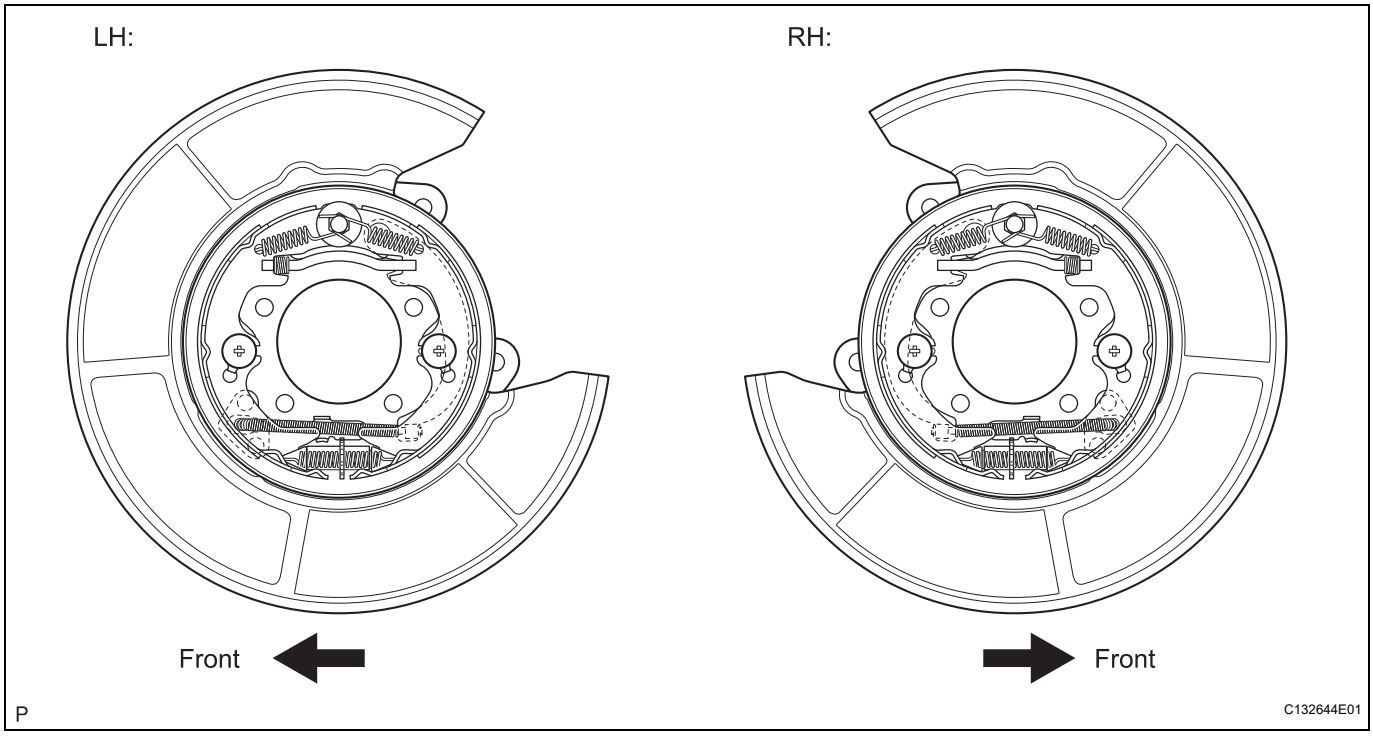
7. INSTALL PARKING BRAKE SHOE STRUT

(a) Attach the parking brake shoe strut and the parking brake shoe strut compression spring to the No. 1 parking brake shoe assembly and No. 2 parking brake shoe assembly.

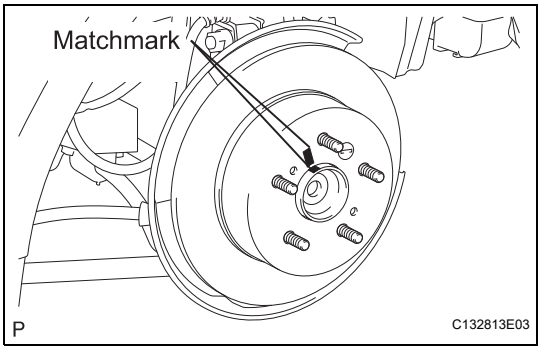


8. **INSTALL PARKING BRAKE SHOE RETURN TENSION NO. 1 SPRING**
   (a) Using needle-nose pliers, install the 2 parking brake shoe return tension No. 1 springs.
   HINT:
   First install the front side spring and then the rear side spring.

9. **CHECK PARKING BRAKE INSTALLATION**
   (a) Check that each part is installed properly.

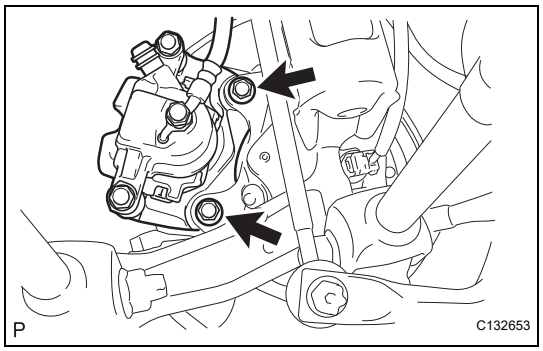


NOTICE:
There should be no oil or grease on the friction surface of the shoe lining and disc.



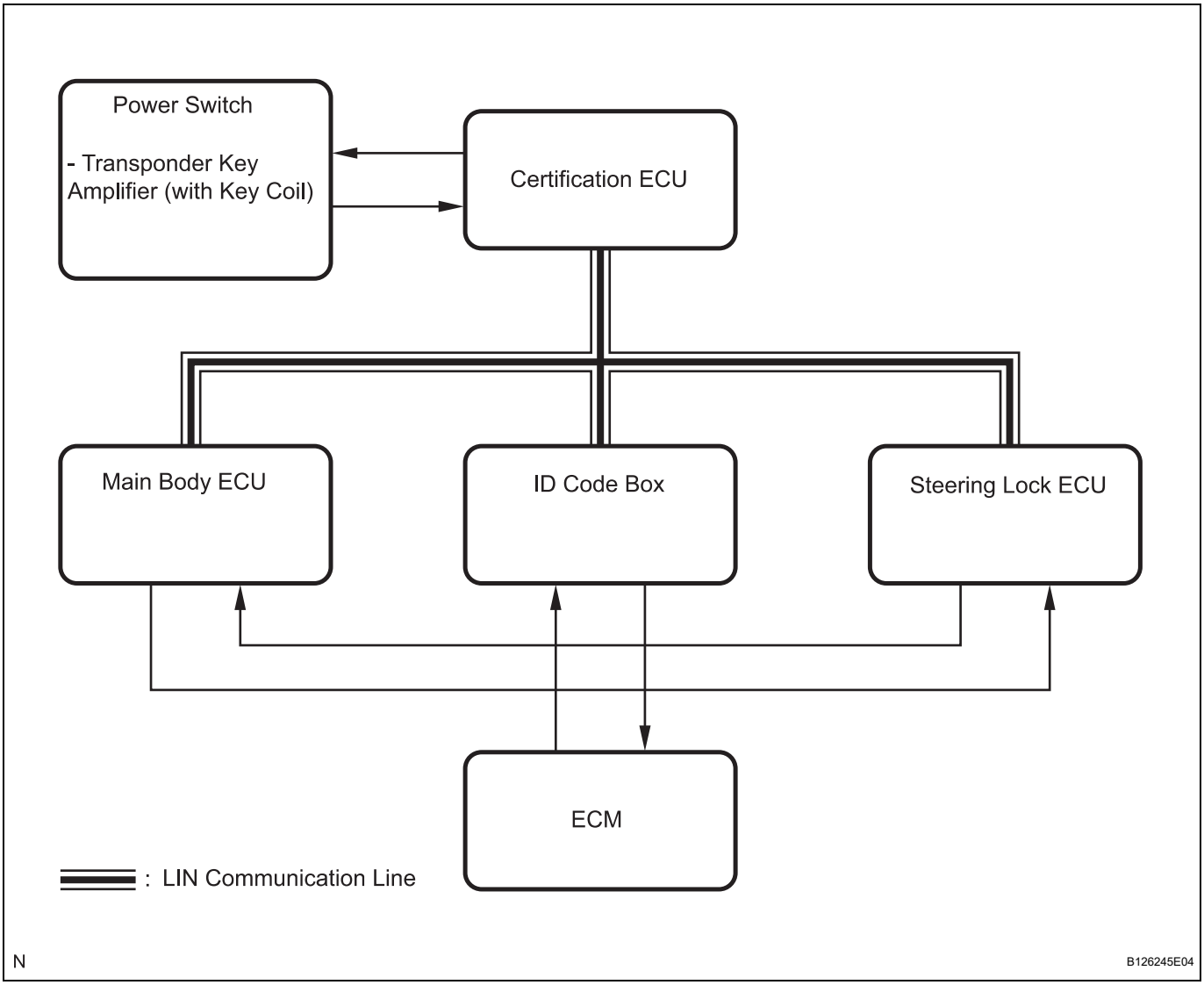
10. **INSTALL REAR DISC**
    (a) Align the matchmarks and install the rear disc.

11. **ADJUST PARKING BRAKE SHOE CLEARANCE (See page PB-1)**



12. **INSTALL REAR DISC BRAKE CALIPER ASSEMBLY**
    (a) Install the rear disc brake caliper assembly with the 2 bolts.
    Torque: 62 N*m (632 kgf*cm, 46 ft.*lbf)
13. **INSTALL REAR WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
14. **INSPECT PARKING BRAKE PEDAL TRAVEL (See page PB-1)**
15. **ADJUST PARKING BRAKE PEDAL TRAVEL (See page PB-1)**

SYSTEM DIAGRAM



Input and output signals of each ECU:

Transmitting ECU (transmitter)	Receiving ECU	Signals	Communication Method
Main Body ECU	Steering Lock ECU	Power supply status (to steering lock motor)	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Sleep available status	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Lock / Unlock sensor status	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Steering lock status	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Motor control status	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Diagnostic response status	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Lock / Unlock sensor malfunction	LIN

Transmitting ECU (transmitter)	Receiving ECU	Signals	Communication Method
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Power supply malfunction (to steering lock motor)	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Motor driver malfunction	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Lock bar (stuck) status	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Push start status	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Lock / Unlock relay drive status	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Engine start control status	LIN

SYSTEM DESCRIPTION

1. DESCRIPTION

(a) The steering lock system locks or unlocks the steering lock by activating the steering lock bar with a motor. The steering lock ECU activates the motor based on signals from the certification ECU and main body ECU.

(b) A LIN (Local Interconnect Network) is used for communication between different ECUs in this system.

2. FUNCTIONS OF COMPONENTS

(a) The steering lock ECU controls the system based on information from the following components.

Item	Function
Steering lock actuator assembly	Consists of a motor, lock bar, lock and unlock position sensors, etc. Activated by the steering lock ECU.
Steering lock ECU	Included in the steering lock actuator assembly. This ECU activates the steering lock motor based on permission signals from the main body ECU and certification ECU. Detects steering lock or unlock state and transmits this status to other ECUs.
Main body ECU	Permits the steering lock ECU to supply power to activate the motor. The main body ECU and certification ECU permit engine start after receiving an unlock signal from the steering lock ECU.
Certification ECU	Orders the steering lock ECU to lock / unlock the steering. The main body ECU and certification ECU permit engine start after receiving an unlock signal from the steering lock ECU.
IG2 relay	Controlled by the main body ECU. This ECU sends IG signals to the steering lock ECU.

HOW TO PROCEED WITH TROUBLESHOOTING

*: Use the intelligent tester.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CHECK AND CLEAR DTCS

NEXT

3	PROBLEM SYMPTOM CONFIRMATION

- SYMPTOM DOES NOT OCCUR (Go to step 4)
- SYMPTOM OCCURS (Go to step 5)

4	SYMPTOM SIMULATION

NEXT

5	CHECK CAN COMMUNICATION SYSTEM

HINT:
Check that there are no problems in the CAN communication system before troubleshooting the steering lock system.

NEXT

6	DTC CHECK

- DTC IS NOT OUTPUT (Go to step 7)
- DTC IS OUTPUT (Go to step 8)

7	PROBLEM SYMPTOMS TABLE

- Go to step 9

8	**DTC CHART**

NEXT

9	**CIRCUIT INSPECTION**

NEXT

10	**PROBLEM IDENTIFICATION**

NEXT

11	**REPAIR OR REPLACEMENT**

NEXT

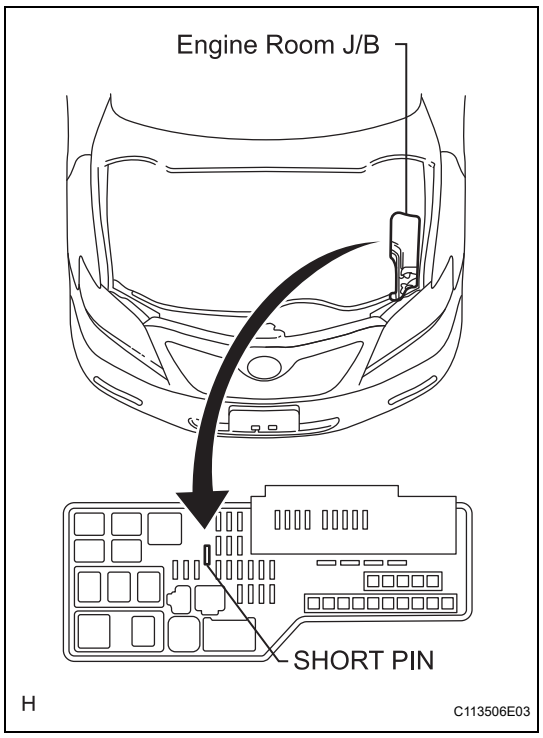
12	**CONFIRMATION TEST**

NEXT

END

INITIALIZATION

HINT:
In vehicles equipped with the smart key system function, the starting function may not operate after recharging or while jump-starting a discharged battery. This condition is most common if the battery voltage drops below 9 V. The following procedure has been developed to address this condition.



1. INITIALIZATION PROCEDURE

(a) Confirm that the short pin is installed.
HINT:
If the short pin is not installed, install it at this time.
(b) Move the shift lever to the P position.
(c) Turn the power switch off.
(d) Open the driver's door.
HINT:
Opening the driver's door will start an initialization process between the steering lock ECU and the engine room J/B.
(e) Depress the brake pedal.
(f) Press the "START STOP" switch.

PROBLEM SYMPTOMS TABLE

Inspect the suspected areas in numerical order by referring to the corresponding pages when any of the following symptoms occurs:

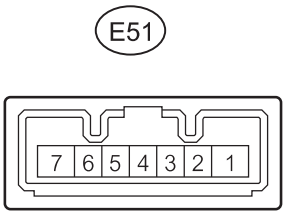
ELECTRIC STEERING LOCK FUNCTION:

Symptom	Suspected Area	See page
Steering wheel cannot be unlocked (the engine cannot be started).	1. Initialization	SR-9
	2. Check for DTCs in the smart key system.	ST-23
	3. Check for DTCs in the engine immobiliser system.	EI-25
	4. Check that the LCK/UNLCK REC item in the DATA LIST of the certification ECU displays YES within 10 seconds after starting the engine. (If it displays NO, see "No steering unlock command" in this table.)	SR-14
	5. Check the input signal from the IGE terminal of the steering lock ECU.	SR-24
	6. Steering lock ECU power source circuit.	SR-30
	7. Replace the steering lock ECU.	SR-39
Steering wheel cannot be unlocked (no steering unlock command).	1. Check that the S CODE CHK item in the DATA LIST of the certification ECU displays OK. (If it displays NG, replace the ID code box.)	-
	2. Check that the L CODE CHK item in the DATA LIST of the certification ECU displays OK. (If it displays NG, replace the ID code box.)	-
	3. Replace the certification ECU.	-
Steering wheel cannot be locked.	1. Check for DTCs in the smart key system.	ST-23
	2. Check for DTCs in the engine immobiliser system.	EI-25
	3. With the power switch off and the shift in the P position, open and close the drivers door. After that, check that the LCK/UNLCK REC item in the DATA LIST of the certification ECU displays YES within 10 seconds. (If it displays NO, see "No steering lock command" in this table.)	SR-14
	4. Check the input signal from the IGE terminal of the steering lock ECU.	SR-24
	5. Steering lock ECU power source circuit.	SR-30
	6. Replace the steering lock ECU.	SR-39
Steering wheel cannot be locked (no steering lock command).	1. Courtesy light switch circuit	LI-41
	2. Check that the S CODE CHK item in the DATA LIST of the certification ECU displays OK. (If it displays NG, replace the ID code box.)	-
	3. Check that the L CODE CHK item in the DATA LIST of the certification ECU displays OK. (If it displays NG, replace the ID code box.)	-
	4. Replace the certification ECU.	-

SMART KEY SYSTEM FUNCTION:

Symptom	Suspected Area	See page
Engine does not start.	1. Initialization	SR-9
	2. Check for DTCs in the smart key system.	ST-23
	3. Check for DTCs in the engine immobiliser system.	EI-25
	4. Check that the power switch is turned on (IG).	-
	5. Check cranking operation. (If cranking operation is possible, see "Engine does not start due to the engine immobiliser" in this table.)	-
	6. Check SHIFT P SIG in the DATA LIST of the main bofy ECU and confirm that the shift signal is normal.	-
	7. Check whether the steering wheel is locked or unlocked. (If it is locked, see "Steering wheel cannot be unlocked" in the steering lock function table.)	-
	8. Check the output from the SLP terminal of the steering lock ECU.	SR-28
	9. Check the output signal from the ST SW of the certification ECU (DTC B2275).	ST-42
	10. Replace the main body ECU.	-
Engine does not start due to the engine immobiliser.	1. Check that the L CODE CHK item in the DATA LIST of the certification ECU displays OK. (If it displays NG, replace the ID code box.)	-
	2. Check that the START RQST item in the DATA LIST of the certification ECU displays YES. (If it displays NO, replace the certification ECU.)	-
	3. Check that the S CODE CHK item in the DATA LIST of the certification ECU displays OK. (If it displays NG, replace the ID code box.)	-
	4. Replace the ID code box.	-

TERMINALS OF ECU



H

C106482E05

1. STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU)

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
E51-1 (GND) - Body ground	W-B - Body ground	Ground	Always	Below 1 V
E51-2 (SGND) - Body ground	W-B - Body ground	Signal ground	Always	Below 1 V
E51-3 (IGE) - E51-1 (GND)	BR - W-B	Power source for driving motor	• Motor is in operation • Motor is not in operation	• Below 1 V • 10 to 12 V
E51-4 (SLP1) - E51-2 (SGND)	P - W-B	Unlock position sensor output signal	• Steering is locked • Steering lock is released	• 10 to 14 V • Below 1 V
E51-5 (LIN) - E51-2 (SGND)	O - W-B	LIN communication bus	Power switch on (IG)	Pulse generation
E51-6 (IG2) - E51-1 (GND)	B - W-B	IG signal input	Power switch on (IG)	10 to 14 V
E51-7 (B) - E51-1 (GND)	P - W-B	Power source	Always	10 to 14 V

DIAGNOSIS SYSTEM

1. DESCRIPTION

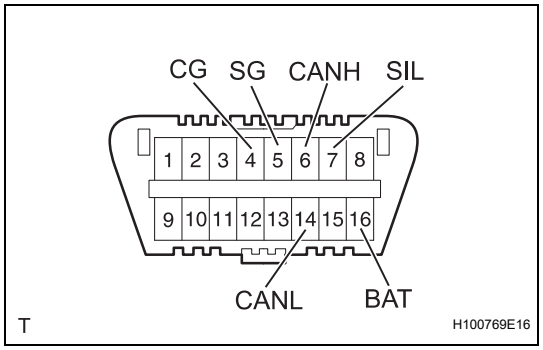
(a) DIAGNOSTIC SYSTEM

When troubleshooting a vehicle with a diagnostic system, the only difference from the usual troubleshooting procedure is connecting the intelligent tester to the vehicle and reading various data output from the vehicle's steering lock ECU. The steering lock ECU records DTCs when the computer detects a malfunction in the computer itself or in system circuits.

To check the DTCs, connect the intelligent tester to the DLC3 on the vehicle. The intelligent tester enables the DTCs to be cleared, the indicators to be activated, and the DATA LIST to be checked.

(b) The steering lock ECU diagnosis information cannot be read directly from the steering lock ECU by the tester. The diagnosis information from the steering lock ECU is transmitted to the tester via the certification ECU to the tester using the controller area network (CAN).

2. CHECK DLC3



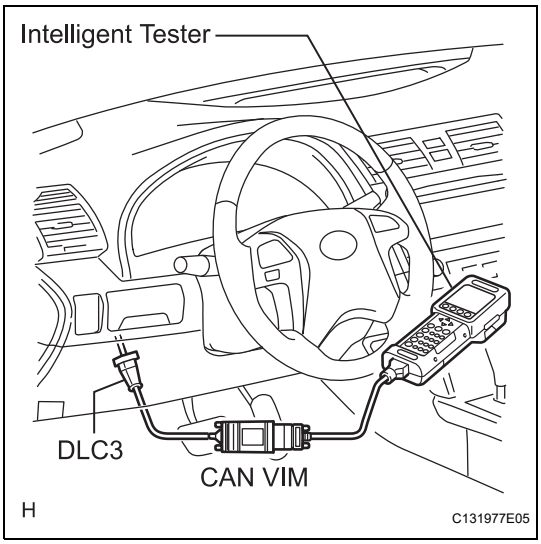
(a) The certification ECU uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	CAN bus line	Power Switch off*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Power Switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Power Switch off*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Power Switch off*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Power Switch off*	6 kΩ or higher

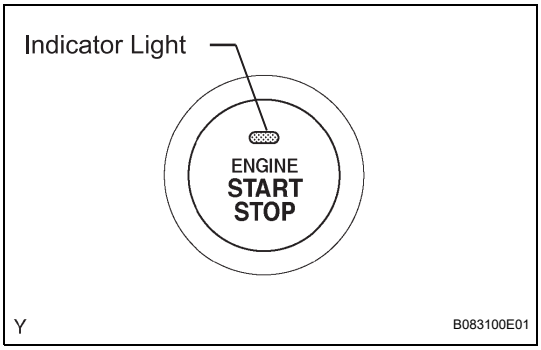
NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.



(b) Connect the cable of the intelligent tester to the DLC3, turn the power switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.
- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.



3. WARNING FUNCTION OF POWER SWITCH INDICATOR

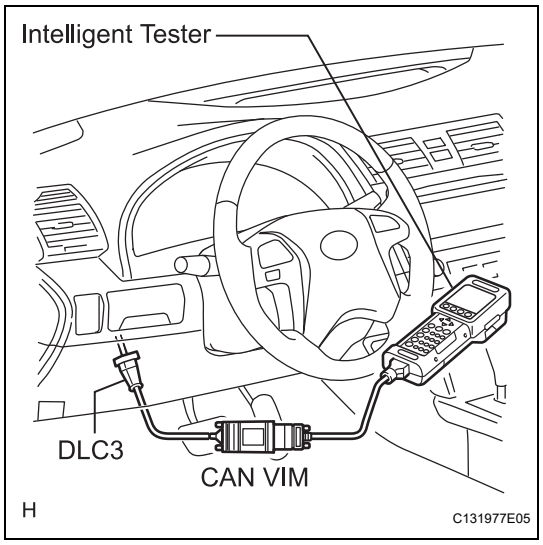
(a) The steering lock ECU blinks the LED indicator of the power switch when any of the following problems occurs in the system:

Detection Item	Indicator Light Blink Pattern	Indication Status	Countermeasure
Steering lock is still not released	• Blinks green at 1-second intervals • Goes off 15 seconds after blinking starts	The motor operates to release the steering lock, but the steering lock cannot be released (e.g. the lock bar is stuck in the steering column).	Push the power switch while turning the steering wheel left or right.
Malfunction in smart key system	• Blinks amber at 2-second intervals • Goes off 15 seconds after the power switch is turned off while blinking	• There is a short in the devices activating the motor. • There is a problem in the steering lock ECU or main body ECU.	Troubleshoot by following "HOW TO PROCEED WITH TROUBLESHOOTING" (See page SR-7).

4. WARNING FUNCTION OF COMBINATION METER

(a) The steering lock ECU displays a warning on the combination meter when any of the following problems occurs in the system.

Detection Item	Display	Indication Status	Countermeasure
Steering lock is still not released	"S/T is not Unlocked" • Goes off 15 seconds after blinking starts	The motor operates to release the steering lock, but the steering lock cannot be released (e.g. the lock bar is stuck in the steering column).	Push the power switch while turning the steering wheel left or right.
Malfunction in push start system	"Check S/T Lock" • Goes off 15 seconds after the power switch is turned off while blinking	• There is a short in the devices activating the motor. • There is a problem in the steering lock ECU or main body ECU.	Troubleshoot by following "HOW TO PROCEED WITH TROUBLESHOOTING" (See page SR-7).



DTC CHECK / CLEAR

1. CHECK FOR DTCS

(a) Prepare the intelligent tester.

(b) Connect the intelligent tester to the DLC3 at the lower part of the instrument panel.

(c) Turn the power switch on (IG) and turn the intelligent tester on.

(d) Use the intelligent tester to check for DTCs, and note or print the result (see the operator's manual for operating instructions).

(e) Confirm the details of the DTCs (See page SR-16).

2. CLEAR DTCS

(a) Operate the intelligent tester to clear the DTCs (see the operator's manual for operating instructions).

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

By accessing the DATA LIST displayed on the intelligent tester, it is possible to perform such functions as reading the values of switches and sensors without removing any parts. Reading the DATA LIST is the first step in troubleshooting and is one method to save labor time.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester on.
(c) Operate the intelligent tester according to the steps on the display and select DATA LIST.

SMART:

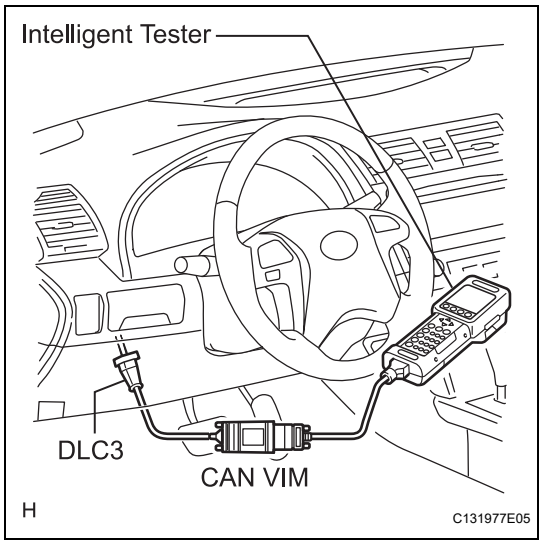
Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
SLCK SLEEP COND	Steering lock ECU sleep condition / YES or NO	YES: Steering lock ECU sleep mode can be entered NO: Steering lock ECU sleep mode cannot be entered	-
SLCK START COND	Steering lock ECU start signal / YES or NO	YES: Steering lock ECU sent a start signal NO: Steering lock ECU did not send a start signal	-
ENG START COND	Engine start condition / OK or NG	OK: Engine is allowed to start NG: Engine is not allowed to start	-
SENSOR VALUE	Sensor malfunction / NG (PAST) or OK	NG (PAST): Sensor malfunction OK: No malfunction	-
PWR SUPPLY SHRT	Short in ECU / NG (PAST) or OK	NG (PAST): Short in ECU OK: No malfunction	-
PWR SUPPLY OPEN	Open in ECU / NG (PAST) or OK	NG (PAST): Open in ECU OK: No malfunction	-
MTR DRIVER SHRT	Short in driver ECU / NG (PAST) or OK	NG (PAST): Short in driver ECU OK: No malfunction	-
MTR DRIVER OPEN	Open in driver ECU / NG (PAST) or OK	NG (PAST): Open in driver ECU OK: No malfunction	-
LCK/UNLCK REC	Steering lock command reception record / YES or NO	YES: Steering lock / unlock signal received NO: Steering lock / unlock signal no received	-
LCK BAR STUCK	Lock bar stuck malfunction / NG (PAST) or OK	NG (PAST): Lock bar stuck malfunction OK: No malfunction	-
PUSH START ERR	Push button start function malfunction / NG (PAST) or OK	NG (PAST): Malfunction in push button start OK: No malfunction	-
IG2	IG2 voltage / ON or OFF	ON: 10 to 14 V OFF: Below 1 V	-
IG (LIN)	LIN bus IG status / ON or OFF	ON: LIN bus IG ON status OFF: LIN bus IG OFF status	-
STEERING LOCK	Steering lock condition / Set or Unset	Set: Steering lock is set Unset: Steering lock is not set	This status changes depending on the state of some sensors.
STEERING UNLOCK	Steering unlock condition / Set or Unset	Set: Steering unlock is set Unset: Steering unlock is not set	This status changes depending on the state of some sensors.

2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST is one of the methods to save labor time. It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester on.
(c) Following the display on the intelligent tester, perform the ACTIVE TEST.



SMART:

Tester Display	Test Part	Control Range	Diagnostic Note
SECURITY INDIC	Security Indicator	ON or OFF	-

DIAGNOSTIC TROUBLE CODE CHART

If a trouble code is displayed during the DTC check, check the parts listed for that code in the table below and proceed to the appropriate page.
HINT:
The steering lock ECU does not store DTCs regarding the past problems.

ELECTRIC STEERING LOCK:

DTC No.	Detection Item	Trouble Area	See page
B2781	Open / Short in Steering Lock ECU	Steering lock actuator assembly (Steering lock ECU)	SR-17
B2782	Power Source Control ECU Malfunction	1. Wire harness 2. Steering lock actuator assembly (Steering lock ECU) 3. Main body ECU	SR-18
B2788	IG2 Signal Malfunction	1. IG2 relay 2. Wire harness 3. Main body ECU 4. Steering lock actuator assembly (Steering lock ECU)	SR-21

DTC	B2781	Open / Short in Steering Lock ECU

DESCRIPTION

If the steering lock ECU determines that there is a malfunction inside the ECU, it outputs this DTC. The steering lock ECU diagnosis information cannot be read directly from the steering lock ECU by the tester. The diagnosis information from the steering lock ECU is transmitted to the tester via the certification ECU to the tester using the controller area network (CAN).

DTC No.	DTC Detecting Condition	Trouble Area
B2781	• Steering lock motor drive circuit is defective. • Both lock and unlock position sensors detect "ON".	Steering lock actuator assembly (Steering lock ECU)

INSPECTION PROCEDURE

1	REPLACE STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU)

HINT:
The steering lock ECU and steering lock actuator assembly are supplied as a unit.

(a) Replace the steering lock actuator assembly (See page SR-39).

NEXT

END

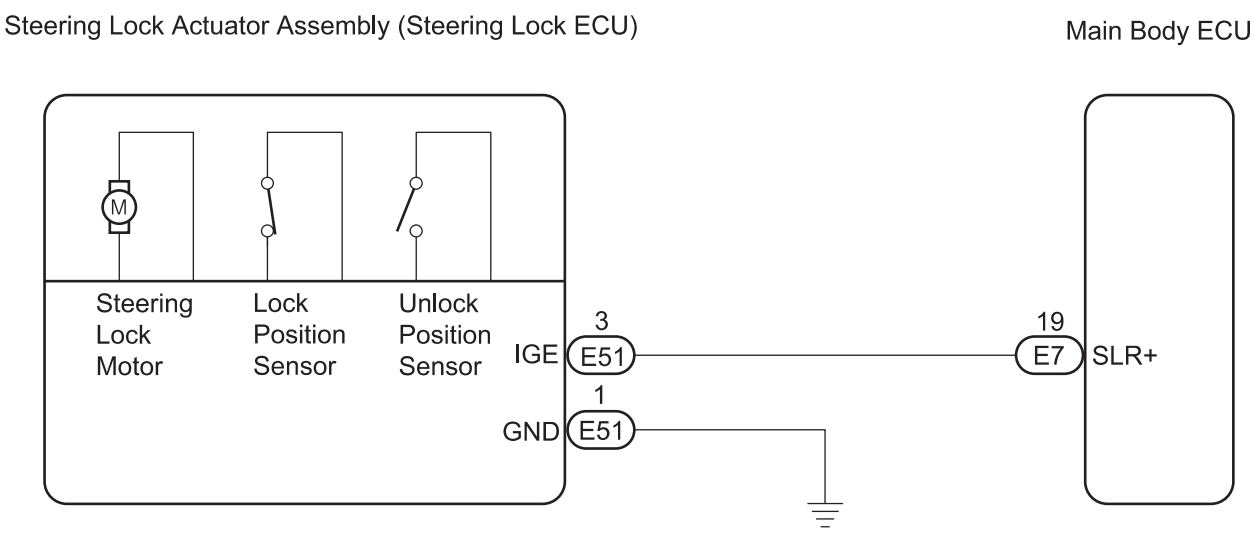
DTC	B2782	Power Source Control ECU Malfunction

DESCRIPTION

The main body ECU (*) controls the power supply to activate the steering lock motor. This prevents the steering from being locked while the vehicle is moving.
HINT:
*: The power source control ECU is not a physical part. This code refers to the power source control function performed by the main body ECU.

DTC No.	DTC Detecting Condition	Trouble Area
B2782	Steering lock motor drive control circuit is defective.	• Wire harness • Steering lock actuator assembly (Steering lock ECU) • Main body ECU

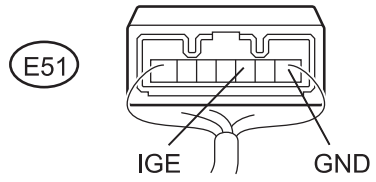
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU)

Steering Lock Actuator Assembly:



(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E51-3 (IGE) - E51-1 (GND)	**The specified condition should be checked after performing the following:** **1. Power switch off** **2. Turn the power switch on (ACC or IG)**	• **Motor activated: Below 1 V** • **Motor not activated: 10 to 12 V**

SR

Tester Connection	Condition	Specified Condition
E51-3 (IGE) - E51-1 (GND)	The specified condition should be checked after performing the following: 1. Move the shift lever to the P position 2. Turn the power switch off 3. Open the driver's door	• Motor activated: Below 1 V • Motor not activated: 10 to 12 V

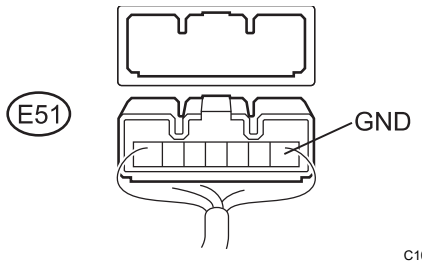
HINT:
The steering lock ECU and steering lock actuator assembly are supplied as a unit.

OK → **REPLACE STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU)**

NG

2 CHECK HARNESS AND CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - BODY GROUND)

Steering Lock Actuator Assembly:



(a) Disconnect the E51 connector from the steering lock actuator assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

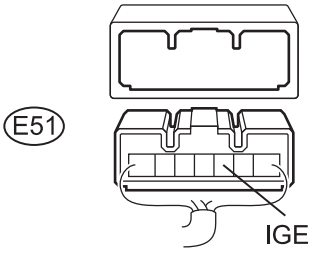
Tester Connection	Condition	Specified Condition
E51-1 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

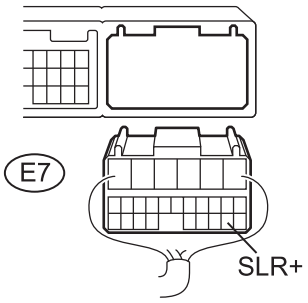
OK

3	CHECK HARNESS AND CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - MAIN BODY ECU)

Steering Lock Actuator Assembly:



Main Body ECU:



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(a) Disconnect the E7 connector from the main body ECU.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E51-3 (IGE) - E7-19 (SLR+)	Always	Below 1 Ω
E51-3 (IGE) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MAIN BODY ECU

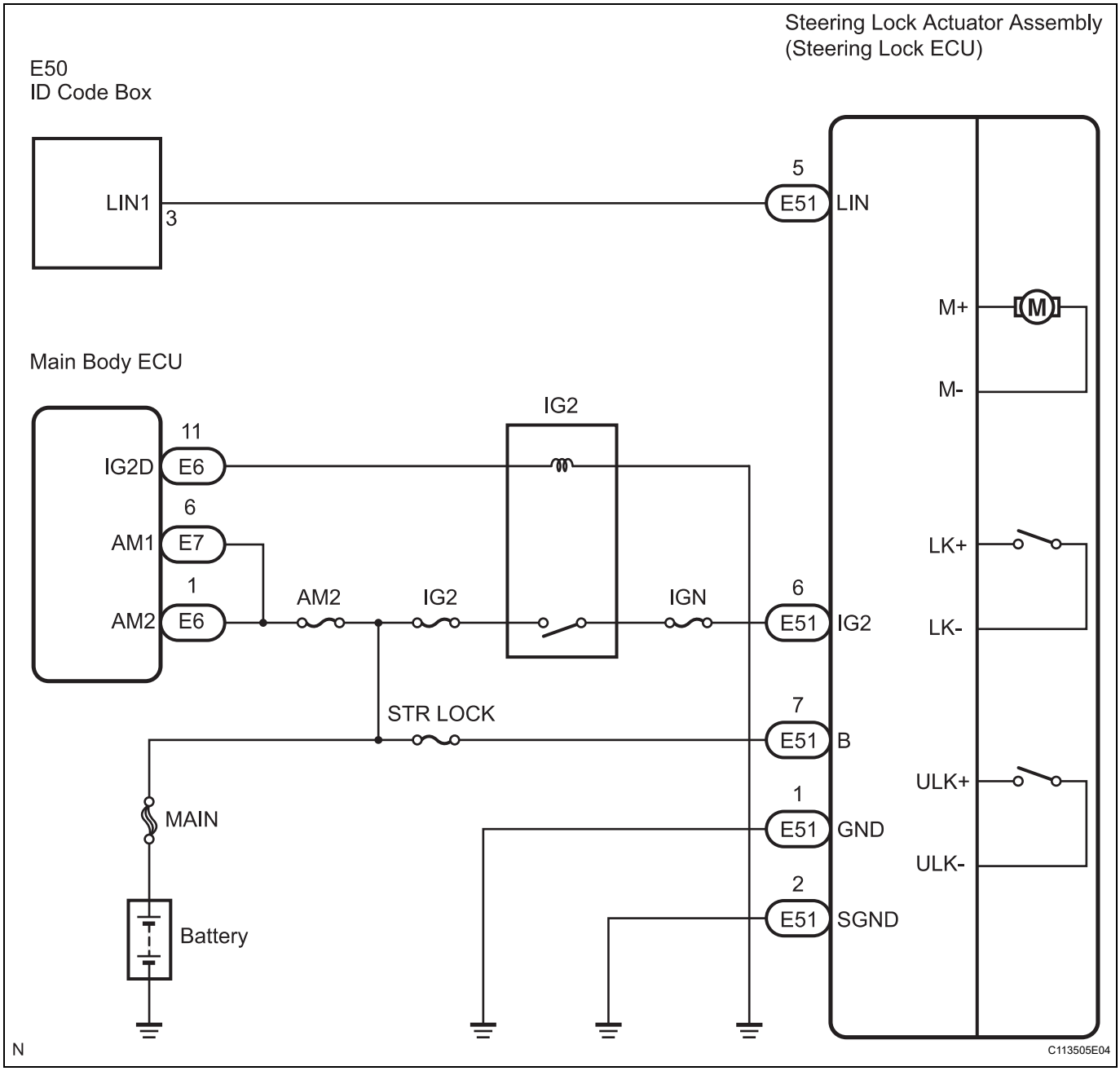
DTC	B2788	IG2 Signal Malfunction

DESCRIPTION

The steering lock ECU receives power from the IG2 relay. When the digital signal from the certification ECU and the voltage from the IG2 relay are received by the steering lock ECU, the steering will be unlocked. The steering lock ECU will not lock the steering when power from the IG2 relay is present (this prevents the steering from being locked while the vehicle is moving).

DTC No.	DTC Detecting Condition	Trouble Area
B2788	Different information is obtained from IG2 signals received directly from the IG2 circuit, and from IG2 signals sent via LIN communication for a period of 1 second.	• IG2 relay • Wire harness • Main body ECU • Steering lock actuator assembly (Steering lock ECU)

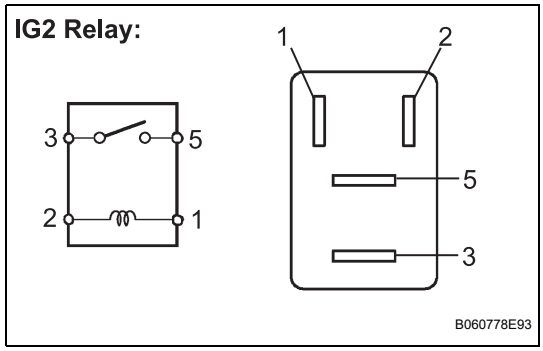
WIRING DIAGRAM



SR

INSPECTION PROCEDURE

1 INSPECT IG2 RELAY



(a) Remove the IG2 relay from the engine room R/B.
(b) Measure the resistance according to the value(s) in the table below.

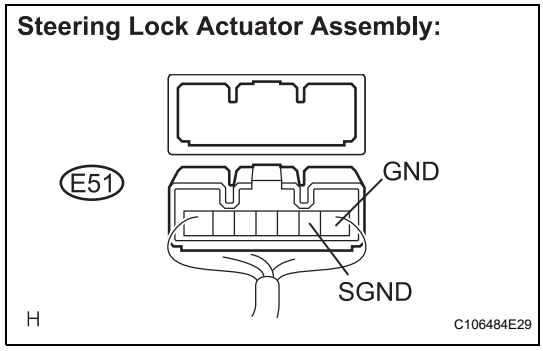
Standard resistance

Tester Connection	Condition	Specified Condition
3 - 5	Always	10 kΩ or higher
3 - 5	When battery voltage is applied to terminals 1 and 2	Below 1 Ω

NG → **REPLACE IG2 RELAY**

OK

2 CHECK HARNESS AND CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - BODY GROUND)



(a) Disconnect the E51 connector from the steering lock actuator assembly.
(b) Measure the resistance according to the value(s) in the table below.

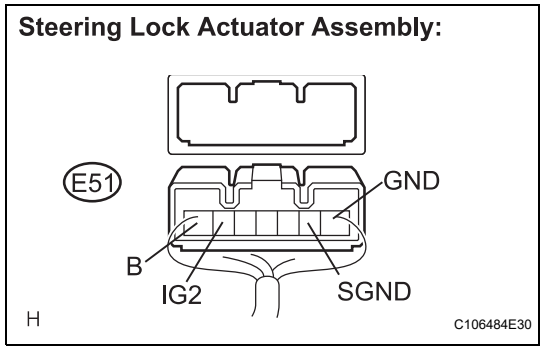
Standard resistance

Tester Connection	Condition	Specified Condition
E51-1 (GND) - Body ground	Always	Below 1 Ω
E51-2 (SGND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 CHECK HARNESS AND CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - BATTERY)



(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E51-6 (IG2) - E51-1 (GND)	Power switch on (IG)	10 to 14 V
E51-6 (IG2) - E51-2 (SGND)	Power switch on (IG)	10 to 14 V

(b) Measure the resistance according to the value(s) in the table below.

SR

Standard resistance

Tester Connection	Condition	Specified Condition
*E51-6 (IG2) - E51-7 (B)	Power switch off	10 kΩ or higher

*: This measurement is performed with the power switch off to check for a short between IG2 and battery voltage.

OK → **REPLACE STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU)**

NG

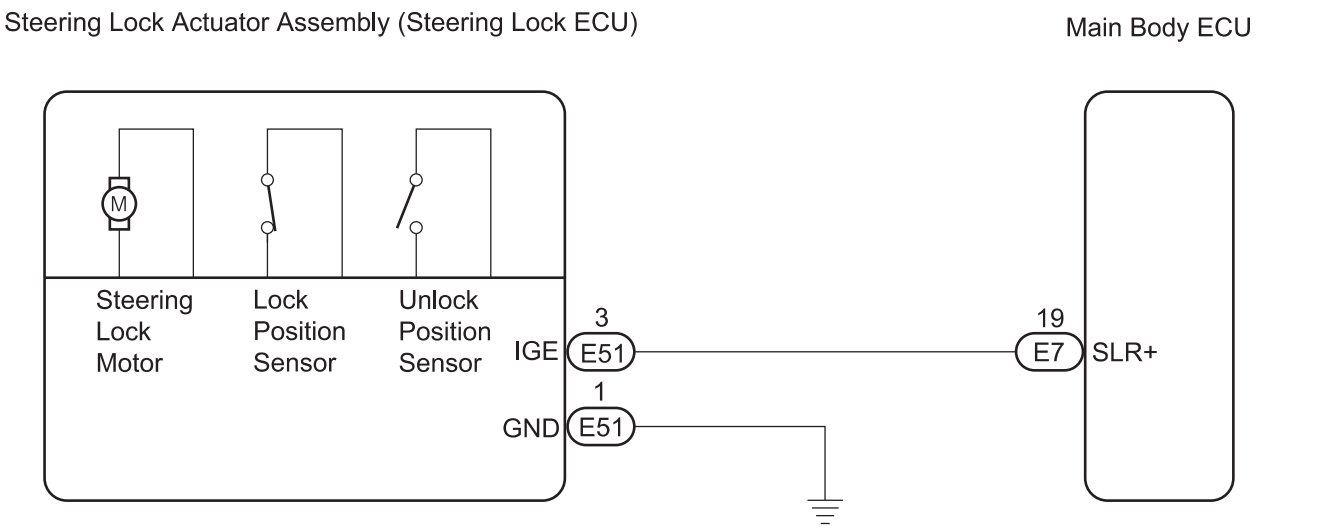
REPAIR OR REPLACE HARNESS OR CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - BATTERY)

Steering Lock Motor Drive Power Circuit

DESCRIPTION

The steering lock ECU is connected to the main body ECU and certification ECU. The steering lock ECU cannot activate the motor unless it receives permission signals from both ECUs. (The main body ECU permits the steering lock ECU to supply power to activate the motor.)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK VEHICLE CONDITION

(a) Check the problem symptom of the steering lock system.

Result

Condition	Proceed to
Steering lock cannot be released	A
Steering cannot be locked	B

B → Go to step 6

A

2	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG), and turn the intelligent tester on.

(c) Select the item below in the DATA LIST, and read its value displayed on the intelligent tester.

SMART

Item	Measurement Item/Range	Normal Condition	Diagnostic Note
LCK/UNLCK REC	Steering lock command reception record / YES or NO	YES: Steering lock / unlock signal received NO: Steering lock / unlock signal not received	-

(d) Check if steering unlock command signal has been received.

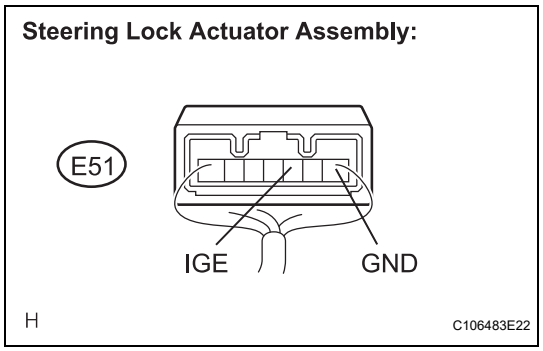
OK:

"YES" is displayed on the tester display.

NG → **CHECK SMART KEY SYSTEM**

OK

3 INSPECT STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU)



(a) Measure the voltage according to the value(s) in the table below.

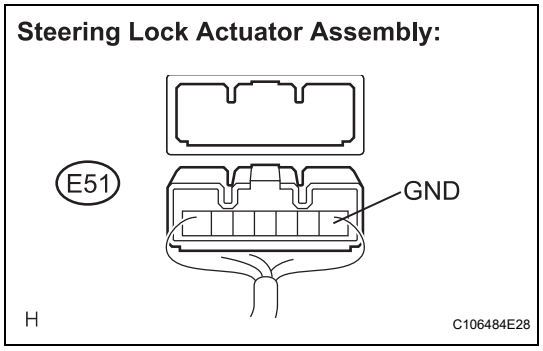
Standard voltage

Tester Connection	Condition	Specified Condition
E51-3 (IGE) - E51-1 (GND)	1. Power switch off 2. Turn the power switch on (ACC or IG)	• Motor activated: Below 1 V • Motor not activated: 10 to 12 V

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

4 CHECK HARNESS AND CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - BODY GROUND)



(a) Disconnect the E51 connector from the steering lock actuator assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

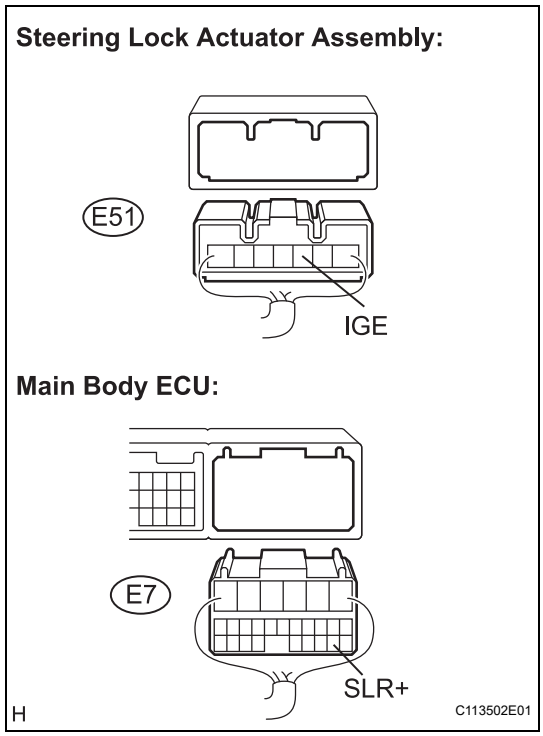
Tester Connection	Condition	Specified Condition
E51-1 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

SR

5	CHECK HARNESS AND CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - MAIN BODY ECU)



(a) Disconnect the E7 connector from the main body ECU.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

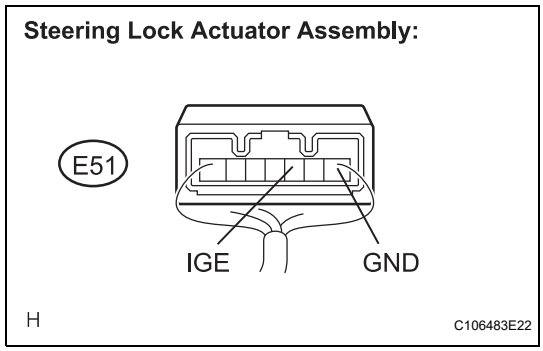
Tester Connection	Condition	Specified Condition
E51-3 (IGE) - E7-19 (SLR+)	Always	Below 1 Ω
E51-3 (IGE) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MAIN BODY ECU

6	INSPECT STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU)



(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E51-3 (IGE) - E51-1 (GND)	The specified condition should be checked after performing the following: 1. Move the shift lever to the P position 2. Turn the power switch off 3. Open the driver's door	• Motor activated: Below 1 V • Motor not activated: 10 to 12 V

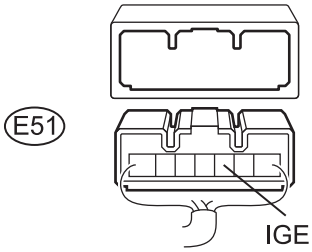
OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

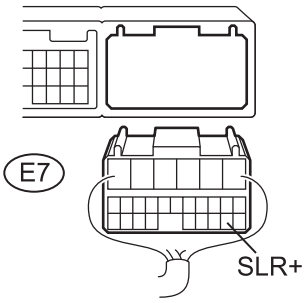
SR

7	CHECK HARNESS AND CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - MAIN BODY ECU)

Steering Lock Actuator Assembly:



Main Body ECU:



H C113502E01

(a) Disconnect the E51 connector from the steering lock actuator assembly.
(b) Disconnect the E7 connector from the main body ECU.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E51-3 (IGE) - E7-19 (SLR+)	Always	Below 1 Ω
E51-3 (IGE) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

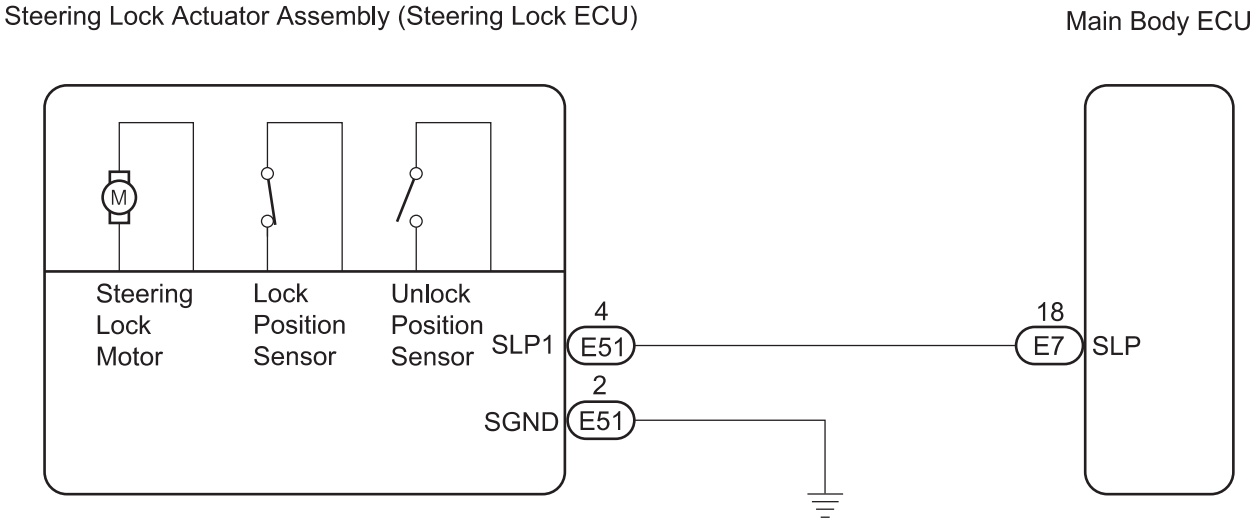
REPLACE MAIN BODY ECU

Unlock Position Sensor Signal Circuit

DESCRIPTION

The unlock position sensor is one of the components in the steering lock actuator. The sensor switch contact closes when the steering lock is released. The steering lock release signal is then sent to the main body ECU. Receiving the signal, the ECU permits engine start. (This prevents the engine from being started with the steering locked.)

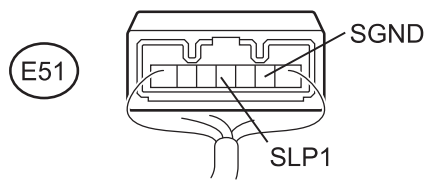
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU)

Steering Lock Actuator Assembly:



(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E51-4 (SLP1) - E51-2 (SGND)	1. Power switch off 2. Turn the power switch on (ACC or IG)	Below 1 V

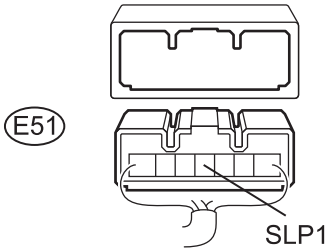
OK → CHECK SMART KEY SYSTEM

NG

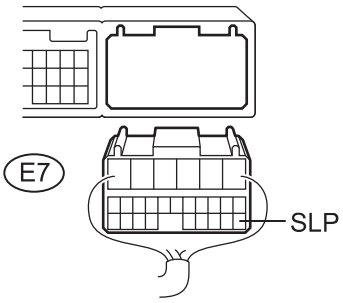
SR

2	CHECK HARNESS AND CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - MAIN BODY ECU)

Steering Lock Actuator Assembly:



Main Body ECU:



H C113502E02

(a) Disconnect the E51 connector from the steering lock actuator assembly.
(b) Disconnect the E7 connector from the main body ECU.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

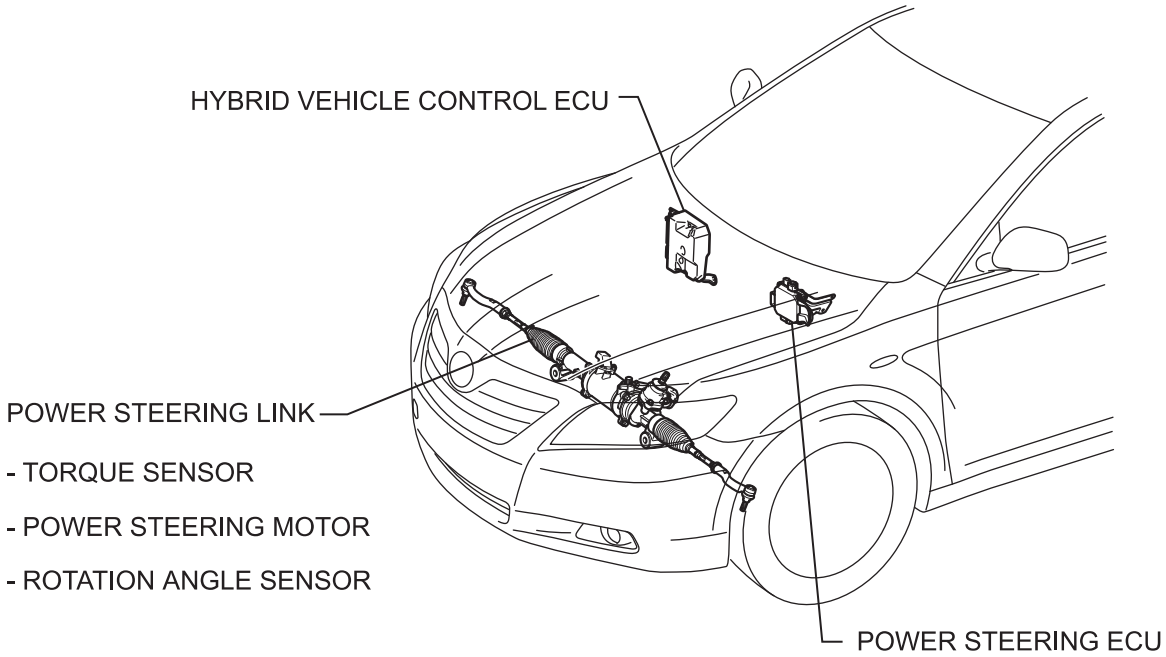
Tester Connection	Condition	Specified Condition
E51-4 (SLP1) - E7-18 (SLP)	Always	Below 1 Ω
E51-4 (SLP1) - Body ground	Always	10 kΩ or higher

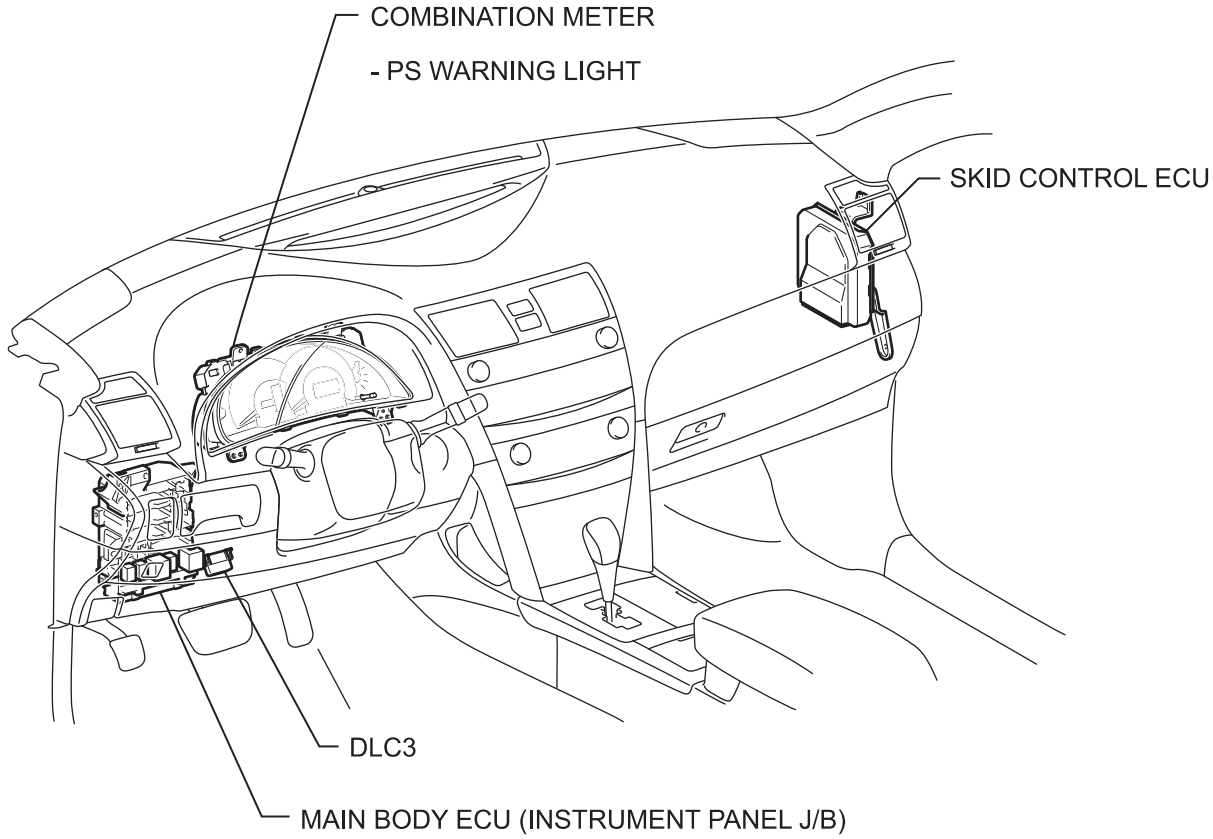
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

PARTS LOCATION





PS

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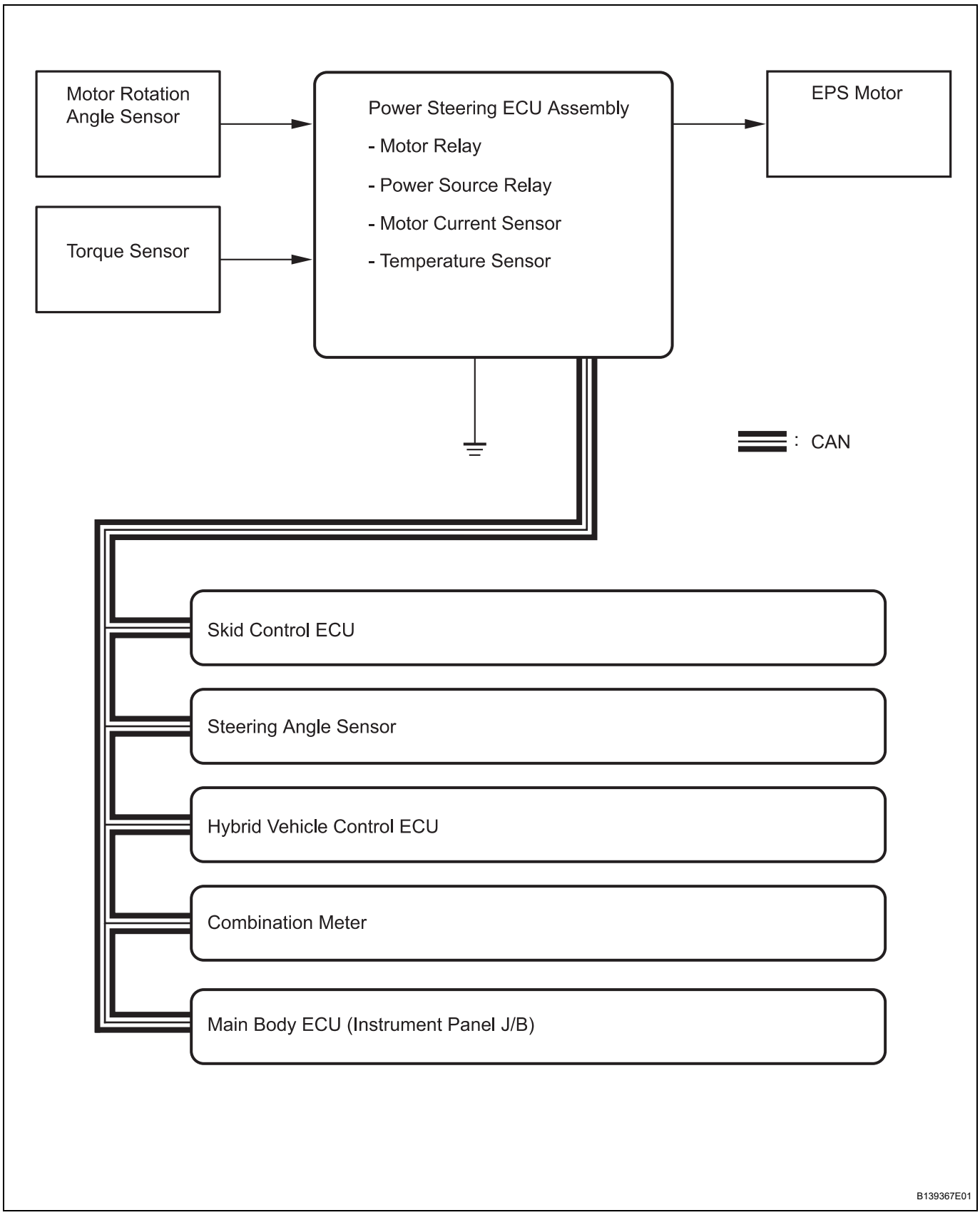
B150822E01

SYSTEM DIAGRAM



Transmitting ECU (transmitter)	Receiving ECU	Signals	Communication method
Hybrid Vehicle Control ECU	Power Steering ECU Assembly	T/M variation information signal	CAN

PS

Transmitting ECU (transmitter)	Receiving ECU	Signals	Communication method
Hybrid Vehicle Control ECU	Power Steering ECU Assembly	Ready signal	CAN
Hybrid Vehicle Control ECU	Power Steering ECU Assembly	Ambient temperature signal	CAN
Hybrid Vehicle Control ECU	Power Steering ECU Assembly	Intake air temperature signal	CAN
Hybrid Vehicle Control ECU	Power Steering ECU Assembly	Engine variation information signal	CAN
Hybrid Vehicle Control ECU	Power Steering ECU Assembly	Vehicle destination information signal	CAN
Hybrid Vehicle Control ECU	Power Steering ECU Assembly	TC terminal condition	CAN
Skid Control ECU	Power Steering ECU Assembly	Output command value (to EPS) signal	CAN
Skid Control ECU	Power Steering ECU Assembly	Additional torque target signal	CAN
Skid Control ECU	Power Steering ECU Assembly	Vehicle speed (SP1) status signal	CAN
Skid Control ECU	Power Steering ECU Assembly	Target steering angle signal	CAN
Skid Control ECU	Power Steering ECU Assembly	Target steering angle and additional torque valid signal	CAN
Skid Control ECU	Power Steering ECU Assembly	Vehicle speed (SP1) signal	CAN
Skid Control ECU	Power Steering ECU Assembly	Test mode signal	CAN
Skid Control ECU	Power Steering ECU Assembly	VSC controlling signal	CAN
Skid Control ECU	Power Steering ECU Assembly	ABS controlling signal	CAN
Steering Angle Sensor	Power Steering ECU Assembly	Data continuity (valid/invalid) signal	CAN
Steering Angle Sensor	Power Steering ECU Assembly	+B open circuit signal	CAN
Steering Angle Sensor	Power Steering ECU Assembly	Sensor malfunction signal	CAN
Steering Angle Sensor	Power Steering ECU Assembly	Steering angle signal	CAN
Steering Angle Sensor	Power Steering ECU Assembly	Zero point memory (in sensor) valid/invalid signal	CAN
Steering Angle Sensor	Power Steering ECU Assembly	Zero point (stored in steering angle sensor) signal	CAN
Main Body ECU (Instrument Panel J/B)	Power Steering ECU Assembly	Vehicle model signal	CAN
Power Steering ECU Assembly	Skid Control ECU	EPS pinion angle invalid signal	CAN
Power Steering ECU Assembly	Skid Control ECU	EPS assisting current invalid signal	CAN
Power Steering ECU Assembly	Skid Control ECU	EPS torque sensor value invalid signal	CAN
Power Steering ECU Assembly	Hybrid Vehicle Control ECU	EPS idle up request signal	CAN
Power Steering ECU Assembly	Skid Control ECU	EPS torque sensor value signal	CAN
Power Steering ECU Assembly	Skid Control ECU	EPS pinion angle signal	CAN
Power Steering ECU Assembly	Skid Control ECU	EPS assisting current signal	CAN
Power Steering ECU Assembly	Combination Meter	EPS light ON request signal	CAN
Power Steering ECU Assembly	Combination Meter	EPS diagnostic information signal	CAN

SYSTEM DESCRIPTION

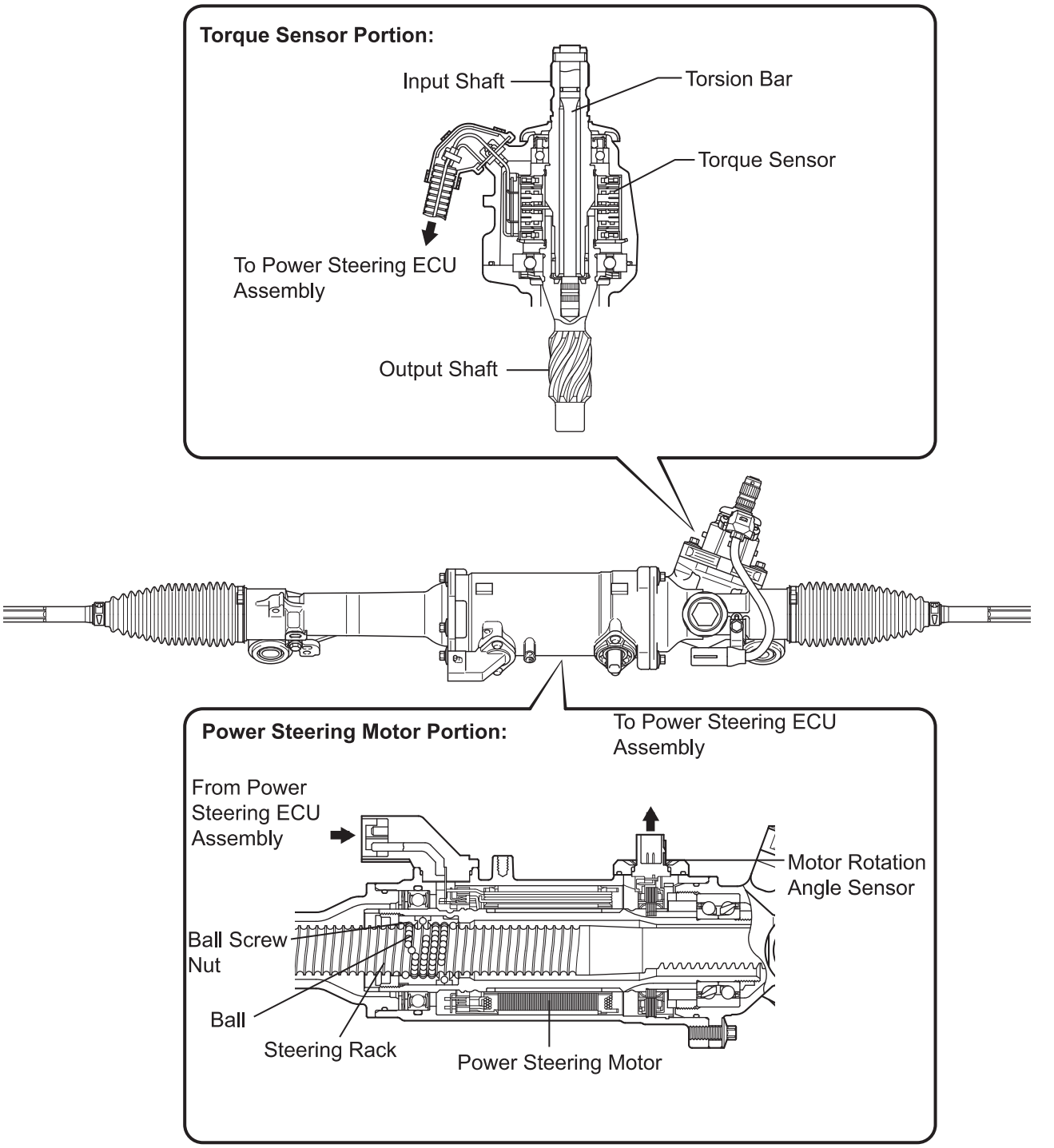
1. DESCRIPTION

(a) The EPS system generates assist torque to assist steering effort through the operation of the motor installed on the power steering link assembly.
The direction and amount of power assistance are determined by signals from the torque sensor, and controlled in accordance with vehicle speed. As a result, steering effort is controlled to be light during low speed driving and moderately high during high speed driving.

2. FUNCTIONS OF COMPONENTS

Components	Function
Power Steering ECU Assembly	Calculates degree of assistance needed based on steering torque and vehicle speed. Drives the motor based on motor electric angle obtained from the motor rotation angle sensor.
	Boosts battery voltage to generate motor drive voltage.
	Restricts power assistance to protect the system if the motor and ECU overheat.
Torque Sensor	Detects steering effort generated when the steering wheel is turned.
Power Steering Motor	Located coaxially with the rack shaft. Its rotation is converted to the rectilinear motion of the steering rack via the ball screw nut and ball.
Hybrid Vehicle Control ECU	Transmits ready signal to the power steering ECU.

3. OPERATION EXPLANATION



(a) The torque sensors is mounted on the input shaft to the main shaft and on the output shaft to the pinion shaft. The input and output shafts are joined by a torsion bar.

(b) If the steering wheel is turned, the torsion bar twists, resulting in a difference in the rotation angle detected by the torque sensor. The power steering ECU assembly calculates torque based on this difference.

(c) The power steering ECU assembly calculates proper assisting torque, according to vehicle speed, based on the torque obtained in the previous step. Then the ECU controls the motor drive circuit in order to allow it to generate assisting torque.
(d) A ball screw nut is attached to the motor shaft. It converts the rotational motion of the motor into the rectilinear motion of the steering rack via the ball.
(e) The assisting force generated in the above process will reduce the steering effort required by the driver.

HOW TO PROCEED WITH TROUBLESHOOTING

Perform troubleshooting according to the following flowchart.
HINT:
- For further details, see the page given.
- *: Use the intelligent tester.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

NEXT

3	CHECK DTC AND FREEZE FRAME DATA*

(a) Record the DTCs and freeze frame data.

NEXT

4	CLEAR DTC AND FREEZE FRAME DATA*

NEXT

5	PROBLEM SYMPTOM CONFIRMATION

	SYMPTOM DOES NOT OCCUR (GO TO STEP 6)
	SYMPTOM OCCURS (GO TO STEP 7)

6	SYMPTOM SIMULATION

NEXT

7	CHECK DTC*

(a) Recheck for DTCs.
HINT:
- Refer to the diagnostic trouble code chart if any DTCs are output.
- If any CAN communication system DTCs are output, perform troubleshooting on the CAN communication system first (See page CA-7).

PS

- If communication to the power steering ECU assembly is not established through the intelligent tester, inspect terminals SIL of the DLC3 and power steering ECU assembly, and inspect the IG circuit of the power steering ECU assembly.

⇨	**NORMAL SYSTEM CODE IS OUTPUT: GO TO STEP 8**
⇨	**TROUBLE CODE IS OUTPUT: GO TO STEP 9**

8	**PROBLEM SYMPTOMS TABLE**

NEXT

9	**DTC CHART**

NEXT

10	**CIRCUIT INSPECTION***

NEXT

11	**IDENTIFICATION OF PROBLEM**

NEXT

12	**REPAIR OR REPLACE**

NEXT

13	**CONFIRMATION TEST**

NEXT

END

CALIBRATION

1. ROTATION ANGLE SENSOR VALUE INITIALIZATION AND TORQUE SENSOR ZERO POINT CALIBRATION

NOTICE:

Clear the rotation angle sensor calibration value, initialize the rotation angle sensor value, and calibrate the torque sensor zero point if any of the following has occurred:

- **The power steering ECU assembly has been replaced.**
- **The power steering link assembly has been replaced.**
- **Steering effort differs between left and right.**

(a) Inspection before calibration

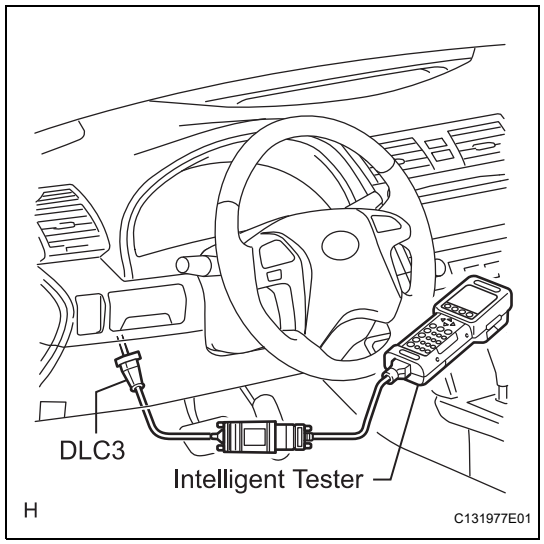
(1) Connect the intelligent tester (with CAN VIM) to the DLC3.

(2) Turn the power switch on (IG).

(3) Turn the intelligent tester on.

(4) Select "IG SUPPLY" from the data list.

(5) Check the IG power supply voltage on the tester screen.



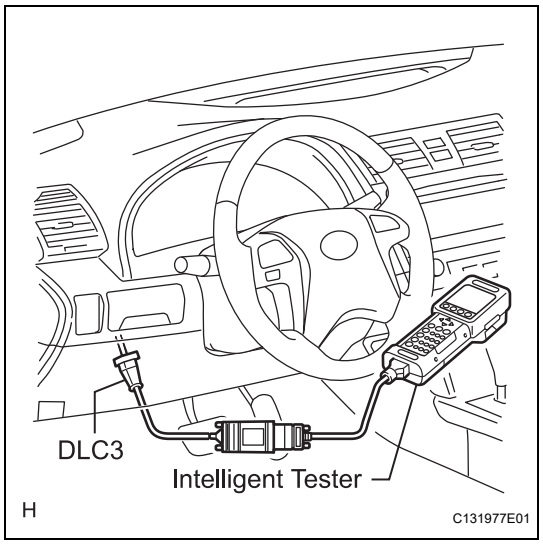
Tester Display	Measurement Item/Range	Inspection Condition	Reference Value
IG SUPPLY	ECU power source voltage/ Min.: 0 V, Max.: 25.5 V	Power switch on (IG)	10 to 14 V

Standard voltage:

10 to 14 V

NOTICE:

If the IG power supply voltage is 10 V or less, calibration cannot be performed. In this case, charge or replace the battery, and then perform calibration.



(b) Rotation angle sensor calibration value clear, rotation angle sensor value initialization, and torque sensor zero point calibration.

NOTICE:

- **If DTC C1516 (Torque Sensor Zero Point Adjustment Incomplete) is stored, the torque sensor zero point cannot be calibrated. Clear the DTC before starting calibration.**
- **If DTC C1526 (Rotation Angle Sensor Initialization Incomplete) is stored, the rotation angle sensor value cannot be initialized. Clear the DTC before starting initialization.**

(1) Connect the intelligent tester (with CAN VIM) to the DLC3.
(2) Turn the power switch on (IG).
(3) Turn the intelligent tester on.
(4) Select "TRQ SENSOR ADJ".
(5) Follow the procedures on the tester display to clear the rotation angle sensor calibration value, initialize the rotation angle sensor value, and calibrate the torque sensor zero point.

NOTICE:

- **When initializing the rotation angle sensor value, observe the following to stabilize sensor voltage:**
  After turning the power switch on (IG), wait for at least 2.5 seconds before turning the steering wheel. Do not turn the steering wheel quickly.
- **The steering wheel will vibrate during torque sensor zero point calibration. Do not touch the steering wheel while it is vibrating or for 2 seconds after it stops.**

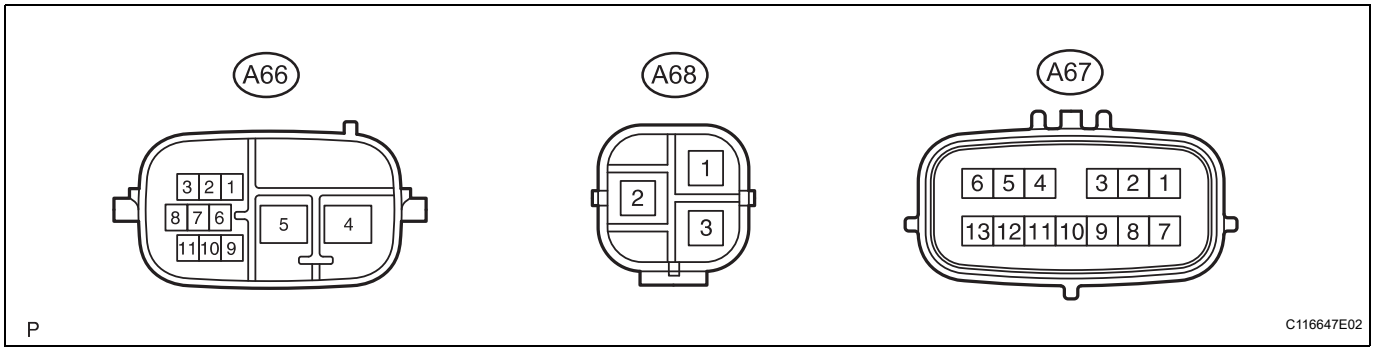
PROBLEM SYMPTOMS TABLE

ELECTRONIC POWER STEERING SYSTEM

Symptom	Suspected Area	See page
Steering is heavy.	1. Front tires (Improperly inflated, unevenly worn)	TW-3
	2. Front wheel alignment (Incorrect)	SP-4
	3. Front suspension	SP-24
	4. Power steering link assembly	PS-61
	5. Steering column assembly	SR-35
	6. Battery and power source system	-
	7. Power source voltage of power steering ECU assembly	PS-50
	8. Power steering ECU assembly	PS-68
	9. Vehicle condition (The steering wheel is turned from left to right repeatedly with the vehicles stopped or a heavy load is continuously applied to the vehicle)	-
Steering effort differs between right and left, or is uneven.	1. Power steering ECU assembly (Steering center point is not recorded correctly)	PS-13
	2. Front tires (Improperly inflated, unevenly worn)	TW-3
	3. Front wheel alignment (Incorrect)	SP-4
	4. Front suspension	SP-24
	5. Power steering link assembly	PS-61
	6. Steering column assembly	SR-35
	7. Power steering ECU assembly	PS-68
While driving, steering effort does not change in accordance with vehicle speed, or the steering wheel does not return to its centered position easily.	1. Speed sensor	BC-273
	2. Skid control ECU	BC-289
	3. Power steering link assembly	PS-61
	4. Power steering ECU assembly	PS-68
Friction sounds occur when turning the steering wheel during low speed driving.	1. Power steering link assembly	PS-61
	2. Power steering ECU assembly	PS-68
High-pitched sounds (squeaking) occur when turning the steering wheel slowly with the vehicle stopped.	Power steering link assembly	PS-61
The steering wheel vibrates and noise occurs when turning the steering wheel with the vehicle stopped.	1. Power steering link assembly	PS-61
	2. Steering column assembly	PS-68
PS warning light remains on.	PS warning light remains on	PS-50
PS warning light does not come on.	PS warning light does not come on	PS-54

TERMINALS OF ECU

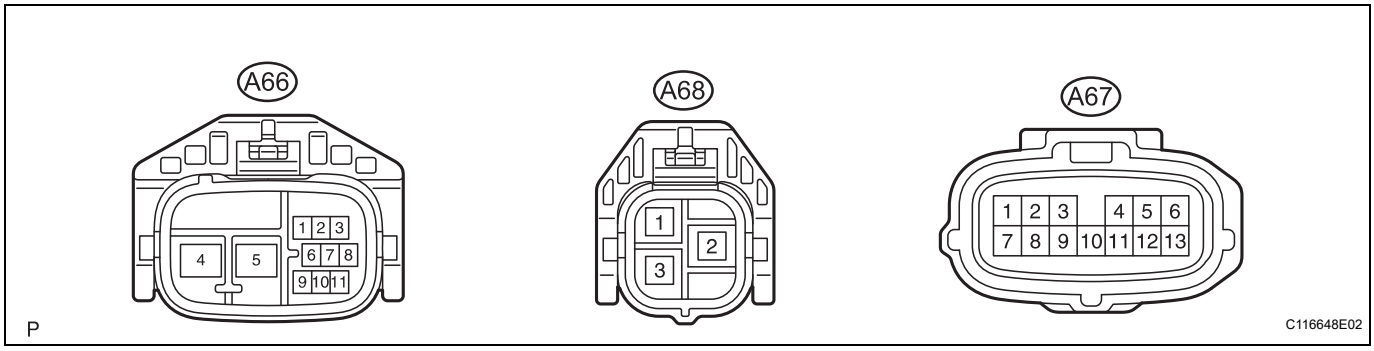
1. TERMINALS OF ECU



HINT:
The power steering ECU assembly uses waterproof connectors. Therefore, voltage or waveforms cannot be checked with the connectors connected to the vehicle.

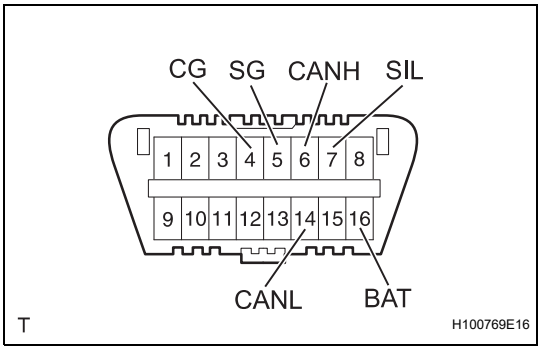
Terminal No. (Symbols)	Wiring Color	Terminal Description
A66-2 (CANH)	B	High-level CAN bus line
A66-3 (CANL)	W	Low-level CAN bus line
A66-4 (PIG)	W	Power source
A66-5 (PGND)	B	Power ground
A66-9 (IG)	O	IG power source
A67-1 (RZG)	W	Rotation angle sensor power source circuit ground
A67-2 (SRZG)	BR	Rotation angle sensor shield ground
A67-3 (RZV)	G	Rotation angle sensor power source
A67-4 (TRQV)	P	Torque sensor power source
A67-6 (TQG1)	L	Torque sensor power source circuit ground
A67-7 (RZSN)	B	SIN phase input signal (Rotation angle sensor)
A67-8 (RZCS)	R	COS phase input signal (Rotation angle sensor)
A67-9 (INSN)	B	SIN phase input signal (Torque sensor input shaft side)
A67-10 (INCS)	R	COS phase input signal (Torque sensor input shaft side)
A67-11 (OUSN)	W	SIN phase input signal (Torque sensor output shaft side)
A67-12 (OUCS)	G	COS phase input signal (Torque sensor output shaft side)
A67-13 (TQG2)	Y	Torque sensor detection circuit ground
A68-1 (V)	R	V phase motor output
A68-2 (U)	B	U phase motor output
A68-3 (W)	W	W phase motor output

2. INSPECT WIRE HARNESS SIDE CONNECTOR



PS

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
A66-4 (PIG) - A66-5 (PGND)	W - B	Power source	Always	10 to 14 V
A66-5 (PGND) - Body ground	B - Body ground	Power ground	Always	Below 1 Ω
A66-9 (IG) - A66-5 (PGND)	O - B	IG power source	Power switch on (IG)	10 to 14 V
A68-2 (U) - A68-3 (W)/A68-1 (V)	B - W/R	U phase motor output	Always	Below 1 Ω
A68-3 (W) - A68-2 (U)/A68-1 (V)	W - BR	W phase motor output	Always	Below 1 Ω
A68-1 (V) - A68-2 (U)/ A68-3 (W)	R - B/W	V phase motor output	Always	Below 1 Ω



DIAGNOSIS SYSTEM

1. CHECK DLC3

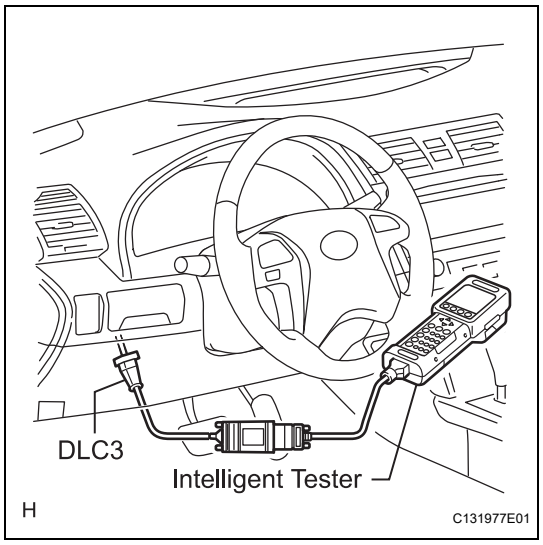
(a) The vehicle's ECU uses ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Power switch off*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Power switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Power switch off*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Power switch off*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Power switch off*	6 kΩ or higher

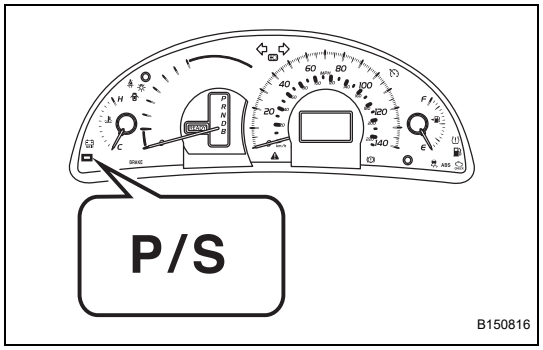
NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.



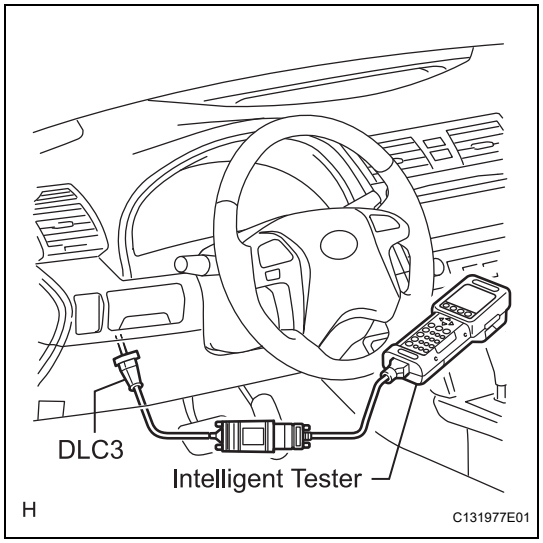
(b) Connect the cable of the intelligent tester (with CAN VIM) to the DLC3, turn the power switch on (IG) and attempt to use the intelligent tester. If the screen displays a communication error message, a problem exists in the vehicle side or tester side.
HINT:
- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself. Consult the Service Department listed in the tool's instruction manual.



2. P/S WARNING LIGHT

(a) Check that the PS warning light comes on when the power switch is turned on (IG) and goes off in approximately 3 seconds.
If the warning light does not come on or remains on, inspect the PS warning light circuit.

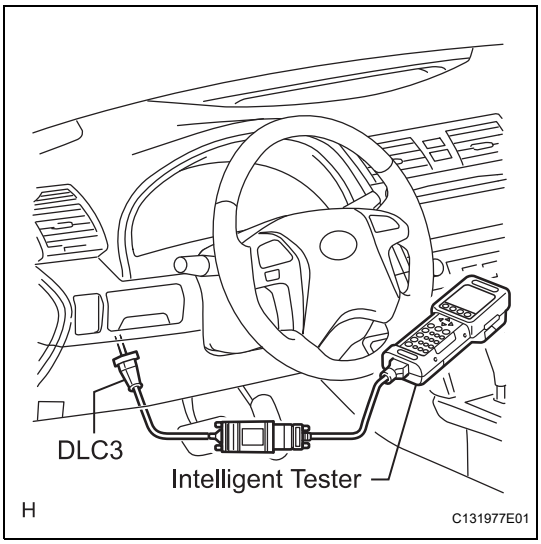
Trouble Area	See Procedure
PS warning light circuit (Remains on)	PS-50
PS warning light circuit (Does not come on)	PS-54



DTC CHECK / CLEAR

1. CHECK FOR DTCs

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the intelligent tester on.
(d) Read the DTCs by following the display on the intelligent tester.
HINT:
Refer to the intelligent tester operator's manual for further details.



2. CLEAR DTCs

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the intelligent tester on.
(d) Clear the DTCs by following the display on the intelligent tester.
HINT:
Refer to the intelligent tester operator's manual for further details.

FREEZE FRAME DATA

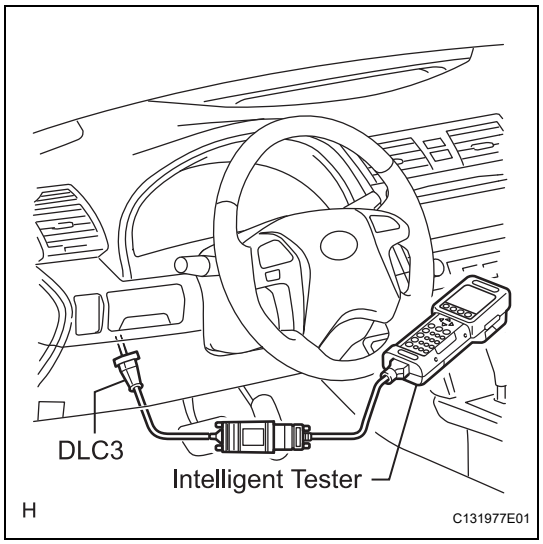
1. FREEZE FRAME DATA

NOTICE:

- **It is difficult to show the specified values (judgement values) clearly because freeze frame data values change significantly due to differences in measurement conditions, surroundings, or vehicle conditions. For this reason, there may be a problem even when the values are within specifications.**
- **Turn the power switch on (IG) and park the vehicle on level ground. Check the freeze frame data by using the intelligent tester.**

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the power switch on (IG) and check the freeze frame data by following the prompts on the intelligent tester's display screen.



Tester Display	Item Description/Range	Inspection Condition	Reference Value
SPD	Vehicle speed from meter/ Min.: 0 km/h (0 mph), Max.: 300 km/h (186 mph)	1. Vehicle is stopped 2. Vehicle is driven at a constant speed	1. 0 km/h (0 mph) 2. No significant fluctuation
ENGINE REV	Engine revolution/ Min.: 0 rpm, Max.: 12.800 rpm	Engine is running at a constant speed	No significant fluctuation
MOTOR ACTUAL	Amount of current to motor/ Min.: -128 A, Max.: 127 A	Power steering is in operation	Value changes in proportion to steering effort
COMMAND VALUE	Demanded amount of current to motor/ Min.: -128 A, Max.: 127 A	Power steering is in operation	Value changes in proportion to steering effort
STR ANGL VEL	Steering angle speed/ Min.: -4.096 deg/sec, Max.: 4.064 deg/sec	Steering wheel is turned	Value changes in proportion to steering speed
THERMISTOR TEMP	ECU substrate temperature/ Min.: -50°C, Max.: 205°C	Power switch on (IG)	-
PIG SUPPLY	Power source voltage to activate motor/ Min.: 0 V, Max.: 25.5 V	Power steering is in operation	10 to 14 V
IG SUPPLY	ECU power source voltage/ Min.: 0 V, Max.: 25.5 V	Power switch on (IG)	10 to 14 V
STR SENS SIG	Steering angle sensor signal status/ OK or NG	-	-
TRQ1	Torque sensor 1 rotation angle/ Min.: 0 deg, Max.: 360 deg	Steering wheel is turned	Value changes from 0 to 360° every 22.5° of steering angle

Tester Display	Item Description/Range	Inspection Condition	Reference Value
TRQ2	Torque sensor 2 rotation angle/ Min.: 0 deg, Max.: 360 deg	Steering wheel is turned	Value changes from 0 to 360° every 22.5° of steering angle
TRQ1 ZERO VAL	Zero point value of torque sensor 1/ Min.: 0 deg, Max.: 360 deg	Steering wheel is not turned (without load)	Values differ depending on vehicle
TRQ2 ZERO VAL	Zero point value of torque sensor 2/ Min.: 0 deg, Max.: 360 deg	Steering wheel is not turned (without load)	Values differ depending on vehicle
STEERING TORQU	Steering torque/ Min.: -7.0 N*m, Max.: 7.0 N*m	Steering wheel is turned	Value changes in proportion to steering effort
MOTOR ROTATE	Motor rotation angle/ Min.: 0 deg, Max.: 360 deg	Steering wheel is turned	Value changes from 0 to 360° every 5° of steering angle
COMMAND VALUE 2	Demanded amount of current to motor 2/ Min.: -128 A, Max.: 127 A	-	-
PIG2 VOLTAGE	Motor drive voltage/ Min.: 0 V, Max.: 64 V	Power steering is in operation	27 to 34 V
MOTOR VOLTAGE	Motor power source voltage/ Min.: 0 V, Max.: 64 V	Power steering is in operation	27 to 34 V
MTR TERMINAL (U)	Motor terminal voltage (U phase)/ Min.: 0 V, Max.: 64 V	Power steering is in operation	0 to 34 V
MTR TERMINAL (V)	Motor terminal voltage (V phase)/ Min.: 0 V, Max.: 64V	Power steering is in operation	0 to 34 V
MTR TERMINAL (W)	Motor terminal voltage (W phase)/ Min.: 0 V, Max.: 64 V	Power steering is in operation	0 to 34 V
IG ON/OFF TIMES	Number of times IG switch is turned on after DTC detection/ Min.: 0 time, Max.: 255 times	-	-
MTR OVERHEAT	Continuous overheat prevention control record/ REC or UNREC	-	-
MTR LOW POWER	PIG power source voltage drop record/ REC or UNREC	-	-
ENG REV INTER	Record of power revolution signal interruption/ REC or UNREC	-	-
STR ANGL INTER	Record of steering angle sensor signal interruption/ REC or UNREC	-	-
SPD SIG INVALID	Record of vehicle speed signal invalid/ REC or UNREC	-	-
BATTERY VOLTAGE	Battery voltage/ Min.: 0 V, Max.: 25.5 V	-	10 to 14 V
PS ASSIST SIG	Power steering assist signal/ ON or OFF	Power switch on (IG)	-
# CODES	Number of detected DTCs when freeze frame data is stored/ Min.: 0, Max.: 255	-	-

FAIL-SAFE CHART

If a problem occurs in the electronic power steering system, the PS warning light will come on in the combination meter and steering power assistance will be stopped, fixed at a particular point, or decreased simultaneously to protect the system.

DTC No.	Malfunction	Fail-safe
C1511	Torque Sensor Circuit Malfunction	Power assistance stops.
C1512		
C1513		
C1521	Motor Circuit Malfunction	
C1522		
C1523		
C1524		
C1528	Motor Rotation Angle Sensor Malfunction	
C1531	ECU Malfunction	
C1532		
C1555	Motor Relay Welding Failure	
C1533	ECU Malfunction	System overheat prevention control continues without using the substrate temperature sensor.
C1534	ECU Malfunction	Torque sensor zero point and rotation angle sensor calibration value are set to the default values.
C1541	Vehicle Speed Signal Malfunction	Amount of power assistance is fixed for a speed of 100 km/h (62 mph).
U0129	Lost Communication With Skid Control ECU	

HINT:

The amount of power assistance may be decreased to prevent the motor and ECUs from overheating if the steering wheel is continuously turned when the vehicle is either stopped or driven at a low speed, or if the steering wheel is kept at either full lock position for a long time. In that case, the amount of power assistance will return to normal if the steering wheel is not turned for approximately 10 minutes with the engine idling.

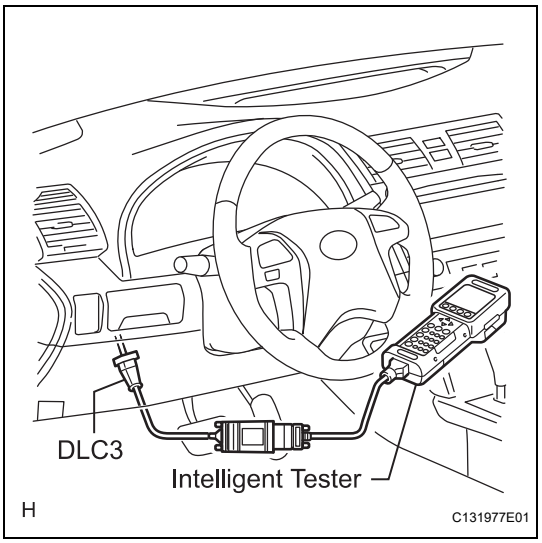
DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

By accessing the data list displayed on the intelligent tester, values of switches, sensors and other related parts can be checked without removing any parts. Reading the data list is the first step in troubleshooting and is one method to shorten labor time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the power switch on (IG).
(c) Operate the intelligent tester according to the steps on the display and select the data list.



Tester Display	Measurement Item/Range	Normal Condition	Reference Value
SPD	Vehicle speed from meter/ Min.: 0 km/h (0 mph), Max.: 300 km/h (186 mph)	1. Vehicle is stopped 2. Vehicle is driven at a constant speed	1. 0 km/h (0 mph) 2. No significant fluctuation
ENGINE REV	Engine revolution/ Min.: 0 rpm, Max.: 12.800 rpm	Engine is running at a constant speed	No significant fluctuation
MOTOR ACTUAL	Amount of current to motor/ Min.: -128 A, Max.: 127 A	Power steering is in operation	Value changes in proportion to steering effort
COMMAND VALUE	Demanded amount of current to motor/ Min.: -128 A, Max.: 127 A	Power steering is in operation	Value changes in proportion to steering effort
STR ANGL VEL	Steering angle speed/ Min.: -4.096 deg/sec, Max.: 4.064 deg/sec	Steering wheel is turned	Value changes in proportion to steering speed
THERMISTOR TEMP	ECU substrate temperature/ Min.: -50°C, Max.: 205°C	Power switch on (IG)	-
PIG SUPPLY	Power source voltage to activate motor/ Min.: 0 V, Max.: 25.5 V	Power steering is in operation	10 to 14 V
IG SUPPLY	ECU power source voltage/ Min.: 0 V, Max.: 25.5 V	Power switch on (IG)	10 to 14 V
STR SENS SIG	Steering angle sensor signal status/ OK or NG	-	-
TRQ1	Torque sensor 1 rotation angle/ Min.: 0 deg, Max.: 360 deg	Steering wheel is turned	Value changes from 0 to 360° every 22.5° of steering angle
TRQ2	Torque sensor 2 rotation angle/ Min.: 0 deg, Max.: 360 deg	Steering wheel is turned	Value changes from 0 to 360° every 22.5° of steering angle
TRQ1 ZERO VAL	Zero point value of torque sensor 1/ Min.: 0 deg, Max.: 360 deg	Steering wheel is not turned (without load)	Values differ depending on vehicle

Tester Display	Measurement Item/Range	Normal Condition	Reference Value
TRQ2 ZERO VAL	Zero point value of torque sensor 2/ Min.: 0 deg, Max.: 360 deg	Steering wheel is not turned (without load)	Values differ depending on vehicle
STEERING TORQU	Steering torque/ Min.: -7.0 N*m, Max.: 7.0 N*m	Steering wheel is turned	Value changes in proportion to steering effort
MOTOR ROTATE	Motor rotation angle/ Min.: 0 deg, Max.: 360 deg	Steering wheel is turned	Value changes from 0 to 360° every 5° of steering angle
COMMAND VALUE 2	Demanded amount of current to motor 2/ Min.: -128 A, Max.: 127 A	-	-
PIG2 VOLTAGE	Motor drive voltage/ Min.: 0 V, Max.: 64 V	Power steering is in operation	27 to 34 V
MOTOR VOLTAGE	Motor power source voltage/ Min.: 0 V, Max.: 64 V	Power steering is in operation	27 to 34 V
MTR TERMINAL (U)	Motor terminal voltage (U phase)/ Min.: 0 V, Max.: 64 V	Power steering is in operation	0 to 34 V
MTR TERMINAL (V)	Motor terminal voltage (V phase)/ Min.: 0 V, Max.: 64V	Power steering is in operation	0 to 34 V
MTR TERMINAL (W)	Motor terminal voltage (W phase)/ Min.: 0 V, Max.: 64 V	Power steering is in operation	0 to 34 V
IG ON/OFF TIMES	Number of times IG switch is turned on after DTC detection/ Min.: 0 time, Max.: 255 times	-	-
MTR OVERHEAT	Continuous overheat prevention control record/ REC or UNREC	-	-
MTR LOW POWER	PIG power source voltage drop record/ REC or UNREC	-	-
ENG REV INTER	Record of power revolution signal interruption/ REC or UNREC	-	-
STR ANGL INTER	Record of steering angle sensor signal interruption/ REC or UNREC	-	-
SPD SIG INVALID	Record of vehicle speed signal invalid/ REC or UNREC	-	-
BATTERY VOLTAGE	Battery voltage/ Min.: 0 V, Max.: 25.5 V	-	10 to 14 V
PS ASSIST SIG	Power steering assist signal/ ON or OFF	Power switch on (IG)	-
# CODES	Number of detected DTCs when freeze frame data is stored/ Min.: 0, Max.: 255	-	-

DIAGNOSTIC TROUBLE CODE CHART

HINT:
If a trouble code is displayed during the DTC check, check the circuit indicated by the DTC. For details of each code, turn to the page for the respective DTC code in the DTC chart

ELECTRONIC POWER STEERING SYSTEM DIAGNOSTIC TROUBLE CODE CHART:

DTC Code	Detection Item	Trouble Area	See page
C1511	Torque Sensor Circuit Malfunction	1. Wire harness 2. Torque sensor (built into power steering link assembly) 3. Power steering ECU assembly	PS-24
C1512	Torque Sensor Circuit Malfunction	1. Wire harness 2. Torque sensor (built into power steering link assembly) 3. Power steering ECU assembly	PS-24
C1513	Torque Sensor Circuit Malfunction	1. Wire harness 2. Torque sensor (built into power steering link assembly) 3. Power steering ECU assembly	PS-24
C1515	Torque Sensor Zero Point Adjustment Undone	-	PS-28
C1516	Torque Sensor Zero Point Adjustment Incomplete	-	PS-30
C1521	Motor Circuit Malfunction	Power steering ECU assembly	PS-33
C1522	Motor Circuit Malfunction	Power steering ECU assembly	PS-33
C1523	Motor Circuit Malfunction	1. Wire harness 2. Power steering motor (built into power steering link assembly) 3. Power steering ECU assembly	PS-35
C1524	Motor Circuit Malfunction	1. Wire harness 2. Power steering motor (built into power steering link assembly) 3. Power steering ECU assembly	PS-35
C1525	Rotation Angle Sensor Initialization Undone	-	PS-28
C1526	Rotation Angle Sensor Initialization Incomplete	-	PS-30
C1528	Motor Rotation Angle Sensor Malfunction	1. Motor rotation angle sensor (built into power steering link assembly) 2. Wire harness 3. Power steering earth wire 4. Power steering ECU assembly	PS-38
C1531	ECU Malfunction	Power steering ECU assembly	PS-33
C1532	ECU Malfunction	Power steering ECU assembly	PS-33
C1533	ECU Malfunction	Power steering ECU assembly	PS-33
C1534	ECU Malfunction	Power steering ECU assembly	PS-33
C1541	Vehicle Speed Signal Malfunction	1. Speed sensor circuit 2. Skid control ECU 3. CAN communication system 4. Power steering ECU assembly	PS-42
C1551	IG Power Supply Voltage Malfunction	Power steering ECU assembly	PS-44
C1552	PIG Power Supply Voltage Malfunction	1. EPS fuse 2. Wire harness 3. Power steering ECU assembly	PS-45
C1554	Power Supply Relay Failure	Power steering ECU assembly	PS-33
C1555	Motor Relay Welding Failure	Power steering ECU assembly	PS-33
C1581	Assist Map Number Un-Writing	1. Hybrid vehicle control ECU 2. Main body ECU (Instrument panel J/B) 3. Power steering ECU assembly	PS-47
U0073	Control Module Communication Bus OFF	CAN communication system	PS-49

DTC Code	Detection Item	Trouble Area	See page
U0100	Lost Communication with ECM/PCM "A"	1. CAN communication system 2. Hybrid vehicle control ECU	PS-49
U0129	Lost Communication with Skid Control ECU	1. CAN communication system 2. Skid control ECU	PS-49
U0293	Lost Communication with HV ECU	1. CAN communication system 2. Hybrid vehicle control ECU	PS-49

DTC	C1511	Torque Sensor Circuit Malfunction

DTC	C1512	Torque Sensor Circuit Malfunction

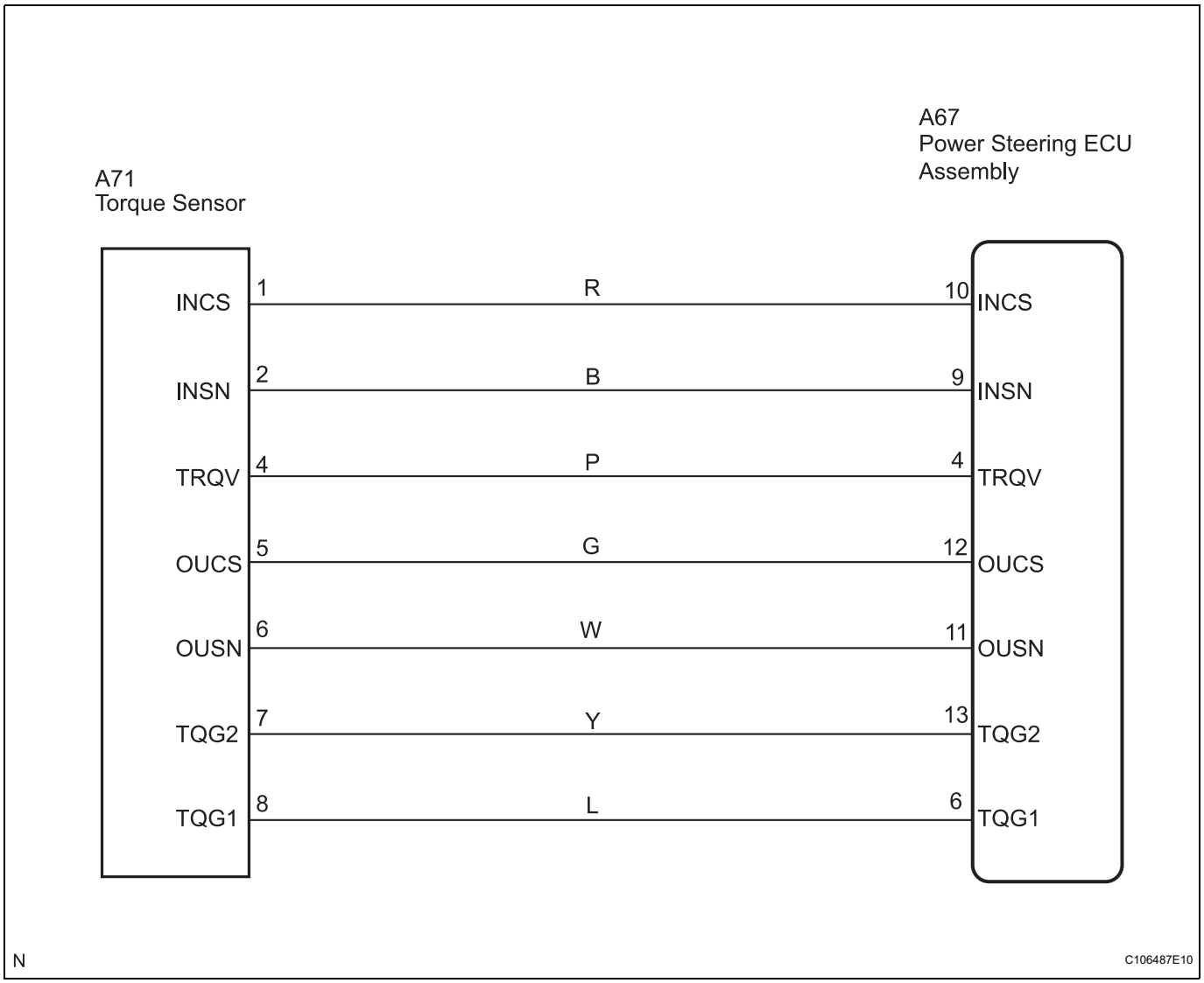
DTC	C1513	Torque Sensor Circuit Malfunction

DESCRIPTION

The torque sensor converts rotation torque input to the steering wheel into an electrical signal and sends it to the ECU. Based on this signal, the ECU detects steering effort.

DTC No.	Detection Item	Trouble Area
C1511	Torque sensor (TRQ1) signal error or stop	• Wire harness • Torque sensor (built into power steering link assembly) • Power steering ECU assembly
C1512	Torque sensor (TRQ2) signal error or stop	• Wire harness • Torque sensor (built into power steering link assembly) • Power steering ECU assembly
C1513	Deviation between torque sensors	• Wire harness • Torque sensor (built into power steering link assembly) • Power steering ECU assembly

WIRING DIAGRAM

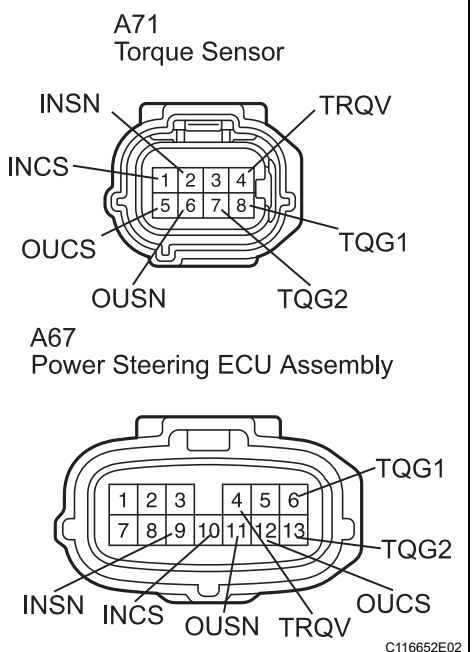


PS

INSPECTION PROCEDURE

1 CHECK HARNESS AND CONNECTOR (POWER STEERING ECU ASSEMBLY - TORQUE SENSOR)

Wire Harness Side Connector Front View:



(a) Disconnect the A67 connector from the power steering ECU assembly.
(b) Disconnect the A71 connector from the torque sensor.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

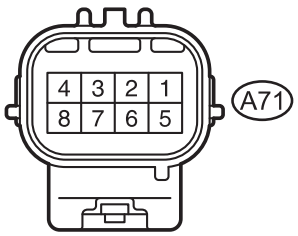
Tester connection (Symbols)	Condition	Specified condition
A71-1 (INCS) - A67-10 (INCS)	Always	Below 1 Ω
A71-2 (INSN) - A67-9 (INSN)	Always	Below 1 Ω
A71-4 (TRQV) - A67-4 (TRQV)	Always	Below 1 Ω
A71-5 (OUCS) - A67-12 (OUCS)	Always	Below 1 Ω
A71-6 (OUSN) - A67-11 (OUSN)	Always	Below 1 Ω
A71-7 (TQG2) - A67-13 (TQG2)	Always	Below 1 Ω
A71-8 (TQG1) - A67-6 (TQG1)	Always	Below 1 Ω
A71-1 (INCS) - Body ground	Always	10 kΩ or higher
A71-2 (INSN) - Body ground	Always	10 kΩ or higher
A71-4 (TRQV) - Body ground	Always	10 kΩ or higher
A71-5 (OUCS) - Body ground	Always	10 kΩ or higher
A71-6 (OUSN) - Body ground	Always	10 kΩ or higher
A71-7 (TQG2) - Body ground	Always	10 kΩ or higher
A71-8 (TQG1) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 INSPECT POWER STEERING LINK ASSEMBLY (TORQUE SENSOR)

Torque Sensor:



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection (Symbols)	Condition	Specified condition
A71-1 (INCS) - A71-7 (TQG2)	Always	90 to 170 Ω
A71-2 (INSN) - A71-7 (TQG2)	Always	300 to 430 Ω
A71-4 (TRQV) - A71-8 (TQG1)	Always	4 to 14 Ω
A71-5 (OUCS) - A71-7 (TQG2)	Always	90 to 170 Ω
A71-6 (OUSN) - A71-7 (TQG2)	Always	300 to 430 Ω

PS

NOTICE:
If replacing the power steering link assembly, clear the rotation angle sensor calibration value, initialize the rotation angle sensor value, and calibrate the torque sensor zero point (See page PS-13).

NG → **REPLACE POWER STEERING LINK ASSEMBLY (See page PS-58)**

OK

3	REPLACE POWER STEERING ECU ASSEMBLY

(a) Replace the power steering ECU assembly (See page PS-68).

NEXT

4	INITIALIZE ROTATION ANGLE SENSOR AND CALIBRATE TORQUE SENSOR ZERO POINT

(a) Initialize the rotation angle sensor value and calibrate the torque sensor zero point (See page PS-13).

NEXT

5	RECONFIRM DTC

(a) Check for DTCs (See page PS-17).
Result

DTC Condition	Proceed to
DTC is not output	A
DTC C1511, C1512, or C1513 is output	B

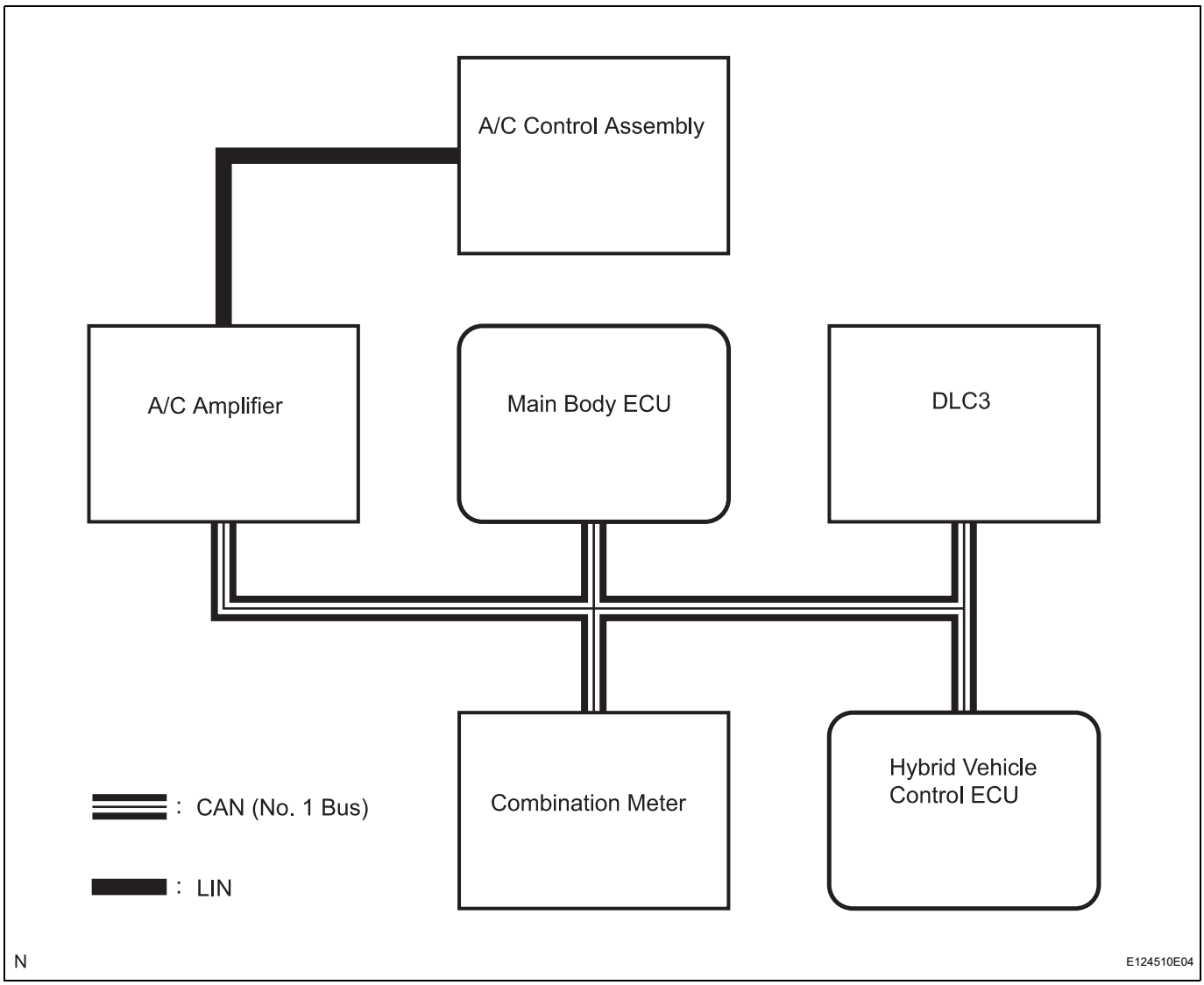
NOTICE:
If replacing the power steering link assembly, clear the rotation angle sensor calibration value, initialize the rotation angle sensor value, and calibrate the torque sensor zero point (See page PS-13).

B → **REPLACE POWER STEERING LINK ASSEMBLY (See page PS-58)**

A

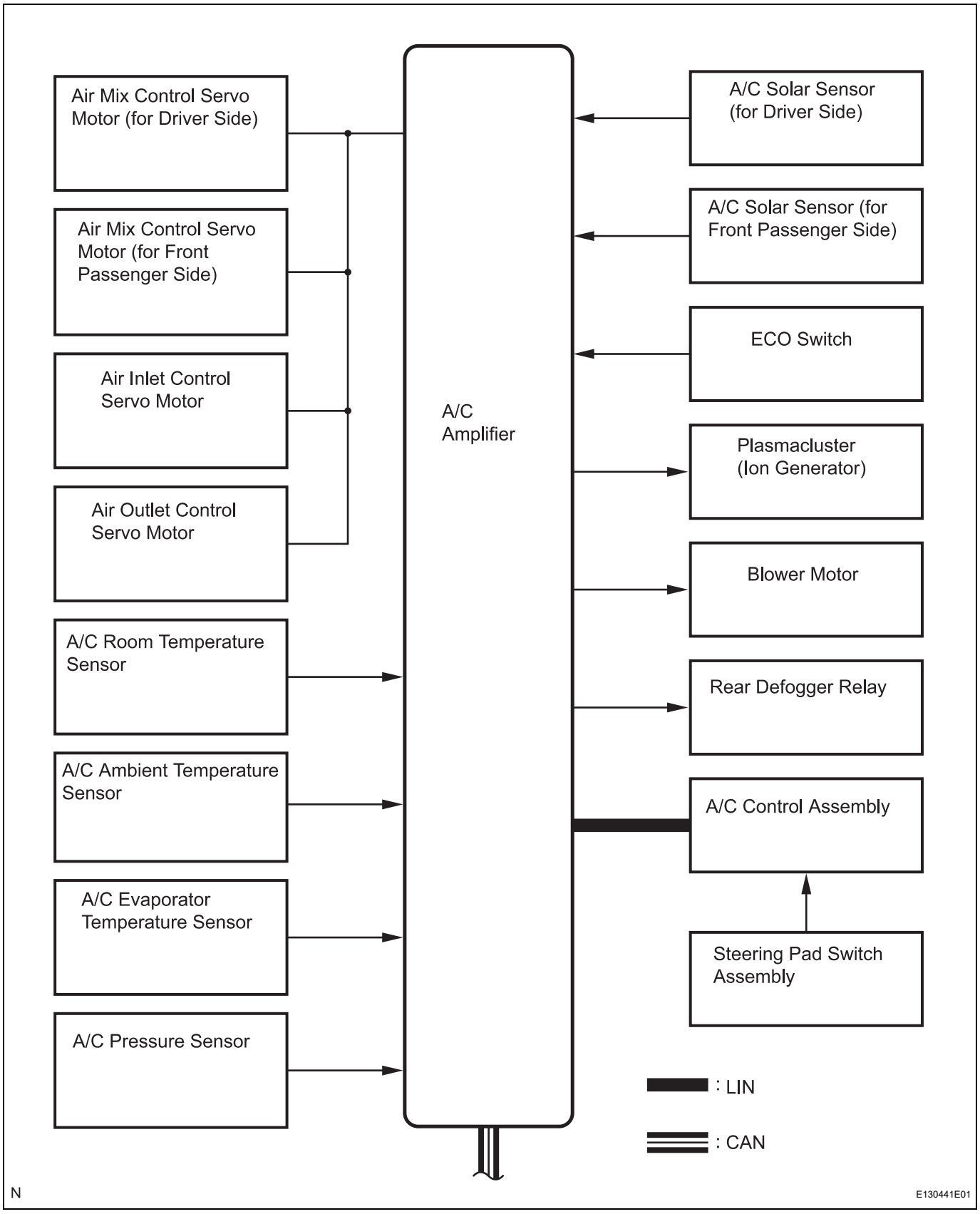
END

SYSTEM DIAGRAM

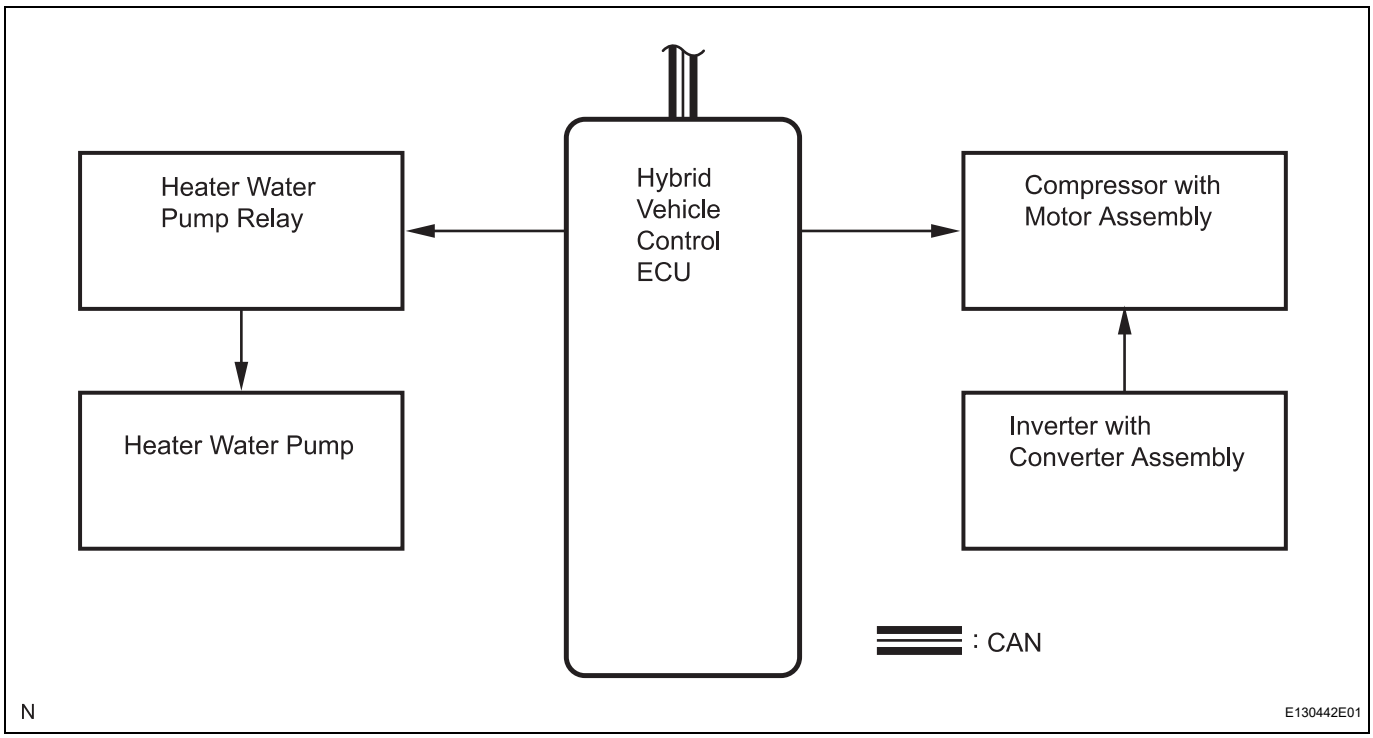


Transmitter	Receiver	Line	Signal
A/C Amplifier	Hybrid Vehicle Control ECU	CAN	Heater Idle Up Request Signal
			Engine ON Request Signal
			Outside Temperature Data
			Water Pump ON/OFF Request Signal
			Prior A/C Control Request Signal
			A/C Control State Signal
			Inlet State Signal
			Standby for Inverter Request Signal
			Electromotion Compressor Start Signal
			Electromotion Compressor Target Revolution Signal
A/C Amplifier	Combination Meter	CAN	Outside Temperature Data
A/C Amplifier	DLC3	CAN	Diagnostic Tool Response
A/C Amplifier	A/C Control Assembly	LIN	A/C Operating State Signal

Transmitter	Receiver	Line	Signal
Main Body ECU	A/C Amplifier	CAN	Auto Dimmer Signal
			Destination Package
			Vehicle Configuration (LHD/RHD) Information
Combination Meter	A/C Amplifier	CAN	Vehicle Speed Signal
Hybrid Vehicle Control ECU	A/C Amplifier	CAN	State of STB
			Compulsion Recycle Request Signal
			A/C Inverter and HV control ECU Communication Signal
			No Electrical Heater Request Signal
			A/C Inverter Main Voltage Signal
			A/C Inverter Output Signal
			Motor Overload Information
			Motor Start Information
			A/C Inverter Power Source Malfunction
			STB Wire Short
			State of STB
			A/C Inverter Temperature
			Battery Cooling Fan Voltage
			A/C Motor Revolution Signal
			A/C Input Power Signal
			A/C Motor Current Request
			A/C Inverter Voltage Signal
A/C Control Assembly	A/C Amplifier	LIN	A/C Operation Signal


Air Mix Control Servo Motor (for Driver Side)
Air Mix Control Servo Motor (for Front Passenger Side)
Air Inlet Control Servo Motor
Air Outlet Control Servo Motor
A/C Room Temperature Sensor
A/C Ambient Temperature Sensor
A/C Evaporator Temperature Sensor
A/C Pressure Sensor
A/C Amplifier
A/C Solar Sensor (for Driver Side)
A/C Solar Sensor (for Front Passenger Side)
ECO Switch
Plasmacluster (Ion Generator)
Blower Motor
Rear Defogger Relay
A/C Control Assembly
Steering Pad Switch Assembly
: LIN
: CAN
N
E130441E01

AC


Heater Water Pump Relay
Hybrid Vehicle Control ECU
Compressor with Motor Assembly
Heater Water Pump
Inverter with Converter Assembly
: CAN
N
E130442E01

SYSTEM DESCRIPTION

1. GENERAL

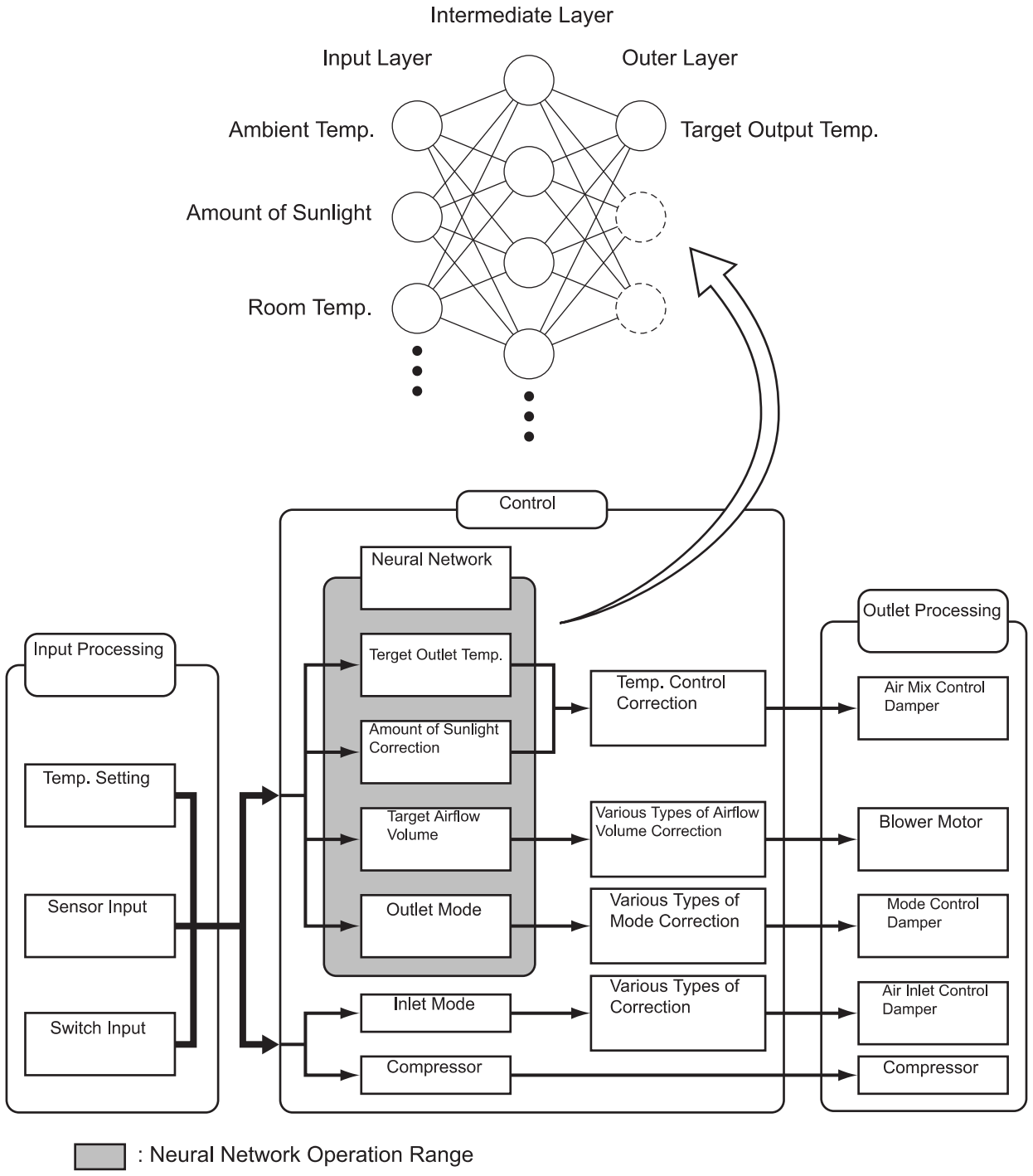
(a) The air conditioning system has the following controls:

Control	Outline
Neural Network Control	This control is capable of effecting complex control by artificially simulating the information processing method of the nervous system of living organisms in order to establish a complex input / output relationship that is similar to a human brain.
Outlet Air Temp. Control	Based on the temperature set at the temperature control switch, the neural network control calculates the outlet air temperature based on the input signals from various sensors.
	The temperature setting for the driver and front passenger are controlled independently in order to provide a separate vehicle interior temperatures for the right and left side of the cabin. Thus, air conditioning that accommodates the occupants' preferences has been realized.
Blower Control	Controls the blower motor in accordance with the airflow volume that has been calculated by the neural network control based on the input signals from various sensors.
Air Outlet Control	Automatically switches the air outlets in accordance with the outlet mode that has been calculated by the neural network control based on the input signals from various sensors.
	In accordance with the engine coolant temperature, outside air temperature, amount of sunlight, required blower volume, outlet temperature, and vehicle speed conditions, this control automatically switches the blower outlet to the FOOT / DEF mode to prevent the windows from becoming fogged when the outside air temperature is low.
Air Inlet Control	Automatically controls the air inlet control damper to achieve the calculated required outlet air temperature.
Electric Inverter Compressor Control	The A/C amplifier calculates the target speed of the compressor based on the target evaporator temperature (which is calculated by the room temperature sensor, outside temp. sensor, and the solar sensor) and the actual evaporator temperature that is detected by the evaporator temperature sensor in order to control the compressor speed.
	The A/C amplifier calculates the target evaporator temperature, which includes corrections based on the room temperature sensor, outside temp. sensor, the solar sensor, and evaporator temperature sensor. Accordingly, the A/C amplifier controls the compressor speed to an extent that would not inhibit the proper cooling performance or defogging performance.
PTC Heater Control	When the THS II system is operating (READY), and the blower motor is turned ON, the A/C amplifier turns ON the PTC heater if the conditions listed below are met. • Engine coolant temperature is below specified temperature. • Outside temperature is below specified temperature (DEF mode). • Tentative air mix damper opening angle is above the specified value (MAX HOT).
Electric Water Pump Control	When the blower motor is ON and the engine has been stopped by the THS II system control, the A/C amplifier turns ON the electric water pump in accordance with the judgment of the air mix damper opening.
ECO Mode Control	When the ECO switch is turned ON, the A/C amplifier limits the air conditioning system performance.
Rear Window Defogger Control	Operates the rear defogger and outside rear view mirror heaters on for 15 minutes to 60 minutes when the rear defogger button is pressed. Switches them off if the button is pressed again while they are operating.
Outside Temperature Indication Control	Calculates the outside temperature using signals transmitted by the outside temperature sensor. Calculated values are corrected by the A/C amplifier and then indicated on the multi-information display.
Self-Diagnosis	A DTC (Diagnostic Trouble Code) is stored in the memory when the A/C amplifier detects a problem with the air conditioning system.

2. NEURAL NETWORK CONTROL

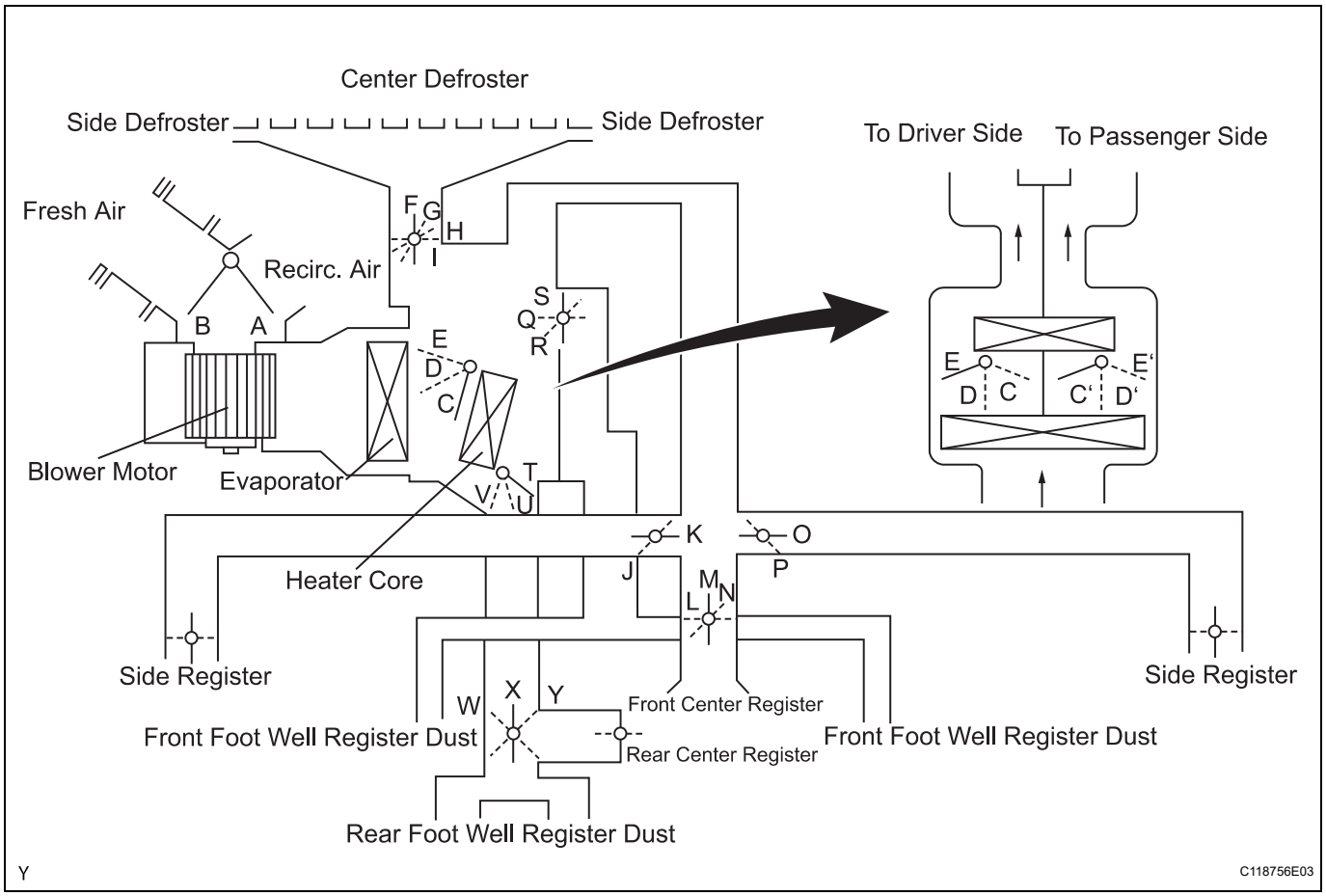
(a) In previous automatic air conditioning systems, the A/C amplifier determined the required outlet air temperature and blower air volume in accordance with the calculation formula that has been obtained based on information received from the sensors. However, because the senses of a person are rather complex, a given temperature is sensed differently, depending on the environment in which the person is situated. For example, a given amount of solar radiation can feel comfortably warm in a cold climate, or extremely uncomfortable in a hot climate. Therefore, as a technique for effecting a higher level of control, a neural network has been adopted in the automatic air conditioning system. With this technique, the data that has been collected under varying environmental conditions is stored in the A/C amplifier. The A/C amplifier can then effect control to provide enhanced air conditioning comfort.

(b) The neural network control consists of neurons in the input layer, intermediate layer, and output layer. The input layer neurons process the input data of the outside temperature, the amount of sunlight, and the room temperature based on the outputs of the switches and sensors, and output them to the intermediate layer neurons. Based on this data, the intermediate layer neurons adjust the strength of the links among the neurons. The sum of these is then calculated by the output layer neurons in the form of the required outlet temperature, solar correction, target airflow volume, and outlet mode control volume. Accordingly, the A/C amplifier controls the servo motors and blower motor in accordance with the control volumes that have been calculated by the neural network control.


Intermediate Layer
Input Layer
Outer Layer
Ambient Temp.
Amount of Sunlight
Room Temp.
Target Output Temp.
Control
Neural Network
Terget Outlet Temp.
Amount of Sunlight Correction
Target Airflow Volume
Outlet Mode
Inlet Mode
Compressor
Input Processing
Temp. Setting
Sensor Input
Switch Input
Temp. Control Correction
Various Types of Airflow Volume Correction
Various Types of Mode Correction
Various Types of Correction
Outlet Processing
Air Mix Control Damper
Blower Motor
Mode Control Damper
Air Inlet Control Damper
Compressor
: Neural Network Operation Range
H
E116942E01

3. MODE POSITION AND DAMPER OPERATION

(a) Mode Position and Damper Operation



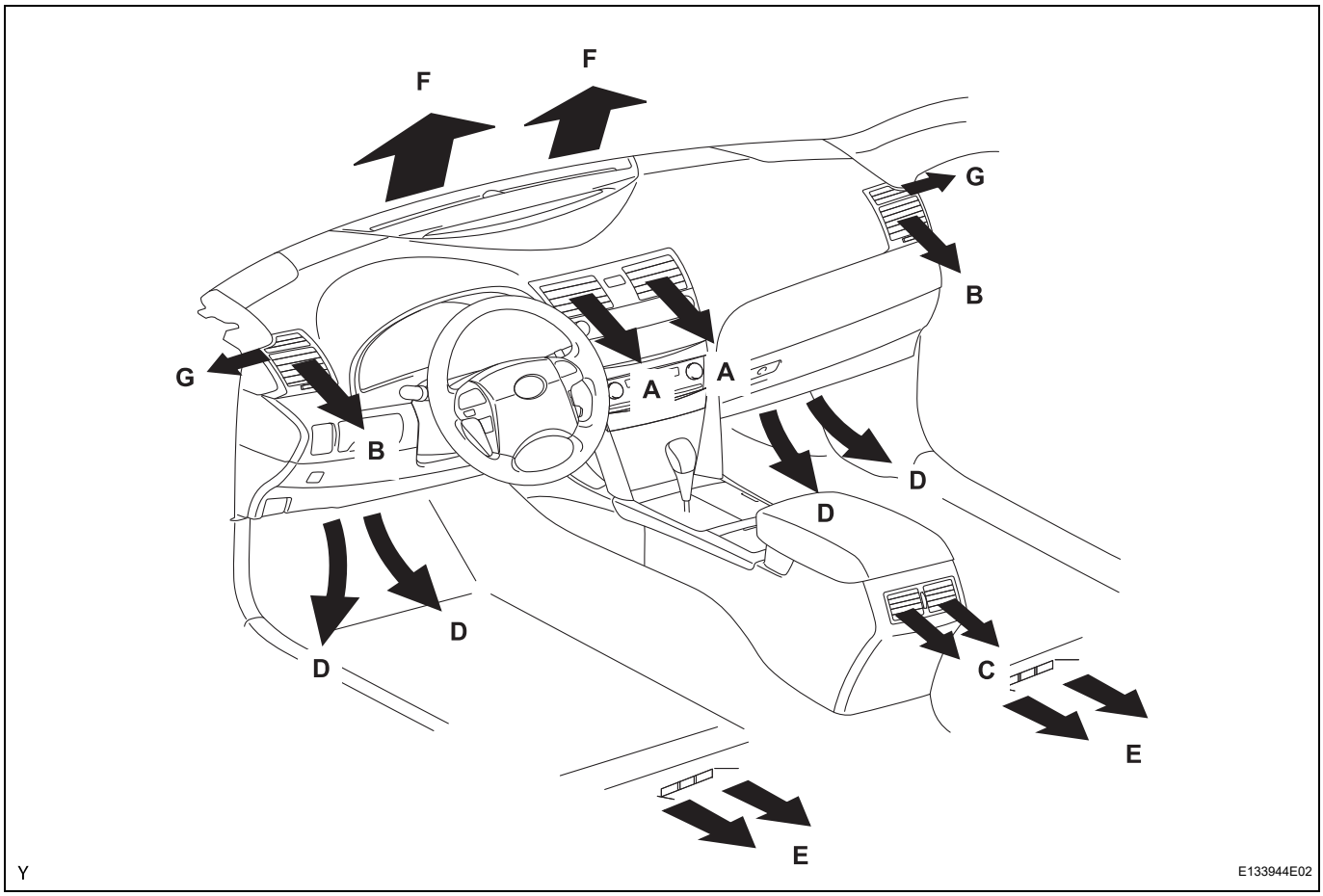
Functions of Main Dampers:

Control Damper	Operation Position	Damper Position	Operation
Air Inlet Control Damper	FRESH	A	Brings in fresh air.
	RECIRC	B	Recirculates internal air.
Air Mix Control Damper	MAX COLD to MAX HOT Temperature Setting	C - D - E (C' - D' - E') T - U - V	Varies the mixture ratio of the fresh air and the recirculation air in order to regulate the temperature continuously from HOT to COLD.

Control Damper	Operation Position	Damper Position	Operation
Air Outlet Control Damper	DEF	F, J, L, P, S, Y	Defrosts the windshield through the center defroster, side defroster, and side register.
	FOOT / DEF	G, J, L, P, Q, X	Defrosts the windshield through the center defroster, side defroster, side register, and rear center register, while air is also blown out from the front and rear foot well register ducts.
	FOOT	H, J, L, P, Q, X	Air blows out of the foot well register dust, and side register. In addition, air blows out slightly from the center defroster and side defroster.
	BI-LEVEL	I, K, N, O, R, X	Air blows out of the front and rear center registers, side register and front and rear foot well register ducts.
	FACE	I, K, M, O, S, W	Air blows out of the front and rear center registers, and side register.

4. AIR OUTLETS AND AIRFLOW VOLUME

(a) Air Outlets and Airflow Volume



INDICATION (MODE)	SELECTION (Auto / Manual)	FACE			FOOT		DEF	
		CTR	SIDE	RR	FR	RR	CTR	SIDE
		A	B	C	D	E	F	G

AC

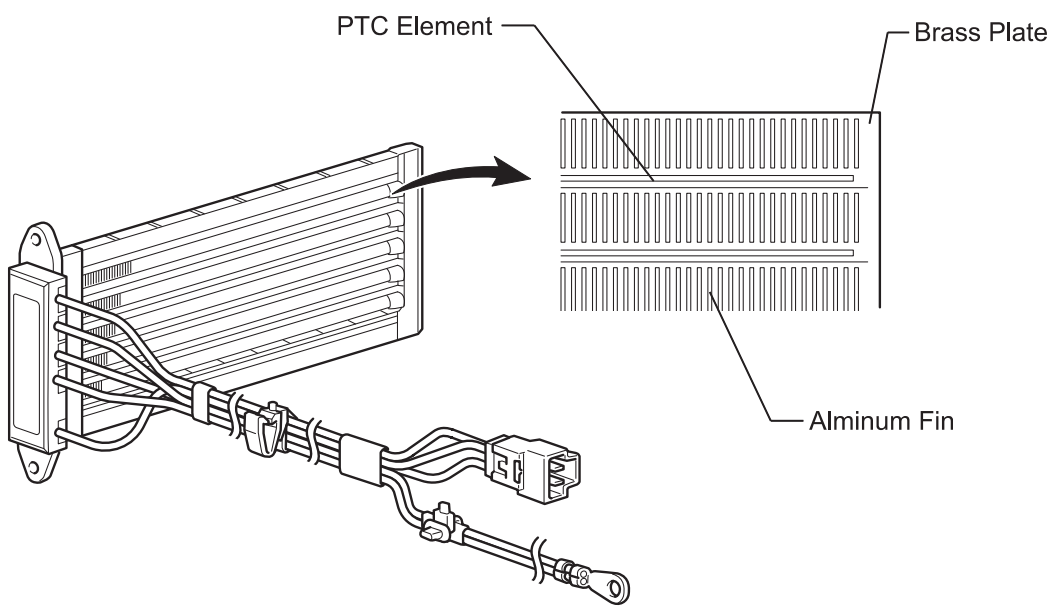
FACE	○ / ○	◯	◯	◯	—	—	—	—
B/L-U*1	○ / ○	○	○	○	○	○	—	—
B/L-L*2	○ / -	○	○	○	◯	◯	—	—
FOOT-F*3	○ / -	—	○	○	◯	○	○	○
FOOT-R*4	○ / ○	—	○	○	◯	◯	○	○
FOOT-D*5	○ / -	—	○	○	○	○	○	○
F/D	○ / ○	—	○	○	◯	◯	○	○
DEF	○ / ○	—	○	—	—	—	◯	◯

The size of the circle ○ indicates the proportion of airflow volume.
*1: Greater airflow volume at the upper area
*2: Greater airflow volume at the lower area
*3: Greater airflow volume at the front
*4: Greater airflow volume at the rear
*5: Greater airflow volume at the defroster

5. PTC HEATER

(a) The PTC heater is located above the heater core in the air conditioning unit.

(b) The PTC heater consists of a PTC element, aluminum fin, and brass plate. When current is applied to the PTC element, it generates that to warm the air that passes through the unit.



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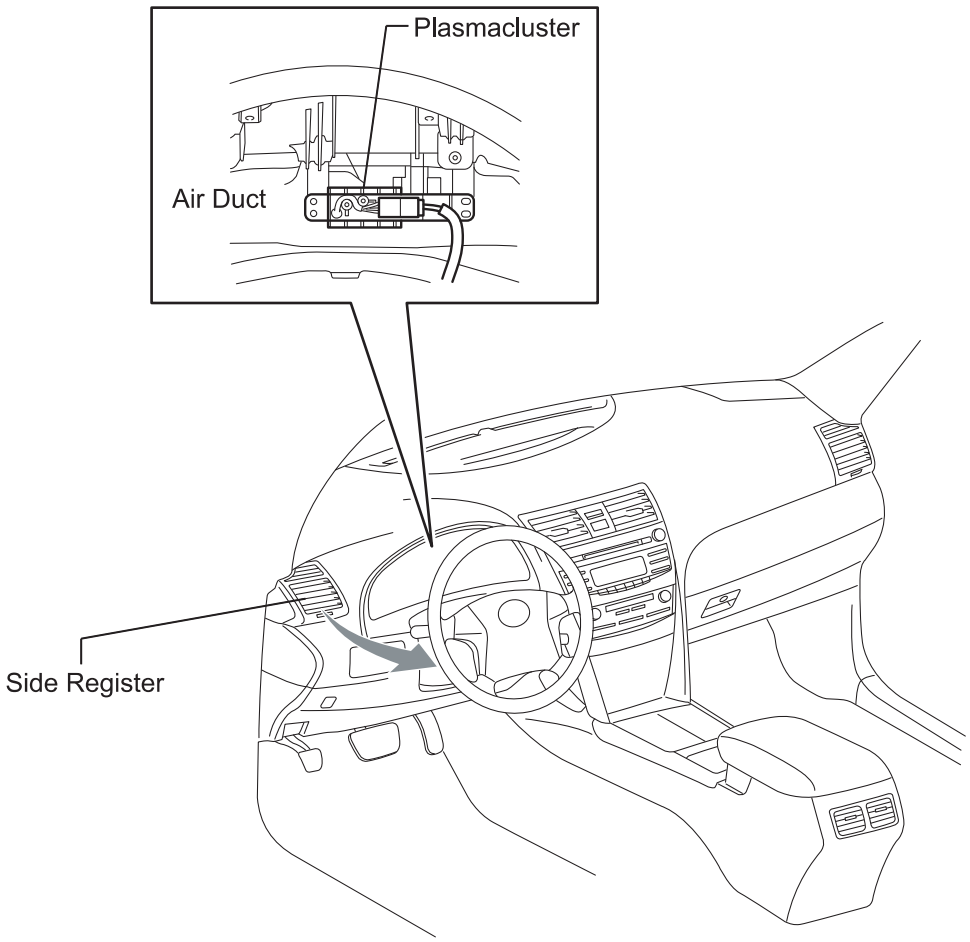
6. PLASMACLUSTER ION GENERATOR CONTROL

(a) General:



(1) A Plasmacluster ion generator is provided inside the air duct of the side register on the driver seat side to improve the air quality and comfort in the cabin.

(2) This generator is controlled by the A/C amplifier and operates in conjunction with the blower motor.

NOTICE:

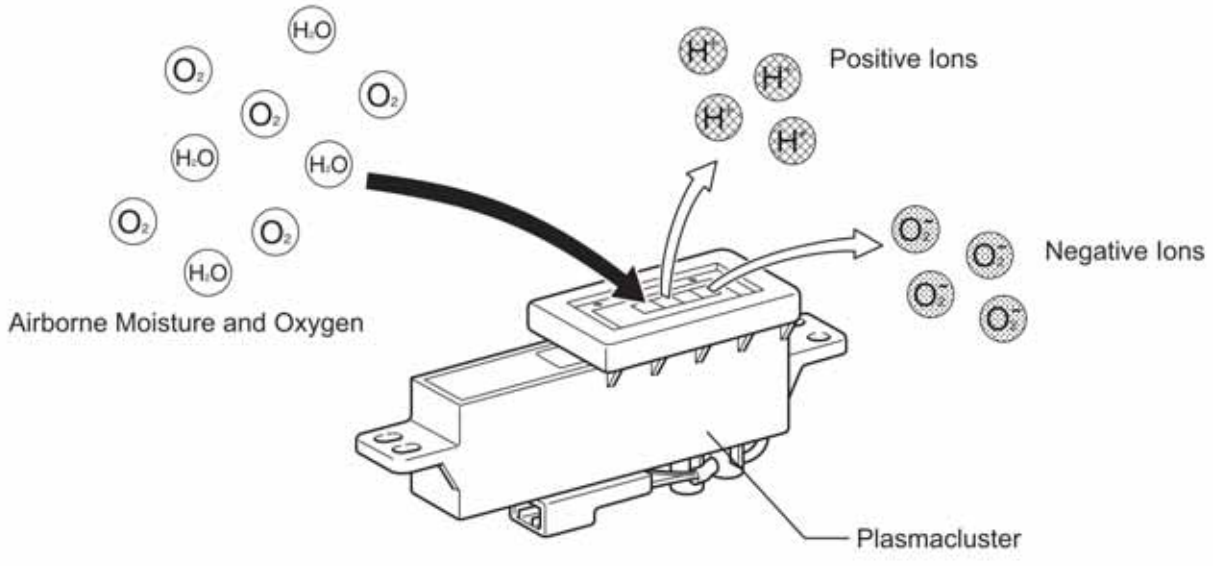
- **The Plasmacluster ion generator uses a high voltage, which is hazardous. Therefore, if the Plasmacluster ion generator requires repairs, be sure to have them done at a TOYOTA dealer.**

- **Do not apply any type of spray (such as a cleaning solvent or hair spray) or stick any foreign matter into the Plasmacluster ion outlet, as this could cause improper operation or a malfunction.**
- **After use, dust may accumulate around the side register on the driver seat side. If this occurs, press the OFF switch on the heater control panel to stop the blower motor before cleaning the area.**
- **It is normal for the Plasmacluster ion generator to emit a slight sound during operation. This sound is created when electrons collide with the electrode while Plasmacluster ions are being generated.**

HINT:

Plasmacluster™, plasmacluster, and plasmacluster ions are a trademark of the SHARP Corporation.

(b) Operation:



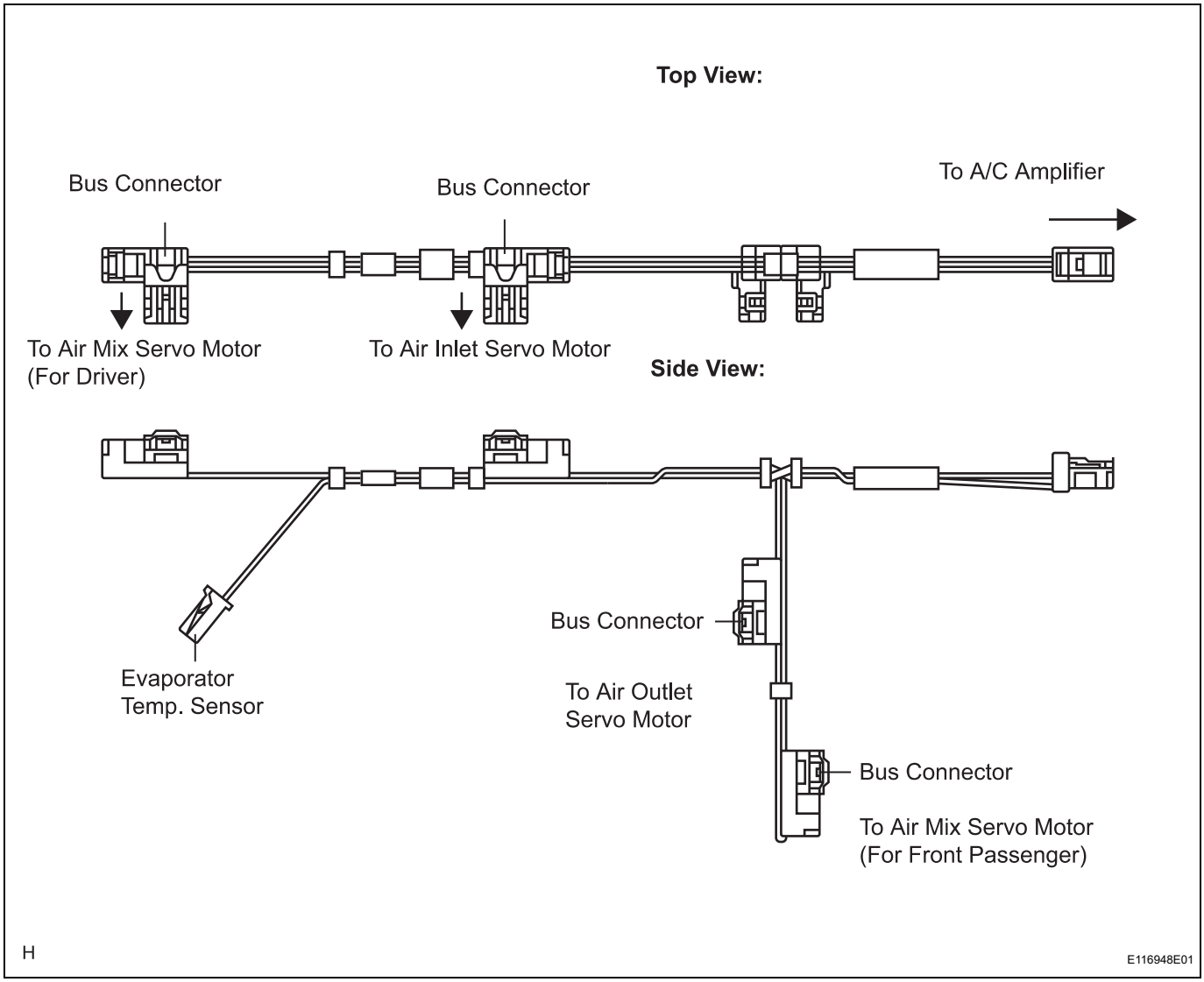
(1) The Plasmacluster ion generator produces positive and negative ions from the water molecules (H2O) and oxygen molecules (O2) in the air, and emits them into the air. These ions reduce airborne germs.

7. BLOWER MOTOR

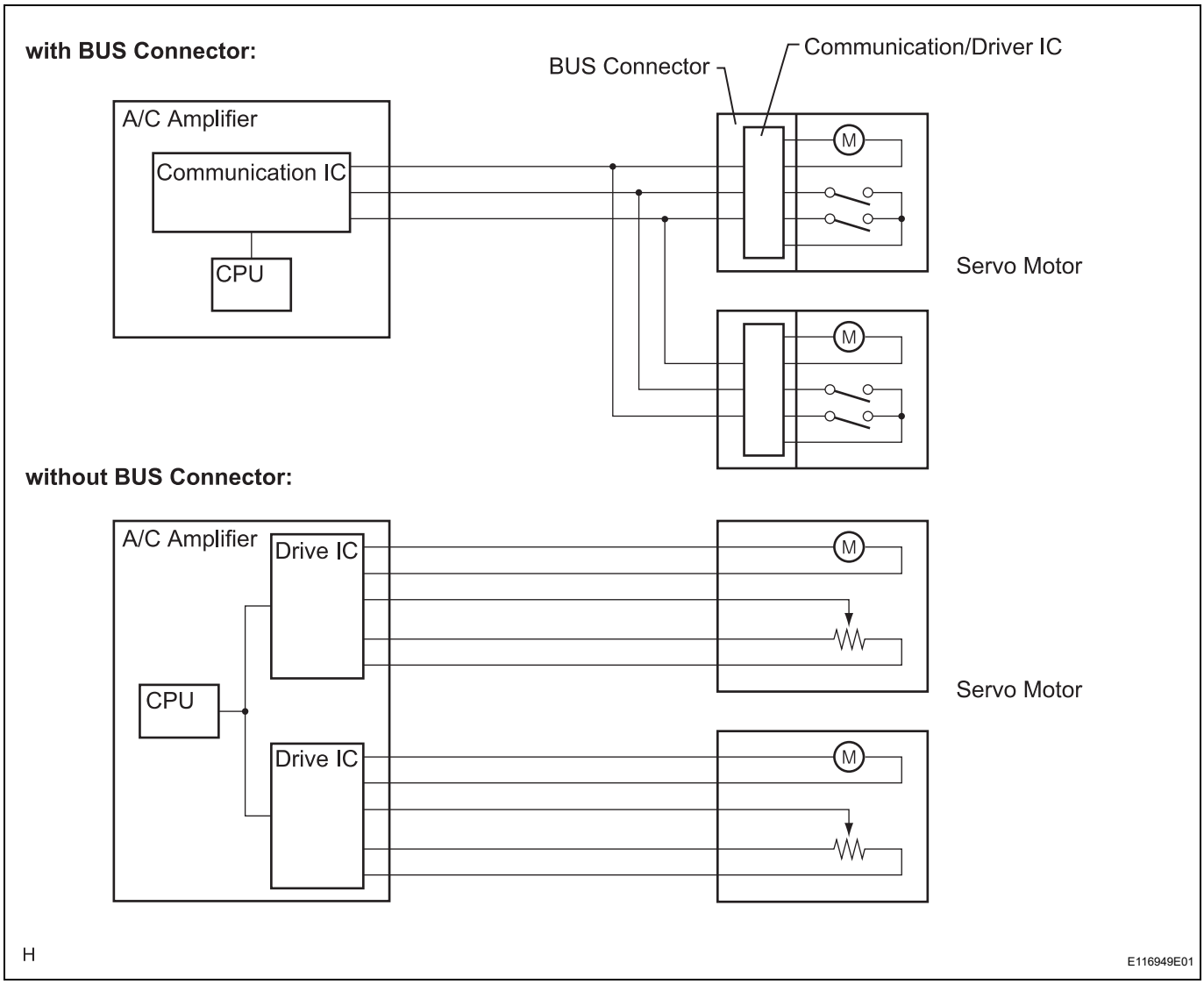
(a) The blower motor has a built-in blower controller, and is controlled with duty control from the A/C amplifier.

8. BUS CONNECTOR

(a) A BUS connector is used in the wire harness connection that connects the servo motor from the A/C amplifier.

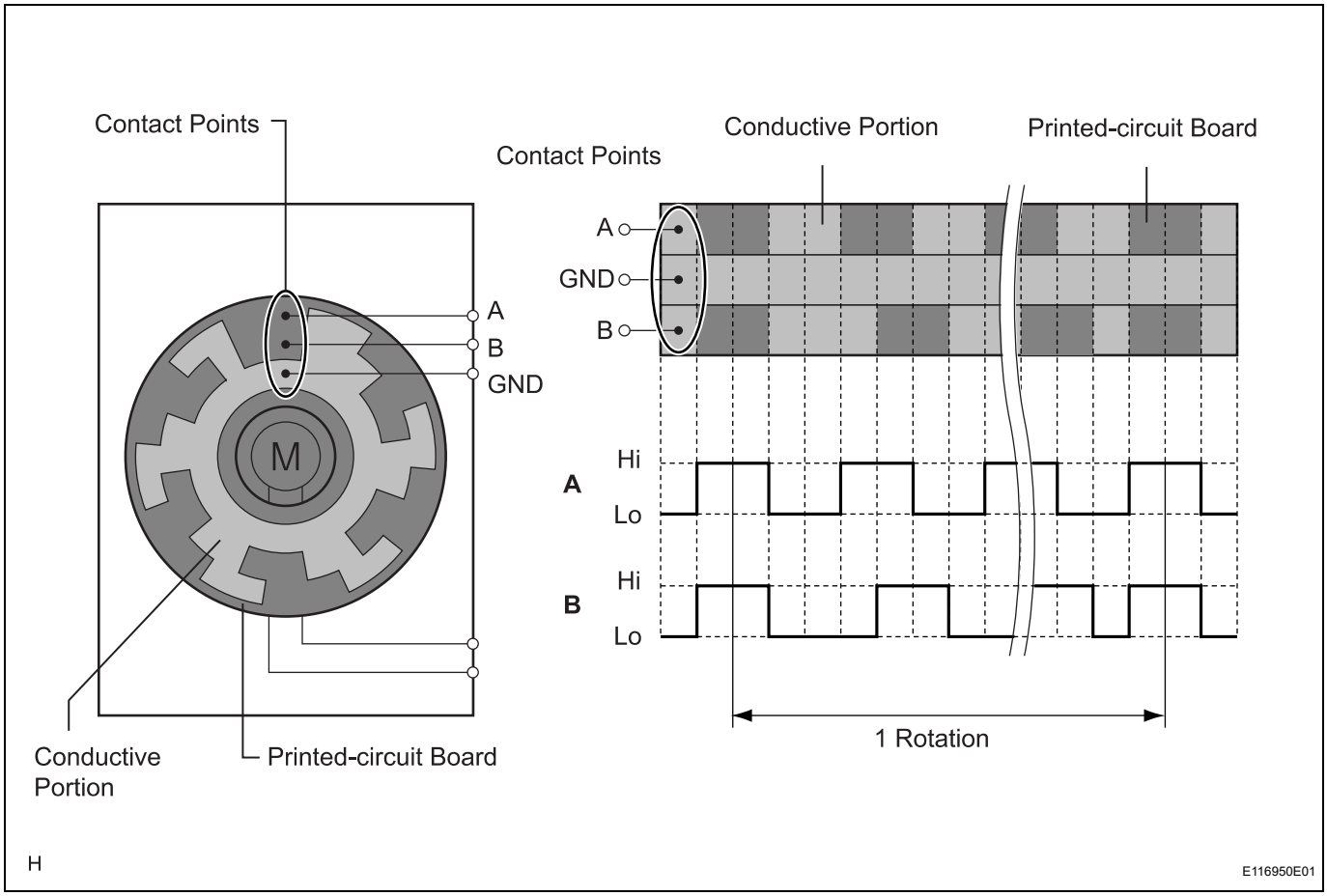


(b) The BUS connector has a built-in communication/ driver IC which communicates with each servo motor connector, actuates the servo motor, and has a position detection function. This enables bus communication for the servo motor wire harness, for a more lightweight construction and a reduced number of wires.



9. SERVO MOTOR

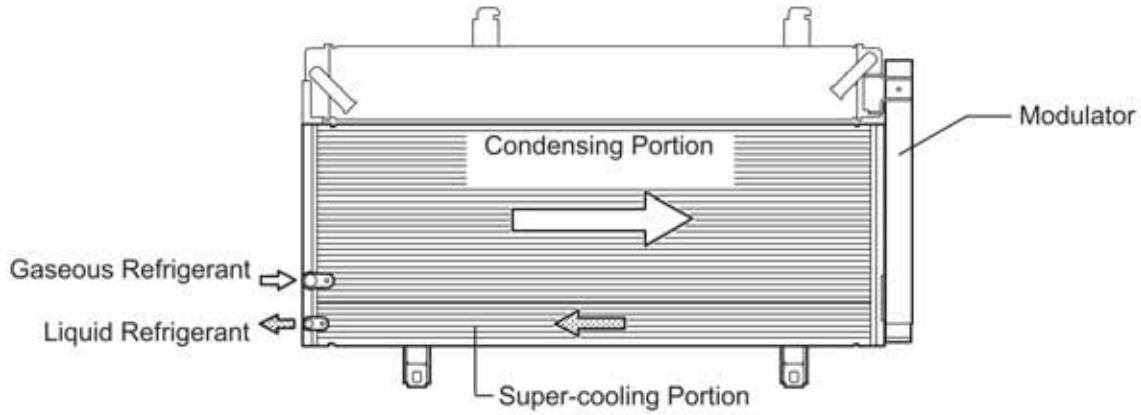
(a) The pulse pattern type servo motor consists of a printed circuit board and servo motor. The printed circuit board has three contact points, and transmits to the A/C amplifier two ON-OFF signals for the difference of the pulse phase. The BUS connector detects the damper position and movement direction with this signal.



10. CONDENSER

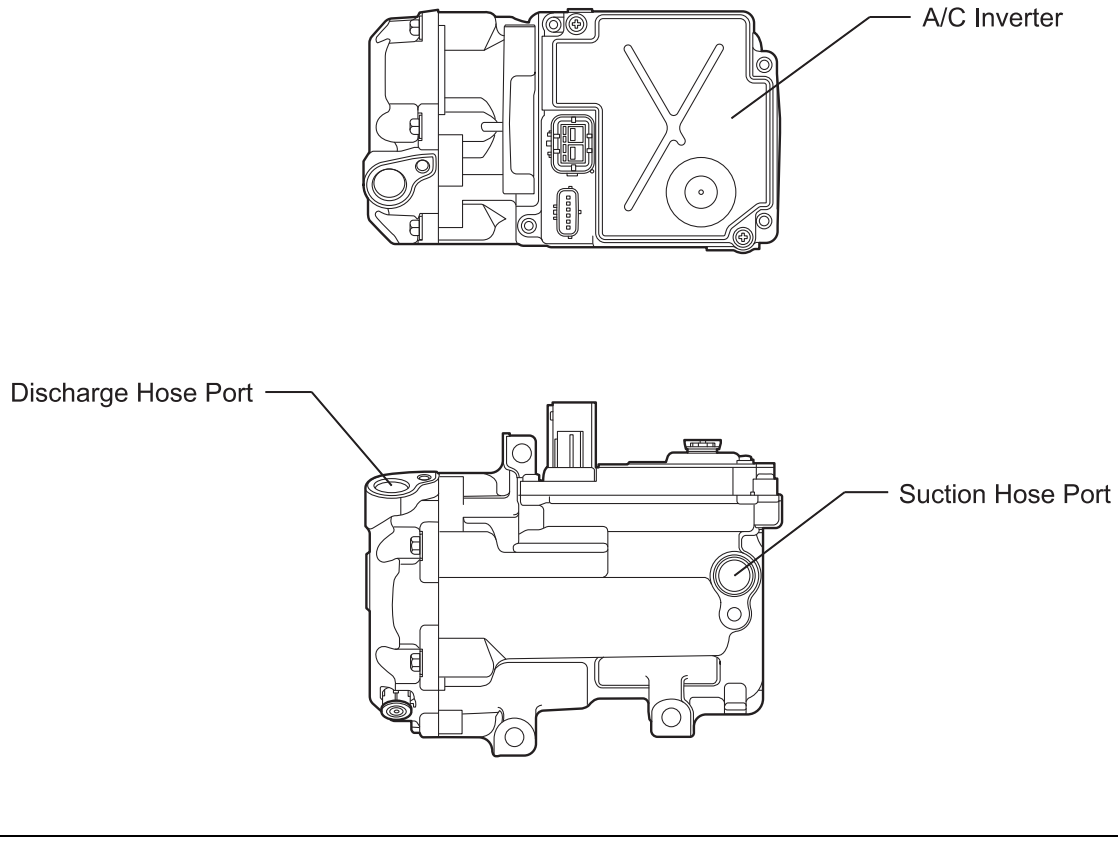
(a) A MF (Multi-Flow) type condenser is used. The condenser consists of two cooling portions: a condensing portion and a super-cooling portion, and gas-liquid separator (modulator) are integrated together. This condenser uses a sub-cool cycle that offers excellent heat-exchange performance.

(b) In the sub-cool cycle, after the refrigerant passes through the condensing portion of the condenser, both the liquid refrigerant and the gaseous refrigerant that could not be liquefied are cooled again in the super-cooling portion. Thus, the refrigerant is sent to the evaporator in an almost completely liquefied state.



11. A/C COMPRESSOR

(a) General



HINT:
In order ensure the proper insulation of the internal high-voltage portion of the compressor and the compressor housing, this vehicle has adopted a compressor oil (ND11) with a high level of insulation performance. Therefore, never use a compressor oil other than the ND11 type compressor oil or its equivalent.

(1) Along with the installation of the hybrid unit on this vehicle, an ES27 electric inverter compressor that is driven by a motor is used. The basic construction and operation of this compressor are the same as the ordinary scroll compressor, except that it is driven by an electric motor.
(2) The Air Conditioning (A/C) inverter is integrated with the compressor.
(3) The electric motor is actuated by 3-phase alternating current (244.8 V) supplied by the A/C inverter. As a result, the air conditioning control system on this vehicle is actuated without depending on the operation of the engine, thus realizing a comfortable air conditioning system and low fuel consumption.
(4) Due to the use of an electric inverter compressor, the compressor speed can be controlled at the required speed calculated by the A/C amplifier. Thus, the cooling and dehumidification performance and power consumption have been optimized.
(5) Low-moisture permeation hoses are used for the suction and discharge hoses at the compressor in order to minimize the entry of moisture into the refrigeration cycle.
(6) The compressor uses high-voltage alternating current. If a short or open circuit occurs in the compressor wiring harness, the hybrid vehicle control ECU will cut off the A/C inverter circuit in order to stop the power supply to the compressor.

(b) Compressor Speed Control

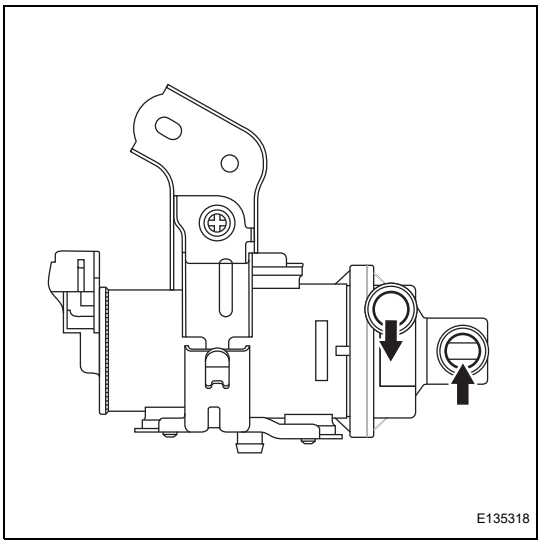
(1) The A/C amplifier calculates the target compressor speed based on the target evaporator temperature (calculated from the room temperature sensor, outside temp. sensor, and solar sensor) and the actual evaporator temperature detected by the evaporator temperature sensor. Then, the A/C amplifier transmits the target speed to the hybrid vehicle control ECU. The hybrid vehicle control ECU controls the A/C inverter based on the target speed data in order to control the compressor to a speed that suits the operating condition of the air conditioning system.

(2) The A/C amplifier calculates the target evaporator temperature, which includes corrections based on the room temperature sensor, outside temp. sensor, solar sensor, and evaporator temperature sensor. Accordingly, the A/C amplifier controls the compressor speed to an extent that does not inhibit the proper cooling performance or defogging performance. As a result, comfort and low fuel consumption can be realized.

12. ELECTRIC WATER PUMP

(a) This vehicle uses an electric water pump for air conditioning. This provides a stable heater performance even if the engine is stopped because of a function of the THS-II system.

(b) This vehicle uses a new type of electrical water pump in which the water flow resistance has been reduced.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13. ROOM TEMPERATURE SENSOR

(a) The room temp. sensor detects the room temperature based on changes in the resistance of its built-in thermistor and sends a signal to the A/C amplifier.

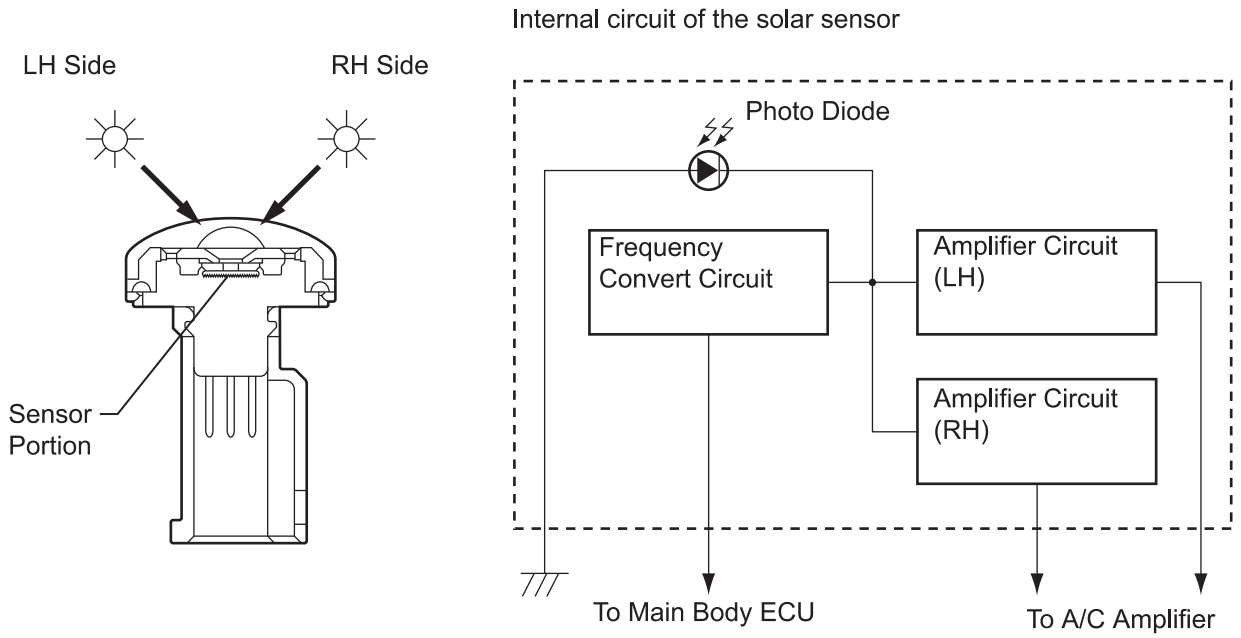
14. AMBIENT TEMPERATURE SENSOR

(a) The outside temp. sensor detects the outside temperature based on changes in the resistance of its built-in thermistor and sends a signal to the A/C amplifier.

15. SOLAR SENSOR

(a) The solar sensor consists of a photo diode, two amplifier circuits for the solar sensor, and frequency converter circuit for the light control sensor.

(b) A solar sensor detects (in the form of changes in the current that flows through the built-in photo diode) the changes in the amount of sunlight from the LH and RH sides (2 directions) and outputs these sunlight strength signals to the A/C amplifier.



16. EVAPORATOR TEMPERATURE SENSOR

(a) The evaporator temperature sensor detects the temperature of the cool air immediately past the evaporator in the form of resistance changes, and outputs it to the A/C amplifier.

17. A/C PRESSURE SENSOR

(a) The A/C pressure sensor detects the refrigerant pressure and outputs it to the A/C amplifier in the form of voltage changes.

18. ECO MODE CONTROL

NOTICE:

- **ECO mode control is performed only when the blower motor is ON. When the ECO switch is turned ON while the blower motor is OFF, the ECO switch indicator light and the heater control panel LCD display illuminate, but ECO mode control is not performed.**

- **During cooling under ECO mode control, the cabin temperature is maintained at 25°C (77°F) even if the set temperature is below 25°C (77°F). Since the power consumption of the electric inverter compressor is limited under ECO mode control, this does not indicate a malfunction. To decrease the cabin temperature to below 25°C (77°F), the MAX COLD temperature (18°C (64.4°F)) must be selected or ECO mode control must be canceled by turning the ECO switch OFF.**

(a) General

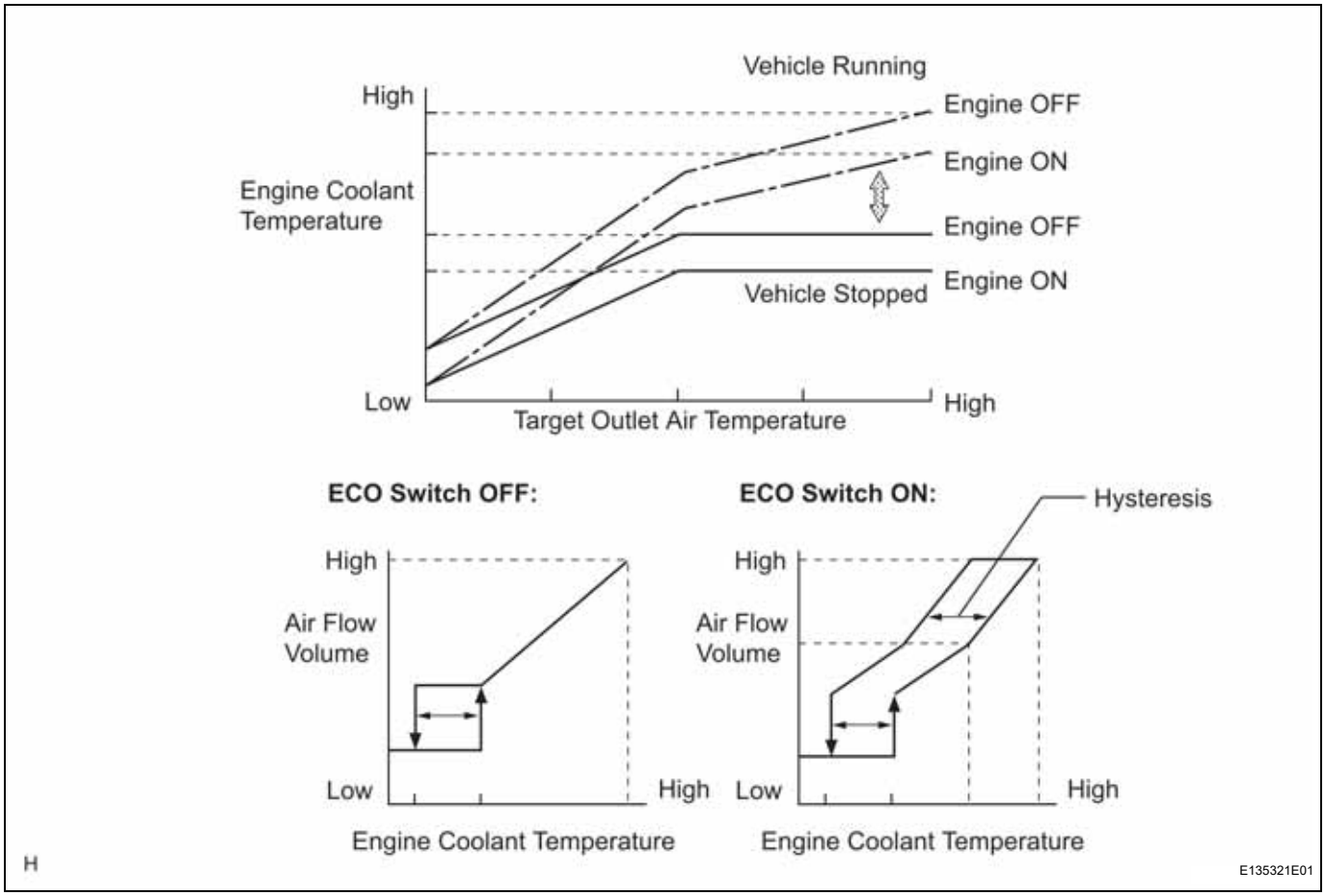
(1) Eco mode control limits the air conditioning system performance during heating and cooling and increases the amount of engine OFF time, thus improving the fuel economy.

(2) Eco mode control is activated by pressing the momentary type ECO switch on the instrument panel. "ECO" is displayed on the heater control panel LCD during this control.

(3) Eco mode control during heating and cooling, and its cancel conditions are shown in the table below.

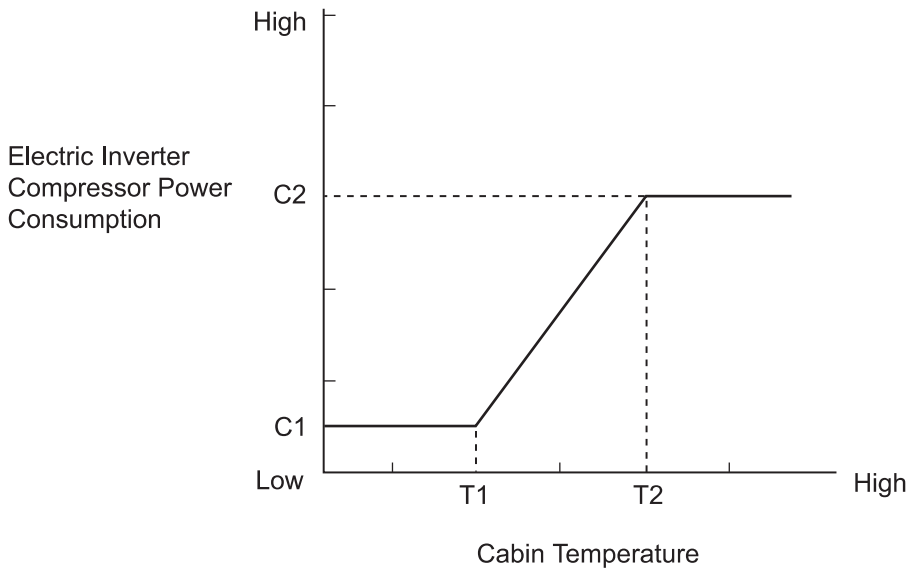
ECO Mode Control		Eco Mode Cancel Conditions
Heating Mode	• Stops PTC heater operation. • Increases the amount of engine OFF time. • Prohibits BI-LEVEL mode during AUTO operation.	• DEF or FOOT DEF mode is selected. • MAX HOT temp. setting • ECO switch OFF
Cooling Mode	Limits power consumption by the electric inverter compressor based on the cabin temperature.	• MAX COLD temp. setting • ECO switch OFF

(b) Heating Mode



(1) The required engine coolant temperature when starting the engine when the vehicle is stopped differs from that when the vehicle is running. Therefore, the fuel economy has been improved by increasing the amount of engine-off time when the vehicle is stopped.
(2) When the ECO switch is turned ON during heating, the A/C amplifier stops the PTC heater operation. Therefore, it takes a longer time to reach the set temperature than while the ECO switch is OFF.
(3) Engine coolant temperatures fluctuate greatly between when the vehicle is running and the vehicle is stopped. The blower level changes accordingly.
(4) The hysteresis, which is used while the ECO switch is ON, is provided to prevent the blower level from hunting due to fluctuations in the engine coolant temperature.

(c) Cooling Mode



(1) When the ECO switch is turned ON during cooling, the A/C amplifier limits the power consumption of the electric inverter compressor in accordance with the cabin temperature.
(2) The A/C amplifier does not limit the power consumption very much (C2 shown in the graph below), and prioritizes decreasing the cabin temperature when the cabin temperature is high (T2 or above). When the cabin temperature decreases to T1 or below, the A/C amplifier limits the power consumption of the electric inverter compressor C1 and restrains the cooling performance. This prevents the SOC (state of charge) of the HV battery from decreasing and increases the amount of engine OFF time, improving the fuel economy.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the air conditioning system.
- *: Use the intelligent tester.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 INSPECT BATTERY VOLTAGE

(a) Inspect the battery voltage.
Standard voltage:
11 to 14 V
If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

3 CHECK COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM*

(a) Use the intelligent tester to check if the CAN Communication System is functioning normally.
Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → Go to CAN COMMUNICATION SYSTEM

A

4 CHECK FOR DTC*

(a) Check for DTCs and note any codes that are output.
HINT:
Refer to the DTC CHECK / CLEAR (See page AC-39).
(b) Delete the DTCs.
(c) Recheck for DTCs. Based on the DTCs output above, try to force output of the A/C system DTC by simulating the operation indicated by the DTC.
Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B → Go to step 7

AC

A

5	PROBLEM SYMPTOMS TABLE

(a) Refer to the PROBLEM SYMPTOMS TABLE (See page AC-32).

Result

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B → Go to step 7

A

6	OVERALL ANALYSIS AND TROUBLESHOOTING*

(a) ACTUATOR CHECK (See page AC-50)
(b) DATA LIST / ACTIVE TEST (See page AC-45)
(c) TERMINALS OF ECU (See page AC-34)
(d) On-vehicle Inspection
(e) Inspection

NEXT

7	ADJUST, REPAIR OR REPLACE

NEXT

END

CUSTOMIZE PARAMETERS

HINT:
The following items can be customized.
NOTICE:

- **When the customer requests a change in a function, first make sure that the function can be customized.**
- **Be sure to make a note of the current settings before customizing.**
- **When troubleshooting a function, first make sure that the function is set to the default setting.**

AIR CONDITIONER:

DISPLAY (ITEM)	DEFAULT	CONTENTS	SETTING
SET TEMP SHIFT (Set Temperature Shift)	NORMAL	To shift the temperature against the displayed temperature	+2 C / +1 C / NORMAL / -1 C / -2 C
AIR INLET MODE (Air Inlet Mode)	AUTO	In case of turning the A/C ON when you desire to make the compartment cool down quickly, this is the function to change the mode automatically to RECIRCULATION mode	MANUAL / AUTO
COMPRESSOR MODE (Compressor Mode)	AUTO	Function to turn the A/C ON automatically by pressing the AUTO button when the blower is ON and the A/C is OFF	MANUAL / AUTO
COMPRS / DEF OPER (Compressor / Air Inlet DEF Operation)	LINK	Function to turn the A/C ON automatically linked with the FRONT DEF button when the A/C is OFF	NORMAL / LINK
EVAP CTRL (Evaporator Control)	AUTO	Function to set the evaporator control to the AUTOMATIC position (AUTO) to save power, or to the coldest position (MANUAL) to dehumidify the air and to prevent the windows from fogging up	MANUAL / AUTO
FOOT / DEF MODE (Foot / DEF Auto Mode)	ON	Function to turn the airflow from FOOT/DEF ON automatically when AUTO MODE is ON	OFF / ON
AUTO BLOW UP (Foot / DEF Automatic Blower Up Function)	ON	Function to change the blower level automatically when the defroster is ON	OFF / ON
AMBIENT TMP SFT (Ambient Temperature Shift)	NORMAL	Function to shift the ambient temperature against the displayed ambient temperature	+3 C / +2 C / +1 C / NORMAL / -1 C / -2 C / -3 C

PROBLEM SYMPTOMS TABLE

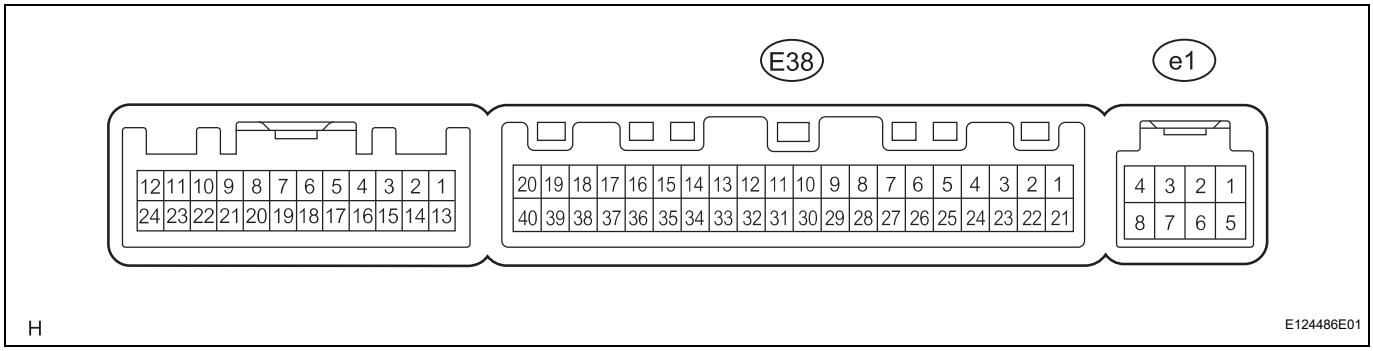
AIR CONDITIONING SYSTEM:

Symptom	Suspected Area	See page
All functions of the A/C system do not operate	1. IG power source circuit	AC-158
	2. Back-up power source circuit	AC-161
	3. Heater control panel power source circuit	AC-133
	4. LIN communication circuit	AC-163
	5. Steering pad switch circuit	AC-149
	6. A/C control assembly	AC-257
	7. A/C amplifier	AC-268
Air Flow Control: No blower operation	1. Blower motor circuit	AC-127
	2. Heater control panel power source circuit	AC-133
	3. LIN communication circuit	AC-163
	4. A/C control assembly	AC-257
	5. A/C amplifier	AC-268
Air Flow Control: No blower control	1. Blower motor circuit	AC-127
	2. Heater control panel power source circuit	AC-133
	3. LIN communication circuit	AC-163
	4. A/C control assembly	AC-257
	5. A/C amplifier	AC-268
Air Flow Control: Insufficient air flow	1. Blower motor circuit	AC-127
	2. A/C amplifier	AC-268
Temperature Control: No cool air comes out	1. Refrigerant volume	-
	2. Refrigerant pressure	AC-165
	3. Pressure switch circuit	AC-69
	4. Air mix control servo motor circuit (Driver side)	AC-86
	5. Air mix control servo motor circuit (Passenger side)	AC-78
	6. Evaporator temperature sensor circuit	AC-60
	7. Room temperature sensor circuit	AC-52
	8. Ambient temperature sensor circuit	AC-56
	9. Heater control panel power source circuit	AC-133
	10. LIN communication circuit	AC-163
	11. Expansion valve	AC-195
	12. A/C control assembly	AC-257
	13. A/C amplifier	AC-268
	14. Engine wire No. 4	HV-563
	15. Compressor with motor assembly	AC-229
	16. Inverter with converter assembly	HV-559
	17. Hybrid vehicle control ECU	HV-570
Temperature Control: No warm air comes out	1. Air mix control servo motor circuit (Driver side)	AC-86
	2. Air mix control servo motor circuit (Passenger side)	AC-78
	3. Evaporator temperature sensor circuit	AC-60
	4. Room temperature sensor circuit	AC-52
	5. Ambient temperature sensor circuit	AC-56
	6. A/C amplifier	AC-268

Symptom	Suspected Area	See page
Temperature Control: Output air is warmer or cooler than the set temperature or response is slow.	1. Refrigerant volume	-
	2. Refrigerant pressure	AC-165
	3. Solar sensor circuit (Driver side)	AC-73
	4. Solar sensor circuit (Passenger side)	AC-64
	5. Room temperature sensor circuit	AC-52
	6. Ambient temperature sensor circuit	AC-56
	7. Air mix control servo motor circuit (Driver side)	AC-86
	8. Air mix control servo motor circuit (Passenger side)	AC-78
	9. ECO switch circuit	AC-154
	10. Radiator unit sub-assembly	AC-195
	11. Expansion valve	AC-195
	12. A/C amplifier	AC-268
Temperature Control: No temperature control (only Max. cool or Max. warm)	1. Air mix control servo motor circuit (Driver side)	AC-86
	2. Air mix control servo motor circuit (Passenger side)	AC-78
	3. Room temperature sensor circuit	AC-52
	4. Ambient temperature sensor circuit	AC-56
	5. Evaporator temperature sensor circuit	AC-60
	6. Solar sensor circuit (Driver side)	AC-73
	7. Solar sensor circuit (Passenger side)	AC-64
	8. A/C control assembly	AC-257
	9. A/C amplifier	AC-268
No air inlet control	1. Air inlet control servo motor circuit	AC-81
	2. A/C amplifier	AC-268
No air flow mode control	1. Air outlet control servo motor circuit	AC-83
	2. A/C amplifier	AC-268
Unable to control A/C with the steering pad switch	1. Steering pad switch circuit	AC-149
	2. Heater control panel power source circuit	AC-133
	3. LIN communication circuit	AC-163
	4. A/C control assembly	AC-257
	5. A/C amplifier	AC-268
Heater performance is low (PTC heater does not operate)	1. PTC heater circuit	AC-140
	2. Heater water pump circuit	AC-135
	3. A/C amplifier	AC-268
Plasmacluster does not operate	1. Blower motor circuit	AC-127
	2. Plasmacluster circuit	AC-146
	3. A/C amplifier	AC-268
ECO switch indicator does not come on (ECO switch does not operate)	1. ECO switch circuit	AC-154
	2. A/C amplifier	AC-268
Diagnostic trouble codes are not recorded. Set mode is cleared when power switch is turned OFF.	1. Back-up power source circuit	AC-161
	2. A/C amplifier	AC-268

TERMINALS OF ECU

1. A/C AMPLIFIER

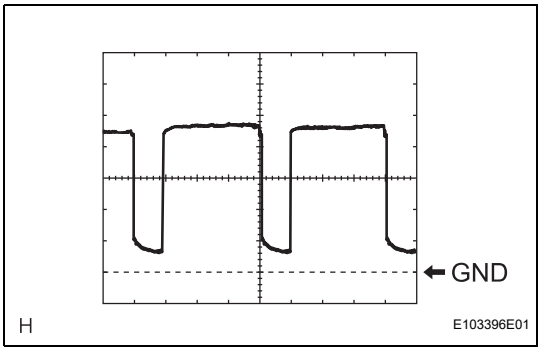


HINT:
Check from the rear of the connector while it is connected to the A/C amplifier.

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
E38-1 (IG+) - E38-14 (GND)	V - W-B	Power source (IG)	Power switch on (IG)	10 to 14 V
E38-1 (IG+) - E38-14 (GND)	V - W-B	Power source (IG)	Power switch off	Below 1 V
E38-3 (PTC1) - E38-14 (GND)	SB - W-B	PTC heater operation signal	Power switch on (IG) Temperature setting: MAX. HOT MODE switch: FOOT Engine coolant temperature: 55°C (131°F) or lower Blower switch: OFF	10 to 14 V
E38-3 (PTC1) - E38-14 (GND)	SB - W-B	PTC heater operation signal	Power switch on (IG) Temperature setting: MAX. HOT MODE switch: FOOT Engine coolant temperature: 55°C (131°F) or lower Blower switch: ON	Below 1 V
E38-5 (TAM) - E38-14 (GND)	P - W-B	A/C ambient temperature sensor signal	Power switch on (IG) at 25°C (77°F)	1.35 to 1.75 V
E38-5 (TAM) - E38-14 (GND)	P - W-B	A/C ambient temperature sensor signal	Power switch on (IG) at 40°C (104°F)	0.9 to 1.2 V
E38-9 (PRE) - E38-13 (SG-2)	V - L	A/C pressure sensor signal	Start HV system, Operate A/C system, Refrigerant pressure: Abnormal pressure (more than 3,140 kPa (32.0 kgf/cm^2, 455 psi))	4.74 V or higher
E38-9 (PRE) - E38-13 (SG-2)	V - L	A/C pressure sensor signal	Start HV system, Operate A/C system, Refrigerant pressure: Abnormal pressure (less than 196 kPa (2.0 kgf/cm^2, 28 psi))	Below 0.76 V
E38-9 (PRE) - E38-13 (SG-2)	V - L	A/C pressure sensor signal	Start HV system, Operate A/C system, Refrigerant pressure: Abnormal pressure (more than 3,140 kPa (32.0 kgf/cm^2, 455 psi) or less than 196 kPa (2.0 kgf/cm^2, 28 psi))	0.76 to 4.74 V
E38-10 (S5-3) - E38-13 (SG-2)	BR - L	Power supply for A/C pressure sensor	Power switch on (IG) A/C switch: ON	4.5 to 5.5 V
E38-10 (S5-3) - E38-13 (SG-2)	BR - L	Power supply for A/C pressure sensor	Power switch on (IG) A/C switch: OFF	Below 1 V
E38-11 (CANH) - E38-12 (CANL)	B - W	CAN communication system	CAN communication circuit	Pulse generation

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
E38-13 (SG-2) - Body ground	L - Body ground	Ground for A/C pressure sensor, A/C ambient temperature sensor	Always	Below 1 V
E38-14 (GND) - Body ground	W-B - Body ground	Ground for main power supply	Always	Below 1 V
E38-15 (ECOS) - E38-14 (GND)	SB - W-B	ECO switch signal	Power switch on (IG) ECO switch: OFF	Below 1 V
E38-15 (ECOS) - E38-14 (GND)	SB - W-B	ECO switch signal	Power switch on (IG) ECO switch: ON	10 to 14 V
E38-16 (ECID) - E38-14 (GND)	B - W-B	ECO switch indicator signal	Power switch on (IG) ECO switch: OFF	10 to 14 V
E38-16 (ECID) - E38-14 (GND)	B - W-B	ECO switch indicator signal	Power switch on (IG) ECO switch: ON	Below 1 V
E38-21 (B) - E38-14 (GND)	GR - W-B	Power source (Back-up)	Always	10 to 14 V
E38-22 (PTC2) - E38-14 (GND)	L - W-B	PTC heater operation signal	Power switch on (IG) Temperature setting: MAX. HOT MODE switch: FOOT Engine coolant temperature: 55°C (131°F) or lower Blower switch: OFF	10 to 14 V
E38-22 (PTC2) - E38-14 (GND)	L - W-B	PTC heater operation signalo	Power switch on (IG) Temperature setting: MAX. HOT MODE switch: FOOT Engine coolant temperature: 55°C (131°F) or lower Blower switch: ON	Below 1 V
E38-23 (BLW) - E38-14 (GND)	R - W-B	Blower motor speed control signal	Power switch on (IG) Blower switch: ON	Pulse generation (See waveform 1)
E38-29 (TR) - E38-34 (SG-1)	P - LG	A/C room temperature sensor signal	Power switch on (IG) Cabin temperature at 25°C (77°F)	1.8 to 2.2 V
E38-29 (TR) - E38-34 (SG-1)	P - LG	A/C room temperature sensor signal	Power switch on (IG) Cabin temperature at 40°C (104°F)	1.2 to 1.6 V
E38-32 (TSP) - E38-14 (GND)	Y - W-B	A/C solar sensor signal (for Front passenger side)	Power switch on (IG) Solar sensor is subjected to electric light.	0.8 to 4.3 V
E38-32 (TSP) - E38-14 (GND)	Y - W-B	A/C solar sensor signal (for Front passenger side)	Power switch on (IG) Solar sensor is covered with a cloth.	Below 0.8 V
E38-33 (TSD) - E38-14 (GND)	O - W-B	A/C solar sensor signal (for Driver side)	Power switch on (IG) Solar sensor is subjected to electric light.	0.8 to 4.3 V
E38-33 (TSD) - E38-14 (GND)	O - W-B	A/C solar sensor signal (for Driver side)	Power switch on (IG) Solar sensor is covered with a cloth.	Below 0.8 V
E38-34 (SG-1) - Body ground	LG - Body ground	Ground for A/C room temperature sensor	Always	Below 1 V
E38-37 (LIN1) - E38-14 (GND)	GR - W-B	LIN communication signal	Power switch on (IG)	Pulse generation
E38-38 (RDFG) - E38-14 (GND)	G - W-B	DEF relay signal	Power switch on (IG) REAR DEF switch: ON	Below 1 V
E38-38 (RDFG) - E38-14 (GND)	G - W-B	DEF relay signal	Power switch on (IG) REAR DEF switch: OFF	10 to 14 V
E38-39 (PCD1) - E38-14 (GND)	R - W-B	Plasmacluster operation signal	Power switch on (IG) Blower switch: OFF (plasmacluster not operating)	10 to 14 V
E38-39 (PCD1) - E38-14 (GND)	R - W-B	Plasmacluster operation signal	Power switch on (IG) Blower switch: ON (plasmacluster operating)	Below 1 V
e1-2 (BUS G) - Body ground	-	Ground for BUS IC	Always	Below 1 V

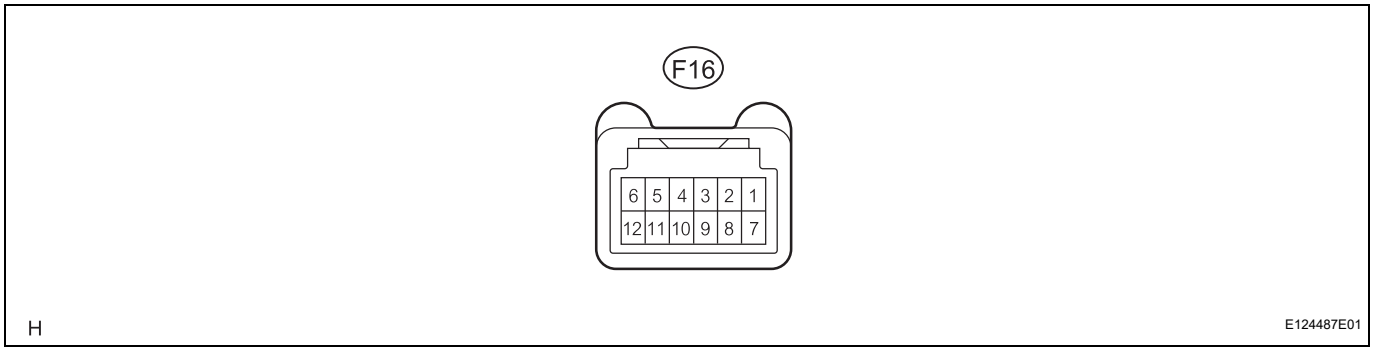
Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
e1-3 (BUS) - e1-2 (BUS G)	-	BUS IC control signal	Power switch off → on (IG)	Pulse generation
e1-4 (B BUS) - e1-2 (BUS G)	-	Power supply for BUS IC	Power switch off	Below 1 V
e1-4 (B BUS) - e1-2 (BUS G)	-	Power supply for BUS IC	Power switch on (IG)	10 to 14 V
e1-5 (SGA) - Body ground	-	Ground for evaporator temperature sensor	Always	Below 1 V
e1-6 (TEA) - e1-5 (SGA)	-	A/C evaporator temperature sensor signal	Power switch on (IG) Evaporator temperature at 0°C (32°F)	1.7 to 2.1 V
e1-6 (TEA) - e1-5 (SGA)	-	A/C evaporator temperature sensor signal	Power switch on (IG) Evaporator temperature at 15°C (59°F)	0.9 to 1.3 V



(a) Waveform 1:

Item	Contents
Terminal No. (Symbols)	E38-23 (BLW) - E38-14 (GND)
Tool Setting	1 V/DIV., 500 μs/DIV.
Vehicle Condition	Power switch on (IG) Blower switch: ON

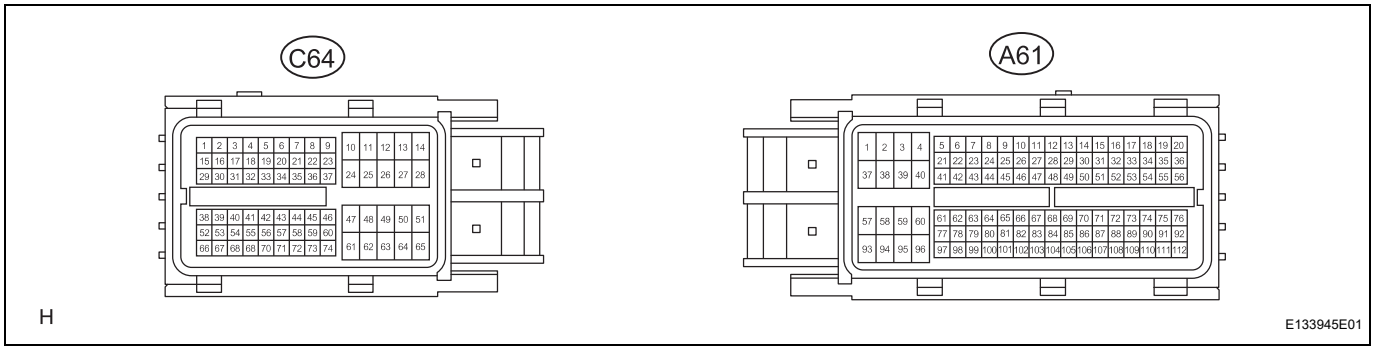
2. A/C CONTROL ASSEMBLY



HINT:
Check from the rear of the connector while it is connected to the A/C control assembly.

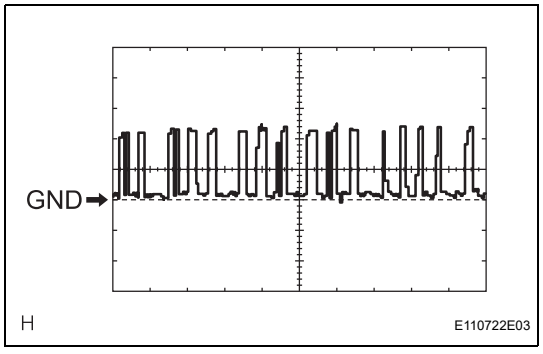
Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
F16-3 (GND) - Body ground	W-B - Body ground	Ground for A/C control assembly	Always	Below 1 V
F16-4 (TX+) - F16-3 (GND)	L - W-B	LIN communication circuit	Power switch on (IG)	Pulse generation
F16-5 (IG+) - F16-3 (GND)	V - W-B	Power source (IG)	Power switch off	Below 1 V
F16-5 (IG+) - F16-3 (GND)	V - W-B	Power source (IG)	Power switch on (IG)	10 to 14 V

3. HYBRID VEHICLE CONTROL ECU



HINT:
Check from the front of the connector while it is disconnected from the hybrid vehicle control ECU.

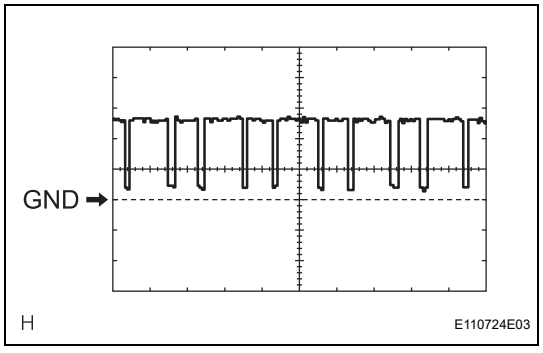
Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
A61-11 (WP) - Body ground	O - Body ground	Heater water pump operation signal	Power switch off	Below 1 V
A61-11 (WP) - Body ground	O - Body ground	Heater water pump operation signal	Power switch on (IG)	10 to 14 V
C64-18 (CLK) - Body ground	G - Body ground	Compressor operation signal	Power switch on (IG)	Pulse generation (See waveform 1)
C64-19 (ETI) - Body ground	Y - Body ground	Compressor operation signal	Power switch on (IG)	Pulse generation (See waveform 2)
C64-20 (ITE) - Body ground	W - Body ground	Compressor operation signal	Power switch on (IG)	Pulse generation (See waveform 3)
C64-33 (STB) - Body ground	R - Body ground	Compressor operation signal	Power switch on (IG)	10 to 14 V
C64-33 (STB) - Body ground	R - Body ground	Compressor operation signal	Power switch off	Below 1 V



(a) Waveform 1:

Item	Contents
Terminal No. (Symbols)	C64-18 (CLK) - Body ground
Tool Setting	5 V/DIV., 200 ms./DIV.
Vehicle Condition	Power switch on (IG)

HINT:
Waveform cycle varies with the communication contents.

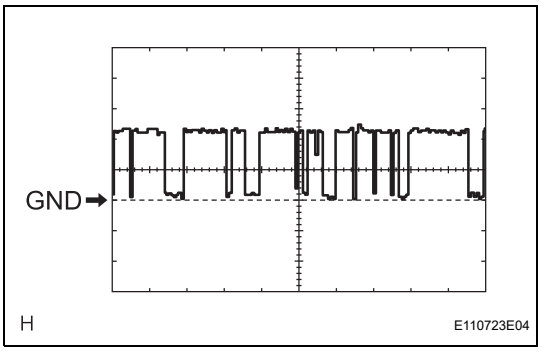


(b) Waveform 2:

Item	Contents
Terminal No. (Symbols)	C64-19 (ETI) - Body ground
Tool Setting	5 V/DIV., 200 ms./DIV.
Vehicle Condition	Power switch on (IG)

HINT:
Waveform cycle varies with the communication contents.

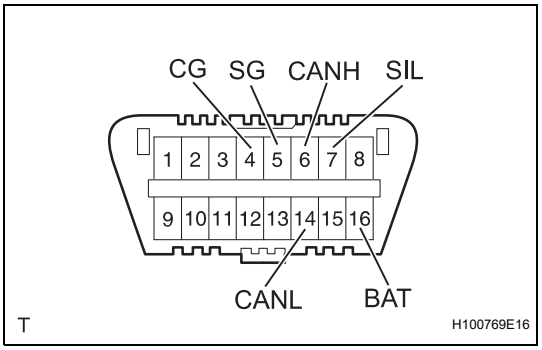
AC



(c) Waveform 3:

Item	Contents
Terminal No. (Symbols)	C64-20 (ITE) - Body ground
Tool Setting	5 V/DIV., 200 ms./DIV.
Vehicle Condition	Power switch on (IG)

HINT:
Waveform cycle varies with the communication contents.



DIAGNOSIS SYSTEM

1. CHECK DLC3

(a) The vehicle's ECU uses the ISO 15765-4 communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

Symbol (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Power switch off*	54 to 69 Ω
CANH (6) - BAT (16)	HIGH-level CAN bus line	Power switch off*	6 kΩ or higher
CANH (6) - CG (4)	HIGH-level CAN bus line	Power switch off*	200 Ω or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Power switch off*	6 kΩ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Power switch off*	200 Ω or higher

NOTICE:
***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches, or the doors.**
HINT:
Connect the cable of the intelligent tester to the DLC3, turn the power switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

DTC CHECK / CLEAR

1. DTC CHECK (SENSOR CHECK)

(a) Start the THS-II system.

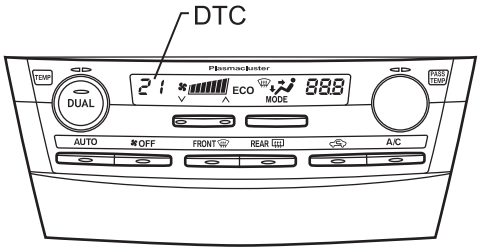
(b) Perform the indicator check (See page AC-41).
HINT:
After the indicator check is completed, the system enters the DTC check mode automatically.

(c) Read the code displayed on the panel. (Trouble codes are output on the temperature display.)
NOTICE:
- **In the sensor check mode, which is automatically transferred from the indicator check mode, troubleshooting may be partially performed. Be sure to perform the actuator check, and then the sensor check again.**
- **If the check is performed in a dark place, DTC 21 or 24 may be displayed even though the system is normal.**

HINT:
Refer to the DTC chart (Diagnostic Trouble Code chart) for details of the codes (See page AC-47).
- When there are no problems, DTC 00 is output.
- As an example, the illustration shows that DTC 21 is output.

(d) If the steps are difficult to read because they change automatically, push the "MODE" switch to display the steps one at a time so that they can be read easily. The items are displayed step by step each time the "MODE" switch is pushed.
HINT:
- Push the "OFF" switch to finish panel diagnosis.
- Push the "R/F" switch to enter the actuator check mode.

A/C Control Assembly:



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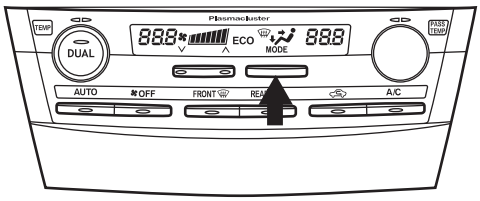
A/C Control Assembly:



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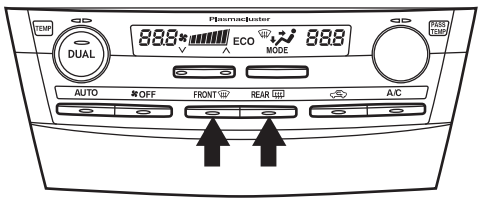
AC

A/C Control Assembly:



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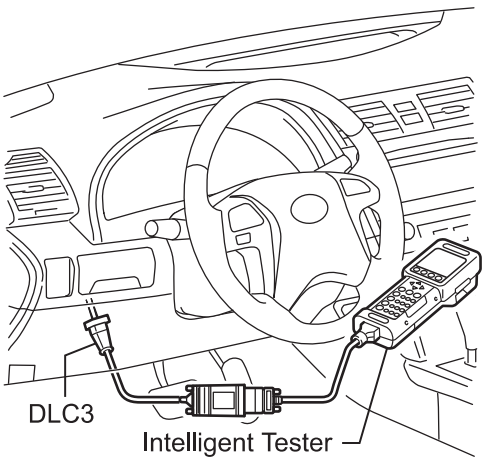
2. CLEARING DTC

(a) During the sensor check, press the "FRONT DEF" switch and "REAR DEF" switch at the same time.



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C131977E01

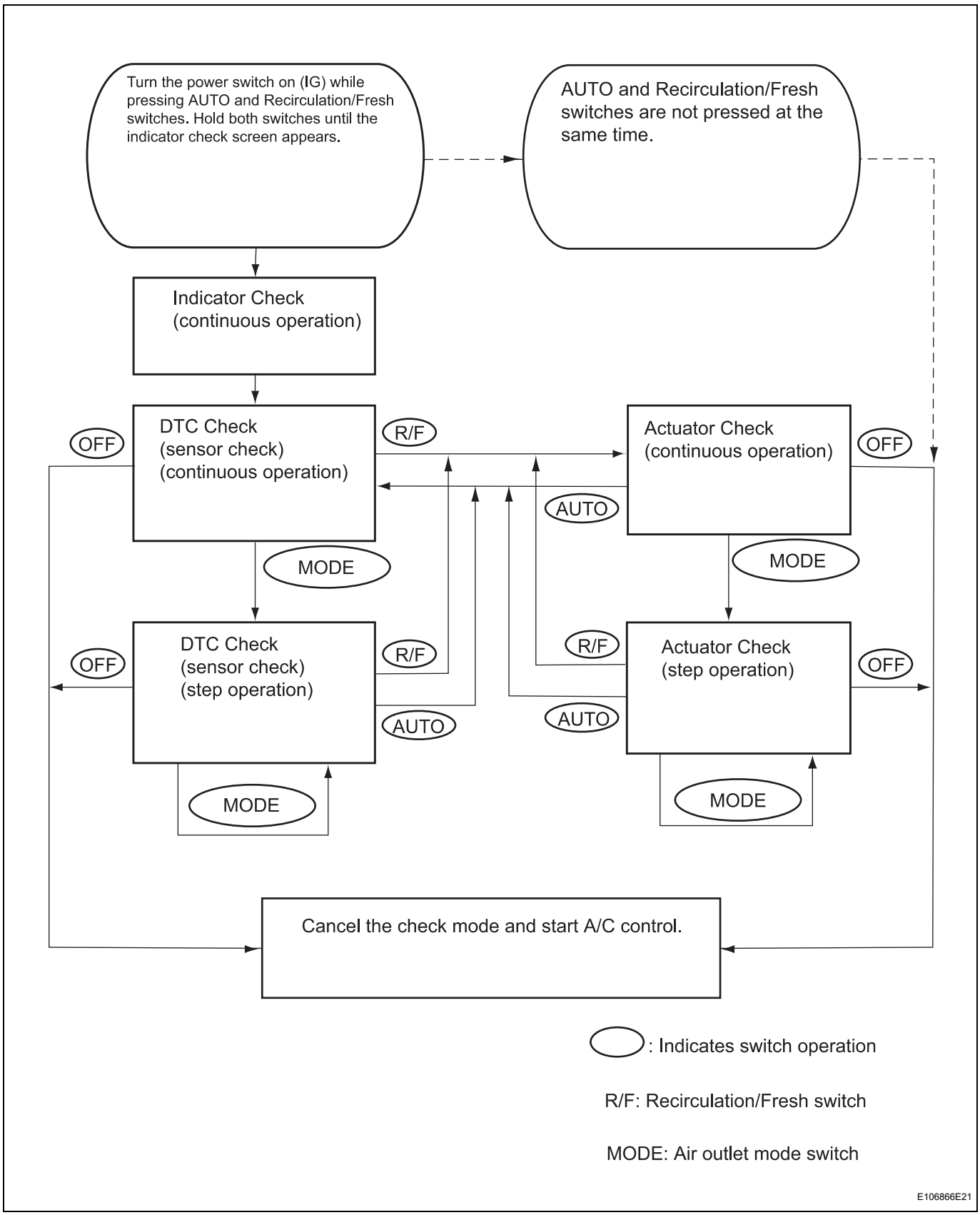
3. DTC CHECK USING INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester ON.
(d) Enter the following menu items: DIAGNOSIS / OBD/ MOBD / DTC INFO / CURRENT CODES.
HINT:
Refer to the intelligent tester operator's manual for further details.
(e) Check the details of the DTCs.
(f) Clear the DTCs.
HINT:
After repairing the malfunctions, clear the DTCs.
(1) Connect the intelligent tester to the DLC3.
(2) Turn the power switch on (IG).
(3) Enter the following menu items: DIAGNOSIS / OBD/MOBD / DTC INFO / CLEAR CODES.
HINT:
Refer to the intelligent tester operator's manual for further details.
(4) Press the YES button.

CHECK MODE PROCEDURE

1. LIST OF OPERATION METHODS

(a) By operating each of the A/C control switches as shown in the diagram below, it is possible to enter the diagnostic check mode.

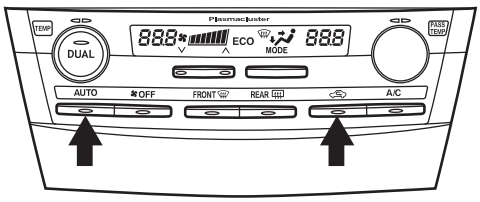


AC

2. INDICATOR CHECK

(a) Turn the power switch off.

A/C Control Assembly:



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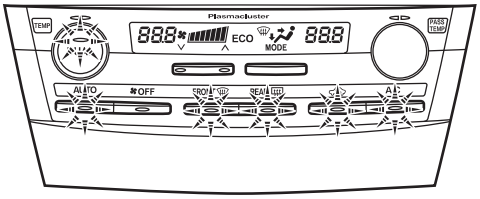
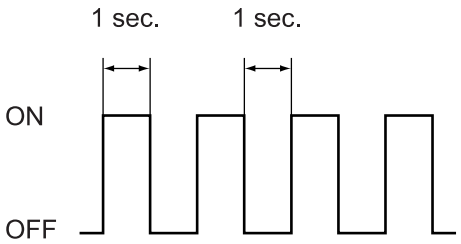
(b) Turn the power switch on (IG) while pressing the A/C control "AUTO" switch and "R/F" switch simultaneously. Hold both switches until the indicator check screen appears.

A/C Control Assembly:



Indicator Blinking Pattern:



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E130399E01

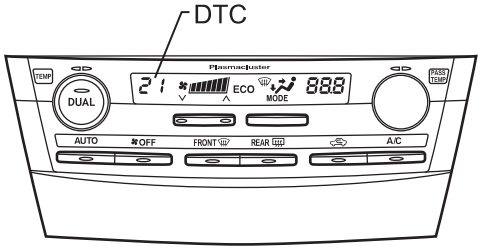
(c) The indicator check is automatically performed when panel diagnosis is activated. Check that the indicators light up and go off at 1-second intervals 4 times in succession.
HINT:
- The sensor check automatically starts when the indicator check is completed.
- Press the "OFF" switch to cancel the check mode.
- If a navigation system is installed, the indicator will blink and the buzzer will sound.

3. DTC CHECK (SENSOR CHECK)

(a) Start the THS-II system.

(b) Perform the indicator check.
HINT:
After the indicator check is completed, the system enters the DTC check mode automatically.

A/C Control Assembly:



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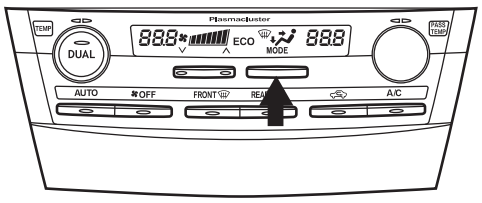
(c) Read the code displayed on the panel (Trouble codes are output on the temperature display.)
NOTICE:
- **In the sensor check mode, which is automatically transferred from the indicator check mode, troubleshooting may be partially performed. Be sure to perform the actuator check, and then the sensor check again.**
- **If the check is performed in a dark place, DTC 21 or 24 may be displayed even though the system is normal.**

HINT:
Refer to the DTC chart (Diagnostic Trouble Code chart) for details of the codes (See page AC-47).
- When there are no problems, DTC 00 is output.
- As an example, the illustration shows that DTC 21 is output.

A/C Control Assembly:



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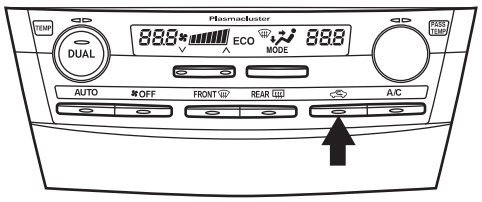
(d) If the steps are difficult to read because they change automatically, push the "MODE" switch to display the steps one at a time so that they can be read easily. The items are displayed step by step each time the "MODE" switch is pushed.
HINT:
- Push the "OFF" switch to finish panel diagnosis.
- Push the "R/F" switch to enter the actuator check mode.

4. ACTUATOR CHECK

(a) Start the THS-II system.
(b) Perform the indicator check.

A/C Control Assembly:



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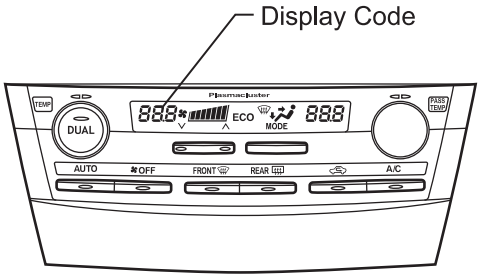
(c) Push the "R/F" switch to perform the actuator check.
HINT:
Be sure to perform the actuator check after starting the THS-II system.

A/C Control Assembly:



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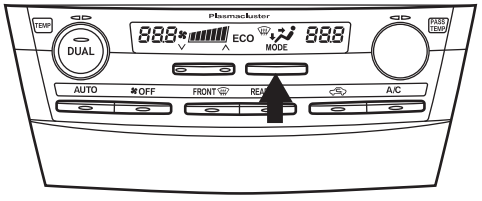
E130397E05

(d) As the actuator check is repeated from steps 1 to 10 at 1-second intervals, check the temperature and air flow visually and by hand.
HINT:
- The display blinks at 1-second intervals in the step operation.
- Push the "OFF" switch to finish panel diagnosis.
- Push the "AUTO" switch to enter the sensor check mode.

Step No.	Display Code	Conditions				
		Blower Level	Air Mix Damper	Airflow Vent	Air Inlet Damper	Compressor
1	0	0	0% open	FACE	FRESH	OFF
2	1	1	0% open	FACE	FRESH	OFF
3	2	17	0% open	FACE	RECIRCULATION / FRESH	ON
4	3	17	0% open	FACE	RECIRCULATION	ON
5	4	17	50% open	B/L	RECIRCULATION	ON
6	5	17	50% open	B/L	RECIRCULATION	ON
7	6	17	50% open	FOOT	FRESH	ON
8	7	17	100% open	FOOT-0	FRESH	ON
9	8	17	100% open	F/D	FRESH	ON
10	9	31	100% open	DEF	FRESH	ON

A/C Control Assembly:



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(e) If the steps are difficult to read because they change automatically, push the "MODE" switch to display the steps one at a time so that they can be read easily. The items are displayed step by step each time the "MODE" switch is pushed.
HINT:
- Push the "OFF" switch to finish panel diagnosis.
- Push the "R/F" switch to enter the sensor check mode.

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator, and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / OBD/ MOBD / AIR CONDITIONER / DATA LIST.
(e) Check the value(s) by referring to the table below.

AIR CONDITIONER:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
ROOM TEMP (Room temperature sensor)	Room temperature sensor / Min.: -6.5°C (20.3°F), Max.: 57.25°C (135.05°F)	Actual cabin temperature is displayed	-
AMBI TEMP SENS (Ambient temperature sensor)	Ambient temperature sensor / Min.: -23.3°C (-9.94°F), Max.: 65.95°C (150.71°F)	Actual ambient temperature is displayed	-
AMBI TEMP (Adjusted ambient temperature)	Adjusted ambient temperature / Min.: -30.8°C (-23.44°F), Max.: 50.8°C (123.44°F)	-	-
EVAP FIN TEMP (Evaporator fin thermistor)	Evaporator fin thermistor / Min.: -29.7°C (-21.46°F), Max.: 59.55°C (139.19°F)	Actual evaporator temperature is displayed	-
SOLAR SENS-D (Solar sensor (D side))	Driver side solar sensor / Min.: 0, Max.: 255	Driver side solar sensor value increases as brightness increases	-
SOLAR SENS-P (Solar sensor (P side))	Passenger side solar sensor / Min.: 0, Max.: 255	Passenger side solar sensor value increases as brightness increases	-
COOLANT TEMP (Engine coolant temperature)	Engine coolant temperature / Min.: 1.3°C (34.34°F), Max.: 90.55°C (194.99°F)	Actual engine coolant temperature is displayed while engine is warmed up	-
SET TEMP-D (Set temperature (D side))	Driver side set temperature / Min.: 0°C (32°F), Max.: 30°C (54°F)	Driver side set temperature is displayed	-
SET TEMP-P (Set temperature (P side))	Passenger side set temperature / Min.: 0°C (32°F), Max.: 30°C (54°F)	Passenger side set temperature is displayed	-
ESTIMATE TEMP-D (Estimated temperature (D side))	Driver side estimated temperature / Min.: -358.4°C (-613.12°F), Max.: 358.4°C (677.12°F)	Damper is at "MAX. COOL": -358.4°C (-613.12°F) Damper is at "MAX. HOT": 358.4°C (677.12°F)	-
ESTIMATE TEMP-P (Estimated temperature (P side))	Passenger side estimated temperature / Min.: -358.4, Max.: 358.4	Damper is at "MAX. COOL": -358.4°C (-613.12°F) Damper is at "MAX. HOT": 358.4°C (677.12°F)	-
BLOWER LEVEL (Blower motor speed level)	Blower motor speed level / Min.: 0 level, Max.: 31 level	Increases in the range between 0 and 31 as the blower motor speed increases	-
REG PRESS SENS (Regulator pressure sensor)	Regulator pressure sensor / Min.: -0.5 kgf/cm^{2}G, Max.: 37.75 kgf/cm^{2}G	Actual refrigerant pressure is displayed	-
AIR MIX PULSE-D (Air mix servomotor target pulse (D side))	Driver side air mix servo motor target pulse / Min.: 0, Max.: 255	MAX. COLD: 5 (pulse) MAX. HOT: 103 (pulse)	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
AIR MIX PULSE-P (Air mix servomotor target pulse (P side))	Passenger side air mix servo motor target pulse / Min.: 0, Max.: 255	MAX. COLD: 105 (pulse) MAX. HOT: 7 (pulse)	-
AIR OUT PULSE-D (Air out pulse-D)	Driver side air outlet servo motor target pulse / Min.: 0, Max.: 255	FACE: 8 (pulse) B/L: 30 to 38 (pulse) FOOT: 50 to 74 (pulse) FOOT/DEF: 80 (pulse) DEF: 97 (pulse)	-
A/I DAMP PLS (Air inlet damper target pulse)	Air inlet damper target pulse / Min.: 0, Max.: 255	RECIRCULATION: 7 (pulse) FRESH: 28 (pulse)	-
COMPRS SPD (Compressor speed)	Compressor speed / Min.: 0, Max.: 65535 rpm	Displays actual rotation speed in the range between 0 rpm and 8,600 rpm	-
COMPRS TARG SPD (Compressor target speed)	Compressor target speed / Min.: 0, Max.: 65535 rpm	Displays actual rotation speed in the range between 0 rpm and 8,600 rpm	-
#CODES (Number of trouble codes)	Number of trouble codes / Min.: 0, Max.: 255	Number of DTCs will be displayed	-

2. ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows relays, VSVs, actuators and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / OBD/ MOBD / AIR CONDITIONER / ACTIVE TEST.
(e) Perform the ACTIVE TEST by referring to the table below.

AIR CONDITIONER:

Tester Display	Test Part	Control Range
BLOWER MOTOR (Blower motor)	Blower motor / Min.: Level 0, Max.: Level 31	-
DEFOGER RLY-R (Defogger relay (Rear))	Defogger relay (Rear) / OFF, ON	-
COMPRS TARG SPD (Compressor target speed)	Compressor target speed / Min.: 0, Max.: 65535 (800 to 8,600 rpm)	-
WATER PUMP (Water pump)	Water pump / OFF, ON	-
ELECTRICAL FAN (Electrical fan)	Electrical fan / OFF, ON	-
HEATER1 (Electric heater1)	Electric Heater1 / OFF, ON	-
HEATER2 (Electric heater2)	Electric Heater2 / OFF, ON	-
AIR MIX PULSE-D (Air mix servomotor pulse (D side))	Driver side air mix servo motor pulse / Min.: 0, Max.: 255	-
AIR MIX PULSE-P (Air mix servomotor pulse (P side))	Passenger side air mix servo motor pulse / Min.: 0, Max.: 255	-
AIR OUT PULSE-D (Air outlet servomotor pulse (D side))	Driver side air outlet servo motor pulse / Min.: 0, Max.: 255	-

Tester Display	Test Part	Control Range
A/I DAMP PLS (Air inlet damper target pulse)	Air inlet damper target pulse / Min.: 0, Max.: 255	-

DIAGNOSTIC TROUBLE CODE CHART

AIR CONDITIONING SYSTEM:

DTC Code	Detection Item	Trouble Area	Memory *5	See page
B1411/11 *1	Room Temperature Sensor Circuit	1. A/C room temperature sensor 2. Harness or connector between A/C room temperature sensor and A/C amplifier 3. A/C amplifier	Memorized (8.5 min. or more)	AC-52
B1412/12 *2	Ambient Temperature Sensor Circuit	1. Ambient temperature sensor 2. Harness or connector between ambient temperature sensor and A/C amplifier 3. A/C amplifier	Memorized (8.5 min. or more)	AC-56
B1413/13	Evaporator Temperature Sensor Circuit	1. Evaporator temperature sensor 2. Air conditioning harness 3. A/C amplifier	Memorized (8.5 min. or more)	AC-60
B1421/21 *3	Solar Sensor Circuit (Passenger Side)	1. Solar sensor 2. Harness or connector between solar sensor and A/C amplifier 3. Harness or connector between solar sensor and main body ECU 4. A/C amplifier 5. Main body ECU	Memorized (8.5 min. or more) (only when circuit is shorted)	AC-64
B1423/23	Pressure Sensor Circuit	1. A/C pressure sensor 2. Harness or connector between A/C pressure sensor and A/C amplifier 3. Refrigerant pipe line 4. A/C amplifier	-	AC-69
B1424/24 *3	Solar Sensor Circuit (Driver Side)	1. Solar sensor 2. Harness or connector between solar sensor and A/C amplifier 3. Harness or connector between solar sensor and main body ECU 4. A/C amplifier 5. Main body ECU	Memorized (8.5 min. or more) (only when circuit is shorted)	AC-73
B1441/41	Air Mix Damper Control Servo Motor Circuit (Passenger Side)	1. A/C amplifier 2. Air conditioning harness 3. Air mix control servo motor	Memorized (30 sec.)	AC-78
B1442/42	Air Inlet Damper Control Servo Motor Circuit	1. A/C amplifier 2. Air conditioning harness 3. Air inlet control servo motor	Memorized (30 sec.)	AC-81
B1443/43	Air Outlet Damper Control Servo Motor Circuit	1. A/C amplifier 2. Air conditioning harness 3. Air outlet control servo motor	Memorized (30 sec.)	AC-83
B1446/46	Air Mix Damper Control Servo Motor Circuit (Driver Side)	1. A/C amplifier 2. Air conditioning harness 3. Air mix control servo motor	Memorized (30 sec.)	AC-86

DTC Code	Detection Item	Trouble Area	Memory *5	See page
B1471/71	A/C Inverter High Voltage Power Resource System Malfunction	1. Harness or connector between compressor with motor assembly and inverter with converter assembly 2. Compressor with motor assembly 3. Hybrid control system 4. Inverter with converter assembly 5. CAN communication system	Memorized	AC-88
B1472/72	A/C Inverter High Voltage Output System Malfunction	1. Compressor with motor assembly 2. CAN communication system	Memorized	AC-94
B1473/73	A/C Inverter Start-up Signal System Malfunction	1. Harness or connector between hybrid vehicle control ECU and compressor with motor assembly 2. Compressor with motor assembly 3. Hybrid control system 4. CAN communication system	-	AC-95
B1474/74	A/C Inverter Malfunction	1. Compressor with motor assembly 2. CAN communication system	Memorized	AC-99
B1475/75	A/C Inverter Cooling / Heating System Malfunction	1. Cooling fan system 2. Refrigerant volume 3. Compressor with motor assembly 4. CAN communication system	Memorized	AC-100
B1476/76	A/C Inverter Load System Malfunction	1. Refrigerant volume 2. Compressor with motor assembly 3. Cooling fan system 4. CAN communication system	Memorized	AC-104
B1477/77	A/C Inverter Low Voltage Power Resource System Malfunction	1. Compressor with motor assembly 2. CAN communication system	Memorized	AC-108
B1497/97	BUS IC Communication Malfunction	1. Air conditioning harness 2. A/C amplifier	Memorized (10 sec. or more)	AC-109
B1498/98 *4	Communication Malfunction (A/C Inverter Local)	1. Harness or connector between hybrid vehicle control ECU and compressor with motor assembly and body ground 2. Electric vehicle fuse 3. Hybrid vehicle control ECU 4. Compressor with motor assembly 5. Inverter with converter assembly 6. Engine wire No. 4 7. CAN communication system 8. Hybrid control system	Memorized	AC-112

DTC Code	Detection Item	Trouble Area	Memory *5	See page
B1499/99	Multiplex Communication Circuit	CAN communication system	Memorized	AC-121
P0AA6-611	Hybrid Battery Voltage System Isolation Fault	1. Compressor oil 2. Refrigerant pipe line 3. Compressor with motor assembly 4. CAN communication system	-	AC-122

HINT:

- *1: If the cabin temperature is approx. -18.6°C (-1.48°F) or lower, DTC B1411/11 may be output even though the system is normal.
- *2: If the ambient temperature is approx. -52.9°C (-63.22°F) or lower, DTC B1412/12 may be output even though the system is normal.
- *3: If the check is performed in a dark place, DTC B1421/21 or B1424/24 (solar sensor circuit abnormal) may be output even though the system is normal.
- *4: Depending on the timing of the power supply to the 12 V power supply circuit and high-voltage circuit when the power switch is turned on (READY), an abnormal information signal may be output, causing this DTC to be stored. If the output DTC is a code that was memorized in the past, check the fuses and wire harnesses. If there is no malfunction, erase the DTC.
- *5: The A/C amplifier memorizes the DTC of the respective malfunction if it has occurred for the period of time indicated in the brackets.

ACTUATOR CHECK

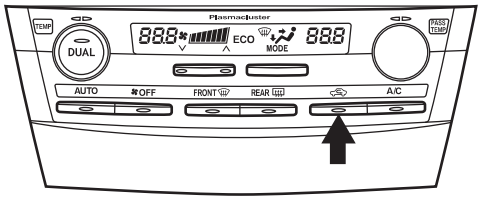
1. ACTUATOR CHECK

(a) Start the THS-II system.

(b) Perform the indicator check (See page AC-41).

(c) Push the "R/F" switch to perform the actuator check.
HINT:
Be sure to perform the actuator check after starting the THS-II system.

A/C Control Assembly:



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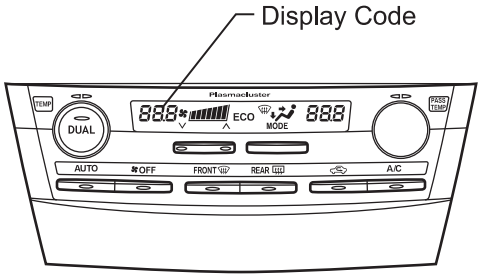
A/C Control Assembly:



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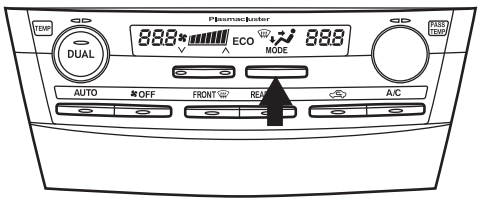
(d) As the actuator check is repeated from steps 1 to 10 at 1-second intervals, check the temperature and air flow visually and by hand.
HINT:
- The display blinks at 1-second intervals in the step operation.
- Push the "OFF" switch to finish panel diagnosis.
- Push the "AUTO" switch to enter the sensor check mode.

Step No.	Display Code	Conditions				
		Blower Level	Air Mix Damper	Airflow Vent	Air Inlet Damper	Compressor
1	0	0	0% open	FACE	FRESH	OFF
2	1	1	0% open	FACE	FRESH	OFF
3	2	17	0% open	FACE	RECIRCULATION / FRESH	ON
4	3	17	0% open	FACE	RECIRCULATION	ON
5	4	17	50% open	B/L	RECIRCULATION	ON
6	5	17	50% open	B/L	RECIRCULATION	ON
7	6	17	50% open	FOOT	FRESH	ON
8	7	17	100% open	FOOT-0	FRESH	ON
9	8	17	100% open	F/D	FRESH	ON
10	9	31	100% open	DEF	FRESH	ON

A/C Control Assembly:



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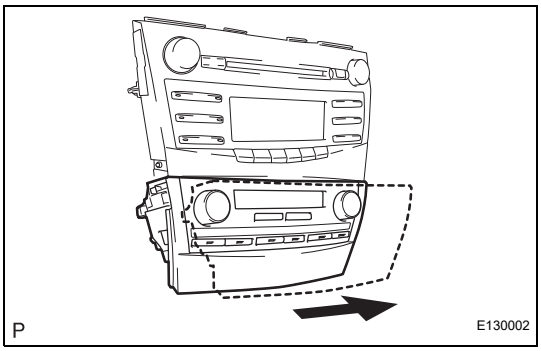
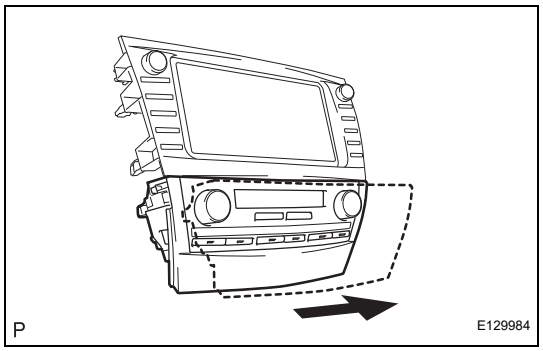
(e) If the steps are difficult to read because they change automatically, push the "MODE" switch to display the steps one at a time so that they can be read easily. The items are displayed step by step each time the "MODE" switch is pushed.
HINT:
- Push the "OFF" switch to finish panel diagnosis.
- Push the "R/F" switch to enter the sensor check mode.

REMOVAL

1. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-14)**
2. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-14)**
3. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-14)**
4. **REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-15)**
5. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-15)**
6. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-16)**
7. **REMOVE INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-16)**
8. **REMOVE RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-136)**
9. **REMOVE NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/ Navigation System) (See page NS-193)**
10. **REMOVE RADIO NO. 1 BRACKET (w/o Navigation System) (See page AV-136)**
11. **REMOVE RADIO NO. 1 BRACKET (w/ Navigation System) (See page NS-193)**
12. **REMOVE RADIO NO. 2 BRACKET (w/o Navigation System) (See page AV-136)**
13. **REMOVE RADIO NO. 2 BRACKET (w/ Navigation System) (See page NS-193)**
14. **REMOVE AIR CONDITIONING CONTROL ASSEMBLY (w/o Navigation System)**
    (a) Remove the air conditioning control assembly as shown in the illustration.

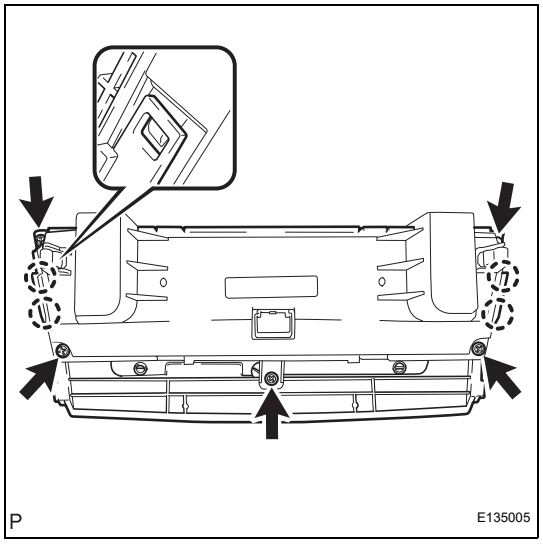




15. REMOVE AIR CONDITIONING CONTROL ASSEMBLY (w/ Navigation System)

(a) Remove the air conditioning control assembly as shown in the illustration.

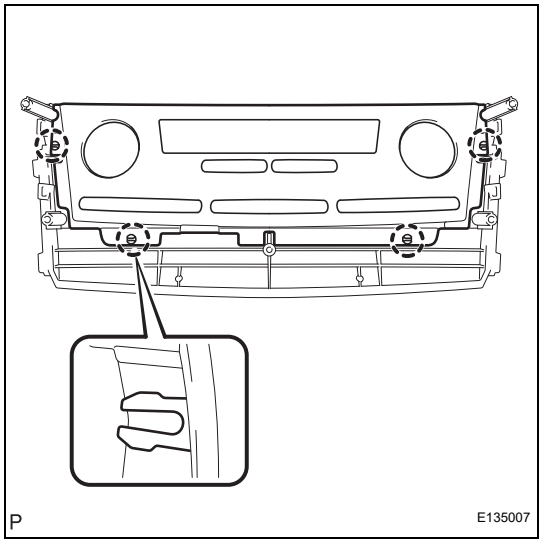
DISASSEMBLY



1. REMOVE AIR CONDITIONING PANEL SUB-ASSEMBLY

(a) Remove the 5 screws.

(b) Disengage the 4 claws and remove the air conditioning panel sub-assembly.

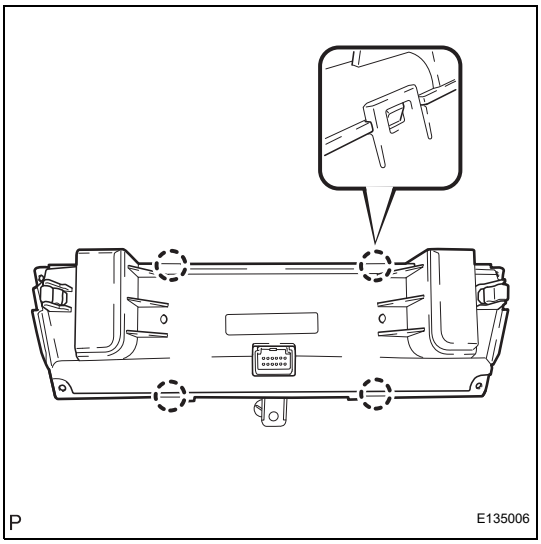


(c) Disengage the 4 claws and remove the ornament.

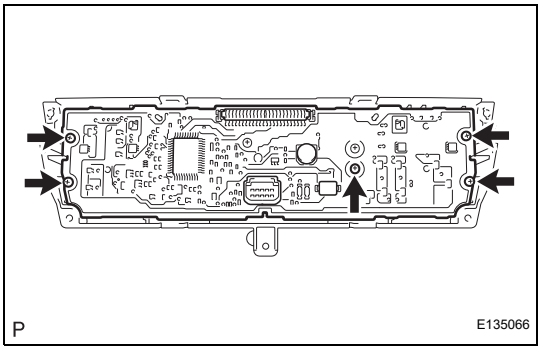
2. REMOVE CONTROL KNOB SUB-ASSEMBLY

NOTICE:

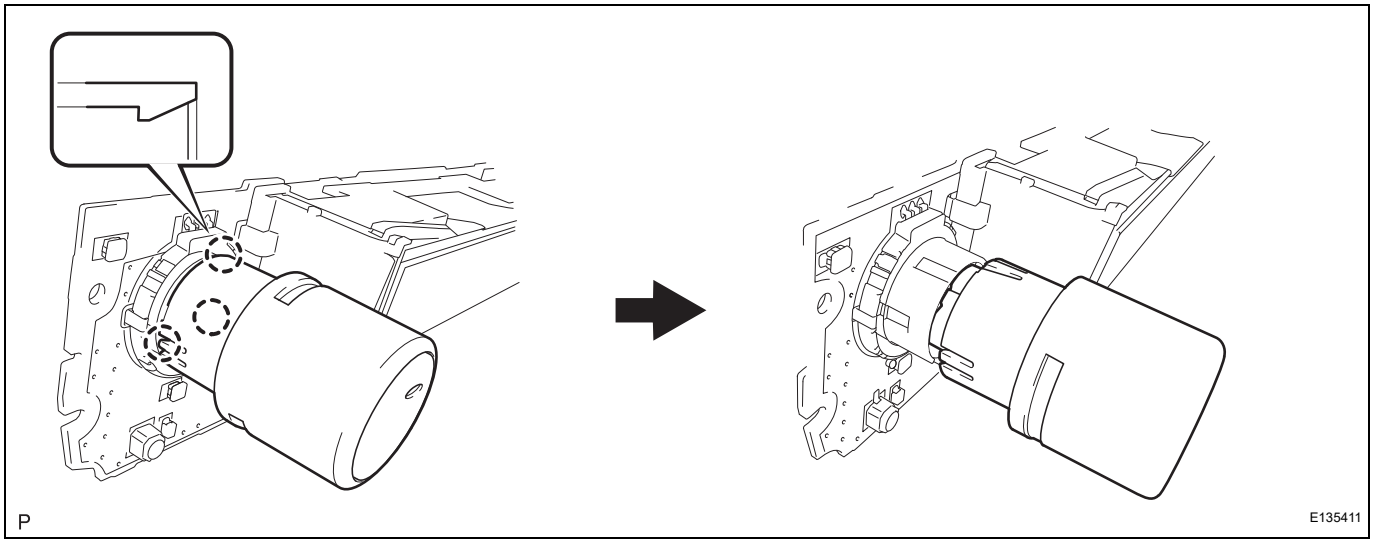
When disassembling the air conditioning control assembly, eliminate static electricity by touching the vehicle body to prevent the components from being damaged.

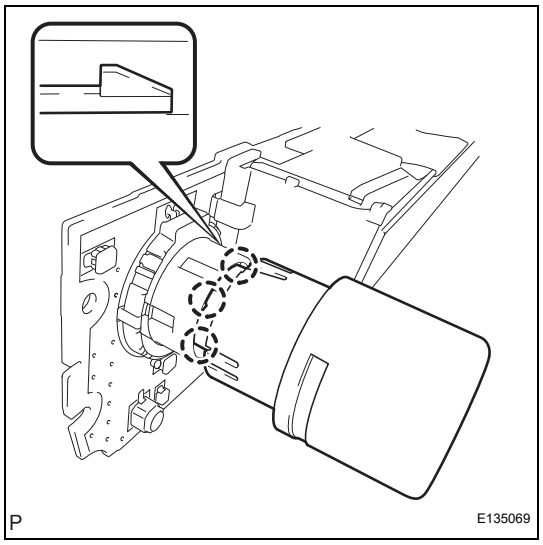


(a) Disengage the 4 claws and remove the control panel case.

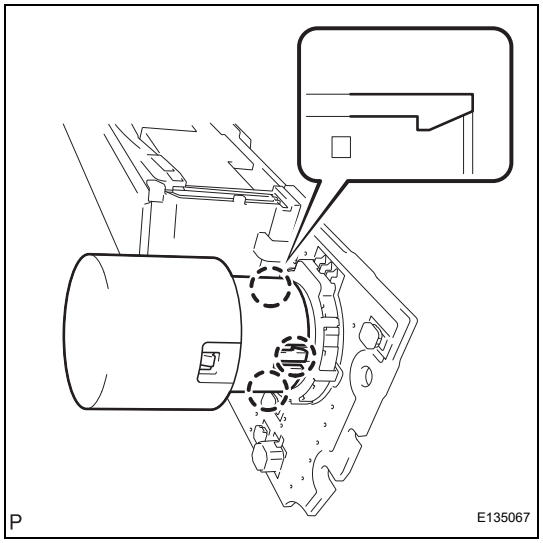


(b) Remove the 5 screws and switch control sub-assembly.
(c) Driver Side:
  (1) Disengage the 3 claws and pull the control knob sub-assembly to the position shown in the illustration.





(2) Disengage the 3 claws and remove the control knob sub-assembly.
HINT:
Remove the control knob sub-assembly and the dual push switch as a unit.



(d) Passenger Side:
(1) Disengage the 3 claws and remove the control knob sub-assembly.

REASSEMBLY

1. INSTALL CONTROL KNOB SUB-ASSEMBLY

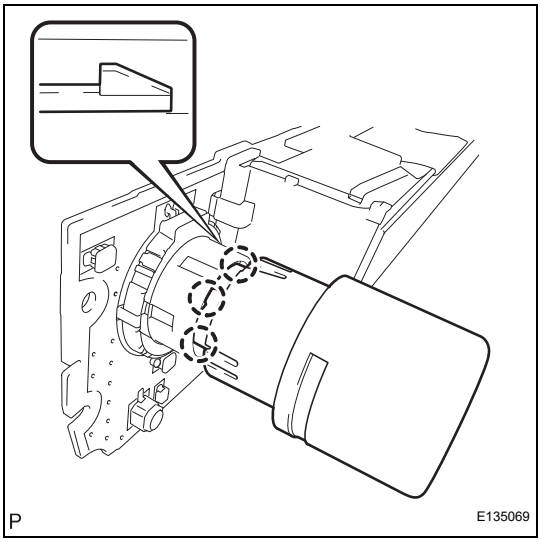
NOTICE:

When disassembling the air conditioning control assembly, eliminate static electricity by touching the vehicle body to prevent the components from being damaged.

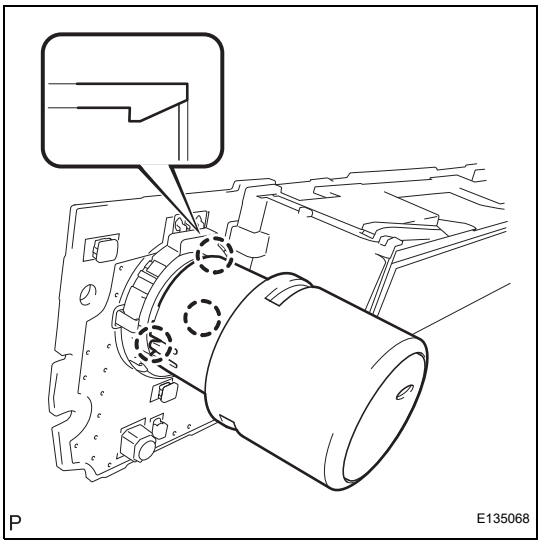
(a) Driver Side:

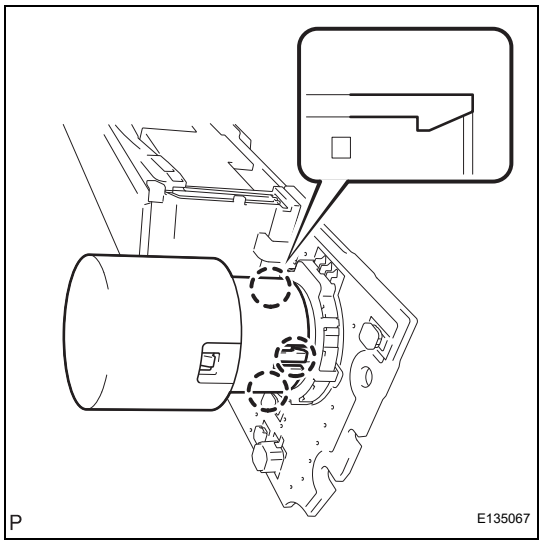
(1) Engage the dual push switch with dial on the switch control sub-assembly.

(2) Engage the 3 claws.

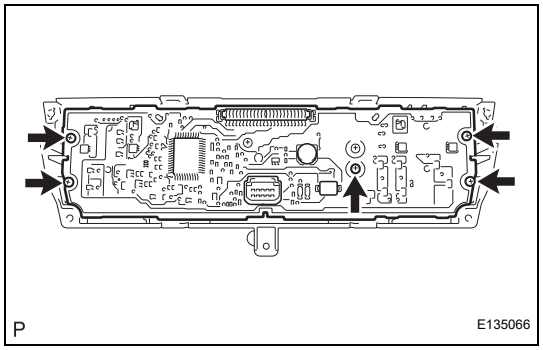


(3) Engage the 3 claws and install the control knob sub-assembly.

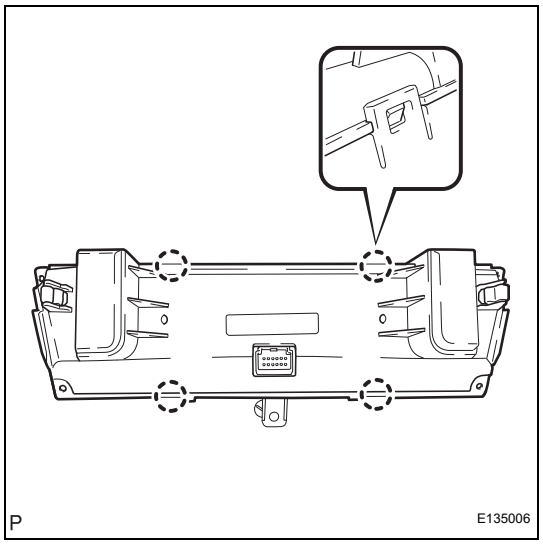




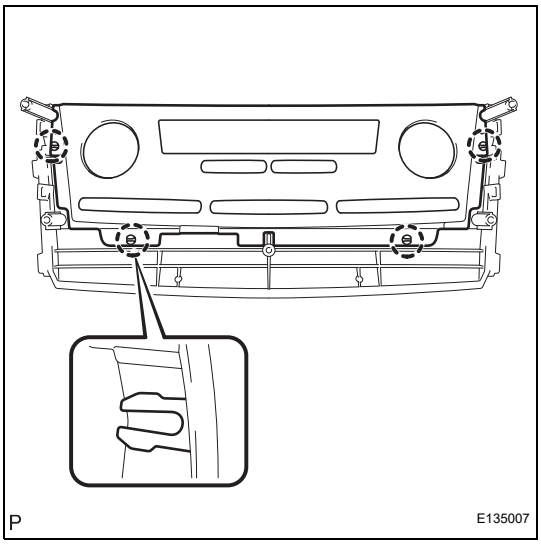
(b) Passenger Side:
(1) Engage the 3 claws and install the control knob sub-assembly.



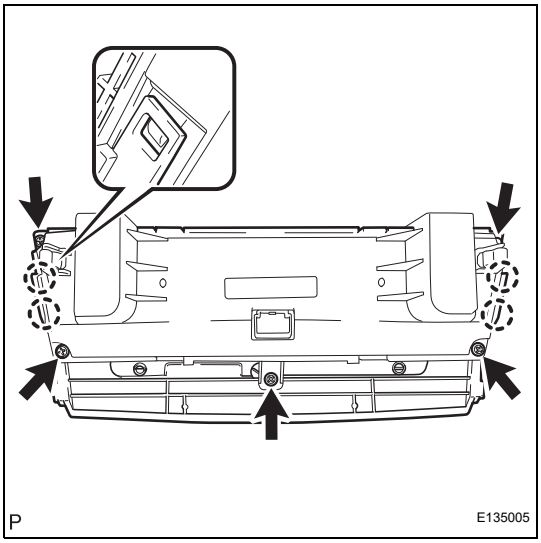
(c) Install the switch control sub-assembly with the 5 screws.



(d) Engage the 4 claws and install the control panel case.

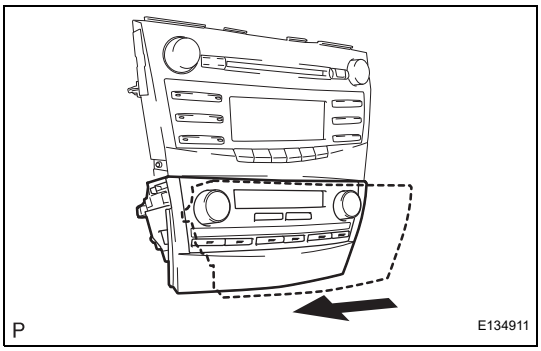


2. **INSTALL AIR CONDITIONING PANEL SUB-ASSEMBLY**
   (a) Engage the 4 claws and install the ornament.

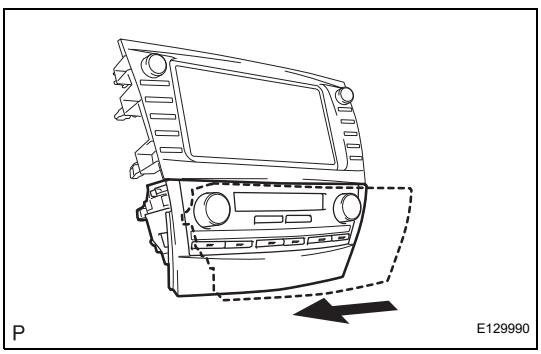


   (b) Engage the 4 claws.
   (c) Install the air conditioning panel sub-assembly with the 5 screws.

INSTALLATION

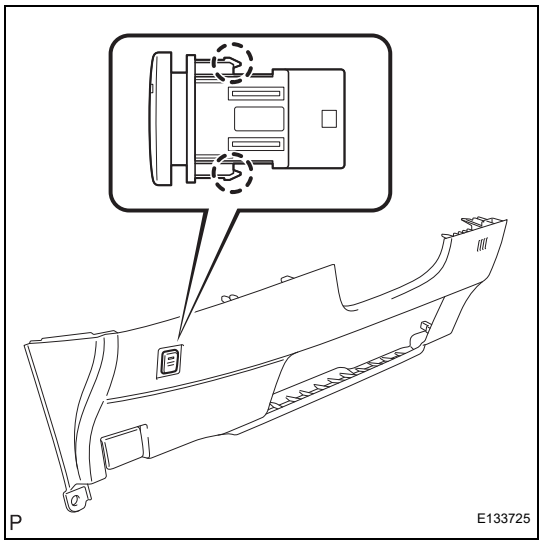


1. **INSTALL AIR CONDITIONING CONTROL ASSEMBLY (w/o Navigation System)**
   (a) Install the air conditioning control assembly as shown in the illustration.



2. **INSTALL AIR CONDITIONING CONTROL ASSEMBLY (w/ Navigation System)**
   (a) Install the air conditioning control assembly as shown in the illustration.
3. **INSTALL RADIO NO. 2 BRACKET (w/o Navigation System) (See page AV-137)**
4. **INSTALL RADIO NO. 2 BRACKET (w/ Navigation System) (See page NS-194)**
5. **INSTALL RADIO NO. 1 BRACKET (w/o Navigation System) (See page AV-137)**

6. INSTALL RADIO NO. 1 BRACKET (w/ Navigation System) (See page NS-194)
7. INSTALL RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-137)
8. INSTALL NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/ Navigation System) (See page NS-194)
9. INSTALL INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-31)
10. INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-31)
11. INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-31)
12. INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-31)
13. INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-32)
14. INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-32)
15. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-32)



INSTALLATION

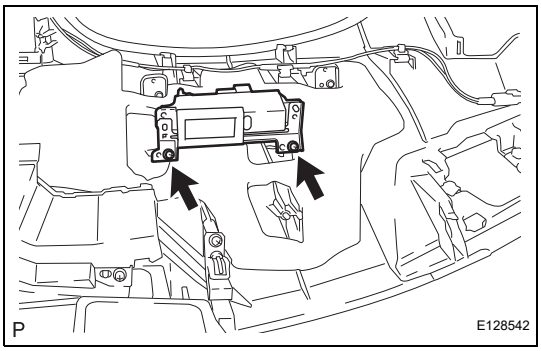
1. **INSTALL ECO SWITCH**
   (a) Engage the 2 claws to install the eco switch.
2. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-35)**
3. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-41)**
4. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-41)**

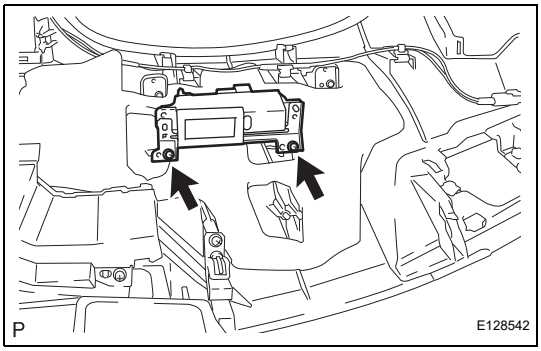
REMOVAL

1. ALIGN FRONT WHEELS FACING STRAIGHT AHEAD
2. DISCONNECT NEGATIVE BATTERY TERMINAL
   NOTICE:
   Wait for 90 seconds after disconnecting the terminal to prevent the airbag from deploying (See page RS-1).
3. REMOVE LOWER NO. 3 STEERING WHEEL COVER (See page RS-345)
4. REMOVE LOWER NO. 2 STEERING WHEEL COVER (See page RS-345)
5. REMOVE STEERING PAD (See page RS-345)
6. REMOVE STEERING WHEEL ASSEMBLY (See page SR-36)
7. REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-13)
8. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-14)
9. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-11)
10. REMOVE STEERING COLUMN COVER (See page IP-12)
11. REMOVE TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY (See page SR-37)
12. REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-12)
13. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-12)
14. REMOVE INSTRUMENT CLUSTER FINISH PANEL (See page IP-13)
15. REMOVE COMBINATION METER ASSEMBLY (See page IP-13)
16. REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-15)
17. REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-15)
18. REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-13)
19. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-14)
20. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-14)
21. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-14)

22. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-14)
23. REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-15)
24. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-15)
25. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-16)
26. REMOVE INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-16)
27. REMOVE RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-136)
28. REMOVE NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/ Navigation System) (See page NS-193)
29. REMOVE CONSOLE BOX POCKET (See page IP-17)
30. REMOVE CONSOLE BOX CARPET (See page IP-17)
31. REMOVE CONSOLE BOX ASSEMBLY (See page IP-17)
32. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (See page IP-18)
33. REMOVE NO. 1 CONSOLE BOX INSERT FRONT (See page IP-18)
34. REMOVE FRONT PILLAR GARNISH LH (See page IR-16)
35. REMOVE INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY (See page IP-18)
36. REMOVE INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY (See page IP-19)
37. REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-146)
38. REMOVE FRONT PILLAR GARNISH RH (See page IR-16)
39. REMOVE INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY (See page IP-19)
40. REMOVE INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY (See page IP-19)
41. REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side) (See page IP-19)
42. REMOVE NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-20)
43. DISCONNECT INSTRUMENT PANEL WIRE ASSEMBLY

44. **REMOVE INSTRUMENT PANEL SAFETY PAD ASSEMBLY (See page IP-20)**
45. **REMOVE SIDE NO. 1 DEFROSTER NOZZLE DUCT (See page IP-22)**
46. **REMOVE NO. 1 HEATER TO REGISTER DUCT (See page IP-23)**
47. **REMOVE PLASMACLUSTER**
    (a) Remove the 2 screws and plasmacluster.





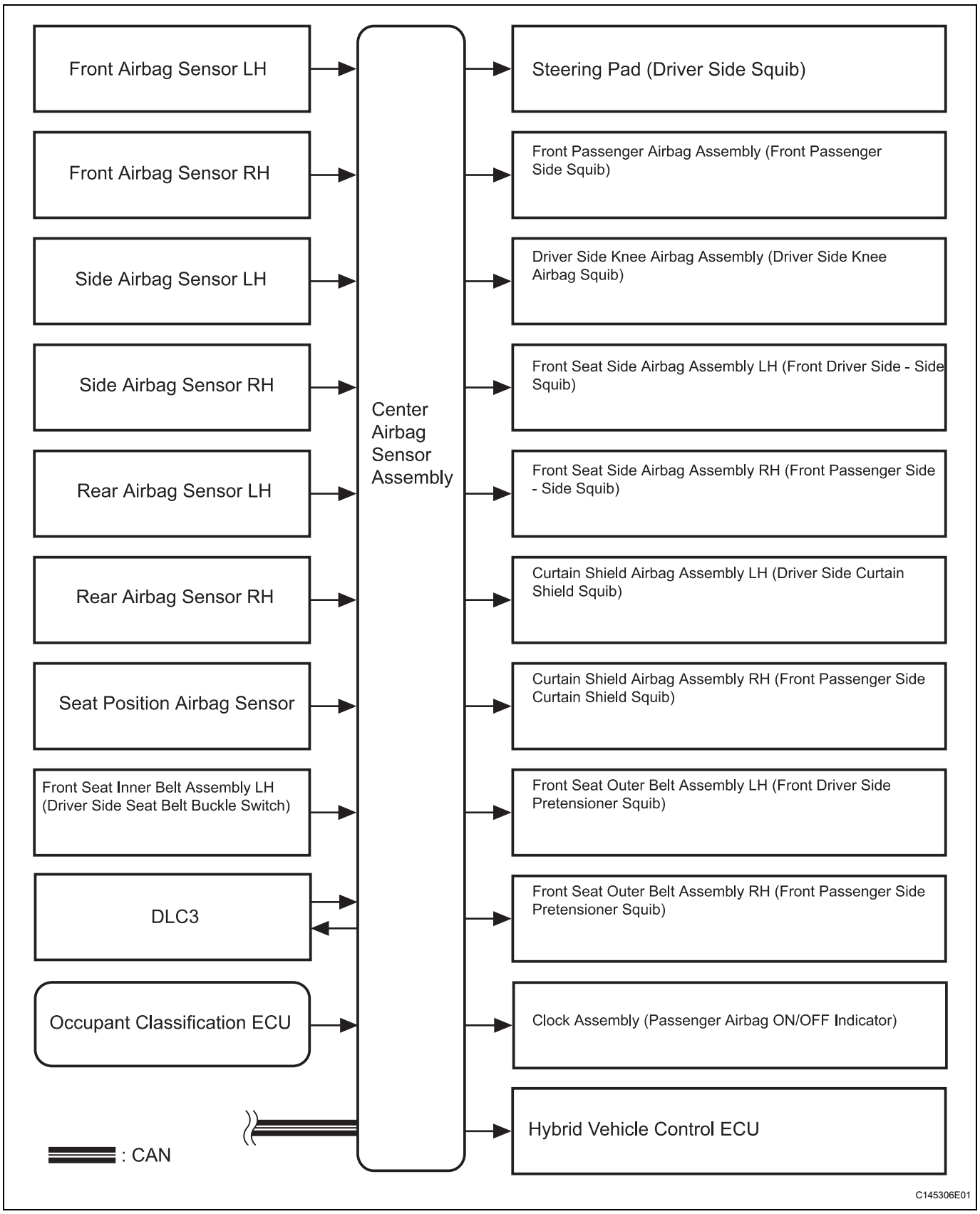
INSTALLATION

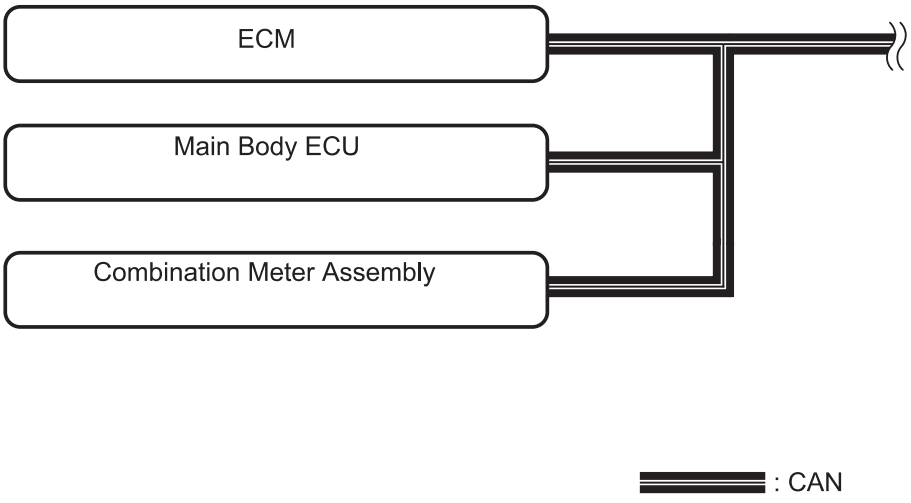
1. **INSTALL PLASMACLUSTER**
   (a) Install the plasmacluster with the 2 screws.
   Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
2. **INSTALL NO. 1 HEATER TO REGISTER DUCT (See page IP-24)**
3. **INSTALL SIDE NO. 1 DEFROSTER NOZZLE DUCT (See page IP-25)**
4. **INSTALL INSTRUMENT PANEL SAFETY PAD ASSEMBLY (See page IP-25)**
5. **CONNECT INSTRUMENT PANEL WIRE ASSEMBLY**
6. **INSTALL NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-28)**
7. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-146)**
8. **INSTALL INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY (See page IP-28)**
9. **INSTALL INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY (See page IP-28)**
10. **INSTALL FRONT PILLAR GARNISH LH (See page IR-38)**
11. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side) (See page IP-28)**
12. **INSTALL INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY (See page IP-29)**
13. **INSTALL INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY (See page IP-29)**
14. **INSTALL FRONT PILLAR GARNISH RH (See page IR-39)**

15. INSTALL NO. 1 CONSOLE BOX INSERT FRONT (See page IP-29)
16. INSTALL NO. 2 CONSOLE BOX INSERT FRONT (See page IP-30)
17. INSTALL CONSOLE BOX ASSEMBLY (See page IP-30)
18. INSTALL CONSOLE BOX CARPET (See page IP-30)
19. INSTALL CONSOLE BOX POCKET (See page IP-30)
20. INSTALL RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-137)
21. INSTALL NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/ Navigation System) (See page NS-194)
22. INSTALL INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-31)
23. INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-31)
24. INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-31)
25. INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-31)
26. INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-32)
27. INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-32)
28. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-32)
29. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-33)
30. INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-33)
31. INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-42)
32. INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-42)
33. INSTALL COMBINATION METER ASSEMBLY (See page IP-33)
34. INSTALL INSTRUMENT CLUSTER FINISH PANEL (See page IP-34)
35. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-34)
36. INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-34)

37. **INSTALL TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY**
38. **ADJUST SPIRAL CABLE SUB-ASSEMBLY (See page RS-360)**
39. **INSTALL STEERING COLUMN COVER (See page IP-35)**
40. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-35)**
41. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-41)**
42. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-41)**
43. **INSTALL STEERING WHEEL ASSEMBLY (See page SR-42)**
44. **INSTALL STEERING PAD (See page RS-346)**
45. **INSTALL LOWER NO. 3 STEERING WHEEL COVER (See page RS-347)**
46. **INSTALL LOWER NO. 2 STEERING WHEEL COVER (See page RS-347)**
47. **CONNECT NEGATIVE BATTERY TERMINAL**
48. **INSPECT STEERING PAD (See page RS-347)**
49. **INSPECT SRS WARNING LIGHT**
    (See page RS-33)
50. **PERFORM INITIALIZATION**
    NOTICE:
    Some systems need initialization after reconnecting the negative battery terminal (See page IN-43).

SYSTEM DIAGRAM





Transmitting ECU (Transmitter)	Receiving ECU	Signals	Communication method
Center Airbag Sensor Assembly	Hybrid Vehicle Control ECU	Crash detection signal	CAN
Center Airbag Sensor Assembly	Main Body ECU	Driver seat buckle switch signal	
Center Airbag Sensor Assembly	Combination Meter Assembly	• SRS warning light ON demand signal • SRS warning light blink demand signal • Passenger seat occupant detection signal • Passenger seat buckle switch signal • Diagnosis signal (DTC)	
Combination Meter Assembly	Center Airbag Sensor Assembly	• Vehicle speed signal • Meter diagnoses polling signal	
Hybrid Vehicle Control ECU	Center Airbag Sensor Assembly	• Accelerator opening angle information • Accelerator opening angle signal • Shift position signal • Test mode signal • Stop signal	
ECM	Center Airbag Sensor Assembly	Engine speed signal	

SYSTEM DESCRIPTION

1. GENERAL

(a) In conjunction with impact absorbing structure for a front collision, the SRS (Supplemental Restraint System) driver airbag, front passenger airbag, and driver side knee airbag were designed to supplement seat belts in the event of a front collision in order to help reduce shock to the head and chest of the driver and front passenger and knee of the driver. This system is a 3-sensor type airbag system to detect the impact during a front collision using the center airbag sensor assembly and front airbag sensors. It also operates the airbag system and seat belt pretensioner.

(b) In order to detect the extent of the collision during the initial stages of the collision in further details, the front airbag sensors have been changed from mechanical type to electrical type deceleration sensors. Accordingly, the deployment of the driver airbag and front passenger airbag is controlled in two stages according to the severity of the impact.

(c) In conjunction with impact absorbing structure for a side collision, the side airbag and curtain shield airbag were designed to help reduce shock to the driver, front passenger, and rear outer passengers in the event of a side collision.

(d) The curtain shield airbag that helps reduce shock to the front and rear seat occupants with a single curtain shield airbag has been adopted. In conjunction with this system, the side airbag sensors have been installed at the bottom of the center pillars and the rear airbag sensors have been installed at the bottom of the rear pillars.

(e) In this system, a front side collision is detected by the side airbag sensor in order to simultaneously deploy the side and curtain shield airbags. A rear side collision is detected by the rear airbag sensor and the center airbag sensor assembly in order to deploy the curtain shield airbag.

(f) The center airbag sensor assembly sends the airbag deployment signal to the hybrid vehicle control ECU through CAN (Controller Area Network) to operate the fuel pump control.

(g) The center airbag sensor assembly sends the airbag deployed signal to cut the hybrid system's high voltage.

2. CONSTRUCTION AND OPERATION

(a) FRONT AIRBAG SENSOR

(1) The front airbag sensors are installed on the right and left radiator supports respectively.

(2) The front airbag sensor consists of the deceleration sensor.

(3) The deceleration sensor is built into the front airbag sensor, and the distortion that is created in the sensor is converted into an electric signal based on the vehicle deceleration rate during a frontal collision. Accordingly, the extent of the initial collision can be detected in detail.

(b) SIDE AIRBAG SENSOR
(1) The side airbag sensors are installed on the bottom of the right and left center pillars respectively.
(2) The side airbag sensor consists of the deceleration sensor and ignition control circuit.
(3) The deceleration sensor is built into the side airbag sensor, and the distortion that is created in the sensor is converted into an electric signal based on the vehicle deceleration rate during a front side collision. Accordingly, the extent of the initial collision can be detected in detail.

(c) REAR AIRBAG SENSOR
(1) The rear airbag sensors are installed on the right and left rear pillars respectively.
(2) The rear airbag sensor consists of the deceleration sensor and ignition control circuit.
(3) The deceleration sensor is built into the rear airbag sensor, and the distortion that is created in the sensor is converted into an electric signal based on the vehicle deceleration rate during a rear side collision. Accordingly, the extent of the initial collision can be detected in detail.

(d) CENTER AIRBAG SENSOR ASSEMBLY
(1) General
- The center airbag sensor assembly is installed on the center floor under the instrument panel.
- The center airbag sensor assembly consists of the deceleration sensor, safing sensor, electronic safing sensor, ignition control circuit, and diagnostic circuit.
- The center airbag sensor assembly receives signals from the deceleration sensor and safing sensor built into the center airbag sensor assembly and front airbag sensor. Then the center airbag sensor assembly determines whether the driver airbag, front passenger airbag, driver side knee airbag, and front seat belt pretensioners should be activated, and diagnoses system malfunctions.
- The center airbag sensor assembly causes the front seat side airbag assembly and the curtain shield airbag assembly to deploy when receiving signals from the side airbag sensor.

- The center airbag sensor assembly receives signals from the deceleration sensor and the electronic safing sensor built into the center airbag sensor assembly and the rear airbag sensor, and determines whether the curtain shield airbag should be activated, and diagnoses system malfunctions.
- The center airbag sensor assembly sends the airbag deployment signal to the ECM through CAN to operate the fuel pump control.
- The center airbag sensor assembly sends the airbag deployed signal to cut the hybrid system's high voltage.

(2) Deceleration sensor and ignition control circuit
- The deceleration sensor is built into the center airbag sensor assembly.
- The ignition control circuit performs calculations based on the signal output from the deceleration sensors of the center airbag sensor assembly and front airbag sensor. If the calculated values are greater than the specified values, it activates ignition operation.

(3) Safing sensor
- The safing sensor is built into the center airbag sensor assembly. During a front collision, the sensor turns on and outputs an ON signal to the center airbag sensor assembly if a deceleration rate sent to the safing sensor is greater than the specified value.

(4) Electronic safing sensor
- The electronic safing sensor is built into the center airbag sensor assembly. During a side collision, the sensor turns on and outputs an ON signal to the center airbag sensor assembly if a deceleration rate sent to the electronic safing sensor is greater than the specified value.

(5) Backup power source
- The backup power source consists of a power supply capacitor and a DC-DC converter. When the power system does not function during a collision, the power supply capacitor discharges and supplies electric power to the system. The DC-DC converter operates as a boosting transformer when the battery voltage falls below a predetermined level.

(6) Diagnostic circuit
- This circuit constantly diagnoses system malfunctions. When a malfunction is detected, it turns on the SRS warning light on the combination meter assembly to inform the driver.

(7) Memory circuit
- When a malfunction is detected in the diagnostic circuit, it is coded and stored in the memory circuit.

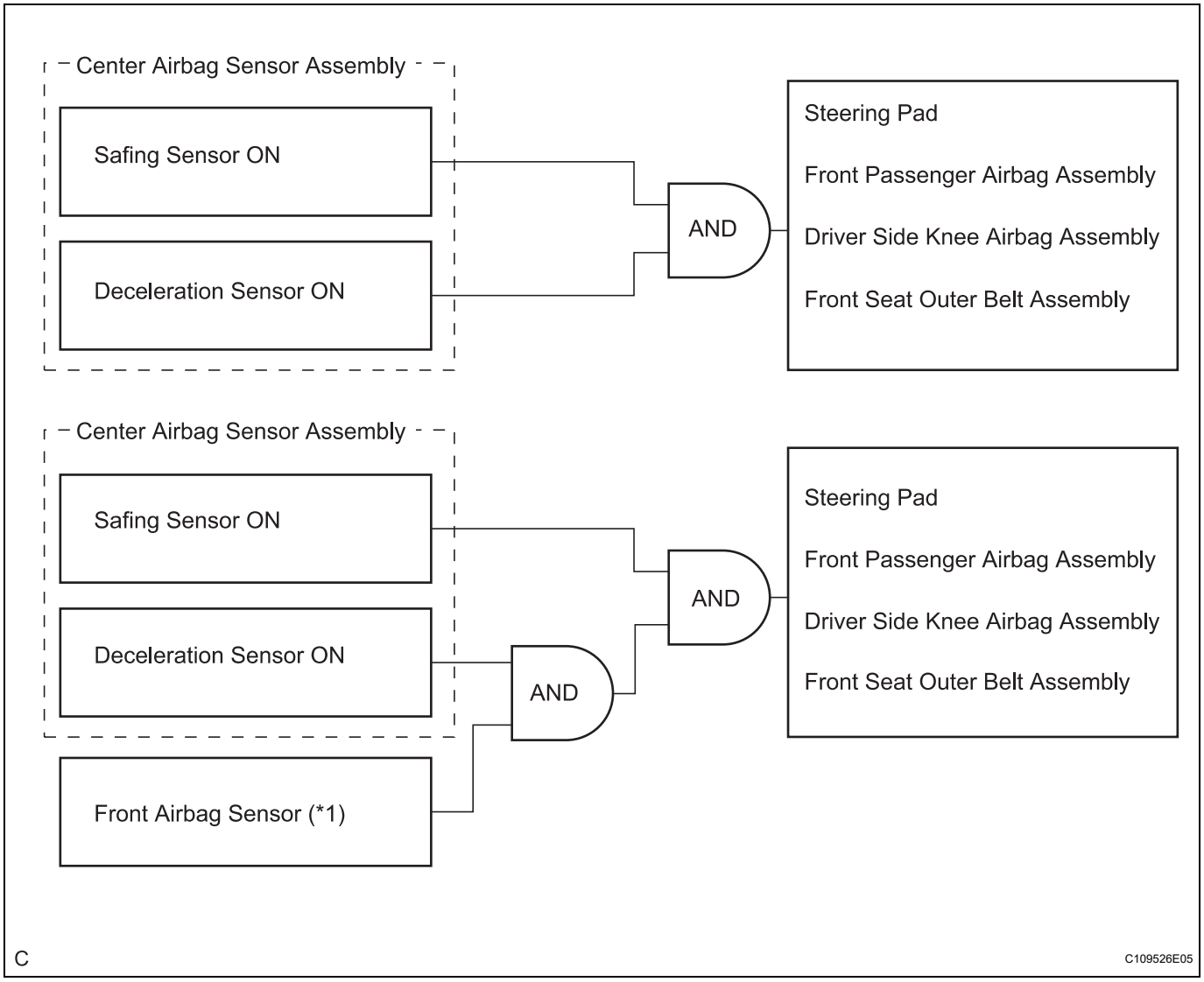
(e) SRS WARNING LIGHT

(1) The SRS warning light is located on the combination meter assembly. It comes on to inform the driver of system trouble when a malfunction is detected in self-diagnosis of the center airbag sensor assembly. Under normal operating conditions when the power switch is turned on (IG), it comes on for approximately 6 seconds and then goes off.

3. DEPLOYMENT CONDITION

When the vehicle collides and the shock is greater than the specified value, the SRS is activated automatically. The center airbag sensor assembly includes the safing sensor and deceleration sensor. The safing sensor is designed to turn on at a smaller deceleration rate than the deceleration sensor.

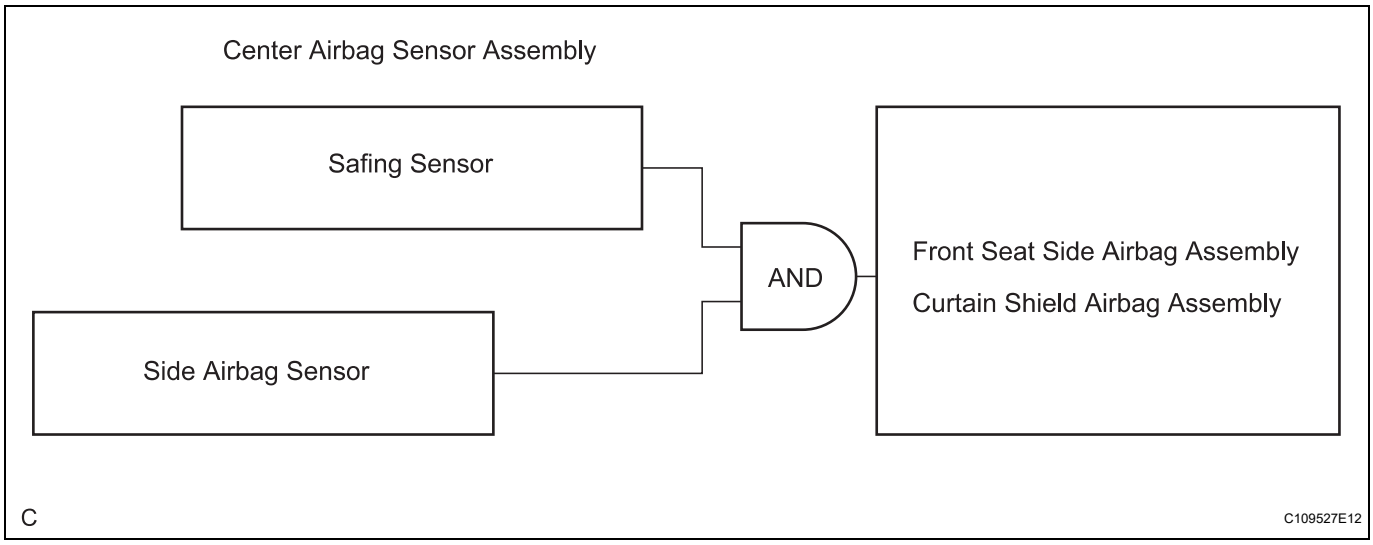
(a) The center airbag sensor assembly determines whether ignition is necessary based on signals from the deceleration sensor and the front airbag sensor (*1). If the safing sensor turns on simultaneously, current flows to the squibs to deploy the SRS as shown in the illustration below.



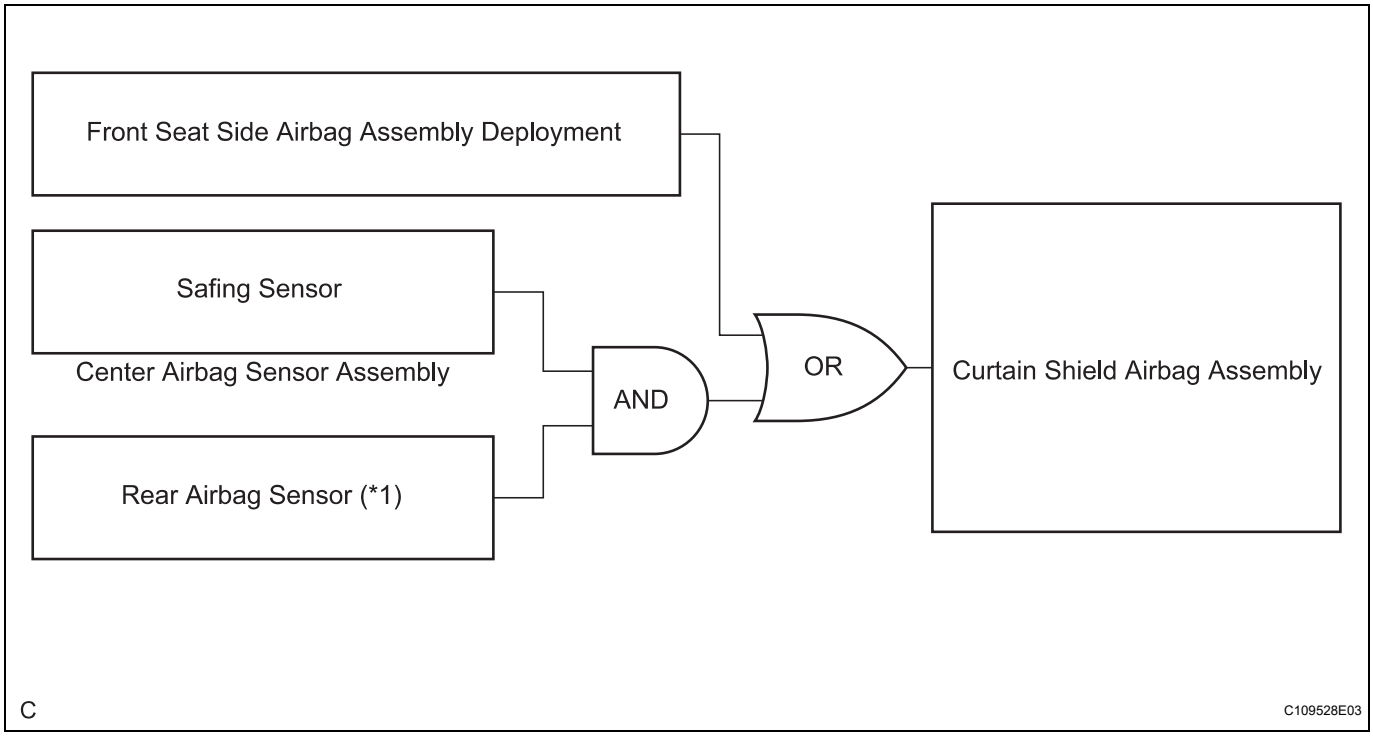
HINT:

*1: In case of front collision, the ignition signal could be output with the deceleration sensor ON signal even without a signal from the front airbag sensor.

(b) The center airbag sensor assembly determines whether ignition is necessary based on signals from the side airbag sensor. If the safing sensor turns on simultaneously, current flows to the squib to deploy the SRS as shown in the illustration below.



(c) The center airbag sensor assembly determines whether ignition is necessary based on signals from the rear airbag sensor. If the safing sensor turns on simultaneously, current flows to the squib to deploy the SRS as shown in the illustration below (*1).



HINT:
*1: If the front seat side airbag assembly deploys, the curtain shield airbag assembly will also deploy, regardless of whether the signal is output from the rear airbag sensor.

HOW TO PROCEED WITH TROUBLESHOOTING

The intelligent tester can be used in steps 3, 5, 7, 9, and 10.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 CUSTOMER PROBLEM ANALYSIS

(a) Confirm problem symptoms (See page IN-72).

NEXT

3 CHECK CAN COMMUNICATION SYSTEM

(a) Check for DTC outputs (See page CA-22).
HINT:
The center airbag sensor assembly is connected to the CAN communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN communication system.

Result

Result	Proceed To
CAN communication DTC is not output.	A
CAN communication DTC is output.	B

B → INSPECT CAN COMMUNICATION CIRCUIT

A

4 WARNING LIGHT CHECK

NEXT

5 CHECK DTC (Present and Past DTCs)

(a) Check for DTC outputs.

Result

Result	Proceed To
DTC is output.	A
DTC is not output.	B

B → PROBLEM SYMPTOMS TABLE

A

6	DTC CHART

NEXT

7	CIRCUIT INSPECTION

NEXT

8	REPAIR

NEXT

9	CLEAR DTC (Present and Past DTCs)

NEXT

10	CHECK DTC (Present and Past DTCs)

(a) Check for DTC outputs.

Result

Result	Proceed To
DTC is not output.	A
DTC is output.	B

B → Go to step 6

A

11	CONFIRMATION TEST

NEXT

END

PROBLEM SYMPTOMS TABLE

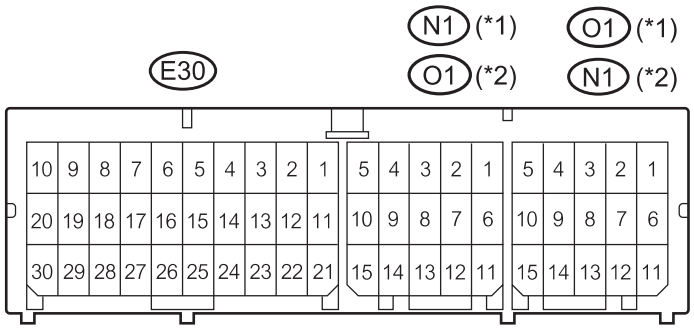
HINT:
Proceed to the troubleshooting for each circuit in the table below.

AIRBAG SYSTEM:

Symptom	Suspected Area	See page
The SRS warning light goes off after the primary check, but comes on.	SRS Warning Light Remains ON	RS-222
With the power switch on (IG), the SRS warning light sometimes comes on after approximately 6 seconds.	SRS Warning Light Remains ON	RS-222
The SRS warning light always comes on even when DTC is not output.	SRS Warning Light Remains ON	RS-222
With the power switch on (IG), the SRS warning light does not come on.	SRS Warning Light does not Come On	RS-227
Although an SRS warning light operates normally, DTC or a normal system code is not displayed.	Diagnosis Circuit	RS-230
Although terminals TC and CG of DLC3 are not connected, DTC or a normal system code is displayed.	Diagnosis Circuit	RS-230

TERMINALS OF ECU

1. CENTER AIRBAG SENSOR ASSEMBLY



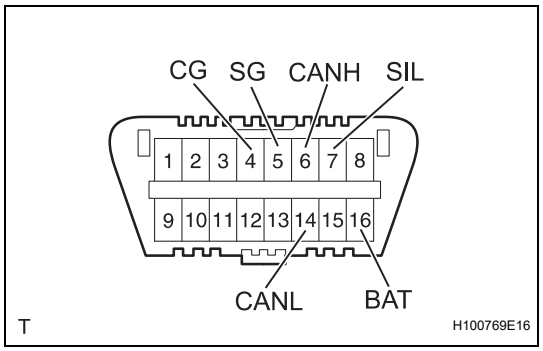
*1: LHD

*2: RHD

C123353E04

Terminal No.	Terminal Symbol	Destination
E30-1	P2+	Front passenger airbag assembly (Front passenger side squib 2nd step)
E30-2	P2-	Front passenger airbag assembly (Front passenger side squib 2nd step)
E30-3	P-	Front passenger airbag assembly (Front passenger side squib)
E30-4	P+	Front passenger airbag assembly (Front passenger side squib)
E30-5	D+	Steering pad (Driver side squib)
E30-6	D-	Steering pad (Driver side squib)
E30-7	D2-	Steering pad (Driver side squib 2nd step)
E30-8	D2+	Steering pad (Driver side squib 2nd step)
E30-9	DK+	Driver side knee airbag assembly (Driver side knee airbag squib)
E30-10	DK-	Driver side knee airbag assembly (Driver side knee airbag squib)
E30-13	CANH	CAN Communication line
E30-14	GSW2	Hybrid vehicle control ECU
E30-16	SIL	DLC3
E30-17	P-AB	Clock assembly (Passenger airbag ON/OFF indicator)
E30-21	IG2	IGN fuse
E30-22	CANL	CAN Communication line
E30-23	PAON	Clock assembly (Passenger airbag ON/OFF indicator)
E30-25	E1	Ground
E30-26	E2	Ground
E30-27	-SR	Front airbag sensor RH
E30-28	-SL	Front airbag sensor LH
E30-29	+SR	Front airbag sensor RH
E30-30	+SL	Front airbag sensor LH
N1-1	PD-	Front seat outer belt assembly LH (Front driver side pretensioner squib)
N1-2	PD+	Front seat outer belt assembly LH (Front driver side pretensioner squib)

Terminal No.	Terminal Symbol	Destination
N1-6	ICD-	Curtain shield airbag assembly LH (Driver side curtain shield squib)
N1-7	ICD+	Curtain shield airbag assembly LH (Driver side curtain shield squib)
N1-8	BBD+	Side airbag sensor LH
N1-9	SFD+	Front seat side airbag assembly LH (Front driver side - side squib)
N1-10	SFD-	Front seat side airbag assembly LH (Front driver side - side squib)
N1-11	DBE+	Front seat inner belt assembly LH (Driver side seat belt buckle switch)
N1-12	DBE-	Front seat inner belt assembly LH (Driver side seat belt buckle switch)
N1-13	DSP-	Seat position airbag sensor
N1-14	DSP+	Seat position airbag sensor
N1-15	BBD-	Side airbag sensor LH
O1-4	PP+	Front seat outer belt assembly RH (Front passenger side pretensioner squib)
O1-5	PP-	Front seat outer belt assembly RH (Front passenger side pretensioner squib)
O1-6	SFP-	Front seat side airbag assembly RH (Front passenger side - side squib)
O1-7	SFP+	Front seat side airbag assembly RH (Front passenger side - side squib)
O1-8	BBP+	Side airbag sensor RH
O1-9	ICP+	Curtain shield airbag assembly RH (Front passenger side curtain shield squib)
O1-10	ICP-	Curtain shield airbag assembly RH (Front passenger side curtain shield squib)
O1-11	BBP-	Side airbag sensor RH
O1-12	FSP+	Occupant classification ECU
O1-13	FSP-	Occupant classification ECU



DIAGNOSIS SYSTEM

1. CHECK DLC3

(a) The ECU uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

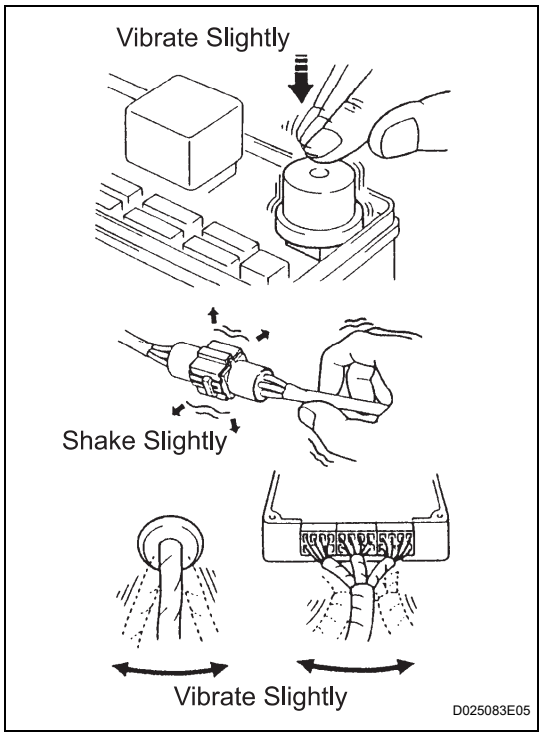
Symbols (Terminal No.)	Terminal Description	Condition	Specified condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Power switch off (*)	54 to 69 Ω
CANH (6) - BAT (16)	HIGH-level CAN bus line	Power switch off (*)	6 kΩ or higher
CANH (6) - CG (4)	HIGH-level CAN bus line	Power switch off (*)	200 Ω or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Power switch off (*)	6 kΩ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Power switch off (*)	200 Ω or higher

NOTICE:
***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches, or the doors.**
If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.
HINT:
If the display shows a communication error message when connecting the cable of the intelligent tester to the DLC3, turning the power switch on (IG) and operating the intelligent tester, there is a problem on the vehicle side or tester side.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

2. SYMPTOM SIMULATION

HINT:
The most difficult case in troubleshooting is when no symptoms occur. In such cases, a thorough customer problem analysis must be carried out. Then the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be reproduced. No matter how experienced or skilled a technician may be, if he proceeds to troubleshoot without confirming the problem symptoms, he will likely overlook something important and make a wrong guess at some points in the repair operation.
This leads to a standstill in troubleshooting.



(a) Vibration method: When vibration seems to be the major cause.
HINT:
Perform the simulation method only during the primary check period (for approximately 6 seconds after the power switch is turned on (IG)).
(1) Slightly vibrate the part of the sensor considered to be the problem cause with your fingers and check whether the malfunction occurs.
HINT:
Shaking the relays too strongly may result in open relays.
(2) Slightly shake the connector vertically and horizontally.
(3) Slightly shake the wire harness vertically and horizontally.
The connector joint and fulcrum of the vibration are the major areas to be checked thoroughly.

3. FUNCTION OF SRS WARNING LIGHT

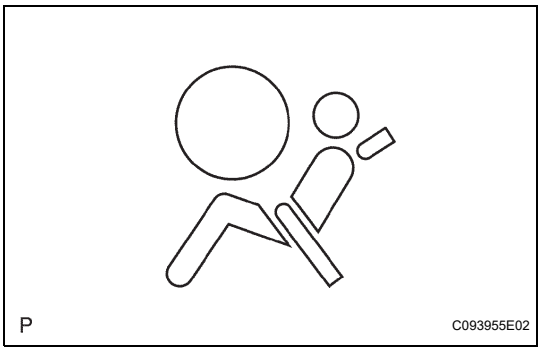
(a) Primary check.
(1) Turn the power switch off. Wait for at least 2 seconds, then turn the power switch on (IG). The SRS warning light comes on for approximately 6 seconds and the diagnosis of the airbag system (including the seat belt pretensioners) is performed.
HINT:
If trouble is detected during the primary check, the SRS warning light remains on even after the primary check period (for approximately 6 seconds) has elapsed.

(b) Constant check.
(1) After the primary check, the center airbag sensor assembly constantly monitors the airbag system for trouble.
HINT:
If trouble is detected during the constant check, the center airbag sensor assembly functions as follows:
- The SRS warning light comes on.
- The SRS warning light goes off, and then comes on. This blinking pattern indicates a source voltage drop. The SRS warning light goes off 10 seconds after the source voltage returns to normal.

(c) Review.
(1) When the airbag system is normal:
The SRS warning light comes on only during the primary check period (for approximately 6 seconds after the power switch is turned on (IG)).
(2) When the airbag system has trouble:
- The SRS warning light remains on even after the primary check period has elapsed.

- The SRS warning light goes off after the primary check, but comes on again during the constant check.
- The SRS warning light does not come on when turning the power switch from off to on (IG).

HINT:
The center airbag sensor assembly keeps the SRS warning light on if the airbag has been deployed.



4. SRS WARNING LIGHT CHECK

(a) Turn the power switch on (IG), and check that the SRS warning light comes on for approximately 6 seconds (primary check).

(b) Check that the SRS warning light goes off approximately 6 seconds after the power switch is turned on (IG) (constant check).

HINT:
When any of the following symptoms occur, refer to "Problem Symptoms Table" (See page RS-30).

- The SRS warning light comes on occasionally, after the primary check period has elapsed.
- The SRS warning light comes on, but a DTC is not output.
- The power switch is turned from off to on (IG), but the SRS warning light does not come on.

5. FUNCTION OF PASSENGER AIRBAG ON/OFF INDICATOR

(a) Initial check

(1) Turn the power switch on (IG).

(2) The passenger airbag ON/OFF indicator comes on for approximately 4 seconds, then goes off for approximately 2 seconds.

(3) Approximately 6 seconds after the power switch is turned on (IG), the passenger airbag ON/OFF indicator will be ON/OFF depending on the conditions listed below.

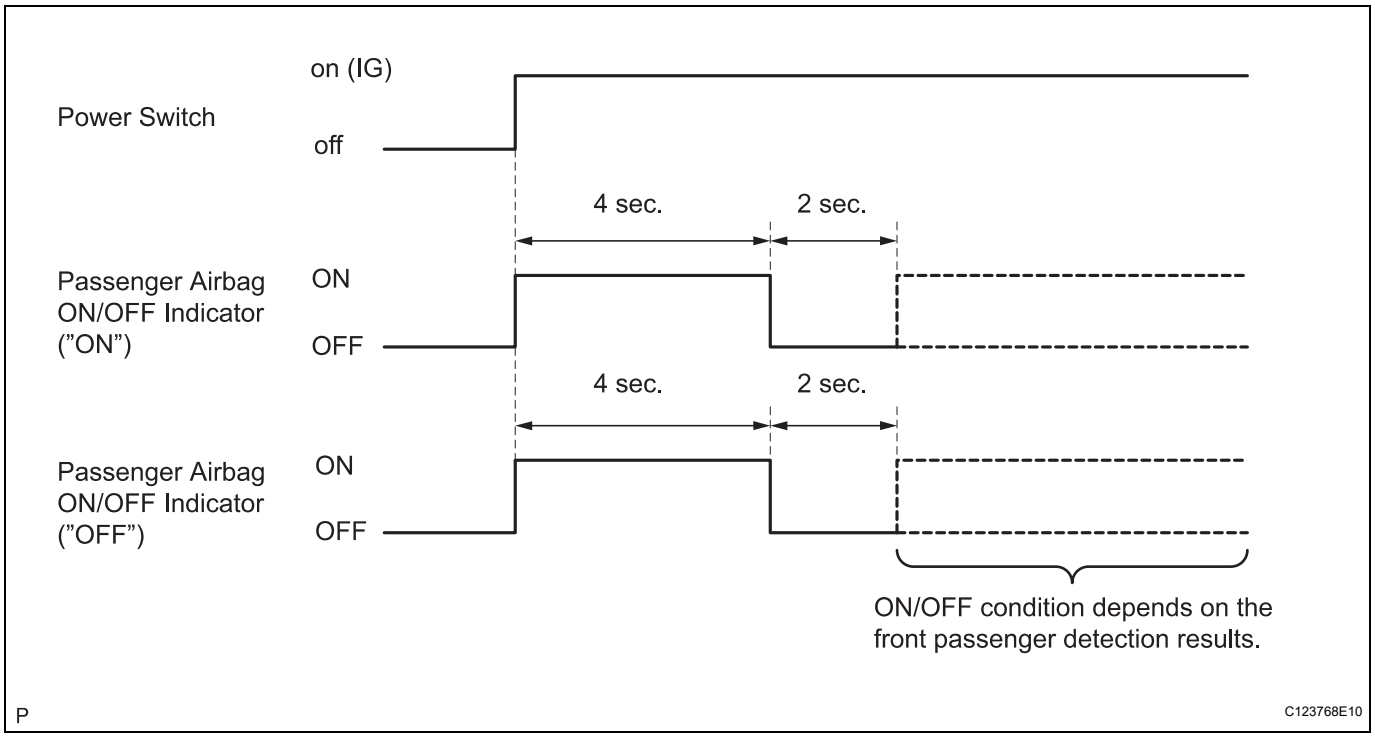
Condition	"ON" indicator	"OFF" indicator
Vacant	OFF	OFF
Adult is seated. (Above 36 kg (79.37 lb))	ON	OFF
Child is seated. (Less than 36 kg (79.37 lb))	OFF	ON
Child restraint system is set. (*)	OFF	ON
Front passenger occupant classification failure	OFF	ON

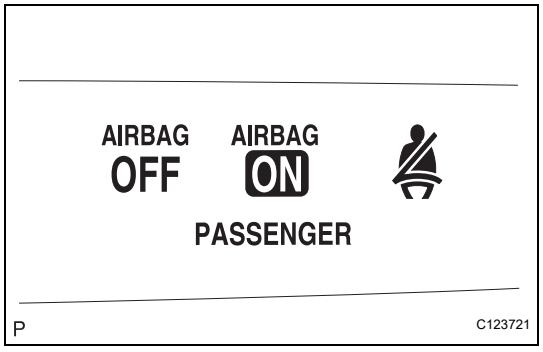
*: Child restraint system (less than 7 kg (15.43 lb)) and passenger side buckle switch is ON, then 7 to 36 kg (15.43 to 79.37 lb) is set.

HINT:

- The passenger airbag ON/OFF indicator is based on the timing chart below in order to check the indicator light circuit.

- When the front passenger occupant classification system has trouble, both the SRS warning light and the passenger airbag ON/OFF indicator ("OFF") come on. In this case, check the DTCs in "AIRBAG SYSTEM" first. Then troubleshoot the occupant classification system if DTC B1650/32 is detected, and troubleshoot the passenger airbag ON/OFF indicator if DTC B1660/43 is detected.





6. PASSENGER AIRBAG ON/OFF INDICATOR CHECK

(a) Turn the power switch on (IG).

(b) Check that the passenger airbag ON/OFF indicator ("ON" and "OFF") comes on for approximately 4 seconds, then goes off for approximately 2 seconds.
HINT:
Refer to the table in the previous step regarding the passenger airbag ON/OFF indicator when the power switch is turned on (IG) and approximately 6 seconds pass.

7. ACTIVATION PREVENTION MECHANISM

(a) FUNCTION OF ACTIVATION PREVENTION MECHANISM

(1) An activation prevention mechanism is built into the connector (on the center airbag sensor assembly side) of the airbag system squib circuit to prevent accidental airbag activation.

(2) This mechanism closes the circuit when the connector is disconnected by bringing the short spring into contact with the terminals and shutting off external electricity to prevent accidental airbag activation.

(b) RELEASE METHOD OF ACTIVATION PREVENTION MECHANISM

(1) To release the activation prevention mechanism, insert a piece of paper with the same thickness as the male terminal (approximately 0.5 mm (0.020 in.)) between the terminals and the short spring to break the connection.

(2) Refer to the following illustrations concerning connectors utilizing the activation prevention mechanism and its release method.

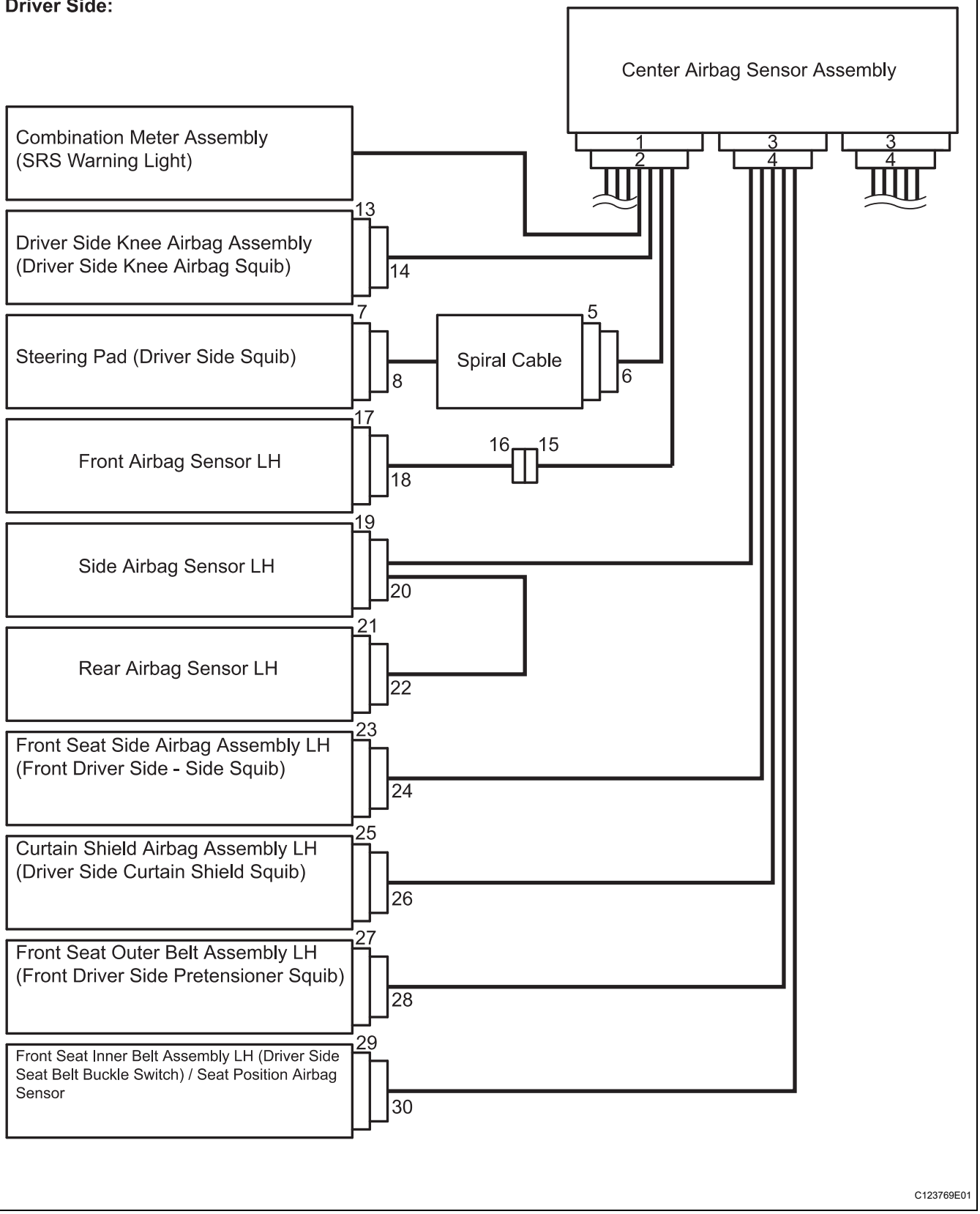
CAUTION:

Never release the activation prevention mechanism on the squib connector even when inspecting with the squib disconnected.

NOTICE:

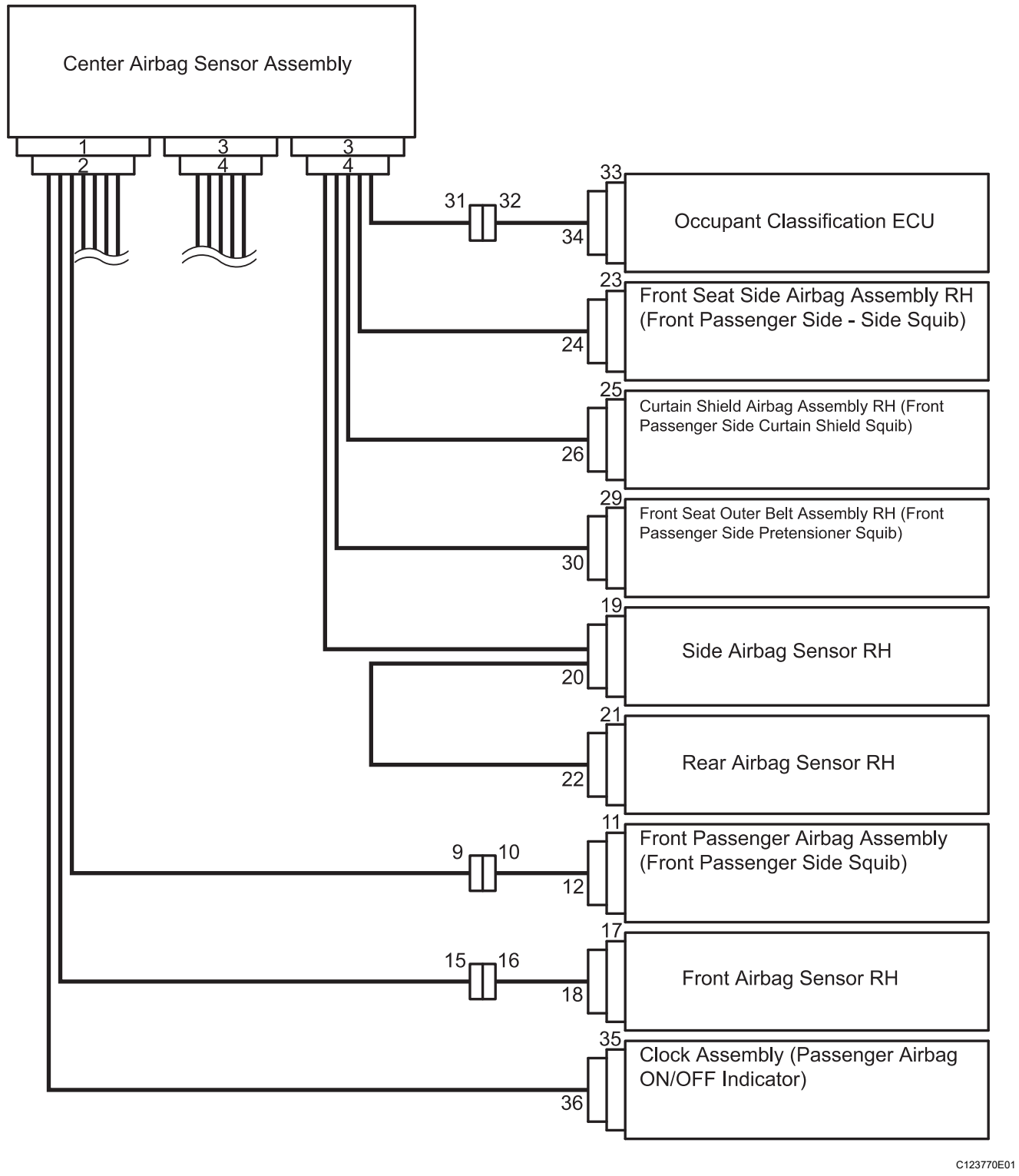
- **Do not release the activation prevention mechanism unless specially directed by the troubleshooting procedure.**
- **To prevent the terminal and the short spring from being damaged, always use a piece of paper with the same thickness as the male terminal.**

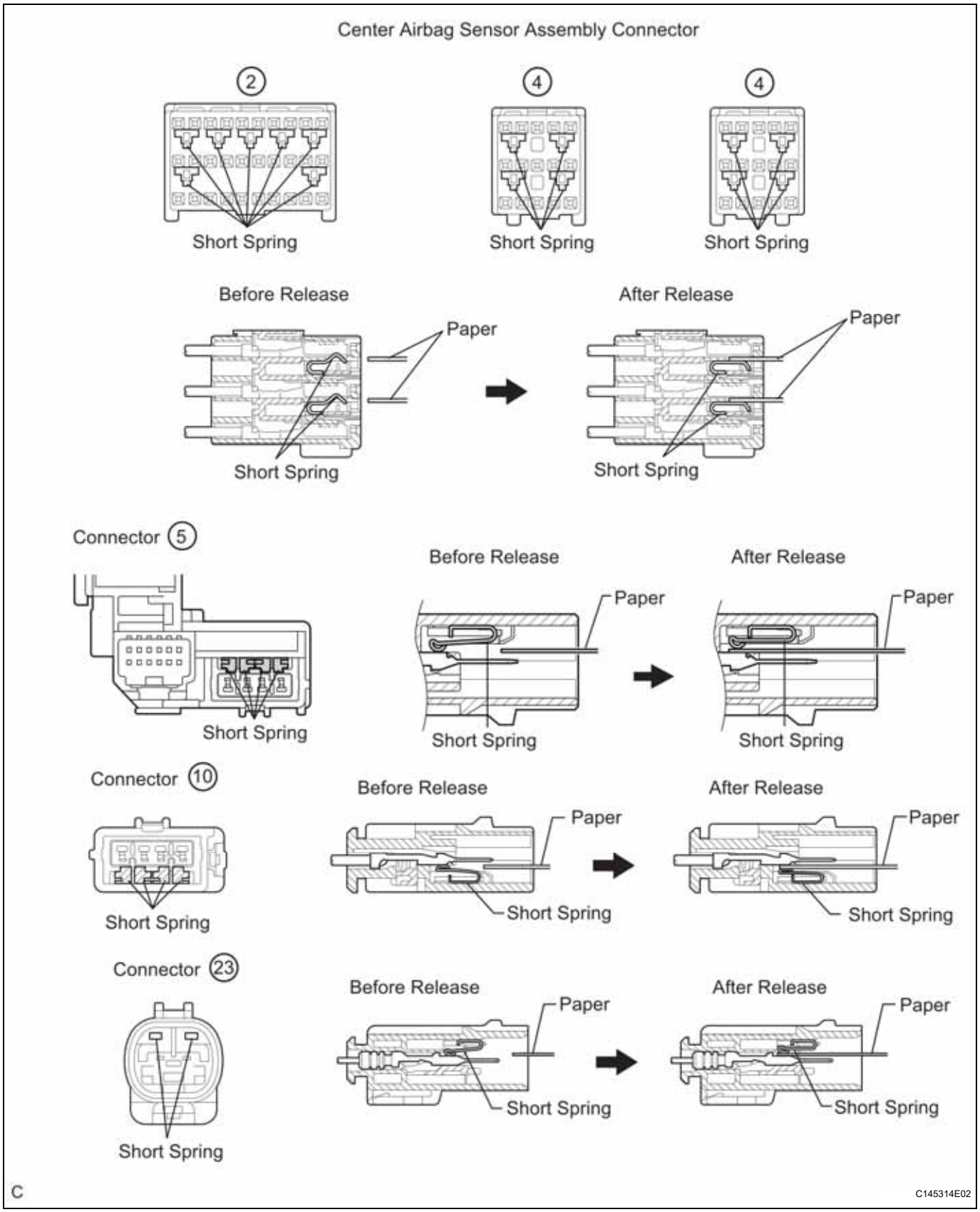
Driver Side:



RS

Passenger Side:




Center Airbag Sensor Assembly Connector
2
4
4
Short Spring
Short Spring
Short Spring
Before Release
After Release
Paper
Paper
Short Spring
Short Spring
Connector 5
Before Release
After Release
Paper
Paper
Short Spring
Short Spring
Short Spring
Connector 10
Before Release
After Release
Paper
Paper
Short Spring
Short Spring
Short Spring
Connector 23
Before Release
After Release
Paper
Paper
Short Spring
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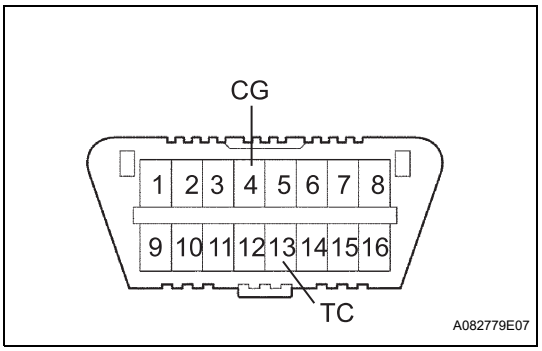
C
C145314E02



DTC CHECK / CLEAR

1. DTC CHECK (USING SST CHECK WIRE)

(a) Check the DTCs (Present trouble code).

(1) Turn the power switch on (IG), and wait for approximately 60 seconds.

(2) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

NOTICE:

Connect the terminals to the correct positions to avoid a malfunction.

(b) Check the DTCs (Past trouble code).

(1) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

NOTICE:

Connect the terminals to the correct positions to avoid a malfunction.

(2) Turn the power switch on (IG), and wait for approximately 60 seconds.

(c) Read the DTCs.

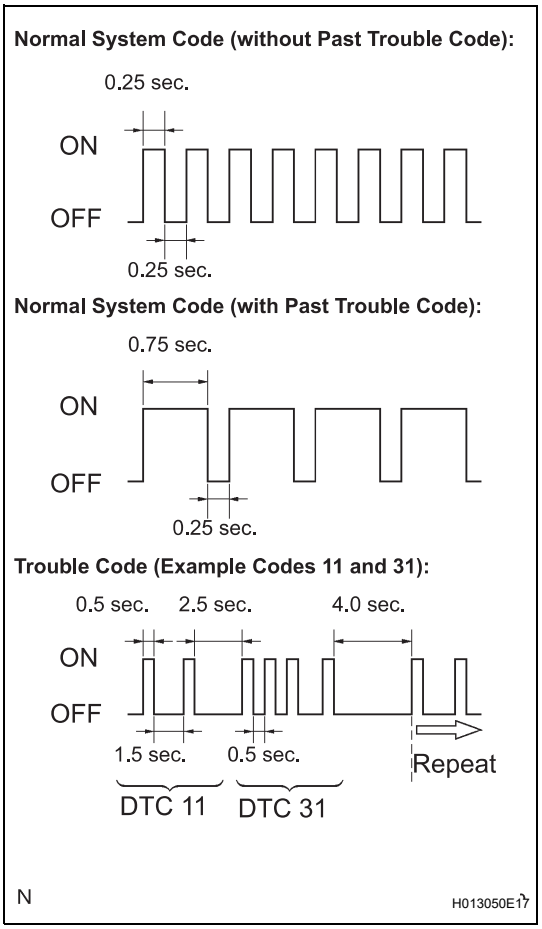
(1) Read the blinking patterns of the DTCs. As examples, the blinking patterns for the normal system code and trouble codes 11 and 31 are shown in the illustration.

- Normal system code indication (without past trouble code)
  The light blinks twice per second.
- Normal system code indication (with past trouble code)
  When the past trouble code is stored in the center airbag sensor assembly, the light blinks only once per second.
- Trouble code indication
  The first blinks indicates the first DTC. The second blinks occurs after a 1.5-second pause.

If there are more than 1 code, there will be a 2.5-second pause between each code. After all codes are shown, there will be a 4.0-second pause, and then they will all be repeated.

HINT:

- If 2 or more malfunctions are found, the indication begins with the smaller numbered code.
- If DTCs are indicated without connecting the terminals, proceed to "Diagnosis Circuit" (See page RS-230).



2. DTC CLEAR (USING SST CHECK WIRE)

(a) Clear the DTCs.

(1) When the power switch is turned off, the DTCs are cleared.
HINT:
Depending on the DTC, the code may not be cleared by turning off the power switch. In this case, proceed to the next procedure.

(2) Using SST, connect terminals TC and CG of the DLC3, and then turn the power switch on (IG).
SST 09843-18040

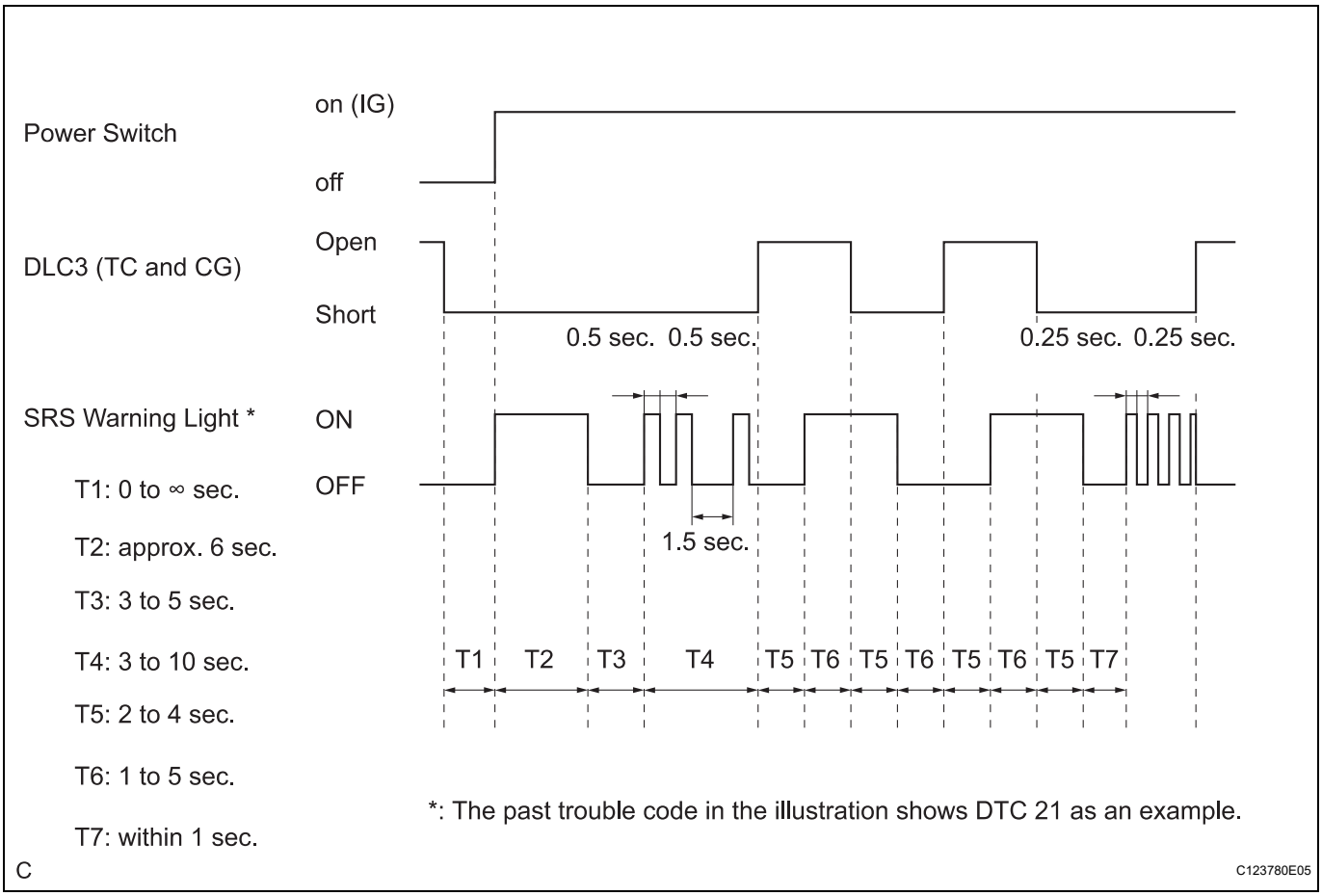
(3) Disconnect terminal TC of the DLC3 within 3 to 10 seconds after the DTCs are output, and check if the SRS warning light comes on after 3 seconds.

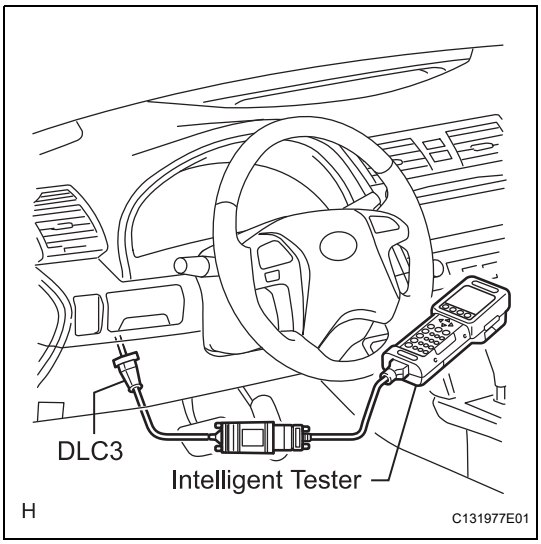
(4) Within 2 to 4 seconds after the SRS warning light comes on, connect terminals TC and CG of the DLC3.

(5) The SRS warning light should go off within 2 to 4 seconds after connecting terminals TC and CG of the DLC3. Then, disconnect terminal TC within 2 to 4 seconds after the SRS warning light goes off.

(6) The SRS warning light comes on again within 2 to 4 seconds after disconnecting terminal TC. Then, reconnect terminals TC and CG within 2 to 4 seconds after the SRS warning light comes on.

(7) Check if the SRS warning light goes off within 2 to 4 seconds after connecting terminals TC and CG of the DLC3. Also check if the normal system code is output within 1 second after the SRS warning light goes off.
If DTCs are not cleared, repeat this procedure until the codes are cleared.

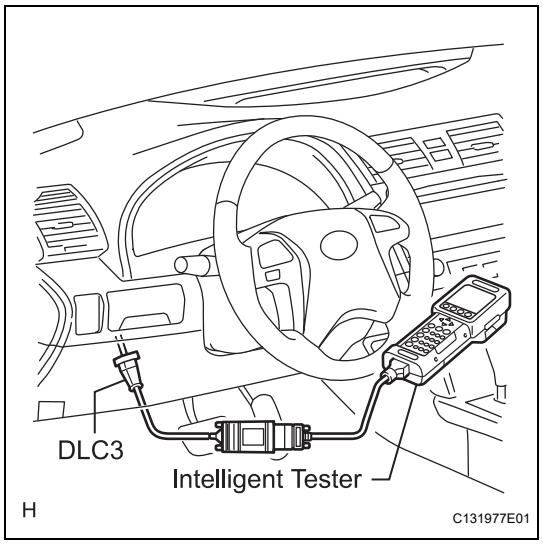




3. DTC CHECK

(a) Check the DTCs.
(1) Connect the intelligent tester to the DLC3.
(2) Turn the power switch on (IG).
(3) Check the DTCs by following the prompts on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

(b) Clear the DTCs.
(1) Connect the intelligent tester to the DLC3.
(2) Turn the power switch on (IG).
(3) Clear the DTCs by following the prompts on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.



CHECK MODE PROCEDURE

1. CHECK MODE (SIGNAL CHECK): DTC CHECK

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG).

(c) Select "SIGNAL CHECK", and proceed with checking using the intelligent tester.

NOTICE:

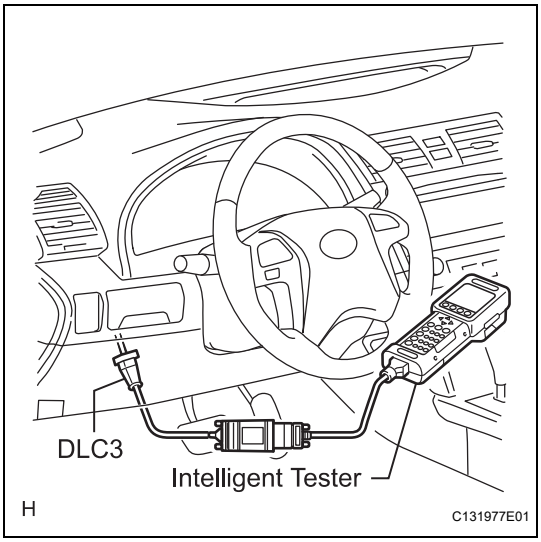
Select "SIGNAL CHECK" from the "DTC CHECK" screen displayed on the intelligent tester to clear the output DTCs (both present and past).

HINT:

- DTCs can be detected more sensitively in check mode than in normal diagnosis mode.
- Perform check mode inspection when a malfunction in each squib circuit is suspected even after the normal system code is output through normal diagnosis mode inspection.

DATA LIST / ACTIVE TEST

HINT:
By accessing the DATA LIST displayed on the intelligent tester, you can perform such functions as reading the values of switches and sensors without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method to save labor time.



1. DATA LIST FOR CENTER AIRBAG SENSOR ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester ON.
(d) Enter the following menus: DIAGNOSIS / OBD/ MOBD / SRS AIRBAG / DATA LIST.
(e) Check the values by referring to the table below.

DATA LIST:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
D SEAT POSITION	Driver Seat Position/ FORWARD: Seat position is forward BKWARD: Seat position is backward FAIL: Failure detected	FORWARD/BKWARD	-
PASSENGER CLASS	Passenger Classification/ NG: Data is not determined OFF: Vacant CHILD: Child (less than 36 kg (79.37 lb)) is seated AF05: Adult (36 to 54 kg (79.37 to 119.05 lb) is seated AM50: Adult (more than 54 kg (119.05 lb)) is seated FAIL: A failure is detected	OFF/CHILD/AF05/AM50	-
D BUCKLE SW	Driver Buckle SW/ UNSET: The seat belt is not fastened SET: The seat belt is fastened NG: Data is not determined	UNSET/SET	-
P BUCKLE SW	Passenger Buckle SW/ UNSET: The seat belt is not fastened SET: The seat belt is fastened NG: Data is not determined	UNSET/SET	-
PAST CODES	Number of Past DTC/ Min.: 0, Max.: 255	0	-

TYPE INFO:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
DISPLAY TYPE	Display Type Information/ LR: The display is indicated by LH/RH DP: The display is indicated by Driver/Passenger	DP	-

DIAGNOSTIC TROUBLE CODE CHART

If a trouble code is displayed during the DTC check, check the circuit listed for the code in the table below (refer to the appropriate page).

HINT:

- When the SRS warning light remains on and the DTC output is the normal system code, a voltage source drop is likely to occur. This malfunction is not stored in the memory by the center airbag sensor assembly. If the power source voltage returns to normal, the SRS warning light will automatically go off.
- When 2 or more codes are indicated, the code with the lower number appears first.
- If a code is not listed on the display chart, the center airbag sensor assembly may have failed.
- In the case of any malfunction concerning an open circuit, short to ground, or short to B+ due to a squib, other trouble codes may not be detected. In this case, repair the malfunction currently indicated and then perform malfunction diagnosis again.
- Mark in the check mode column:
  *1: DTC is not corresponding to the check mode.
  *2: DTC is corresponding to the check mode.

AIRBAG SYSTEM:

DTC Code	Detection Item	Trouble Area	Check Mode	See page
B1000/31	Center Airbag Sensor Assembly Malfunction	Center airbag sensor assembly	*1	RS-51
B1603/83	Front Satellite Sensor Bus RH Initialization Incomplete	1. Instrument panel wire 2. Engine room main wire 3. Front airbag sensor RH 4. Center airbag sensor assembly	*1	RS-52
B1608/84	Front Satellite Sensor Bus LH Initialization Incomplete	1. Instrument panel wire 2. Engine room main wire 3. Front airbag sensor LH 4. Center airbag sensor assembly	*1	RS-62
B1610/13	Front Airbag Sensor RH Malfunction	1. Front airbag sensor RH 2. Center airbag sensor assembly	*1	RS-72
B1612/83	Lost Communication with Front Airbag Sensor RH	1. Instrument panel wire 2. Engine room main wire 3. Front airbag sensor RH 4. Center airbag sensor assembly	*1	RS-52
B1613/83	Front Airbag Sensor RH Initialization Incomplete	1. Instrument panel wire 2. Engine room main wire 3. Front airbag sensor RH 4. Center airbag sensor assembly	*1	RS-52
B1615/14	Front Airbag Sensor LH Malfunction	1. Front airbag sensor LH 2. Center airbag sensor assembly	*1	RS-74
B1617/84	Lost Communication with Front Airbag Sensor LH	1. Instrument panel wire 2. Engine room main wire 3. Front airbag sensor LH 4. Center airbag sensor assembly	*1	RS-62

DTC Code	Detection Item	Trouble Area	Check Mode	See page
B1618/84	Front Airbag Sensor LH Initialization Incomplete	1. Instrument panel wire 2. Engine room main wire 3. Front airbag sensor LH 4. Center airbag sensor assembly	*1	RS-62
B1620/21	Driver Side - Side Airbag Sensor Malfunction	1. Side airbag sensor LH 2. Center airbag sensor assembly	*1	RS-76
B1622/81	Lost Communication with Driver Side - Side Airbag Sensor Assembly	1. Floor wire 2. Side airbag sensor LH 3. Rear airbag sensor LH 4. Center airbag sensor assembly	*1	RS-80
B1623/81	Driver Side - Side Airbag Sensor Assembly Initialization Incomplete	1. Floor wire 2. Side airbag sensor LH 3. Rear airbag sensor LH 4. Center airbag sensor assembly	*1	RS-80
B1625/22	Front Passenger Side - Side Airbag Sensor Malfunction	1. Side airbag sensor RH 2. Center airbag sensor assembly	*1	RS-96
B1627/82	Lost Communication with Front Passenger Side - Side Airbag Sensor Assembly	1. Floor wire No. 2 2. Side airbag sensor RH 3. Rear airbag sensor RH 4. Center airbag sensor assembly	*1	RS-100
B1628/82	Front Passenger Side - Side Airbag Sensor Assembly Initialization Incomplete	1. Floor wire No. 2 2. Side airbag sensor RH 3. Rear airbag sensor RH 4. Center airbag sensor assembly	*1	RS-100
B1630/23	Driver Side Rear Airbag Sensor Malfunction	1. Rear airbag sensor LH 2. Center airbag sensor assembly	*1	RS-116
B1632/81	Lost Communication with Driver Side Rear Airbag Sensor	1. Floor wire 2. Side airbag sensor LH 3. Rear airbag sensor LH 4. Center airbag sensor assembly	*1	RS-80
B1633/81	Driver Side Rear Airbag Sensor Initialization Incomplete	1. Floor wire 2. Side airbag sensor LH 3. Rear airbag sensor LH 4. Center airbag sensor assembly	*1	RS-80
B1635/24	Front Passenger Side Rear Airbag Sensor Malfunction	1. Rear airbag sensor RH 2. Center airbag sensor assembly	*1	RS-120
B1637/82	Lost Communication with Passenger Side Rear Airbag Sensor	1. Floor wire No. 2 2. Side airbag sensor RH 3. Rear airbag sensor RH 4. Center airbag sensor assembly	*1	RS-100
B1638/82	Passenger Side Rear Airbag Sensor Initialization Incomplete	1. Floor wire No. 2 2. Side airbag sensor RH 3. Rear airbag sensor RH 4. Center airbag sensor assembly	*1	RS-100
B1642/81	Lost Communication with Driver Side Satellite Sensor Bus	1. Floor wire 2. Side airbag sensor LH 3. Rear airbag sensor LH 4. Center airbag sensor assembly	*1	RS-80

DTC Code	Detection Item	Trouble Area	Check Mode	See page
B1643/81	Driver Side Satellite Sensor Bus Initialization Incomplete	1. Floor wire 2. Side airbag sensor LH 3. Rear airbag sensor LH 4. Center airbag sensor assembly	*1	RS-80
B1647/82	Lost Communication with Front Passenger Side Satellite Sensor Bus	1. Floor wire No. 2 2. Side airbag sensor RH 3. Rear airbag sensor RH 4. Center airbag sensor assembly	*1	RS-100
B1648/82	Front Passenger Side Satellite Sensor Bus Initialization Incomplete	1. Floor wire No. 2 2. Side airbag sensor RH 3. Rear airbag sensor RH 4. Center airbag sensor assembly	*1	RS-100
B1650/32	Occupant Classification System Malfunction	1. Floor wire No. 2 2. Occupant classification system 3. Front seat wire RH 4. Center airbag sensor assembly	*1	RS-124
B1653/35	Seat Position Airbag Sensor Circuit Malfunction	1. Floor wire 2. Seat position airbag sensor 3. Center airbag sensor assembly	*1	RS-136
B1655/37	Driver Side Seat Belt Buckle Switch Circuit Malfunction	1. Floor wire 2. Front seat inner belt assembly LH (Driver side seat belt buckle switch) 3. Center airbag sensor assembly	*1	RS-142
B1660/43	Passenger Airbag ON / OFF Indicator Circuit Malfunction	1. Instrument panel wire 2. Instrument panel wire No. 2 3. Clock assembly (Passenger airbag ON/ OFF indicator) 4. Center airbag sensor assembly	*1	RS-148
B1800/51	Short in Driver Side Squib Circuit	1. Instrument panel wire 2. Spiral cable 3. Steering pad (Driver side squib) 4. Center airbag sensor assembly	*2	RS-159
B1801/51	Open in Driver Side Squib Circuit	Same as DTC B1800/51	*2	RS-159
B1802/51	Short to GND in Driver Side Squib Circuit	Same as DTC B1800/51	*2	RS-159
B1803/51	Short to B+ in Driver Side Squib Circuit	Same as DTC B1800/51	*2	RS-159
B1805/52	Short in Front Passenger Side Squib Circuit	1. Instrument panel wire 2. Instrument panel wire assembly 3. Front passenger airbag assembly (Front passenger side squib) 4. Center airbag sensor assembly	*2	RS-166
B1806/52	Open in Front Passenger Side Squib Circuit	Same as DTC B1805/52	*2	RS-166

DTC Code	Detection Item	Trouble Area	Check Mode	See page
B1807/52	Short to GND in Front Passenger Side Squib Circuit	Same as DTC B1805/52	*2	RS-166
B1808/52	Short to B+ in Front Passenger Side Squib Circuit	Same as DTC B1805/52	*2	RS-166
B1810/53	Short in Driver Side Squib 2nd Step Circuit	1. Instrument panel wire 2. Spiral cable 3. Steering pad (Driver side squib 2nd step) 4. Center airbag sensor assembly	*2	RS-173
B1811/53	Open in Driver Side Squib 2nd Step Circuit	Same as DTC B1810/53	*2	RS-173
B1812/53	Short to GND in Driver Side Squib 2nd Step Circuit	Same as DTC B1810/53	*2	RS-173
B1813/53	Short to B+ in Driver Side Squib 2nd Step Circuit	Same as DTC B1810/53	*2	RS-173
B1815/54	Short in Front Passenger Side Squib 2nd Step Circuit	1. Instrument panel wire 2. Instrument panel wire assembly 3. Front passenger airbag assembly (Front passenger side squib 2nd step) 4. Center airbag sensor assembly	*2	RS-180
B1816/54	Open in Front Passenger Side Squib 2nd Step Circuit	Same as DTC B1815/54	*2	RS-180
B1817/54	Short to GND in Front Passenger Side Squib 2nd Step Circuit	Same as DTC B1815/54	*2	RS-180
B1818/54	Short to B+ in Front Passenger Side Squib 2nd Step Circuit	Same as DTC B1815/54	*2	RS-180
B1820/55	Short in Front Driver Side - Side Squib Circuit	1. Floor wire 2. Front seat side airbag assembly LH (Front driver side - side squib) 3. Center airbag sensor assembly	*2	RS-187
B1821/55	Open in Front Driver Side - Side Squib Circuit	Same as DTC B1820/55	*2	RS-187
B1822/55	Short to GND in Front Driver Side - Side Squib Circuit	Same as DTC B1820/55	*2	RS-187
B1823/55	Short to B+ in Front Driver Side - Side Squib Circuit	Same as DTC B1820/55	*2	RS-187
B1825/56	Short in Front Passenger Side - Side Squib Circuit	1. Floor wire No. 2 2. Front seat side airbag assembly RH (Front passenger side - side squib) 3. Center airbag sensor assembly	*2	RS-192
B1826/56	Open in Front Passenger Side - Side Squib Circuit	Same as DTC B1825/56	*2	RS-192
B1827/56	Short to GND in Front Passenger Side - Side Squib Circuit	Same as DTC B1825/56	*2	RS-192

DTC Code	Detection Item	Trouble Area	Check Mode	See page
B1828/56	Short to B+ in Front Passenger Side - Side Squib Circuit	Same as DTC B1825/56	*2	RS-192
B1830/57	Short in Driver Side Curtain Shield Squib Circuit	1. Floor wire 2. Curtain shield airbag assembly LH (Driver side curtain shield squib) 3. Center airbag sensor assembly	*2	RS-197
B1831/57	Open in Driver Side Curtain Shield Squib Circuit	Same as DTC B1830/57	*2	RS-197
B1832/57	Short to GND in Driver Side Curtain Shield Squib Circuit	Same as DTC B1830/57	*2	RS-197
B1833/57	Short to B+ in Driver Side Curtain Shield Squib Circuit	Same as DTC B1830/57	*2	RS-197
B1835/58	Short in Front Passenger Side Curtain Shield Squib Circuit	1. Floor wire No. 2 2. Curtain shield airbag assembly RH (Front passenger side curtain shield squib) 3. Center airbag sensor assembly	*2	RS-202
B1836/58	Open in Front Passenger Side Curtain Shield Squib Circuit	Same as DTC B1835/58	*2	RS-202
B1837/58	Short to GND in Front Passenger Side Curtain Shield Squib Circuit	Same as DTC B1835/58	*2	RS-202
B1838/58	Short to B+ in Front Passenger Side Curtain Shield Squib Circuit	Same as DTC B1835/58	*2	RS-202
B1860/64	Short in Driver Side Knee Airbag Squib Circuit	1. Instrument panel wire 2. Driver side knee airbag assembly (Driver side knee airbag squib) 3. Center airbag sensor assembly	*2	RS-207
B1861/64	Open in Driver Side Knee Airbag Squib Circuit	Same as DTC B1860/64	*2	RS-207
B1862/64	Short to GND in Driver Side Knee Airbag Squib Circuit	Same as DTC B1860/64	*2	RS-207
B1863/64	Short to B+ in Driver Side Knee Airbag Squib Circuit	Same as DTC B1860/64	*2	RS-207
B1900/73	Short in Front Driver Side Pretensioner Squib Circuit	1. Floor wire 2. Front seat outer belt assembly LH (Front driver side pretensioner squib) 3. Center airbag sensor assembly	*2	RS-212
B1901/73	Open in Front Driver Side Pretensioner Squib Circuit	Same as DTC B1900/73	*2	RS-212
B1902/73	Short to GND in Front Driver Side Pretensioner Squib Circuit	Same as DTC B1900/73	*2	RS-212
B1903/73	Short to B+ in Front Driver Side Pretensioner Squib Circuit	Same as DTC B1900/73	*2	RS-212

DTC Code	Detection Item	Trouble Area	Check Mode	See page
B1905/74	Short in Front Passenger Side Pretensioner Squib Circuit	1. Floor wire No. 2 2. Front seat outer belt assembly RH (Front passenger side pretensioner squib) 3. Center airbag sensor assembly	*2	RS-217
B1906/74	Open in Front Passenger Side Pretensioner Squib Circuit	Same as DTC B1905/74	*2	RS-217
B1907/74	Short to GND in Front Passenger Side Pretensioner Squib Circuit	Same as DTC B1905/74	*2	RS-217
B1908/74	Short to B+ in Front Passenger Side Pretensioner Squib Circuit	Same as DTC B1905/74	*2	RS-217

DTC	B1000/31	Center Airbag Sensor Assembly Malfunction

DESCRIPTION

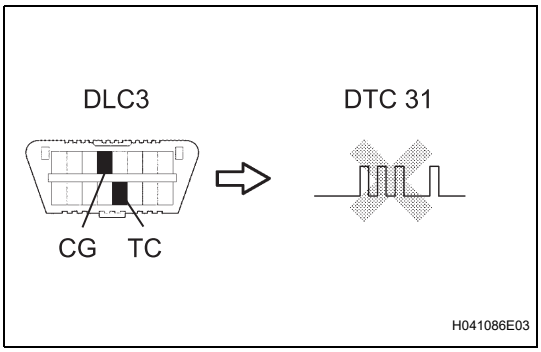
The center airbag sensor assembly consists of the deceleration sensor, the safing sensor, the drive circuit, the diagnosis circuit, the ignition control, etc.
If the center airbag sensor assembly receives signals from the deceleration sensor, it determines whether the SRS should be activated.
DTC B1000/31 is recorded when a malfunction is detected in the center airbag sensor assembly.

DTC No.	DTC Detecting Condition	Trouble Area
B1000/31	Center airbag sensor assembly malfunction	Center airbag sensor assembly

HINT:
When a trouble code is displayed simultaneously with B1000/31, repair the malfunction indicated by this code (except B1000/31) first.

INSPECTION PROCEDURE

1 CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in the memory (See page RS-41).
(f) Turn the power switch off.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (See page RS-41).
OK:
DTC B1000/31 is not output.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

DTC	B1603/83	Front Satellite Sensor Bus RH Initialization Incomplete

DTC	B1612/83	Lost Communication with Front Airbag Sensor RH

DTC	B1613/83	Front Airbag Sensor RH Initialization Incomplete

DESCRIPTION

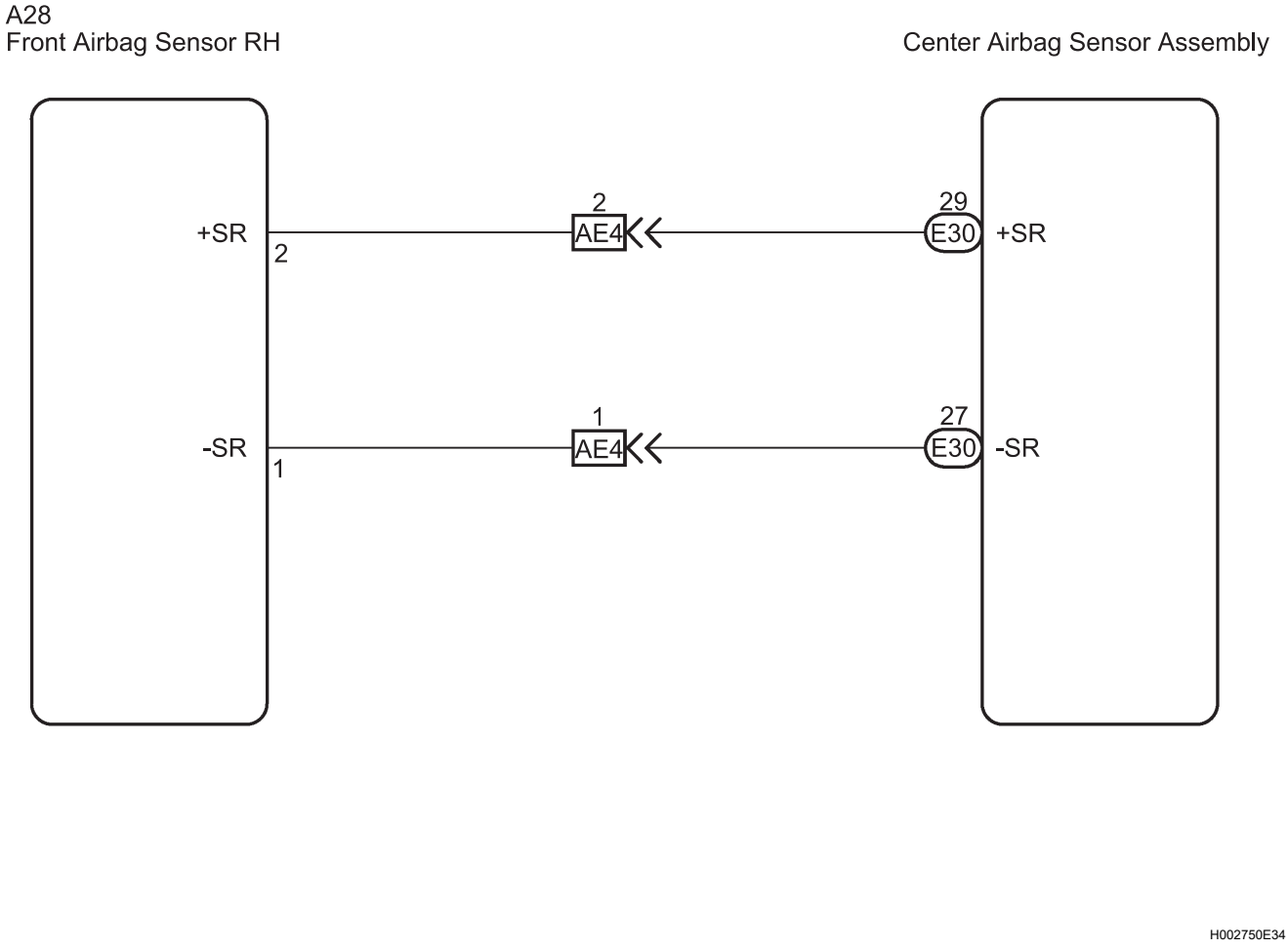
The front airbag sensor RH circuit consists of the center airbag sensor assembly and front airbag sensor RH.

The front airbag sensor RH detect impacts to the vehicle and send signals to the center airbag sensor assembly to determine if the airbag should be deployed.

DTC B1603/83, B1612/83, or B1613/83 is recorded when a malfunction is detected in the front airbag sensor RH circuit.

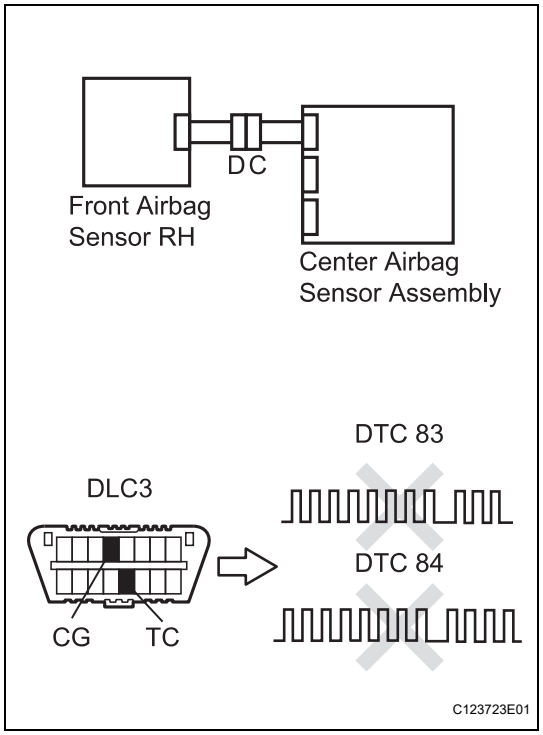
DTC No.	DTC Detecting Condition	Trouble Area
B1603/83 B1612/83 B1613/83	• The airbag sensor assembly center receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the front airbag sensor RH circuit for 2 seconds. • Front airbag sensor RH malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Engine room main wire • Front airbag sensor RH • Center airbag sensor assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the power switch on (IG), and wait for at least 60 seconds.
(b) Turn the power switch off.
HINT:
If a communication error occurs, DTCs for both the LH and RH sides will be stored simultaneously. To identify the malfunctioning area, turn the power switch off and then on (IG) again.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Check the DTCs (See page RS-41).
Result

Result	Proceed to
DTC B1603, B1613, or 83 is output.	A
DTC B1618/84 is output.	B
DTC B1603, B1613, or 83 and B1618/84 are not output.	C

HINT:
- DTCs indicating communication errors will be changed to DTCs indicating errors in initialization by turning the power switch off and then on (IG) again.
- Codes other than DTC B1603, B1613, or 83 and B1618/84 may be output at this time, but they are not related to this check.

B → **GO TO DTC B1618/84 (See page RS-62)**

C → **USE SIMULATION METHOD TO CHECK (See page RS-33)**

A

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and the front airbag sensor RH.
OK:
The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY**

OK

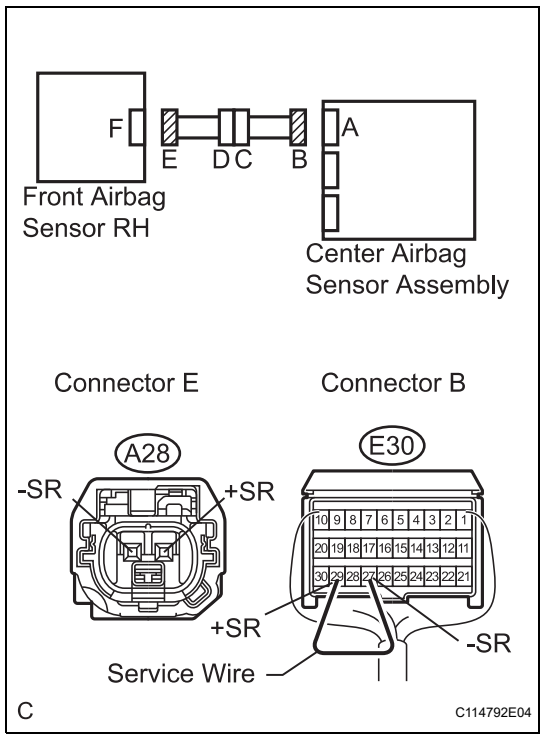
3	CHECK CONNECTORS

(a) Disconnect the connectors from the center airbag sensor assembly and front airbag sensor RH.
(b) Check that the connectors (on the center airbag sensor assembly side and front airbag sensor RH side) are not damaged.
OK:
The connectors are not deformed or damaged.

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

4	CHECK FRONT AIRBAG SENSOR RH CIRCUIT (OPEN)



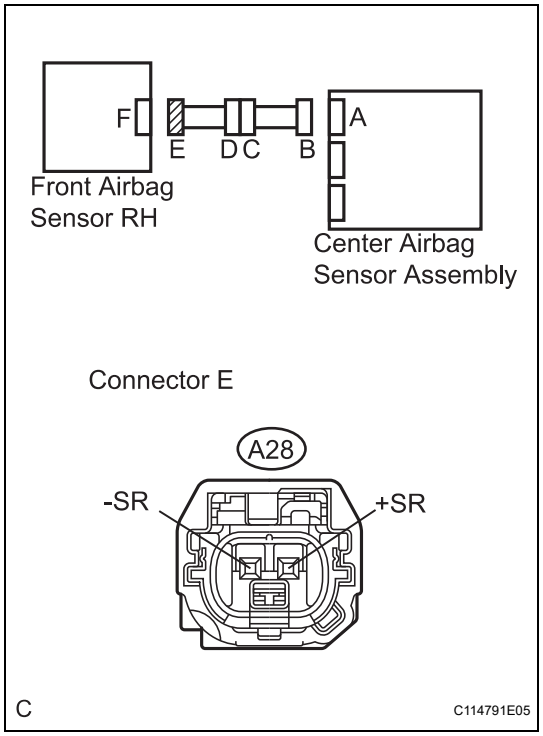
(a) Using a service wire, connect terminals 29 (+SR) and 27 (-SR) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
A28-2 (+SR) - A28-1 (-SR)	Always	Below 1 Ω

NG → **Go to step 9**

OK

5 CHECK FRONT AIRBAG SENSOR RH CIRCUIT (SHORT)



(a) Disconnect the service wire from connector B.
(b) Measure the resistance according to the value(s) in the table below.

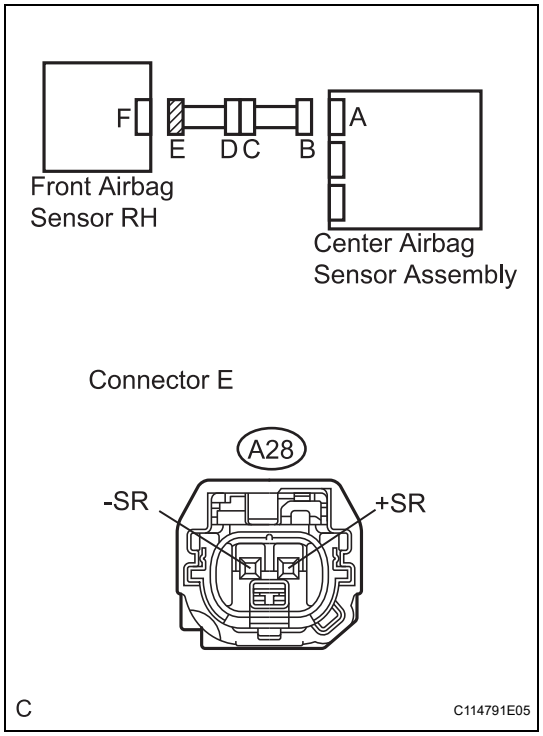
Standard resistance

Tester Connection	Condition	Specified Condition
A28-2 (+SR) - A28-1 (-SR)	Always	1 MΩ or higher

NG → **Go to step 10**

OK

6 CHECK FRONT AIRBAG SENSOR RH CIRCUIT (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

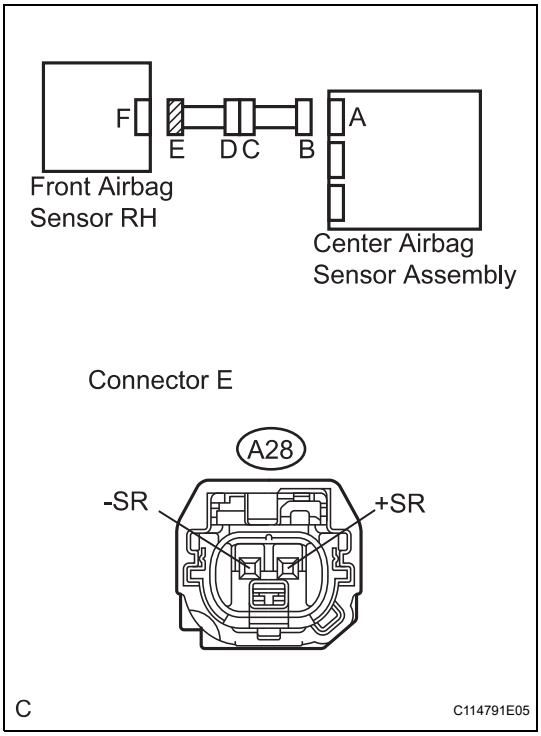
Standard voltage

Tester Connection	Condition	Specified Condition
A28-2 (+SR) - Body ground	Power switch on (IG)	Below 1 V
A28-1 (-SR) - Body ground	Power switch on (IG)	Below 1 V

NG → **Go to step 11**

OK

7 CHECK FRONT AIRBAG SENSOR RH CIRCUIT (SHORT TO GROUND)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

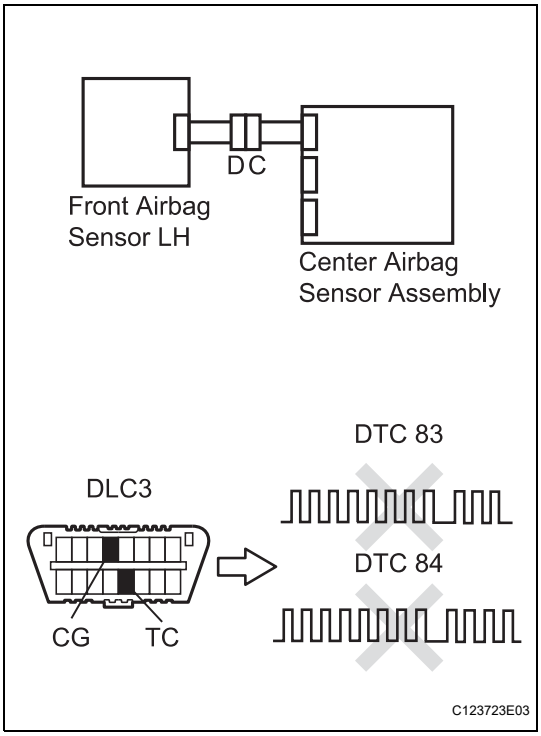
Standard resistance

Tester Connection	Condition	Specified Condition
A28-2 (+SR) - Body ground	Always	1 MΩ or higher
A28-1 (-SR) - Body ground	Always	1 MΩ or higher

NG → **Go to step 12**

OK

8 CHECK FRONT AIRBAG SENSOR RH



(a) Connect the connectors to the center airbag sensor assembly.
(b) Interchange the front airbag sensor LH with RH and connect the connectors to them.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in the memory (See page RS-41).
(f) Turn the power switch off.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (See page RS-41).

Result

Result	Proceed to
DTC B1603, B1612, B1613, or 83 is output.	A
DTC B1608, B1617, B1618, or 84 is output.	B
DTC B1603, B1612, B1613, or 83 and B1608, B1617, B1618, or 84 are not output.	C

HINT:
Codes other than DTC B1603, B1612, B1613, or 83 and B1608, B1617, B1618, or 84 may be output at this time, but they are not related to this check.

RS

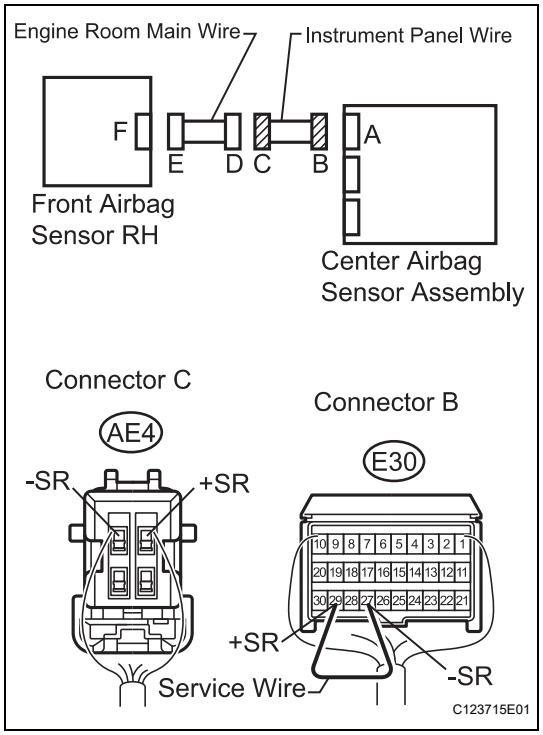
A → REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)

B → REPLACE FRONT AIRBAG SENSOR RH (See page RS-428)

C

USE SIMULATION METHOD TO CHECK (See page RS-33)

9 CHECK INSTRUMENT PANEL WIRE (OPEN)



(a) Disconnect the instrument panel wire connector from the engine room main wire.
HINT:
The service wire has already been inserted into connector B.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

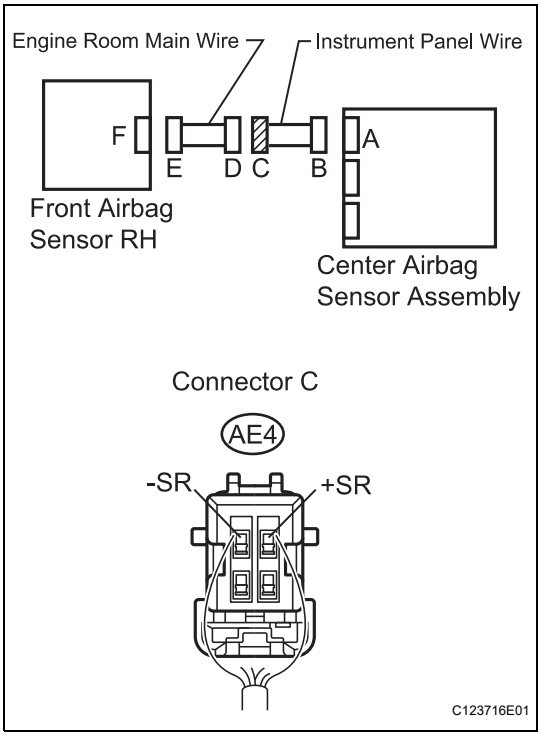
Tester Connection	Condition	Specified Condition
AE4-2 (+SR) - AE4-1 (-SR)	Always	Below 1 Ω

NG → REPAIR OR REPLACE INSTRUMENT PANEL WIRE

OK

REPAIR OR REPLACE ENGINE ROOM MAIN WIRE

10	CHECK INSTRUMENT PANEL WIRE (SHORT)



(a) Disconnect the instrument panel wire connector from the engine room main wire.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

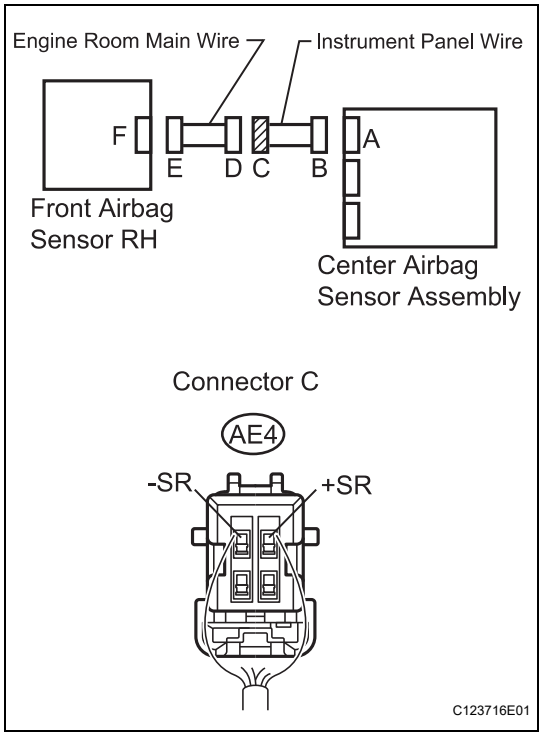
Tester Connection	Condition	Specified Condition
AE4-2 (+SR) - AE4-1 (-SR)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

REPAIR OR REPLACE ENGINE ROOM MAIN WIRE

11	CHECK INSTRUMENT PANEL WIRE (SHORT TO B+)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the instrument panel wire connector from the engine room main wire.
(d) Connect the negative (-) terminal cable to battery, and wait for at least 2 seconds.
(e) Turn the power switch on (IG).
(f) Measure the voltage according to the value(s) in the table below.

Standard voltage

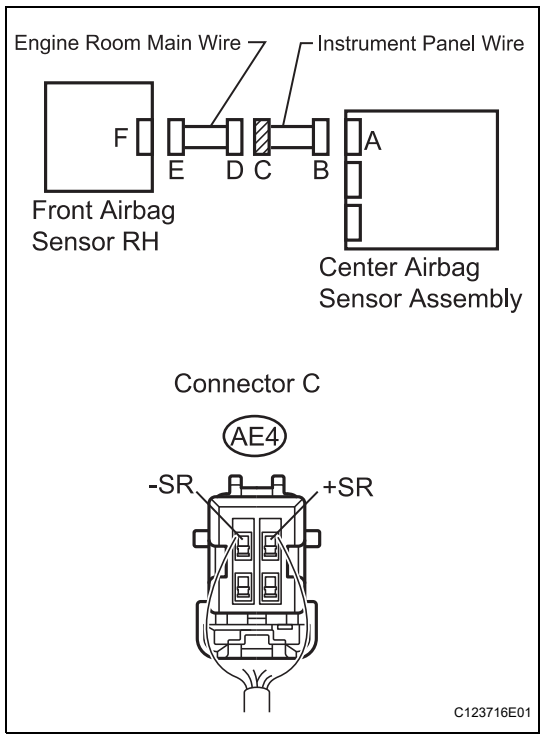
Tester Connection	Condition	Specified Condition
AE4-2 (+SR) - Body ground	Power switch on (IG)	Below 1 V
AE4-1 (-SR) - Body ground	Power switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

REPAIR OR REPLACE ENGINE ROOM MAIN WIRE

12	CHECK INSTRUMENT PANEL WIRE (SHORT TO GROUND)



(a) Disconnect the instrument panel wire connector from the engine room main wire.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
AE4-2 (+SR) - Body ground	Always	1 MΩ or higher
AE4-1 (-SR) - Body ground	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

REPAIR OR REPLACE ENGINE ROOM MAIN WIRE

DTC	B1608/84	Front Satellite Sensor Bus LH Initialization Incomplete

DTC	B1617/84	Lost Communication with Front Airbag Sensor LH

DTC	B1618/84	Front Airbag Sensor LH Initialization Incomplete

DESCRIPTION

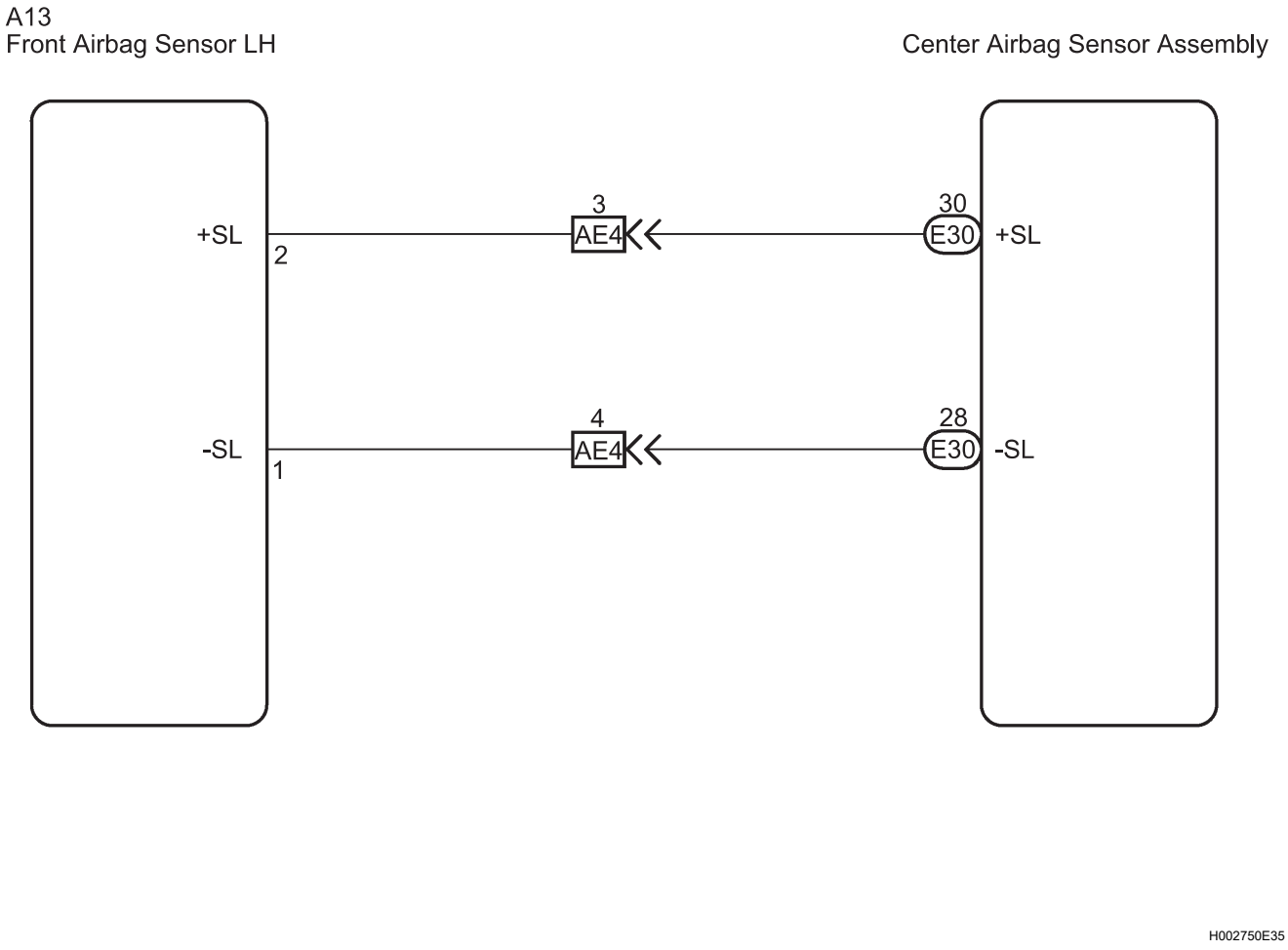
The front airbag sensor LH circuit consists of the center airbag sensor assembly and front airbag sensor LH.

The front airbag sensor LH detects impacts to the vehicle and sends signals to the center airbag sensor assembly to determine if the airbag should be deployed.

DTC B1608/84, B1617/84, or B1618/84 is recorded when a malfunction is detected in the front airbag sensor LH circuit.

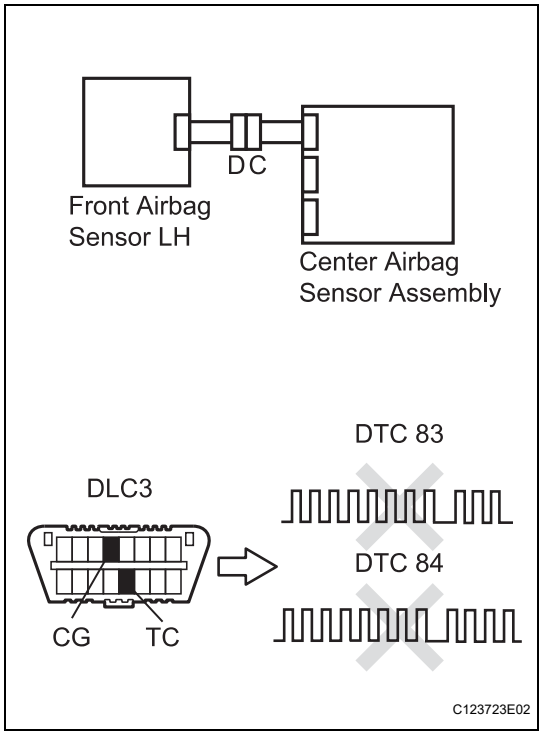
DTC No.	DTC Detecting Condition	Trouble Area
B1608/84 B1617/84 B1618/84	• The center airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the front airbag sensor LH circuit for 2 seconds. • Front airbag sensor LH malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Engine room main wire • Front airbag sensor LH • Center airbag sensor assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK DTC



(a) Turn the power switch on (IG), and wait for at least 60 seconds.
(b) Turn the power switch off.
HINT:
If a communication error occurs, DTCs for both the LH and RH sides will be stored simultaneously. To identify the malfunctioning area, turn the power switch off and then on (IG) again.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Check the DTCs (See page RS-41).
Result

Result	Proceed to
DTC B1608, B1618, or 84 is output.	A
DTC B1613/83 is output.	B
DTC B1608, B1618, or 84 and B1613/83 are not output.	C

HINT:
- DTCs indicating communication errors will be changed to DTCs indicating errors in initialization by turning the power switch off and then on (IG) again.
- Codes other than DTC B1608, B1618, or 84 and B1613/83 may be output at this time, but they are not related to this check.

B → **GO TO DTC B1613/83 (See page RS-52)**

C → **USE SIMULATION METHOD TO CHECK (See page RS-33)**

A

2 CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and the front airbag sensor LH.
OK:
The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY**

OK

RS

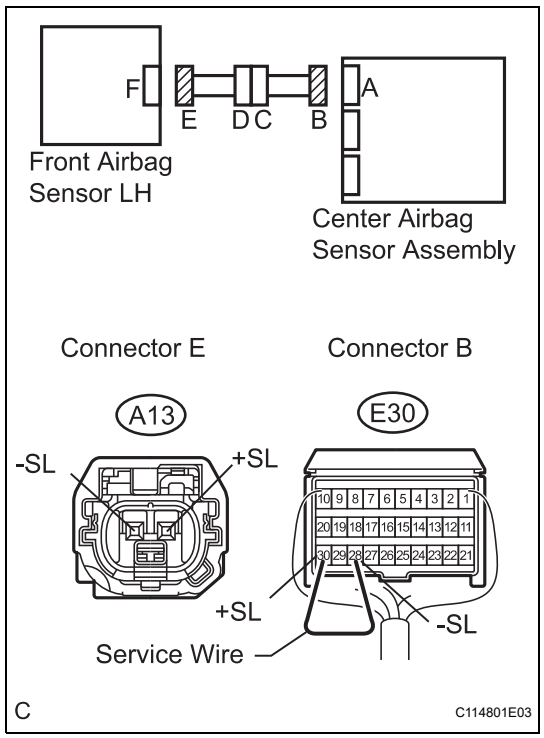
3	CHECK CONNECTORS

(a) Disconnect the connectors from the center airbag sensor assembly and front airbag sensor LH.
(b) Check that the connectors (on the center airbag sensor assembly side and front airbag sensor LH side) are not damaged.
OK:
The connectors are not deformed or damaged.

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

4	CHECK FRONT AIRBAG SENSOR LH (OPEN)



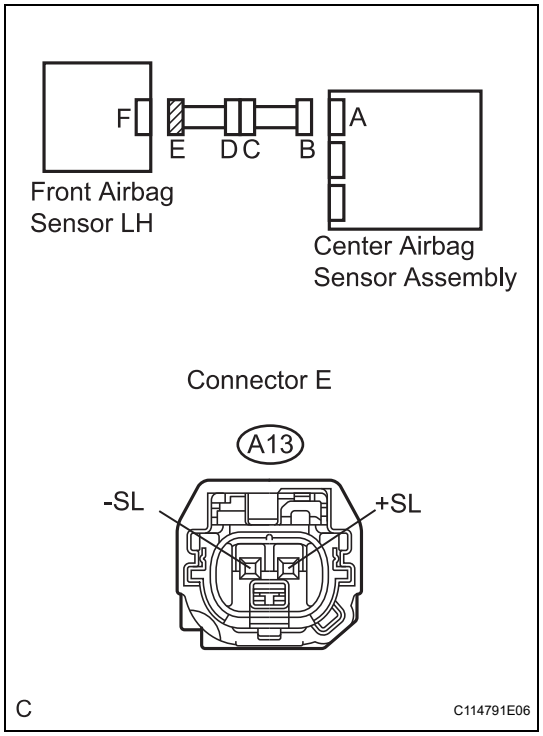
(a) Using a service wire, connect terminals 30 (+SL) and 28 (-SL) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
A13-2 (+SL) - A13-1 (-SL)	Always	Below 1 Ω

NG → **Go to step 9**

OK

5 CHECK FRONT AIRBAG SENSOR LH (SHORT)



(a) Disconnect the service wire from connector B.
(b) Measure the resistance according to the value(s) in the table below.

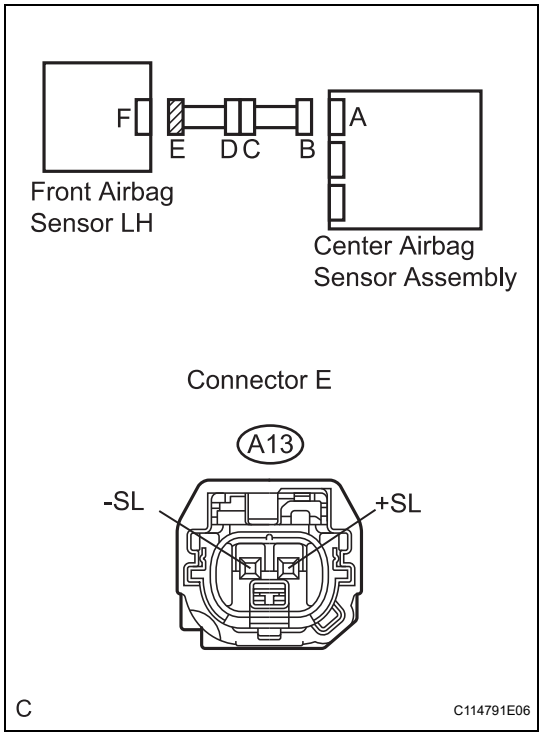
Standard resistance

Tester Connection	Condition	Specified Condition
A13-2 (+SL) - A13-1 (-SL)	Always	1 MΩ or higher

NG → **Go to step 10**

OK

6 CHECK FRONT AIRBAG SENSOR LH (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

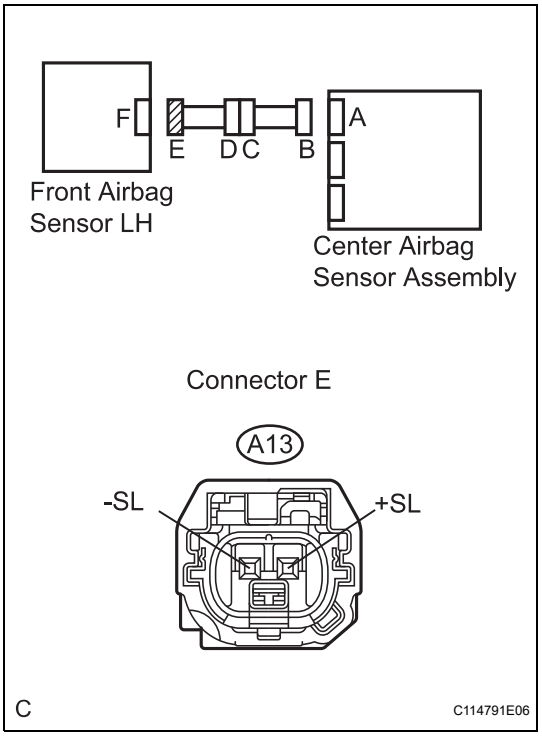
Standard voltage

Tester Connection	Condition	Specified Condition
A13-2 (+SL) - Body ground	Power switch on (IG)	Below 1 V
A13-1 (-SL) - Body ground	Power switch on (IG)	Below 1 V

NG → **Go to step 11**

OK

7 CHECK FRONT AIRBAG SENSOR LH (SHORT TO GROUND)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

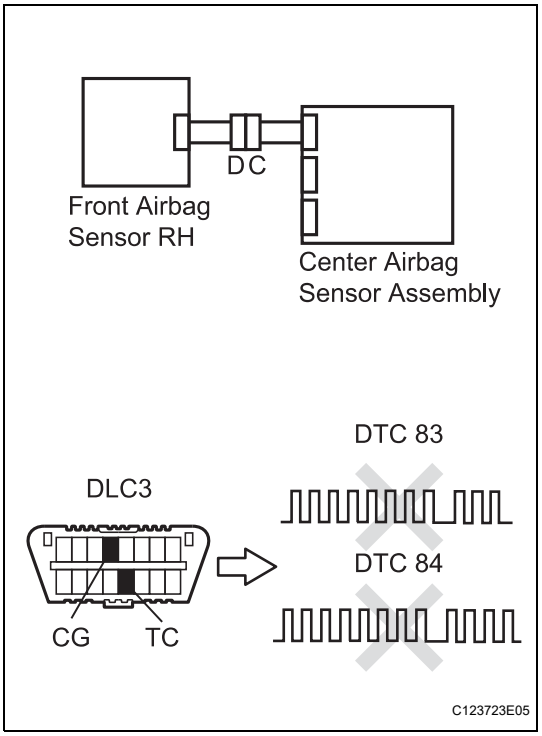
Standard resistance

Tester Connection	Condition	Specified Condition
A13-2 (+SL) - Body ground	Always	1 MΩ or higher
A13-1 (-SL) - Body ground	Always	1 MΩ or higher

NG → **Go to step 12**

OK

8 CHECK FRONT AIRBAG SENSOR LH



(a) Connect the connectors to the center airbag sensor assembly.
(b) Interchange the front airbag sensor RH with LH and connect the connectors to them.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in the memory (See page RS-41).
(f) Turn the power switch off.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (See page RS-41).

Result

Result	Proceed to
DTC B1608, B1617, B1618, or 84 is output.	A
DTC B1603, B1612, B1613, or 83 is output.	B
DTC B1603, B1612, B1613, or 83 and B1608, B1617, B1618, or 84 are not output.	C

HINT:
Codes other than DTC B1608, B1617, B1618, or 84 and B1603, B1612, B1613, or 83 may be output at this time, but they are not related to this check.

RS

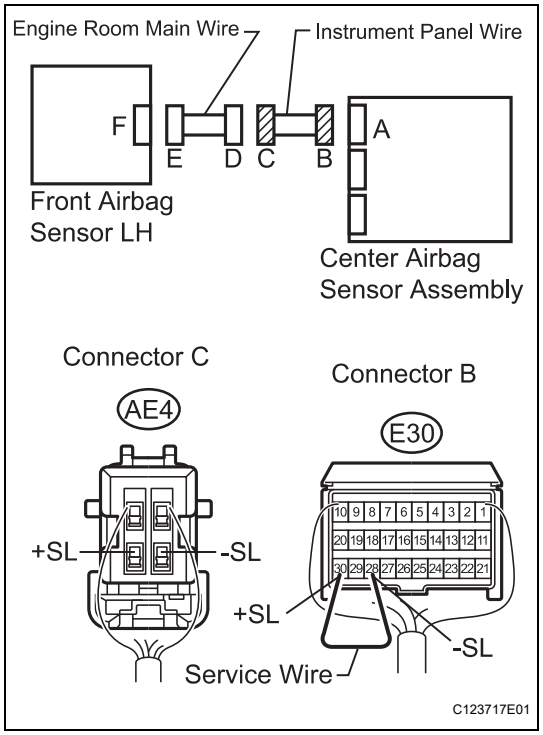
A → REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)

B → REPLACE FRONT AIRBAG SENSOR LH (See page RS-428)

C

USE SIMULATION METHOD TO CHECK (See page RS-33)

9 CHECK INSTRUMENT PANEL WIRE (OPEN)



(a) Disconnect the instrument panel wire connector from the engine room main wire.
HINT:
The service wire has already been inserted into connector B.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

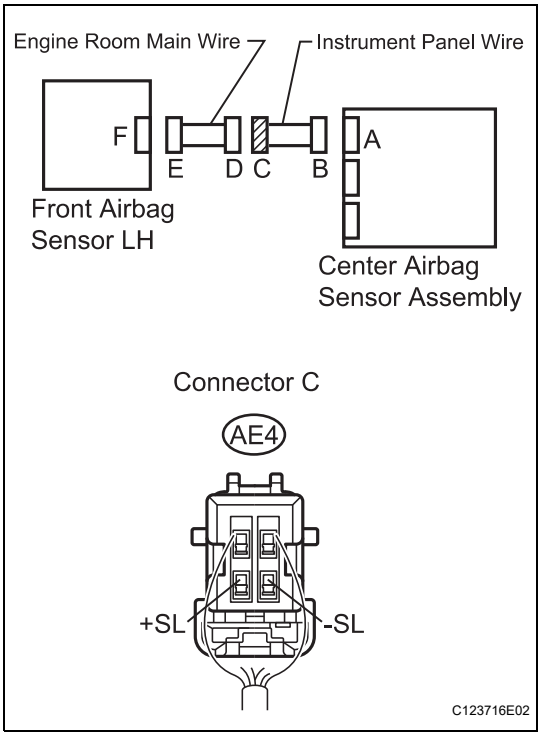
Tester Connection	Condition	Specified Condition
AE4-3 (+SL) - AE4-4 (-SL)	Always	Below 1 Ω

NG → REPAIR OR REPLACE INSTRUMENT PANEL WIRE

OK

REPAIR OR REPLACE ENGINE ROOM MAIN WIRE

10	CHECK INSTRUMENT PANEL WIRE (SHORT)



(a) Disconnect the instrument panel wire connector from the engine room main wire.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

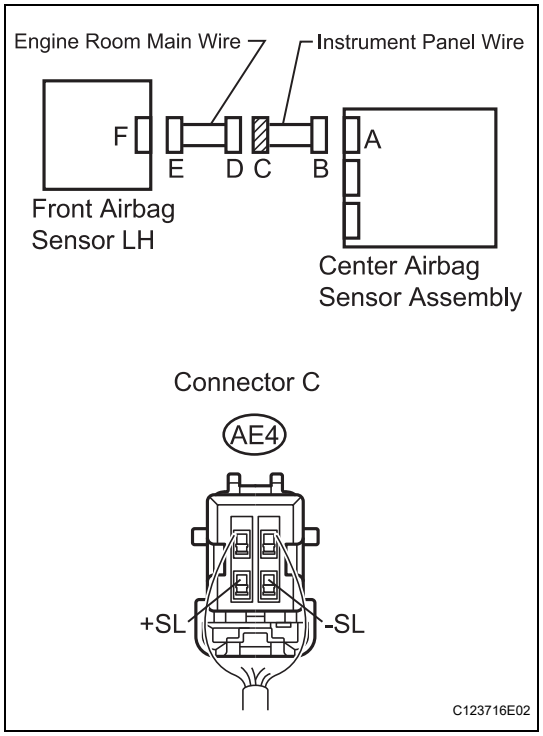
Tester Connection	Condition	Specified Condition
AE4-3 (+SL) - AE4-4 (-SL)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

REPAIR OR REPLACE ENGINE ROOM MAIN WIRE

11	CHECK INSTRUMENT PANEL WIRE (SHORT TO B+)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the instrument panel wire connector from the engine room main wire.
(d) Connect the negative (-) terminal cable to battery, and wait for at least 2 seconds.
(e) Turn the power switch on (IG).
(f) Measure the voltage according to the value(s) in the table below.

Standard voltage

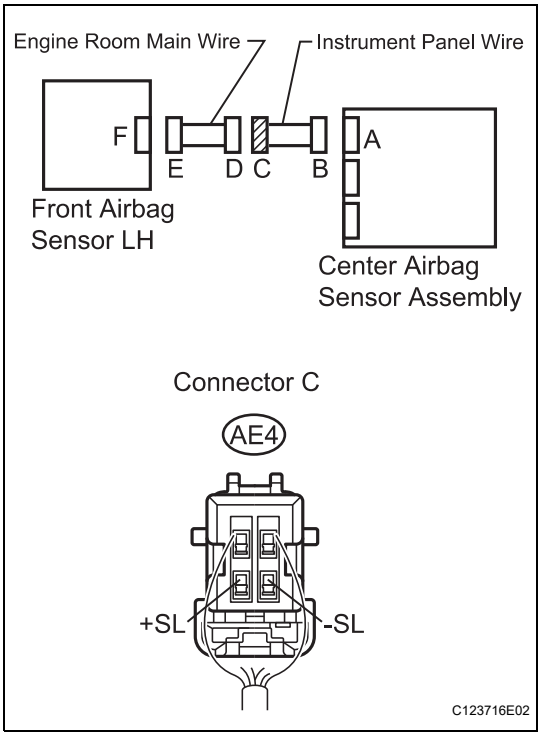
Tester Connection	Condition	Specified Condition
AE4-3 (+SL) - Body ground	Power switch on (IG)	Below 1 V
AE4-4 (-SL) - Body ground	Power switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

REPAIR OR REPLACE ENGINE ROOM MAIN WIRE

12	CHECK INSTRUMENT PANEL WIRE (SHORT TO GROUND)



(a) Disconnect the instrument panel wire connector from the engine room main wire.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
AE4-3 (+SL) - Body ground	Always	1 MΩ or higher
AE4-4 (-SL) - Body ground	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

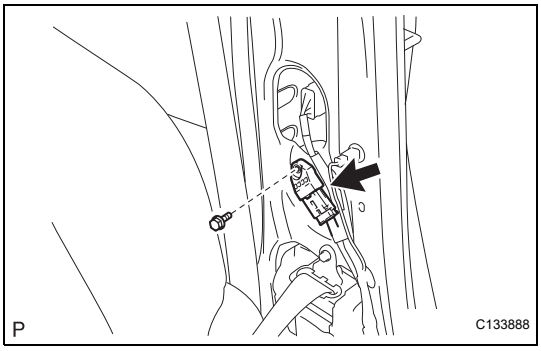
OK

REPAIR OR REPLACE ENGINE ROOM MAIN WIRE

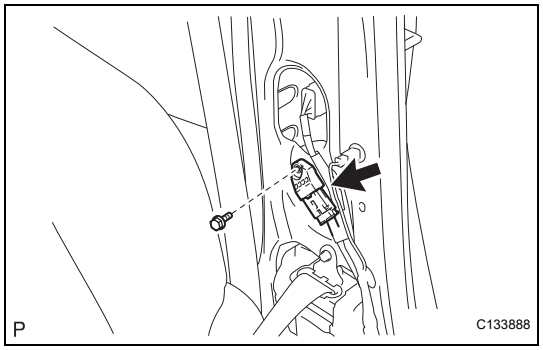
REMOVAL

HINT:
- Use the same procedure for the RH side and the LH side.
- The procedure listed below are for the LH side.

1. **PRECAUTION**
   CAUTION:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
3. **REMOVE FRONT DOOR SCUFF PLATE (See page IR-13)**
4. **REMOVE REAR DOOR SCUFF PLATE (See page IR-13)**
5. **REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP**
6. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP**
7. **REMOVE LOWER CENTER PILLAR GARNISH (See page IR-14)**
8. **REMOVE SIDE AIRBAG SENSOR**
   (a) Remove the bolt and side airbag sensor from the body.
   (b) Disconnect the connector from the side airbag sensor.
   NOTICE:
   When handling the airbag connector, take care not to damage the airbag wire harness.



INSTALLATION



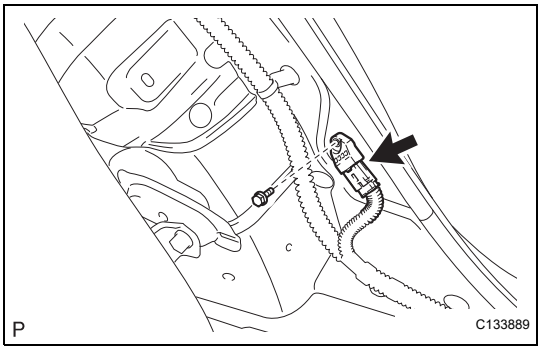
1. **INSTALL SIDE AIRBAG SENSOR**
   (a) Check that the power switch is turned off.
   (b) Check that the battery negative (-) cable is disconnected.
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
   (c) Install the side airbag sensor with the bolt.
   Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
   NOTICE:
   - **If the side airbag sensor has been dropped, or there are any cracks, dents or other defects in the case, bracket or connector, replace it with a new one.**
   - **When installing the side airbag sensor, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**
   (d) Check that there is no looseness in the installation parts of the side airbag sensor.
   (e) Connect the connector.
   NOTICE:
   When handling the airbag connector, take care not to damage the airbag wire harness.
2. **INSTALL LOWER CENTER PILLAR GARNISH (See page IR-40)**
3. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP**
4. **INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP**
5. **INSTALL REAR DOOR SCUFF PLATE (See page IR-43)**
6. **INSTALL FRONT DOOR SCUFF PLATE (See page IR-41)**
7. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
8. **PERFORM INITIALIZATION**
   (a) Perform initialization (See page IN-43).
   NOTICE:
   Some systems need initialization after reconnecting the cable to the negative battery terminal.
9. **INSPECT SRS WARNING LIGHT**
   (a) Inspect the SRS warning light (See page RS-33).

REMOVAL

HINT:

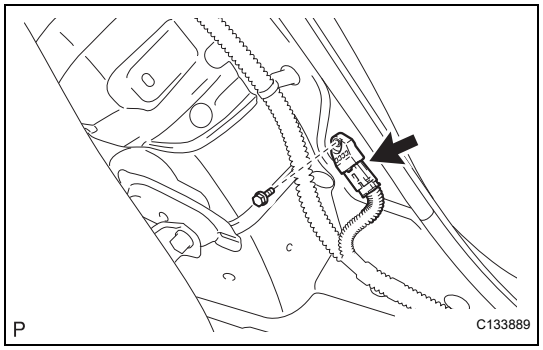
- Use the same procedure for the RH side and the LH side.
- The procedure listed below are for the LH side.

1. **PRECAUTION**
   CAUTION:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
3. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-44)**
4. **REMOVE REAR DOOR SCUFF PLATE (See page IR-13)**
5. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP**
6. **REMOVE ROOF SIDE INNER GARNISH (See page IR-15)**
7. **REMOVE REAR SIDE SEATBACK ASSEMBLY (See page SE-45)**
8. **REMOVE REAR AIRBAG SENSOR**
   (a) Disconnect the connector.
   NOTICE:
   When handling the airbag connector, take care not to damage the airbag wire harness.
   (b) Remove the bolt and rear airbag sensor.



INSTALLATION

1. **INSTALL REAR AIRBAG SENSOR**
   (a) Check that the power switch is turned off.
   (b) Check that the battery negative (-) cable is disconnected.
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.



   (c) Install the rear airbag sensor with the bolt.
   Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
   NOTICE:
   - **If the rear airbag sensor has been dropped, or there are any cracks, dents or other defects in the case, bracket or connector, replace it with a new one.**
   - **When installing the rear airbag sensor, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**

   (d) Check that there is no looseness in the installation parts of the rear airbag sensor.
   (e) Connect the connector.
   NOTICE:
   When handling the airbag connector, take care not to damage the airbag wire harness.

2. **INSTALL REAR SIDE SEATBACK ASSEMBLY (See page SE-54)**

3. **INSTALL ROOF SIDE INNER GARNISH (See page IR-39)**

4. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP**

5. **INSTALL REAR DOOR SCUFF PLATE (See page IR-43)**

6. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-55)**

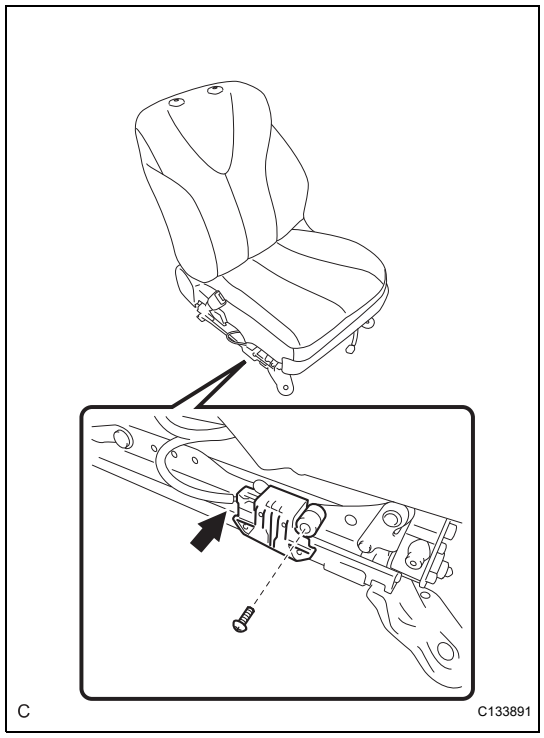
7. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

8. **PERFORM INITIALIZATION**
   (a) Perform initialization (See page IN-43).
   NOTICE:
   Some systems need initialization after reconnecting the cable to the negative battery terminal.

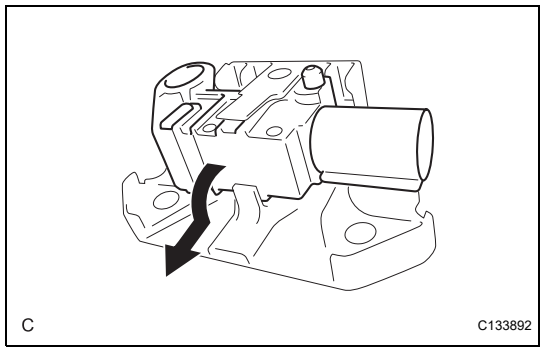
9. **INSPECT SRS WARNING LIGHT**
   (a) Inspect the SRS warning light (See page RS-33).

REMOVAL

1. **PRECAUTION**
   CAUTION:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).
2. **REMOVE FRONT SEAT HEADREST ASSEMBLY**
3. **REMOVE SEAT TRACK COVER LH (See page SE-29)**
4. **REMOVE INNER SEAT TRACK BRACKET COVER LH (See page SE-29)**
5. **REMOVE FRONT SEAT ASSEMBLY LH (See page SE-29)**
6. **REMOVE SEAT POSITION SENSOR**
   (a) Disconnect the connector.
   NOTICE:
   When handling the airbag connector, take care not to damage the airbag wire harness.
   (b) Using a "TORX" socket (T30), remove the "TORX" screw and seat position sensor with the seat slide position sensor protector.



(c) Remove the seat position sensor from the seat slide position sensor protector as shown in the illustration.



INSTALLATION

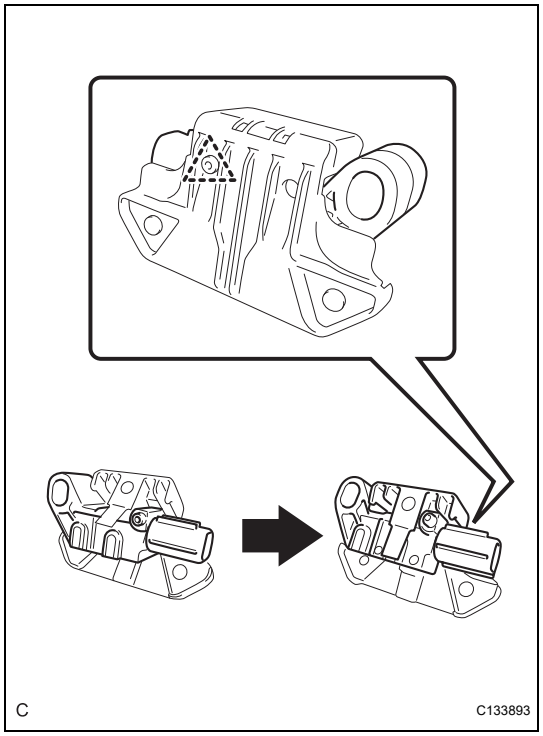
1. INSTALL SEAT POSITION SENSOR

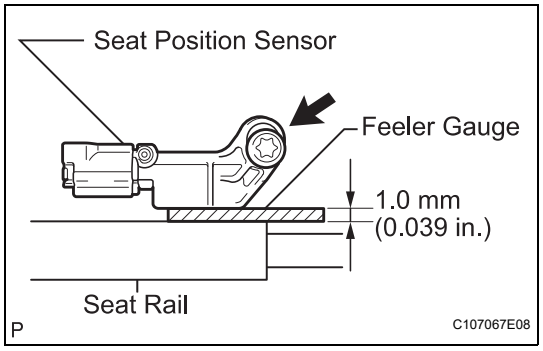
(a) Check that the power switch is turned off.

(b) Check that the negative battery (-) cable is disconnected.

CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.

(c) Engage the pin and install the seat position sensor to the seat slide position sensor protector as shown in the illustration.





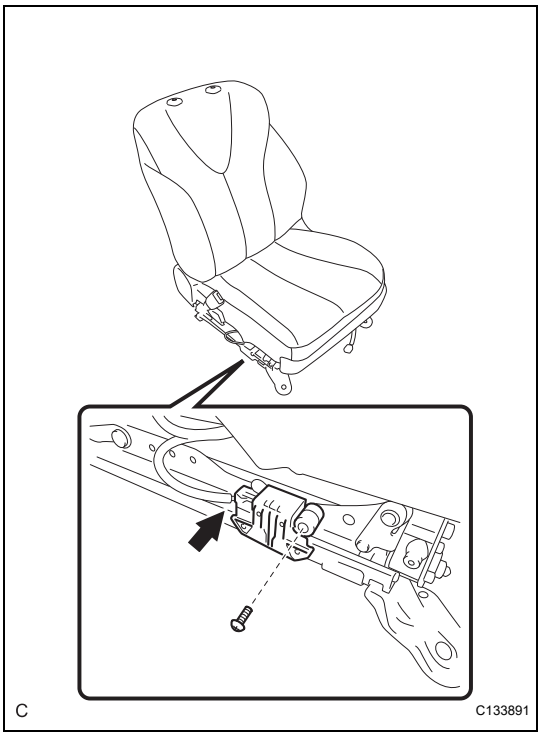
(d) Using a feeler gauge 1.0 mm (0.039 in.), temporarily install the seat position sensor.

NOTICE:

- **If the seat position sensor has been dropped, or there are any cracks, dents or other defects in the case or connector, replace the seat position sensor with a new one.**
- **When installing the seat position sensor, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**

HINT:

Be sure that a clearance between the seat position sensor and the seat rail is within 0.6 mm (0.024 in.) to 2.0 mm (0.079 in.).



(e) Using a "TORX" socket (T30), tighten the "TORX" screw to install the seat position sensor.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

(f) Make sure that a clearance between the seat position sensor and the seat rail is within 0.6 mm (0.024 in.) to 2.0 mm (0.079 in.).

(g) Check that there is no looseness in the installation parts of the seat position sensor.

(h) Connect the connector.
NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.

2. **INSTALL FRONT SEAT ASSEMBLY LH (See page SE-38)**

3. **INSTALL INNER SEAT TRACK BRACKET COVER LH (See page SE-39)**

4. **INSTALL SEAT TRACK COVER LH (See page SE-39)**

5. **INSTALL FRONT SEAT HEADREST ASSEMBLY**

6. **PERFORM INITIALIZATION**
(a) Perform initialization (See page IN-43).
NOTICE:
Some systems need initialization after reconnecting the cable to the negative battery terminal.

7. **INSPECT FRONT SEAT ASSEMBLY (See page SE-39)**

8. **INSPECT SRS WARNING LIGHT**
(a) Inspect the SRS warning light (See page RS-33).

ON-VEHICLE INSPECTION

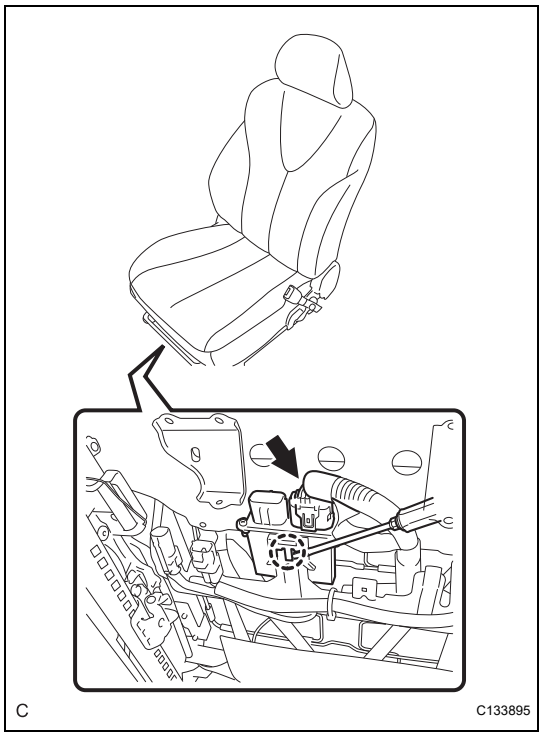
1. **INSPECT OCCUPANT CLASSIFICATION ECU (VEHICLE NOT INVOLVED IN COLLISION)**
   (a) Perform a diagnostic system check (See page RS-245).

2. **INSPECT OCCUPANT CLASSIFICATION ECU (VEHICLE INVOLVED IN COLLISION)**
   (a) Perform a diagnostic system check (See page RS-245).
   (b) Even if the airbag was not deployed, check if there is any damage to the occupant classification ECU. If there are any defects as mentioned below, replace the occupant classification ECU with a new one:
   - Cracks, dents or chips on the case.
   - Cracks or other damage to the connector.

   CAUTION:
   Be sure to follow the correct removal and installation procedures.

REMOVAL

1. **PRECAUTION**
   CAUTION:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (for Manual Seat)**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
3. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**
4. **REMOVE SEAT TRACK COVER RH (for Manual Seat) (See page SE-16)**
5. **REMOVE INNER SEAT TRACK BRACKET COVER RH (for Manual Seat) (See page SE-16)**
6. **REMOVE FRONT SEAT ASSEMBLY RH (for Manual Seat) (See page SE-16)**
7. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**
8. **REMOVE SEAT TRACK COVER RH (for Power Seat)**
   HINT:
   Use the same procedure for the RH side and the LH side (See page IR-12).
9. **REMOVE INNER SEAT TRACK BRACKET COVER RH (for Power Seat)**
   HINT:
   Use the same procedure for the RH side and the LH side (See page IR-12).
10. **REMOVE FRONT SEAT ASSEMBLY RH (for Power Seat)**
    HINT:
    Use the same procedure for the RH side and the LH side (See page IR-12).



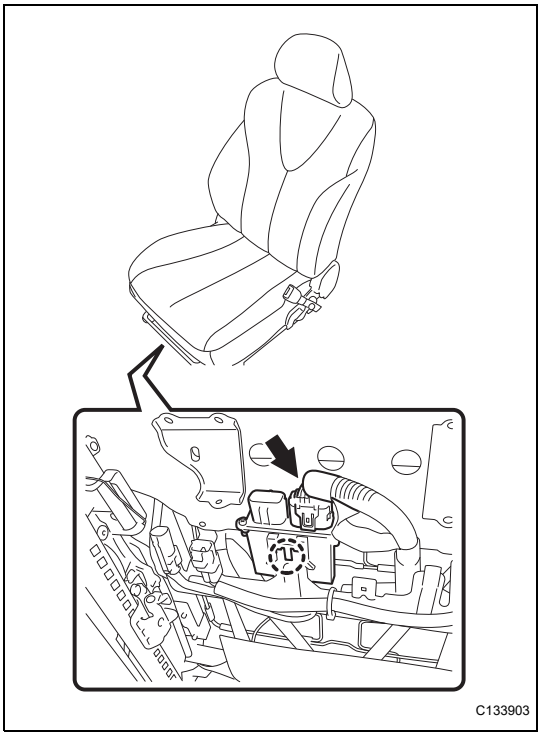
11. REMOVE OCCUPANT CLASSIFICATION ECU

(a) Disconnect the connector from the occupant classification ECU.

NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.

(b) Using a screwdriver, disengage the claw and remove the occupant classification ECU.

INSTALLATION



1. **INSTALL OCCUPANT CLASSIFICATION ECU**
   (a) Check that the power switch is off.
   (b) Check that the negative battery (-) cable is disconnected.
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
   (c) Engage the claw.
   (d) Connect the connector and install the occupant classification ECU.
   NOTICE:
   - **When handling the airbag connector, take care not to damage the airbag wire harness.**
   - **If the occupant classification ECU has been dropped, or there are any cracks, dents or other defects in the case or connector, replace the occupant classification ECU with a new one.**
   - **When installing the occupant classification ECU, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**
2. **INSTALL FRONT SEAT ASSEMBLY RH (for Power Seat)**
   HINT:
   Use the same procedure for the RH side and the LH side (See page IR-43).
3. **INSTALL INNER SEAT TRACK BRACKET COVER RH (for Power Seat)**
   HINT:
   Use the same procedure for the RH side and the LH side (See page IR-43).
4. **INSTALL SEAT TRACK COVER RH (for Power Seat)**
   HINT:
   Use the same procedure for the RH side and the LH side (See page IR-43).
5. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**
6. **INSTALL FRONT SEAT ASSEMBLY RH (for Manual Seat) (See page SE-23)**
7. **INSTALL INNER SEAT TRACK BRACKET COVER RH (for Manual Seat) (See page SE-24)**
8. **INSTALL SEAT TRACK COVER RH (for Manual Seat) (See page SE-39)**
9. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**
10. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (for Manual Seat)**

11. **PERFORM INITIALIZATION**
    (a) Perform initialization (See page IN-43).
    NOTICE:
    Some systems need initialization after reconnecting the cable to the negative battery terminal.

12. **INSPECT SLIDE ADJUSTER LOCK (for Manual Seat)**

13. **INSPECT FRONT SEAT ASSEMBLY (for Power Seat) (See page SE-39)**

14. **PERFORM ZERO POINT CALIBRATION AND SENSITIVITY CHECK**
    (a) Perform zero point calibration and sensitivity check (See page RS-239).

15. **INSPECT SRS WARNING LIGHT**
    (a) Inspect the SRS warning light (See page RS-33).

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the seat belt warning system.
- *: Use the intelligent tester.

SB

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V
If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT

3	CHECK COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM (CAN)*

(a) Use the intelligent tester to check if the CAN Communication System (CAN) is functioning normally.
Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → GO TO CAN COMMUNICATION SYSTEM

A

4	PROBLEM SYMPTOMS TABLE

HINT:
See page SB-5.

NEXT

5	OVERALL ANALYSIS AND TROUBLESHOOTING*

(a) DATA LIST / ACTIVE TEST (See page SB-8)
(b) Terminals of ECU (See page SB-6)
(c) On-vehicle Inspection (See page SB-8)

NEXT

6	**REPAIR OR REPLACE**

NEXT

SB

7	**CONFIRMATION TEST**

NEXT

END

PROBLEM SYMPTOMS TABLE

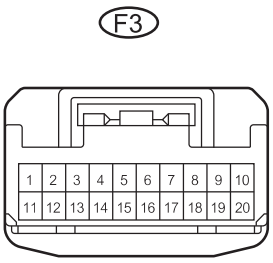
SEAT BELT WARNING SYSTEM

Symptom	Suspected Area	See page
Driver side seat belt warning light does not operate	1. Front seat inner belt LH	SB-10
	2. Center airbag sensor assembly	SB-10
	3. Combination meter assembly	SB-10
	4. Wire harness	SB-10
	5. Main body ECU	SB-10
Front passenger seat belt warning light does not operate	1. Front seat inner belt RH	SB-12
	2. Occupant detection ECU	SB-12
	3. Road sensor	SB-12
	4. Center airbag sensor assembly	SB-12
	5. Combination meter assembly	SB-12
	6. Clock assembly	SB-12
	7. Wire harness	SB-12

TERMINALS OF ECU

1. CLOCK ASSEMBLY

SB



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Standard voltage

Terminal No. (Symbols)	Terminal Description	Condition	Specified Condition
F3-3 (IG) - Body ground	Power supply	Power switch OFF → ON (IG)	Below 1 V → 10 to 14 V

Standard resistance

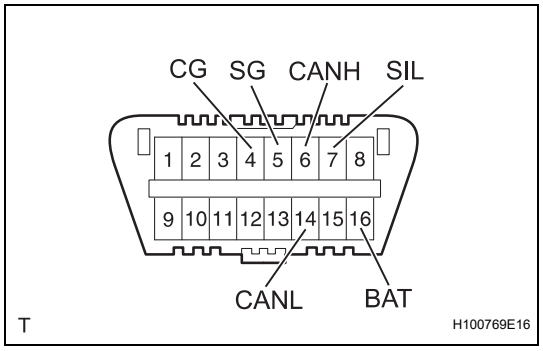
Terminal No. (Symbols)	Terminal Description	Condition	Specified Condition
F3-10 (PBEW) - Body ground	Passenger seat belt signal	The passenger seat is occupied, seat belt is fastened → unfastened	Below 1 Ω → 10 kΩ or higher
F3-19 (GND1) - Body ground	Ground	Always	Below 1 Ω

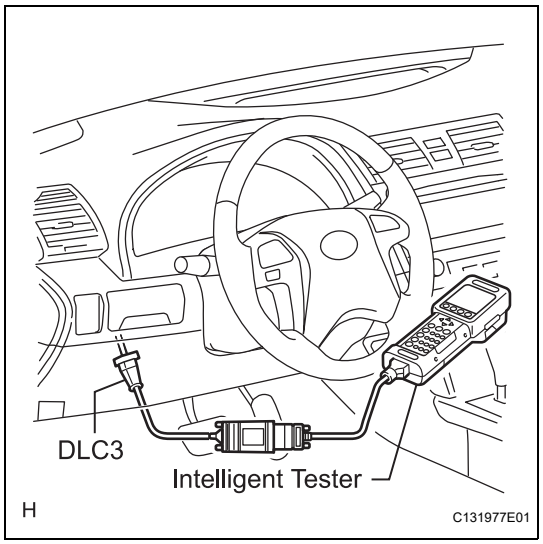
DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) The seat belt warning system data can be read from the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the intelligent tester to check for malfunctions and perform repairs.

2. CHECK DLC3





(a) The ECU uses ISO 15765-4 communication. The terminal arrangement of the DLC3 complies with SAE J 1962 and matches the ISO 15765-4 format.

Symbols (Terminals No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Power switch OFF*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Power switch OFF*	200 Ω or more
CANL (14) - CG (4)	LOW-level CAN bus line	Power switch OFF*	200 Ω or more
CANH (6) - BAT (16)	HIGH-level CAN bus line	Power switch OFF*	6 kΩ or more
CANL (14) - BAT (16)	LOW-level CAN bus line	Power switch OFF*	6 kΩ or more

NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the door.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the power switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

DATA LIST / ACTIVE TEST

1. ACTIVE TEST

Performing the ACTIVE TEST using the intelligent tester allows the meters, indicators and so on to operate without removing any parts. Performing the ACTIVE TEST as the first step in troubleshooting is one way to shorten labor time.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) From the display on the tester, select the "ACTIVE TEST".

METER:

Tester Display	Measurement Item/Range	Normal Condition
D-BELT REMIND	D-SEAT BELT indicator light (OFF/ON)	Confirm that the vehicle is stopped with the engine idling
P-BELT REMIND	P-SEAT BELT indicator light (OFF/ON)	Confirm that the vehicle is stopped with the engine idling

SB

ON-VEHICLE INSPECTION

1. INSPECT DRIVER SIDE SEAT BELT WARNING

(a) Turn the power switch on (IG).

(b) When the driver seat belt is not fastened, check that the driver seat belt warning light on the combination meter blinks.

(c) When the driver seat belt is fastened, check that the driver seat belt warning light on the combination meter is off.

2. INSPECT PASSENGER SIDE SEAT BELT WARNING

(a) Turn the power switch on (IG).

(b) When the front passenger seat belt is not fastened with the passenger seat occupied, check that the front passenger seat belt warning light on the clock display blinks.

(c) When the front passenger seat belt is fastened with the passenger seat occupied, check that the front passenger seat belt warning light on the clock display is off.

3. INSPECT SEAT BELT WARNING BUZZER

HINT:

- If the buzzer does not sound, the buzzer cancel setting may be set to ON.
- Only the intelligent tester can change the buzzer cancel setting to off. (See page ME-15)
- The buzzer sounds for 6 seconds if the front seat belts are not fastened even while the vehicle is stationary.

(a) Start the engine.

(b) When the vehicle is driven at approximately 20 km/h (12.5 mph) or more with the driver or front passenger seat belt not fastened, check that the buzzer in the combination meter assembly sounds at intervals of 1.2 seconds for 30 seconds.

(c) With the belt remaining unfastened, check that the buzzer changes and sounds at intervals of 0.4 seconds for 90 seconds.

(d) Check that the buzzer stops 2 minutes after the buzzer starts sounding.

(e) After the buzzer has stopped, turn the ignition switch off and then start the engine again. Drive the vehicle at approximately 20 km/h (12.5 mph) or more with the driver or front passenger seat belt not fastened, and then check that the buzzer sounds again.

(f) After the buzzer has stopped, fasten the driver and front passenger seat belts. Drive the vehicle at approximately 20 km/h (12.5 mph) or more and unfasten the driver or front passenger seat belt, and then check that the buzzer sounds again.

(g) After the buzzer has stopped, move the shift lever to the R position, and then move it to the D position. Drive the vehicle at approximately 20 km/h (12.5 mph) or more, and then check that the buzzer sounds again.

Driver Side Seat Belt Warning Light does not Operate

DESCRIPTION

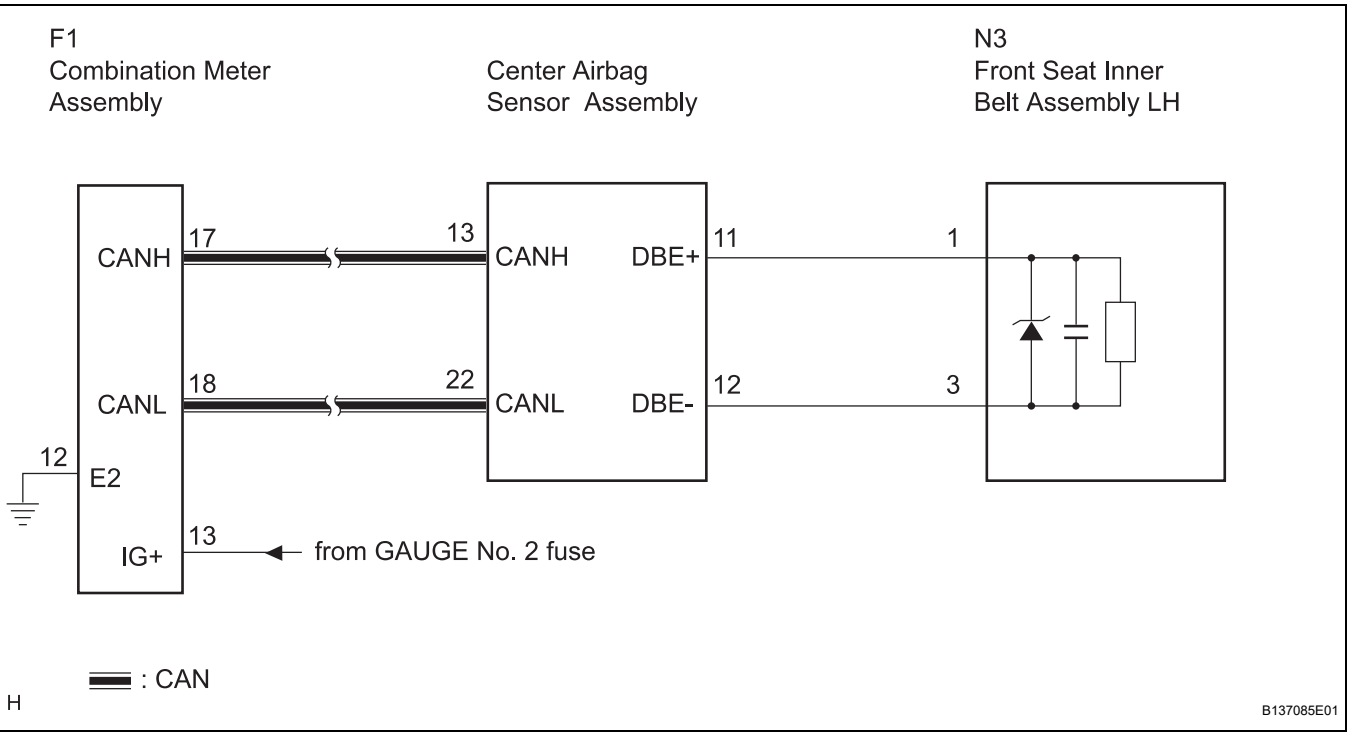
When the power switch is on (IG), the center airbag sensor assembly transmits front seat inner belt state signals to the combination meter assembly through CAN. If the driver seat belt is not fastened, the combination meter assembly blinks the driver seat belt warning light. If the seat belt is fastened, the warning light goes off.

SB

NOTICE:

The seat belt warning system uses CAN. Before troubleshooting the seat belt warning system, perform "COMMUNICATION FUNCTION CHECK" by following "HOW TO PROCEED WITH TROUBLESHOOTING" to confirm that the communication systems are normal.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FOR DTCs

(a) Check for DTCs.

Result

Result	Proceed to
Output DTC (CAN communication)	A
Output DTC (Airbag system)	B
No output DTC	C

A	GO TO CAN COMMUNICATION SYSTEM
B	GO TO AIRBAG SYSTEM

C

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Operate the intelligent tester according to the steps on the display and select "ACTIVE TEST".

SB

METER

Item	Test Details	Diagnostic Note
D-BELT REMIND	D-SEAT BELT indicator light (OFF/ON)	Confirm that the vehicle is stopped with the engine idling

OK:
Switch condition (ON/OFF) can be switched by "ACTIVE TEST".

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

END

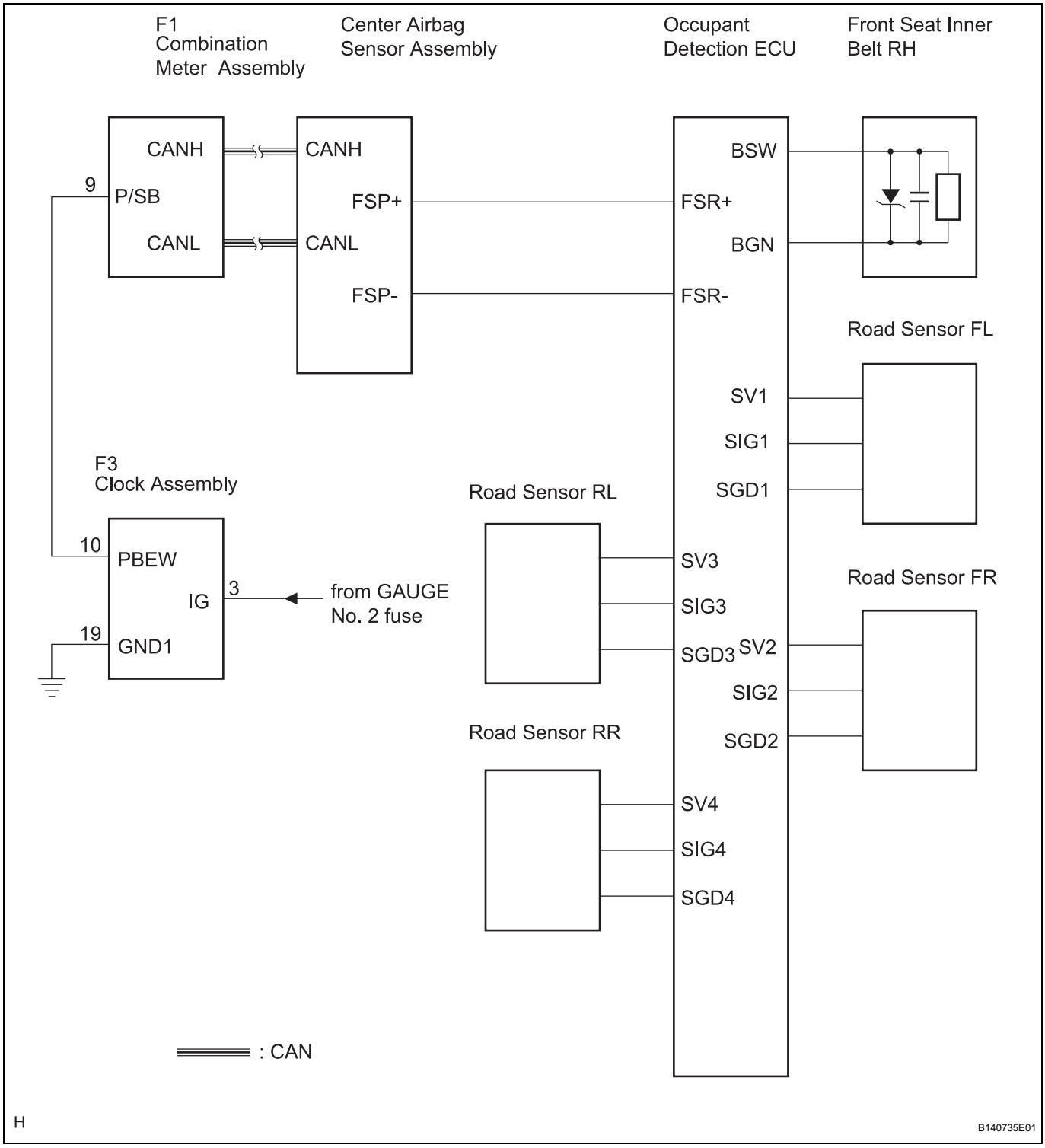
Front Passenger Side Seat Belt Warning Light Malfunction

DESCRIPTION

The occupant detection ECU detects the state of the front seat inner belt assembly RH and road sensor when the front passenger seat is occupied with the power switch on (IG). If the front passenger seat belt is not fastened, the front seat belt warning light on the clock display blinks. If the seat belt is fastened, the warning light goes off.

SB

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK FOR DTCs

(a) Check for DTCs.

Result

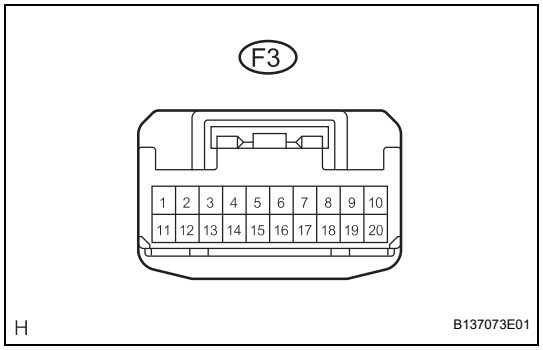
Result	Proceed to
No output DTC	A
Output DTC (CAN communication)	B
Output DTC (Occupant detection)	C

B → GO TO CAN COMMUNICATION SYSTEM

C → GO TO OCCUPANT CLASSIFICATION SYSTEM

A

2 CHECK WIRE HARNESS (BATTERY POSITIVE AND BODY GROUND)



(a) Disconnect the clock assembly connector.
(b) Measure the voltage and resistance according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
F3-3 (IG) - Body ground	Power switch on (IG)	10 to 14 V

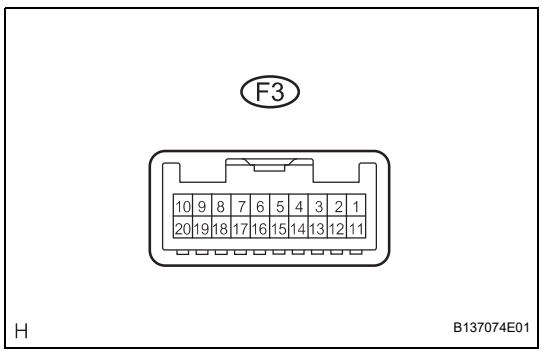
Standard resistance

Tester Connection	Condition	Specified Condition
F3-19 (GND1) - Body ground	Always	Below 1 Ω

NG → REPAIR OR REPLACE GAUGE NO. 2 FUSE, HARNESS OR CONNECTOR

OK

3 CHECK CLOCK ASSEMBLY



(a) Disconnect the clock assembly connector.
(b) Apply battery voltage to the connector according to the table below.

Standard

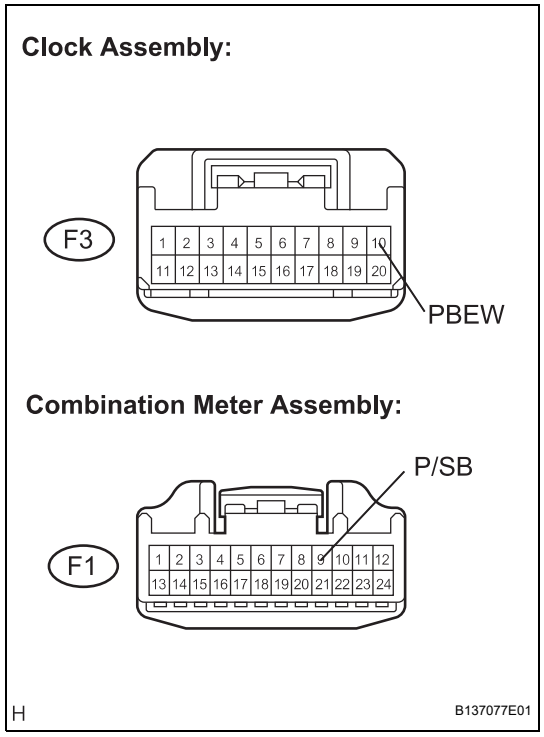
Condition	Specified Condition
Battery positive (+) → Terminal 3 (IG) Battery negative (-) → Terminal 10 (PBEW), 19 (GND1)	Lights up (Seat belt warning light)

NG → REPLACE CLOCK ASSEMBLY

OK

4	CHECK WIRE HARNESS (CLOCK ASSEMBLY - COMBINATION METER ASSEMBLY)

SB



(a) Disconnect the combination meter assembly and clock assembly connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
F1-9 (P/SB) - F3-10 (PBEW)	Always	Below 1 Ω
F1-9 (P/SB) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE COMBINATION METER ASSEMBLY

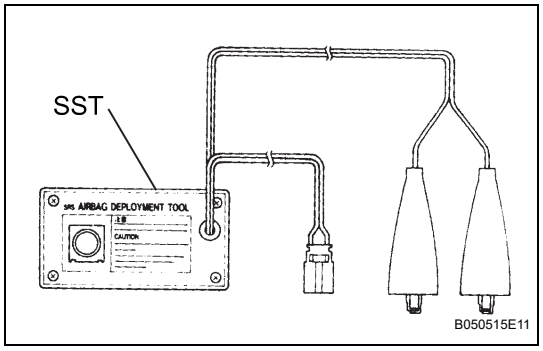
DISPOSAL

HINT:
When scrapping vehicles equipped with a seat belt pretensioner or disposing of a front seat outer belt (with a seat belt pretensioner), always deploy the seat belt pretensioner first in accordance with the procedures described below. If any abnormality occurs during deployment of the seat belt pretensioner, contact the SERVICE DEPT. of the TOYOTA MOTOR SALES, U.S.A., INC.

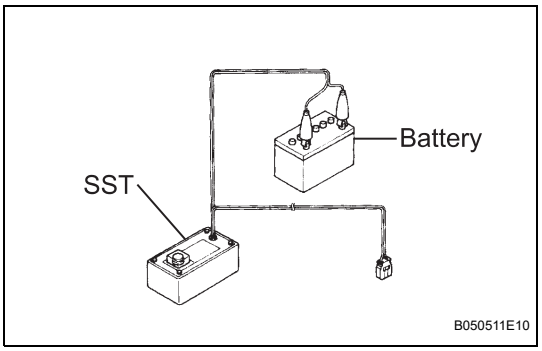
1. DISPOSE OF FRONT SEAT OUTER BELT ASSEMBLY (WHEN INSTALLED IN VEHICLE)
NOTICE:

- **Never dispose of a front seat outer belt assembly with a pretensioner that has not been deployed.**
- **The seat belt pretensioner produces an exploding sound when it deploys, so perform the operation outdoors where it will not disturb local residents.**
- **When deploying a front seat outer belt (with a seat belt pretensioner), perform the operation at least 10 m (33 ft) away from the front seat outer belt.**
- **Use gloves and safety glasses when handling a front seat belt with a deployed pretensioner.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front seat outer belt with a deployed pretensioner.**
- **When deploying the seat belt pretensioner, always use the specified SST (SRS airbag deployment tool). Perform the operation in a place away from electrical interference.**
- **Be sure to follow the procedures listed below when deploying the seat belt pretensioner.**

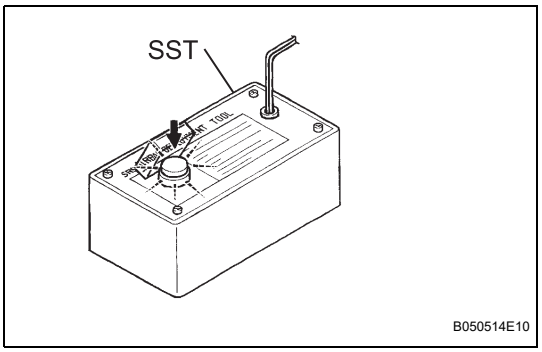
(a) Check the function of SST.
SST 09082-00700, 09082-00770
CAUTION:
When deploying the seat belt pretensioner, always use the specified SST.



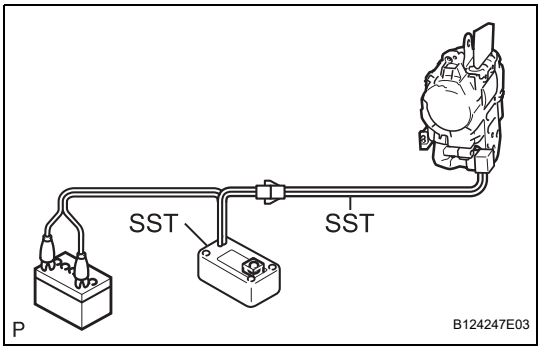
SB



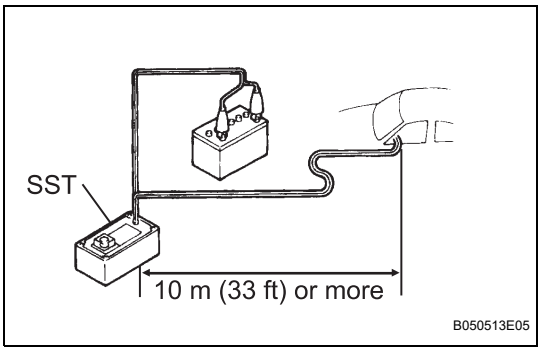
(1) Connect the red clip of the SST to the battery positive (+) terminal, and the black clip to the battery negative (-) terminal.
HINT:
At this time, do not connect the yellow connector that will later be connected to the seat belt pretensioner.



(2) Press the SST deployment switch, and check that the LED of the SST deployment switch lights up.
CAUTION:
If the LED is lit when the deployment switch is not pressed, the SST may be malfunctioning. Therefore, do not use the SST.

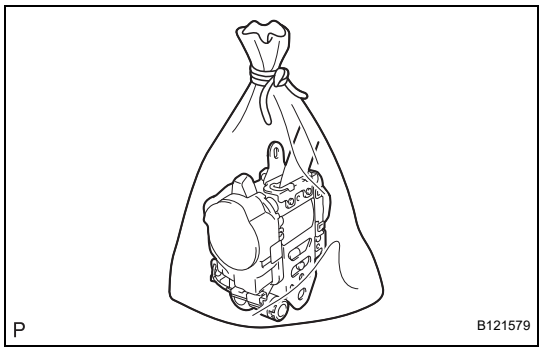


(b) Connect SST.
(1) Connect 2 SST, and then connect them to the front seat outer belt pretensioner.
SST 09082-00700, 09082-00770
NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the pretensioner connector.



(2) Move the SST at least 10 m (33 ft) away from the front of the vehicle.
(3) Close all the doors and windows of the vehicle.
NOTICE:
Do not damage the SST wire harness.

(c) Deploy the front seat outer belt pretensioner.
(1) Confirm that no one is inside the vehicle or within a 10 m (33 ft) radius of the vehicle.
(2) Connect the red clip of the SST to the battery positive (+) terminal, and the black clip to the negative (-) terminal.
(3) Press the SST deployment switch to deploy the front seat outer belt pretensioner.
HINT:
The seat belt pretensioner will deploy at the same time as the LED of the SST illuminates.



(d) Dispose of the front seat outer belt assembly.
(1) Remove the front seat outer belt assembly and SST.
(2) Place the outer belt in a plastic bag, tie the end tightly, and dispose of it in the same way as other general part disposal.

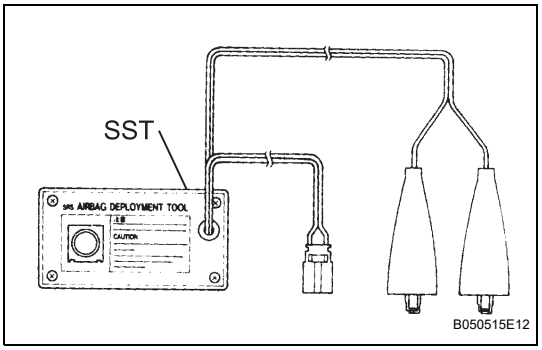
CAUTION:
- **The outer belt becomes very hot when the front seat outer belt pretensioner is deployed, so leave it untouched for at least 30 minutes after it has been deployed.**
- **Use gloves and safety glasses when handling an outer belt with a pretensioner that has been deployed.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front seat outer belt assembly with a pretensioner that has been deployed.**

HINT:
When scrapping a vehicle, deploy the front seat outer belt pretensioners, and then scrap the vehicle with the deployed outer belt installed.

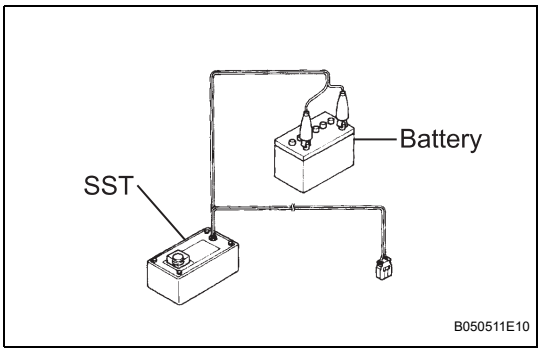
2. DISPOSE OF FRONT SEAT OUTER BELT ASSEMBLY (WHEN NOT INSTALLED IN VEHICLE)

NOTICE:
- **Never dispose of a front seat outer belt assembly with a pretensioner that has not been deployed.**
- **The seat belt pretensioner produces an exploding sound when it deploys, so perform the operation outdoors where it will not disturb local residents.**
- **When deploying a front seat outer belt (with a seat belt pretensioner), perform the operation at least 10 m (33 ft) away from the front seat outer belt.**
- **Use gloves and safety glasses when handling a front seat belt with a deployed pretensioner.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front seat outer belt with a deployed pretensioner.**
- **When disposing of a pretensioner equipped front seat outer belt, never deploy the belt in the customer's vehicle.**
- **Be sure to follow the procedures listed below when deploying the seat belt pretensioner.**

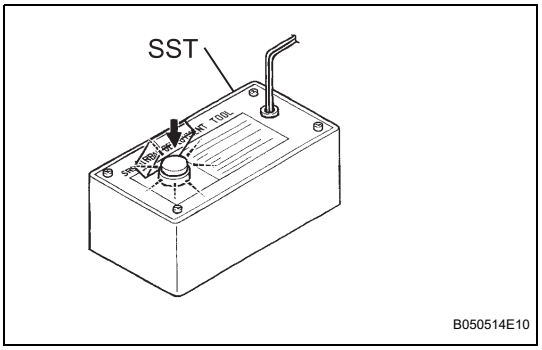
SB



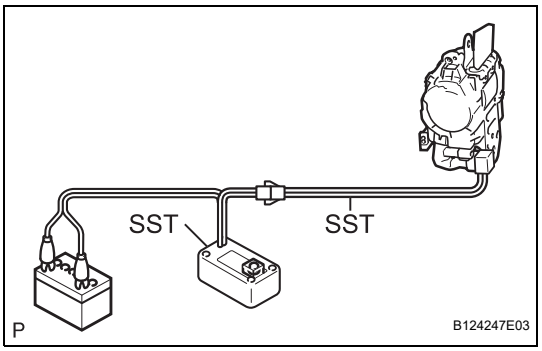
(a) Check the function of SST.
SST 09082-00700, 09082-00770
CAUTION:
When deploying the seat belt pretensioner, always use the specified SST.



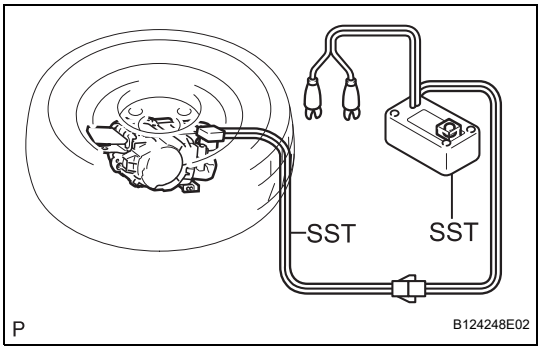
(1) Connect the red clip of the SST to the battery positive (+) terminal, and the black clip to the battery negative (-) terminal.
HINT:
At this time, do not connect the yellow connector that will later be connected to the seat belt pretensioner.



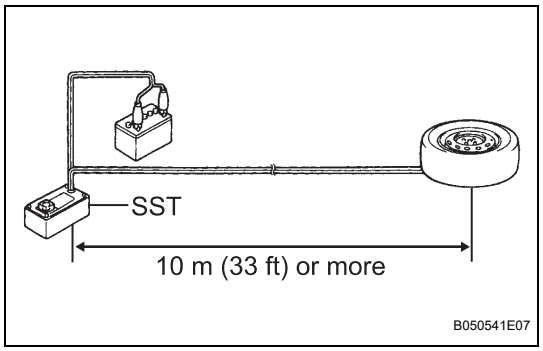
(2) Press the SST deployment switch, and check that the LED of the SST deployment switch lights up.
CAUTION:
If the LED is lit when the deployment switch is not pressed, the SST may be malfunctioning. Therefore, do not use the SST.

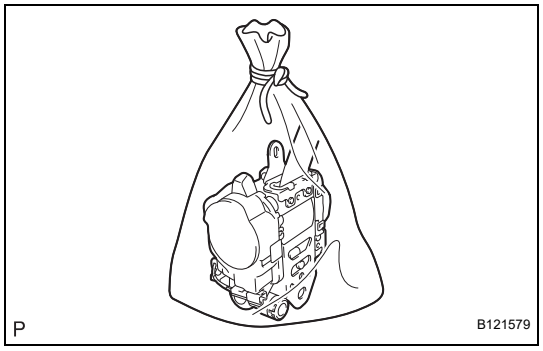


(b) Connect SST.
(1) Connect 2 SST, and then connect them to the front seat outer belt pretensioner.
SST 09082-00700, 09082-00770
NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the pretensioner connector.



(2) Place the outer belt on the ground and cover it with a tire and wheel assembly.
NOTICE:
Position the front seat outer belt assembly as shown in the illustration.
(3) Position and hold the SST at least 10 m (33 ft) away from the wheel.
NOTICE:
Do not damage the SST wire harness.





(c) Deploy the front seat outer belt pretensioner.
  (1) Check that no one is within a 10 m (33 ft) radius of the wheel.
  (2) Connect the red clip of the SST to the battery positive (+) terminal, and the black clip to the battery negative (-) terminal.
  (3) Press the SST deployment switch to deploy the front seat outer belt pretensioner.
  HINT:
  The seat belt pretensioner will deploy at the same time as the LED of the SST illuminates.

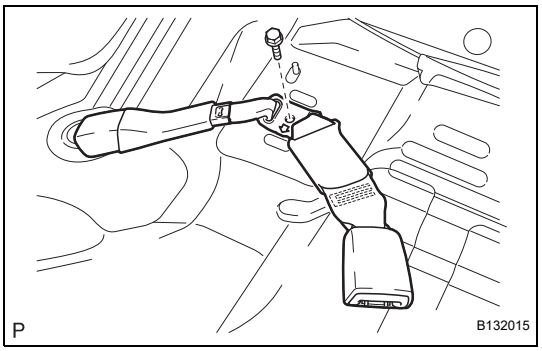
(d) Dispose of the front seat outer belt assembly.
  (1) Remove the wheel and SST.
  (2) Place the outer belt in a plastic bag, tie the end tightly, and dispose of it in the same way as other general part disposal.
  CAUTION:
  - **The outer belt becomes very hot when the front seat outer belt pretensioner is deployed, so leave it untouched for at least 30 minutes after it has been deployed.**
  - **Use gloves and safety glasses when handling an outer belt with a pretensioner that has been deployed.**
  - **Always wash your hands with water after completing the operation.**
  - **Do not apply water, etc. to a front seat outer belt assembly with a pretensioner that has been deployed.**

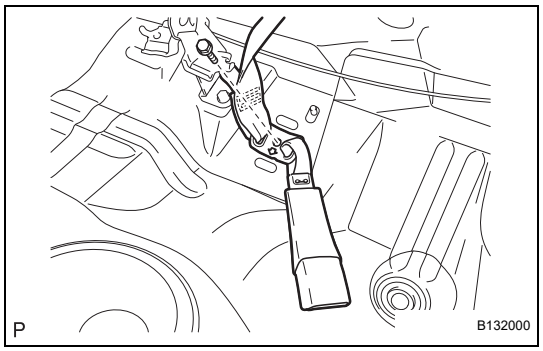
  HINT:
  When scrapping a vehicle, deploy the front seat outer belt pretensioners, and then scrap the vehicle with the deployed outer belt installed.

SB

REMOVAL

1. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-44)**
2. **REMOVE REAR SEAT HEADREST ASSEMBLY**
3. **REMOVE REAR CENTER SEAT HEADREST ASSEMBLY**
4. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-44)**
5. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-44)**
6. **REMOVE REAR SIDE SEATBACK ASSEMBLY LH (See page SE-45)**
7. **REMOVE REAR SIDE SEATBACK ASSEMBLY RH (See page SE-45)**
8. **REMOVE REAR DOOR SCUFF PLATE LH (See page IR-13)**
9. **DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH**
10. **REMOVE REAR DOOR SCUFF PLATE RH (See page IR-13)**
11. **DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH**
12. **REMOVE CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH (See page SB-51)**
13. **REMOVE CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY RH**
    HINT:
    Use the same procedure for the RH side and the LH side.
14. **REMOVE REAR SEAT INNER WITH CENTER BELT ASSEMBLY RH**
    (a) Remove the bolt and the rear seat inner with center belt assembly RH.





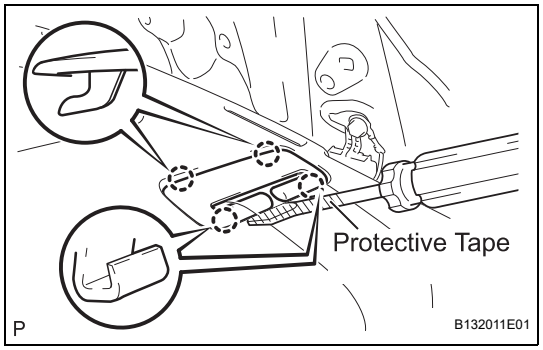
15. **DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH**
    (a) Remove the bolt and disconnect the floor end of the rear seat inner with center belt assembly LH.

16. **REMOVE ROOF SIDE INNER GARNISH LH (See page IR-15)**

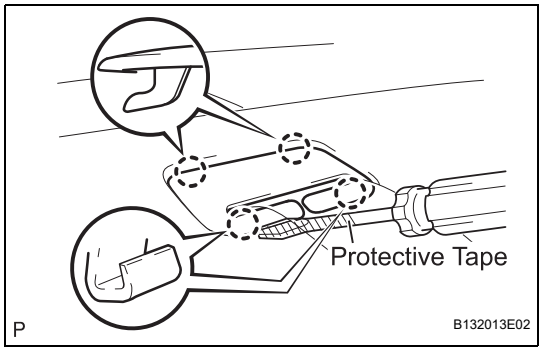
17. **REMOVE ROOF SIDE INNER GARNISH RH (See page IR-15)**

18. **DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-40)**

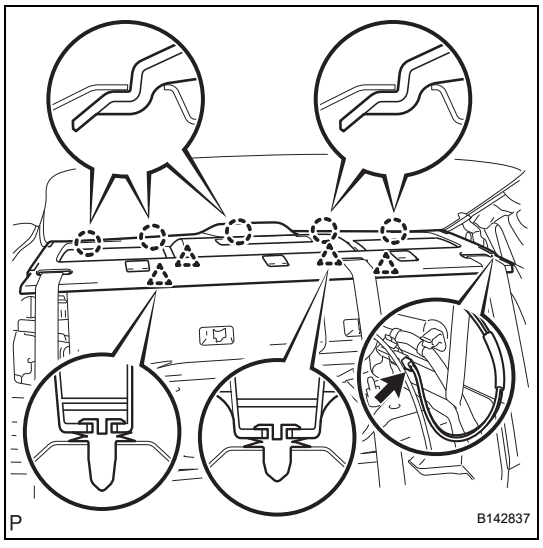
19. **DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-41)**



20. **REMOVE REAR SEAT SHOULDER BELT COVER**
    (a) Using a screwdriver, disengage the 4 claws and remove the rear seat shoulder belt cover.
    HINT:
    - Tape the screwdriver tip before use.
    - Use the same procedure for the RH side and LH side.



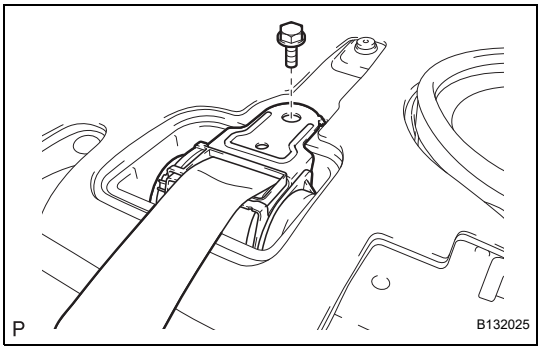
21. **REMOVE REAR SEAT SHOULDER BELT HOLE COVER**
    (a) Using a screwdriver, disengage the 4 claws and remove the rear seat shoulder belt hole cover.
    HINT:
    Tape the screwdriver tip before use.



22. **REMOVE PACKAGE TRAY TRIM PANEL ASSEMBLY**
    (a) Disconnect the connector.
    (b) Disengage the 4 clips and the 5 claws.
    (c) Pass the 3 rear seat belt floor anchors through the package tray trim panel assembly, then remove the package tray trim panel assembly.

SB

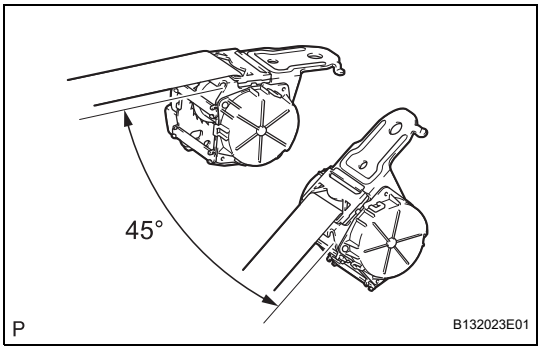
SB



23. REMOVE REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH

(a) Remove the bolt and the rear seat inner with center belt assembly LH.

INSTALLATION

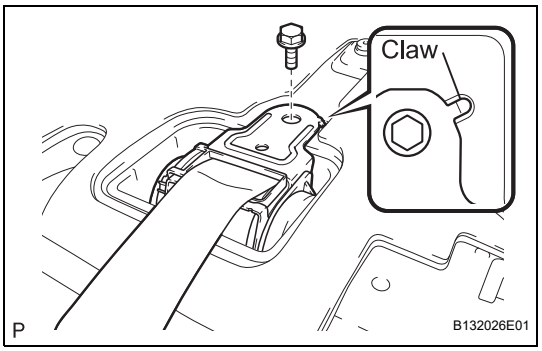


1. INSTALL REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH

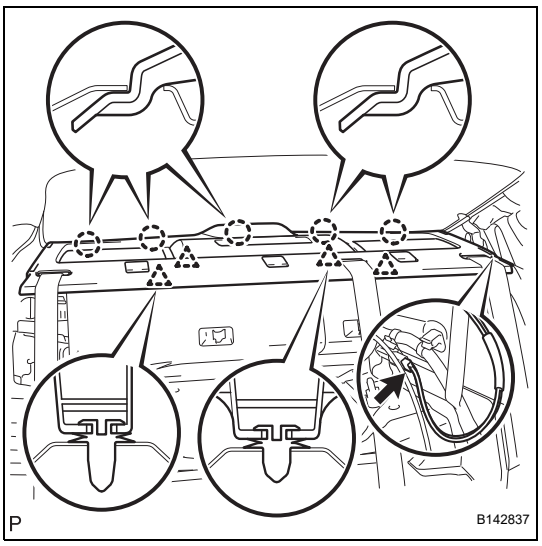
(a) Check the degree of the tilt when the ELR begins to lock.

(1) Check that the belt does not lock at less than 15 degrees of tilt in any direction but locks at over 45 degrees of tilt while gently pulling the belt.

NOTICE:
Do not disassemble the retractor.



(b) Align the claw with the seat belt positioning hole and install the rear seat inner with center belt assembly LH with the bolt.
Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

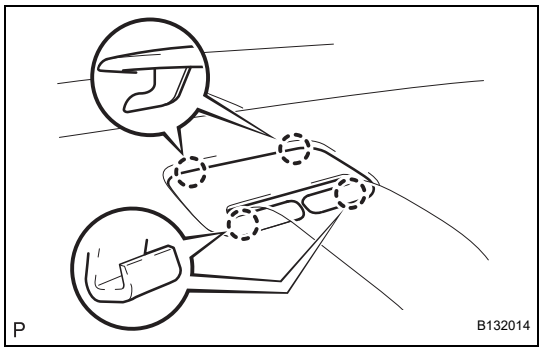


2. INSTALL PACKAGE TRAY TRIM PANEL ASSEMBLY

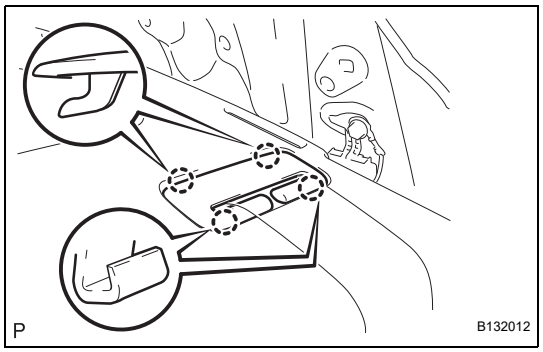
(a) Pass the 3 rear seat belt floor anchors through the package tray trim panel assembly.

(b) Engage the 4 clips and 5 claws and install the package tray trim panel assembly.

(c) Connect the connector.



3. **INSTALL REAR SEAT SHOULDER BELT HOLE COVER**
   (a) Engage the 4 claws and install the rear seat shoulder belt hole cover.



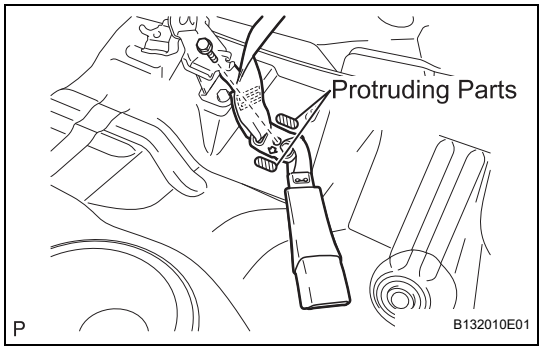
4. **INSTALL REAR SEAT SHOULDER BELT COVER**
   (a) Engage the 4 claws and install the rear seat shoulder belt cover.
   HINT:
   Use the same procedure for the RH side and LH side.

5. **CONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-42)**

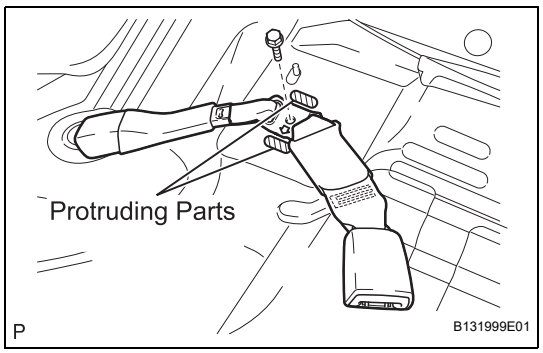
6. **CONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-42)**

7. **INSTALL ROOF SIDE INNER GARNISH LH (See page IR-39)**

8. **INSTALL ROOF SIDE INNER GARNISH RH (See page IR-39)**



9. **CONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH**
   (a) Connect the floor end of the rear seat inner with center belt assembly LH with the bolt.
   Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
   NOTICE:
   Do not allow the anchor part of the rear seat inner with center belt assembly LH to overlap the protruding parts of the floor panel.
   (b) Check if the ELR locks.
   NOTICE:
   The check should be performed with the outer belt assembly installed.
      (1) With the belt assembly installed, check that the belt locks when it is pulled out quickly.



10. **INSTALL REAR SEAT INNER WITH CENTER BELT ASSEMBLY RH**
    (a) Install the rear seat inner with center belt assembly RH with the bolt.
    Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
    NOTICE:
    Do not allow the anchor part of the rear seat inner with center belt assembly RH to overlap the protruding parts of the floor panel.

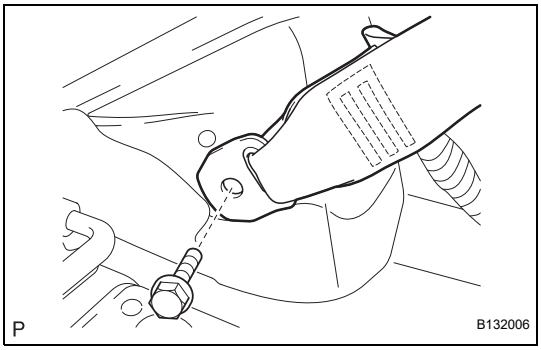
11. **INSTALL CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH (See page SB-51)**

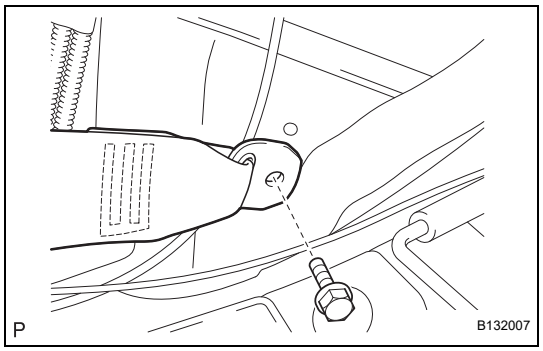
12. **INSTALL CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY RH**
HINT:
Use the same procedure for the RH side and the LH side.
13. **CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-43)**
14. **INSTALL REAR DOOR SCUFF PLATE LH (See page IR-43)**
15. **CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-43)**
16. **INSTALL REAR DOOR SCUFF PLATE RH (See page IR-43)**
17. **INSTALL REAR SIDE SEATBACK ASSEMBLY LH (See page SE-54)**
18. **INSTALL REAR SIDE SEATBACK ASSEMBLY RH**
HINT:
Use the same procedure for the RH side and the LH side.
19. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-54)**
20. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-54)**
21. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**
22. **INSTALL REAR SEAT HEADREST ASSEMBLY**
23. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-55)**

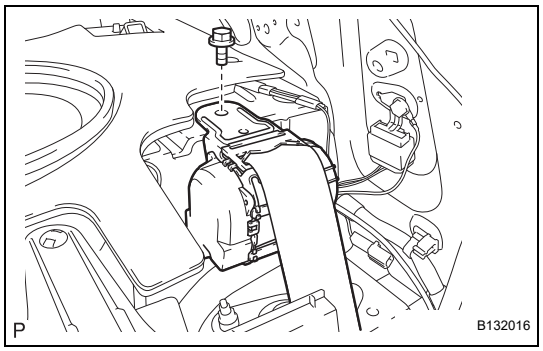
SB

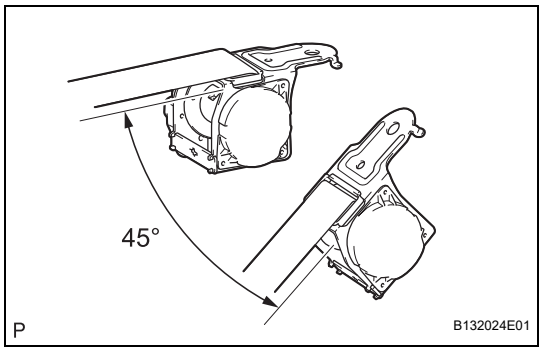
REMOVAL

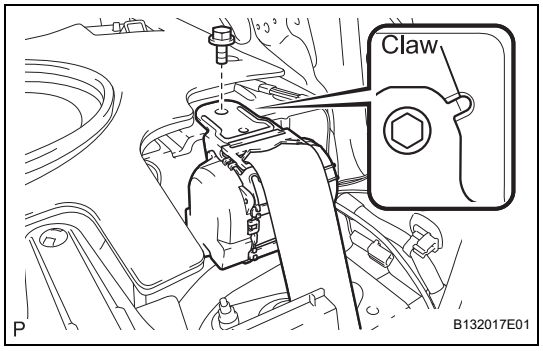
1. REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-44)
2. REMOVE REAR SEAT HEADREST ASSEMBLY
3. REMOVE REAR CENTER SEAT HEADREST ASSEMBLY
4. REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-44)
5. REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-44)
6. REMOVE REAR SIDE SEATBACK ASSEMBLY LH (See page SE-45)
7. REMOVE REAR SIDE SEATBACK ASSEMBLY RH (See page SE-45)
8. REMOVE REAR DOOR SCUFF PLATE LH (See page IR-13)
9. DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH
10. REMOVE REAR DOOR SCUFF PLATE RH (See page IR-13)
11. DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH
12. REMOVE CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH (See page SB-51)
13. DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (See page SB-33)
14. REMOVE ROOF SIDE INNER GARNISH LH (See page IR-15)
15. REMOVE ROOF SIDE INNER GARNISH RH (See page IR-15)
16. DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side)
    (a) Remove the bolt and disconnect the floor end of the rear seat outer belt assembly.









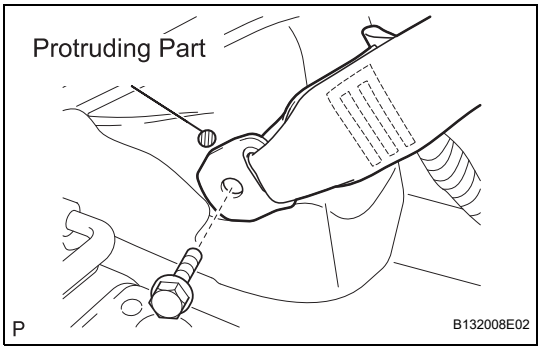


17. **DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side)**
    (a) Remove the bolt and disconnect the floor end of the rear seat outer belt assembly.
18. **REMOVE REAR SEAT SHOULDER BELT COVER (See page SB-33)**
19. **REMOVE REAR SEAT SHOULDER BELT HOLE COVER (See page SB-33)**
20. **REMOVE PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-33)**
21. **REMOVE REAR SEAT OUTER BELT ASSEMBLY**
    (a) Remove the bolt and the rear seat outer belt assembly.

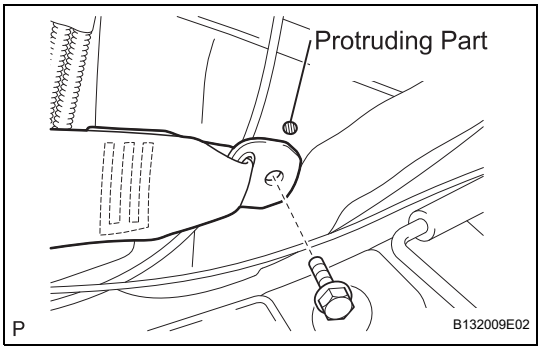
INSTALLATION

1. **INSTALL REAR SEAT OUTER BELT ASSEMBLY**
    (a) Check the degree of the tilt when the ELR begins to lock.
        (1) Check that the belt does not lock at less than 15 degrees of tilt in any direction but locks at over 45 degrees of tilt while gently pulling the belt.
        NOTICE:
        Do not disassemble the retractor.
    (b) Align the claw with the seat belt positioning hole and install the rear seat outer belt assembly with the bolt.
        Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
2. **INSTALL PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-34)**
3. **INSTALL REAR SEAT SHOULDER BELT HOLE COVER (See page SB-35)**
4. **INSTALL REAR SEAT SHOULDER BELT COVER (See page SB-35)**

SB



5. **CONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side)**
   (a) Connect the floor end of the rear seat outer belt assembly with the bolt.
   Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
   NOTICE:
   Do not allow the anchor part of the rear seat outer belt assembly to overlap the protruding part of the floor panel.
   (b) Check if the ELR locks.
   NOTICE:
   The check should be performed with the outer belt assembly installed.
      (1) With the belt assembly installed, check that the belt locks when it is pulled out quickly.



6. **CONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side)**
   (a) Connect the floor end of the rear seat outer belt assembly with the bolt.
   Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
   NOTICE:
   Do not allow the anchor part of the rear seat outer belt assembly to overlap the protruding part of the floor panel.
   (b) Check if the ELR locks.
   NOTICE:
   The check should be performed with the outer belt assembly installed.
      (1) With the belt assembly installed, check that the belt locks when it is pulled out quickly.

7. **INSTALL ROOF SIDE INNER GARNISH LH (See page IR-39)**
8. **INSTALL ROOF SIDE INNER GARNISH RH (See page IR-39)**
9. **CONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (See page SB-35)**
10. **INSTALL CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH (See page SB-51)**
11. **CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-43)**
12. **INSTALL REAR DOOR SCUFF PLATE LH (See page IR-43)**
13. **CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-43)**
14. **INSTALL REAR DOOR SCUFF PLATE RH (See page IR-43)**
15. **INSTALL REAR SIDE SEATBACK ASSEMBLY LH (See page SE-54)**

16. **INSTALL REAR SIDE SEATBACK ASSEMBLY RH**
HINT:
Use the same procedure for the RH side and the LH side.

17. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-54)**

18. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-54)**

19. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**

20. **INSTALL REAR SEAT HEADREST ASSEMBLY**

21. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-55)**

SYSTEM DESCRIPTION

1. ENGINE IMMOBILISER SYSTEM DESCRIPTION

(a) The immobiliser system is a theft deterrent system that determines whether to disable starting of the hybrid control system based on a comparison of the key's ID codes and the vehicle's pre-registered code. The immobiliser system compares the vehicle certification ECU's pre-registered ID code with the ID of the key-embedded transponder chip. If the ID codes do not match, the immobiliser system activates and the hybrid control system cannot be started. The certification ECU manages communication with the ECM, main body ECU (instrument panel J/B), steering lock ECU and ID code box. When the ID codes of the transponder chip and certification ECU match, the certification ECU authorizes the hybrid control system to start.

2. FUNCTION OF MAIN COMPONENT

Component	Outline
Transponder key coil/amplifier (built into power switch)	Receives key ID code, amplifies ID code and outputs the code to the certification ECU.
Indoor electrical key oscillator	Transmits key detection signals within the detection area in the vehicle interior upon receiving a transmission request signal from the certification ECU. Certification ECU request signal is activated when the key is brought into the vehicle interior and the power switch is pushed.
Door control receiver	Receives an ID code from the key in the actuation area and transmits it to the certification ECU.
Security indicator	Illuminates or starts flashing. Illumination is controlled by the certification ECU.

3. SYSTEM FUNCTION

(a) Using entry function

(1) When the driver (or passenger) is sitting in the vehicle while carrying the key, and the power switch is pressed while the brake pedal is depressed, the main body ECU (instrument panel J/B) recognizes that the engine start operation has occurred and sends a certification request signal to the certification ECU. Upon receipt of the certification request signal, the certification ECU sends a request signal to the indoor electrical key oscillator. Upon receipt of the request signal, the indoor electrical key oscillator sends a request signal to detect if the key is inside the vehicle. When the key receives this request signal, it answers by sending an ID code containing a response code through the glass antenna to the door control receiver. Upon receipt of the ID code, the certification ECU analyzes the code. If the interior certification passes, then the main body ECU (instrument panel J/B) sends a certification pass response signal. When the main body ECU (instrument panel J/B) receives this signal, the ACC relay is

switched on and the IG1 and IG2 relays are switched on in sequence. At this time, the power switch indicator illuminates in green. Then the certification ECU checks that the power source mode has been changed and sends a steering lock command signal to the main body ECU (instrument panel J/B). After receiving this signal, the main body ECU (instrument panel J/B) supplies power to the steering lock actuator. Then (via the ID code box) the steering lock ECU confirms that the certification ECU is certified and drives the steering actuator motor until the steering lock is unlocked. After unlocking the steering lock, an unlock completed signal is sent to the certification ECU. Upon receipt of this signal, the certification ECU sends an unset command signal to the ID code box. Once this signal is received, the ID code box confirms that the certification ECU is certified, sends an immobiliser unset command signal to the ECM and sends a security indicator light off signal to the certification ECU.

(b) Not using the entry function (when key battery is depleted)

(1) When the driver is sitting in the vehicle while carrying the key and the brake pedal is depressed, the main body ECU (instrument panel J/B) recognizes that the stop light switch is on and sends a key confirmation request signal to the certification ECU. Upon receipt of this signal, the certification ECU drives the immobiliser amplifier built in the power switch. At this time, the power switch sends an RF wave communication signal to the immobiliser. If the driver holds the key up to the power switch at this time, the power switch receives the immobiliser RF wave signal and responds by sending a radio wave signal. When the power switch receives the radio wave signal from the key, it duplicates the signal and sends an ID code to the certification ECU. Upon receipt of the ID code, the code is analyzed. If the certification passes, a key certification pass response signal is sent to the main body ECU (instrument panel J/B) while simultaneously sending a sound buzzer request signal to the meter ECU. When the main body ECU (instrument panel J/B) receives this signal, the ACC relay is switched on and the IG1 and IG2 relays are switched on in sequence. At this time, the power switch indicator illuminates in green. Then the certification ECU checks that the power source mode has been changed and sends a steering lock command signal to the

main body ECU (instrument panel J/B). After receiving this signal, the main body ECU (instrument panel J/B) supplies power to the steering lock actuator. Then (via the ID code box) the steering lock ECU confirms that the certification ECU is certified and drives the steering actuator motor until the steering lock is unlocked. After unlocking the steering lock, an unlock completed signal is sent to the certification ECU. Upon receipt of this signal, the certification ECU sends an unset command signal to the ID code box. Once this signal is received, the ID code box confirms that the certification ECU is certified, sends an immobiliser unset command signal to the hybrid control system and sends a security indicator light off signal to the certification ECU.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the engine immobiliser system.
- The intelligent tester should be used in steps 3, 4 and 6.

EI

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	INSPECT BATTERY VOLTAGE

(a) Inspect the battery voltage.
Standard voltage:
11 to 14 V
If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT

3	INSPECT COMMUNICATION FUNCTION OF MULTIPLEX COMMUNICATION SYSTEM (CAN)

(a) Using the intelligent tester, check if the CAN communication system is functioning normally.

Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B (See page CA-7)

B → GO TO CAN COMMUNICATION SYSTEM

A

4	CHECK FOR DTCS

(a) Check for DTCs and note any codes that are output (see page EI-25).
(b) Delete the DTCs.
(c) Recheck for DTCs. Based on the DTCs output above, try to duplicate the hybrid control system DTC or engine immobiliser system DTC by simulating the symptoms indicated by the DTCs.

Result

Result	Proceed to
DTC output does not reoccur	A
Hybrid control system DTC output reoccurs	B (See page HV-46)

Result	Proceed to
Engine immobiliser system DTC output reoccurs	C (See page EI-27)

B → GO TO HYBRID CONTROL SYSTEM

C → GO TO DTC CHART

A

5 PROBLEM SYMPTOMS TABLE

(a) If the fault is not listed in the problem symptoms table, proceed to A.
(b) If the fault is listed in the problem symptoms table, proceed to B.

B → GO TO STEP 7

A

6 OVERALL ANALYSIS AND TROUBLESHOOTING

(a) DATA LIST/ACTIVE TEST (See page EI-25)
(b) TERMINALS OF ECU (See page EI-16)

NEXT

7 ADJUST, REPAIR OR REPLACE

NEXT

8 CONFIRMATION TEST

NEXT

END

REGISTRATION

1. DESCRIPTION OF CODE REGISTRATION

HINT:

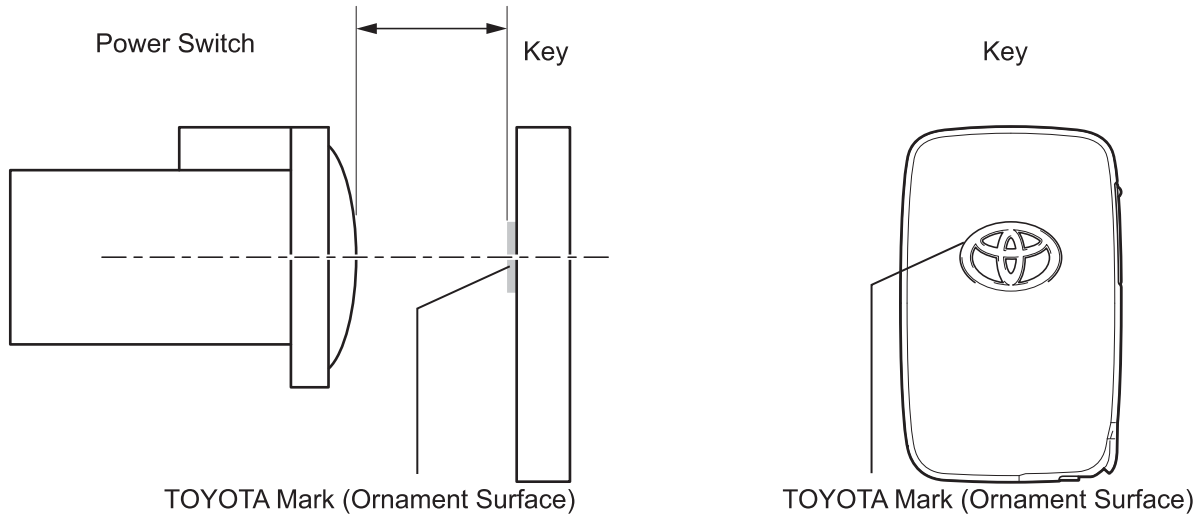
- ID codes are the same as recognition codes for the wireless transmitter and the engine immobiliser function. Registering an ID code enables the smart key system, the wireless door lock control function and the engine immobiliser function to be operated.
- Code registration is needed when the certification ECU, ID code box, steering lock ECU or key is replaced with a new one.

(a) PROCEDURE "1"

The vehicle with the smart key system does not have a key slot. Therefore, hold the key close to the power switch to register the key, as shown in the illustration below.

Hold the key with its ornament surface within a range of 10 mm (0.39 in.) or less from the power switch.

Communication distance: 10 mm (0.39 in.) or less from the power switch.



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2. PART REPLACEMENT KEY REGISTRATION

(a) The following table shows ECU replacement and key registration procedures in case the malfunctioning ECU has been identified after troubleshooting the smart key system.
HINT:
- The following procedures indicated in the table below require the use of the intelligent tester:
  New key ID registration
  Additional key ID registration
  Key ID erasure
  ECU code registration
- If all of the registered keys are not available, replacement of the ID code box is also required.
- A maximum of 7 keys can be registered.

Part to be replaced	Condition		Procedure	Reference
Certification ECU	Customer has brought all keys		1. Replace certification ECU	-
			2. Reregister all keys (new key ID registration)	PROCEDURE "B"
	Some keys are lost	Key ID codes can be registered and erased	1. Erase key codes (key ID erasure)	PROCEDURE "D"
			2. Perform additional key registration procedure (additional key ID registration)	PROCEDURE "C"
			3. Replace certification ECU	-
			4. Reregister all keys (new key ID registration) HINT: If some keys are not registered during above steps, they will be disabled because they cannot be registered later.	PROCEDURE "B"
		Key ID codes cannot be either registered or erased	1. Replace certification ECU	-
			2. Replace ID code box	-
			3. Reregister all keys (new key ID registration) HINT: If key codes cannot be erased or additional keys cannot be registered due to a malfunction in certification ECU, replace ID code box and certification ECU. If some keys are not registered during above steps, they will be disabled because they cannot be registered later.	PROCEDURE "A"
			4. ECU communication ID registration	PROCEDURE "F"
ID code box	At least 1 key is available		1. Replace ID code box	-
			2. Register recognition codes in ECUs (ECU code registration)	PROCEDURE "E"
			3. ECU communication ID registration	PROCEDURE "F"
	All keys are lost		1. Replace ID code box	-
			2. Replace certification ECU	-
			3. Reregister all keys (new key ID registration) HINT: If some keys are not registered during above steps, they will be disabled because they cannot be registered later.	PROCEDURE "A"
			4. ECU communication ID registration	PROCEDURE "F"

Part to be replaced	Condition	Procedure	Reference
Steering lock ECU	Customer has brought at least 1 key	1. Replace steering lock ECU	-
		2. Register recognition codes in ECUs (ECU code registration)	PROCEDURE "E"
	All keys are lost	1. Replace steering lock ECU	-
		2. Replace certification ECU	-
		3. Replace ID code box	-
		4. Reregister all keys (new key ID registration) HINT: If some keys are not registered during above steps, they will be disabled because they cannot be registered later.	PROCEDURE "A"
		5. ECU communication ID registration	PROCEDURE "F"
Main body ECU (Instrument panel J/B)	No condition required	Replace main body ECU (Instrument panel J/B)	-
Hybrid vehicle control ECU	No condition required	1. Replace hybrid vehicle control ECU	-
		2. ECU communication ID registration	PROCEDURE "F"
Key	Customer has brought at least 1 key	1. Using remaining key, erase lost key code (key ID erasure)	PROCEDURE "D"
		2. Register additional keys as necessary (additional key ID registration)	PROCEDURE "E"
	All keys are lost	1. Replace certification ECU	-
		2. Replace ID code box	-
		3. Register all keys (new key ID registration) HINT: If customer brings lost keys at later date, they can be registered using additional key ID registration function.	PROCEDURE "A"
		4. ECU communication ID registration	PROCEDURE "F"

3. KEY REGISTRATION

(a) PROCEDURE "A"

New key ID registration (when replacing certification ECU and ID code box, or certification ECU, ID code box and steering lock ECU)

Process	Procedure
1. Start of registration	1. Connect intelligent tester (with CAN VIM) to DLC3 2. Turn power switch on (IG) 3. Select "SMART KEY / ID UTILITY / SMART CODE REG" from tester menu HINT: The power switch cannot be turned on (IG) more than 10 times. After connecting tester, turn tester on while turning driver's side door courtesy light switch on and off repeatedly at 1.5-second intervals or less to continue key registration procedure.
2. Confirmation of ECU code	Perform operation according to prompts on tester screen HINT: The mode is automatically selected by tester, new registration mode or add mode.
3. Verification of unregistered key *1	Hold unregistered key close to power switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds. Place unregistered key on front passenger's side seat.
	Confirm that wireless door lock buzzer sounds
4. Registration of ID code	Perform operation according to prompts on tester screen
5. End of registration	Finish new key ID code registration

*1: Repeat this process for each key which is to be registered for the vehicle. Finish the procedure for each key within 30 seconds. If the procedure for any of the keys has not been finished within the specified time, perform registration procedures from process 1 again. Make sure that only 1 key is in the cabin during registration procedures. If 2 or more keys are in the cabin simultaneously, electric waves will interfere with each other, preventing normal registration.

(b) PROCEDURE "B"
New key ID registration (when replacing certification ECU)

Process	Procedure
1. Start of registration	1. Connect intelligent tester (with CAN VIM) to DLC3 2. Turn power switch on (IG) 3. Select "SMART KEY / ID UTILITY / SMART CODE REG" from tester menu HINT: The power switch cannot be turned on (IG) more than 10 times. After connecting tester, turn tester on while turning driver's side door courtesy light switch on and off repeatedly at 1.5-second intervals or less to continue key registration procedure.
2. Confirmation of ECU code	Perform operation according to prompts on tester screen HINT: The mode is automatically selected by tester, new registration mode or add mode.
3. Confirmation of all registered keys *1	Hold unregistered key close to power switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds
4. Confirmation of ECU code	Perform operation according to prompts on tester screen
5. Verification of unregistered key *2	Hold unregistered key close to power switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds. Place unregistered key on front passenger side seat.
	Confirm that wireless door lock buzzer sounds
5. Registration of ID code	Perform operation according to prompts on tester screen
6. End of registration	Finish new key ID code registration

*1: Repeat this process for each key registered for the vehicle. Finish the procedure for each key within 30 seconds. If the procedure for any of the keys has not been finished within the specified time, perform registration procedures from process 1 again. If performing the key confirmation procedure for a key, the security indicator comes on and remains on until all the keys are confirmed.
*2: Repeat this process for each key which is to be registered for the vehicle. Finish the procedure for each key within 30 seconds. If the procedure for any of the keys has not been finished within the specified time, perform registration procedures from 1 again. Make sure that only 1 key is in the cabin during registration procedures. If 2 or more keys are in the cabin simultaneously, electric waves will interfere with each other, preventing normal registration.

(c) PROCEDURE "C"
Additional key ID registration

Process	Procedure
1. Start of registration	1. Connect intelligent tester (with CAN VIM) to DLC3 2. Turn power switch on (IG) 3. Select "SMART KEY / ID UTILITY / SMART CODE REG" from tester menu
2. Confirmation of registered key *1	Perform operation according to prompts on intelligent tester screen HINT: The mode is automatically selected by tester, new registration mode or add mode.
	Hold unregistered key close to power switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds once
3. Confirmation of ECU code	Perform operation according to prompts on tester screen
4. Verification of unregistered key *2	Hold unregistered key close to power switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds. Place unregistered key on front passenger's side seat.
	Confirm that wireless door lock buzzer sounds
5. Registration of ID code	Perform operation according to prompts on tester screen
6. End of registration	Finish key ID code registration

*1: Perform this process for one of the keys registered for the vehicle. Finish the procedure within 30 seconds. If the procedure has not been finished within the specified time, perform registration procedures from process 1 again.
*2: Repeat this process for each key which is to be registered for the vehicle. Finish the procedure for each key within 30 seconds. If the procedure for any of the keys has not been finished within the specified time, perform registration procedures from 1 again. Make sure that only 1 key is in the cabin during registration procedures. If 2 or more keys are in the cabin simultaneously, electric waves will interfere with each other, preventing normal registration.

(d) PROCEDURE "D"
Key ID erasure
HINT:
Erase all registered key codes except one.

Process	Procedure
1. Start of erasure	1. Connect intelligent tester (with CAN VIM) to DLC3 2. Turn power switch on (IG) 3. Select "SMART KEY / ID UTILITY / SMART CODE ERS" from tester menu
2. Confirmation of registered key *1	Perform operation according to prompts on intelligent tester screen
	Hold unregistered key close to power switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds once
3. Confirmation of ECU code	Perform operation according to prompts on tester screen
4. Erasure of ID code	Perform operation according to prompts on tester screen
5. End of erasure	Finish key ID code erasure

*1: Perform this process for one of the keys registered for the vehicle. Finish the procedure within 30 seconds. If the procedure has not been finished within the specified time, perform erasure procedures from process 1 again.

(e) PROCEDURE "E"
ECU code registration

Process	Procedure
1. Start of registration	1. Connect intelligent tester (with CAN VIM) to DLC3 2. Turn power switch on (IG) 3. Select "SMART KEY / ID UTILITY / ECU COMM ID REG / ID Code Box and Steering Lock" from tester menu
2. Confirmation of registered key *1	Hold unregistered key close to power switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds once
3. Registration of ECU code	Perform operation according to prompts on tester screen
4. End of registration	Finish ECU code registration

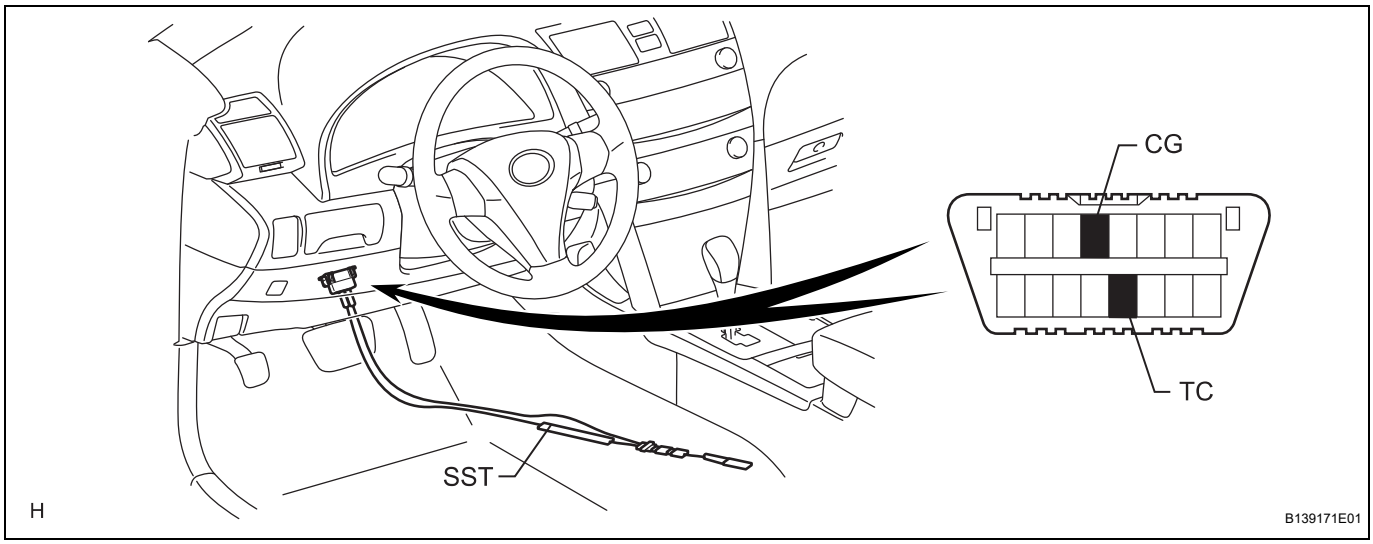
*1: Perform this process for one of the keys registered for the vehicle. Finish the procedure within 30 seconds. If the procedure has not been finished within the specified time, perform erasure procedures from process 1 again.

(f) PROCEDURE "F"
ECU communication ID registration

NOTICE:

- **The ECU communication ID should be registered when the ID code box and/or the hybrid vehicle control ECU is replaced in order to match these ECU communication ID.**
- **The engine cannot be started unless the ECU communication ID matches.**
- **After the registration, pressing the power switch may not start the hybrid control system on the first try. If so, press the power switch again.**
- **After the hybrid control system is started, erase DTC B2799-542, 790 (code for hybrid vehicle control ECU's immobiliser communication error).**

Register the ECU communication ID.



(1) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040

(2) Turn the power switch on (IG) and leave it for 30 minutes.
HINT:
Do not start the engine.

(3) Turn the power switch off and disconnect terminals TC and CG.

(4) Check that the hybrid control system.
OK:
Hybrid control system starts and stays on for more than 3 seconds.
HINT:
Using an already registered key, turn the power switch on (IG) with the brake pedal depressed.

PROBLEM SYMPTOMS TABLE

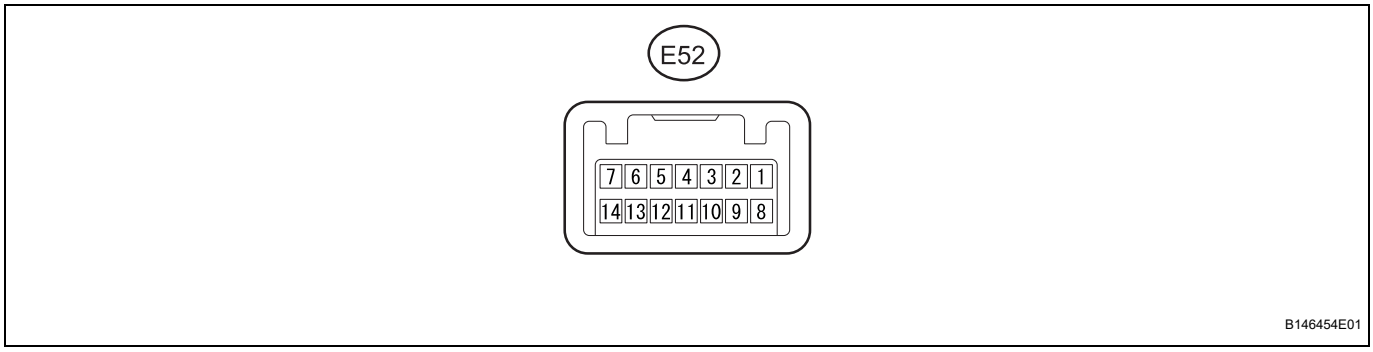
HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected area in the order they are listed. Replace parts as necessary.

ENGINE IMMOBILISER SYSTEM:

Symptom	Suspected Area	See page
Engine does not start	1. Key	EI-25
	2. ID code box power source circuit	EI-50
	3. Certification ECU power source circuit	EI-52
	4. Steering lock ECU power source circuit	SR-30
	5. Smart key system	ST-10
	6. Hybrid control system	HV-15

TERMINALS OF ECU

1. CHECK POWER SWITCH



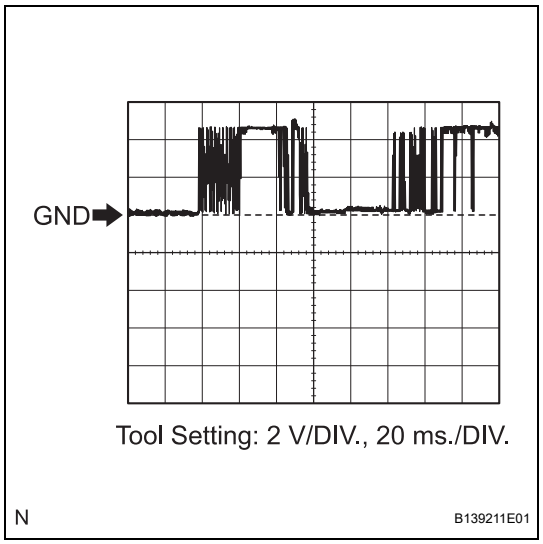
(a) Disconnect the E52 switch connector.
(b) Measure the resistance according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AGND (E52-8) - Body ground	G - Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.
(c) Reconnect the E52 switch connector.
(d) Measure the resistance and voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AGND (E52-8) - Body ground	G - Body ground	Ground	Always	Below 1 Ω
VC5 (E52-14) - AGND (E52-8)	R - G	Power supply	Key is not in cabin	Below 1 V
			Press power switch	4.6 to 5.4 V
CODE (E52-10) - AGND (E52-8)	W - G	Demodulated signal of key code data	Key is not in cabin	Below 1 V
			Press power switch and hold key close to power switch*	Pulse generation (see waveform 1)
TXCT (E52-9) - AGND (E52-8)	GR - G	Key code output signal	Key is not in cabin	Below 1 V
			Press power switch and hold key close to power switch*	Pulse generation (see waveform 2)

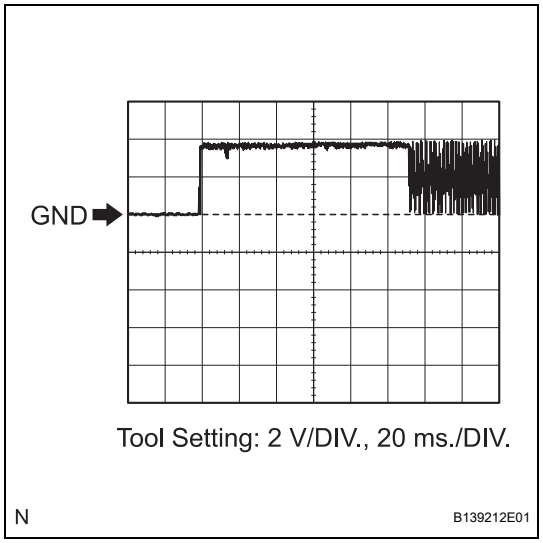
HINT:
*: Remove the key battery before performing this inspection.
If the result is not as specified, the switch may have a malfunction.



(e) Inspect using an oscilloscope.
(1) Waveform 1 (Reference)

Item	Content
Symbols (Terminal No.)	CODE (E52-10) - AGND (E52-8)
Tool Setting	2 V/DIV., 20 ms./DIV.
Condition	Press power switch and hold key close to power switch*

HINT:
*: Remove the key battery before performing this inspection.

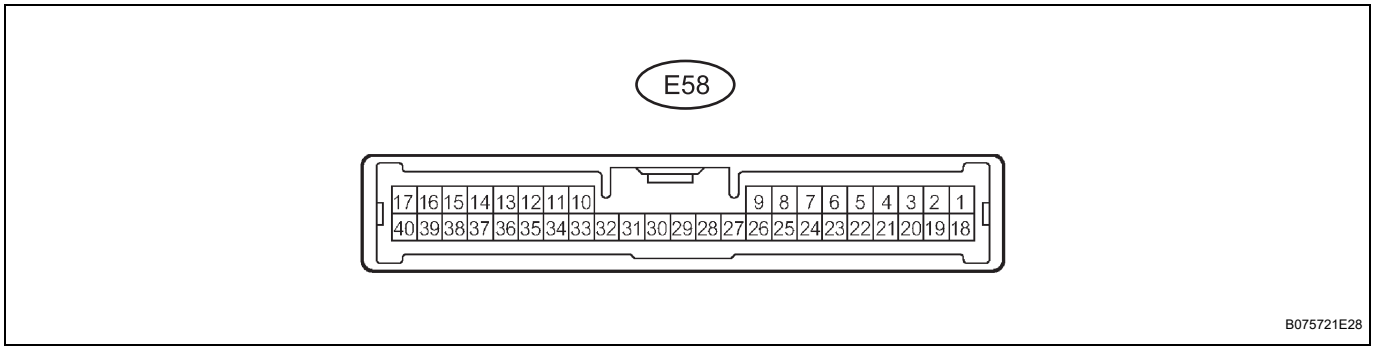


(2) Waveform 2 (Reference)

Item	Content
Symbols (Terminal No.)	TXCT (E52-9) - AGND (E52-8)
Tool Setting	2 V/DIV., 20 ms./DIV.
Condition	Press power switch and hold key close to power switch*

HINT:
*: Remove the key battery before performing this inspection.

2. CHECK CERTIFICATION ECU



(a) Disconnect the E58 ECU connector.
(b) Measure the resistance and voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
E (E58-17) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
+B (E58-1) - E (E58-17)	W - W-B	+B power supply	Always	10 to 14 V
IG (E58-18) - E (E58-17)	LG - W-B	Ignition power supply	Power switch off	Below 1 V

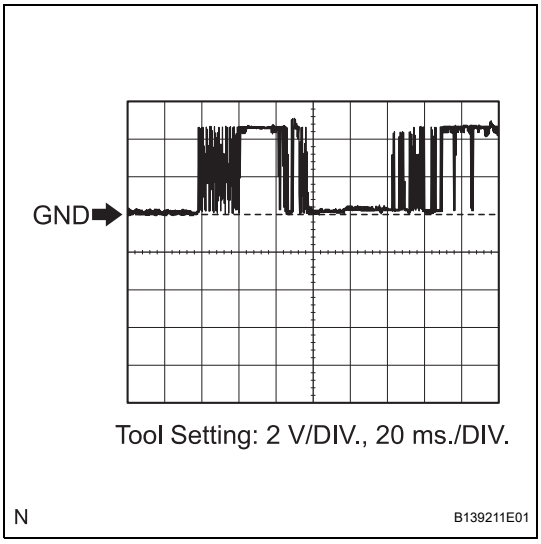
If the result is not as specified, there may be a malfunction on the wire harness side.
(c) Reconnect the E58 ECU connector.

(d) Measure the resistance and voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AGND (E58-40) - Body ground	G - Body ground	Power switch ground	Always	Below 1 Ω
VC5 (E58-30) - AGND (E58-40)	R - G	Power switch power supply	Key is not in cabin	Below 1 V
			Press power switch*	4.6 to 5.4 V
CODE (E58-9) - AGND (E58-40)	W - G	Power switch CODE input	Key is not in cabin	Below 1 V
			Press power switch and hold key close to power switch*	Pulse generation (see waveform 1)
TXCT (E58-8) - AGND (E58-40)	GR - G	Power switch TXCT output	Key is not in cabin	Below 1 V
			Press power switch and hold key close to power switch*	Pulse generation (see waveform 2)

HINT:
*: Remove the key battery before performing this inspection.
If the result is not as specified, the ECU may have a malfunction.

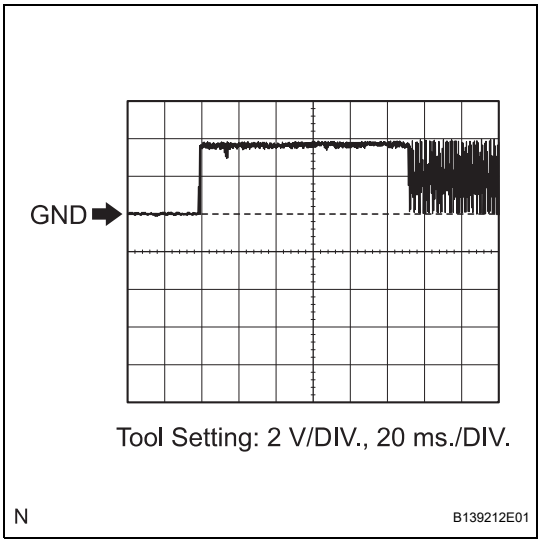
(e) Inspect using an oscilloscope.
(1) Waveform 1 (Reference)



Item	Content
Symbols (Terminal No.)	CODE (E58-9) - AGND (E58-40)
Tool Setting	2 V/DIV., 20 ms./DIV.
Condition	Press power switch and hold key close to power switch*

HINT:
*: Remove the key battery before performing this inspection.

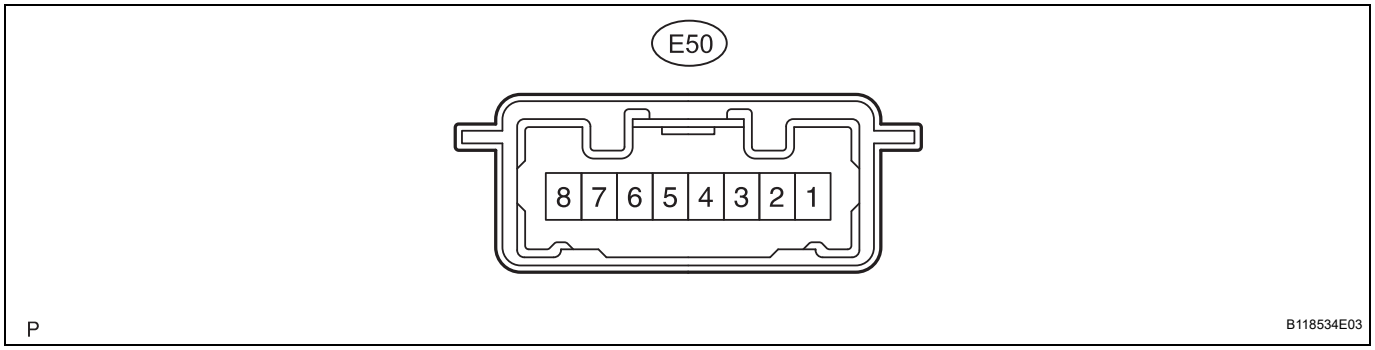
(2) Waveform 2 (Reference)



Item	Content
Symbols (Terminal No.)	TXCT (E58-8) - AGND (E58-40)
Tool Setting	2 V/DIV., 20 ms./DIV.
Condition	Press power switch and hold key close to power switch*

HINT:
*: Remove the key battery before performing this inspection.

3. CHECK ID CODE BOX



(a) Disconnect the E50 ECU connector.
(b) Measure the resistance and voltage according to the value(s) in the table below.

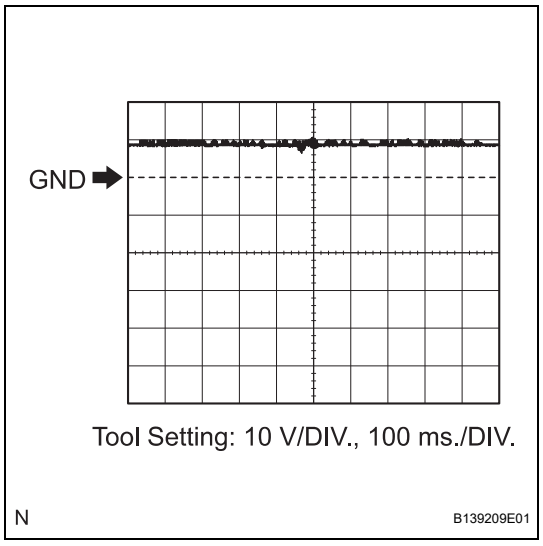
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND (E50-8) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
+B (E50-1) - GND (E50-8)	W - W-B	+B power supply	Always	10 to 14 V

If the result is not as specified, there may be a malfunction on the wire harness side.
(c) Reconnect the E50 ECU connector.
(d) Measure the voltage according to the value(s) in the table below.

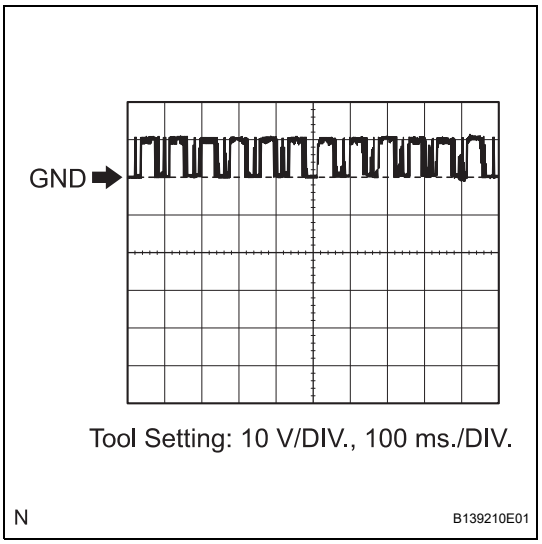
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
EFII (E50-5) - GND (E50-8)	G - W-B	Hybrid vehicle control ECU input signal	Power switch off	Below 1 V
			Power switch on (IG)	Pulse generation (see waveform 1)
EFIO (E50-6) - GND (E50-8)	L - W-B	Hybrid vehicle control ECU output signal	Power switch off	Below 1 V
			Power switch on (IG)	Pulse generation (see waveform 2)

If the result is not as specified, the ECU may have a malfunction.

(e) Inspect using an oscilloscope.
(1) Waveform 1 (Reference)



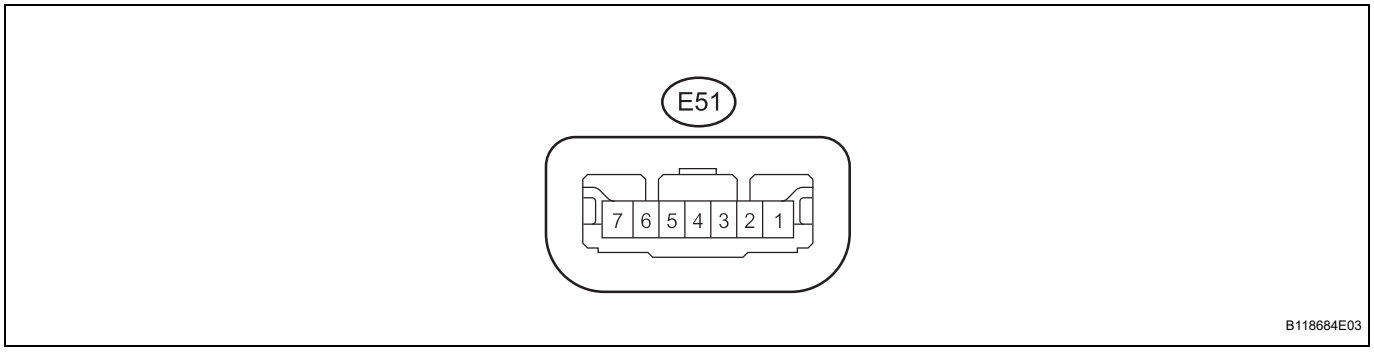
Item	Content
Symbols (Terminal No.)	EFII (E50-5) - GND (E50-8)
Tool Setting	10 V/DIV., 100 ms./DIV.
Condition	Power switch on (IG)



(2) Waveform 2 (Reference)

Item	Content
Symbols (Terminal No.)	EFIO (E50-6) - GND (E50-8)
Tool Setting	10 V/DIV., 100 ms./DIV.
Condition	Power switch on (IG)

4. CHECK STEERING CONTROL ECU

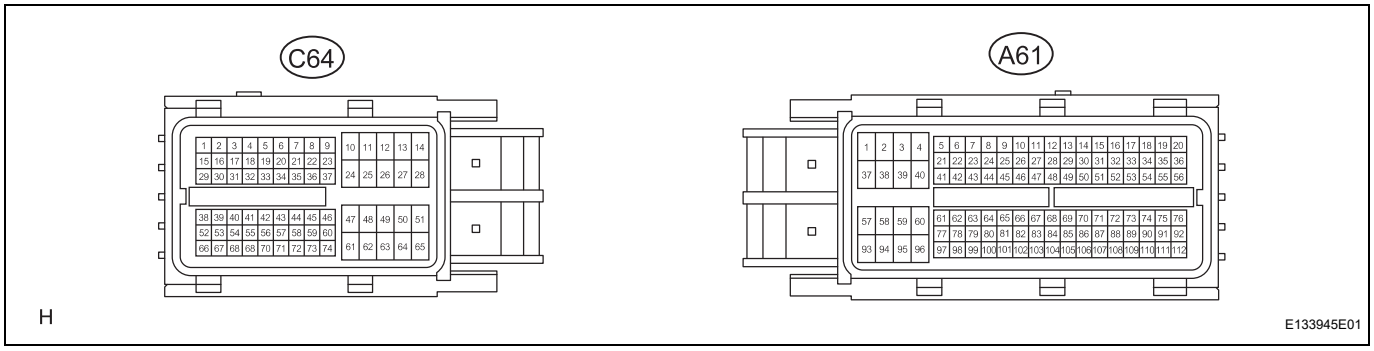


(a) Disconnect the E51 ECU connector.
(b) Measure the resistance and voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SGND (E51-2) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
GND (E51-1) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
B (E51-7) - Body ground	P - Body ground	+B power supply	Always	10 to 14 V
IG2 (E51-6) - Body ground	B - Body ground	Ignition power supply	Power switch off	0 V
			Power switch on (IG)	10 to 14 V

If the result is not as specified, there may be a malfunction on the wire harness side.

5. CHECK HYBRID VEHICLE CONTROL ECU

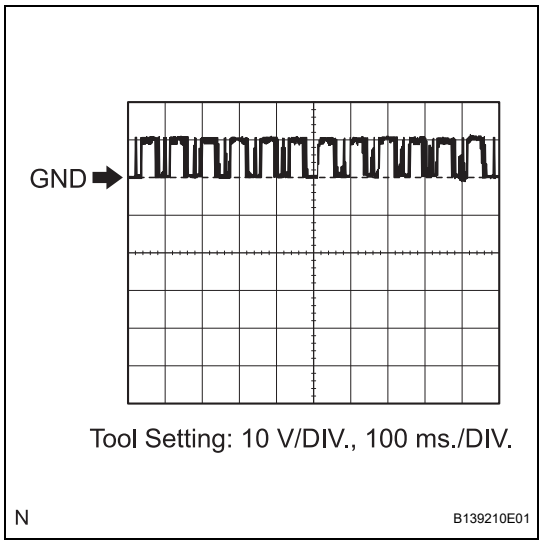


(a) Measure the resistance and voltage according to the value(s) in the table below.

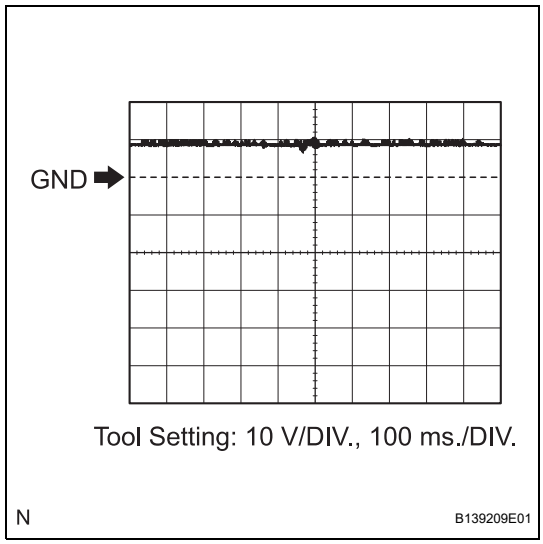
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
E1 (C64-14) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
E01 (C64-51) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
E02 (C64-65) - Body ground	B-W - Body ground	Ground	Always	Below 1 Ω
E03 (C64-25) - Body ground	B - Body ground	Ground	Always	Below 1 Ω
E04 (C64-48) - Body ground	W - Body ground	Ground	Always	Below 1 Ω
ME01 (C64-13) - Body ground	B - Body ground	Ground	Always	Below 1 Ω
BATT (A61-4) - E1 (C64-14)	W - W-B	Battery (for measuring battery voltage and for hybrid vehicle control ECU memory)	Always	10 to 14 V
+B1 (A61-2) - E1 (C64-14)	Y - W-B	Power source of hybrid vehicle control ECU	Power switch off	Below 1 V
			Power switch on (IG)	10 to 14 V
IMI (A61-42) - E1 (C64-14)	Y - W-B	Immobiliser code ECU input signal	Power switch off	Below 1 V
			Power switch on (IG)	Pulse generation (see waveform 1)
IMO (A61-41) - E1 (C64-14)	G - W-B	Immobiliser code ECU output signal	Power switch off	Below 1 V
			Power switch on (IG)	Pulse generation (see waveform 2)

If the result is not as specified, the hybrid vehicle control ECU may have a malfunction.

(b) Inspect using an oscilloscope.
(1) Waveform 1 (Reference)



Item	Content
Symbols (Terminal No.)	IMI (A61-42) - E1 (C64-14)
Tool Setting	10 V/DIV., 100 ms./DIV.
Condition	Power switch on (IG)



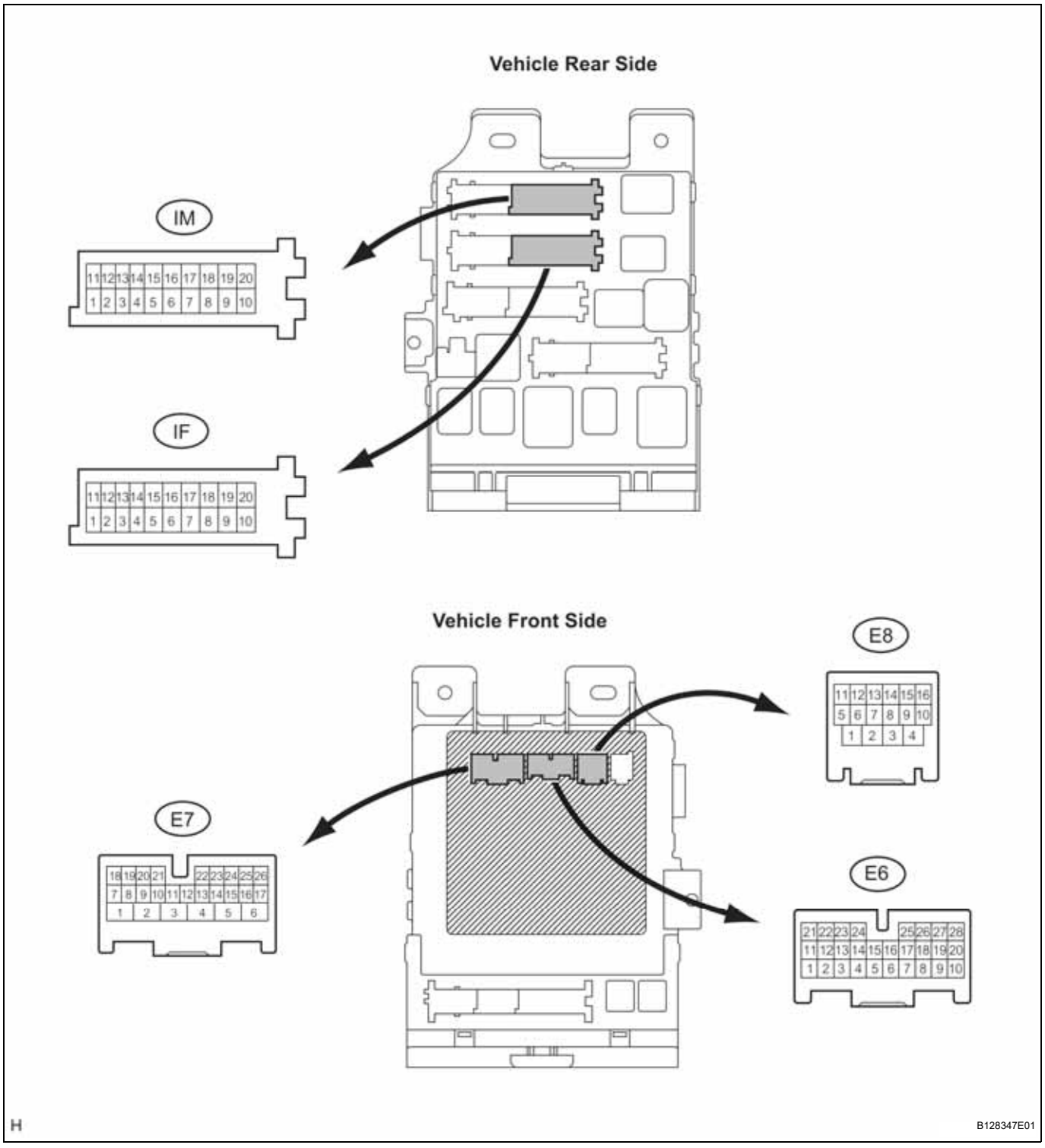
(2) Waveform 2 (Reference)

Item	Content
Symbols (Terminal No.)	IMO (A61-41) - E1 (C64-14)
Tool Setting	10 V/DIV., 100 ms./DIV.
Condition	Power switch on (IG)

6. CHECK MAIN BODY ECU (INSTRUMENT PANEL J/B)

(a) Disconnect the IF and IM junction block connectors.

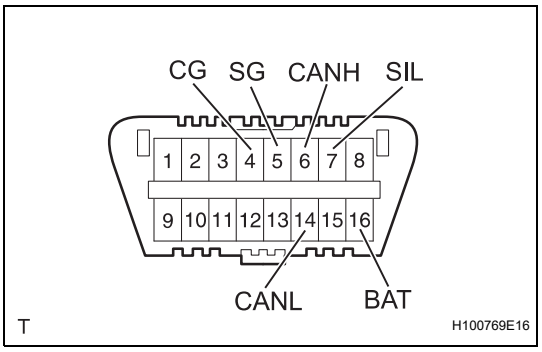
(b) Disconnect the E8, E7 and E6 main body ECU (Instrument panel J/B) connectors.



(c) Measure the resistance and voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND1 (IF-10) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
GND2 (IM-9) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
GND3 (E8-1) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
AM1 (E7-6) - Body ground	L - Body ground	+B power supply	Always	10 to 14 V
AM2 (E6-1) - Body ground	L - Body ground	+B power supply	Always	10 to 14 V

If the result is not as specified, there may be a malfunction on the wire harness side.



DIAGNOSIS SYSTEM

1. CHECK DLC3

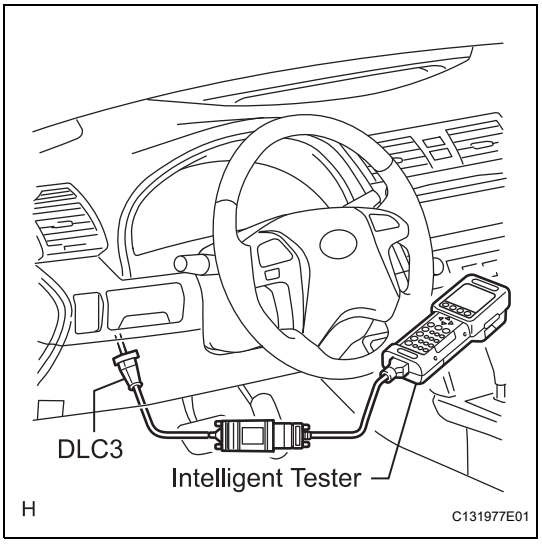
(a) The vehicle's ECU uses ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Power switch off*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Power switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Power switch off*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Power switch off*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Power switch off*	6 kΩ or higher

NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors.**

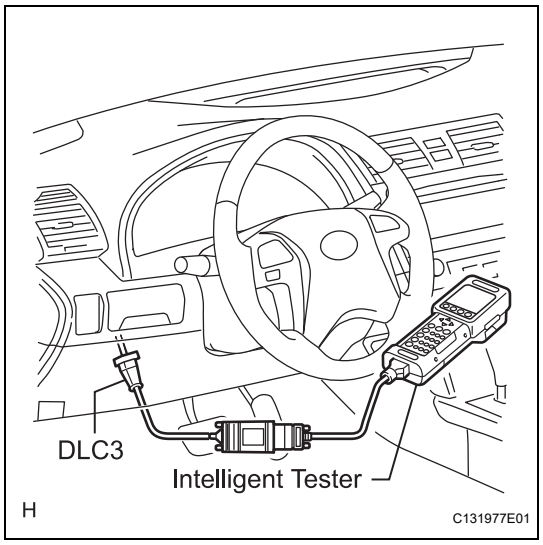
If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.



(b) Connect the cable of the intelligent tester (with CAN VIM) to the DLC3, turn the power switch on (IG) and attempt to use the intelligent tester. If the screen displays a communication error message, a problem exists in the vehicle side or tester side.

HINT:

- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself. Consult the Service Department listed in the tool's instruction manual.



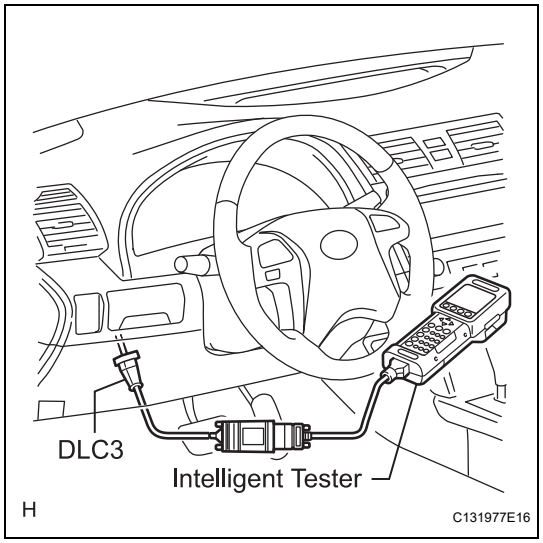
DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the intelligent tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the DLC3.

(b) Turn the power switch on (IG).

(c) Read the DTCs by following the directions on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.



2. CLEAR DTC

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the power switch on (IG).

(c) Erase the DTCs by following the directions on the tester's screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

EI

EI

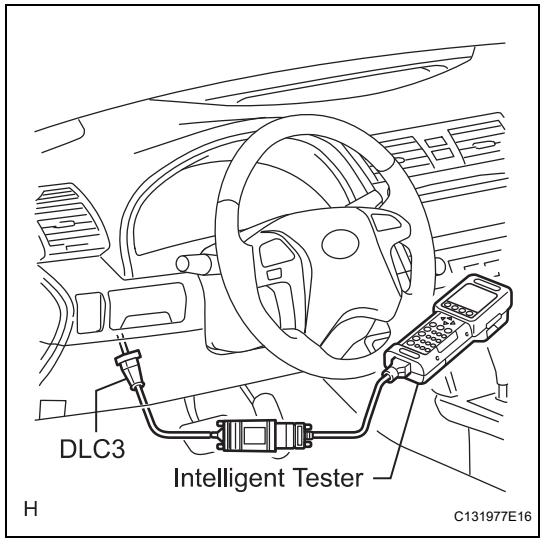
DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester to read the DATA LIST allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful as intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the DATA LIST information early in troubleshooting is one way to save diagnostic time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the power switch on (IG).
(c) Read the DATA LIST.



SMART KEY:

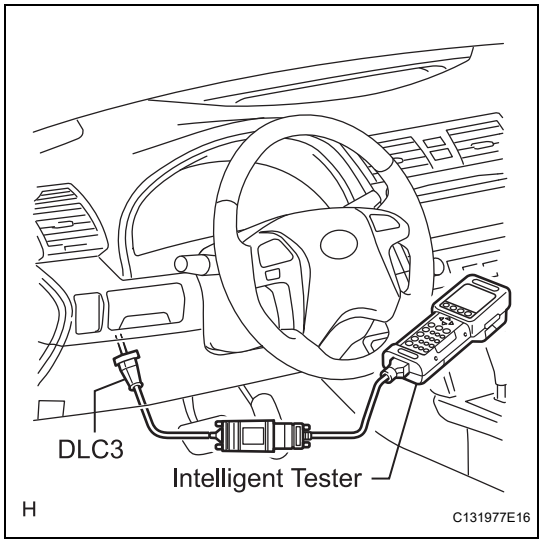
Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
IG SW	Power switch on (IG) signal / ON or OFF	ON: Power switch on (ACC, IG) or start OFF: Power switch off	-
ACC SW	Power switch on (ACC) signal / ON or OFF	ON: Power switch on (ACC, IG) or start OFF: Power switch off	-
IMMOBILISER	Immobiliser system status / SET or UNSET	SET: Key is not in cabin UNSET: Key is in cabin	-
MASTER KEY	Master key code signal / MATCH or NO MATCH	MATCH: Master key code is sent NO MATCH: Unmatched master key code is sent	-
SUB KEY	Sub-key (Master key) code signal / MATCH or NO MATCH	MATCH: Sub-key (master key) code is sent NO MATCH: Unmatched sub-key (master key) code is sent	-
ENCRYPT CODE	Transponder chip signal / OK or NG	OK: Correct data sent NG: Incorrect data sent	-
SERIAL NUMBER	Transponder chip signal / OK or NG	OK: Correct data sent NG: Incorrect data sent	-
FRAME	Transponder chip signal / OK or NG	OK: Correct data sent NG: Incorrect data sent	-
RESPONSE	Transponder chip signal / OK or NG	OK: Correct data sent NG: Incorrect data sent	-
BCC	Transponder chip signal / OK or NG	OK: Correct data sent NG: Incorrect data sent	-
STATUS	Transponder chip data / OK or NG	OK: Data OK NG: Data error	-

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the power switch on (IG).
(c) Perform the ACTIVE TEST by following the directions on the tester screen.



MAIN BODY:

Tester Display	Test Part	Control Range	Diagnostic Note
SECURITY INDIC	Turn security indicator	ON/OFF	-

DIAGNOSTIC TROUBLE CODE CHART

1. CERTIFICATION ECU DIAGNOSTIC TROUBLE CODE CHART

CERTIFICATION ECU

DTC Code	Detection Item	Trouble Area	See page
B2784	Antenna Coil Open / Short	1. Wire harness 2. Power switch 3. Certification ECU	EI-28
B2785	Communication Malfunction between ECUs Connected by LIN	1. Wire harness 2. Certification ECU 3. Main body ECU (Instrument panel J/B) 4. Steering lock ECU 5. ID code box	EI-30
B2786	No Response from Steering Lock ECU	1. Wire harness 2. Certification ECU 3. Steering lock ECU	EI-34
B2789	No Response from ID BOX	1. Wire harness 2. Certification ECU 3. ID code box	EI-37
B278A	Short to GND in Immobiliser System Power Source Circuit	1. Wire harness 2. Power switch 3. Certification ECU	EI-40
B2790	ID BOX EEPROM Malfunction	ID code box	EI-43
B2791	Communication Condition Failure between ECM	-	EI-44

2. HYBRID VEHICLE CONTROL ECU DIAGNOSTIC TROUBLE CODE CHART

HINT:

The DTCs for the engine immobiliser system are specified above. If other codes are output, check the DTC chart for the hybrid control system.

HYBRID VEHICLE CONTROL ECU

DTC Code	Detection Item	Trouble Area	See page
B2799-542	Engine Immobiliser System Malfunction	1. Wire harness 2. Hybrid vehicle control ECU 3. ID code box	EI-46
B2799-790	Engine Immobiliser System Malfunction	1. Wire harness 2. Hybrid vehicle control ECU 3. ID code box	EI-46

DTC	B2784	Antenna Coil Open / Short

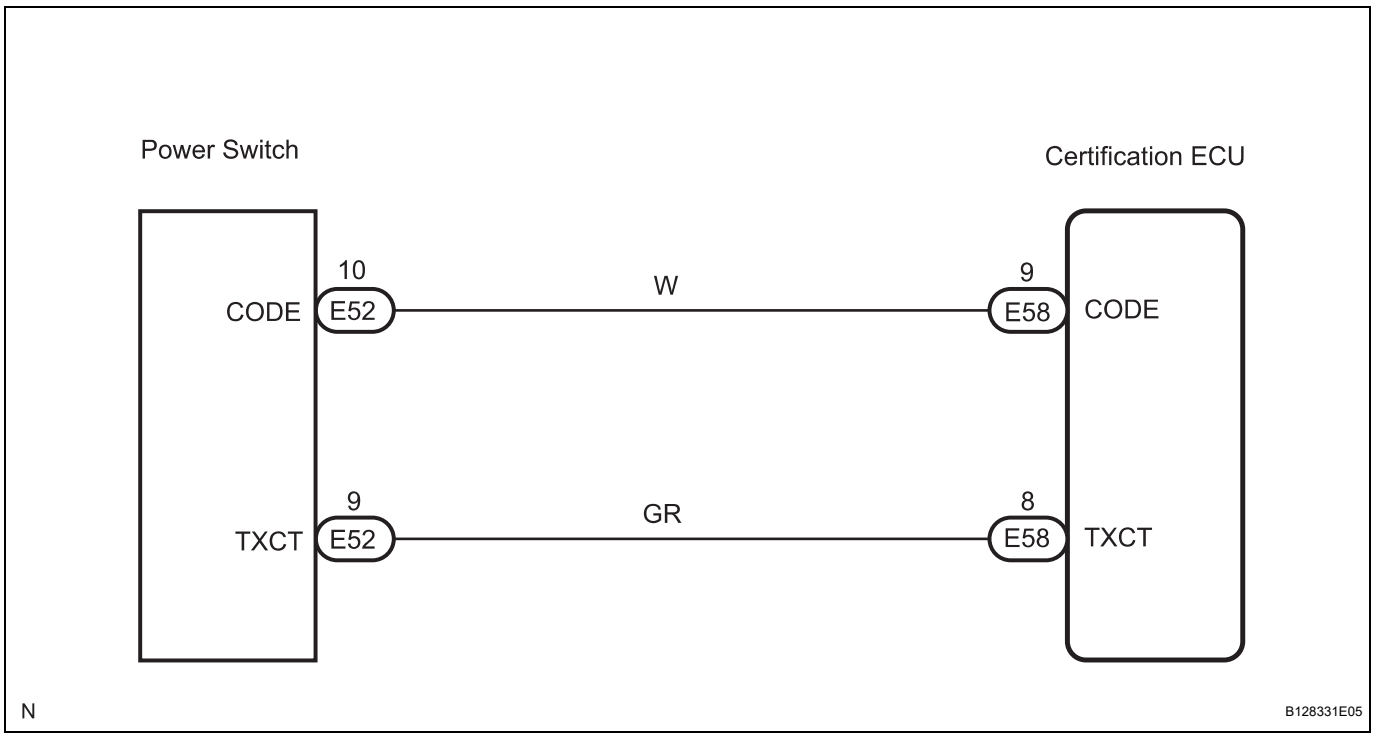
DESCRIPTION

This DTC is output when there is an open or short in the key coil (built into power switch).

DTC No.	DTC Detection Condition	Trouble Area
B2784	Antenna coil is open/shorted	• Wire harness • Power switch • Certification ECU

EI

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

If the certification ECU is replaced, register the key and ECU communication ID (See page EI-9).

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-25).

(b) Recheck for DTCs (See page EI-25).

Result

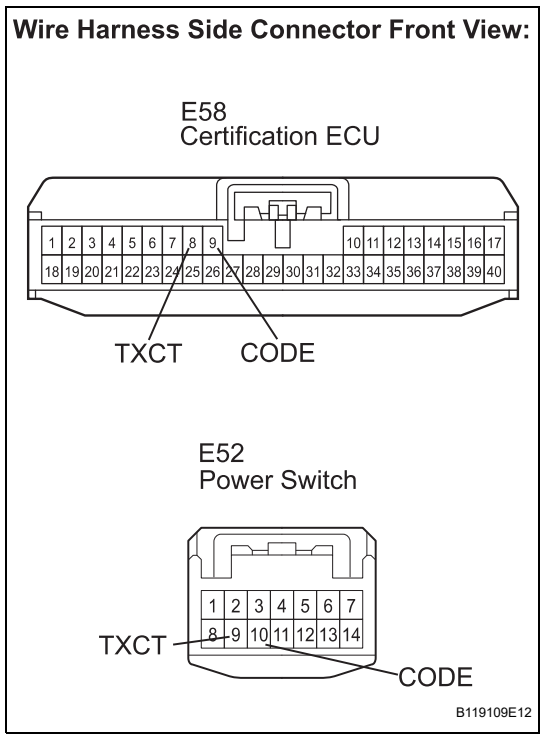
Result	Proceed to
B2784 output recurs	A
B2784 output does not recur	B

B → USE SIMULATION METHOD TO CHECK

A

EI

2 CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - POWER SWITCH)



(a) Disconnect the E58 ECU and E52 switch connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E58-9 (CODE) - E52-10 (CODE)	Below 1 Ω
E58-8 (TXCT) - E52-9 (TXCT)	
E58-9 (CODE) - Body ground	10 kΩ or higher
E58-8 (TXCT) - Body ground	

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 REPLACE POWER SWITCH

(a) Replace the power switch (See page ST-126).

NEXT

4 CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-25).
(b) Recheck for DTCs (See page EI-25).

Result

Result	Proceed to
B2784 output does not recurs	A
B2784 output recur	B

B → **REPLACE CERTIFICATION ECU**

A

END

DTC	B2785	Communication Malfunction between ECUs Connected by LIN

DESCRIPTION

This DTC is output when LIN communication from the certification ECU stops for a certain amount of time.
HINT:
If this DTC B2785 is detected simultaneously with DTC B2786 , B2789 or B2287, troubleshoot DTC B2786, B2789 or B2287 first.

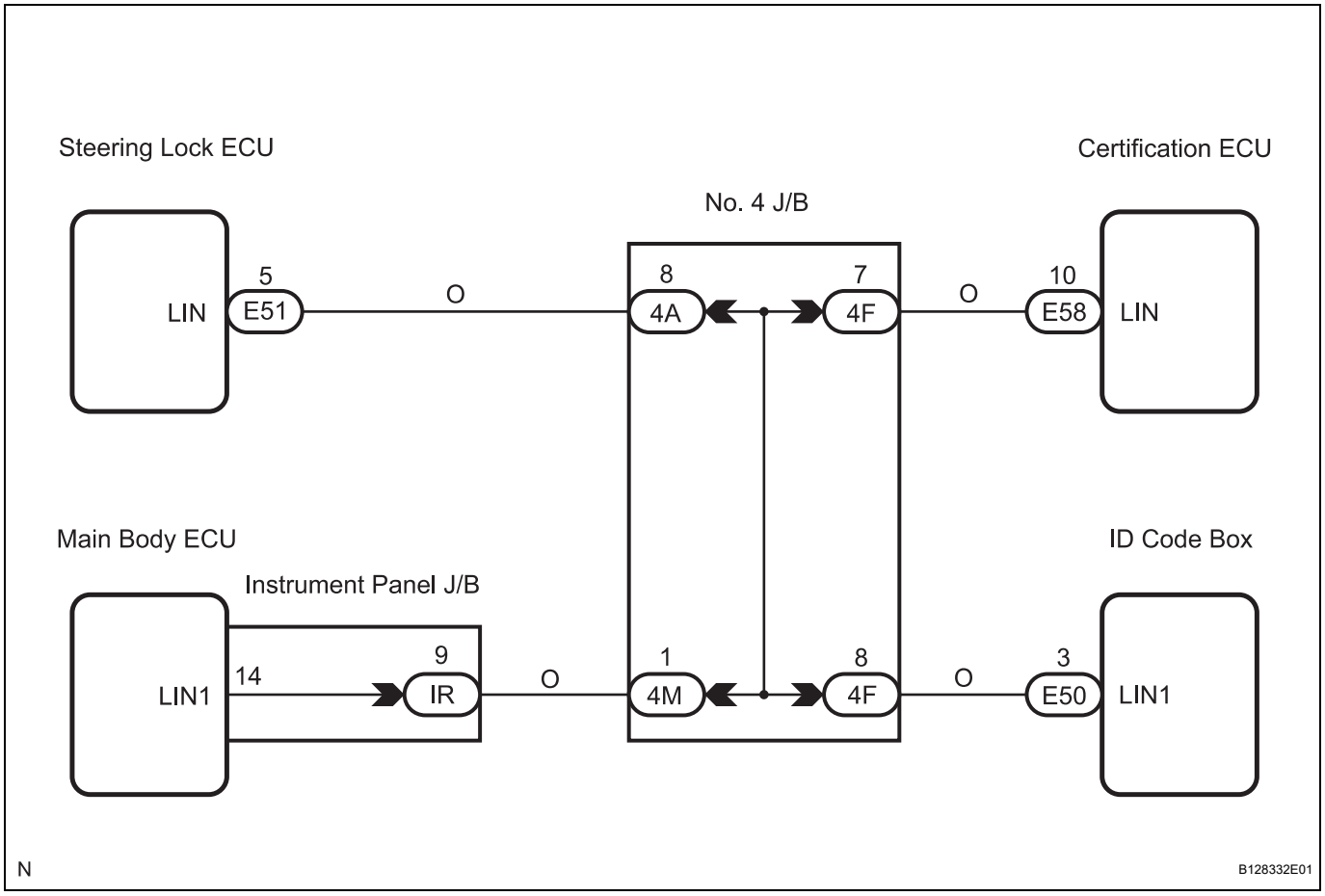
EI

DTC No.	B2785	B2786	B2789	B2287	Trouble Area
DTC Output	○	○	-	-	Wire harness (Certification ECU - Steering lock ECU)
	○	-	○	-	Wire harness (Certification ECU - ID code box)
	○	-	-	○	Wire harness (Certification ECU - Main body ECU (Instrument panel J/B))

○: DTC is output
-: DTC is not output

DTC No.	DTC Detection Condition	Trouble Area
B2785	• LIN communication from certification ECU stops for a certain amount of time • Open or short in wire harness between ECUs	• Wire harness • Certification ECU • Main body ECU (Instrument panel J/B) • Steering lock ECU • ID code box

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- **If the certification ECU or ID code box is replaced, register the key and ECU communication ID (See page EI-9).**
- **If the steering lock ECU or main body ECU is replaced, register the ECU code and ECU communication ID (See page EI-9).**

EI

1 CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-25).
(b) Recheck for DTCs (See page EI-25).
Result

Result	Proceed to
B2785 output recurs	A
B2785 output does not recur	B

B → **USE SIMULATION METHOD TO CHECK**

A

2 REPLACE CERTIFICATION ECU

(a) Replace the certification ECU.

NEXT

3 ELECTRICAL KEY REGISTRATION

(a) Register the electrical key code in the certification ECU (See page EI-9).

NEXT

4 REGISTER ECU COMMUNICATION ID

(a) Register the ECU communication ID between the ID code box and hybrid vehicle control ECU (See page EI-9).

NEXT

5 CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-25).
(b) Recheck for DTCs (See page EI-25).
Result

Result	Proceed to
B2785 output recurs	A
B2785 output does not recur	B

B → END

A

6 REPLACE MAIN BODY ECU (INSTRUMENT PANEL J/B)

(a) Replace the main body ECU (Instrument panel J/B).

NEXT

7 ECU CODE REGISTRATION

(a) Register the ECU code between the ECUs connected by LIN communication (See page EI-9).

NEXT

8 CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-25).
(b) Recheck for DTCs (See page EI-25).

Result

Result	Proceed to
B2785 output recurs	A
B2785 output does not recur	B

B → END

A

9 REPLACE STEERING LOCK ECU

(a) Replace the steering lock ECU.

NEXT

10 ECU CODE REGISTRATION

(a) Register the ECU code between the ECUs connected by LIN communication (See page EI-9).

NEXT

11 CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-25).
(b) Recheck for DTCs (See page EI-25).

Result

Result	Proceed to
B2785 output recurs	A

Result	Proceed to
B2785 output does not recur	B

B → END

A

EI

REPLACE ID CODE BOX

DTC	B2786	No Response from Steering Lock ECU

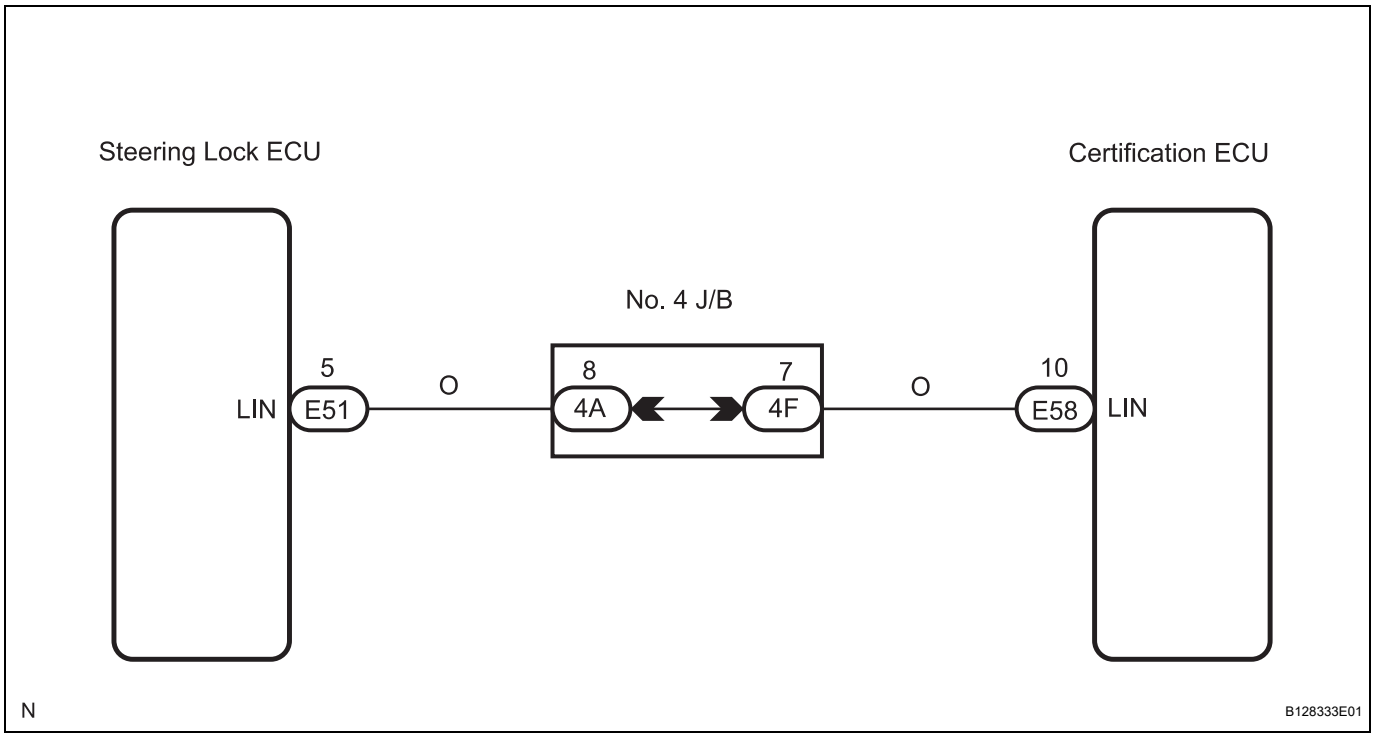
DESCRIPTION

This DTC is output when the certification ECU does not receive LIN communication from the steering lock ECU for 10 seconds.

DTC No.	DTC Detection Condition	Trouble Area
B2786	• Certification ECU does not receive LIN communication from steering lock ECU for 10 seconds • Open or short in wire harness between ECUs	• Wire harness • Certification ECU • Steering lock ECU

EI

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- **If the certification ECU is replaced, register the key and ECU communication ID (See page EI-9).**
- **If the steering lock ECU is replaced, register the ECU code and ECU communication ID (See page EI-9).**

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-25).
(b) Recheck for DTCs (See page EI-25).

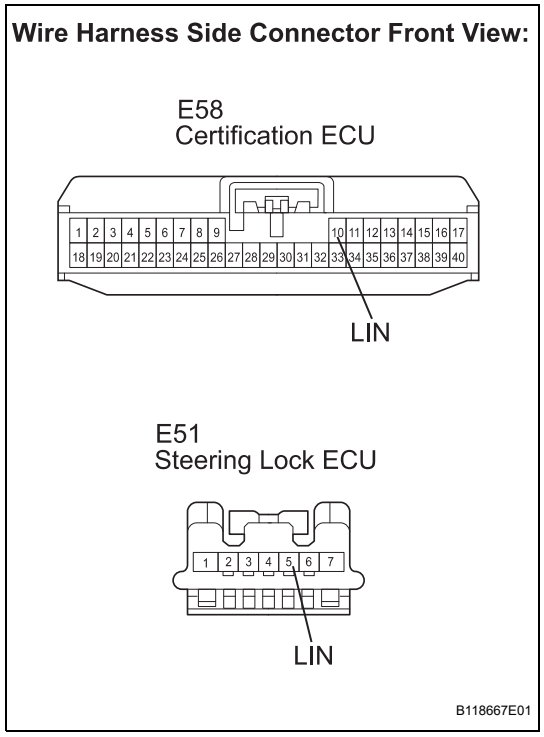
Result

Result	Proceed to
B2786 output recurs	A
B2786 output does not recur	B

B	USE SIMULATION METHOD TO CHECK

A

2	CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - STEERING LOCK ECU)



(a) Disconnect the E58 and E51 ECU connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E58-10 (LIN) - E51-5 (LIN)	Below 1 Ω
E58-10 (LIN) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	REPLACE CERTIFICATION ECU

(a) Replace the certification ECU.

NEXT

4	ELECTRICAL KEY REGISTRATION

(a) Register the electrical key code in the certification ECU (See page EI-9).

NEXT

5	REGISTER ECU COMMUNICATION ID

(a) Register the ECU communication ID between the ID code box and hybrid vehicle control ECU (See page EI-9).

NEXT

6	CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-25).
(b) Recheck for DTCs (See page EI-25).

Result

Result	Proceed to
B2786 output recurs	A
B2786 output does not recur	B

B → END

A → REPLACE STEERING LOCK ECU

DTC	B2789	No Response from ID BOX

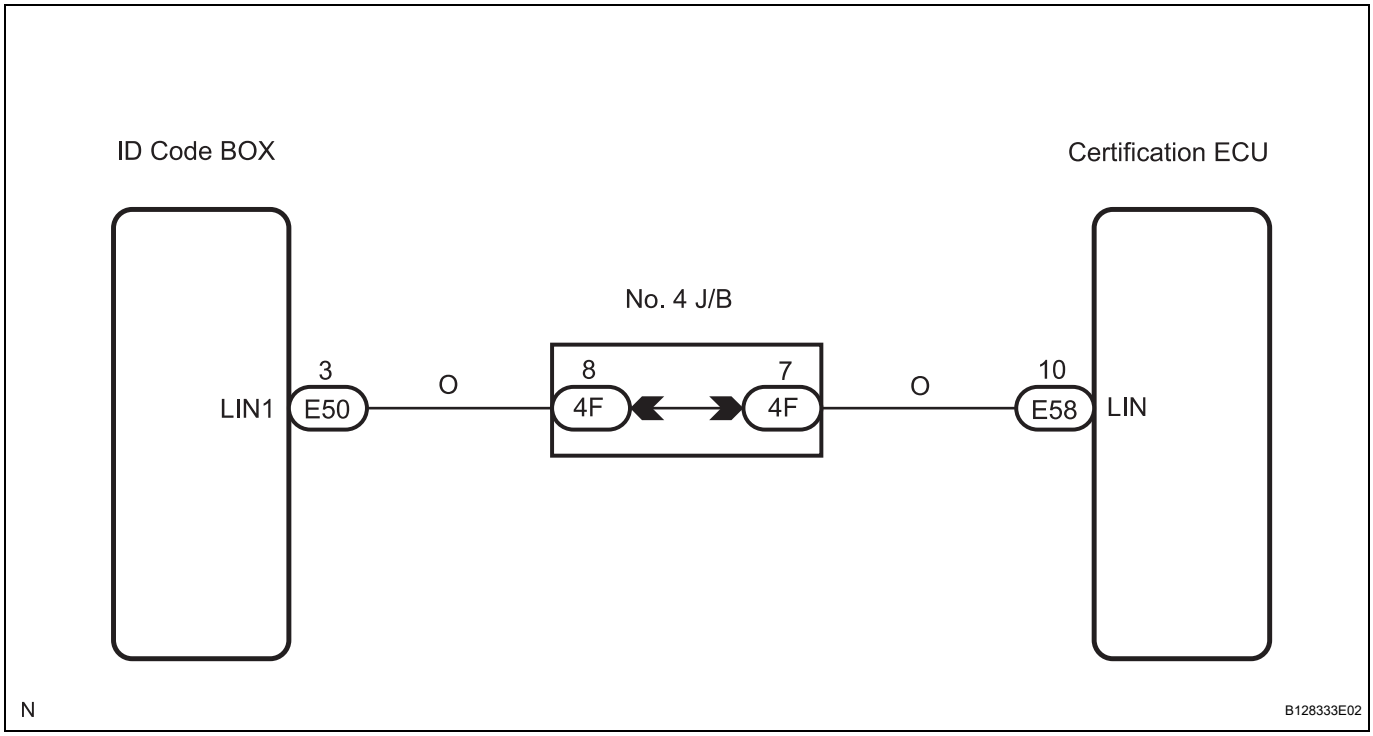
DESCRIPTION

This DTC is output when the certification ECU does not receive LIN communication from the ID code box for 10 seconds.

DTC No.	DTC Detection Condition	Trouble Area
B2789	• Certification ECU does not receive LIN communication from ID code box for 10 seconds • Open or short in wire harness between ECUs	• Wire harness • Certification ECU • ID code box

EI

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

If the certification ECU or ID code box is replaced, register the key and ECU communication ID (See page EI-9).

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-25).
(b) Recheck for DTCs (See page EI-25).

Result

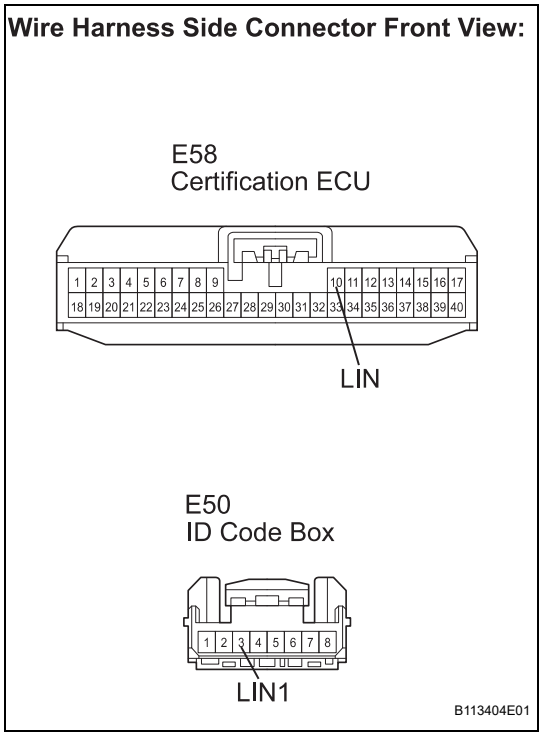
Result	Proceed to
B2789 output recurs	A
B2789 output does not recur	B

B	USE SIMULATION METHOD TO CHECK

A

2 CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - ID CODE BOX)

Wire Harness Side Connector Front View:



(a) Disconnect the E58 ECU and E50 ID code box connectors.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E58-10 (LIN) - E50-3 (LIN1)	Below 1 Ω
E58-10 (LIN) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 REPLACE CERTIFICATION ECU

(a) Replace the certification ECU.

NEXT

4 ELECTRICAL KEY REGISTRATION

(a) Register the electrical key code in the certification ECU (See page EI-9).

NEXT

5 REGISTER ECU COMMUNICATION ID

(a) Register the ECU communication ID between the ID code box and hybrid vehicle control ECU (See page EI-9).

NEXT

EI

6	CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-25).
(b) Recheck for DTCs (See page EI-25).

Result

Result	Proceed to
B2789 output recurs	A
B2789 output does not recur	B

B → END

A

REPLACE ID CODE BOX

PROBLEM SYMPTOMS TABLE

HINT:
Be sure to perform the SYMPTOM SIMULATION procedures before replacing the hybrid vehicle control ECU. If these symptoms are no longer present, the cause of the problem may be poor intermittent electrical contact (open or short) of a wire harness or connector.

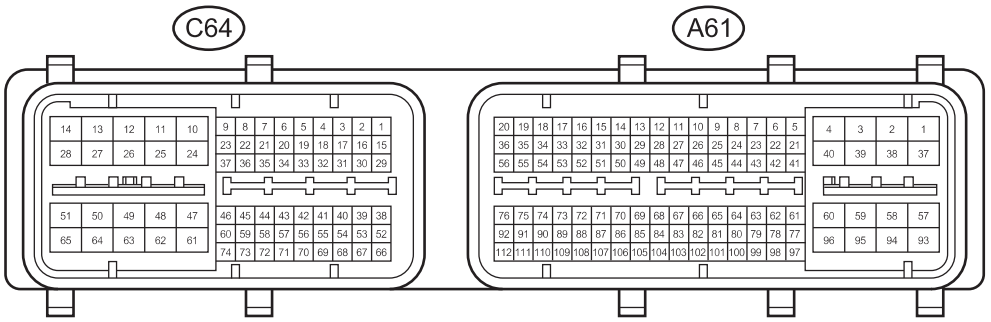
Cruise control system:

Symptom	Suspected Area	See page
Vehicle speed cannot be set. (The CRUISE main indicator light comes on.)	1. Cruise control switch circuit	CC-28
	2. Combination meter	ME-14
	3. Vehicle speed sensor circuit	CC-20
	4. Stop light switch	CC-24
	5. Park/Neutral position switch circuit	HV-90
	6. If the symptoms still occur after the above areas have been inspected and have proven to be normal, replace the hybrid vehicle control ECU.	HV-570
Pushing the ON-OFF button does not turn the cruise control system on. (Vehicle speed cannot be set.)	1. Stop light switch circuit	CC-24
	2. Vehicle speed sensor circuit	CC-20
	3. Cruise control switch circuit	CC-28
	4. Park/Neutral position switch circuit	HV-90
	5. If the symptoms still occur after the above areas have been inspected and have proven to be normal, replace the hybrid vehicle control ECU.	HV-570
Cruise control is canceled while it is operating.	1. Stop light switch circuit	CC-24
	2. Park/Neutral position switch circuit	HV-90
	3. Cruise control switch circuit	CC-28
	4. Vehicle speed sensor circuit	CC-20
	5. Combination meter	ME-14
	6. If the symptoms still occur after the above areas have been inspected and have proven to be normal, replace the hybrid vehicle control ECU.	HV-570
Pulling back on the control main switch does not cancel cruise control. (The CRUISE main indicator light remains on.)	1. Cruise control switch circuit	CC-28
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the hybrid vehicle control ECU.	HV-570
Pulling back on the control main switch does not cancel cruise control. (The CRUISE main indicator light goes off.)	Replace the hybrid vehicle control ECU	HV-570
Cruise control is not canceled when vehicle speed drops below the low speed limit. (The CRUISE main indicator light remains on.)	1. Vehicle speed sensor circuit	CC-20
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the hybrid vehicle control ECU.	HV-570
Cruise control is not canceled when vehicle speed drops below the low speed limit. (The CRUISE main indicator light goes off.)	Replace the hybrid vehicle control ECU	HV-570
Depressing the brake pedal does not cancel cruise control. (The CRUISE main indicator light remains on.)	1. Stop light switch circuit	CC-24
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the hybrid vehicle control ECU.	HV-570
Depressing the brake pedal does not cancel cruise control. (The CRUISE main indicator light goes off.)	Replace the hybrid vehicle control ECU	HV-570
Moving the shift liver does not cancel cruise control.	1. Park/Neutral position switch circuit	HV-90
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the hybrid vehicle control ECU.	HV-570

Symptom	Suspected Area	See page
Hunting (Speed is not constant.)	1. Vehicle speed sensor circuit	CC-20
	2. Combination meter	ME-14
	3. If the symptoms still occur after the above areas have been inspected and have proven to be normal, replace the hybrid vehicle control ECU. (2AZ-FXE)	HV-15
The CRUISE main indicator light remains blinking.	1. TC and CG terminal circuit	CC-35
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the hybrid vehicle control ECU.	HV-570

TERMINALS OF ECU

1. CHECK HYBRID VEHICLE CONTROL ECU



H

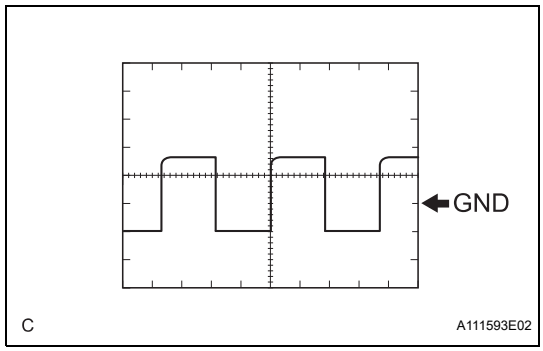
E128782E03

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
A61-33 (TC) - C64-14 (E1)	P - W-B	Ground	Power switch on (IG)	10 to 14 V
A61-33 (TC) - C64-14 (E1)	P - W-B	Ground	Terminals TC and CG of DLC3 connected	Below 1 V
A61-56 (STP) - C64-14 (E1)	W - W-B	Stop light signal	Power switch on (IG), brake pedal depressed	10 to 14 V
A61-56 (STP) - C64-14 (E1)	W - W-B	Stop light signal	Power switch on (IG), brake pedal released	Below 1 V
A61-74 (CCS) - C64-14 (E1)	W - W-B	Cruise control main switch circuit	Power switch on (IG)	10 to 14 V
A61-74 (CCS) - C64-14 (E1)	W - W-B	Cruise control main switch circuit	CANCEL switch ON	6.6 to 10.1 V
A61-74 (CCS) - C64-14 (E1)	W - W-B	Cruise control main switch circuit	SET/COAST switch ON	4.5 to 7.1 V
A61-74 (CCS) - C64-14 (E1)	W - W-B	Cruise control main switch circuit	RES/ACC switch ON	2.3 to 4.0 V
A61-74 (CCS) - C64-14 (E1)	W - W-B	Cruise control main switch circuit	MAIN switch ON	Below 1 V
A61-55 (ST1-) - C64-14 (E1)	GR - W-B	Stop light signal	Power switch on (IG), brake pedal depressed	Below 1 V
A61-55 (ST1-) - C64-14 (E1)	GR - W-B	Stop light signal	Power switch on (IG), brake pedal released	10 to 14 V
A61-21 (SPDI) - C64-14 (E1)	L - W-B	Vehicle speed signal	Approximately 20 km/h (12 mph)	Pulse generation (Waveform 1)

2. Oscilloscope waveforms

HINT:

Oscilloscope waveform samples are provided here for information purposes. Noise and fluttering waveforms have been omitted.



(a) Waveform 1 (vehicle speed signal)

Item	Contents
Terminal	SPDI - E1
Equipment Setting	5 V/DIV., 20 ms./DIV.
Condition	Driving at approximately 20 km/h (12 mph) with power switch on (READY)

HINT:
The higher the vehicle speed, the shorter the cycle.

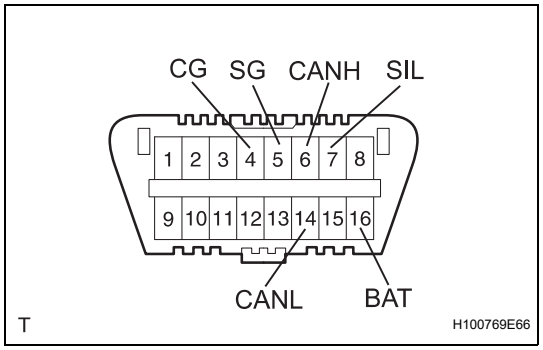
CC

DIAGNOSIS SYSTEM

1. DESCRIPTION

The ECU controls the cruise control system of the vehicle. The data and DTCs relating to the cruise control system can be read from the DLC3 of the vehicle. If either DTC or CRUISE OK is not displayed on the multi-information display on the combination meter when checking for DTCs, there may be a problem with either the combination meter or the CAN communication and multiplex communication systems. Use the intelligent tester to check and solve the problem.

2. CHECK DLC3



(a) The ECU uses the ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962, and matches the ISO 15765-4 format.

Terminal No. (Symbols)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Power switch off*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Power switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Power switch off*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Power switch off*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Power switch off*	6 kΩ or higher

NOTICE:

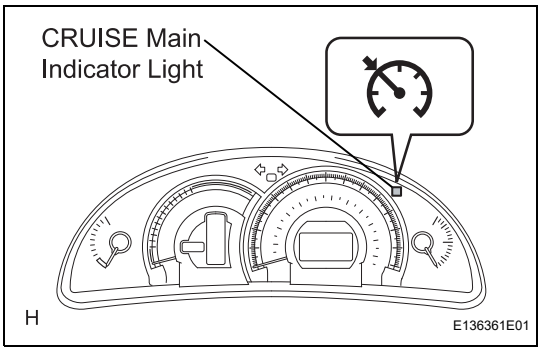
***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

(b) Connect the cable of the intelligent tester to the DLC3, turn the power switch on (IG), and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem with either the vehicle or the tester.

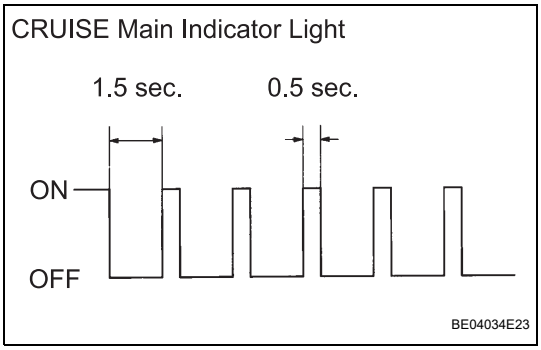
- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.

- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.



3. CHECK INDICATOR

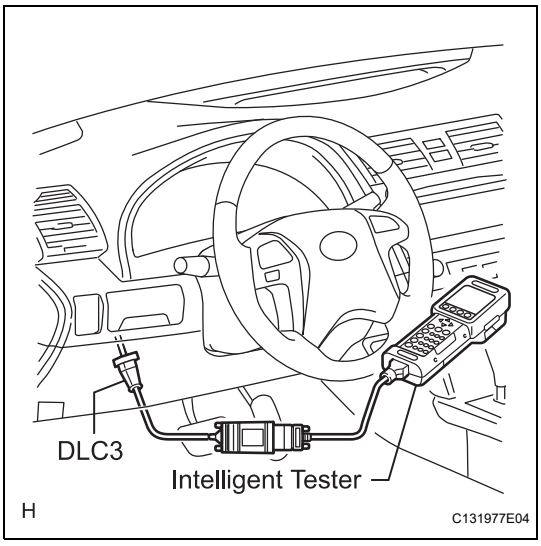
(a) Turn the power switch on (IG).



(b) Check that the CRUISE main indicator light illuminates when the cruise control main switch is turned on, and that the indicator light turns off when the main switch is turned off. If the results are not as specified, inspect the CRUISE main indicator light circuit (See page CC-34).

HINT:

While driving using cruise control, the hybrid vehicle control ECU activates AUTO CANCEL of the cruise control system when a malfunction occurs in one of the following: vehicle speed sensors, stop light switch, or any other related part. When AUTO CANCEL is activated, the CRUISE main indicator light outputs the blinking pattern shown to the left. At the same time, data related to the malfunction is stored as a DTC.



DTC CHECK / CLEAR

1. DTC CHECK

(a) Connect the intelligent tester to the DLC3.

(1) Connect the intelligent tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the Data Link Connector 3 (DLC3).

(b) Turn the power switch on (IG).

(c) Read the DTCs by following the prompts on the tester screen.

HINT:

Refer to the intelligent tester operator's manual for further details.

2. DTC CLEAR

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG).

(c) Operate the intelligent tester to erase the codes.

HINT:

Refer to the intelligent tester operator's manual for further details.

FAIL-SAFE CHART

HINT:
If the following conditions are detected while the cruise control is in operation, the system clears the stored vehicle speed in the hybrid vehicle control ECU and cancels the cruise control operation.

Vehicle Condition	Auto Cancel Condition	Re-operation Condition
CRUISE main indicator light blinks	• There is open or short in stop light switch circuit • There is problem with vehicle speed signal • There is problem with throttle position sensor and motor	Turn cruise control main switch on again
CRUISE main indicator light blinks	• There is problem with input circuit of stop light switch circuit • There is problem with cancel circuit	• Turn cruise control main switch on again • Turn power switch off then on again
CRUISE main indicator light remains on (Cruise control is canceled)	• Vehicle speed is lower than low speed limit (approx. 40 km/h (25 mph)) while running with cruise control on • VSC operates • Electrically controlled brake operates	Push cruise control main switch to + (ACCEL)/RES (RESUME)
	• Vehicle speed is lower than stored speed by approx. 16 km/h (10 mph) or more	Push cruise control main switch to - (COAST)/ SET

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:
Using the intelligent tester's DATA LIST allows switch, sensor, actuator, and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save diagnostic time.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Read the DATA LIST according to the display on the tester.

CC

Hybrid vehicle control ECU (Cruise control):

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
VEHICLE SPD	Vehicle speed / min.: 0 km/h (0 mph), max.: 255 km/h (158 mph)	Actual vehicle speed	-
MEMORY SPD	Cruise control memorized speed / min.: 0 km/h (0 mph), max.: 200 km/h (125 mph)	Actual stored vehicle speed	-
THROTTLE	Throttle opening angle / min.: 0°, max.: 125°	Actual demanded throttle angle	-
CRUISE CONTROL	Cruise control system active condition / ON or OFF	ON: Cruise control system activated OFF: Cruise control system deactivated	-
MAIN SW (MAIN)	Main switch signal (Main CPU) / ON or OFF	ON: Cruise control main switch on OFF: Cruise control main switch off	"3"
CCS READY M	Cruise control system standby condition (Main CPU) / ON or OFF	ON ←→ OFF: Switching each time ON-OFF button is pushed	"1"
CCS INDICATOR M	Cruise indicator signal (Main CPU) / ON or OFF	ON: "CRUISE" on OFF: "CRUISE" off	"2"
CANCEL SW	CANCEL switch signal / ON or OFF	ON: CANCEL switch on OFF: CANCEL switch off	-
SET/COAST SW	SET / COAST switch signal / ON or OFF	ON: - (COAST) / SET switch on OFF: - (COAST) / SET switch off	-
RES/ACC SW	RES / ACC switch signal / ON or OFF	ON: + (ACCEL) / RES (RESUME) switch on OFF: + (ACCEL) / RES (RESUME) switch off	-
STP LIGHT SW1 M	Stop light switch signal (Main CPU) / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
STP LIGHT SW1-S	Stop light switch signal (Sub CPU) / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
STP LIGHT SW2-S	Stop light switch signal (Sub CPU) / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
CCS OPER STATUS	Cruise control condition / ON or OFF	ON: Cruise control operating OFF: Cruise control not operating	-
VEHICLE SPD CHG	Vehicle speed sudden change / ON or OFF	ON: Sudden change in vehicle speed OFF: No change in vehicle speed	-
SHIFT D POS	Shift D position / ON or OFF	ON: Shift lever in D OFF: Shift lever is except in D	-

HINT:
- "3" is OK but "1" is NG → Hybrid vehicle control ECU failure

- "1" is OK but "2" is NG → DTC output or hybrid vehicle control ECU failure
- "3" is OK but the CRUISE main indicator light does not turn on → CRUISE main indicator light, wire harness, or hybrid vehicle control ECU failure

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows relays, VSVs, actuators, and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save diagnostic time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG).

(c) Perform the ACTIVE TEST according to the display on the tester.

HINT:

The power switch must be turned on (IG) to proceed to the ACTIVE TEST using the intelligent tester.

Combination meter:

Tester Display	Test Part	Control Range	Diagnostic Note
CRUISE INDIC	CRUISE main indicator light	ON / OFF	-

DIAGNOSTIC TROUBLE CODE CHART

If a trouble code is displayed during the DTC check, check the trouble areas listed for that code in the table below and proceed to the appropriate page.

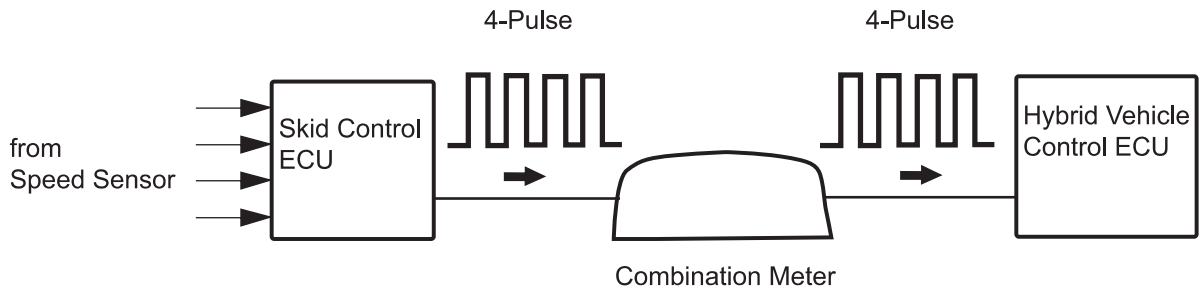
Cruise control system:

DTC Code	Detection Item	Trouble Area	See page
P0500	Vehicle Speed Sensor Malfunction	1. Vehicle speed sensor 2. Vehicle speed sensor signal circuit 3. Combination meter 4. Wire harness and connector 5. Hybrid vehicle control ECU	CC-20
P0571	Brake Switch "A" Circuit	1. Stop light switch 2. Stop light switch circuit 3. Hybrid vehicle control ECU	CC-24
P0607	Control Module Performance	Hybrid vehicle control ECU	CC-27

DTC	P0500	Vehicle Speed Sensor Malfunction

DESCRIPTION

The speed sensor for the skid control ECU detects wheel speed and sends appropriate signals to the skid control ECU. The skid control ECU converts these wheel speed signals into 4-pulse signals and outputs them to the hybrid vehicle control ECU via the combination meter. The hybrid vehicle control ECU determines vehicle speed based on the frequency of these pulse signals.



DTC No.	DTC Detection Condition	Trouble Area
P0500	The vehicle speed signal from the vehicle speed sensor is cut for 0.14 sec. or more while cruise control is in operation.	• Vehicle speed sensor • Vehicle speed sensor signal circuit • Combination meter • Wire harness or connector • Hybrid vehicle control ECU

WIRING DIAGRAM

INSPECTION PROCEDURE

1	CHECK OPERATION OF SPEEDOMETER

(a) Drive the vehicle and check if the function of the speedometer in the combination meter is normal.

OK:

The actual vehicle speed and the speed indicated on the speedometer are the same.

HINT:

The vehicle speed sensor is functioning normally when the indication on the speedometer is normal.

NG → **GO TO SPEEDOMETER CIRCUIT (See page ME-42)**

OK

2	READ VALUE ON INTELLIGENT TESTER (VEHICLE SPEED SIGNAL)

(a) Check the DATA LIST for proper functioning of the vehicle speed signal.

Hybrid vehicle control ECU

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
VEHICLE SPD	Cruise control vehicle speed/min.: 0 km/h (0 mph), max.: 255 km/h (158 mph)	Actual vehicle speed is displayed	-

OK:

The speed displayed on the tester screen is almost the same as the speed indicated on the combination meter.

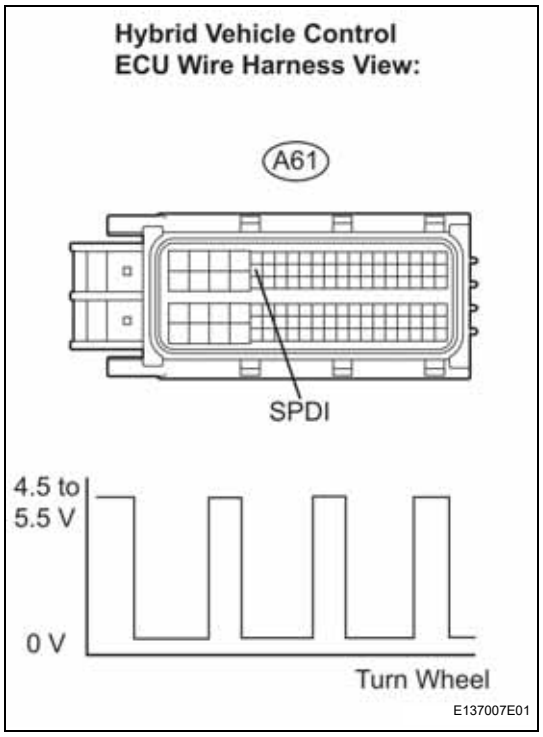
NG → **Go to step 3**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page CC-12)

3	INSPECT HYBRID VEHICLE CONTROL ECU (SPD VOLTAGE)

(a) Turn the power switch on (IG).
(b) Move the shift lever to neutral.
(c) Jack up the vehicle.



(d) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
A61-21 (SPDI) - Body ground	Waveform appears

HINT:
The output voltage fluctuates up and down, in a pattern similar to the diagram on the left, when the wheel is turned slowly.

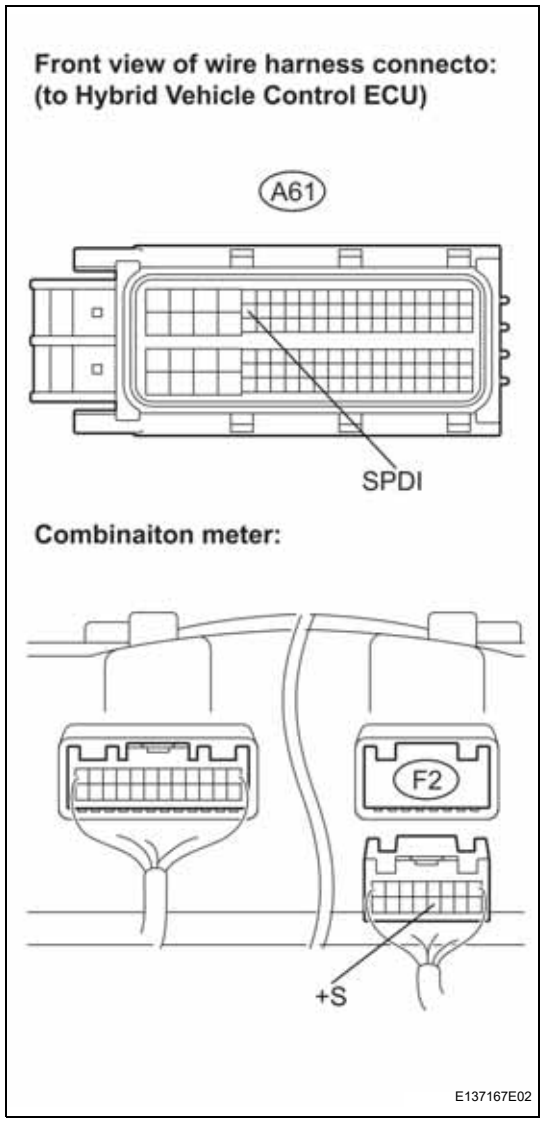
NG → **Go to step 4**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-570)

CC

4	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - COMBINATION METER)



(a) Disconnect the A61 ECU connector.
(b) Disconnect the F1 combination meter connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A61-21 (SPDI) - F2-12 (+S)	Below 1Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-570)

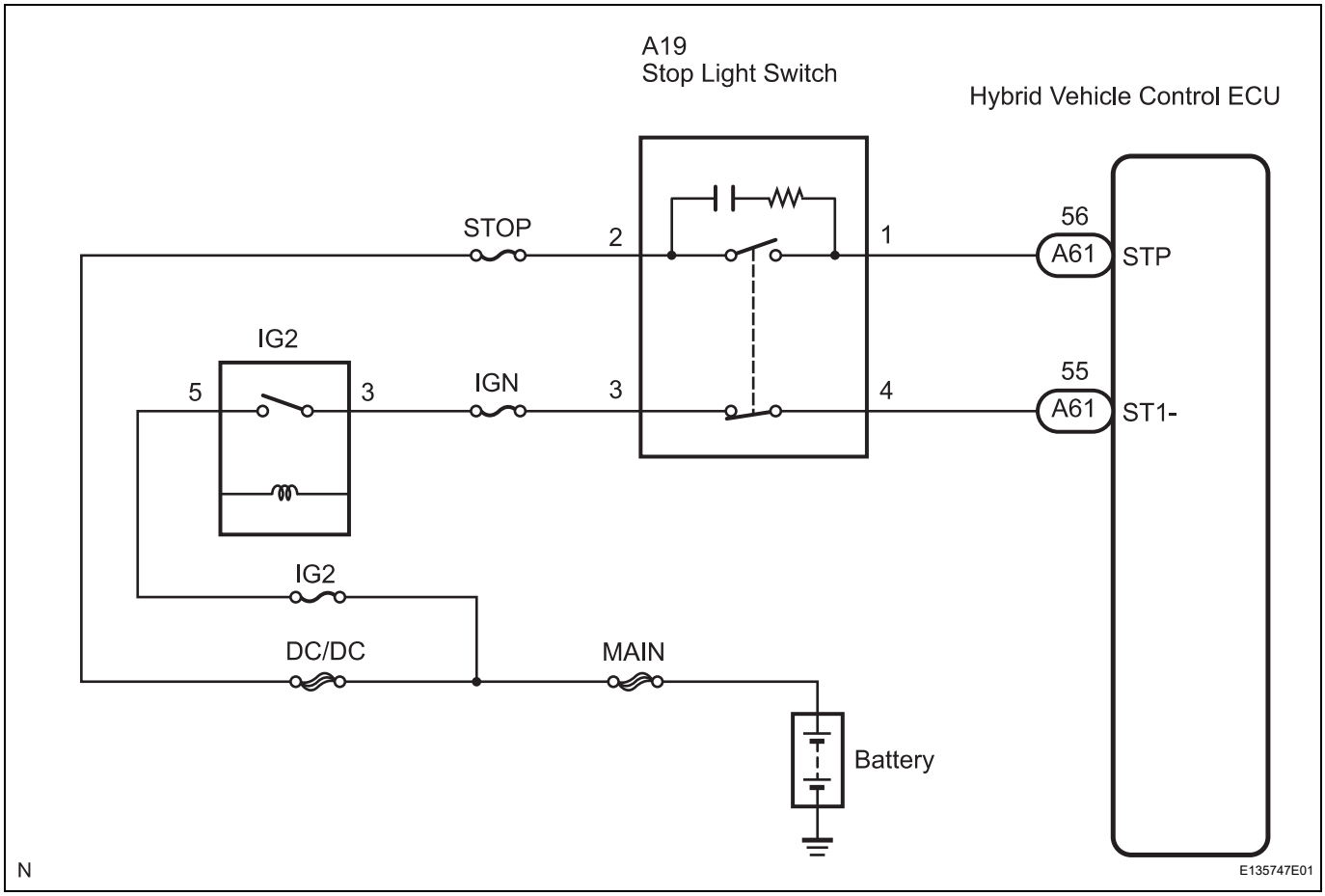
DTC	P0571	Brake Switch "A" Circuit

DESCRIPTION

When the brake pedal is depressed, the stop light switch sends a signal to the hybrid vehicle control ECU. When the hybrid vehicle control ECU receives this signal, it cancels the cruise control. The fail-safe function operates to enable normal driving even if there is a malfunction in the stop light signal circuit. The cancellation condition occurs when voltage is applied to terminal STP. When the brake is applied, voltage is normally applied to terminal STP of the hybrid vehicle control ECU through the STOP SW fuse and the stop light switch, and the hybrid vehicle control ECU turns the cruise control off.

DTC No.	DTC Detection Condition	Trouble Area
P0571	When voltage of STP terminal and that of ST1- terminal of hybrid vehicle control ECU are less than 1 V for 0.5 sec. or more	• Stop light switch • Stop light switch circuit • Hybrid vehicle control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE ON INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG), and turn the intelligent tester main switch on.

(c) Check the DATA LIST for proper functioning of the stop light switch.

Hybrid vehicle control ECU (Cruise control):

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
STP LIGHT SW1 M	Stop light switch signal (Main CPU) / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
STP LIGHT SW1-S	Stop light switch signal (Sub CPU) / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
STP LIGHT SW2-S	Stop light switch signal (Sub CPU) / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-

CC

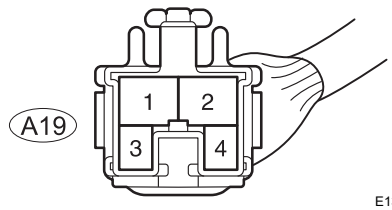
OK:
When the brake pedal is operated, the display changes as shown above.

OK → **REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-570)**

NG

2 CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH - BATTERY)

Stop Light Switch Wire Harness Side Connector Front View:



(a) Disconnect the A19 connector from the stop light switch.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

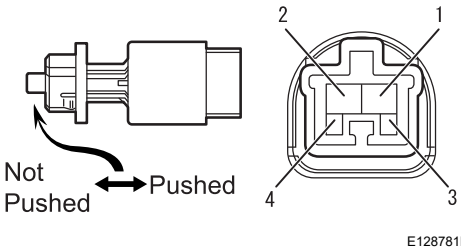
Tester Connection	Condition	Specified Condition
A19-2 - Body ground	Always	10 to 14 V
A19-3 - Body ground	Power switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 INSPECT STOP LIGHT SWITCH

Stop Light Switch:



(a) Remove the stop light switch. (See page BR-73)
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

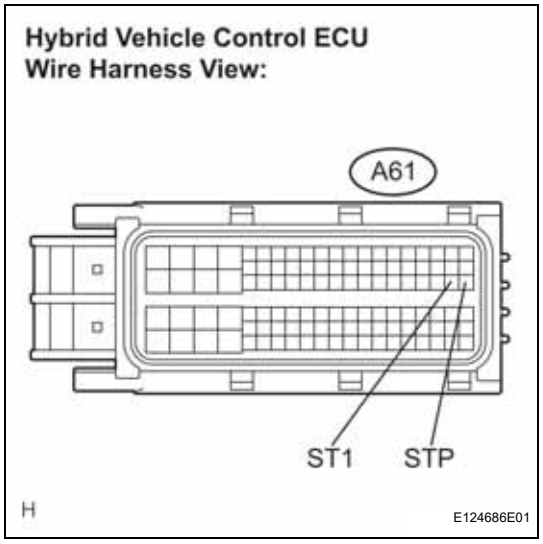
Tester Connection	Switch Condition	Specified Condition
1 - 2	Switch pin not pushed	Below 1 Ω
3 - 4	Switch pin not pushed	10 kΩ or higher
1 - 2	Switch pin pushed	10 kΩ or higher
3 - 4	Switch pin pushed	Below 1 Ω

(c) Install the stop light switch.

NG → **REPLACE STOP LIGHT SWITCH (See page BR-73)**

OK

4	CHECK HYBRID VEHICLE CONTROL ECU



(a) Reconnect the stop light switch connector.
(b) Disconnect the A61 connector from the hybrid vehicle control ECU.
(c) Turn the power switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Brake Pedal Condition	Specified Condition
A61-56 (STP) - Body ground	Depressed	10 to 14 V
A61-56 (STP) - Body ground	Released	Below 1 V
A61-55 (ST1-) - Body ground	Depressed	Below 1 V
A61-55 (ST1-) - Body ground	Released	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT SWITCH - HYBRID VEHICLE CONTROL ECU)**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-570)

CC

DTC	P0607	Control Module Performance

DESCRIPTION

This DTC indicates internal abnormalities in the hybrid vehicle control ECU.

DTC No.	DTC Detection Condition	Trouble Area
P0607	When both of the following conditions are met: • The STP signals input to the supervisory CPU and control ECU in the hybrid vehicle control ECU are different for 0.15 sec. or more • 0.4 sec. have passed after a cruise cancel input signal (STP input) is input to the hybrid vehicle control ECU	Hybrid vehicle control ECU

HINT:
The hybrid vehicle control ECU receives signals from each sensor to control all functions of the cruise control system. When a trouble code is detected, the fail-safe function remains on until the power switch is turned off.

INSPECTION PROCEDURE

1	REPLACE HYBRID VEHICLE CONTROL ECU

(a) (See page HV-570)

NEXT

END

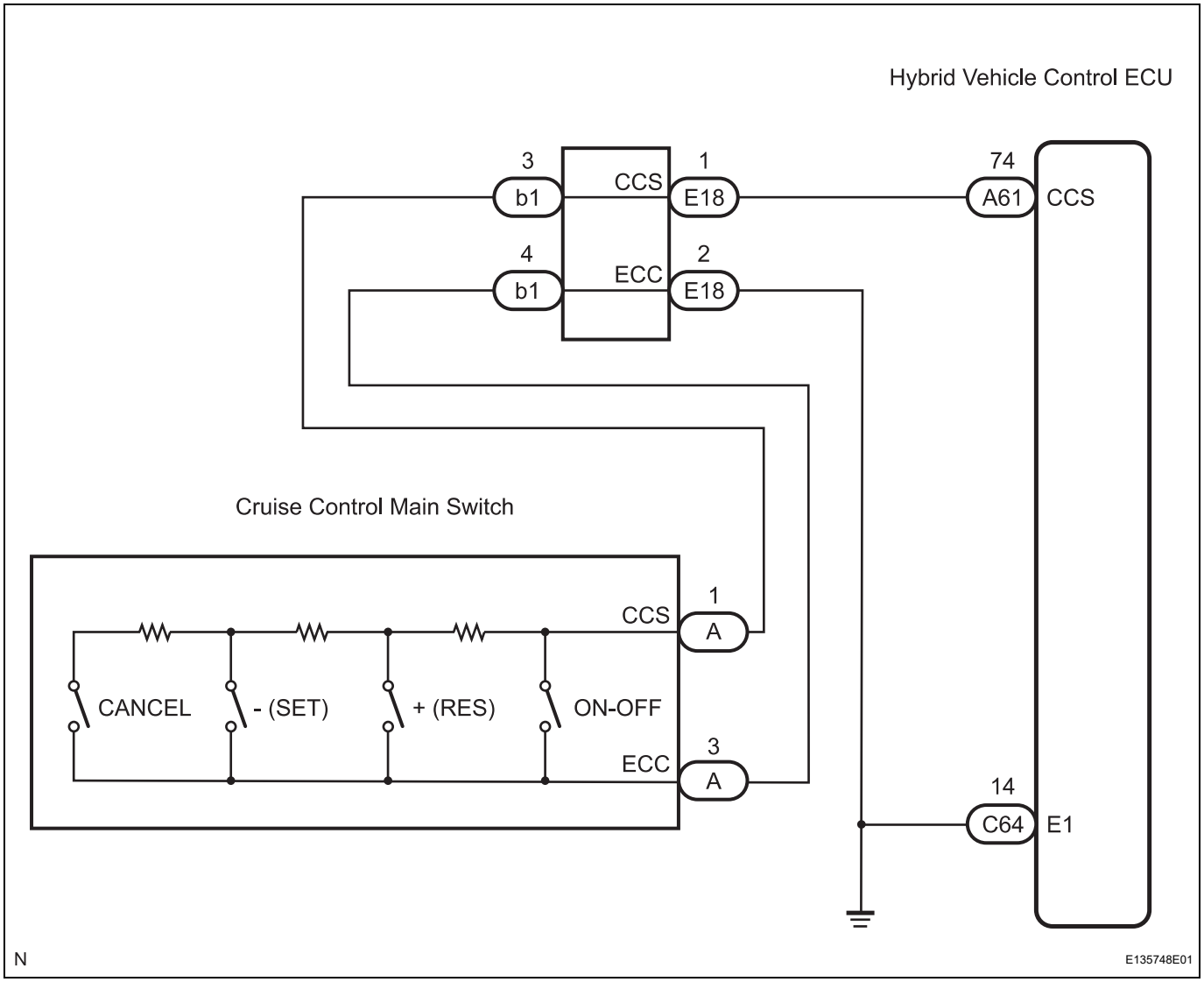
Cruise Control Switch Circuit

DESCRIPTION

The cruise control main switch operates 7 functions: SET, - (COAST), TAP-DOWN, RES (RESUME), + (ACCEL), TAP-UP, and CANCEL. The SET, TAP-DOWN, and - (COAST) functions, and the RES (RESUME), TAP-UP, and + (ACCEL) functions are operated with the same switch. The cruise control main switch is an automatic return type switch which turns on only while operating it in the direction of each arrow and turns off after releasing it. The internal contact point of the cruise control main switch is turned on with the switch operation. The hybrid vehicle control ECU then reads the voltage value that has been changed by the switch operation to control SET, - (COAST), RES (RESUME), + (ACCEL), and CANCEL.

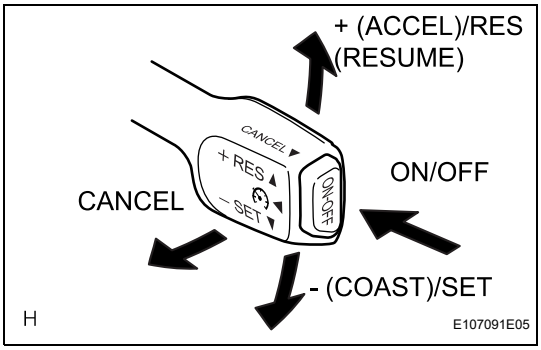
CC

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE ON INTELLIGENT TESTER



(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Check the DATA LIST for proper functioning of the cruise control main switch.

Hybrid vehicle control ECU (Cruise control):

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
MAIN SW (MAIN)	Main switch signal (Main CPU)/ ON or OFF	ON: Cruise control main switch on OFF: Cruise control main switch off	-
CANCEL SW	CANCEL switch signal/ON or OFF	ON: CANCEL switch on OFF: CANCEL switch off	-
SET / COAST SW	SET / COAST switch signal/ON or OFF	ON: - (COAST)/SET switch on OFF: - (COAST)/SET switch off	-
RES / ACC SW	RES / ACC switch signal/ON or OFF	ON: + (ACCEL)/RES (RESUME) switch on OFF: + (ACCEL)/RES (RESUME) switch off	-

OK:
When the cruise control main switch is operated, the display changes as shown above.

Result

Result	Proceed to
OK	A
NG (All items are defective)	B
NG (1 to 4 items are defective)	C

A → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page CC-12)**

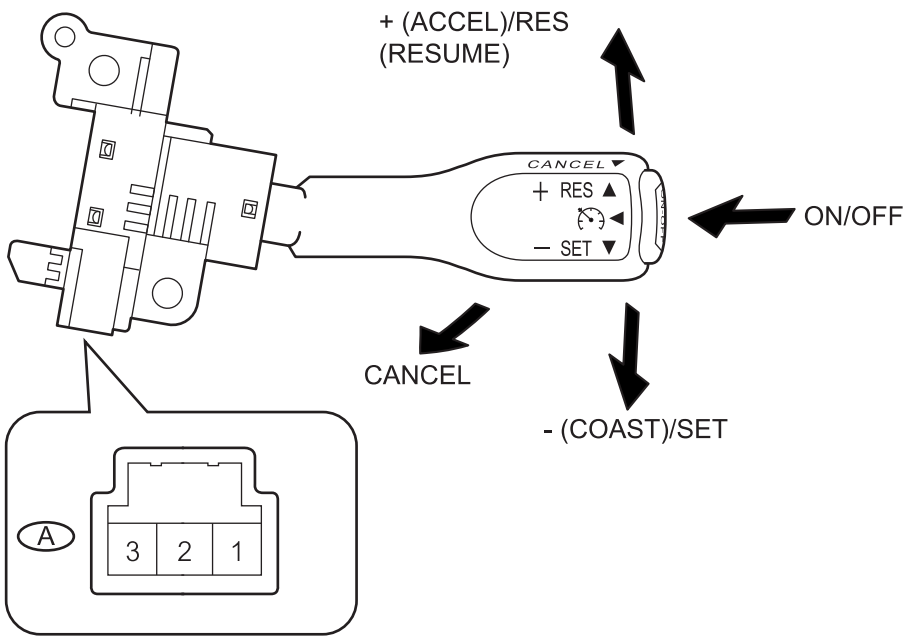
C → **REPLACE CRUISE CONTROL MAIN SWITCH (See page CC-38)**

B

2	INSPECT CRUISE CONTROL MAIN SWITCH

(a) Remove the cruise control main switch (See page CC-38).
(b) Measure the resistance according to the value(s) in the table below.

Cruise Control Main Switch:



H

E106137E06

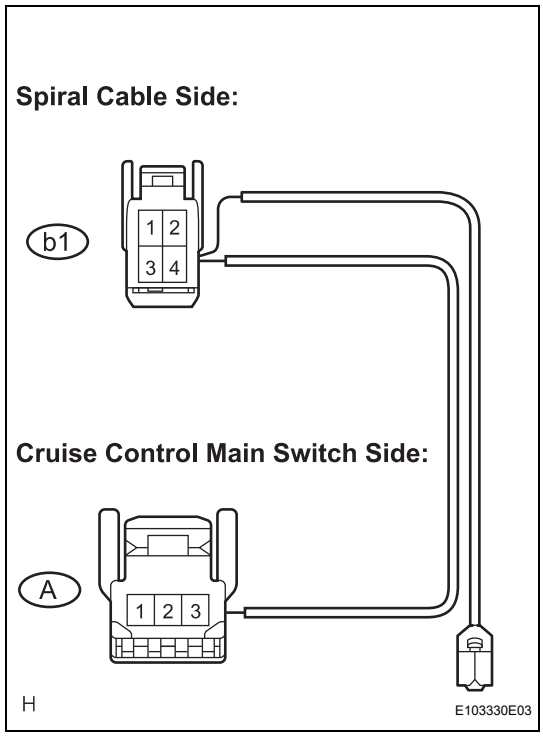
Standard resistance

Tester Connection	Switch Condition	Specified Condition
A-1 (CCS) - A-3 (ECC)	Neutral	10 kΩ or higher
	+ (ACCEL)/RES (RESUME)	216 to 264 Ω
	- (COAST)/SET	567 to 693 Ω
	CANCEL	1,386 to 1,694 Ω
	Main switch on	Below 1 Ω

NG → **REPLACE CRUISE CONTROL MAIN SWITCH (See page CC-38)**

OK

3	**CHECK HARNESS AND CONNECTOR (CRUISE CONTROL MAIN SWITCH - SPIRAL CABLE)**



(a) Disconnect the b1 connector from the spiral cable.
(b) Measure the resistance according to the value(s) in the table below.

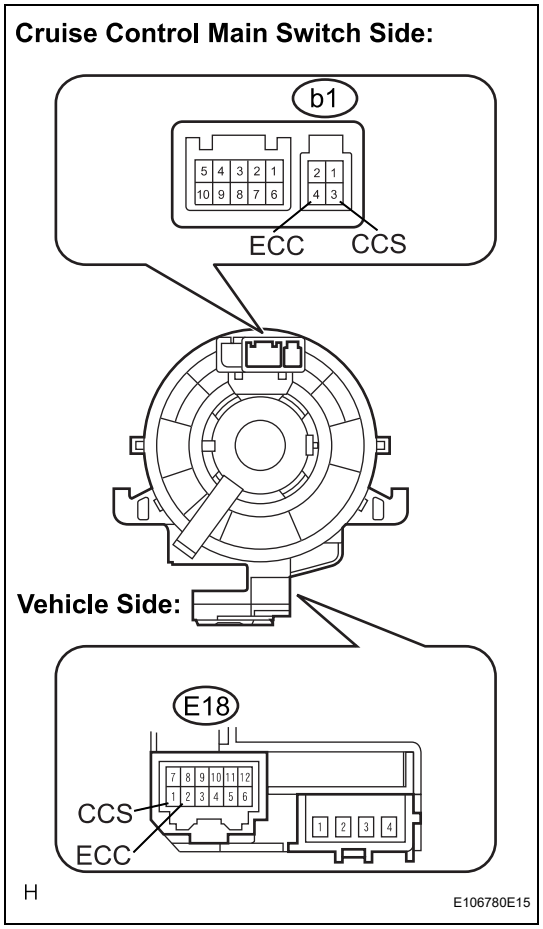
Standard resistance

Tester Connection	Specified Condition
A-1 - b1-3	Below 1 Ω
A-3 - b1-4	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	CHECK SPIRAL CABLE



NOTICE:
The spiral cable is an important part of the SRS airbag system. Incorrect removal or installation of the spiral cable may prevent the airbag from deploying. Be sure to read the pages shown in the brackets.
HINT:
- Removal (See page RS-357)
- Installation (See page RS-359)

(a) Remove the spiral cable.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

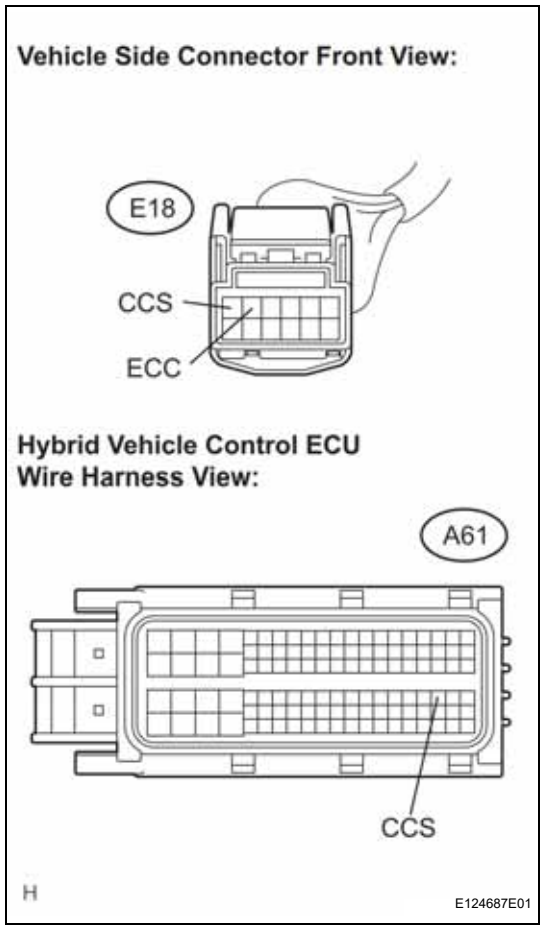
Tester Connection	Spiral Cable Position	Specified Condition
b1-3 - E18-1 (CCS)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
b1-4 - E18-2 (ECC)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	

HINT:
The spiral cable can make a maximum of approximately 5 rotations.

NG → **REPLACE SPIRAL CABLE (See page RS-357)**

OK

5	CHECK WIRE HARNESS (SPIRAL CABLE - HYBRID VEHICLE CONTROL ECU AND BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E18-1 (CCS) - A61-74 (CCS)	Always	Below 1 Ω
A61-74 (CCS) - Body ground	Always	10 kΩ or higher
E18-2 (ECC) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-570)

Cruise Main Indicator Light Circuit

DESCRIPTION

- The hybrid vehicle control ECU detects a cruise control main switch signal and sends it to the combination meter through CAN. The CRUISE main indicator light then comes on.
- The CRUISE main indicator light circuit uses CAN for communication. If there is a malfunction in this circuit, check for DTCs in the CAN communication system before troubleshooting the circuit.

INSPECTION PROCEDURE

CC

1 **PERFORM ACTIVE TEST USING INTELLIGENT TESTER**

(a) Connect the intelligent tester to the DLC3.
(b) Check the CRUISE main indicator light by performing the ACTIVE TEST.

Combination meter:

Tester Display	Test Part	Control Range	Diagnostic Note
CRUISE INDIC	CRUISE main indicator light	ON / OFF	-

OK:
Indicator light comes on/goes off.

NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-64)**

OK

2 **READ VALUE ON INTELLIGENT TESTER**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Check the DATA LIST for proper functioning of the CRUISE main indicator light.

Hybrid vehicle control ECU (Cruise control):

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
CCS INDICATOR M	Cruise indicator signal (Main CPU) / ON or OFF	ON: "CRUISE" on OFF: "CRUISE" off	-

OK:
When the cruise control main switch is operated, the display changes as shown above.

NG → **REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-570)**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page CC-12)

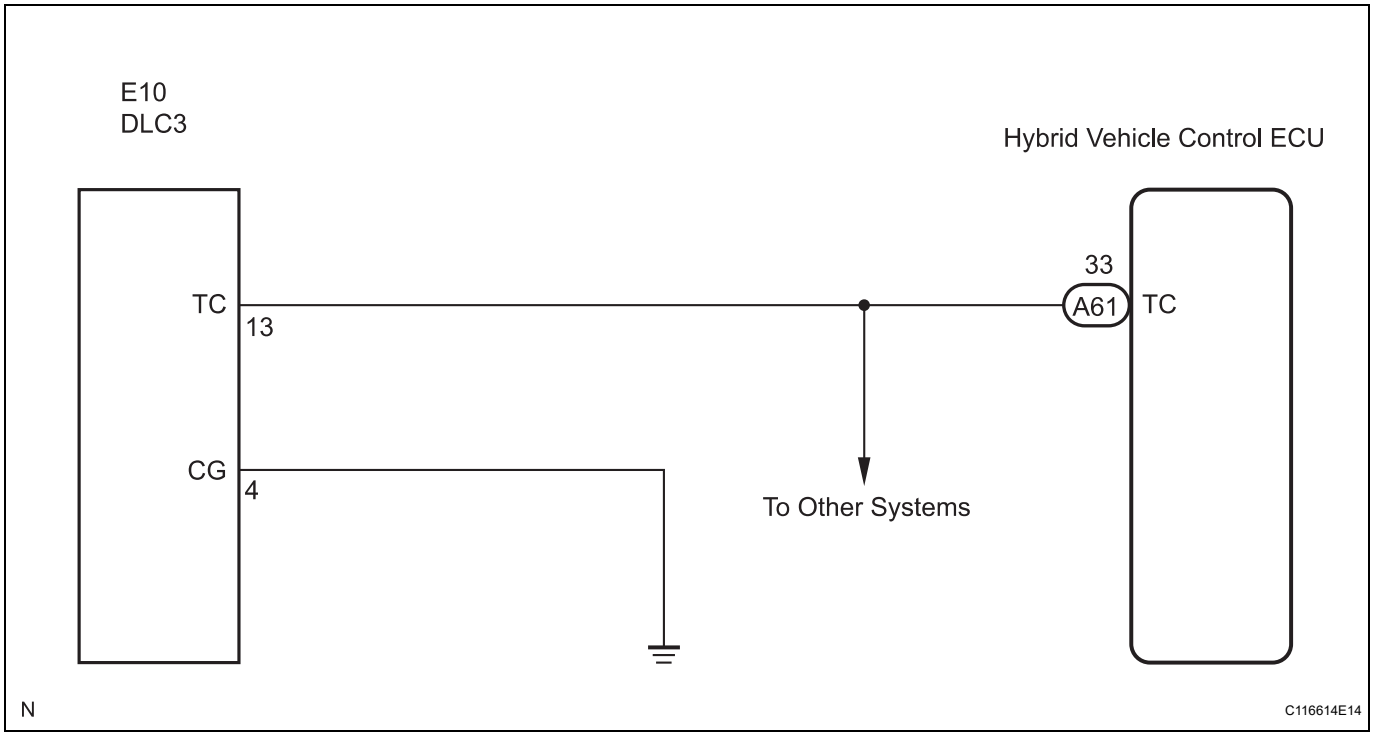
TC and CG Terminal Circuit

DESCRIPTION

Connecting terminals TC and CG of the DLC3 causes the system to enter self-diagnostic mode. If a malfunction is present, DTCs will be output.
HINT:
When a particular warning light remains blinking, either a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in the relevant ECU is possibly the cause.

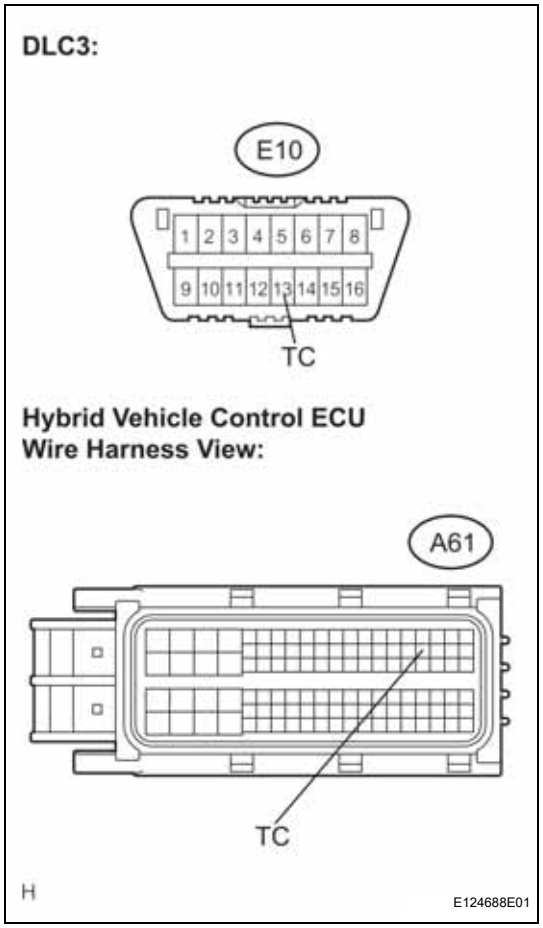
CC

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK WIRE HARNESS (TERMINAL TC of DLC3 - HYBRID VEHICLE CONTROL ECU)



(a) Disconnect the A61 connector from the hybrid vehicle control ECU.

(b) Measure the resistance according to the value(s) in the table below.

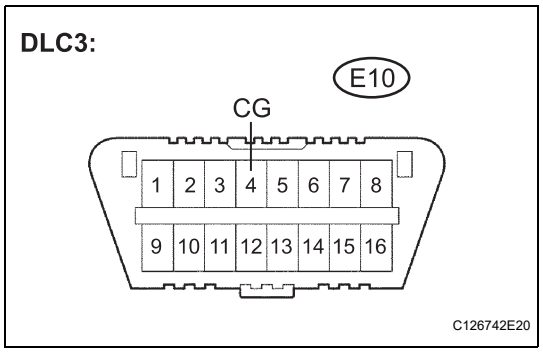
Standard resistance

Tester Connection	Condition	Specified Condition
A61-33 (TC) - E10-13 (TC)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 - HYBRID VEHICLE CONTROL ECU)**

OK

2	CHECK WIRE HARNESS (TERMINAL CG of DLC3 - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

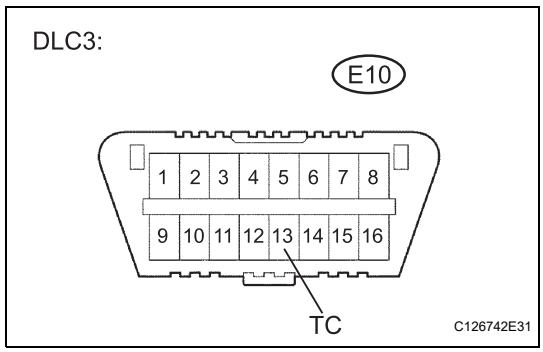
Tester connection	Condition	Specified condition
E10-4 (CG) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 - BODY GROUND)**

OK

CC

3	CHECK WIRE HARNESS (TERMINAL TC of DLC3 - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E10-13 (TC) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR OR EACH ECU**

OK

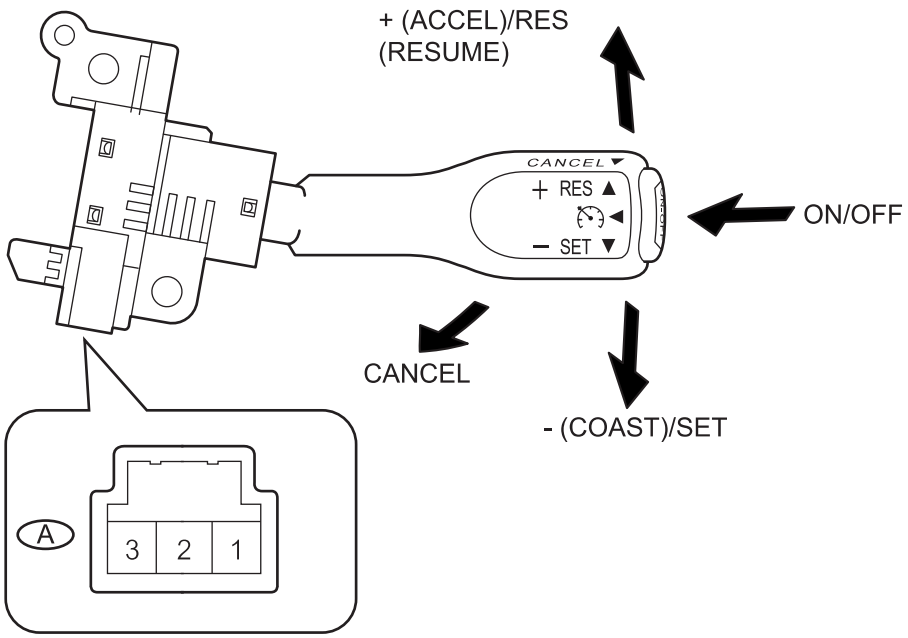
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page CC-12)

INSPECTION

1. INSPECT CRUISE CONTROL MAIN SWITCH

(a) Remove the cruise control main switch

Cruise Control Main Switch:



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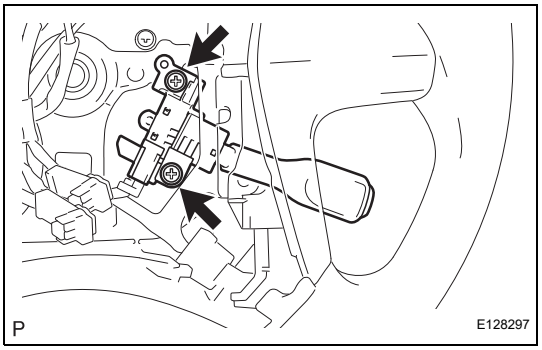
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Switch Condition	Specified Condition
A-1 (CCS) - A-3 (ECC)	Neutral	10 kΩ or higher
	+ (ACCEL)/RES (RESUME)	216 to 264Ω
	- (COAST)/SET	567 to 693Ω
	CANCEL	1,386 to 1,694Ω
	Main Switch on	Below 1Ω

If the result is not as specified, replace the cruise control main switch



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INSTALLATION

1. INSTALL CRUISE CONTROL MAIN SWITCH

(a) Install the cruise control main switch with the 2 screws.

Torque: 2.4 N*m (24 kgf*cm, 21 in.*lbf)

(b) Connect the connector.

2. INSTALL STEERING PAD (See page RS-346)

3. INSTALL LOWER NO. 2 STEERING WHEEL COVER (See page RS-347)

4. INSTALL LOWER NO. 3 STEERING WHEEL COVER (See page RS-347)

5. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

6. **INSPECT SRS WARNING LIGHT**
(See page RS-33)

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the lighting system.
- *: Use the intelligent tester.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK

NEXT

3	INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

4	INSPECT CAN COMMUNICATION SYSTEM*

(a) Use the intelligent tester to check if the CAN communication system is functioning normally.

Result

Result	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **Go to step 8**

A

5	CHECK FOR DTC*

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B → **Go to step 8**

A

6	PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B → Go to step 8

A

7	OVERALL ANALYSIS AND TROUBLESHOOTING*

(a) Data List / Active Test (See page LI-20)
(b) Terminals of ECU (See page LI-16)

NEXT

8	ADJUST, REPAIR OR REPLACE

NEXT

9	CONFIRMATION TEST

NEXT

END

CUSTOMIZE PARAMETERS

HINT:
The followings are the possible items to be customized.
NOTICE:

- **Before attempting to customize vehicle settings, confirm whether it is possible to make the change that the customer has requested.**
- **Be sure to record the current value before customizing.**
- **In case of performing the troubleshooting, pay attention because there is a possibility that the function has been disabled by customizing. (Example: In case of the symptom in which "The wireless operation does not function", check that the wireless operation has not been disabled by customizing, then perform the troubleshooting.)**

ILLUMINATED ENTRY:

Display	Default	Contents	Setting
LIGHTING TIME	15 s	Changes the lighting time of the interior light and power switch illumination.	7.5 s / 15 s / 30 s
I/L ON / UNLOCK	ON	Lights up the interior light and power switch illumination when a door is unlocked.	ON / OFF
I/L ON / ACC OFF	ON	Lights up the interior light and power switch illumination when the power switch is turned from on (ACC) to off	ON / OFF

LIGHT CONTROL:

Display	Default	Contents	Setting
LIGHT OFF DELAY	30 s	Keeps the headlights on for a certain period of time after turning the power switch off and closing all the doors with the headlights on.	OFF / 30 s / 60 s / 90 s
SENSITIVITY	NORMAL	Adjusts the sensitivity of the automatic light control system. *1	LIGHT 2 / LIGHT 1 / NORMAL / DARK 1 / DARK 2
DRL FUNCTION	ON	ON / OFF of the DRL function (for U.S.A package models)	ON / OFF
DISP EX ON SEN	NORMAL	Changes the ambient brightness level required to dim the lights such as the indicator lights of the combination meter, A/C indicator light, and clock. *1	LIGHT 2 / LIGHT 1 / NORMAL / DARK 1 / DARK 2
DISP EX OFF SEN	NORMAL	Changes the ambient brightness level required to cancel the dimming of the lights such as the indicator lights of the combination meter, A/C indicator light, and clock.	LIGHT 2 / LIGHT 1 / NORMAL / DARK 1 / DARK 2

HINT:
Sensitivity adjustment can hardly be confirmed. Check by driving the customer's vehicle.

Illustration *1

Ambient Brightness Level	Dark ◄——————————► Bright

Setting	DARK2	DARK1	NORMAL	LIGHT1	LIGHT2

PROBLEM SYMPTOMS TABLE

1. Headlight system:

Symptom	Suspected Area	See page
One side LO-beam headlight does not illuminate	1. H-LP RL fuse or H-LP LL fuse	-
	2. Bulb	-
	3. Harness or connector	-
	4. Power distributor (Engine room J/B)	-
Both left and right LO-beam headlights do not illuminate	1. H-LP RL fuse and H-LP LL fuse	-
	2. Bulb	-
	3. Light control switch circuit	LI-38
	4. Headlight relay circuit	LI-26
	5. Main body ECU (Instrument panel J/B)	-
One side HI-beam headlight does not illuminate	1. H-LP RH fuse or H-LP LH fuse	-
	2. Bulb	-
	3. Harness or connector	-
	4. Power distributor (Engine room J/B)	-
Both left and right HI-beam headlights do not illuminate	1. H-LP RH fuse and H-LP LH fuse	-
	2. Bulb	-
	3. Light control switch circuit	LI-38
	4. Headlight (HI-BEAM) circuit	LI-30
	5. Main body ECU (Instrument panel J/B)	-
"Flash" headlights do not illuminate	1. Light control switch circuit	LI-38
	2. Main body ECU (Instrument panel J/B)	-
LO-beam headlights or HI-beam headlights do not go off	1. Headlight dimmer switch assembly	LI-96
	2. Power distributor (Engine room J/B)	-
	3. Harness or connector	-
	4. Main body ECU (Instrument panel J/B)	-

2. Daytime running light system:

Symptom	Suspected Area	See page
Day time running light system does not operate	1. Light control switch circuit	LI-38
	2. Parking brake switch circuit	LI-52
	3. Power distributor (Engine room J/B)	-
	4. Main body ECU (Instrument panel J/B)	-
	5. ECM	-

3. Taillight system:

Symptom	Suspected Area	See page
Front parking light does not illuminate	1. Bulb	-
	2. Harness or connector	-
Rear taillight does not illuminate	1. Rear combination light assembly	-
	2. Harness or connector	-
License plate light does not illuminate	1. Bulb	-
	2. Harness or connector	-
Front side marker light does not illuminate	1. Bulb	-
	2. Harness or connector	-
Taillight system does not operate (Taillights, front side marker lights, parking lights, and license plate lights do not illuminate)	1. TAIL fuse	-
	2. Taillight relay	LI-116
	3. Light control switch circuit	LI-38
	4. Taillight relay circuit	LI-54
	5. Main body ECU (Instrument panel J/B)	-

4. Stop light system:

Symptom	Suspected Area	See page
Stop light system does not operate	1. Stop fuse	-
	2. Stop light switch	LI-102
	3. Harness or connector	-
One side stop light does not illuminate	1. Rear combination light assembly	-
	2. Harness or connector	-
Hi-mounted stop light does not illuminate	1. High mounted stop light assembly	-
	2. Harness or connector	-

5. Turn signal and hazard warning system:

Symptom	Suspected Area	See page
Hazard warning lights do not operate (Turn signal lights are normal)	1. HAZ fuse	-
	2. Hazard warning signal switch	LI-100
	3. Clock assembly	OT-4
	4. Turn signal flasher assembly	LI-113
	5. Harness or connector	-
Turn signal lights do not operate (Hazard warning lights are normal)	1. GAUGE No. 1 fuse	-
	2. Headlight dimmer switch assembly (Turn signal switch)	LI-96
	3. Turn signal flasher assembly	LI-113
	4. Harness or connector	-
"Hazard" and "Turn" do not operate	1. HAZ fuse and GAUGE No. 1 fuse	-
	2. Bulb	-
	3. Turn signal flasher assembly	LI-113
	4. Hazard warning signal switch	LI-100
	5. Headlight dimmer switch assembly (Turn signal switch)	LI-96
	6. Clock assembly	OT-4
	7. Harness or connector	-
Turn signal lights do not operate in one direction	1. Headlight dimmer switch assembly (Turn signal switch)	LI-96
	2. Turn signal flasher assembly	LI-113
	3. Harness or connector	-
Only one bulb does not operate	1. Bulb	-
	2. Harness or connector	-

6. Buck-up light system:

Symptom	Suspected Area	See page
One side back-up light does not illuminate	1. Bulb	-
	2. Harness or connector	-
Both left and right back-up lights do not illuminate	1. Bulb	-
	2. GAUGE No. 1 fuse	-
	3. Buck-up light relay	LI-117
	4. Back-up light circuit	LI-35
	5. Park/Neutral position switch	HX-5
	6. Harness or connector	-
	7. Hybrid vehicle control ECU	-

7. Illuminated entry system:

Symptom	Suspected Area	See page
Only interior light installed in personal light assembly does not illuminate	1. Bulb	-
	2. Personal light assembly	LI-84
	3. Harness or connector	-

Symptom	Suspected Area	See page
Only interior light installed in rear room light assembly does not illuminate	1. Bulb	-
	2. Rear room light assembly	LI-87
	3. Harness or connector	-
Only power switch illumination does not comes on	1. Power switch illumination circuit	LI-50
	2. Harness or connector	-
Interior light and power switch illumination do not operate normally	1. DOME fuse	-
	2. Personal light assembly	LI-84
	3. Rear room light assembly	LI-87
	4. Power switch	ST-127
	5. Door courtesy switch circuit	LI-41
	6. Door lock position switch circuit	LI-44
	7. Interior light circuit	LI-46
	8. Power switch illumination circuit	LI-50
	9. Main body ECU (Instrument panel J/B)	-

8. Vanity light system:

Symptom	Suspected Area	See page
Vanity light does not illuminate	1. Bulb	-
	2. Vanity light assembly	LI-93
	3. Visor assembly (Vanity light switch)	-
	4. Harness or connector	-

9. Luggage compartment light system:

Symptom	Suspected Area	See page
Luggage compartment light does not illuminate	1. Luggage compartment light	LI-90
	2. Luggage compartment door lock assembly (Door courtesy switch)	LI-109
	3. Harness or connector	-

10. Glove box light system:

Symptom	Suspected Area	See page
Glove box light does not illuminate	1. Bulb	-
	2. Glove box light assembly	LI-92
	3. Harness or connector	-

11. Door courtesy light system:

Symptom	Suspected Area	See page
Door courtesy light does not illuminate	1. Door courtesy light	LI-88
	2. Door courtesy switch	LI-105
	3. Harness or connector	-

13. Automatic light control system:

Symptom	Suspected Area	See page
Automatic light control system does not operate normally	1. Light control switch circuit	LI-38
	2. Automatic light control sensor circuit	LI-23
	3. Main body ECU (Instrument panel J/B)	-

14. Light auto turn off system:

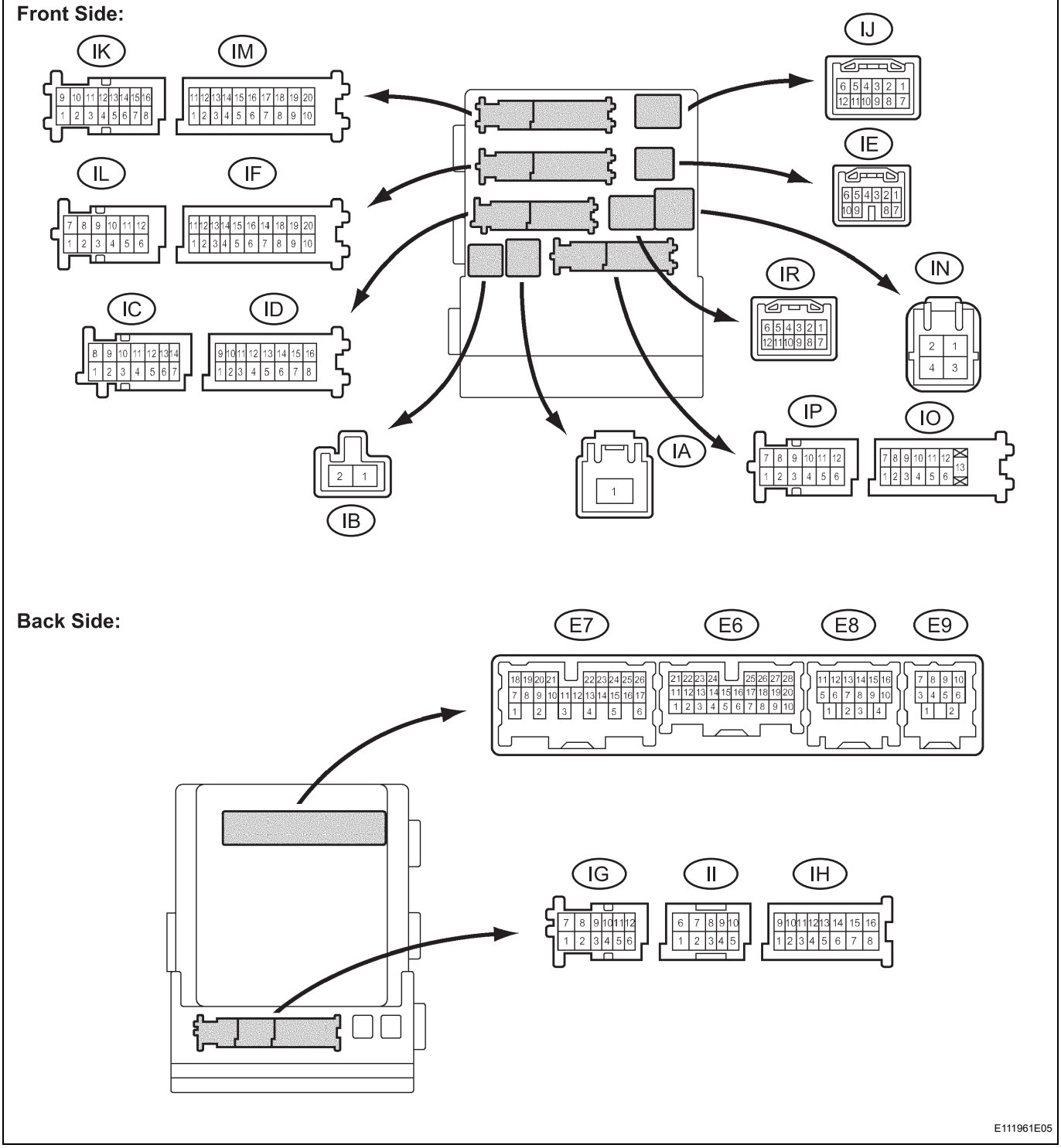
Symptom	Suspected Area	See page
Light auto turn off system does not operate normally	1. Light control switch circuit	LI-38
	2. Door courtesy switch circuit	LI-41
	3. Main body ECU (Instrument panel J/B)	-

15. Battery saving system:

Symptom	Suspected Area	See page
Battery saving function does not operate	1. Door courtesy switch circuit	LI-41
	2. Main body ECU (Instrument panel J/B)	-

TERMINALS OF ECU

1. CHECK MAIN BODY ECU (INSTRUMENT PANEL J/B)



(a) Disconnect the IA, ID, IF and IM J/B connectors.
(b) Measure the voltage and resistance between the specified terminals of the wire harness side connectors and body ground.

Standard voltage

Symbols	Wiring Color	Terminal Description	Condition	Specified Condition
IA-1 - Body ground	B - Body ground	Battery power supply	Always	10 to 14 V

Symbols	Wiring Color	Terminal Description	Condition	Specified Condition
ALTB (ID-16) - Body ground	W - Body ground	Power supply	Always	10 to 14 V

Standard resistance

Symbols	Wiring Color	Terminal Description	Condition	Specified Condition
GND1 (IF-10) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
GND2 (IM-9) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the IA, ID, IF, and IM J/B connectors.

(d) Measure the resistance and voltage between the specified terminals of the J/B connectors and body ground.

Standard resistance

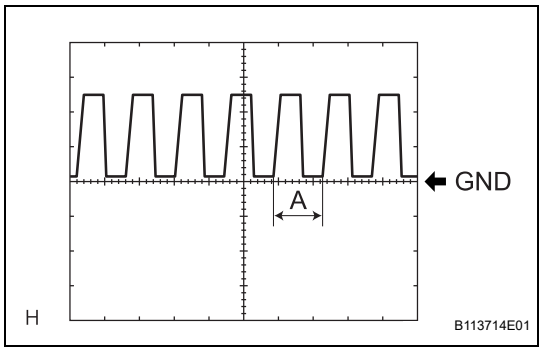
Symbols	Wiring Color	Terminal Description	Condition	Specified Condition
CLTE (E6-18) - Body ground	BR - Body ground	Automatic light control sensor ground	Always	Below 1 Ω

Standard voltage

Symbols	Wiring Color	Terminal Description	Condition	Specified Condition
PKB (IC-14) - Body ground	L - Body ground	Parking brake switch input	Parking brake switch ON	Below 1 V
			Parking brake switch OFF	10 to 14 V
HRLY (ID-3) - Body ground	P - Body ground	Headlight relay drive output	Light control switch in HEAD	Below 1 V
			Light control switch not in HEAD	10 to 14 V
DRL (ID-9) - Body ground	V - Body ground	High beam headlights drive output	Dimmer switch in HIGH or HIGH FLASH	Below 1 V
			Dimmer switch in LOW	10 to 14 V
HU (IG-5) - Body ground	LG - Body ground	Dimmer switch HIGH input	Dimmer switch in HIGH or HIGH FLASH	10 to 14 V
			Dimmer switch in LOW	Below 1 V
ILE (IR-5) - Body ground	BR - Body ground	Interior light drive output	Interior light ON	Below 1 V
			Interior light OFF	10 to 14 V
LCTY (IO-7) - Body ground	LG - Body ground	Rear left door courtesy switch input	Rear left door open	Below 1 V
			Rear left door closed	10 to 14 V
LSWL (IP-5) - Body ground	GR - Body ground	Rear left door lock position switch input	Rear left door locked	10 to 14 V
			Rear left door unlocked	Below 1 V
HEAD (E6-17) - Body ground	P - Body ground	Light control switch HEAD input	Light control switch in HEAD	Below 1 V
			Light control switch not in HEAD	10 to 14 V
CLTS (E6-19) - Body ground	G - Body ground	Automatic light control sensor signal input	Power switch off	Below 1 V
			Automatic light control system operates	Pulse generation (See waveform 1)
CLTB (E6-20) - Body ground	B - Body ground	Automatic light control sensor power supply output	Power switch off	Below 1 V
			Power switch on (IG) and light control switch in AUTO	10 to 14 V

Symbols	Wiring Color	Terminal Description	Condition	Specified Condition
PCTY (E6-21) - Body ground	Y - Body ground	Passenger side door courtesy switch input	Passenger side door open	Below 1 V
			Passenger side door closed	10 to 14 V
LGCY (E6-25) - Body ground	W - Body ground	Luggage courtesy switch input	Luggage compartment door open	Below 1 V
			Luggage compartment door closed	10 to 14 V
LSWP (E6-27) - Body ground	LG - Body ground	Passenger side door lock position switch input	Passenger side door locked	10 to 14 V
			Passenger side door unlocked	Below 1 V
LSWR (E6-5) - Body ground	V - Body ground	Rear right door lock position switch input	Rear right door locked	10 to 14 V
			Rear right door unlocked	Below 1 V
RCTY (E6-7) - Body ground	GR - Body ground	Rear right door courtesy switch input	Rear right door open	Below 1 V
			Rear right door closed	10 to 14 V
HF (E7-13) - Body ground	R - Body ground	Dimmer switch HIGH FLASH signal input	Dimmer switch in HIGH FLASH position	Below 1 V
			Dimmer switch not in HIGH FLASH position	10 to 14 V
SSW2 (E7-16) - Body ground	V - Body ground	Power switch input	Power switch not pushed	10 to 14 V
			Power switch pushed	Below 1 V
SSW1 (E7-17) - Body ground	L - Body ground	Power switch input	Power switch not pushed	10 to 14 V
			Power switch pushed	Below 1 V
A (E7-21) - Body ground	G - Body ground	Light control switch AUTO signal input	Light control switch in AUTO	Below 1 V
			Light control switch not in AUTO	10 to 14 V
ACCD (E7-22) - Body ground	W - Body ground	Accessory relay drive output	Power switch on (ACC)	Below 1 V
			Power switch off	10 to 14 V
TAIL (E7-23) - Body ground	B - Body ground	Light control switch TAIL signal input	Light control switch in TAIL or HEAD	Below 1 V
			Light control switch in neither TAIL nor HEAD	10 to 14 V
DCTY (E7-24) - Body ground	L - Body ground	Driver side door courtesy switch input	Driver side door open	Below 1 V
			Driver side door closed	10 to 14 V
IG1D (E7-3) - Body ground	P - Body ground	Ignition 1 relay drive output	Power switch on (IG)	Below 1 V
			Power switch off	10 to 14 V
LSWD (E7-9) - Body ground	L - Body ground	Driver side door lock position switch input	Driver side door locked	10 to 14 V
			Driver side door unlocked	Below 1 V
CANH (E8-5) - Body ground	B - Body ground	Control system CAN communication	Power switch on (IG)	Pulse generation
			Power switch off	Below 1 V
CANL (E8-6) - Body ground	W - Body ground	Control system CAN communication	Power switch on (IG)	Pulse generation
			Power switch off	Below 1 V

If the result is not as specified, the main body ECU (Instrument panel J/B) may have a malfunction.



(1) Waveform 1

Item	Contents
Tool setting	5 V/DIV., 5 ms./DIV.

HINT:
If the ambient light becomes brighter, width A becomes narrower.

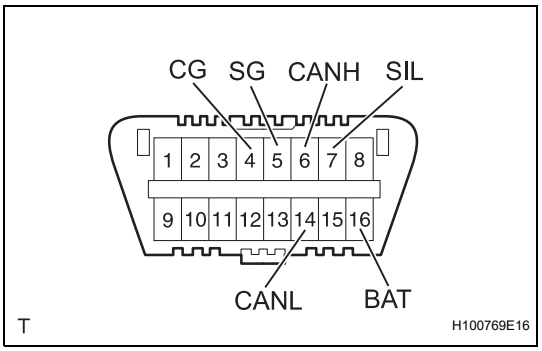
DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) Lighting system data and the Diagnostic Trouble Codes (DTCs) can be read from the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the intelligent tester to check for malfunctions and perform repairs.

2. CHECK DLC3

(a) The ECU uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

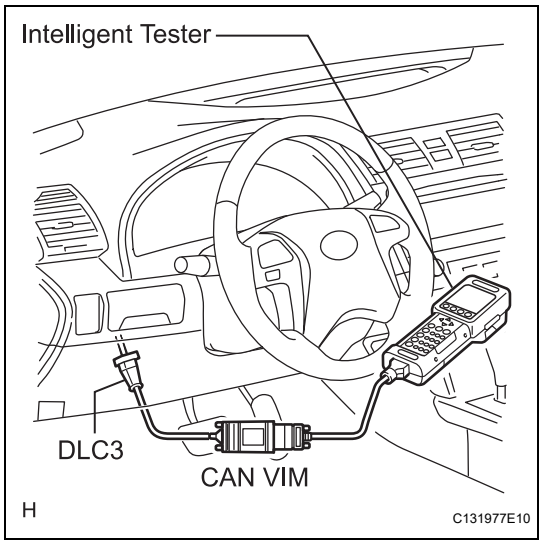


Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	CAN bus line	Power switch off*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Power switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Power switch off*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Power switch off*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Power switch off*	6 kΩ or higher

NOTICE:

***Before measuring the resistance, leave the vehicle as is for at least 1minute and do not operate the ignition switch, any other switches, or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.



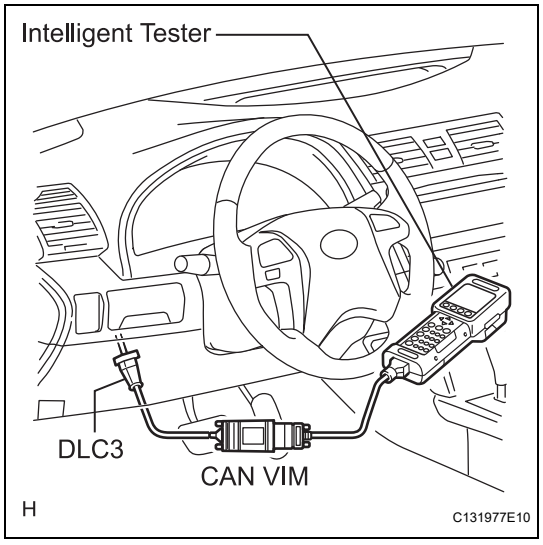
(b) Connect the cable of the intelligent tester to the DLC3, turn the power switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.
HINT:
- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

3. INSPECT BATTERY VOLTAGE

Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding.



DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Read the DTCs by following the directions on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

2. CLEAR DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Erase the DTCs by following the directions on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

LI

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester DATA LIST allows switch, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Read the DATA LIST according to the display on the tester.

MAIN BODY (MAIN BODY ECU):

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
ACC SW	Power switch ACC signal / ON or OFF	ON: Power switch on (ACC or IG) OFF: Power switch off	-
IG SW	Power switch IG signal / ON or OFF	ON: Power switch on (IG) OFF: Power switch off	-
D DOR CTY SW	Driver side door courtesy switch signal / ON or OFF	ON: Driver side door is open OFF: Driver side door is closed	-
P DOR CTY SW	Passenger side door courtesy switch signal / ON or OFF	ON: Front passenger side door is open OFF: Front passenger side door is closed	-
RR DOR CTY SW	Rear right door courtesy switch signal / ON or OFF	ON: Rear right door is open OFF: Rear right door is closed	-
RL DOR CTY SW	Rear left door courtesy switch signal / ON or OFF	ON: Rear left door is open OFF: Rear left door is closed	-
D LOCK POS SW	Driver side door lock position switch signal / ON or OFF	ON: Driver side door is unlocked OFF: Driver side door is locked	-
P LOCK POS SW	Passenger side door lock position switch signal / ON or OFF	ON: Front passenger side door is unlocked OFF: Front passenger side door is locked	-
RR LOCK POS SW	Rear right door lock position switch signal / ON or OFF	ON: Rear right door is unlocked OFF: Rear right door is locked	-
RL. LOCK POS SW	Rear left door lock position switch signal / ON or OFF	ON: Rear left door is unlocked OFF: Rear left door is locked	-
DIMMER SW	Dimmer switch HIGH signal / ON or OFF	ON: Dimmer switch in HIGH or HIGH FLASH OFF: Dimmer switch in LOW	-
HIGH FLASHER SW	Dimmer switch HIGH FLASH signal / ON or OFF	ON: Dimmer switch in HIGH FLASH OFF: Dimmer switch not in HIGH FLASH	-
AUTO LIGHT SW	Light control switch AUTO signal / ON or OFF	ON: Light control switch in AUTO OFF: Light control switch not in AUTO	-
HEAD LIGHT SW	Light control switch HEAD signal / ON or OFF	ON: Light control switch in HEAD OFF: Light control switch not in HEAD	-
TAIL LIGHT SW	Light control switch TAIL signal / ON or OFF	ON: Light control switch in TAIL or HEAD OFF: Light control switch not in TAIL or HEAD	-
ILLUMINATE RATE	Illumination rate information / 0 ms to 99.99 ms	0.8 ms to 22.0 ms (Value is output according to ambient illuminance)	-
PARKING BRAKE SW	Parking brake switch signal / ON or OFF	ON: Parking brake switch is ON OFF: Parking brake switch is OFF	-

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester ACTIVE TEST allows a relay, VSV, actuator, and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Perform the ACTIVE TEST according to the display on the tester.

MAIN BODY (MAIN BODY ECU):

Tester Display	Test Part	Control Range	Diagnostic Note
HEAD LIGHT	Headlight relay	ON / OFF	-
HEAD LIGHT (HI)	High beam headlights	ON / OFF	-
TAIL LIGHT	Taillight	ON / OFF	-
DIMMER SIG	Dimmer signal	ON / OFF	-
ILLUMI OUTPUT	Interior light (Interior light switch in DOOR position and all doors are closed)	ON / OFF	-

DIAGNOSTIC TROUBLE CODE CHART

LIGHTING SYSTEM:

DTC Code	Detection Item	Suspected Area	See page
B1244	Light Sensor Circuit Malfunction	1. Automatic light control sensor 2. Harness or connector 3. Main body ECU (Instrument panel J/B)	LI-23

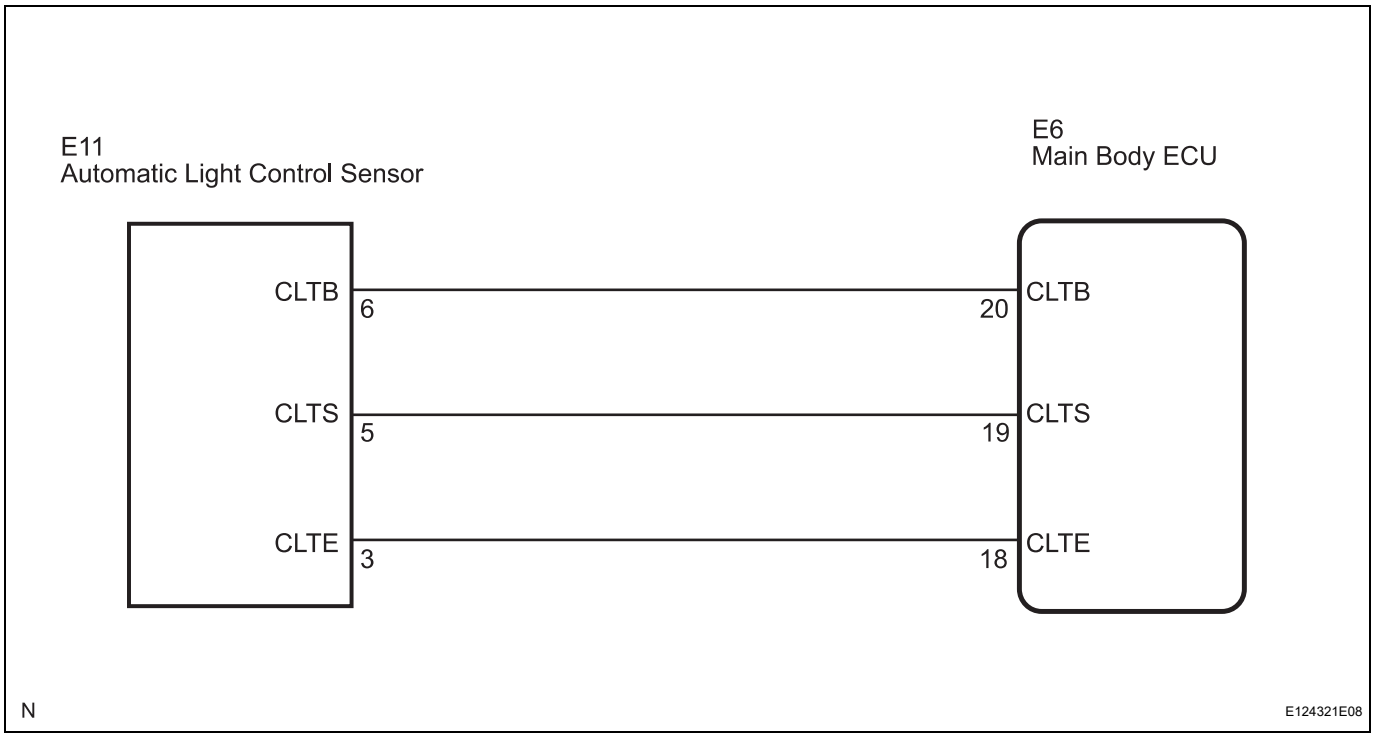
DTC	B1244	Light Sensor Circuit Malfunction

DESCRIPTION

The automatic light control sensor detects ambient light, converts it into an electrical signal, and outputs it to the main body ECU. The main body ECU turns on or off the headlights and taillights according to the signal.

DTC No.	DTC Detecting Condition	Trouble Area
B1244	• Malfunction in automatic light control sensor • Open or short in automatic light control sensor circuit	• Automatic light control sensor • Harness or connector • Main body ECU (Instrument panel J/B)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

MAIN BODY (MAIN BODY ECU):

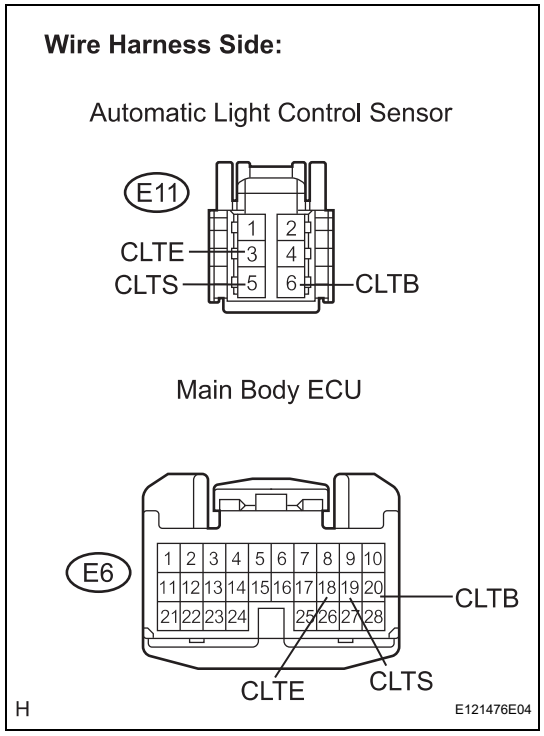
Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
ILLUMINATE RATE	Illumination rate information / 0 ms to 99.99 ms	0.8 ms to 22.0 ms (Value is output according to ambient illuminance)	-

OK:
Normal condition listed above is displayed.

OK → REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

NG

2 CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - AUTOMATIC LIGHT CONTROL SENSOR)



(a) Disconnect the E11 automatic light control sensor connector.
(b) Disconnect the E6 main body ECU connector.

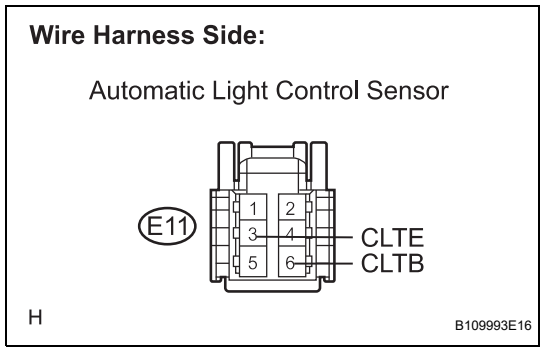
Standard resistance

Tester Connection	Condition	Specified Condition
E6-18 (CLTE) - E11-3 (CLTE)	Always	Below 1 Ω
E6-19 (CLTS) - E11-5 (CLTS)	Always	Below 1 Ω
E6-20 (CLTB) - E11-6 (CLTB)	Always	Below 1 Ω
E6-18 (CLTE) - Body ground	Always	10 kΩ or higher
E6-19 (CLTS) - Body ground	Always	10 kΩ or higher
E6-20 (CLTB) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 INSPECT MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY)



(a) Reconnect the main body ECU connector.
(b) Measure the voltage and resistance according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E11-6 (CLTB) - E11-3 (CLTE)	Power switch off	Below 1 V
E11-6 (CLTB) - E11-3 (CLTE)	Power switch on (IG)	10 to 14 V

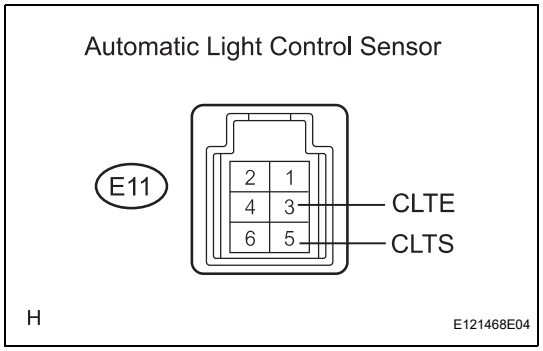
Standard resistance

Tester Connection	Condition	Specified Condition
E11-3 (CLTE) - Body ground	Always	Below 1 Ω

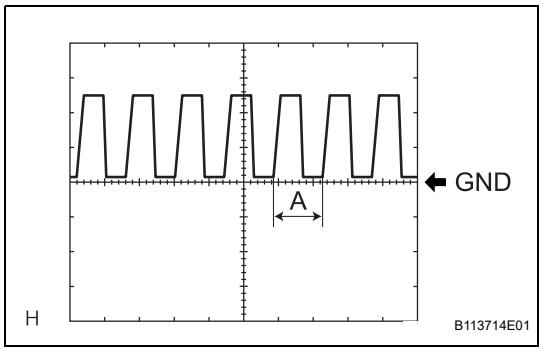
NG → REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

OK

4	INSPECT AUTOMATIC LIGHT CONTROL SENSOR



(a) Reconnect the automatic light control sensor connector.
(b) Connect an oscilloscope to the automatic light control sensor connector.



(c) Check the waveform.
OK

Tester Connection	Tool Setting	Condition	Specified Condition
E11-3 (CLTE) - E11-5 (CLTS)	5 V/DIV., 5 ms./ DIV.	Power switch on (IG), light control switch in AUTO	Correct waveform is as shown

HINT:
If the ambient light becomes brighter, width A becomes narrower.

NG → **REPLACE AUTOMATIC LIGHT CONTROL SENSOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

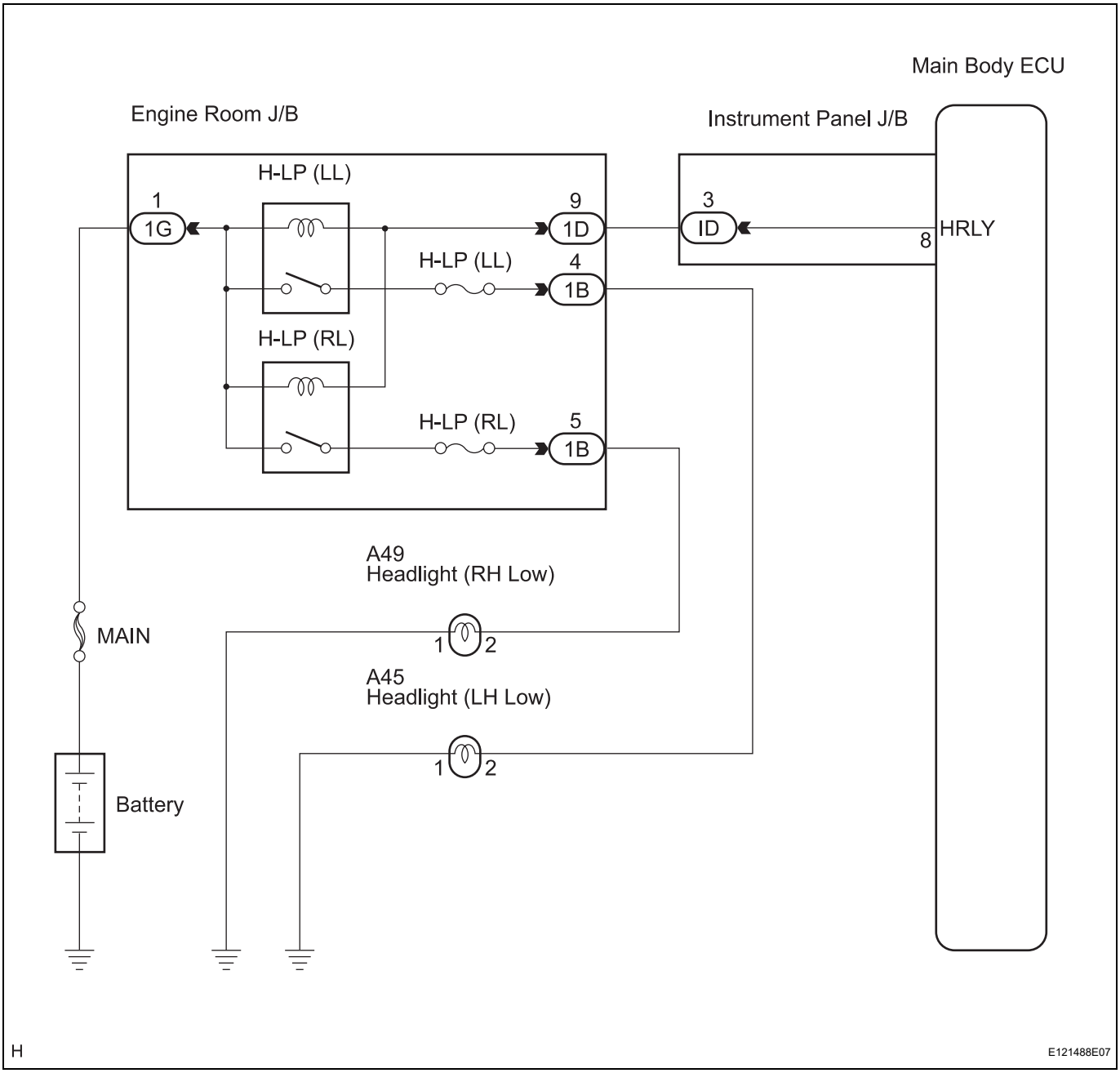
LI

Headlight Relay Circuit

DESCRIPTION

The main body ECU receives a light control switch HEAD signal from the headlight dimmer switch assembly, and turns the low beam headlights on. The headlight relay is installed in the power distributor (engine room J/B assembly).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST USING INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Select the item below in the ACTIVE TEST and then check that the relay operates.

MAIN BODY (MAIN BODY ECU):

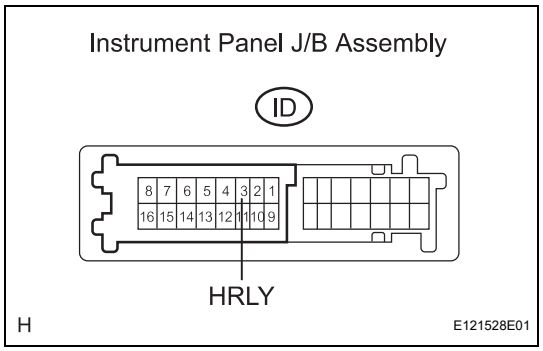
Tester Display	Test Part	Control Range	Diagnostic Note
HEAD RELAY	Headlight Relay	ON / OFF	-

OK:
The headlight relay operates. (Low beam headlights illuminate.)

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

2 INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY



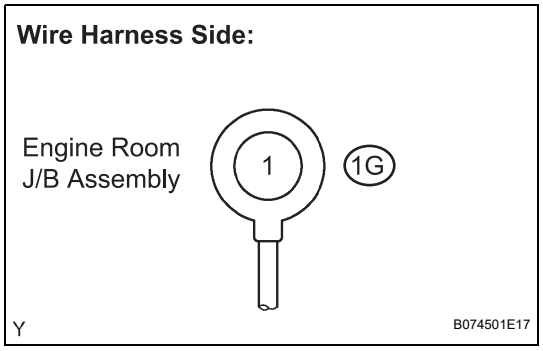
(a) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
ID-3 (HRLY) - Body ground	Light control switch OFF → HEAD	10 to 14 V → Below 1 V

OK → **Go to step 6**

NG

3 CHECK HARNESS AND CONNECTOR (BATTERY - ENGINE ROOM J/B ASSEMBLY)



(a) Disconnect the 1G engine room J/B assembly connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

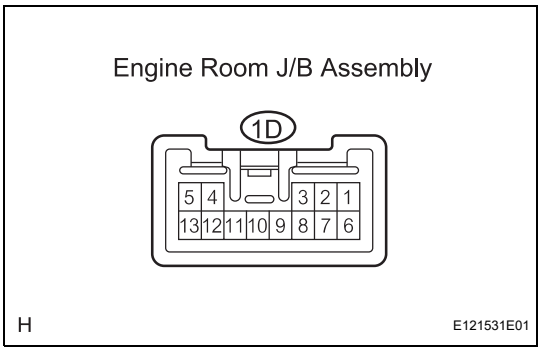
Tester Connector	Condition	Specified Condition
1G - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 INSPECT ENGINE ROOM J/B BLOCK ASSEMBLY

(a) Reconnect the 1G engine room J/B assembly connector.



(b) Disconnect the 1D engine room J/B assembly connector.
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

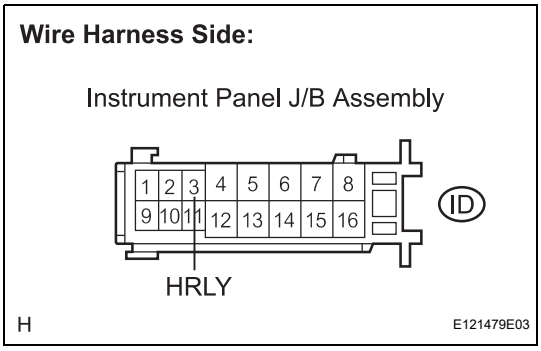
Tester Connection	Condition	Specified Condition
1D-9 - Body ground	Always	10 to 14 V

NG → **REPLACE ENGINE ROOM JUNCTION BLOCK ASSEMBLY (POWER DISTRIBUTOR)**

LI

OK

5	CHECK HARNESS AND CONNECTOR (ENGINE ROOM J/B ASSEMBLY - INSTRUMENT PANEL J/B ASSEMBLY)



(a) Reconnect the 1D engine room J/B assembly connector.
(b) Disconnect the ID instrument panel J/B assembly connector.
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

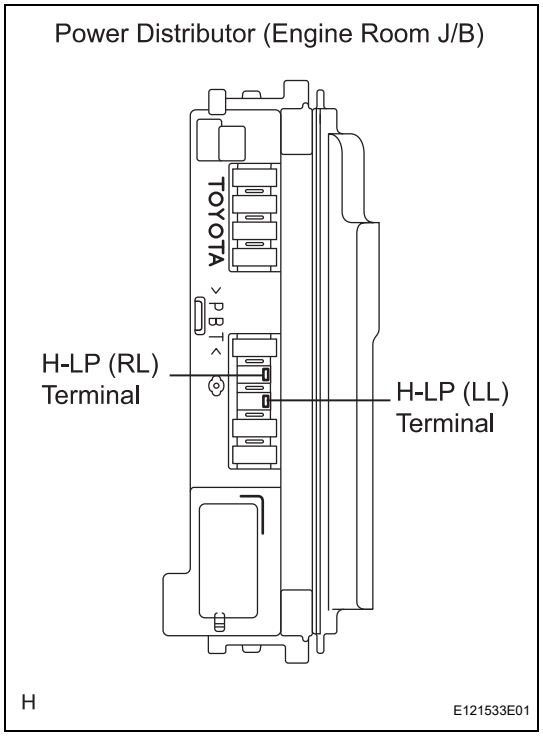
Tester Connection	Condition	Specified Condition
ID-3 (HRLY) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

6	INSPECT ENGINE ROOM JUNCTION BLOCK ASSEMBLY



(a) Remove the H-LP (RL) fuse and H-LP (LL) fuse from the engine room J/B assembly.
(b) Measure the voltage between the loading slot of each fuse and body ground.

Standard voltage

Tester Connection	Condition	Specified Condition
H-LP (RL) Terminal - Body ground	Light control switch in HEAD	10 to 14 V
H-LP (LL) Terminal - Body ground	Light control switch in HEAD	10 to 14 V

NG → **REPLACE ENGINE ROOM JUNCTION BLOCK ASSEMBLY (POWER DISTRIBUTOR)**

OK

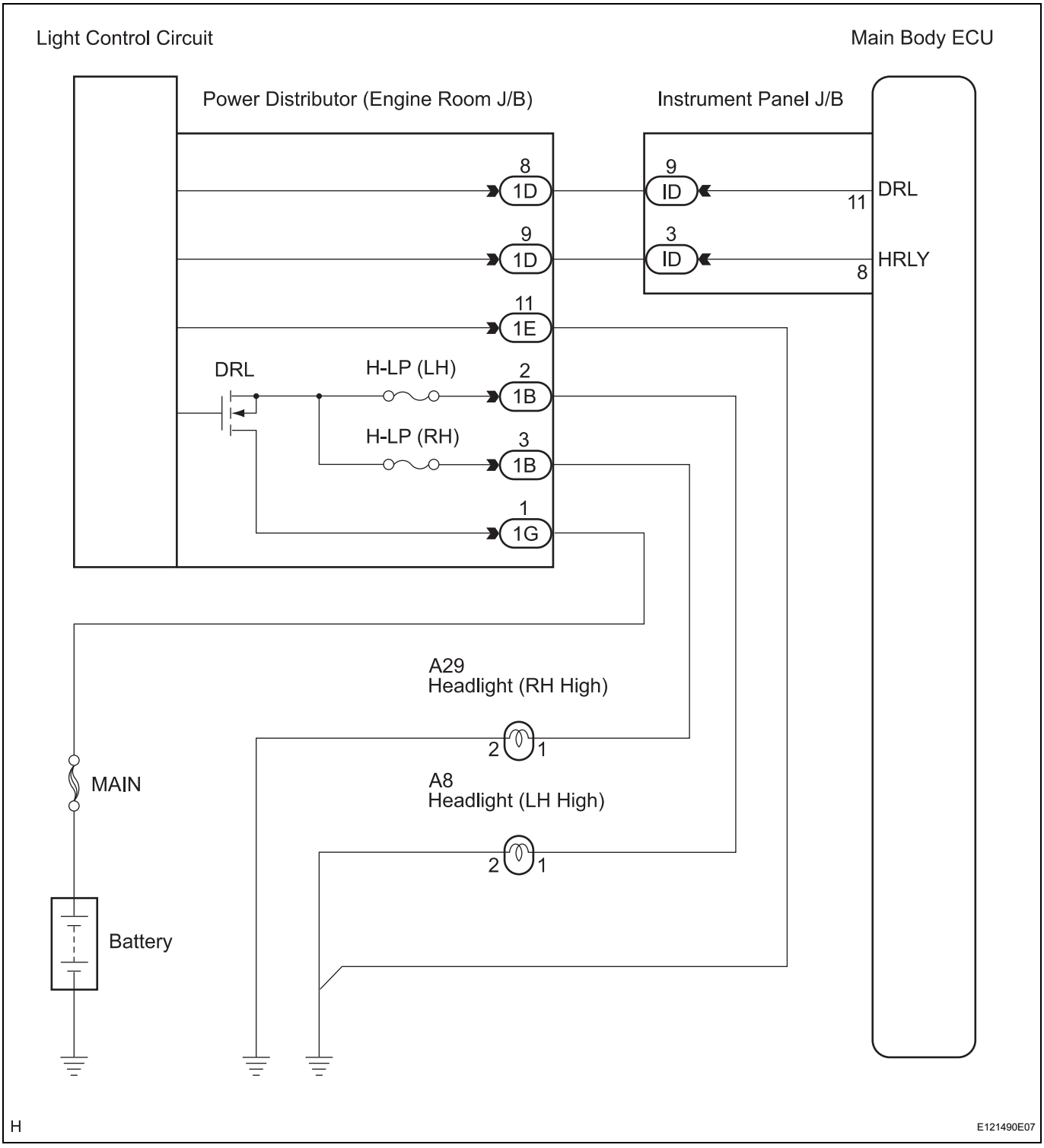
REPAIR OR REPLACE HARNESS OR CONNECTOR (FUSE - BODY GROUND)

Headlight (HI-BEAM) Circuit

DESCRIPTION

The main body ECU receives dimmer switch HIGH signal and light control switch HEAD signal from the headlight dimmer switch assembly, and turns the high beam headlights on.
HINT:
When a short circuit occurs between the power distributor (engine room J/B assembly) and high beam headlight, the power distributor stops the DRL relay operation (Fail-safe function).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST USING INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Select the item below in the ACTIVE TEST and then check that the relay operates.

MAIN BODY (MAIN BODY ECU):

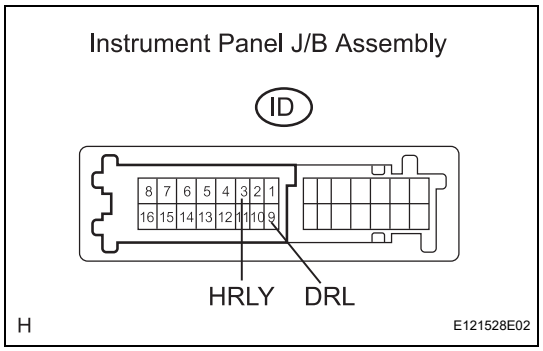
Tester Display	Test Part	Control Range	Diagnostic Note
HEAD LIGHT (HI)	High beam headlights	ON / OFF	-

OK:
The relay operates. (High beam headlights illuminate.)

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

2	INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY



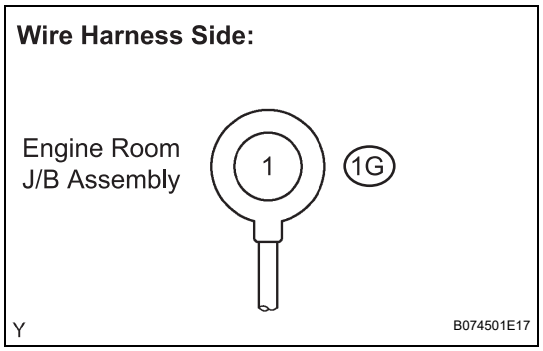
(a) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
ID-3 (HRLY) - Body ground	Light control switch OFF → HEAD	10 to 14 V → Below 1 V
ID-9 (DRL) - Body ground	Light control switch in HEAD, dimmer switch LOW → HIGH	10 to 14 V → Below 1 V

OK → **Go to step 6**

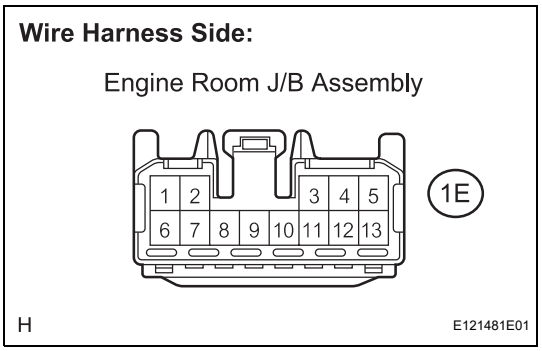
NG

3	CHECK HARNESS AND CONNECTOR (ENGINE ROOM J/B ASSEMBLY - BATTERY AND BODY GROUND)



(a) Disconnect the 1G engine room J/B assembly connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
1G-1 - Body ground	Always	10 to 14 V



(c) Disconnect the 1E engine room J/B assembly connector.
(d) Measure the resistance according to the value(s) in the table below.

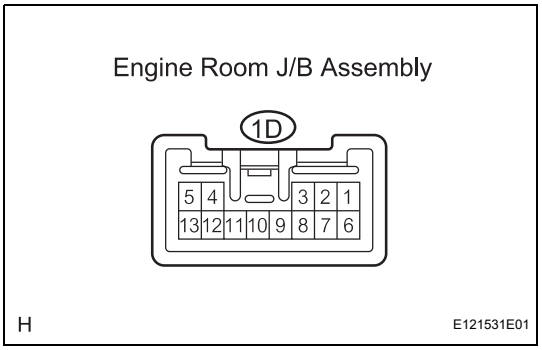
Standard resistance

Tester Connection	Condition	Specified Condition
1E-11 - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 INSPECT ENGINE ROOM JUNCTION BLOCK ASSEMBLY



(a) Reconnect the 1G and 1E engine room J/B assembly connectors.
(b) Disconnect the 1D engine room J/B assembly connector.
(c) Measure the voltage according to the value(s) in the table below.

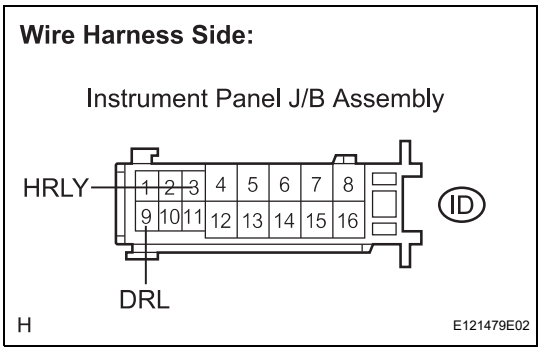
Standard voltage

Tester Connection	Condition	Specified Condition
1D-8 - Body ground	Always	10 to 14 V
1D-9 - Body ground	Always	10 to 14 V

NG → **REPLACE ENGINE ROOM JUNCTION BLOCK ASSEMBLY (POWER DISTRIBUTOR)**

OK

5 CHECK HARNESS AND CONNECTOR (ENGINE ROOM J/B ASSEMBLY - INSTRUMENT PANEL J/B ASSEMBLY)



(a) Reconnect the 1D engine room J/B assembly connector.
(b) Disconnect the ID instrument panel J/B connector.
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

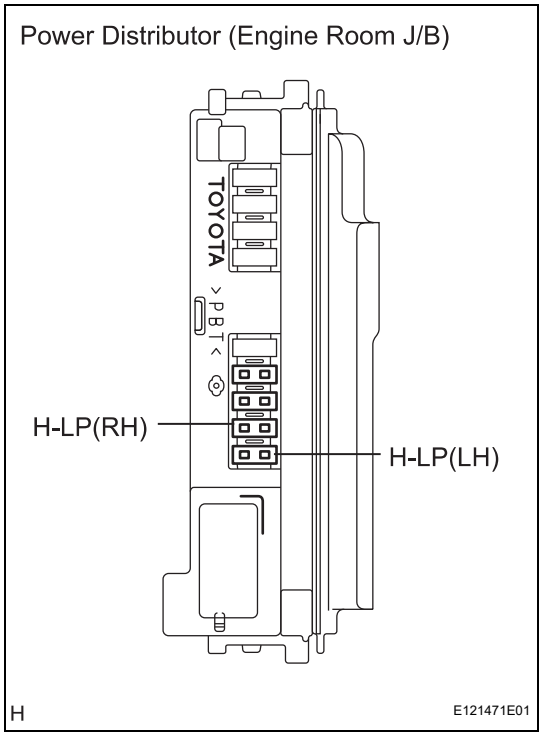
Tester Connection	Condition	Specified Condition
ID-3 (HRLY) - Body ground	Always	10 to 14 V
ID-9 (DRL) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

6 CHECK HARNESS AND CONNECTOR (SHORT IN RELAY-DRIVEN CIRCUIT)



(a) Remove the H-LP (RH) fuse from the engine room J/B assembly.
(b) Turn the light control switch to the HEAD position and turn the dimmer switch to the HIGH position.
(c) Check if the high beam headlight LH illuminates.
(d) Turn the dimmer switch to the LOW position.
(e) Install the H-LP (RH) fuse and remove the H-LP (LH) fuse.
(f) Turn the dimmer switch to the HIGH position.
(g) Check if the high beam headlight RH illuminates.

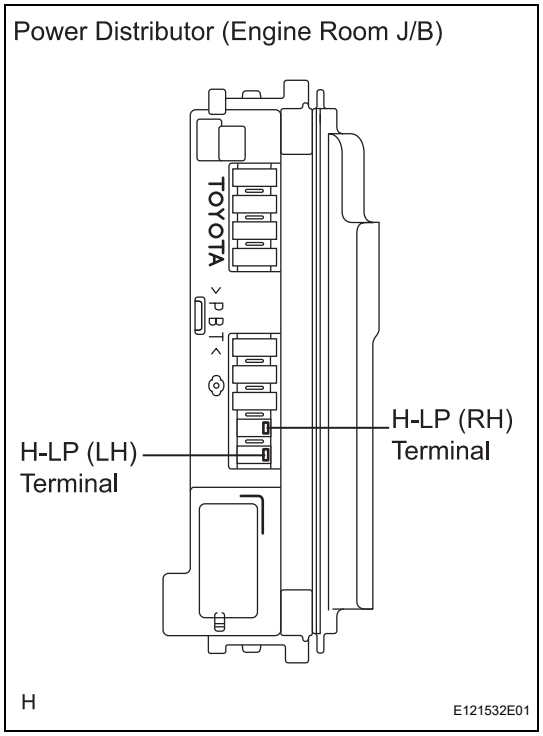
OK:

Either high beam headlight LH or RH illuminates.

OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SHORT CIRCUIT BETWEEN FUSE AND BULB)**

NG

7 INSPECT ENGINE ROOM JUNCTION BLOCK ASSEMBLY



(a) Remove the H-LP (RH) fuse and H-LP (LH) fuse from the engine room J/B assembly.
(b) Measure the voltage between the loading slot of each fuse and body ground.

Standard voltage

Tester Connection	Condition	Specified Condition
H-LP (RH) Terminal - Body ground	Light control switch in HEAD and dimmer switch in HIGH	10 to 14 V
H-LP (LH) Terminal - Body ground	Light control switch in HEAD and dimmer switch in HIGH	10 to 14 V

NG → **REPLACE ENGINE ROOM JUNCTION BLOCK ASSEMBLY (POWER DISTRIBUTOR)**

OK

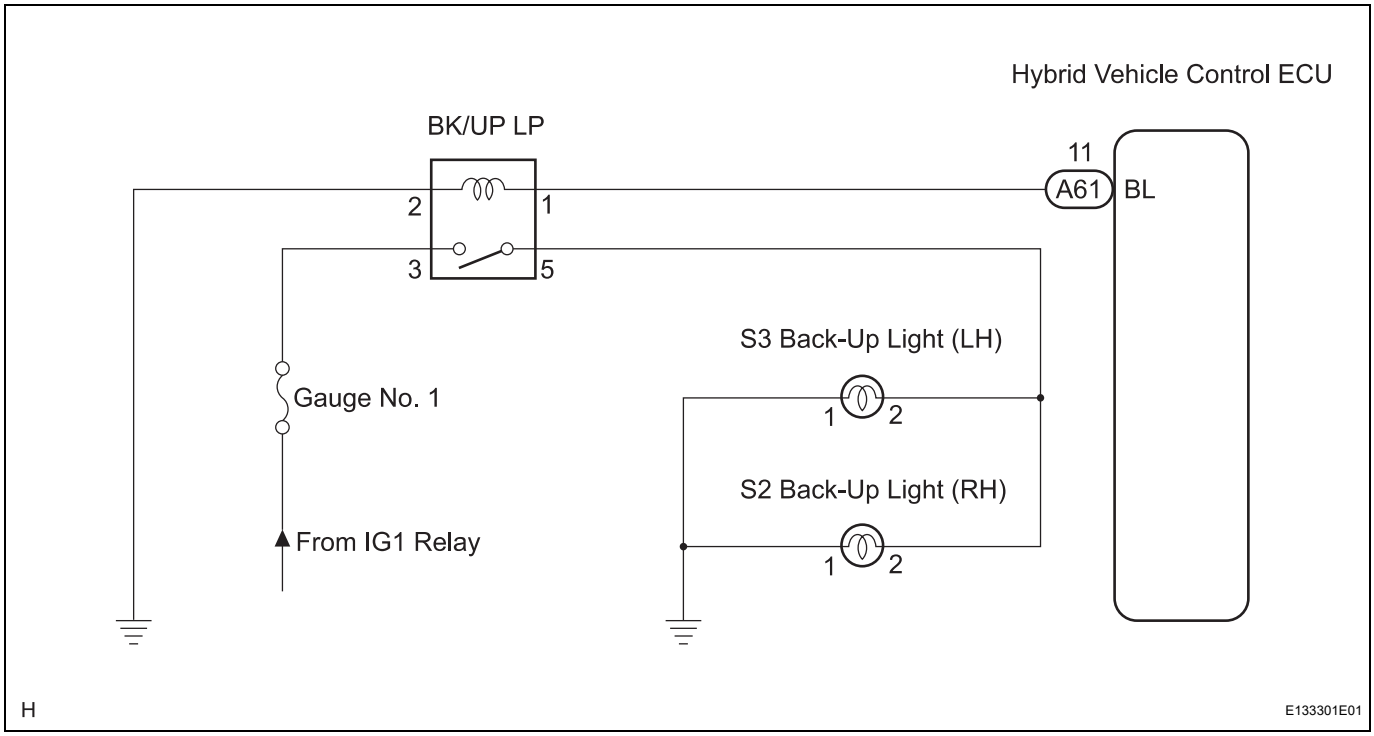
REPAIR OR REPLACE HARNESS OR CONNECTOR (OPEN CIRCUIT BETWEEN FUSE AND BODY GROUND)

Back-up Light Circuit

DESCRIPTION

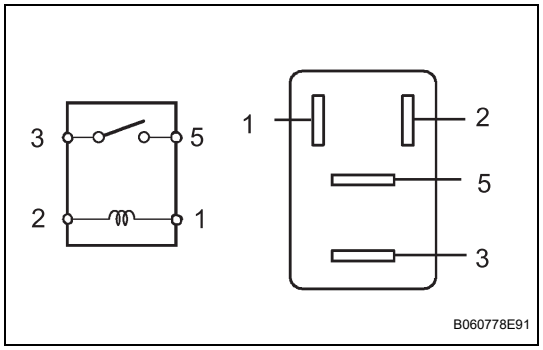
The HV control ECU receives shift position R signal and controls the back-up light relay.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT BACK-UP LIGHT RELAY



(a) Remove the back-up light relay from the engine room relay block.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)

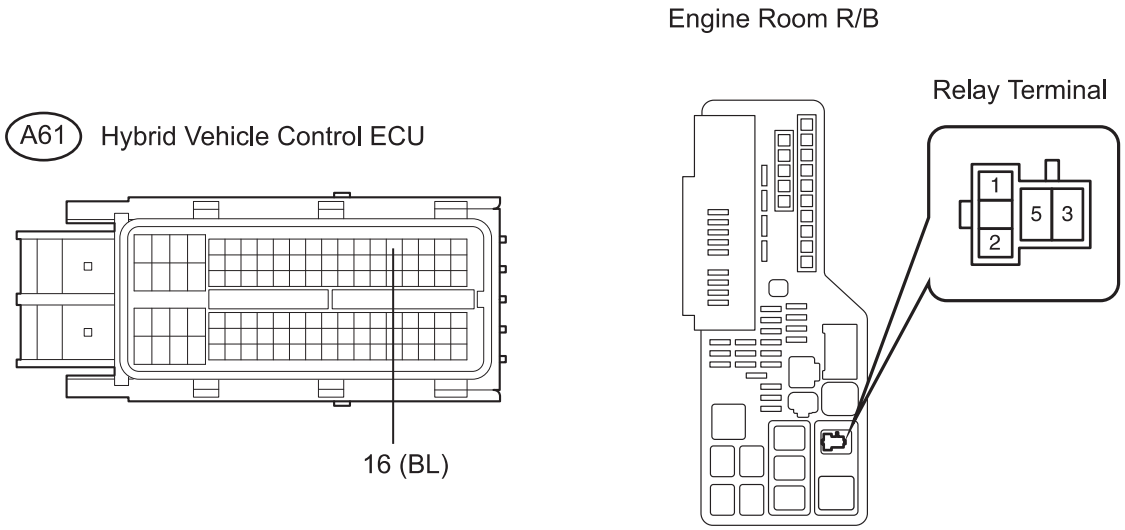
NG → REPLACE BACK-UP LIGHT RELAY

OK

2	CHECK HARNESS AND CONNECTOR (RELAY - HYBRID VEHICLE CONTROL ECU AND BODY GROUND)

(a) Disconnect the A61 hybrid vehicle ECU connector.

Wire Harness Side:



E133308E02

(b) Remove the back-up relay from the engine room relay block.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

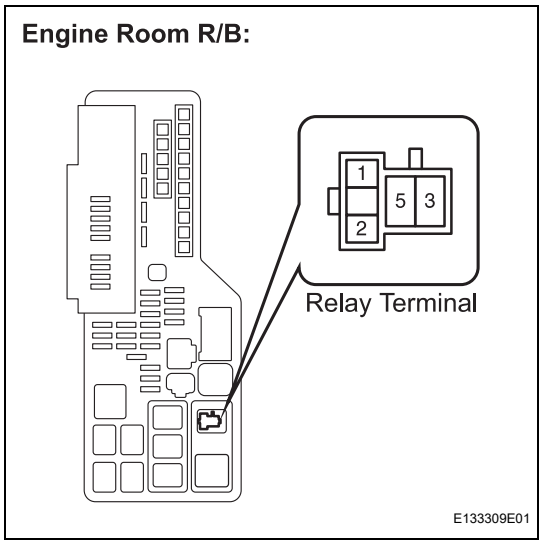
Tester connection	Condition	Specified value
A61-16 - Relay terminal 1	Always	Below 1 Ω
Relay terminal 2 - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	INSPECT HYBRID VEHICLE CONTROL ECU

(a) Reconnect the hybrid vehicle control ECU connector.



(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

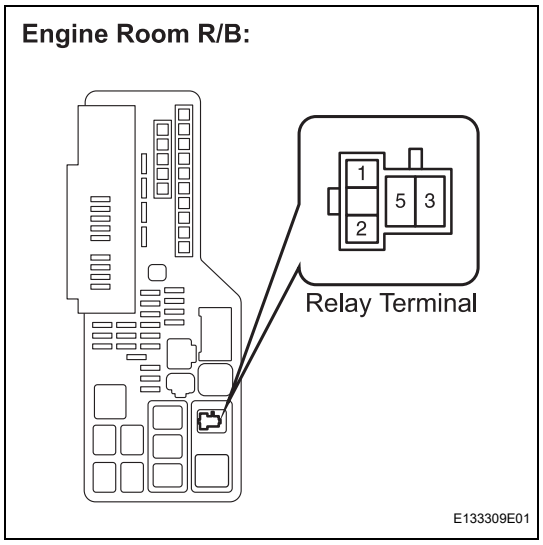
Tester connection	Condition	Specified value
Relay terminal 1 - Body ground	Shift lever in R position	10 to 14 V
Relay terminal 1 - Body ground	Shift lever not in R position	Below 1 V

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

LI

OK

4 CHECK HARNESS AND CONNECTOR (BATTERY - RELAY)



(a) Measure the voltage according to the value(s) in the table below.

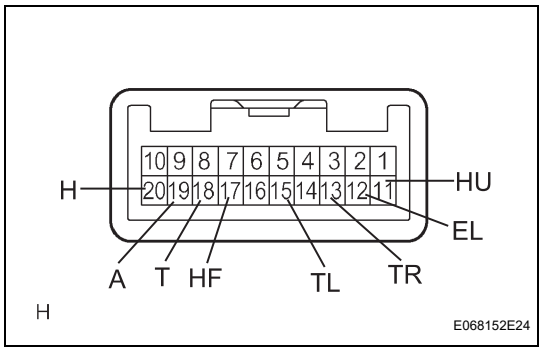
Standard voltage

Tester connection	Condition	Specified value
Relay terminal 3 - Body ground	Power switch on (IG)	10 to 14 V
Relay terminal 3 - Body ground	Power switch off	Below 1 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (BATTERY - RELAY)**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (BULB - RELAY AND BODY GROUND)



INSPECTION

1. INSPECT HEADLIGHT DIMMER SWITCH ASSEMBLY

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance:

Light control switch

Tester Connection	Switch Condition	Specified Condition
12 (EL) - 20 (H) - 18 (T) - 19 (A)	OFF	10 kΩ or higher
12 (EL) - 18 (T)	TAIL	Below 1 Ω
12 (EL) - 20 (H) - 18 (T)	HEAD	Below 1 Ω
12 (EL) - 19 (A)	AUTO	Below 1 Ω

Dimmer switch

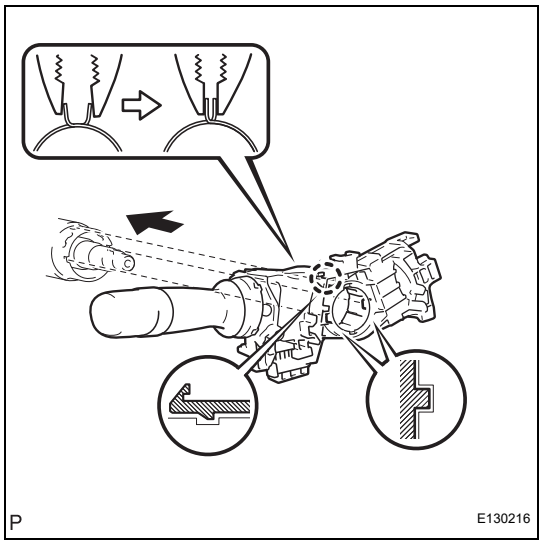
Tester Connection	Switch Condition	Specified Condition
17 (HF) - 12 (EL)	FLASH	Below 1 Ω
11 (HU) - 12 (EL)	HIGH	Below 1 Ω

Turn signal switch

Tester Connection	Switch Condition	Specified Condition
13 (TR) - 12 (EL) - 15 (TL)	OFF	10 kΩ or higher
13 (TR) - 12 (EL)	RH	Below 1 Ω
15 (TL) - 12 (EL)	LH	Below 1 Ω

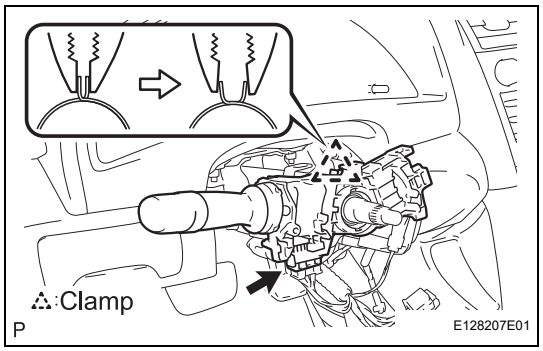
If the result is not as specified, replace the headlight dimmer switch assembly.

INSTALLATION



1. INSTALL HEADLIGHT DIMMER SWITCH ASSEMBLY

(a) Engage the claw while loosening the clamp as shown in the illustration.



(b) Install the headlight dimmer switch assembly with the clamp.

(c) Connect the connector.

2. INSTALL WINDSHIELD WIPER SWITCH ASSEMBLY (See page WW-22)

3. INSTALL SPIRAL CABLE WITH STEERING ANGLE SENSOR (See page RS-359)

4. INSTALL STEERING COLUMN COVER (See page SR-41)

5. **INSTALL STEERING WHEEL ASSEMBLY (See page SR-42)**
6. **INSPECT STEERING WHEEL CENTER POINT**
7. **INSTALL STEERING PAD (See page RS-346)**
8. **INSTALL NO. 3 LOWER STEERING WHEEL COVER (See page RS-347)**
9. **INSTALL NO. 2 LOWER STEERING WHEEL COVER (See page RS-347)**
10. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
11. **INSPECT STEERING PAD (See page RS-347)**
12. **INSPECT SRS WARNING LIGHT**
    (See page RS-33)
13. **PERFORM INITIALIZATION**
    NOTICE:
    Some systems need initialization after reconnecting the cable to the negative battery terminal (See page IN-43).

INSTALLATION

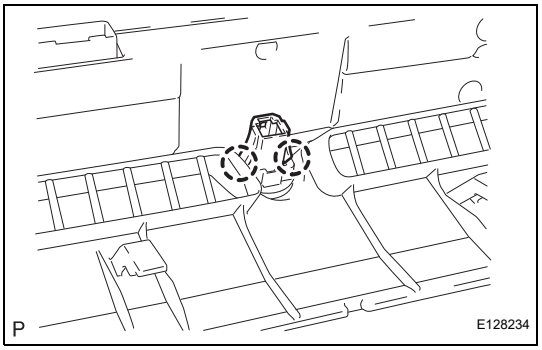
1. INSTALL STOP LIGHT SWITCH ASSEMBLY (See page BR-74)
2. INSTALL COMBINATION METER ASSEMBLY (See page ME-67)
3. INSTALL INSTRUMENT CLUSTER FINISH PANEL (See page ME-69)
4. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (See page ME-69)
5. INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-34)
6. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page ME-69)
7. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-41)
8. INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-41)

INSTALLATION

1. **INSTALL LUGGAGE COMPARTMENT DOOR LOCK ASSEMBLY (See page ED-89)**
2. **INSTALL LUGGAGE COMPARTMENT DOOR COVER (See page ET-53)**

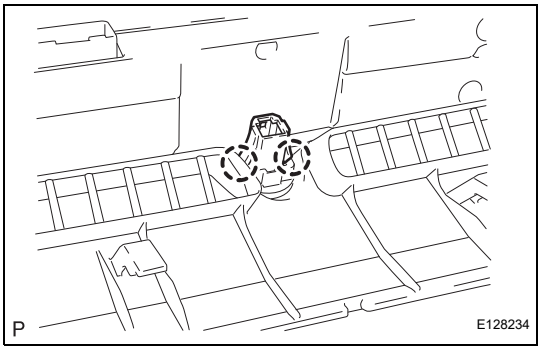
REMOVAL

1. **REMOVE NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-20)**



2. **REMOVE AUTOMATIC LIGHT CONTROL SENSOR**
   (a) Disengage the 2 claws and remove the automatic light control sensor.

INSTALLATION

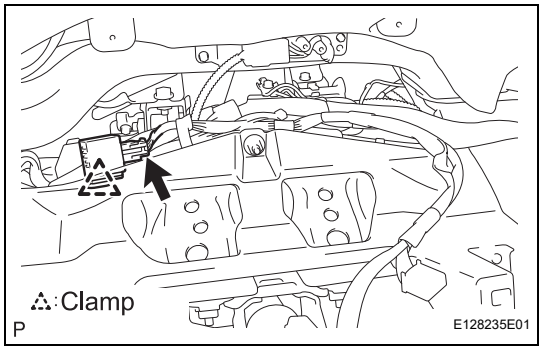


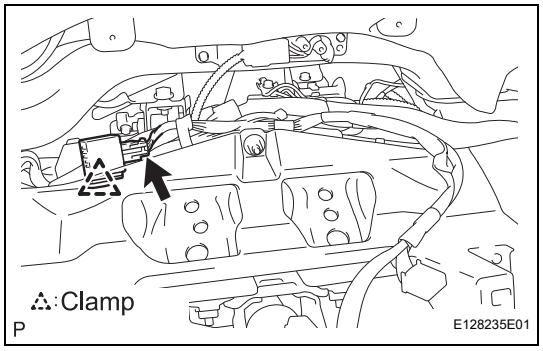
1. **INSTALL AUTOMATIC LIGHT CONTROL SENSOR**
   (a) Engage the 2 claws and install the automatic light control sensor.

2. **INSTALL NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-28)**

REMOVAL

1. REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-13)
2. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-14)
3. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page ME-64)
4. REMOVE STEERING COLUMN COVER (See page ME-64)
5. REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-12)
6. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-12)
7. REMOVE INSTRUMENT CLUSTER FINISH PANEL (See page ME-66)
8. REMOVE COMBINATION METER ASSEMBLY (See page ME-66)
9. REMOVE TURN SIGNAL FLASHER ASSEMBLY
   (a) Disconnect the connector.
   (b) Remove the clamp and the turn signal flasher assembly.





INSTALLATION

1. INSTALL TURN SIGNAL FLASHER ASSEMBLY
   (a) Install the clamp and the turn signal flasher assembly.
   (b) Connect the connector.
2. INSTALL COMBINATION METER ASSEMBLY (See page ME-67)
3. INSTALL INSTRUMENT CLUSTER FINISH PANEL (See page ME-69)
4. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-34)
5. INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-34)
6. INSTALL STEERING COLUMN COVER (See page ME-69)
7. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page ME-69)
8. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-41)

9. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-41)**

PROBLEM SYMPTOMS TABLE

HINT:

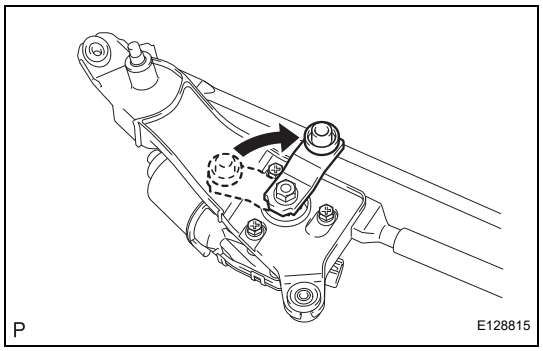
- Use the table below to help determine the cause of the problem symptom. The potential cases of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to the system before inspecting the suspected areas below.

FRONT WIPER AND WASHER SYSTEM:

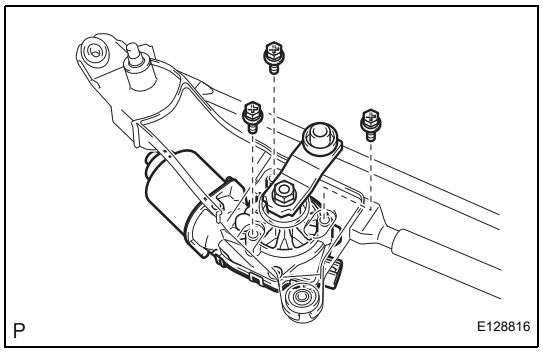
Symptom	Suspected Area	See page
Front wiper system does not operate.	1. IG1 relay	-
	2. WIP fuse	-
	3. Windshield wiper switch assembly	WW-21
	4. Windshield wiper motor assembly	WW-11
	5. Wire harness or connector	-
Front wipers do not operate in LO or HI.	1. Windshield wiper switch assembly	WW-21
	2. Windshield wiper motor assembly	WW-11
	3. Wire harness or connector	-
Front wipers do not operate in INT.	1. Windshield wiper switch assembly	WW-21
	2. Windshield wiper motor assembly	WW-11
	3. Wire harness or connector	-
Front washer motor does not operate.	1. WASH fuse	-
	2. Windshield wiper switch assembly	WW-21
	3. Windshield washer motor assembly	WW-24
	4. Wire harness or connector	-
Front wipers do not operate when the front washer switch is ON.	1. Windshield wiper switch assembly	WW-21
	2. Windshield wiper motor assembly	WW-11
	3. Wire harness or connector	-
Washer fluid does not operate.	Washer hose and nozzle	WW-26
When the front wiper switch is in the HI position, the wiper blade is in contact with the body.	1. Front wiper arm installation position	WW-12
	2. Windshield wiper motor assembly	WW-11
When the front wiper switch is OFF, the wiper blade does not retract or retracts in a wrong position.	1. Front wiper arm installation position	WW-12
	2. Windshield wiper motor assembly	WW-11

Others:

Symptom	Suspected Area	See page
Washer fluid level warning system does not operate.	1. Washer fluid level warning switch	WW-24
	2. Combination meter assembly	-



(b) Move the crank arm in the direction indicated by the arrow.



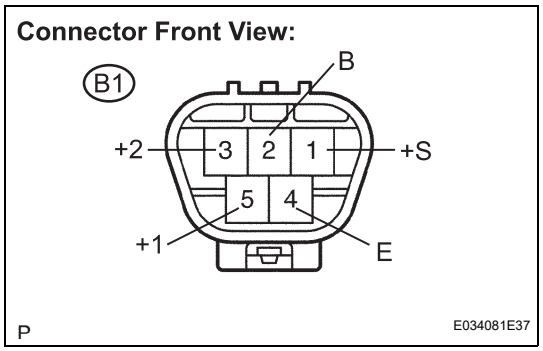
(c) Remove the 3 bolts and the windshield wiper motor assembly from the windshield wiper link assembly.

INSPECTION

1. INSPECT WINDSHIELD WIPER MOTOR ASSEMBLY

(a) LO Operation Check

(1) Connect a positive (+) battery lead to terminal B1-5 (+1) of the connector, and a negative (-) battery lead to terminal B1-4 (E), and check that the motor operates at low speed (LO).

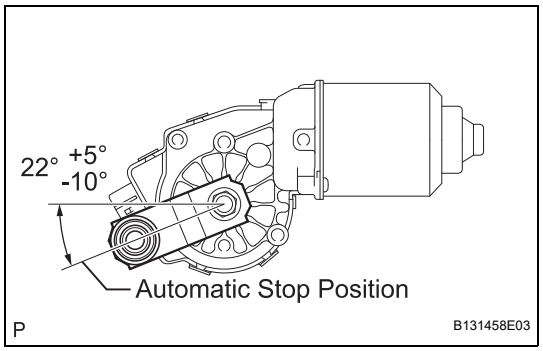


(b) HI Operation Check

(1) Connect a positive (+) lead to terminal B1-3 (+2) of the connector, and a negative (-) battery lead to terminal B1-4 (E), and check that the motor operates at high speed (HI).

(c) Automatic Stop Operation Check

(1) Put matchmarks on the windshield wiper motor assembly. The matchmarks will be used to confirm the return of the motor shaft to the park position.

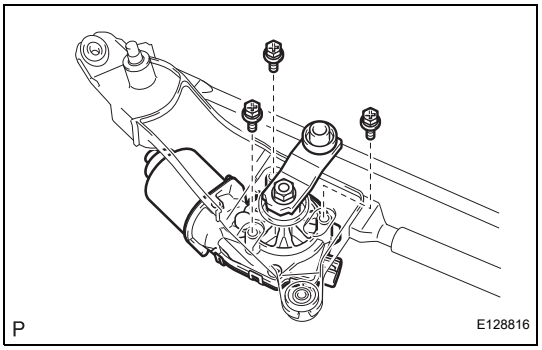


(2) Connect a positive (+) battery lead to terminal B1-5 (+1) of the connector on the wiper motor and connect a negative battery lead to terminal B1-4 (E) of the wiper motor. With the motor operating at low speed (LO), disconnect terminal B1-5 (+1) to stop the wiper motor at a position where the matchmarks do not line up.
HINT:
In the following step, connections will be made at the wiper motor to allow verification of the operation of the park contacts that are operated by the cam in the wiper motor. After the connections have been made, when the motor is not in the park position, current will flow from terminal B1-2 (B) through the park contacts in the wiper motor, to terminal B1-1 (+S). The current will then flow through the jumper wire to terminal B1-5 (+1) through the motor to ground (causing it to operate). When the motor reaches the park position, the park contacts should open, stopping the operation of the wiper motor in the correct location. Terminals B1-2 (B) and B1-1 (+S) are connected by the internal cam in the wiper motor when the wiper motor is not in the park position. Terminals B1-1 (+S) and B1-4 (E) are connected by the internal cam in the wiper motor when the wiper motor is in the park position.

(3) With the ground wire still attached from the previous step, connect a jumper lead between terminal B1-1 (+S) and terminal B1-5 (+1). Next, connect a positive (+) battery lead to terminal B1-2 (B) to cause the wiper motor to operate at low speed. If the wiper motor is operating correctly, the wiper will operate until it reaches the park position. When it reaches the park position, it will automatically stop.

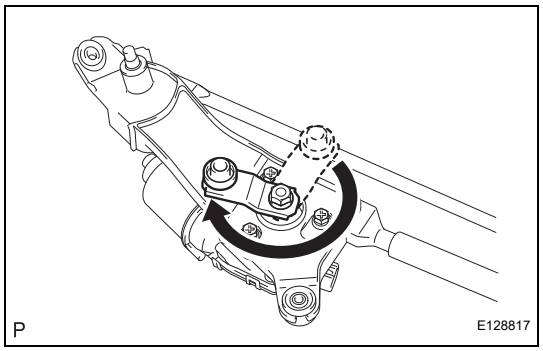
(4) Verify that the matchmarks on the windshield wiper motor assembly are lined up.

INSTALLATION

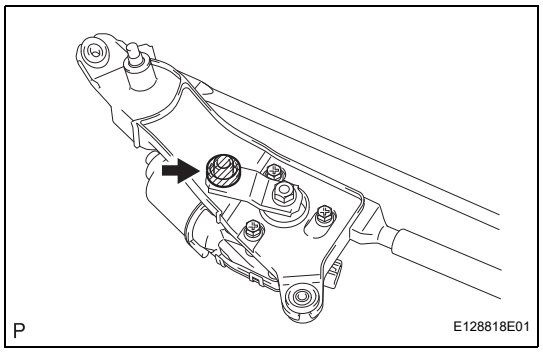


1. INSTALL WINDSHIELD WIPER MOTOR ASSEMBLY

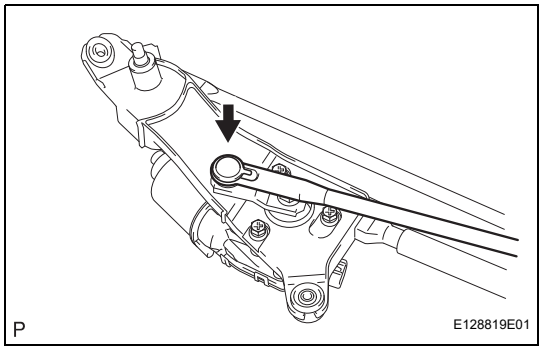
(a) Install the windshield wiper motor assembly with the 3 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



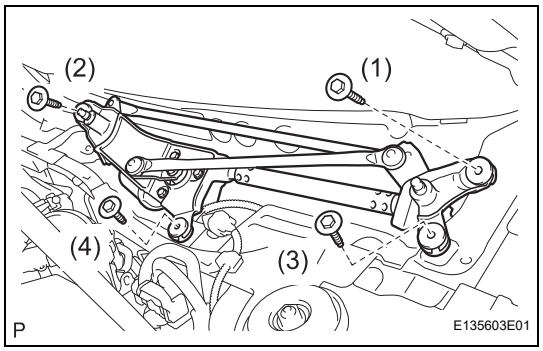
(b) Move the crank arm in the direction indicated by the arrow.



(c) Apply MP grease to the crank arm pivot of the windshield wiper motor assembly.

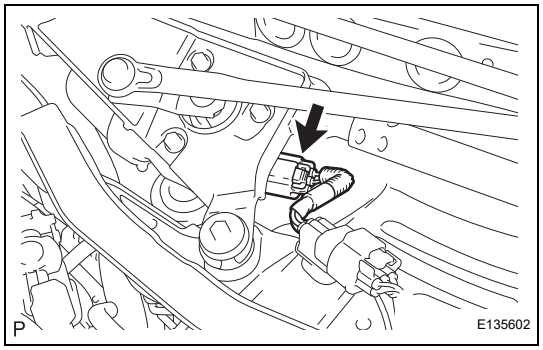


(d) Install the No. 2 windshield wiper link rod to the pivot of the windshield wiper motor assembly.

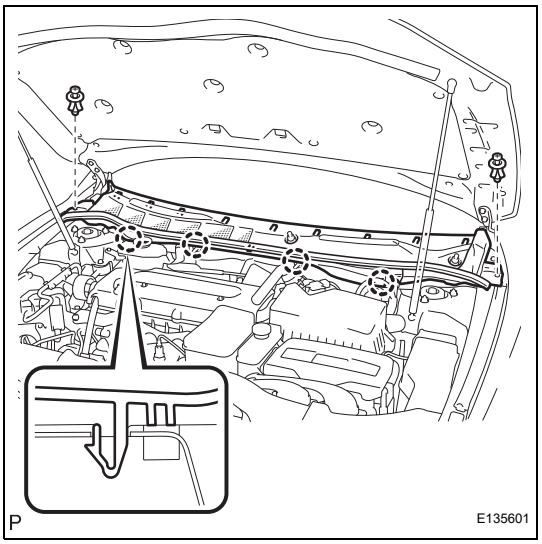


2. INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY

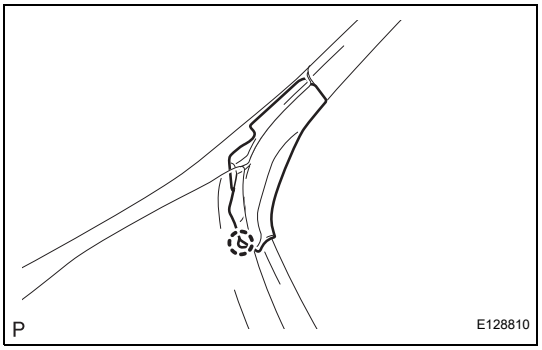
(a) Install the windshield wiper motor and link assembly with the 4 bolts.
Torque: 7.5 N*m (77 kgf*cm, 66 in.*lbf)
NOTICE:
Tighten the bolts in the order shown in the illustration.



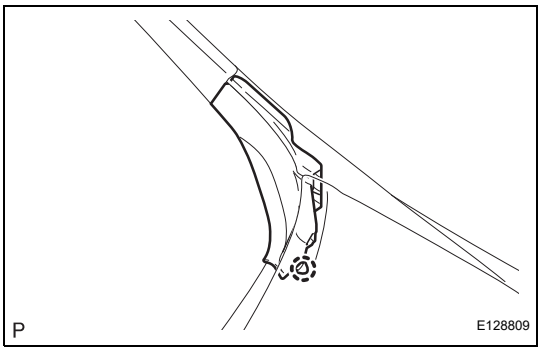
(b) Connect the connector.



3. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY**
   (a) Engage the 4 claws and install the cowl top ventilator louver sub-assembly.
   (b) Install the 2 clips.

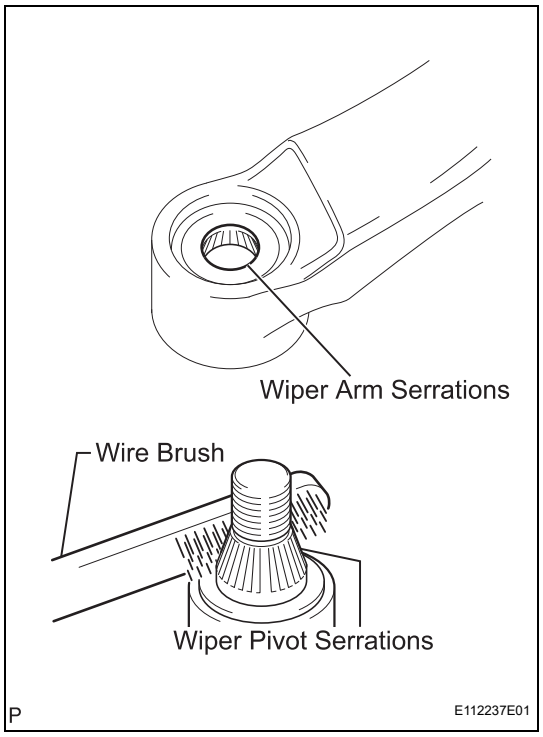


4. **INSTALL FRONT FENDER TO COWL SIDE SEAL RH**
   (a) Engage the claw and install the front fender to cowl side seal RH.

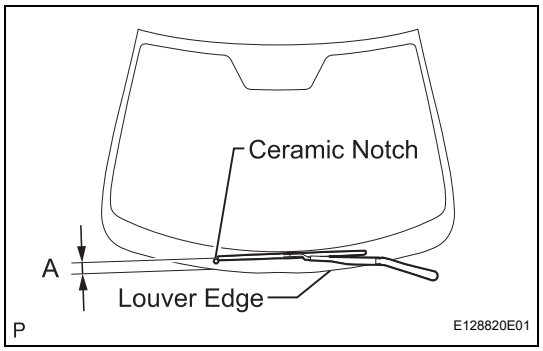


5. **INSTALL FRONT FENDER TO COWL SIDE SEAL LH**
   (a) Engage the claw and install the front fender to cowl side seal LH.

6. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH**
   (a) Operate the wiper and stop the windshield wiper motor at the automatic stop position.



(b) Clean the wiper arm serrations.
(c) When reinstalling:
(1) Clean the wiper pivot serrations with a wire brush.

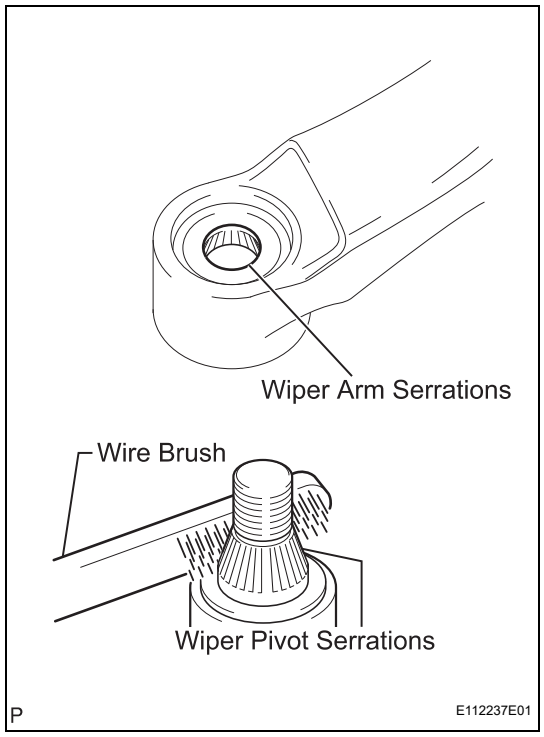


(d) Install the front wiper arm and blade assembly LH with the nut to the position shown in the illustration.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)
HINT:
Hold the arm hinge by hand to fasten the nut.

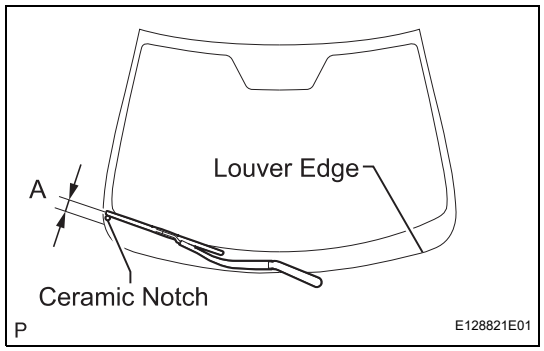
Area	Measurement
A	37 to 52 mm (1.46 to 2.05 in.)

7. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH

(a) Operate the wiper and stop the windshield wiper motor at the automatic stop position.



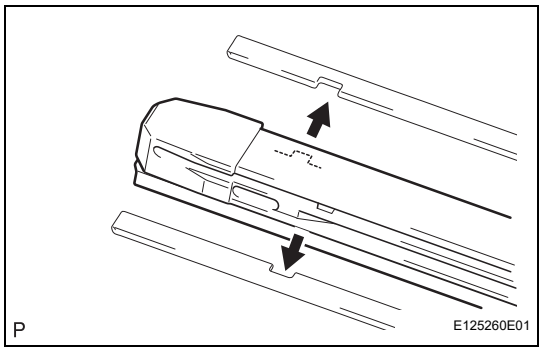
(b) Clean the wiper arm serrations.
(c) When reinstalling:
  (1) Clean the wiper pivot serrations with a wire brush.



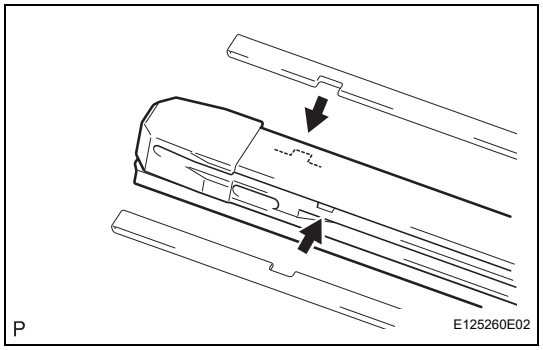
(d) Install the front wiper arm and blade assembly RH with the nut to the position shown in the illustration.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)
HINT:
Hold the arm hinge by hand to fasten the nut.

Area	Measurement
A	23 to 38 mm (0.90 to 1.49 in.)

(e) Operate the front wipers while spraying washer fluid on the windshield glass. Make sure that the front wipers function properly and the wipers do not come into contact with the vehicle body.



(b) Remove the 2 wiper rubber backing plates from the wiper rubber.



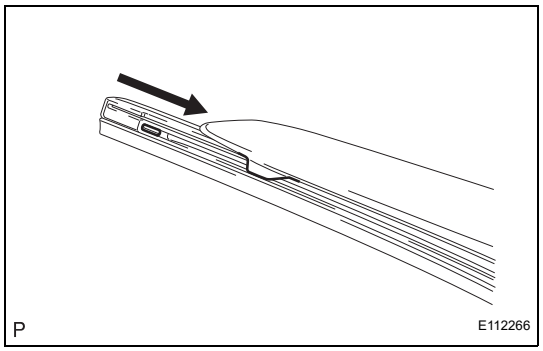
INSTALLATION

1. INSTALL WIPER RUBBER

(a) Install the 2 wiper rubber backing plates to the wiper rubber.

NOTICE:

- **Align the protrusions on the wiper rubber with the notches in the backing plates.**
- **Align the curves of the backing plates with the curve of the glass.**



(b) Install the wiper rubber to the front wiper blade with the tip of the rubber (curved end) facing the axis of the wiper arm.

NOTICE:

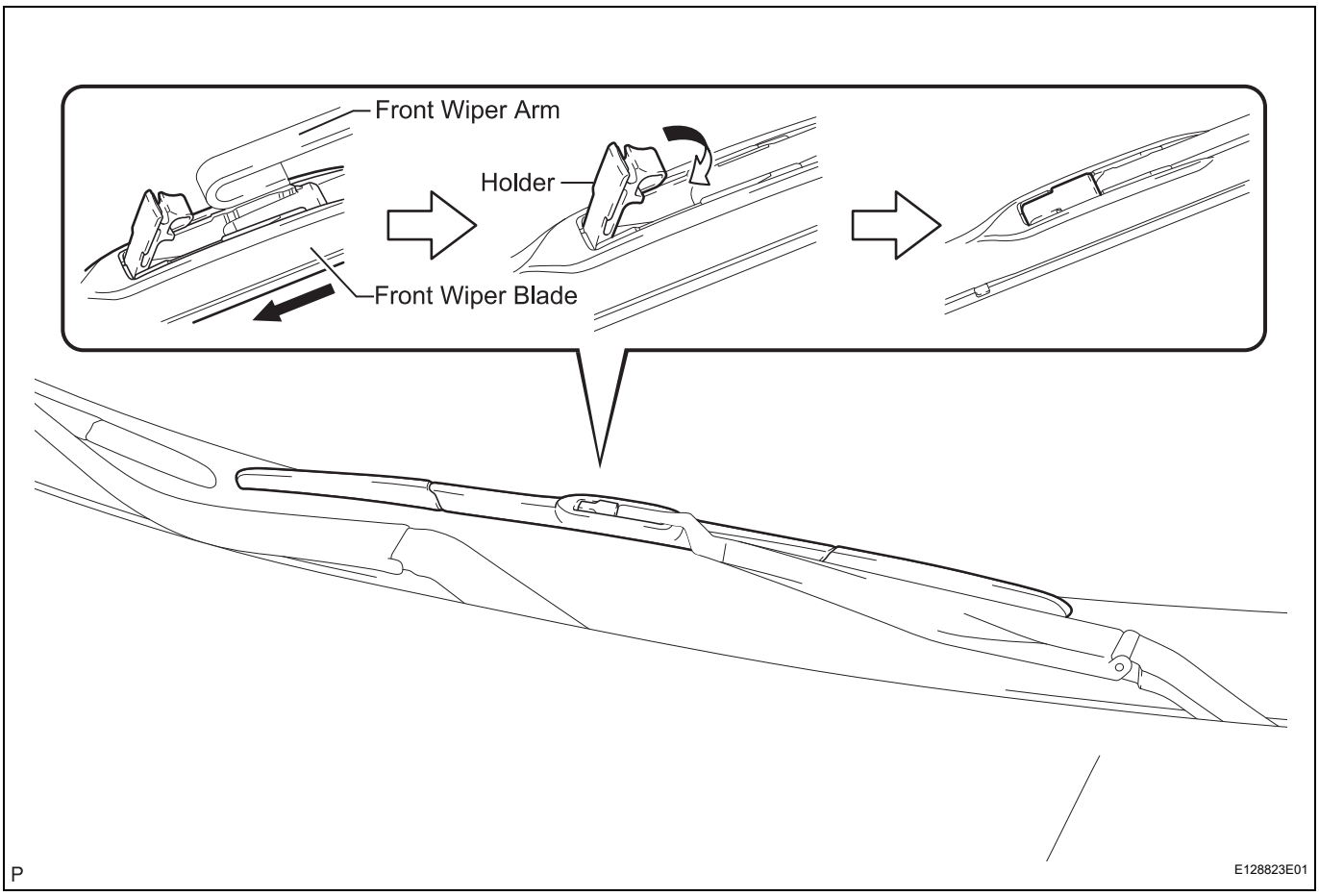
Firmly push the wiper rubber into the wiper blade to securely engage them.

2. INSTALL FRONT WIPER BLADE

(a) Install the front wiper blade as shown in the illustration.

WW

(b) Engage the holder of the front wiper blade.

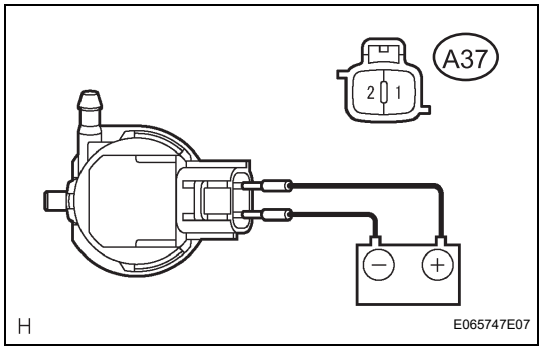


INSPECTION

1. INSPECT WINDSHIELD WASHER MOTOR AND PUMP ASSEMBLY

HINT:

This check should be performed with the front washer motor and pump installed to the washer jar.



(a) Fill the washer jar with washer fluid.

(b) Connect the positive (+) battery lead to terminal A37-1 of the washer motor and pump, and the negative (-) lead to terminal A37-2.

(c) Check if washer fluid is pumped from the washer jar.

OK:

Washer fluid is pumped from the washer jar.

2. INSPECT WASHER FLUID LEVEL SENSOR

HINT:

The following check should be performed with the windshield washer motor and pump installed to the washer jar.

(a) Fill the washer jar with washer fluid.

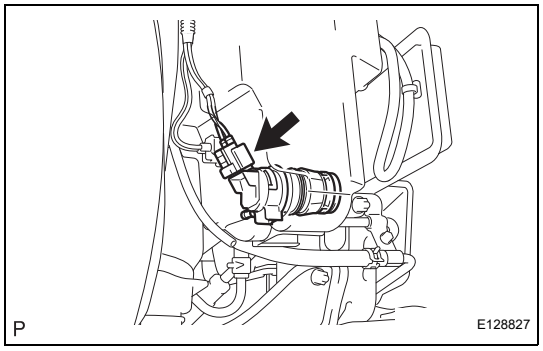
(b) Disconnect the connector from the washer fluid level sensor.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Fluid Volume	Specified Condition
More than 700 to 900 ml	10 kΩ or higher
Less than 700 to 900 ml	Below 1 Ω

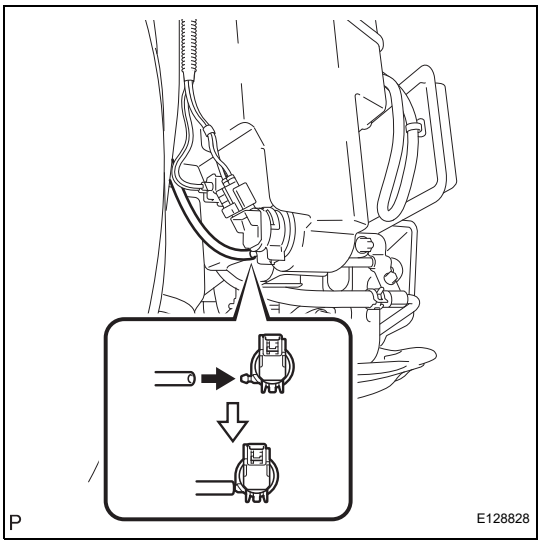
INSTALLATION



1. INSTALL WINDSHIELD WASHER MOTOR AND PUMP ASSEMBLY

(a) Install the windshield washer motor and pump assembly.

(b) Connect the connector.



2. **FILL WASHER JAR WITH WASHER FLUID**
   (a) Connect the washer hose to the windshield washer motor and pump assembly and fill the washer jar with washer fluid.

3. **INSTALL FRONT BUMPER ASSEMBLY (See page ET-9)**

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the power door lock control system.
- The intelligent tester should be used in steps 5 and 7.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

DL

2	CUSTOMER PROBLEM ANALYSIS CHECK

HINT:

- In troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.
- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.
- The following 5 items are important points in the problem analysis:

What	Vehicle model, system name
When	Date, time, occurrence frequency
Where	Road conditions
Under what conditions?	Running conditions, driving conditions, weather conditions
How did it happen?	Problem symptoms

NEXT

3	INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V
If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT

4	PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Fault is not listed in problem symptoms table	**A**
Fault is listed in problem symptoms table	**B**

B → GO TO STEP 6

A

5	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) Terminals of ECU
(See page DL-13)
(b) DATA LIST/ACTIVE TEST
(See page DL-17)

NEXT

6	REPAIR OR REPLACE

NEXT

7	CONFIRMATION TEST

NEXT

END

OPERATION CHECK

1. CHECK ELECTRICAL DOOR LOCK OPERATION

NOTICE:

The initial condition that the customizing function using the intelligent tester is not chosen is shown.

(a) Check the basic function.

(1) Check that all doors lock when the door control switch (for manual operation) is turned to LOCK and all doors unlock when turned to UNLOCK.

(2) Check that all doors lock when the driver side door lock key cylinder is turned to LOCK using the mechanical key.

(b) Check the electrical key lock-in prevention function.

NOTICE:

In order to prevent the electrical key from being actually locked-in, the following inspection should be performed with the driver side door window open.

(1) Place the electrical key in the cabin.

(2) With the driver side door open, check that all doors unlock immediately after the door lock knob for the driver side door is turned to LOCK.

(3) With the driver side door open, check that all doors unlock immediately after the door control switch (for manual operation) is turned to LOCK.

(4) With the driver side door open, turn the driver side door lock knob to LOCK, and then close the driver side door. Then check that all doors unlock.

(c) Check the security function.

(1) Close all doors with the driver side door window open so that the door control switch can be operated from outside the vehicle.

(2) Pull out the electrical key, open the driver side door and then close and lock the door using the electrical key. Under this condition, check that all doors do not unlock when the door control switch (for manual operation) is turned to UNLOCK from outside the vehicle.

(3) Pull out the electrical key, and close and lock the driver side door by mechanical key operation. Under this condition, check that all doors do not unlock when the door control switch (for manual operation) is turned to UNLOCK from outside the vehicle.

(4) Pull out the electrical key, close the driver side door, and lock the door by wireless door lock operation. Under this condition, check that all doors do not unlock when the door control switch (for manual operation) is turned to UNLOCK from outside the vehicle.

HINT:

Check that the security function is canceled under the following conditions:

- The power switch is turned on (IG).
- The driver side door is unlocked using the mechanical key or the electrical key.
- The door control switch (for manual operation) is turned to UNLOCK after the door control knob is turned to UNLOCK manually.

(d) Check the illumination function.
(1) Set the room light switch to the DOOR position.
(2) With all doors locked, check that driver's door unlock when the driver side door lock cylinder is turned to UNLOCK using the key. At the same time, the room light comes on.
(3) Check that the room light goes off in approximately 15 seconds if the doors have not been opened.

(e) Check the AUTO lock function.
(1) Lock all doors.
(2) Unlock driver's door using the electrical key.
(3) Allow 30 seconds to elapse while all doors remain closed and the electrical key switch and the entry unlock switch remain untouched. Then, check that all doors will lock automatically.

(f) Check the automatic locking function interlocked with the shift lever.
(1) When any door is unlocked with all doors closed and the engine started, check that all doors automatically lock when the shift lever is moved into any position from the P position.
(2) When any door is unlocked after all doors automatically lock, check that all doors attempt to automatically lock once again (retry function). The retry function is canceled when any of the following conditions is fulfilled:
- All doors are locked.
- Any door is opened.
- The shift lever is moved into the P position.
- The doors are locked or unlocked by the user.
- The power switch is turned off.

CUSTOMIZE PARAMETERS

1. CUSTOMIZING FUNCTION WITH INTELLIGENT TESTER

HINT:

The following items can be customized.

NOTICE:

- **Before attempting to customize vehicle settings, confirm whether it is possible to make the change that the customer has requested.**
- **Be sure to record the current settings before customizing.**
- **When troubleshooting, make sure that the item in question has not been disabled using the customizing function.**

DOOR LOCK:

Display (Item)	Default	Contents	Setting
UNLOCK/PARK (Unlock, power switch on (IG), shift P, speed 0 km/h (0 mph))	ON	Function that unlocks doors when the shift lever is moved to the P position from any other position while the power switch is on (IG)	ON/OFF
ALL UNLK/OPN-CL (All unlock, D door open-close)	OFF	Function that unlocks all other doors when opening driver side door within 10 seconds after turning the power switch off from on (IG)	ON/OFF
UNLK/KEY TWICE (Unlock, 2 times D key operation)	ON	• Function that unlocks only the driver side door when the driver side door key cylinder is turned to unlock once and unlocks all the doors when it is turned to unlock twice • In the OFF setting, turning it once unlocks all doors	ON/OFF
AUTO LOCK/SHIFT (Auto lock/shift not P)	ON	Function that locks doors when the shift lever is moved from the P position to any other position	ON/OFF
AUTO LOCK	OFF	Function that locks doors when vehicle reaches a vehicle speed 20 km/h (13 mph)	ON/OFF

WIRELESS D LOCK

Display (Item)	Default	Contents	Setting
AUTO LOCK DELAY	60s	Function that selects AUTO LOCK time (30 sec. or 60 sec.)	30s/60s

PROBLEM SYMPTOMS TABLE

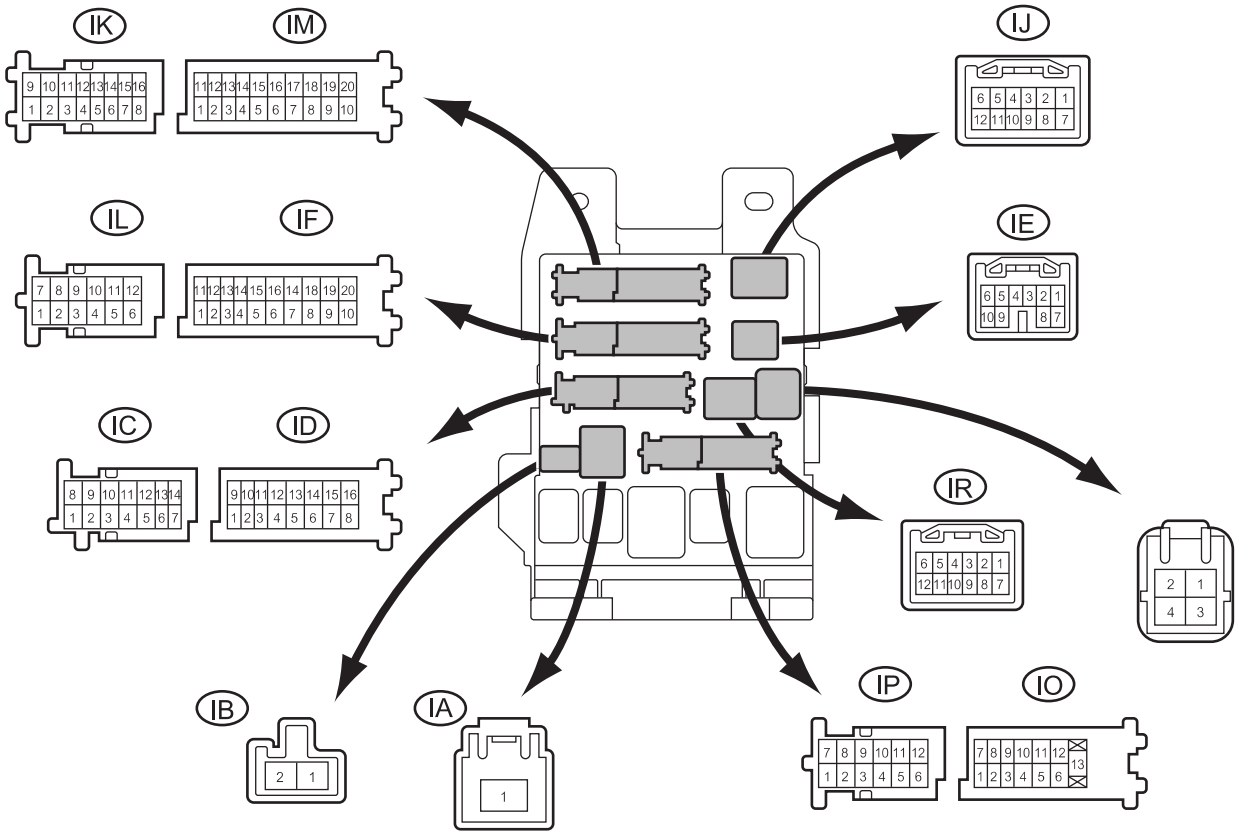
POWER DOOR LOCK CONTROL SYSTEM:

Symptom	Suspected Area	See page
All doors cannot be locked/unlocked simultaneously by neither door control switch nor door key cylinder	1. Power source circuit (Main body ECU)	DL-13
	2. Replace main body ECU (Instrument panel J/B)	-
All doors cannot be locked/unlocked simultaneously by driver side door control switch	1. Door control switch circuit (Driver side)	DL-56
	2. Replace main body ECU (Instrument panel J/B)	-
All doors cannot be locked/unlocked simultaneously by front passenger side door control switch	1. Door control switch circuit (Front passenger side door)	DL-56
	2. Replace main body ECU (Instrument panel J/B)	-
All doors cannot be locked/unlocked simultaneously by door key cylinder	1. Driver side door key lock and unlock switch circuit	DL-52
	2. Multiplex network master switch assembly	DL-13
	3. Replace main body ECU (Instrument panel J/B)	-
Driver side door lock does not operate	1. Driver side door lock motor circuit	DL-31
	2. Replace main body ECU (Instrument panel J/B)	-
Passenger side door lock does not operate	1. Front passenger side door lock motor circuit	DL-34
	2. Replace main body ECU (Instrument panel J/B)	-
Rear LH side door lock does not operate	1. Rear door lock motor LH circuit	DL-37
	2. Replace main body ECU (Instrument panel J/B)	-
Rear RH side door lock does not operate	1. Rear door lock motor RH circuit	DL-40
	2. Replace main body ECU (Instrument panel J/B)	-
Luggage compartment door unlock does not operate	1. Luggage compartment door lock circuit	DL-46
	2. Luggage compartment door courtesy switch circuit	DL-43
	3. Luggage compartment door key cylinder switch circuit	DL-49
	4. Replace main body ECU (Instrument panel J/B)	-
Key lock-in prevention function does not work properly (manual operation and key-linked lock are active)	1. Door courtesy switch circuit (Driver side)	LI-41
	2. Smart key system (Entry)	DL-121
	3. Replace main body ECU (Instrument panel J/B)	-
Shift-linked automatic door lock does not operate	1. CAN communication system	CA-7
	2. Replace main body ECU (Instrument panel J/B)	-
One or more doors cannot be locked/unlocked simultaneously (Wireless key operation)	1. Wireless door lock system	DL-71
	2. Driver side door unlock detection switch circuit	DL-19
	3. Front passenger door unlock detection switch circuit	DL-22
	4. Rear door unlock detection switch LH circuit	DL-25
	5. Rear door unlock detection switch RH circuit	DL-28
	6. Replace main body ECU (Instrument panel J/B)	-

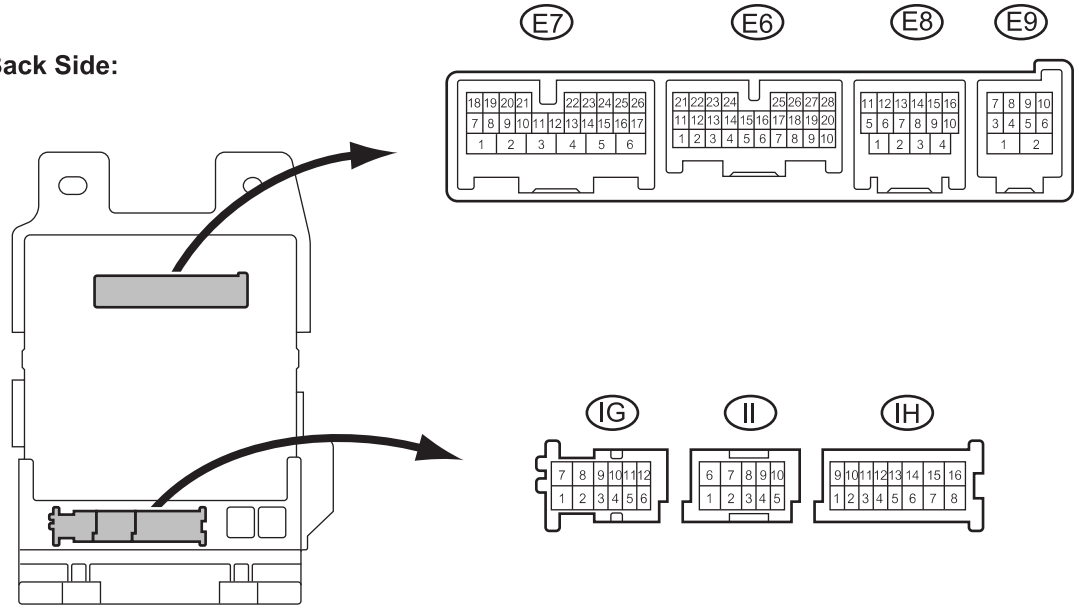
TERMINALS OF ECU

1. CHECK MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

Front Side:



Back Side:



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(a) Disconnect the E6, E7, IO, IK, IM, ID, IJ, and E9 J/B and ECU connectors.
(b) Measure the voltage and resistance according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
DCTY (E7-24) - Body ground	L - Body ground	Driver door courtesy switch	Driver door CLOSED → OPEN	10 kΩ or higher → Below 1 Ω
RCTY (E6-7) - Body ground	GR - Body ground	Rear right door courtesy switch input	Rear right door CLOSED → OPEN	10 kΩ or higher → Below 1 Ω
PCTY (E6-21) - Body ground	Y - Body ground	Passenger door courtesy switch input	Passenger door CLOSED → OPEN	10 kΩ or higher → Below 1 Ω
LCTY (IO-7) - Body ground	LG - Body ground	Rear left door courtesy switch input	Rear left door CLOSED → OPEN	10 kΩ or higher → Below 1 Ω
GND2 (IM-9) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
GND1 (IF-10) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
L1 (IJ-3) - Body ground	L - Body ground	Passenger door control switch LOCK input	Passenger door control switch OFF → LOCK	10 kΩ or higher → Below 1 Ω
UL1 (IJ-4) - Body ground	G - Body ground	Passenger door control switch UNLOCK input	Passenger door control switch OFF → UNLOCK	10 kΩ or higher → Below 1 Ω
L1 (IK-15) - Body ground	V - Body ground	Driver door control switch LOCK input	Driver door control switch OFF → LOCK	10 kΩ or higher → Below 1 Ω
UL1 (IK-12) - Body ground	G - Body ground	Driver door control switch UNLOCK input	Driver door control switch OFF → UNLOCK	10 kΩ or higher → Below 1 Ω
LGCY (E6-25) - Body ground	W - Body ground	Luggage compartment door courtesy switch input	Luggage compartment door CLOSED → OPEN	10 kΩ or higher → Below 1 Ω
TCAN (E8-2) - Body ground	O - Body ground	Luggage compartment door key-linked door unlock input	Using mechanical key, operate luggage compartment door lock cylinder to CENTER → CANCEL	10 kΩ or higher → Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.
(c) Reconnect the J/B and ECU connectors.
(d) Measure the voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IG (IF-11) - Body ground	B - Body ground	Engine power supply	Power switch on (IG) → off	10 to 14 V → Below 1 V
ACC (IF-2) - Body ground	L - Body ground	ACC power supply	Power switch on (ACC) → off	10 to 14 V → Below 1 V
LSWL (IP-5) - Body ground	GR - Body ground	Rear left door lock position switch input	Rear left door UNLOCK → LOCK	Below 1 V → 10 to 14 V (or pulse generation)
LSWD (E7-9) - Body ground	L - Body ground	Driver door lock position switch input	Driver door UNLOCK → LOCK	Below 1 V → 10 to 14 V (or pulse generation)
UL3 (E7-10) - Body ground	GR - Body ground	Driver door key-linked door unlock input	Using mechanical key, operate driver door lock cylinder to LOCK → UNLOCK	10 to 14 V (or pulse generation) → Below 1 V
L2 (IK-16) - Body ground	BR - Body ground	Driver door key-linked door lock input	Using mechanical key, operate driver door lock cylinder to UNLOCK → LOCK	10 to 14 V (or pulse generation) → Below 1 V

DL

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
ACT+ (IJ-1) - Body ground	L - Body ground	Door lock motor LOCK drive output (Front passenger door)	Door control switch (Master switch or passenger side switch) or driver side door key cylinder OFF → LOCK → OFF	Below 1 V → 10 to 14 V → Below 1 V
ACT+ (IP-11) - Body ground	W - Body ground	Door lock motor LOCK drive output (Rear door LH)	Door control switch (Master switch or passenger side switch) or driver side door key cylinder OFF → LOCK → OFF	Below 1 V → 10 to 14 V → Below 1 V
ACT+ (IF-5) - Body ground	L - Body ground	Door lock motor LOCK drive output (Rear door RH)	Door control switch (Master switch or passenger side switch) or driver side door key cylinder OFF → LOCK → OFF	Below 1 V → 10 to 14 V → Below 1 V
ACT- (IP-6) - Body ground	G - Body ground	Door lock motor UNLOCK drive output (Rear door LH)	Door control switch (Master switch or passenger side switch) or driver side door key cylinder OFF → UNLOCK → OFF	Below 1 V → 10 to 14 V → Below 1 V
ACT- (IF-18) - Body ground	B - Body ground	Door lock motor UNLOCK drive output (Rear door RH)	Door control switch (Master switch or passenger side switch) or driver side door key cylinder OFF → UNLOCK → OFF	Below 1 V → 10 to 14 V → Below 1 V
TR+ (E7-1) - Body ground	B - Body ground	Door lock motor UNLOCK drive output (Luggage compartment door)	Luggage compartment open switch (Transmitter) or luggage compartment door key cylinder OFF → UNLOCK → OFF	Below 1 V → 10 to 14 V → Below 1 V
ACTD (E7-5) - Body ground	GR - Body ground	Door lock motor UNLOCK drive output (Driver door)	Door control switch (Master switch or passenger side switch) or driver side door key cylinder OFF → UNLOCK → OFF	Below 1 V → 10 to 14 V → Below 1 V
ACT+ (IK-2) - Body ground	W - Body ground	Door lock motor LOCK drive output (Driver door)	Door control switch (Master switch or passenger side switch) or driver side door key cylinder OFF → LOCK → OFF	Below 1 V → 10 to 14 V → Below 1 V
ACT- (IJ-2) - Body ground	LG - Body ground	Door lock motor UNLOCK drive output (Front passenger)	Door control switch (Master switch or passenger side switch) or driver side door key cylinder OFF → UNLOCK → OFF	Below 1 V → 10 to 14 V → Below 1 V
LSWR (E6-5) - Body ground	V - Body ground	Rear right door lock position switch input	Rear right door UNLOCK → LOCK	Below 1 V → 10 to 14 V (or pulse generation)
LSWP (E6-27) - Body ground	LG - Body ground	Passenger door lock position switch input	Passenger door UNLOCK → LOCK	Below 1 V → 10 to 14 V (or pulse generation)

If the result is not as specified, the main body ECU (instrument panel J/B) may have a malfunction.

DIAGNOSIS SYSTEM

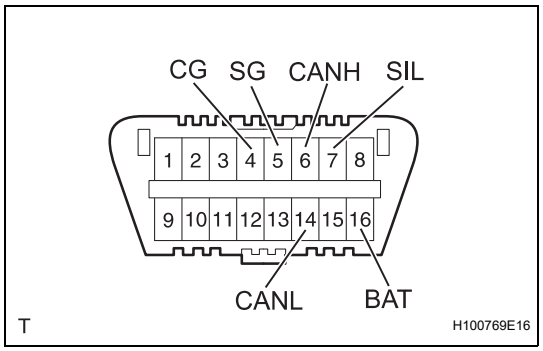
1. DESCRIPTION

(a) Power door lock control system data and Diagnostic Trouble Codes (DTCs) can be read through the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the intelligent tester to check for malfunctions and perform repairs.

2. CHECK DLC3

HINT:

The vehicle uses the ISO 15765-4 communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.



Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Power Switch OFF*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Power Switch OFF*	200 Ω or more
CANL (14) - CG (4)	LOW-level CAN bus line	Power Switch OFF*	200 Ω or more
CANH (6) - BAT (16)	HIGH-level CAN bus line	Power Switch OFF*	6 kΩ or more
CANL (14) - BAT (16)	LOW-level CAN bus line	Power Switch OFF*	6 kΩ or more

NOTICE:

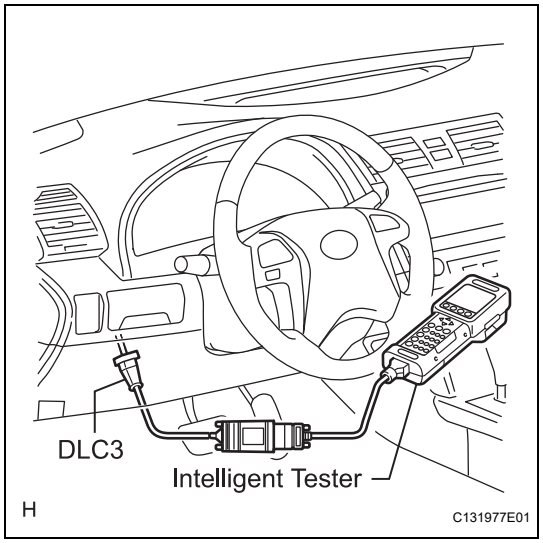
***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the power switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.



3. INSPECT BATTERY VOLTAGE

Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding.

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator, and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / DATA LIST.
(d) Read the DATA LIST according to the display on the tester.

MAIN BODY:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
D DOR CTY SW	Driver side door courtesy light switch signal/ON or OFF	ON: Driver side door is OPEN OFF: Driver side door is CLOSED	-
P DOR CTY SW	Passenger side door courtesy light switch signal/ON or OFF	ON: Passenger side door is OPEN OFF: Passenger side door is CLOSED	-
RR DOR CTY SW	Rear right door courtesy light switch signal/ON or OFF	ON: Rear right door is OPEN OFF: Rear right door is CLOSED	-
RL DOR CTY SW	Rear left door courtesy light switch signal/ON or OFF	ON: Rear left door is OPEN OFF: Rear left door is CLOSED	-
D LOCK POS SW	Driver side door lock position switch signal/ON or OFF	ON: Driver side door is unlocked OFF: Driver side door is locked	-
P LOCK POS SW	Front passenger side door lock position switch signal/ON or OFF	ON: Front passenger side door is unlocked OFF: Front passenger side door is locked	-
RR LOCK POS SW	Rear right door lock position switch signal/ON or OFF	ON: Rear right door is unlocked OFF: Rear right door is locked	-
RL LOCK POS SW	Rear left door lock position switch signal/ON or OFF	ON: Rear left door is unlocked OFF: Rear left door is locked	-
LUGG COURTSY SW	Luggage compartment door courtesy light switch signal/ON or OFF	ON: Luggage compartment door is OPEN OFF: Luggage compartment door is CLOSED	-
D/L SW-LOCK	Door control switch lock signal/ ON or OFF	ON: Door control switch is pushed to lock position OFF: Door control switch is not pushed to lock position	-
D/L SW-UNLOCK	Door control switch unlock signal/ ON or OFF	ON: Door control switch is pushed to unlock position OFF: Door control switch is not pushed to unlock position	-
DOR KEY SW-LOCK	Driver door lock/unlock switch lock signal (key-linked lock switch)/ON or OFF	ON: Driver side door key cylinder is turned to lock position OFF: Driver side door key cylinder is turned to unlock position	-
D DOR KEY SW-ULCK	Driver door lock/unlock switch unlock signal (key-linked unlock switch)/ON or OFF	ON: Driver side door key cylinder is turned to unlock position OFF: Driver side door key cylinder is turned to lock position	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
TRUNK KEY UNLK	Luggage compartment door key cylinder switch/ON or OFF	ON: Mechanical key is inserted and turned to CANCEL position OFF: Mechanical key is inserted and turned to except CANCEL position	-

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows relays, VSVs, actuators, and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / ACTIVE TEST.
(d) Perform the ACTIVE TEST according to the display on the tester.

MAIN BODY:

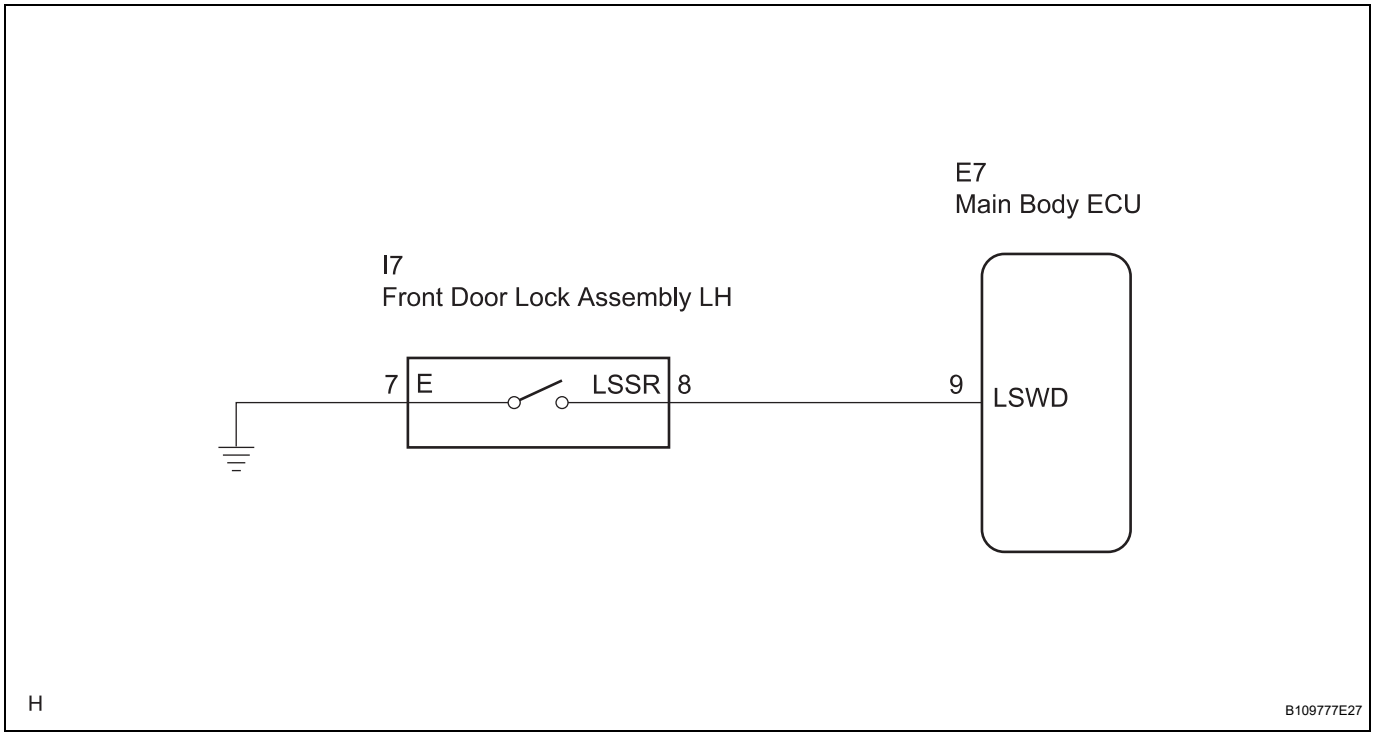
Tester Display	Test Part	Control Range	Diagnostic Note
DOOR LOCK	Operate door lock motor	LOCK/UNLOCK	-
D DOOR UNLOCK	Operate driver door lock motor	UNLOCK	-
TRUNK/BDOR OPEN	Operate luggage compartment door unlock motor	UNLOCK	-

Driver Side Door UNLOCK Detection Switch Circuit

DESCRIPTION

The driver's door unlock detection switch is built into the driver's door lock assembly. The switch turns on when the driver's door is locked and turns off when the door is unlocked.
The main body ECU is connected to the driver's door lock assembly via terminal LSWD and driver's door lock/unlock state signals are input to the main body ECU.
The main body ECU applies voltage to the door unlock detection switch via terminal LSWD. When the door unlock detection switch is on (there is continuity between the switch terminals), a lock state signal is input to the main body ECU. When the switch is off (there is no continuity between the switch terminals), an unlock state signal is input.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF DATA LIST (DOOR UNLOCK DETECTION SWITCH)

(a) Check the DATA LIST to ensure proper function of the door unlock detection switch.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
D LOCK POS SW	Driver side door unlock detection switch signal /ON or OFF	ON: Driver side door is unlocked OFF: Driver side door is locked	-

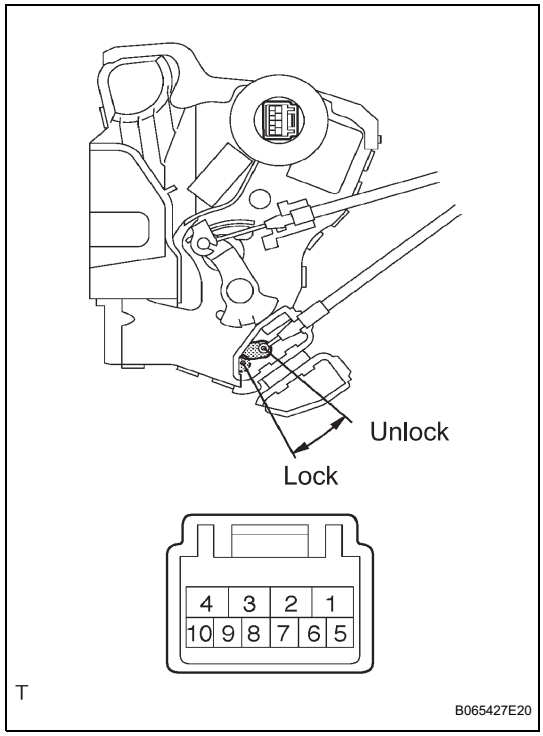
OK:
The display is as specified in the normal condition column.

NG	Go to step 2

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2 INSPECT FRONT DOOR LOCK ASSEMBLY (DOOR UNLOCK DETECTION SWITCH)



(a) Remove the front door lock assembly LH.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Measurement Condition	Door Lock Condition	Specified Condition
7 - 8	Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock	10 kΩ or higher
7 - 8	Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock	Below 1 Ω

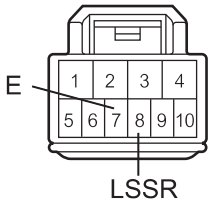
NG → **REPLACE FRONT DOOR LOCK ASSEMBLY**

OK

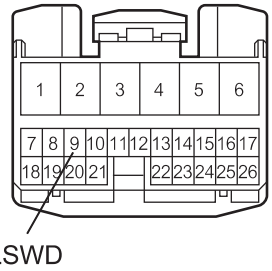
3	CHECK WIRE HARNESS (FRONT DOOR LOCK ASSEMBLY - MAIN BODY ECU)

Wire Harness Side:

I7
Front Door Lock Assembly LH



E7
Main Body ECU



H

B112606E01

(a) Disconnect the front door lock assembly LH connector.
(b) Disconnect the main body ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
I7-8 (LSSR) - E7-9 (LSWD)	Always	Below 1 Ω
I7-8 (LSSR) - Body ground	Always	10 kΩ or higher
I7-7 (E) - Body ground	Always	Below 1 Ω

DL

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MAIN BODY ECU

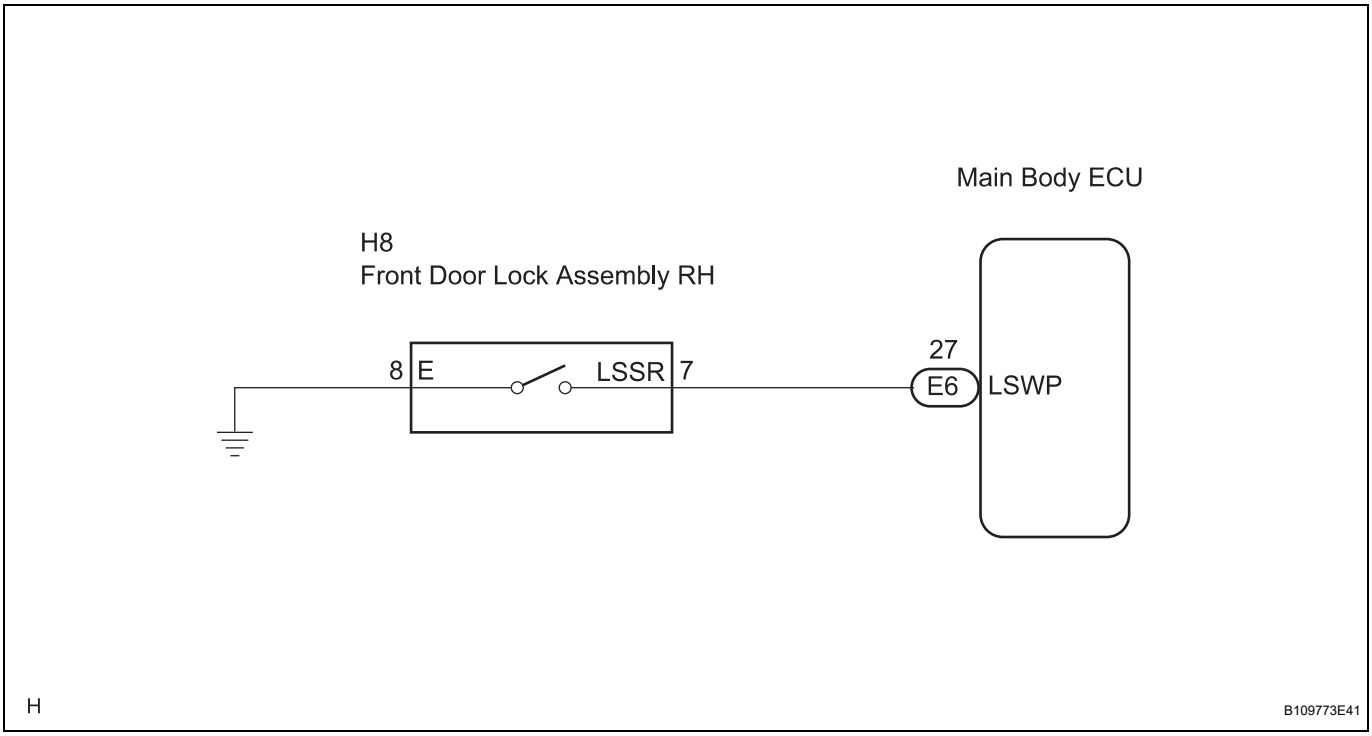
Front Passenger Side Door UNLOCK Detection Switch Circuit

DESCRIPTION

The front passenger door unlock detection switch is built into the front passenger door lock assembly. The switch turns on when the front passenger door is locked and turns off when the door is unlocked.
The main body ECU is connected to the front passenger door lock assembly via terminal LSWP and front passenger door lock/unlock state signals are input to the ECU.
The main body ECU applies voltage to the door unlock detection switch via terminal LSWP. When the door unlock detection switch is on (there is continuity between the switch terminals), a lock state signal is input to the ECU. When the switch is off (there is no continuity between the switch terminals), an unlock state signal is input.

WIRING DIAGRAM

DL



INSPECTION PROCEDURE

1	READ VALUE OF DATA LIST (DOOR UNLOCK DETECTION SWITCH)

(a) Check the DATA LIST to ensure proper function of the door unlock detection switch.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
P LOCK POS SW	Passenger side door lock position switch signal /ON or OFF	ON: Passenger side door lock is in UNLOCK position OFF: Passenger side door lock is in LOCK position	-

OK:

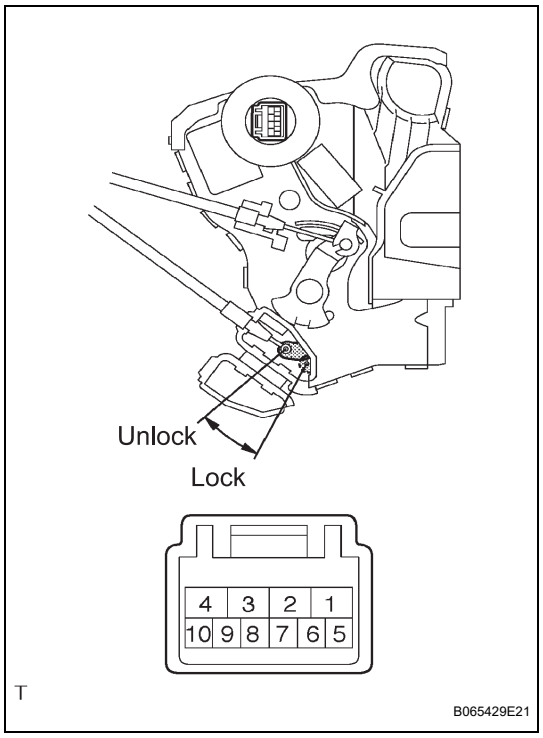
The display is as specified in the normal condition column.

NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2 INSPECT FRONT DOOR LOCK ASSEMBLY (DOOR UNLOCK DETECTION SWITCH)



(a) Remove the front door lock assembly RH.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Measurement Condition	Door Lock Condition	Specified Condition
7 - 8	Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	LOCK	10 kΩ or higher
7 - 8	Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	UNLOCK	Below 1 Ω

NG → **REPLACE FRONT DOOR LOCK ASSEMBLY**

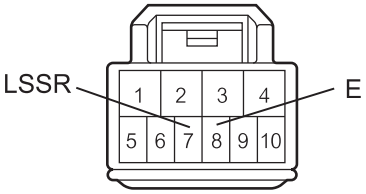
OK

DL

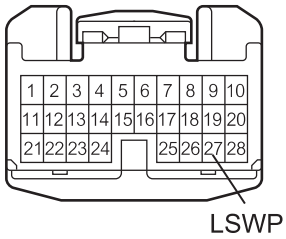
3	CHECK WIRE HARNESS (FRONT DOOR LOCK ASSEMBLY - MAIN BODY ECU)

Wire Harness Side:

H8
Front Door Lock Assembly RH



E6
Main Body ECU



H

B111708E17

(a) Disconnect the front door lock assembly RH connector.
(b) Disconnect the ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
H8-7 (LSSR) - E6-27 (LSWP)	Always	Below 1 Ω
H8-7 (LSSR) - Body ground	Always	10 kΩ or higher
H8-8 (E) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

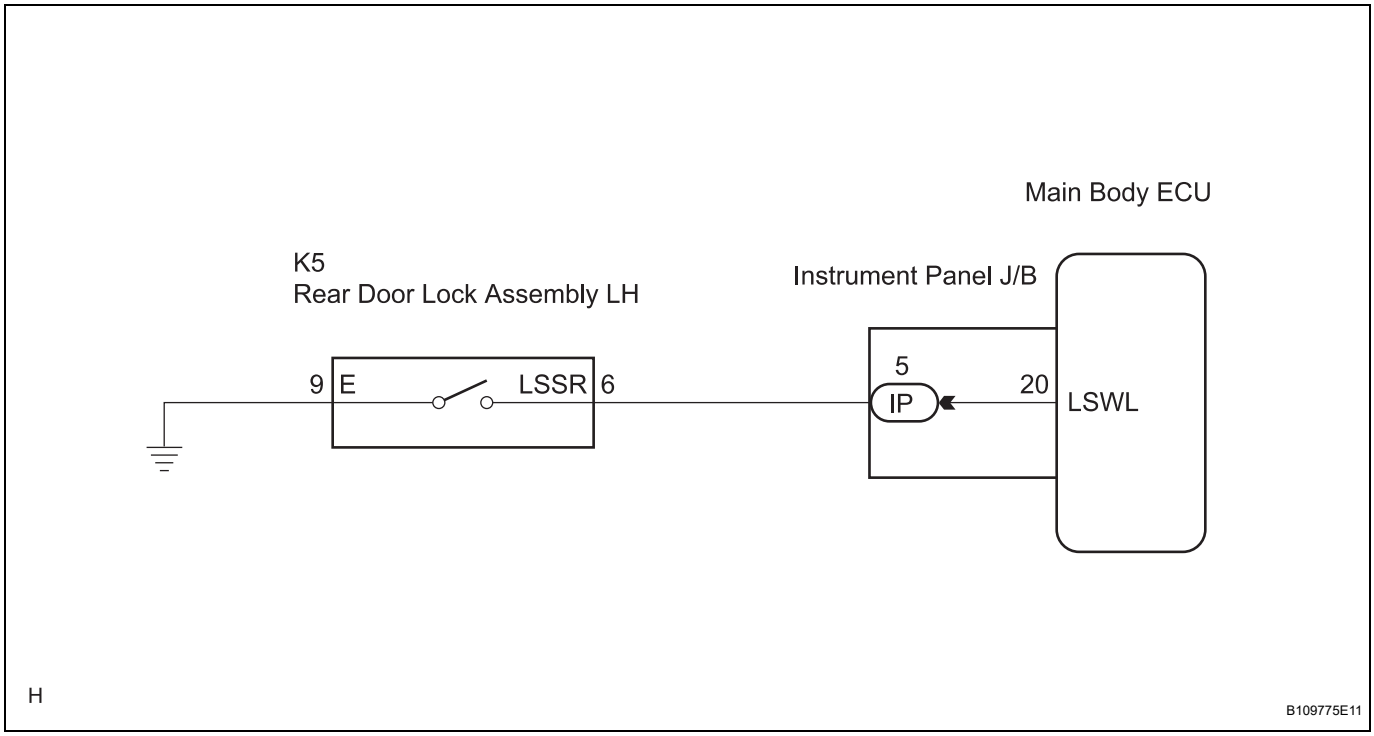
REPLACE MAIN BODY ECU

Rear Door UNLOCK Detection Switch LH Circuit

DESCRIPTION

The rear left door unlock detection switch is built into the rear left door lock assembly. The switch turns on when the rear left door is locked and turns off when the door is unlocked.
The main body ECU is connected to the rear left door lock assembly via terminal LSWL and rear left side door lock/unlock state signals are input to the ECU.
The main body ECU applies voltage to the door unlock detection switch via terminal LSWL. When the door unlock detection switch is on (there is continuity between the switch terminals), a lock state signal is input to the ECU. When the switch is off (there is no continuity between the switch terminals), an unlock state signal is input.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF DATA LIST (UNLOCK DETECTION SWITCH)

(a) Check the DATA LIST to ensure proper function of the door unlock detection switch.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
RL LOCK POS SW	Rear left door lock position switch signal / ON or OFF	ON: Rear left door lock is in UNLOCK position OFF: Rear left door lock is in LOCK position	-

OK:

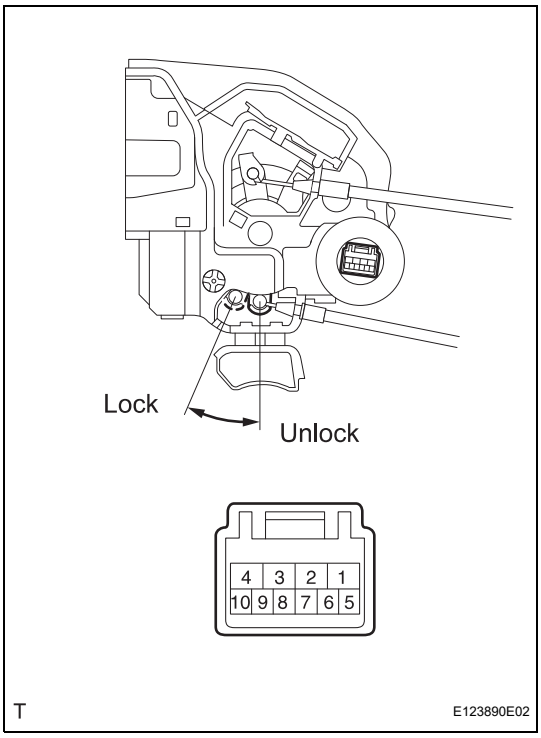
The display is as specified in the normal condition column.

NG → Go to step 2

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2 INSPECT REAR DOOR LOCK ASSEMBLY (UNLOCK DETECTION SWITCH)



(a) Remove the rear door lock assembly LH.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Measurement Condition	Door Lock Condition	Specified Condition
6 - 9	Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock	10 kΩ or higher
6 - 9	Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock	Below 1 Ω

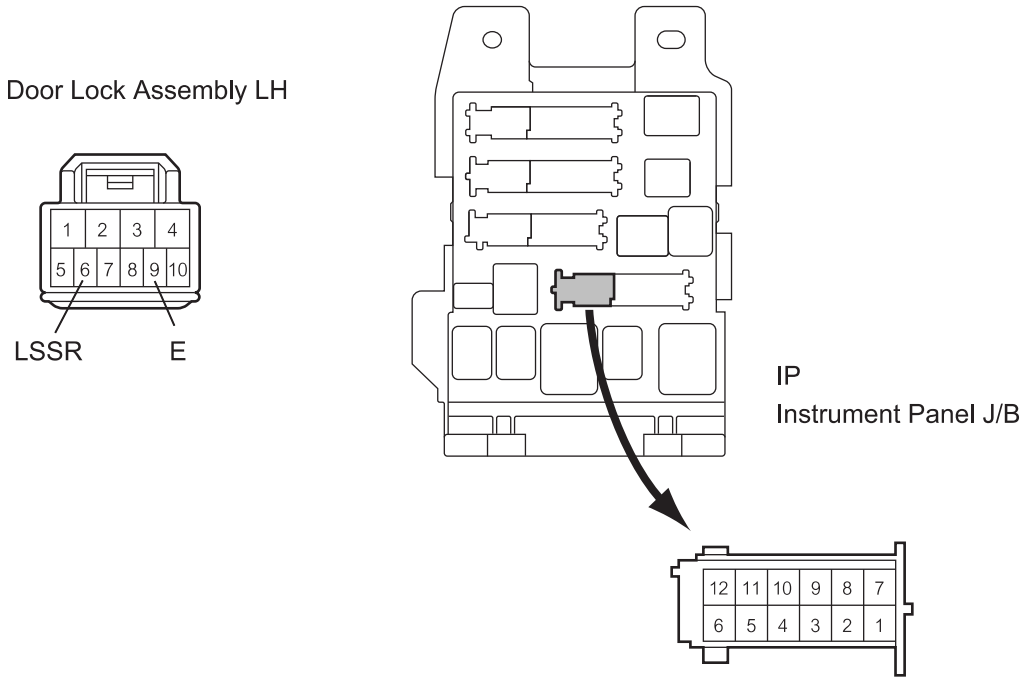
NG → REPLACE REAR DOOR LOCK ASSEMBLY

OK

3 CHECK WIRE HARNESS (REAR DOOR LOCK ASSEMBLY - MAIN BODY ECU)

(a) Disconnect the rear door lock assembly LH connector.

Wire Harness Side:



(b) Disconnect the ECU (instrument panel J/B) connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
K5-6 (LSSR) - IP-5	Always	Below 1 Ω
K5-6 (LSSR) - Body ground	Always	10 kΩ or higher
K5-9 (E) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

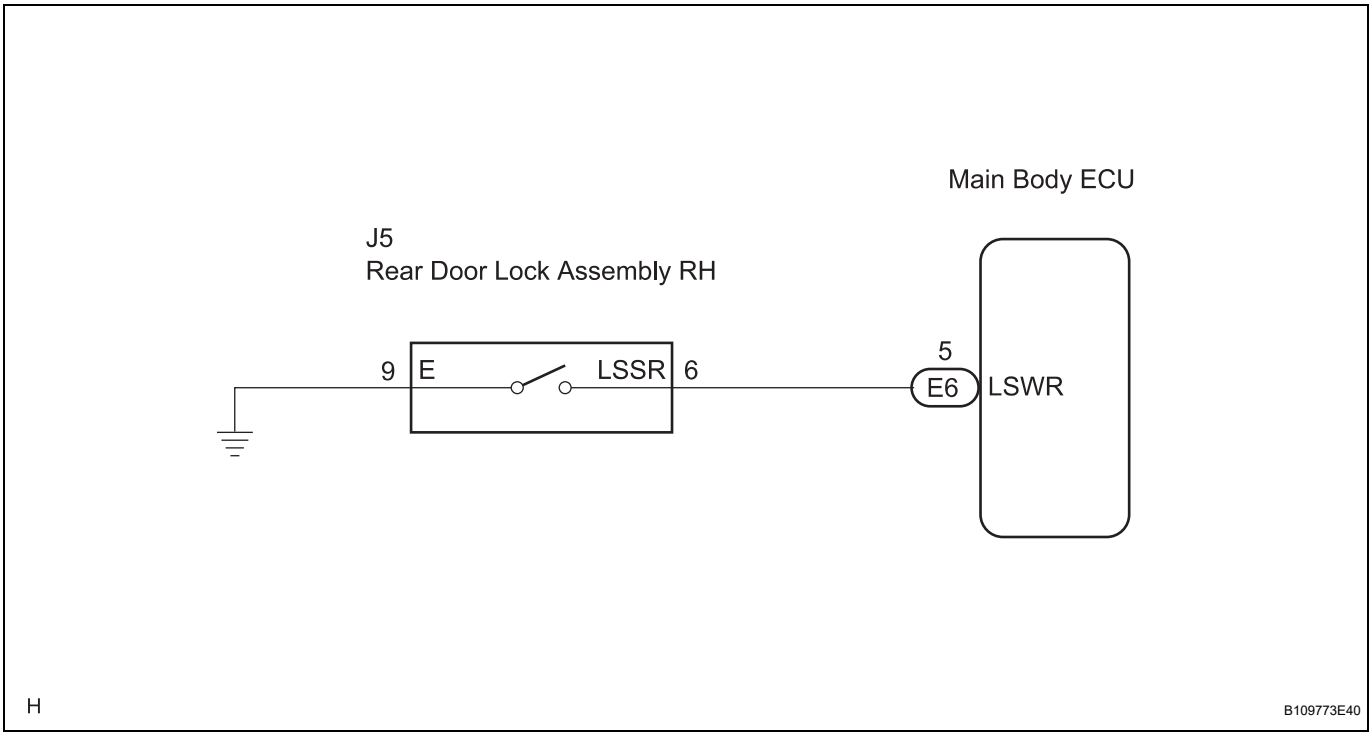
REPLACE MAIN BODY ECU (INSTRUMENT PANEL J/B)

Rear Door UNLOCK Detection Switch RH Circuit

DESCRIPTION

The rear right door unlock detection switch is built into the rear right door lock assembly. The switch turns on when the rear right door is locked and turns off when the door is unlocked.
The main body ECU is connected to the rear right door lock assembly via terminal LSWR and rear right side door lock/unlock state signals are input to the ECU.
The main body ECU applies voltage to the door unlock detection switch via terminal LSWR. When the door unlock detection switch is on (there is continuity between the switch terminals), a lock state signal is input to the ECU. When the switch is off (there is no continuity between the switch terminals), an unlock state signal is input.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF DATA LIST (UNLOCK DETECTION SWITCH)

(a) Check the DATA LIST to ensure proper function of the door unlock detection switch.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
RR LOCK POS SW	Rear right door lock position switch signal / ON or OFF	ON: Rear right door lock is in UNLOCK position OFF: Rear right door lock is in LOCK position	-

OK:

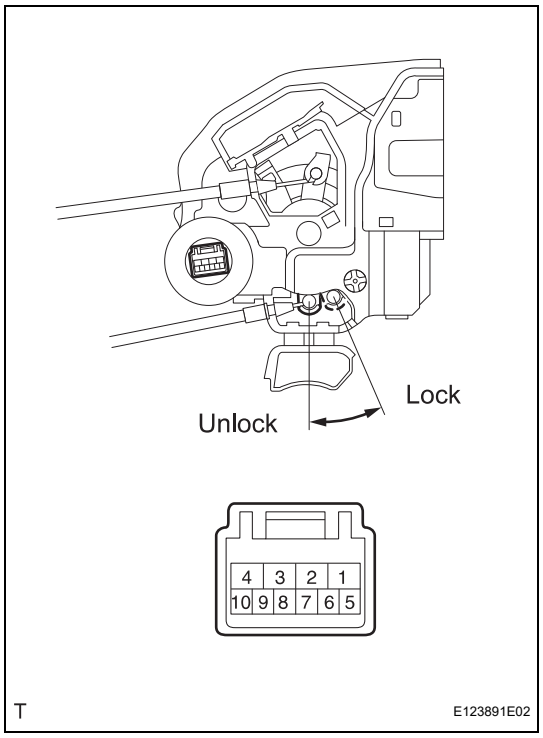
The display is as specified in the normal condition column.

NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2 INSPECT REAR DOOR LOCK ASSEMBLY (UNLOCK DETECTION SWITCH)



(a) Remove the rear door lock assembly RH.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Measurement Condition	Door Lock Condition	Specified Condition
6 - 9	Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock	10 kΩ or higher
6 - 9	Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock	Below 1 Ω

NG → **REPLACE REAR DOOR LOCK ASSEMBLY**

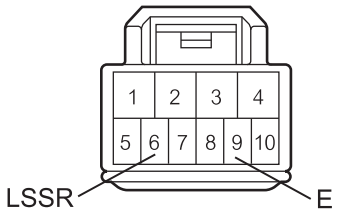
OK

DL

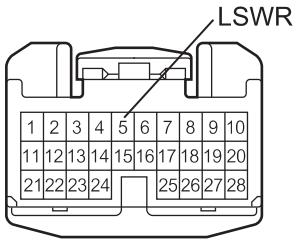
3	CHECK WIRE HARNESS (REAR DOOR LOCK - MAIN BODY ECU (INSTRUMENT PANEL J/B))

Wire Harness Side:

J5
Rear Door Lock Assembly RH



E6
Main Body ECU



H

B111708E16

(a) Disconnect the rear door lock assembly RH connector.
(b) Disconnect the ECU (instrument panel J/B) connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
J5-6 (LSSR) - E6-5 (LSWR)	Always	Below 1 Ω
J5-6 (LSSR) - Body ground	Always	10 kΩ or higher
J5-9 (E) - Body ground	Always	Below 1 Ω

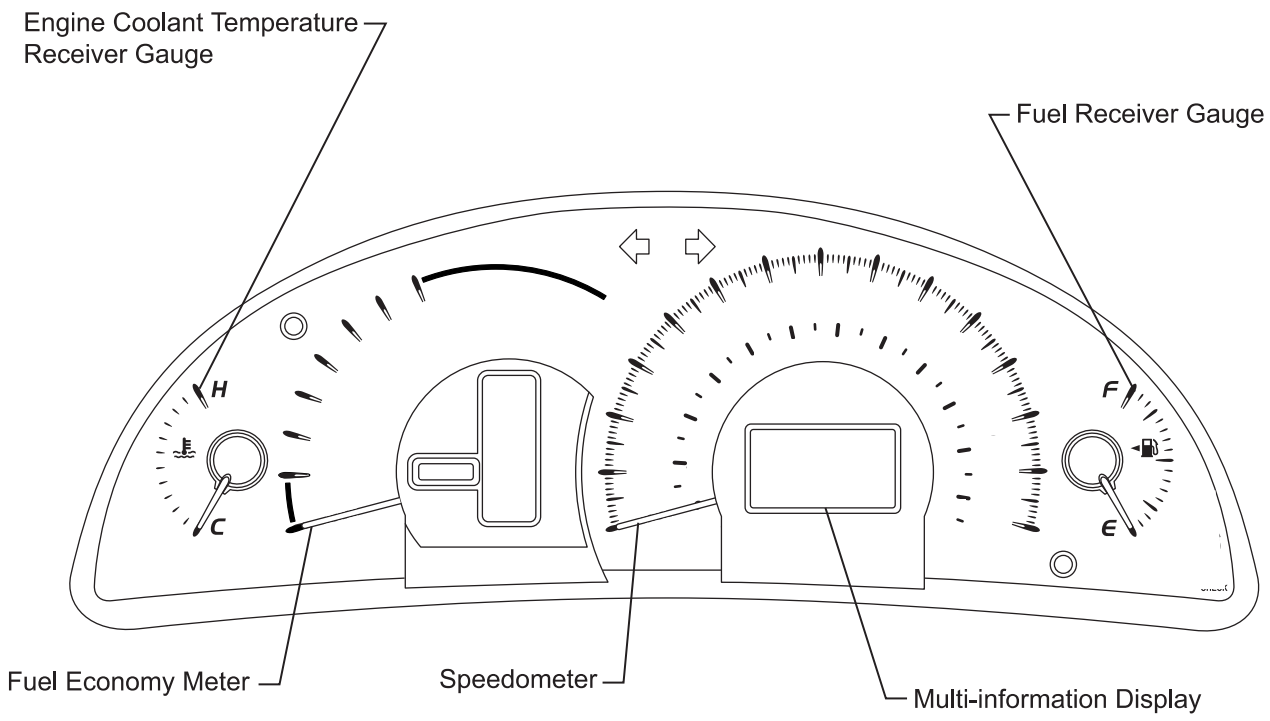
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MAIN BODY ECU (INSTRUMENT PANEL J/B)

SYSTEM DESCRIPTION

1. METER GAUGE



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METER GAUGE:

Item	Detail
Speedometer	Indicates the vehicle speed receiving a signal from the skid control ECU. (CAN (CAN No. 1 Bus))
Fuel Economy Meter	Indicates the fuel consumption based on a signal received from the skid control ECU and hybrid vehicle control ECU. (CAN (CAN No. 1 Bus))
Engine Coolant Temperature Receiver Gauge	Indicates the engine coolant temperature based on a signal received from the hybrid vehicle control ECU. (CAN (CAN No. 1 Bus))
Fuel Receiver Gauge	Indicates the fuel level based on a signal received from the fuel sender gauge. (Direct Line)

WARNING/INDICATOR:

Item	Detail
TURN SIGNAL	Receives a turn signal from the turn signal flasher. (Direct Line)
BEAM	Receives a beam signal from the main body ECU. (CAN (CAN No. 1 Bus))
CHARGE	Receives a charge light signal from the hybrid vehicle control ECU. (CAN (Can No. 1 Bus))
CHECK E/G	Receives a check engine light signal from the hybrid vehicle control ECU. (Direct Line)
READY	Receives a ready warning light signal from hybrid vehicle control ECU. (CAN (CAN No. 1 Bus))
DOOR	The open door indicator light comes on receiving a door condition signal from the main body ECU. (CAN (CAN MS Bus))
D-BELT	Receives a driver side seat belt signal from the center airbag sensor assembly. (CAN (CAN No. 1 Bus))
P-BELT	Receives a passenger side seat belt signal from the center airbag sensor assembly via the main body ECU (CAN (CAN No. 1 Bus)) and transmits a passenger side seat belt condition signal to the clock assembly. (Direct Line)
HEAD (*1)	Receives a HEAD indicator light signal from the main body ECU. (CAN (CAN No. 1 Bus))
TAIL (*2)	Receives a TAIL indicator light signal from the main body ECU. (CAN (CAN No. 1 Bus))

Item	Detail
A/T SHIFT	Receives an A/T shift condition signal from the park/neutral position switch and the hybrid vehicle control ECU. (CAN (CAN No. 1 Bus))
FUEL	Receives a fuel signal from the fuel sender gauge. (Direct Line)
ABS	Receives an ABS signal from the skid control ECU. (CAN (CAN No. 1 Bus))
SLIP	Receives a SLIP signal from the skid control ECU. (CAN (CAN No. 1 Bus))
BRAKE	Receives a brake signal from skid control ECU. (CAN (CAN No. 1 Bus))
ECB	Receives an electrically controlled brake warning light signal from the skid control ECU. (CAN (CAN No. 1 Bus))
CRUISE	Receives a cruise signal from the hybrid vehicle control ECU. (CAN (CAN No. 1 Bus))
AIRBAG	Receives an airbag signal from the center airbag sensor assembly. (CAN (CAN No. 1 Bus))
Tire pressure (*3)	Receives a tire pressure signal from the tire pressure warning ECU. (Direct Line)
Oil replacement reminder (*1)	The oil replacement reminder light comes on/blinks to remind the driver to change the engine oil depending on the vehicle driving distance.
Master caution indicator light	The master caution indicator light comes on to indicate that an oil maintenance resetting procedure has finished.
P/S	Receives a electronic power steering warning light signal from the electronic power steering ECU. (CAN (CAN No. 1 Bus))

ME

*1: for U.S.A.
*2: for Canada
*3: with Tire Pressure Warning System
HINT:

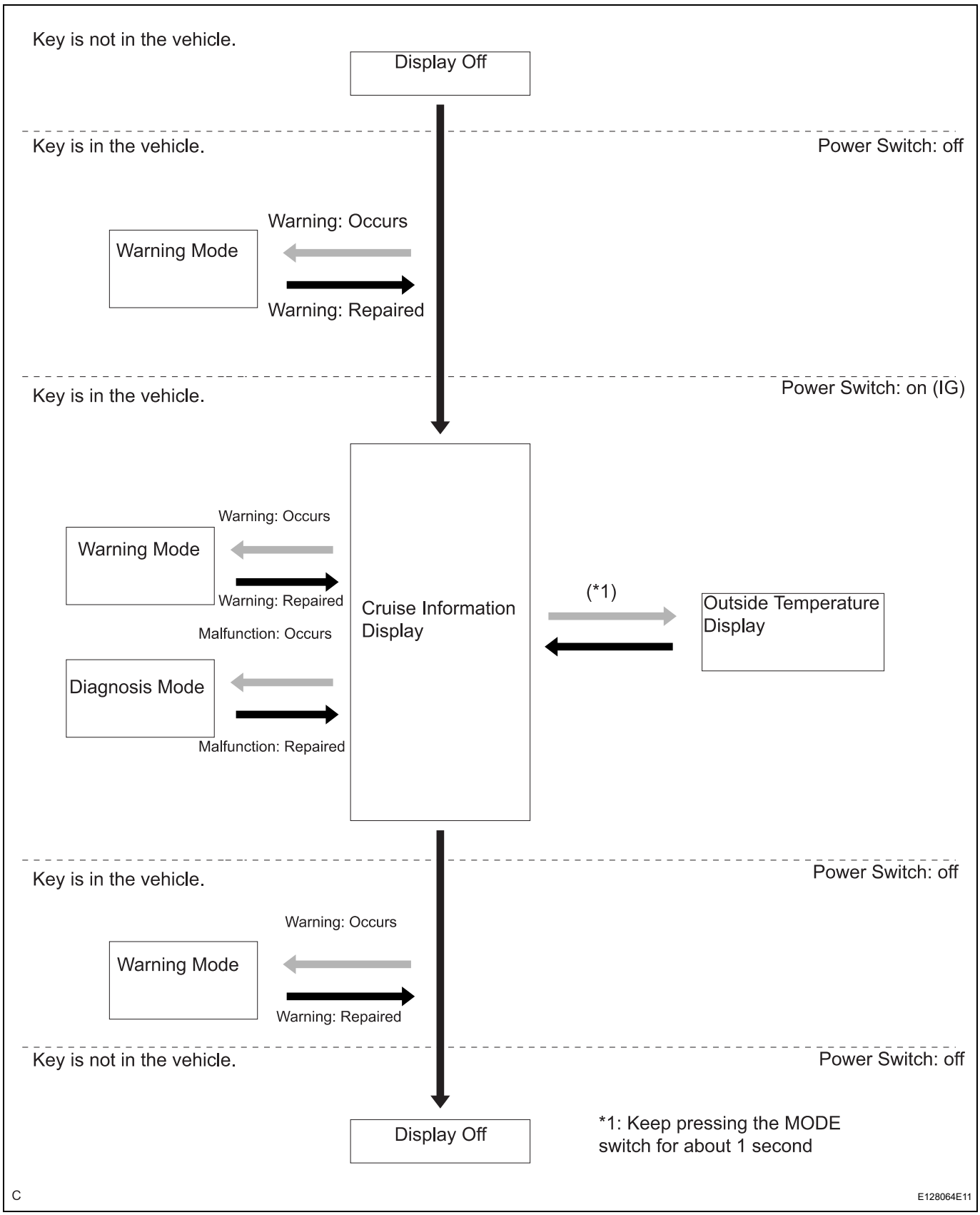
- The multi-information display has been located in the center of the speedometer.
- The display shows a message or animation for each of the functions described in the table below.

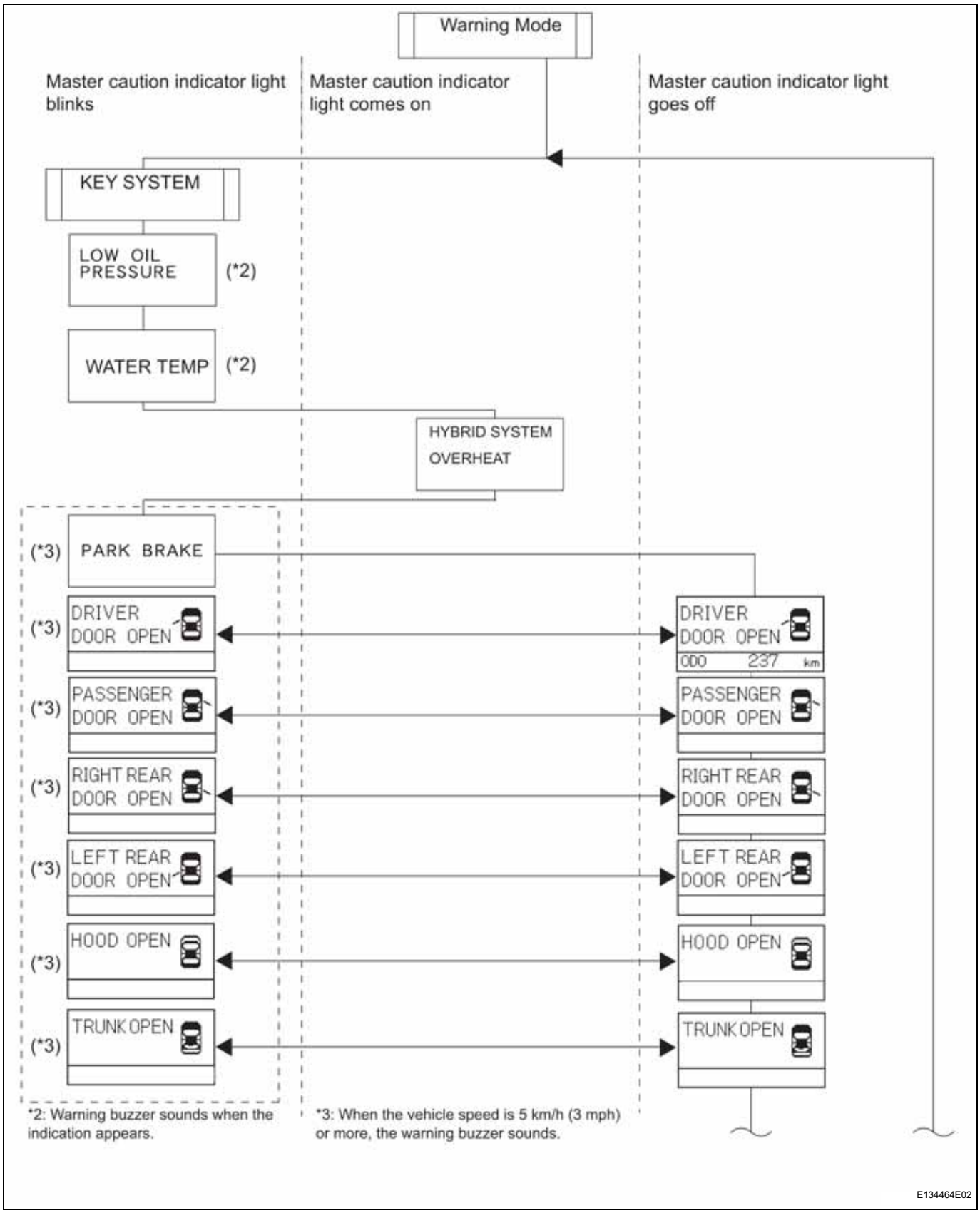
MULTI-INFORMATION DISPLAY:

Item		Detail
Cruise Information	• Outside Temperature • Driving Range • Average Fuel Consumption since refueling • Distance driven since engine start • Average speed since engine start	Five types of information (outside temperature, driving range, average fuel consumption after refueling, distance driven since engine start and average speed) can be displayed.
Warning	• Door Warning • Oil Replacement Reminder (*1)	Interrupts the multi-information display immediately when a warning occurs.
Energy Monitor Display (Average Fuel Consumption Since Starting)		• Indicates the energy transmission direction for checking the current drive method (engine, motor or both), the power generation status of the engine and the status of regenerative energy use. • The SOC (state of charge) of the battery can be checked on the meter using an 9-stage display, which is provided in the battery illustration. • The data is updated every 0.3 second.
Eco Drive Level Display		• The actual fuel consumption conditions are indicated in 4 levels. • The display can be changed by using the DISP switch.
Warning		Interrupts the multi-information display immediately when a warning occurs.
Diagnosis		DTC (Diagnostic Trouble Code) for the VDIM system can be displayed.

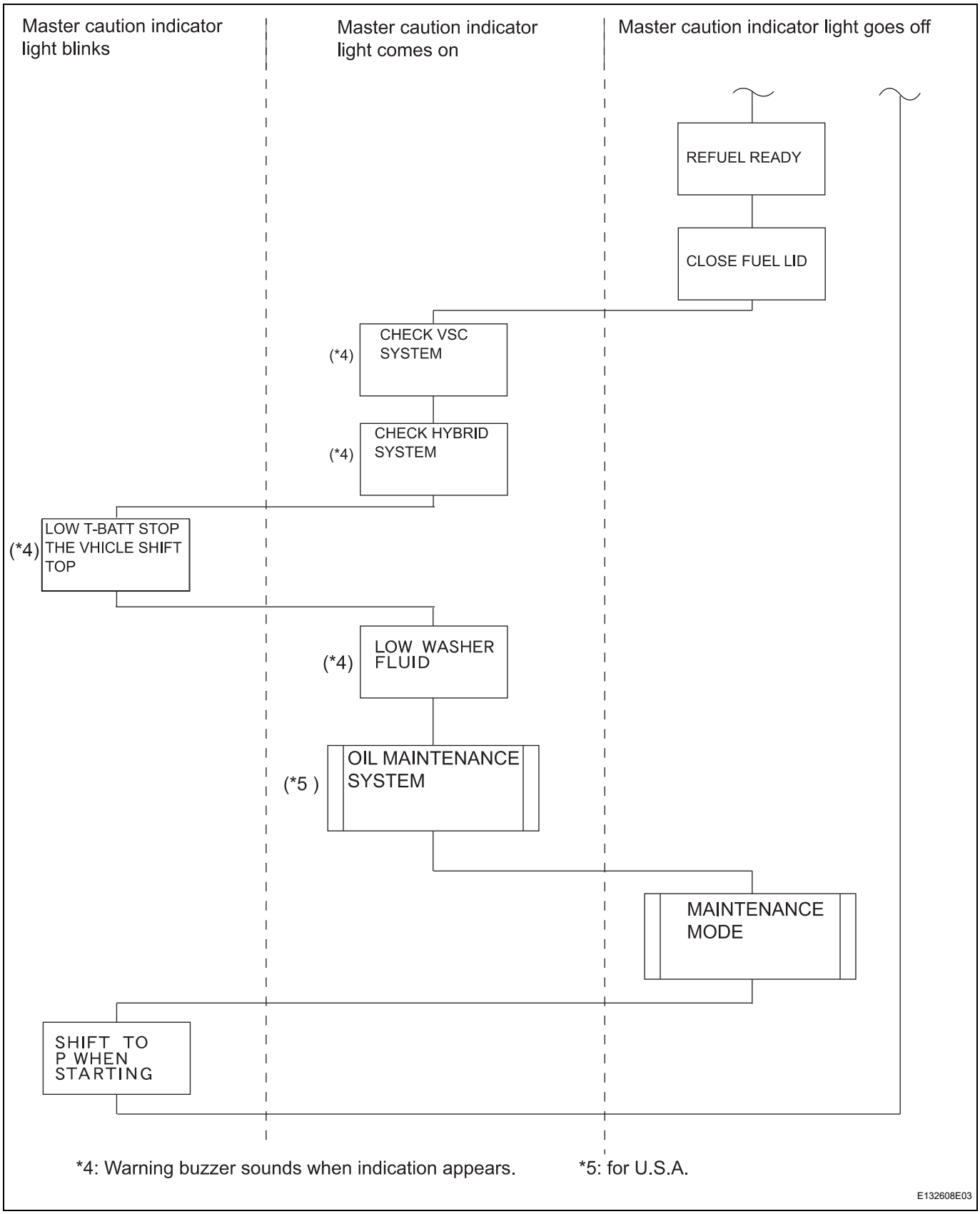
*1: for U.S.A.

2. MULTI-INFORMATION DISPLAY



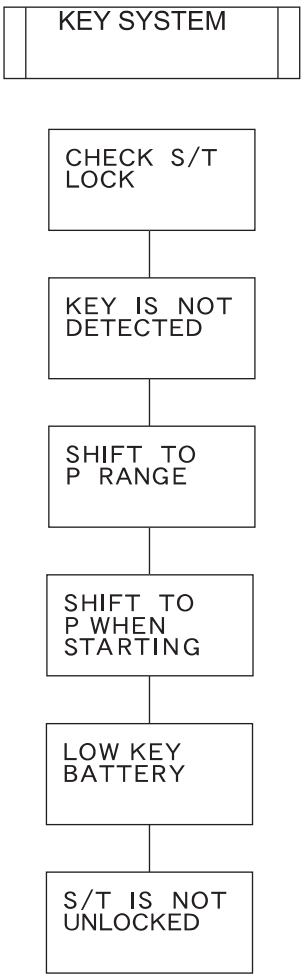

Warning Mode
Master caution indicator light blinks
Master caution indicator light comes on
Master caution indicator light goes off
KEY SYSTEM
LOW OIL PRESSURE
(*2)
WATER TEMP
(*2)
HYBRID SYSTEM OVERHEAT
(*3)
PARK BRAKE
DRIVER DOOR OPEN
PASSENGER DOOR OPEN
RIGHT REAR DOOR OPEN
LEFT REAR DOOR OPEN
HOOD OPEN
TRUNK OPEN
000 237 km
*2: Warning buzzer sounds when the indication appears.
*3: When the vehicle speed is 5 km/h (3 mph) or more, the warning buzzer sounds.
E134464E02

ME

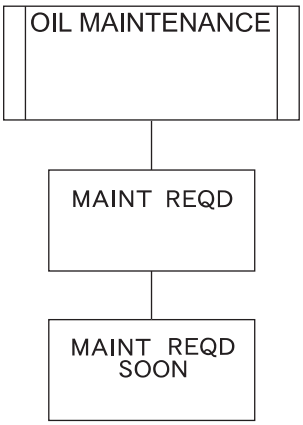

Master caution indicator light blinks
Master caution indicator light comes on
Master caution indicator light goes off
REFUEL READY
CLOSE FUEL LID
(*4) CHECK VSC SYSTEM
(*4) CHECK HYBRID SYSTEM
(*4) LOW T-BATT STOP THE VHICLE SHIFT TOP
(*4) LOW WASHER FLUID
(*5) OIL MAINTENANCE SYSTEM
MAINTENANCE MODE
SHIFT TO P WHEN STARTING
*4: Warning buzzer sounds when indication appears.
*5: for U.S.A.
E132608E03

ME

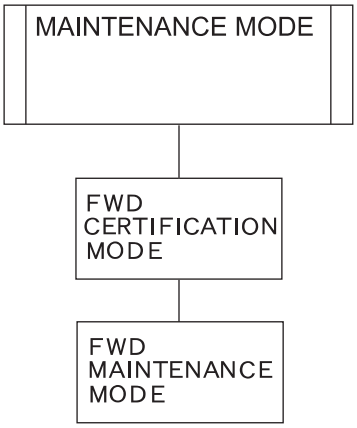
Key System Flow Chart:



Oil Maintenance System Flow Chart:



Maintenance Mode Flow Chart:



*5: for U.S.A.

E134465E02

ME

3. DIAGNOSIS SYSTEM

C

E134540

HINT:

- Diagnosis information can be displayed on the multi-information display after connecting a jumper wire between terminals TC and CG of the DLC3 connector.

- The multi-information display shows "DIAG VSC" before the meter CPU receives a diagnosis information signal from the skid control ECU.
- The multi-information display shows "DIAG VSC 23" when the meter CPU receives a diagnosis information signal from the skid control ECU.

4. MAINTENANCE MODE

HINT:

For more information about maintenance mode, go to the hybrid system (See page ES-35).

HOW TO PROCEED WITH TROUBLESHOOTING

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

NEXT

3	CHECK CAN COMMUNICATION SYSTEM

(a) Check for DTC output.
HINT:
See page CA-22.

→	CAN DTC OUTPUT (PROCEED TO "CAN COMMUNICATION SYSTEM")
→	NO CAN DTC (GO TO STEP 4)

4	PROBLEM SYMPTOM CONFIRMATION

NEXT

5	SYMPTOM SIMULATION

NEXT

6	PROBLEM SYMPTOMS TABLE

HINT:
See page ME-17.

NEXT

7	CIRCUIT INSPECTION

NEXT

ME

8	**REPAIR OR REPLACE**

NEXT

9	**CONFIRMATION TEST**

NEXT

END

CUSTOMIZE PARAMETERS

1. COMBINATION METER ASSEMBLY

NOTICE:

Be sure to record the current value before customizing.

HINT:

The following items can be customized using the intelligent tester.

METER:

Tester Display	Default	Contents	Setting
SEAT-BELT WARN	D/P ON	Function to change the setting of the seat belt buzzer	D/P ON, D ON, P ON, D/P OFF

HINT:

This setting is only valid for the buzzer which sounds at 5 km/h (3 mph) or more.

INITIALIZATION

1. OIL MAINTENANCE INFORMATION MODE RESET OPERATION

HINT:

- The trip meter reset knob is located on the right side of the combination meter assembly.
- This reset operation is required only for U.S.A..

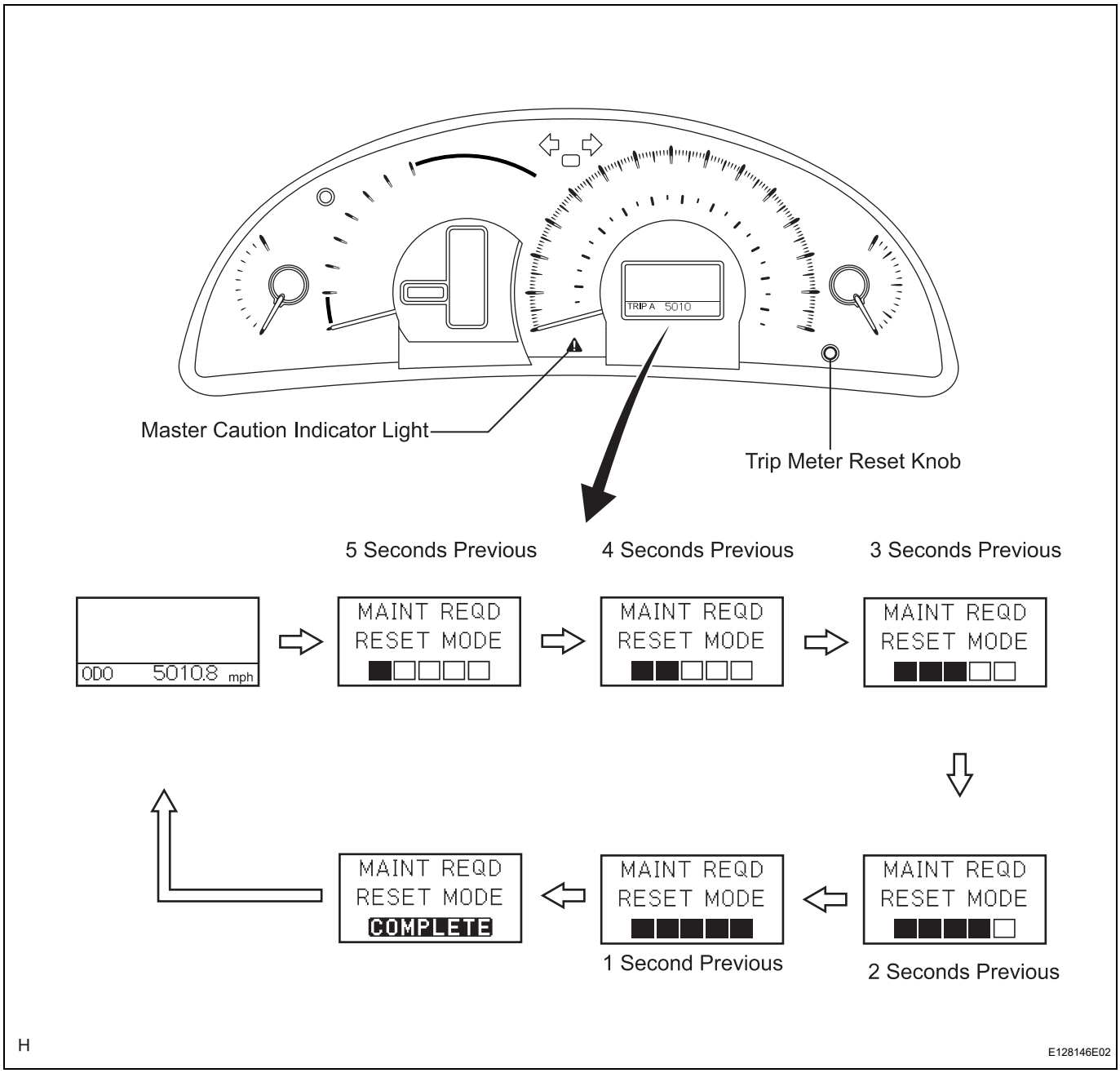
(a) Turn the power switch on (IG).

(b) Press the ODO/TRIP switch until the trip meter A appears.

(c) Turn the power switch off.

(d) Turn the power switch on (IG) while pressing and holding the trip meter reset knob. Hold the trip meter reset knob until the following conditions are met and 5 seconds have passed.

ME



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- The multi-information display shows "MAINT REQD RESET MODE".
- The master caution indicator light illuminates.
- When the oil replacement reminder light turns off, the reset is complete.

(e) When "MAINT REQD RESET MODE COMPLETE" disappears and the master caution indicator light turns off, the reset is complete.

PROBLEM SYMPTOMS TABLE

MALFUNCTION SYSTEM:

Symptom	Suspected Area	See page
Entire combination meter does not operate.	Power Source Circuit	ME-40
Meter illumination is always dark.	Meter Illumination Circuit	ME-56
Meter illumination does not dim at night.	Meter Illumination Circuit	ME-59

METER GAUGES:

Symptom	Suspected Area	See page
Speedometer malfunction	Speedometer Circuit	ME-42
Fuel economy meter malfunction	Fuel Economy Meter Circuit	ME-52
Fuel receiver gauge malfunction	Fuel Receiver Gauge Circuit	ME-45
Engine coolant temperature malfunction	Engine Coolant Temperature Receiver Gauge Circuit	ME-49

WARNING LIGHTS:

Symptom	Suspected Area	See page
Check engine warning light does not come on.	1. Combination meter (LED)	ME-30
	2. MIL Circuit	ES-373
	3. Wire Harness or Connector	-
	4. Combination Meter Assembly	ME-64
Charge warning light does not come on.	1. Combination Meter (LED)	ME-30
	2. Wire Harness or Connector	-
	3. ECM	-
	4. Combination Meter Assembly	ME-64
Brake warning light does not come on.	1. Combination meter (LED)	ME-30
	2. Wire Harness or Connector	-
	3. Brake Warning Light Circuit	BC-234
	4. Main Body ECU	-
	5. Combination Meter Assembly	ME-64
Brake warning light does not go off.	1. Combination meter (LED)	ME-30
	2. Wire Harness or Connector	-
	3. Brake Warning Light Circuit	BC-227
	4. Main Body ECU	-
	5. Combination Meter Assembly	ME-64
ABS warning light does not come on.	1. Combination meter (LED)	ME-30
	2. Wire Harness or Connector	-
	3. ABS Warning Light Circuit	BC-219
	4. Combination Meter Assembly	ME-64
ABS warning light does not go off.	1. Combination meter (LED)	ME-30
	2. Wire Harness or Connector	-
	3. ABS Warning Light Circuit	BC-214
	4. Combination Meter Assembly	ME-64
Airbag warning light does not come on.	1. Combination Meter (LED)	ME-30
	2. Airbag Warning Light Circuit	RS-227
	3. Wire Harness or Connector	-
	4. Combination Meter Assembly	ME-64
Airbag warning light does not go off.	1. Combination Meter (LED)	ME-30
	2. Airbag Warning Light Circuit	RS-222
	3. Wire Harness or Connector	-
	4. Combination Meter Assembly	ME-64

Symptom	Suspected Area	See page
Open door warning light does not come on.	1. Combination Meter (LED)	ME-30
	2. Wire Harness or Connector	-
	3. Door Courtesy Switch	LI-105
	4. Main Body ECU	-
	5. Combination Meter Assembly	ME-64
Fuel level warning light does not come on.	1. Combination Meter (LED)	ME-30
	2. Wire Harness or Connector	-
	3. Fuel Sender Gauge Assembly	ME-72
	4. Combination Meter Assembly	ME-64
Driver seat belt warning light does not come on.	1. Combination Meter (LED)	ME-30
	2. Wire Harness or Connector	-
	3. Driver Seat Belt Warning Light Circuit	SB-10
	4. Center Airbag Sensor Assembly	-
	5. Combination Meter Assembly	ME-64
Tire pressure warning light does not come on. (with Tire Pressure Warning System)	1. Combination Meter (LED)	ME-30
	2. Wire Harness or Connector	-
	3. Tire Pressure Warning System	TW-22
	4. Combination Meter Assembly	ME-64
Electrically controlled brake warning light does not come on.	1. Combination Meter (LED)	ME-30
	2. Wire Harness or Connector	-
	3. Electrically Controlled Brake Indicator Light Circuit	BC-234
	4. Combination Meter Assembly	ME-64
Electrically controlled brake warning light does not go off.	1. Combination Meter (LED)	ME-30
	2. Wire Harness or Connector	-
	3. Electrically Controlled Brake Indicator Light Circuit	BC-227
	4. Combination Meter Assembly	ME-64
EPS warning light does not come on.	1. Combination Meter (LED)	ME-30
	2. Electronic Power Steering System	PS-54
	3. Combination Meter Assembly	ME-64
EPS warning light does not go off.	1. Combination Meter (LED)	ME-30
	2. Electronic Power Steering System	PS-50
	3. Combination Meter Assembly	ME-64

INDICATOR LIGHTS:

Symptom	Suspected Area	See page
Shift indicator light does not come on.	1. Combination Meter (LED)	ME-30
	2. Wire Harness or Connector	-
	3. Hybrid Control System	HV-46
	4. Combination Meter Assembly	ME-64
Turn indicator light does not come on.	1. Wire Harness or Connector	-
	2. Turn Indicator Light Circuit	LI-12
	3. Combination Meter Assembly	ME-64
Slip indicator light does not come on.	1. Combination Meter (LED)	ME-30
	2. Wire Harness or Connector	-
	3. SLIP Indicator Light Circuit	BC-246
	4. Combination Meter Assembly	ME-64
Slip indicator light does not go off.	1. Combination Meter (LED)	ME-30
	2. Wire Harness or Connector	-
	3. SLIP Indicator Light Circuit	BC-242
	4. Combination Meter Assembly	ME-64

Symptom	Suspected Area	See page
Cruise indicator light does not come on.	1. Combination Meter (LED)	ME-30
	2. Wire Harness or Connector	-
	3. Cruise Main Indicator Light Circuit	CC-34
	4. Combination Meter Assembly	ME-64
High beam indicator light does not come on.	1. Combination Meter (LED)	ME-30
	2. Wire Harness or Connector	-
	3. Headlight Dimmer Switch	LI-12
	4. Main Body ECU	-
	5. Combination Meter Assembly	ME-64
Ready indicator light does not come on.	1. Combination Meter (LED)	ME-30
	2. Hybrid Vehicle Control ECU	-
	3. Combination Meter Assembly	ME-64
Master caution indicator light does not come on.	1. Combination Meter (LED)	ME-30
	2. Combination Meter Assembly	ME-64
Head indicator light does not come on. (for U.S.A.)	1. Combination Meter (LED)	ME-30
	2. Wire Harness or Connector	-
	3. Main Body ECU	-
	4. Combination Meter Assembly	ME-64
Tail indicator light does not come on. (for Canada)	1. Combination Meter (LED)	ME-30
	2. Wire Harness or Connector	-
	3. Main Body ECU	-
	4. Combination Meter Assembly	ME-64

MULTI-INFORMATION DISPLAY:

Symptom	Suspected Area	See page
Multi-information display does not light up.	1. Combination Meter (Multi-information Display)	ME-30
	2. Combination Meter Assembly	ME-64
Door open warning is not available.	1. Main Body ECU	-
	2. Door Courtesy Light Switch	LI-12
	3. Combination Meter Assembly	ME-64
Refueling ready display does not appear.	1. Fuel Lid Opener System	ED-12
	2. Wire Harness or Connector	-
	3. Hybrid Vehicle Control ECU	-
	4. Combination Meter Assembly	ME-64
ODO/TRIP display does not appear.	Combination Meter Assembly	ME-64
Energy monitor display does not appear.	1. Hybrid Vehicle Control ECU	-
	2. Combination Meter Assembly	ME-64
Outside temperature display malfunction	1. A/C Conditioning System	AC-56
	2. Combination Meter Assembly	ME-64
Check VSC system display malfunction	1. Skid Control ECU	-
	2. Combination Meter Assembly	ME-64
Check hybrid system display malfunction	1. Hybrid Vehicle Control ECU	-
	2. Combination Meter Assembly	ME-64
Low washer fluid display malfunction	1. Washer Level Switch	ME-35
	2. Wire Harness or Connector	-
	3. Combination Meter Assembly	ME-64
Door open running display malfunction	1. Door Courtesy Switch	LI-12
	2. Main Body ECU	-
	3. Wire Harness or Connector	-
	4. Combination Meter Assembly	ME-64

Symptom	Suspected Area	See page
Low engine oil pressure display malfunction	1. Engine Oil Pressure Switch	ME-35
	2. Hybrid Vehicle Control ECU	-
	3. Combination Meter Assembly	ME-64
Water temp display malfunction	1. Hybrid Vehicle Control ECU	ES-45
	2. Engine Coolant Temperature Sensor	-
	3. Combination Meter Assembly	ME-64
Moon roof open display malfunction (with Sliding Roof)	1. Sliding Roof Control System	-
	2. Wire Harness or Connector	-
	3. Combination Meter Assembly	ME-64
DTC (Diagnostic Trouble Code) display malfunction	1. Skid Control ECU	-
	2. Combination Meter Assembly	ME-64
Trip information display is not switched when pushing the "DISP" switch on the steering pad switch.	1. Steering Pad Switch	ME-76
	2. Spiral Cable	RS-358
	3. Wire Harness or Connector	-
	4. Combination Meter Assembly	ME-64
Maintenance required reset mode display malfunction	1. Combination Meter Assembly (Oil Maintenance Resetting Procedure Undone)	ME-15
	2. Combination Meter Assembly	ME-64
Fuel lid opener display malfunction	1. Fuel Lid Opener System	ED-12
	2. Wire Harness or Connector	-
	3. Hybrid Vehicle Control ECU	-
	4. Combination Meter Assembly	ME-64

BUZZER:

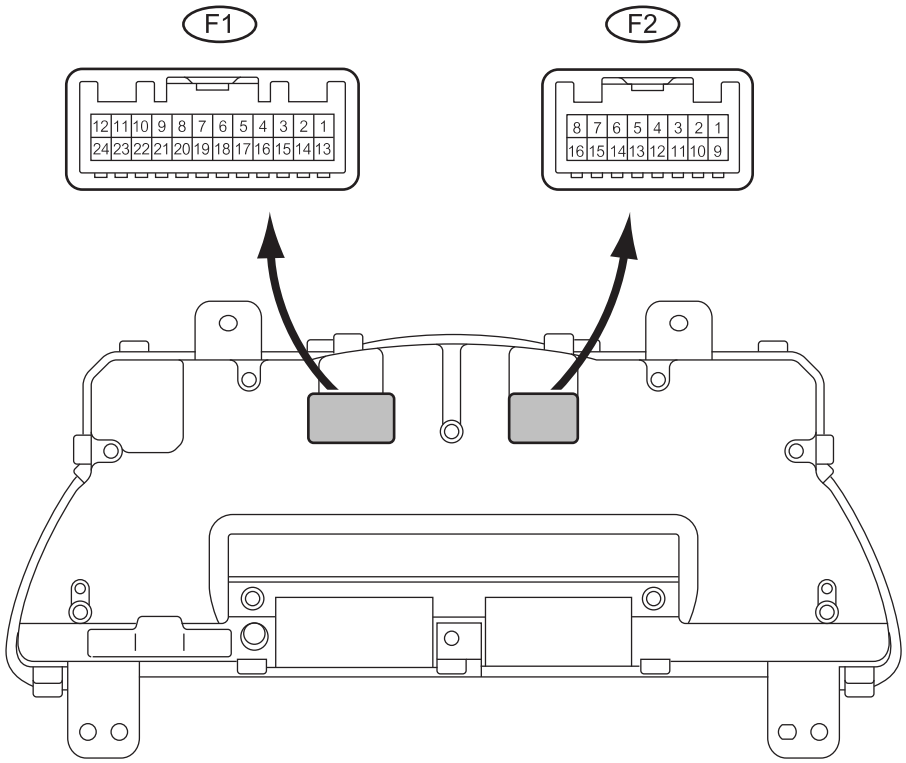
Symptom	Suspected Area	See page
All buzzers do not sound.	1. Wire Harness or Connector	-
	2. Combination Meter Assembly	ME-66
Park brake buzzer does not sound.	1. Parking Brake Switch	-
	2. Wire Harness or Connector	-
	3. Skid Control ECU	-
	4. Main Body ECU	-
	5. Combination Meter Assembly	ME-64
Door open warning buzzer does not sound.	1. Door Courtesy Light Switch	LI-12
	2. Wire Harness or Connector	-
	3. Main Body ECU	-
	4. Skid Control ECU	-
	5. Combination Meter Assembly	ME-66
Seat belt warning buzzer does not sound.	1. Combination Meter Assembly (Seat Belt Warning Buzzer Setting)	ME-15
	2. Center Airbag Sensor Assembly	-
	3. Main Body ECU	-
	4. Skid Control ECU	-
	5. Combination Meter Assembly	ME-64
Sliding roof warning buzzer does not sound. (with Sliding Roof)	1. Main Body ECU	-
	2. Combination Meter Assembly	ME-66

OTHERS:

Symptom	Suspected Area	See page
Front passenger seat belt warning light does not come on.	1. Combination Meter (LED)	ME-30
	2. Wire Harness or Connector	-
	3. Front Passenger Seat Belt Warning Light Circuit	SB-12
	4. Center Airbag Sensor Assembly	-
	5. Combination Meter Assembly	ME-64
	6. Clock Assembly	OT-5

TERMINALS OF ECU

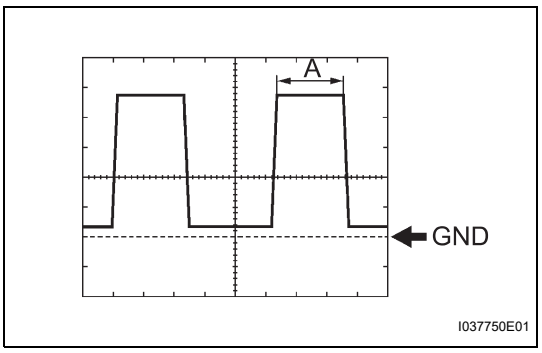
1. COMBINATION METER ASSEMBLY



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
B (F1-1) - Body ground	R - Body ground	Battery	Always	10 to 14 V
B2 (F1-2) - Body ground	V - Body ground	Battery	Always	10 to 14 V
WLVL (F1-5) - Body ground	LG - Body ground	Washer level warning switch signal	Power switch on (IG), washer level warning light ON	Below 1 V
			Power switch on (IG), washer level warning light off	10 to 14 V
TIRE (F1-7) (*) - Body ground	L - Body ground	Tire pressure warning light signal	Power switch on (IG), tire pressure warning light ON	0.9 to 3.2 V
			Power switch on (IG), tire pressure warning light off	3.2 V or higher
P/SB (F1-9) - Body ground	P - Body ground	Passenger seat belt warning light signal	Sit on the front passenger seat, power switch on (IG), front passenger seat belt warning light OFF	10 to 14 V
			Sit on the front passenger seat, power switch on (IG), front passenger seat belt warning light Blinks	10 to 14 V ←→ Below 1 V
ILL- (F1-11) - Body ground	BR - Body ground	Illumination signal	Power switch on (IG)	Pulse generation (See Waveform 1)
E2 (F1-12) - Body ground	W-B - Body ground	Ground (Power ground)	Always	Below 1 V
IG+ (F1-13) - Body ground	GR - Body ground	Power switch signal	Power switch off	Below 1 V
			Power switch on (IG)	10 to 14 V

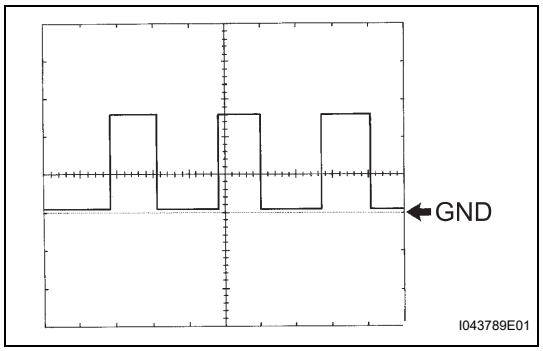
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CANH (F1-17) - Body ground	B - Body ground	CAN communication signal	-	-
CANL (F1-18) - Body ground	W - Body ground	CAN communication signal	-	-
FUC1 (F1-19) - Body ground	BR - Body ground	Fuel lid courtesy switch signal	Power switch on (IG), fuel lid is closed	Below 1 V
			Power switch on (IG), fuel lid is opened	10 to 14 V
FUW1 (F1-20) - Body ground	Y - Body ground	Fuel lid opener switch signal	Power switch on (IG), fuel lid opener switch is not pressed	10 to 14 V
			Power switch on (IG), fuel lid opener switch is pressed	Below 1 V
DISP (F1-22) - Body ground	V - Body ground	Steering pad switch signal	Power switch on (IG), DISP switch OFF	4 to 6 V
			Power switch on (IG), DISP switch ON	Below 1 V
ES (F1-24) - Body ground	BR - Body ground	Ground (Signal ground)	Always	Below 1 V
B (F2-1) - Body ground	G - Body ground	Turn RH indicator light signal	Power switch on (IG), turn signal RH indicator light OFF	Below 1 V
			Power switch on (IG), turn signal RH indicator light is blinking	10 to 14 V ←→ Below 1 V
B (F2-2) - Body ground	L - Body ground	Turn LH indicator light signal	Power switch on (IG), turn signal LH indicator light OFF	Below 1 V
			Power switch on (IG), turn signal LH indicator light is blinking	10 to 14 V ←→ Below 1 V
CHK (F2-4) - Body ground	R - Body ground	Malfunction indicator lamp signal	Power switch on (IG), CHECK ENGINE warning light ON	Below 3 V
			Power switch on (IG), CHECK ENGINE warning light OFF	10 to 14 V
+S (F2-12) - Body ground	V - Body ground	Speed signal for other system (Output)	Turn the wheel slowly	Pulse generation (See waveform 2)
SI (F2-14) - Body ground	W - Body ground	Speed signal for other system (Input)	Power switch on (IG), turn the wheel slowly	Pulse generation (See waveform 2)
FR (F2-15) - Body ground	GR - Body ground	Fuel signal	Power switch on (IG), fuel level is FULL	Below 1 V
			Power switch on (IG), fuel level is EMPTY	3 to 8 V
FE (F2-16) - Body ground	P - Body ground	Ground (Fuel ground)	Always	Below 1 V

*: with Tire Pressure Warning System



(a) Waveform 1 (Reference): Using oscilloscope:

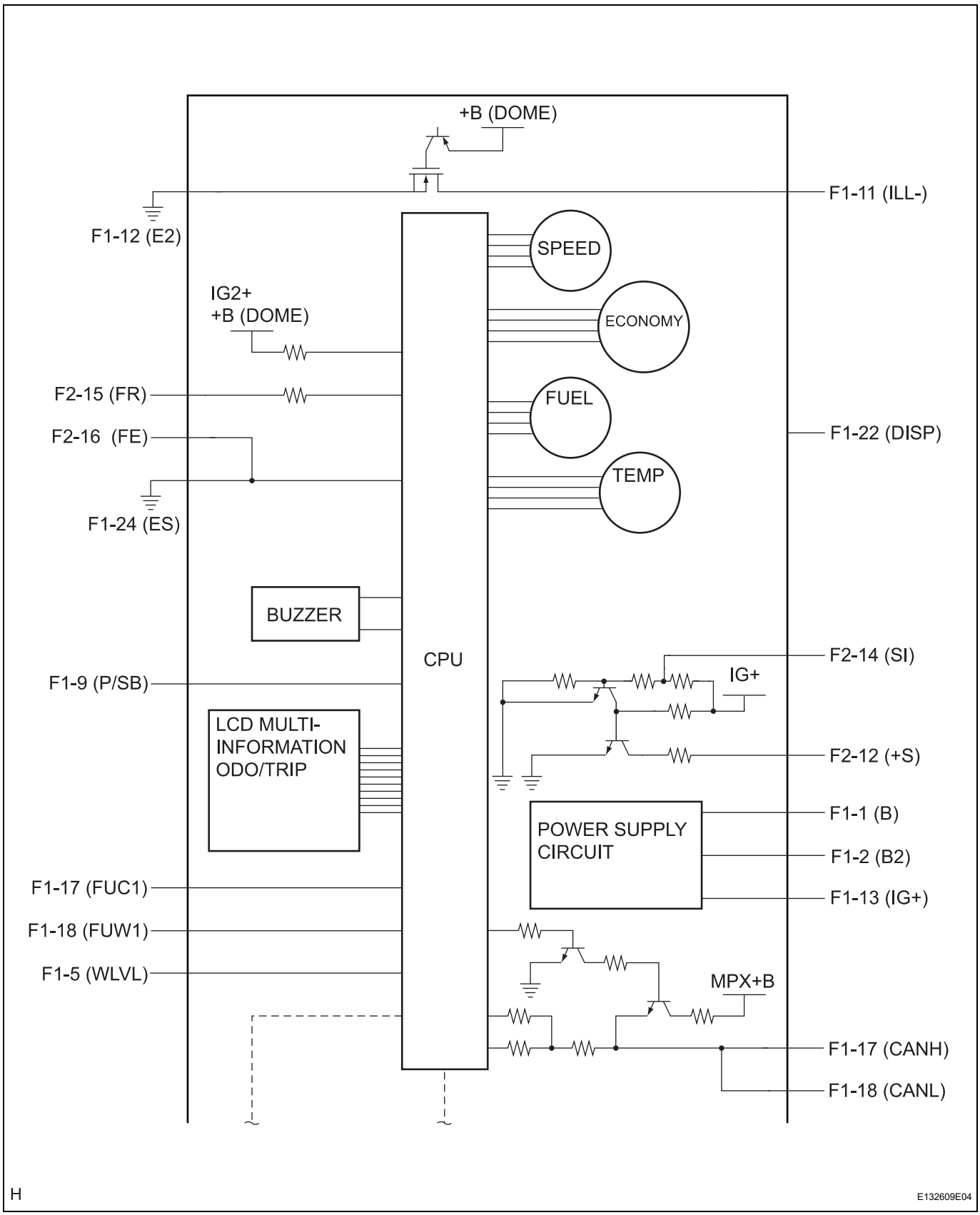
Item	Condition
Tool setting	2 V/DIV., 1 ms./DIV.
Vehicle condition	Turn the power switch on (IG), light control switch TAIL/HEAD

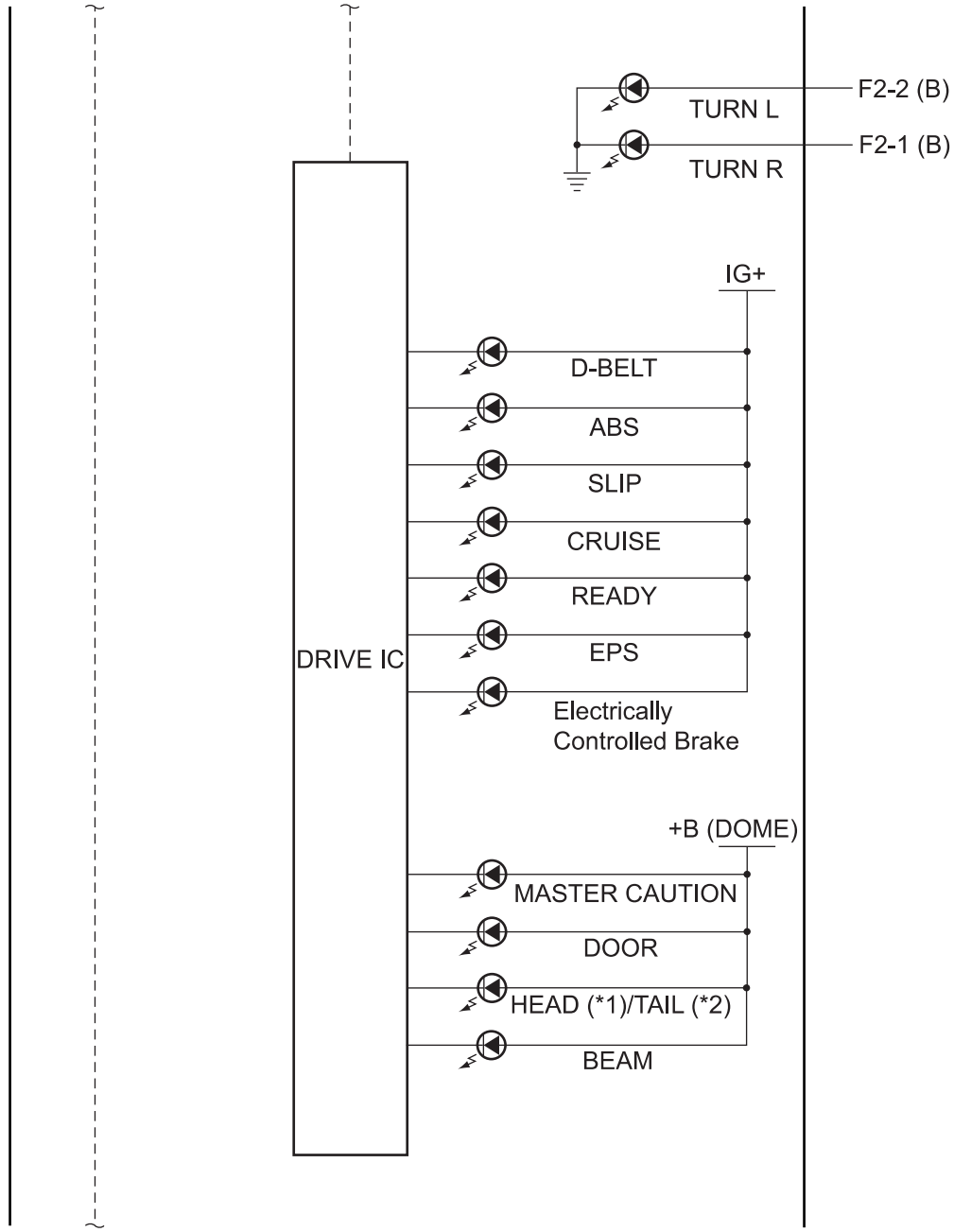


(b) Waveform 2 (Reference): Using oscilloscope:

Item	Condition
Tool setting	5 V/DIV., 20 ms./DIV.
Vehicle condition	Driving at approx. 20 km/h (12 mph)

2. COMBINATION METER INNER CIRCUIT





*1: for U.S.A. *2: for Canada

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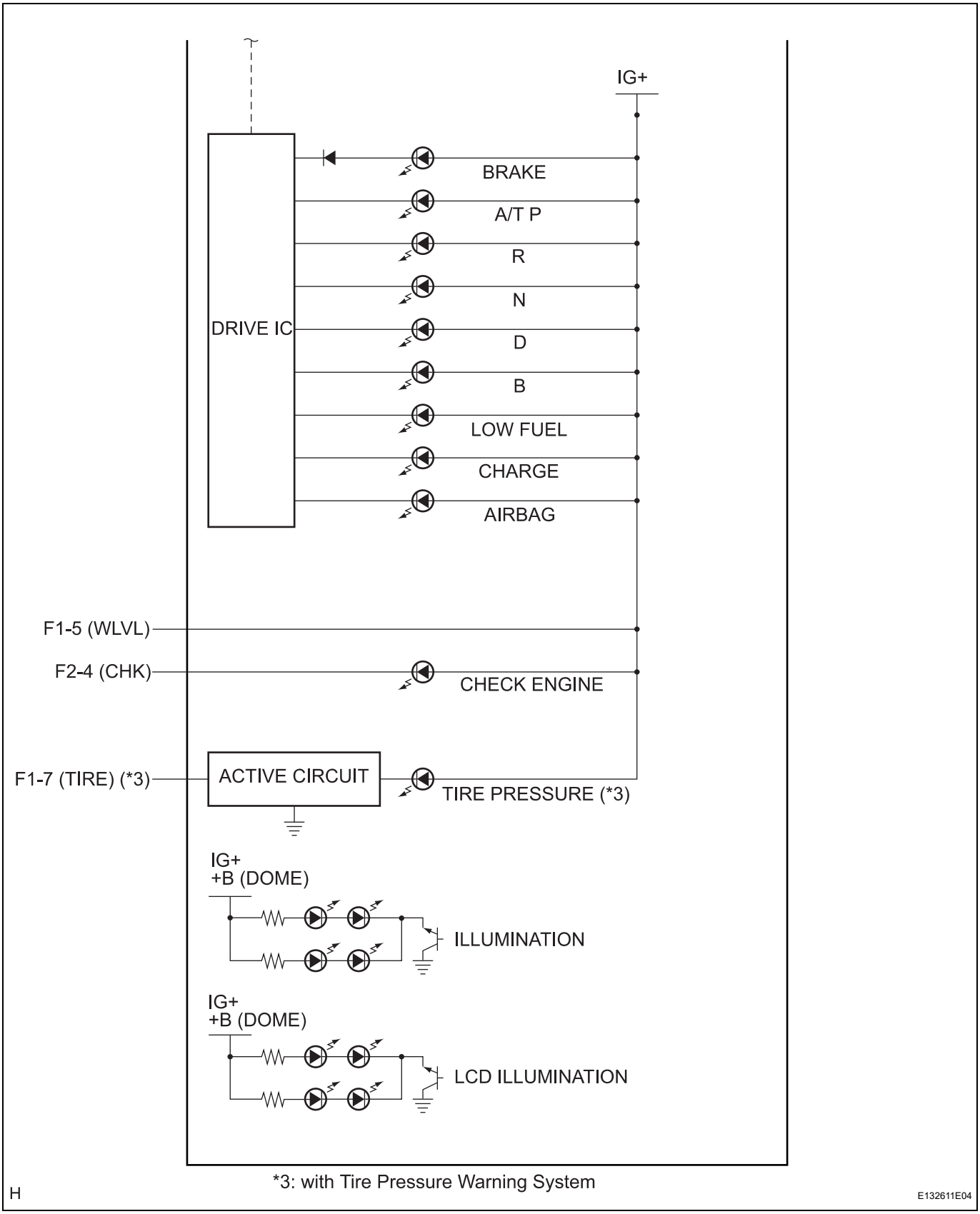
ME



*3: with Tire Pressure Warning System

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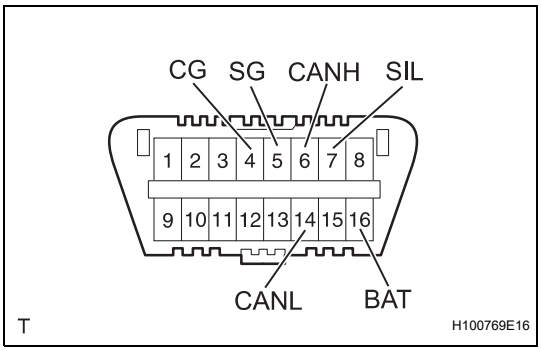
Terminal No.		Wire harness side
F1	1	DOME Fuse (B)
	2	MPX-B Fuse (B2)
	3	-
	4	-
	5	Washer Level Switch (WLVL)
	6	-
	7	Tire Pressure Warning ECU (TIRE) (*)
	8	-
	9	Clock Assembly (P/SB)
	10	-
	11	PANEL Fuse (ILL-)
	12	Ground (E2)
	13	No. 2 GAUGE Fuse (IG+)
	14	-
	15	-
	16	-
	17	CAN Communication Line (CAN H)
	18	CAN Communication Line (CAN L)
	19	Fuel Lid Courtesy Switch (FUC1)
	20	Fuel Lid Opener Switch (FUW1)
	21	-
	22	Steering Pad Switch (DISP)
	23	-
	24	Ground (ES)
F2	1	Turn Signal Flasher (B)
	2	Turn Signal Flasher (B)
	3	-
	4	ECM (CHK)
	5	-
	6	-
	7	-
	8	-
	9	-
	10	-
	11	-
	12	Each part that uses speed signal (+S)
	13	-
	14	Skid Control ECU (SI)
	15	Fuel Sender Gauge Assembly (FR)
	16	Fuel Sender Gauge Assembly (FE)

*: with Tire Pressure Warning System



DIAGNOSIS SYSTEM

1. CHECK DLC3

(a) The ECU the ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format. If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

Symbols (Terminal No.)	Terminal Description	Condition	Specified condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	CAN bus line	Power switch off*	54 to 67 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Power switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Power switch off*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Power switch off*	6 kΩ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Power switch off*	6 kΩ or higher

NOTICE:

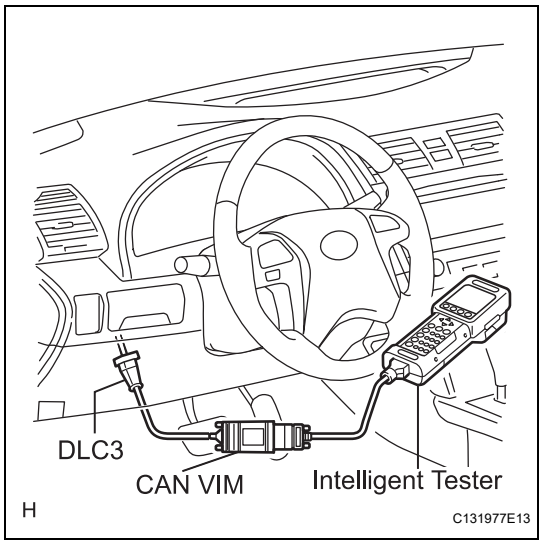
***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

If the display shows an error message after having connected the cable of the intelligent tester to the DLC3, turned the power switch on (IG), and operated the tester, there is a problem on either the vehicle side or the tool side.

- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself. Consult the Service Department listed in the tool's instruction manual.



DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester on.
(c) Enter the following menus: DIAGNOSTICS / OBD/ MOBD / METER / DTC INFO / CURRENT CODES.
(d) Check for DTCs.

2. CLEAR DTC

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester on.
(c) Enter the following menus: DIAGNOSTICS / OBD/ MOBD / METER / DTC INFO / CURRENT CODES.
(d) Erase DTCs by pressing the YES button on the tester.

FAIL-SAFE CHART

ENGINE COOLANT TEMPERATURE GAUGE:

Condition	Response	Recovery
Engine coolant temperature data is interrupted for 3 seconds.	The gauge needle indicates between / and C	Engine coolant temperature data is received.

SHIFT INDICATOR:

Condition	Response	Recovery
Shift position data is interrupted for 3 seconds.	All indicator lights go off.	Normal data is received.

ABS & BRAKE:

Condition	Response	Recovery
ABS & brake data is interrupted for 1 second.	The warning light comes on.	Normal data is received.

DOOR:

Condition	Response	Recovery
Each door condition data is interrupted for 10 seconds.	The data received most recently remains indicated.	Normal data is received.

DRIVER SIDE SEAT BELT:

Condition	Response	Recovery
Driver side front seat inner belt assembly data is interrupted for 10 seconds.	The data received most recently remains indicated.	Normal data is received.

TIRE PRESSURE (*1):

Condition	Response	Recovery
Tire pressure data is interrupted for 10 seconds.	The tire pressure indicator light blinks for 60 to 64 seconds, then comes on.	Normal data is received.

HEAD (*2)/TAIL (*3):

Condition	Response	Recovery
Regular data is interrupted for 10 seconds.	The data received most recently remains indicated.	Normal data is received.

BEAM:

Condition	Response	Recovery
Regular data is interrupted for 10 seconds.	The data received most recently remains indicated.	Normal data is received.

AIRBAG:

Condition	Response	Recovery
Airbag data is interrupted for 10 seconds. Turn the power switch on (IG), then the combination meter (meter CPU) cannot detect the voltage of 9 V or more for 60 seconds.	The warning light comes on.	Normal data is received.

FRONT PASSENGER SIDE SEAT BELT:

Condition	Response	Recovery
Regular data is interrupted for 10 seconds.	The data received most recently remains indicated.	Normal data is received.

CRUISE:

Condition	Response	Recovery
Regular data is interrupted for 10 seconds.	The data received most recently remains indicated.	Normal data is received.

CHARGE:

Condition	Response	Recovery
Regular data is interrupted for 3 seconds.	The data received most recently remains indicated.	Normal data is received.

MULTI-INFORMATION DISPLAY:

Condition	Response	Recovery
Cruise information data is interrupted.	The display becomes blank (only measurement units are displayed).	Normal data is received.
Energy monitor data is interrupted for 3 seconds.	The energy transmission direction is not indicated.	Normal data is received.

*1: with Tire Pressure Warning System
*2: for U.S.A.
*3: for Canada

DATA LIST / ACTIVE TEST

1. DATA LIST

According to the DATA LIST displayed by the intelligent tester, you can read the values of the switches, sensors, actuators and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten work time.

(a) Warm up the engine.
(b) Turn the power switch off.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the power switch on (IG).
(e) Turn the tester on.
(f) Enter following menus: DIAGNOSIS / OBD/MOBD / METER / DATA LIST.
(g) Check values by referring to the table below.

METER:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
TAIL CANCEL SW	TAIL CANCEL switch is ON/OFF	ON: Rheostat knob is turned fully clockwise	-
		OFF: Rheostat knob is turned fully counterclockwise	-
ODO/TRIP SW	ODO/TRIP switch is ON/OFF	ON: Switch is pushed	-
		OFF: Switch is released	-
P-BELT BUCKL SW	Front passenger buckle switch is ON/OFF	ON: Seat belt is fastened	-
		OFF: Seat belt is unfastened	-
SPEED METER	Vehicle speed/Min.: 0 km/h (0 mph), Max.: 255 km/h (158 mph)	Almost same as actual vehicle speed (When driving)	-
COOLANT TEMP	Engine coolant temperature/Min.: 0°C (32°F), Max.: 127.5°C (261.5°F)	After warming up: 60 to 105°C (140 to 221°F)	-
WASHER SW	Washer level switch is ON/OFF	ON: Washer level is more than low	-
		OFF: Washer level is less than low	-
MULTI DISP SW	MODE switch in the steering pad is ON/OFF	ON: Mode switch is ON	-
		OFF: Mode switch is OFF	-
+B VOLTAGE VAL	Battery voltage/Min.: 0 V, Max.: 25.5 V	10 to 14 V	-
FUEL GAUGE	Fuel input signal/Min.: 0, Max. 127.5 (L)	Fuel gauge indicates (F): 62.9 (L)	-
		Fuel gauge indicates (1/2): 35 (L)	-
		Fuel gauge indicates (E): 7 (L)	-
AMBIENT TEMP	Outside temperature/Min.: -40°C (-40°F), Max.: 87.5°C (189.5°F)	Current temperature is displayed	-
RHEOSTAT	Light Control Rheostat/Min.: 0, Max.: 100	Light control rheostat switch is Dark (0) → Bright (100)	-
OUTSIDE LIGHT	Light Control Rheostat/Min.: 0, Max.: 255	Light control rheostat switch is Dark (0) → Bright (100)	-
SEAT-BELT WARN	The volume of the seat belt warning buzzer is D/P ON, D ON, P ON, D/P OFF	The customized setting of the volume of the seat belt warning buzzer is displayed.	-
ECM/PCM DTC 1 to 3	The communication error history REC/UNREC	UNREC: No error has occurred	-
		REC: Error has occurred	-
ECM/PCM ODO 1 to 3	Value when DTC is output/Min.: 0, Max.: 999999	-	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
ABS/VSC DTC 1 to 3	Value when DTC is output/Min.: 0, Max.: 999999	UNREC: No error has occurred	-
		REC: Error has occurred	-
ABS/VSC ODO 1 to 3	Value when DTC is output/Min.: 0, Max.:999999	-	-

ABS/VSC/TRAC:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
FR/FL/RR/RL WHEEL SPD	Vehicle speed/Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Almost same as actual vehicle speed (When driving)	-
VEHICLE SPD	Vehicle speed/Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Almost same as actual vehicle speed (When driving)	-

HYBRID VEHICLE CONTROL ECU:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
ENGINE SPD	Vehicle speed/Min.: 0 rpm, Max.: 16,383.75 rpm	Almost same as actual vehicle speed (When driving)	-
HV COOLANT TEMP	Coolant temperature/Min.: -40°C (-40°F), Max.: 140°C (284°F)	After warming up: 80 to 100°C (176 to 212°F)	• If -40°C (-40°F): sensor circuit open • If 140°C (284°F) or more: sensor circuit shorted

ME

2. ACTIVE TEST

Performing the ACTIVE TEST using the intelligent tester allows the meters, indicators and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one way to shorten labor time.

It is possible to display the DATA LIST on the intelligent tester during the ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Enter following menus: DIAGNOSIS / OBD/MOBD / METER / ACTIVE TEST.
(e) From the display on the tester, perform the "ACTIVE TEST".

METER:

Tester Display	Test Part	Control Range	Diagnostic Note
SPEED METER	Speedometer	0, 40, 80, 120, 160 mph	-
		0, 40, 80, 120, 160, 200, 240 km/h	-
FUEL GAUGE	Fuel receiver gauge	EMPTY, 1/2, FULL	-
COOLANT TEMP	Engine coolant temperature receiver gauge	LOW, NORMAL, HIGH	-
FC METER	Fuel economy meter	MIN, 1/4, 1/2, 3/4, MAX	-
A/T INDEC (1)	A/T shift indicator light	A/T shift indicator light P, R, N, D, 4, 3, 2, L OFF/ON	-
A/T INDEC (2)	A/T gear range indicator light	A/T gear range indicator light B OFF/ON	-
METER DISPLAY1	Multi-information display	All the dots in the multi-information display (OFF/ON)	Confirm that the vehicle is stopped, engine idling
METER DISPLAY2	Multi-information display	The segments in the combination meter assembly (OFF/ON)	Confirm that the vehicle is stopped, engine idling
SRS WARN	Airbag warning light	AIRBAG indicator light OFF/ON	Confirm that the vehicle is stopped, engine idling
DOORS ALL OPEN	Door open warning light	All the DOOR OPEN indicator OFF/ON	Confirm that the vehicle is stopped, engine idling

Tester Display	Test Part	Control Range	Diagnostic Note
P-BELT REMIND	Front passenger seat belt warning light	P-SEAT BELT indicator OFF/ON	Confirm that the vehicle is stopped, engine idling
D-BELT REMIND	Driver seat belt warning light	D-SEAT BELT indicator OFF/ON	Confirm that the vehicle is stopped, engine idling
ABS WARN	ABS warning light	ABS warning light OFF/ON	Confirm that the vehicle is stopped, engine idling
DISCHARGE WARN	Charge warning light	Charge warning light OFF/ON	Confirm that the vehicle is stopped, engine idling
VSC WARN	VSC warning display	VSC warning display OFF/ON	Confirm that the vehicle is stopped, engine idling
SLIP INDIC	Slip indicator light	Slip indicator light OFF/ON	Confirm that the vehicle is stopped, engine idling
HIGH BEAM INDIC	Beam indicator light	Beam indicator light OFF/ON	Confirm that the vehicle is stopped, engine idling
HEADLIGHT INDIC (*1)	Head indicator light	Head indicator light OFF/ON	Confirm that the vehicle is stopped, engine idling
TAILLIGHT INDIC (*2)	Tail indicator light	Tail indicator light OFF/ON	Confirm that the vehicle is stopped, engine idling
D DOOR OPEN	Door open warning light	Door open warning light OFF/ON	Confirm that the vehicle is stopped, engine idling
P DOOR OPEN	Door open warning light	Door open warning light OFF/ON	Confirm that the vehicle is stopped, engine idling
RR DOOR OPEN	Door open warning light	Door open warning light OFF/ON	Confirm that the vehicle is stopped, engine idling
RL DOOR OPEN	Door open warning light	Door open warning light OFF/ON	Confirm that the vehicle is stopped, engine idling
LUGG DOOR OPEN	Door open warning light	Door open warning light OFF/ON	Confirm that the vehicle is stopped, engine idling
LOW WASHER WARN	Low washer warning display	Low washer warning display OFF/ON	Confirm that the vehicle is stopped, engine idling
LOW FUEL WARN	Fuel warning light	Fuel warning light OFF/ON	Confirm that the vehicle is stopped, engine idling
TIRE PRESS WARN (*3)	Tire pressure warning light	Tire pressure warning light OFF/ON	Confirm that the vehicle is stopped, engine idling
ECB INDIC	Electrically controlled brake indicator light	Electrically controlled brake indicator light OFF/ON	Confirm that the vehicle is stopped, engine idling
CRUISE INDIC	Cruise indicator light	Cruise indicator light OFF/ON	Confirm that the vehicle is stopped, engine idling
BRAKE WARN	Brake warning light	Brake warning light OFF/ON	Confirm that the vehicle is stopped, engine idling
EPS INDIC	EPS warning light	EPS warning light OFF/ON	Confirm that the vehicle is stopped, engine idling
OIL MAINTENANCE (*1)	Oil replacement reminder light	Oil replacement reminder light OFF/ON	Confirm that the vehicle is stopped, engine idling
MST WARN INDIC	Master caution indicator light	Master caution indicator light OFF/ON	Confirm that the vehicle is stopped, engine idling
READY(HV)	Ready indicator light	Ready indicator light OFF/ON	Confirm that the vehicle is stopped, engine idling

*1: for U.S.A.
*2: for Canada
*3: with Tire Pressure Warning System

ME

DIAGNOSTIC TROUBLE CODE CHART

METER / GAUGE SYSTEM:

DTC Code	Detection Item	Trouble Area	See page
U0100	Lost Communication with ECM/ PCM "A"	1. Hybrid vehicle control ECU 2. CAN communication system	ME-36
U0129	Lost Communication with Skid Control ECU	1. Skid control ECU 2. CAN communication system	ME-38

ON-VEHICLE INSPECTION

1. INSPECT SPEEDOMETER

(a) Check the operation.

(1) Using a speedometer tester (calibrated chassis dynamometer), check the speedometer indication according to the table below.

Reference: mph (for U.S.A.)

Chassis dynamometer indication	Acceptable range
20 mph	20.0 to 23.0 mph
40 mph	40.0 to 43.5 mph
60 mph	60.0 to 64.0 mph
80 mph	80.0 to 84.5 mph
100 mph	100.0 to 105.0 mph
120 mph	120.0 to 125.5 mph

Reference: km/h (for Canada)

Chassis dynamometer indication	Acceptable range Data in ( ) is for reference
20 km/h	(17.5 to 21.5 km/h)
40 km/h	38.0 to 42.0 km/h
60 km/h	58.0 to 63.0 km/h
80 km/h	78.0 to 84.0 km/h
100 km/h	98.5 to 104.5 km/h
120 km/h	119.0 to 125.0 km/h
140 km/h	139.0 to 146.0 km/h
160 km/h	159.0 to 167.0 km/h
180 km/h	179.0 to 188.0 km/h
200 km/h	199.0 to 209.0 km/h
220 km/h	219.0 to 230.0 km/h

NOTICE:
Tire wear as well as over or under inflation will cause errors.

(2) Check the deviation from the acceptable range of the speedometer indication.

Reference:
Less than 0.5 km/h (0.3 mph)

HINT:
If the indication is not as specified, go to the problem symptoms table (See page ME-17).

2. INSPECT FUEL ECONOMY METER

(a) Connect a tune-up tachometer, and start the engine.

(b) Compare the test results with the fuel economy meter indications.

Reference: mpg (for U.S.A.)

Input value	Acceptable range
MAX	0
3/4	15
1/2	30
1/4	45
MIN	60

HINT:
If the input value is 60 mpg or more, the needle indicates 60.

Reference: L/100 km (for Canada)

Input value	Acceptable range
MAX	30
3/4	22.5
1/2	15
1/4	7.5
MIN	0

HINT:
If the input value is 2.5 L/100 km or less, the needle indicates 2.5 L/100 km.
If the input value is 30 L/100 km or more, the needle indicates 30 L/100 km.
HINT:
If the indication is not as specified, go to the problem symptoms table (See page ME-17).

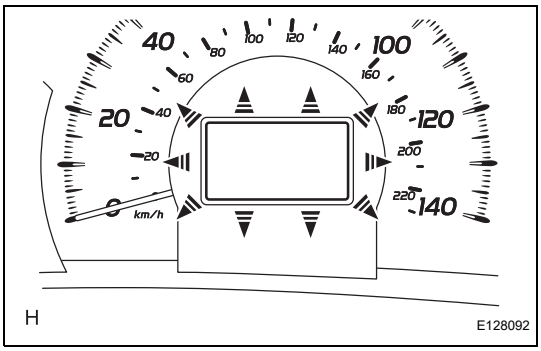
ME

3. INSPECT ENGINE OIL PRESSURE SWITCH

(a) Disconnect the connector from the engine oil pressure switch.
(b) Turn the power switch on (IG).
(c) Wait for 10 seconds or more.
(d) Ground the terminal of the wire harness side connector, then check the multi-information display.
OK:
Oil pressure warning message appears.
HINT:
If the warning message is not displayed, go to the problem symptoms table (See page ME-17).

4. INSPECT WASHER LEVEL WARNING DISPLAY

(a) Disconnect the connector from the washer level switch.
(b) Turn the power switch on (IG).
(c) Ground the terminal of the wire harness side connector.
(d) Wait for 10 seconds or more, then check the multi-information display.
OK:
Low washer fluid warning message is displayed.
HINT:
If the warning message is not displayed, go to the problem symptoms table (See page ME-17).



5. INSPECT MULTI-INFORMATION DISPLAY

(a) Turn the power switch off.

(b) Press the "DISP" button and hold it down.

(c) Turn the power switch on (IG).

OK:

All the dots in the multi-information display come on.

HINT:

This test is also available in "ACTIVE TEST" (See page ME-30).

(d) Turn the power switch off to finish this test mode.

HINT:

If the result is not as specified, replace the combination meter assembly because this part is not independently supplied.

ME

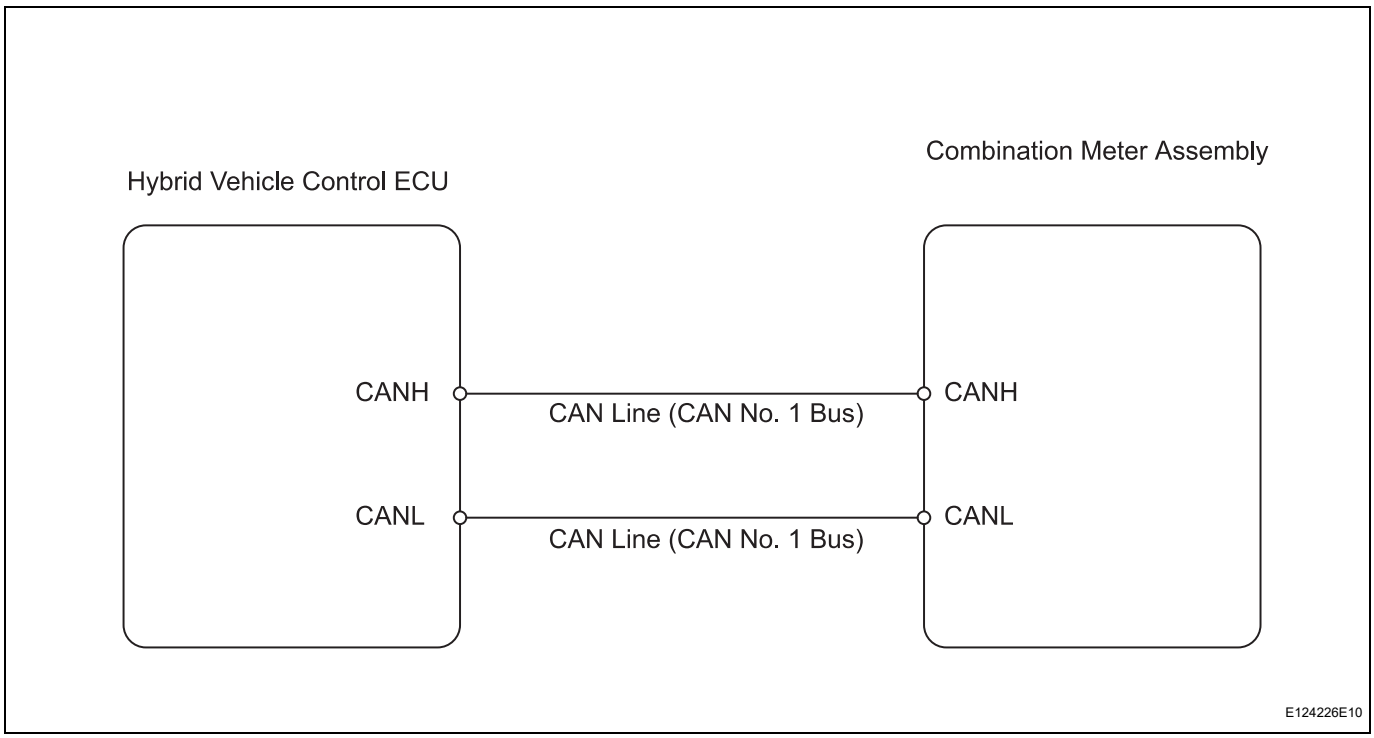
DTC	U0100	Lost Communication with ECM/PCM "A"

DESCRIPTION

The combination meter assembly communicates with the hybrid vehicle control ECU via the CAN communication lines (CAN No. 1 Bus).

DTC No.	DTC Detection Conditions	Trouble Areas
U0100	When either of following conditions detected: 1. Vehicle speed 5 km/h (3.1 mph) or more and IG voltage 10.5 V or more 2. No communication with ECM continues for 3 seconds or more (No communication to ECM or skid control ECU continues for 60 seconds or more)	• CAN communication system • Hybrid vehicle control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CONFIRM DTC OUTPUT

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (READY).
(c) Turn the tester on.
(d) Clear the stored DTCs by selecting the following menu items on the tester: DIAGNOSIS / OBD / MOBD / METER / DTC INFO / CLEAR CODES.
(e) Drive the vehicle at more than 5 km/h (3.1 mph) for at least 60 seconds.
(f) Stop the vehicle.
(g) Check for DTCs (See page CA-22).

Result

Result	Proceed to
DTC output	A (See page CA-29)
DTC not output	B

B → **USE SIMULATION METHOD TO CHECK**

A

GO TO CAN COMMUNICATION SYSTEM

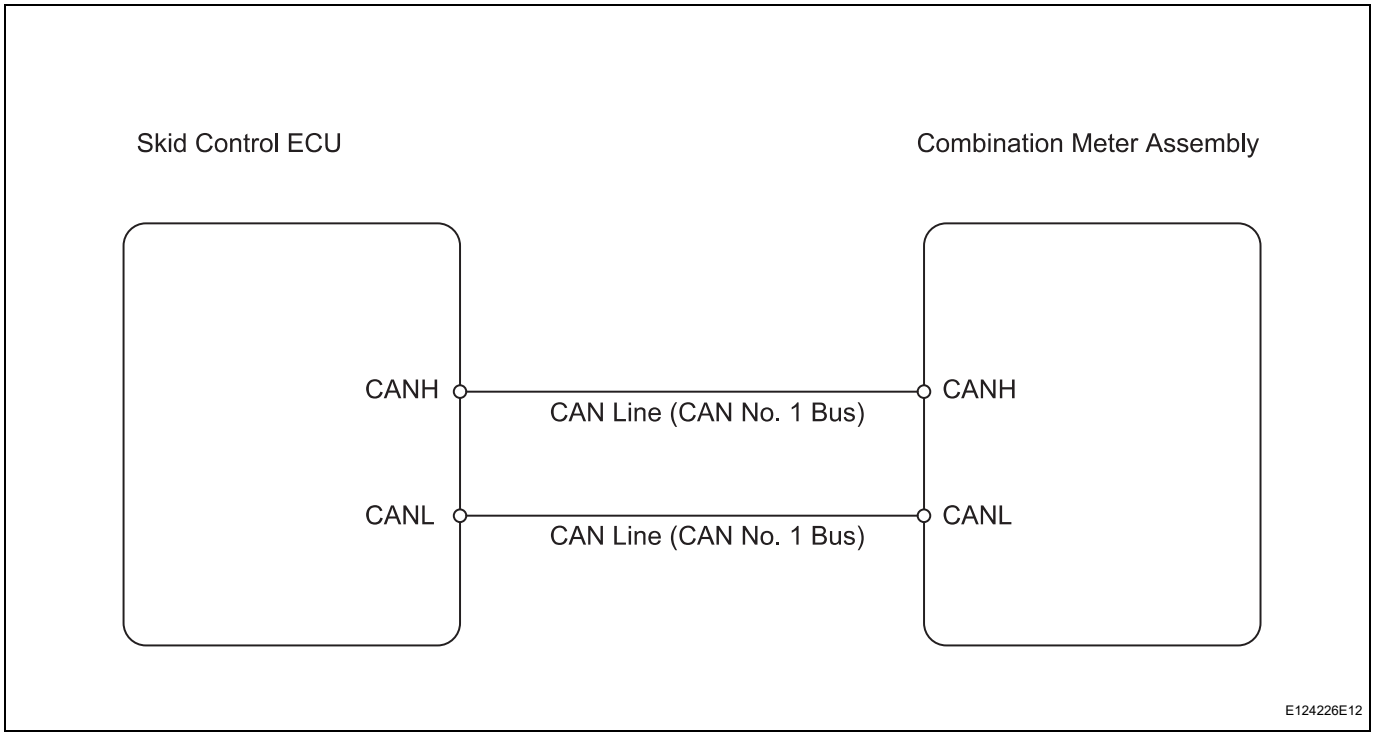
DTC	U0129	Lost Communication with Skid Control ECU

DESCRIPTION

The combination meter assembly communicates with the skid control ECU via the CAN communication system (CAN No. 1 Bus).

DTC No.	DTC Detection Conditions	Trouble Areas
U0129	When either of following conditions detected: 1. 15 seconds have elapsed since engine started and IG voltage 10.5 V or more 2. No communication with the skid control ECU continues for 60 seconds or more and IG voltage is 10.5 V or more.	• Skid control ECU • CAN communication system

WIRING DIAGRAM



ME

INSPECTION PROCEDURE

1	CONFIRM DTC OUTPUT

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (READY).
(c) Turn the tester on.
(d) Clear the stored DTCs by selecting the following menu items on the tester: DIAGNOSIS / OBD / MOBD / METER / DTC INFO / CLEAR CODES.
(e) Drive the vehicle at more than 5 km/h (3.1 mph) for at least 60 seconds.
(f) Stop the vehicle.
(g) Check for DTCs (See page CA-22).

Result

Result	Proceed to
DTC output	A (See page CA-29)
DTC not output	B

B → **USE SIMULATION METHOD TO CHECK**

A

GO TO CAN COMMUNICATION SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V
If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

3	BASIC INSPECTION

(a) Turn the power switch on (IG).
(b) Check whether or not the radio receiver turns on.

Result

Result	Proceed to
Radio receiver turns on	A
Radio receiver does not turn on	B

B → **Go to step 6**

A

4	CHECK FOR DTC

(a) Check for DTCs and note any codes that are output.
(b) Delete the DTCs.
(c) Recheck for DTCs by simulating the operation indicated by the DTCs.
HINT:
- If the system cannot enter the diagnostic mode, inspect the AVC-LAN and all the components that connect to the AVC-LAN for short circuits and repair or replace the problem part.
- Even if the malfunction symptom is not confirmed, check the DTCs. This is because the system stores past DTCs.
- Check and clear past DTCs. Then check for DTCs.

Result

Result	Proceed to
DTC is output again	A
DTC is not output	B

B → Go to step 6

A

5	DIAGNOSTIC TROUBLE CODE CHART

Find the output code in the diagnostic trouble code chart (See page AV-26).

NEXT

Go to step 8

6	PROBLEM SYMPTOMS TABLE

Refer to the problem symptoms table (See page AV-13).

AV

Result

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B → Go to step 8

A

7	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) Terminals of ECU (See page AV-15)

NEXT

8	ADJUST, REPAIR OR REPLACE

NEXT

9	CONFIRMATION TEST

NEXT

END

IDENTIFICATION OF NOISE SOURCE

1. Radio Description

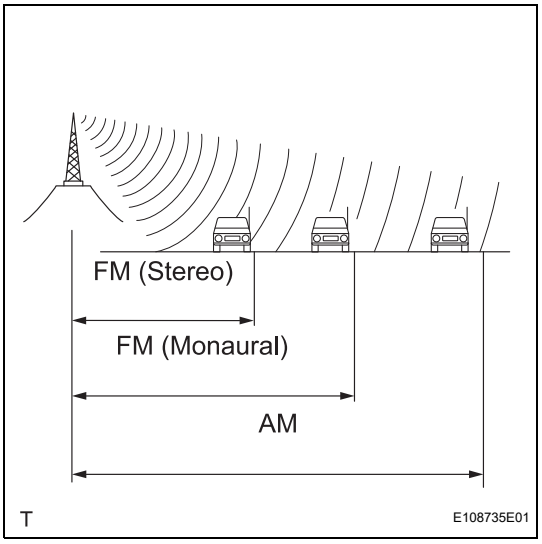
(a) Radio frequency band

(1) Radio broadcasts use the radio frequency bands shown in the table below.

Frequency	30 kHz	300 kHz	30 MHz	30 MHz	300 MHz
Designation	LF	MF	HF	VHF	
Radio Wave		AM ⟷		FM ⟷	
Modulation	Amplitude modulation			Frequency modulation	

LF: Low Frequency MF: Medium Frequency HF: High Frequency VHF: Very High Frequency

E108734E01



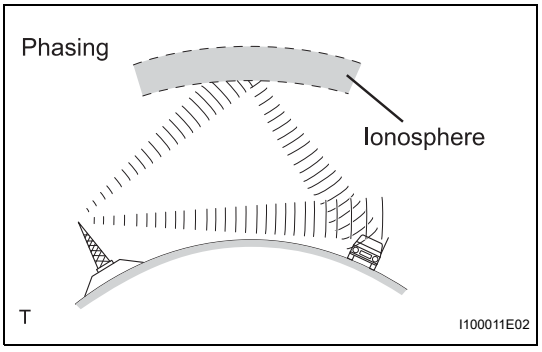
(b) Service area

(1) The service areas of AM and FM broadcasts are vastly different. Sometimes an AM broadcast can be received very clearly but an FM stereo cannot. FM stereo has the smallest service area, and is prone to pick up static and other types of interference such as noise.

(c) Radio reception problems

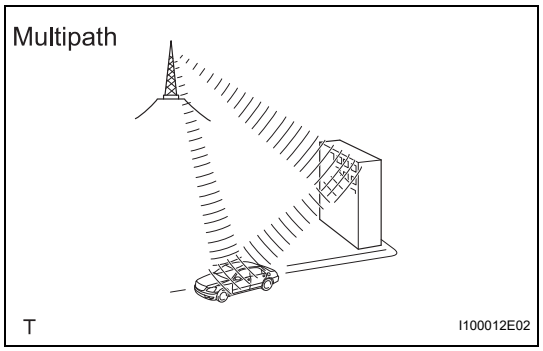
HINT:

In addition to static, other problems such as "phasing", "multipath", and "fade out" exist. These problems are not caused by electrical noise, but by the radio signal propagation method itself.

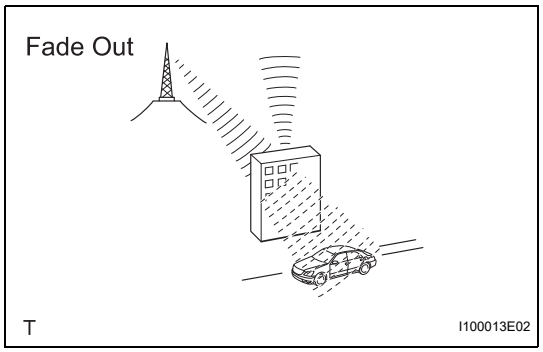


(1) Phasing

AM broadcasts are susceptible to electrical interference and another kind of interference called phasing. Occurring only at night, phasing is the interference created when a vehicle receives 2 radio wave signals from the same transmitter. One signal is reflected off the ionosphere and the other signal is received directly from the transmitter.



(2) Multipath
Multipath is a type of interference created when a vehicle receives 2 radio wave signals from the same transmitter. One signal is reflected off buildings or mountains and the other signal is received directly from the transmitter.



(3) Fade out
Fade out is caused by objects (buildings, mountains, and other such large obstacles) that deflect away part of a signal, resulting in a weaker signal when the object is between the transmitter and vehicle. High frequency radio waves, such as FM broadcasts, are easily deflected by obstructions. Low frequency radio waves, such as AM broadcasts, are much more difficult to deflect.

(d) Noise problem
Technicians must have a clear understanding about each customer's noise complaint. Use the following table to diagnose noise problems.

Radio Frequency	Noise Occurrence Condition	Presumable Cause
AM	Noise occurs in a specified area	Foreign noise
AM	Noise occurs when listening to an intermittent broadcast	An identical program transmitted from multiple towers can cause noise where the signals overlap
AM	Noise occurs only at night	Music beat from a distant broadcast
FM	Noise occurs while driving in a specified area	Multipath or phasing noise resulting from a change in FM frequency

HINT:
If the noise does not match the examples above, refer to the descriptions about phasing and multipath.

AV

PROBLEM SYMPTOMS TABLE

HINT:

- Before inspecting the suspected areas listed in the table below, check the fuse and relay.
- Before inspecting the suspected areas listed in the table below, check for DTCs.
- Methods used to verify the cause of the problem are listed in order of probability in the suspected area column.

Audio Function:

Symptom	Suspected Area	See page
Pressing power switch does not turn on system.	1. Proceed to "Pressing Power Switch does not Turn on System"	AV-67
	2. Radio receiver power source circuit	AV-130
	3. AVC-LAN circuit	AV-108
	4. Radio receiver	AV-135
Panel switch does not function.	1. Steering pad switch circuit	AV-85
	2. AVC-LAN circuit	AV-108
	3. Radio receiver	AV-135
No sound can be heard from speakers. (Audio is mute.)	1. Radio receiver power source circuit	AV-130
	2. Proceed to "No Sound can be Heard from Speakers"	AV-68
	3. Stereo component amplifier power source circuit	AV-132
	4. Proceed to "Sound Signal Circuit between Radio Receiver and Stereo Component Amplifier"	AV-101
	5. Speaker circuit	AV-96
	6. Proceed to "Mute Signal Circuit between Radio Receiver and Stereo Component Amplifier"	AV-105
	7. Stereo component amplifier	AV-140
	8. Radio receiver	AV-135
Sound quality is bad in all modes. (Volume is too low.)	1. Proceed to "Poor Sound Quality in All Modes (Low Volume)"	AV-78
	2. Speaker circuit	AV-96
	3. Proceed to "Sound Signal Circuit between Radio Receiver and Stereo Component Amplifier"	AV-101
	4. Proceed to "Mute Signal Circuit between Radio Receiver and Stereo Component Amplifier"	AV-105
	5. Stereo component amplifier	AV-140
	6. Radio receiver	AV-135
ASL does not function.	Proceed to "Vehicle Speed Signal Circuit between Stereo Component Amplifier and Combination Meter"	AV-110
External device sound cannot be heard or sound quality is bad. (Stereo jack is used.)	1. Radio receiver power source circuit	AV-130
	2. Proceed to "Sound Signal Circuit between Radio Receiver and Stereo Jack Adapter"	AV-103
	3. Stereo jack adapter	AV-192
	4. Radio receiver	AV-135
Abnormal noise occurs.	1. Proceed to "Noise occurs"	AV-65
	2. Stereo component amplifier	AV-140
	3. Radio receiver	AV-135
Radio broadcast cannot be received or poor reception.	Proceed to "Radio Broadcast cannot be Received or Poor Reception"	AV-75
CD cannot be inserted/played or CD is ejected right after insertion.	1. Radio receiver power source circuit	AV-130
	2. Proceed to "CD cannot be Inserted/Played or CD is Ejected Right After Insertion"	AV-71
CD cannot be ejected.	1. Radio receiver power source circuit	AV-130
	2. Proceed to "CD cannot be Ejected"	AV-70

Symptom	Suspected Area	See page
Sound quality is bad only when CD is played. (Volume is too low.)	Proceed to "Sound Quality is Bad Only when CD is Played (Volume is Too Low)"	AV-69
CD sound skips.	Proceed to "CD Sound Skips"	AV-73
Radio receiver cannot be illuminated at night.	1. Illumination circuit	AV-89
	2. Radio receiver	AV-135

Steering Pad Switch Function:

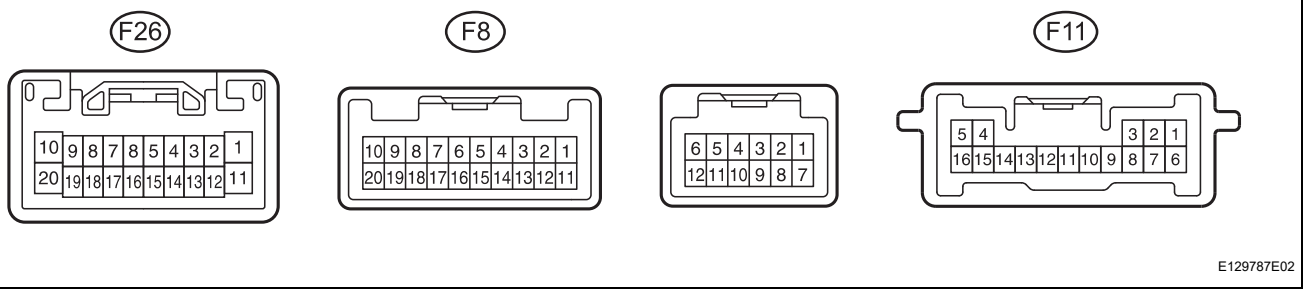
Symptom	Suspected Area	See page
Audio system cannot be operated with steering pad switch.	1. Steering pad switch circuit	AV-85
	2. Radio receiver	AV-135
Steering pad switch cannot be illuminated at night.	1. Illumination circuit	AV-89
	2. Radio receiver	AV-135

"Bluetooth" Function:

Symptom	Suspected Area	See page
Cellular phone registration failure, phone directory transfer failure.	Proceed to "Cellular Phone Registration Failure, Phone Directory Transfer Failure"	AV-79
Cellular phone cannot send / receive.	1. Proceed to "Cellular Phone cannot Send / Receive"	AV-81
	2. Steering pad switch circuit	AV-85
	3. Radio receiver	AV-135
The other callers voice cannot be heard, is too quiet, or distorted.	1. Proceed to "The Other Callers Voice cannot be Heard, is too Quiet, or Distorted"	AV-83
	2. Proceed to "Cellular Phone Voice Circuit between Radio Receiver and Stereo Component Amplifier"	AV-114
	3. Radio receiver	AV-135
	4. Stereo component amplifier	AV-140
The other caller cannot hear your voice, or your voice is too quiet or distorted.	1. Proceed to "The Other Caller cannot Hear Your Voice, or Your Voice is too Quiet or Distorted"	AV-84
	2. Proceed to "Microphone Circuit between Microphone and Radio Receiver"	AV-116
	3. Microphone	AV-197
	4. Radio receiver	AV-135

TERMINALS OF ECU

1. RADIO RECEIVER



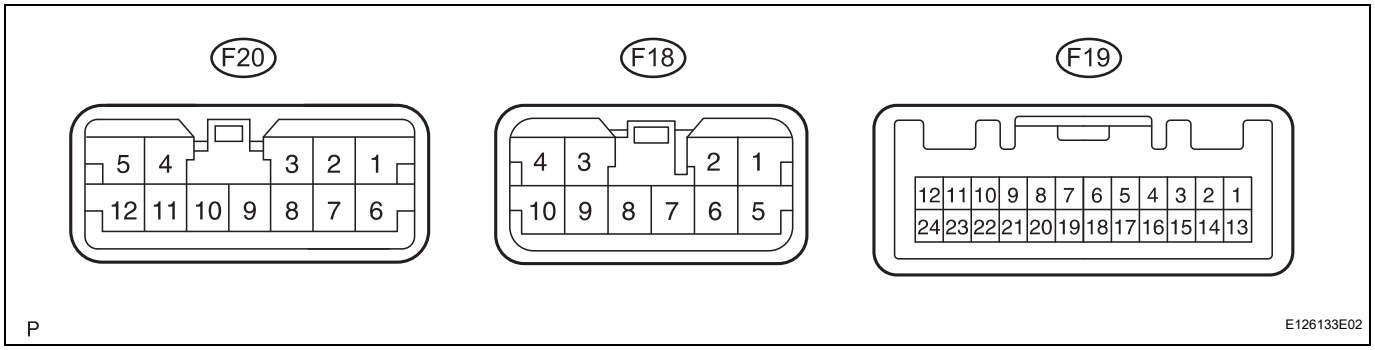
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
B (F26-1) - GND (F26-20)	L-Y - BR	Battery	Always	10 to 14 V
ILL+ (F26-2) - GND (F26-20)	G - BR	Illumination signal	Light control switch OFF → TAIL	Below 1 V → 10 to 14 V
ATX+ (F26-5) - GND (F26-20)	R - BR	AVC-LAN communication signal	Power switch on (ACC)	2 to 3 V
MUTE (F26-7) - GND (F26-20)	O - BR	MUTE signal	Audio system is playing → Changing	Above 3.5 V → Below 1 V
R+ (F26-8) - GND (F26-20)	R - BR	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
L+ (F26-9) - GND (F26-20)	B - BR	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
SLD (F26-10) - Body ground	Shielded - Body ground	Shield ground	Always	Below 1 V
ACC (F26-11) - GND (F26-20)	GR - BR	Accessory (ON)	Power switch on (ACC)	10 to 14 V
ILL- (F26-12) - GND (F26-20)	W-B - BR	Illumination (rheostat) signal	Light control switch OFF → TAIL	Below 1 V → Pulse generation
ANT (F26-13) - GND (F26-20)	O - BR	Power source of antenna	Radio switch ON and AM or FM	10 to 14 V
ATX- (F26-15) - GND (F26-20)	G - BR	AVC-LAN communication signal	Power switch on (ACC)	2 to 3 V
R- (F26-18) - GND (F26-20)	G - BR	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
L- (F26-19) - GND (F26-20)	W - BR	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
GND (F26-20) - Body ground	BR - Body ground	Ground	Always	Below 1 V
SWG (F8-6) - GND (F26-20)	P - BR	Steering pad switch ground	Always	Below 1 V
SW1 (F8-7) - GND (F26-20)	O - BR	Steering pad switch signal	Steering pad switch not operated → SEEK+ switch pushed → SEEK- switch pushed → VOL+ switch pushed → VOL- switch pushed	4 V or higher → Approx. 0.5 V → Approx. 0.9 V → Approx. 2.0 V → Approx. 3.4 V
SW2 (F8-8) - GND (F26-20)	Y - BR	Steering pad switch signal	Steering pad switch not operated → MODE switch pushed → ON HOOK switch pushed → OFF HOOK switch pushed	4 V or higher → Approx. 0.5 V → Approx. 0.9 V → Approx. 2.0 V
IVO+ (F8-11) - GND (F26-20)	R - BR	Voice signal	"Bluetooth" handsfree voice signal is playing	A waveform synchronized with sounds is output
IVO- (F8-12) - GND (F26-20)	G - BR	Voice signal	"Bluetooth" handsfree voice signal is playing	A waveform synchronized with sounds is output

AV

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
SLD (F8-13) - Body ground	Shielded - Body ground	Shield ground	Always	Below 1 V
ARI (F8-15) - GND (F26-20)	G - BR	Sound signal (Right)	External device is playing (When stereo jack is used)	A waveform synchronized with sounds is output
ASGN (F8-16) - GND (F26-20)	BR - BR	Shield ground	Always	Below 1 V
ALI (F8-17) - GND (F26-20)	R - BR	Sound signal (Left)	External device is playing (When stereo jack is used)	A waveform synchronized with sounds is output
AUXI (F8-19) - GND (F26-20)	G - BR	External device connection detection signal	External device is connected	Below 1 V
MIC- (F11-1) - GND (F26-20)	R - BR	Microphone voice signal	"Bluetooth" handsfree function is ON	A waveform synchronized with sounds is output
MIC+ (F11-2) - GND (F26-20)	G - BR	Microphone voice signal	"Bluetooth" handsfree function is ON	A waveform synchronized with sounds is output
TSW- (F11-3) - GND (F26-20)	P - BR	Telephone relation switch signal	Always	Below 1 V
+B (F11-5) - GND (F26-20)	L - BR	Battery	Always	10 to 14 V
MGND (F11-6) - GND (F26-20)	P - BR	Ground	Always	Below 1 V
MCVD (F11-7) - GND (F26-20)	LG - BR	Microphone AMP power supply	Power switch off → on (IG)	Below 1 V → 5 V
GND (F11-14) - Body ground	BR - Body ground	Ground	Always	Below 1 V
ACC (F11-16) - GND (F26-20)	GR - BR	Accessory (ON)	Power switch off → on (ACC)	Below 1 V → 10 to 14 V

AV

2. STEREO COMPONENT AMPLIFIER

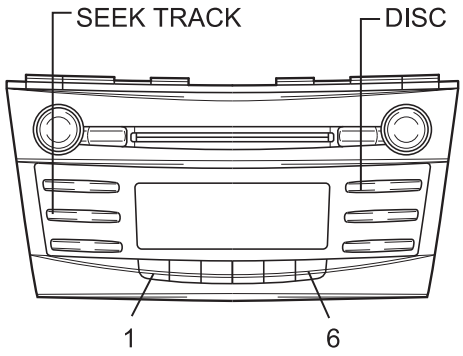


Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
MUTE (F19-1) - GND (F20-6)	O - BR	Mute signal from radio receiver	Audio system is playing → Changing	Above 3.5 V → Below 1 V
L- (F19-2) - GND (F20-6)	W - BR	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
L+ (F19-3) - GND (F20-6)	B - BR	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
R- (F19-4) - GND (F20-6)	G - BR	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
R+ (F19-5) - GND (F20-6)	R - BR	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
SLD (F19-6) - Body ground	Shielded - Body ground	Shield ground	Always	Blow 1 V
TX- (F19-7) - GND (F20-6)	G - BR	AVC-LAN communication signal	Power switch on (ACC)	2 to 3 V
TX+ (F19-8) - GND (F20-6)	R - BR	AVC-LAN communication signal	Power switch on (ACC)	2 to 3 V
SPD (F19-11) - GND (F20-6)	V - BR	Speed signal from combination meter	Power switch on (IG), Drive wheels are turning turned slowly	Pulse generation

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
ACC (F19-12) - GND (F20-6)	GR - BR	Accessory (ON)	Power switch off → on (ACC)	Below 1 V → 10 to 14 V
INT- (F19-22) - GND (F20-6)	G - BR	Voice signal	Navigation or "Bluetooth" handsfree voice signal is provided	A waveform synchronized with sounds is output
INT+ (F19-23) - GND (F20-6)	R - BR	Voice signal	Navigation or "Bluetooth" handsfree voice signal is provided	A waveform synchronized with sounds is output
+B (F18-1) - GND (F20-6)	GR - BR	Battery	Always	10 to 14 V
FR+ (F18-2) - GND (F20-6)	LG - BR	Sound signal (Front Right)	Audio system is playing	A waveform synchronized with sounds is output
RL+ (F18-3) - GND (F20-6)	B - BR	Sound signal (Rear Left)	Audio system is playing	A waveform synchronized with sounds is output
RR- (F18-4) - GND (F20-6)	W - BR	Sound signal (Rear Right)	Audio system is playing	A waveform synchronized with sounds is output
+B2 (F18-5) - GND (F20-6)	GR - BR	Battery	Always	10 to 14 V
FR- (F18-6) - GND (F20-6)	L - BR	Sound signal (Front Right)	Audio system is playing	A waveform synchronized with sounds is output
FL- (F18-7) - GND (F20-6)	V - BR	Sound signal (Front Left)	Audio system is playing	A waveform synchronized with sounds is output
FL+ (F18-8)- GND (F20-6)	P - BR	Sound signal (Front Left)	Audio system is playing	A waveform synchronized with sounds is output
RL- (F18-9) - GND (F20-6)	Y - BR	Sound signal (Rear Left)	Audio system is playing	A waveform synchronized with sounds is output
RR+ (F18-10) - GND (F20-6)	R - BR	Sound signal (Rear Right)	Audio system is playing	A waveform synchronized with sounds is output
WFL- (F20-1) - GND (F20-6)	V - BR	Sound signal (Front Left)	Audio system is playing	A waveform synchronized with sounds is output
WFL+ (F20-2) - GND (F20-6)	P - BR	Sound signal (Front Left)	Audio system is playing	A waveform synchronized with sounds is output
WFR- (F20-3) - GND (F20-6)	L - BR	Sound signal (Front Right)	Audio system is playing	A waveform synchronized with sounds is output
SL+ (F20-4) - GND (F20-6)	G-W - BR	Sound signal (Rear Left)	Audio system is playing	A waveform synchronized with sounds is output
SR+ (F20-5) - GND (F20-6)	L - BR	Sound signal (Rear Right)	Audio system is playing	A waveform synchronized with sounds is output
GND (F20-6) - Body ground	BR - Body ground	Ground	Always	Below 1 V
E (F20-7) - Body ground	BR - Body ground	Ground	Always	Below 1 V
WFR+ (F20-9) - GND (F20-6)	LG - BR	Sound signal (Front Right)	Audio system is playing	A waveform synchronized with sounds is output
SL- (F20-10) - GND (F20-6)	BR - BR	Sound signal (Rear Left)	Audio system is playing	A waveform synchronized with sounds is output
SR- (F20-12) - GND (F20-6)	Y - BR	Sound signal (Rear Right)	Audio system is playing	A waveform synchronized with sounds is output

DTC CHECK / CLEAR

HINT:
If the system cannot enter the diagnostic mode, inspect the AVC-LAN and all the components that connect to the AVC-LAN for short circuits and repair or replace the problem part.
(See page AV-108)



P E129786E01

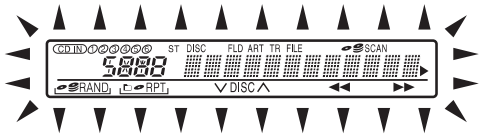
1. STARTING DIAGNOSTIC MODE

(a) READY-on state.
(b) Turn off the audio system.
(c) While pressing the preset switches "1" and "6" at the same time, press the "DISC" switch 3 times.
HINT:
A beep is emitted 3 times and the diagnostic function is activated. The system enters the all element illumination mode and the switch check mode.

2. ALL ELEMENT ILLUMINATION MODE AND SWITCH CHECK MODE

HINT:
Illumination status of all switches and operations of the panel switches can be checked.

Example:



N E119764E02

(a) Check that all elements are on.
(b) When pressing each panel switch, check that a beep is emitted.
NOTICE:
Pressing the "SEEK TRACK UP" switch transfers the screen to the stereo jack adapter connection check screen. Check the operation of this switch by confirming the transfer of the screen.

When a stereo jack adapter is connected:

AUX OK

When a stereo jack adapter is not connected:

AUX – –

N E119765E02

3. STEREO JACK ADAPTER CONNECTION CHECK MODE

(a) Press the "SEEK TRACK UP" switch.
(b) Check if the stereo jack adapter is recognized.
HINT:
Vehicles that do not have a stereo jack adapter also have this function.
NOTICE:
This function is not to check connection information on an external device, but to check recognition information on a stereo jack adapter.

4. SERVICE CHECK MODE

(a) Press the "SEEK TRACK UP" switch.
HINT:
For details of the service check mode, refer to "6. CHECK DTC" and "7. DTC CLEAR/RECHECK".

5. FINISHING DIAGNOSTIC MODE

(a) Press the "DISC" switch for 2 seconds or more, or turn the power switch off.

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6. CHECK DTC

HINT:

Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

(a) Reference:

In the system check mode, the system check and the diagnostic memory check are performed, and the check results are displayed in ascending order of the component codes (physical address).

Terms	Meaning
Component code (Physical address)	Three-digit code (in hexadecimal) given to each device comprising AVC-LAN. Corresponding to its function, individual symbol is provided.
Logical address	Two-digit code (in hexadecimal) given to each function and device unit in each device comprising AVC-LAN.

(b) Service check result display

Display	Previous term	Meaning	Action to be taken
good	Good (normal)	No DTCs are detected in both "System Check Mode" and "Diagnostic Memory Mode".	-
nCon	No connection	The system recognized the component when it was registered, but the component gives no response to the "Diagnostic Mode ON Request".	Check the power source circuit and the communication circuit of the component indicated by the component code (physical address).
ECHn	Exchange	One or more DTCs for "Exchange" are detected in either "System Check Mode" or "Diagnostic Memory Mode".	Go to the detailed information mode to check the trouble area referring to the DTC list.
CHEC	Check	When no DTCs are detected for "Exchange", one or more DTCs for "Check" are detected in either "System Check Mode" or "Diagnostic Memory Mode".	Go to the detailed information mode to check the trouble area referring to the DTC list.
OLd	Old version	Old DTC application is identified and DTC is detected in either "System Check Mode" or "Diagnostic Memory Mode".	-
nrES	No response	The device gives no response to any one of "System Check Mode ON Request", "System Check Result Request", and "Diagnostic Memory Request".	Check the power source circuit and the communication circuit of the component indicated by the component code (physical address).

(c) Device name and physical address

Physical address No.	Name
190	Radio receiver
440	Stereo component amplifier
19D	"Bluetooth" handsfree module

(d) Service check mode

(1) Press the "SEEK TRACK" switch to see the check result of each component.

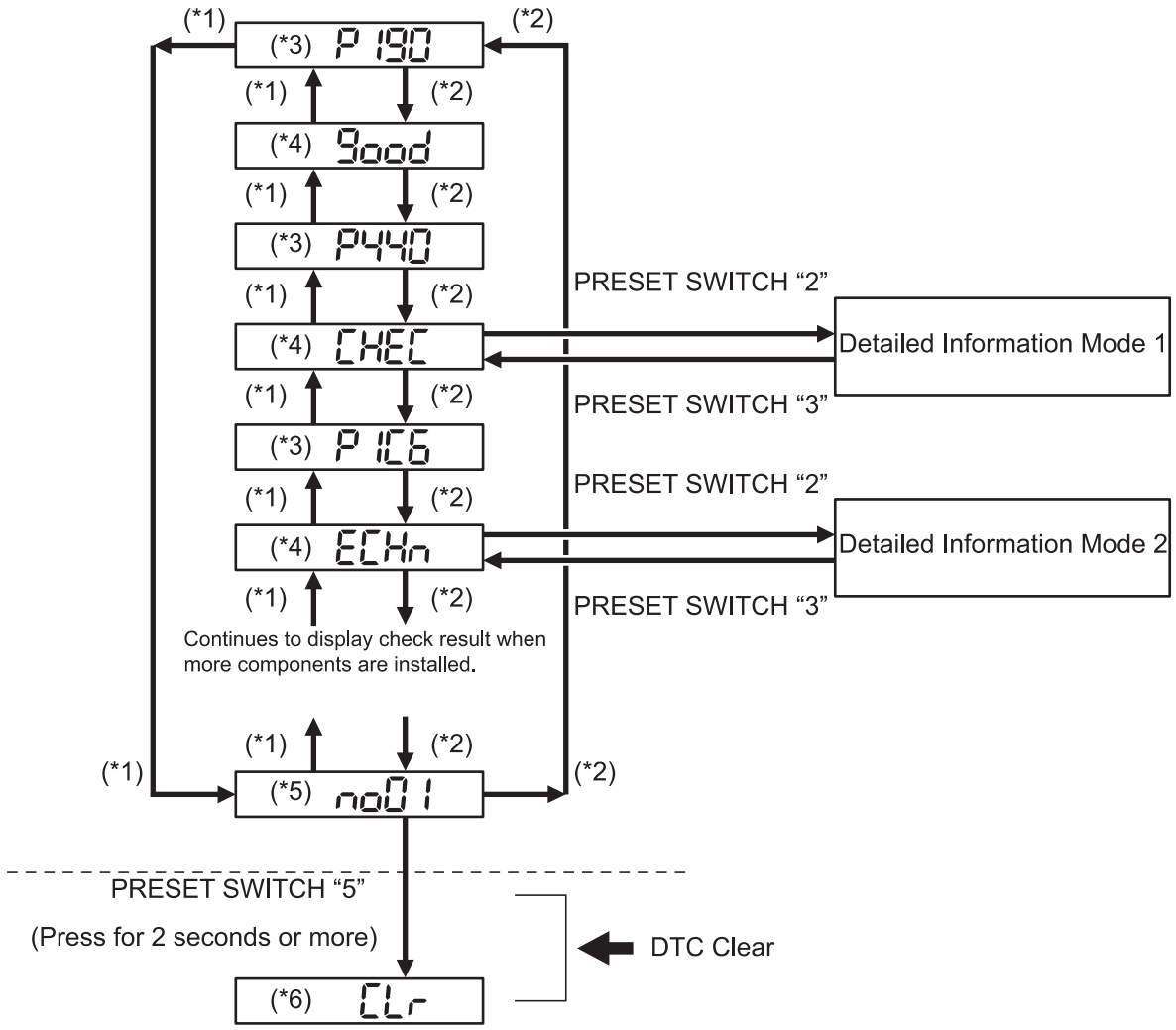
(2) The component code (physical address) is displayed first, and then the check result follows.

HINT:

- If all check results are "good", the system judges that no DTC exists.

- If the preset switch "1" is pressed in the service check mode, service check is performed again.
- This illustration is only an example and may differ in cases such as for each option part and output DTCs.

Service Check Mode:



*1: SEEK TRACK DOWN

*2: SEEK TRACK UP

*3: P...Indicates physical address

190/440/1C6...Physical address

*4: Result

*5: Up-to-date connection check number

*6: Memory clear

P

E110920E07

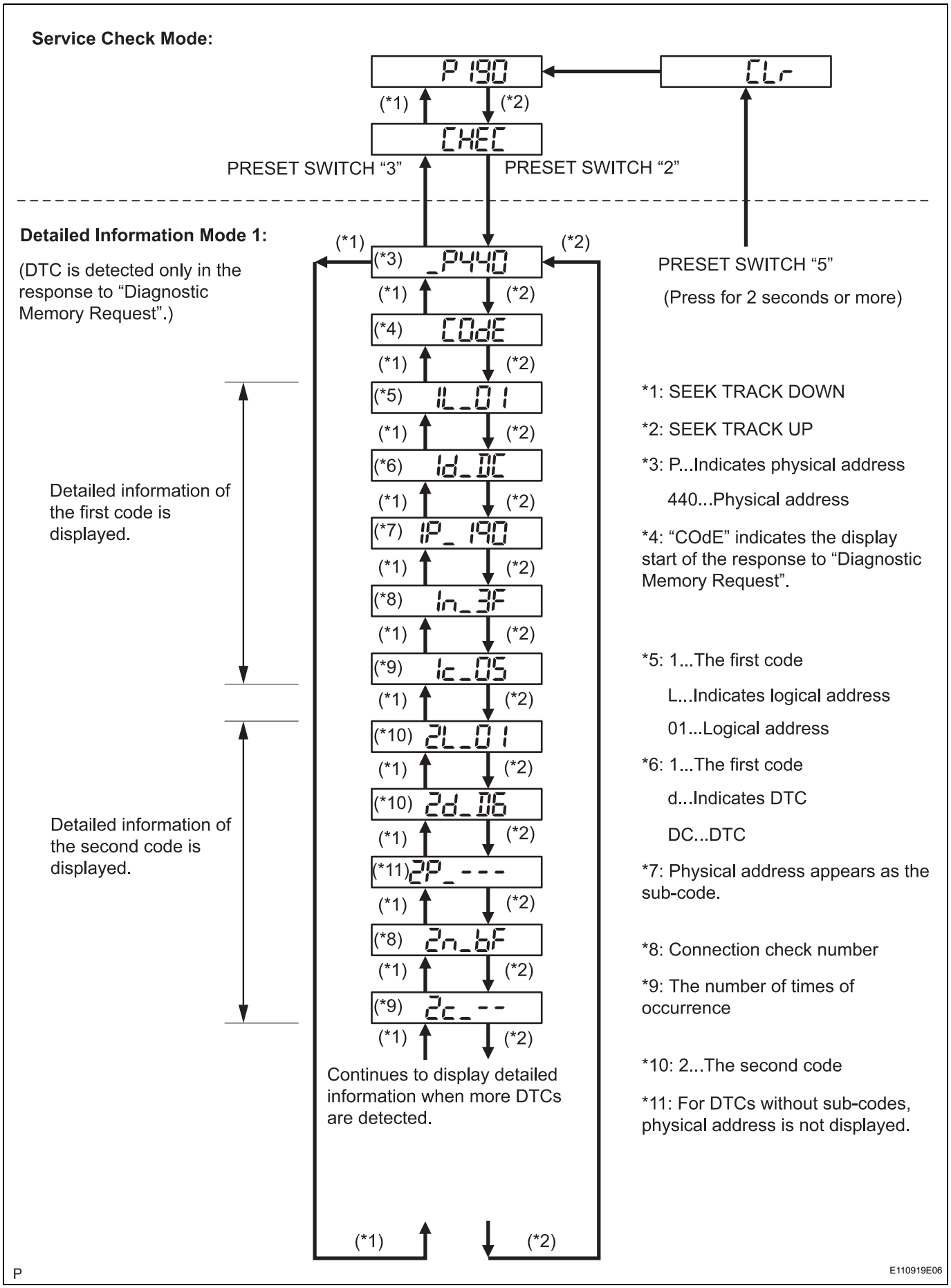
AV

(e) Detailed information mode 1
HINT:
- "Detailed Information Mode 1" is displayed when there is no response to "System Check Result Request" and DTC is detected only in "Diagnostic Memory Request".
- The component device code (physical address) is displayed first, and then the check result follows.
- This illustration is only an example and may differ in cases such as for each option part and output DTCs.

(1) Press the preset switch "2" to go to the "Detailed Information Mode 1".
(2) Press the "SEEK TRACK" switch to display the physical address and DTC of the component.
(3) Press the preset switch "3" to go to the "Service Check Mode".
(4) Distinguish between the displays of the responses to "System Check Result Request" and "Diagnostic Memory Request". In order to distinguish the information detected in "System Check Mode" and "Diagnostic Memory Mode" in "ECHn", "CHEC", and "OLd" in "Detailed Information Mode 1", refer to the following:
- "SyS" is displayed before the detailed codes detected as a result of "System Check Result Request" are displayed.
- "COdE" is displayed before the detailed codes detected as a result of "Diagnostic Memory Request" are displayed.

HINT:
- The response to "System Check Result Request" is the current information given from each ECU as a result of the system check.
- The response to "Diagnostic Memory Request" contains the information received from each ECU or stored in each ECU in the past.
- The response to "Diagnostic Memory Request" is the output DTCs as a result of the diagnostic memory check or the DTCs received from each ECU.
- "System Check Result Request (SyS)" is displayed first, and then the logical address and DTC appear in order.
- "Diagnostic Memory Request (COdE)" is displayed first, and then the logical address, DTC, sub-code, connection check number, and the number of occurrence appear in order.

AV


Service Check Mode:
P190
CLr
(*1)
(*2)
CHEC
PRESET SWITCH "3"
PRESET SWITCH "2"
Detailed Information Mode 1:
(DTC is detected only in the response to "Diagnostic Memory Request".)
(*3) _P440
PRESET SWITCH "5"
(Press for 2 seconds or more)
(*4) COdE
(*5) 1L_01
(*6) 1d_DC
(*7) 1P_190
(*8) 1n_3F
(*9) 1c_05
(*10) 2L_01
(*10) 2d_D6
(*11) 2P_---
(*8) 2n_bF
(*9) 2c_--
Detailed information of the first code is displayed.
Detailed information of the second code is displayed.
Continues to display detailed information when more DTCs are detected.
*1: SEEK TRACK DOWN
*2: SEEK TRACK UP
*3: P...Indicates physical address
440...Physical address
*4: "COdE" indicates the display start of the response to "Diagnostic Memory Request".
*5: 1...The first code
L...Indicates logical address
01...Logical address
*6: 1...The first code
d...Indicates DTC
DC...DTC
*7: Physical address appears as the sub-code.
*8: Connection check number
*9: The number of times of occurrence
*10: 2...The second code
*11: For DTCs without sub-codes, physical address is not displayed.
P
E110919E06

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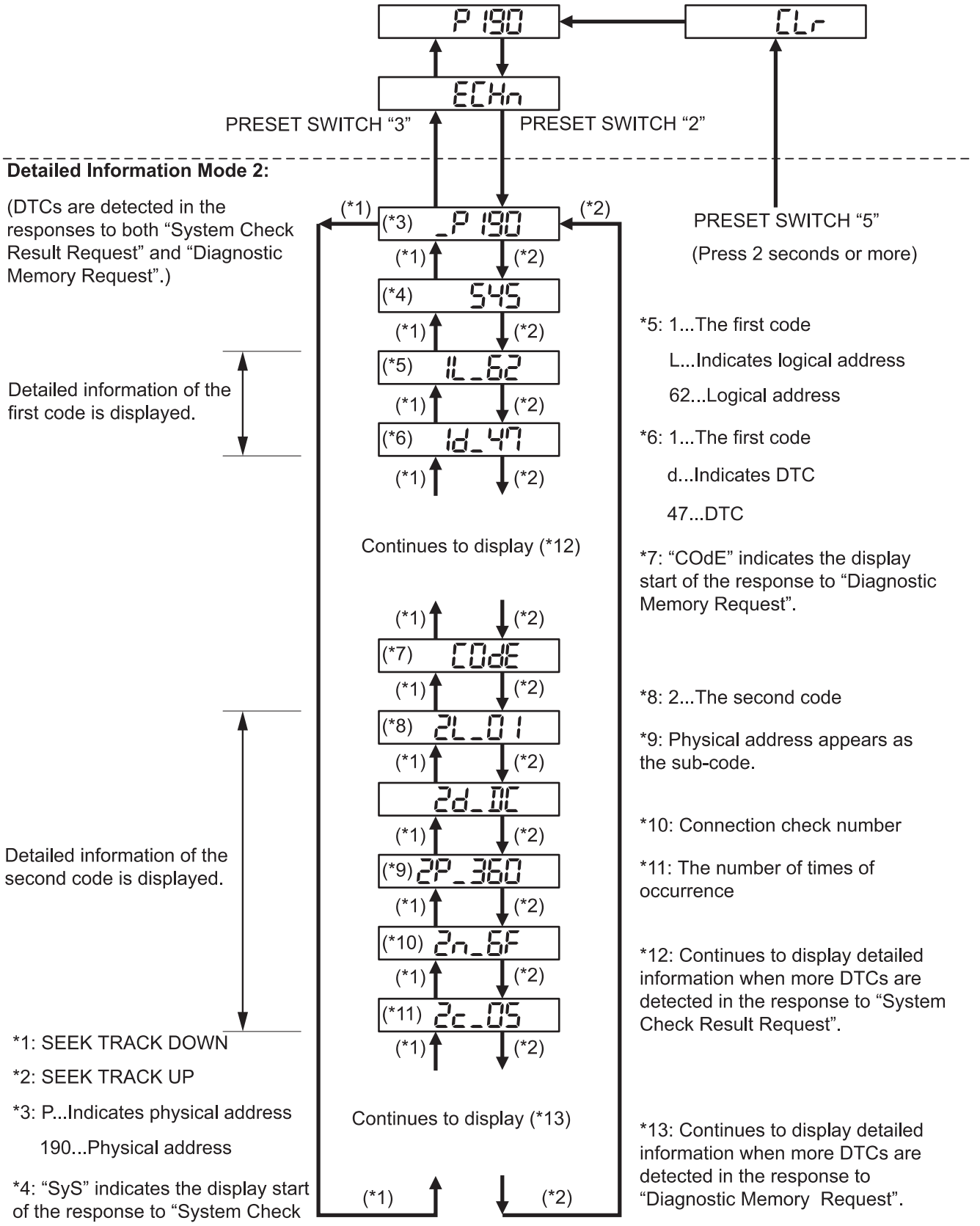
(f) Detailed information mode 2
HINT:
- "Detailed Information Mode 2" is displayed when DTCs are detected in the responses to both "System Check Result Request" and "Diagnostic Memory Request".
- The component device code (physical address) is displayed first, and then the check result follows.
- This illustration is only an example and may differ in cases such as for each option part and output DTCs.

(1) Press the preset switch "2" to go to the "Detailed Information Mode 2".
(2) Press the "SEEK TRACK" switch to display the physical address and DTC of the component.
(3) Press the preset switch "3" to go to the "Service Check Mode".
(4) Distinguish between the displays of the responses to "System Check Result Request" and "Diagnostic Memory Request". In order to distinguish the information detected in "System Check Mode" and "Diagnostic Memory Mode" in "ECHn", "CHEC", and "OLd" in "Detailed Information Mode 2", refer to the following:
- "SyS" is displayed before the detailed codes detected as a result of "System Check Result Request" are displayed.
- "COdE" is displayed before the detailed codes detected as a result of "Diagnostic Memory Request" are displayed.
HINT:
- The response to "System Check Result Request" is the current information given from each ECU as a result of the system check.
- The response to "Diagnostic Memory Request" contains the information received from each ECU or stored in each ECU in the past.
- The response to "Diagnostic Memory Request" is the output DTCs as a result of the diagnostic memory check or the DTCs received from each ECU.
- "System Check Result Request (SyS)" is displayed first, and then the logical address and DTC appear in order.
- "Diagnostic Memory Request (COdE)" is displayed first, and then the logical address, DTC, sub-code, connection check number, and the number of occurrence appear in order.

AV

System Check Mode:



P

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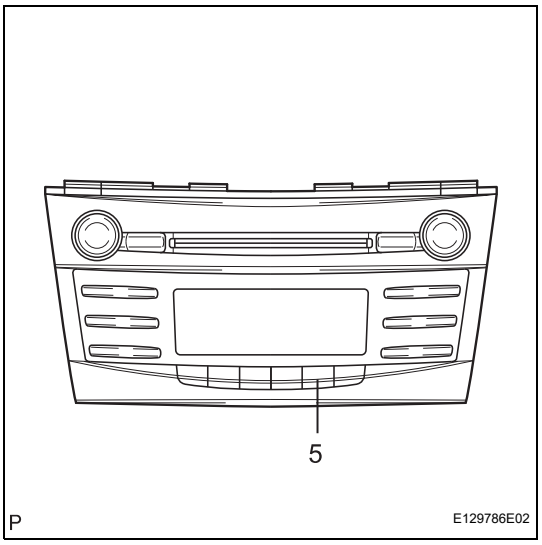
AV



7. DTC CLEAR/RECHECK

(a) Clearing All DTC Memory (when clearing all the memory of the DTCs previously detected)
  (1) When the preset switch "5" is pressed for 2 seconds or more during "Service Check Mode", the DTCs for all components are cleared. ("CLr" is displayed at this time.)
  HINT:
  - A beep sound is emitted once when the DTC memory is completely cleared.
  - When the DTC memory for all the components is cleared, only the component codes (physical address) are displayed.
  - After the DTC memory is cleared, the "Service Check Mode" is restored.

(b) Clearing Individual DTC Memory (when clearing the memory of the DTC previously detected individually)
  (1) When the preset switch "5" is pressed for 2 seconds or more during "Detailed Information Mode 1" or "Detailed Information Mode 2", the DTCs for the target component are cleared.
  HINT:
  - A beep sound is emitted once when the DTC memory is completely cleared.
  - When the DTC memory is cleared, only the component code (physical address) is displayed for the target component.
  - After the DTC memory is cleared, the "Service Check Mode" is restored.
  - To check DTCs, press the preset switch "1" and perform the system check again.

(c) Press the preset switch "1" to perform the service check again, and check that no DTCs are displayed for all the component codes (physical address).

DIAGNOSTIC TROUBLE CODE CHART

COMMUNICATION DIAGNOSIS:

DTC Code	Detection Item	Trouble Area	See page
01-21	ROM Error	Radio receiver	AV-30
01-22	RAM Error	Radio receiver	AV-30
01-D5	Absence of Registration Unit	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio receiver and the component shown by the sub-code 3. Component shown by the sub-code	AV-31
01-D6	No Master	1. Radio receiver power source circuit 2. Power source circuit of the component which has stored this code 3. AVC-LAN circuit between the radio receiver and the component which has stored this code 4. Component which has stored this code 5. Radio receiver	AV-33
01-D7	Connection Check Error	1. Radio receiver power source circuit 2. Power source circuit of the component which has stored this code 3. AVC-LAN circuit between the radio receiver and the component which has stored this code 4. Component which has stored this code 5. Radio receiver	AV-33
01-D8	No Response for Connection Check	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio receiver and the component shown by the sub-code 3. Component shown by the sub-code	AV-31
01-D9	Last Mode Error	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio receiver and the component shown by the sub-code 3. Component shown by the sub-code	AV-31
01-DA	No Response Against ON / OFF Command	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio receiver and the component shown by the sub-code 3. Component shown by the sub-code	AV-31

DTC Code	Detection Item	Trouble Area	See page
01-DB	Mode Status Error	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio receiver and the component shown by the sub-code 3. Component shown by the sub-code	AV-31
01-DC	Transmission Error	If the same sub-code is recorded in other components, check harness for power supply and the communication system of all components shown by the code	AV-38
01-DD	Master Reset	1. Radio receiver power source circuit 2. AVC-LAN circuit between the radio receiver and the component which has stored this code 3. Radio receiver 4. Component which has stored this code	AV-41
01-DE	Slave Reset	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio receiver and the component shown by the sub-code 3. Component shown by the sub-code	AV-31
01-DF	Master Error	1. Radio receiver power source circuit 2. AVC-LAN circuit between the radio receiver and the component which has stored this code 3. Radio receiver 4. Component which has stored this code	AV-46
01-E0	Registration Complete Indication Error	-	AV-50
01-E1	Voice Processing Device ON Error	1. Radio receiver power source circuit 2. AVC-LAN circuit between the radio receiver and the component which has stored this code 3. Radio receiver 4. Component which has stored this code	AV-41
01-E2	ON / OFF Indication Parameter Error	Radio receiver	AV-51
01-E3	Registration Demand Transmission	-	AV-50
01-E4	Multiple Frame Incomplete	-	AV-50

CD PLAYER:

DTC Code	Detection Item	Trouble Area	See page
62-10	CD Player Mechanical Error	Radio receiver	AV-53
62-12	CD Reading Abnormal	Radio receiver	AV-53
62-41	Wrong Disc	1. CD 2. Radio receiver	AV-54
62-42	Disc cannot be Read	1. CD 2. Radio receiver	AV-54
62-43	CD-ROM Abnormal	1. CD 2. Radio receiver	AV-56

DTC Code	Detection Item	Trouble Area	See page
62-44	CD Abnormal	Radio receiver	AV-58
62-45	Eject Error	Radio receiver	AV-59
62-46	Scratched / Reversed Disc	1. CD 2. Radio receiver	AV-60
62-47	High Temperature	Radio receiver	AV-62
62-48	Excess Current	Radio receiver	AV-58
62-50	Tray Insertion / Ejection Error	Radio receiver	AV-58
62-51	Elevator Error	Radio receiver	AV-59
62-52	Clamp Error	Radio receiver	AV-59
62-78	DSP Error	-	AV-63
62-7D	Disc cannot be Played	1. CD 2. Radio receiver	AV-64
62-7E	No Playable Files	1. CD 2. Radio receiver	AV-64
62-7F	Copyright Protection Error	1. CD 2. Radio receiver	AV-64

IN-DASH CD CHANGER:

DTC Code	Detection Item	Trouble Area	See page
63-10	CD Changer Mechanical Error	Radio receiver	AV-53
63-12	CD Reading Abnormal	Radio receiver	AV-53
63-41	Wrong Disc	1. CD 2. Radio receiver	AV-54
63-42	Disc cannot be Read	1. CD 2. Radio receiver	AV-54
63-43	CD-ROM Abnormal	1. CD 2. Radio receiver	AV-56
63-44	CD Abnormal	Radio receiver	AV-58
63-45	Eject Error	Radio receiver	AV-59
63-46	Scratched / Reversed Disc	1. CD 2. Radio receiver	AV-60
63-47	High Temperature	Radio receiver	AV-62
63-48	Excess Current	Radio receiver	AV-58
63-50	Tray Insertion / Ejection Error	Radio receiver	AV-58
63-51	Elevator Error	Radio receiver	AV-59
63-52	Clamp Error	Radio receiver	AV-59
63-78	DSP Error	-	AV-63
63-7D	Disc cannot be Played	1. CD 2. Radio receiver	AV-64
63-7E	No Playable Files	1. CD 2. Radio receiver	AV-64
63-7F	Copyright Protection Error	1. CD 2. Radio receiver	AV-64

TELEPHONE:

DTC Code	Detection Item	Trouble Area	See page
57-47	Bluetooth Module Initialization Failed	Radio receiver	AV-52
62-11	CD Insertion and Ejection Error		AV-53
63-11	CD Insertion and Ejection Error		AV-53

DTC	01-21	ROM Error

DTC	01-22	RAM Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-21	A malfunction exists in ROM.	Radio receiver
01-22	A malfunction exists in RAM.	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	REPLACE RADIO RECEIVER

AV

NEXT

END

DTC	01-D5	Absence of Registration Unit

DTC	01-D8	No Response for Connection Check

DTC	01-D9	Last Mode Error

DTC	01-DA	No Response Against ON / OFF Command

DTC	01-DB	Mode Status Error

DTC	01-DE	Slave Reset

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-D5 *1, *3	A device that the sub-code shows is (was) disconnected from the system when turning the power switch on (ACC or IG). The communication condition with the device that the code shows cannot be obtained when the engine starts.	• Power source circuit of the component shown by the sub-code • AVC-LAN circuit between the radio receiver and the component shown by the sub-code • Component shown by the sub-code
01-D8 *2, *3	The device indicated by the sub-code is (was) disconnected from the system after the engine starts.	
01-D9 *1, *3	The device that had functioned before the engine stopped is (was) disconnected from the system when turning the power switch on (ACC or IG).	
01-DA *3	No response is identified when changing mode. Sound and image do not change by switch operation.	
01-DB *1, *3	A dual alarm is detected.	
01-DE *3	A slave device has been disconnected after the engine starts	

HINT:
- *1: Even if no fault is present, this trouble code may be stored depending on the battery condition or engine start voltage.
- *2: If the power connector is disconnected after the engine starts, this code is stored after 180 seconds.
- *3: If the device is reported as not existing during verification, check the power source circuit and AVC-LAN circuit for the device.

NOTICE:
- **Before starting troubleshooting, be sure to clear DTCs to erase codes stored due to the reasons described in the HINT above. Then, check for DTCs and troubleshoot according to the output DTCs.**
- **The radio receiver is the master unit.**
- **Be sure to clear and recheck DTCs after the inspection is completed to confirm that no DTCs are output.**

INSPECTION PROCEDURE

NOTICE:
Be sure to read DESCRIPTION before performing the following procedures.

1	CHECK "RADIO RECEIVER COMMUNICATION ERROR" IN FLOW CHART

Refer to the radio receiver communication error (See page AV-119).

NEXT

END

DTC	01-D6	No Master

DTC	01-D7	Connection Check Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-D6 *1	When either of the following conditions is met: • The device that stores (stored) the code has (had) been disconnected when the power switch is turned on (ACC or IG). • The master device has (had) been disconnected when this code is stored.	• Radio receiver power source circuit • Power source circuit of the component which has stored this code • AVC-LAN circuit between the radio receiver and the component which has stored this code • Component which has stored this code • Radio receiver
01-D7 *2	When either of the following conditions is met: • The device that stored the code has (had) been disconnected after the engine starts (started). • The master device has (had) been disconnected when this code is (was) stored.	

HINT:
- *1: Even if no fault is present, this trouble code may be stored depending on the battery condition or engine start voltage.
- *2: When 210 seconds have elapsed after disconnecting the power supply connector of the master component with the power switch on (ACC or IG), this code is stored.

NOTICE:
- **Before starting troubleshooting, be sure to clear DTCs to erase codes stored due to the reasons described in the HINT above. Then, check for DTCs and troubleshoot according to the output DTCs.**
- **The radio receiver is the master unit.**
- **Be sure to clear and recheck DTCs after the inspection is completed to confirm that no DTCs are output.**

INSPECTION PROCEDURE

NOTICE:
Be sure to read DESCRIPTION before performing the following procedures.

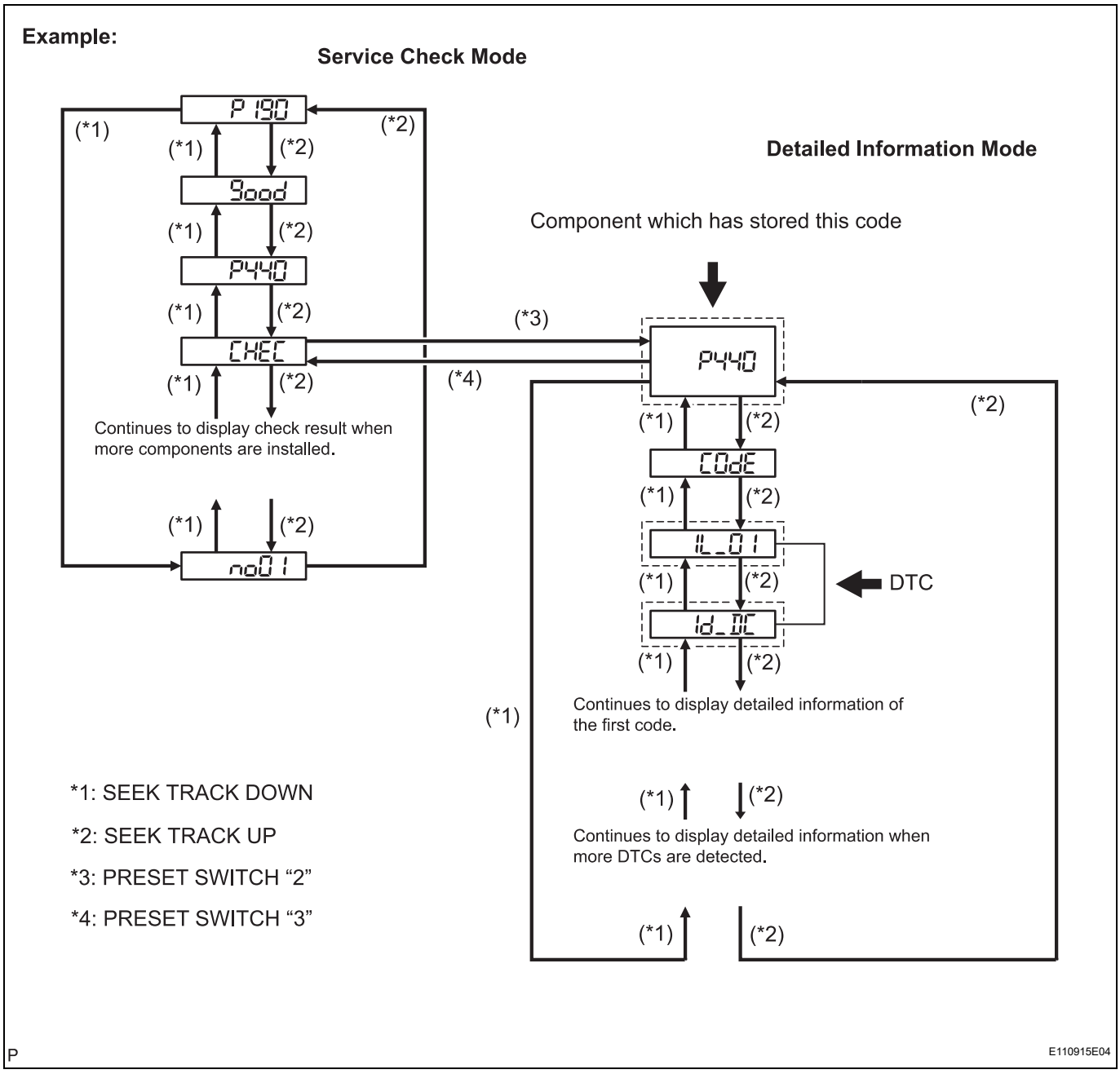
1	CHECK RADIO RECEIVER POWER SOURCE CIRCUIT

Refer to the radio receiver power source circuit (See page AV-130).
If the power source circuit is operating normally, proceed to the next step.

NEXT

2	IDENTIFY THE COMPONENT WHICH HAS STORED THIS CODE

(a) Enter the diagnostic mode.



(b) Press the preset switch "3" to change to "Detailed Information Mode".
(c) Identify the component which has stored this code.

Component Table:

Component	Physical address
Stereo component amplifier	440
"Bluetooth" handsfree module	19D

HINT:
- "440 (stereo component amplifier)" is the component which has stored this code in the example shown in the illustration.
- For details of the DTC display, refer to "DTC CHECK/ CLEAR" (See page AV-18).

NEXT

3	CHECK COMPONENT WHICH HAS STORED THIS CODE

(a) Select the component which has stored this code.
HINT:
The "Bluetooth" handsfree module is built into the radio receiver. If there is a problem between the "Bluetooth" handsfree module and radio receiver, replace the radio receiver.

Component Table:

Component	Proceed to
"Bluetooth" handsfree module	A
Except "Bluetooth" handsfree module	B

A → REPLACE RADIO RECEIVER

B

4	CHECK POWER SOURCE CIRCUIT OF COMPONENT WHICH HAS STORED THIS CODE

(a) Inspect the power source circuit of the component which has stored this code.
If the power source circuit is operating normally, proceed to the next step.

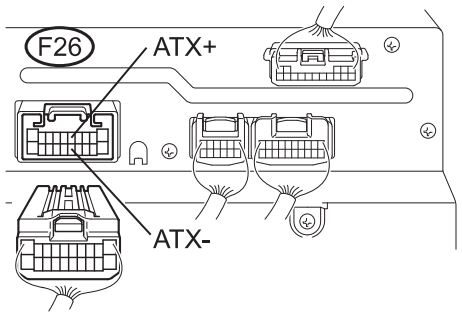
Component Table:

Component	Proceed to
Stereo component amplifier	Stereo component amplifier power source circuit (See page AV-132)

NEXT

5	INSPECT RADIO RECEIVER

Wire Harness View:



P E129798E03

(a) Disconnect the radio receiver connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
ATX+ (F26-5) - ATX- (F26-15)	Always	60 to 80 Ω

NG → REPLACE RADIO RECEIVER

AV

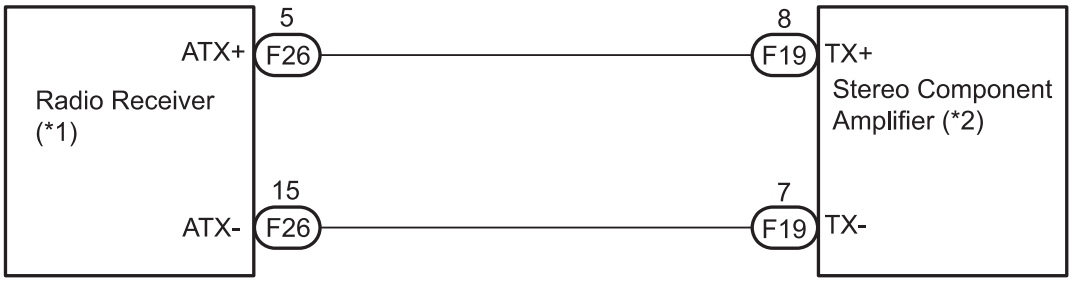
OK

6	CHECK HARNESS AND CONNECTOR (RADIO RECEIVER - COMPONENT WHICH HAS STORED THIS CODE)

HINT:
For details of the connectors, refer to the "TERMINALS OF ECU" (See page AV-15).

(a) Referring to the AVC-LAN wiring diagram below, check the AVC-LAN circuit between the radio receiver and the component which has stored this code.
  (1) Disconnect all connectors between the radio receiver and the component which has stored this code.
  (2) Check for an open or short in the AVC-LAN circuit between the radio receiver and the component which has stored this code.
  OK:
  There is no open or short circuit.

AVC-LAN WIRING DIAGRAM



*1: Master Unit

*2: Slave Unit

P

E111831E12

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

7	REPLACE COMPONENT WHICH HAS STORED THIS CODE

(a) Replace the component which has stored this code with a normal one and check if the same problem occurs again.

OK:
Same problem does not occur.

NG → **REPLACE RADIO RECEIVER**

OK

END

DTC 01-DC Transmission Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-DC	Transmission to component shown by sub-code failed (Detecting this DTC does not always mean actual failure)	If the same sub-code is recorded in other components, check harness for power supply and the communication system of all components shown by the code

NOTICE:
- **The radio receiver is the master unit.**
- **Be sure to clear and recheck DTCs after the inspection is completed to confirm that no DTCs are output.**

INSPECTION PROCEDURE

NOTICE:
Be sure to read DESCRIPTION before performing the following procedures.

AV

1 CHECK FOR DTC OF OTHER COMPONENTS

(a) Check if the component shown by the sub-code is displayed in the check result of the other components.
  (1) Check if "01-DC" is output for the other components.
  (2) If "01-DC" is output for any other components, check if the same physical address is displayed.
  Result

Result	Proceed to
"01-DC" is output and the same physical address is displayed	**A**
"01-DC" is not output or the same physical address is not displayed	**B**

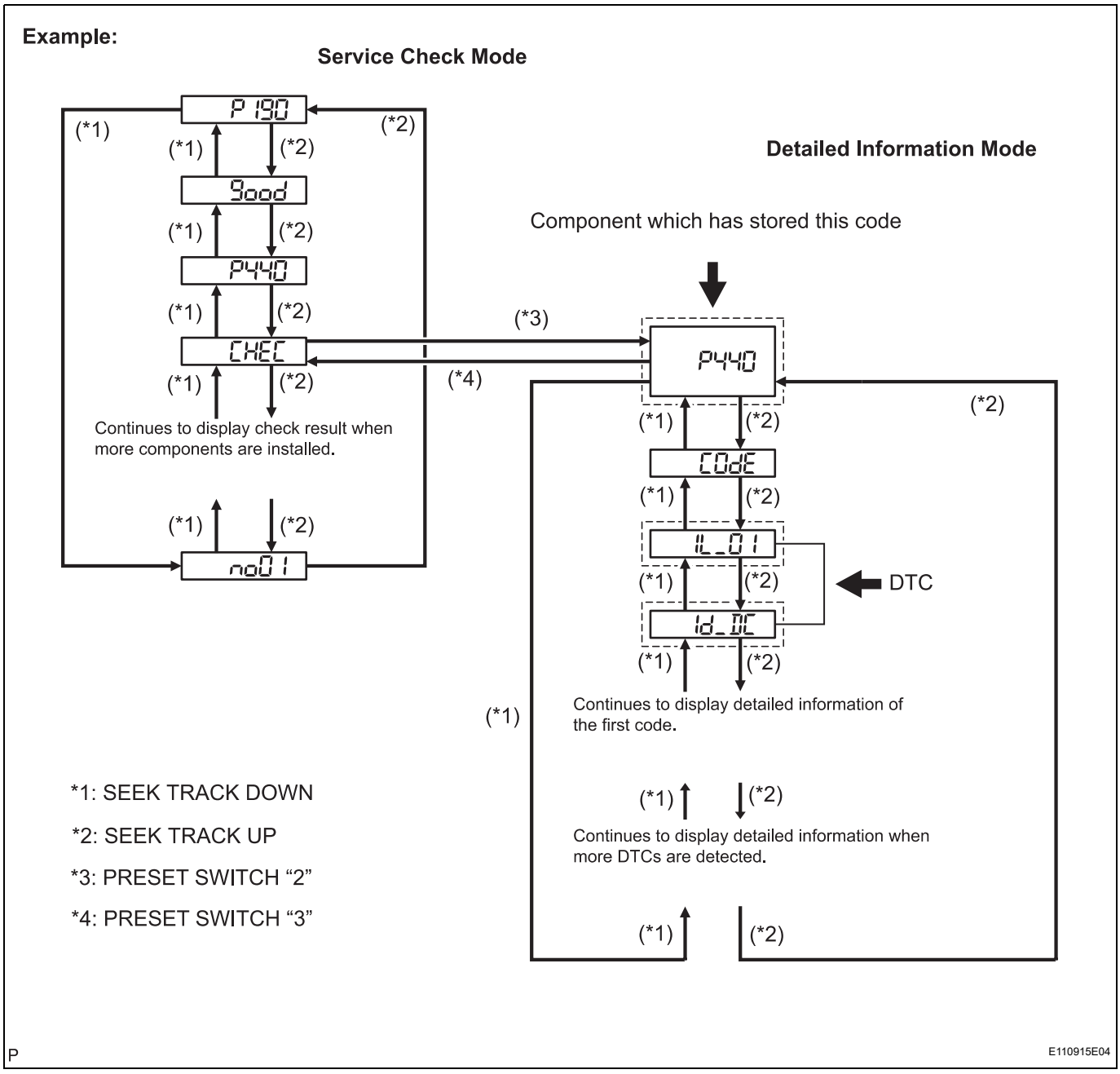
HINT:
For the list of the components shown by sub-codes, refer to the table in step 2.

B → **Go to step 4**

A

2 IDENTIFY THE COMPONENT WHICH HAS STORED THIS CODE

(a) Enter the diagnostic mode.



(b) Press the preset switch "3" to change to "Detailed Information Mode".
(c) Identify the component which has stored this code.

Component Table:

Component	Physical address
Stereo component amplifier	440
"Bluetooth" handsfree module	19D
Radio receiver	190

HINT:

- "440 (stereo component amplifier)" is the component which has stored this code in the example shown in the illustration.
- For details of the DTC display, refer to "DTC CHECK/ CLEAR" (See page AV-18).

NEXT

3	CHECK COMPONENT WHICH HAS STORED THIS CODE

(a) Select the component which has stored this code.

Component Table:

Component	Proceed to
Stereo component amplifier	Stereo component amplifier communication error (See page AV-123)
"Bluetooth" handsfree module	"Bluetooth" handsfree module communication error (See page AV-126)
Radio receiver	Radio receiver communication error (See page AV-119)

NEXT

END

AV

4	CLEAR DTC

(a) Clear the DTCs (See page AV-18).
HINT:
If "01-DC" is output for only one component, this may not indicate a malfunction.

NEXT

5	RECHECK DTC

(a) Recheck for DTCs and check if the same trouble code occurs again.
OK:
Malfunction disappears.

NG → **Go to step 3**

OK

END

DTC	01-DD	Master Reset

DTC	01-E1	Voice Processing Device ON Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-DD	The device that should be the master has been disconnected after engine start.	• Radio receiver power source circuit • AVC-LAN circuit between the radio receiver and the component which has stored this code • Radio receiver • Component which has stored this code
01-E1 *1	The AMP device records that the AMP output does not function even while the source device operates.	

HINT:
*1: Even if no fault is present, this trouble code may be stored depending on the battery condition or engine start voltage.

NOTICE:

- **Before starting troubleshooting, be sure to clear DTCs to erase codes stored due to the reasons described in the HINT above. Then, check for DTCs and troubleshoot according to the output DTCs.**
- **The radio receiver is the master unit.**
- **Be sure to clear and recheck DTCs after the inspection is completed to confirm that no DTCs are output.**

AV

INSPECTION PROCEDURE

NOTICE:

Be sure to read DESCRIPTION before performing the following procedures.

1	CHECK RADIO RECEIVER POWER SOURCE CIRCUIT

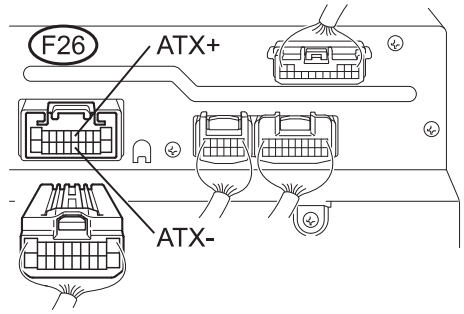
Refer to the radio receiver power source circuit (See page AV-130).

If the power source circuit is operating normally, proceed to the next step.

NEXT

2	INSPECT RADIO RECEIVER

Wire Harness View:



P E129798E03

(a) Disconnect the radio receiver connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
ATX+ (F26-5) - ATX- (F26-15)	Always	60 to 80 Ω

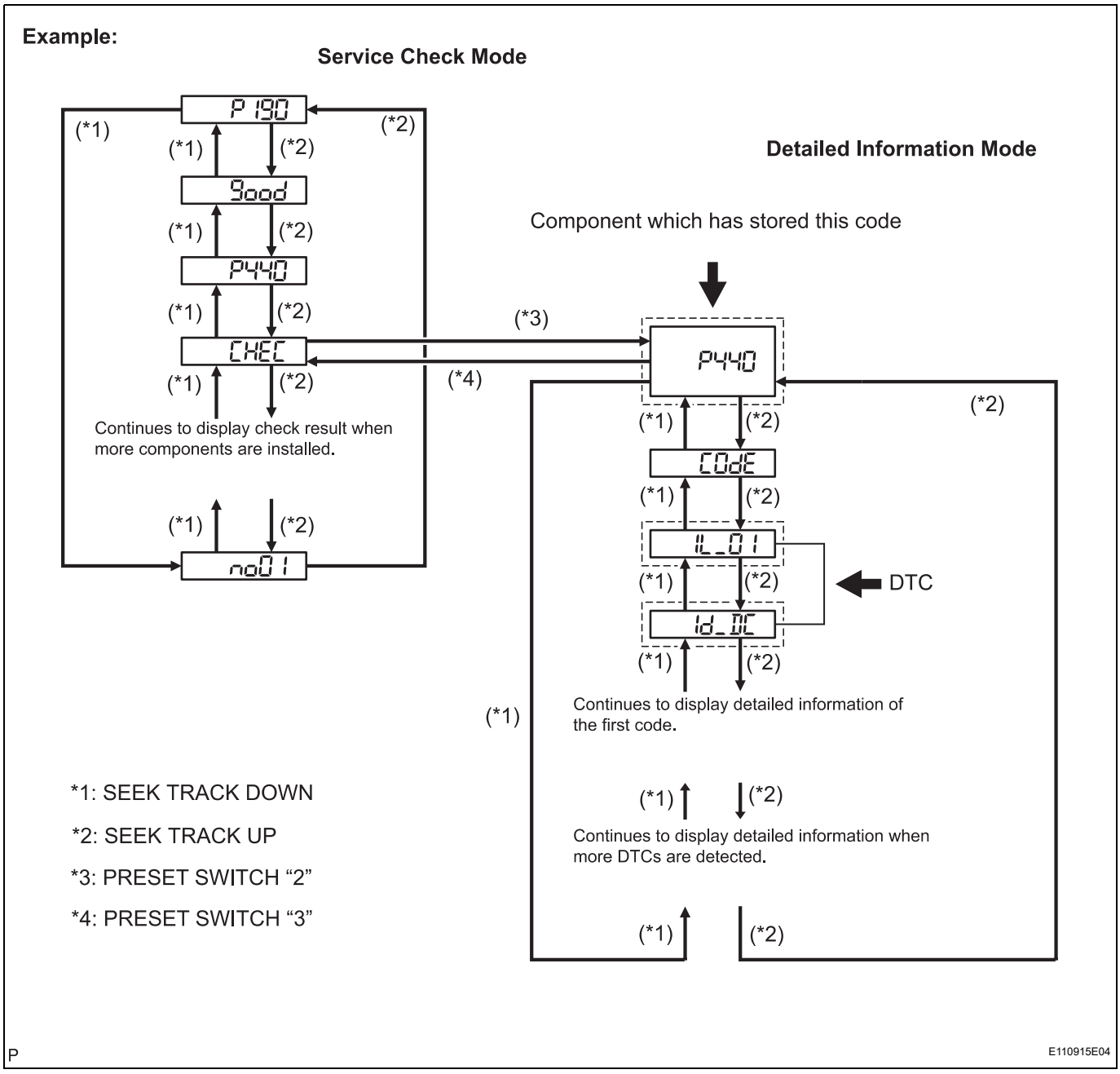
NG → **REPLACE RADIO RECEIVER**

OK

3	IDENTIFY THE COMPONENT WHICH HAS STORED THIS CODE

(a) Enter the diagnostic mode.

AV



(b) Press the preset switch "3" to change to "Detailed Information Mode".
(c) Identify the component which has stored this code.

Component Table:

Component	Physical address
Stereo component amplifier	440
"Bluetooth" handsfree module	19D

HINT:
- "440 (stereo component amplifier)" is the component which has stored this code in the example shown in the illustration.
- For details of the DTC display, refer to "DTC CHECK/ CLEAR" (See page AV-18).

AV

NEXT

4	CHECK COMPONENT WHICH HAS STORED THIS CODE

(a) Select the component which has stored this code.
HINT:
The "Bluetooth" handsfree module is built into the radio receiver. If there is a problem between the "Bluetooth" handsfree module and radio receiver, replace the radio receiver.

Component Table:

Component	Proceed to
"Bluetooth" handsfree module	A
Except "Bluetooth" handsfree module	B

A → REPLACE RADIO RECEIVER

AV

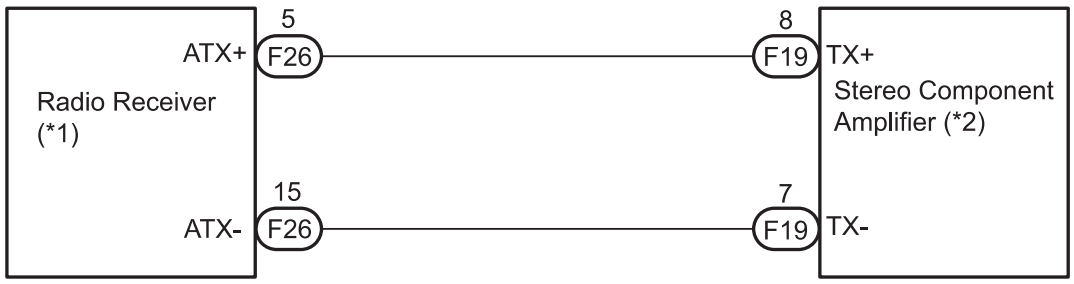
B

5	CHECK HARNESS AND CONNECTOR (RADIO RECEIVER - COMPONENT WHICH HAS STORED THIS CODE)

HINT:
For details of the connectors, refer to the "TERMINALS OF ECU" (See page AV-15).

(a) Referring to the AVC-LAN wiring diagram below, check the AVC-LAN circuit between the radio receiver and the component which has stored this code.
  (1) Disconnect all connectors between the radio receiver and the component which has stored this code.
  (2) Check for an open or short in the AVC-LAN circuit between the radio receiver and the component which has stored this code.
  OK:
  There is no open or short circuit.

AVC-LAN WIRING DIAGRAM



*1: Master Unit

*2: Slave Unit

P

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AV

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6	REPLACE RADIO RECEIVER

(a) Replace the radio receiver with a normal one and check if the same problem occurs again.
OK:
Same problem does not occur.

NG → **REPLACE COMPONENT WHICH HAS STORED THIS CODE**

OK

END

HOW TO PROCEED WITH TROUBLESHOOTING

1	VEHICLE BROUGHT INTO A WORKSHOP

NEXT

2	DIAGNOSTIC QUESTIONING AND SYMPTOM CONFIRMATION

(a) Ask the customer about symptoms and confirm malfunctions.

- THE SCREEN DISPLAYS NOTHING (GO TO STEP 8, AND PROCEED TO "BLACK SCREEN")
- OTHER SYMPTOMS (GO TO STEP 3)

NS

3	CONFIRM THE SYSTEM NORMAL CONDITION

- APPLICABLE (THIS IS NOT A MALFUNCTION)
- NOT APPLICABLE (GO TO STEP 4)

4	CHECK DTC

HINT:
If the system cannot enter the diagnostic mode, inspect the AVC-LAN and all the components that connect to the AVC-LAN for short circuits and repair or replace the problem part.

- A CODE IS OUTPUT (GO TO STEP 5)
- A CODE IS NOT OUTPUT (GO TO STEP 8)

5	DTC CLEAR

(a) Clear the DTCs and finish the diagnostic mode.
HINT:
The currently output DTCs may not indicate actual malfunctions depending on the vehicle conditions.

NEXT

6	RECHECK DTC

HINT:
- If the system cannot enter the diagnostic mode, inspect the AVC-LAN and all the components that connect to the AVC-LAN for short circuits.
- Even if the malfunction symptom is not confirmed, check for diagnostic trouble codes. This is because the system stores past diagnostic trouble codes.
- Refer to the detailed description on the diagnostic screen as necessary (See page NS-31).
- Check the diagnostic trouble code and inspect the area the code indicates.

⇨	**A CODE IS OUTPUT (GO TO STEP 7)**
⇨	**A CODE IS NOT OUTPUT (GO TO STEP 8)**

NS

7	DIAGNOSTIC TROUBLE CODE CHART

(a) Find the output code in the diagnostic trouble code chart (See page NS-53).

NEXT ⇨	**GO TO STEP 10**

8	PROBLEM SYMPTOMS TABLE

(a) Find the applicable symptom in the problem symptoms table (See page NS-42).
HINT:
If the symptom does not recur and no code is output, perform the symptom reproduction method (See page IN-67).

⇨	**THERE IS AN APPLICABLE SYMPTOM IN THE TABLE (GO TO STEP 10)**
⇨	**THERE IS NO APPLICABLE SYMPTOM IN THE TABLE (GO TO STEP 9)**

9	CHECK THE ECU TERMINAL ARRANGEMENT BASED ON THE MALFUNCTION SYMPTOM

NEXT ⇩

10	CHECK THE CIRCUIT

(a) Adjust, repair, or replace as necessary.

NEXT

11	**RECHECK THE DIAGNOSTIC TROUBLE CODE**

HINT:
After deleting the DTCs, recheck for diagnostic trouble codes.

NEXT

12	**PERFORM CONFIRMATION TEST**

NEXT

END

IDENTIFICATION OF NOISE SOURCE

1. Radio Description

(a) Radio frequency band

(1) Radio broadcasts use the radio frequency bands shown in the table below.

Frequency	30 kHz	300 kHz	30 MHz	30 MHz	300 MHz
Designation	LF	MF	HF	VHF	
Radio Wave		AM ⟷		FM ⟷	
Modulation	Amplitude modulation			Frequency modulation	

LF: Low Frequency MF: Medium Frequency HF: High Frequency VHF: Very High Frequency

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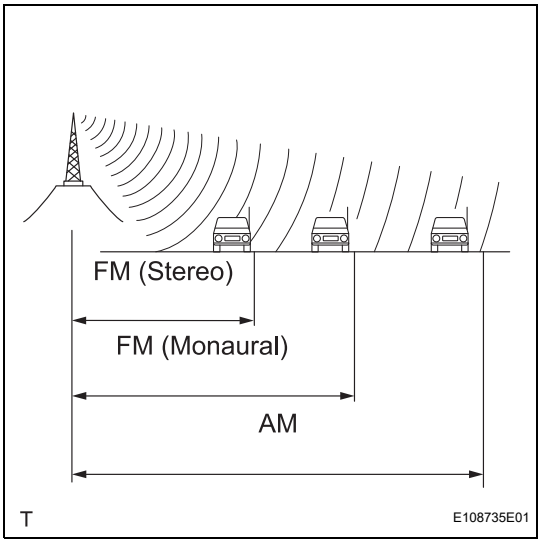


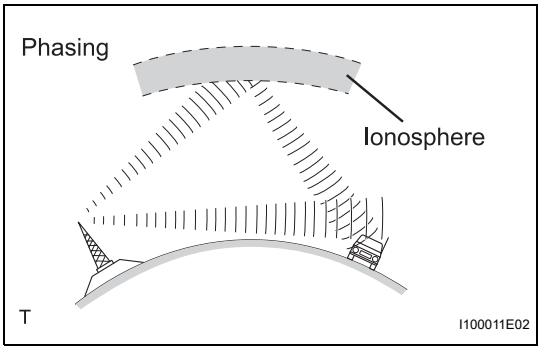
(b) Service area

(1) The service areas of AM and FM broadcasts are vastly different. Sometimes an AM broadcast can be received very clearly but an FM stereo cannot. FM stereo has the smallest service area, and is prone to pick up static and other types of interference such as noise.

(c) Radio reception problems

HINT:

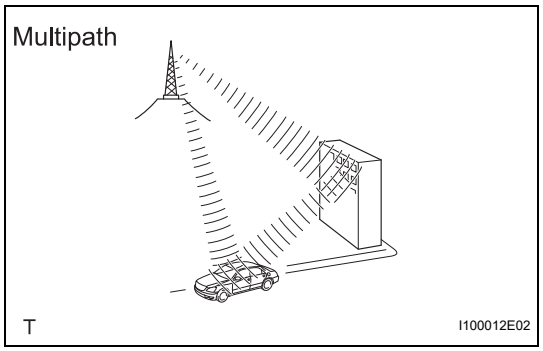
In addition to static, other problems such as "phasing", "multipath", and "fade out" exist. These problems are not caused by electrical noise, but by the radio signal propagation method itself.



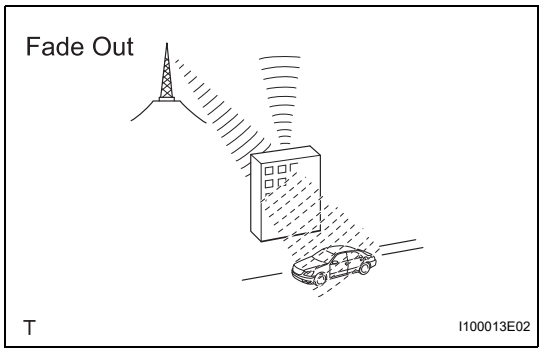
(1) Phasing

AM broadcasts are susceptible to electrical interference and another kind of interference called phasing. Occurring only at night, phasing is the interference created when a vehicle receives 2 radio wave signals from the same transmitter. One signal is reflected off the ionosphere and the other signal is received directly from the transmitter.

NS



(2) Multipath
Multipath is a type of interference created when a vehicle receives 2 radio wave signals from the same transmitter. One signal is reflected off buildings or mountains and the other signal is received directly from the transmitter.



(3) Fade out
Fade out is caused by objects (buildings, mountains, and other such large obstacles) that deflect away part of a signal, resulting in a weaker signal when the object is between the transmitter and vehicle. High frequency radio waves, such as FM broadcasts, are easily deflected by obstructions. Low frequency radio waves, such as AM broadcasts, are much more difficult to deflect.

(d) Noise problem
Technicians must have a clear understanding about each customer's noise complaint. Use the following table to diagnose noise problems.

Radio Frequency	Noise Occurrence Condition	Presumable Cause
AM	Noise occurs in a specified area	Foreign noise
AM	Noise occurs when listening to an intermittent broadcast	An identical program transmitted from multiple towers can cause noise where the signals overlap
AM	Noise occurs only at night	Music beat from a distant broadcast
FM	Noise occurs while driving in a specified area	Multipath or phasing noise resulting from a change in FM frequency

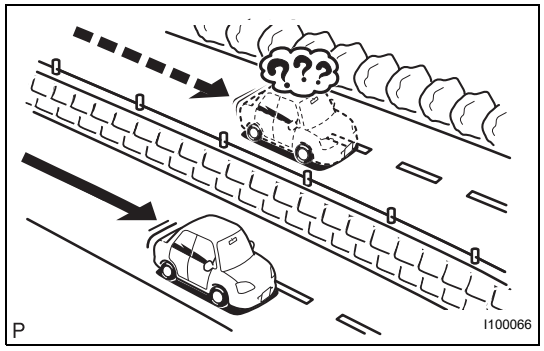
HINT:
If the noise does not match the examples above, refer to the descriptions about phasing and multipath.

SYSTEM NORMAL CONDITION CHECK

1. CHECK NORMAL CONDITION

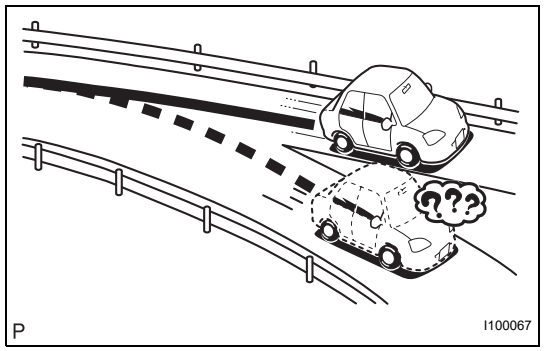
(a) If the symptom is applicable to any of the following, it is intended behavior, and not a malfunction.

Symptom	Answer
A longer route than expected is chosen.	Depending on the road conditions, the radio and navigation assembly may determine that a longer route is quicker.
Even when distance priority is high, the shortest route is not shown.	Some paths may not be advised due to safety concerns.
When the vehicle is put into motion immediately after the engine starts, the navigation system deviates from the actual position.	If the vehicle starts before the navigation system activates, the system may not react.
When running on certain types of roads, especially new roads, the vehicle position deviates from the actual position.	When the vehicle is driving on new roads not available on the map disc, the system attempts to match it to another nearby road, causing the position mark to deviate.

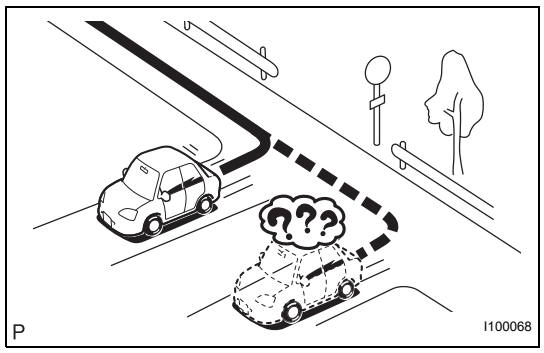


(b) The following symptoms are not a malfunction, but are caused by errors inherent in the GPS, gyro sensor, speed sensor, and radio and navigation assembly.

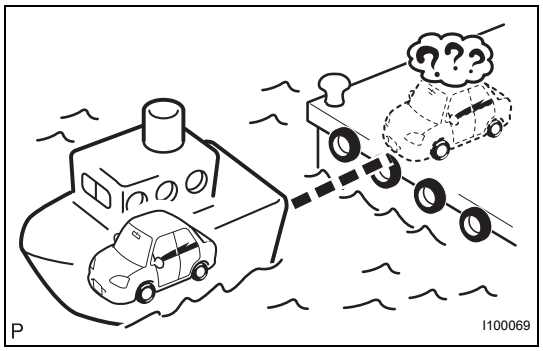
(1) The current position mark may be displayed on a nearby parallel road.



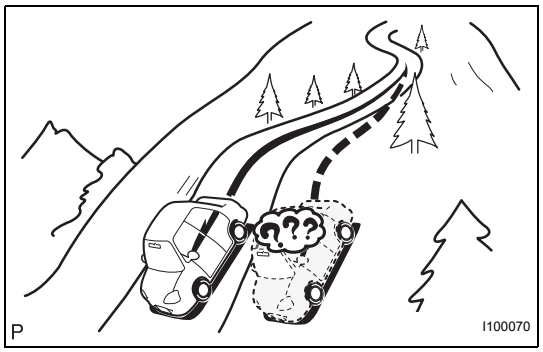
(2) Immediately after a fork in the road, the current vehicle position mark may be displayed on the wrong road.



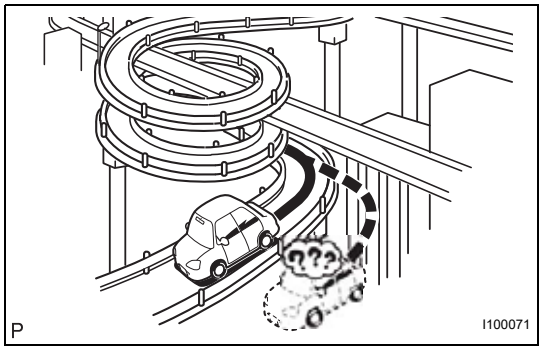
(3) When the vehicle turns right or left at an intersection, the current vehicle position mark may be displayed on a nearby parallel road.



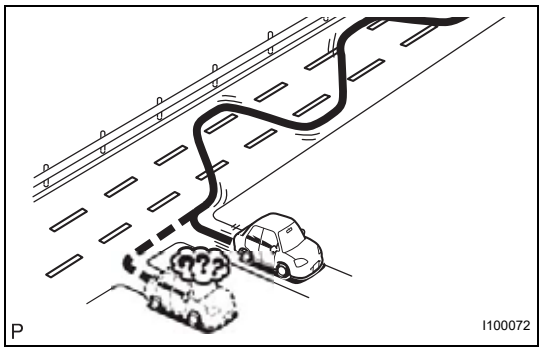
(4) When the vehicle is carried, such as on a ferry, and the vehicle itself is not running, the current vehicle position mark may be displayed in the position where the vehicle was until a measurement can be performed by GPS.



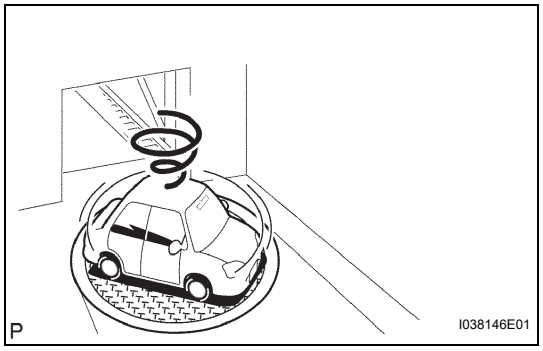
(5) When the vehicle runs on a steep hill, the current vehicle position mark may deviate from the correct position.



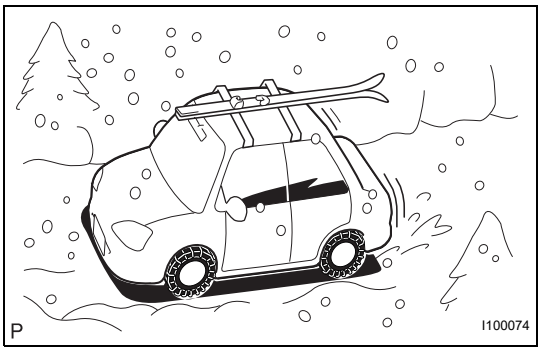
(6) When the vehicle makes a continuous turn of 360, 720, 1,080, etc. degrees, the current vehicle position mark may deviate from the correct position.



(7) When the vehicle moves erratically, such as constant lane changes, the current vehicle position mark may deviate from the correct position.



(8) When the power switch is on (ACC or IG) on a turntable before parking, the current vehicle position mark may not point in the correct direction. The same will occur when the vehicle comes out of parking.



(9) When the vehicle runs on a snowy road or a mountain path with the chains installed or using a spare tire, the current vehicle position mark may deviate from the correct position.

(10)When a tire is changed, the current vehicle position mark may deviate from the correct position.
HINT:
- Diameter of the tire may change, causing a speed sensor error.
- Performing the "tire change" in calibration mode will allow the system to correct the current vehicle position faster.

DISPLAY CHECK MODE

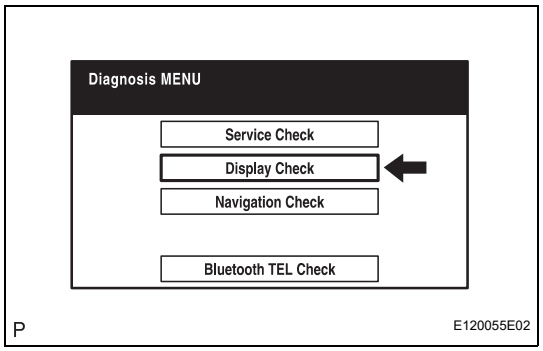
HINT:

- This mode checks the color display on the display.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

1. ENTER DIAGNOSTIC MODE (See page NS-47)

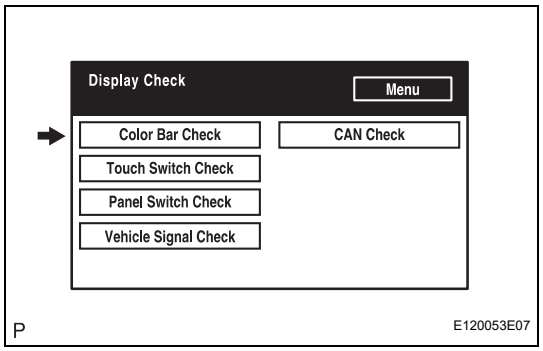
2. DISPLAY CHECK

(a) Select "Display Check" from the "Diagnosis MENU" screen.



3. COLOR BAR CHECK

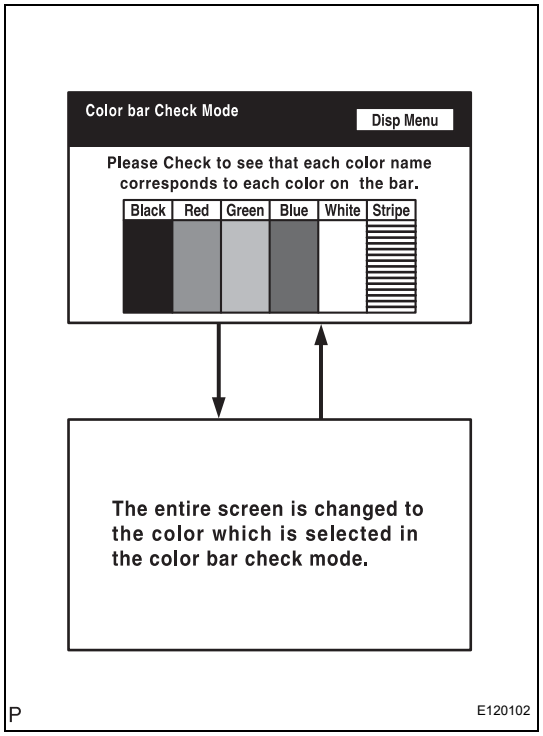
(a) Select "Color Bar Check" from the "Display Check" screen.



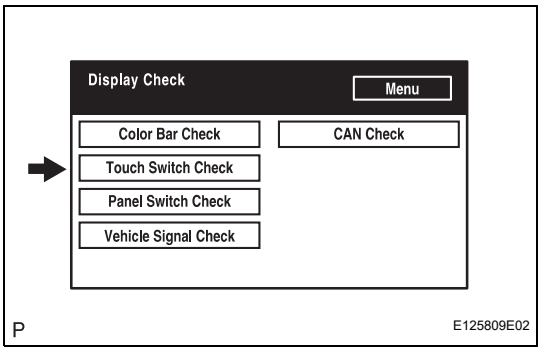
(b) Select a color bar from the "Color Bar Check Mode" screen.

(c) Check the display color.
HINT:

- The entire screen turns to the color or stripe selected.
- Touching the display will return to the "Color Bar Check" screen.

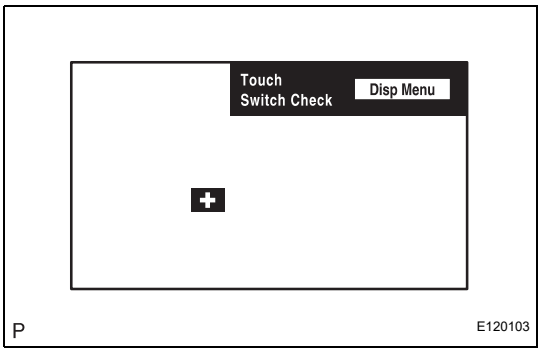


NS

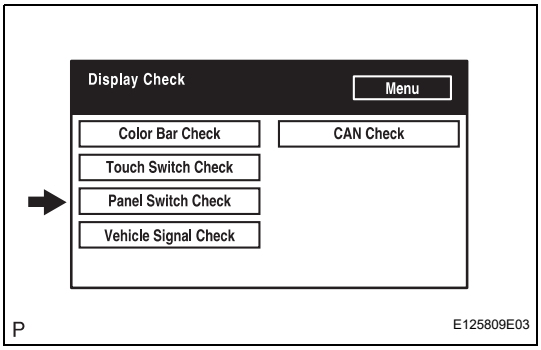


4. TOUCH SWITCH CHECK

(a) Select "Touch Switch Check" from the "Display Check" screen.

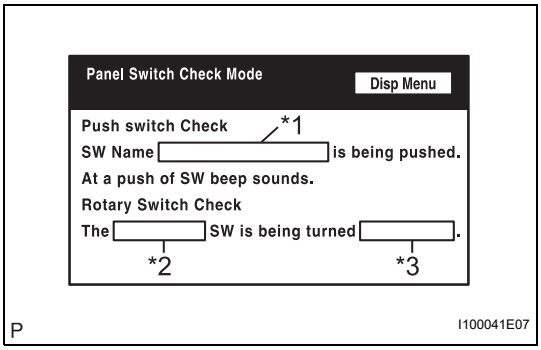


(b) Touch the display anywhere in the open area to perform the check when the "Touch Switch Check" screen is displayed.
HINT:
- A "+" mark is displayed where the display is touched.
- The "+" mark remains on the display even after the finger is removed.



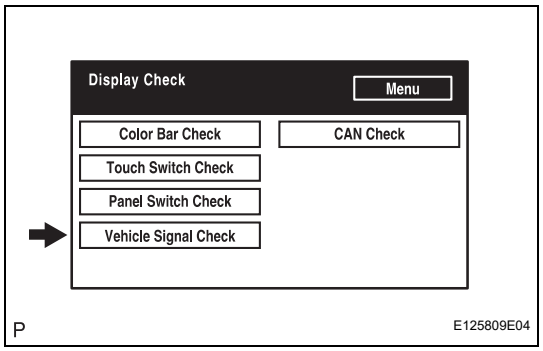
5. PANEL SWITCH CHECK

(a) Select "Panel Switch Check" from the "Display Check" screen.



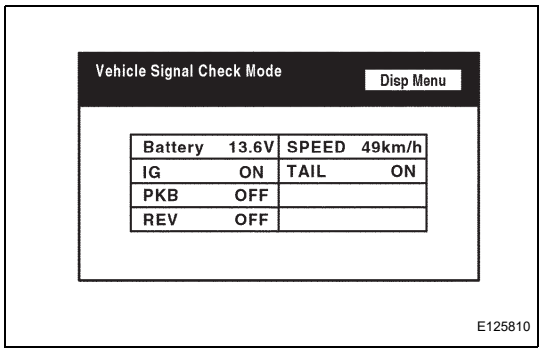
(b) Operate each switch and check that the switch names and condition are correctly displayed.

Display	Contents
Push switch name/*1	• Name of the pressed switch is displayed. • If more than one switch is pressed, "MULTIPLE" is displayed.
Rotary switch name/*2	Name of the rotary switch is displayed.
Rotary switch direction/*3	Direction of the rotary switch is displayed.



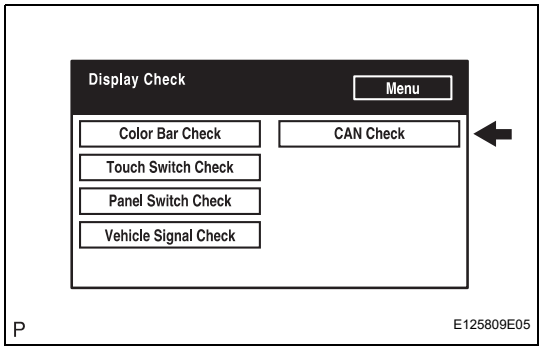
6. VEHICLE SIGNAL CHECK

(a) Select "Vehicle Signal Check" from the "Display Check" screen.



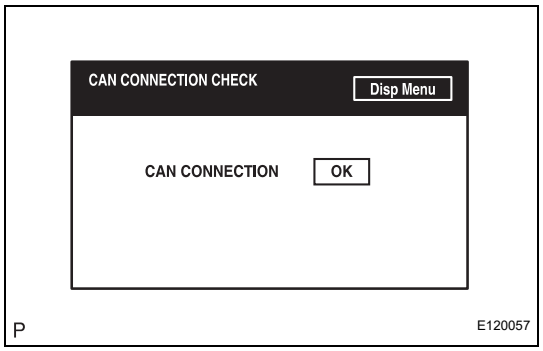
(b) When the "Vehicle Signal Check Mode" screen is displayed, check all the vehicle signal conditions.
HINT:
- Only conditions having inputs are displayed.
- This screen is updated once per second when input signals to the vehicle are changed.
- For details of this function, refer to DIAGNOSIS DISPLAY DETAILED DESCRIPTION (See page NS-31).

NS



7. CAN CHECK

(a) Select "CAN Check" from the "Display Check" screen.



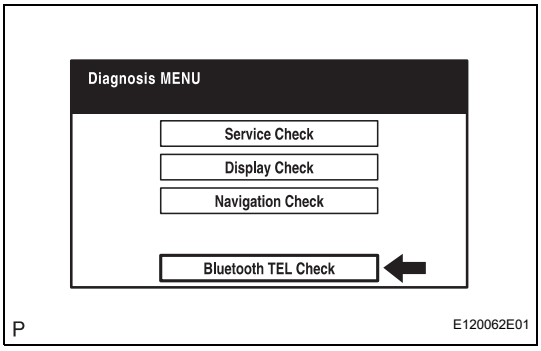
(b) Check the CAN connection check result.
HINT:
For details of this function, refer to DIAGNOSIS DISPLAY DETAILED DESCRIPTION (See page NS-31).

BLUETOOTH TEL CHECK MODE

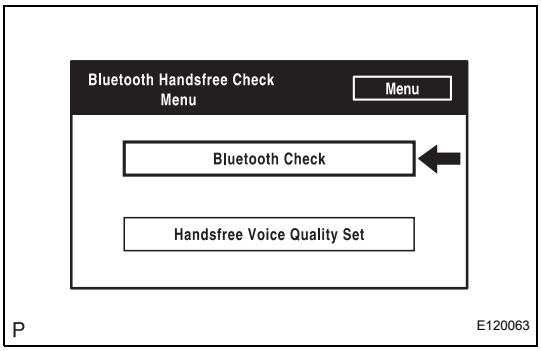
HINT:
Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

1. **ENTER DIAGNOSTIC MODE (See page NS-47)**

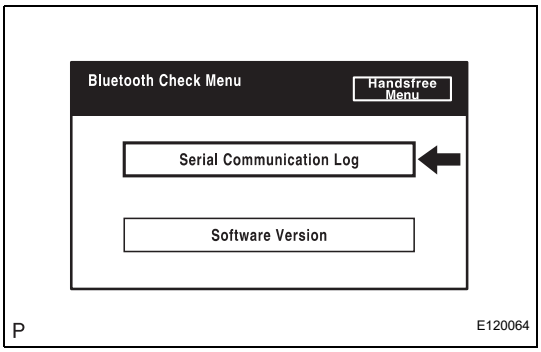
2. **"BLUETOOTH" TEL CHECK**
   (a) Select "'Bluetooth' TEL Check" from the "Diagnosis MENU" screen.



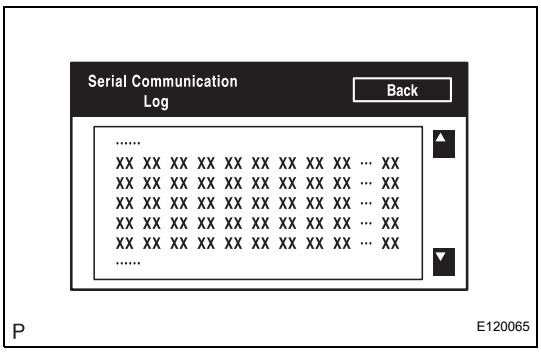
3. **"BLUETOOTH" CHECK**
   (a) Select "'Bluetooth' Check" from the "'Bluetooth' Handsfree Check Menu" screen.

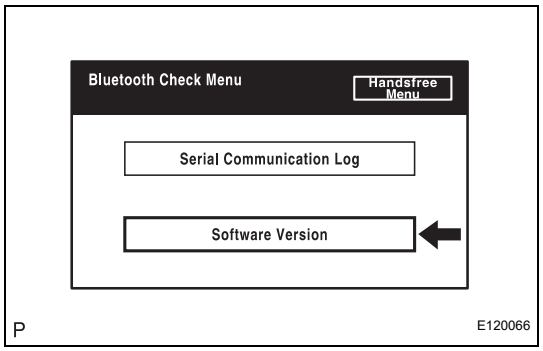


   (b) Select "Serial Communication Log" from the "'Bluetooth' Check Menu" screen.

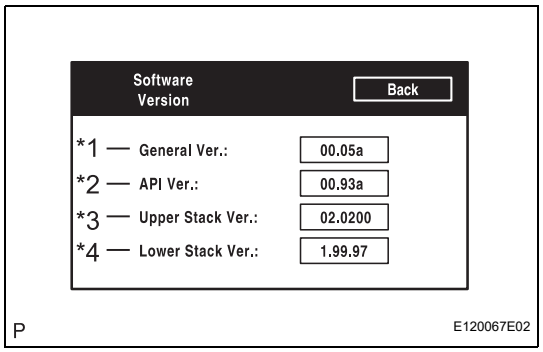


   (1) The communication log data in the display ECU are displayed on this screen.
   HINT:
   The displayed data can be used as a reference.





(c) Select "Software Version" from the "'Bluetooth' Check Menu" screen.



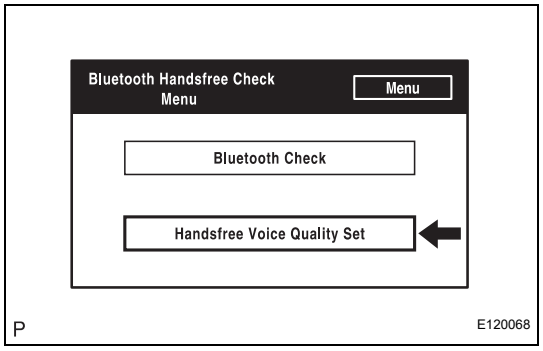
(1) Check the software version of the "Bluetooth" module.

NS

Screen Description:

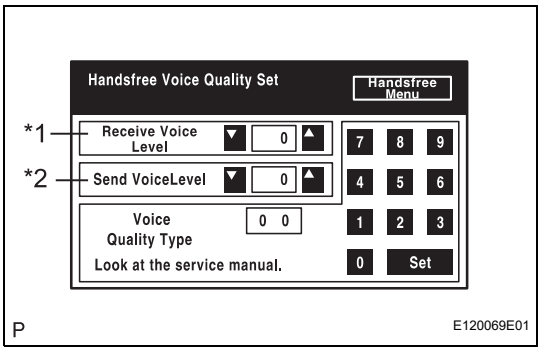
Display	Contents
General Version/*1	• General software version of "Bluetooth" module • If any of the API version, upper stack version, and lower stack version is updated, the general version is upgraded.
API Version/*2	API software version is displayed.
Upper Stack Version/*3	Upper Stack version is displayed.
Lower Stack Version/*4	Lower Stack version is displayed.

HINT:
This function is controlled by the built-in display ECU.



4. HANDSFREE VOICE QUALITY SET

(a) Select "Handsfree Voice Quality Set" from the "'Bluetooth' Handsfree Check Menu" screen.



(b) Check the handsfree voice level.

Screen Description:

Display	Contents
Received voice level adjustment/*1	Setting possible for the voice level received from "Bluetooth" compatible phones.
Sent voice level adjustment/*2	Setting possible for the voice level sent to "Bluetooth" compatible phones.

HINT:
This function is controlled by the built-in display ECU.
NOTICE:
"Voice Quality Type" should not be changed.

NAVIGATION CHECK MODE

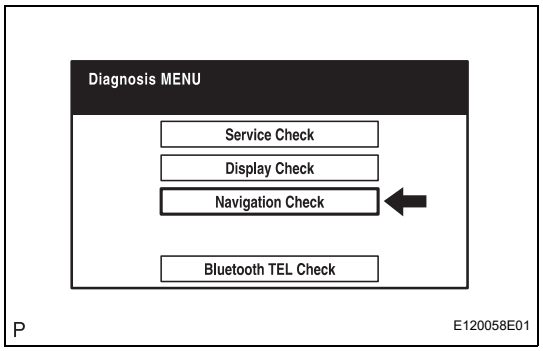
HINT:

- This mode displays GPS satellite information.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

1. ENTER DIAGNOSTIC MODE (See page NS-47)

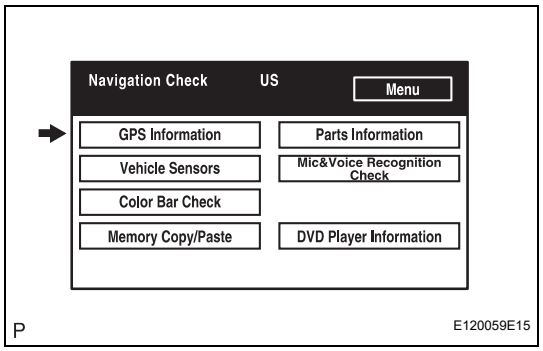
2. NAVIGATION CHECK

(a) Select "Navigation Check" from the "Diagnosis MENU" screen.



3. GPS INFORMATION

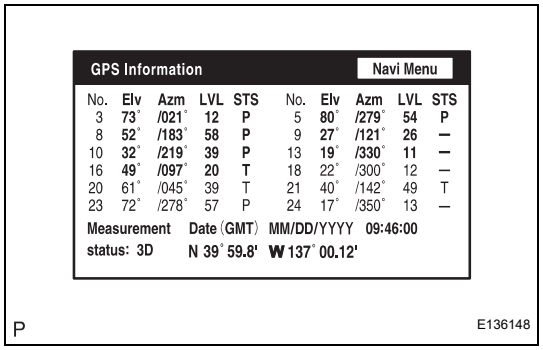
(a) Select "GPS Information" from the "Navigation Check" screen.



(b) When GPS information is displayed, check the GPS conditions.

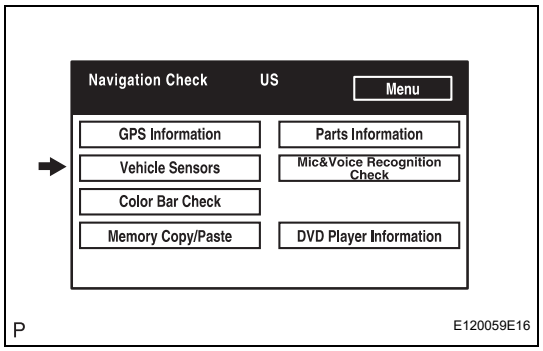
HINT:

- This screen is updated once per second when input signals to the vehicle are changed.
- For details of this function, refer to DIAGNOSIS DISPLAY DETAILED DESCRIPTION (See page NS-31).

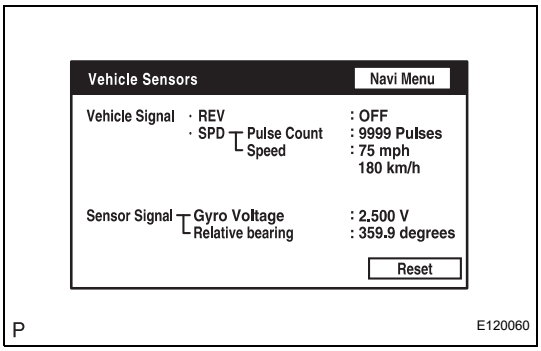


4. VEHICLE SENSORS

(a) Select "Vehicle Sensors" from the "Navigation Check" screen.



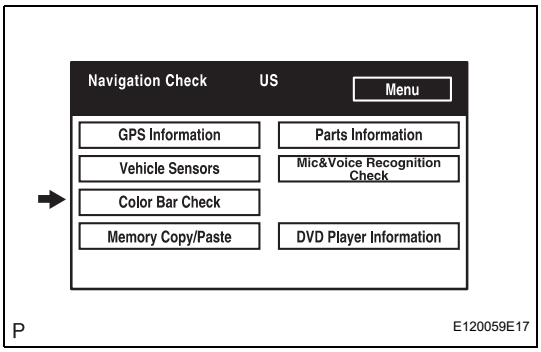
NS



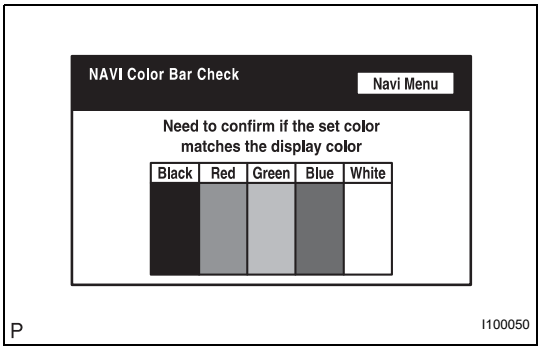
(b) Check all the signals and sensors when vehicle signal information is displayed.
HINT:
- This screen is updated once per second when input signals to the vehicle are changed.
- This screen displays vehicle signals input to the built-in navigation ECU.
- For details of this function, refer to DIAGNOSIS DISPLAY DETAILED DESCRIPTION (See page NS-31).

5. COLOR BAR CHECK

(a) Select "Color Bar Check" from the "Navigation Check" screen.

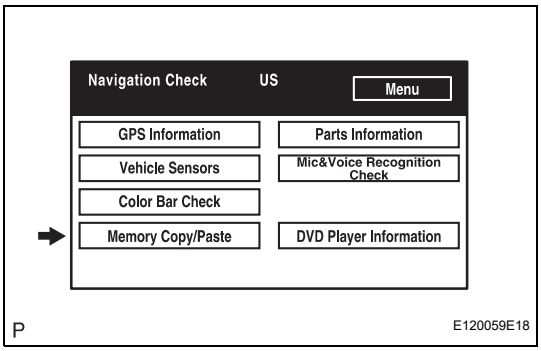


(b) Check each color of the color bar when the "NAVI Color Bar Check" screen is displayed.
HINT:
- Colors will not be displayed full-screen as in "Display Check Mode".
- This screen displays the built-in navigation ECU display color.



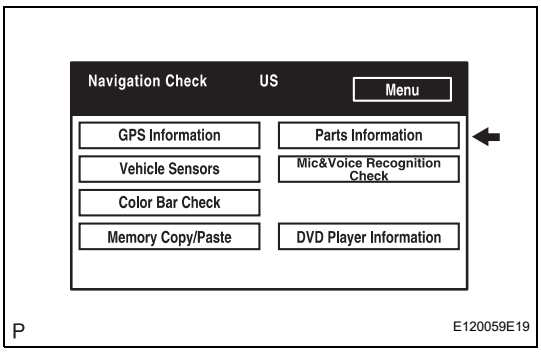
6. MEMORY COPY/PASTE CHECK

HINT:
This function cannot be used.

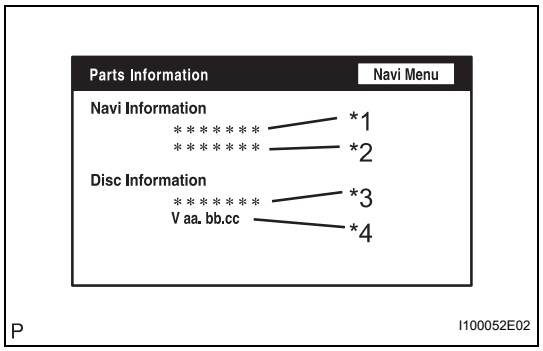


7. PARTS INFORMATION

(a) Select "Parts Information" from the "Navigation Check" screen.



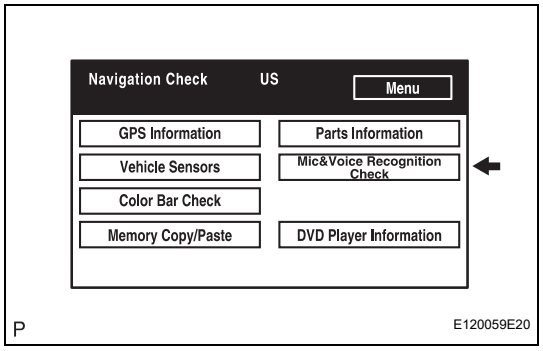
NS



(b) Check the navigation and disc information when the "Parts Information" screen is displayed.

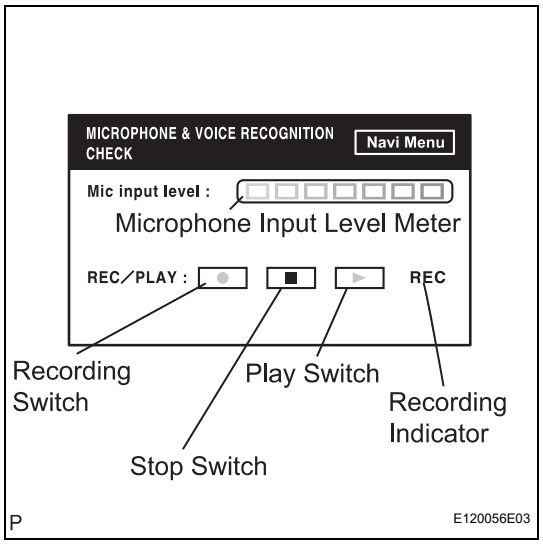
Screen Description:

Display	Contents
Navigation Manufacturer/*1	Radio and navigation assembly manufacturer is displayed.
Navigation Version/*2	Radio and navigation assembly version is displayed.
Disc Manufacturer/*3	Map disc manufacturer is displayed.
Disc Version/*4	Map disc version is displayed.



8. MIC & VOICE RECOGNITION CHECK

(a) Select "Mic & Voice Recognition Check" on the "Navigation Check" screen to display the "MICROPHONE & VOICE RECOGNITION CHECK" screen.



(b) When voice is input into the microphone, check that the microphone input level meter changes according to the input voice.

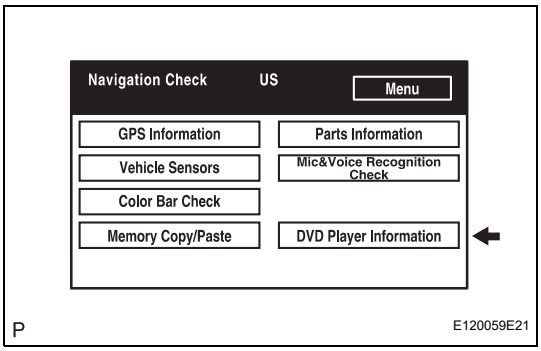
(c) Push the recording switch and perform voice recording.

(d) Check that the recording indicator remains on while recording and that the recorded voice is played normally.

HINT:

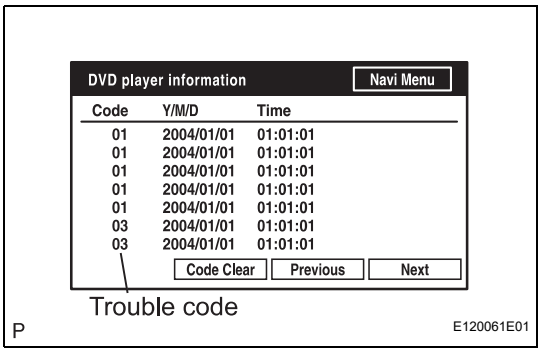
- For details of this function, refer to DIAGNOSIS DISPLAY DETAILED DESCRIPTION (See page NS-31).
- This function is controlled by the built-in navigation ECU.

NS



9. DVD PLAYER INFORMATION CHECK

(a) Select "DVD Player Information" from the "Navigation Check" screen.



(b) Check for DTCs.
HINT:
- This is a DVD player check function in the radio and navigation assembly (built-in navigation ECU).
- For details of this function, refer to DIAGNOSIS DISPLAY DETAILED DESCRIPTION (See page NS-31).

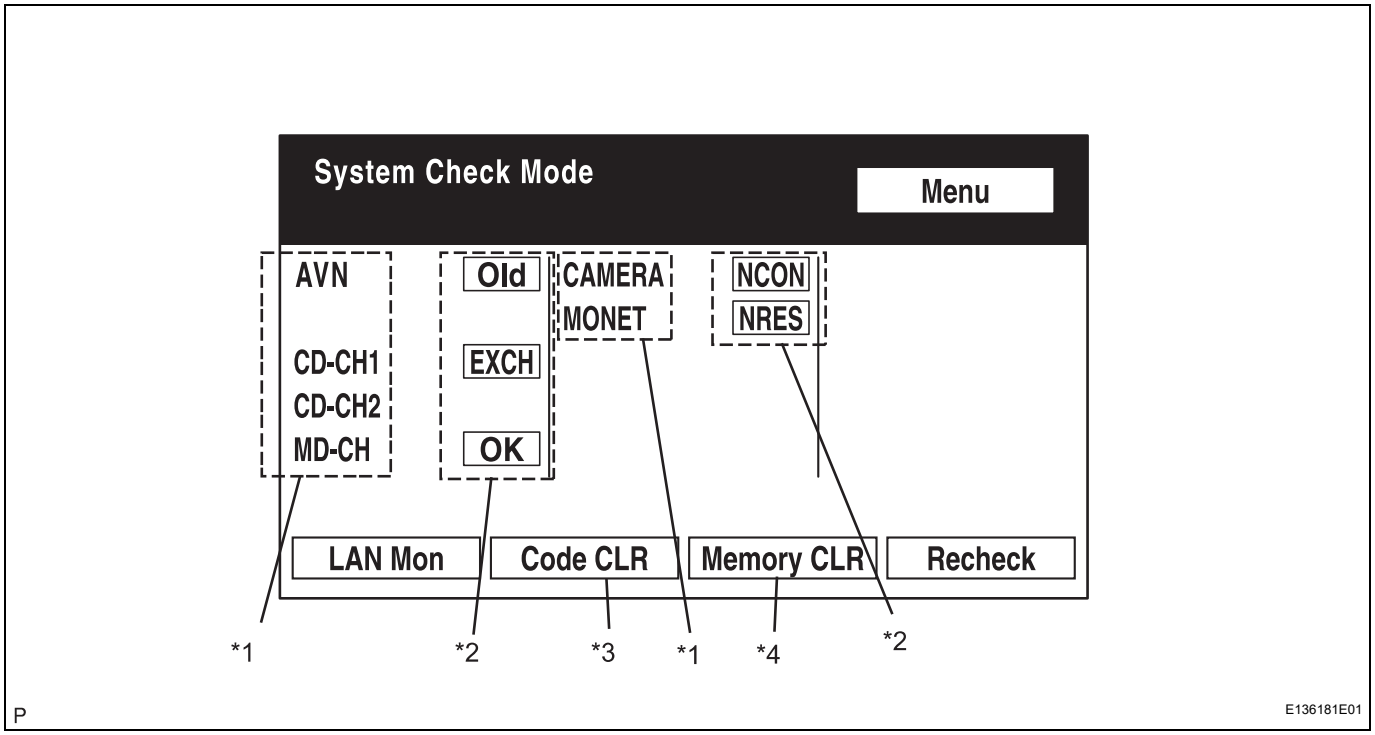
DIAGNOSIS DISPLAY DETAILED DESCRIPTION

HINT:

- This section contains a detailed description of displays within diagnostic mode.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

1. SYSTEM CHECK

(a) System Check Mode Screen



(1) Device Names and Hardware Address/*1

HINT:

- Registered device names are displayed.
- If a device name is unknown to the system, its physical address is shown instead.

Address No.	Name	Address No.	Name
110	EMV	120	AVX
128	1DIN TV	140	AVN
144	G-BOOK	178	NAVI
17C	MONET	190	AUDIO H/U
1AC	CAMERA-C	1B0	Rr-TV
1C0	Rr-CONT	19D	BT-HF
1C4	PANEL	1C6	G/W
1C8	FM-M-LCD	1D8	CONT-SW
1EC	Body	118	EMVN
1F1	XM	1F2	SIRIUS
230	TV-TUNER	240	CD-CH2
250	DVD-CH	280	CAMERA
360	CD-CH1	3A0	MD-CH

Address No.	Name	Address No.	Name
17D	TEL	440	DSP-AMP
530	ETC	1F6	RSE
1A0	DVD-P	1D6	CLOCK
238	DTV	480	AMP

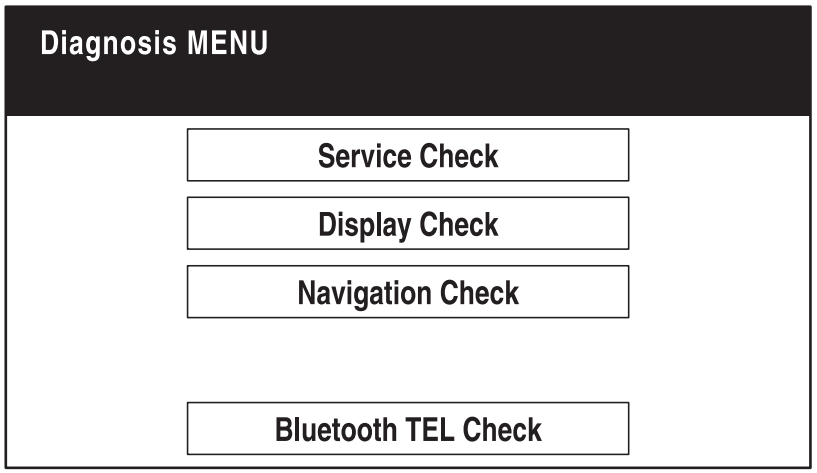
(2) Check Result/*2
HINT:
Result codes for all devices are displayed.

Result	Meaning	Action
OK	The device did not respond with a DTC (excluding communication DTCs from the AVC-LAN).	-
EXCH	The device responds with a "replace"-type DTC.	Check the DTC in "Unit Check Mode" and replace the device.
CHEK	The device responds with a "check"-type DTC.	Check the DTC in "Unit Check Mode".
NCON	The device was previously present, but does not respond in diagnostic mode.	1. Check the power supply wire harness of the device. 2. Check the AVC-LAN of the device.
Old	The device responds with an "old"-type DTC.	Check the DTC in "Unit Check Mode".
NRES	The device responds in diagnostic mode, but gives no DTC information.	1. Check the power supply wire harness of the device. 2. Check the AVC-LAN of the device.

(3) Code Clear/*3
- Present DTCs are cleared.
- Press the "Code CLR" switch for 3 seconds.

(4) Memory Clear/*4
- Present and past DTCs and registered connected device names are cleared.
- Press the "Memory CLR" switch for 3 seconds.

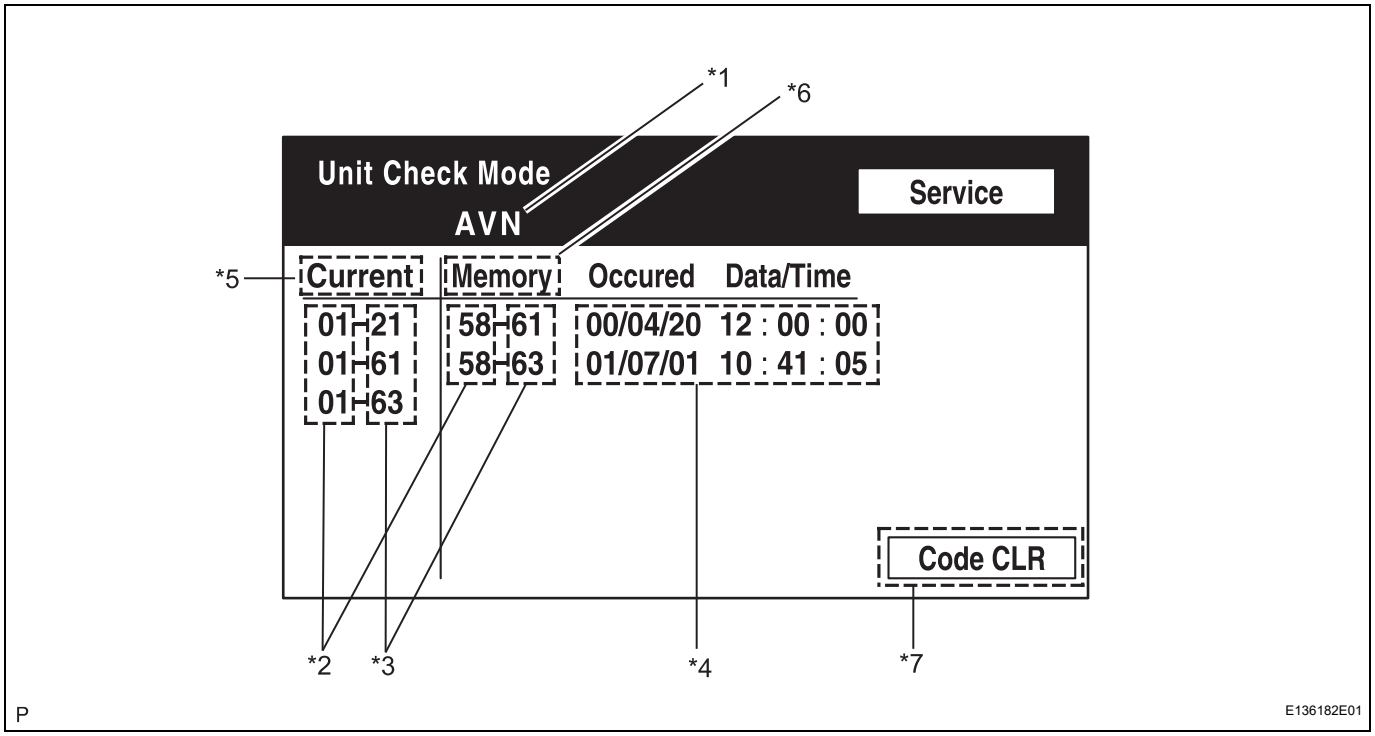
(b) Diagnosis MENU Screen



P
E120070E01

HINT:
Each item is grayed out or not displayed based on the device settings.

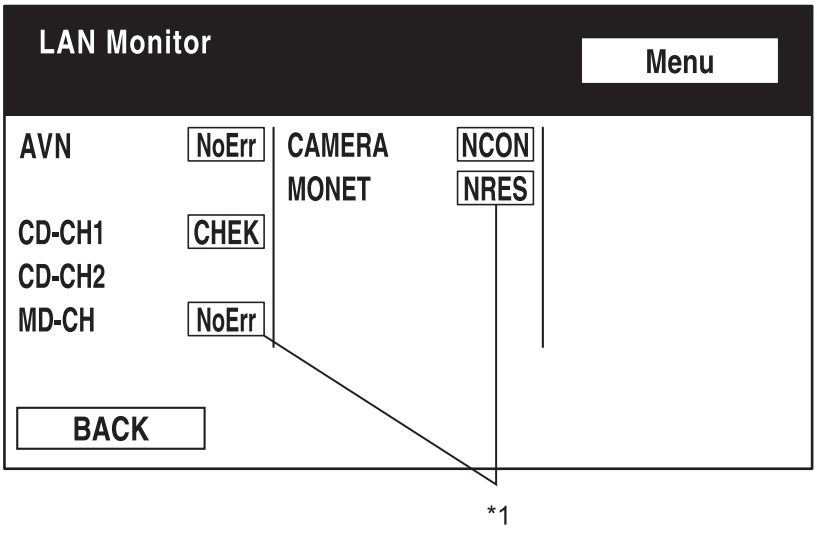
(c) Unit Check Mode Screen



Screen Description:

Display	Contents
Device name/*1	Target device
Segment/*2	Target device logical address
DTC/*3	DTC (Diagnostic Trouble Code)
Timestamp/*4	The time and date of past DTCs are displayed. (The year is displayed in 2-digit format.)
Present code/*5	DTCs output at the service check are displayed.
Past code/*6	Diagnostic memory results and recorded DTCs are displayed.
Diagnosis clear switch/*7	Pushing this switch for 3 seconds clears the diagnostic memory data of the target device. (Both response to diagnostic system check result and the displayed data are cleared.)

(d) LAN Monitor (Original) Screen



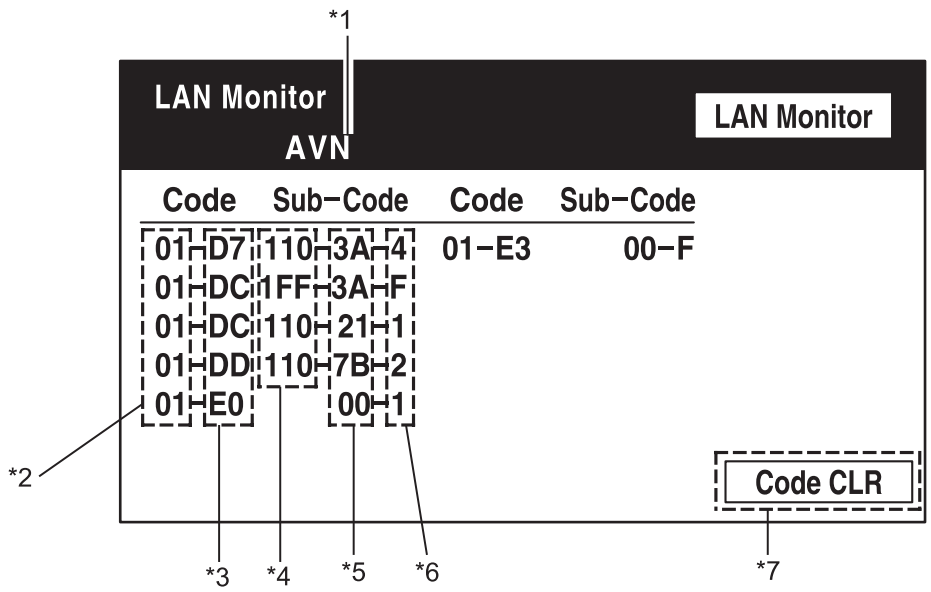
P

E136183E01

(1) Check Result/*1
HINT:
Check results of all the devices are displayed.

Result	Meaning	Action
No Err (OK)	There are no communication DTCs.	-
CHEK	The device responds with a "check"-type DTC.	Check the DTC in "Unit Check Mode".
NCON	The device was previously present, but does not respond in diagnostic mode.	1. Check the power supply wire harness of the device. 2. Check the AVC-LAN of the device.
Old	The device responds with an "old"-type DTC.	Check the DTC in "Unit Check Mode".
NRES	The device responds in diagnostic mode, but gives no DTC information.	1. Check the power supply wire harness of the device. 2. Check the AVC-LAN of the device.

(e) LAN Monitor (Individual) Screen



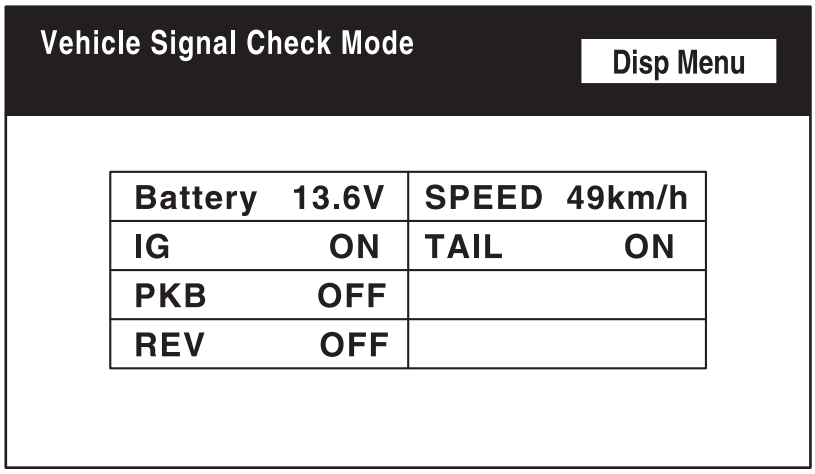
NS

Screen Description:

Display	Contents
Device name/*1	Target device
Segment/*2	Target logical address
DTC/*3	DTC (Diagnostic Trouble Code)
Sub-code (device address)/*4	Physical address stored with DTC (If there is no address, nothing is displayed.)
Connection check No./*5	Connection check number stored with DTC
DTC occurrence/*6	Number of times the same DTC has been recorded
Diagnosis clear switch/*7	Pushing this switch for 3 seconds clears the diagnostic memory data of the target device. (Both response to diagnostic system check result and the displayed data are cleared.)

2. DISPLAY CHECK

(a) Vehicle Signal Check Mode Screen



P E120073

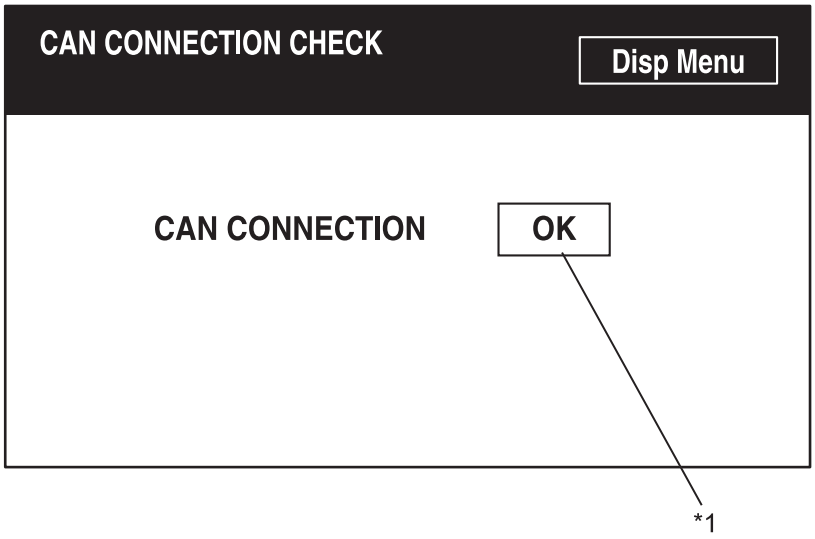
Screen Description:

Name	Contents
Battery	Battery voltage is displayed.
PKB	Parking brake ON/OFF state is displayed.
REV	Reverse signal ON/OFF state is displayed.
IG	Power switch ON/OFF state is displayed.
TAIL	TAIL signal (Light control switch) ON/OFF state is displayed.
SPEED	Vehicle speed is displayed in km/h.

HINT:

- Only items sending a vehicle signal will be displayed.
- This screen is updated once per second when input signals to the vehicle are changed.

(b) CAN Connection Check Screen



P

E120075E01

Screen Description:

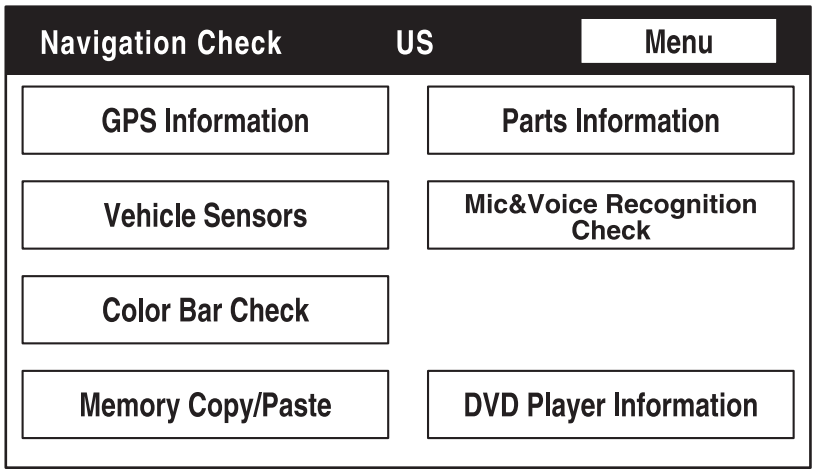
Name	Contents
CAN connection check result/*1	• For systems connected to the CAN system, the results of the CAN connection check are displayed. • "NG" - The power switch is on (ACC or IG) and the CAN communication lines are malfunctioning or the CAN bus lines are not connected. • "OK" - The power switch is on (ACC or IG) and the CAN communication lines are normal. • Blank - CAN connection check is performed with the power switch on (ACC) or off.

HINT:
When the power switch is off, the bus lines are disconnected, or a malfunction occurs in the bus lines while the CAN connection check result is being displayed, the problem will be reflected on the screen in real time.

NS

3. NAVIGATION CHECK

(a) Navigation Check Screen



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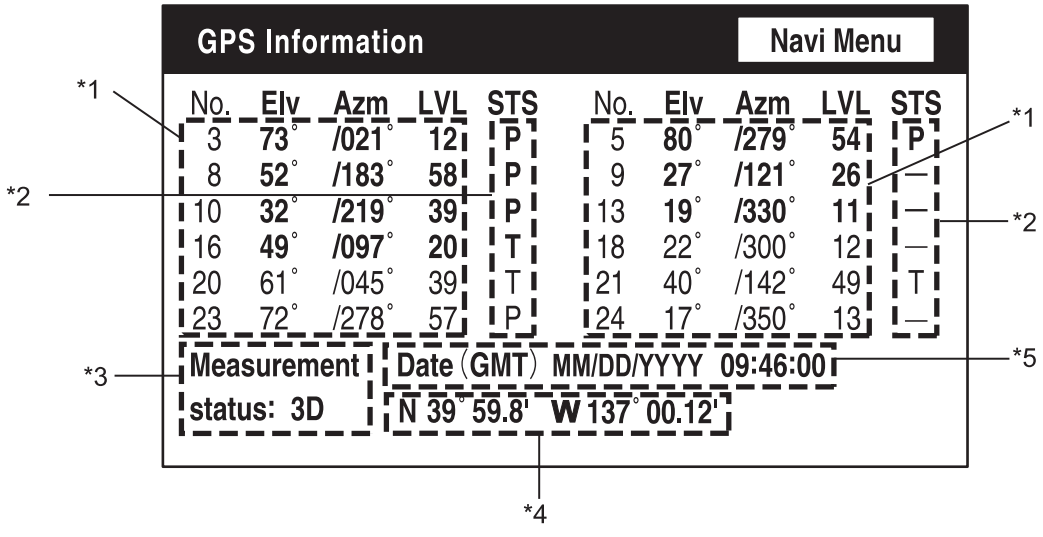
E120076E01

HINT:
Each item is grayed out or not displayed based on the device settings.

(b) GPS Information Screen



P

E136147E02

(1) Satellite information/*1
Information from a maximum of 12 satellites is displayed on the screen. This information includes the target GPS satellite number, elevation angle, direction, and signal level.

(2) Receiving condition/*2

(DENSO model):

Display	Contents
T	The system is receiving a GPS signal, but is not using it for location.
P	The system is using the GPS signal for location.
-	The system cannot receive a GPS signal.

(AISIN AW model):

Display	Contents
01H	The system cannot receive a GPS signal.
02H	The system is tracing a satellite.
03H	The system is receiving a GPS signal, but is not using it for location.
04H	The system is using the GPS signal for location.

Measurement information/*3:

Display	Contents
2D	2-dimensional location method is being used.
3D	3-dimensional location method is being used.
NG	Location data cannot be used.
Error	Reception error has occurred.
-	Any other state.

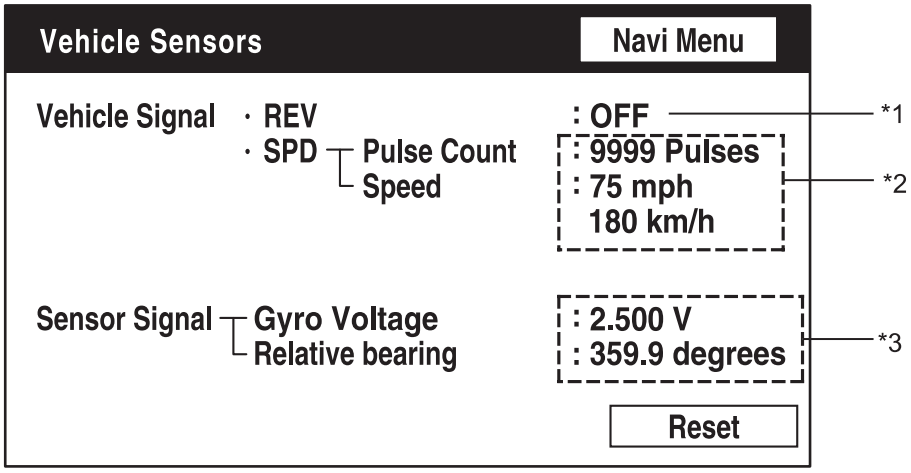
Position information/*4

Display	Contents
Position	Latitude and longitude information on the current position is displayed.

Date information/*5:

Display	Contents
Date	The date/time information obtained from GPS signal is displayed in Greenwich mean time (GMT). The last 4 digits are displayed.

(c) Vehicle Sensors Screen



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E120077E01

NS

Vehicle signal:

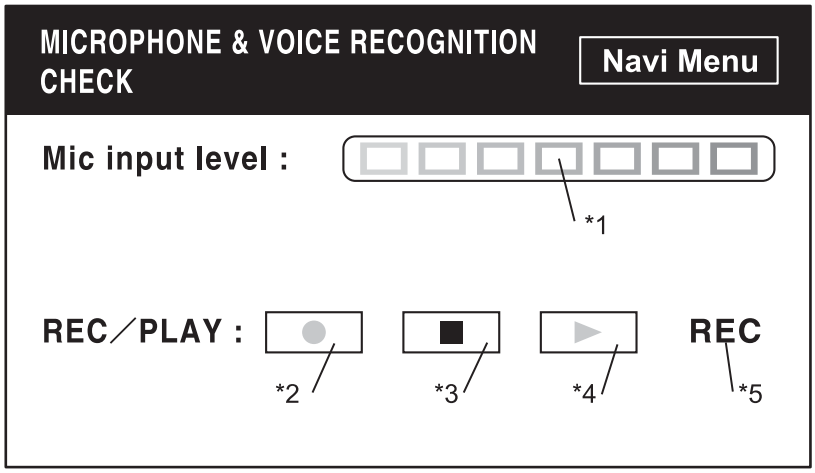
Display	Contents
REV/*1	REV signal ON/OFF state is displayed.
SPD/*2	SPD signal condition is displayed.

Sensor signal:

Display	Contents
Gyro sensor/*3	Gyro sensor output condition is displayed (when the vehicle runs straight or is stationary, the voltage is approximately 2.5 V).

HINT:
Signals are updated once per second only when vehicle sensor signals are changed.

(d) Microphone & Voice Recognition Check Screen



P

E125119E01

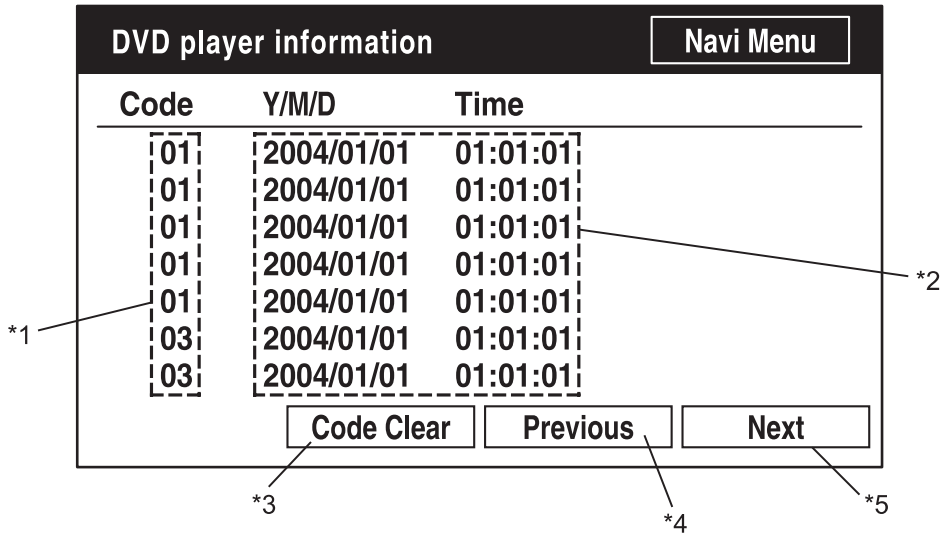
Screen Description:

Display	Contents
Microphone input level meter/*1	Monitors the microphone input level every 100 ms and displays the results in 8 different levels.
Recording switch/*2	Starts recording.
Stop switch/*3	Stops recording.
Play switch/*4	Plays the recorded voice.
Recording indicator/*5	Comes on while recording.

HINT:

- The microphone input function is on at all times when this screen is displayed.
- While recording or playing, the switches other than the stop switch cannot be pushed.
- When no voice is recorded, the play switch cannot be pushed.
- Recording will stop after 5 seconds or by pushing the stop switch.

(e) DVD Player Information Screen



P E120078E01

Screen Description:

Display	Contents
Trouble code/*1	Each code corresponding to the malfunctions is displayed. For details, refer to "Trouble Code Description".
Occurrence time/*2	• The date (year, month, day) and time (hour, minute, second) when the trouble code was detected are displayed as a time stamp. (Greenwich mean time) • The time data to be displayed are received from the GPS receiver.
Trouble code clear switch/*3	All code data being displayed are cleared by pushing this switch for 3 seconds.
Returning switch/*4	The previous page is displayed. If the current displayed page is the first page, this switch cannot be operated.
Proceeding switch/*5	The next page is displayed. If the current displayed page is the last page, this switch cannot be operated.

Trouble Code Description:

Code	Malfunction	Countermeasure
01	Cannot be recognized	Replace radio and navigation assembly.
03	Cannot be read	Follow the inspection procedure for DTC 58-42 (See page NS-83).

HINT:
This is a DVD player check function in the radio and navigation assembly (built-in navigation ECU).

NS

PROBLEM SYMPTOMS TABLE

HINT:

- Before inspecting the suspected areas listed in the table below, check the fuse and relay.
- Before inspecting the suspected areas listed in the table below, check the DTCs.
- Methods used to verify the cause of the problem are listed in order of probability in the suspected area column.

Display function:

Symptom	Suspected Area	See page
Pressing PWR switch does not turn on system.	1. Proceed to "Pressing Power Switch does not Turn on System"	NS-101
	2. Radio and navigation assembly power source circuit	NS-189
	3. AVC-LAN circuit	NS-174
	4. Radio and navigation assembly	NS-192
Black screen (No image appears on navigation/audio screen).	1. Proceed to "Black Screen"	NS-146
	2. Illumination circuit	NS-155
	3. AVC-LAN circuit	NS-174
	4. Radio and navigation assembly	NS-192
Illumination for panel switch does not come on with TAIL switch on.	1. Proceed to "Illumination for Panel Switch does not Come on with TAIL Switch ON"	NS-111
	2. Illumination circuit	NS-155
	3. Radio and navigation assembly	NS-192
Display does not dim (Night Screen) when light control switch is turned on.	1. Proceed to "Display does not DIM when Light Control Switch is Turned ON"	NS-112
	2. Illumination circuit	NS-155
	3. Radio and navigation assembly	NS-192
Power does not turn off (The screen remains on).	1. Radio and navigation assembly power source circuit	NS-189
	2. Radio and navigation assembly	NS-192
Panel switches do not function.	1. Proceed to "Panel Switches do not Function"	NS-113
	2. Steering pad switch circuit	NS-151
	3. Radio and navigation assembly power source circuit	NS-189
	4. Radio and navigation assembly	NS-192
Touch panel switch does not function.	1. Proceed to "Touch Panel Switch does not Function"	NS-114
	2. Steering pad switch circuit	NS-151
	3. Radio and navigation assembly power source circuit	NS-189
	4. Radio and navigation assembly	NS-192
Display panel does not open, tilt, or tilts improperly.	1. Proceed to "Display Panel does not Open, Tilt, or Tilts Improperly"	NS-115
	2. Radio and navigation assembly power source circuit	NS-189
	3. Radio and navigation assembly	NS-192
Screen is distorted.	1. Radio and navigation assembly power source circuit	NS-189
	2. Radio and navigation assembly	NS-192
Screen flicker or color distortion.	1. Proceed to "Screen Flicker or Color Distortion"	NS-116
	2. Radio and navigation assembly power source circuit	NS-189
	3. Radio and navigation assembly	NS-192
Navigation function switches can be operated while vehicle is running.	Proceed to "Vehicle Speed Signal Circuit between Radio and Navigation Assembly and Combination Meter"	NS-147

Audio function:

Symptom	Suspected Area	See page
No sound can be heard from speakers (audio is mute).	1. Proceed to "No Sound can be Heard from Speakers"	NS-102
	2. Stereo component amplifier power source circuit	AV-140
	3. Proceed to "Mute Signal Circuit between Radio and Navigation Assembly and Stereo Component Amplifier"	NS-171
	4. Proceed to "Sound Signal Circuit between Radio and Navigation Assembly and Stereo Component Amplifier"	NS-167
	5. Speaker circuit	NS-162
	6. Stereo component amplifier	AV-140
	7. Radio and navigation assembly	NS-192
Radio broadcast cannot be received or poor reception.	Proceed to "Radio Broadcast cannot be Received or Poor Reception"	NS-108
CD cannot be inserted / played or CD is ejected right after insertion.	Proceed to "CD cannot be Inserted / Played or CD is Ejected Right After Insertion"	NS-104
CD cannot be ejected.	Proceed to "CD cannot be Ejected"	NS-103
CD sound skips.	Proceed to "CD Sound Skips"	NS-106
Abnormal noise occurs.	Proceed to "Noise Occurs"	NS-99
Poor sound quality in all modes (low volume).	1. Proceed to "Poor Sound Quality in All Modes (Low Volume)"	NS-118
	2. Proceed to "Mute Signal Circuit between Radio and Navigation Assembly and Stereo Component Amplifier"	NS-171
	3. Stereo component amplifier power source circuit	AV-132
	4. Radio and navigation assembly power source circuit	NS-189
	5. Stereo component amplifier	AV-140
	6. Radio and navigation assembly	NS-192
External device sound cannot be heard or sound quality is bad (Stereo jack is used).	1. Proceed to "Sound Signal Circuit between Radio and Navigation Assembly and Stereo Jack Adapter"	NS-169
	2. Stereo jack adapter	AV-192
	3. Radio and navigation assembly	NS-192
ASL does not function.	Proceed to "Vehicle Speed Signal Circuit between Stereo Component Amplifier and Combination Meter"	AV-110

Navigation function:

Symptom	Suspected Area	See page
Map disc cannot be inserted.	1. Proceed to "Map Disc cannot be Inserted"	NS-119
	2. Radio and navigation assembly power source circuit	NS-189
	3. Radio and navigation assembly	NS-192
Map disc cannot be ejected.	1. Radio and navigation assembly power source circuit	NS-189
	2. Radio and navigation assembly	NS-192
Vehicle position mark deviates.	1. Proceed to "Vehicle Position Mark Deviates Greatly"	NS-120
	2. GPS antenna	NS-201
	3. Radio and navigation assembly	NS-192
Cursor or map rotates when vehicle is stopped.	1. Proceed to "Cursor or Map Rotates When Vehicle is Stopped"	NS-122
	2. Radio and navigation assembly	NS-192
Vehicle position mark is not updated.	1. Proceed to "Vehicle Position Mark is not Updated"	NS-123
	2. Map disc	-
	3. Radio and navigation assembly	NS-192
Current position display does not appear.	1. Proceed to "Current Position Display does not Appear"	NS-124
	2. Map disc	-
	3. GPS antenna	NS-201
	4. Radio and navigation assembly	NS-192

Symptom	Suspected Area	See page
GPS mark is not displayed.	1. Proceed to "GPS Mark is not Displayed"	NS-125
	2. GPS antenna	NS-201
	3. Radio and navigation assembly	NS-192
Voice guidance does not function.	1. Proceed to "Voice Guidance does not Function"	NS-128
	2. Proceed to "Mute Signal Circuit between Radio and Navigation Assembly and Stereo Component Amplifier"	NS-171
	3. Navigation voice circuit	NS-178
	4. Speaker circuit	NS-162
	5. Map disc	-
	6. Radio and navigation assembly	NS-192
	7. Stereo component amplifier	AV-140
Map display incomplete.	1. Proceed to "Map Display Incomplete"	NS-131
	2. Map disc	-
	3. Radio and navigation assembly	NS-192
Route cannot be calculated.	1. Proceed to "Route cannot be Calculated"	NS-132
	2. Map disc	-
	3. Radio and navigation assembly	NS-192
Voice recognition difficulty.	1. Proceed to "Voice Recognition Difficulty"	NS-133
	2. Radio and navigation assembly	NS-192
Voice is not recognized.	1. Proceed to "Voice is not Recognized"	NS-135
	2. Proceed to "Microphone Circuit between Microphone and Radio and Navigation Assembly"	NS-180
	3. Steering pad switch circuit	NS-151
	4. Microphone	AV-197
	5. Radio and navigation assembly	NS-192
Speed signal does not change in the navigation check mode.	Proceed to "Vehicle Speed Signal Circuit between Radio and Navigation Assembly and Combination Meter"	NS-147
Reverse signal does not change in the navigation check mode.	Reverse signal circuit	NS-176

Steering pad switch function:

Symptom	Suspected Area	See page
The system cannot be operated by the steering pad switch.	1. Steering pad switch circuit	NS-151
	2. Radio and navigation assembly	NS-192
Illumination for steering pad switch does not come on with TAIL switch on.	1. Illumination circuit	NS-155
	2. Radio and navigation assembly	NS-192

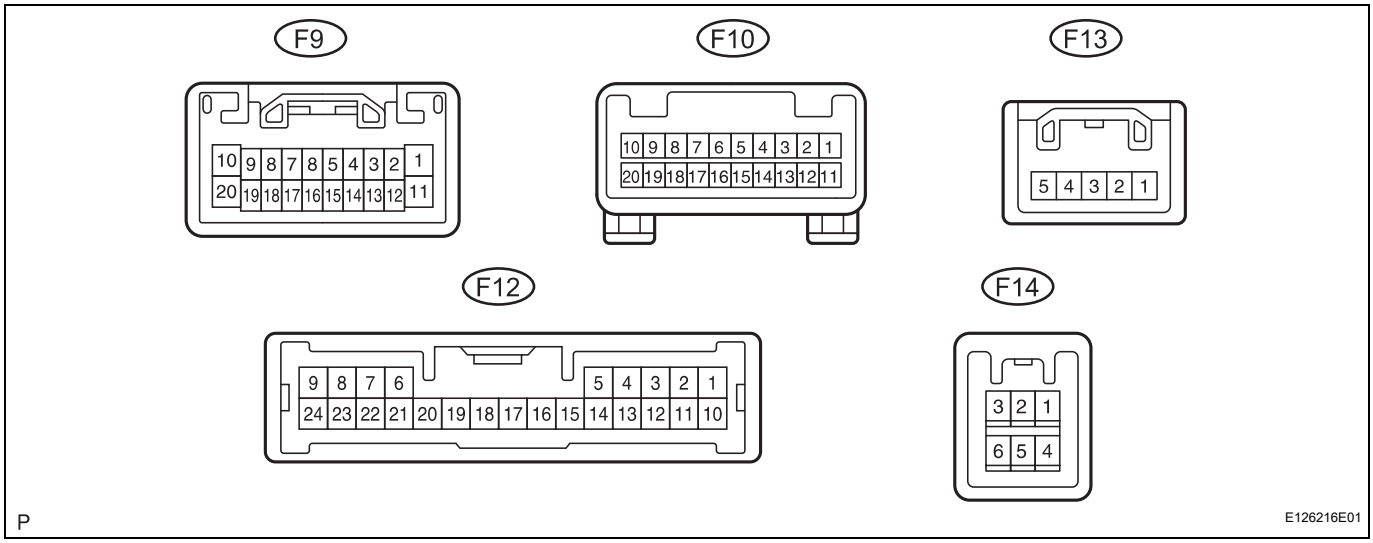
"Bluetooth" function:

Symptom	Suspected Area	See page
Cellular phone registration failure, phone directory transfer failure.	Proceed to "Cellular Phone Registration Failure, Phone Directory Transfer Failure"	NS-137
Cellular phone cannot send / receive.	1. Proceed to "Cellular Phone cannot Send / Receive"	NS-139
	2. Steering pad switch circuit	NS-151
	3. Radio and navigation assembly	NS-192
Cannot call in a certain place.	Proceed to "Cannot Call in a Certain Place"	NS-141
The other callers voice cannot be heard, is too quiet, or distorted.	1. Proceed to "The Other Callers Voice cannot be Heard, is too Quiet, or Distorted"	NS-142
	2. Navigation voice circuit	NS-178
	3. Radio and navigation assembly	NS-192
	4. Stereo component amplifier	AV-140

Symptom	Suspected Area	See page
The other caller cannot hear your voice, or your voice is too quiet or distorted.	1. Proceed to "The Other Caller cannot Hear Your Voice, or Your Voice is too Quiet or Distorted"	NS-144
	2. Proceed to "Microphone Circuit between Microphone and Radio and Navigation Assembly"	NS-180
	3. Microphone	AV-197
	4. Radio and navigation assembly	NS-192

TERMINALS OF ECU

1. RADIO AND NAVIGATION ASSEMBLY



NS

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
IG (F13-2) - GND (F9-20)	B - BR	Power switch on (IG)	Power switch off → on (IG)	Below 1 V → 10 to 14 V
SPD (F13-3) - GND (F9-20)	V - BR	Speed signal from combination meter	See "Vehicle Signal Check" (See page NS-23)	-
REV (F13-5) - GND (F9-20)	R - BR	Reverse signal	See "Vehicle Signal Check" (See page NS-23)	-
SWG (F10-6) - Body ground	P - Body ground	Steering pad switch ground	Always	Below 1 V
SW1 (F10-7) - SWG (F10-6)	O - P	Steering pad switch signal	No switch is pushed → SEEK+ switch pushed → SEEK- switch pushed → VOL+ switch pushed → VOL- switch pushed	4 V or higher → Approx. 0.5 V → Approx. 0.9 V → Approx. 2.0 V → Approx. 3.4 V
SW2 (F10-8) - SWG (F10-6)	Y - P	Steering pad switch signal	No switch is pushed → MODE switch pushed → ON HOOK switch pushed → OFF HOOK switch pushed → VOICE switch pushed	4 V or higher → Approx. 0.5 V → Approx. 0.9 V → Approx. 2.0 V → Approx. 3.4 V
IVO+ (F10-11) - GND (F9-20)	R - BR	Voice guidance signal	Voice guidance is playing	A waveform synchronized with sounds is output
IVO- (F10-12) - GND (F9-20)	G - BR	Voice guidance signal	Voice guidance is playing	A waveform synchronized with sounds is output
SLD1 (F10-13) - Body ground	Shielded - Body ground	Voice sound signal shielded ground	Always	Below 1 V
B (F9-1) - GND (F9-20)	L-Y - BR	Battery	Always	10 to 14 V
ILL+ (F9-2) - GND (F9-20)	G - BR	Illumination signal	Power switch on (IG), Light control switch OFF → TAIL or ON	Below 1 V → 10 to 14 V
ATX+ (F9-5) - GND (F9-20)	R - BR	AVC-LAN communication signal	Power switch on (ACC)	2 to 3 V
MUTE (F9-7) - GND (F9-20)	O - BR	Mute signal	Audio system is playing → Changing	Above 3.5 V → Below 1 V
R+ (F9-8) - GND (F9-20)	R - BR	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
L+ (F9-9) - GND (F9-20)	B - BR	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
SLD (F9-10) - Body ground	Shielded - Body ground	Shielded ground	Always	Below 1 V
ACC (F9-11) - GND (F9-20)	GR - BR	Accessory (ON)	Power switch off → on (ACC or IG)	Below 1 V → 10 to 14 V
ILL- (F9-12) - GND (F9-20)	W-B - BR	Illumination signal	Power switch on (IG), Light control switch OFF → TAIL or ON	Below 1 V →10 to 14 V
ANT (F9-13) - GND (F9-20)	O - BR	Power source of antenna	Radio switch ON and AM or FM	10 to 14 V
ATX- (F9-15) - GND (F9-20)	G - BR	AVC-LAN communication signal	Power switch on (ACC)	2 to 3 V
R- (F9-18) - GND (F9-20)	G - BR	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
L- (F9-19) - GND (F9-20)	W - BR	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
GND (F9-20) - Body ground	BR - Body ground	Ground	Always	Below 1 V
CANH (F12-2) - CANL (F12-3)	B - W	CAN bus line	Go to CAN communication system (See page CA-10)	-
TSW- (F12-12) - GND (F9 -20)	P - BR	Telephone relation switch signal	Always	Below 1 V
MACC (F12-17) - GND (F9-20)	LG - BR	Microphone AMP power supply	Power switch off → on (IG)	Below 1 V → 5 V
SGND (F12-18) - GND (F9-20)	P - BR	Ground	Always	Below 1 V
MIC+ (F12-19) - GND (F9-20)	G - BR	Microphone voice signal	See "Microphone Check" (See page NS-28)	-
MIC- (F12-20) - Body ground	R - Body ground	Microphone voice signal	See "Microphone Check" (See page NS-28)	-
VAR+ (F14-2) - GND (F9-20)	G - BR	Sound signal (Right)	External device is playing (When stereo jack is used)	A waveform synchronized with sounds is output
VAL+ (F14-3) - GND (F9-20)	R - BR	Sound signal (Left)	External device is playing (When stereo jack is used)	A waveform synchronized with sound is output
VA- (F14-5) - Body ground	BR - Body ground	Shielded ground	Always	Below 1 V
ADPG (F14 - 6) - GND (F9-20)	G - BR	External device connection detection signal	External device is connected	Below 1 V

NS

2. STEREO COMPONENT AMPLIFIER (See page AV-15)

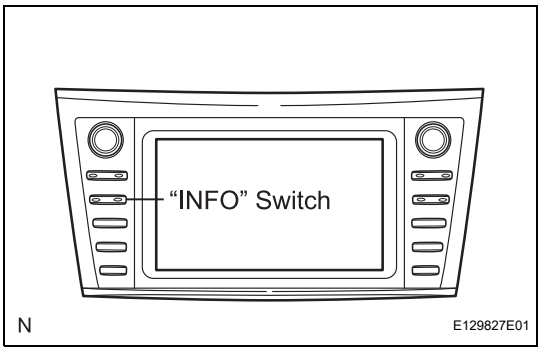
DTC CHECK / CLEAR

HINT:

- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.
- If the system cannot enter the diagnostic mode, inspect all AVC-LAN communication components and repair or replace problem parts (See page NS-174).
- After the power switch is on (IG), check that the map is displayed before starting the diagnostic mode. Otherwise, some items cannot be checked.

1. START DIAGNOSTIC MODE

(a) There are 2 methods to start diagnostic mode. Start the mode by using one of them.

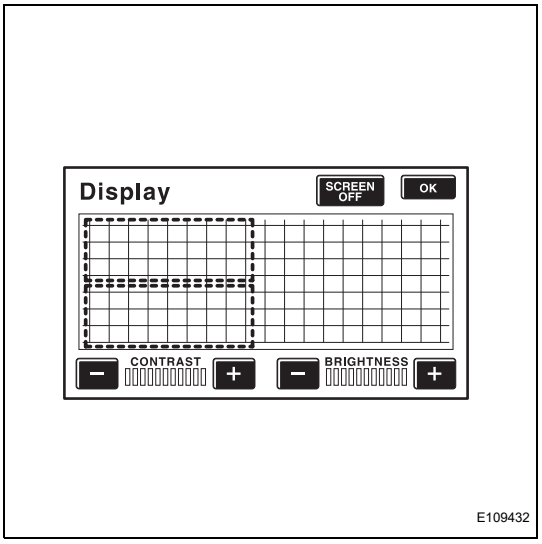


(b) Method 1

(1) READY-on state.

(2) While pressing and holding the "INFO" switch, operate the light control switch: OFF → Turn ON → Turn OFF → Turn ON → Turn OFF → Turn ON → Turn OFF.

(3) The diagnostic mode starts and the "System Check Mode" screen will be displayed. Service inspection starts automatically and the result will be displayed.



(c) Method 2

(1) READY-on state.

(2) Switch to the "Display Check" screen.

(3) From the display quality adjustment screen, touch the corners of the screen in the following order: upper left → lower left → upper left → lower left → upper left → lower left.

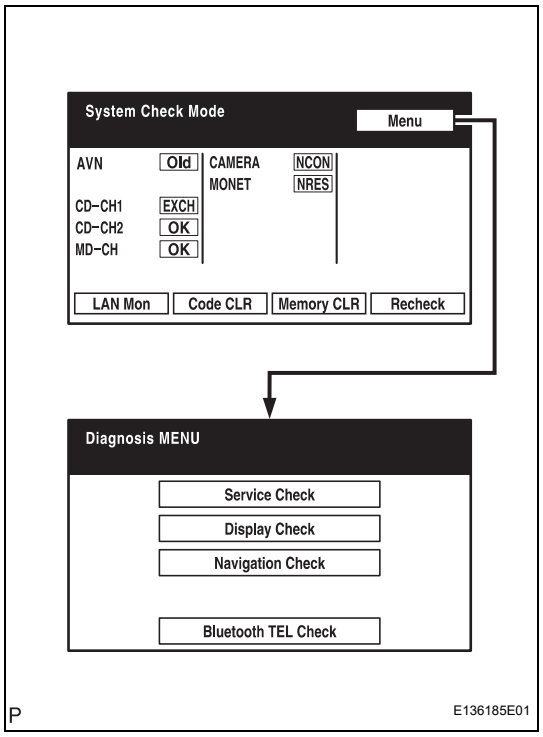
(4) The diagnostic mode starts and the "System Check Mode" screen will be displayed. Service inspection starts automatically and the result will be displayed.

2. FINISH DIAGNOSTIC MODE

(a) There are 2 methods to end diagnostic mode. Use one of them.

(1) Turn the power switch off.

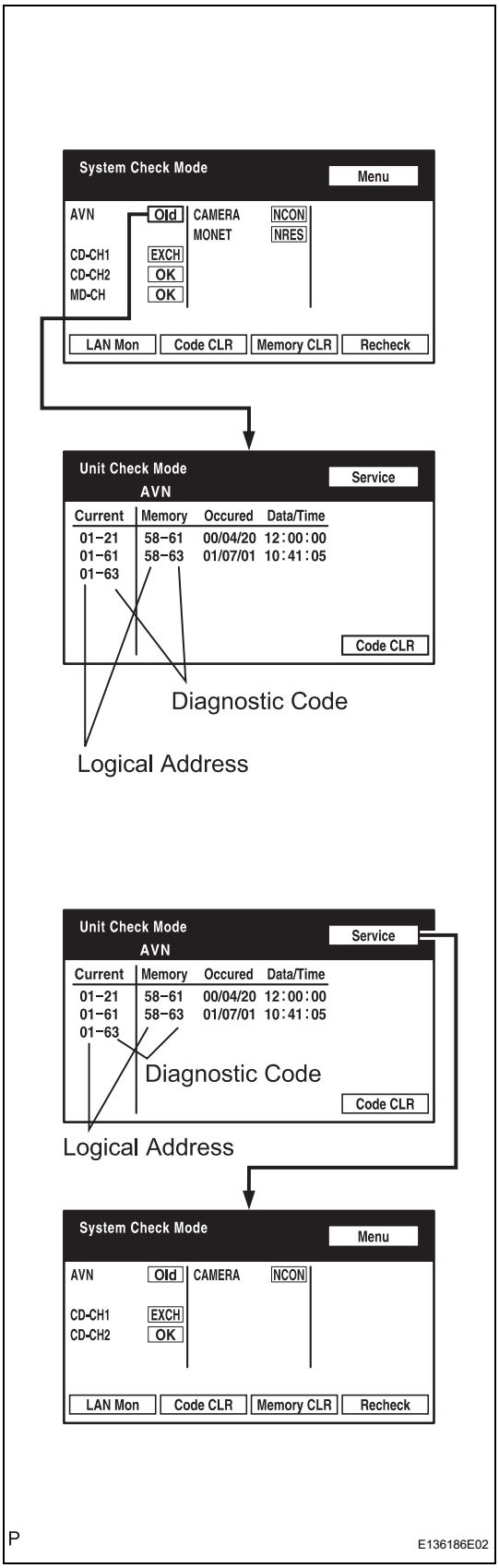
(2) Press and hold the "DISP" switch for 3 seconds.



3. DIAGNOSIS MENU

(a) The "Diagnosis MENU" screen will be displayed by pressing the "Menu" switch on the "System Check Mode" screen.

NS



4. CHECK DTC

(a) Read the system check result.

(1) If the check result is "EXCH", "CHEK" or "Old", touch the displayed check result to view the results on the "Unit Check Mode" screen and record them.

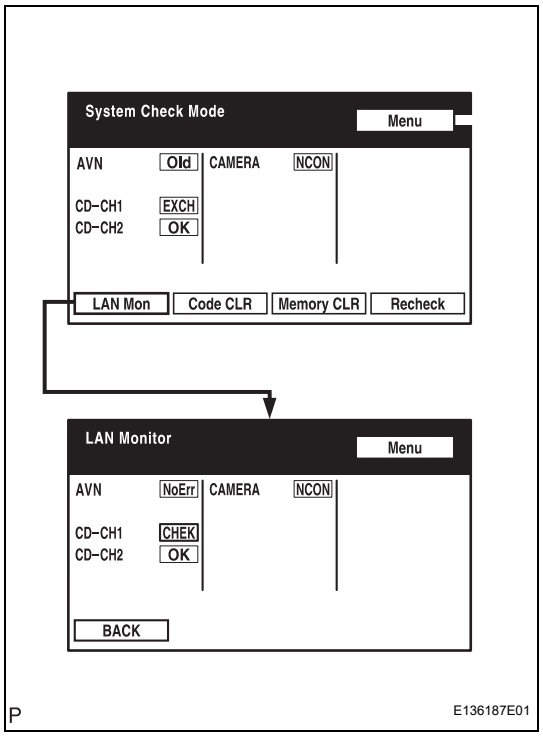
HINT:

- If all check results are "OK", go to communication DTC check.
- If a device name is not known, its physical address is displayed.

HINT:

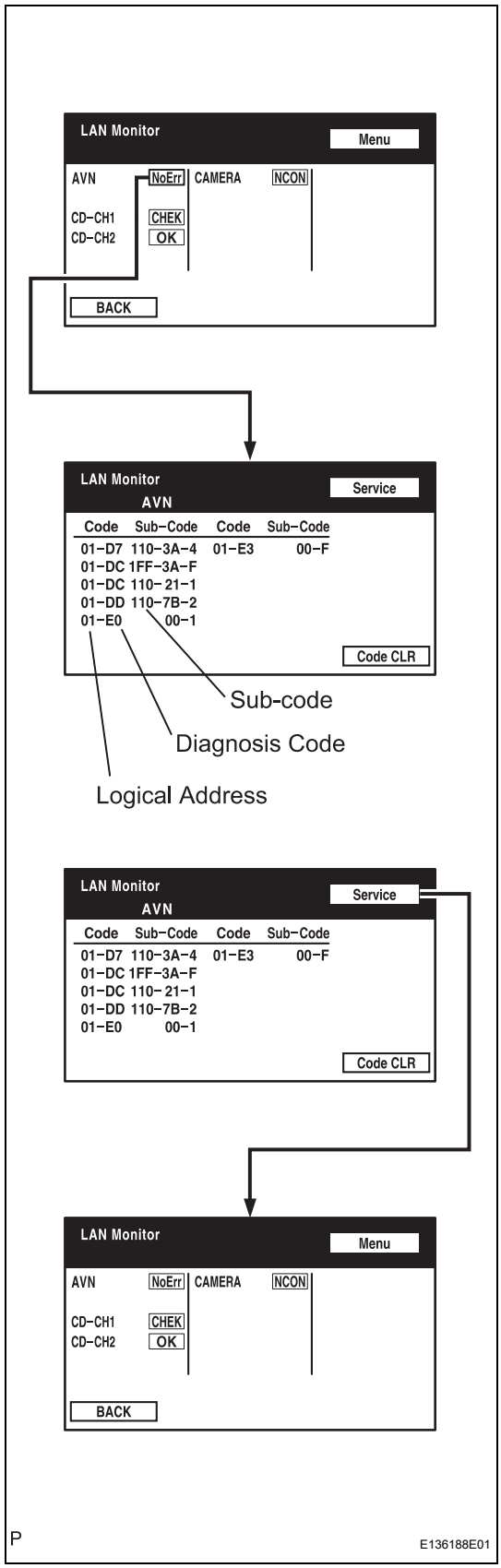
When proceeding to view the results of another device, press the "Service" switch to return to the "System Check Mode" screen. Repeat this step.

NS



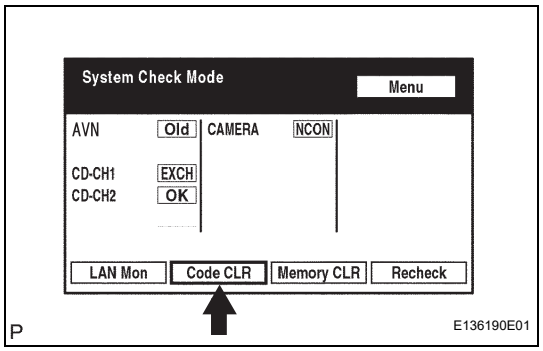
(b) Read the communication diagnostic check result.
(1) Return to the "System Check Mode" screen, and press the "LAN Mon" switch to enter the "LAN Monitor" screen.

NS



(2) If the check result is "CHEK" or "Old", touch the displayed check result to view the results on the individual communication diagnostic screen and record them.
HINT:
- If all check results are "No Err", the system judges that no DTC exists.
- The sub-code (relevant device) will be indicated by its physical address.
- When proceeding to view the results of another device, press the "Service" switch to return to the original "LAN Monitor" screen. Repeat this step.

NS

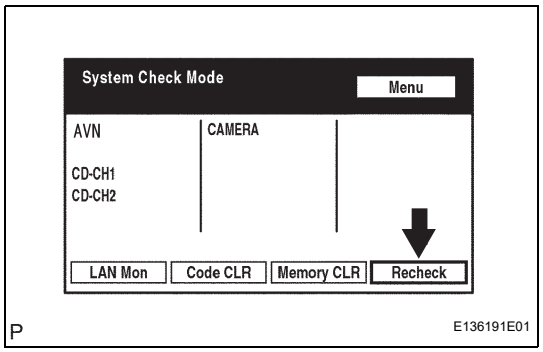


5. DTC CLEAR/RECHECK

(a) Clear DTC

(1) Press the "Code CLR" switch for 3 seconds.

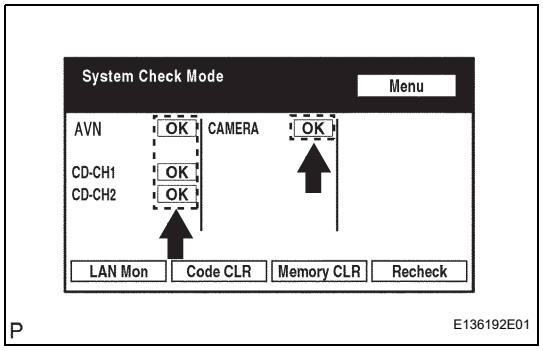
(2) The check results are cleared.



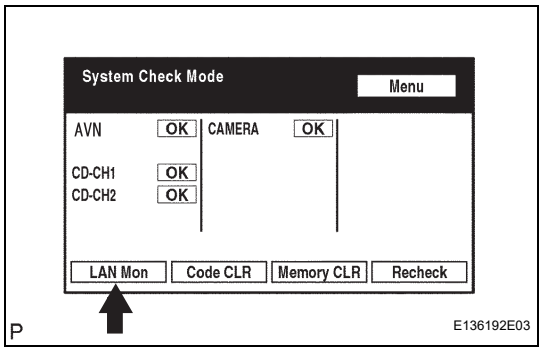
(b) Recheck

(1) Press the "Recheck" switch.

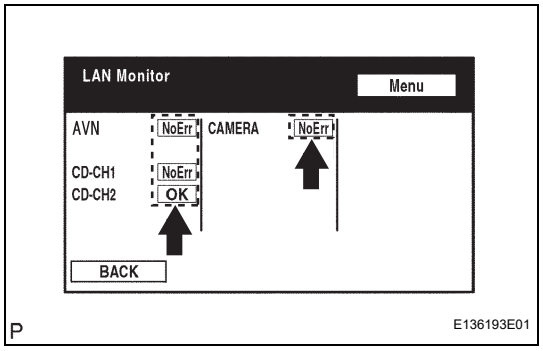
NS



(2) Confirm that all diagnostic codes are "OK" when the check results are displayed. If a code other than "OK" is displayed, troubleshoot again.



(3) Press the "LAN Mon" switch to change to the "LAN Monitor" screen.



(4) Confirm that all diagnostic codes are "No Err". If a code other than "No Err" is displayed, troubleshoot again.

DIAGNOSTIC TROUBLE CODE CHART

COMMUNICATION DIAGNOSIS:

DTC Code	Detection Item	Trouble Area	See page
01-21	ROM Error	Radio and navigation assembly	NS-57
01-22	RAM Error	Radio and navigation assembly	NS-57
01-D5	Absence of Registration Unit	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio and navigation assembly and the component shown by the sub-code 3. Component shown by the sub-code	NS-58
01-D6	No Master	1. Radio and navigation assembly power source circuit 2. Power source circuit of the component which has stored this code 3. AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code 4. Component which has stored this code 5. Radio and navigation assembly	NS-60
01-D7	Connection Check Error	1. Radio and navigation assembly power source circuit 2. Power source circuit of the component which has stored this code 3. AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code 4. Component which has stored this code 5. Radio and navigation assembly	NS-60
01-D8	No Response for Connection Check	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio and navigation assembly and the component shown by the sub-code 3. Component shown by the sub-code	NS-58
01-D9	Last Mode Error	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio and navigation assembly and the component shown by the sub-code 3. Component shown by the sub-code	NS-58
01-DA	No Response Against ON / OFF Command	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio and navigation assembly and the component shown by the sub-code 3. Component shown by the sub-code	NS-58

DTC Code	Detection Item	Trouble Area	See page
01-DB	Mode Status Error	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio and navigation assembly and the component shown by the sub-code 3. Component shown by the sub-code	NS-58
01-DC	Transmission Error	If the same sub-code is recorded in other components, check harness for power supply and communication system of all components shown by code	NS-64
01-DD	Master Reset	1. Radio and navigation assembly power source circuit 2. AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code 3. Radio and navigation assembly 4. Component which has stored this code	NS-67
01-DE	Slave Reset	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio and navigation assembly and the component shown by the sub-code 3. Component shown by the sub-code	NS-58
01-DF	Master Error	1. Radio and navigation assembly power source circuit 2. AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code 3. Radio and navigation assembly 4. Component which has stored this code	NS-71
01-E0	Registration Complete Indication Error	-	NS-74
01-E1	Voice Processing Device ON Error	1. Radio and navigation assembly power source circuit 2. AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code 3. Radio and navigation assembly 4. Component which has stored this code	NS-67
01-E2	ON / OFF Indication Parameter Error	Radio and navigation assembly	NS-75
01-E3	Registration Demand Transmission	-	NS-74
01-E4	Multiple Frame Incomplete	-	NS-74

SW:

DTC Code	Detection Item	Trouble Area	See page
21-10	Panel Switch Error	Radio and navigation assembly	NS-76
21-11	Touch Switch Error	Radio and navigation assembly	NS-76

SW WITH NAME:

DTC Code	Detection Item	Trouble Area	See page
23-10	Panel Switch Error	Radio and navigation assembly	NS-76
23-11	Touch Switch Error	Radio and navigation assembly	NS-76

SW CONVERTING:

DTC Code	Detection Item	Trouble Area	See page
24-10	Panel Switch Error	Radio and navigation assembly	NS-76
24-11	Touch Switch Error	Radio and navigation assembly	NS-76

COMMAND SW:

DTC Code	Detection Item	Trouble Area	See page
25-10	Panel Switch Error	Radio and navigation assembly	NS-76
25-11	Touch Switch Error	Radio and navigation assembly	NS-76

FRONT MONITOR:

DTC Code	Detection Item	Trouble Area	See page
34-10	Error in Picture Circuit	Radio and navigation assembly	NS-77
34-11	No Current in Back-light	Radio and navigation assembly	NS-77
34-12	Excess Current in Back-light	Radio and navigation assembly	NS-77

NS

TELEPHONE:

DTC Code	Detection Item	Trouble Area	See page
57-47	Bluetooth Module Initialization Failed	Radio and navigation assembly	NS-78

NAVI:

DTC Code	Detection Item	Trouble Area	See page
58-10	Gyro Error	1. Gyro sensor 2. Radio and navigation assembly	NS-79
58-11	GPS Receiver Error	Radio and navigation assembly	NS-81
58-40	GPS Antenna Error	1. Wire harness 2. GPS antenna 3. Radio and navigation assembly	NS-82
58-41	GPS Antenna Power Source Error	1. Wire harness 2. GPS antenna 3. Radio and navigation assembly	NS-82
58-42	Map Disc Read Error	1. Map Disc 2. Radio and navigation assembly	NS-83
58-43	SPD Signal Error	1. Speed signal circuit 2. Radio and navigation assembly	NS-85
58-44	Player Error	Radio and navigation assembly	NS-86
58-45	High Temperature	Radio and navigation assembly	NS-87

IN-DASH CD CHANGER:

DTC Code	Detection Item	Trouble Area	See page
63-10	CD Changer Mechanical Error	Radio and navigation assembly	NS-88
63-11	CD Insertion and Ejection Error	Radio and navigation assembly	NS-88
63-12	CD Reading Abnormal	Radio and navigation assembly	NS-88
63-41	Wrong Disc	1. CD 2. Radio and navigation assembly	NS-89
63-42	Disc cannot be Read	1. CD 2. Radio and navigation assembly	NS-89
63-43	CD-ROM Abnormal	1. CD 2. Radio and navigation assembly	NS-91
63-44	CD Abnormal	Radio and navigation assembly	NS-92
63-45	Eject Error	Radio and navigation assembly	NS-93

DTC Code	Detection Item	Trouble Area	See page
63-46	Scratched / Reversed Disc	1. CD 2. Radio and navigation assembly	NS-94
63-47	High Temperature	Radio and navigation assembly	NS-96
63-48	Excess Current	Radio and navigation assembly	NS-92
63-50	Tray Insertion / Ejection Error	Radio and navigation assembly	NS-92
63-51	Elevator Error	Radio and navigation assembly	NS-93
63-52	Clamp Error	Radio and navigation assembly	NS-93
63-78	DSP Error	-	NS-97
63-7D	Disc cannot be Played	1. CD 2. Radio and navigation assembly	NS-98
63-7E	No Playable Files	1. CD 2. Radio and navigation assembly	NS-98
63-7F	Copyright Protection Error	1. CD 2. Radio and navigation assembly	NS-98

GPS:

DTC Code	Detection Item	Trouble Area	See page
80-10	Gyro Error	1. Gyro sensor 2. Radio and navigation assembly	NS-79
80-11	GPS Receiver Error	Radio and navigation assembly	NS-81
80-40	GPS Antenna Error	1. Wire harness 2. GPS antenna 3. Radio and navigation assembly	NS-82
80-41	GPS Antenna Power Source Error	1. Wire harness 2. GPS antenna 3. Radio and navigation assembly	NS-82
80-42	Map Disc Read Error	1. Map disc 2. Radio and navigation assembly	NS-83
80-43	SPD Signal Error	1. Speed signal circuit 2. Radio and navigation assembly	NS-85
80-44	Player Error	Radio and navigation assembly	NS-86
80-45	High Temperature	Radio and navigation assembly	NS-87

DTC	01-21	ROM Error

DTC	01-22	RAM Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-21	A malfunction exists in ROM.	Radio and navigation assembly
01-22	A malfunction exists in RAM.	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	REPLACE RADIO AND NAVIGATION ASSEMBLY

NEXT

END

DTC	01-D5	Absence of Registration Unit

DTC	01-D8	No Response for Connection Check

DTC	01-D9	Last Mode Error

DTC	01-DA	No Response Against ON / OFF Command

DTC	01-DB	Mode Status Error

DTC	01-DE	Slave Reset

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-D5 *1, *3	• A component shown by the sub-code is (was) disconnected from the system when power switch is turned on (ACC or IG). • The communication condition with the device that the code shows cannot be obtained when the engine starts.	• Power source circuit of the component shown by the sub-code • AVC-LAN circuit between the radio and navigation assembly and the component shown by the sub-code • Component shown by the sub-code
01-D8 *2, *3	A component shown by the sub-code is (was) disconnected from the system after engine start.	
01-D9 *1, *3	The device that had functioned before the engine stopped is (was) disconnected from the system when power switch is turned on (ACC or IG).	
01-DA *3	• No response is identified when changing mode. • Detected when sound and image do not change by switch operation.	
01-DB *1, *3	A dual alarm is detected.	
01-DE *3	A slave device has been disconnected after engine start.	

HINT:

- *1: Even if no fault is present, this trouble code may be stored depending on the battery condition or engine start voltage.
- *2: If the power connector is disconnected after the engine starts, this code is stored after 180 seconds.
- *3: If it is reported that the device does not exist during verification, check the power source circuit and AVC-LAN circuit for the device.

NOTICE:

- **Before starting troubleshooting, be sure to clear DTCs to erase codes stored due to the reasons described in the HINT above. Then, check for DTCs and troubleshoot according to the output DTCs.**
- **The radio and navigation assembly is the master unit.**
- **Be sure to clear and recheck DTCs after the inspection is completed to confirm that no DTCs are output.**

INSPECTION PROCEDURE

NOTICE:

Be sure to read DESCRIPTION before performing the following procedures.

1	**CHECK "RADIO AND NAVIGATION ASSEMBLY COMMUNICATION ERROR" IN FLOW CHART**

Refer to the radio and navigation assembly communication error (See page NS-186).

NEXT

END

DTC	01-D6	No Master

DTC	01-D7	Connection Check Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-D6 *1	When either of the following conditions is met: • The component which has stored the code has (had) been disconnected when the power switch is turned on (ACC or IG). • The master device has (had) been disconnected when this code is stored.	• Radio and navigation assembly power source circuit • Power source circuit of the component which has stored this code • AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code • Component which has stored this code • Radio and navigation assembly
01-D7 *2	When either of the following conditions is met: • The component which has stored the code has (had) been disconnected after the engine starts (started). • The master device has (had) been disconnected when this code is (was) stored.	

HINT:
- *1: Even if no fault is present, this trouble code may be stored depending on the battery condition or engine start voltage.
- *2: When 210 seconds have elapsed after disconnecting the power supply connector of the master component with the power switch on (ACC or IG), this code is stored.

NOTICE:
- **Before starting troubleshooting, be sure to clear DTCs to erase codes stored due to the reasons described in the HINT above. Then, check for DTCs and troubleshoot according to the output DTCs.**
- **The radio and navigation assembly is the master unit.**
- **Be sure to clear and recheck DTCs after the inspection is completed to confirm that no DTCs are output.**

INSPECTION PROCEDURE

NOTICE:
Be sure to read DESCRIPTION before performing the following procedures.

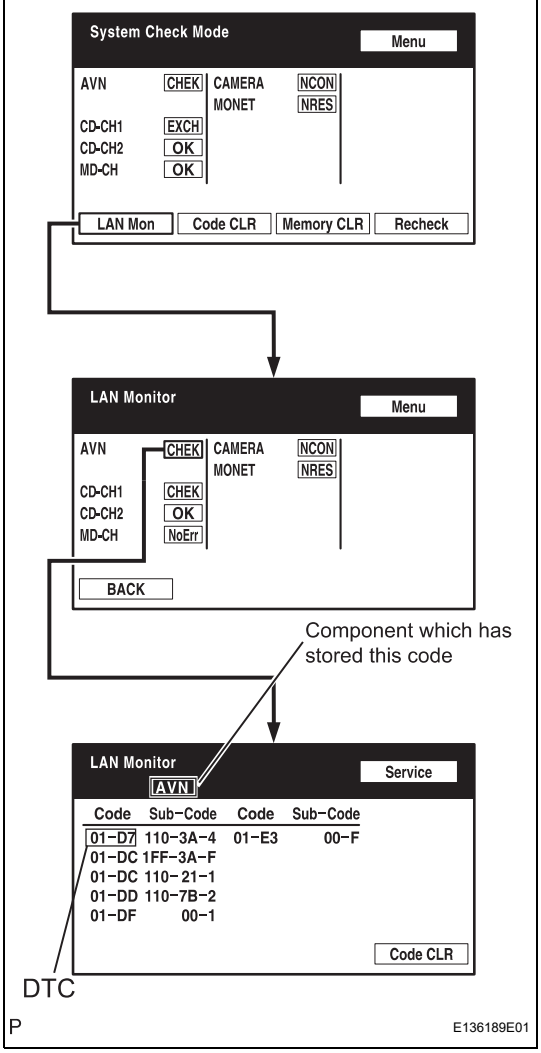
1	CHECK RADIO AND NAVIGATION ASSEMBLY POWER SOURCE CIRCUIT

Refer to the radio and navigation assembly power source circuit (See page NS-189).
If the power source circuit is operating normally, proceed to the next step.

NEXT

2 IDENTIFY THE COMPONENT WHICH HAS STORED THIS CODE

Example:



(a) Enter the diagnostic mode.
(b) Press the "LAN Mon" switch to change to "LAN Monitor" mode.
(c) Identify the component which has stored this code.

Component Table:

Display	Component
DSP-AMP	Stereo component amplifier

HINT:
"NAVI" is the component which has stored this code in the example shown in the illustration.

NEXT

3 CHECK POWER SOURCE CIRCUIT OF COMPONENT WHICH HAS STORED THIS CODE

(a) Inspect the power source circuit of the component which has stored this code.
If the power source circuit is operating normally, proceed to the next step.

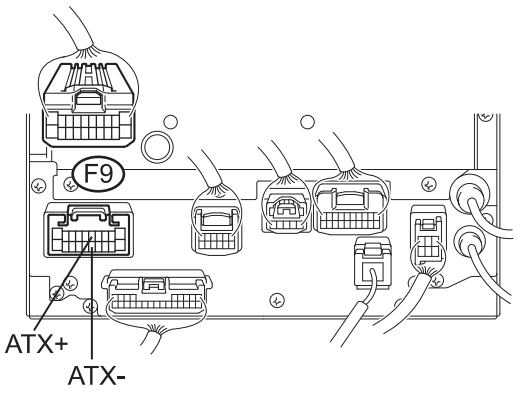
Component Table:

Component	Proceed to
Stereo component amplifier (DSP-AMP)	Stereo component amplifier power source circuit (See page AV-132)

NEXT

4	CHECK RADIO AND NAVIGATION ASSEMBLY

Wire Harness View:



(a) Disconnect the radio and navigation assembly connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
ATX+ (F9-5) - ATX- (F9-15)	Always	60 to 80 Ω

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

5	CHECK HARNESS AND CONNECTOR

HINT:
For details of the connectors, refer to "TERMINALS OF ECU" (See page NS-46).

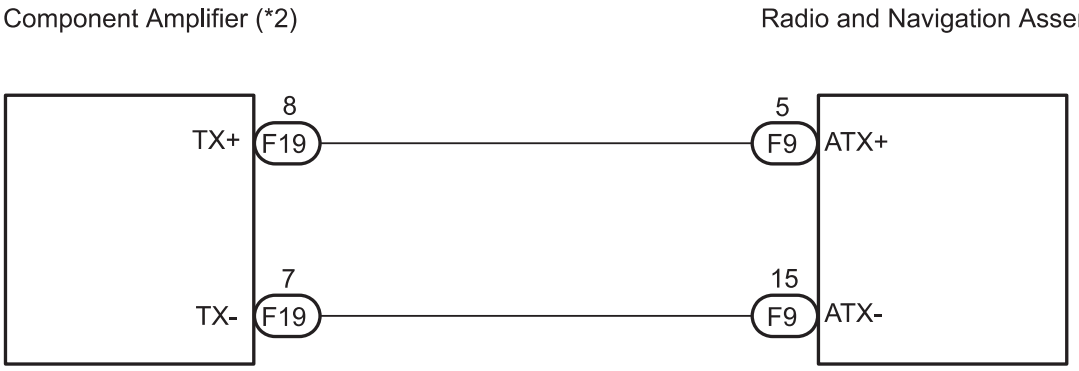
(a) Referring to the AVC-LAN wiring diagram below, check the AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code.
  (1) Disconnect all connectors between the radio and navigation assembly and the component which has stored this code.
  (2) Check for an open or short in the AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code.

OK:

There is no open or short circuit.

NS

AVC-LAN WIRING DIAGRAM



*1: Master Unit

*2: Slave Unit

P

E111831E09

NS

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6	REPLACE COMPONENT WHICH HAS STORED THIS CODE

(a) Replace the component which has stored this code with a normal one and check if the same problem occurs again.
OK:
Same problem does not occur.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

END

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedure to troubleshoot the power window control system.
- The intelligent tester should be used in step 4.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK

NEXT

3	PROBLEM SYMPTOMS TABLE

HINT:
See page WS-7.

NEXT

4	OVERALL ANALYSIS AND TROUBLESHOOTING

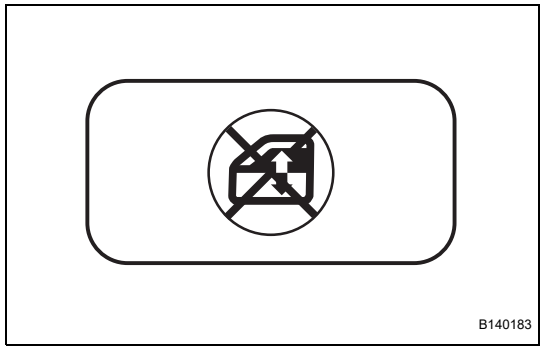
(a) Circuit inspection
(b) Terminal of ECU
HINT:
See page WS-8.

NEXT

5	ADJUST, REPAIR OR REPLACE

NEXT

END



OPERATION CHECK

1. CHECK WINDOW LOCK SWITCH

(a) Check that the front passenger side power window and rear power windows operation are disabled when the window lock switch of the power window master switch is pressed.

Standard:

Front passenger side power window and rear power windows operation are disabled.

(b) Check that the front passenger side power window and rear power windows can be operated when the window lock switch is pressed again.

Standard:

Front passenger side power window and rear power windows can be operated.

2. CHECK MANUAL UP/DOWN FUNCTION

(a) Check that the driver side power window operates as follows:

Standard

Condition	Master Switch	Switch Operation	Power Window
Power switch on (IG)	Driver side	Pulled halfway up	UP (Closed)
		Pushed halfway down	DOWN (Open)

(b) Check that the power windows except the driver side power window operate as follows:

Standard

Condition	Switch	Switch Operation	Power Window
• Power switch on (IG) • Window lock switch OFF	Passenger side	Pulled up	UP (Closed)
		Pushed down	DOWN (Open)
	Rear LH	Pulled up	UP (Closed)
		Pushed down	DOWN (Open)
	Rear RH	Pulled up	UP (Closed)
		Pushed down	DOWN (Open)

3. CHECK AUTO DOWN FUNCTION

(a) Check that the driver side power window operates as follows:

WS

Standard

Condition	Master Switch	Switch Operation	Power Window
Power switch on (IG)	Driver side	Pulled up fully	UP (Closed)
		Pushed down fully	DOWN (Open)

4. CHECK REMOTE MANUAL UP/DOWN FUNCTION

(a) Check that the power windows except the driver side power window operate as follows:

Standard

Condition	Master Switch	Switch Operation	Power Window
• Power switch on (IG) • Window lock switch OFF	Passenger side	Pulled up	UP (Closed)
		Pushed down	DOWN (Open)
	Rear LH	Pulled up	UP (Closed)
		Pushed down	DOWN (Open)
	Rear RH	Pulled up	UP (Closed)
		Pushed down	DOWN (Open)

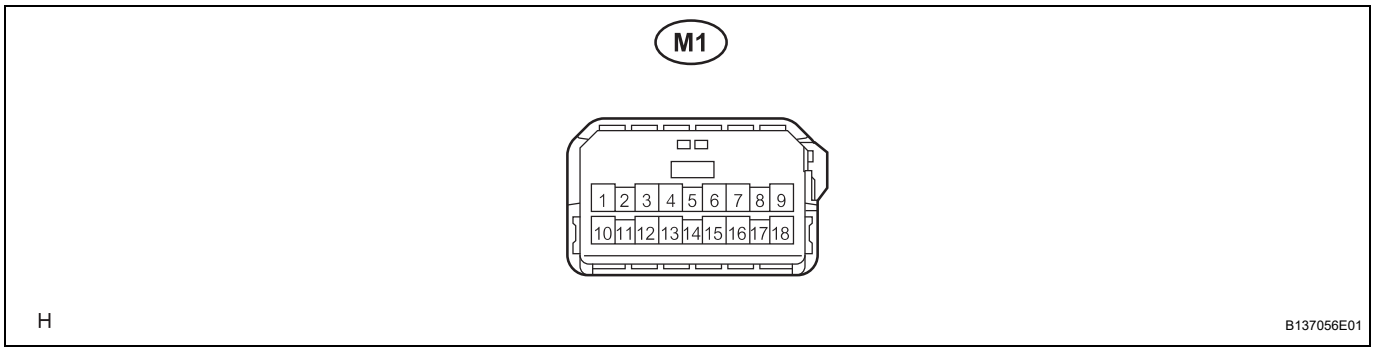
PROBLEM SYMPTOMS TABLE

POWER WINDOW CONTROL SYSTEM

Symptom	Suspected Area	See page
Power window does not operate with power window regulator master switch	1. POWER, RR DOOR LH/RH fuses	-
	2. Power window master switch circuit (power source)	WS-12
	3. Power window regulator motor circuit	WS-18
	4. Power window regulator master switch	WS-27
Front passenger side power window does not operate with power window regulator switch	1. Power window switch circuit (power source)	WS-15
	2. Power window regulator motor circuit (front passenger side)	WS-20
	3. Power window regulator switch (front passenger side)	WS-15
Rear LH side power window does not operate with power window regulator switch	1. Power window switch circuit (power source)	WS-16
	2. Power window regulator motor circuit (rear LH side)	WS-22
	3. Power window regulator switch (rear LH side)	WS-32
Rear RH side power window does not operate with power window regulator switch	1. Power window switch circuit (power source)	WS-17
	2. Power window regulator motor circuit (rear RH side)	WS-24
	3. Power window regulator switch (rear RH side)	WS-32
Remote UP/DOWN function does not operate	1. Power window regulator master switch	WS-12
	2. Wire harness	-
Power window can be operated after power switch is turned off even if operated conditions are not met	1. Front door courtesy switch	LI-105
	2. Wire harness	-

TERMINALS OF ECU

1. POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY



(a) Disconnect the M1 switch connector.
(b) Measure the voltage and resistance of each terminal according to the value(s) in the table below.

Standard resistance

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
E (M1-1) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω

Standard voltage

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
B (M1-6) - E (M1-1)	GR - W-B	Power supply	Power switch on (IG)	10 to 14 V

If the result is not as specified, there may be a malfunction in the wire harness.
(c) Reconnect the M1 switch connector and reset the power window motor.
(d) Measure the voltage according to the value(s) in the table below.

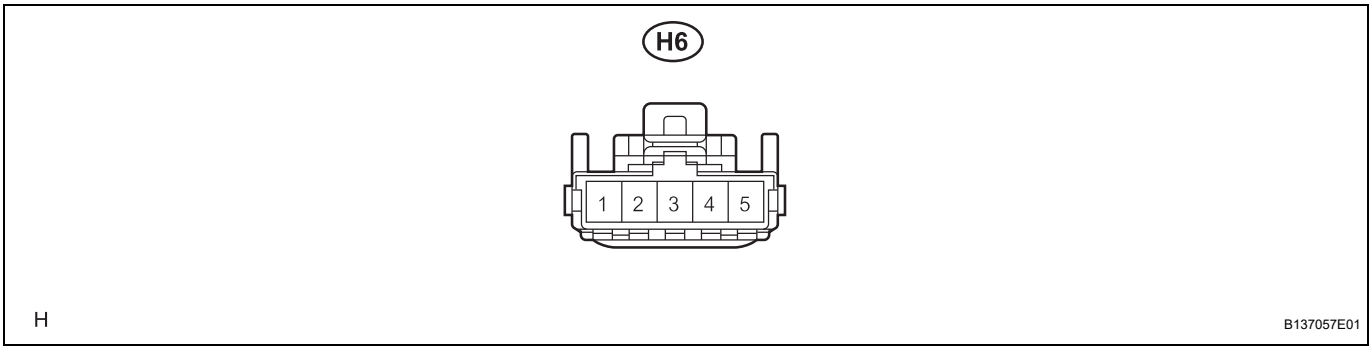
Standard voltage

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
DU (M1-3) - E (M1-1)	G - W-B	Power window motor UP output	Power switch on (IG), driver side power window switch OFF → UP (Manual operation)	0 V → 10 to 14 V
DD (M1-4) - E (M1-1)	BR - W-B	Power window motor DOWN output	Power switch on (IG), driver side power window switch OFF → DOWN (Manual operation)	0 V → 10 to 14 V
PU (M1-16) - E (M1-1)	W - W-B	Power window motor UP output	Power switch on (IG), front passenger side power window switch OFF → UP (Manual operation)	0 V → 10 to 14 V
PD (M1-15) - E (M1-1)	R - W-B	Power window motor DOWN output	Power switch on (IG), front passenger side power window switch OFF → DOWN (Manual operation)	0 V → 10 to 14 V
RLU (M1-12) - E (M1-1)	L - W-B	Power window motor UP output	Power switch on (IG), rear LH side power window switch OFF → UP (Manual operation)	0 V → 10 to 14 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
RLD (M1-13) - E (M1-1)	B - W-B	Power window motor DOWN output	Power switch on (IG), rear LH side power window switch OFF → DOWN (Manual operation)	0 V → 10 to 14 V
RRU (M1-10) - E (M1-1)	Y - W-B	Power window motor UP output	Power switch on (IG), rear RH side power window switch OFF → UP (Manual operation)	0 V → 10 to 14 V
RRD (M1-18) - E (M1-1)	LG - W-B	Power window motor DOWN output	Power switch on (IG), rear RH side power window switch OFF → DOWN (Manual operation)	0 V → 10 to 14 V

If the result is not as specified, there may be a malfunction in the wire harness.

2. CHECK POWER WINDOW REGULATOR SWITCH ASSEMBLY (FRONT RH)



(a) Disconnect the H6 switch connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
B (H6-3) - Body ground	GR - Body ground	Power supply	Power switch on (IG)	10 to 14 V

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the H6 switch connector and reset the power window motor.
(d) Measure the voltage according to the value(s) in the table below.

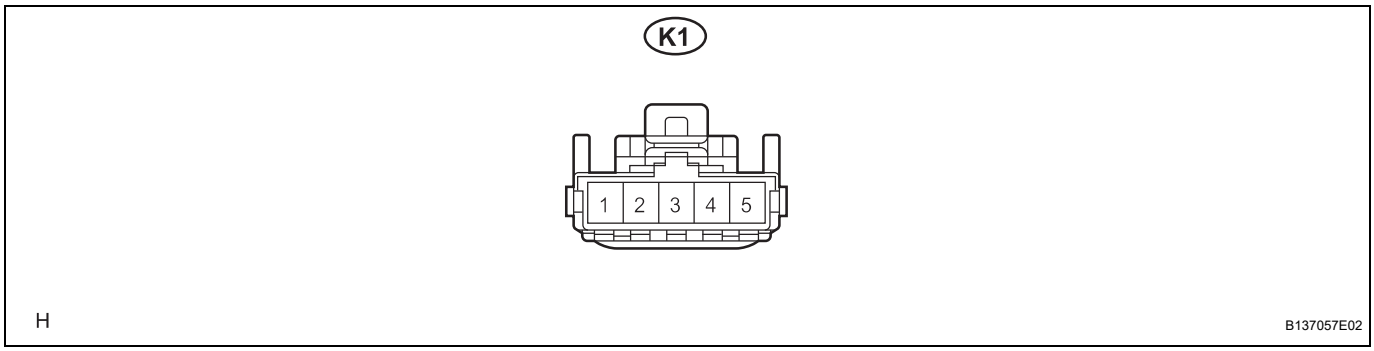
Standard voltage

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
U (H6-4) - Body ground	G - Body ground	Power window motor UP output	Power switch on (IG), front passenger side power window switch OFF → UP (Manual operation)	0 V → 10 to 14 V
D (H6-1) - Body ground	Y - Body ground	Power window motor DOWN output	Power switch on (IG), front passenger side power window switch OFF → DOWN (Manual operation)	0 V → 10 to 14 V

If the result is not as specified, the power window regulator switch assembly may have a malfunction.

WS

3. CHECK POWER WINDOW REGULATOR SWITCH ASSEMBLY (REAR LH)



(a) Disconnect the K1 switch connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
B (K1-3) - Body ground	R - Body ground	Power supply	Power switch on (IG)	10 to 14 V

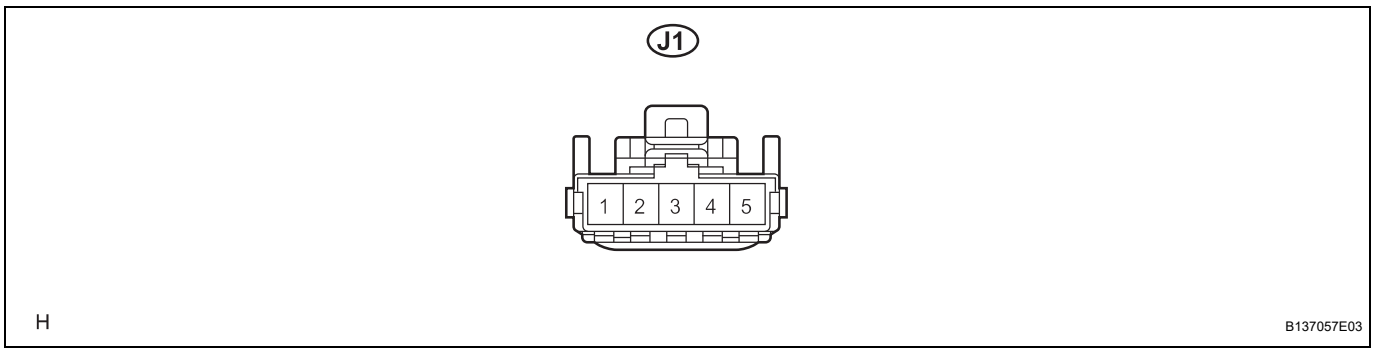
If the result is not as specified, there may be a malfunction in the wire harness.
(c) Reconnect the K1 switch connector and reset the power window motor.
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
U (K1-4) - Body ground	V - Body ground	Power window motor UP output	Power switch on (IG), front passenger side power window switch OFF → UP (Manual operation)	0 V → 10 to 14 V
D (K1-1) - Body ground	R - Body ground	Power window motor DOWN output	Power switch on (IG), front passenger side power window switch OFF → DOWN (Manual operation)	0 V → 10 to 14 V

If the result is not as specified, the power window regulator switch assembly may have a malfunction.

4. CHECK POWER WINDOW REGULATOR SWITCH ASSEMBLY (REAR RH)



(a) Disconnect the J1 switch connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
B (J1-3) - Body ground	R - Body ground	Power supply	Power switch on (IG)	10 to 14 V

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the J1 switch connector and reset the power window motor.

(d) Measure the voltage according to the value(s) in the table below.

Standard voltage

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
U (J1-4) - Body ground	V - Body ground	Power window motor UP output	Power switch on (IG), front passenger side power window switch OFF → UP (Manual operation)	0 V → 10 to 14 V
D (J1-1) - Body ground	R - Body ground	Power window motor DOWN output	Power switch on (IG), front passenger side power window switch OFF → DOWN (Manual operation)	0 V → 10 to 14 V

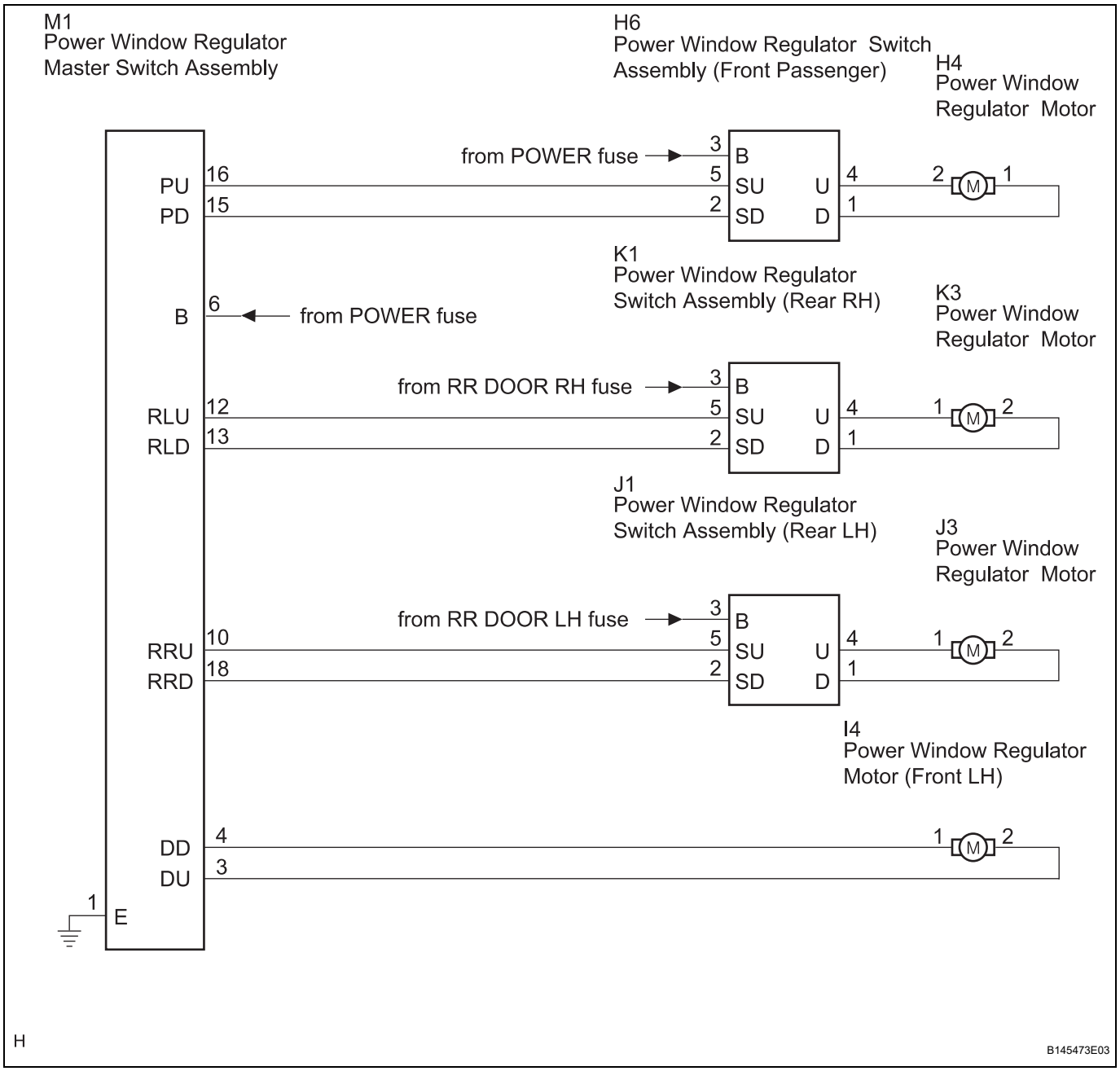
If the result is not as specified, the power window regulator switch assembly may have a malfunction.

Power Window Master Switch Circuit

DESCRIPTION

This circuit transmits signals from the power window regulator master switch assembly to the power window regulator switch.

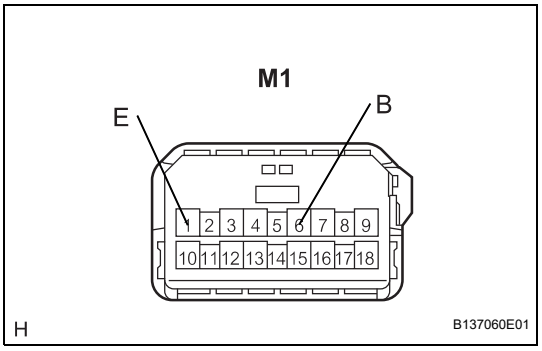
WIRING DIAGRAM



WS

INSPECTION PROCEDURE

1 **INSPECT POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY**



(a) Disconnect the M1 connector.
(b) Measure the voltage and resistance according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
6 (B) - Body ground	Power switch on (IG)	10 to 14 V

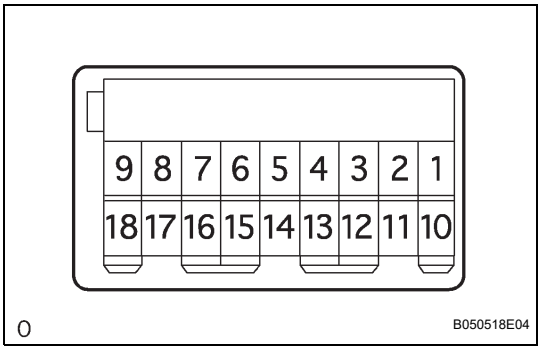
Standard resistance

Tester Connection	Condition	Specified Condition
1 (E) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 **INSPECT POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY**



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

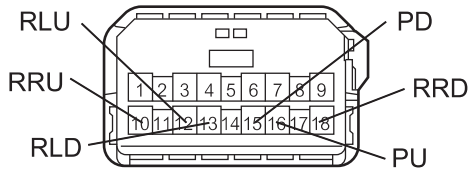
Tester Connection	Condition	Specified Condition
1 (E) - 3 (DU)	OFF	Below 1 Ω
1 (E) - 4 (DD)	OFF	Below 1 Ω
1 (E) - 10 (RRU)	Lock/Unlock switch	UNLOCK (Below 1 Ω) → LOCK (10 kΩ or higher)
1 (E) - 12 (RLU)	Lock/Unlock switch	UNLOCK (Below 1 Ω) → LOCK (10 kΩ or higher)
1 (E) - 13 (RLD)	Lock/Unlock switch	UNLOCK (Below 1 Ω) → LOCK (10 kΩ or higher)
1 (E) - 15 (PD)	Lock/Unlock switch	UNLOCK (Below 1 Ω) → LOCK (10 kΩ or higher)
1 (E) - 16 (PU)	Lock/Unlock switch	UNLOCK (Below 1 Ω) → LOCK (10 kΩ or higher)
1 (E) - 18 (RRD)	Lock/Unlock switch	UNLOCK (Below 1 Ω) → LOCK (10 kΩ or higher)

NG → **REPLACE POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY**

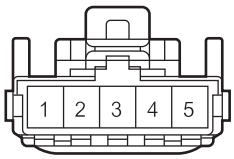
OK

3	CHECK WIRE HARNESS (POWER WINDOW MASTER SWITCH - FRONT LH, REAR LH/RH SWITCH)

M1
Power Window Regulator Master Switch Assembly:



H6 (K1, J1)
Power Window Switch (Front RH, Rear LH/RH):



H B137067E01

(a) Disconnect the M1 and H6 (K1, J1) connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

Front RH side

Tester Connection	Condition	Specified Condition
M1-16 (PU) - H6-5 (SU)	Always	Below 1 Ω
M1-15 (PD) - H6-2 (SD)	Always	Below 1 Ω
M1-16 (PU) - Body ground	Always	10 kΩ or higher
M1-15 (PD) - Body ground	Always	10 kΩ or higher

Rear LH side

Tester Connection	Condition	Specified Condition
M1-12 (RLU) - K1-5 (SU)	Always	Below 1 Ω
M1-13 (RLD) - K1-2 (SD)	Always	Below 1 Ω
M1-12 (RLU) - Body ground	Always	10 kΩ or higher
M1-13 (RLD) - Body ground	Always	10 kΩ or higher

Rear RH side

Tester Connection	Condition	Specified Condition
M1-10 (RRU) - J1-5 (SU)	Always	Below 1 Ω
M1-18 (RRD) - J1-2 (SD)	Always	Below 1 Ω
M1-10 (RRU) - Body ground	Always	10 kΩ or higher
M1-18 (RRD) - Body ground	Always	10 kΩ or higher

WS

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

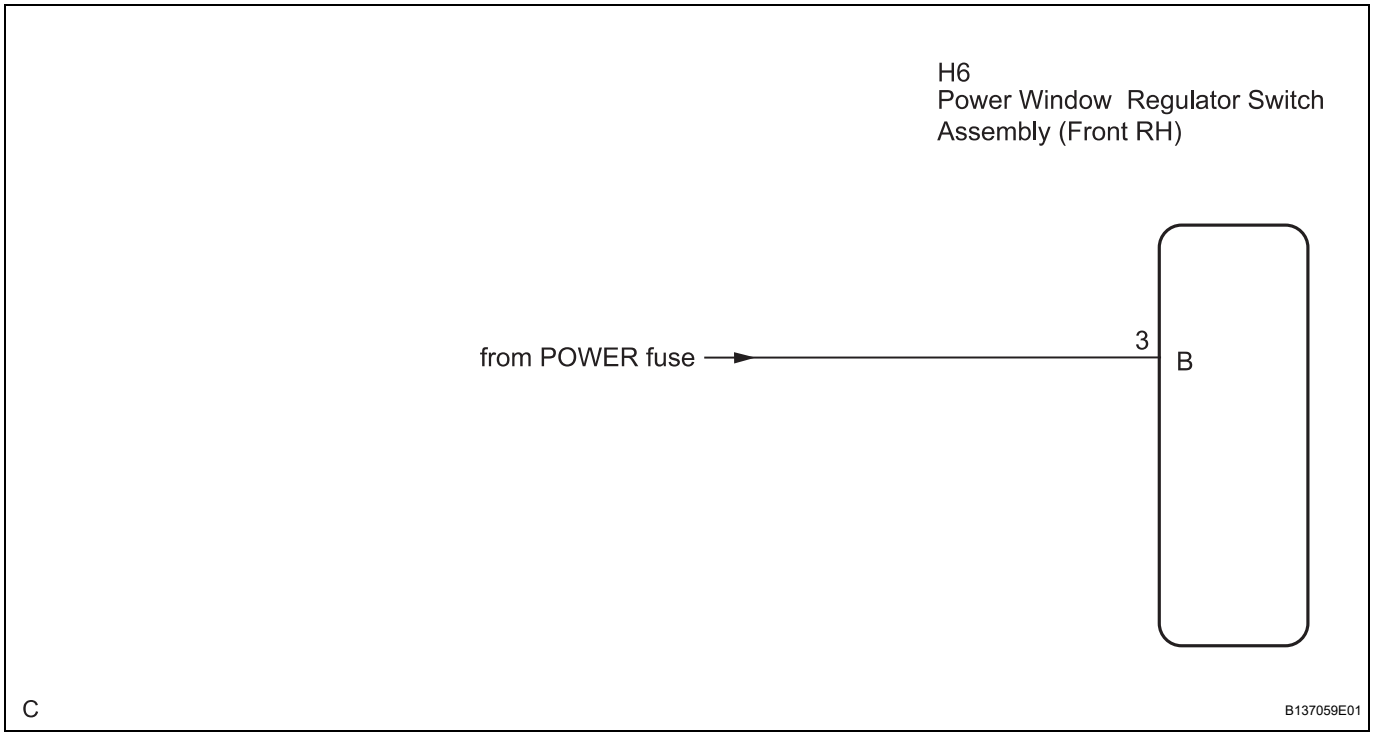
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Front Passenger Side Power Window Switch Power Source Circuit

DESCRIPTION

This circuit supplies power to operate the power window regulator switch assembly (Front RH).

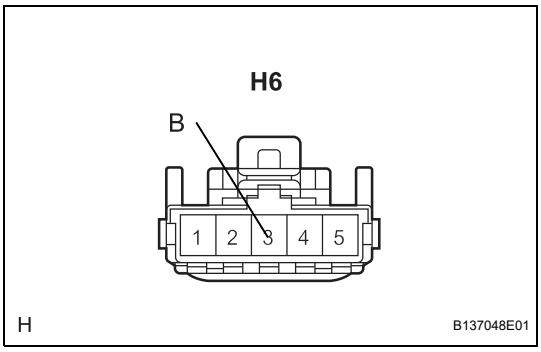
WIRING DIAGRAM



WS

INSPECTION PROCEDURE

1	CHECK WIRE HARNESS (POWER WINDOW REGULATOR SWITCH - BATTERY AND BODY GROUND)



(a) Disconnect the H6 connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
3 (B) - Body ground	Power switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

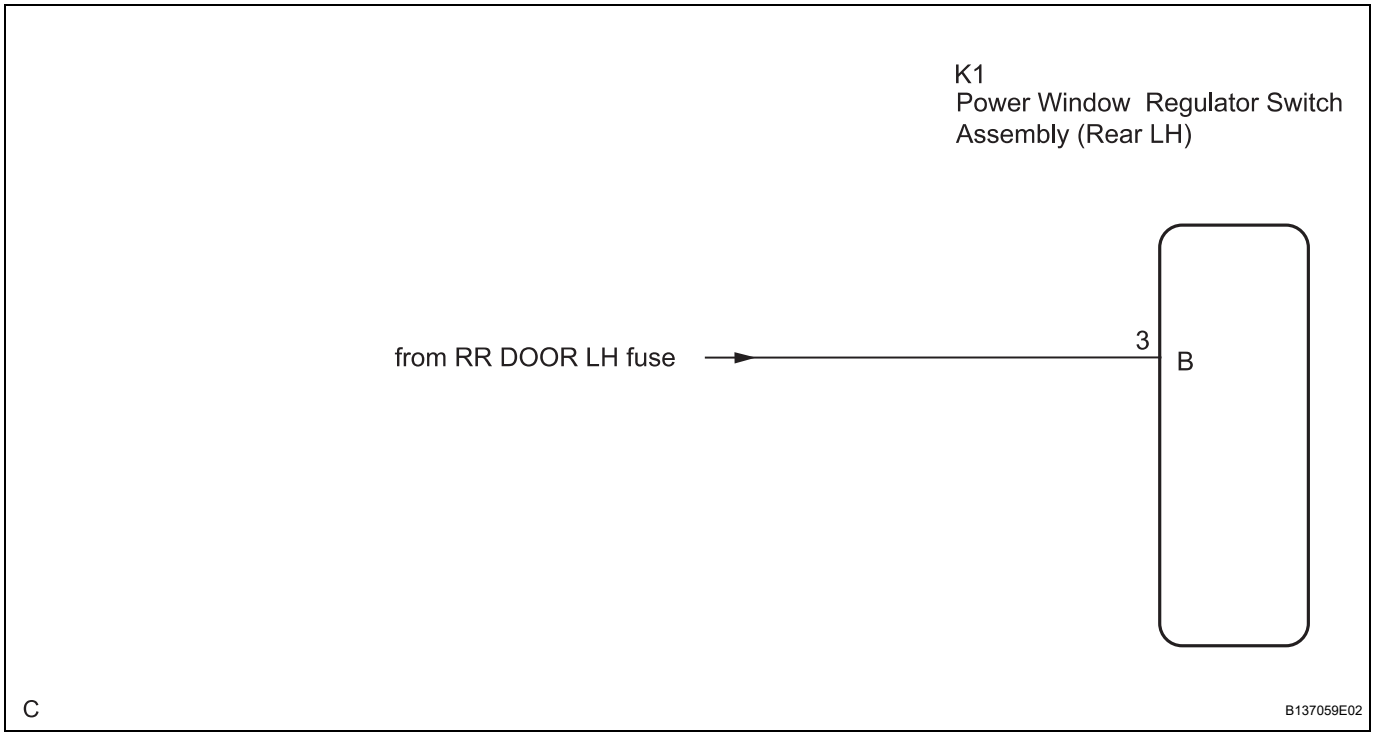
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Rear Power Window Switch LH Circuit

DESCRIPTION

This circuit supplies power to operate the power window regulator switch assembly (Rear LH).

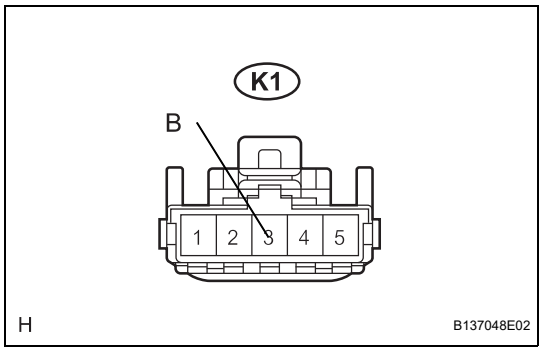
WIRING DIAGRAM



WS

INSPECTION PROCEDURE

1	CHECK WIRE HARNESS (POWER WINDOW REGULATOR SWITCH - BATTERY AND BODY GROUND)



(a) Disconnect the K1 connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
3 (B) - Body ground	Power switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

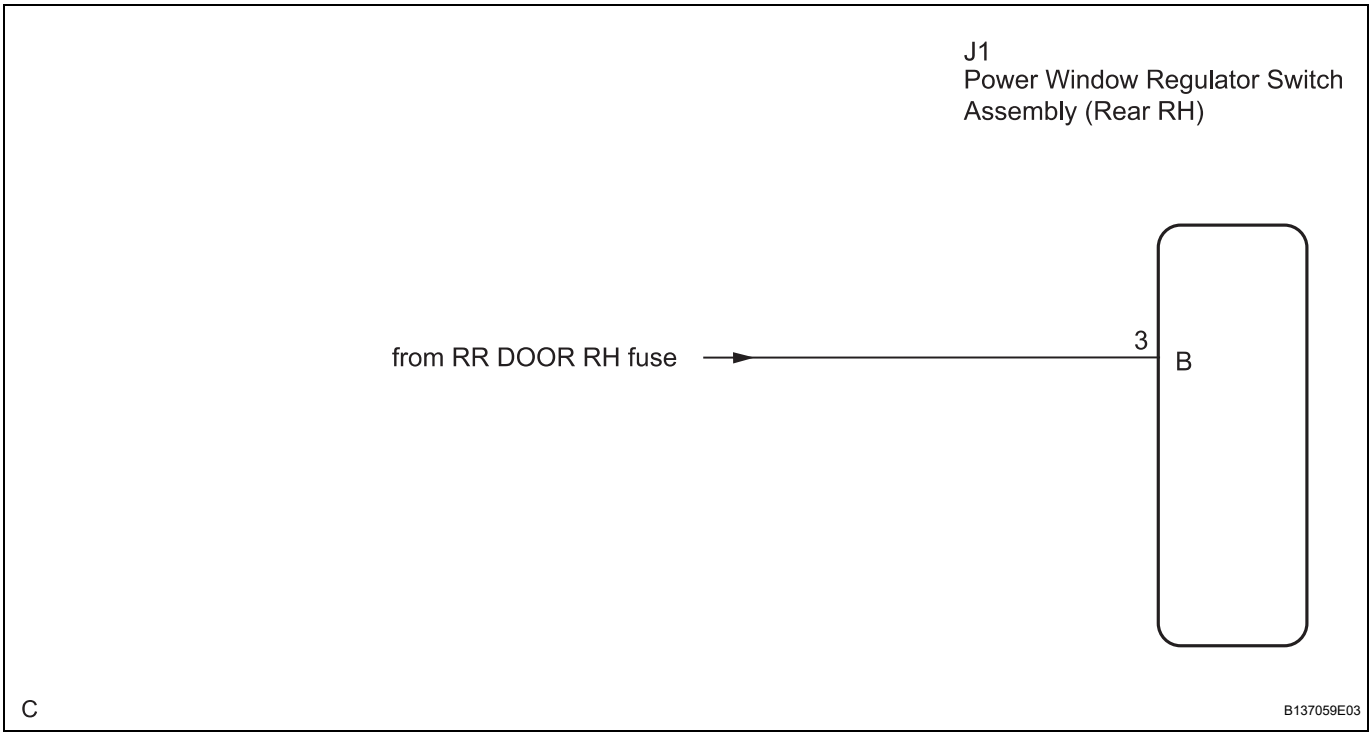
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Rear Power Window Switch RH Circuit

DESCRIPTION

This circuit supplies power to operate the power window regulator switch (Rear RH).

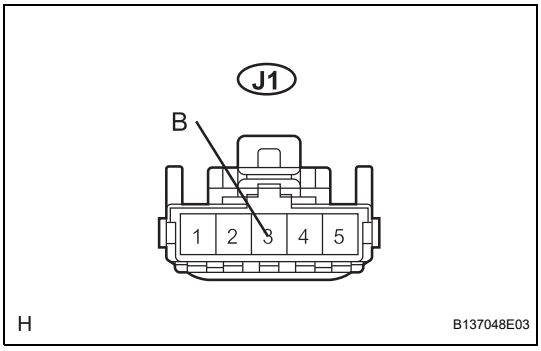
WIRING DIAGRAM



WS

INSPECTION PROCEDURE

1	CHECK WIRE HARNESS (POWER WINDOW REGULATOR SWITCH - BATTERY AND BODY GROUND)



(a) Disconnect the J1 connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
3 (B) - Body ground	Power switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

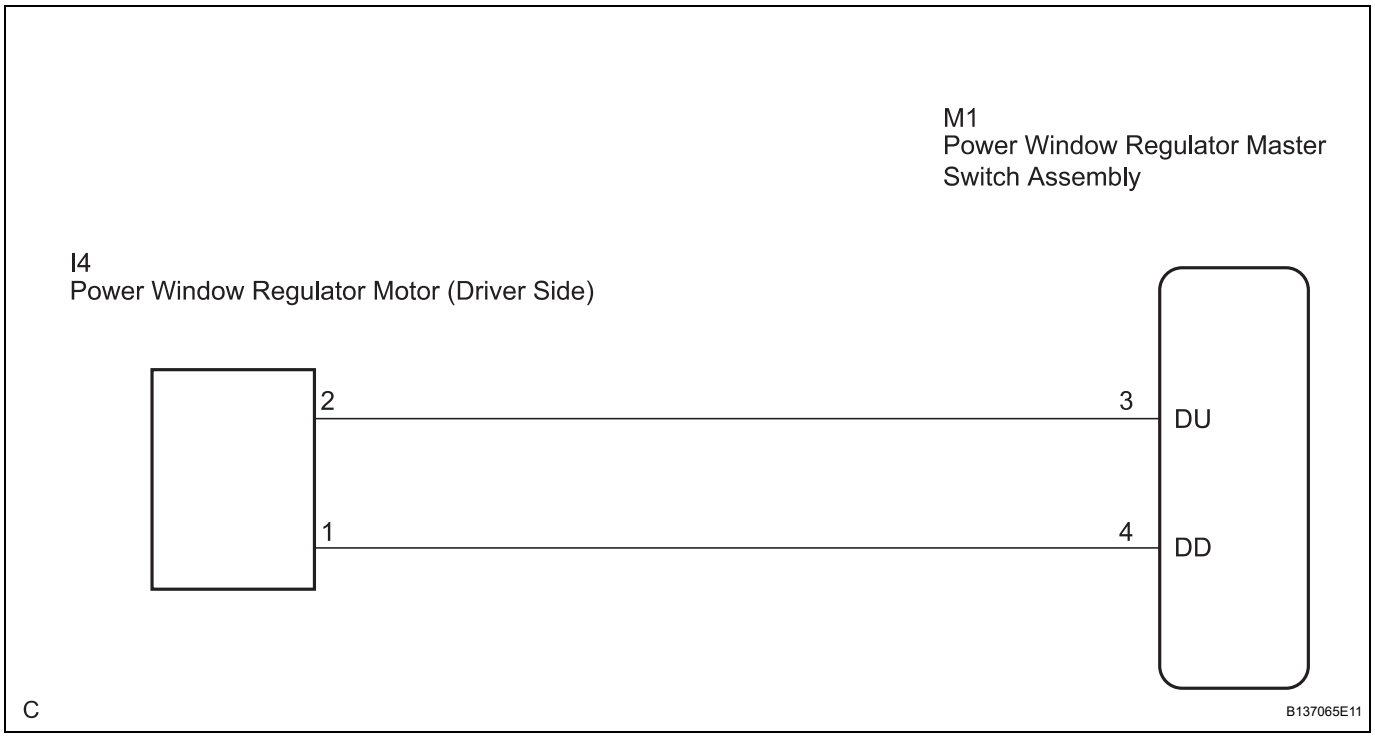
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Driver Side Power Window Motor Circuit

DESCRIPTION

This circuit transmits signals from the power window regulator master switch assembly to the power window regulator motor (Front LH).

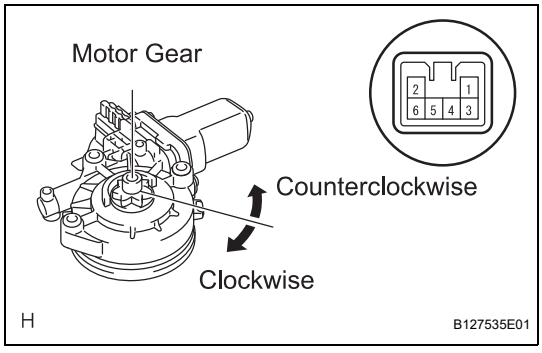
WIRING DIAGRAM



WS

INSPECTION PROCEDURE

1	INSPECT POWER WINDOW REGULATOR MOTOR



(a) Remove the power window motor.
  (1) Apply battery voltage to the motor connector according to the table below.
  NOTICE:
  Do not apply battery voltage to any terminals except terminals 1 and 2.
  Standard

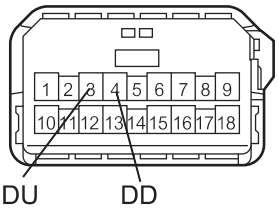
Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 1	Motor gear rotates clockwise
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 2	Motor gear rotates counterclockwise

NG → **REPLACE POWER WINDOW REGULATOR MOTOR**

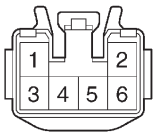
OK

2	CHECK WIRE HARNESS (WINDOW REGULATOR MOTOR - WINDOW REGULATOR MASTER SWITCH)

M1
Power Window Regulator Master Switch Assembly:



I4
Power Window Regulator Motor (Driver Side):



B137061E02

(a) Disconnect the M1 and I4 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
M1-3 (DU) - I4-2	Always	Below 1 Ω
M1-4 (DD) - I4-1	Always	Below 1 Ω
M1-3 (DU) - Body ground	Always	10 kΩ or higher
M1-4 (DD) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

WS

OK

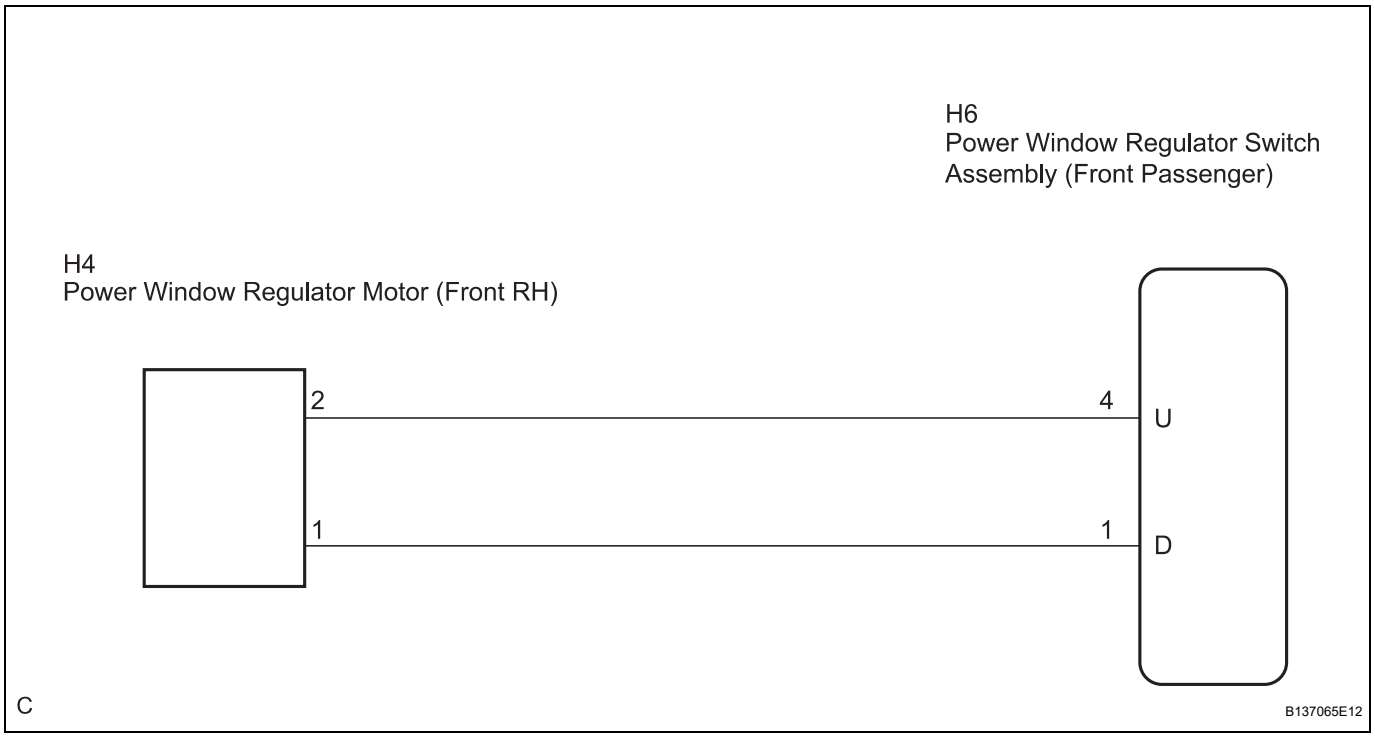
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Front Passenger Side Power Window Motor Circuit

DESCRIPTION

This circuit transmits signals from the power window regulator switch assembly (Front RH) to the power window regulator motor (Front RH).

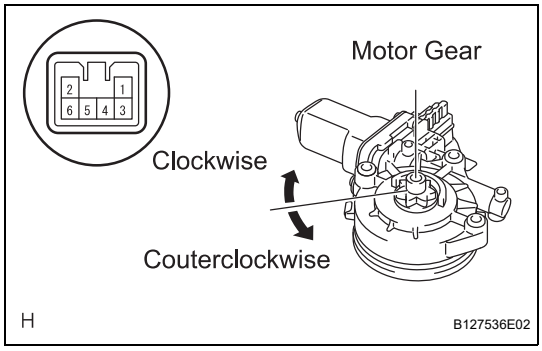
WIRING DIAGRAM



WS

INSPECTION PROCEDURE

1	INSPECT POWER WINDOW REGULATOR MOTOR



(a) Remove the power window motor.
(b) Apply battery voltage to the motor connector according to the table below.

NOTICE:
Do not apply battery voltage to any terminals except terminals 1 and 2.

Standard

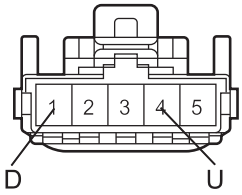
Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 2	Motor gear rotates clockwise
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 1	Motor gear rotates counterclockwise

NG → **REPLACE POWER WINDOW REGULATOR MOTOR**

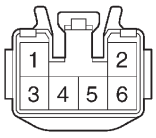
OK

2	CHECK WIRE HARNESS (WINDOW REGULATOR MOTOR - POWER WINDOW REGULATOR SWITCH)

H6
Power Window Regulator Switch Assembly (Front Passenger):



H4
Power Window Regulator Motor (Front Passenger):



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(a) Disconnect the H6 and H4 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
H6-4 (U) - H4-2	Always	Below 1 Ω
H6-1 (D) - H4-1	Always	Below 1 Ω
H6-4 (U) - Body ground	Always	10 kΩ or higher
H6-1 (D) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

WS

OK

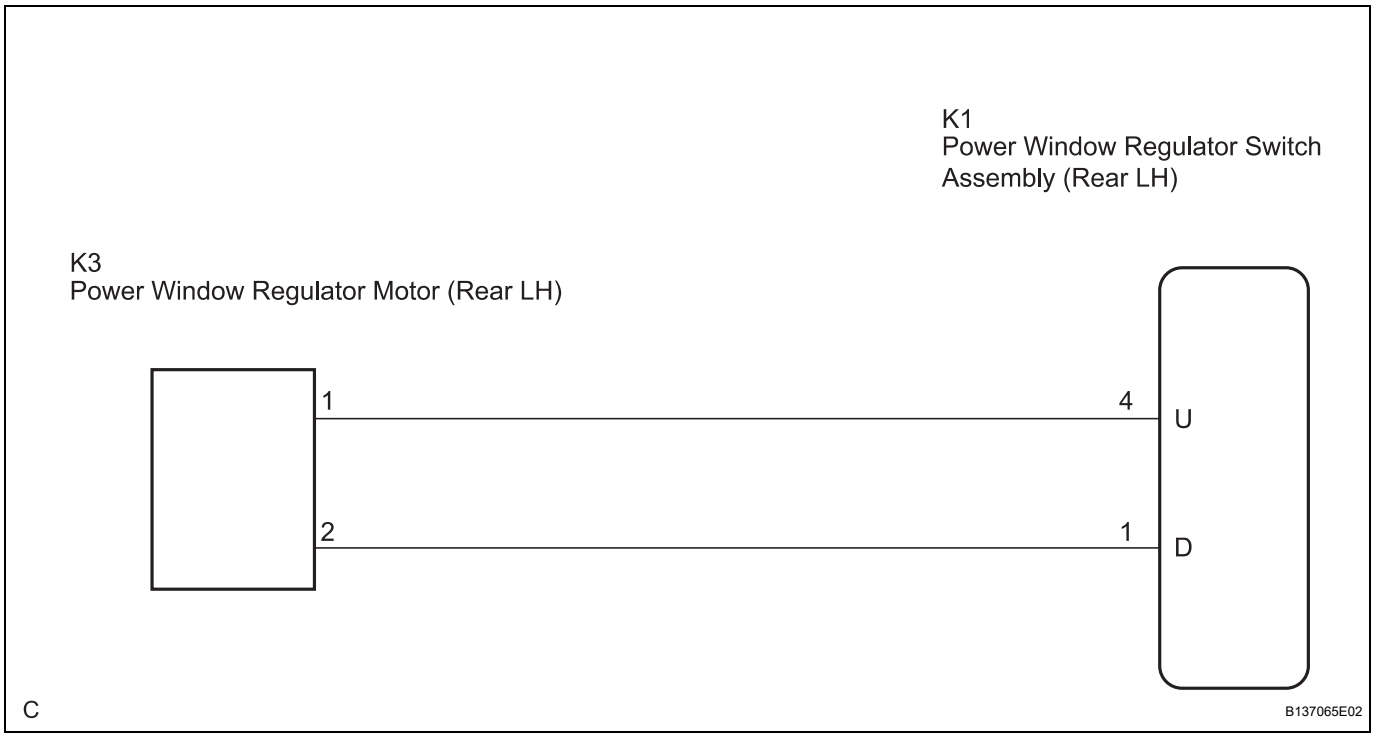
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Rear Power Window Motor LH Circuit

DESCRIPTION

This circuit transmits signals from the power window regulator switch assembly (Rear LH) to the power window regulator motor (Rear LH).

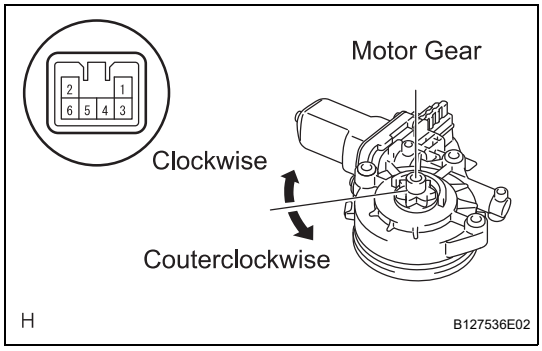
WIRING DIAGRAM



WS

INSPECTION PROCEDURE

1	INSPECT POWER WINDOW REGULATOR MOTOR



(a) Remove the power window motor.
(b) Apply battery voltage to the motor connector according to the table below.
NOTICE:
Do not apply battery voltage to any terminals except terminals 1 and 2.
Standard

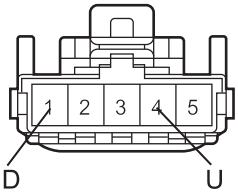
Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 2	Motor gear rotates clockwise
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 1	Motor gear rotates counterclockwise

NG → **REPLACE POWER WINDOW REGULATOR MOTOR**

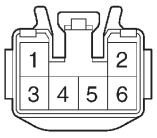
OK

2	CHECK WIRE HARNESS (WINDOW REGULATOR MOTOR - WINDOW REGULATOR SWITCH)

K1
Power Window Regulator Switch Assembly (Rear LH):



K3
Power Window Regulator Motor (Rear LH):



B137066E02

(a) Disconnect the K1 and K3 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
K1-4 (U) - K3-1	Always	Below 1 Ω
K1-1 (D) - K3-2	Always	Below 1 Ω
K1-4 (U) - Body ground	Always	10 kΩ or higher
K1-1 (D) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

WS

OK

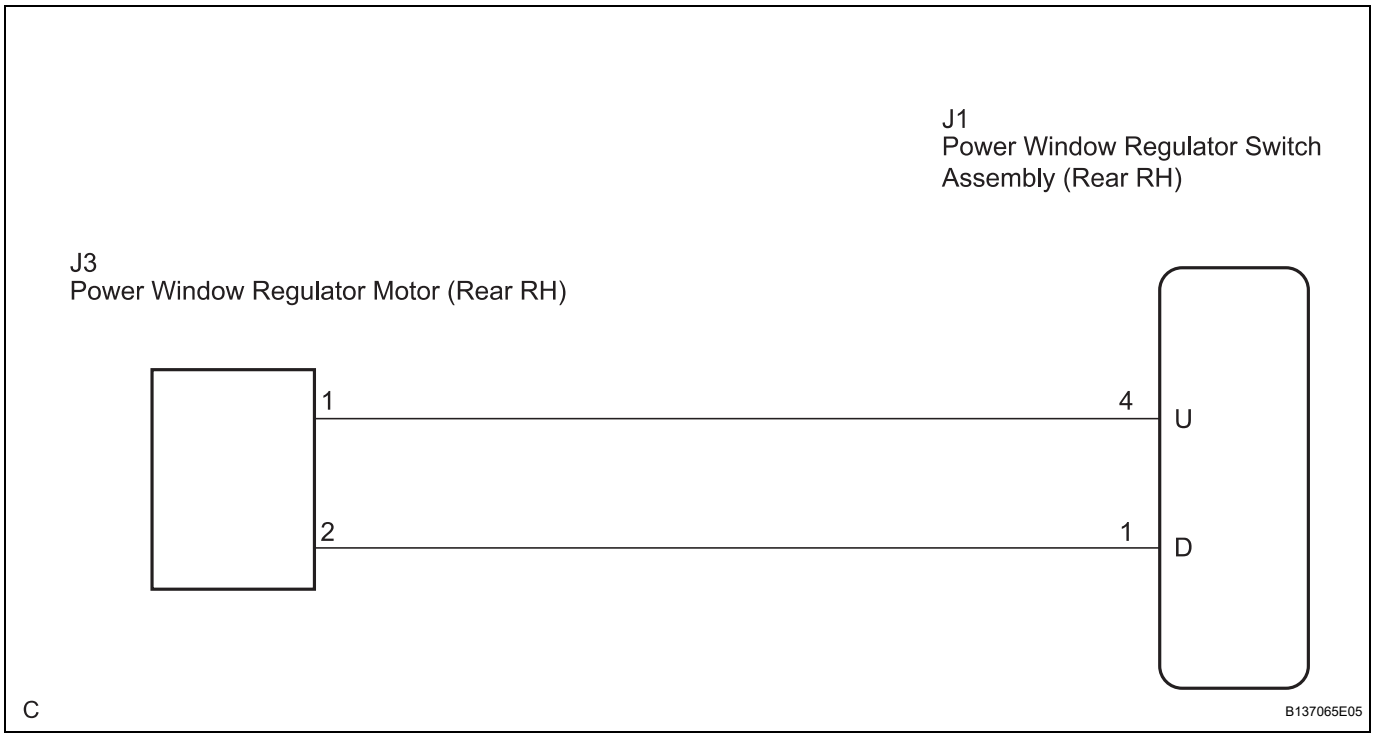
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Rear Power Window Motor RH Circuit

DESCRIPTION

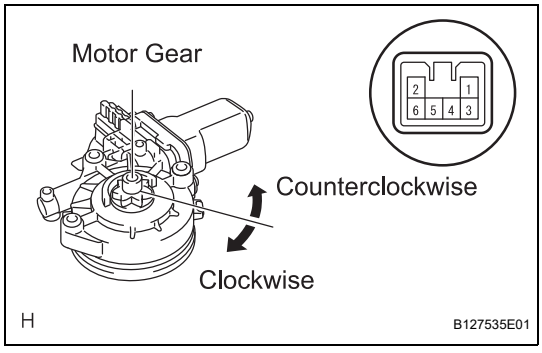
This circuit transmits signals from the power window regulator switch assembly (Rear RH) to the power window regulator motor (Rear RH).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT POWER WINDOW REGULATOR MOTOR



(a) Remove the power window motor.
(b) Apply battery voltage to the motor connector according to the table below.

NOTICE:
Do not apply battery voltage to any terminals except terminals 1 and 2.

Standard

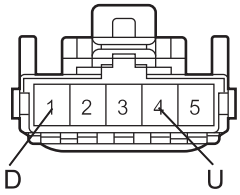
Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 1	Motor gear rotates clockwise
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 2	Motor gear rotates counterclockwise

NG → **REPLACE POWER WINDOW REGULATOR MOTOR**

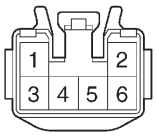
OK

2	CHECK WIRE HARNESS (WINDOW REGULATOR MOTOR - WINDOW REGULATOR SWITCH)

J1
Power Window Regulator Switch Assembly (Rear RH):



J3
Power Window Regulator Motor (Rear RH):



B137066E03

(a) Disconnect the J1 and J3 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
J1-4 (U) - J3-1	Always	Below 1 Ω
J1-1 (D) - J3-2	Always	Below 1 Ω
J1-4 (U) - Body ground	Always	10 kΩ or higher
J1-1 (D) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

WS

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

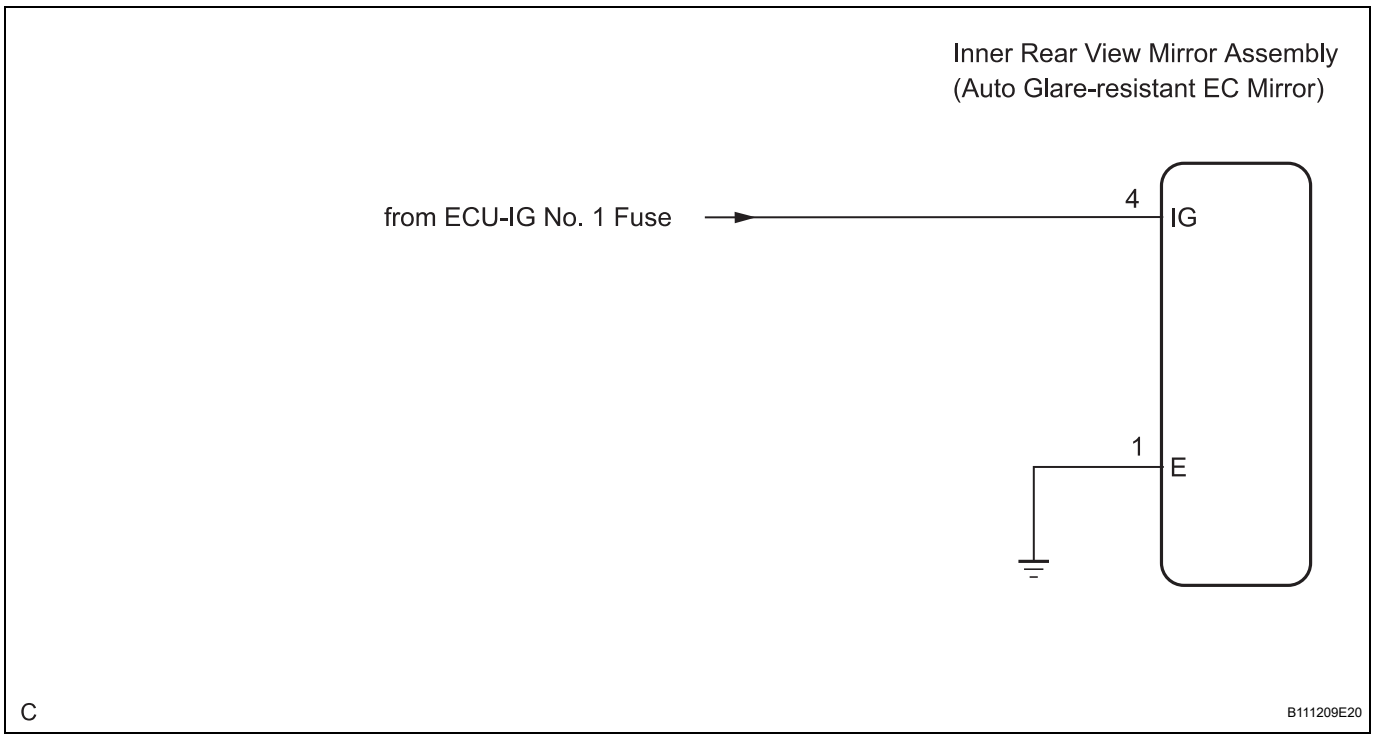
INSTALLATION

1. INSTALL POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY (See page ED-58)
2. INSTALL FRONT DOOR INNER GLASS WEATHERSTRIP (See page ED-58)
3. INSTALL FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY (See page ED-59)
4. INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-59)
5. INSTALL COURTESY LIGHT ASSEMBLY (See page ED-59)
6. INSTALL ASSIST GRIP COVER (See page ED-60)
7. INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-60)
8. INSTALL FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-60)

INSTALLATION

1. **INSTALL POWER WINDOW REGULATOR SWITCH ASSEMBLY**
   (a) Engage the 2 claws and install the power window regulator switch assembly.
2. **INSTALL FRONT DOOR INNER GLASS WEATHERSTRIP (See page ED-58)**
3. **INSTALL FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY (See page ED-59)**
4. **INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-59)**
5. **INSTALL COURTESY LIGHT ASSEMBLY (See page ED-59)**
6. **INSTALL ASSIST GRIP COVER (See page ED-60)**
7. **INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-60)**
8. **INSTALL FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-60)**

SYSTEM DIAGRAM



CALIBRATION

1. SELECT COMPASS DISPLAY MODE

(a) The COMP switch allows you to select the Display or Non-display mode of the compass.

2. SET ZONE

(a) Deviation between the "magnetic north" and "actual north" differs depending on the location. Therefore, adjustment of the magnetism is required. Since the magnetic condition differs depending on the area where the vehicle is used, it is necessary for each user to set the zone (Refer to Compass Zone Map). The zone setting can be changed using the COMP switch of the inner mirror.

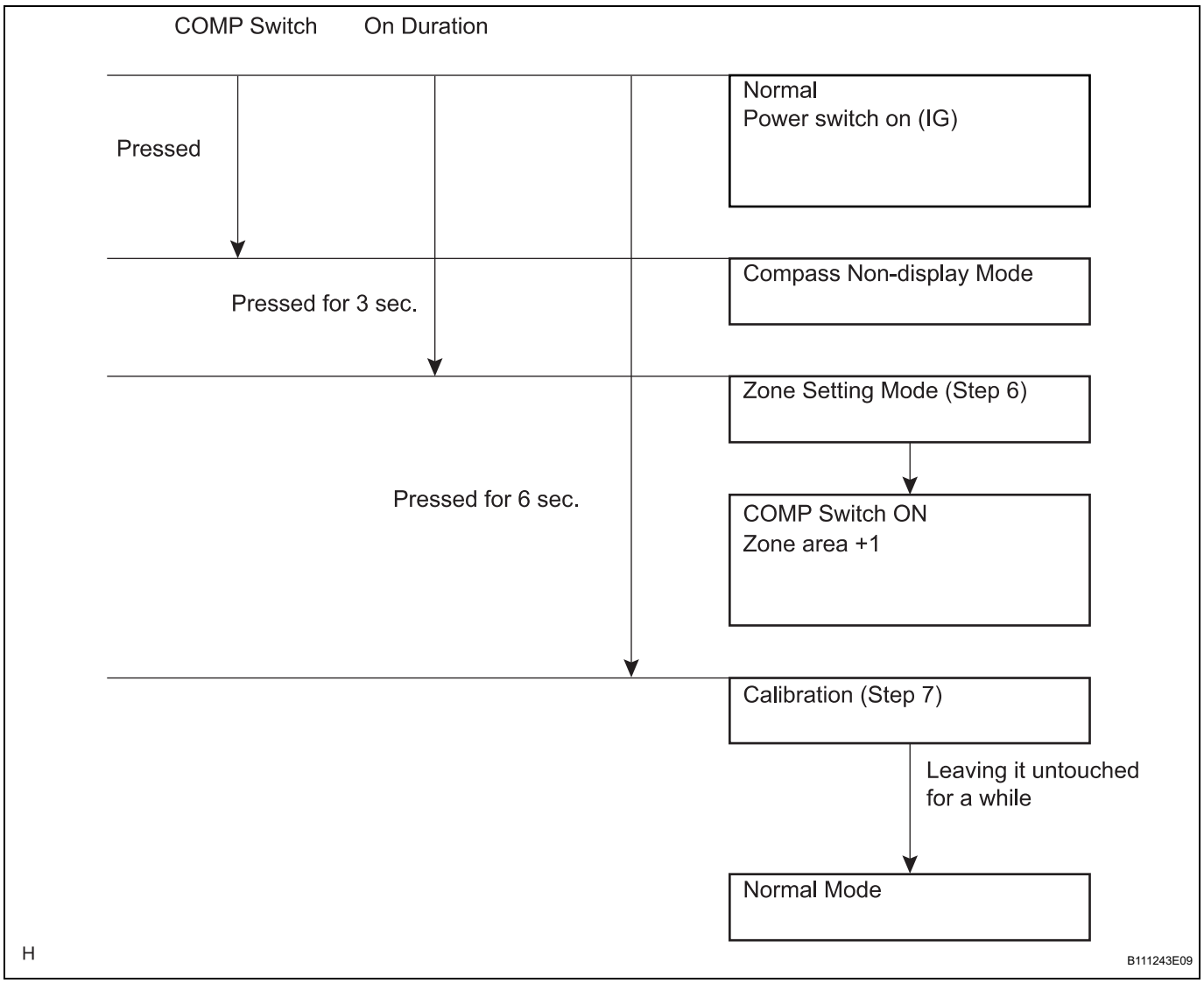
3. PERFORM CALIBRATION

(a) Because each vehicle has its own magnetic field, calibration should be performed for each vehicle. This compass function is used when storing the record of the vehicle's magnetic field.

4. WHEN COMPASS IS MAGNETIZED

(a) A compass could be magnetized during shipping by vessels or freight cars. Therefore, make sure to perform calibration and ensure that calibration is performed properly before delivery. If it cannot be done (cannot be completed in spite of driving around several times), it may be caused by magnetization. Demagnetize the vehicle using a demagnetizer and perform calibration again.

5. SET COMPASS



6. ZONE SETTING MODE

(a) Pressing the COMP switch for 3 seconds in the normal mode will activate the zone setting mode. A number (1 to 15) is displayed on the compass display.

NOTICE:

In the initial state, "8" is displayed.

(b) The displayed number increases by 1 every time the COMP switch is pressed. Referring to the map, check the number for the area where the vehicle will be used and set the zone number.

(c) Leave it untouched for several seconds after setting and check that the compass display shows an azimuthal direction (N, NE, E, SE, S, SW, W or NW) or "C".

7. CALIBRATION SETTING MODE

(a) Pressing the COMP switch for 6 seconds in the normal mode will activate the calibration setting mode.

MI

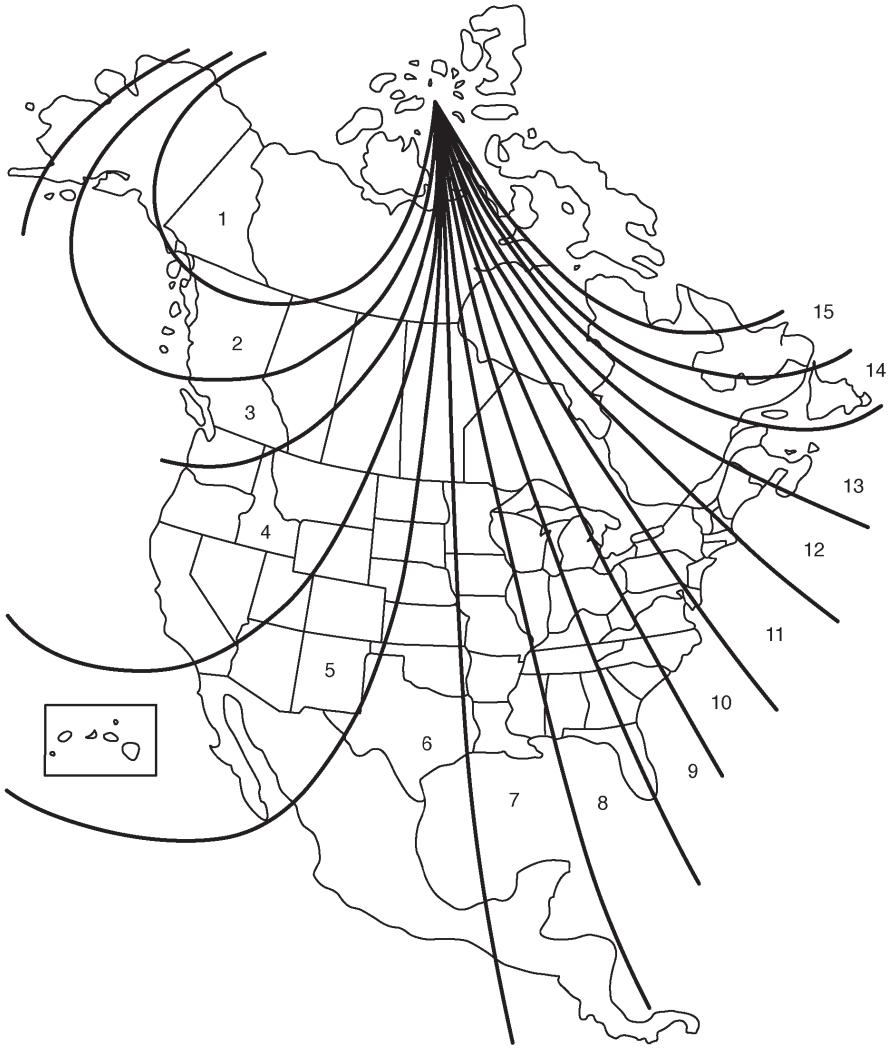
(b) Drive the vehicle at a slow speed of 8 km/h (5 mph) or less in the circular direction.

(c) Driving around the circle 1 to 3 times will display the azimuthal direction on the display, completing the calibration.

NOTICE:

After the calibration is completed, it is not necessary to perform the above procedures unless the magnetic field strength is drastically changed. If this happens, the azimuthal display will be changed to "C".

Zone Setting Map:



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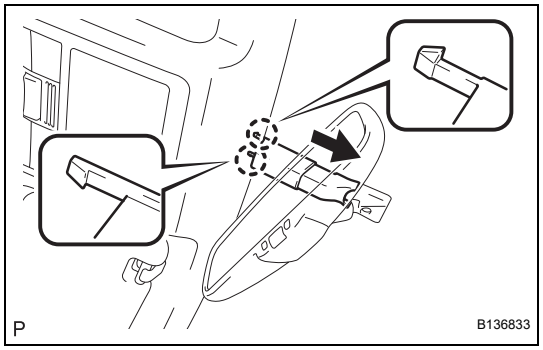
PROBLEM SYMPTOMS TABLE

AUTOMATIC GLARE-RESISTANT EC MIRROR

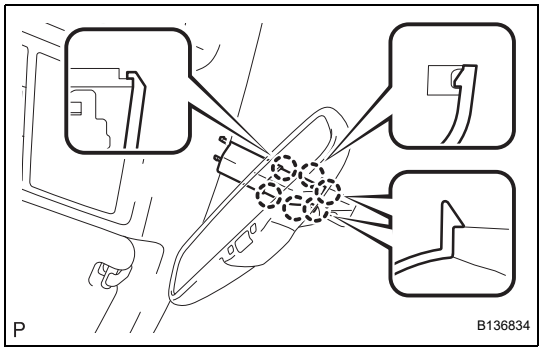
Symptom	Suspected Area	See page
Auto glare-resistant EC mirror does not operate	1. ECU-IG No. 1 fuse	-
	2. Inner rear view mirror	MI-11
	3. Wire harness	-

REMOVAL

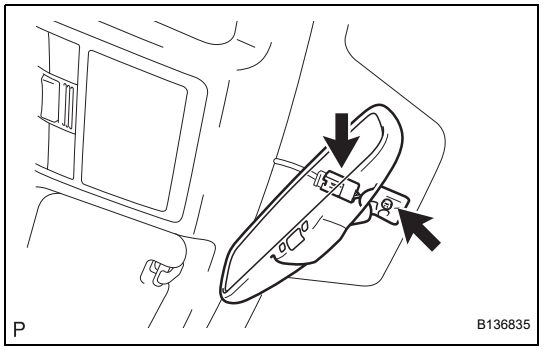


1. REMOVE INNER REAR VIEW MIRROR STAY HOLDER COVER

(a) Disengage the 2 claws and slide the inner rear view mirror stay holder cover as shown in the illustration.



(b) Disengage the 6 claws and remove the inner rear view mirror stay holder cover.

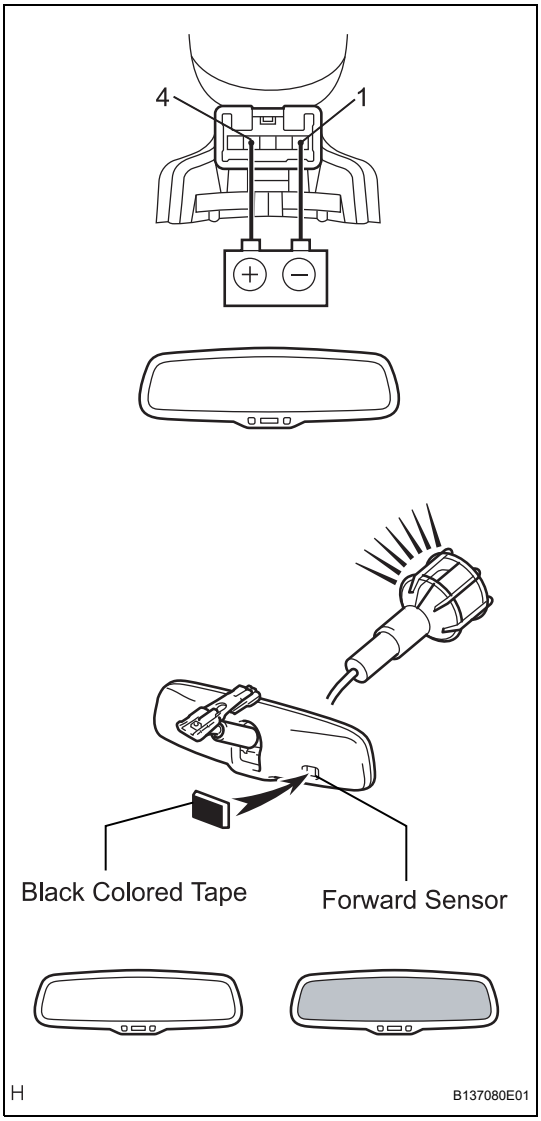


2. REMOVE INNER REAR VIEW MIRROR ASSEMBLY

(a) Disconnect the connector.

(b) Using a "TORX" socket wrench (T20), remove the screw and the inner rear view mirror.

MI



INSPECTION

1. INSPECT INNER REAR VIEW MIRROR ASSEMBLY

(a) Inspect operation of the electrochromic inner mirror.

(1) Connect the positive (+) lead from the battery to terminal 4 and the negative (-) lead to terminal 1.

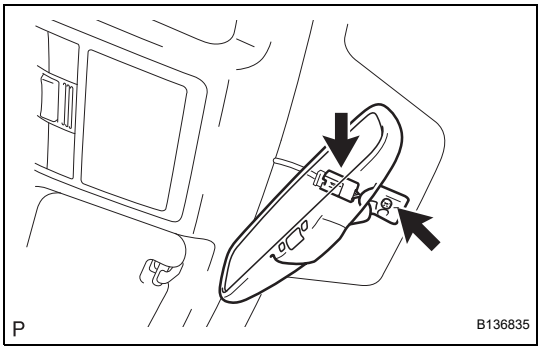
(2) Attach black colored tape to the forward sensor to prevent it from sensing.

(3) Light up the mirror with an electric light, and check that the mirror surface changes from bright to dark.

Standard:

Mirror surface changes from bright to dark.

If the result is not as specified, replace the mirror assembly.



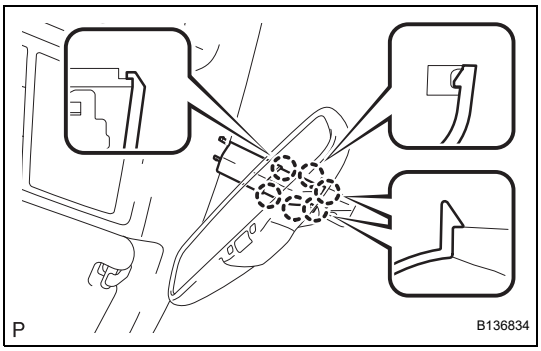
INSTALLATION

1. INSTALL INNER REAR VIEW MIRROR ASSEMBLY

(a) Using a "TORX" socket wrench (T20), install the inner rear view mirror with the screw.

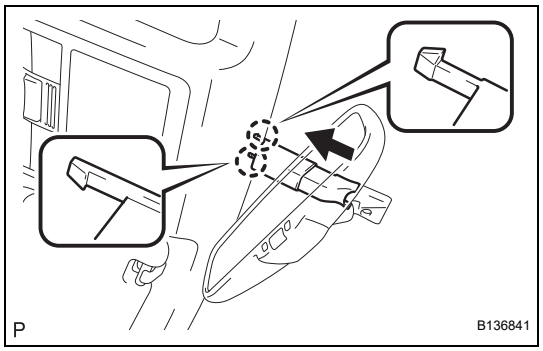
Torque: 1.8 N*m (18 kgf*cm, 16 in.*lbf)

(b) Connect the connector.



2. INSTALL INNER REAR VIEW MIRROR STAY HOLDER COVER

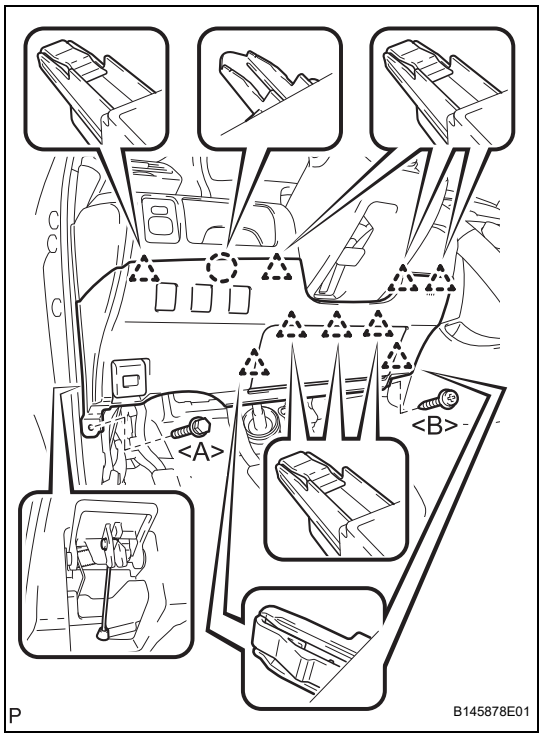
(a) Engage the 6 claws and install the inner rear view mirror stay holder cover.



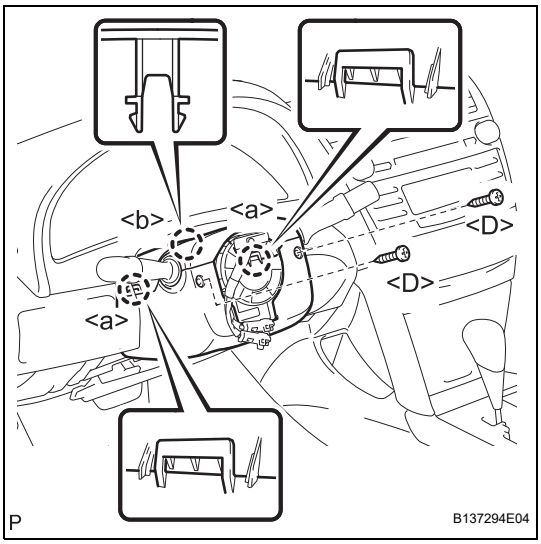
(b) Engage the 2 claws and install the inner rear view mirror stay holder cover as shown in the illustration.

REMOVAL

1. **PRECAUTION**
   (See page IP-1)
2. **ALIGN FRONT WHEELS FACING STRAIGHT AHEAD**
3. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See page RS-1).
4. **REMOVE LOWER NO. 3 STEERING WHEEL COVER (See page RS-345)**
5. **REMOVE LOWER NO. 2 STEERING WHEEL COVER (See page RS-345)**
6. **REMOVE STEERING PAD (See page RS-345)**
7. **REMOVE STEERING WHEEL ASSEMBLY (See page SR-36)**
8. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-13)**
9. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-14)**
10. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH**
    (a) Remove the bolt <A> and the screw <B>.
    (b) Disconnect the hood lock control cable assembly.
    (c) Disengage the claw and the 9 clips.
    (d) Remove the air hose, disconnect each connector, and then remove the lower instrument panel finish panel LH.



IP



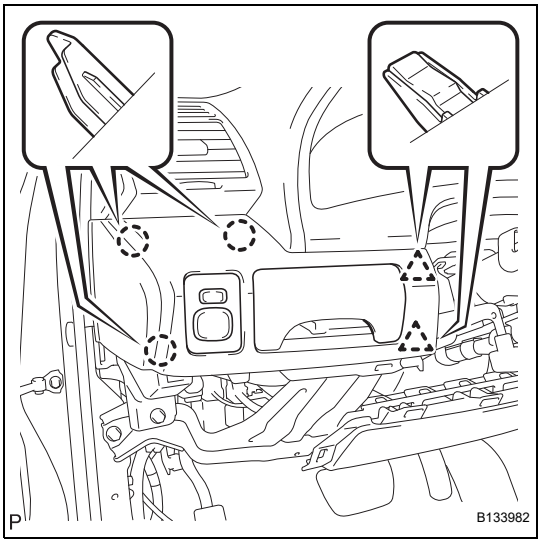
11. REMOVE STEERING COLUMN COVER

(a) Remove the 2 screws <D>.

(b) Disengage the 2 claws <a> and remove the lower steering column cover.

(c) Disengage the claw <b> and remove the upper steering column cover.

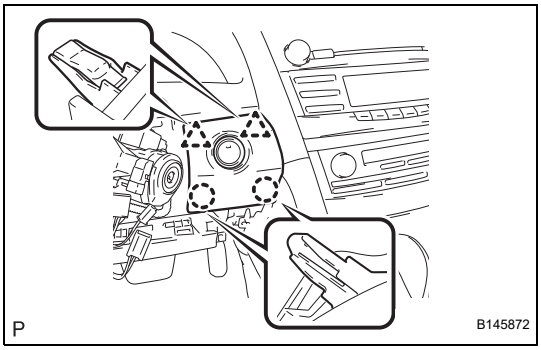
12. REMOVE TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY (See page SR-37)



13. REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY

(a) Disengage the 3 claws and the 2 clips.

(b) Disconnect the connector and remove the instrument panel sub-assembly.

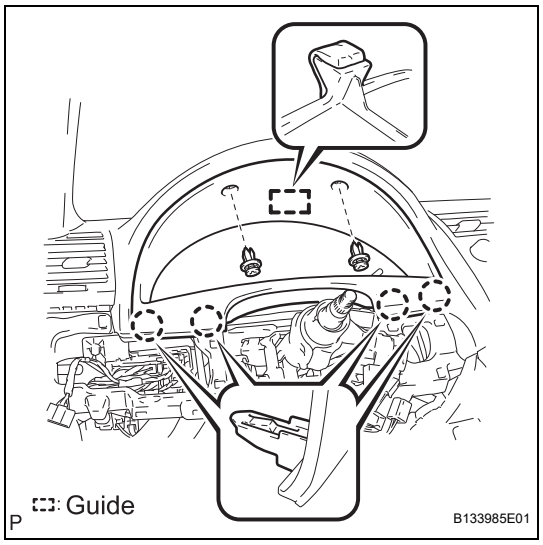


14. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL

(a) Disengage the 2 claws and 2 clips.

(b) Disconnect the connector and remove the lower instrument panel finish panel.

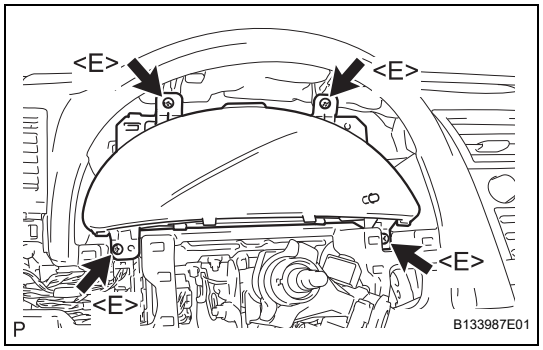
IP



15. REMOVE INSTRUMENT CLUSTER FINISH PANEL

(a) Remove the 2 clips.

(b) Disengage the guide and 4 claws, and then remove the instrument cluster finish panel.



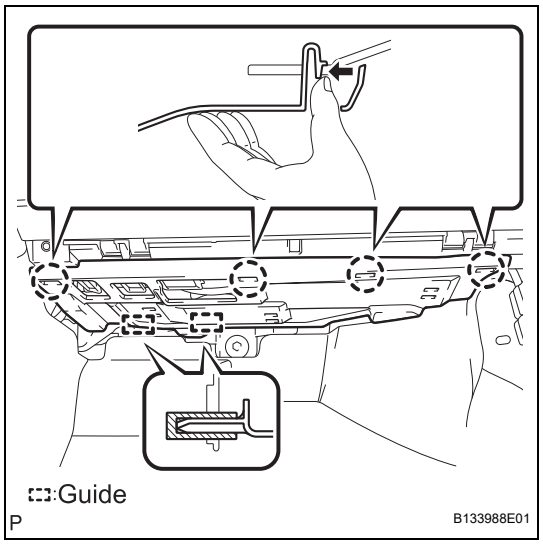
16. REMOVE COMBINATION METER ASSEMBLY

(a) Remove the 4 screws <E>.

(b) Disengage each connector and remove the combination meter assembly.

17. REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-15)

18. REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-15)

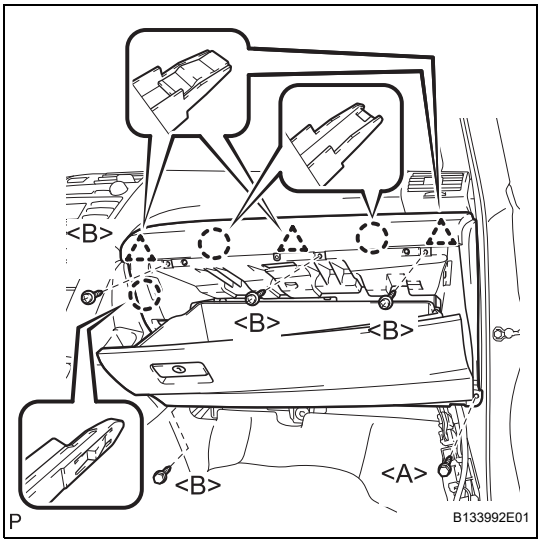


19. REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY

(a) Disengage the 4 claws.

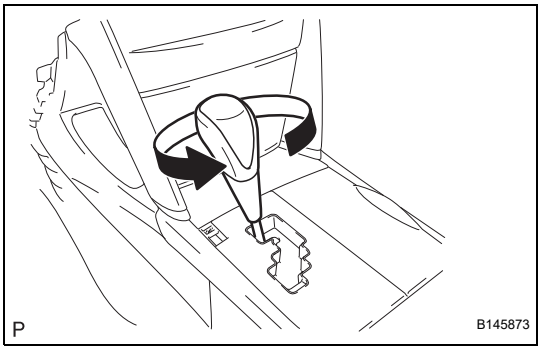
(b) Disengage the 2 guides and remove the No. 2 under cover sub-assembly.

IP



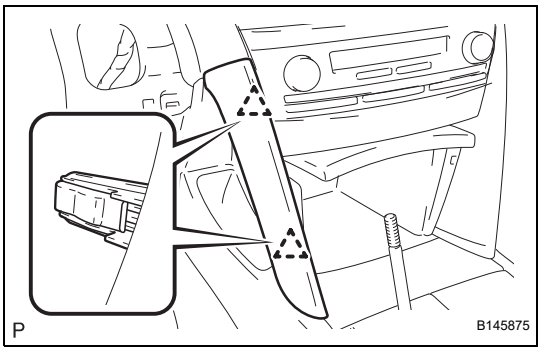
20. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY

(a) Remove the bolt <A>.
(b) Remove the 4 screws <B>.
(c) Disengage the 3 claws and the 3 clips.
(d) Disconnect the connector and remove the lower instrument panel sub-assembly.



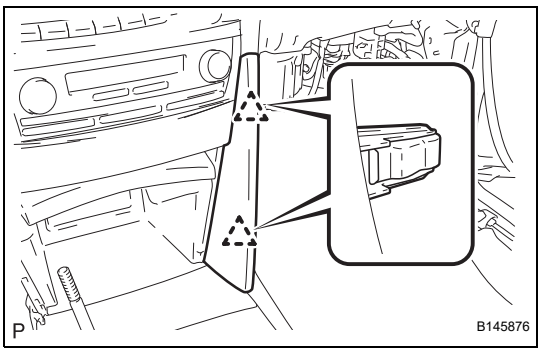
21. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY

(a) Turn the shift lever knob counterclockwise and remove the shift lever knob sub-assembly.



22. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH

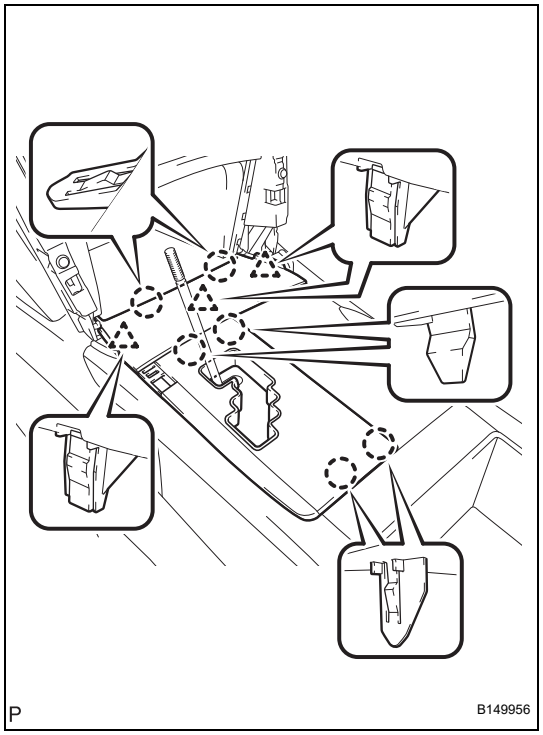
(a) Disengage the 2 clips and remove the No. 1 instrument cluster finish panel garnish.



23. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH

(a) Disengage the 2 clips and remove the No. 2 instrument cluster finish panel garnish.

IP

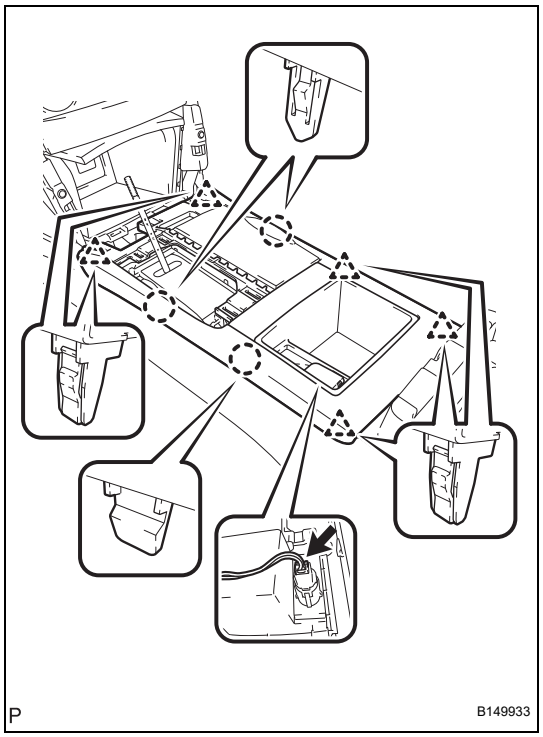


24. REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY

(a) Disengage the 6 claws and the 3 clips, and then remove the floor shift position indicator housing sub-assembly.

(b) with Seat Heater System:

(1) Disconnect each connector.

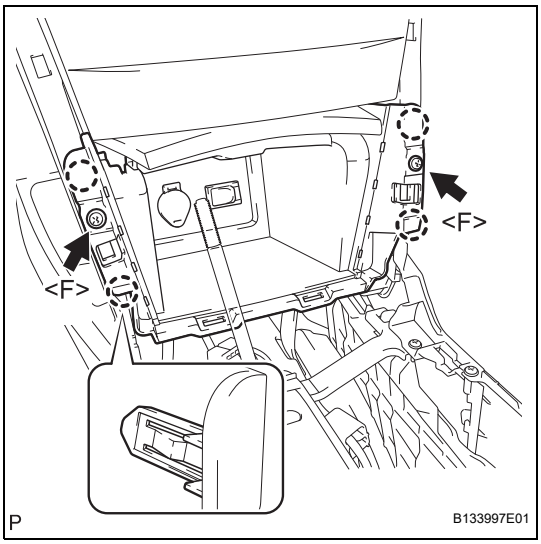


25. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY

(a) Disengage the 3 claws and the 5 clips.

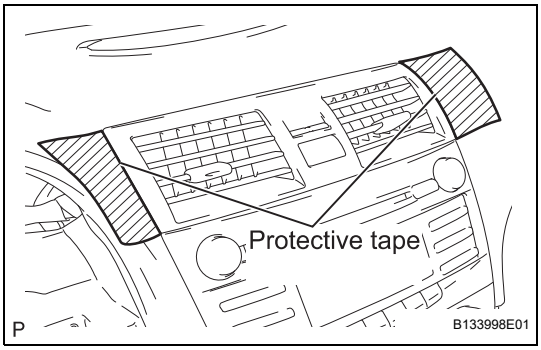
(b) Disconnect the connector and remove the upper console rear panel sub-assembly.

IP



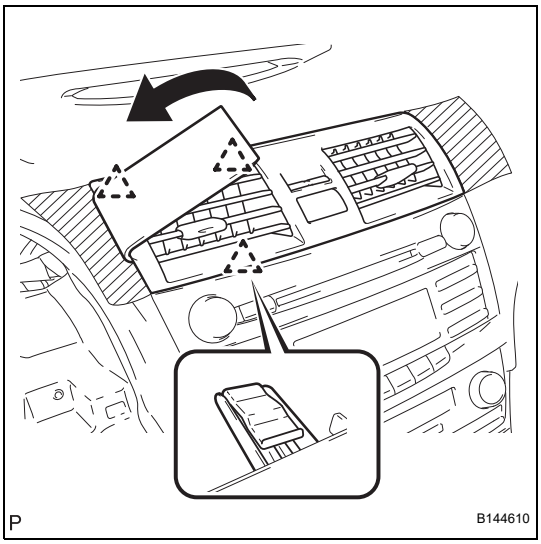
26. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY

(a) Remove the 2 screws <F>.
(b) Disengage the 4 claws.
(c) Disconnect each connector and remove the upper console panel sub-assembly.



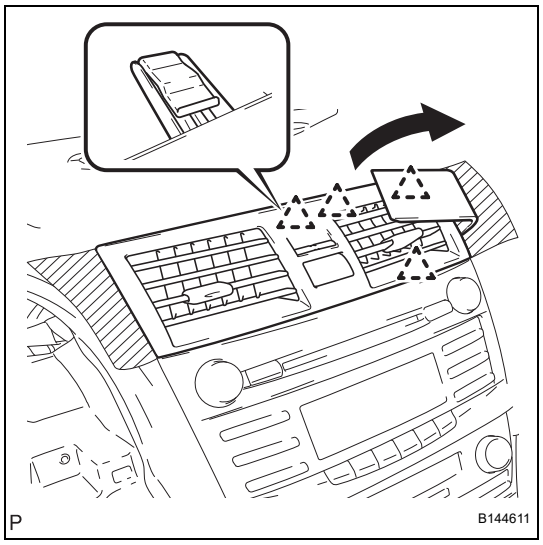
27. REMOVE INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY

(a) Apply protective tape to the areas shown in the illustration.



(b) Using a moulding remover, disengage the 3 clips.

IP

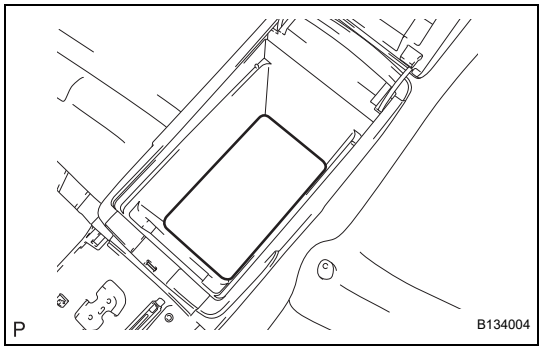


(c) Using a moulding remover, disengage the 4 clips.
(d) Disconnect the connector and remove the instrument panel No. 2 register assembly.

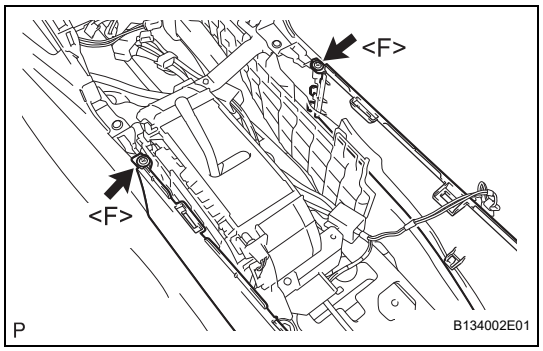
28. REMOVE RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-136)

29. REMOVE NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/ Navigation System) (See page NS-193)

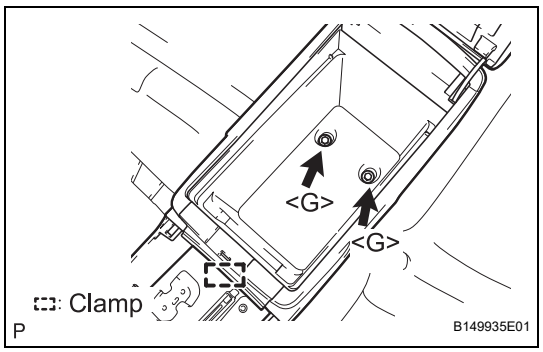
30. REMOVE CONSOLE BOX POCKET
(a) Remove the console box pocket.



31. REMOVE CONSOLE BOX CARPET
(a) Remove the console box carpet.

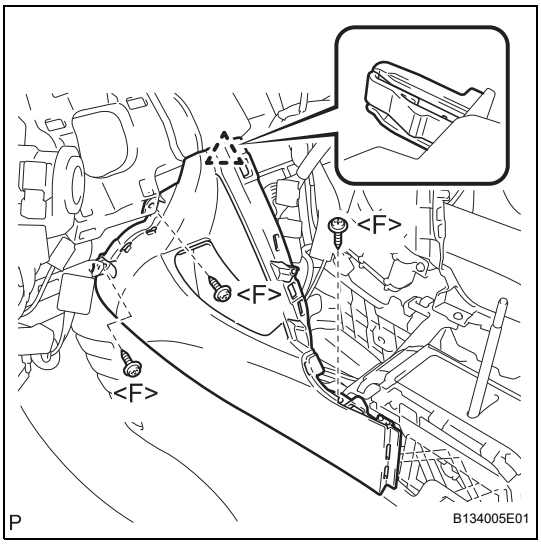


32. REMOVE CONSOLE BOX ASSEMBLY
(a) Remove the 2 screws <F>.



(b) Disengage the clamp.
(c) Remove the 2 bolts <G> and the console box assembly.

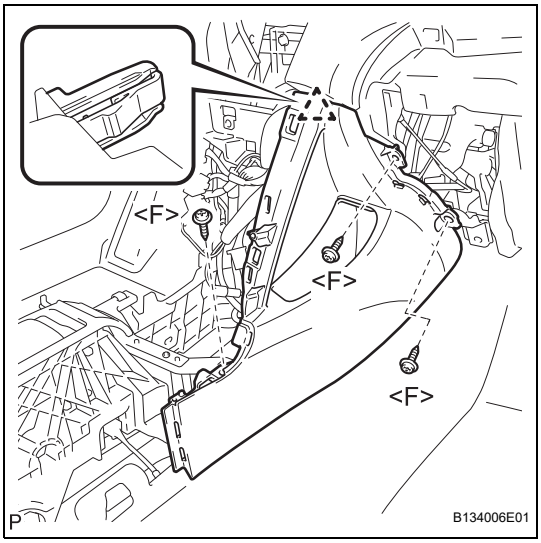
IP



33. REMOVE NO. 2 CONSOLE BOX INSERT FRONT

(a) Remove the 3 screws <F>.

(b) Disengage the clip and remove the No. 2 console box insert front.

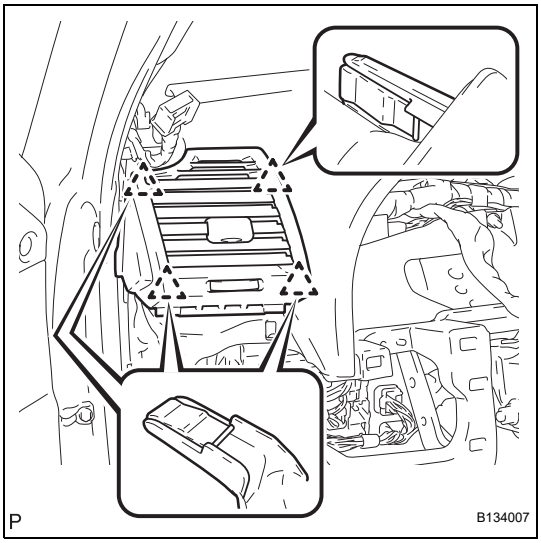


34. REMOVE NO. 1 CONSOLE BOX INSERT FRONT

(a) Remove the 3 screws <F>.

(b) Disengage the clip and remove the No. 1 console box insert front.

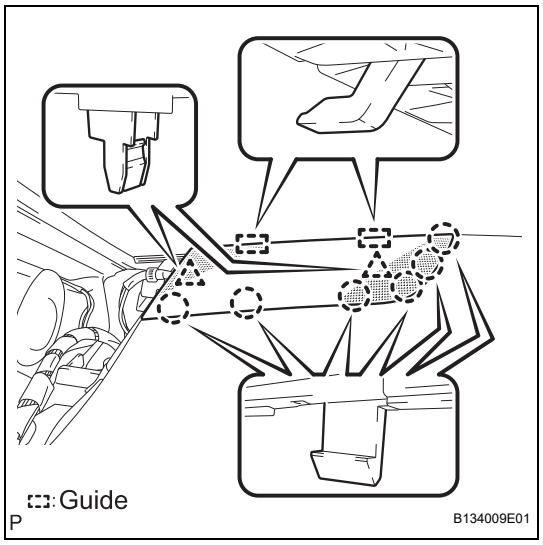
35. REMOVE FRONT PILLAR GARNISH LH (See page IR-16)



36. REMOVE INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY

(a) Disengage the 4 clips and remove the instrument panel No. 1 register assembly.

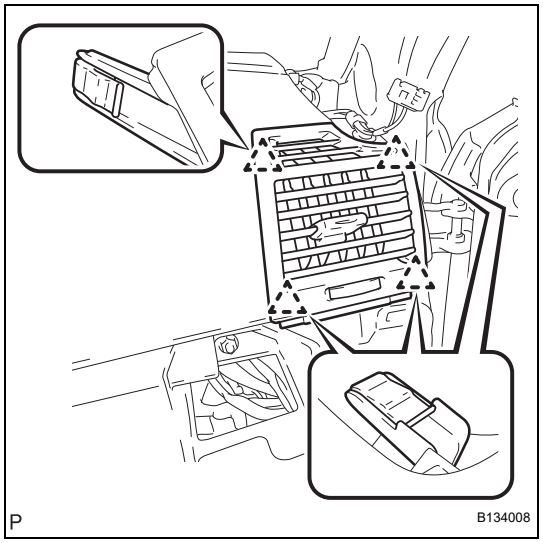
IP



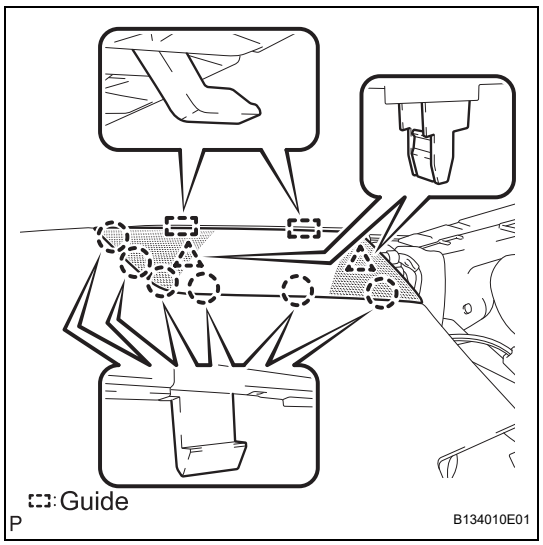
37. **REMOVE INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY**
    (a) Disengage the 6 claws and the 2 clips.
    (b) Disengage the 2 guides and remove the instrument panel No. 1 speaker panel sub-assembly.

38. **REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-146)**

39. **REMOVE FRONT PILLAR GARNISH RH (See page IR-16)**



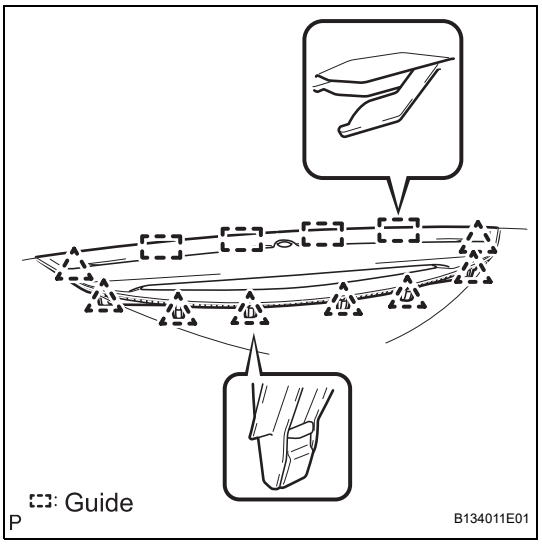
40. **REMOVE INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY**
    (a) Disengage the 4 clips and remove the instrument panel No. 3 register assembly.



41. **REMOVE INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY**
    (a) Disengage the 6 claws and the 2 clips.
    (b) Disengage the 2 guides and remove the instrument panel No. 2 speaker panel sub-assembly.

42. **REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side)**
    HINT:
    Use the same procedures described for the LH side (See page AV-146).

IP



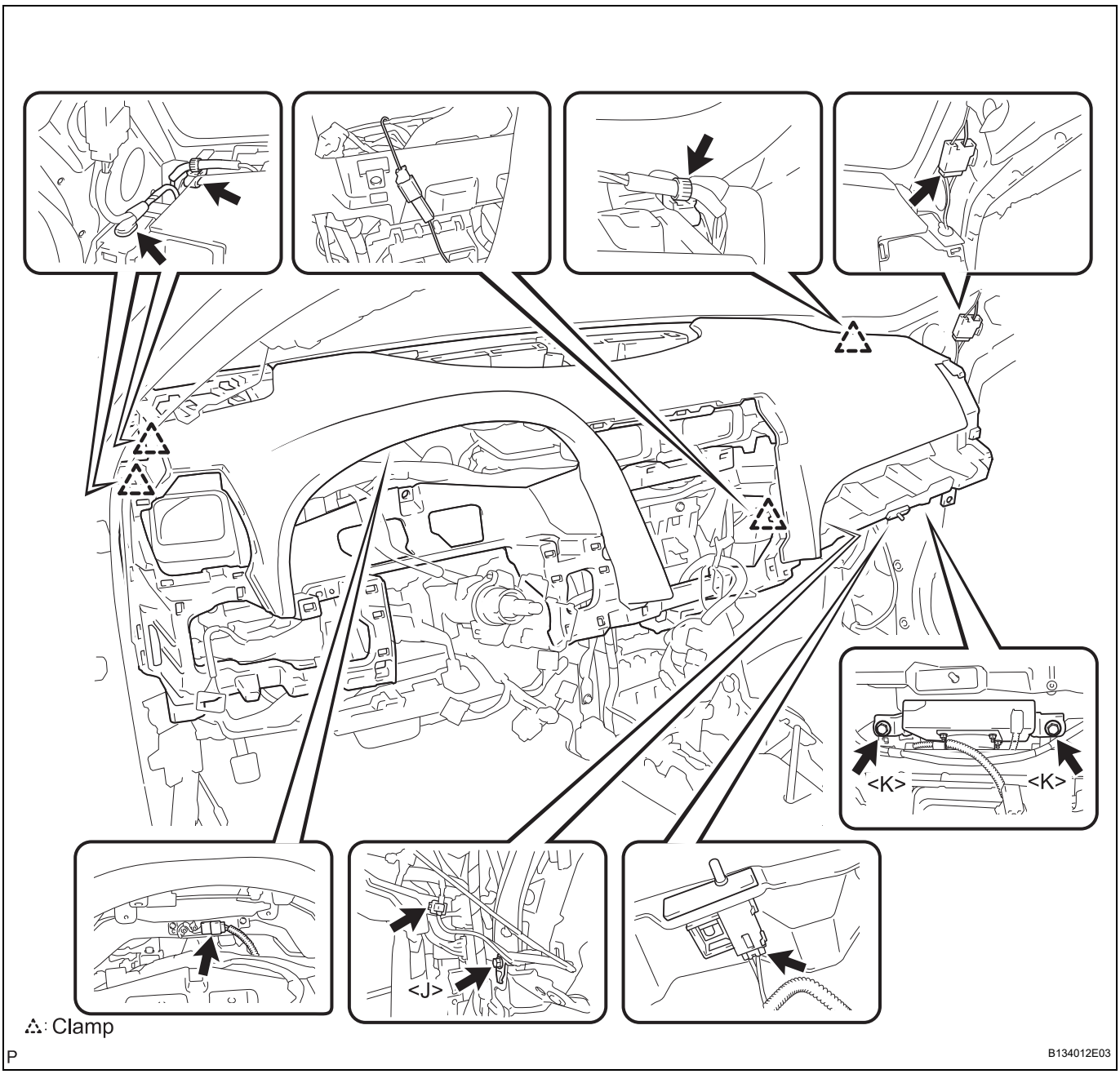
43. REMOVE NO. 1 DEFROSTER NOZZLE GARNISH

(a) Disengage the 8 clips and the 4 guides.
(b) Disconnect each connector and remove the No. 1 defroster nozzle garnish.

44. DISCONNECT INSTRUMENT PANEL WIRE ASSEMBLY (See page RS-381)

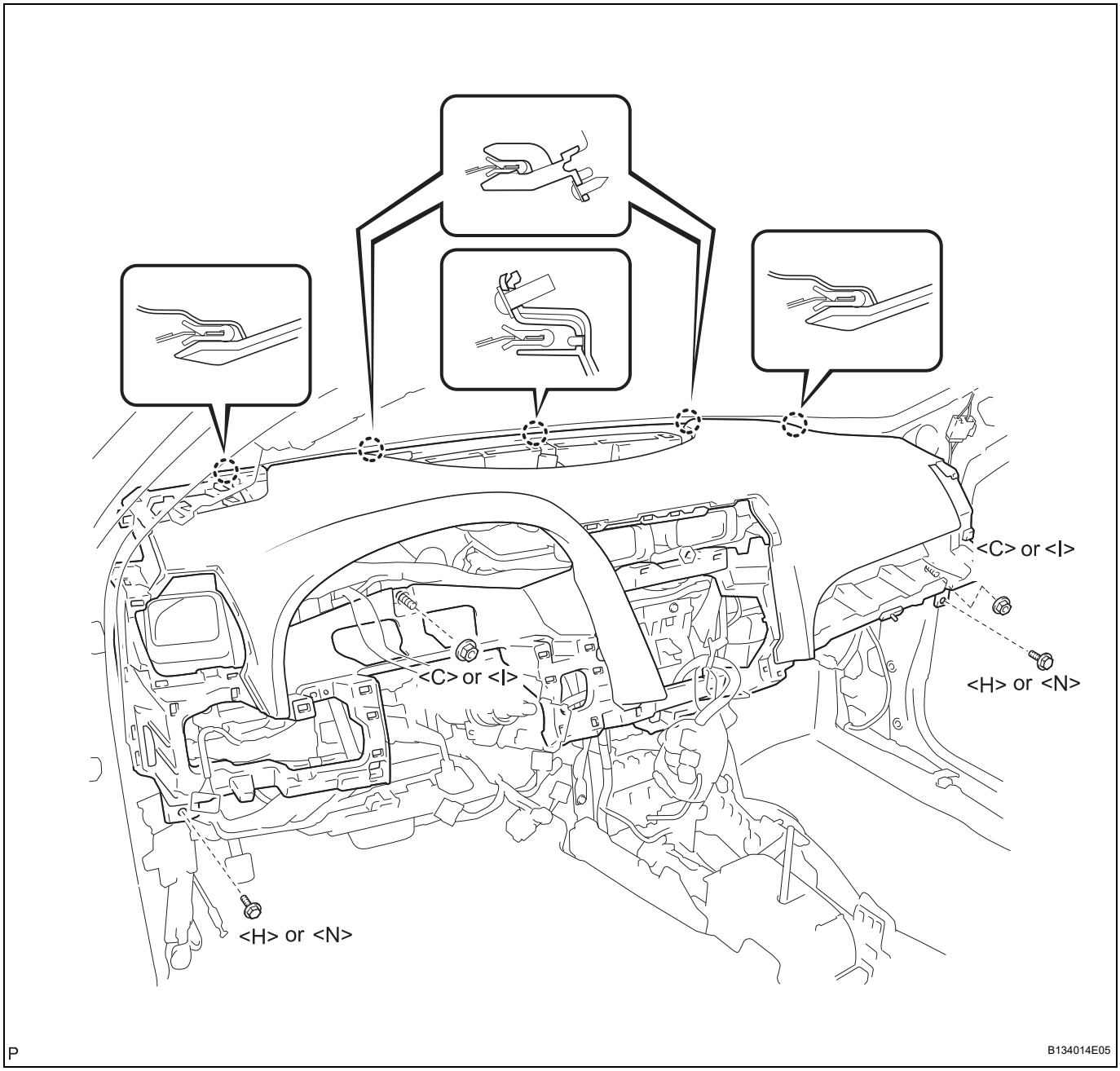
45. REMOVE INSTRUMENT PANEL SAFETY PAD ASSEMBLY

(a) Disengage each clamp.
(b) Disconnect each connector.
(c) Remove the bolt <J>.
(d) Remove the 2 passenger airbag bolts <K>.



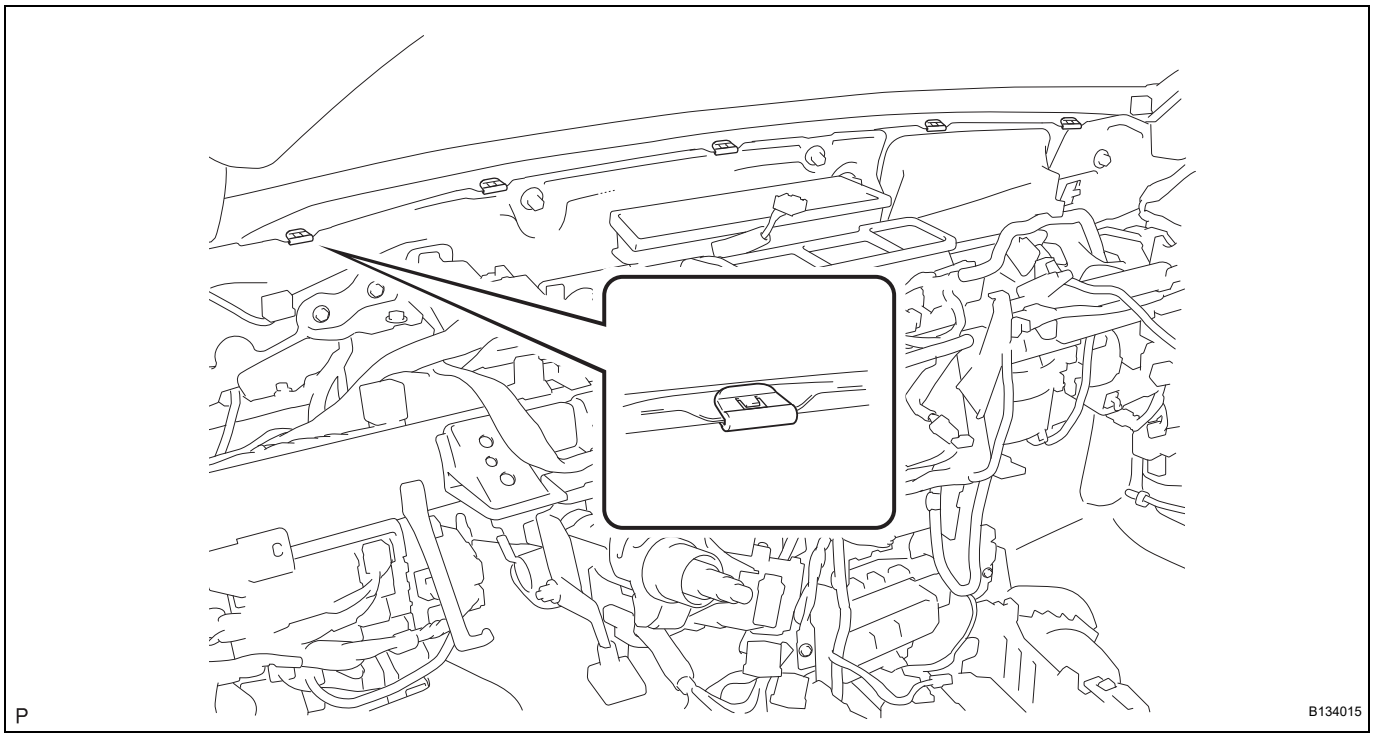
IP

(e) Remove the 2 bolts <H> or <N>.
(f) Remove the 2 nuts <C> or <I>.
(g) Disengage the 5 claws and remove the instrument panel safety pad assembly.



46. REMOVE NO. 3 INSTRUMENT PANEL STAY

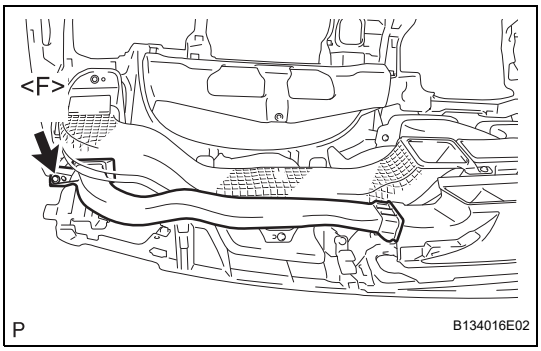
(a) Disengage the 5 claws and remove the 5 No. 3 instrument panel stays.



DISASSEMBLY

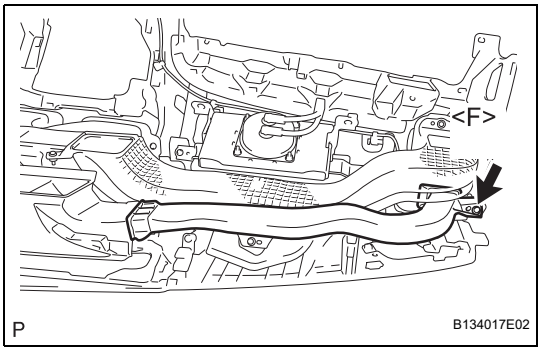
1. REMOVE SIDE NO. 1 DEFROSTER NOZZLE DUCT

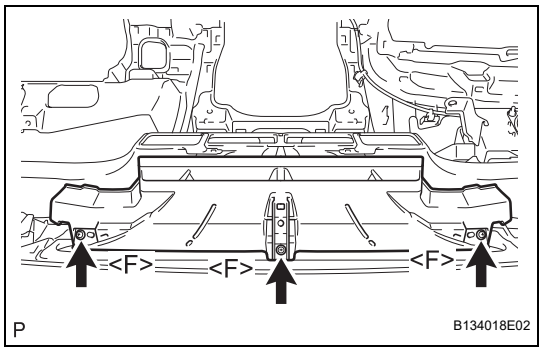
(a) Remove the screw <F> and the side No. 1 defroster nozzle duct.



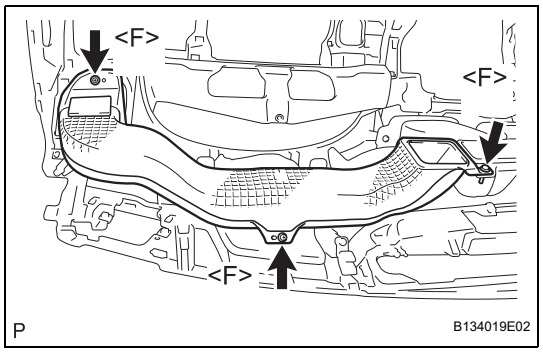
2. REMOVE SIDE NO. 2 DEFROSTER NOZZLE DUCT

(a) Remove the screw <F> and the side No. 2 defroster nozzle duct.

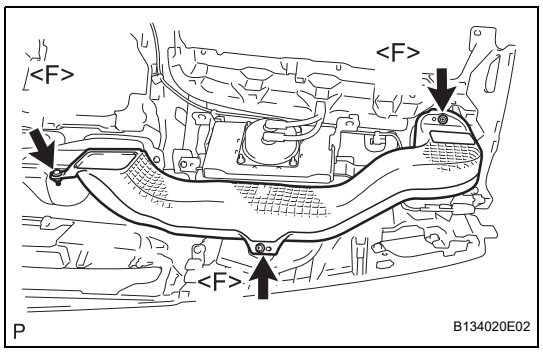




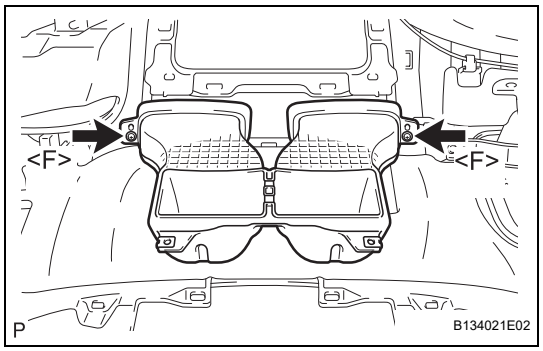
3. **REMOVE DEFROSTER NOZZLE ASSEMBLY**
   (a) Remove the 3 screws <F> and the defroster nozzle assembly.



4. **REMOVE NO. 1 HEATER TO REGISTER DUCT**
   (a) Remove the 3 screws <F> and the No. 1 heater to register duct.



5. **REMOVE NO. 3 HEATER TO REGISTER DUCT**
   (a) Remove the 3 screws <F> and the No. 3 heater to register duct.

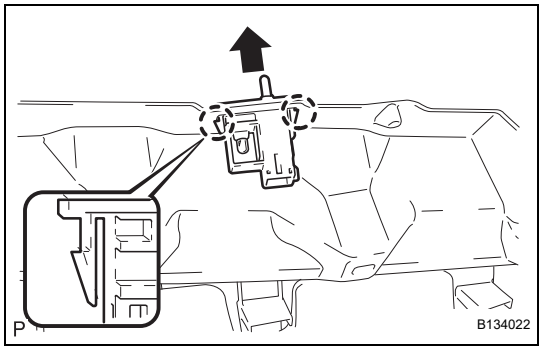


6. **REMOVE NO. 2 HEATER TO REGISTER DUCT**
   (a) Remove the 2 screws <F> and the No. 2 heater to register duct.

7. **REMOVE NO. 2 ANTENNA CORD SUB-ASSEMBLY (See page AV-173)**

8. **REMOVE NAVIGATION ANTENNA ASSEMBLY (See page NS-204)**

9. **REMOVE FRONT PASSENGER AIRBAG ASSEMBLY (See page RS-381)**



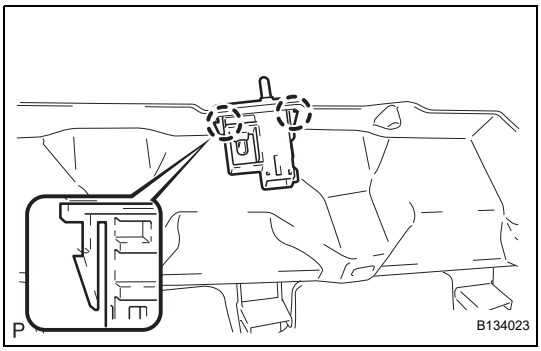
10. **REMOVE GLOVE BOX LIGHT ASSEMBLY**
    (a) Disengage the 2 claws and remove the glove box light assembly.

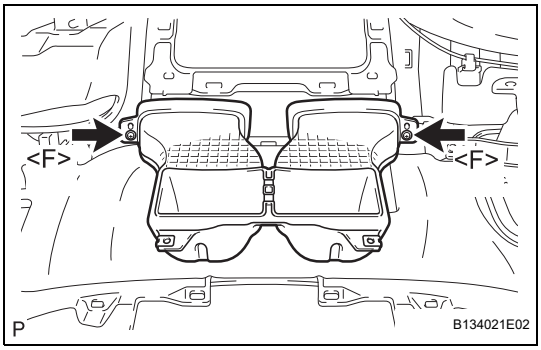
11. **REMOVE PLASMACLUSTER (See page AC-279)**

IP

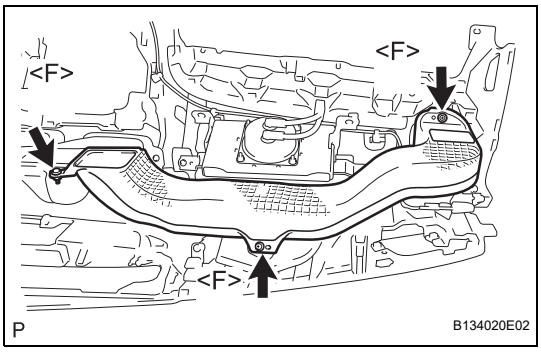
REASSEMBLY

1. **INSTALL PLASMACLUSTER (See page AC-280)**
2. **INSTALL GLOVE BOX LIGHT ASSEMBLY**
   (a) Engage the 2 claws and install the glove box light assembly.
3. **INSTALL FRONT PASSENGER AIRBAG ASSEMBLY (See page RS-383)**
4. **INSTALL NAVIGATION ANTENNA ASSEMBLY (See page NS-204)**
5. **INSTALL NO. 2 ANTENNA CORD SUB-ASSEMBLY (See page AV-185)**
6. **INSTALL NO. 2 HEATER TO REGISTER DUCT**
   (a) Install the No. 2 heater to register duct with the 2 screws <F>.

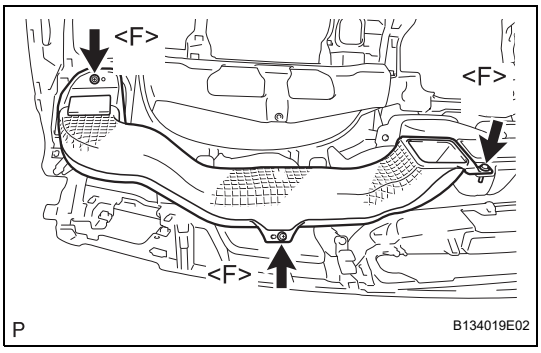




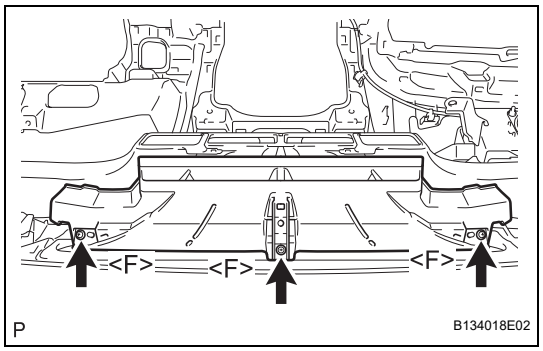
7. **INSTALL NO. 3 HEATER TO REGISTER DUCT**
   (a) Install the No. 3 heater to register duct with the 3 screws <F>.



8. **INSTALL NO. 1 HEATER TO REGISTER DUCT**
   (a) Install the No. 1 heater to register duct with the 3 screws <F>.

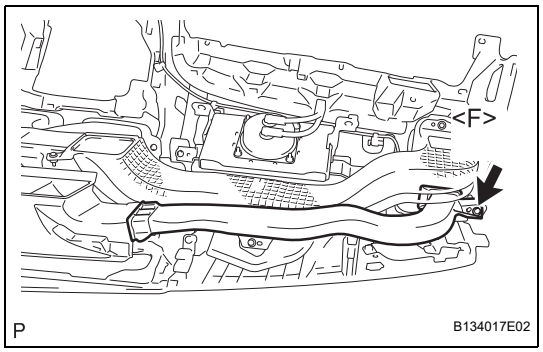


IP



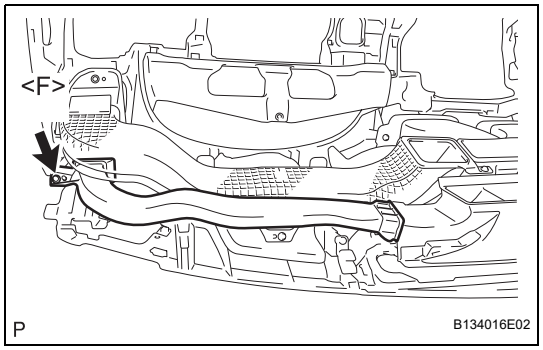
9. INSTALL DEFROSTER NOZZLE ASSEMBLY

(a) Install the defroster nozzle assembly with the 3 screws <F>.



10. INSTALL SIDE NO. 2 DEFROSTER NOZZLE DUCT

(a) Install the side No. 2 defroster nozzle duct with the screw <F>.



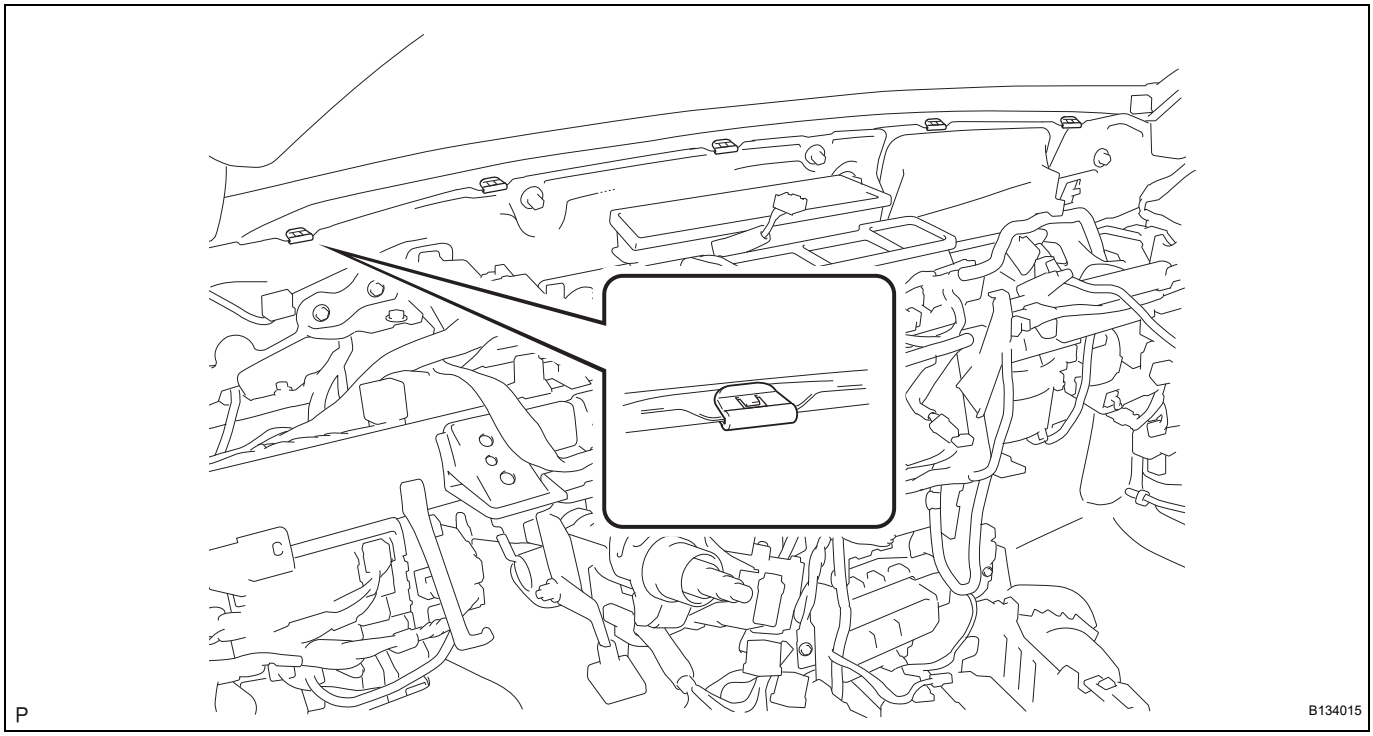
11. INSTALL SIDE NO. 1 DEFROSTER NOZZLE DUCT

(a) Install the side No. 1 defroster nozzle duct with the screw <F>.

INSTALLATION

1. INSTALL NO. 3 INSTRUMENT PANEL STAY

(a) Engage the 5 claws and install the 5 No. 3 instrument panel stays.

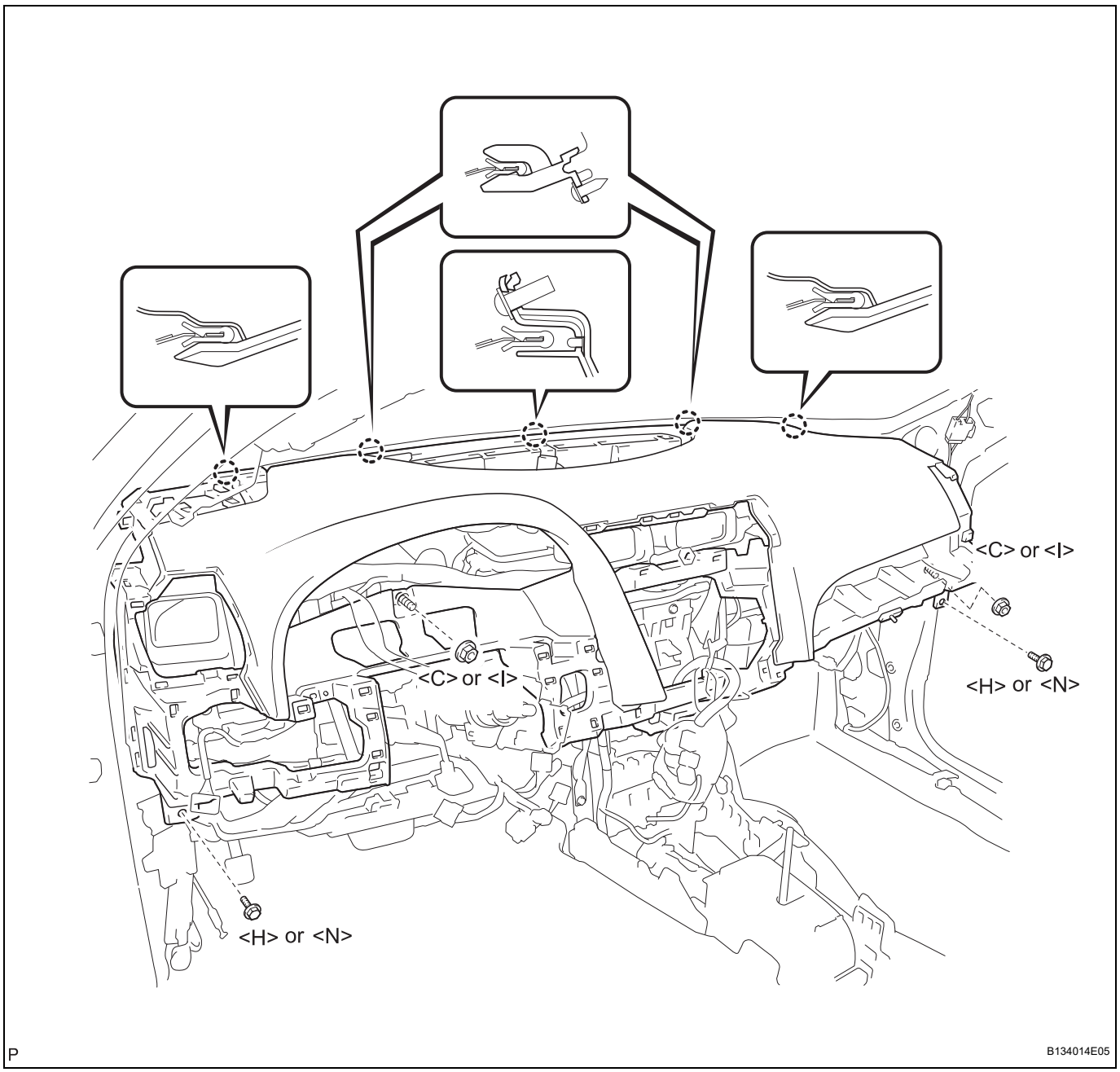


2. INSTALL INSTRUMENT PANEL SAFETY PAD ASSEMBLY

(a) Engage the 5 claws.

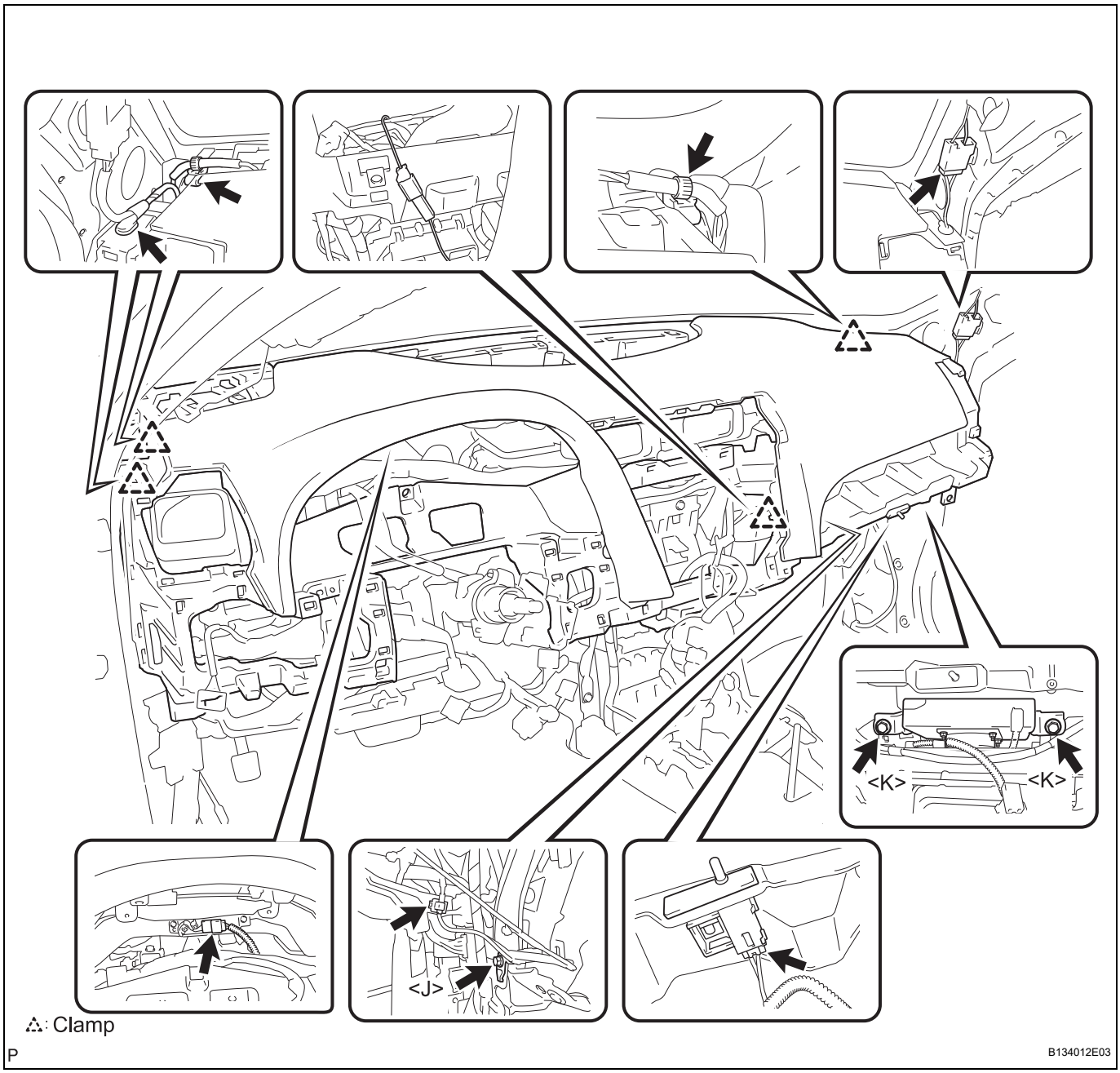
NOTICE:
Do not allow the wire harness to get caught in the claws.

(b) Install the 2 bolts <H> or <N> and 2 nuts <C> or <I>.

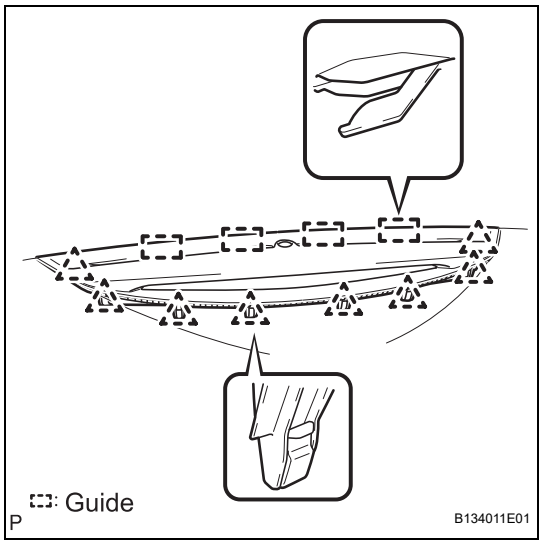


(c) Engage each clamp.
(d) Install the bolt <J>.
Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf)
(e) Install the 2 passenger airbag bolts <K>.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)

(f) Connect each connector and install the instrument panel safety pad assembly.

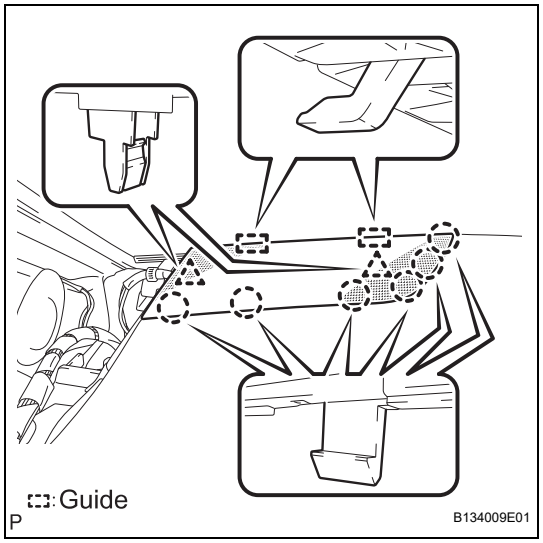


3. CONNECT INSTRUMENT PANEL WIRE ASSEMBLY (See page RS-383)

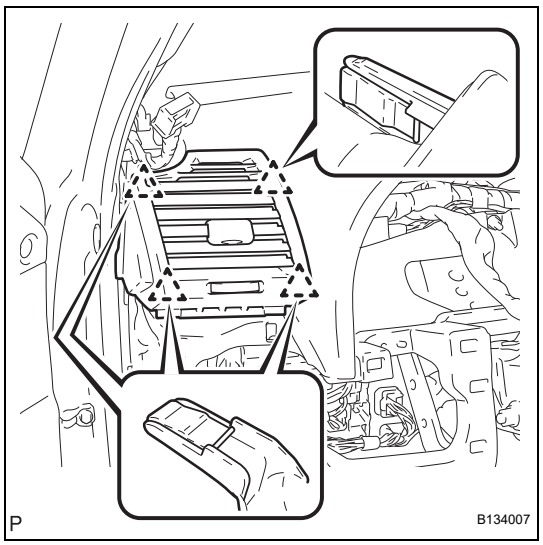


4. **INSTALL NO. 1 DEFROSTER NOZZLE GARNISH**
   (a) Connect each connector.
   (b) Engage the 4 guides.
   (c) Engage the 8 clips and install the No. 1 defroster nozzle garnish.

5. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-146)**



6. **INSTALL INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY**
   (a) Engage the 2 guides.
   (b) Engage the 6 claws and the 2 clips to install the instrument panel No. 1 speaker panel sub-assembly.

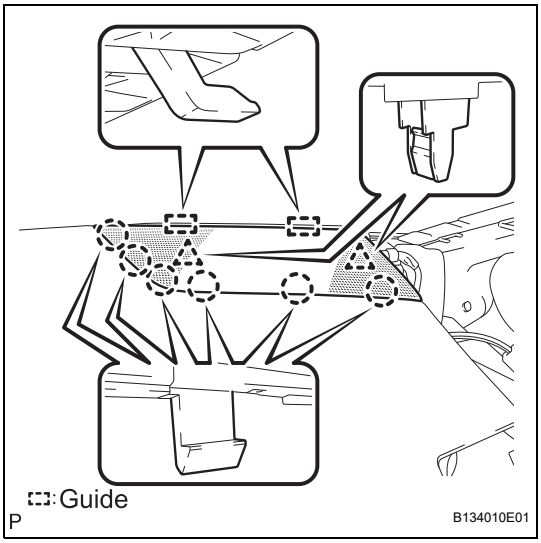


7. **INSTALL INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY**
   (a) Engage the 4 clips and install the instrument panel No. 1 register assembly.

8. **INSTALL FRONT PILLAR GARNISH LH (See page IR-38)**

9. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side)**
   HINT:
   Use the same procedures described for the LH side (See page AV-146).

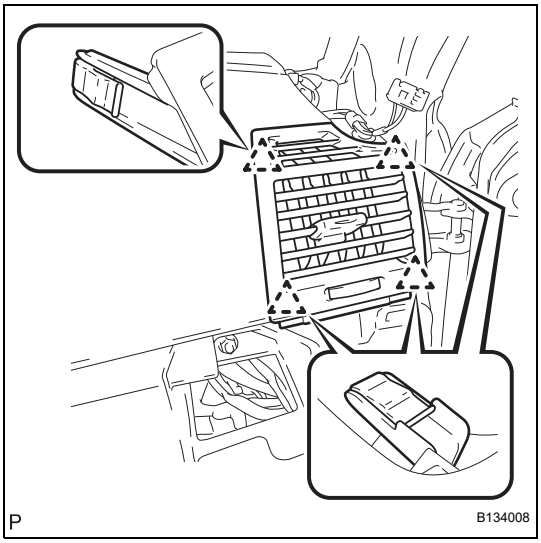
IP



10. INSTALL INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY

(a) Engage the 2 guides.

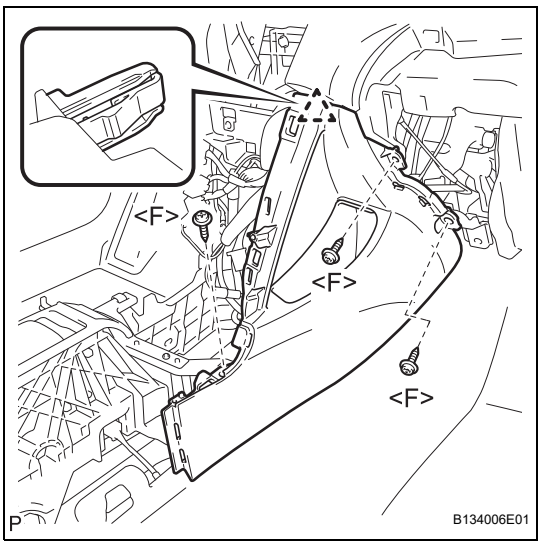
(b) Engage the 6 claws and the 2 clips to install the instrument panel No. 2 speaker panel sub-assembly.



11. INSTALL INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY

(a) Engage the 4 clips and install the instrument panel No. 3 register assembly.

12. INSTALL FRONT PILLAR GARNISH RH (See page IR-39)

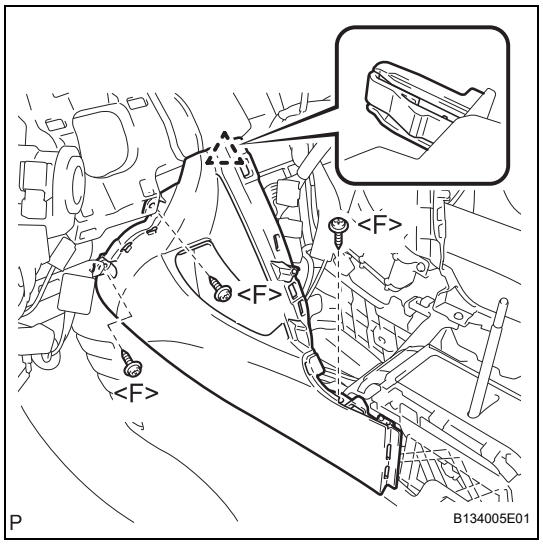


13. INSTALL NO. 1 CONSOLE BOX INSERT FRONT

(a) Engage the clip.

(b) Install the No. 1 console box insert front with the 3 screws <F>.

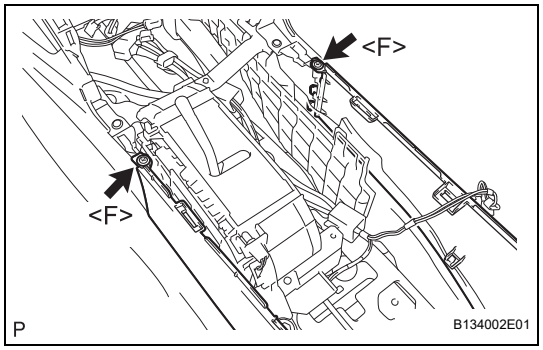
IP



14. INSTALL NO. 2 CONSOLE BOX INSERT FRONT

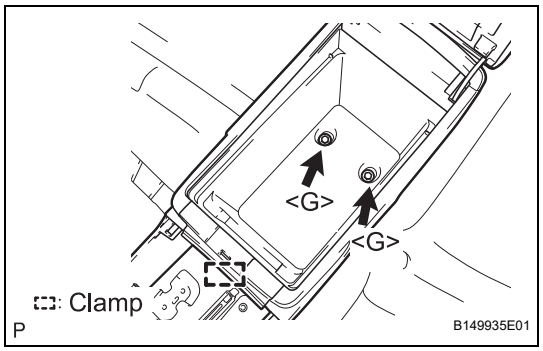
(a) Engage the clip.

(b) Install the No. 2 console box insert front with the 3 screws <F>.



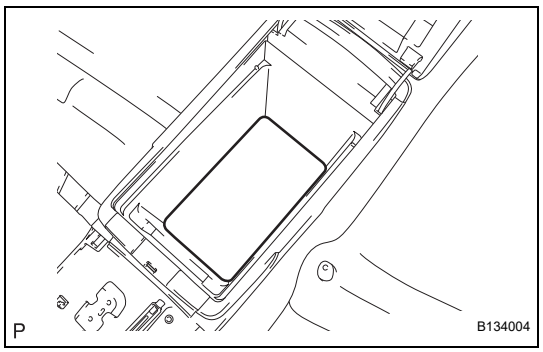
15. INSTALL CONSOLE BOX ASSEMBLY

(a) Install the 2 screws <F>.



(b) Install the console box assembly with the 2 bolts <G>.

(c) Engage the clamp.



16. INSTALL CONSOLE BOX CARPET

(a) Install the console box carpet.

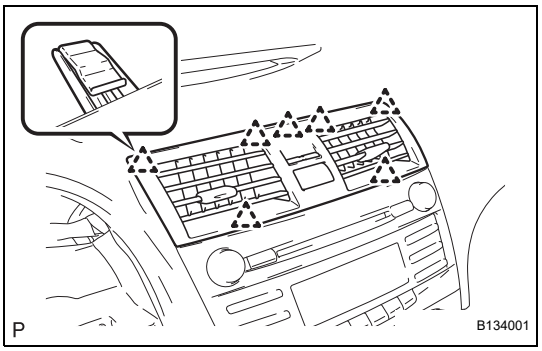
17. INSTALL CONSOLE BOX POCKET

(a) Install the console box pocket.

18. INSTALL RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-137)

19. INSTALL NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/ Navigation System) (See page NS-194)

IP

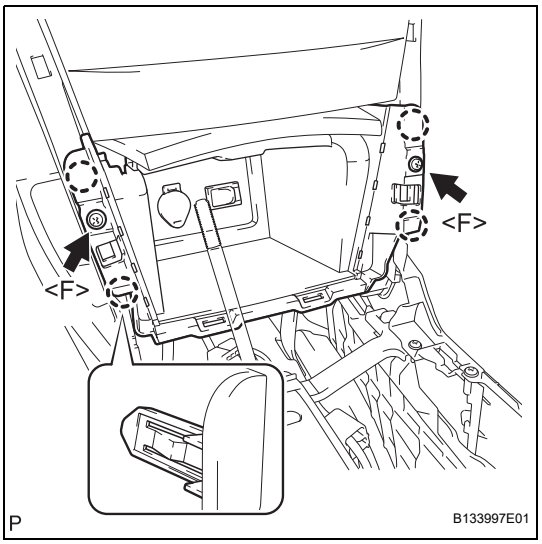


20. INSTALL INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY

(a) Engage the 7 clips and install the instrument panel No. 2 register assembly.

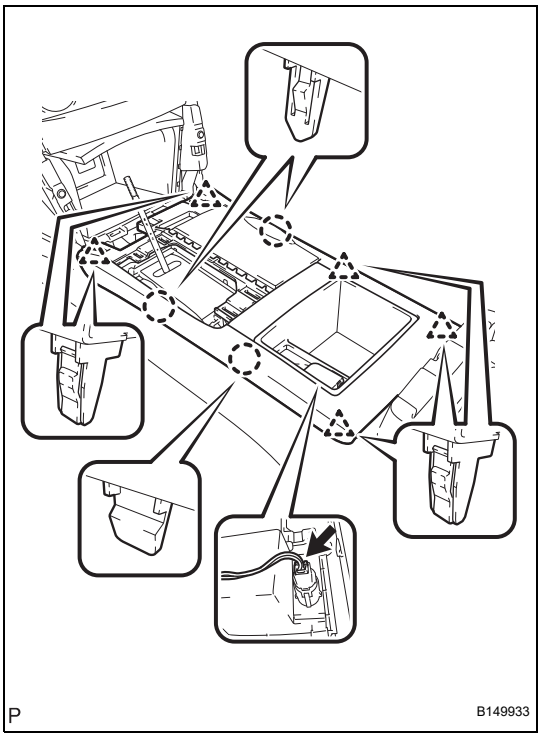
21. INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY

(a) Connect each connector.



(b) Engage the 4 claws.

(c) Install the upper console panel sub-assembly with the 2 screws <F>.



22. INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY

(a) Connect the connector.

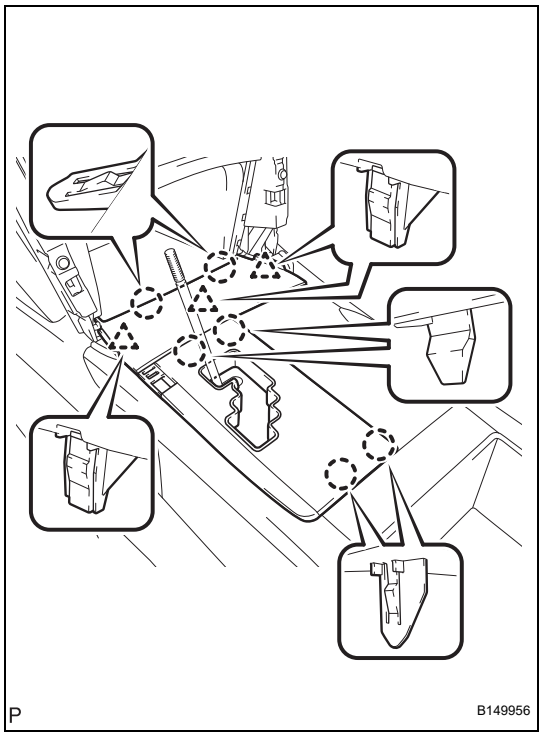
(b) Engage the 3 claws and 5 clips to install the upper console rear panel sub-assembly.

23. INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY

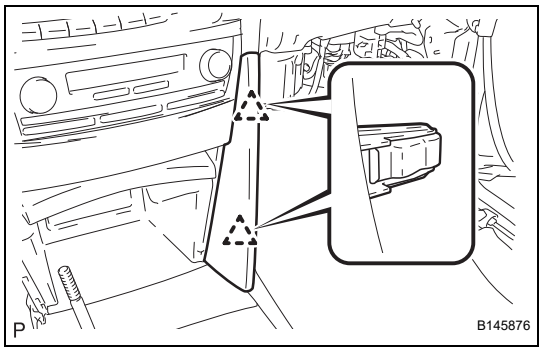
(a) with Seat Heater System:

(1) Connect each connector.

IP

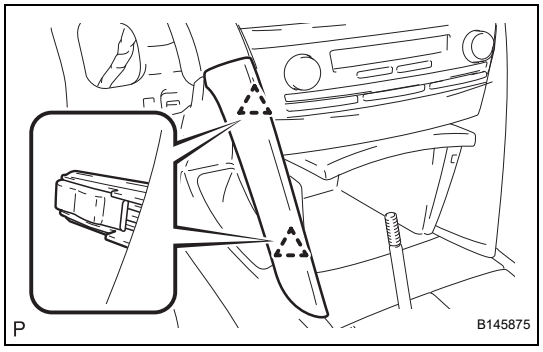


(b) Engage the 6 claws and the 3 clips to install the floor shift position indicator housing sub-assembly.



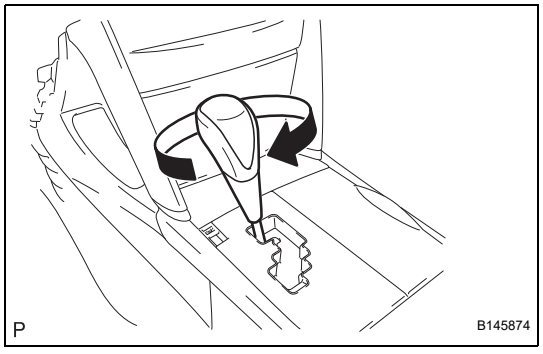
24. INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH

(a) Engage the 2 clips and install the No. 2 instrument cluster finish panel garnish.



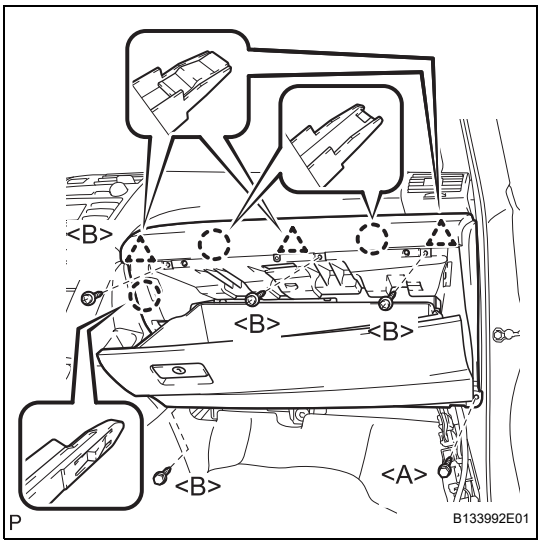
25. INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH

(a) Engage the 2 clips and install the No. 1 instrument cluster finish panel garnish.



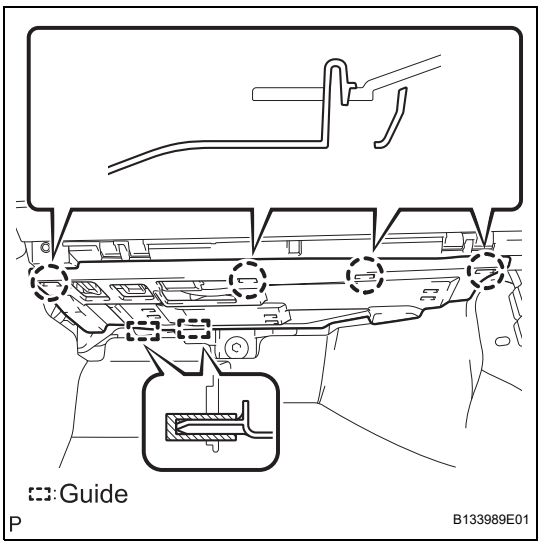
26. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY

(a) Install the shift lever knob sub-assembly.



27. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY

(a) Engage the 3 claws and 3 clips.
(b) Install the 4 screws <B>.
(c) Install the lower instrument panel sub-assembly with the bolt <A>.

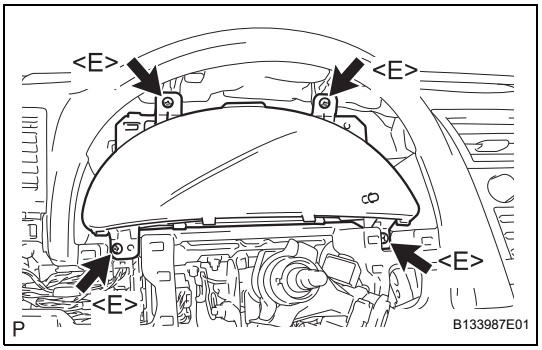


28. INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY

(a) Engage the 4 claws and 2 guides and install the instrument panel No. 2 under cover.

29. INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-42)

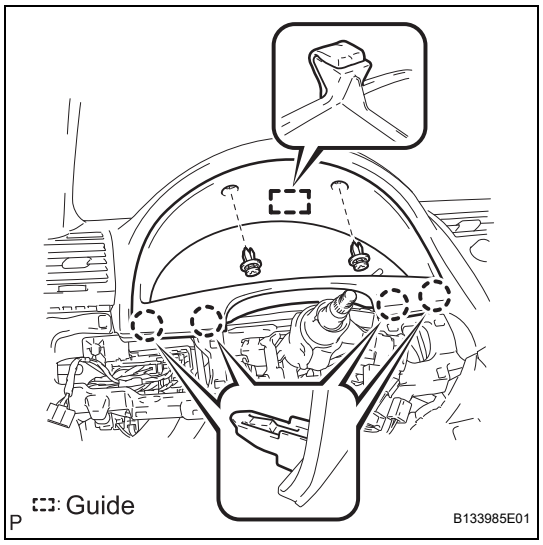
30. INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-42)



31. INSTALL COMBINATION METER ASSEMBLY

(a) Connect each connector.
(b) Install the combination meter assembly with the 4 screws <E>.

IP



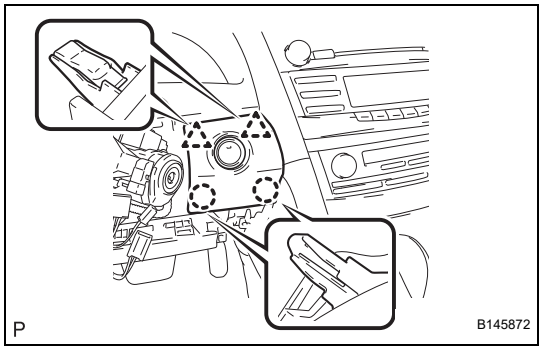
32. INSTALL INSTRUMENT CLUSTER FINISH PANEL

(a) Engage the guide and the 4 claws.

(b) Install the instrument cluster finish panel with the 2 clips.

33. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL

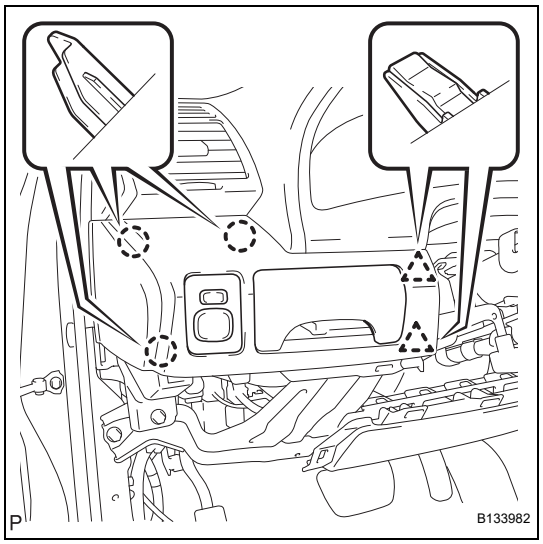
(a) Connect the connector.



(b) Engage the 2 claws and 2 clips to install the lower instrument panel finish panel.

34. INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY

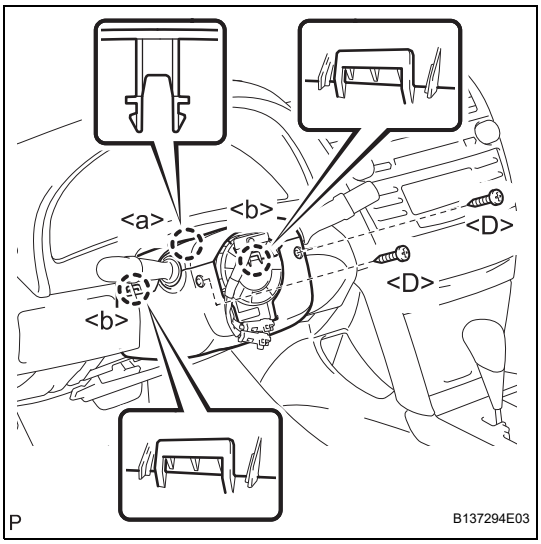
(a) Connect the connector.



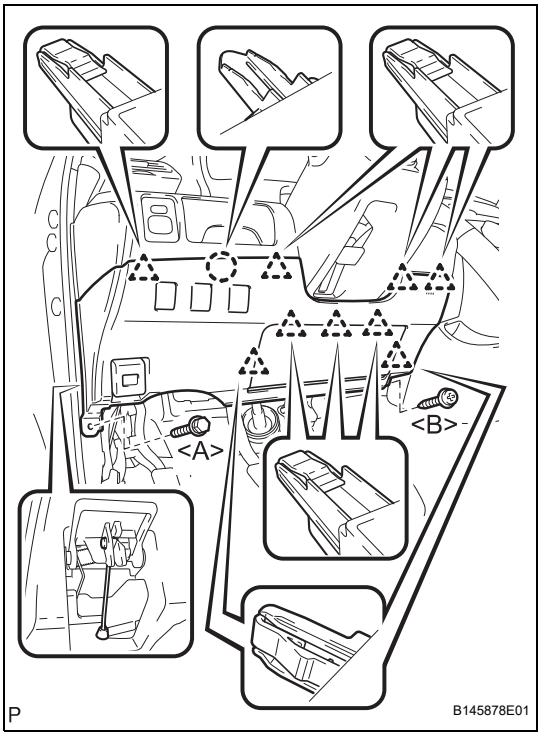
(b) Engage the 3 claws and 2 clips to install the No. 1 instrument panel sub-assembly.

35. INSTALL TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY (See page SR-41)

36. ADJUST SPIRAL CABLE SUB-ASSEMBLY (See page RS-360)



37. **INSTALL STEERING COLUMN COVER**
    (a) Engage the claw <a> and install the upper steering column cover.
    (b) Engage the 2 claws <b> and install the lower steering column cover.
    (c) Install the steering column cover with the 2 screws <D>.

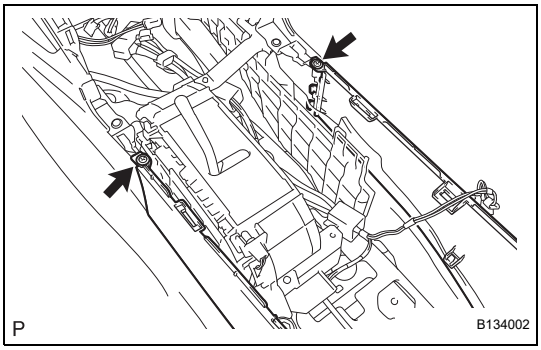


38. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH**
    (a) Install the air hose and connect each connector.
    (b) Engage the claw and the 9 clips.
    (c) Instal the instrument panel finish panel LH with the screw <B> and bolt <A>.
39. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-41)**
40. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-41)**
41. **INSTALL STEERING WHEEL ASSEMBLY (See page SR-42)**
42. **INSTALL STEERING PAD (See page RS-346)**
43. **INSTALL LOWER NO. 3 STEERING WHEEL COVER (See page RS-347)**
44. **INSTALL LOWER NO. 2 STEERING WHEEL COVER (See page RS-347)**
45. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
46. **INSPECT STEERING PAD (See page RS-347)**
47. **INSPECT SRS WARNING LIGHT**
    (RS-1)
48. **PERFORM INITIALIZATION**
    NOTICE:
    Some systems need initialization after reconnecting the cable to the negative battery terminal. (See page IN-43)

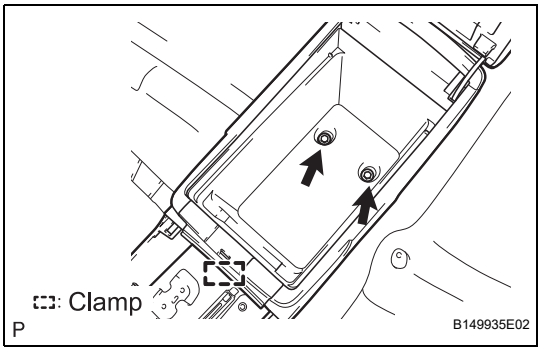
IP

REMOVAL

1. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-14)**
2. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-14)**
3. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-14)**
4. **REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-15)**
5. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-15)**
6. **REMOVE CONSOLE BOX POCKET (See page IP-17)**
7. **REMOVE CONSOLE BOX CARPET (See page IP-17)**
8. **REMOVE CONSOLE BOX ASSEMBLY**
   (a) Remove the 2 screws.

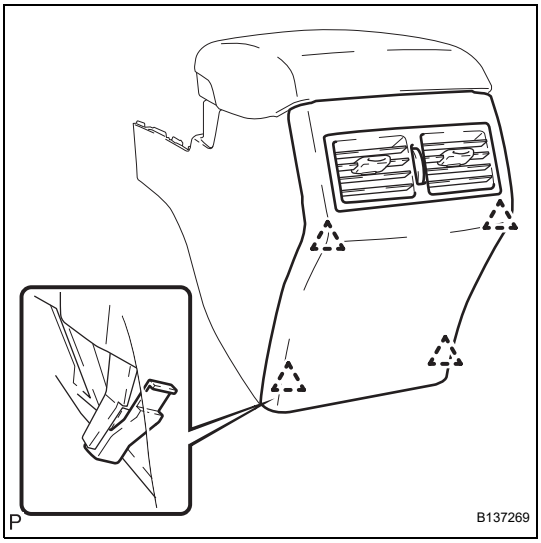


   (b) Disengage the clamp.
   (c) Remove the 2 bolts and the console box assembly.

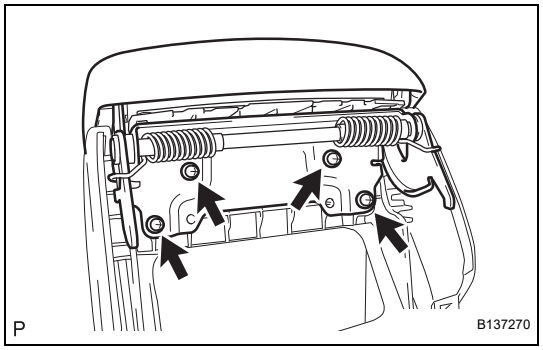


DISASSEMBLY

1. **REMOVE REAR CONSOLE END PANEL SUB-ASSEMBLY**
   (a) Disengage the 4 clips and remove the rear console end panel sub-assembly.



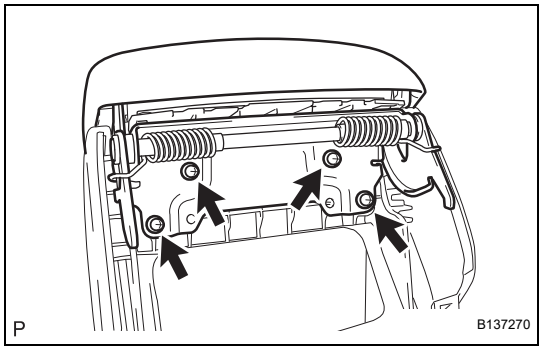
IP



2. REMOVE CONSOLE COMPARTMENT DOOR SUB-ASSEMBLY

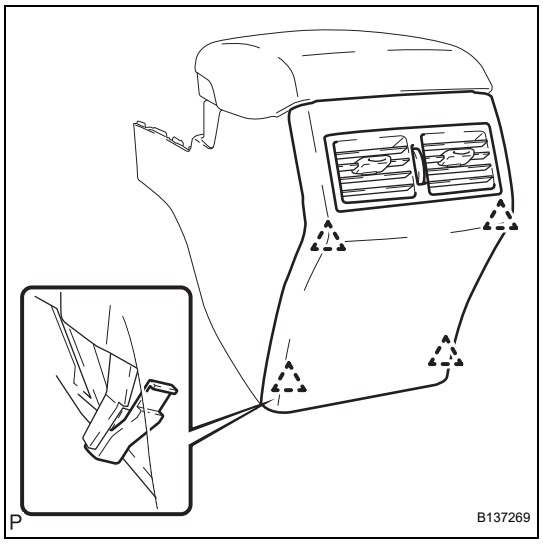
(a) Remove the 4 screws and the console compartment door sub-assembly.

REASSEMBLY



1. INSTALL CONSOLE COMPARTMENT DOOR SUB-ASSEMBLY

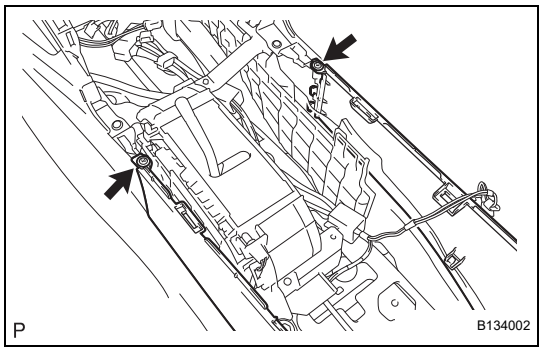
(a) Install the console compartment door sub-assembly with the 4 screws.



2. INSTALL REAR CONSOLE END PANEL SUB-ASSEMBLY

(a) Engage the 4 clips and install the rear console end panel sub-assembly.

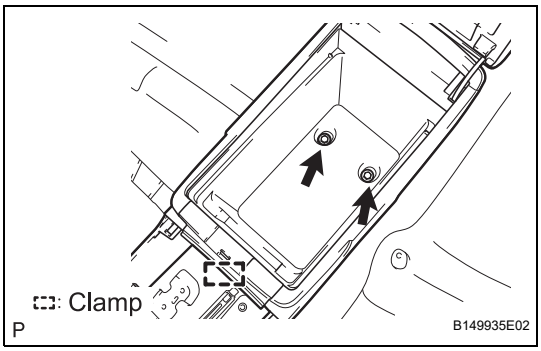
INSTALLATION



1. INSTALL CONSOLE BOX ASSEMBLY

(a) Install the 2 screws.

IP



(b) Install the console box assembly with the 2 bolts.
(c) Engage the clamp.

2. **INSTALL CONSOLE BOX CARPET (See page IP-30)**
3. **INSTALL CONSOLE BOX POCKET (See page IP-30)**
4. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-31)**
5. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-31)**
6. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-32)**
7. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-32)**
8. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-32)**

SYSTEM DESCRIPTION

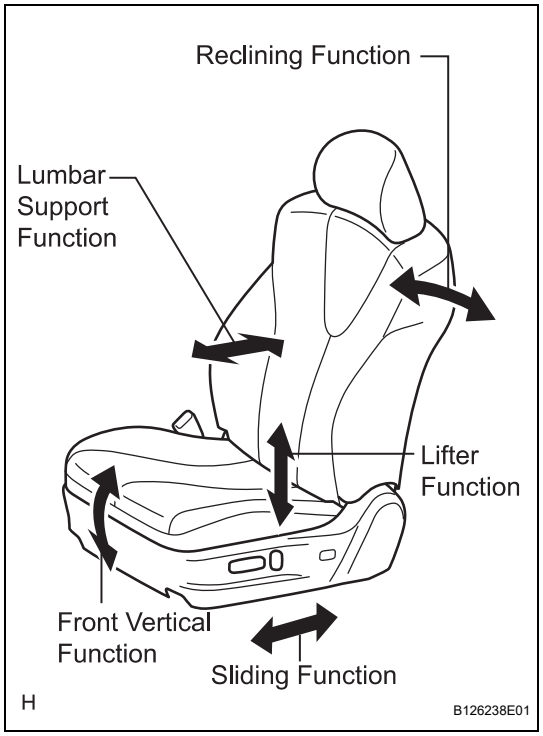
1. FRONT POWER SEAT CONTROL SYSTEM DESCRIPTION

The driver seat and front passenger seat are equipped with slide, reclining, lifter, front vertical, and lumbar support adjustment functions.

2. FUNCTION OF MAIN COMPONENTS

The following functions are available:

Components	Function
Power seat motor assembly (slide motor)	Activated based on a signal from the power seat switch, a motor is activated and slides the seat forward and rearward.
Power seat motor assembly (reclining motor)	Activated based on a signal from the power seat switch, a motor is activated and tilts and reclines the seat.
Power seat motor assembly (front vertical motor)	Activated based on a signal from the power seat switch and raises and lowers the seat cushion front vertically.
Power seat motor assembly (lifter motor)	Activated based on a signal from the power seat switch and raises and lowers the seat vertically.
Lumbar support adjuster motor	Activated based on a signal from the front power seat lumbar switch and adjusts lumbar support.
Front power seat lumbar switch	Based on switches operated, the seat is adjusted accordingly.



OPERATION CHECK

1. CHECK POWER SEAT FUNCTION

(a) Check the basic functions.

(1) Operate the power seat switches and check that the following functions work:

- Sliding
- Reclining
- Lumbar support (Driver side only)
- Front vertical (Driver side only)
- Lifter (Driver side only)

SE

PROBLEM SYMPTOMS TABLE

HINT:

- Inspect the fuses and relays before confirming the suspected areas in the table below.
- Inspect each suspected area in numerical order for the corresponding symptom.

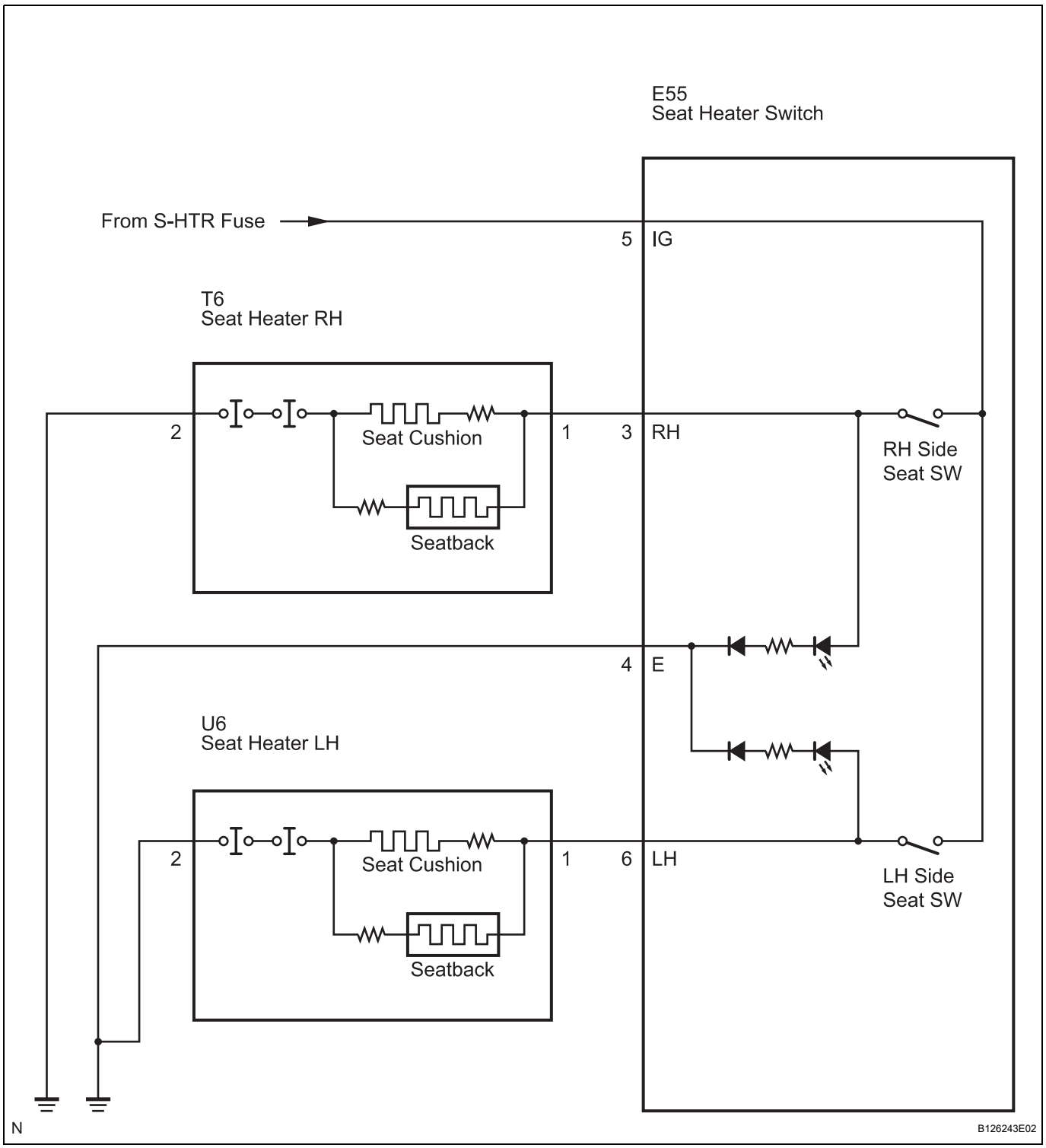
Front Power Seat Control System (Driver Side):

Symptom	Suspected area	See page
Power seat does not operate (slide, front vertical, lifter, reclining).	1. P/SEAT fuse	-
	2. Power seat switch LH	SE-58
	3. Wire harness or connector	-
Only slide operation function does not operate.	1. Power seat switch LH	SE-58
	2. Front seat frame with adjuster LH (slide motor)	SE-62
	3. Wire harness or connector	-
Only front vertical operation function does not operate.	1. Power seat switch LH	SE-58
	2. Front seat frame with adjuster LH (front vertical motor)	SE-62
	3. Wire harness or connector	-
Only lifter operation function does not operate.	1. Power seat switch LH	SE-58
	2. Front seat frame with adjuster LH (lifter motor)	SE-62
	3. Wire harness or connector	-
Only reclining operation function does not operate.	1. Power seat switch LH	SE-58
	2. Front seat frame with adjuster LH (reclining motor)	SE-62
	3. Wire harness or connector	-
Only lumbar support operation function does not operate.	1. Front power seat lumbar switch LH	SE-66
	2. Lumbar support adjuster assembly LH	SE-70
	3. Wire harness or connector	-

Front Power Seat Control System (Front Passenger Side):

Symptom	Suspected area	See page
Power seat does not operate (slide and reclining).	1. P/SEAT fuse	-
	2. Power seat switch RH	SE-60
	3. Wire harness or connector	-
Only slide operation function does not operate.	1. Power seat switch RH	SE-60
	2. Front seat frame with adjuster RH (slide motor)	SE-63
	3. Wire harness or connector	-
Only reclining operation function does not operate.	1. Power seat switch RH	SE-60
	2. Front seat frame with adjuster RH (reclining motor)	SE-63
	3. Wire harness or connector	-

SYSTEM DIAGRAM



SE

SYSTEM DESCRIPTION

1. GENERAL DESCRIPTION

(a) By operating the seat heater switch, which is located in the console box, the temperature can be controlled within the range of 30 to 40°C (86 to 104°F).

(b) The seat heater switch indicator light provides seat heater on/off status.

(c) The seat heaters of both seats are controlled by the seat heater controls, which are located under the respective seat.

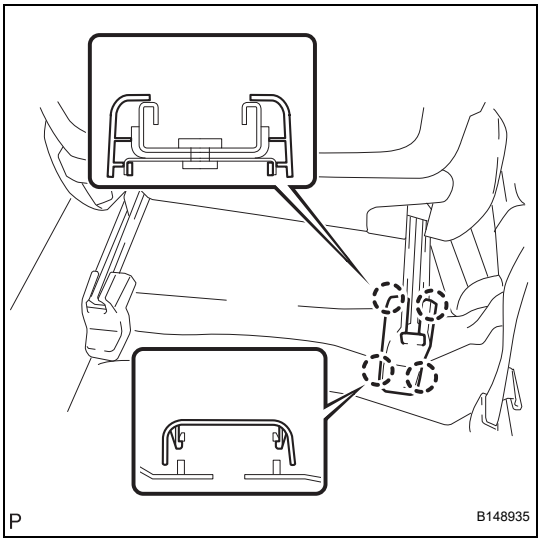
PROBLEM SYMPTOMS TABLE

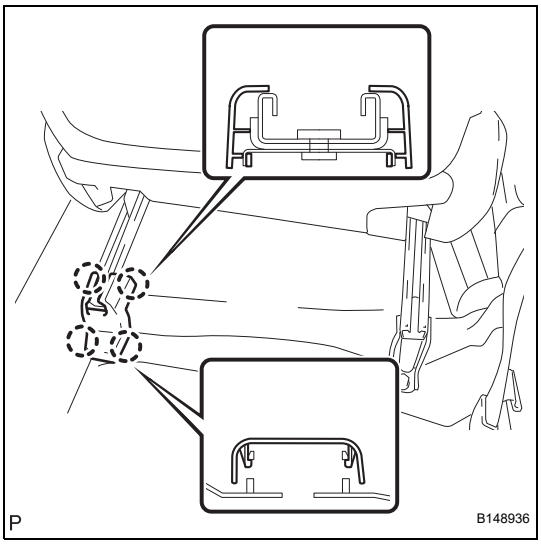
SEAT HEATER SYSTEM:

Symptom	Suspected Area	See page
Seat heater does not operate. (Front LH side)	1. S-HTR fuse	-
	2. Seat heater switch	SE-73
	3. Front seat cushion heater	SE-81
	4. Front seat back heater	SE-77
	5. Wire harness	-
Seat heater does not operate. (Front RH side)	1. S-HTR fuse	-
	2. Seat heater switch	SE-73
	3. Front seat cushion heater	SE-81
	4. Front seat back heater	SE-77
	5. Wire harness	-
Temperature of seat heater cannot be adjusted.	Seat heater switch	SE-73

REMOVAL

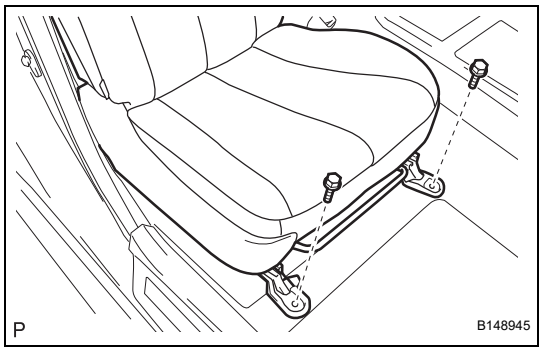
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent the airbag from deploying (See page RS-33).
2. **REMOVE FRONT SEAT HEADREST ASSEMBLY**
3. **REMOVE SEAT TRACK COVER**
   (a) Move the front seat assembly fully forward by operating the slide handle.
   (b) Using a screwdriver, disengage the 4 claws and remove the seat track cover.
   HINT:
   Tape the screwdriver tip before use.



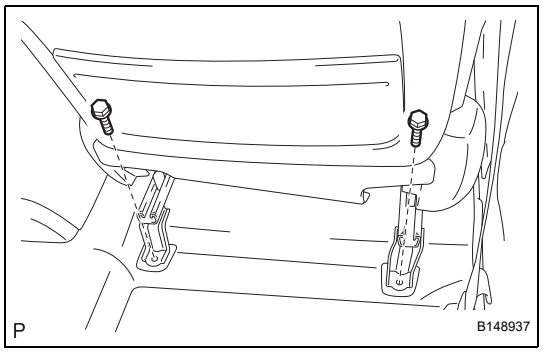


4. **REMOVE INNER SEAT TRACK BRACKET COVER**
   (a) Using a screwdriver, disengage the 4 claws and remove the inner seat track bracket cover.
   HINT:
   Tape the screwdriver tip before use.
5. **REMOVE FRONT SEAT ASSEMBLY**
   (a) Move the front seat assembly to the rearmost position by operating the slide handle.

SE



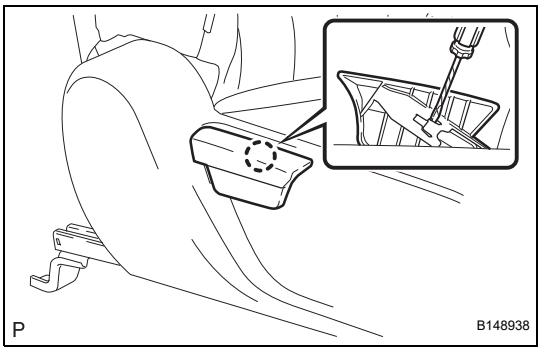
(b) Remove the 2 bolts on the front seat track bracket.
(c) Move the front seat assembly fully forward by operating the slide handle.



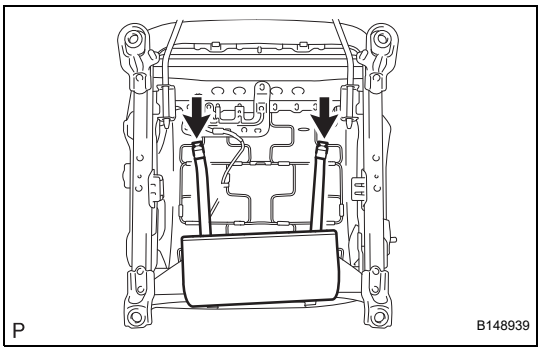
(d) Remove the 2 bolts on the rear seat track bracket.
(e) Move the front seat assembly to the center position and adjust the seatback to the vertical position by operating the slide and reclining adjuster release handle.
(f) Disconnect the connectors and clamp.
(g) Remove the front seat assembly.

DISASSEMBLY

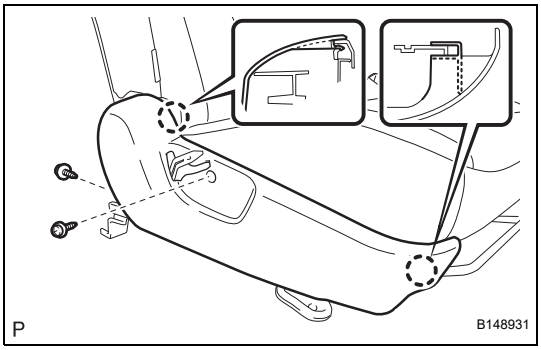
NOTICE:
Wear protective gloves. Sharp areas on the seat frame and adjuster may injure your hands.



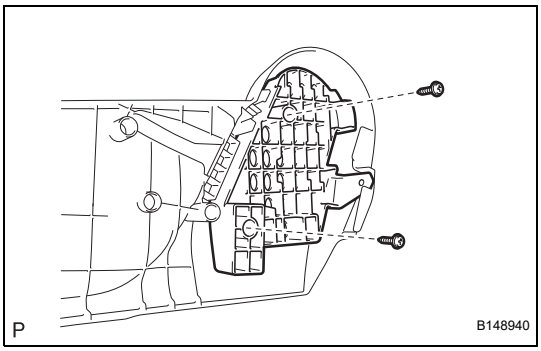
1. REMOVE RECLINING ADJUSTER RELEASE HANDLE
(a) Lift the reclining adjuster release handle.
(b) Using a screwdriver, disengage the claw and remove the reclining adjuster release handle.
HINT:
Tape the screwdriver tip before use.



2. REMOVE FRONT SEAT CUSHION SHIELD
(a) Disengage the 2 hooks.



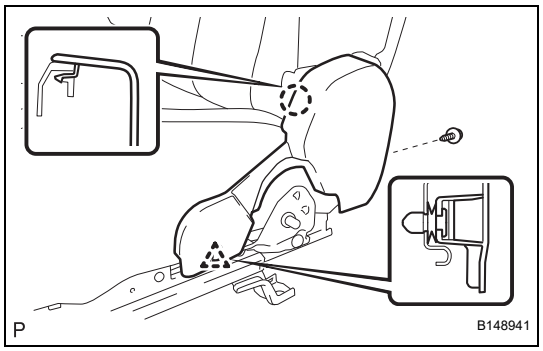
(b) Remove the 2 screws.
(c) Disengage the 2 claws and remove the front seat cushion shield.



3. REMOVE LOWER SEAT TRACK SPACER
(a) Remove the 2 screws and lower seat track spacer.

4. REMOVE FRONT SEAT INNER BELT ASSEMBLY
(See page SB-16)

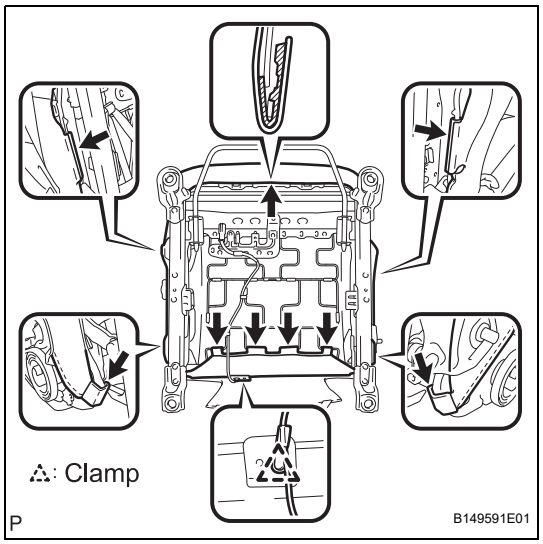
SE



5. REMOVE FRONT INNER SEAT CUSHION SHIELD

(a) Remove the screw.

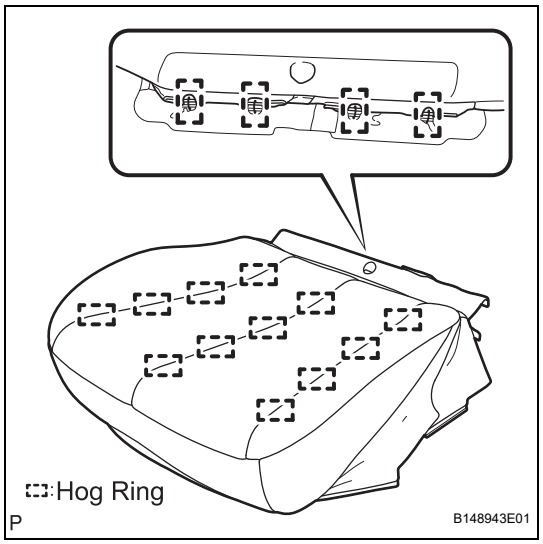
(b) Disengage the claw and clip, and then remove the front inner seat cushion shield.



6. REMOVE FRONT SEAT CUSHION COVER WITH PAD

(a) Disengage the clamp.

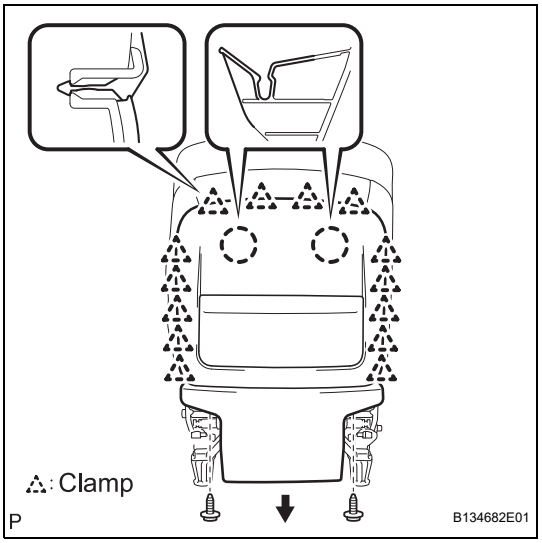
(b) Disengage the hooks and remove the front seat cushion cover with pad.



7. REMOVE SEPARATE TYPE FRONT SEAT CUSHION COVER

(a) Remove the 16 hog rings and separate type front seat cushion cover.

SE

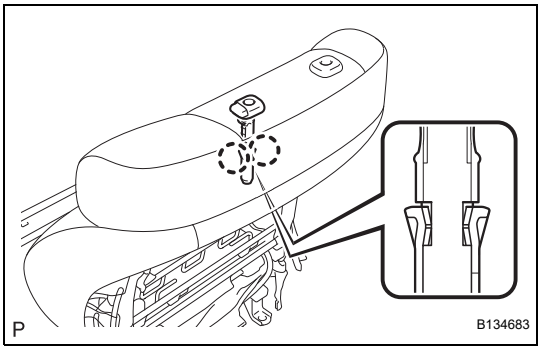


8. REMOVE FRONT SEATBACK BOARD SUB-ASSEMBLY

(a) Remove the 2 screws.

(b) Disconnect the 14 clamps and front separate type seatback cover.

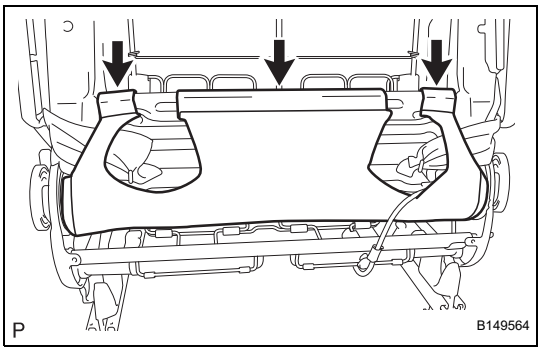
(c) Pull the seatback board in the direction indicated by the arrow in the illustration to detach the 2 claws. Then, remove the front seatback board sub-assembly.



9. REMOVE FRONT SEAT HEADREST SUPPORT

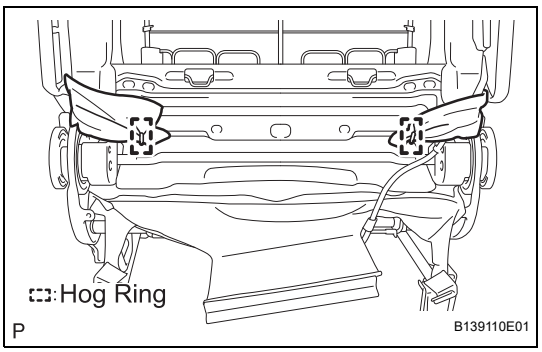
(a) Detach the 2 claws and remove the headrest support.

10. REMOVE FRONT SEAT HEADREST SUPPORT



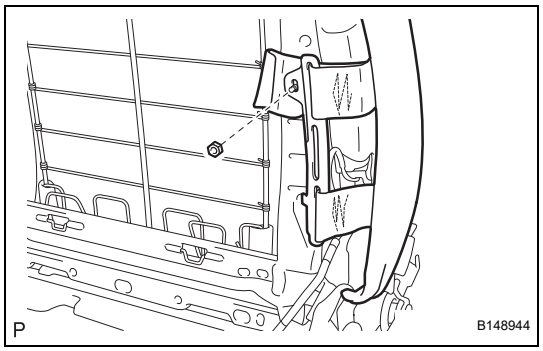
11. REMOVE FRONT SEATBACK COVER WITH PAD

(a) Disengage the 3 hooks.

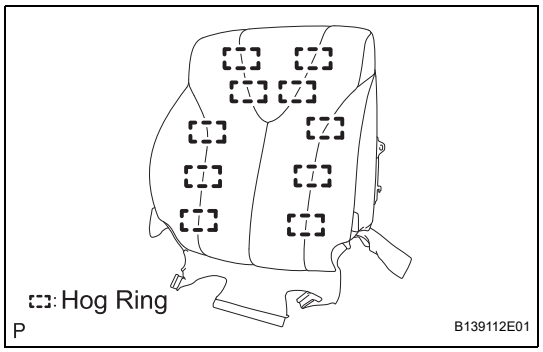


(b) Remove the 2 hog rings.

SE

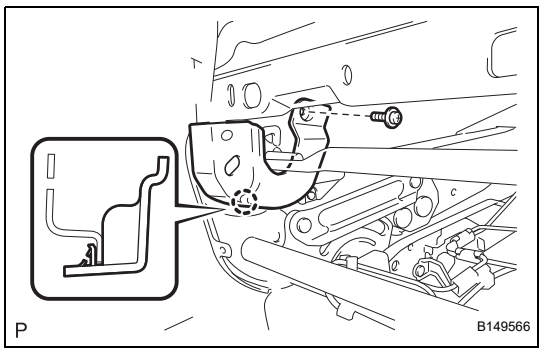


(c) Remove the nut and separate the 2 brackets.
(d) Remove the front seatback cover with pad.



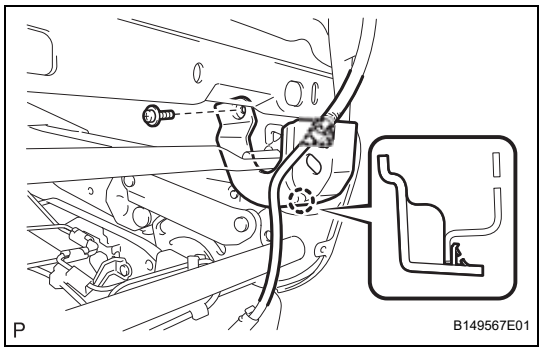
12. REMOVE SEPARATE TYPE FRONT SEATBACK COVER

(a) Remove the 10 hog rings and front separate type seatback cover.



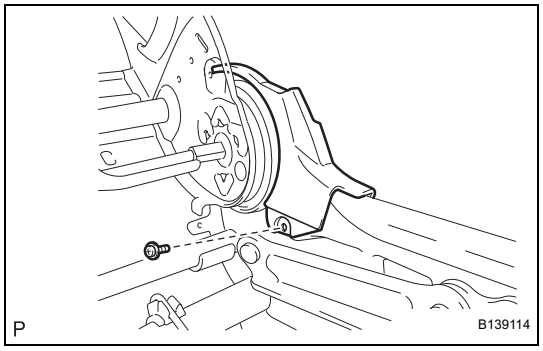
13. REMOVE RECLINING ADJUSTER INSIDE COVER LH

(a) Remove the screw.
(b) Disengage the claw and remove the reclining adjuster inside cover LH.



14. REMOVE RECLINING ADJUSTER INSIDE COVER RH

(a) Disconnect the clamp.
(b) Remove the screw.
(c) Disengage the claw and remove the reclining adjuster inside cover RH.



15. REMOVE RECLINING ADJUSTER INSIDE COVER LH

(a) Remove the screw and reclining adjuster inside cover LH.

16. REMOVE RECLINING ADJUSTER INSIDE COVER RH

HINT:
Use the same procedures for the RH side and LH side.

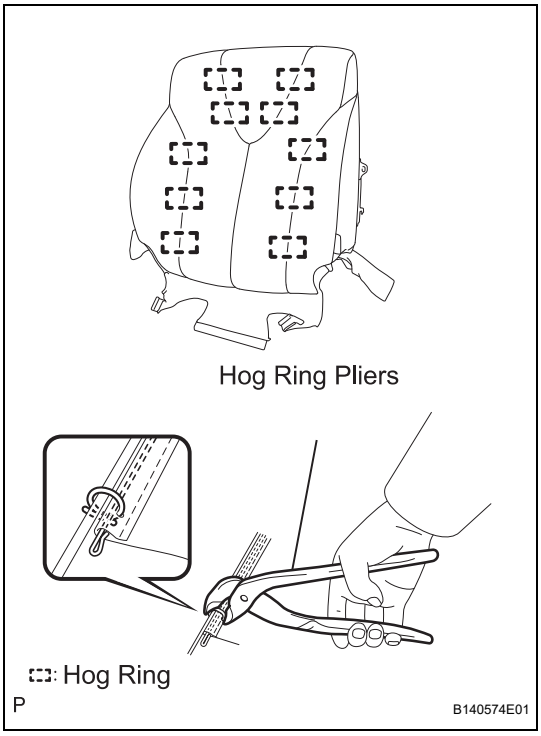
17. REMOVE OCCUPANT DETECTION ECU (See page RS-446)

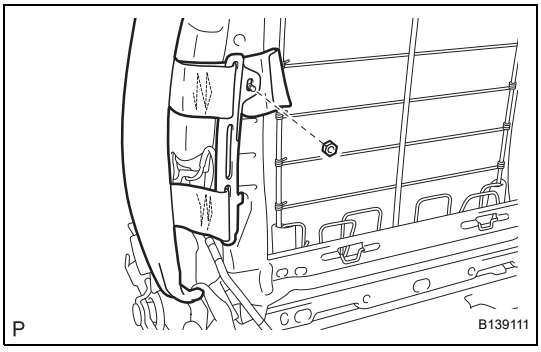
SE

REASSEMBLY

NOTICE:
Wear protective gloves. Sharp areas on the seat frame and adjuster may injure your hands.

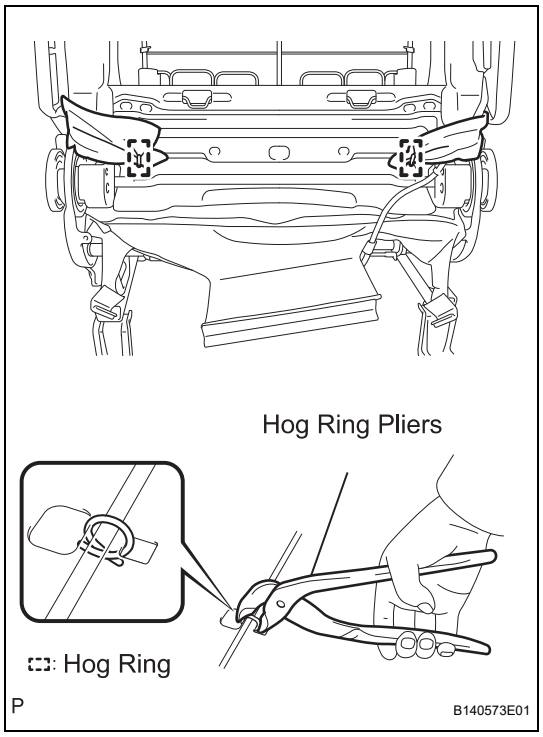
1. **INSTALL OCCUPANT DETECTION ECU (See page RS-446)**
2. **INSTALL RECLINING ADJUSTER INSIDE COVER LH**
3. **INSTALL RECLINING ADJUSTER INSIDE COVER RH**
4. **INSTALL RECLINING ADJUSTER INSIDE COVER LH**
5. **INSTALL RECLINING ADJUSTER INSIDE COVER RH**
6. **INSTALL SEPARATE TYPE FRONT SEATBACK COVER**
   (a) Using hog ring pliers, install the separate type front seatback cover to the front separate type seatback pad with 10 new hog rings.
   NOTICE:
   - **Be careful not to damage the cover.**
   - **When installing the hog rings, take care to minimize wrinkles as much as possible.**



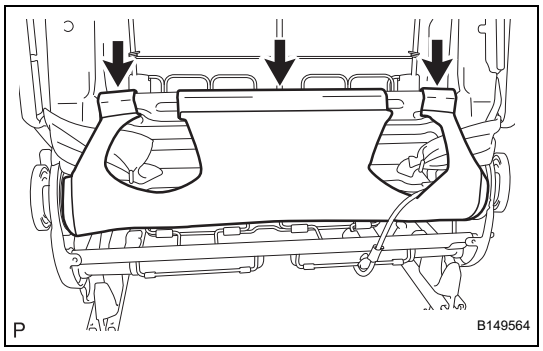


7. **INSTALL FRONT SEATBACK COVER WITH PAD**
   (a) Fully cover the airbag with the 2 seatback cover brackets and tighten the nut.
   Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)
   NOTICE:
   - **For vehicles with side airbags, the seatback cover must be securely installed. Otherwise, the side airbags may not deploy properly.**
   - **Make sure that the strap is not twisted after installing the bracket.**
   - **Install the bracket securely.**

SE

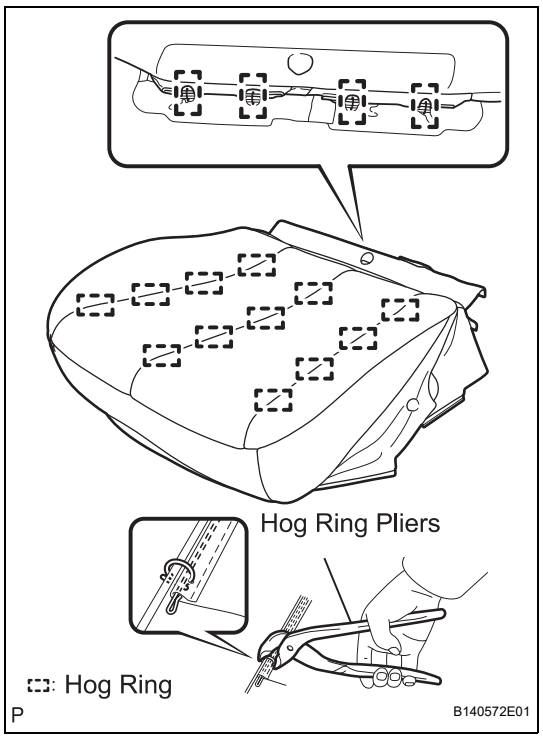


(b) Using hog ring pliers, install the front seatback cover with pad to the seat frame with 2 new hog rings, and attach the hooks.



(c) Engage the 3 hooks.

8. **INSTALL FRONT SEAT HEADREST SUPPORT**
9. **INSTALL FRONT SEAT HEADREST SUPPORT**
10. **INSTALL FRONT SEATBACK BOARD SUB-ASSEMBLY**



11. **INSTALL SEPARATE TYPE FRONT SEAT CUSHION COVER**
    (a) Using hog ring pliers, install the separate type front seat cushion cover to the seat cushion pad with 16 new hog rings.
    NOTICE:
    - **Be careful not to damage the cover.**
    - **When installing the hog rings, take care to minimize wrinkles as much as possible.**
12. **INSTALL FRONT SEAT CUSHION COVER WITH PAD**
13. **INSTALL FRONT INNER SEAT CUSHION SHIELD**
14. **INSTALL FRONT SEAT INNER BELT ASSEMBLY (See page SB-17)**
15. **INSTALL LOWER SEAT TRACK SPACER**
16. **INSTALL FRONT SEAT CUSHION SHIELD**
17. **INSTALL RECLINING ADJUSTER RELEASE HANDLE**

SE

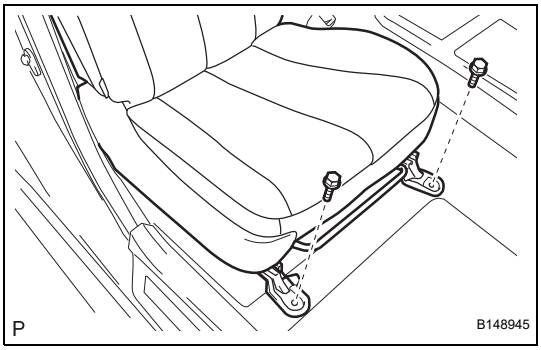
INSTALLATION

1. INSTALL FRONT SEAT ASSEMBLY

(a) Place the front seat assembly in the vehicle and align the adjuster pin with the hole on the vehicle side.

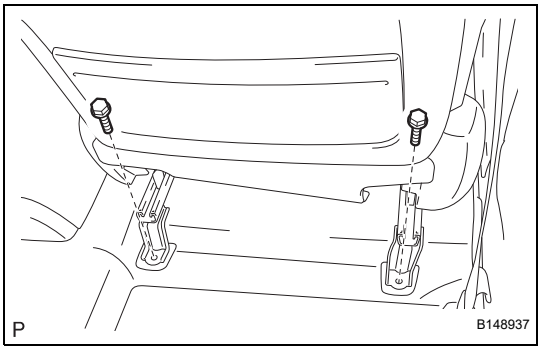
(b) Connect the connector and clamp.

(c) Move the front seat assembly to the rearmost position by operating the slide handle.
NOTICE:
Check that the seat is locked.



(d) Temporarily install the front seat track bracket with the 2 bolts.

(e) Move the front seat assembly fully forward by operating the slide handle.
NOTICE:
Check that the seat is locked.



(f) Temporarily install the rear seat track bracket with the 2 bolts.

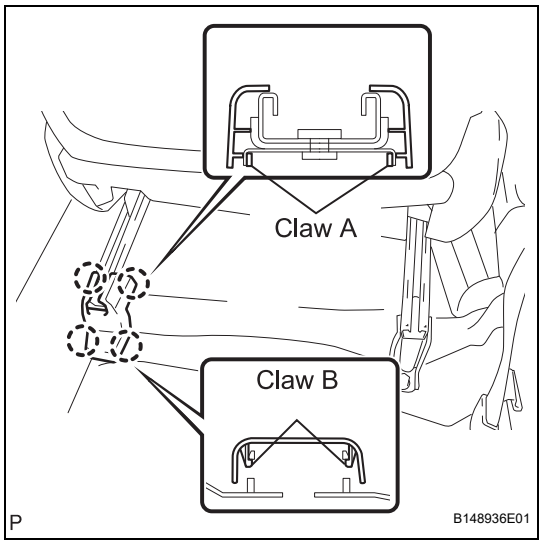
(g) Move the front seat assembly to the rearmost position by operating the slide handle.
NOTICE:
Check that the seat is locked.

(h) Fully tighten the 2 bolts on the front seat track bracket in the order of the inner side bolt and then the outer side bolt.
Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)

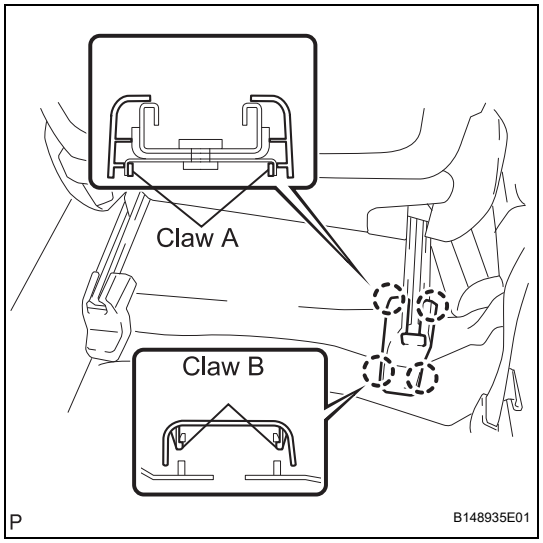
(i) Move the front seat assembly fully forward by operating the slide handle.
NOTICE:
Check that the seat is locked.

(j) Fully tighten the 2 bolts on the rear seat track bracket in the order of the inner side bolt and then the outer side bolt.
Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)

SE



2. **INSTALL INNER SEAT TRACK BRACKET COVER**
   (a) Slide the inner seat track bracket cover along the seat rail toward the front of the vehicle. Engage claw A to the seat rail.
   (b) Push the seat track bracket cover inner to engage claw B.



3. **INSTALL SEAT TRACK COVER**
   (a) Slide the seat track cover along the seat rail toward the front of the vehicle. Engage claw A to the seat rail.
   (b) Push the seat track cover to engage claw B.
4. **INSTALL FRONT SEAT HEADREST ASSEMBLY**
5. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
6. **INSPECT SLIDE ADJUSTER LOCK**
7. **PERFORM INITIALIZATION**
   NOTICE:
   Some systems need initialization after reconnecting the cable to the negative battery terminal (See page IN-43).
8. **PERFORM ZERO POINT CALIBRATION AND SENSITIVITY CHECK (for Front Passenger Seat)**
   (See page RS-239)
9. **INSPECT SRS WARNING LIGHT**
   Inspect the SRS warning light (See page RS-33).

SE

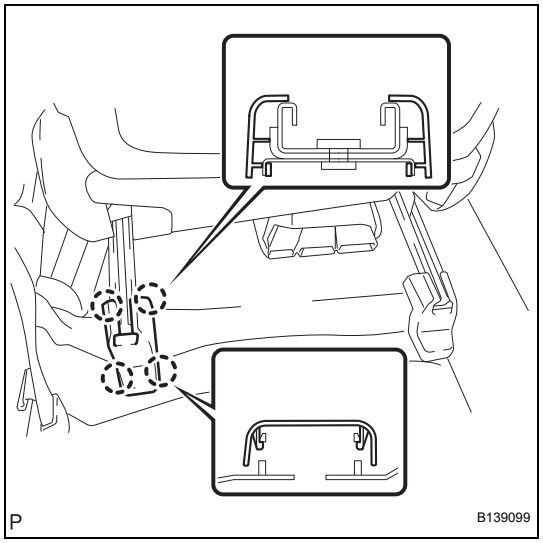
REMOVAL

1. REMOVE FRONT SEAT HEADREST ASSEMBLY

2. REMOVE SEAT TRACK COVER

(a) Operate the power seat switch knob and move the seat to the position farthest forward.

(b) Using a screwdriver, detach the 4 claws and remove the seat track cover.
HINT:
Tape the screwdriver tip before use.

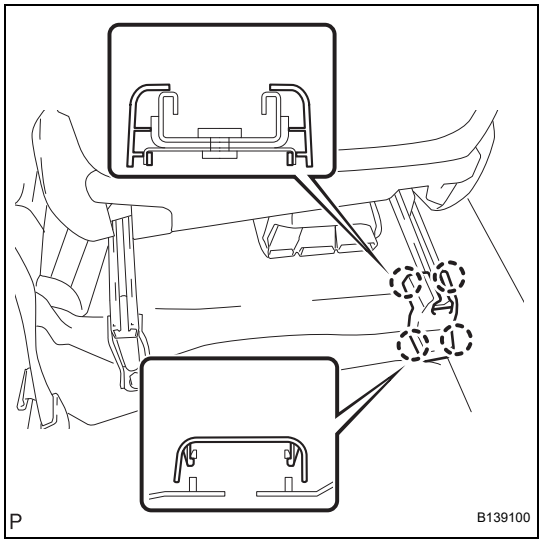


3. REMOVE INNER SEAT TRACK BRACKET COVER

(a) Using a screwdriver, detach the 4 claws and remove the inner seat track bracket cover.

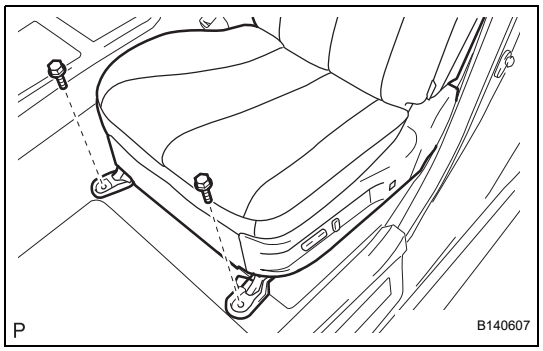
4. REMOVE FRONT SEAT ASSEMBLY

(a) Operate the power seat switch knob and move the seat to the rearmost position.

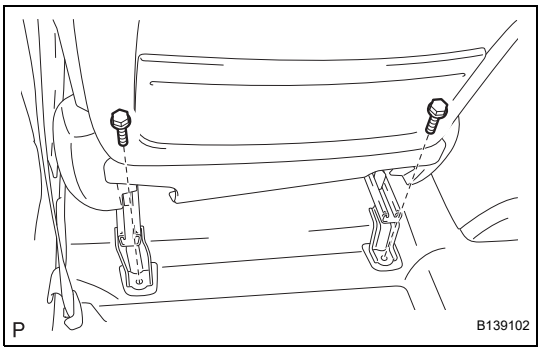


(b) Remove the 2 bolts on the front seat track bracket.

(c) Operate the power seat switch knob and move the seat to the position farthest forward.



SE



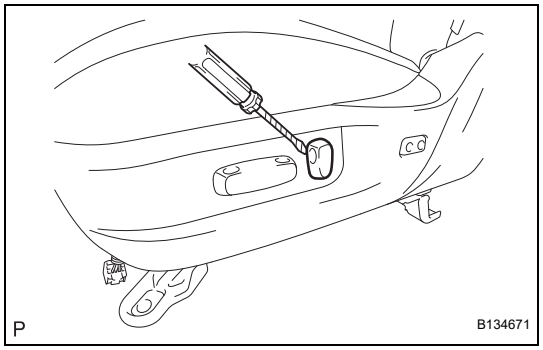
(d) Remove the 2 bolts on the rear seat track bracket.
(e) Disconnect the cable from the negative (-) battery terminal.
CAUTION:
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent the airbag and seat belt pretensioner from deploying (See page RS-33).
(f) Disconnect the connectors under the seat. Then remove the front seat assembly.

DISASSEMBLY

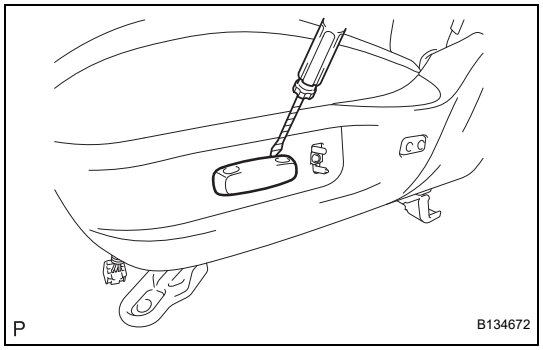
CAUTION:
Wear protective gloves. Sharp areas on the seat frame and adjuster may injure your hands.

1. **REMOVE OCCUPANT DETECTION ECU (See page RS-446)**

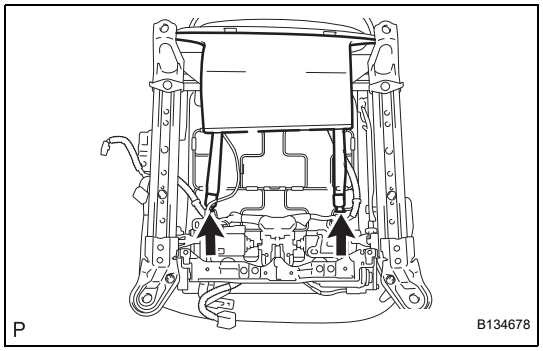
2. **REMOVE RECLINING POWER SEAT SWITCH KNOB**
   (a) Using a screwdriver, detach the reclining power seat switch knob.
   HINT:
   Tape the screwdriver tip before use.



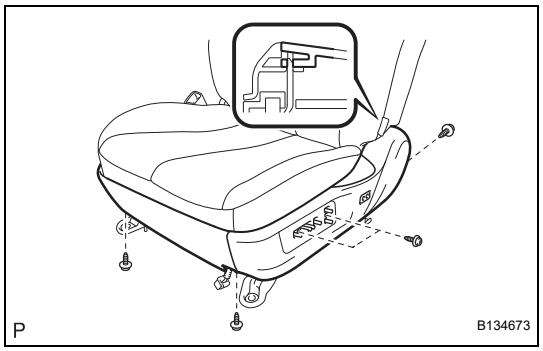
3. **REMOVE SLIDE AND VERTICAL POWER SEAT SWITCH KNOB**
   (a) Using a screwdriver, detach the slide and vertical power seat switch knob.
   HINT:
   Tape the screwdriver tip before use.



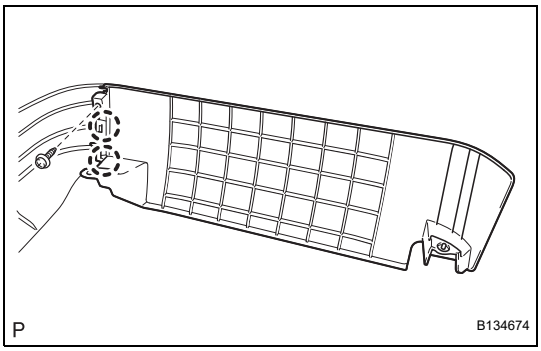
4. **REMOVE FRONT SEAT CUSHION SHIELD ASSEMBLY**
   (a) Disconnect the 2 hooks.



   (b) Remove the 5 screws.
   (c) Disengage the claw and separate the front seat cushion shield assembly.
   (d) Disconnect the connector from the front power seat lumbar switch.



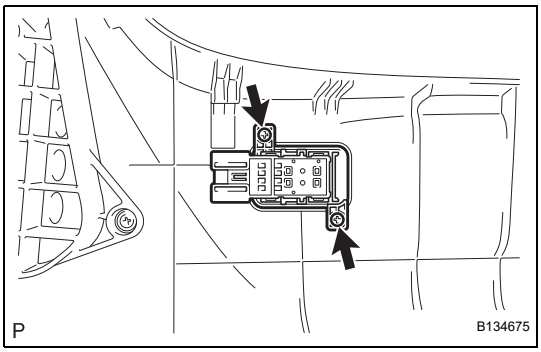
SE



5. REMOVE FRONT INNER NO. 1 SEAT CUSHION SHIELD

(a) Remove the screw.

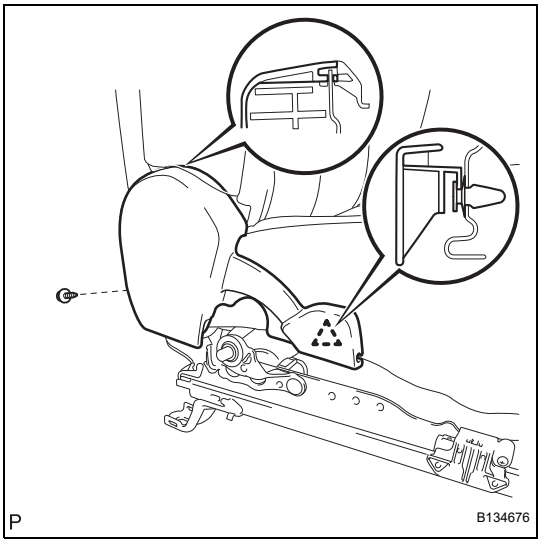
(b) Detach the 2 claws and remove the front inner No. 1 seat cushion shield.



6. REMOVE FRONT LUMBAR POWER SEAT SWITCH

(a) Remove the 2 screws and front lumbar power seat switch.

7. REMOVE FRONT SEAT INNER BELT ASSEMBLY (See page SB-17)



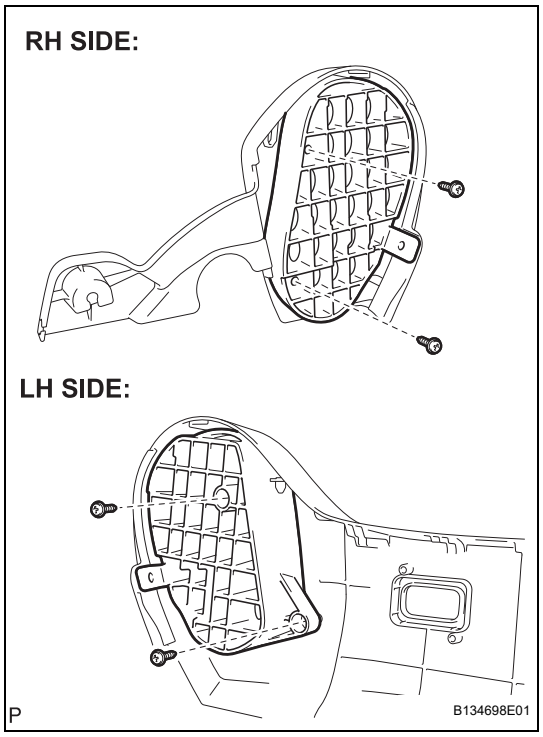
8. REMOVE FRONT INNER SEAT CUSHION SHIELD

(a) Remove the screw.

(b) Using a clip remover, detach the clip.

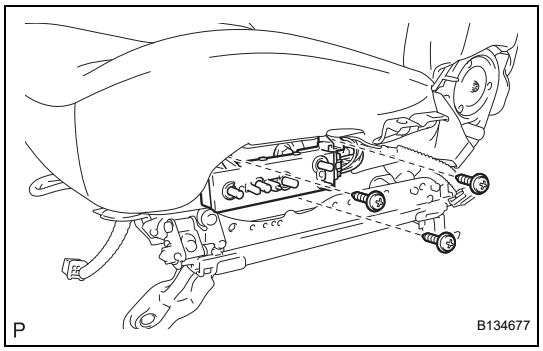
(c) Using a screwdriver, detach the claw and remove the front inner seat cushion shield.
HINT:
Tape the screwdriver tip before use.

SE



9. REMOVE LOWER SEAT TRACK SPACER

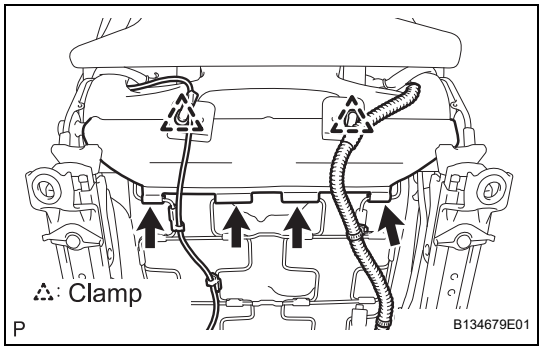
(a) Remove the 2 screws and lower seat track spacer.



10. REMOVE FRONT POWER SEAT SWITCH

(a) Remove the 3 screws.

(b) Disconnect the connector and remove the front power seat switch.

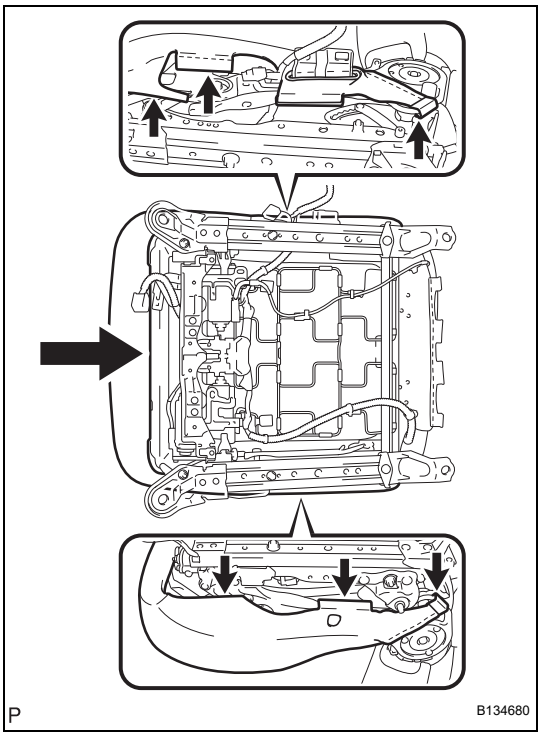


11. REMOVE FRONT SEPARATE TYPE SEAT CUSHION ASSEMBLY

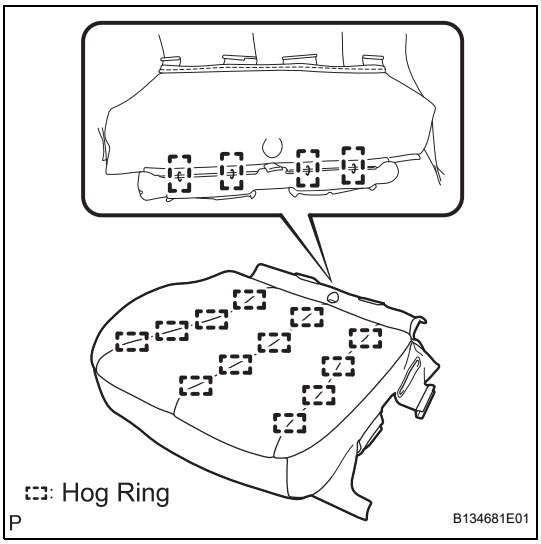
(a) Disconnect the 2 clamps.

(b) Remove the 4 hooks.

SE

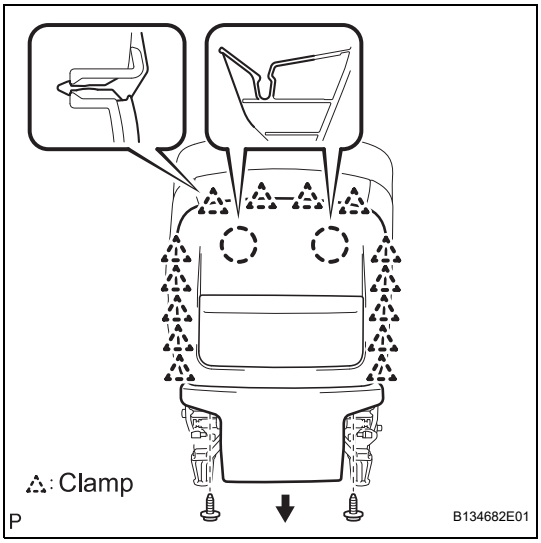


(c) Using a screwdriver, detach the hooks and remove the front separate type seat cushion assembly.



12. REMOVE FRONT SEPARATE TYPE SEAT CUSHION COVER

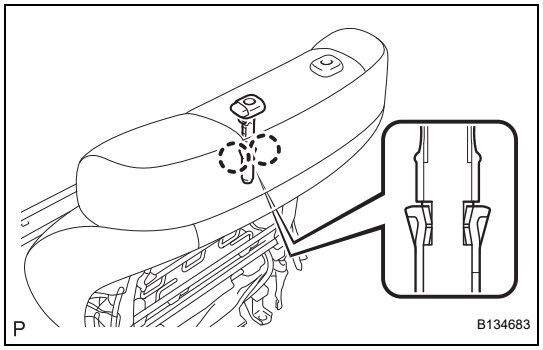
(a) Remove the 16 hog rings and front separate type seat cushion cover from the seat cushion pad.



13. REMOVE FRONT SEATBACK BOARD SUB-ASSEMBLY

(a) Remove the 2 screws.
(b) Disconnect the 14 clamps and front separate type seatback cover.
(c) Pull the seatback board in the direction indicated by the arrow in the illustration to detach the 2 claws. Then, remove the seatback board.

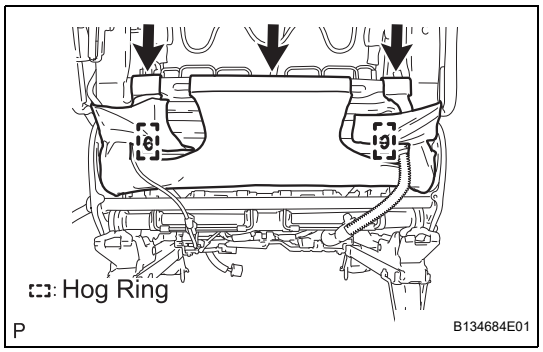
SE



14. REMOVE FRONT SEAT HEADREST SUPPORT

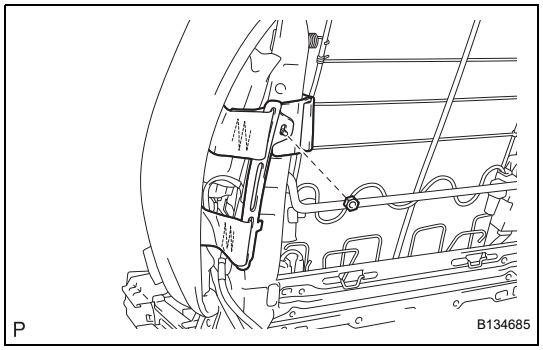
(a) Detach the 2 claws and remove the headrest support.

15. REMOVE FRONT SEAT HEADREST SUPPORT

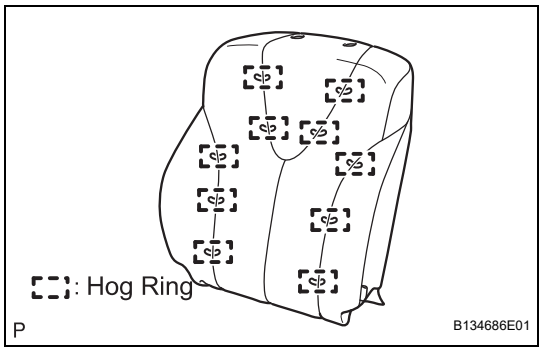


16. REMOVE FRONT SEPARATE TYPE SEATBACK ASSEMBLY

(a) Remove the 2 hog rings and 3 hooks.

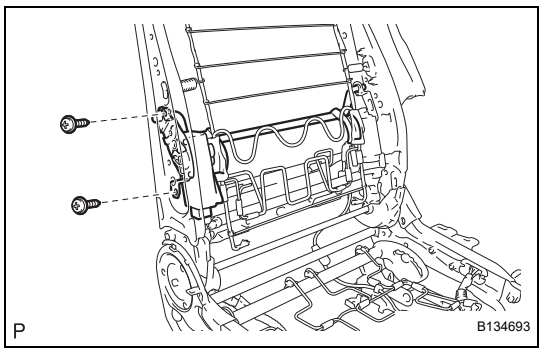


(b) Remove the nut and 2 seatback cover brackets.



17. REMOVE FRONT SEPARATE TYPE SEATBACK COVER

(a) Remove the 10 hog rings and front separate type seatback cover from the seatback pad.



18. REMOVE LUMBAR SUPPORT ADJUSTER ASSEMBLY

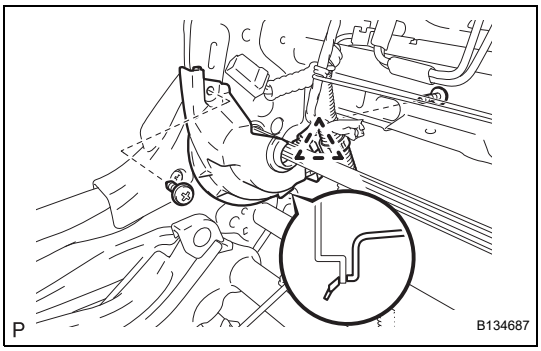
(a) Disconnect the connector.

(b) Remove the 2 screws and lumbar support adjuster assembly.

19. REMOVE RECLINING ADJUSTER INSIDE COVER RH

(a) Disconnect the harness.

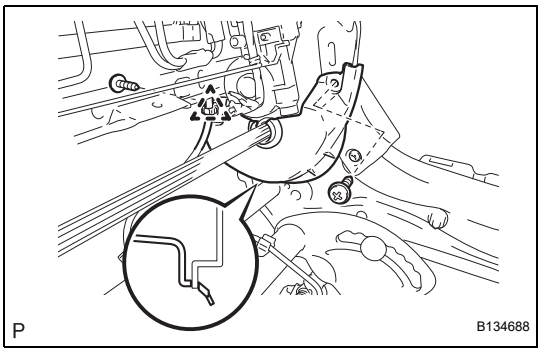
SE



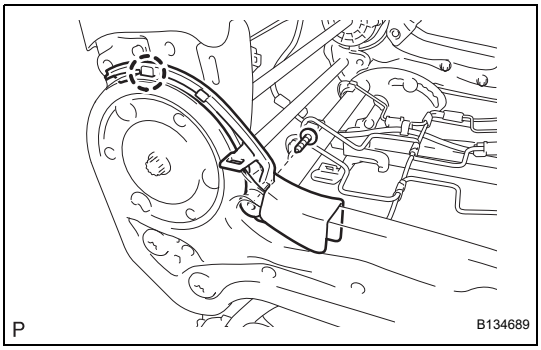
(b) Remove the 2 screws and reclining adjuster inside cover RH.

20. REMOVE RECLINING ADJUSTER INSIDE COVER LH

(a) Disconnect the harness.



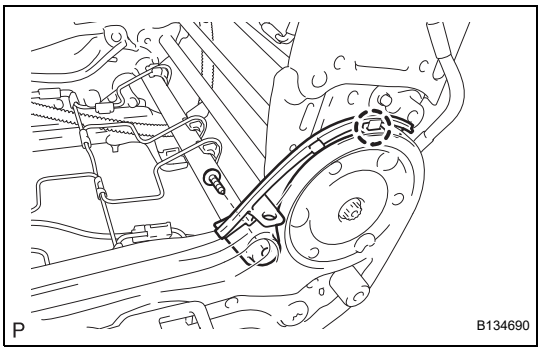
(b) Remove the 2 screws and reclining adjuster inside cover LH.



21. REMOVE SEAT RECLINING ADJUSTER INSIDE COVER RH

(a) Remove the screw.

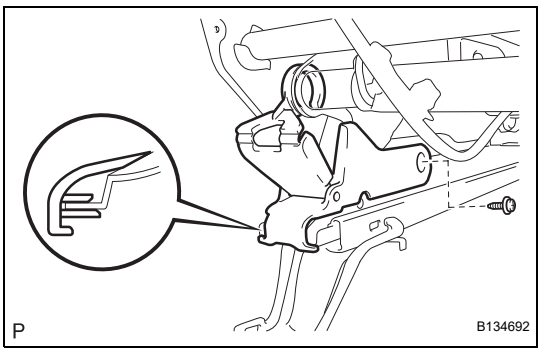
(b) Detach the claw and remove the seat reclining adjuster inside cover RH.



22. REMOVE SEAT RECLINING ADJUSTER INSIDE COVER LH

(a) Remove the screw.

(b) Detach the claw and remove the seat reclining adjuster inside cover LH.



23. REMOVE FRONT LOWER SEAT CUSHION SHIELD LH

(a) Remove the screw and detach the hook of the front lower seat cushion shield LH.

24. REMOVE FRONT LOWER SEAT CUSHION SHIELD

25. REMOVE SEAT POSITION SENSOR (for Driver Side) (See page RS-440)

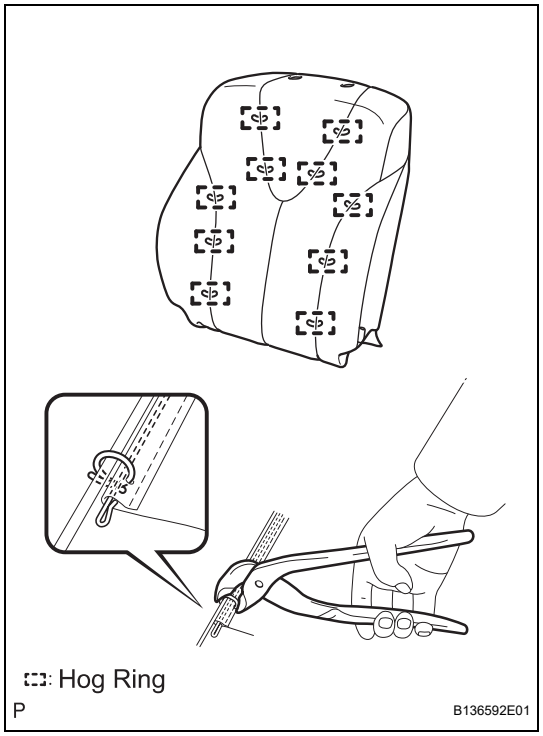
26. REMOVE FRONT SEAT WIRE

SE

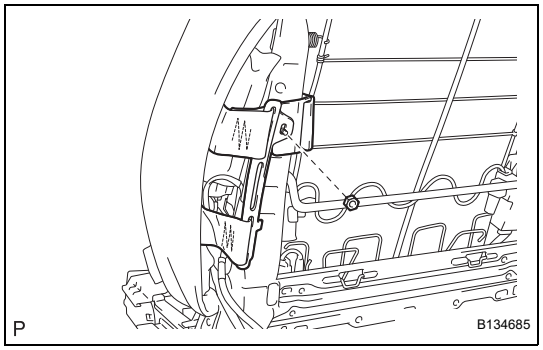
REASSEMBLY

CAUTION:
Wear protective gloves. Sharp areas on the seat adjuster may injure your hands.

1. **INSTALL FRONT SEAT WIRE**
2. **INSTALL SEAT POSITION SENSOR (for Driver Side) (See page RS-440)**
3. **INSTALL FRONT LOWER SEAT CUSHION SHIELD**
4. **INSTALL FRONT LOWER SEAT CUSHION SHIELD LH**
5. **INSTALL SEAT RECLINING ADJUSTER INSIDE COVER LH**
6. **INSTALL SEAT RECLINING ADJUSTER INSIDE COVER RH**
7. **INSTALL RECLINING ADJUSTER INSIDE COVER LH**
8. **INSTALL RECLINING ADJUSTER INSIDE COVER RH**
9. **INSTALL LUMBAR SUPPORT ADJUSTER ASSEMBLY**
10. **INSTALL FRONT SEPARATE TYPE SEATBACK COVER**
    (a) Using hog ring pliers, install the front separate type seatback cover to the front seatback pad with 16 new hog rings.
    NOTICE:
    - **Be careful not to damage the cover.**
    - **When installing the hog rings, take care to minimize wrinkles as much as possible.**



11. **INSTALL FRONT SEPARATE TYPE SEATBACK ASSEMBLY**
    (a) Fully cover the airbag with the 2 seatback cover brackets and tighten the nut.
    Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)
    NOTICE:
    - **For vehicles with side airbags, the seatback cover must be securely installed. Otherwise, the side airbags may not deploy properly.**



SE

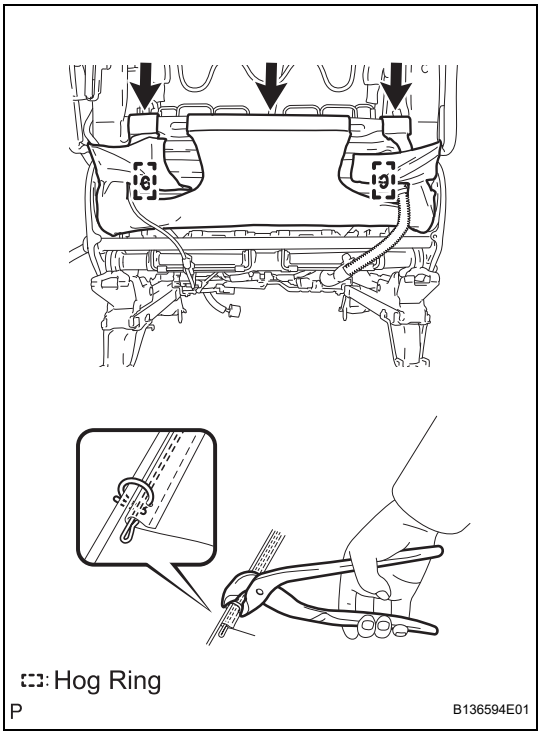
- **Make sure that the strap is not twisted after installing the bracket.**
- **Install the bracket securely.**

(b) Engage the 3 hooks.

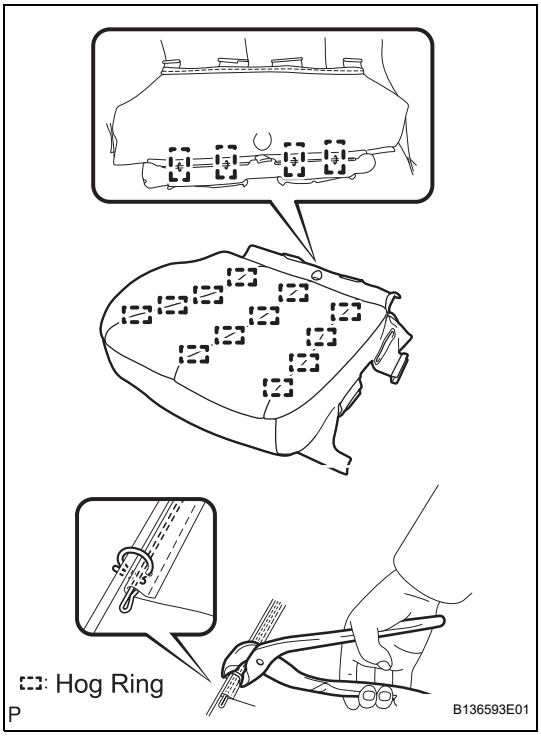
(c) Using hog ring pliers, install 2 new hog rings.

NOTICE:

- **Be careful not to damage the cover.**
- **When installing the hog rings, take care to minimize wrinkles as much as possible.**



12. **INSTALL FRONT SEAT HEADREST SUPPORT**
13. **INSTALL FRONT SEAT HEADREST SUPPORT**
14. **INSTALL FRONT SEATBACK BOARD SUB-ASSEMBLY**



15. **INSTALL FRONT SEPARATE TYPE SEAT CUSHION COVER**

(a) Using hog ring pliers, install the front separate type seat cushion cover to the front separate type seat pad with 16 new hog rings.

NOTICE:

- **Be careful not to damage the cover.**
- **When installing the hog rings, take care to minimize wrinkles as much as possible.**

16. **INSTALL FRONT SEPARATE TYPE SEAT CUSHION ASSEMBLY**
17. **INSTALL FRONT POWER SEAT SWITCH**
18. **INSTALL LOWER SEAT TRACK SPACER**
19. **INSTALL FRONT INNER SEAT CUSHION SHIELD**
20. **INSTALL FRONT LUMBAR POWER SEAT SWITCH**
21. **INSTALL FRONT SEAT INNER BELT ASSEMBLY (See page SB-18)**
22. **INSTALL FRONT INNER NO. 1 SEAT CUSHION SHIELD**
23. **INSTALL FRONT SEAT CUSHION SHIELD ASSEMBLY**
24. **INSTALL SLIDE AND VERTICAL POWER SEAT SWITCH KNOB**
25. **INSTALL RECLINING POWER SEAT SWITCH KNOB**

SE

26. **INSTALL OCCUPANT DETECTION ECU (See page RS-446)**

INSTALLATION

1. INSTALL FRONT SEAT ASSEMBLY

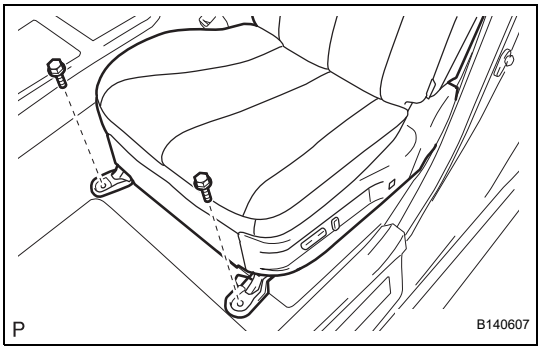
(a) Place the seat in the cabin.

(b) Connect the connectors under the seat.

(c) Connect the cable to the negative (-) battery terminal.

(d) Move the front seat assembly fully forward by operating the slide and vertical power seat switch knob.

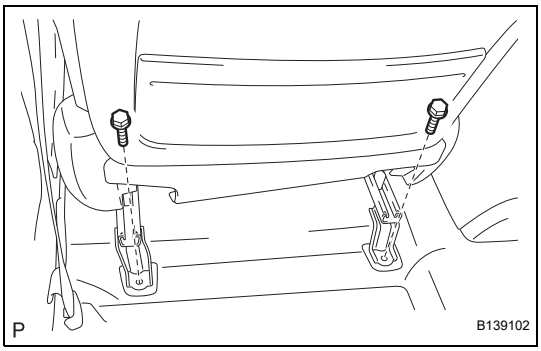
NOTICE:
Check that the seat is locked.



(e) Temporarily install the front side of the front seat assembly with the 2 bolts.

(f) Move the front seat assembly fully forward by operating the slide and vertical power seat switch knob.

NOTICE:
Check that the seat is locked.



(g) Temporarily install the rear side of the front seat assembly with the 2 bolts.

(h) Move the front seat assembly to the rearmost position by operating the slide and vertical power seat switch knob.

NOTICE:
Check that the seat is locked.

(i) Fully tighten the 2 bolts on the front side of the front seat assembly in the order of the inner side bolt and then the outer side bolt.

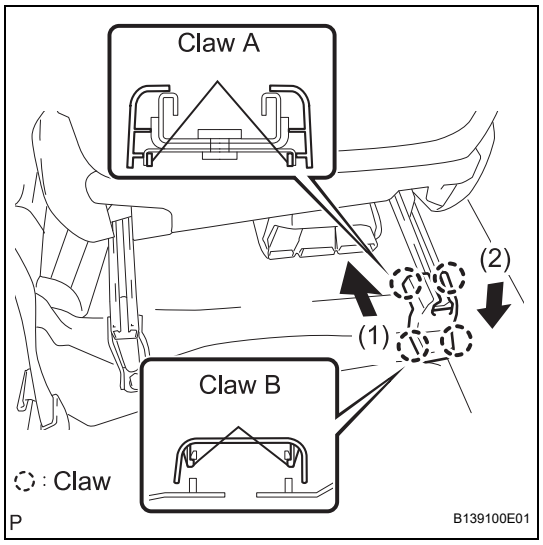
Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)

(j) Move the front seat assembly fully forward by operating the slide and vertical power seat switch knob.

NOTICE:
Check that the seat is locked.

(k) Fully tighten the 2 bolts on the rear side of the front seat assembly in the order of the inner side bolt and then the outer side bolt.

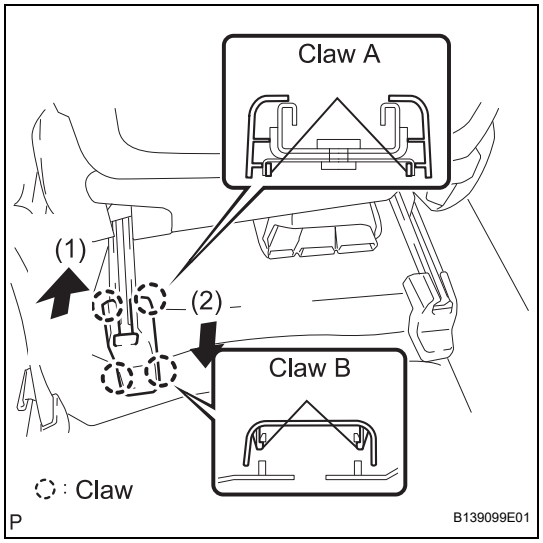
Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)



2. INSTALL INNER SEAT TRACK BRACKET COVER

(a) Slide the inner seat track bracket cover along the seat rail toward the front of the vehicle. Engage claw A to the seat rail.

(b) Push the inner seat track bracket cover to engage claw B.



3. INSTALL SEAT TRACK COVER

(a) Slide the seat track cover along the seat rail toward the front of the vehicle. Engage claw A to the seat rail.

(b) Push the seat track cover to engage claw B.

4. INSTALL FRONT SEAT HEADREST ASSEMBLY

5. PERFORM INITIALIZATION

NOTICE:

Some systems need initialization after reconnecting the cable to the negative battery terminal (See page IN-43).

6. PERFORM ZERO POINT CALIBRATION AND SENSITIVITY CHECK (for Front Passenger Seat)

(See page RS-239)

7. INSPECT SRS WARNING LIGHT

Inspect the SRS warning light. (See page RS-33)

8. INSPECT FRONT SEAT ASSEMBLY

(a) Inspect the power seat operation.

(b) Inspect the seat heater operation (with seat heater system).

(1) Turn the ignition switch on (IG).

(2) Turn the seat heater switch ON.

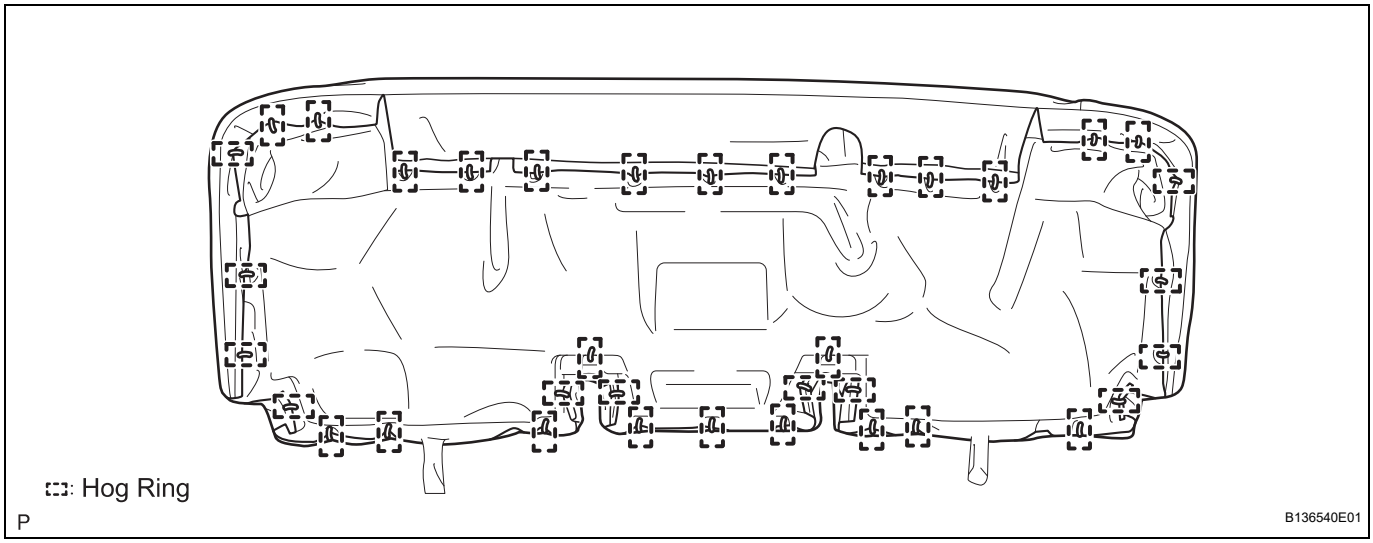
(3) Wait 5 minutes or more and confirm that the seat surface becomes warm.

SE

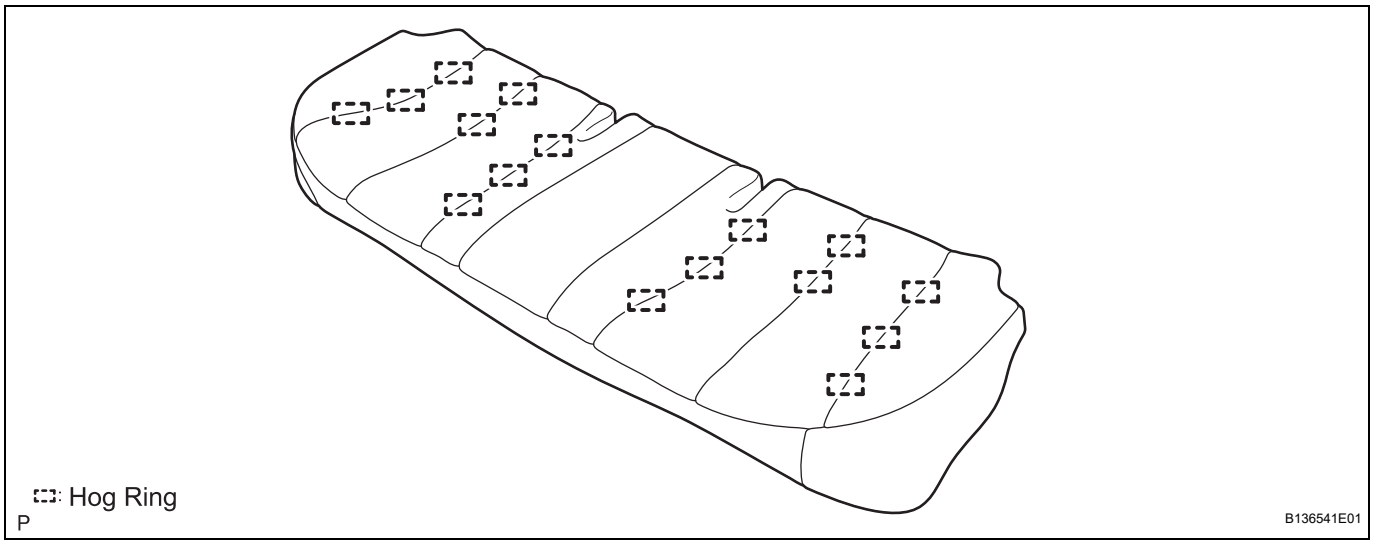
DISASSEMBLY

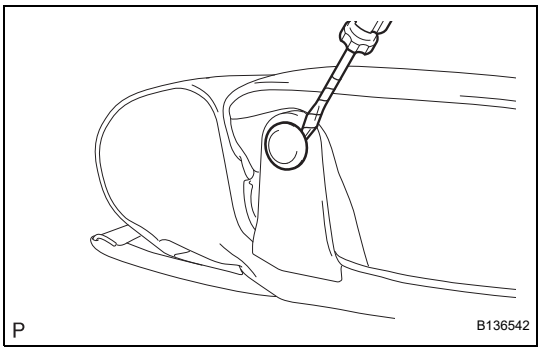
1. REMOVE REAR BENCH TYPE SEAT CUSHION COVER

(a) Remove the 36 hog rings.



(b) Remove the 16 hog rings and rear bench type seat cushion cover.



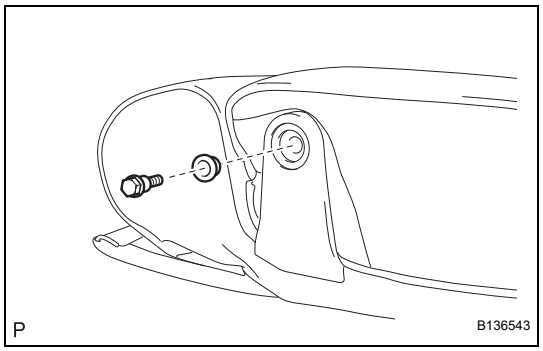


2. REMOVE NO. 1 SEAT ARMREST CAP

(a) Using a screwdriver, remove the No. 1 seat armrest cap.

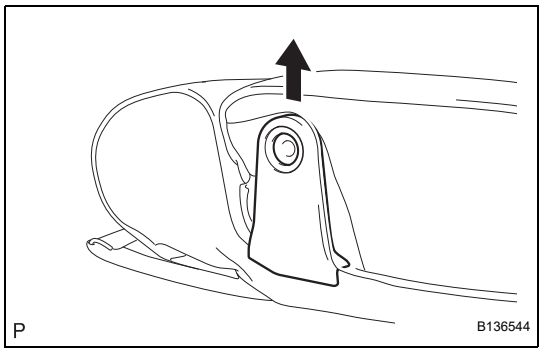
HINT:

Tape the screwdriver tip before use.

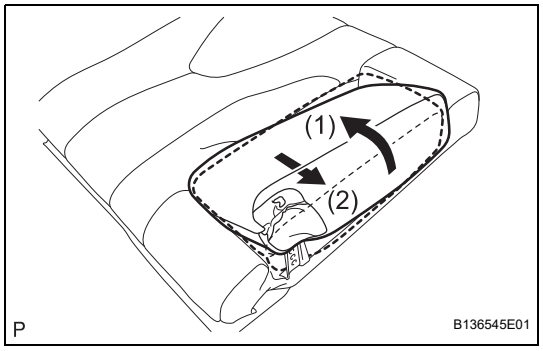


3. REMOVE REAR SEATBACK HINGE COVER

(a) Remove the bolt and bush.

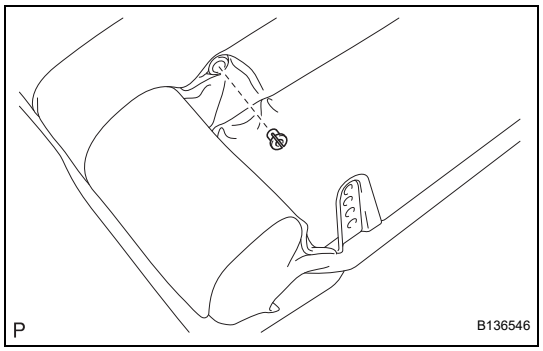


(b) Remove the rear seatback hinge cover.

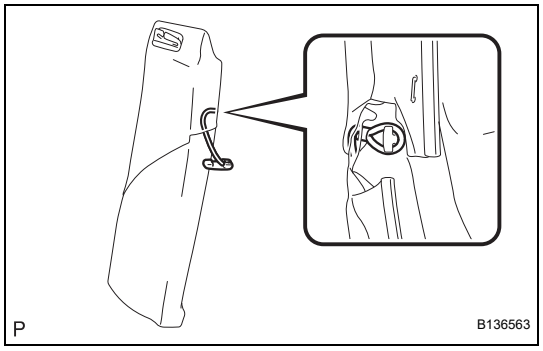


4. REMOVE REAR CENTER SEAT ARMREST ASSEMBLY

(a) Remove the rear center seat armrest assembly as shown in the illustration.



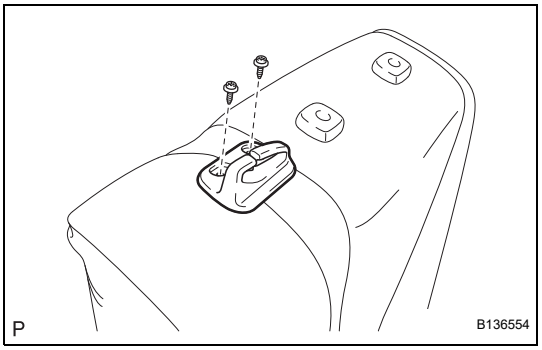
(b) Remove the bush.



5. REMOVE REAR SEAT BELT HOOK

(a) Remove the rear seat belt hook.
HINT:
Use the same procedures for the RH side and LH side.

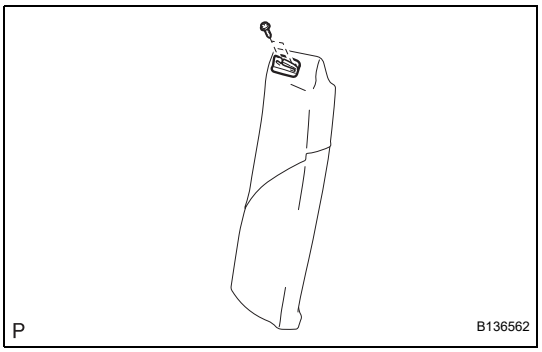
SE



6. REMOVE REAR SEAT SHOULDER BELT GUIDE LH

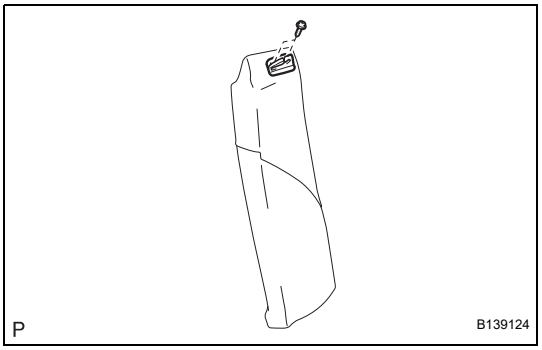
(a) Seatback:

(1) Remove the 2 screws and rear seat shoulder belt guide LH.



(b) Side Seatback:

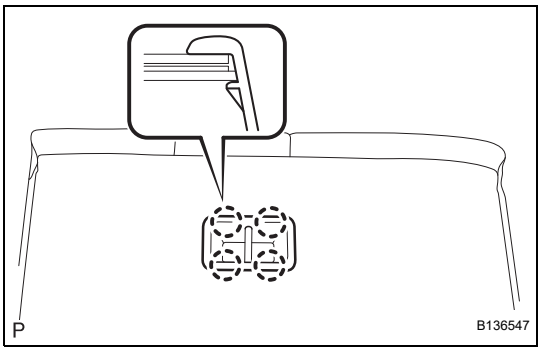
(1) Remove the 2 screws and rear seat shoulder belt guide LH.



7. REMOVE REAR SEAT SHOULDER BELT GUIDE RH

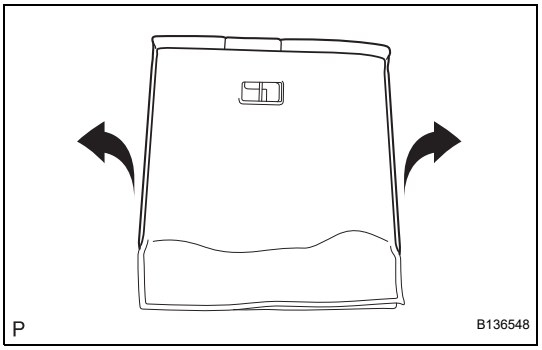
(a) Remove the 2 screws and rear seat shoulder belt guide RH.

SE



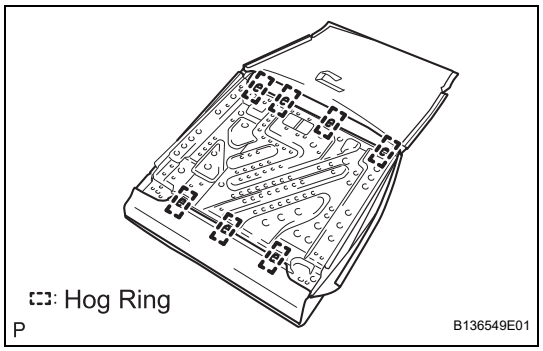
8. REMOVE REAR SEATBACK LOCK BEZEL UPPER (for RH Side)

(a) Disengage the 4 claws and remove the rear seatback lock bezel upper.

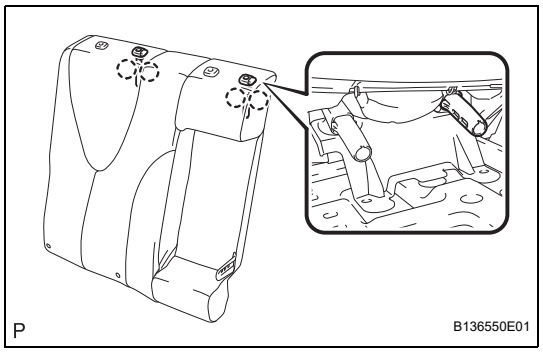


9. REMOVE REAR SEAT HEADREST SUPPORT (for RH Side)

(a) Disengage the 2 hooks and separate the rear separate type seatback cover.

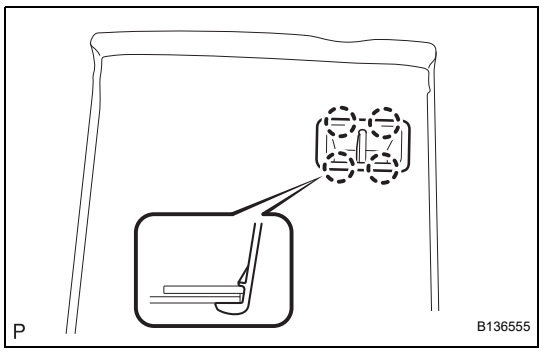


(b) Remove the 7 hog rings.



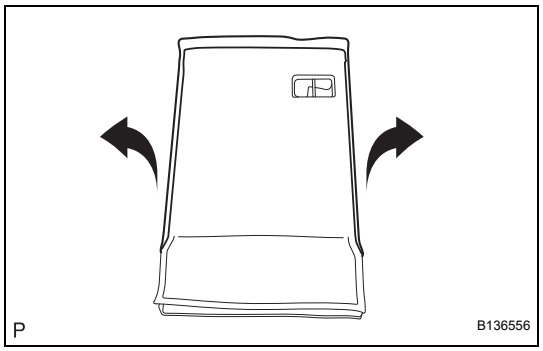
(c) Disengage the 4 claws and remove the 2 rear seat headrest supports.

10. REMOVE REAR SEAT HEADREST SUPPORT (for RH Side)



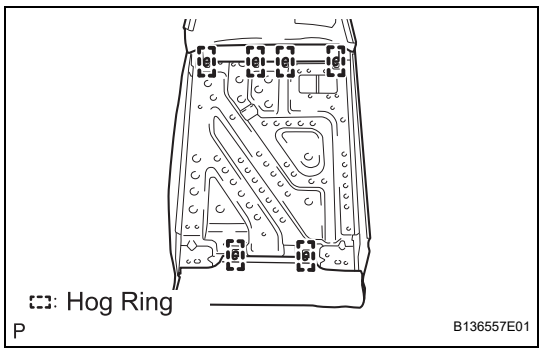
11. REMOVE REAR SEATBACK LOCK BEZEL UPPER (for LH Side)

(a) Disengage the 4 claws and remove the rear seatback lock bezel upper.



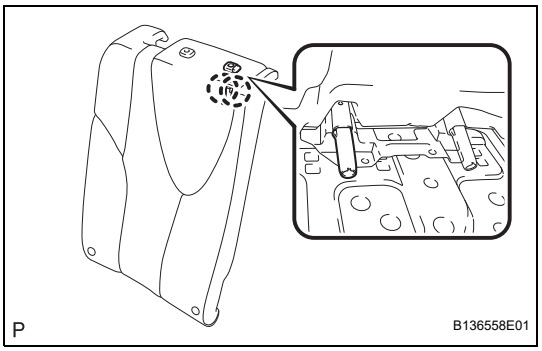
12. REMOVE REAR SEAT HEADREST SUPPORT (for LH Side)

(a) Disengage the 2 hooks and separate the rear separate type seatback cover.



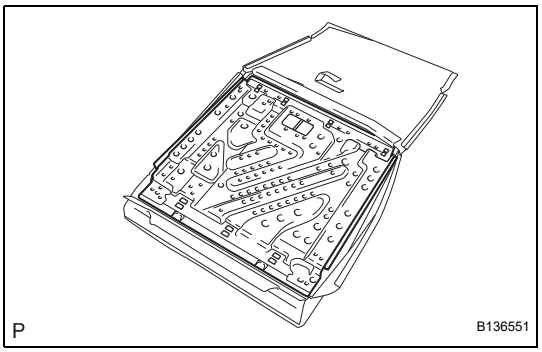
(b) Remove the 6 hog rings.

SE



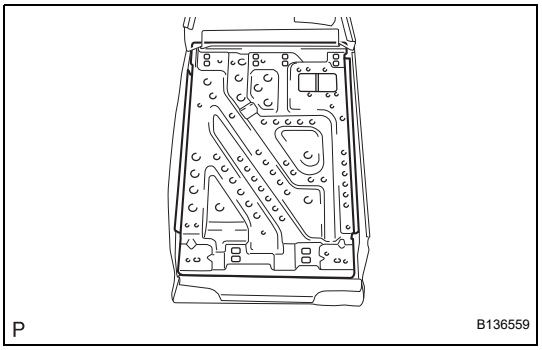
(c) Disengage the 2 claws and remove the rear seat headrest support.

13. REMOVE REAR SEAT HEADREST SUPPORT (for LH Side)



14. REMOVE REAR SEATBACK FRAME SUB-ASSEMBLY RH

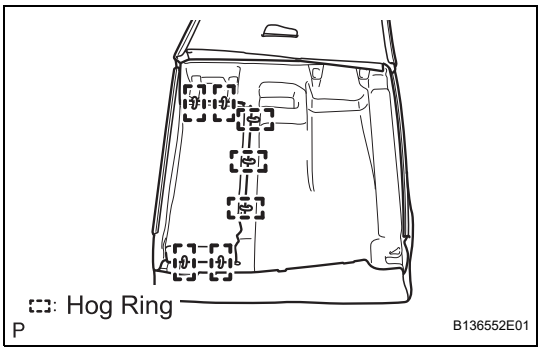
(a) Remove the rear seatback frame sub-assembly RH.



15. REMOVE REAR SEATBACK FRAME SUB-ASSEMBLY LH

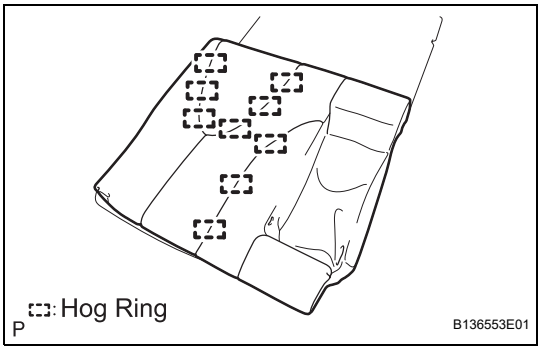
(a) Remove the rear seatback frame sub-assembly LH.

SE



16. REMOVE REAR SEPARATE TYPE SEATBACK COVER (for RH Side)

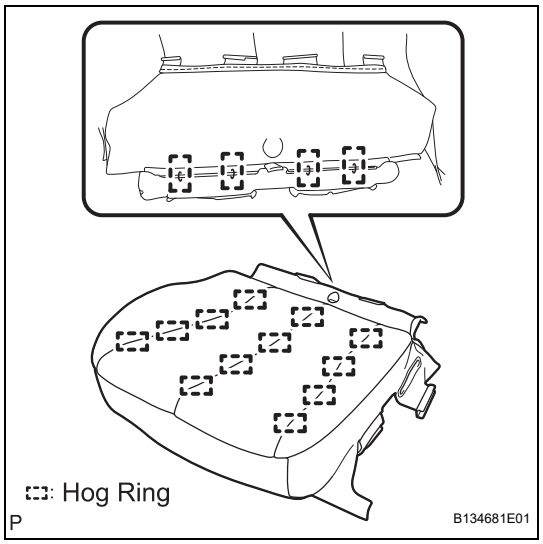
(a) Remove the 7 hog rings.

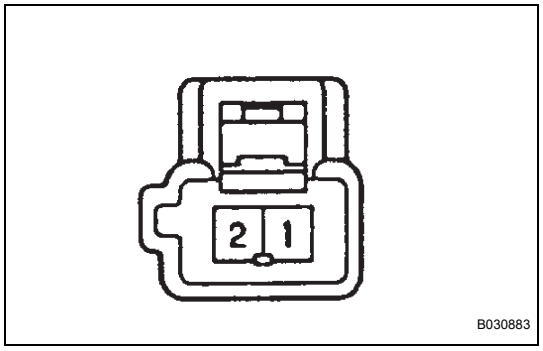


(b) Remove the 9 hog rings and rear separate type seatback cover.

REMOVAL

1. **REMOVE FRONT SEAT HEADREST ASSEMBLY**
2. **REMOVE SEAT TRACK COVER (See page SE-29)**
3. **REMOVE INNER SEAT TRACK BRACKET COVER (See page SE-29)**
4. **REMOVE FRONT SEAT ASSEMBLY (See page SE-29)**
5. **REMOVE RECLINING POWER SEAT SWITCH KNOB (See page SE-30)**
6. **REMOVE SLIDE AND VERTICAL POWER SEAT SWITCH KNOB (See page SE-30)**
7. **REMOVE FRONT SEAT CUSHION SHIELD ASSEMBLY (See page SE-30)**
8. **REMOVE FRONT SEAT INNER BELT ASSEMBLY (See page SB-17)**
9. **REMOVE FRONT INNER SEAT CUSHION SHIELD (See page SE-31)**
10. **REMOVE FRONT SEPARATE TYPE SEAT CUSHION ASSEMBLY (See page SE-32)**
11. **REMOVE FRONT SEPARATE TYPE SEAT CUSHION COVER**
    (a) Remove the 16 hog rings and seat cushion cover from the seat cushion pad.



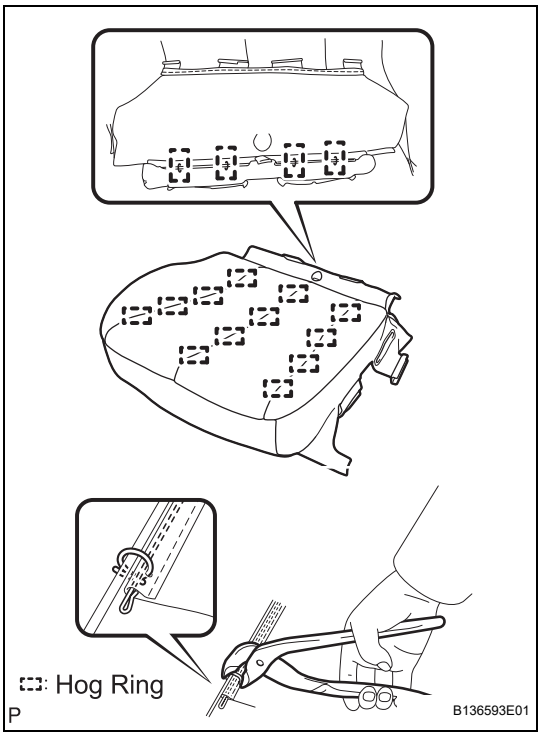


INSPECTION

1. **INSPECT FRONT SEAT CUSHION HEATER**
   (a) Measure the resistance according to the value(s) in the table below.
   Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Always	Below 1 Ω

SE



INSTALLATION

1. **INSTALL FRONT SEPARATE TYPE SEAT CUSHION COVER**
   (a) Using hog ring pliers, install 16 new hog rings.
   NOTICE:
   - **Be careful not to damage the cover.**
   - **When installing the hog rings, take care to minimize wrinkles as much as possible.**
2. **INSTALL FRONT SEPARATE TYPE SEAT CUSHION ASSEMBLY**
3. **INSTALL FRONT INNER SEAT CUSHION SHIELD**
4. **INSTALL FRONT SEAT INNER BELT ASSEMBLY (See page SB-18)**
5. **INSTALL FRONT SEAT CUSHION SHIELD ASSEMBLY**
6. **INSTALL SLIDE AND VERTICAL POWER SEAT SWITCH KNOB**
7. **INSTALL RECLINING POWER SEAT SWITCH KNOB**
8. **INSTALL FRONT SEAT ASSEMBLY (See page SE-38)**
9. **INSTALL INNER SEAT TRACK BRACKET COVER (See page SE-39)**
10. **INSTALL SEAT TRACK COVER (See page SE-39)**
11. **INSTALL FRONT SEAT HEADREST ASSEMBLY**
12. **PERFORM INITIALIZATION**
    NOTICE:
    Some systems need initialization after reconnecting the cable to the negative battery terminal (See page IN-43).
13. **PERFORM ZERO POINT CALIBRATION AND SENSITIVITY CHECK (for Front Passenger Seat)** (See page RS-239)
14. **INSPECT SRS WARNING LIGHT**
    Inspect SRS warning light. (See page RS-33)
15. **INSPECT FRONT SEAT ASSEMBLY (See page SE-39)**

SE

HOW TO PROCEED WITH TROUBLESHOOTING

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	PROBLEM SYMPTOM CONFIRMATION

Result

Result	Proceed to
Malfunction does not occur	A
Malfunction occurs	B

B → GO TO STEP 4

A

3	SYMPTOM SIMULATION

NEXT

4	CHECK FOR DIAGNOSTICS TROUBLE CODE OF SFI SYSTEM

(a) When no code is output, proceed to A.
(b) When either of code P1453 or P2451 is output, proceed to B (See page ES-45).

B → GO TO SFI SYSTEM

A

5	PROBLEM SYMPTOMS TABLE

(a) When the problem is not listed on the problem symptoms table, proceed to A.
(b) When the problem is listed on the problem symptoms table, proceed to B.

B → GO TO STEP 7

A

6	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) DATA LIST / ACTIVE TEST (See page ED-14)
(b) TERMINAL OF ECU (See page ED-12)

NEXT

7	**ADJUSTMENT, REPAIR OR REPLACE**

NEXT

8	**CONFIRMATION TEST**

NEXT

END

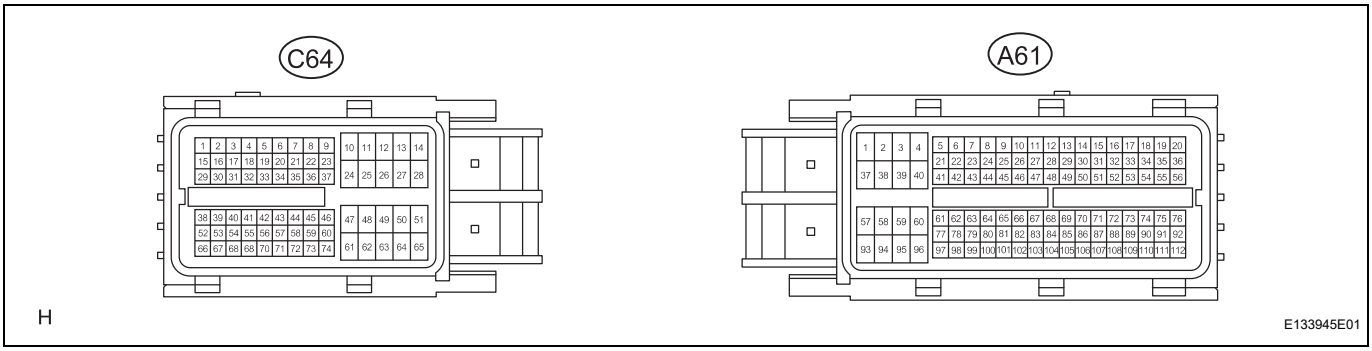
PROBLEM SYMPTOMS TABLE

FUEL LID OPENER SYSTEM

Symptom	Suspected Area	See page
Multi-information display does not display	1. Fuel lid opener switch circuit	ED-16
	2. Hybrid vehicle control ECU	-
	3. Combination meter	-
"CLOSE FUEL LID" remains displayed	1. Check and correct fitting of the fuel lid	-
	2. Fuel lid courtesy switch circuit	ED-24
	3. Hybrid vehicle control ECU	-
"PLEASE WAIT NOW OPENING" remains displayed (with one bar left)	SFI system	ES-8
Fuel lid opener does not operate	1. Fuel lid opener switch circuit	ED-16
	2. Fuel lid opener motor circuit	ED-20
	3. SFI system	ES-8

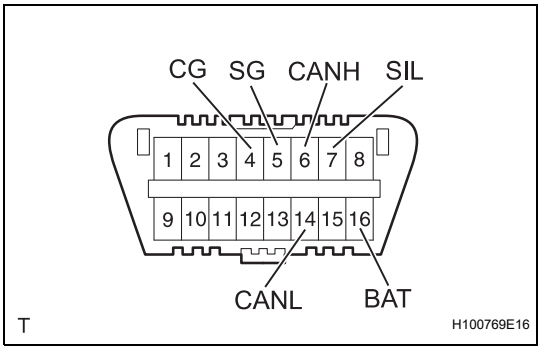
TERMINALS OF ECU

1. HYBRID VEHICLE CONTROL ECU



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
LST1 (A61-23) - E1 (C64-14)	O - W-B	Fuel lid opener switch signal output	Power switch on (IG), fuel lid opener switch is pressed	Below 1 V
			Power switch on (IG), fuel lid opener switch is not pressed	10 to 14 V
LST2 (A61-24) - E1 (C64-14)	G - W-B	Fuel lid courtesy switch signal output	Power switch on (IG), fuel lid is closed	Below 1 V
			Power switch on (IG), fuel lid is opened	10 to 14 V
FUO (A61-38) - E1 (C64-14)	LG - W-B	Fuel lid motor signal	Fuel lid motor operating	Below 1 V
			Fuel lid motor not operating	10 to 14 V
FUEL (A61-48) - E1 (C64-14)	L - W-B	Fuel lid opener switch signal input	Power switch on (IG), fuel lid opener switch is pressed	Below 1 V
			Power switch on (IG), fuel lid opener switch is not pressed	10 to 14 V
LIDO (A61-49) - E1 (C64-14)	W - W-B	Fuel lid courtesy switch signal input	Power switch on (IG), fuel lid is closed	Below 1 V
			Power switch on (IG), fuel lid is opened	10 to 14 V

ED



DIAGNOSIS SYSTEM

1. CHECK DLC3

(a) The vehicle's ECU uses ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

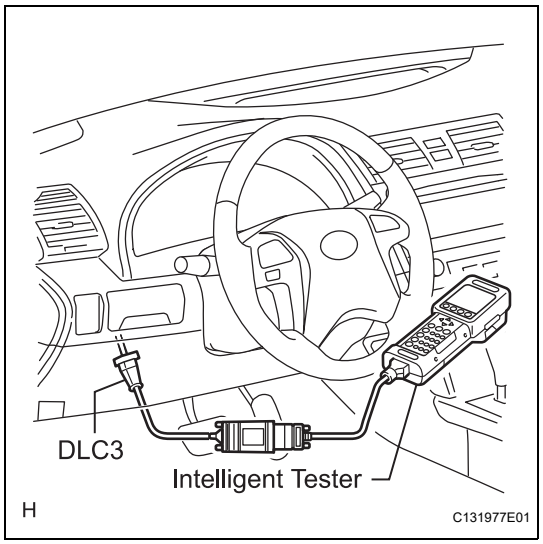
Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Power switch off*	54 to 69 Ω

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
CANH (6) - CG (4)	HIGH-level CAN bus line	Power switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Power switch off*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Power switch off*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Power switch off*	6 kΩ or higher

NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.



(b) Connect the cable of the intelligent tester (with CAN VIM) to the DLC3, turn the power switch on (IG) and attempt to use the intelligent tester. If the screen displays a communication error message, a problem exists in the vehicle side or tester side.

HINT:

- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself. Consult the Service Department listed in the tool's instruction manual.

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

By reading the DATA LIST displayed on an intelligent tester, you can check values, including those of the switches, sensors, and actuators, without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method of shortening diagnostic time.

NOTICE:

In the table below, the values listed under Normal Condition are reference only. Do not depend solely on these values when determining whether or not a part is faulty.

(a) Put the engine in inspection mode (See page ES-11).

(b) Warm up the engine.

(c) Turn the power switch off.

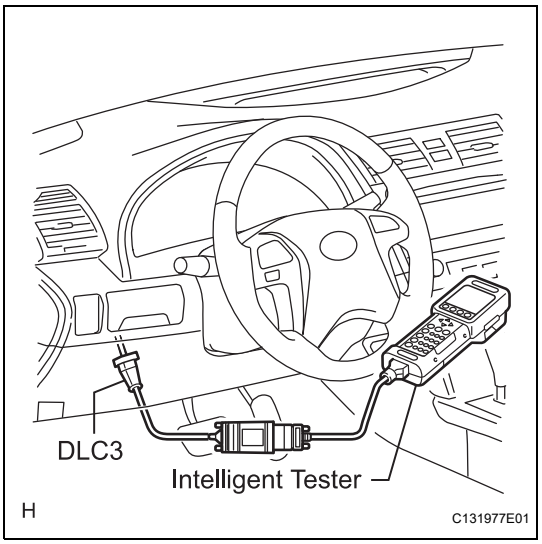
(d) Connect the intelligent tester (with CAN VIM) to the DLC3.

(e) Turn the power switch on (IG).

(f) Turn the tester on.

(g) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.

(h) Check the values by referring to the table below.



ED

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
FUEL LID	Fuel lid position switch: Open or Close	ON: Fuel lid is opened OFF: Fuel lid is closed	-
FUEL LID SW	Fuel lid position switch: ON or OFF	ON: Fuel lid opener switch is pressed OFF: Fuel lid opener switch is not pressed	-

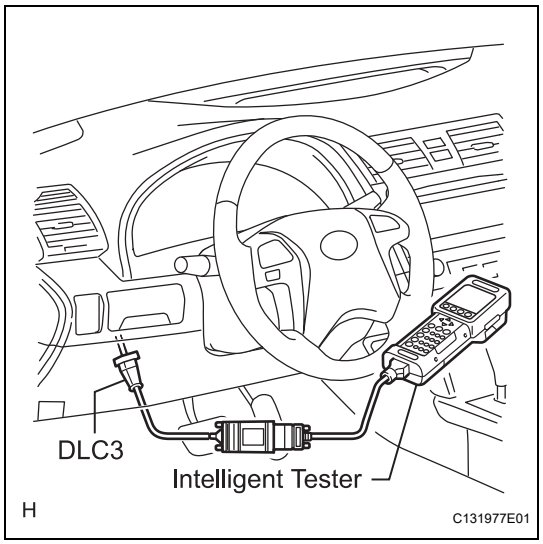
2. ACTIVE TEST

HINT:

Performing an ACTIVE TEST enables components including the relays, VSV (Vacuum Switching Valve) and actuators, to be operated without removing any parts. The ACTIVE TEST can be performed with an intelligent tester. Performing an ACTIVE TEST as the first step in troubleshooting is one method of shortening diagnostic time.

DATA LIST can be displayed during ACTIVE TEST.

(a) Put the engine in inspection mode (See page ES-11).



(b) Connect the intelligent tester (with CAN VIM) to the DLC3.
(c) Turn the power switch on (IG).
(d) Turn the tester on.
(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
(f) Perform the ACTIVE TEST by referring to the table below.

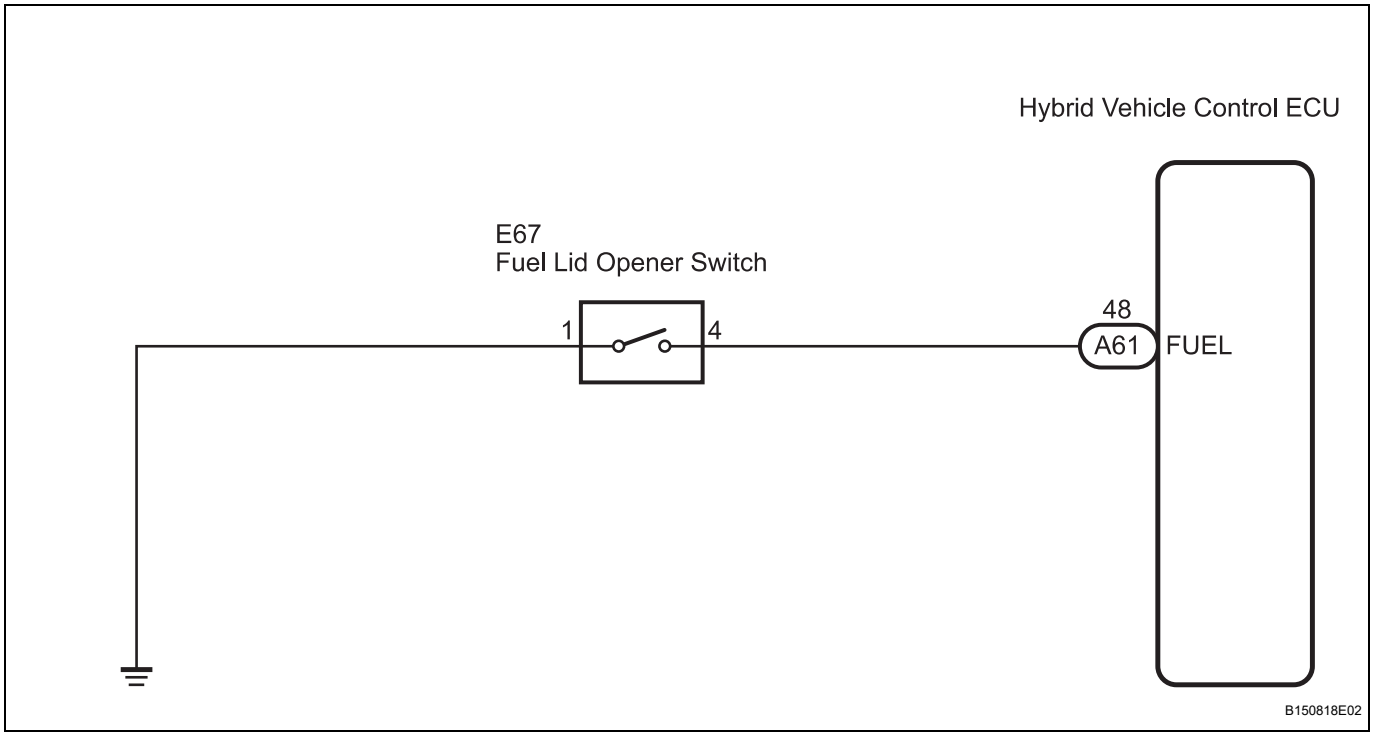
Tester Display	Test Part	Control Range	Diagnostic Note
FUEL FILLER OPN	Fuel lid opener control	ON: Open	-

Fuel Lid Opening Switch Circuit

DESCRIPTION

The hybrid vehicle control ECU detects the condition of the fuel lid opener switch.

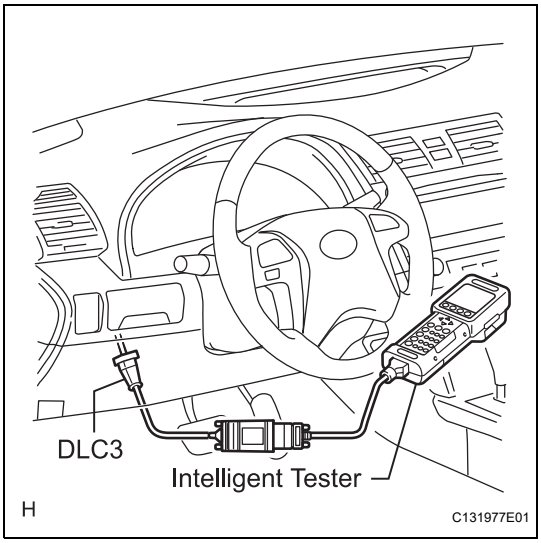
WIRING DIAGRAM



INSPECTION PROCEDURE

ED

1	READ VALUE OF INTELLIGENT TESTER



(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.

(c) Select FUEL LID SW in the DATA LIST and read the tester display.

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
FUEL LID SW	Fuel lid opener switch: ON or OFF	ON: Fuel lid opener switch is pressed OFF: Fuel lid opener switch is not pressed	-

OK:
ON or OFF appears on the screen according to the switch condition.

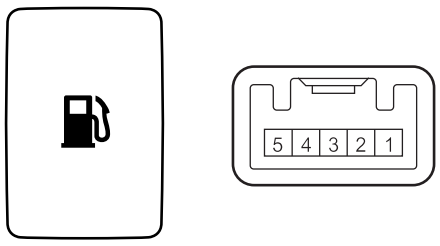
NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page ED-12)

2 INSPECT FUEL LID OPENER SWITCH

Fuel Lid Opener Switch:



(a) Remove the fuel lid opener switch (See page ED-108).
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

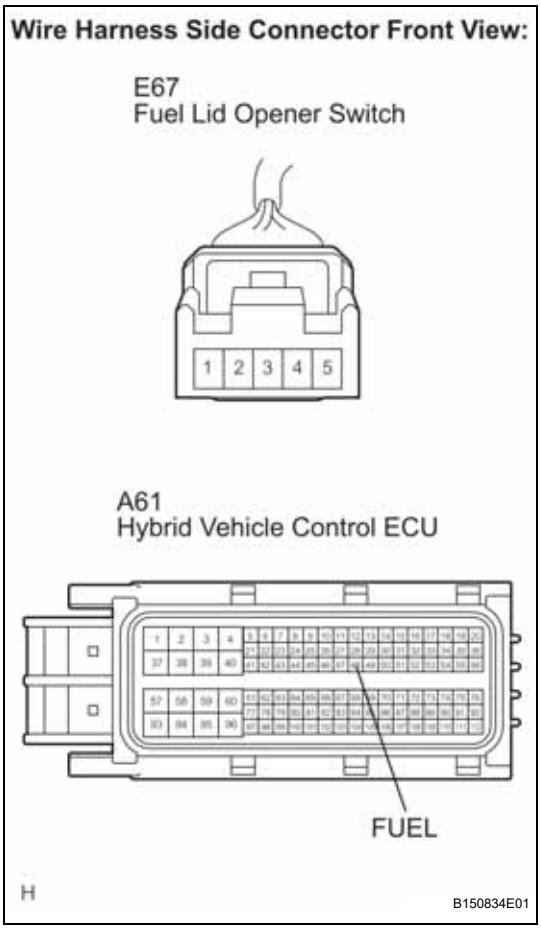
Tester Connection	Condition	Specified Condition
1 - 4	Fuel lid opener switch is not pressed	10 kΩ or higher
	Fuel lid opener switch is pressed	Below 1 Ω

NG → **REPLACE FUEL LID OPENER SWITCH (See page ED-108)**

OK

ED

3	CHECK HARNESS AND CONNECTOR (FUEL LID OPENER SWITCH - HYBRID VEHICLE CONTROL ECU)



(a) Disconnect the A61 ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

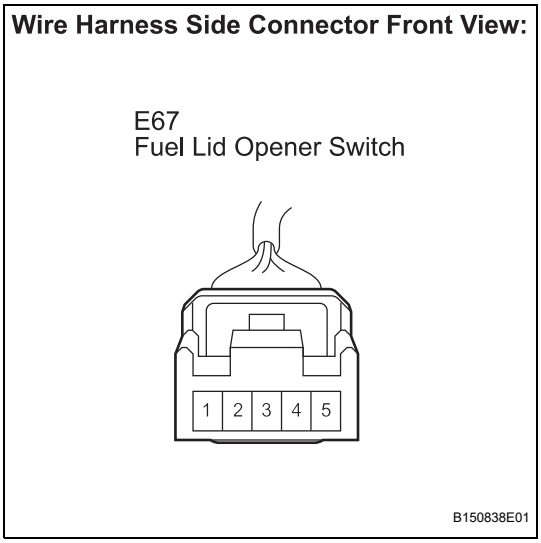
Tester Connection	Condition	Specified Condition
E67-4 - A61-48 (FUEL)	Always	Below 1 Ω
E67-4 - Body ground		10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

ED

4	CHECK HARNESS AND CONNECTOR (FUEL LID OPENER SWITCH - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E67-1 - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

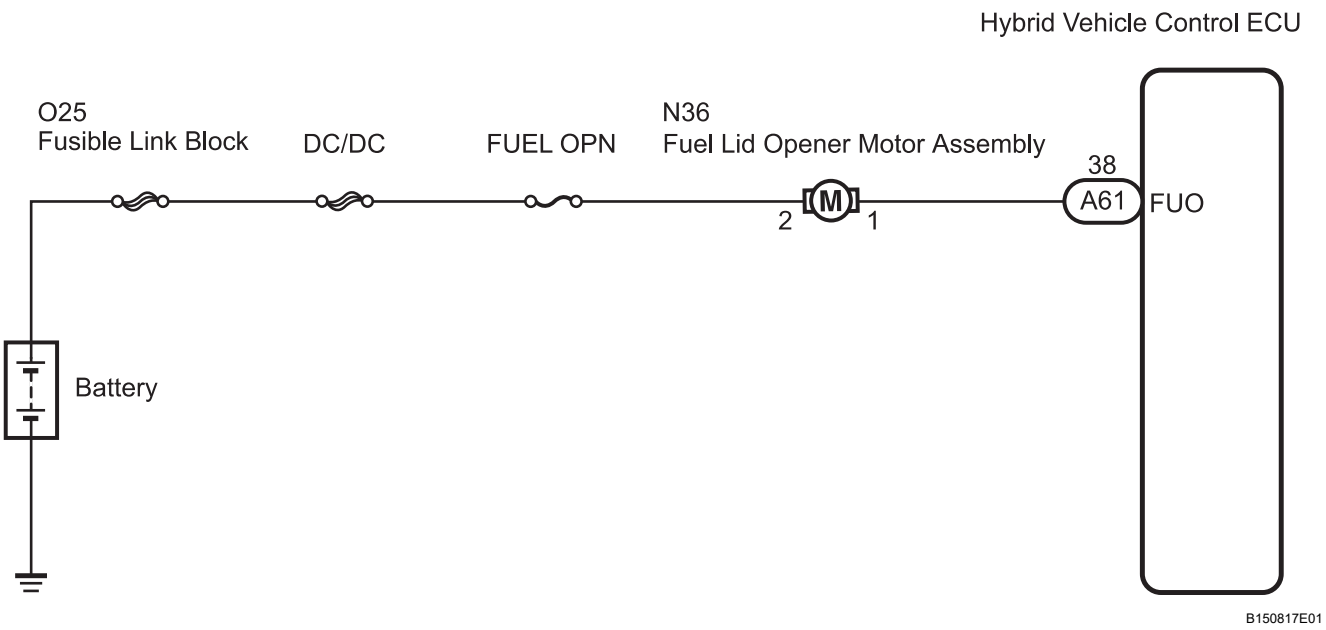
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page ED-12)

Fuel Lid Opener Motor Circuit

DESCRIPTION

The hybrid vehicle control ECU receives signals from the fuel lid opener switch, it actives the fuel lid opener motor.

WIRING DIAGRAM



INSPECTION PROCEDURE

ED

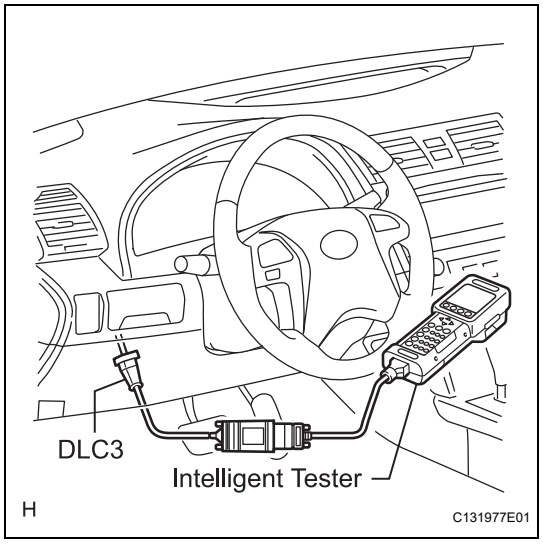
1	INSPECT FUSE (FUEL OPN)

(a) Remove the FUEL OPN fuse from the instrument pane J/B.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE (FUEL OPN)**

OK

2 PERFORM ACTIVE TEST BY INTELLIGENT TESTER



(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Perform the ACTIVE TEST according to the tester display.

Tester Display	Test Part	Control Range	Diagnostic Note
FUEL FILLER OPN	Fuel lid opener control	ON: Open	-

OK:
Fuel lid opens.

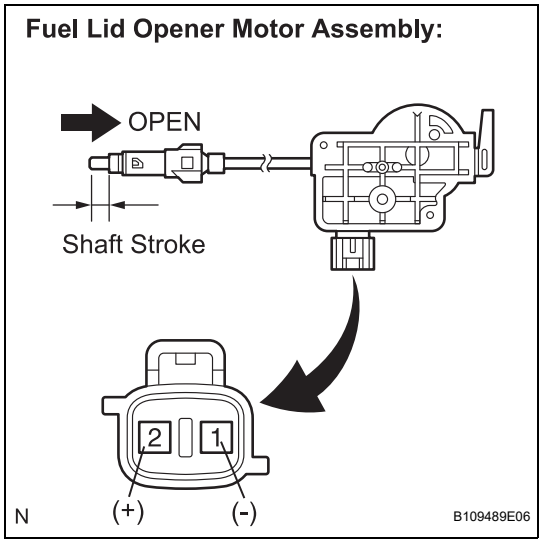
NG → **Go to step 3**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page ED-12)

3 INSPECT FUEL LID OPENER MOTOR ASSEMBLY

Fuel Lid Opener Motor Assembly:



(a) Remove the fuel lid opener motor assembly (See page ED-106).
(b) Apply battery voltage to the lock terminals and check that the motor operates and the shaft moves in the open direction.
OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 1	Motor operates and shaft moves in open direction

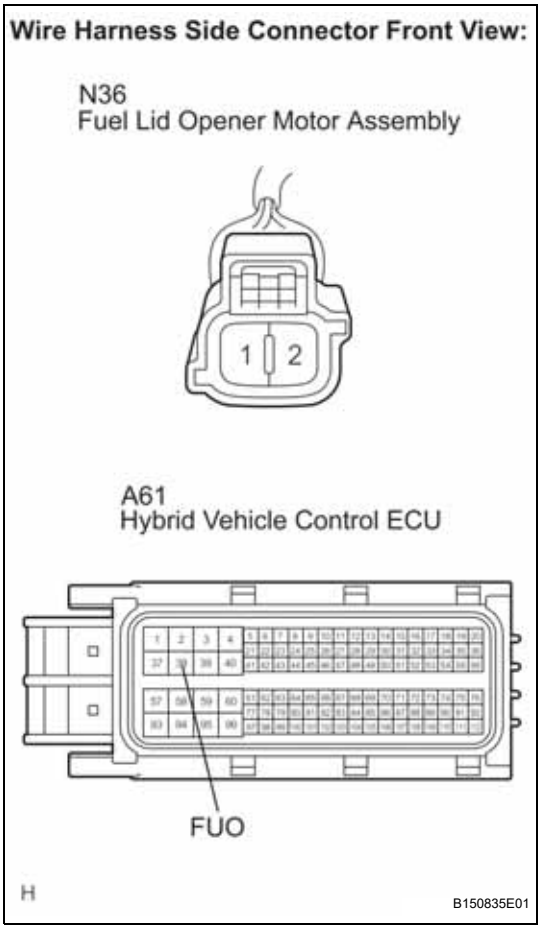
(c) Measure the shaft stroke.
Standard:
10.3 mm (0.406 in.) or more
If the result is not as specified, replace the motor assembly.

NG → **REPLACE FUEL LID OPENER MOTOR ASSEMBLY (See page ED-106)**

ED

OK

4	CHECK HARNESS AND CONNECTOR (FUEL LID OPENER MOTOR - HYBRID VEHICLE CONTROL ECU)



(a) Disconnect the A61 ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

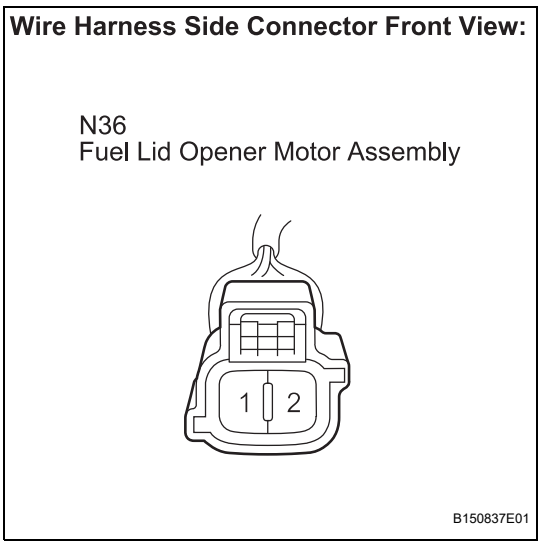
Tester Connection	Condition	Specified Condition
N36-1 - A61-38 (FUO)	Always	Below 1 Ω
N36-1 - Body ground		10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

ED

OK

5	CHECK HARNESS AND CONNECTOR (FUEL LID OPENER MOTOR - BATTERY)



(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
N36-2 - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

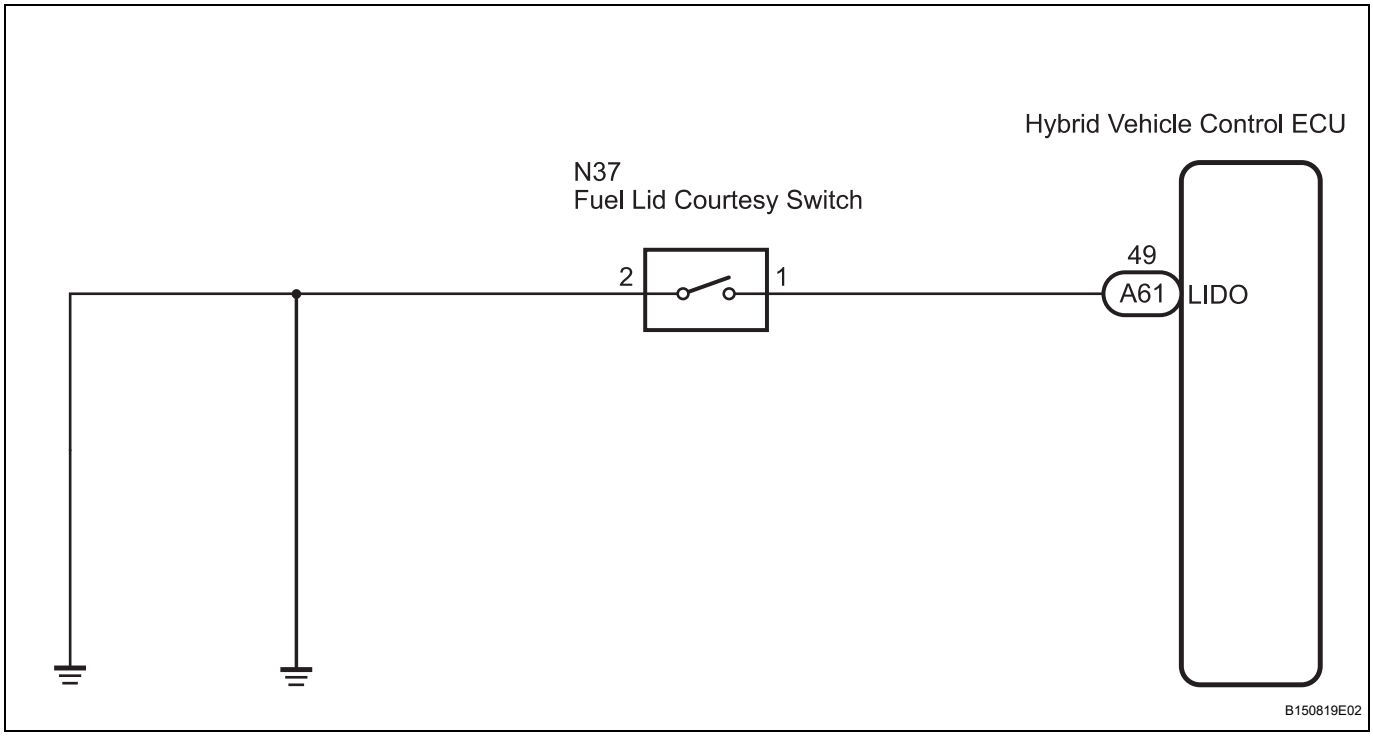
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page ED-12)

Fuel Lid Courtesy Switch Circuit

DESCRIPTION

The hybrid vehicle control ECU detects the condition of the fuel lid courtesy switch.

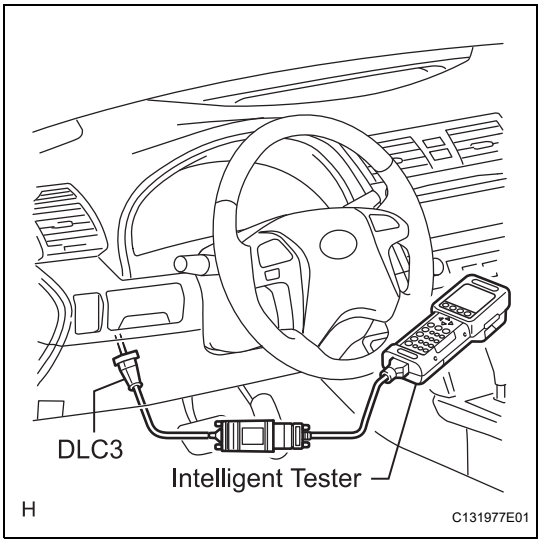
WIRING DIAGRAM



INSPECTION PROCEDURE

ED

1	READ VALUE OF INTELLIGENT TESTER



(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Select FUEL LID in the DATA LIST and read the tester display.

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
FUEL LID	Fuel lid courtesy switch: ON or OFF	ON: Fuel lid is opened OFF: Fuel lid is not closed	-

OK:
ON or OFF appears on the screen according to the fuel lid condition.

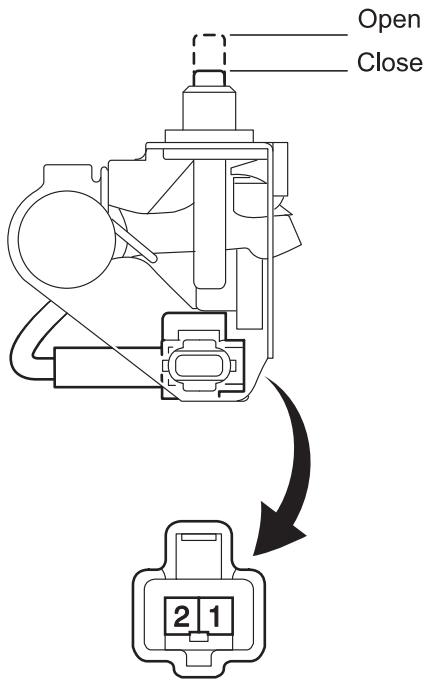
NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page ED-12)

2 INSPECT FUEL LID COURTESY SWITCH

Fuel Lid Courtesy Switch:



N B110870E04

(a) Remove the fuel lid courtesy switch (See page ED-111).
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Courtesy switch pushed (Fuel lid closed)	Below 1 Ω
	Courtesy switch free (Fuel lid open)	10 kΩ or higher

NG → **REPLACE FUEL LID COURTESY SWITCH (See page ED-111)**

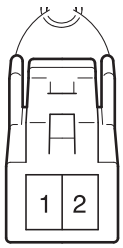
OK

ED

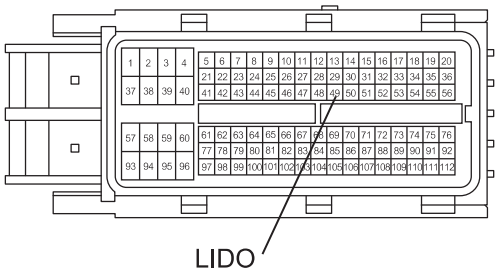
3	CHECK HARNESS AND CONNECTOR (FUEL LID COURTESY SWITCH - HYBRID VEHICLE CONTROL ECU)

Wire Harness Side Connector Front View:

N37 Fuel Lid Courtesy Switch



A61
Hybrid Vehicle Control ECU



B150820E01

(a) Disconnect the A61 ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
N37-1 - A61-49 (LIDO)	Always	Below 1 Ω
N37-1 - Body ground		10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

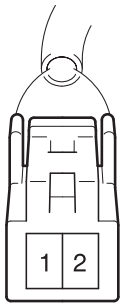
OK

ED

4	CHECK HARNESS AND CONNECTOR (FUEL LID COURTESY SWITCH BODY GROUND)

Wire Harness Side Connector Front View:

N37
Fuel Lid Courtesy Switch



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B139172E02

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
N37-2 - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page ED-12)

INSTALLATION

NOTICE:

- **Avoid touching the stroke portions of the rod as much as possible to prevent foreign matter from attaching to the stroke portions. Be sure to hold the cylinders while servicing the vehicle.**
- **Do not wear cotton gloves or other similar materials when handling the rod. Fibers may attach to the rod and result in gas leaks.**
- **Do not apply any load to the cylinders in the horizontal direction in order to prevent the rod from being deformed.**

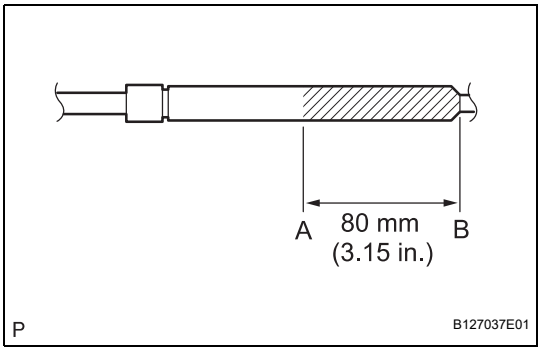
1. INSTALL HOOD SUPPORT ASSEMBLY

(a) Install the hood support assembly.

NOTICE:

- **Install the hood support assembly while supporting the hood by hand.**
- **Check that the hood support assembly is engaged in the ball joint and that the hood support assembly cannot be pulled out.**

DISPOSAL



1. DISPOSE OF HOOD SUPPORT ASSEMBLY

(a) Secure the hood support horizontally in a vise with the piston-rod pulled out.

(b) Wear safety glasses. Use a metal saw to slowly cut a groove between A and B shown in the illustration to release the gas.

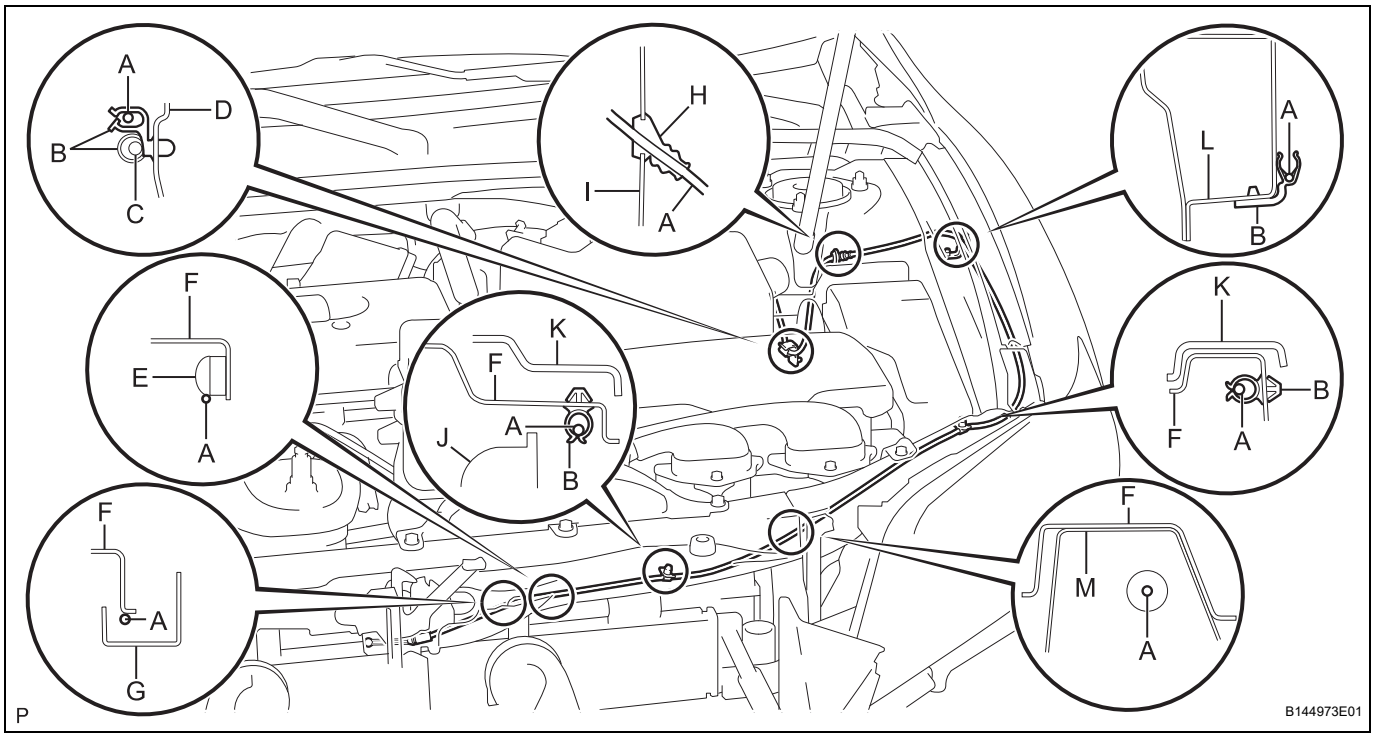
NOTICE:

Although the gas inside the hood support is colorless, odorless, and harmless, metal debris may scatter. Therefore, cover the hood support with a piece of cloth or other material.

INSTALLATION

1. INSTALL HOOD LOCK CONTROL CABLE ASSEMBLY

(a) Pass the hood lock control cable assembly into the engine compartment.



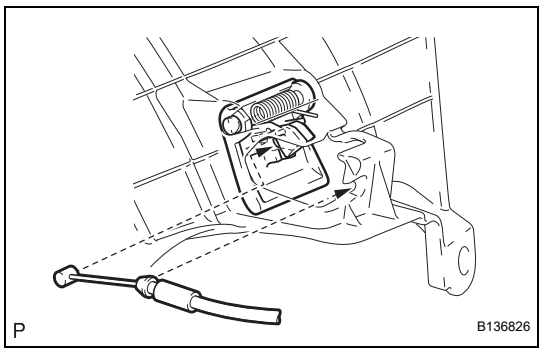
Area	Part Name	Area	Part Name
A	Hood lock control cable	H	Grommet
B	Clamp	I	Side member outer
C	Wire harness	J	Radiator
D	Pillar	K	Radiator support cover
E	Nut	L	Front fender apron
F	Radiator support upper	M	Brace
G	Hood lock protector	-	-

(b) Pass the cable through the upper radiator support.

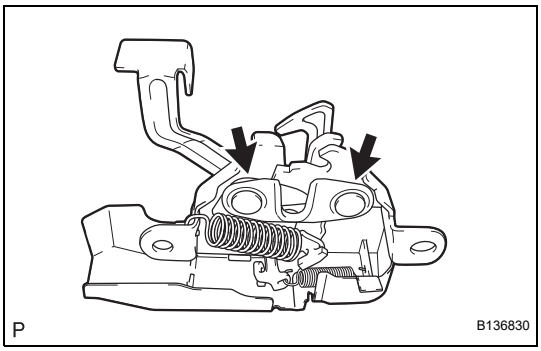
(c) Connect the clamps as shown in the illustration.

2. INSTALL HOOD LOCK CONTROL LEVER SUB-ASSEMBLY

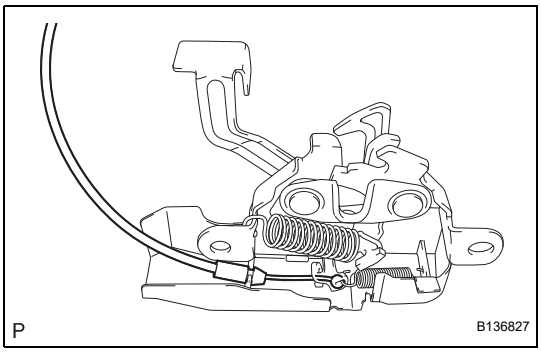
(a) Install the hood lock control lever and connect the hood lock control cable.



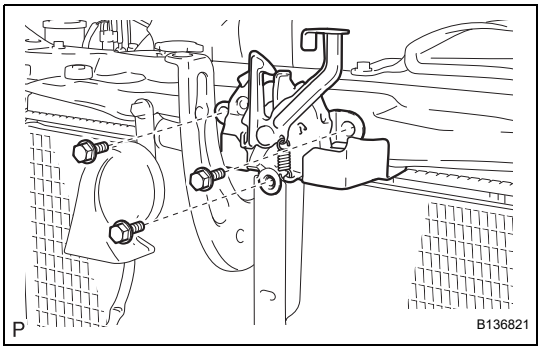
ED



3. **INSTALL HOOD LOCK ASSEMBLY**
   (a) Apply MP grease to the sliding areas of the lock.

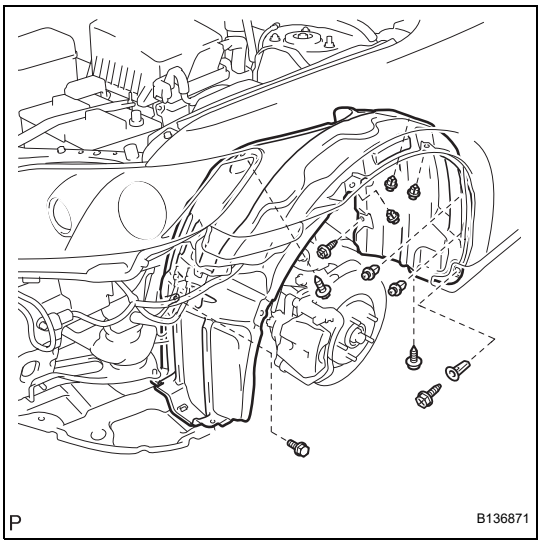


   (b) Connect the hood lock control cable.



   (c) Install the hood lock assembly with the 3 bolts.
   Torque: 7.5 N*m (77 kgf*cm, 66 in.*lbf)

4. **INSTALL HIGH PITCHED HORN ASSEMBLY (See page HO-8)**



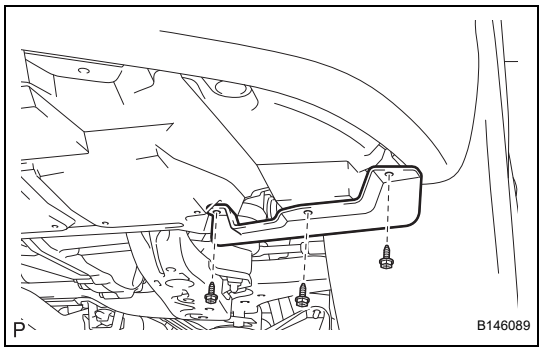
5. **INSTALL FRONT FENDER SPLASH SHIELD SUB-ASSEMBLY**
   (a) Install the front fender splash shield sub-assembly with the grommet and 4 screws.
   (b) Install the bolt and 5 clips.

6. **INSPECT HOOD SUB-ASSEMBLY (See page ED-28)**

7. **ADJUST HOOD SUB-ASSEMBLY (See page ED-28)**

8. **INSTALL FRONT BUMPER ASSEMBLY (See page ET-9)**

ED



9. INSTALL FRONT WHEEL OPENING EXTENSION PAD

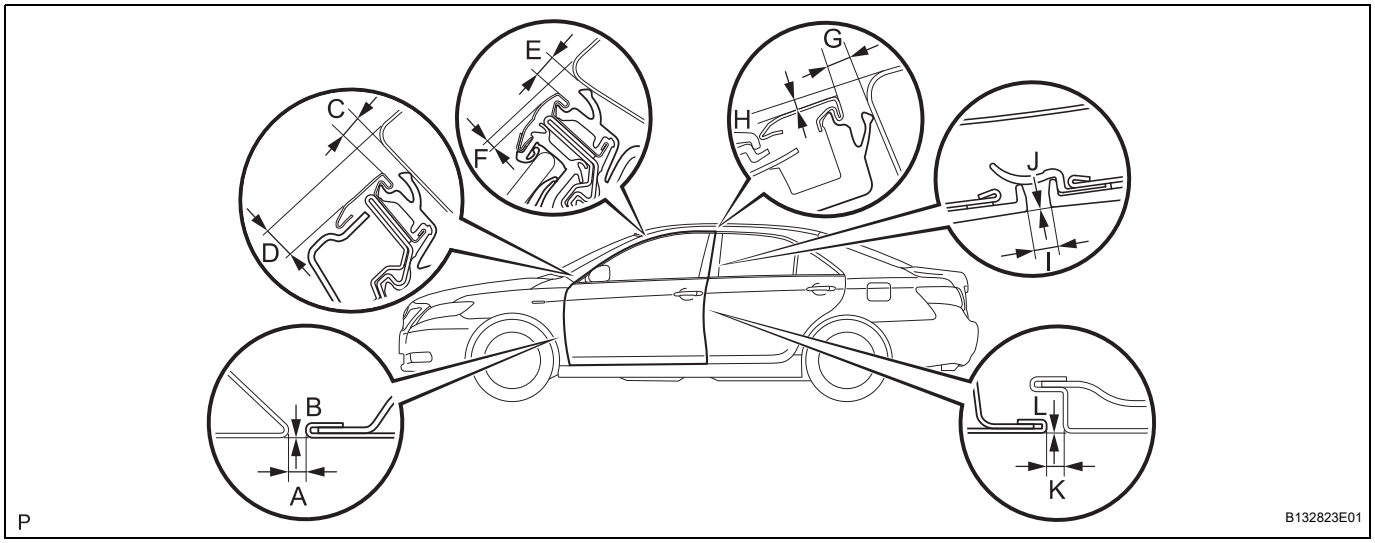
(a) Install the front wheel opening extension pad with the 3 screws.

10. INSTALL FRONT WHEEL (See page SP-19)

ON-VEHICLE INSPECTION

1. INSPECT FRONT DOOR PANEL SUB-ASSEMBLY

(a) Check that the clearance measurements of areas A through L are within each standard range.



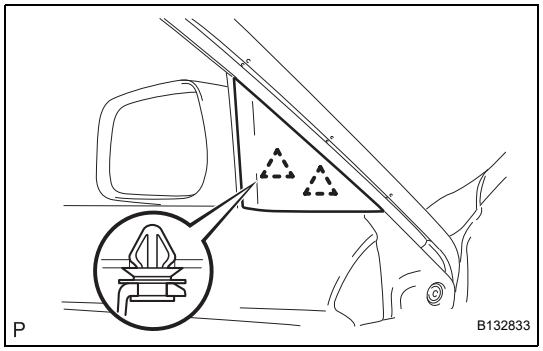
Standard clearance

Area	Measurement	Area	Measurement
A	2.7 to 5.7 mm (0.106 to 0.224 in.)	G	3.3 to 6.3 mm (0.130 to 0.248 in.)
B	-1.5 to 1.5 mm (-0.059 to 0.059 in.)	H	-0.3 to 2.7 mm (-0.012 to 0.106 in.)
C	3.3 to 6.3 mm (0.130 to 0.248 in.)	I	2.3 to 6.3 mm (0.091 to 0.248 in.)
D	6.4 to 9.4 mm (0.252 to 0.370 in.)	J	-2.0 to 2.0 mm (-0.079 to 0.079 in.)
E	3.3 to 6.3 mm (0.130 to 0.248 in.)	K	2.7 to 5.7 mm (0.106 to 0.224 in.)
F	0.9 to 3.9 mm (0.035 to 0.154 in.)	L	-1.5 to 1.5 mm (-0.059 to 0.059 in.)

DISASSEMBLY

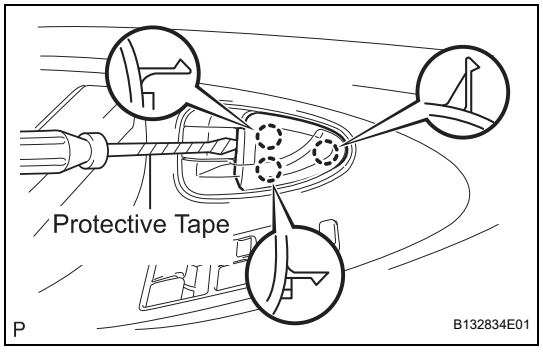
1. REMOVE FRONT DOOR LOWER FRAME BRACKET GARNISH

(a) Disengage the 2 clips and remove the front door lower frame bracket garnish.

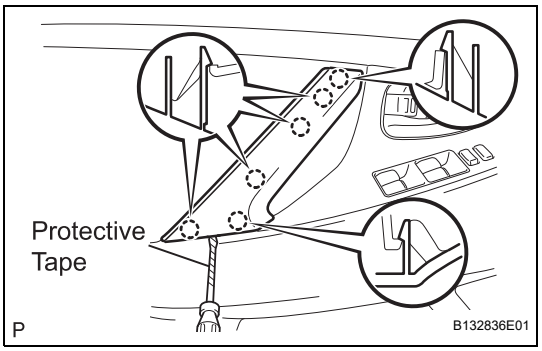


2. REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG

(a) Using a screwdriver with the tip wrapped with protective tape, disengage the 3 claws, and remove the front door inside handle bezel plug.

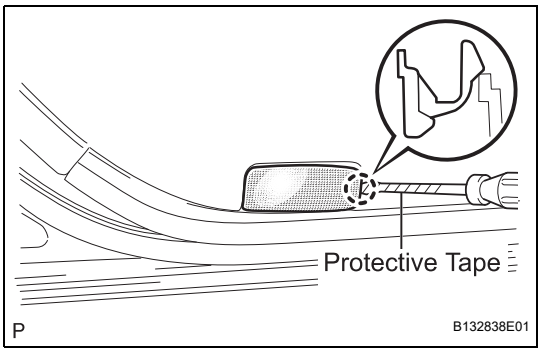


ED



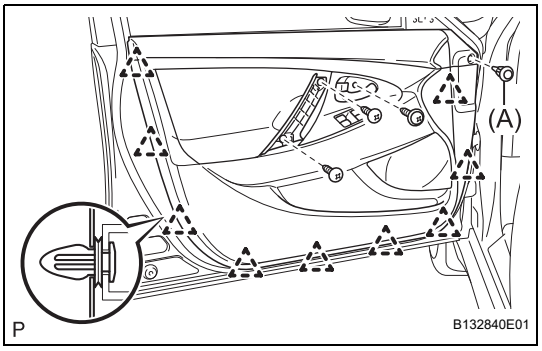
3. REMOVE ASSIST GRIP COVER

(a) Using a screwdriver with the tip wrapped with protective tape, disengage the 6 claws and remove the assist grip cover.



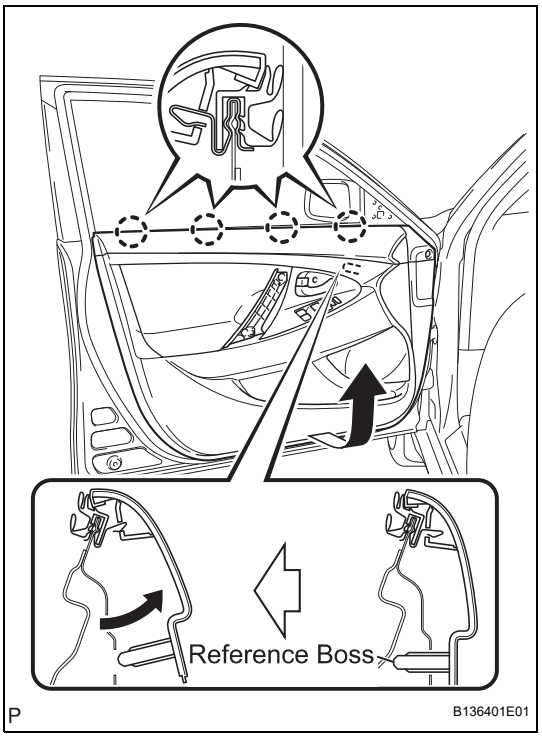
4. REMOVE COURTESY LIGHT ASSEMBLY

(a) Using a screwdriver with the tip wrapped with protective tape, disengage the claw and remove the courtesy light assembly.
(b) Disconnect the connector.



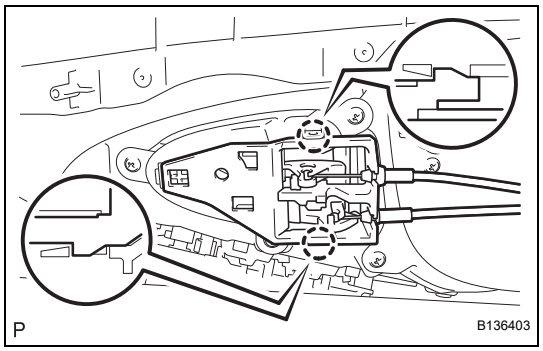
5. REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY

(a) Remove the 3 screws and clip (A).
(b) Using a clip remover, disengage the 9 clips.

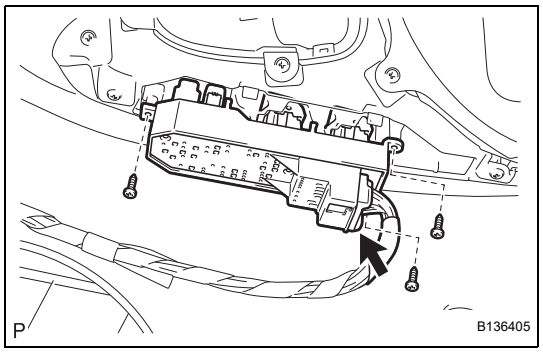


(c) Pull up the front door trim board in the direction indicated by the arrow.
(d) Disengage the reference bosses from the front door panel.
(e) Raise the front door trim board to disengage the 4 claws and remove the front door trim board together with the front door inner glass weatherstrip.

ED

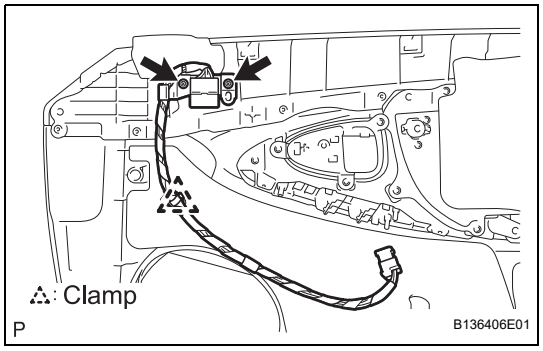


(f) Disengage the 2 claws and disconnect the front door inside handle sub-assembly.



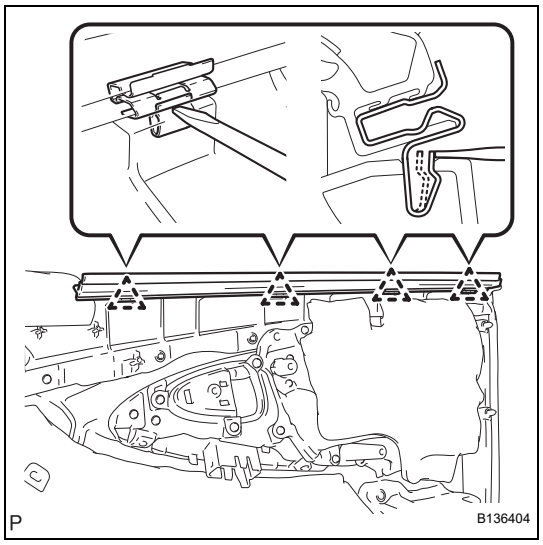
6. REMOVE POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY

(a) Disconnect the connector.
(b) Remove the 3 screws and the power window regulator master switch assembly.



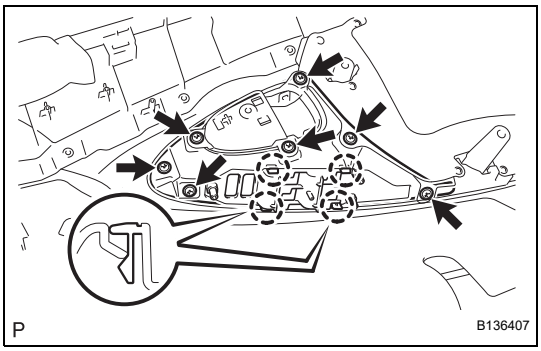
7. REMOVE FRONT DOOR WIRE (for Driver Side)

(a) Disengage the clamp and remove the 2 screws and front door wire.



8. REMOVE FRONT DOOR INNER GLASS WEATHERSTRIP

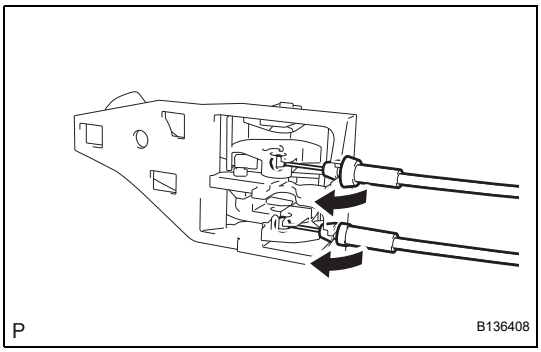
(a) Using a screwdriver, disengage the 4 clips as shown in the illustration and remove the front door inner glass weatherstrip from the front door trim board.



9. REMOVE FRONT ARMREST BASE PANEL UPPER

(a) Remove the 7 screws.

(b) Disengage the 4 claws and remove the front armrest base panel upper.

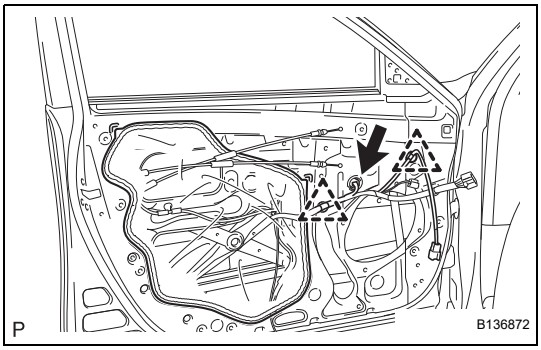


10. REMOVE FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY

(a) Disconnect the front door lock remote control cable and front door inside locking cable and remove the front door inside handle sub-assembly.

11. REMOVE FRONT NO. 1 SPEAKER ASSEMBLY (See page AV-145)

12. REMOVE OUTER REAR VIEW MIRROR ASSEMBLY (See page MI-13)



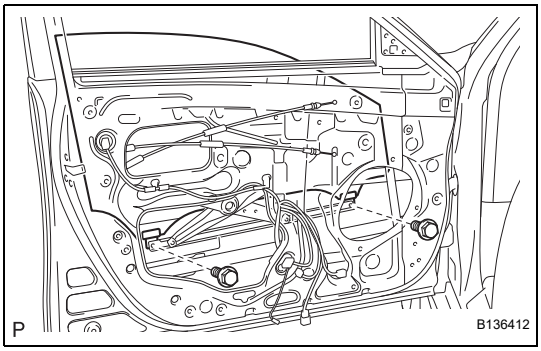
13. REMOVE FRONT DOOR SERVICE HOLE COVER

(a) Disconnect the connector and each clamp, and remove the front door service hole cover.
HINT:
Remove the remaining butyl tape on the door side.

14. REMOVE FRONT DOOR GLASS SUB-ASSEMBLY

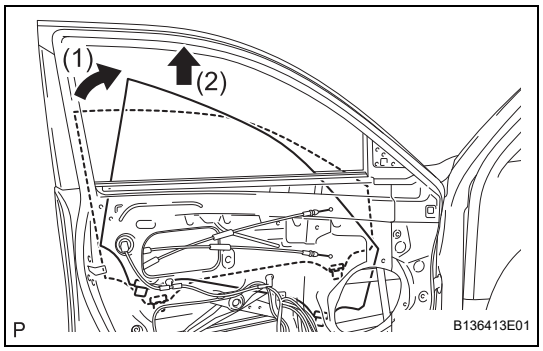
(a) Connect the front power window regulator motor assembly connector.

(b) Connect the power window regulator master switch assembly and move the front door glass sub-assembly so that the door glass bolts can be seen.

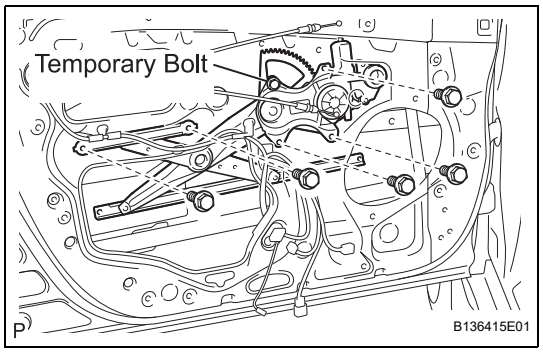


(c) Remove the 2 bolts.
NOTICE:
After the bolts are removed, the door glass may fall, causing damage.

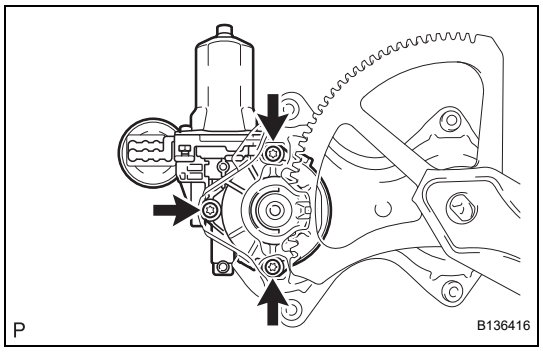
ED



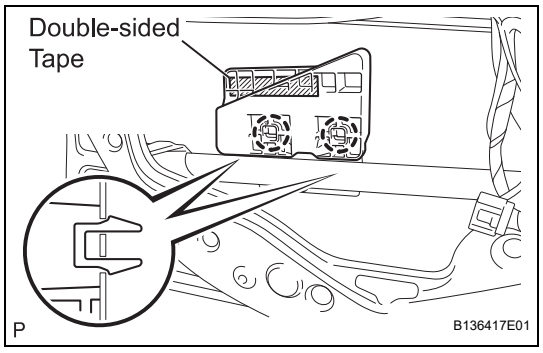
(d) Remove the front door glass sub-assembly as shown in the illustration.
NOTICE:
Do not damage the door glass.
(e) Disconnect the power window regulator master switch assembly and front power window regulator motor assembly connector.



15. REMOVE FRONT DOOR WINDOW REGULATOR SUB-ASSEMBLY
(a) Loosen the temporary bolt.
NOTICE:
Do not remove the temporary bolt. If the temporary bolt is removed, the front door window regulator may fall, causing damage.
(b) Remove the 5 bolts.
(c) Remove the front door window regulator sub-assembly and the power window regulator motor assembly front as a unit.
(d) Remove the temporary bolt from the front door window regulator sub-assembly.



16. REMOVE FRONT POWER WINDOW REGULATOR MOTOR ASSEMBLY
(a) Using a "TORX" driver (T25), remove the 3 screws and the front power window regulator motor assembly.



17. REMOVE FRONT NO. 1 DOOR STIFFENER CUSHION
(a) Disengage the 2 claws.
(b) Remove the double-sided tape and the front No. 1 door stiffener cushion.

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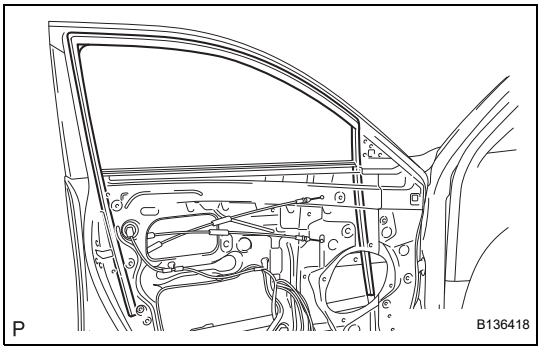
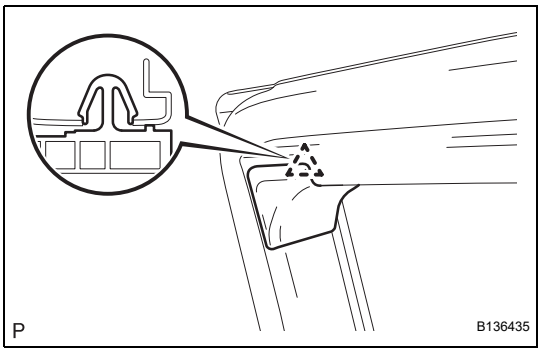


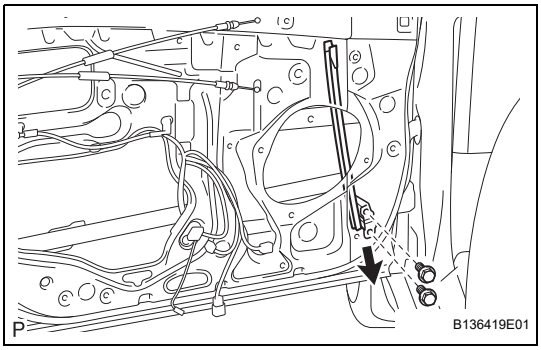
18. REMOVE FRONT DOOR GLASS RUN

(a) Remove the front door glass run.



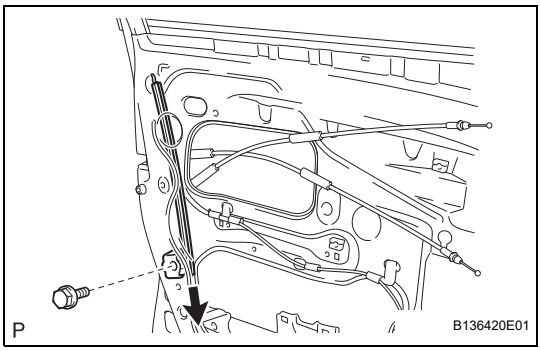
19. REMOVE DOOR FRAME GARNISH

(a) Disengage the clip and remove the door frame garnish.



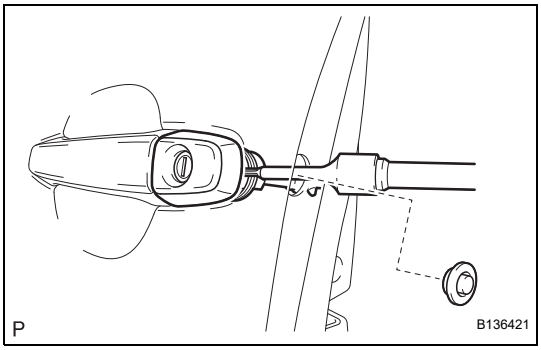
20. REMOVE FRONT DOOR FRONT LOWER FRAME SUB-ASSEMBLY

(a) Remove the 2 bolts and the front door front lower frame sub-assembly as shown in the illustration.



21. REMOVE FRONT DOOR REAR LOWER FRAME SUB-ASSEMBLY

(a) Remove the bolt and the front door rear lower frame sub-assembly as shown in the illustration.

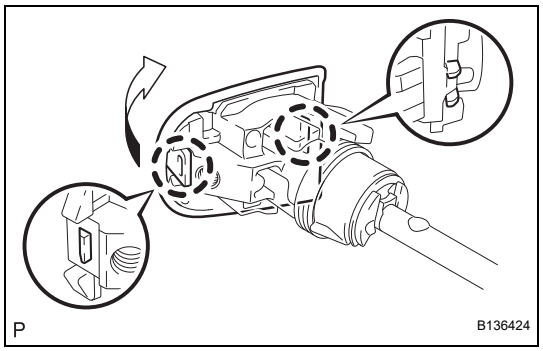


22. REMOVE FRONT DOOR OUTSIDE HANDLE COVER

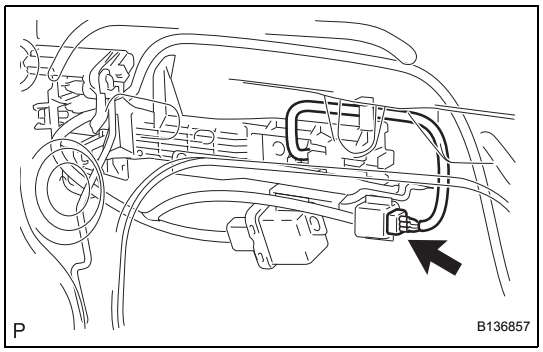
(a) Remove the hole plug.

(b) Using a "TORX" socket wrench (T30), loosen the screw and remove the front door outside handle cover and the door lock key cylinder as a unit.
HINT:
The screw cannot be removed because it is integrated into the front door outside handle frame sub-assembly.

ED

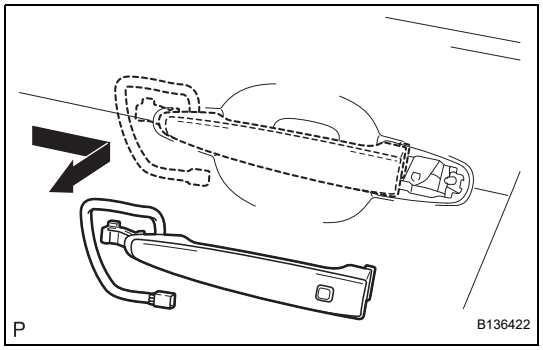


(c) Using a screwdriver, disengage the 2 claws and remove the front door outside handle cover.

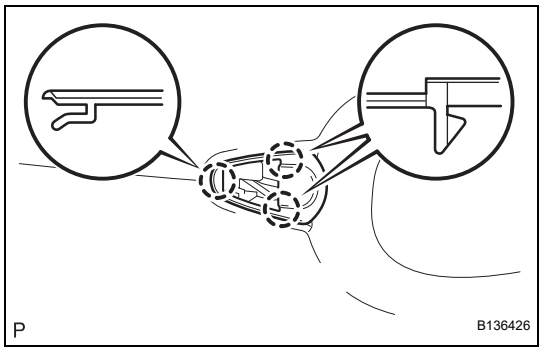


23. REMOVE FRONT DOOR OUTSIDE HANDLE ASSEMBLY

(a) Disconnect the connector.

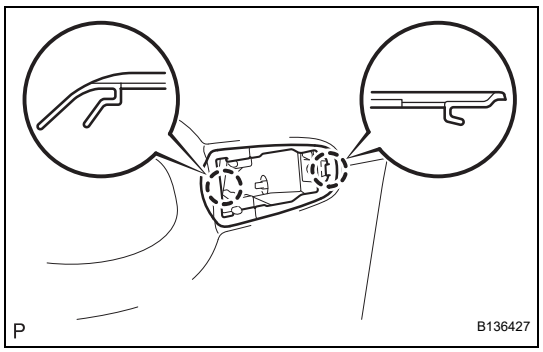


(b) Remove the front door outside handle assembly as shown in the illustration.



24. REMOVE FRONT DOOR FRONT OUTSIDE HANDLE PAD

(a) Disengage the 3 claws and remove the front door front outside handle pad.



25. REMOVE FRONT DOOR REAR OUTSIDE HANDLE PAD

(a) Disengage the 2 claws and remove the front door rear outside handle pad.

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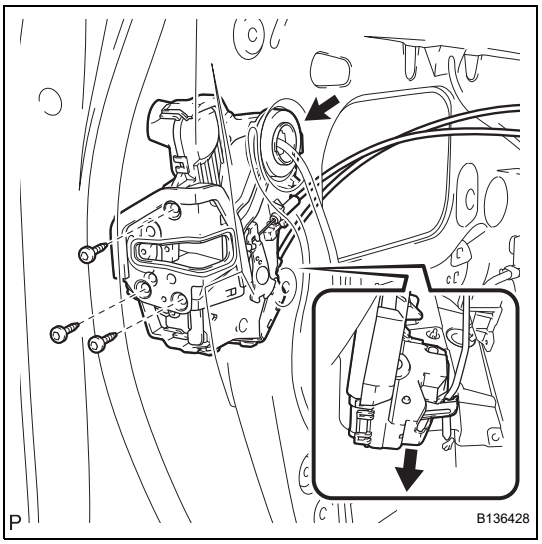
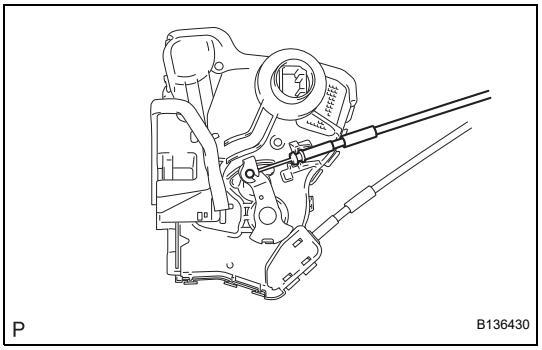


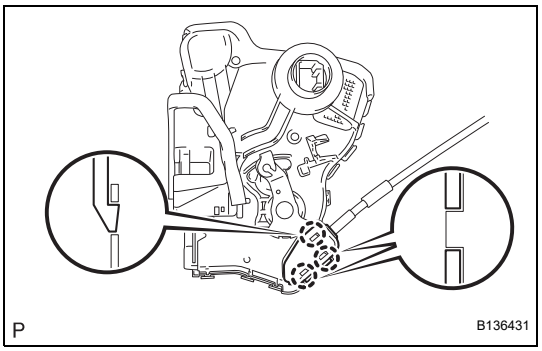
26. REMOVE FRONT DOOR LOCK ASSEMBLY

(a) Disconnect the connector.
(b) Using a "TORX" socket wrench (T30), remove the 3 screws.
(c) Slide the front door lock assembly downward, pull out the front door lock open rod from the outside handle frame, and remove the front door lock assembly and cables as a unit.
(d) Remove the front door lock open rod from the front door lock assembly.
(e) Remove the door lock wiring harness seal from the front door lock assembly.



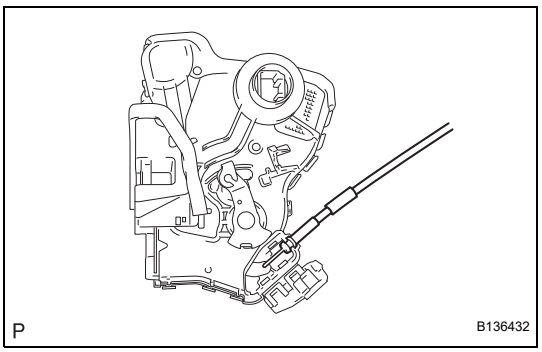
27. REMOVE FRONT DOOR LOCK REMOTE CONTROL CABLE ASSEMBLY

(a) Remove the front door lock remote control cable assembly.



28. REMOVE FRONT DOOR INSIDE LOCKING CABLE ASSEMBLY

(a) Using a screwdriver, disengage the 3 claws.
HINT:
Tape the screwdriver tip before use.



(b) Remove the front door inside locking cable assembly.

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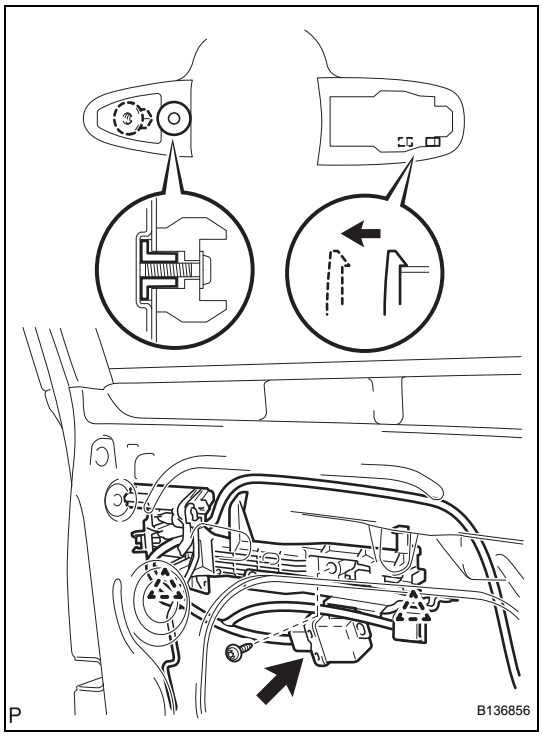
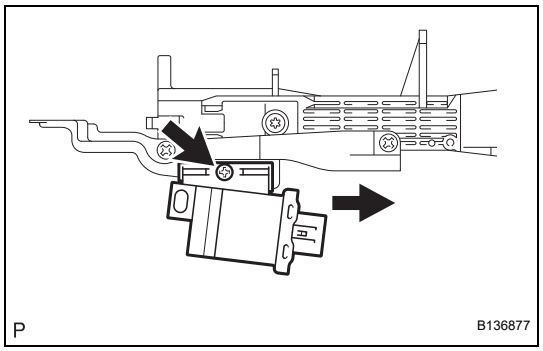


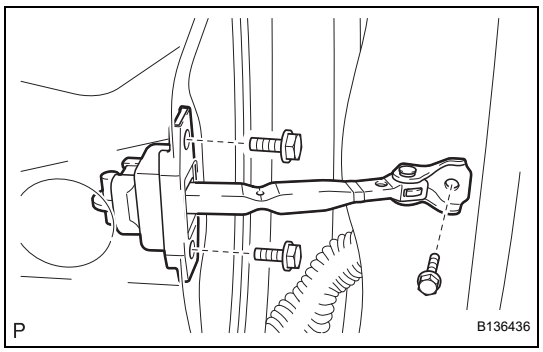
29. REMOVE FRONT DOOR OUTSIDE HANDLE FRAME SUB-ASSEMBLY

(a) Using a "TORX" socket wrench (T30), remove the screw.
(b) Disconnect the connector.
(c) Disengage the 2 clamps.
(d) Disengage the claw and remove the front door outside handle frame sub-assembly.



30. REMOVE DOOR ELECTRICAL KEY OSCILLATOR

(a) Remove the screw and door electrical key oscillator.



31. REMOVE FRONT DOOR CHECK ASSEMBLY

(a) Remove the 3 bolts and front door check assembly.

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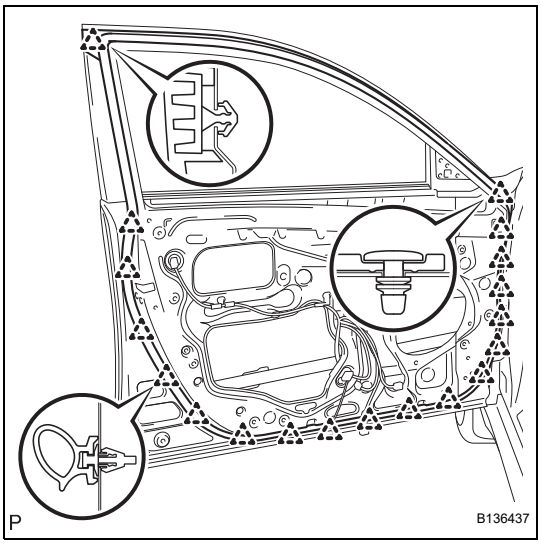
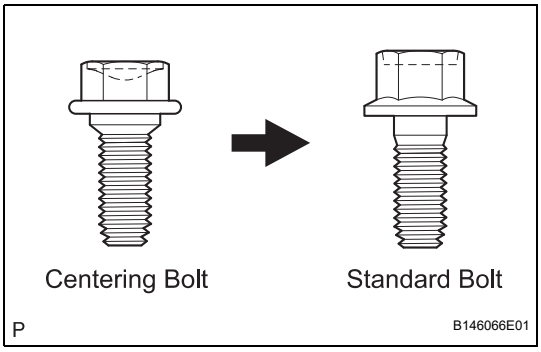




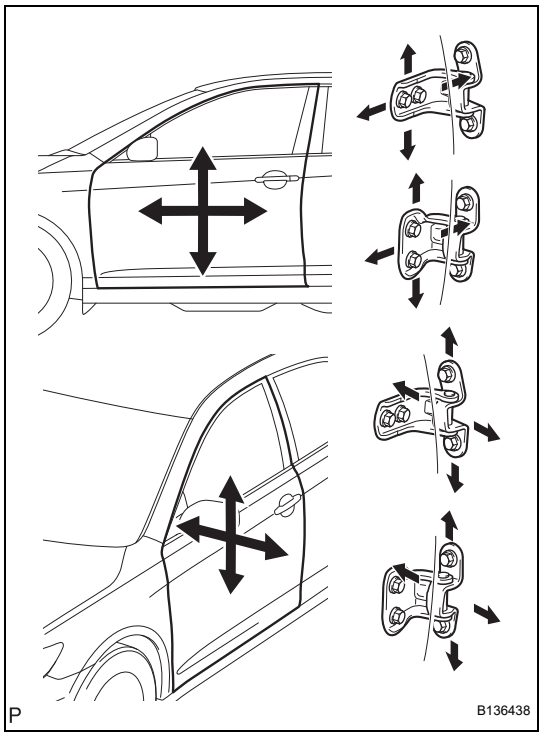
32. **REMOVE FRONT DOOR WEATHERSTRIP**
    (a) Using a clip remover, disengage the 19 clips and remove the front door weatherstrip.
33. **REMOVE FRONT DOOR BELT MOULDING ASSEMBLY (See page ET-23)**
34. **REMOVE FRONT DOOR REAR WINDOW FRAME MOULDING (See page ET-37)**
35. **REMOVE FRONT DOOR UPPER WINDOW FRAME MOULDING (See page ET-38)**
36. **REMOVE FRONT DOOR STRIPE (See page ET-56)**
37. **REMOVE FRONT DOOR LOWER OUTSIDE STRIPE (See page ET-56)**

ADJUSTMENT

HINT:

- Before adjusting the door positions of vehicles equipped with side airbags and curtain shield airbags, be sure to disconnect the battery. After adjustment, inspect the SRS warning light, the side airbag system, and the curtain shield airbag system for normal operation. Then initialize both airbag systems.
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.
- Centering bolts are used to mount the door hinge to the vehicle body and door. The door cannot be adjusted with the centering bolts installed on it. Substitute the centering bolts with standard bolts (with washers) when making adjustments.
- A bolt without a torque specification is shown in the standard bolt chart (See page SS-2).

1. **DISCONNECT NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the terminal to prevent airbag deployment (See page RS-1).



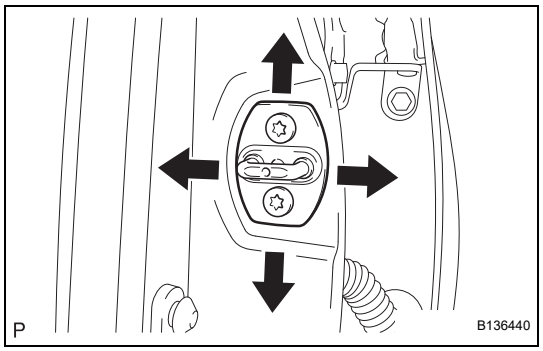
2. ADJUST FRONT DOOR

(a) Using SST, loosen the hinge bolts on the vehicle body and adjust the door position.
SST 09812-00010

(b) Tighten the hinge bolts on the vehicle body after the adjustment.
Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)

(c) Loosen the hinge bolts on the door and adjust the door position.

(d) Tighten the hinge bolts on the door after the adjustment.
Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)



(e) Adjust the striker position by slightly loosening the striker mounting screws with a "TORX" socket wrench (T40) and hitting the striker with a plastic hammer.

(f) Using a "TORX" socket wrench (T40), tighten the striker mounting screws after the adjustment.
Torque: 23 N*m (235 kgf*cm, 17 ft.*lbf)

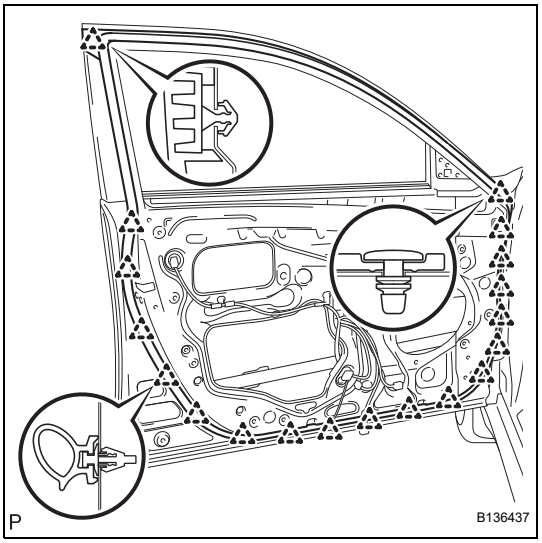
3. CONNECT NEGATIVE BATTERY TERMINAL

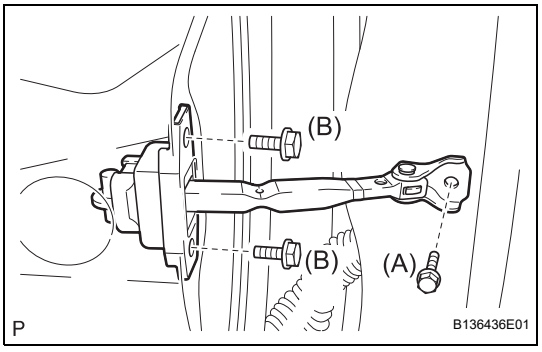
4. PERFORM INITIALIZATION
NOTICE:
Some systems need initialization after reconnecting the negative battery terminal (See page IN-43).

5. INSPECT SRS WARNING LIGHT
(See page RS-33)

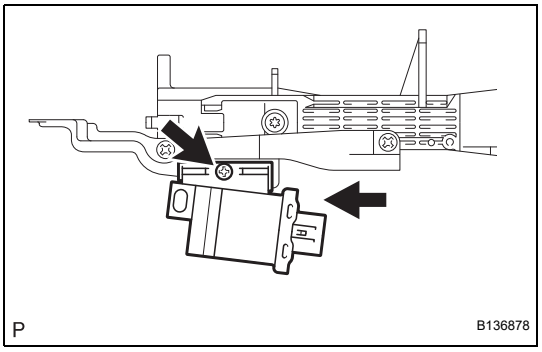
REASSEMBLY

1. **REPAIR INSTRUCTION (See page ET-57)**
2. **INSTALL FRONT DOOR LOWER OUTSIDE STRIPE (See page ET-60)**
3. **INSTALL FRONT DOOR STRIPE (See page ET-60)**
4. **INSTALL FRONT DOOR UPPER WINDOW FRAME MOULDING (See page ET-38)**
5. **INSTALL FRONT DOOR REAR WINDOW FRAME MOULDING (See page ET-39)**
6. **INSTALL FRONT DOOR BELT MOULDING ASSEMBLY (See page ET-23)**
7. **INSTALL FRONT DOOR WEATHERSTRIP**
   (a) Engage the 19 clips to install a new front door weatherstrip.





8. **INSTALL FRONT DOOR CHECK ASSEMBLY**
   (a) Install the front door check assembly with the 3 bolts.
   Torque: Bolt (A)
   26 N*m (265 kgf*cm, 19 ft.*lbf)
   Torque: Bolt (B)
   8.0 N*m (82 kgf*cm, 71 in.*lbf)



9. **INSTALL DOOR ELECTRICAL KEY OSCILLATOR**
   (a) Install the door electrical key oscillator with the screw.
10. **INSTALL FRONT DOOR OUTSIDE HANDLE FRAME SUB-ASSEMBLY**
    (a) Apply MP grease to the sliding parts of the front door outside handle frame sub-assembly.

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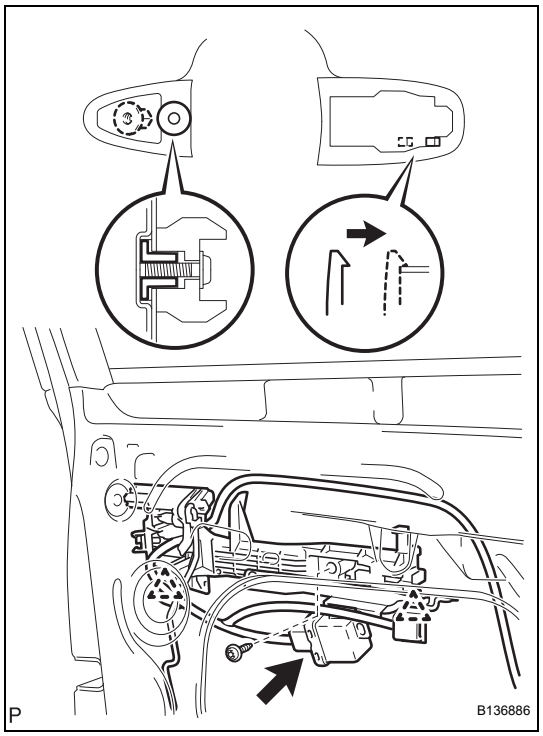
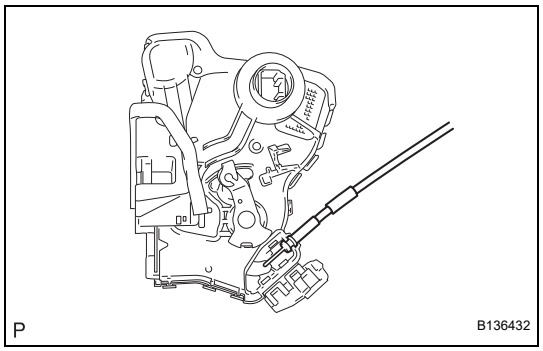
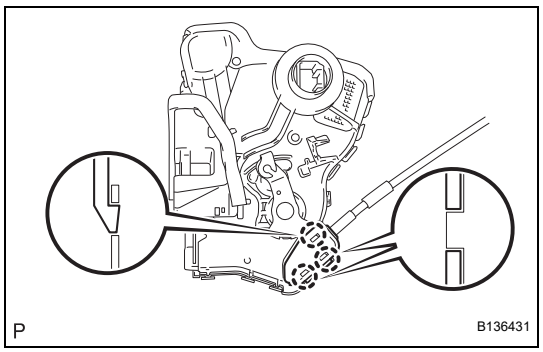


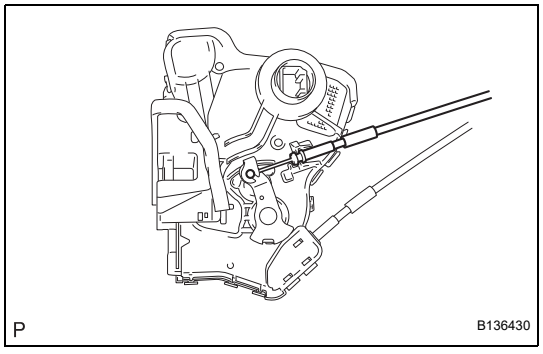
(b) Engage the claw to install the front door outside handle frame sub-assembly.
(c) Using a "TORX" socket wrench (T30), install the front door outside handle frame sub-assembly with the screw.
Torque: 4.0 N*m (41 kgf*cm, 35 in.*lbf)
(d) Engage the 2 clamps.
(e) Connect the connector.



11. INSTALL FRONT DOOR INSIDE LOCKING CABLE ASSEMBLY
(a) Install the front door inside locking cable assembly.



(b) Engage the 3 claws.



12. INSTALL FRONT DOOR LOCK REMOTE CONTROL CABLE ASSEMBLY
(a) Install the front door lock remote control cable assembly.

13. INSTALL FRONT DOOR LOCK ASSEMBLY
NOTICE:
- **When reusing the removed front door lock assembly, replace the door lock wiring harness seal on the connector with a new one.**

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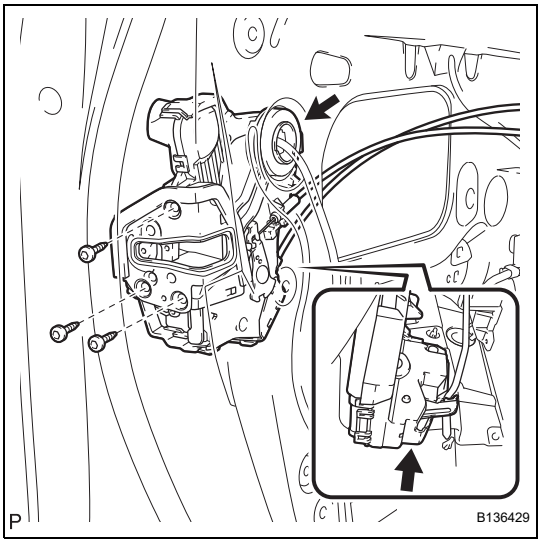
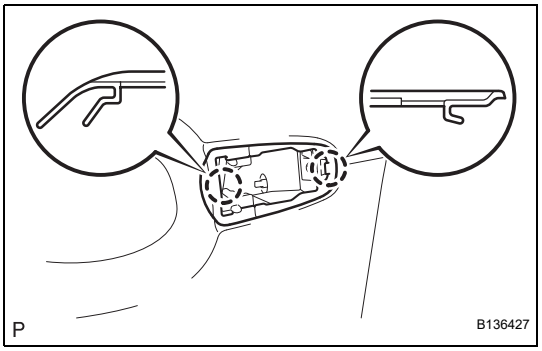
- **Do not allow grease or dust to adhere to the door lock wiring harness seal surface of the connector.**
- **Reusing the door lock wiring harness seal or using a damaged door lock wiring harness seal may cause water intrusion to the connection. This may result in a malfunction of the front door lock assembly.**

(a) Apply MP grease to the sliding parts of the front door lock assembly.
(b) Install a new door lock wiring harness seal to the front door lock assembly.

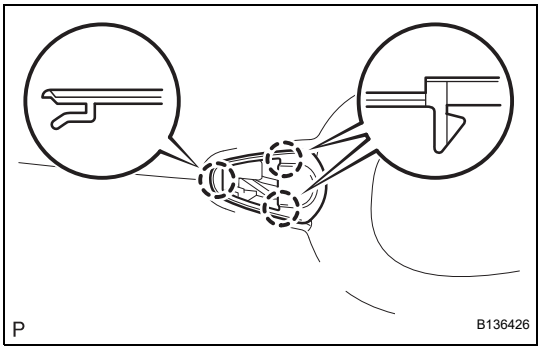


(c) Insert the front door lock open rod to the front door lock assembly, and set it to the front door outside handle frame.
(d) Make sure that the front door lock open rod is securely connected to the front door lock assembly.
(e) Using a "TORX" socket wrench (T30), install the front door lock assembly with the 3 screws.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
(f) Connect the connector.



14. INSTALL FRONT DOOR REAR OUTSIDE HANDLE PAD

(a) Engage the 2 claws to install the front door rear outside handle pad.



15. INSTALL FRONT DOOR FRONT OUTSIDE HANDLE PAD

(a) Engage the 3 claws to install the front door front outside handle pad.

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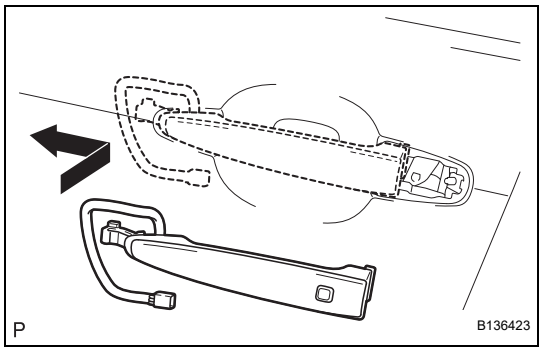
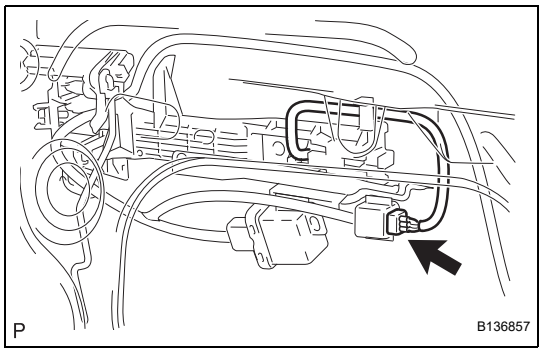


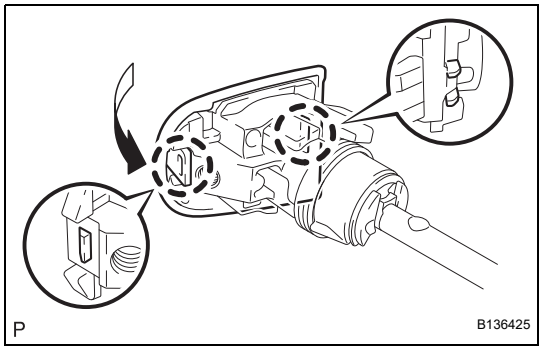
16. INSTALL FRONT DOOR OUTSIDE HANDLE ASSEMBLY

(a) Insert the front end of the front door outside handle assembly into the front door outside handle frame.

(b) Insert the rear end of the front door outside handle assembly into the front door outside handle frame. Next, slide the front door outside handle assembly toward the front of the vehicle to install it.

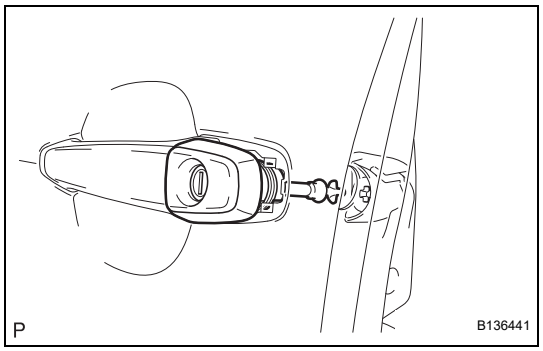


(c) Connect the connector.

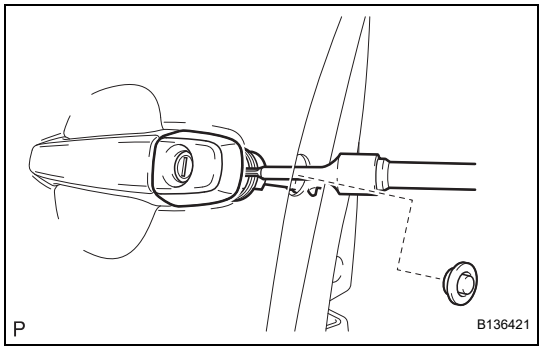


17. INSTALL FRONT DOOR OUTSIDE HANDLE COVER

(a) Engage the 2 claws to install the front door outside handle cover to the front door lock cylinder.



(b) Install the front door lock cylinder.
HINT:
Make sure that the front door lock cylinder rod is inserted into the front door lock assembly.



(c) Using a "TORX" socket wrench (T30), install the front door lock cylinder with the screw.
Torque: 4.0 N*m (41 kgf*cm, 35 in.*lbf)

(d) Install the hole plug.

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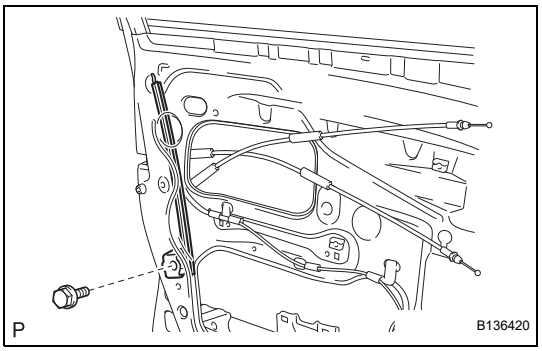
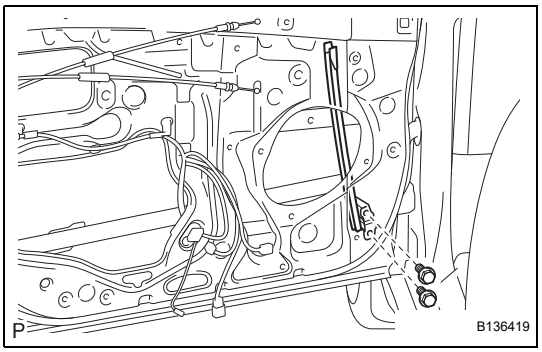


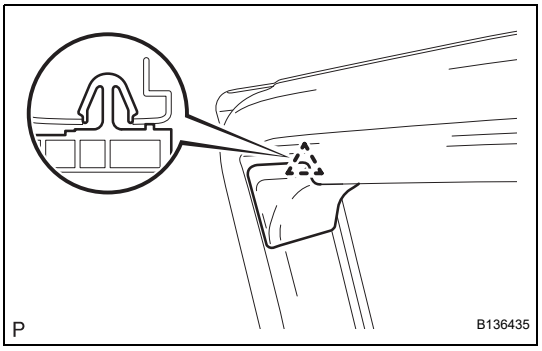
18. INSTALL FRONT DOOR REAR LOWER FRAME SUB-ASSEMBLY

(a) Install the front door rear lower frame sub-assembly with the bolt.



19. INSTALL FRONT DOOR FRONT LOWER FRAME SUB-ASSEMBLY

(a) Install the front door front lower frame sub-assembly with the 2 bolts.



20. INSTALL DOOR FRAME GARNISH

(a) Engage the clip and install a new door frame garnish.

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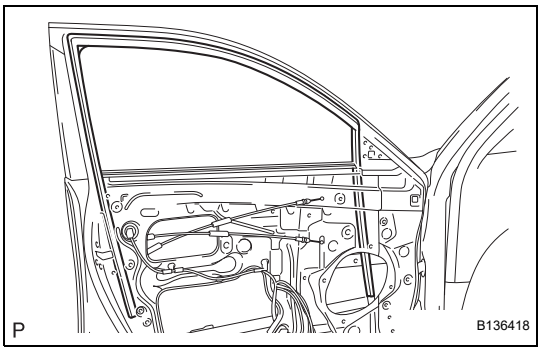
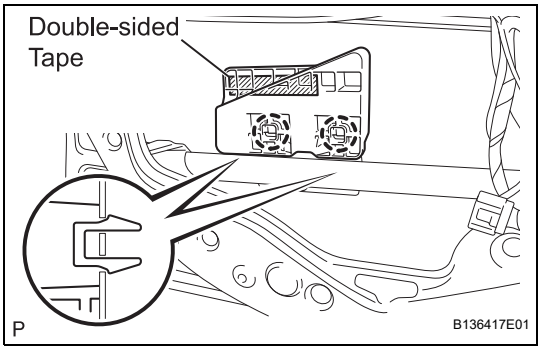


21. INSTALL FRONT DOOR GLASS RUN

(a) Install the front door glass run.



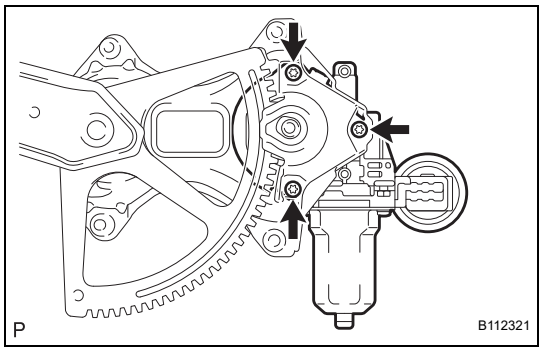
22. INSTALL FRONT NO. 1 DOOR STIFFENER CUSHION

(a) Engage the 2 claws and install a new front No. 1 door stiffener cushion with double-sided tape.

23. INSTALL FRONT POWER WINDOW REGULATOR MOTOR ASSEMBLY

NOTICE:

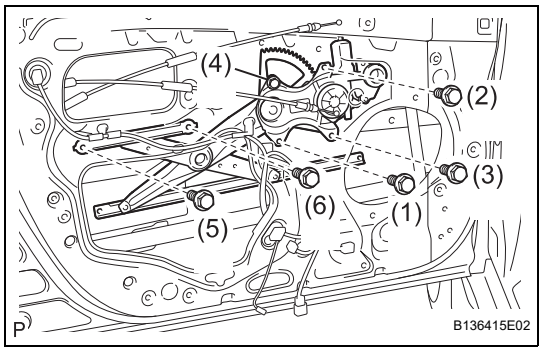
The regulator arm must be below the intermediate position when installing the power window regulator motor.



(a) Using a "TORX" driver (T25), install the front power window regulator motor sub-assembly with the 3 screws.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
HINT:
A new front window regulator adopts a self-tapping method. The installation position of the regulator will be threaded when the self-tapping screw is inserted.

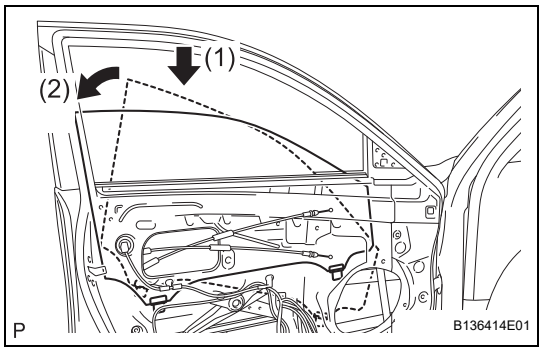
24. INSTALL FRONT DOOR WINDOW REGULATOR SUB-ASSEMBLY

(a) Apply MP grease to the sliding parts of the front door window regulator sub-assembly.

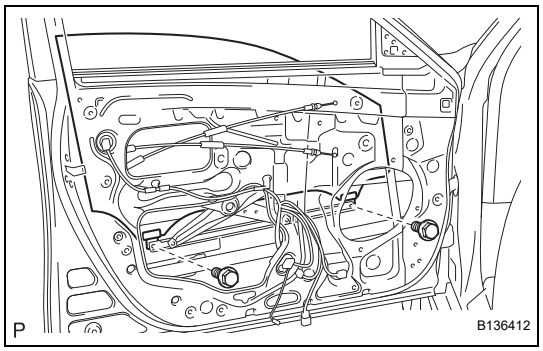


(b) Install the temporary bolt to the front door window regulator sub-assembly.
(c) Temporarily install the window regulator.
(d) Tighten the 6 bolts in the order shown in the illustration to install the front window regulator.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

25. INSTALL FRONT DOOR GLASS SUB-ASSEMBLY



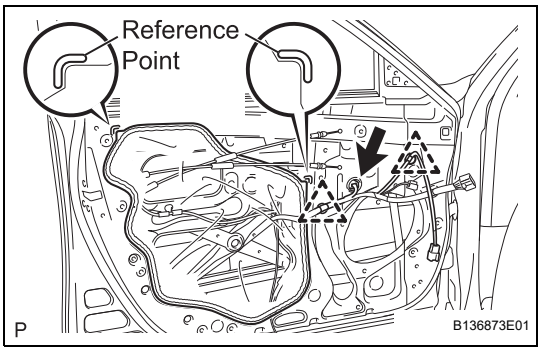
(a) Insert the front door glass sub-assembly into the front door panel along the front door glass run as indicated in the order of the arrows in the illustration.



(b) Install the front door glass sub-assembly with the 2 bolts.
Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)

26. INSTALL FRONT DOOR SERVICE HOLE COVER

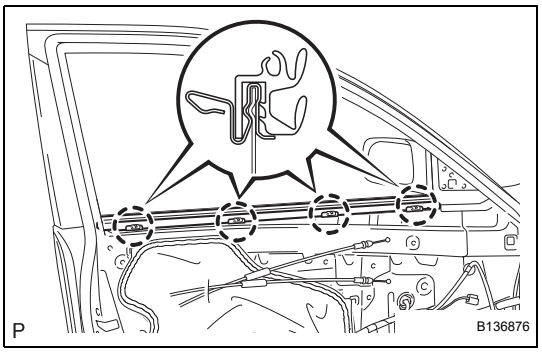
(a) Apply butyl tape to the front door panel.
(b) Pass the front door lock remote control cable and rear door inside locking cable through a new front door service hole cover.



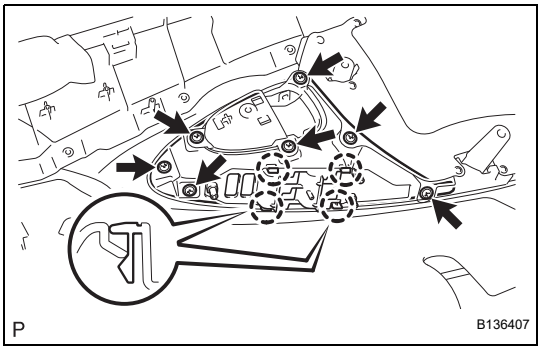
(c) Install the new service hole cover.
NOTICE:
Securely install the front door service hole cover avoiding wrinkles and air bubbles.
(d) Connect each connector and each clamp.

27. INSTALL OUTER REAR VIEW MIRROR ASSEMBLY (See page MI-15)

28. INSTALL FRONT NO. 1 SPEAKER ASSEMBLY (See page AV-147)

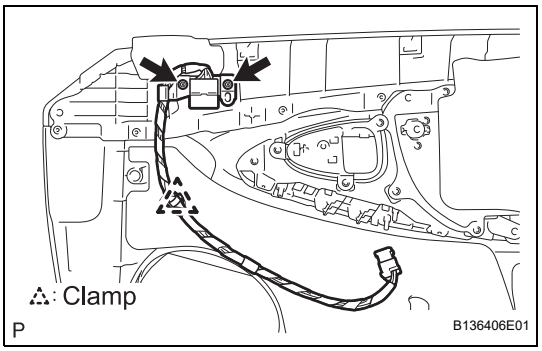


29. INSTALL FRONT DOOR INNER GLASS WEATHERSTRIP
(a) Engage the 4 claws and install the front door inner glass weatherstrip.

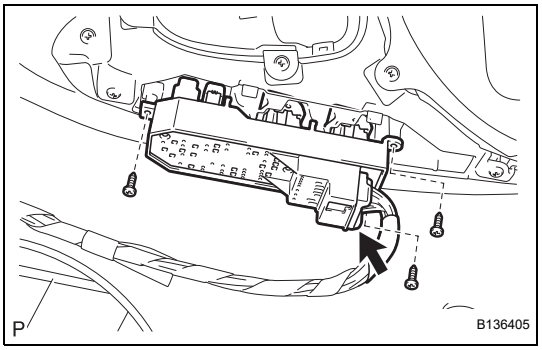


30. INSTALL FRONT ARMREST BASE PANEL UPPER
(a) Engage the 4 claws and install the front armrest base panel upper.
(b) Install the 7 screws.

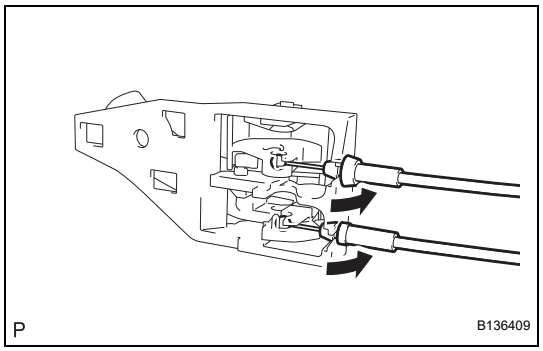
ED



31. INSTALL FRONT DOOR WIRE (for Driver Side)
(a) Install the front door wire with the 2 screws.
(b) Engage the clamp.

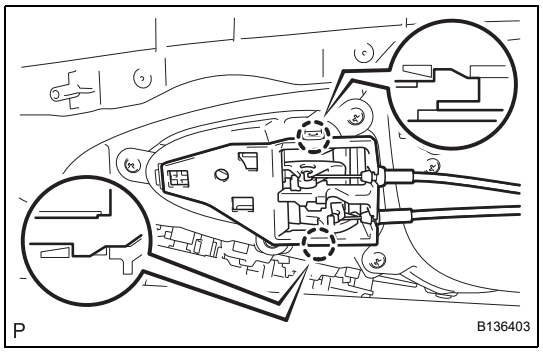


32. INSTALL POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY
(a) Connect the connector.
(b) Install the power window regulator master switch assembly with the 3 screws.



33. INSTALL FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY

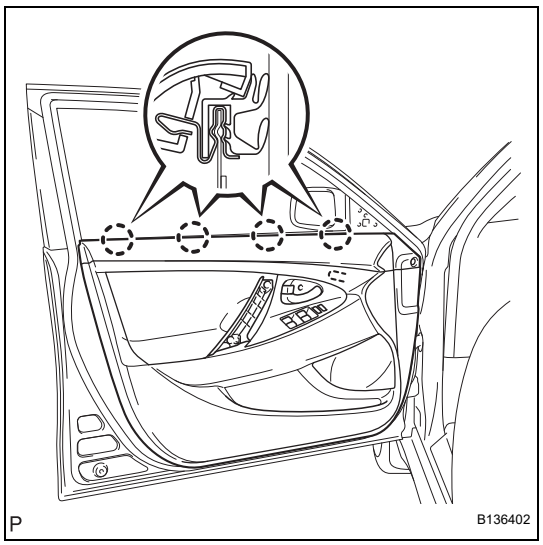
(a) Connect the front door lock remote control cable and front door inside locking cable to the front door inside handle sub-assembly.



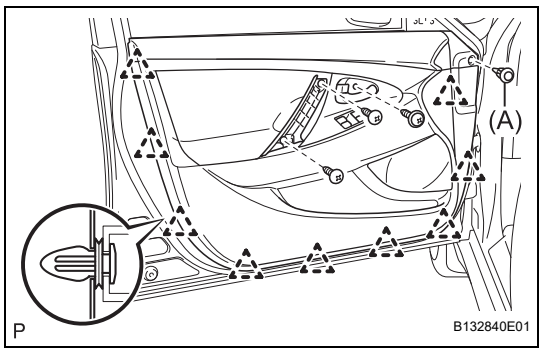
(b) Engage the 2 claws and install the front door inside handle sub-assembly.

34. INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY

(a) Connect each connector.



(b) Engage the front door trim board with the 4 clips of the front door inner glass weatherstrip.



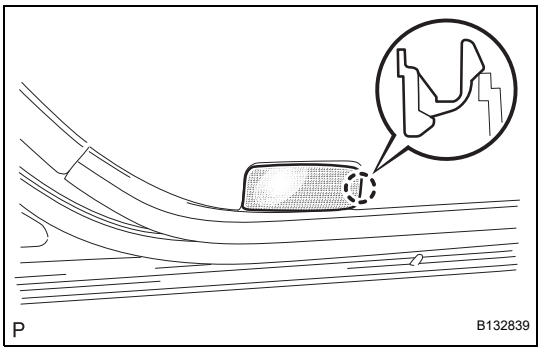
(c) Engage the 9 clips and install the front door trim board to the front door panel.

(d) Install the 3 screws and clip (A).

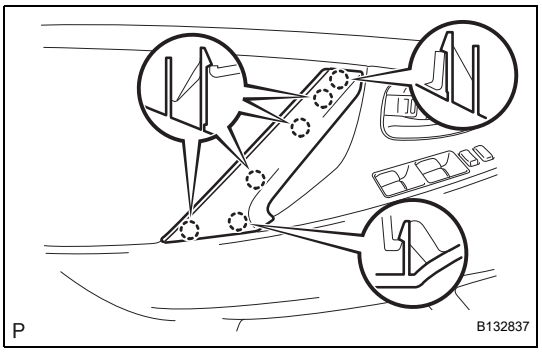
35. INSTALL COURTESY LIGHT ASSEMBLY

(a) Connect the connector.

ED

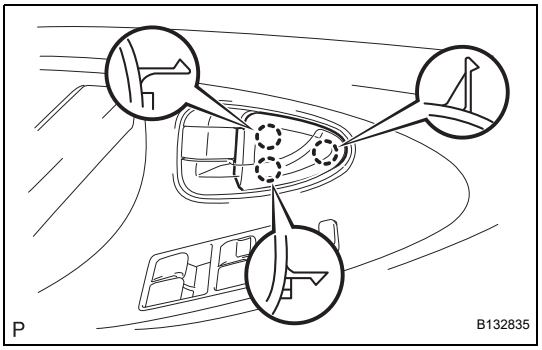


(b) Engage the claw and install the courtesy light assembly.



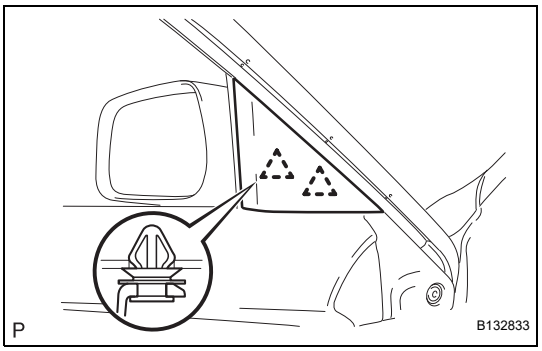
36. INSTALL ASSIST GRIP COVER

(a) Engage the 6 claws and install the assist grip cover.



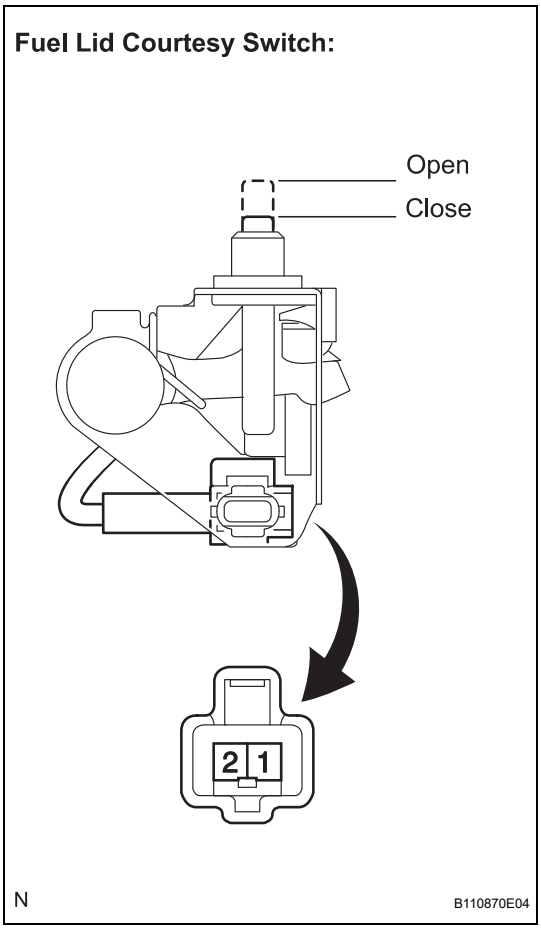
37. INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG

(a) Engage the 3 claws and install the front door inside handle bezel plug.



38. INSTALL FRONT DOOR LOWER FRAME BRACKET GARNISH

(a) Engage the 2 clips and install the front door lower frame bracket garnish.

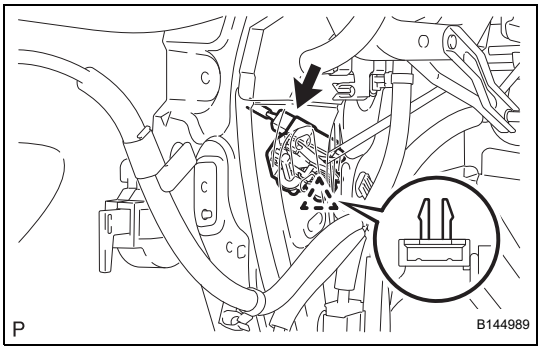


INSPECTION

1. **INSPECT FUEL LID COURTESY SWITCH**
   (a) Check the fuel lid courtesy switch resistance.
   Standard resistance

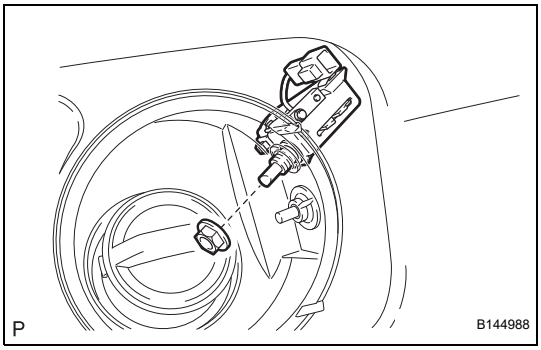
Tester Connection	Switch Position	Specified Condition
1 - 2	Courtesy switch free (Fuel lid open)	10 kΩ or higher
1 - 2	Courtesy switch pushed (Fuel lid closed)	Below 1 Ω

If the result is not as specified, replace the fuel lid courtesy switch.



INSTALLATION

1. **INSTALL FUEL LID COURTESY SWITCH**
   (a) Connect the connector from the cabin side.
   (b) Engage the clamp and temporarily install the fuel lid courtesy switch.



   (c) Install the fuel lid courtesy switch with the nut and plate from the outside of the vehicle.
   Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)

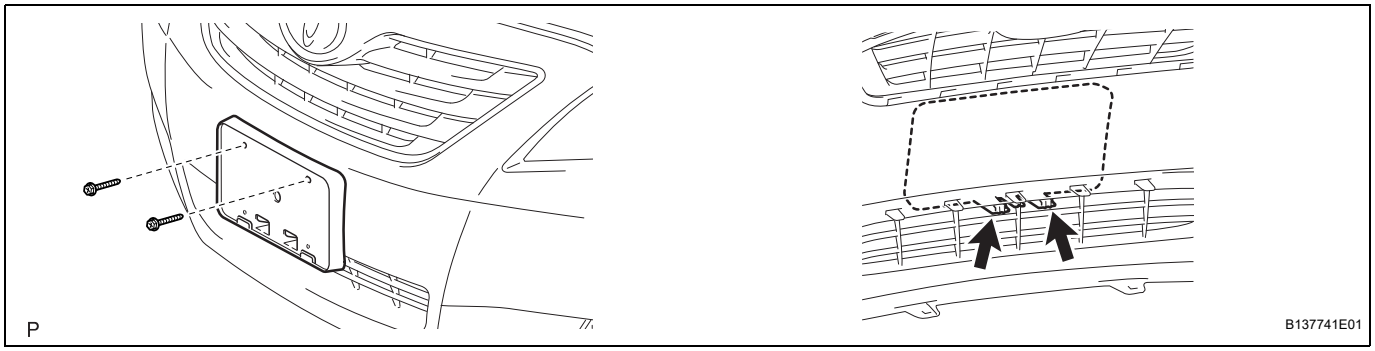
2. **INSTALL LUGGAGE COMPARTMENT INNER TRIM COVER LH (See page ED-102)**
3. **INSTALL LUGGAGE COMPARTMENT REAR TRIM COVER (See page ED-102)**
4. **INSTALL REAR FLOOR FINISH PLATE (See page ED-103)**
5. **INSTALL NO. 1 LUGGAGE COMPARTMENT TRIM HOOK (See page ED-103)**
6. **INSTALL SPARE WHEEL COVER ASSEMBLY**
7. **INSTALL SPARE WHEEL COVER CLAMP**

8. INSTALL LUGGAGE COMPARTMENT FLOOR MAT

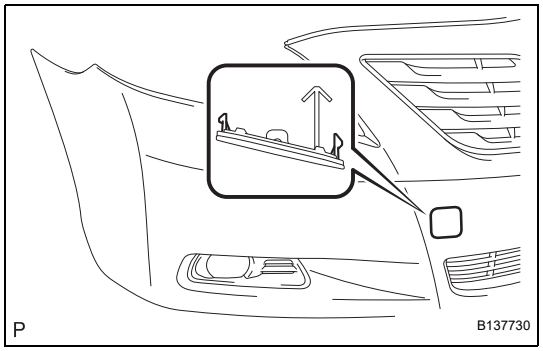
DISASSEMBLY

1. REMOVE FRONT BUMPER EXTENSION MOUNTING BRACKET (w/ Bracket)

(a) Remove the 2 screws.

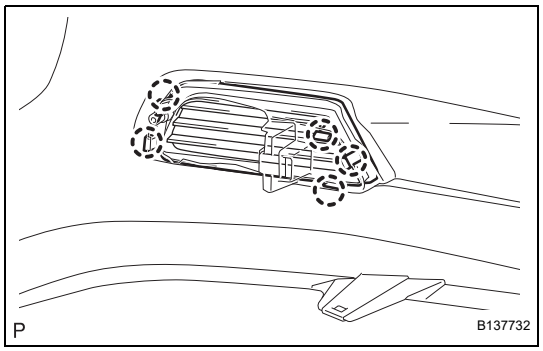


(b) Disengage the 2 claws and remove the front bumper extension mounting bracket.



2. REMOVE FRONT BUMPER LOWER COVER

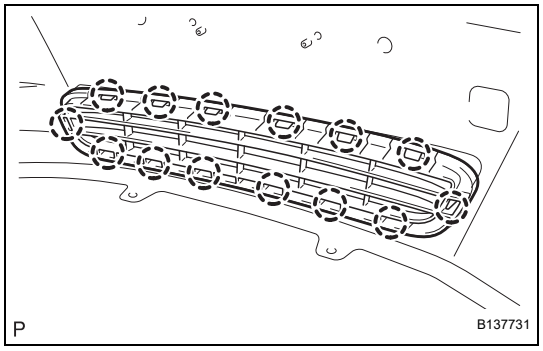
(a) Disengage the 2 claws and remove the front bumper lower cover.



3. REMOVE FRONT BUMPER HOLE COVER LH

(a) Disengage the 5 claws and remove the front bumper hole cover LH.

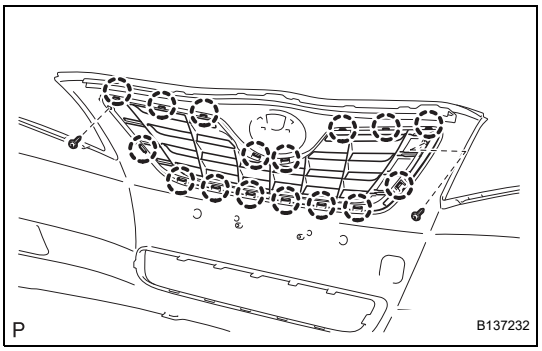
4. REMOVE FRONT BUMPER HOLE COVER RH



5. REMOVE LOWER RADIATOR GRILLE

(a) Disengage the 14 claws and remove the lower radiator grille.

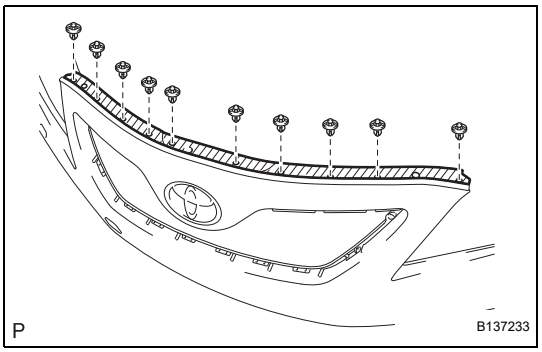
ET



6. REMOVE RADIATOR GRILLE

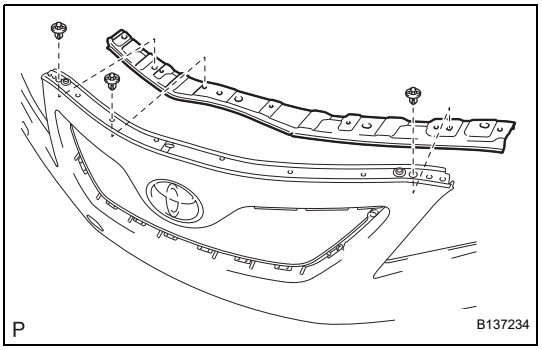
(a) Remove the 2 screws.

(b) Disengage the 16 claws and remove the radiator grille.



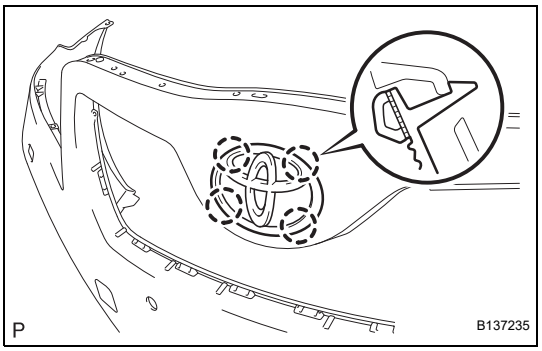
7. REMOVE HOOD TO FRONT END PANEL SEAL

(a) Remove the 10 clips and hood to front end panel seal.



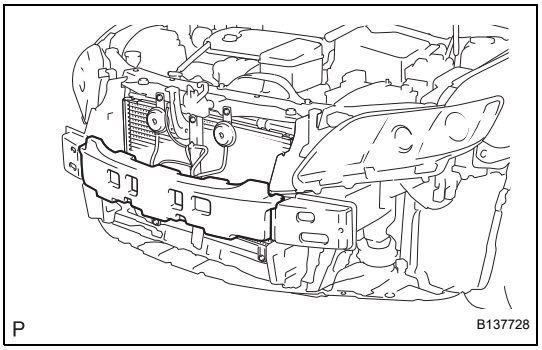
8. REMOVE FRONT BUMPER UPPER RETAINER

(a) Remove the 3 clips and front bumper upper retainer.



9. REMOVE RADIATOR GRILLE EMBLEM

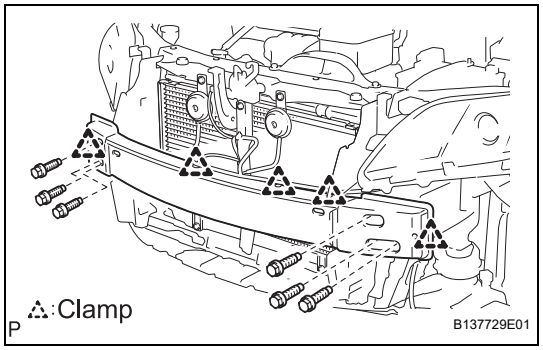
(a) Disengage the 4 claws and remove the radiator grille emblem.



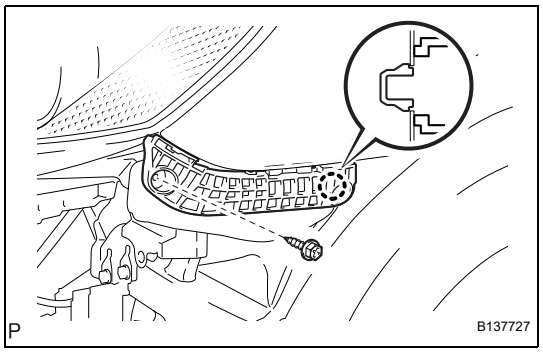
10. REMOVE FRONT BUMPER ENERGY ABSORBER

(a) Remove the front bumper energy absorber from the front bumper reinforcement sub-assembly.

ET



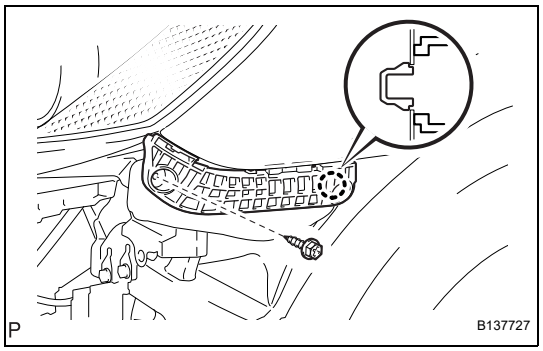
11. REMOVE FRONT BUMPER REINFORCEMENT SUB-ASSEMBLY
(a) Disengage each clamp.
(b) Remove the 6 bolts and front bumper reinforcement sub-assembly.



12. REMOVE FRONT BUMPER SIDE RETAINER LH
(a) Remove the screw.
(b) Disengage the claw and remove the front bumper side retainer LH.

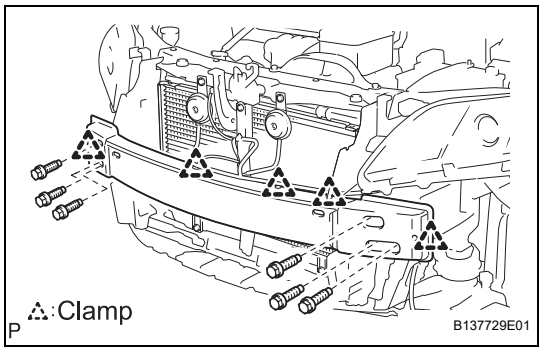
13. REMOVE FRONT BUMPER SIDE RETAINER RH

REASSEMBLY

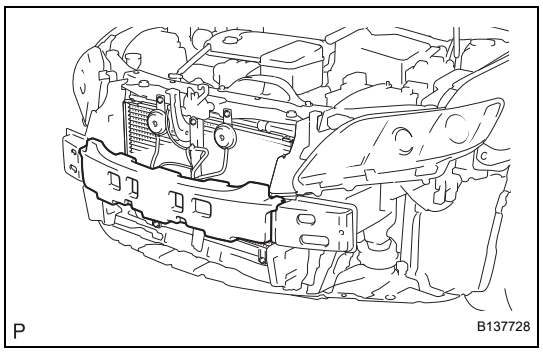


1. INSTALL FRONT BUMPER SIDE RETAINER LH
(a) Engage the claw and install the front bumper side retainer LH.
(b) Install the screw.

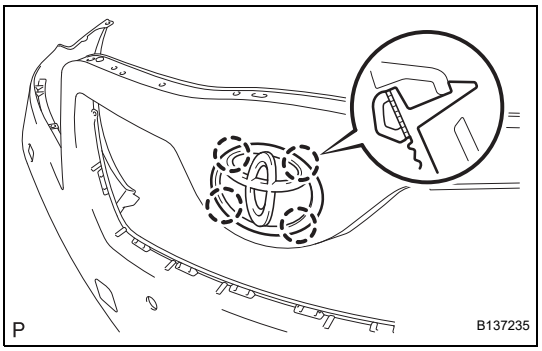
2. INSTALL FRONT BUMPER SIDE RETAINER RH



3. INSTALL FRONT BUMPER REINFORCEMENT SUB-ASSEMBLY
(a) Install the front bumper reinforcement sub-assembly with the 6 bolts.
Torque: 34 N*m (347 kgf*cm, 25 ft.*lbf)
(b) Engage each clamp.

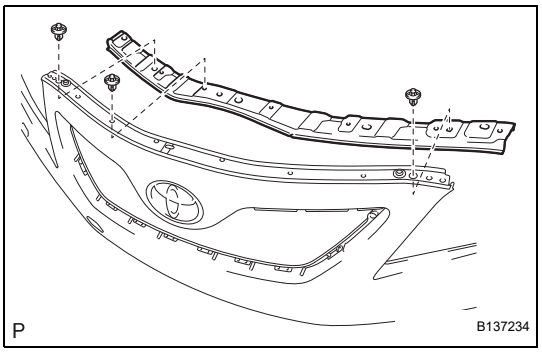


4. INSTALL FRONT BUMPER ENERGY ABSORBER
(a) Install the front bumper energy absorber to the front bumper reinforcement sub-assembly.



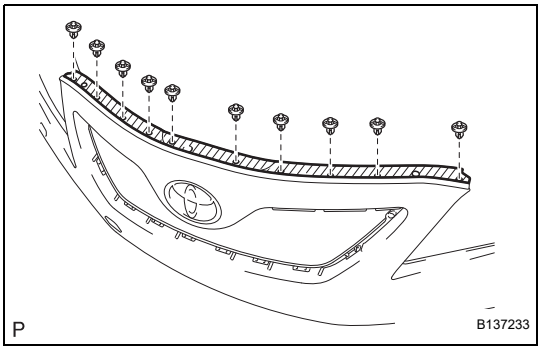
5. INSTALL RADIATOR GRILLE EMBLEM

(a) Engage the 4 claws and install the radiator grille emblem.



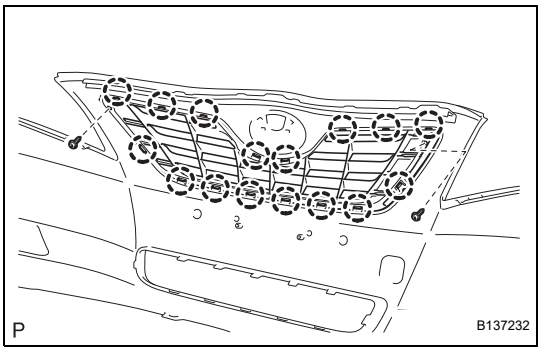
6. INSTALL FRONT BUMPER UPPER RETAINER

(a) Install the front bumper upper retainer with the 3 clips.



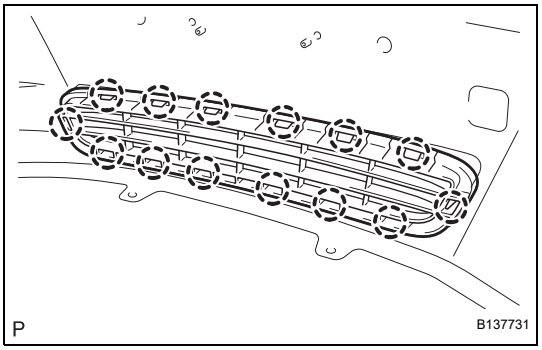
7. INSTALL HOOD TO FRONT END PANEL SEAL

(a) Apply new double-sided tape to the hood to front end panel seal.
(b) Remove the release paper from the hood to front end panel seal.
(c) Install the hood to front end panel seal with the 10 clips.



8. INSTALL RADIATOR GRILLE

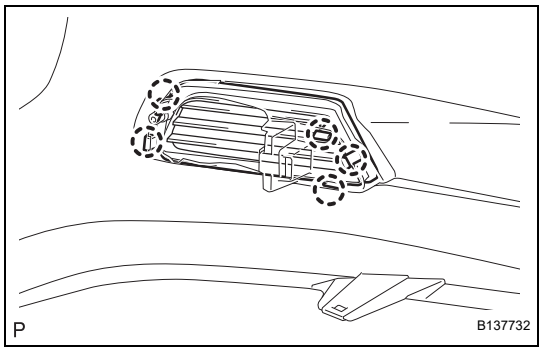
(a) Engage the 16 claws and install the radiator grille.
(b) Install the 2 screws.



9. INSTALL LOWER RADIATOR GRILLE

(a) Engage the 14 claws and install the lower radiator grille.

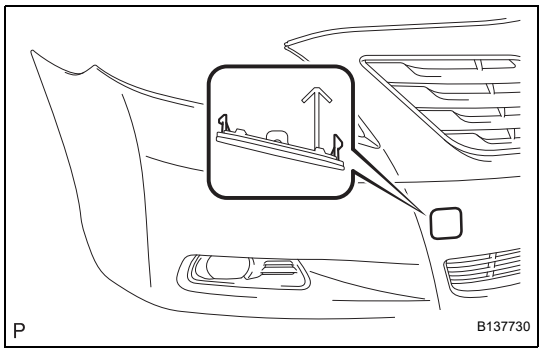
ET



10. INSTALL FRONT BUMPER HOLE COVER LH

(a) Engage the 5 claws and install the front bumper hole cover LH.

11. INSTALL FRONT BUMPER HOLE COVER RH

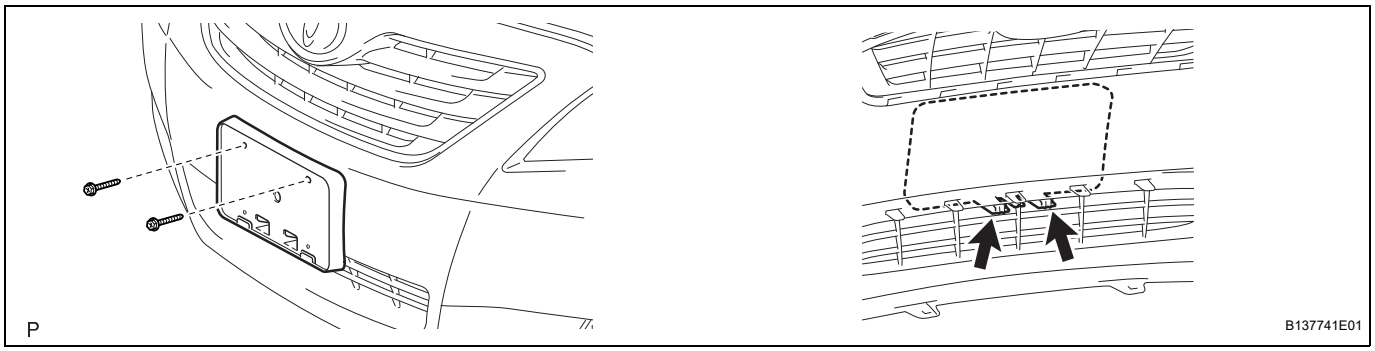


12. INSTALL FRONT BUMPER LOWER COVER

(a) Engage the 2 claws and install the front bumper lower cover.

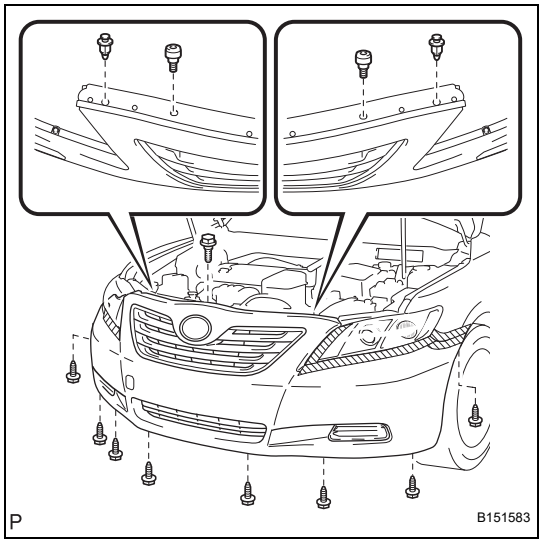
13. INSTALL FRONT BUMPER EXTENSION MOUNTING BRACKET (w/ Bracket)

(a) Engage the 2 claws and install the front bumper extension mounting bracket.



(b) Install the 2 screws.

INSTALLATION

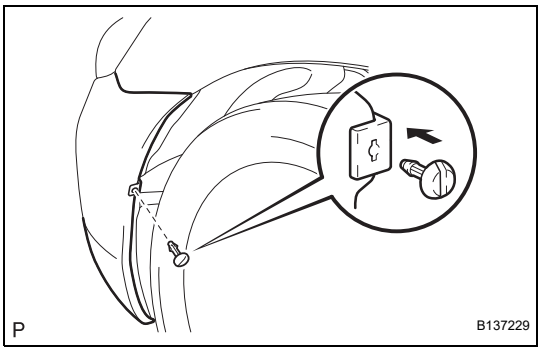


1. INSTALL FRONT BUMPER ASSEMBLY

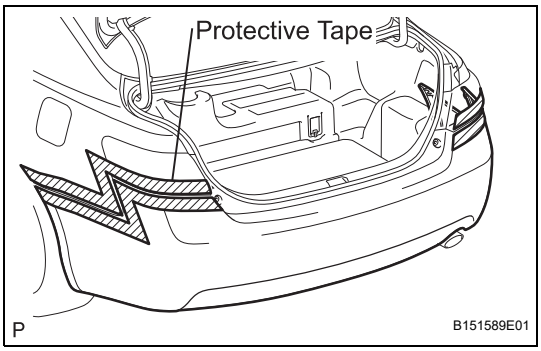
(a) Engage each claw.

(b) Install the front bumper assembly with the 8 screws, 2 clips, 2 radiator grille protectors and bolt.

ET



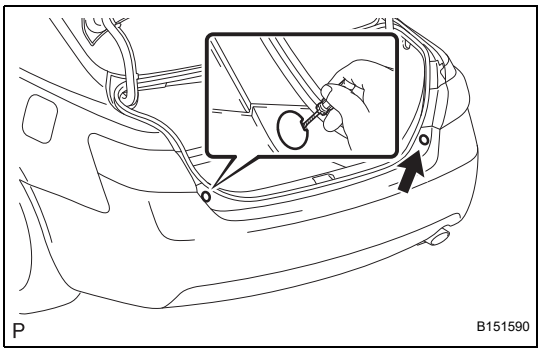
(c) Install the pin hold clip.
HINT:
Use the same procedures for the RH side and LH side.



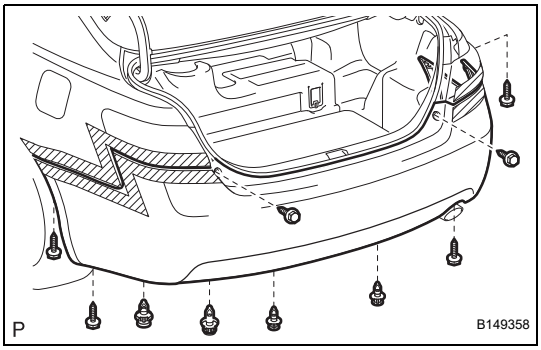
REMOVAL

1. REMOVE REAR BUMPER ASSEMBLY

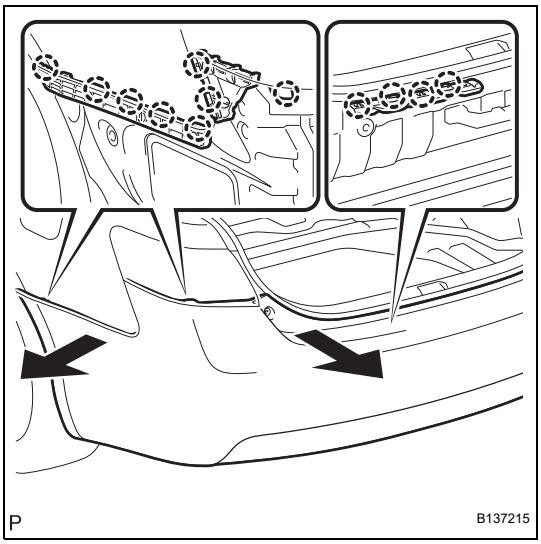
(a) Put protective tape around the rear bumper assembly.



(b) Using a screwdriver, open the 2 rear bumper plates.
HINT:
Tape the screwdriver tip before use.



(c) Remove the 6 screws and 4 clips.



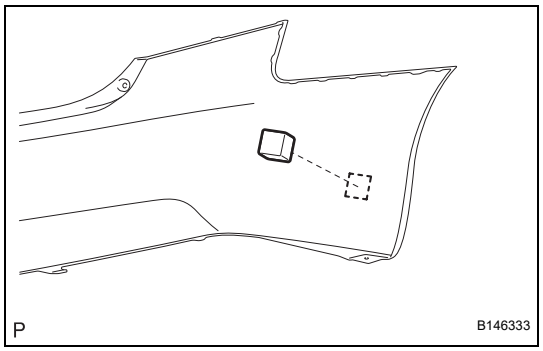
(d) Disengage the 12 claws and disconnect the rear bumper assembly as shown in the illustration.
HINT:
Use the same procedures for the RH side and LH side.

(e) Remove the rear bumper assembly.

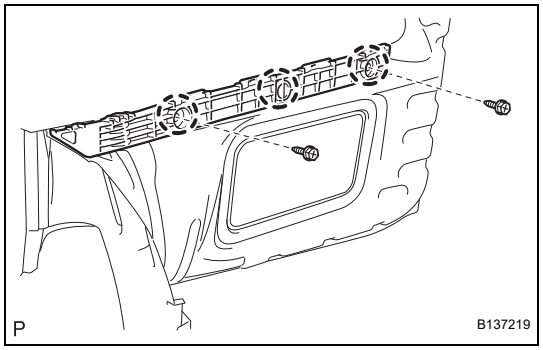
ET

DISASSEMBLY

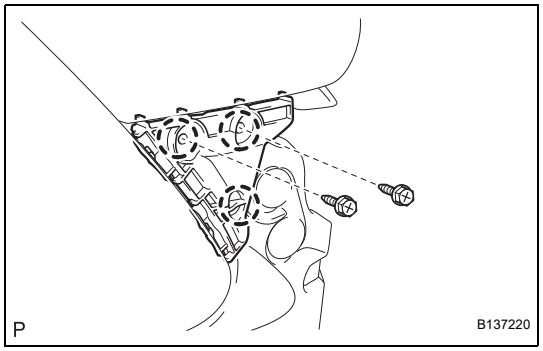
1. **REMOVE REAR BUMPER PLATE LH**
2. **REMOVE REAR BUMPER PLATE RH**
3. **REMOVE REAR BUMPER PAD**
   (a) Remove the rear bumper pad.
   HINT:
   Use the same procedures for the RH side and LH side.



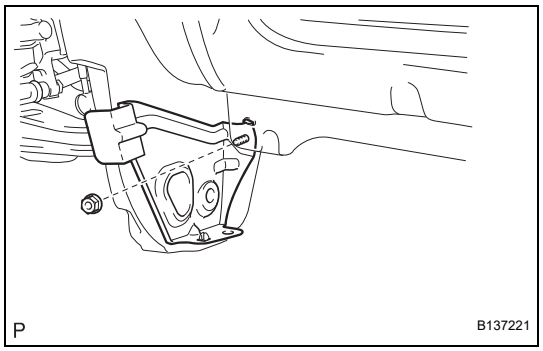
4. **REMOVE REAR BUMPER SIDE SUPPORT LH**
   (a) Remove the 2 screws.
   (b) Disengage the 3 claws and remove the rear bumper side support LH.
5. **REMOVE REAR BUMPER SIDE SUPPORT RH**



6. **REMOVE REAR BUMPER SIDE RETAINER LH**
   (a) Remove the 2 screws.
   (b) Disengage the 3 claws and remove the rear bumper side retainer LH.
7. **REMOVE REAR BUMPER SIDE RETAINER RH**



8. **REMOVE WHEEL HOUSE REINFORCEMENT LH**
   (a) Remove the nut and wheel house reinforcement LH.
9. **REMOVE WHEEL HOUSE REINFORCEMENT RH**



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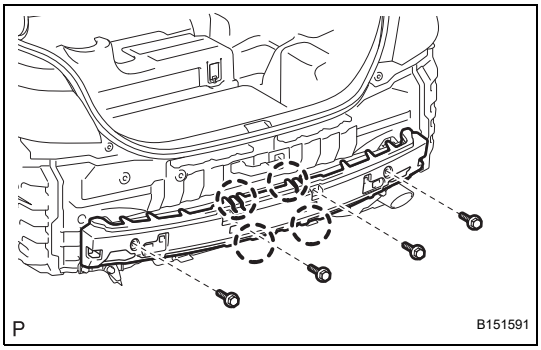
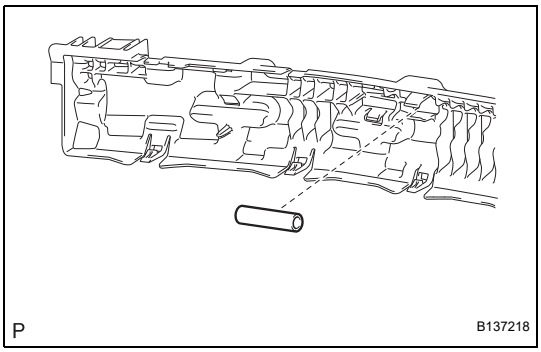


10. REMOVE REAR BUMPER ENERGY ABSORBER

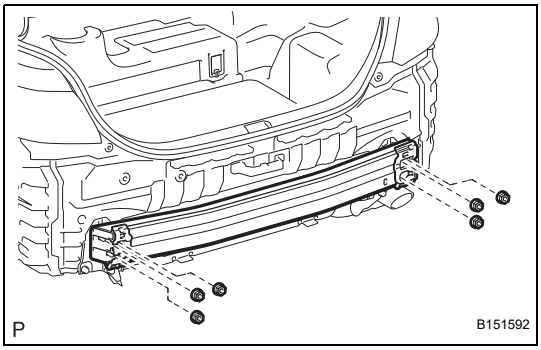
(a) Remove the 4 bolts.

(b) Disengage the 4 claws and remove the rear bumper energy absorber.



11. REMOVE REAR BUMPER BAR

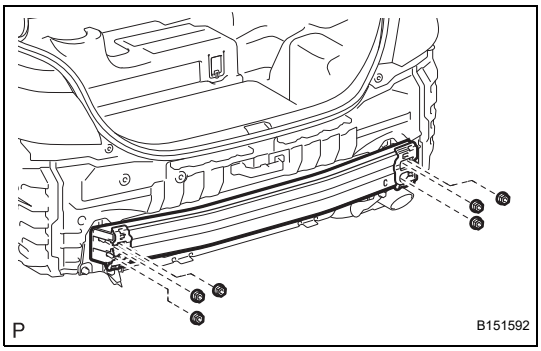
(a) Remove the rear bumper bar from the rear bumper energy absorber.



12. REMOVE REAR BUMPER REINFORCEMENT SUB-ASSEMBLY

(a) Remove the 6 nuts and rear bumper reinforcement sub-assembly.

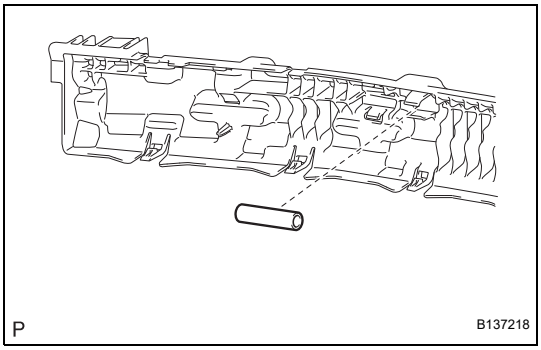
REASSEMBLY



1. INSTALL REAR BUMPER REINFORCEMENT SUB-ASSEMBLY

(a) Install the rear bumper reinforcement sub-assembly with the 6 nuts.

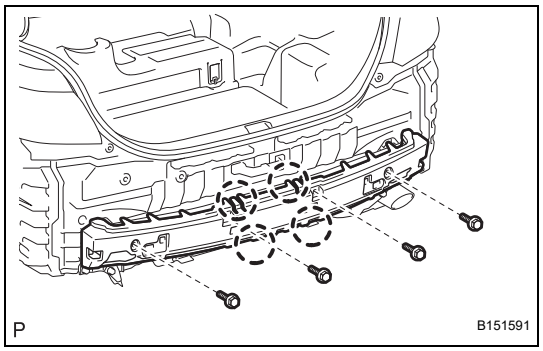
Torque: 68 N*m (693 kgf*cm, 50 ft.*lbf)



2. INSTALL REAR BUMPER BAR

(a) Install the rear bumper bar on the rear bumper energy absorber.

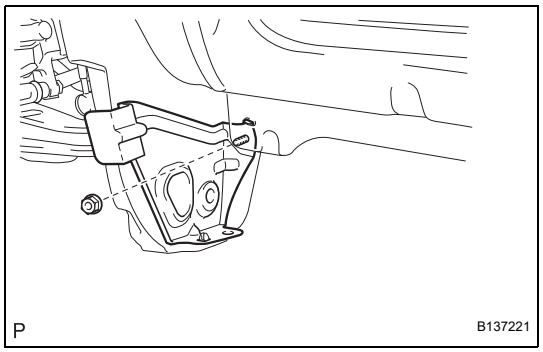
ET



3. INSTALL REAR BUMPER ENERGY ABSORBER

(a) Engage the 4 claws and install the rear bumper energy absorber.

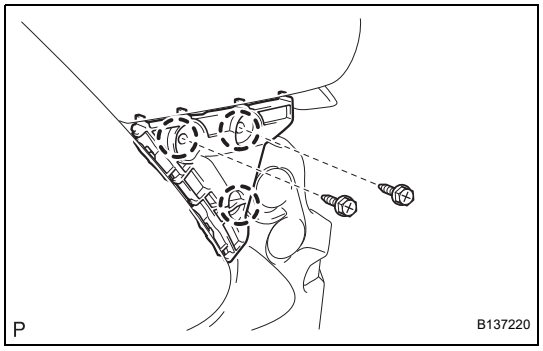
(b) Install the 4 bolts.



4. INSTALL WHEEL HOUSE REINFORCEMENT LH

(a) Install the wheel house reinforcement LH with the nut.

5. INSTALL WHEEL HOUSE REINFORCEMENT RH

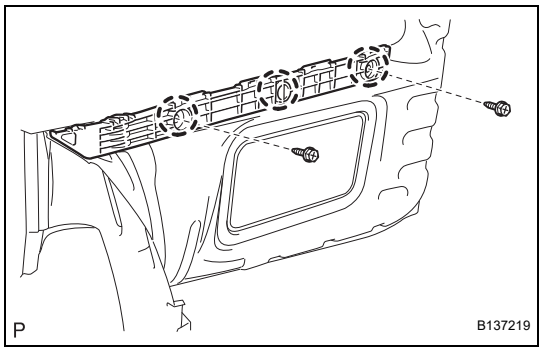


6. INSTALL REAR BUMPER SIDE RETAINER LH

(a) Engage the 3 claws and install the rear bumper side retainer LH.

(b) Install the 2 screws.

7. INSTALL REAR BUMPER SIDE RETAINER RH

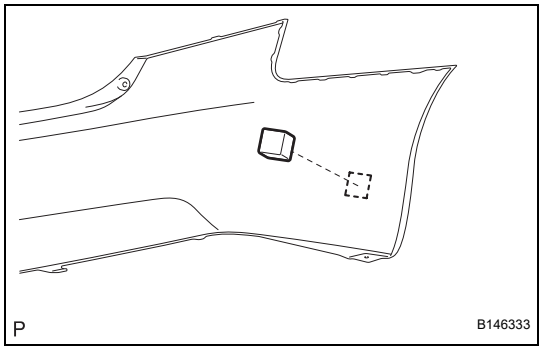


8. INSTALL REAR BUMPER SIDE SUPPORT LH

(a) Engage the 3 claws and install the rear bumper side support LH.

(b) Install the 2 screws.

9. INSTALL REAR BUMPER SIDE SUPPORT RH



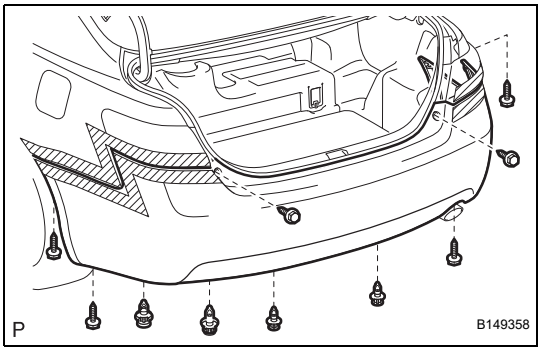
10. INSTALL REAR BUMPER PAD

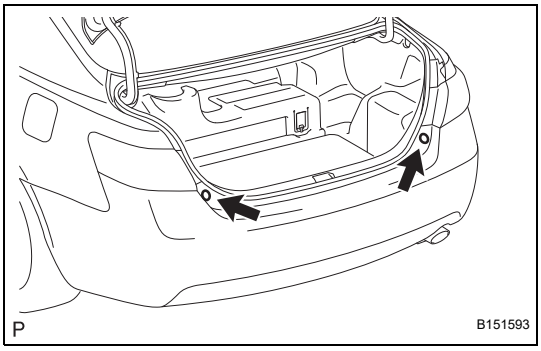
(a) Apply new double-sided tape to the rear bumper pad.

(b) Remove the release paper from the rear bumper pad.

(c) Install the rear bumper pad.
HINT:
Use the same procedures for the RH side and LH side.

11. INSTALL REAR BUMPER PLATE LH





12. INSTALL REAR BUMPER PLATE RH

INSTALLATION

1. INSTALL REAR BUMPER ASSEMBLY

(a) Engage each claw.

(b) Install the rear bumper assembly with the 6 screws and 4 clips.

(c) Install the 2 rear bumper plates.

INSTALLATION

HINT:
When installing the name plate, heat the vehicle body and name plate using a heat light.

Heating temperature

Item	Temperature
Vehicle Body	40 to 60°C (104 to 140°F)
Name Plate	20 to 30°C (68 to 86°F)

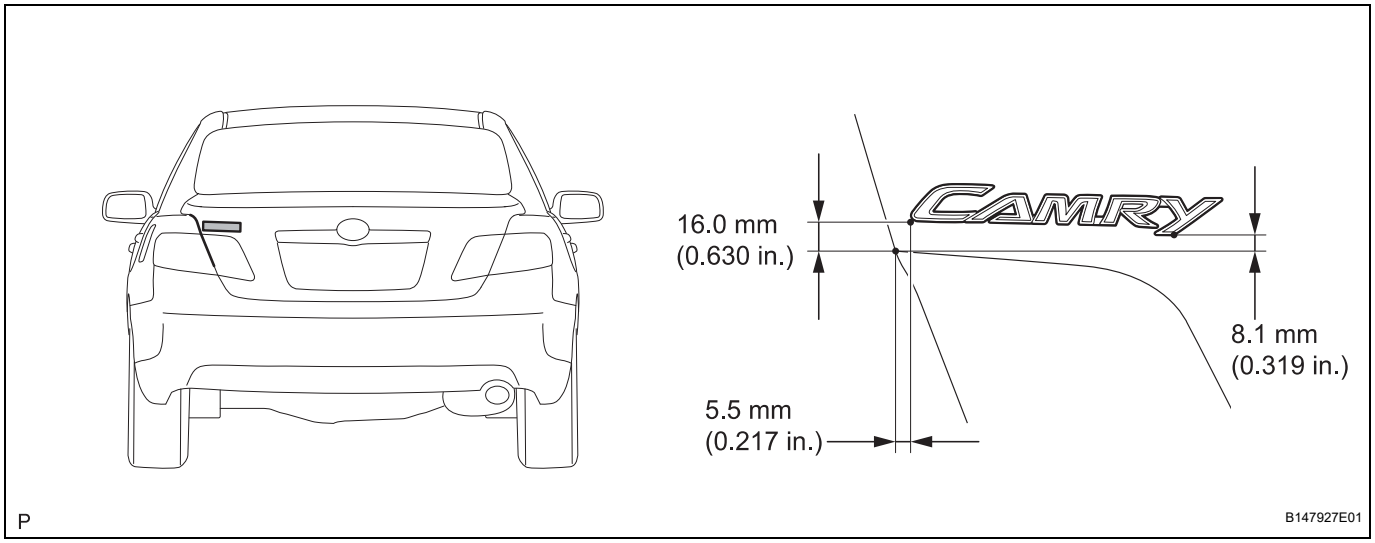
NOTICE:
Do not heat the vehicle body and name plate excessively.

1. INSTALL NO. 2 LUGGAGE COMPARTMENT DOOR NAME PLATE

(a) Clean the vehicle body surface.
  (1) Using a heat light, heat the vehicle body surface.
  (2) Remove the double-sided tape from the vehicle body.
  (3) Wipe off any tape adhesive residue with cleaner.

(b) Clean the name plate. (If reusing the name plate)
  (1) Using a heat light, heat the name plate.
  (2) Remove the double-sided tape from the name plate.
  (3) Wipe off any tape adhesive residue with cleaner.
  (4) Apply new double-sided tape to the name plate.

(c) Install the name plate.



(1) Using a heat light, heat the vehicle body and name plate.
(2) Remove the release paper from the name plate.
  HINT:
  After removing the release paper, keep the exposed adhesive free from foreign matter.
(3) Install the name plate.

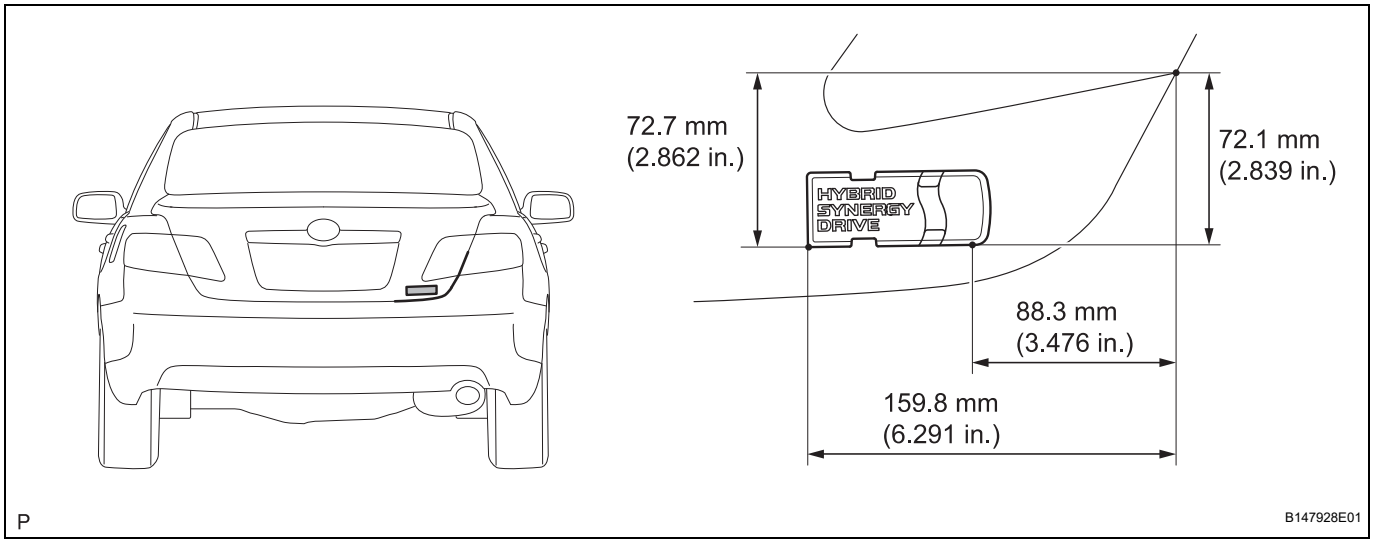
ET

2. INSTALL BACK DOOR NAME PLATE

(a) Clean the vehicle body surface.
  (1) Using a heat light, heat the vehicle body surface.
  (2) Remove the double-sided tape from the vehicle body.
  (3) Wipe off any tape adhesive residue with cleaner.

(b) Clean the name plate. (If reusing the name plate)
  (1) Using a heat light, heat the name plate.
  (2) Remove the double-sided tape from the name plate.
  (3) Wipe off any tape adhesive residue with cleaner.
  (4) Apply new double-sided tape to the name plate.

(c) Install the name plate.
  (1) Using a heat light, heat the vehicle body and name plate.
  (2) Remove the release paper from the name plate.
  HINT:
  After removing the release paper, keep the exposed adhesive free from foreign matter.
  (3) Install the name plate.



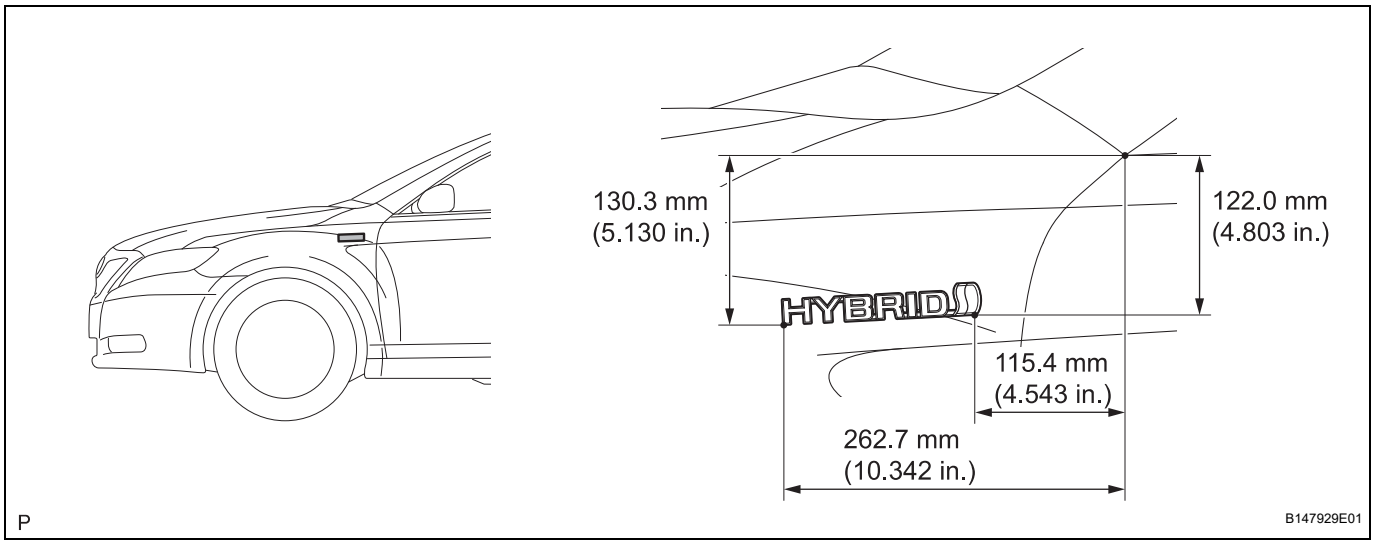
3. INSTALL SIDE PANEL EMBLEM

(a) Clean the vehicle body surface.
  (1) Using a heat light, heat the vehicle body surface.
  (2) Remove the double-sided tape from the vehicle body.
  (3) Wipe off any tape adhesive residue with cleaner.

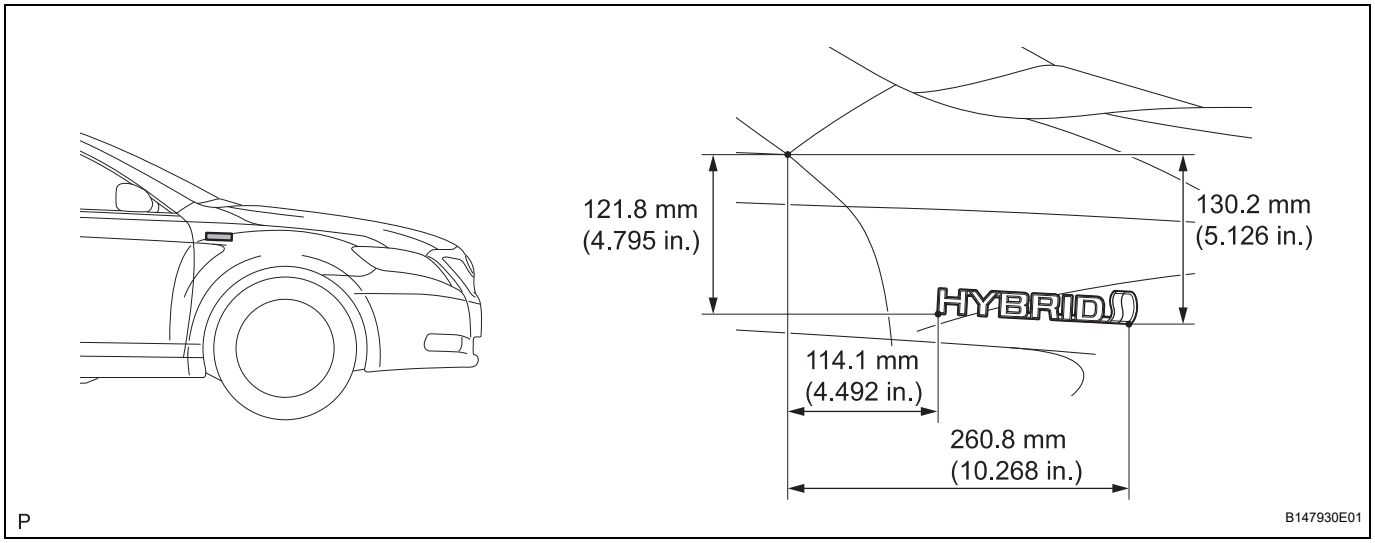
(b) Clean the side panel emblem. (If reusing the side panel emblem)
  (1) Using a heat light, heat the side panel emblem.
  (2) Remove the double-sided tape from the side panel emblem.

(3) Wipe off any tape adhesive residue with cleaner.
(4) Apply new double-sided tape to the side panel emblem.

(c) Install the side panel emblem.
(1) Using a heat light, heat the vehicle body and side panel emblem.
(2) Remove the release paper from the side panel emblem.
HINT:
After removing the release paper, keep the exposed adhesive free from foreign matter.
(3) Install the side panel emblem.
For LH side:



For RH side:



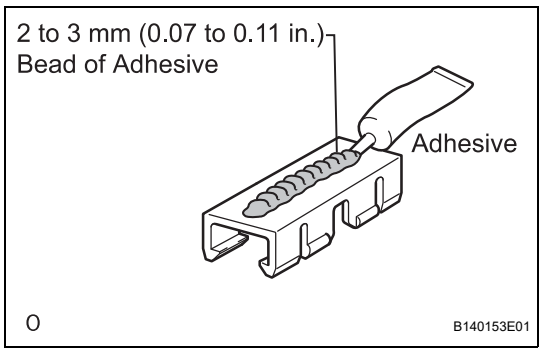
ET

INSTALLATION

1. INSTALL ROOF DRIP SIDE FINISH MOULDING CLIP

NOTICE:

If installing new clips, remove the double-sided tape remaining where the clips will be installed on the body and clean the body with a non-residue type solvent.

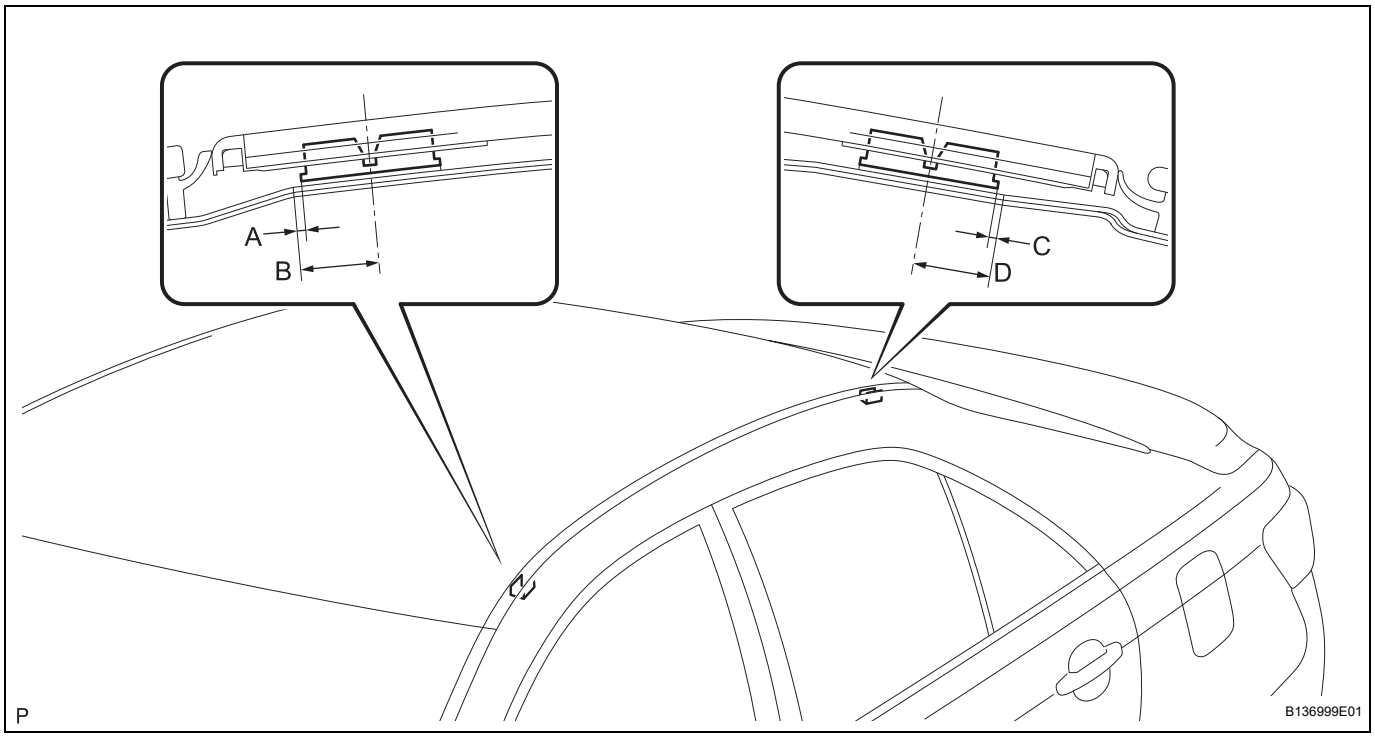


(a) Apply a 2 to 3 mm (0.07 to 0.11 in.) bead of adhesive (3M DP-105 or equivalent) to new roof drip side finish moulding clips.

HINT:

Adhesive strength (tensile strength): 13.7 MPa (140 kgf/cm^2) or more (when the temperature is 23°C)

(b) Install the roof drip side finish moulding clips to the positions on the roof panel shown in the illustration. Determine the locations and firmly press and install the roof drip side finish moulding clips after lightly rubbing up adhesive (3M DP-105 or equivalent).



Standard dimension

Area	Dimension
A	1.4 mm (0.055 in.)
B	12.4 mm (0.488 in.)
C	1.1 mm (0.043 in.)
D	12.1 mm (0.476 in.)

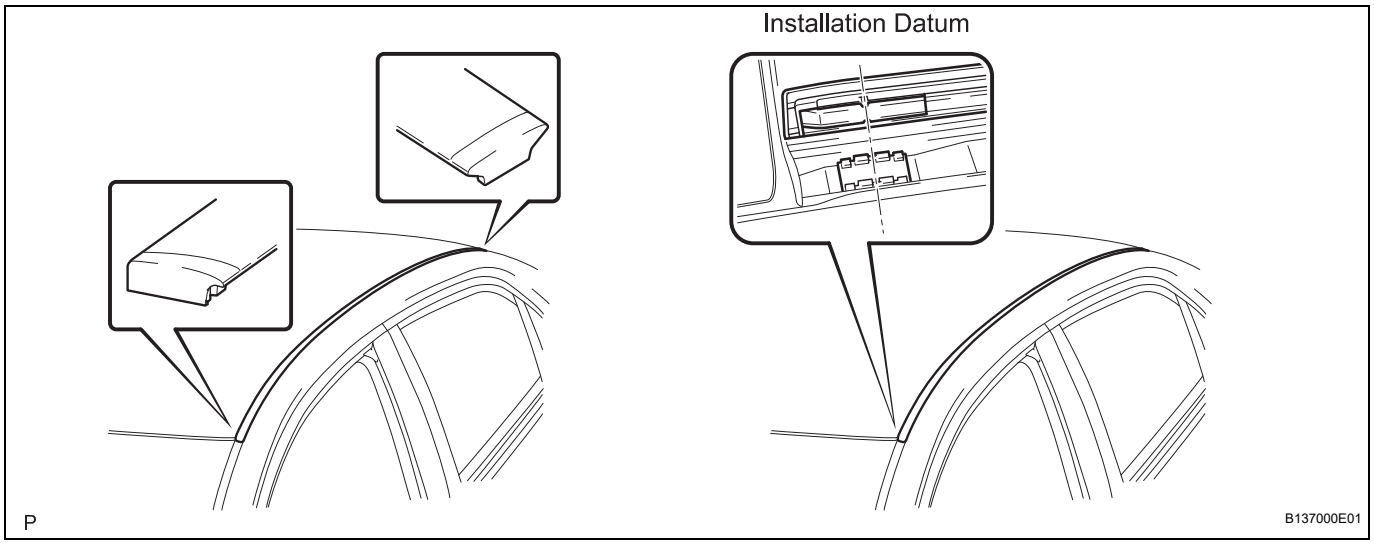
HINT:

- Initial hardening time: 20 minutes
- Complete hardening time: 48 hours

ET

2. INSTALL ROOF DRIP SIDE FINISH MOULDING CENTER

(a) Install the roof drip side finish moulding center when 20 minutes or more have elapsed after pressing and installing the roof drip side finish moulding clips.

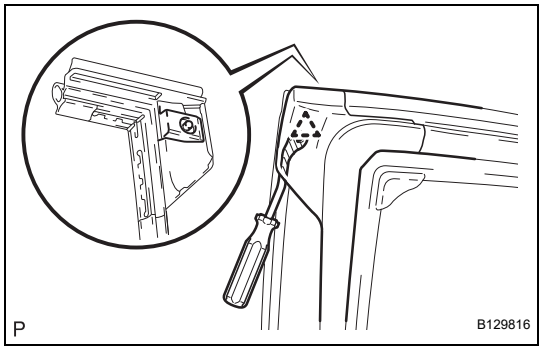


NOTICE:

- **Install the roof drip side finish moulding center in the proper direction.**
- **Set the front clip to the installation datum. Make sure that the front clip and roof drip side finish moulding center are fit each other.**

REMOVAL

1. **REMOVE FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-41)**
2. **REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-41)**
3. **REMOVE ASSIST GRIP COVER (See page ED-42)**
4. **REMOVE COURTESY LIGHT ASSEMBLY (See page ED-42)**
5. **REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-42)**
6. **REMOVE FRONT DOOR INNER GLASS WEATHERSTRIP (See page ED-43)**
7. **REMOVE FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY (See page ED-44)**
8. **REMOVE FRONT NO. 1 SPEAKER ASSEMBLY (See page AV-145)**
9. **REMOVE OUTER REAR VIEW MIRROR ASSEMBLY (See page MI-13)**
10. **REMOVE FRONT DOOR SERVICE HOLE COVER (See page ED-44)**
11. **REMOVE FRONT DOOR GLASS SUB-ASSEMBLY (See page ED-44)**
12. **REMOVE FRONT DOOR GLASS RUN (See page ED-46)**
13. **REMOVE FRONT DOOR WEATHERSTRIP**
    (a) Using a clip remover, disengage the clip and remove the front door weatherstrip.
    HINT:
    Tape the clip remover tip before use.



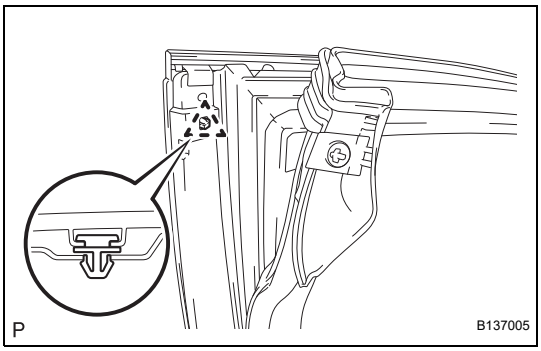
14. **REMOVE FRONT DOOR REAR WINDOW FRAME MOULDING**
    HINT:
    When removing the front door rear window frame moulding, heat the vehicle body and front door rear window frame moulding using a heat light.
    Heating temperature

Item	Temperature
Vehicle Body	40 to 60°C (104 to 140°F)
Moulding	20 to 30°C (68 to 86°F)

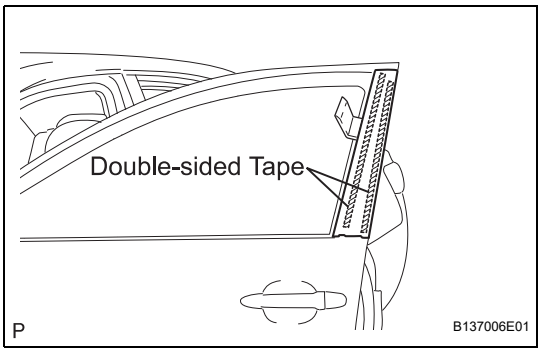
NOTICE:
Do not heat the vehicle body and moulding excessively.

(a) Using a heat light, heat the front door rear window frame moulding.

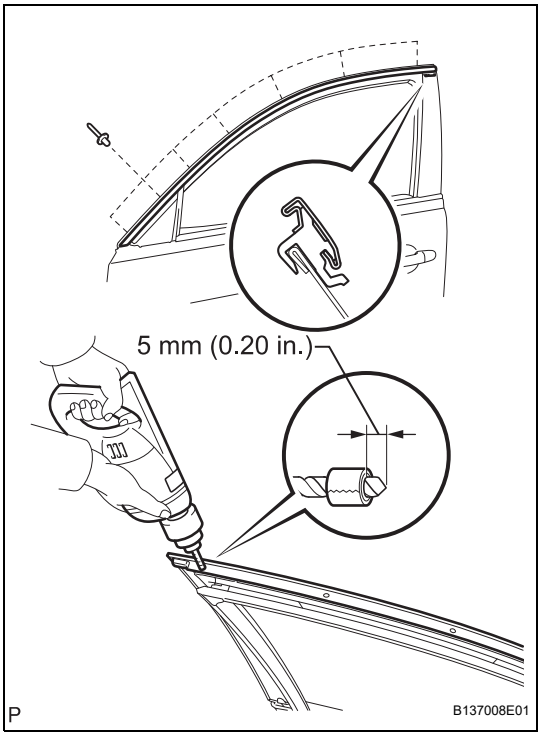
ET



(b) Disengage the clip.



(c) Using a moulding remover, remove the front door rear window frame moulding.



15. REMOVE FRONT DOOR UPPER WINDOW FRAME MOULDING

(a) Put a 4 mm (0.16 in.) drill bit into a drill.

(b) Tape the drill bit without the portion of 5 mm (0.20 in.) from the tip covered.
HINT:
Tape the drill bit to prevent the drill bit from going too deep.

(c) Lightly press the drill against the rivets, drill off the flanges of the rivets, and remove the 7 rivets.
NOTICE:
- **Pressing the drill too firmly will cause the rivet to turn and result in the rivet not being drilled through.**
- **Do not pry the rivets with the drill, because this may cause damage to the installation holes of the rivets or the drill bit.**
- **Be careful when touching the drilled rivets as they may become hot.**

(d) Using a vacuum cleaner, remove the rivet fragments and shavings from the drilled areas.

(e) Remove the front door upper window frame moulding from the door frame.

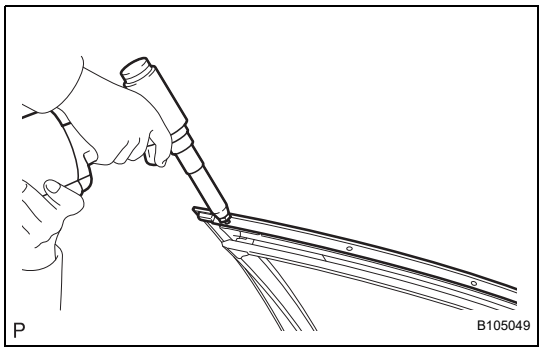
ET

INSTALLATION

1. INSTALL FRONT DOOR UPPER WINDOW FRAME MOULDING

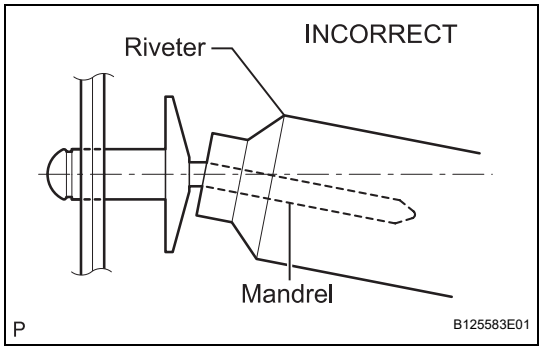
(a) Install the front door upper window frame moulding to the door frame.

(b) Using an air riveter or hand riveter with a nose piece, install the front door upper window frame moulding with 7 new rivets.
HINT:
If the rivet cannot be cut, pull it once and cut it.

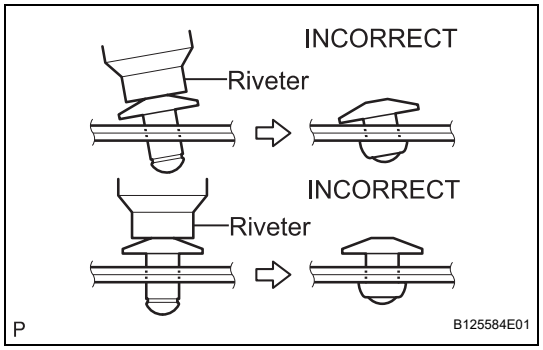


NOTICE:

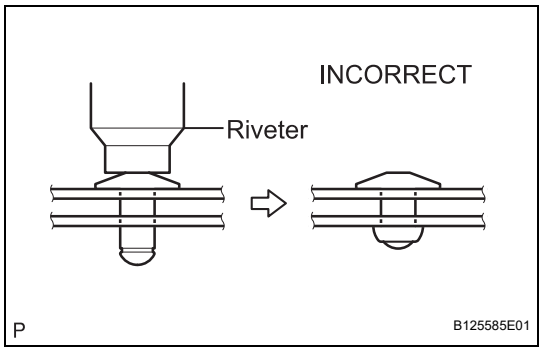
- **Do not pry the rivet with the riveter, as this will cause damage to the riveter and mandrel.**



- **Confirm that the rivets are seated properly against the moulding. Do not tilt the riveter when installing the rivet to the moulding. Do not leave any space between the rivet head and moulding.**



- **Do not leave any space between the moulding and door frame. Firmly hold together the 2 items while installing the rivet.**



2. INSTALL FRONT DOOR REAR WINDOW FRAME MOULDING

HINT:
When installing the front door rear window frame moulding, heat the vehicle body and front door rear window frame moulding using a heat light.

Heating temperature

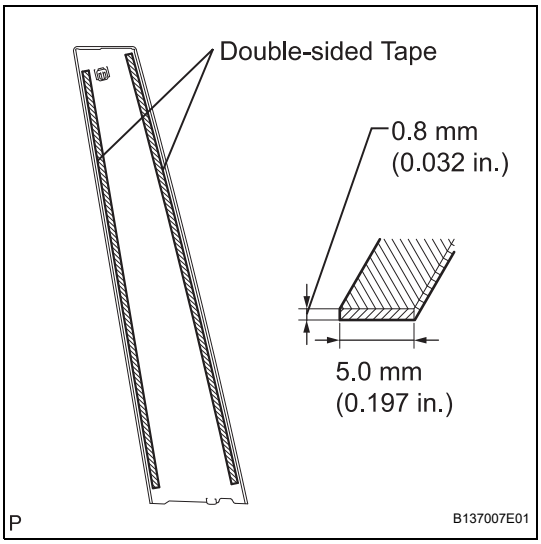
Item	Temperature
Vehicle Body	40 to 60°C (104 to 140°F)
Moulding	20 to 30°C (68 to 86°F)

ET

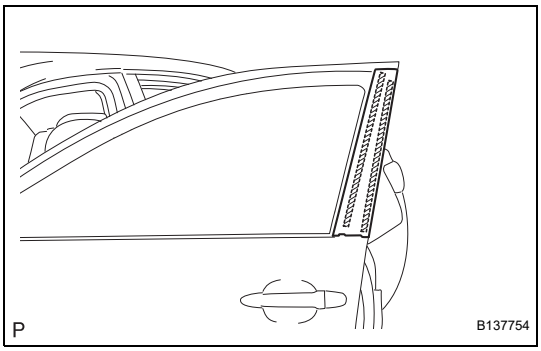
NOTICE:
Do not heat the vehicle body and front door window frame moulding excessively.

(a) Clean the vehicle body surface.
  (1) Using a heat light, heat the vehicle body surface.
  (2) Remove the double-sided tape from the vehicle body.
  (3) Wipe off any tape adhesive residue with cleaner.

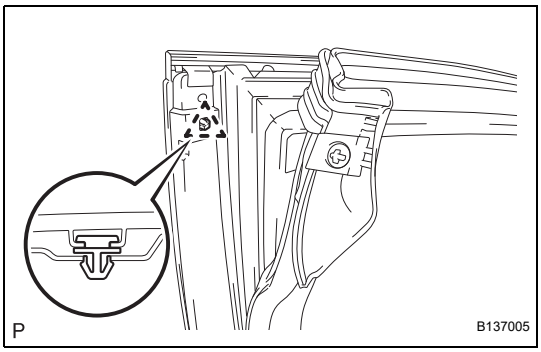
(b) Clean the front door rear window frame moulding. (If reusing the front door rear window frame moulding)
  (1) Using a heat light, heat the front door rear window frame moulding.
  (2) Remove the double-sided tape from the front door rear window frame moulding.
  (3) Wipe off any tape adhesive residue with cleaner.
  (4) Apply new double-sided tape to the front door rear window frame moulding.



(c) Install the front door rear window frame moulding.
  (1) Using a heat light, heat the vehicle body and front door rear window frame moulding.
  (2) Remove the release paper from the front door rear window frame moulding.
  HINT:
  After removing the release paper, keep the exposed adhesive free from foreign matter.



  (3) Engage the clip and install the front door rear window frame moulding.



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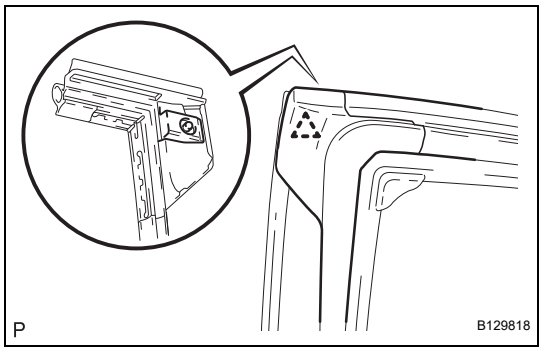
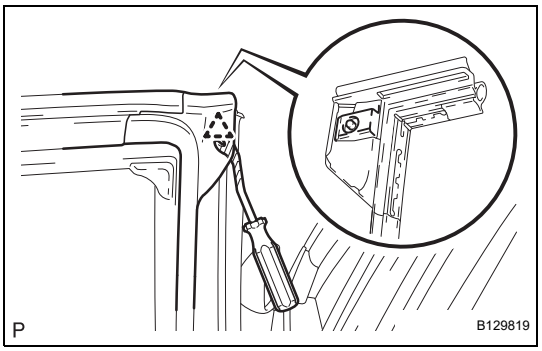


3. **INSTALL FRONT DOOR WEATHERSTRIP**
   (a) Engage the clip and install the front door weatherstrip.
4. **INSTALL FRONT DOOR GLASS RUN (See page ED-56)**
5. **INSTALL FRONT DOOR GLASS SUB-ASSEMBLY (See page ED-57)**
6. **INSTALL FRONT DOOR SERVICE HOLE COVER (See page ED-57)**
7. **INSTALL OUTER REAR VIEW MIRROR ASSEMBLY (See page MI-15)**
8. **INSTALL FRONT NO. 1 SPEAKER ASSEMBLY (See page AV-147)**
9. **INSTALL FRONT DOOR INNER GLASS WEATHERSTRIP (See page ED-58)**
10. **INSTALL FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY (See page ED-59)**
11. **INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-59)**
12. **INSTALL COURTESY LIGHT ASSEMBLY (See page ED-59)**
13. **INSTALL ASSIST GRIP COVER (See page ED-60)**
14. **INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-60)**
15. **INSTALL FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-60)**

REMOVAL

1. **REMOVE REAR DOOR INSIDE HANDLE BEZEL PLUG (See page ED-64)**
2. **REMOVE DOOR ASSIST GRIP COVER (See page ED-64)**
3. **REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-65)**
4. **REMOVE REAR DOOR INNER GLASS WEATHERSTRIP (See page ED-66)**
5. **REMOVE REAR DOOR INSIDE HANDLE SUB-ASSEMBLY (See page ED-66)**
6. **REMOVE REAR DOOR SERVICE HOLE COVER (See page ED-67)**
7. **REMOVE REAR DOOR GLASS RUN (See page ED-68)**
8. **REMOVE REAR DOOR LOWER WINDOW FRAME SUB-ASSEMBLY (See page ED-68)**
9. **REMOVE REAR DOOR QUARTER WINDOW GLASS (See page ED-68)**
10. **REMOVE REAR DOOR GLASS SUB-ASSEMBLY (See page ED-69)**
11. **REMOVE REAR DOOR WEATHERSTRIP**
    (a) Using a clip remover, disengage the clip and remove the rear door weatherstrip.
    HINT:
    Tape the clip remover tip before use.



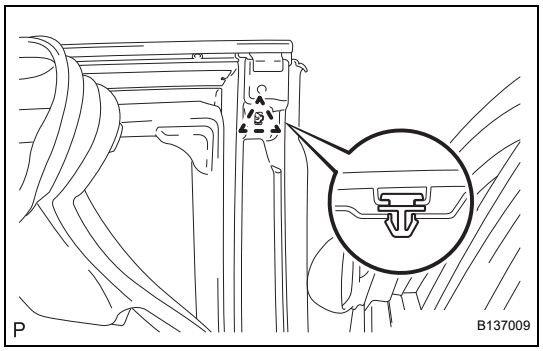
12. **REMOVE REAR DOOR FRONT WINDOW FRAME MOULDING**
    HINT:
    When removing the rear door front window frame moulding, heat the vehicle body and rear door front window frame moulding using a heat light.
    Heating temperature

Item	Temperature
Vehicle Body	40 to 60°C (104 to 140°F)
Moulding	20 to 30°C (68 to 86°F)

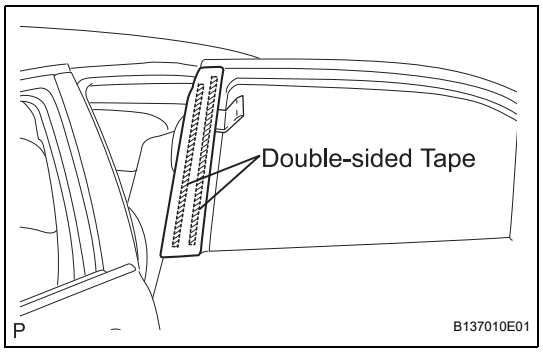
NOTICE:
Do not heat the vehicle body and moulding excessively.

(a) Using a heat light, heat the rear door front window frame moulding.

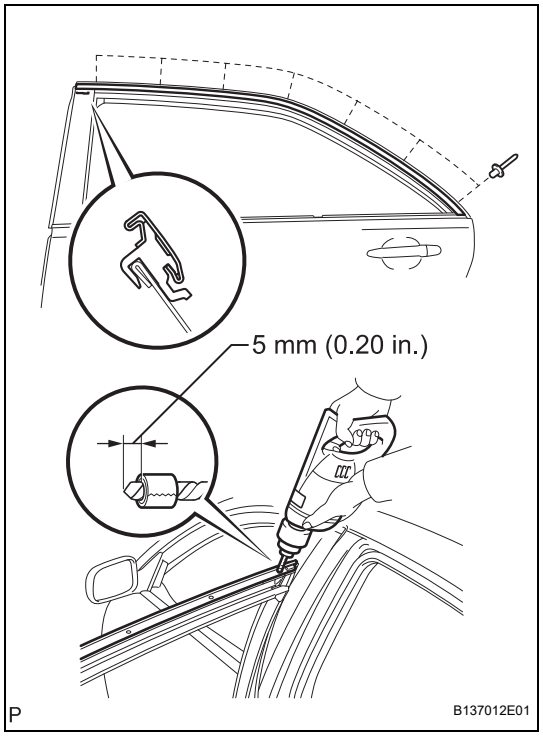
ET



(b) Disengage the clip.



(c) Using a moulding remover, remove the rear door front window frame moulding.



13. REMOVE REAR DOOR UPPER WINDOW FRAME MOULDING

(a) Put a 4 mm (0.16 in.) drill bit into a drill.

(b) Tape the drill bit without the portion of 5 mm (0.20 in.) from the tip covered.
HINT:
Tape the drill bit to prevent the drill bit from going too deep.

(c) Lightly press the drill bit against the rivets, drill off the flanges of the rivets, and remove the 7 rivets.
NOTICE:
- **Pressing the drill too firmly will cause the rivet to turn and result in the rivet not being drilled through.**
- **Do not pry the rivets with the drill, as this may cause damage to the installation holes of the rivets or the drill bit.**
- **Be careful when touching the drilled rivets, as they may become hot.**

(d) Using a vacuum cleaner, remove the rivet fragments and shavings from the drilled areas.

(e) Remove the rear door upper window frame moulding from the door frame.

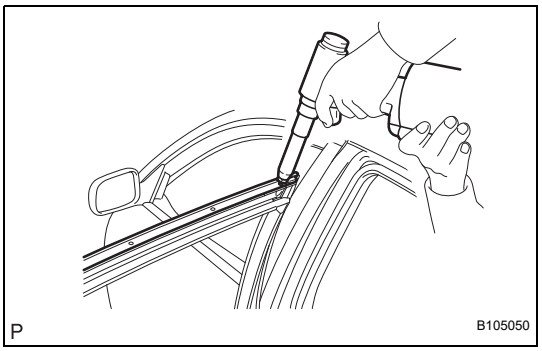
ET

INSTALLATION

1. INSTALL REAR DOOR UPPER WINDOW FRAME MOULDING

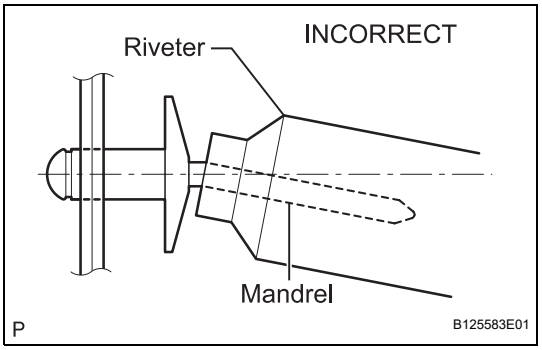
(a) Install the rear door upper window frame moulding to the door frame.

(b) Using an air riveter or hand riveter with a nose piece, install the rear door upper window frame moulding with 7 new rivets.
HINT:
If the rivet cannot be cut, pull it once and cut it.

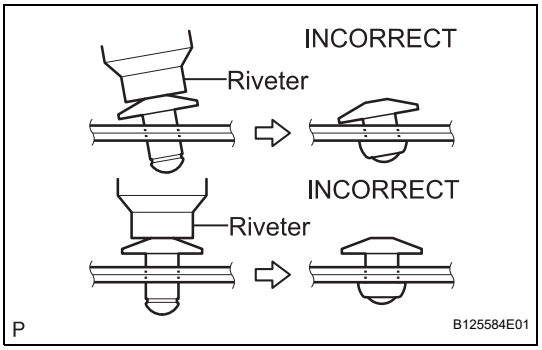


NOTICE:

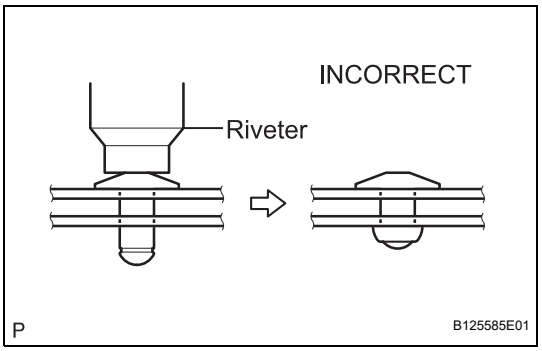
- **Do not pry the rivet with the riveter, as this will cause damage to the riveter and mandrel.**



- **Confirm that the rivets are seated properly against the moulding. Do not tilt the riveter when installing the rivet to the moulding. Do not leave any space between the rivet head and moulding.**



- **Do not leave any space between the moulding and door frame. Firmly hold together the 2 items while installing the rivet.**



2. INSTALL REAR DOOR FRONT WINDOW FRAME MOULDING

HINT:
When installing the rear door front window frame moulding, heat the vehicle body and rear door front window frame using a heat light.

Heating temperature

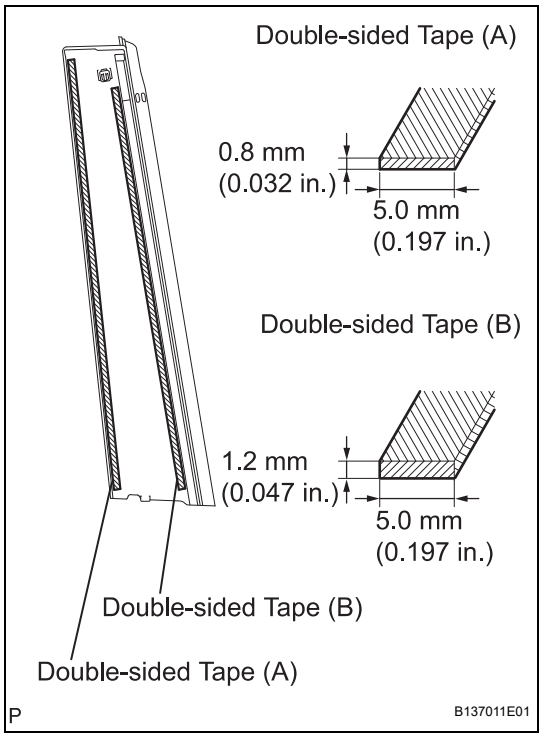
Item	Temperature
Vehicle Body	40 to 60°C (104 to 140°F)
Moulding	20 to 30°C (68 to 86°F)

ET

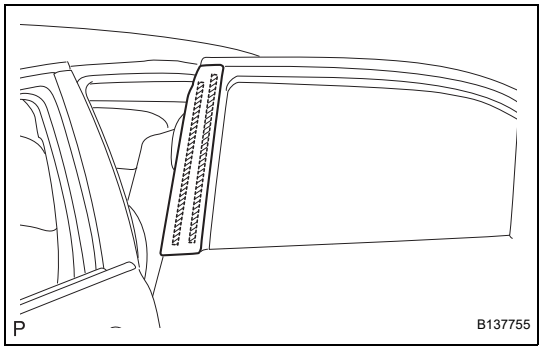
NOTICE:
Do not heat the vehicle body and rear door window frame moulding excessively.

(a) Clean the vehicle body surface.
  (1) Using a heat light, heat the vehicle body surface.
  (2) Remove the double-sided tape from the vehicle body.
  (3) Wipe off any tape adhesive residue with cleaner.

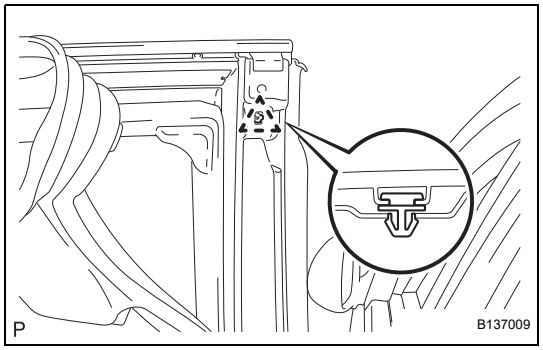
(b) Clean the rear door front window frame moulding. (If reusing the rear door front window frame moulding)
  (1) Using a heat light, heat the rear door front window frame moulding.
  (2) Remove the double-sided tape from the rear door front window frame moulding.
  (3) Wipe off any tape adhesive residue with cleaner.
  (4) Apply new double-sided tape to the rear door front window frame moulding.



(c) Install the rear door front window frame moulding.
  (1) Using a heat light, heat the vehicle body and rear door front window frame moulding.
  (2) Remove the release paper from the rear door front window frame moulding.
  HINT:
  After removing the release paper, keep the exposed adhesive free from foreign matter.



  (3) Engage the clip and install the rear door front window frame moulding.



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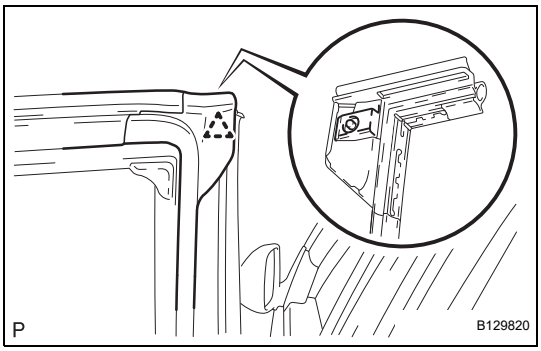


3. **INSTALL REAR DOOR WEATHERSTRIP**
   (a) Engage the clip and install the rear door weatherstrip.
4. **INSTALL REAR DOOR GLASS RUN (See page ED-78)**
5. **INSTALL REAR DOOR GLASS SUB-ASSEMBLY (See page ED-78)**
6. **INSTALL REAR DOOR QUARTER WINDOW GLASS (See page ED-78)**
7. **INSTALL REAR DOOR LOWER WINDOW FRAME SUB-ASSEMBLY (See page ED-78)**
8. **INSTALL REAR DOOR SERVICE HOLE COVER (See page ED-79)**
9. **INSTALL REAR DOOR INSIDE HANDLE SUB-ASSEMBLY (See page ED-80)**
10. **INSTALL REAR DOOR INNER GLASS WEATHERSTRIP (See page ED-80)**
11. **INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-81)**
12. **INSTALL DOOR ASSIST GRIP COVER (See page ED-82)**
13. **INSTALL REAR DOOR INSIDE HANDLE BEZEL PLUG (See page ED-82)**

REMOVAL

1. **REMOVE FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-41)**
2. **REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-41)**
3. **REMOVE ASSIST GRIP COVER (See page ED-42)**
4. **REMOVE COURTESY LIGHT ASSEMBLY (See page ED-42)**
5. **REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-42)**
6. **REMOVE FRONT DOOR INNER GLASS WEATHERSTRIP (See page ED-43)**
7. **REMOVE FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY (See page ED-44)**
8. **REMOVE FRONT NO. 1 SPEAKER ASSEMBLY (See page AV-145)**
9. **REMOVE OUTER REAR VIEW MIRROR ASSEMBLY (See page MI-13)**
10. **REMOVE FRONT DOOR SERVICE HOLE COVER (See page ED-44)**
11. **REMOVE FRONT DOOR GLASS SUB-ASSEMBLY (See page ED-44)**
12. **REMOVE FRONT DOOR GLASS RUN (See page ED-46)**
13. **REMOVE FRONT DOOR WEATHERSTRIP (See page ET-37)**
14. **REMOVE DOOR FRAME GARNISH (See page ED-46)**
15. **REMOVE FRONT DOOR STRIPE**
    (a) Using a heat light, heat the front door stripe.
    Heating temperature

Item	Temperature
Vehicle Body	40 to 60°C (104 to 140°F)

    NOTICE:
    Do not heat the vehicle body excessively.
    (b) Pull back an edge of the front door stripe and pull it parallel to the vehicle body to pull it off.
16. **REMOVE FRONT DOOR LOWER OUTSIDE STRIPE**
    (a) Using a heat light, heat the front door lower outside stripe.
    Heating temperature

Item	Temperature
Vehicle Body	40 to 60°C (104 to 140°F)

    NOTICE:
    Do not heat the vehicle body excessively.

ET

(b) Pull back an edge of the front door lower outside stripe and pull it parallel to the vehicle body to pull it off.

INSTALLATION

1. REPAIR INSTRUCTION

(a) Clean the vehicle body surface.

(1) Using a heat light, heat the vehicle body surface.

Heating temperature

Item	Temperature
Vehicle Body	40 to 60°C (104 to 140°F)

NOTICE:
Do not heat the vehicle body excessively.

(2) Wipe off any tape adhesive residue with cleaner.

(b) Installation temperature

(1) When ambient temperature is below 15°C, perform the installation procedure after warming the vehicle body surface (installation surface of the door frame) and tape up to between 20 and 30°C using a heat light. When ambient temperature is above 35°C, cool the vehicle body surface (installation surface of the door frame) and tape down to between 20 and 30°C prior to installation.
HINT:
- The most appropriate temperature for installing the tape is 25°C.
- When the temperature is low, the tape turns stiff and comes off easily. When the temperature is high, the tape looses elasticity.

(c) Before installation

(1) Remove any roughness of coating and dirt on and around the vehicle body surface where the tape will be installed (installation surface of the door frame). If any roughness or dirt remains when pressing the tape onto the surface, air will be trapped under the tape and result in a poor appearance.
HINT:
Spray water on the shop floor to settle any dust.

(d) Key points for handling the tape

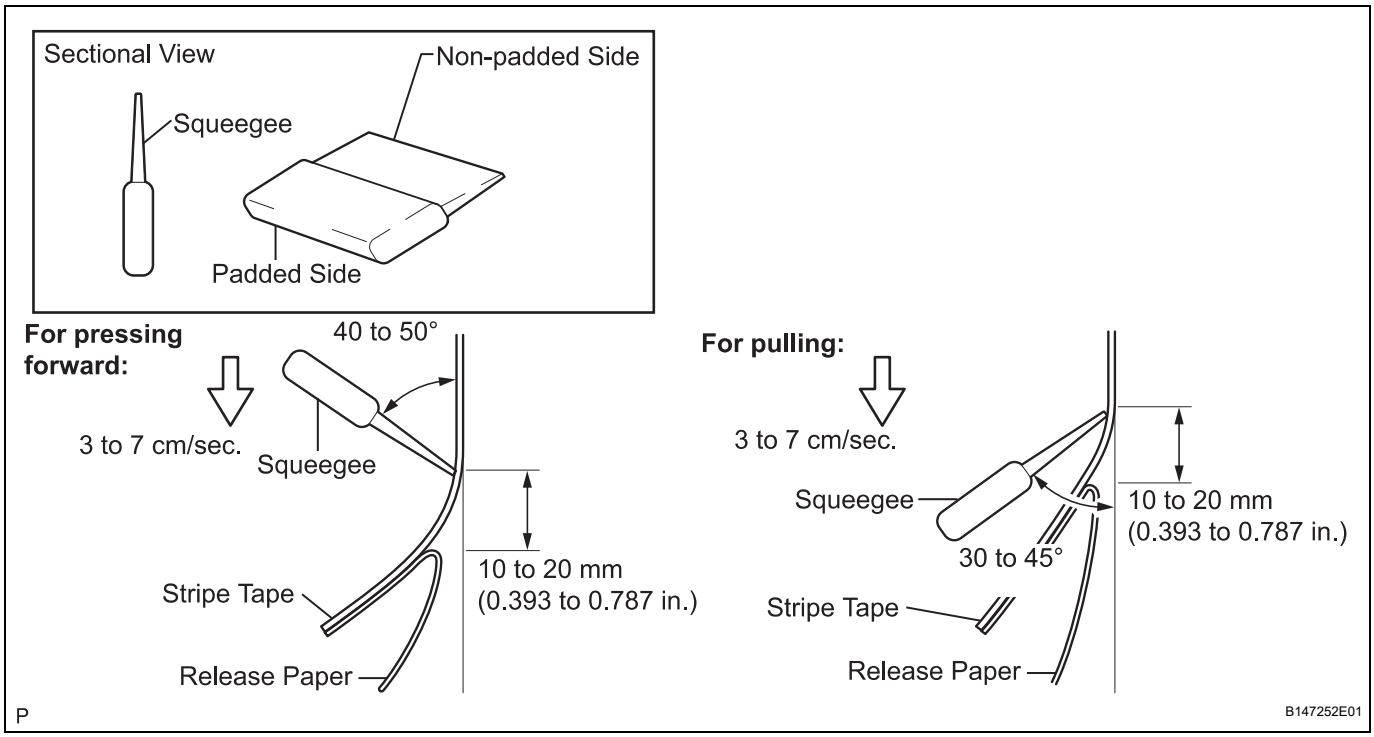
(1) The tape bends and rolls up easily. Store the tape between flat pieces of cardboard or other similar objects and keep it dry and level.
NOTICE:
Do not bend the tape or leave it in high temperature places.

(e) Key points for installation of the tape (how to use a squeegee and installation procedure for flat surfaces)
NOTICE:
- **Conduct positioning of the tape with a high accuracy to achieve a neat finish and to avoid peeling.**

ET

- **The tape cannot be reused because it deforms or does not fit any more after being removed.**

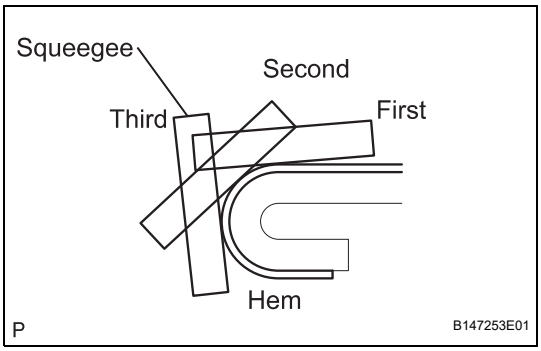
(1) To avoid air bubbles, slightly raise the part of the tape that is going to be applied so that its adhesive surface does not touch the vehicle body while applying the tape. Tilt the squeegee at 40 to 50° (for pressing forward) or 30 to 45° (for pulling) to the vehicle body surface and press the tape onto the vehicle body surface with a force of 20 to 30 N (2 to 3 kgf) at a constant slow speed of 3 to 7 cm per second.



NOTICE:
Be sure to observe the specified pressing speed, force, and angle of the squeegee to avoid wrinkles or air bubbles.
HINT:

- Either angle of the squeegee (for pressing forward or for pulling) is acceptable.
- Be sure to apply the tape while removing the release paper 10 to 20 mm from the edge of the squeegee.

ET



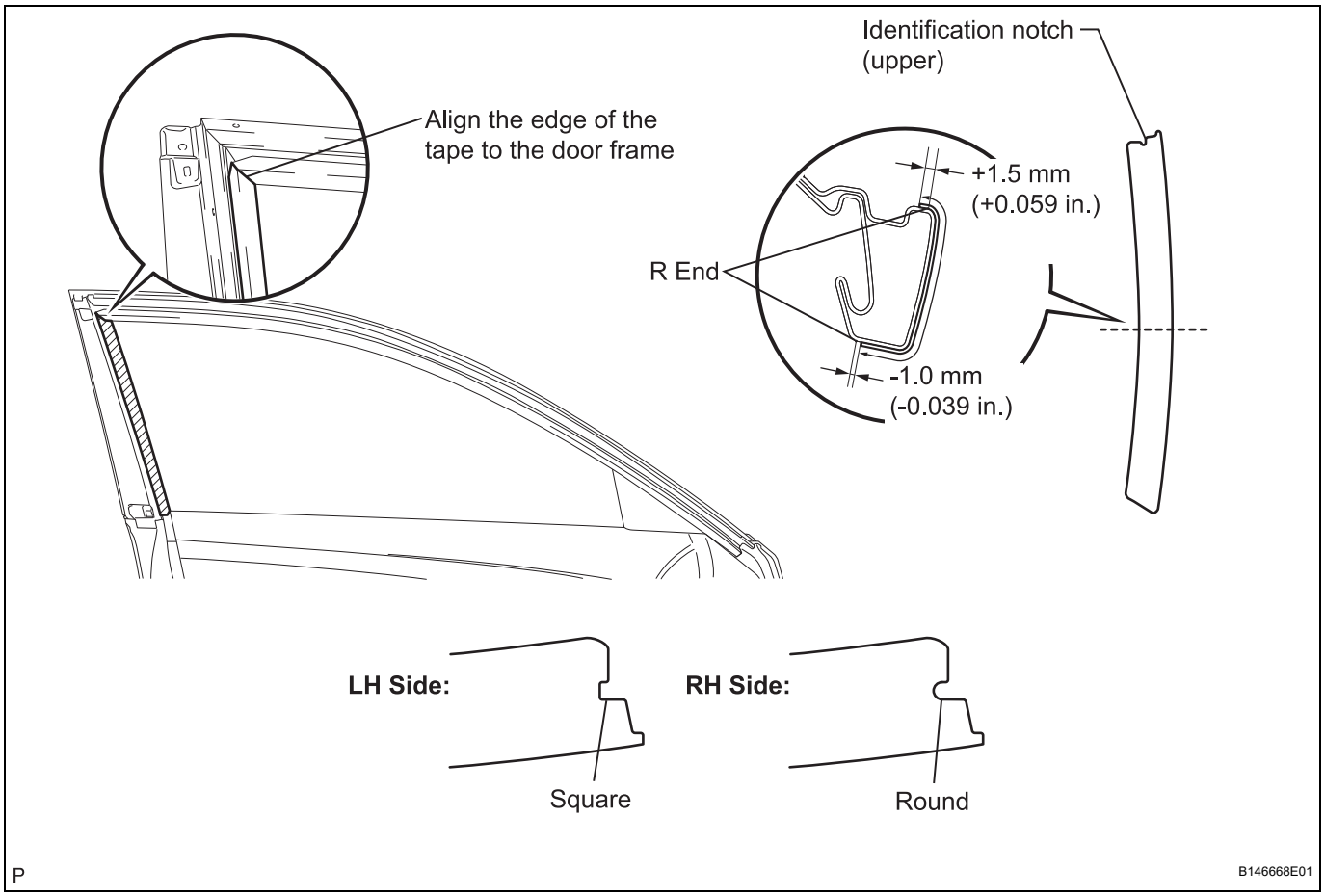
(f) Key points for installation of the tape (how to use a squeegee and installation procedure for hemming surfaces)
  (1) If it is difficult to press the tape, press it in several steps as shown in the illustration. Use your fingers or the padded surface of a squeegee to slowly apply the tape to the hem of the vehicle, especially for a small hem.
  HINT:
  When applying the tape to the backside of a hem, remove the release paper and use your fingers or the padded surface of a squeegee.

(g) Key points for installation of the tape (how to use a squeegee and installation procedure for corners)
  (1) Remove the release paper and apply the tape carefully with your fingers.
  (2) Before applying the tape to each corner, heat the tape using a heat light and gradually apply it, to avoid wrinkles on the tape and achieve a neat finish.

(h) Check after installation
  (1) After completing the application, check if the tape is applied neatly. If the tape is not applied neatly, reapply using new tape.
  NOTICE:
  Do not reuse the tape.

2. INSTALL FRONT DOOR LOWER OUTSIDE STRIPE

(a) Refer to the illustration to position the front door lower outside stripe.



(b) Remove the release paper and apply the stripe.

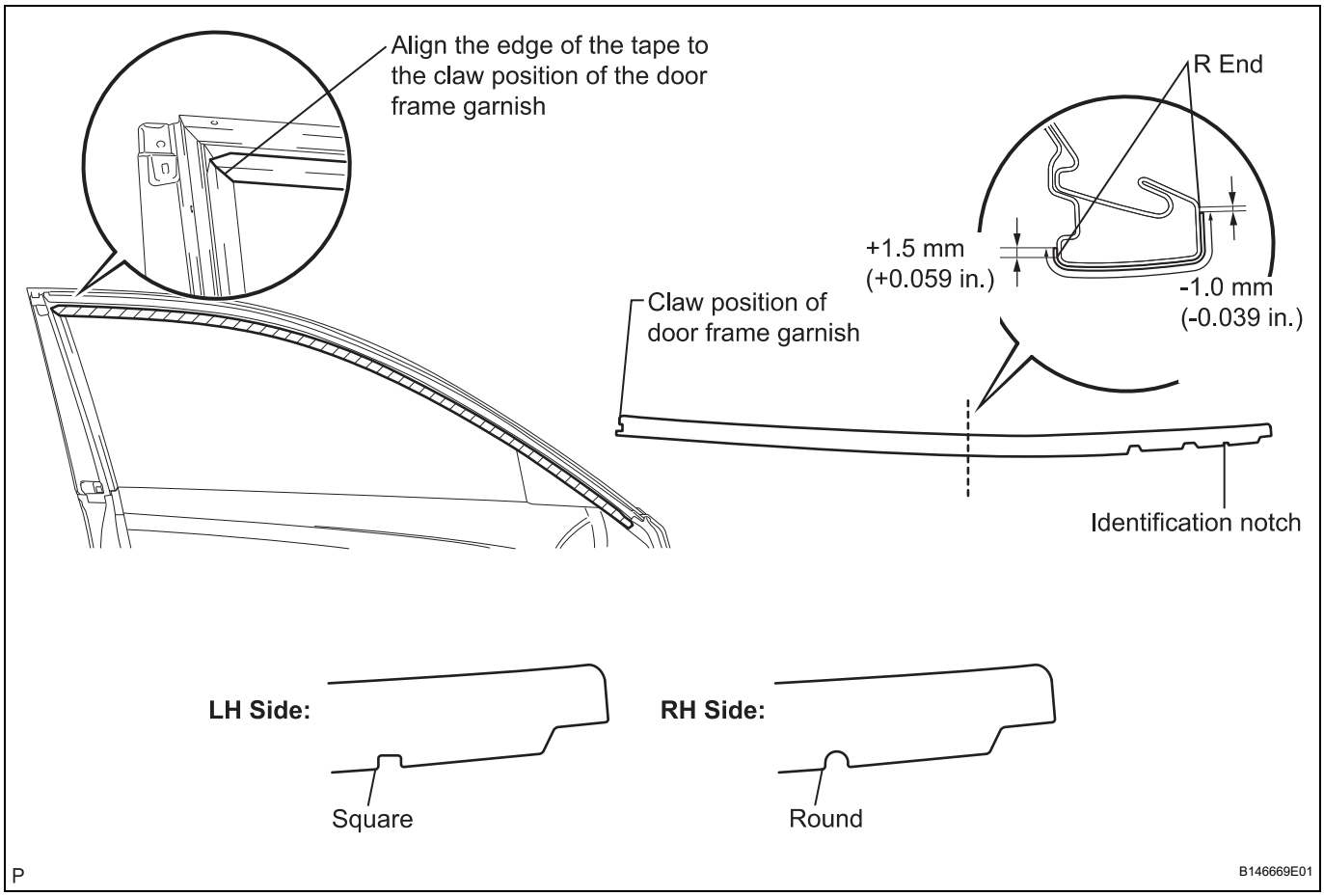
3. INSTALL FRONT DOOR STRIPE

NOTICE:

Be sure to install the front door stripe after applying the front door lower outside stripe.

ET

(a) Refer to the illustration to position the front door stripe.



(b) Remove the release paper and apply the stripe.

4. **INSTALL DOOR FRAME GARNISH (See page ED-56)**
5. **INSTALL FRONT DOOR WEATHERSTRIP (See page ET-40)**
6. **INSTALL FRONT DOOR GLASS RUN (See page ED-56)**
7. **INSTALL FRONT DOOR GLASS SUB-ASSEMBLY (See page ED-57)**
8. **INSTALL FRONT DOOR SERVICE HOLE COVER (See page ED-57)**
9. **INSTALL OUTER REAR VIEW MIRROR ASSEMBLY (See page MI-15)**
10. **INSTALL FRONT NO. 1 SPEAKER ASSEMBLY (See page AV-147)**
11. **INSTALL FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY (See page ED-59)**
12. **INSTALL FRONT DOOR INNER GLASS WEATHERSTRIP (See page ED-58)**
13. **INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-59)**

14. **INSTALL COURTESY LIGHT ASSEMBLY (See page ED-59)**
15. **INSTALL ASSIST GRIP COVER (See page ED-60)**
16. **INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-60)**
17. **INSTALL FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-60)**

REMOVAL

1. **REMOVE REAR DOOR INSIDE HANDLE BEZEL PLUG (See page ED-64)**
2. **REMOVE DOOR ASSIST GRIP COVER (See page ED-64)**
3. **REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-65)**
4. **REMOVE REAR DOOR INNER GLASS WEATHERSTRIP (See page ED-66)**
5. **REMOVE REAR DOOR INSIDE HANDLE SUB-ASSEMBLY (See page ED-66)**
6. **REMOVE REAR DOOR SERVICE HOLE COVER (See page ED-67)**
7. **REMOVE REAR DOOR GLASS RUN (See page ED-68)**
8. **REMOVE REAR DOOR LOWER WINDOW FRAME SUB-ASSEMBLY (See page ED-68)**
9. **REMOVE REAR DOOR QUARTER WINDOW GLASS (See page ED-68)**
10. **REMOVE REAR DOOR GLASS SUB-ASSEMBLY (See page ED-69)**
11. **REMOVE REAR DOOR WEATHERSTRIP (See page ET-44)**
12. **REMOVE REAR DOOR FRAME GARNISH (See page ED-68)**
13. **REMOVE REAR DOOR OUTSIDE STRIPE**
    (a) Using a heat light, heat the rear door outside stripe.
    Heating temperature

Item	Temperature
Vehicle Body	40 to 60°C (104 to 140°F)

    NOTICE:
    Do not heat the vehicle body excessively.
    (b) Pull back an edge of the rear door outside stripe and pull it parallel to the vehicle body to pull it off.
14. **REMOVE REAR DOOR LOWER OUTSIDE STRIPE**
    (a) Using a heat light, heat the rear door lower outside stripe.
    Heating temperature

Item	Temperature
Vehicle Body	40 to 60°C (104 to 140°F)

    NOTICE:
    Do not heat the vehicle body excessively.
    (b) Pull back an edge of the rear door lower outside stripe and pull it parallel to the vehicle body to pull it off.

INSTALLATION

1. REPAIR INSTRUCTION

(a) Clean the vehicle body surface.

(1) Using a heat light, heat the vehicle body surface.

Heating temperature

Item	Temperature
Vehicle Body	40 to 60°C (104 to 140°F)

NOTICE:
Do not heat the vehicle body excessively.

(2) Wipe off any tape adhesive residue with cleaner.

(b) Installation temperature

(1) When ambient temperature is below 15°C, perform the installation procedure after warming the vehicle body surface (installation surface of the door frame) and tape up to between 20 and 30°C using a heat light. When ambient temperature is above 35°C, cool the vehicle body surface (installation surface of the door frame) and tape down to between 20 and 30°C prior to installation.

HINT:

- The most appropriate temperature for installing the tape is 25°C.
- When the temperature is low, the tape turns stiff and comes off easily. When the temperature is high, the tape looses elasticity.

(c) Before installation

(1) Remove any roughness of coating and dirt on and around the vehicle body surface where the tape will be installed (installation surface of the door frame). If any roughness or dirt remains when pressing the tape onto the surface, air will be trapped under the tape and result in a poor appearance.

HINT:

Spray water on the shop floor to settle any dust.

(d) Key points for handling the tape

(1) The tape bends and rolls up easily. Store the tape between flat pieces of cardboard or other similar objects and keep it dry and level.

NOTICE:
Do not bend the tape or leave it in high temperature places.

(e) Key points for installation of the tape (how to use a squeegee and installation procedure for flat surfaces)

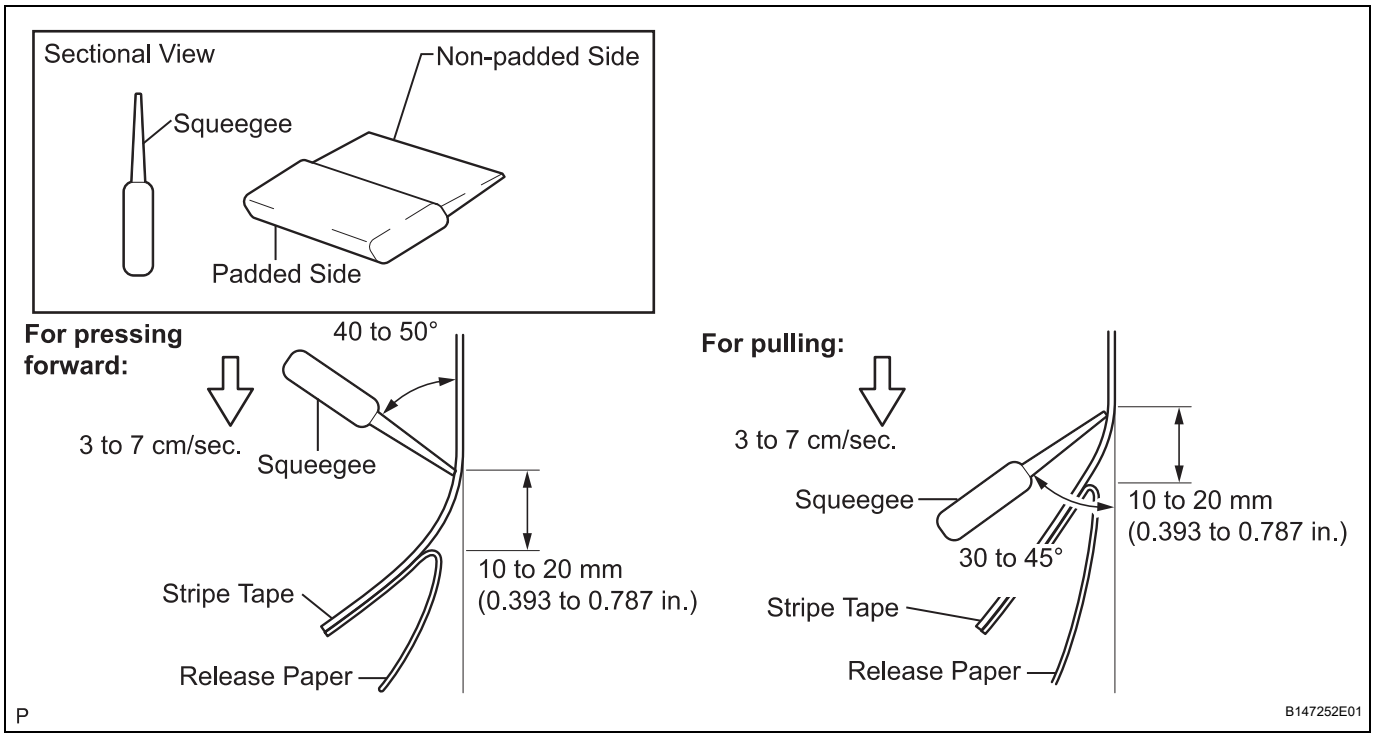
NOTICE:

- **Conduct positioning of the tape with a high accuracy to achieve a neat finish and to avoid peeling.**

ET

- **The tape cannot be reused because it deforms or does not fit any more after being removed.**

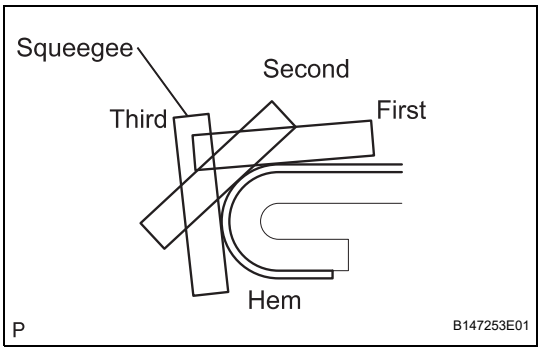
(1) To avoid air bubbles, slightly raise the part of the tape that is going to be applied so that its adhesive surface does not touch the vehicle body while applying the tape. Tilt the squeegee at 40 to 50° (for pressing forward) or 30 to 45° (for pulling) to the vehicle body surface and press the tape onto the vehicle body surface with a force of 20 to 30 N (2 to 3 kgf) at a constant slow speed of 3 to 7 cm per second.



NOTICE:
Be sure to observe the specified pressing speed, force, and angle of the squeegee to avoid wrinkles or air bubbles.
HINT:

- Either angle of the squeegee (for pressing forward or for pulling) is acceptable.
- Be sure to apply the tape while removing the release paper 10 to 20 mm from the edge of the squeegee.

ET



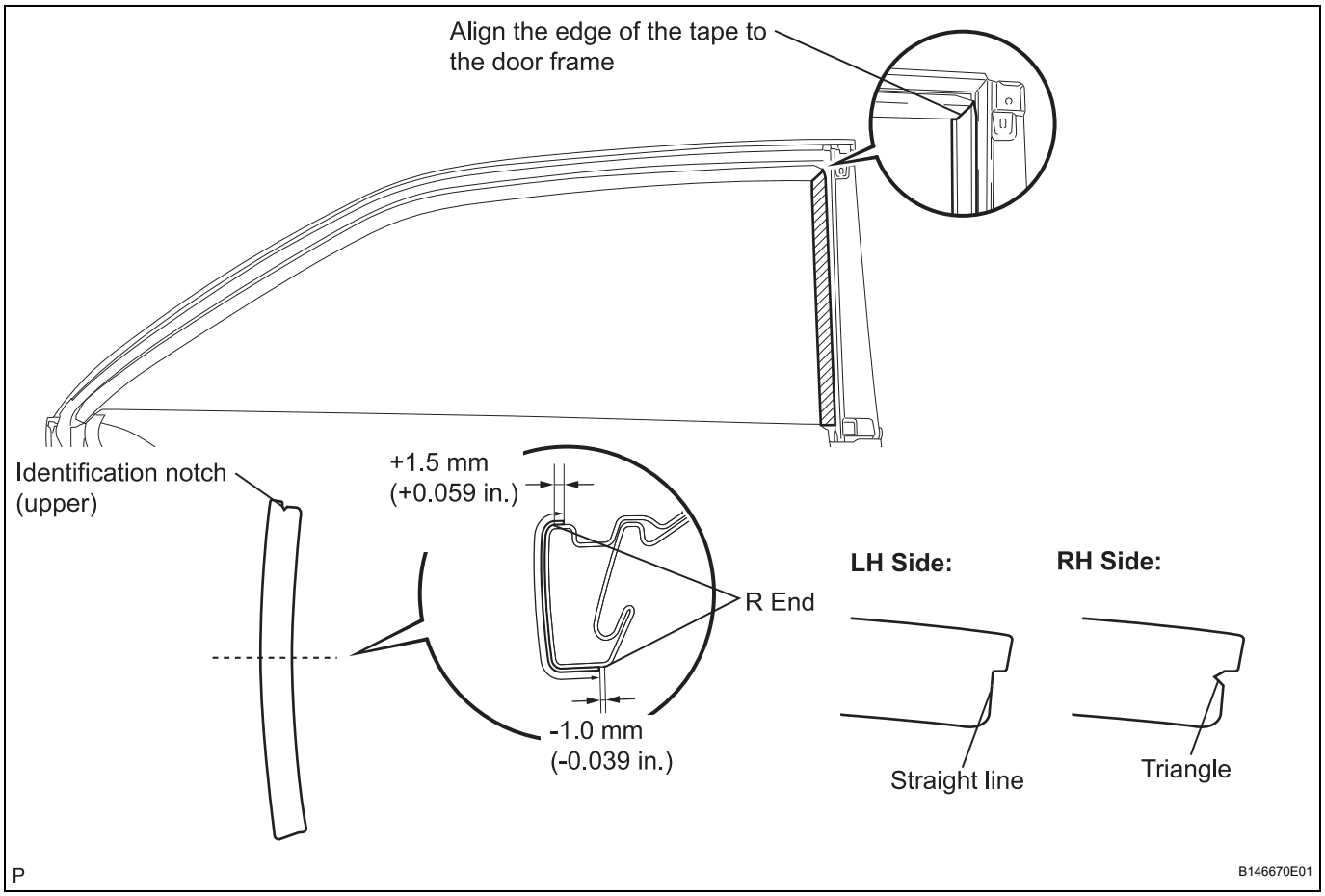
(f) Key points for installation of the tape (how to use a squeegee and installation procedure for hemming surfaces)
  (1) If it is difficult to press the tape, press it in several steps as shown in the illustration. Use your fingers or the padded surface of a squeegee to slowly apply the tape to the hem of the vehicle, especially for a small hem.
  HINT:
  When applying the tape to the backside of a hem, remove the release paper and use your fingers or the padded surface of a squeegee.

(g) Key points for installation of the tape (how to use a squeegee and installation procedure for corners)
  (1) Remove the release paper and apply the tape carefully with your fingers.
  (2) Before applying the tape to each corner, heat the tape using a heat light and gradually apply it, to avoid wrinkles on the tape and achieve a neat finish.

(h) Check after installation
  (1) After completing the application, check if the tape is applied neatly. If the tape is not applied neatly, reapply using new tape.
  NOTICE:
  Do not reuse the tape.

2. INSTALL REAR DOOR LOWER OUTSIDE STRIPE

(a) Refer to the illustration to position the rear door lower outside stripe.



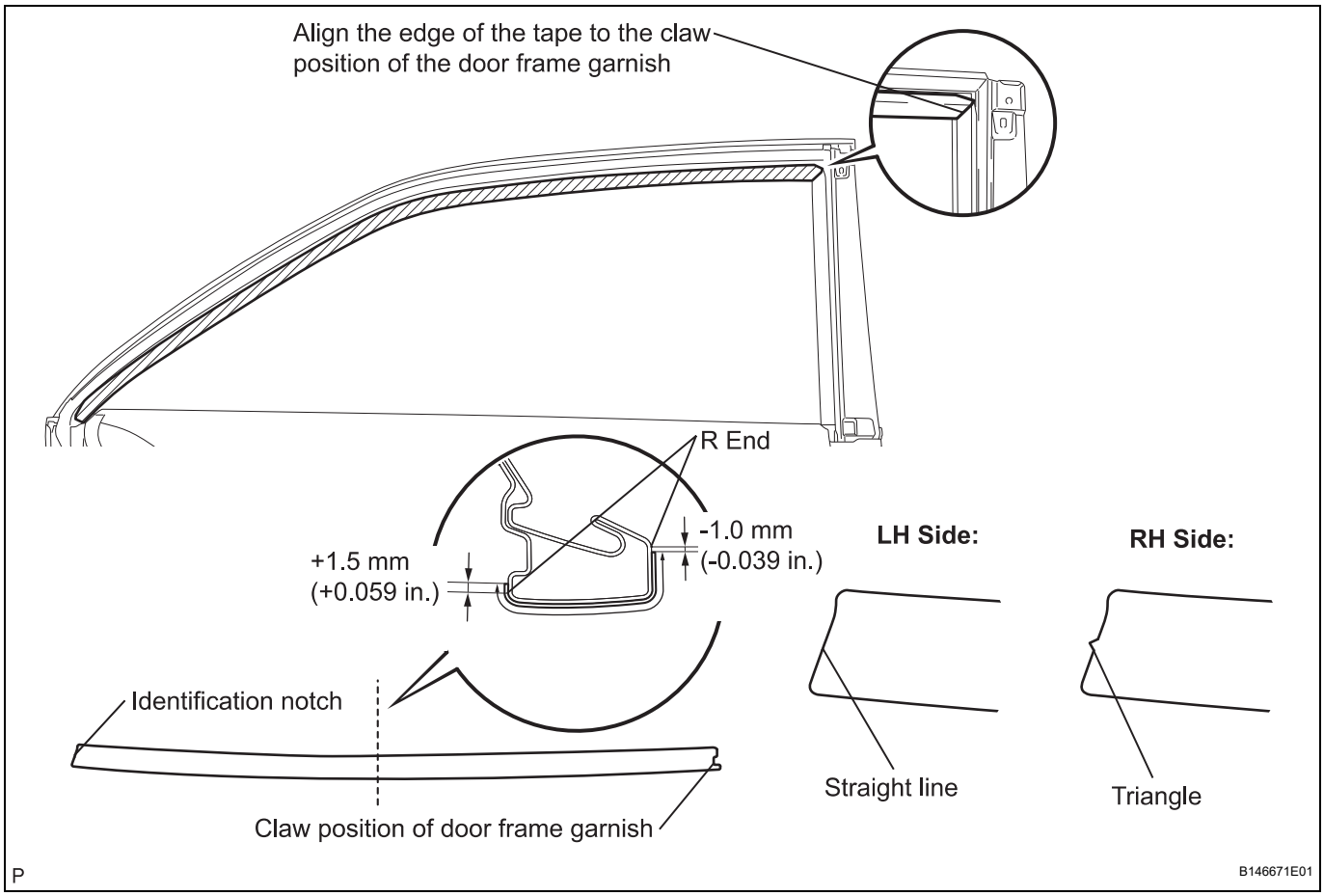
(b) Remove the release paper and apply the stripe.

3. INSTALL REAR DOOR OUTSIDE STRIPE

NOTICE:

Be sure to install the rear door outside stripe after applying the rear door lower outside stripe.

(a) Refer to the illustration to position the rear door outside stripe.



(b) Remove the release paper and apply the stripe.

4. **INSTALL REAR DOOR FRAME GARNISH (See page ED-77)**
5. **INSTALL REAR DOOR WEATHERSTRIP (See page ET-48)**
6. **INSTALL REAR DOOR GLASS RUN (See page ED-78)**
7. **INSTALL REAR DOOR GLASS SUB-ASSEMBLY (See page ED-78)**
8. **INSTALL REAR DOOR QUARTER WINDOW GLASS (See page ED-78)**
9. **INSTALL REAR DOOR LOWER WINDOW FRAME SUB-ASSEMBLY (See page ED-78)**
10. **INSTALL REAR DOOR SERVICE HOLE COVER (See page ED-79)**
11. **INSTALL REAR DOOR INSIDE HANDLE SUB-ASSEMBLY (See page ED-80)**
12. **INSTALL REAR DOOR INNER GLASS WEATHERSTRIP (See page ED-80)**
13. **INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-81)**

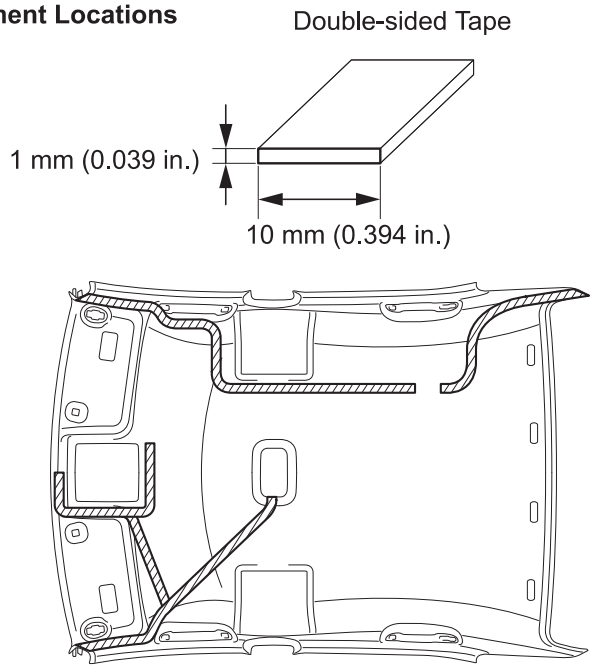
14. **INSTALL DOOR ASSIST GRIP COVER (See page ED-82)**
15. **INSTALL REAR DOOR INSIDE HANDLE BEZEL PLUG (See page ED-82)**

INSTALLATION

1. INSTALL NO. 1 ROOF WIRE (w/o Sliding Roof)

(a) Apply new double-sided tape to locations shown in the illustration while aligning the tape with the markings on the roof headlining.

Reference: Tape Attachment Locations



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NOTICE:
Securely apply the double-sided tape to prevent it from being out of alignment and peeling off.

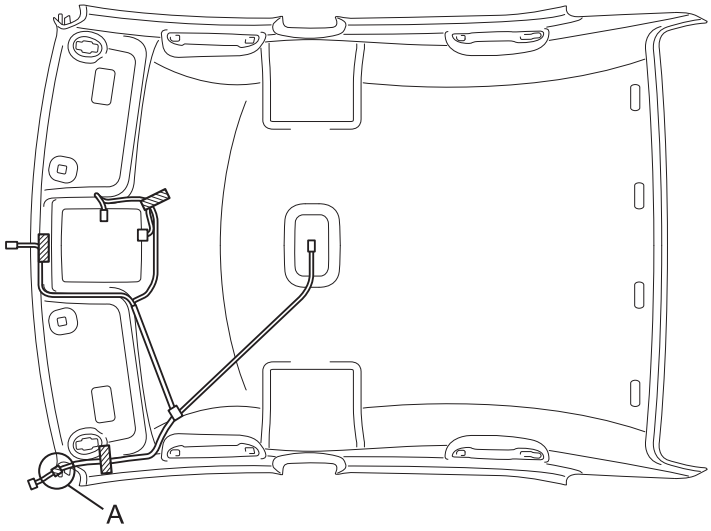
(b) Peel off the release paper from the double-sided tape.

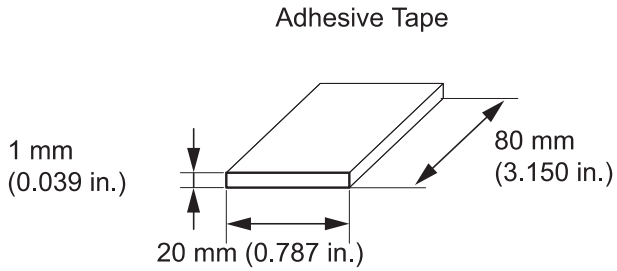
(c) Attach the No. 1 roof wire along the double-sided tape so that the marking surface of the wire harness faces downward.

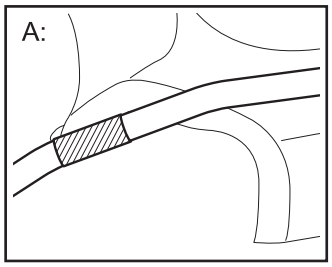
NOTICE:
- **Securely attach the No. 1 roof wire.**
- **Failure to do so may cause abnormal noise.**

(d) Apply adhesive tape to locations shown in the illustration.

Reference: Tape Attachment Locations







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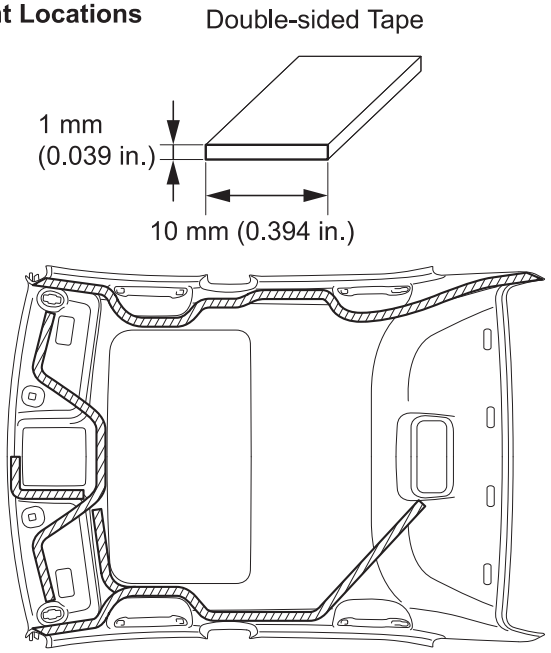
B149256E01

HINT:
As shown in illustration A, line up and secure the reference tape of the wire harness to the tip of the roof headlining assembly.

2. INSTALL NO. 1 ROOF WIRE (w/ Sliding Roof)

(a) Apply new double-sided tape to locations shown in the illustration while aligning the tape with the markings on the roof headlining.

Reference: Tape Attachment Locations



NOTICE:
Securely apply the double-sided tape to prevent it from being out of alignment and peeling off.

(b) Peel off the release paper from the double-sided tape.

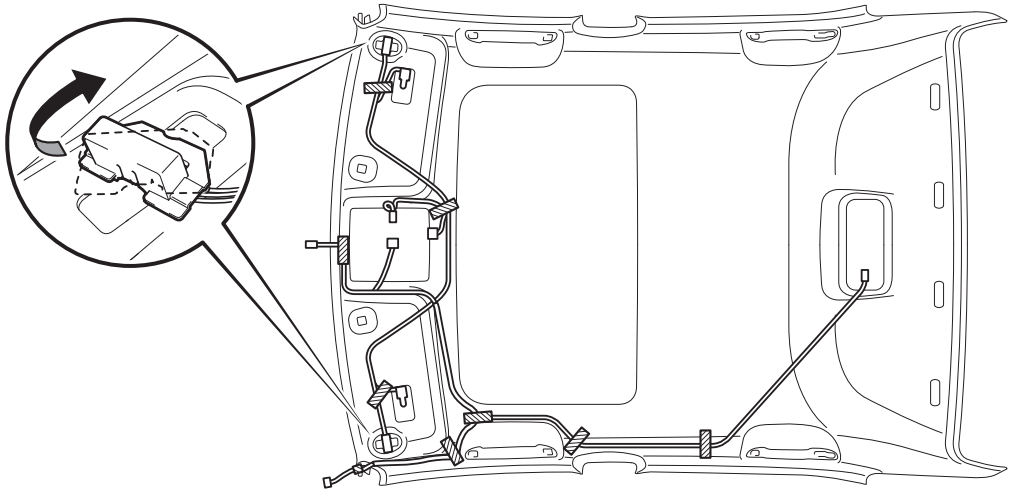
(c) Turn the visor connectors clockwise approximately 90° to install the connectors to the roof headlining.

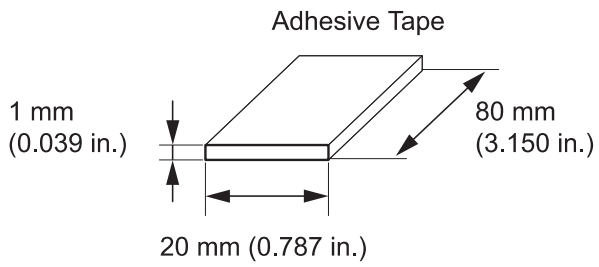
(d) Attach the No. 1 roof wire along the double-sided tape so that the marking surface of the wire harness faces downward.

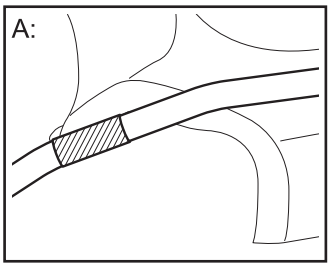
NOTICE:
- **Securely attach the No. 1 roof wire.**
- **Failure to do so may cause abnormal noise.**

(e) Apply adhesive tape to locations shown in the illustration.

Reference: Tape Attachment Locations







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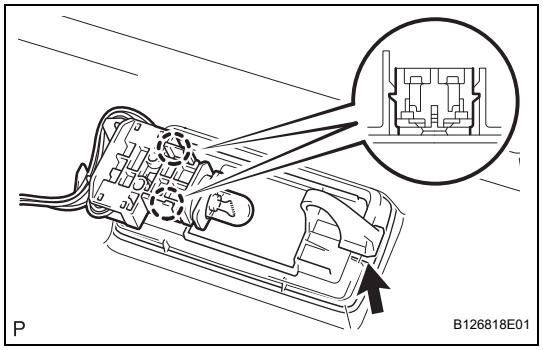
HINT:
As shown in illustration A, line up and secure the reference tape of the wire harness to the tip of the roof headlining assembly.

3. INSTALL ANTENNA CORD SUB-ASSEMBLY (See page AV-178)

4. INSTALL VANITY LIGHT ASSEMBLY

(a) Engage the 3 claws and install the vanity light assembly.



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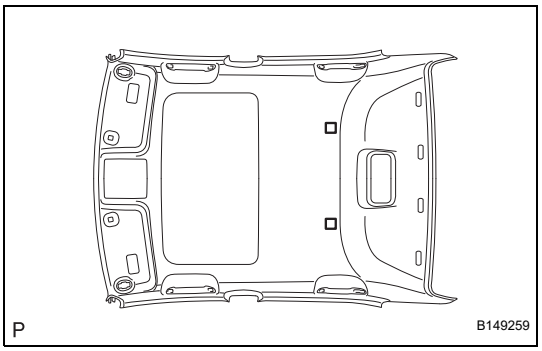
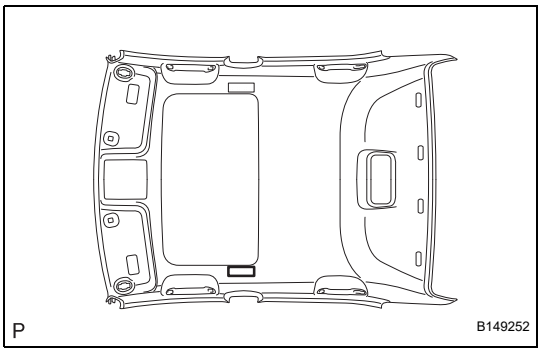


5. INSTALL FASTENER HOOK (w/ Sliding Roof)

(a) Align the markings on the roof headlining assembly with the fastener hooks and install the fastener hooks using hot melt glue as shown in the illustration.



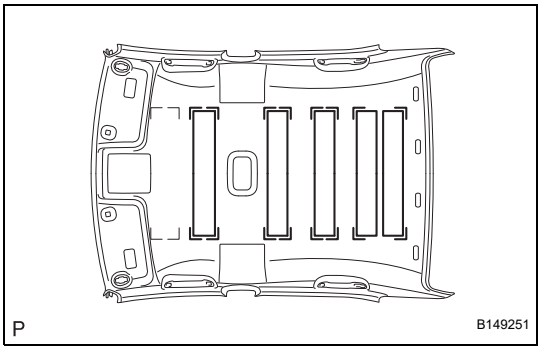
6. INSTALL NO. 2 REAR SIDE RAIL SPACER LH (w/ Sliding Roof)

(a) Align the markings on the roof headlining assembly with the No. 2 rear side rail spacer LH and install the spacer using hot melt glue as shown in the illustration.

7. INSTALL NO. 2 REAR SIDE RAIL SPACER RH (w/ Sliding Roof)

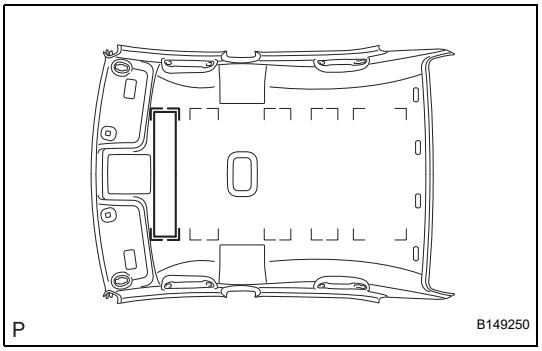
HINT:

Use the same procedure for the RH side and the LH side.



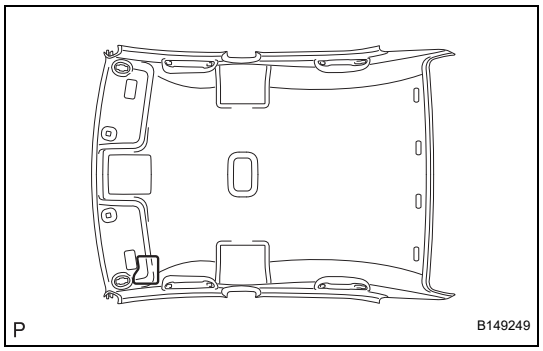
8. INSTALL NO. 4 ROOF SILENCER PAD (w/o Sliding Roof)

(a) Align the markings on the roof headlining assembly with the No. 4 roof silencer pads and install the silencer pads using hot melt glue or double-sided tape as shown in the illustration.



9. INSTALL NO. 2 ROOF SILENCER PAD (w/o Sliding Roof)

(a) Align the markings on the roof headlining assembly with the No. 2 roof silencer pad and install the silencer pad using hot melt glue or double-sided tape as shown in the illustration.



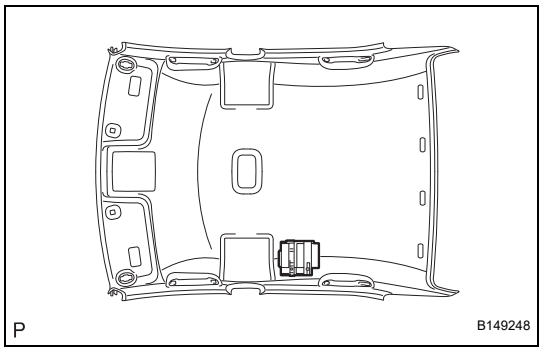
10. INSTALL ROOF SIDE RAIL SILENCER PAD LH (w/o Sliding Roof)

(a) Align the markings on the roof headlining assembly with the roof side rail silencer pad LH and install the silencer pad using hot melt glue as shown in the illustration.

11. INSTALL ROOF SIDE RAIL SILENCER PAD RH (w/o Sliding Roof)

HINT:

Use the same procedure for the RH side and the LH side.



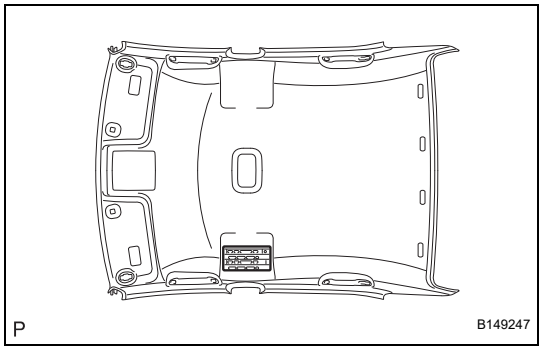
12. INSTALL NO. 3 REAR SIDE RAIL SPACER LH (w/o Sliding Roof)

(a) Align the markings on the roof headlining assembly with the No. 3 rear side rail spacer LH and install the spacer using hot melt glue as shown in the illustration.

13. INSTALL NO. 3 REAR SIDE RAIL SPACER RH (w/o Sliding Roof)

HINT:

Use the same procedure for the RH side and the LH side.



14. INSTALL NO. 2 REAR SIDE RAIL SPACER LH (w/o Sliding Roof)

(a) Align the markings on the roof headlining assembly with the No. 2 rear side rail spacer LH and install the spacer using hot melt glue as shown in the illustration.

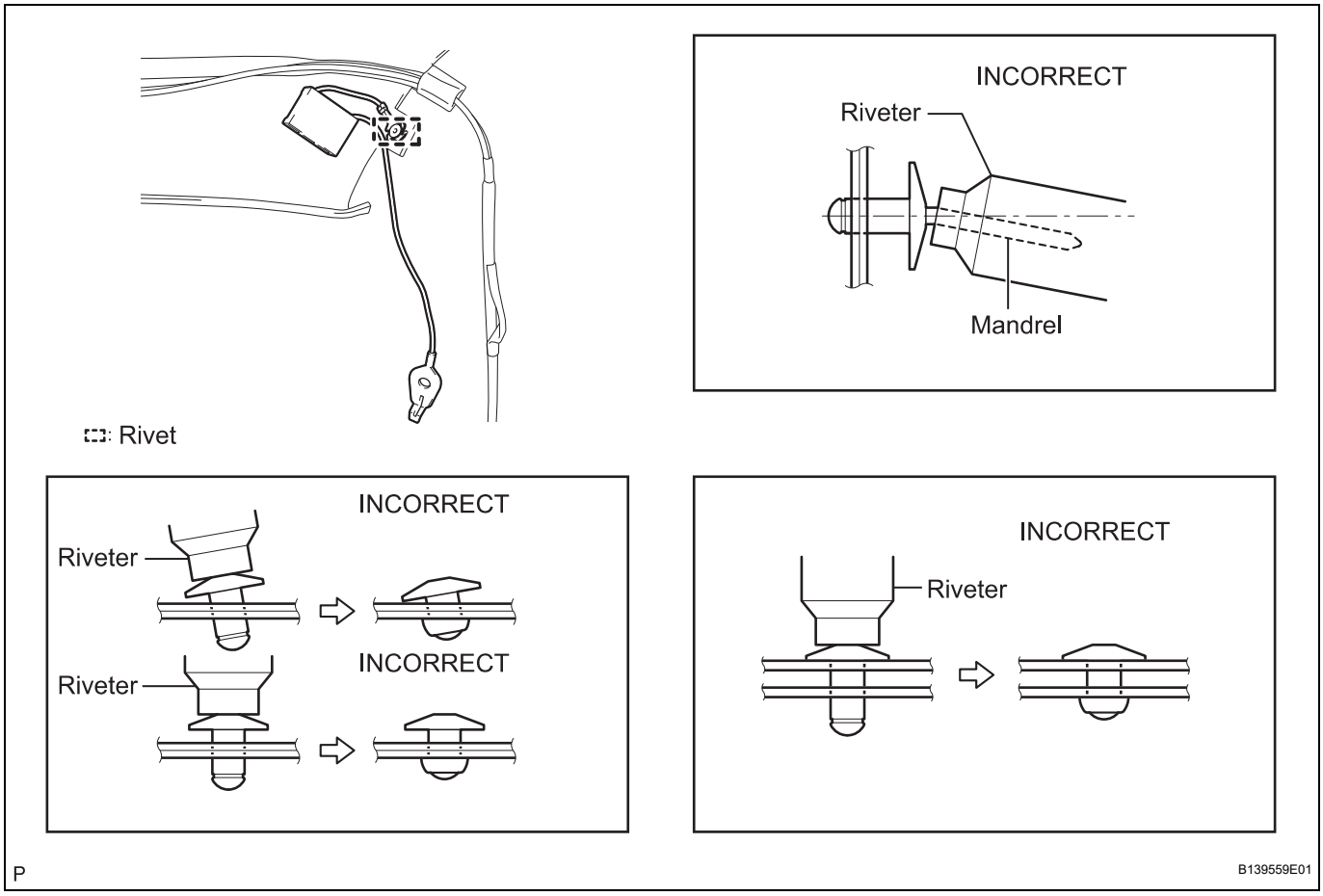
15. INSTALL NO. 2 REAR SIDE RAIL SPACER RH (w/o Sliding Roof)

HINT:

Use the same procedure for the RH side and the LH side.

16. INSTALL RADIO SETTING CONDENSER

(a) Using an air riveter or hand riveter with a nose piece, install the radio setting condenser with a new rivet.

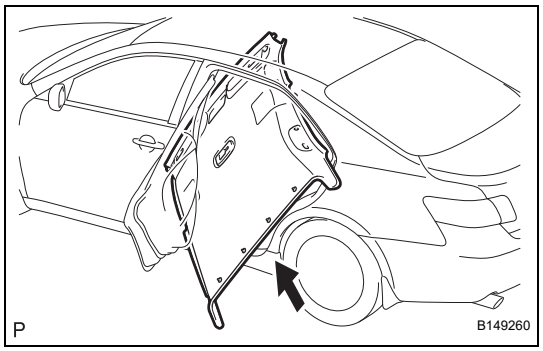


NOTICE:

- **Do not pry the rivet with the riveter, as this will cause damage to the riveter and mandrel.**
- **Confirm that the rivet is seated properly against the moulding. Do not tilt the riveter when installing the rivet to the moulding. Do not leave any space between the rivet head and moulding.**
- **Do not leave any space between the moulding and door frame. Firmly hold the 2 items together while installing the rivet.**

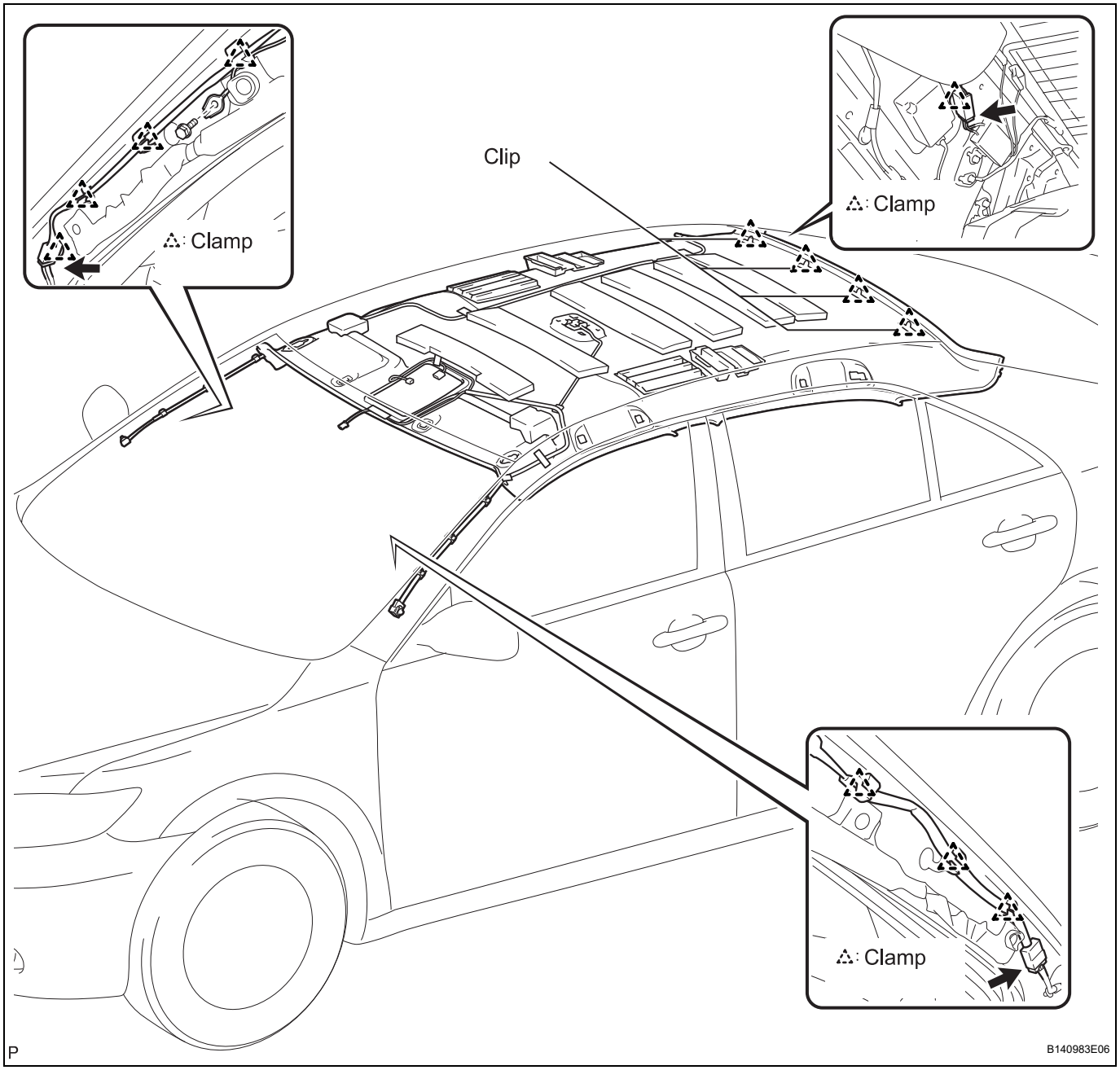
HINT:

If the rivet cannot be cut, pull it once and cut it.



17. INSTALL ROOF HEADLINING ASSEMBLY (w/o Sliding Roof)

(a) Pull the roof headlining assembly into the vehicle through the rear left door.
(b) Engage the 4 clips.
(c) Connect the antenna cord sub-assembly connector and engage the clamp to the rear pillar RH.
(d) Connect the antenna cord sub-assembly connector and engage each clamp to the front pillar RH.
(e) Install the radio setting condenser to the front pillar RH with the bolt.
(f) Connect the No. 1 roof wire connector and engage each clamp to the front pillar LH.



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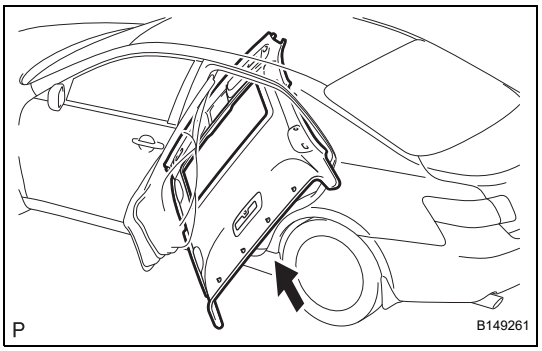
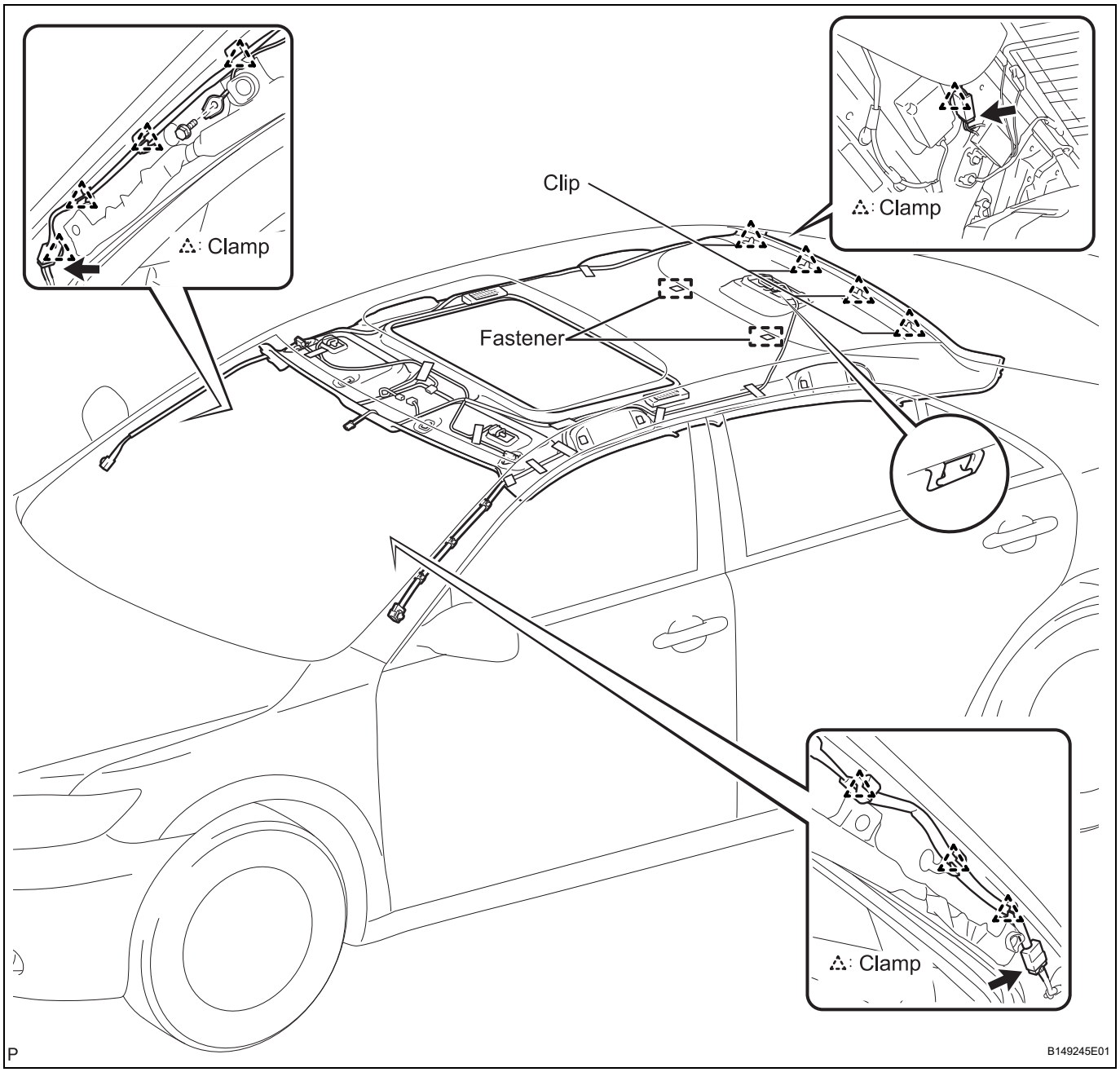


18. INSTALL ROOF HEADLINING ASSEMBLY (w/ Sliding Roof)

(a) Pull the roof headlining assembly into the vehicle through the rear left door.
(b) Engage the hook, 4 clips, and 2 fasteners.
(c) Connect the sliding roof drive gear connector.
(d) Connect the antenna cord sub-assembly connector and engage the clamp to the rear pillar RH.
(e) Connect the antenna cord sub-assembly connector and engage each clamp to the front pillar RH.
(f) Install the radio setting condenser to the front pillar RH with the bolt.
(g) Connect the No. 1 roof wire connector and engage each clamp to the front pillar LH.



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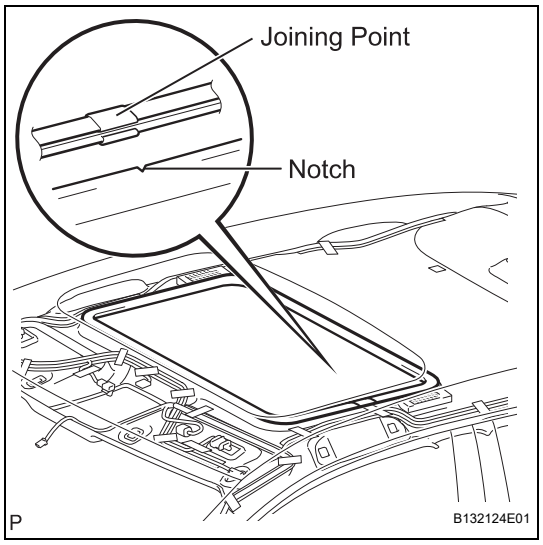
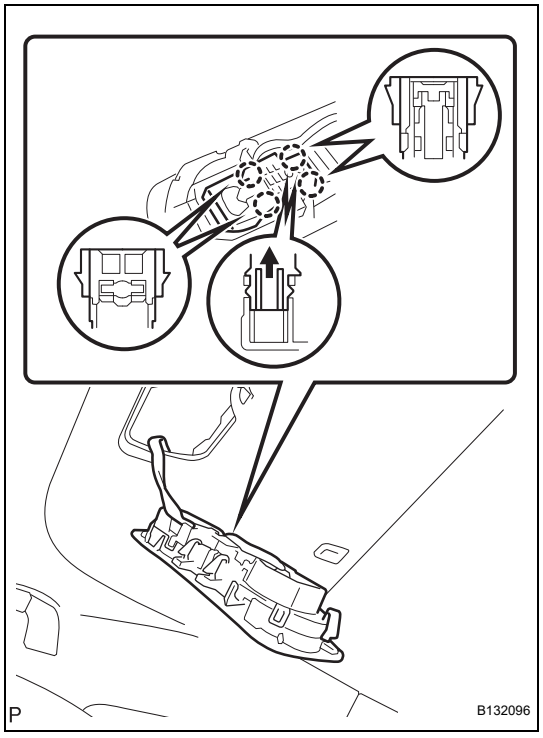


19. INSTALL SUN ROOF OPENING TRIM MOULDING (w/ Sliding Roof)

(a) Align the joining point of the moulding with the notch of the roof headlining assembly, and install the sun roof opening trim moulding.

NOTICE:

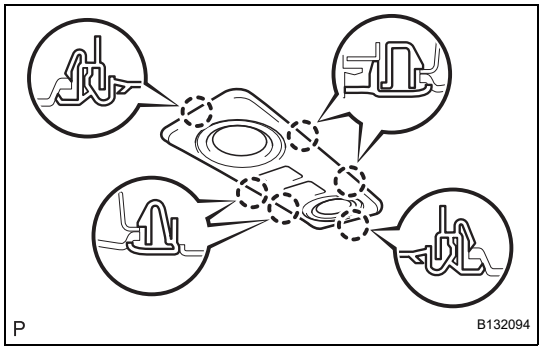
After installation, check that the corners fit correctly.



20. INSTALL SPOT LIGHT ASSEMBLY (w/ Sliding Roof)

(a) Push the light bulb holder in the direction indicated by the arrow in the illustration to engage the claw.

(b) Engage the 4 claws.



(c) Engage the 6 claws and install the spot light assembly.

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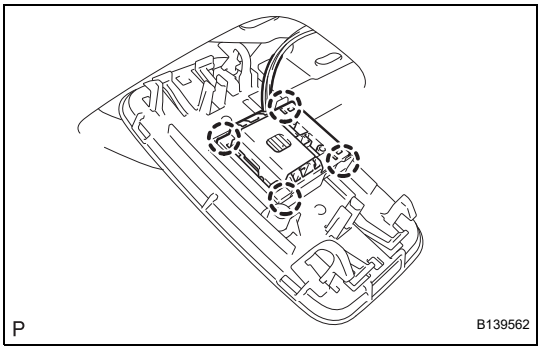
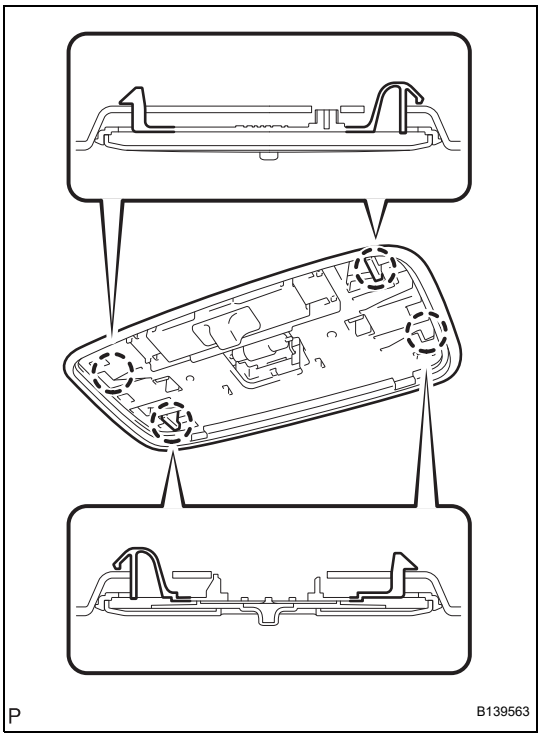
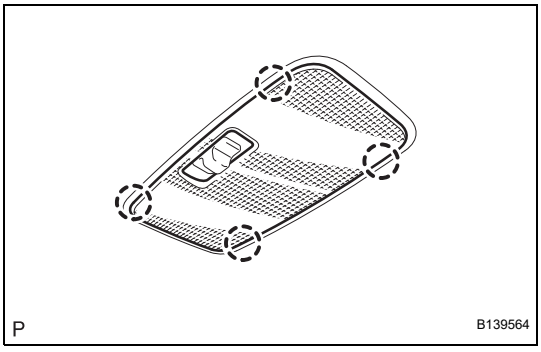


21. INSTALL NO. 1 ROOM LIGHT ASSEMBLY (w/o Sliding Roof)

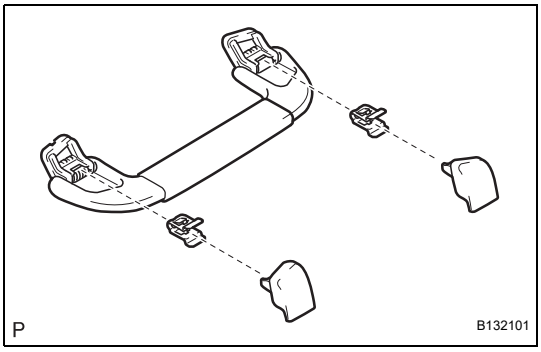
(a) Engage the 4 claws and install the room light switch base to the No. 1 room light assembly.



(b) Engage the 4 claws.

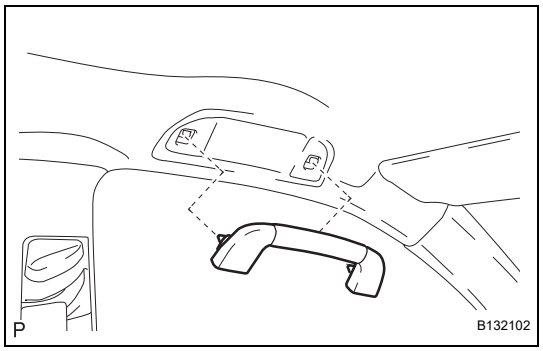


(c) Engage the 4 claws and install the lens cover.



22. INSTALL FRONT ASSIST GRIP SUB-ASSEMBLY

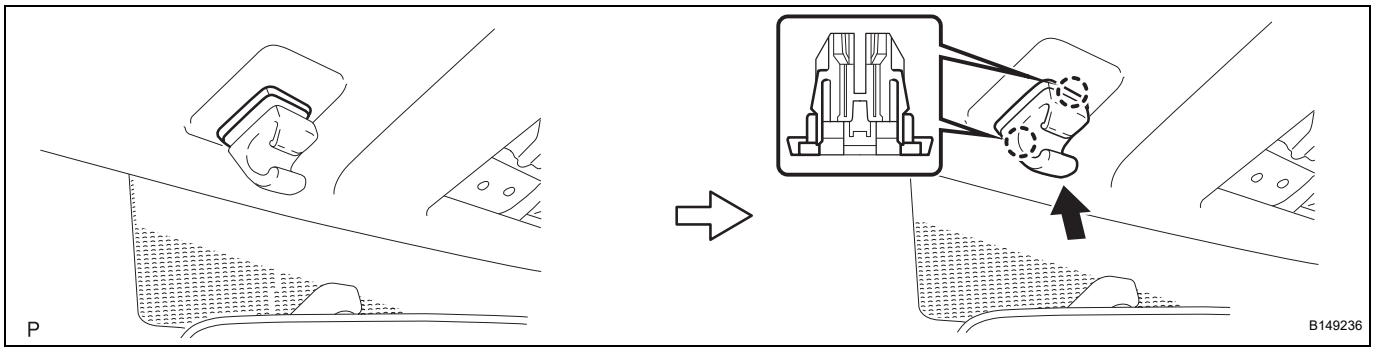
(a) Assemble the front assist grip sub-assembly as shown in the illustration.

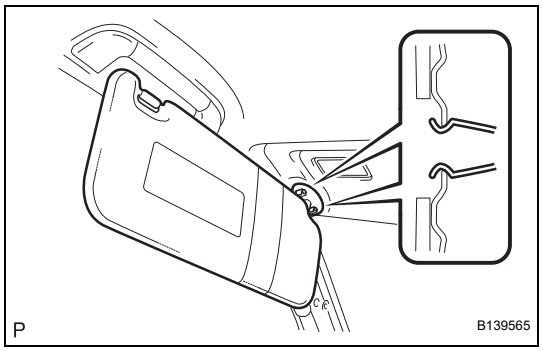


(b) Install the front assist grip sub-assembly.
HINT:
Use the same procedure for the RH side and the LH side.

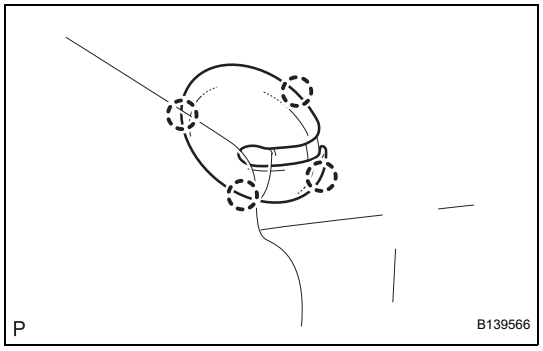
23. INSTALL REAR ASSIST GRIP SUB-ASSEMBLY
HINT:
Use the same procedure for the rear side and the front side.

24. INSTALL VISOR HOLDER
(a) Engage the 2 claws.
(b) Push in the visor holder as shown in the illustration.





25. INSTALL VISOR ASSEMBLY LH
(a) Engage the 2 clips and install the visor assembly LH.



(b) Engage the 4 claws and install the visor bracket cover.

26. INSTALL VISOR ASSEMBLY RH
HINT:
Use the same procedure for the RH side and the LH side.

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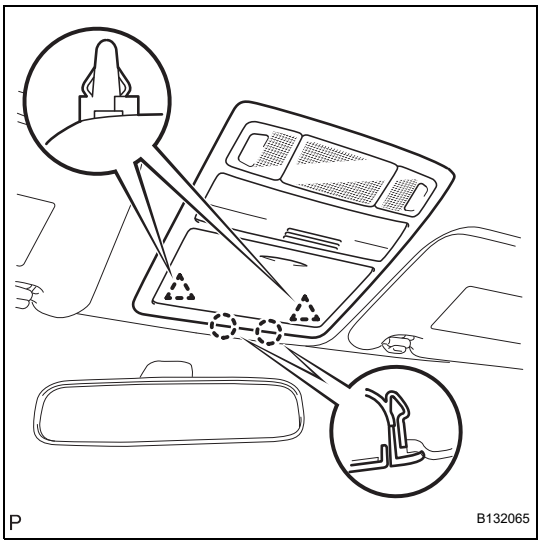
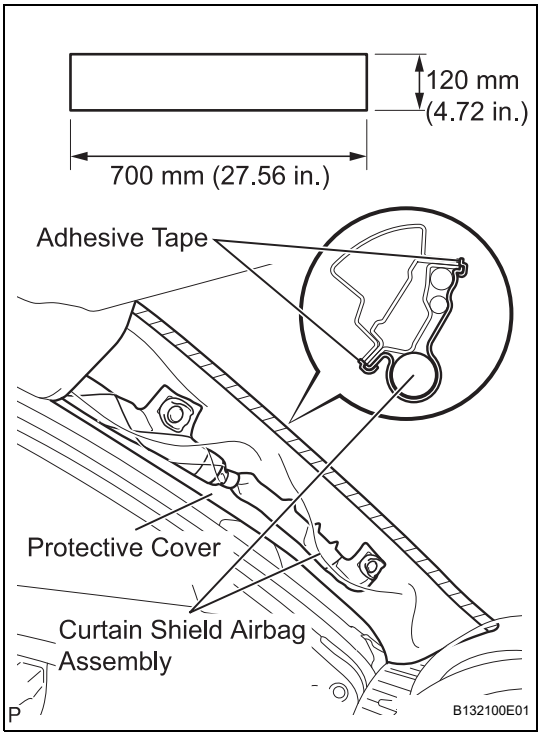


27. INSTALL ROOF CONSOLE BOX ASSEMBLY

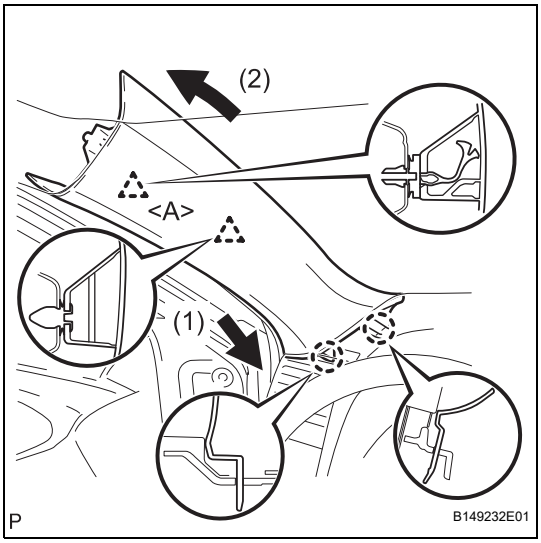
(a) Connect the connectors.

(b) Engage the 2 claws and 2 clips, and then install the roof console box assembly.



28. INSTALL FRONT PILLAR GARNISH LH

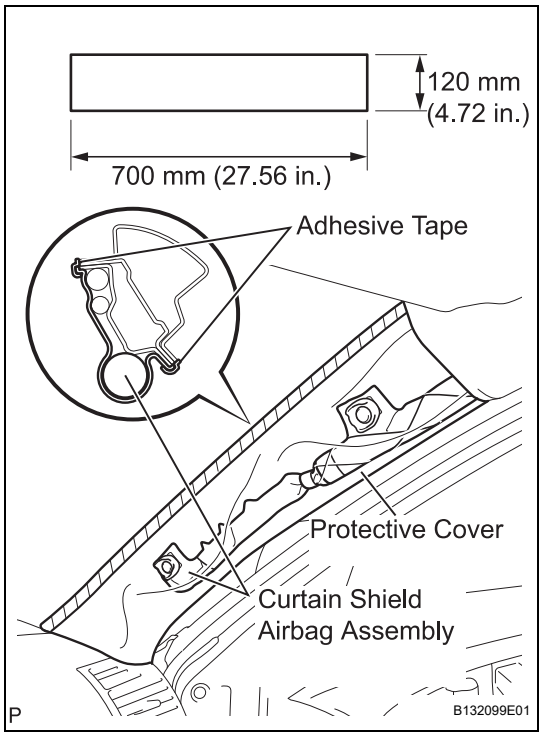
(a) Remove the protective cover.



(b) Install a new clip <A> on the front pillar garnish LH.

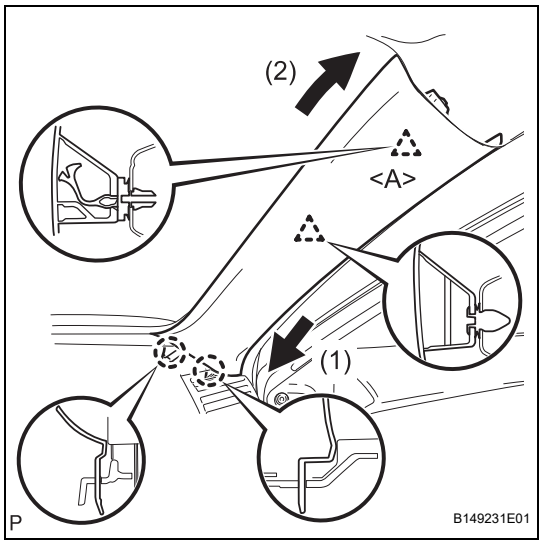
(c) Engage the 2 claws and 2 clips, then install the front pillar garnish LH.

IR



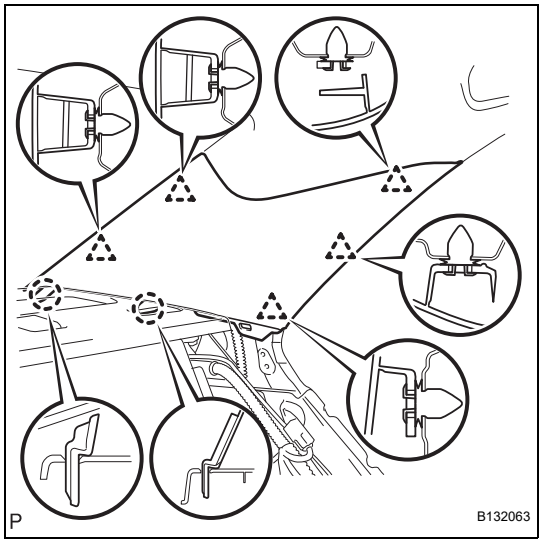
29. INSTALL FRONT PILLAR GARNISH RH

(a) Remove the protective cover.



(b) Install a new clip <A> on the front pillar garnish RH.

(c) Engage the 2 claws and 2 clips, then install the front pillar garnish RH.



30. INSTALL ROOF SIDE INNER GARNISH LH

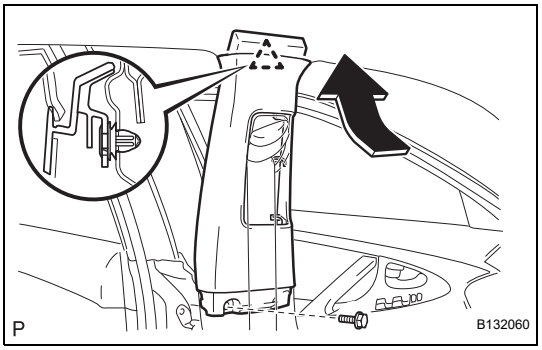
(a) Engage the 5 clips and 2 claws, then install the roof side inner garnish LH.

31. INSTALL ROOF SIDE INNER GARNISH RH

HINT:

Use the same procedure for the RH side and the LH side.

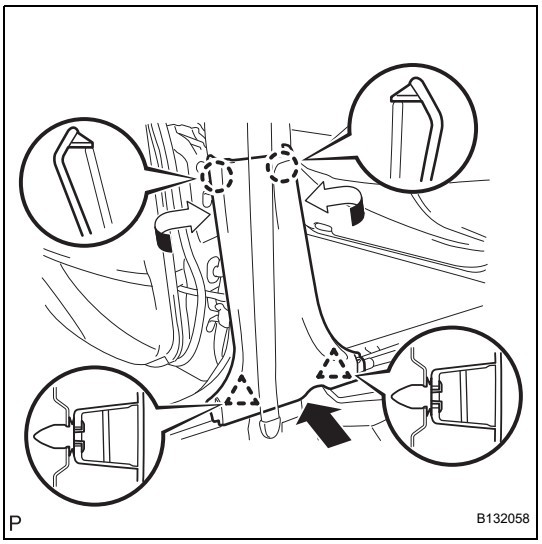
IR



32. INSTALL UPPER CENTER PILLAR GARNISH LH

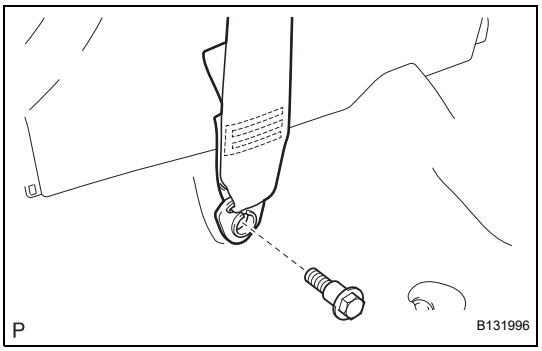
(a) Engage the clip.

(b) Install the upper center pillar garnish LH with the bolt.



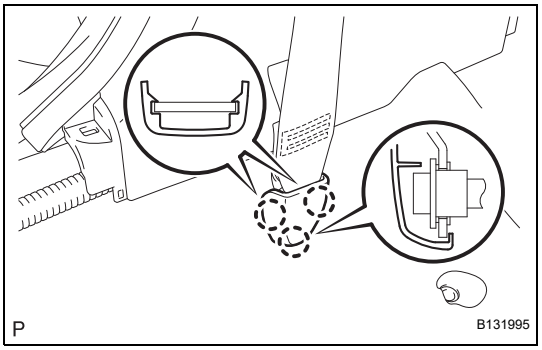
33. INSTALL LOWER CENTER PILLAR GARNISH LH

(a) Engage the 2 claws and 2 clips, then install the lower center pillar garnish LH.



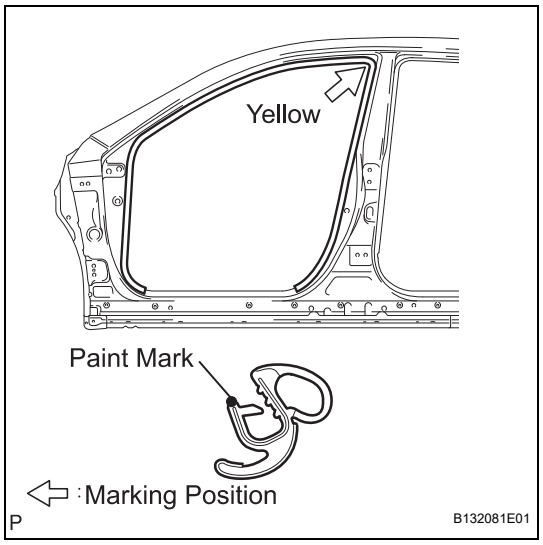
34. CONNECT FRONT SEAT OUTER BELT ASSEMBLY LH

(a) Install the floor end of the front seat outer belt assembly with the bolt.
Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)



35. INSTALL LAP BELT OUTER ANCHOR COVER (for LH Side)

(a) Engage the 3 claws and install the lap belt outer anchor cover.

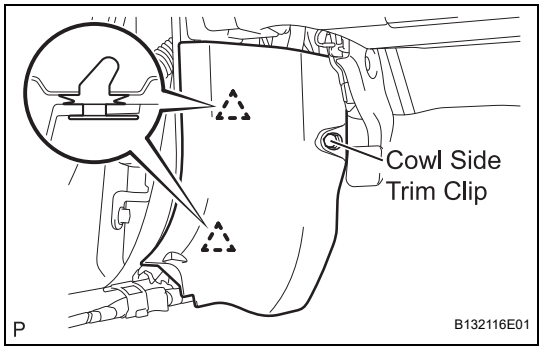


36. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP LH

(a) Install the front door opening trim weatherstrip LH as shown in the illustration.

NOTICE:

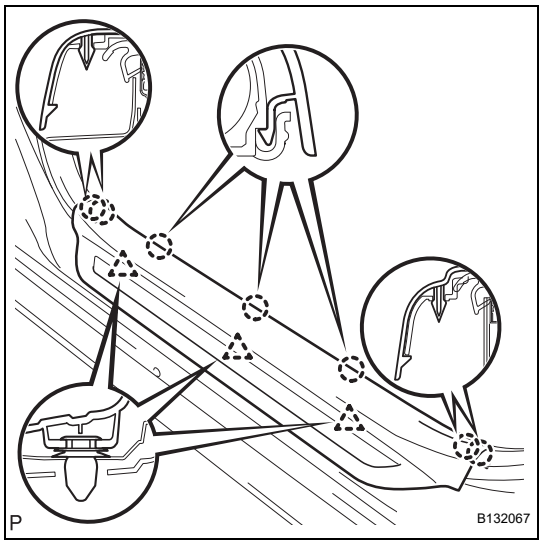
After installation, check that the corners fit correctly.



37. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH

(a) Engage the 2 clips.

(b) Install the cowl side trim sub-assembly LH with the cowl side trim clip.



38. INSTALL FRONT DOOR SCUFF PLATE LH

(a) Engage the 7 claws and 3 clips, then install the front door scuff plate LH.

39. INSTALL UPPER CENTER PILLAR GARNISH RH

HINT:

Use the same procedure for the RH side and the LH side.

40. INSTALL LOWER CENTER PILLAR GARNISH RH

HINT:

Use the same procedure for the RH side and the LH side.

41. CONNECT FRONT SEAT OUTER BELT ASSEMBLY RH

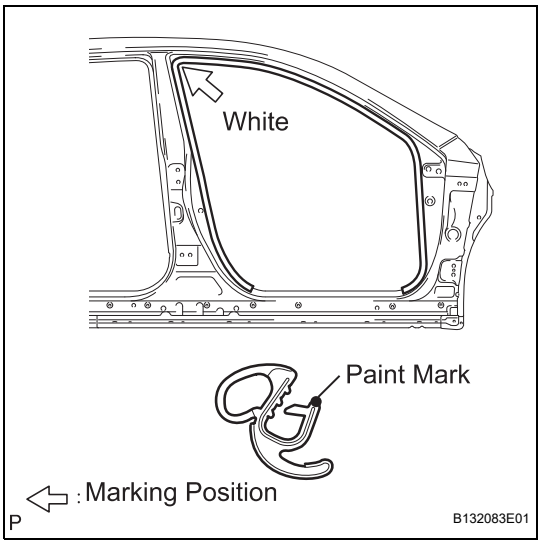
HINT:

Use the same procedure for the RH side and the LH side.

42. INSTALL LAP BELT OUTER ANCHOR COVER (for RH Side)

HINT:

Use the same procedure for the RH side and the LH side.



43. **INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP RH**
    (a) Install the front door opening trim weatherstrip RH as shown in the illustration.
    NOTICE:
    After installation, check that the corners fit correctly.

44. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH**
    HINT:
    Use the same procedure for the RH side and the LH side.

45. **INSTALL FRONT DOOR SCUFF PLATE RH**
    HINT:
    Use the same procedure for the RH side and the LH side.

46. **INSTALL REAR DOOR INNER GLASS WEATHERSTRIP LH (See page ED-80)**

47. **INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY LH (See page ED-81)**

48. **INSTALL DOOR ASSIST GRIP COVER LH (See page ED-82)**

49. **INSTALL REAR DOOR INSIDE HANDLE BEZEL PLUG LH (See page ED-82)**

50. **INSTALL REAR SIDE SEATBACK ASSEMBLY LH (See page SE-54)**

51. **INSTALL REAR SIDE SEATBACK ASSEMBLY RH**

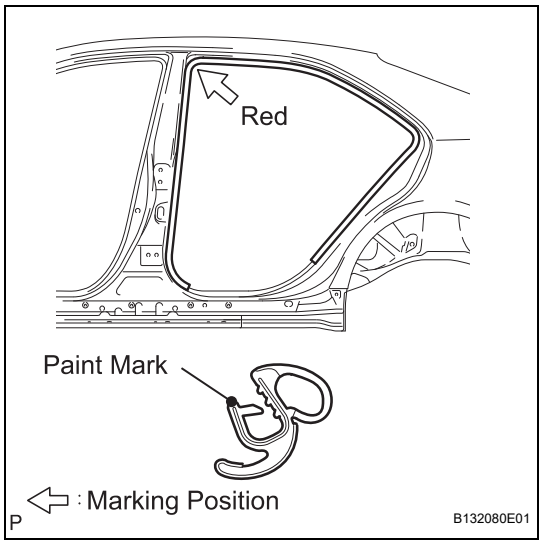
52. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-54)**

53. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-54)**

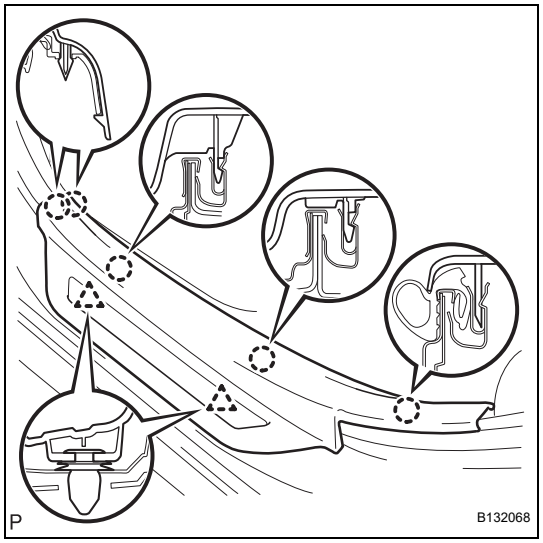
54. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-55)**

55. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**

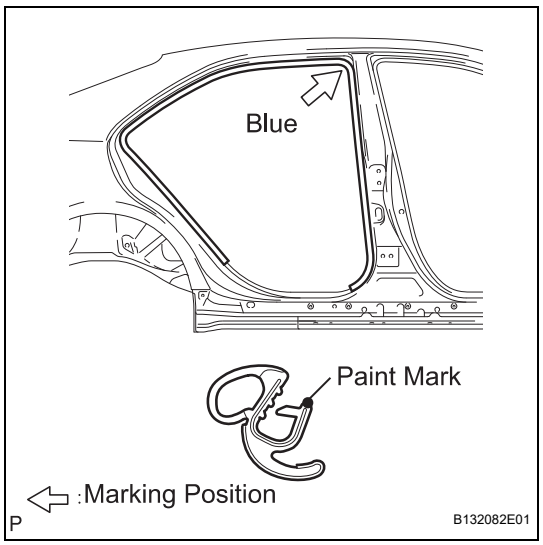
56. **INSTALL REAR SEAT HEADREST ASSEMBLY**



57. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH**
    (a) Install the rear door opening trim weatherstrip LH as shown in the illustration.
    NOTICE:
    After installation, check that the corners fit correctly.



58. **INSTALL REAR DOOR SCUFF PLATE LH**
    (a) Engage the 5 claws and 2 clips, then install the rear door scuff plate LH.



59. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP RH**
    (a) Install the rear door opening trim weatherstrip RH as shown in the illustration.
    NOTICE:
    After installation, check that the corners fit correctly.

60. **INSTALL REAR DOOR SCUFF PLATE RH**
    HINT:
    Use the same procedure for the RH side and the LH side.

61. **INSTALL FRONT SEAT ASSEMBLY LH (for Power Seat) (See page SE-38)**

62. **INSTALL INNER SEAT TRACK BRACKET COVER LH (for Power Seat) (See page SE-39)**

63. **INSTALL SEAT TRACK COVER LH (for Power Seat) (See page SE-39)**

64. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**

65. **INSTALL FRONT SEAT ASSEMBLY RH (for Power Seat)**
HINT:
Use the same procedure for the RH side and the LH side.

66. **INSTALL INNER SEAT TRACK BRACKET COVER RH (for Power Seat)**
HINT:
Use the same procedure for the RH side and the LH side.

67. **INSTALL SEAT TRACK COVER RH (for Power Seat)**
HINT:
Use the same procedure for the RH side and the LH side.

68. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**
HINT:
Use the same procedure for the RH side and the LH side.

69. **INSTALL FRONT SEAT ASSEMBLY RH (for Manual Seat) (See page SE-23)**

70. **INSTALL INNER SEAT TRACK BRACKET COVER RH (for Manual Seat) (See page SE-24)**

71. **INSTALL SEAT TRACK COVER RH (for Manual Seat) (See page SE-24)**

72. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**

73. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (for Manual Seat)**

74. **PERFORM INITIALIZATION**
NOTICE:
Some systems need initialization after reconnecting the cable to the negative battery terminal (See page IN-43)

75. **PERFORM ZERO POINT CALIBRATION AND SENSITIVITY CHECK (for Front Passenger Seat)**
(See page RS-239)

76. **INSPECT SRS WARNING LIGHT**
(See page RS-33)

77. **INSPECT FRONT SEAT ASSEMBLY (for Power Seat) (See page SE-39)**

78. **INSPECT SLIDE ADJUSTER LOCK (for Manual Seat)**

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the sliding roof system.
- *: Use the intelligent tester.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT

3 INSPECT COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM*

(a) Using the intelligent tester, check if the CAN communication system is functioning normally.

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B → **Go to CAN COMMUNICATION SYSTEM**

A

4 PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B → **Go to step 6**

A

5 OVERALL ANALYSIS AND TROUBLESHOOTING*

1. Data List / Active Test (See page RF-10)
2. Terminals of ECU (See page RF-7)
3. On-vehicle Inspection (See page RF-13)

RF

NEXT

6	**ADJUST, REPAIR OR REPLACE**

NEXT

7	**CONFIRMATION TEST**

NEXT

END

CUSTOMIZE PARAMETERS

CUSTOMIZING FUNCTION WITH INTELLIGENT TESTER (REFERENCE)

HINT:

The following items can be customized.

NOTICE:

- **When the customer requests a change in a function, first make sure that the function can be customized.**
- **Be sure to make a note of the current settings before customizing.**
- **When troubleshooting a function, first make sure that the function is set to the default setting.**

Sliding roof ECU

Display (Item)	Default	Contents	Setting
OPEN/DOOR KEY	ON	Function to manually open sliding roof linked with power window if holding driver's side and passenger's side door key for 1.5 seconds or more to unlock position when power switch is off	ON/OFF
CLOSE/DOOR KEY	ON	Function to manually close sliding roof linked with power window if holding driver's side and passenger's side door key for 1.5 seconds or more to lock position when power switch is off	ON/OFF
OPEN/WIRELESS	ON	Function to manually open sliding roof linked with power window if pressing transmitter UNLOCK switch for 2.4 seconds or more when power switch is off	ON/OFF
CLOSE/WIRELESS	ON	Function to manually open sliding roof linked with power window if pressing transmitter LOCK switch for 2.4 seconds or more when power switch is off	ON/OFF
DOOR KEY OPER	SLIDE	Function to select tilt up or slide open of manual sliding roof operation linked with power window Activated by holding driver's side door key for 1.5 seconds or more to unlock position when power switch is off	TILT/SLIDE
WIRELESS OPER	SLIDE	Function to select tilt up or slide open of manual sliding roof operation linked with power window Activated by pressing transmitter UNLOCK switch for 2.4 seconds or more when power switch is off	TILT/SLIDE

INITIALIZATION

1. INITIALIZE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY

NOTICE:

When replacing the sliding roof drive gear, the sliding roof drive gear requires initialization. If a reset is not executed, the following functions do not operate: auto operation and key off operation.

(a) Turn the power switch on (IG).

(b) Make sure that the sliding roof is fully closed.

(c) Push and hold the CLOSE switch or the UP switch until the following movement finishes: Tilt up → approximately 1 second → tilt down → slide open → slide closed.

(d) Check that the sliding roof stops at the fully closed position.

(e) Finish the initialization.

(f) Check that the AUTO operation works normally.

NOTICE:

If the following conditions occur during initialization procedure, initialization will fail:

- **Power switch is turned off.**
- **Sliding roof control switch is released while sliding roof is operating.**
- **Vehicle speed is 5 km/h (3 mph) or more.**
- **Communication is cut off.**
- **Another switch is turned on during initialization.**
- **The vehicle experiences a strong vibration during initialization, such as the slamming of a door.**

HINT:

- If the sliding roof cannot be fully closed or its position has become misaligned, perform initialization again.
- If the roof glass stops moving or starts moving in the opposite direction while the CLOSE or UP switch is held down, continue to hold the switch for another 10 seconds or more to return the sliding roof control ECU to an uninitialized condition. Then perform the initialization procedure again.
- If the AUTO operation function and jam protection function do not operate after the drive gear has been reset, replace the sliding roof drive gear (sliding roof ECU).

PROBLEM SYMPTOMS TABLE

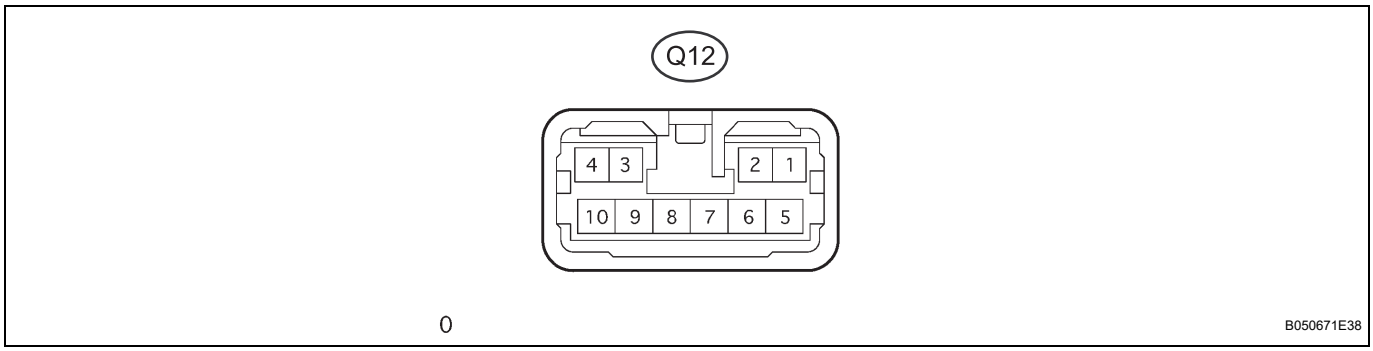
HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
Inspect the fuses and relays related to this system before inspecting the suspected areas below.

Sliding Roof System

Symptom	Suspected Area	See page
Sliding function and tilt function do not operate	Sliding roof ECU power source circuit	RF-28
Either sliding function or tilt function does not operate	Sliding roof control switch circuit	RF-26

TERMINALS OF ECU

1. CHECK SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)



(a) Disconnect the Q12 ECU connector.
(b) Measure the resistance and voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
B (Q12-1) - E (Q12-2)	B - W-B	+B power supply	Always	10 to 14 V
IG (Q12-5) - E (Q12-2)	Y - W-B	Power switch power supply	Power switch off	Below 1 V
IG (Q12-5) - E (Q12-2)	Y - W-B	Power switch power supply	Power switch on (IG)	10 to 14 V
OPN (Q12-7) - E (Q12-2)	BR - W-B	Sliding roof motor open	OPEN switch OFF	10 kΩ or higher
OPN (Q12-7) - E (Q12-2)	BR - W-B	Sliding roof motor open	OPEN switch ON	Below 1 Ω
CLS (Q12-9) - E (Q12-2)	L - W-B	Sliding roof motor closed	CLOSE switch OFF	10 kΩ or higher
CLS (Q12-9) - E (Q12-2)	L - W-B	Sliding roof motor closed	CLOSE switch ON	Below 1 Ω
UP (Q12-10) - E (Q12-2)	W - W-B	Sliding roof motor up	UP switch OFF	10 kΩ or higher
UP (Q12-10) - E (Q12-2)	W - W-B	Sliding roof motor up	UP switch ON	Below 1 Ω
DWN (Q12-8) - E (Q12-2)	G - W-B	Sliding roof motor down	DOWN switch OFF	10 kΩ or higher
DWN (Q12-8) - E (Q12-2)	G - W-B	Sliding roof motor down	DOWN switch ON	Below 1 Ω
E (Q12-2) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.
(c) Reconnect the Q12 ECU connector.
(d) Measure the voltage according to the value(s) in the table below.

RF

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
OPN (Q12-7) - E (Q12-2)	BR - W-B	Sliding roof motor open	Power switch on (IG), sliding roof closed, OPEN switch OFF	Below 1 V
OPN (Q12-7) - E (Q12-2)	BR - W-B	Sliding roof motor open	Power switch on (IG), sliding roof closed, OPEN switch ON	10 to 14 V
CLS (Q12-9) - E (Q12-2)	L - W-B	Sliding roof motor closed	Power switch on (IG), sliding roof open, CLOSE switch OFF	Below 1 V
CLS (Q12-9) - E (Q12-2)	L - W-B	Sliding roof motor closed	Power switch on (IG), sliding roof open, CLOSE switch ON	10 to 14 V
UP (Q12-10) - E (Q12-2)	W - W-B	Sliding roof motor up	Power switch on (IG), sliding roof tilted downward, UP switch OFF	Below 1 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
UP (Q12-10) - E (Q12-2)	W - W-B	Sliding roof motor up	Power switch on (IG), sliding roof tilted downward, UP switch ON	10 to 14 V
DWN (Q12-8) - E (Q12-2)	G - W-B	Sliding roof motor down	Power switch on (IG), sliding roof tilted upward, DOWN switch OFF	Below 1 V
DWN (Q12-8) - E (Q12-2)	G - W-B	Sliding roof motor down	Power switch on (IG), sliding roof tilted upward, DOWN switch ON	10 to 14 V

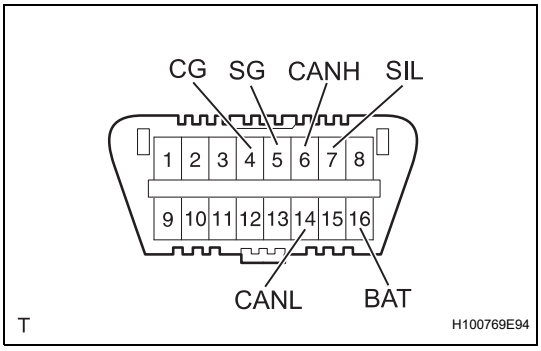
If the result is not as specified, the ECU may have a malfunction.

DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) Sliding roof system data and Diagnostic Trouble Codes (DTCs) can be read through the vehicle's Data Link Connector 3 (DLC3). When the system seems to be malfunctioning, use the intelligent tester to check for malfunctions and perform repairs.

2. CHECK DLC3



HINT:

The ECU uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format. If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

Symbols (Terminals No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	HIGH-LEVEL CAN bus line	Power switch off*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-LEVEL CAN bus line	Power switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-LEVEL CAN bus line	Power switch off*	200 Ω or higher
CANL (14) - BAT (16)	LOW-LEVEL CAN bus line	Power switch off*	6 kΩ or higer

NOTICE:

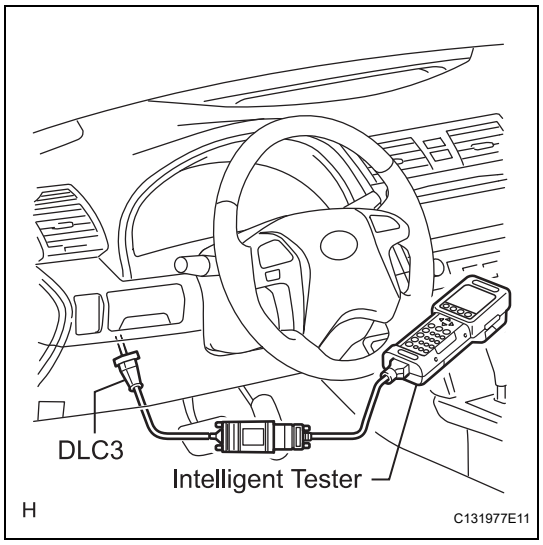
***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches, or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the power switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.



3. INSPECT BATTERY VOLTAGE

Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:
Using the intelligent tester's Data List allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the Data List early in troubleshooting is one way to save time.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Read the Data List according to the display on the tester.

SLIDE ROOF:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
OPEN SW	Slide switch open signal/ON or OFF	ON: OPEN switch is pressed. OFF: OPEN switch is not pressed.	-
CLOSE SW	Slide switch close signal/ON or OFF	ON: CLOSE switch is pressed. OFF: CLOSE switch is not pressed.	-
UP SW	Tilt switch up signal/ON or OFF	ON: UP switch is pressed. OFF: UP switch is not pressed.	-
DOWN SW	Tilt switch down signal/ON or OFF	ON: DOWN switch is pressed. OFF: DOWN switch is not pressed.	-
HALL IC1 STATUS	Sliding roof operation signal/ NORMAL or LOCK	NORMAL: Sliding roof motor is operating. LOCK: Sliding roof motor is not operating.	-
HALL IC1 PULSE	Sliding roof operation signal/LO or HI	LO: Sliding roof motor is not operating. HI: Sliding roof motor is operating.	-
HALL IC2 STATUS	Sliding roof operation signal/ NORMAL or LOCK	NORMAL: Sliding roof motor is operating. LOCK: Sliding roof motor is not operating.	-
HALL IC2 PULSE	Sliding roof operation signal/LO or HI	LO: Sliding roof motor is not operating. HI: Sliding roof motor is operating.	-
WIRLES OPN OPRT	Wireless sliding roof open signal/ ON or OFF	ON: Transmitter UNLOCK switch is pressed. OFF: Transmitter UNLOCK switch is not pressed.	-
WIRLES CL OPRT	Wireless sliding roof close signal/ ON or OFF	ON: Transmitter UNLOCK switch is not pressed. OFF: Transmitter UNLOCK switch is pressed.	-
KEY OPEN OPERT	Door key-linked open operation signal/ON or OFF	ON: Driver's side door is open for 1.5 sec. or more. OFF: Driver's side door is not open for 1.5 sec. or more.	-
KEY CLOSE OPERT	Door key-linked open operation signal/ON or OFF	ON: Driver's side door is kept closed for 1.5 sec. or more. OFF: Driver's side door is not kept closed for 1.5 sec. or more.	-
D-DOOR WARN SW	Driver's door courtesy light switch signal/ON or OFF	ON: Driver's door is open. OFF: Driver's door is closed.	-
IG (MPX)	Power switch signal (MPX signal)/ON or OFF	ON: Power switch on (IG) OFF: Power switch off	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
IG (DIRCT SIG)	Power switch signal/ON or OFF	ON: Power switch on (IG) OFF: Power switch off	-
KEY OFF PERMS	Key-OFF sliding roof operation permit signal (Current)/ON or OFF	ON: Driver's side door is not closed within 45 sec. after power switch is turned off. OFF: Any status except "ON" status	-
WIRELESS OPER	Wireless sliding roof operating direction signal/Tilt or Slide	Tilt: Slide close direction → Tilt up direction SLIDE: Slide open direction → Tilt down direction	-
DOOR KEY OPER	Key-linked sliding roof operating direction signal/Tilt or Slide	Tilt: Slide close direction → Tilt up direction SLIDE: Slide open direction → Tilt down direction	-
CLOSE / WIRELESS	Wireless sliding roof close permit signal/Available or Not available	Available: No key is in vehicle and all doors are opened. Not Available: Any status except "Available" status.	-
OPEN / WIRELESS	Wireless sliding roof open permit signal/Available or Not available	Available: No key is in vehicle and all doors are closed. Not Available: Any status except "AVAIL" status.	-
CLOSE / DOOR KEY	Key-linked sliding roof close permit signal/Available or Not available	Available: Driver's side door is not closed within 45 sec. after power switch is turned off. Not Available: Any status except "AVAIL" status.	-
OPEN / DOOR KEY	Key-linked sliding roof open permit signal/Available or Not available	Available: Driver's side door is not closed within 45 sec. after power switch is turned off. Not Available: Any status except "AVAIL" status.	-
CURRENT DOWN SW	Down switch failure signal (Current)/Fail or Not Fail	Fail: Sliding roof tilt down signal failure (Current) Not Fail: Sliding roof tilt down signal not fail (Current)	-
CURRENT UP SW	Up switch failure signal (Current)/ Fail or Not Fail	Fail: Sliding roof tilt up signal failure (Current) Not Fail: Sliding roof tilt up signal not fail (Current)	-
CURRENT CLS SW	Close switch failure signal (Current)/Fail or Not Fail	Fail: Sliding roof close signal failure (Current) Not Fail: Sliding roof close signal not fail (Current)	-
CURRENT OPN SW	Open switch failure signal (Current)/Fail or Not Fail	Fail: Sliding roof open signal failure (Current) Not Fail: Sliding roof open signal not fail (Current)	-
PAST DOWN SW	Down switch failure signal (Past)/ Fail or Not Fail	Fail: Sliding roof tilt down signal failure (Past) Not Fail: Sliding roof tilt down signal not fail (Past)	-
PAST UP SW	Up switch failure signal (Past)/ Fail or Not Fail	Fail: Sliding roof tilt up signal failure (Past) Not Fail: Sliding roof tilt up signal not fail (Past)	-
PAST CLS SW	Close switch failure signal (Past)/ Fail or Not Fail	Fail: Sliding roof close signal failure (Past) Not Fail: Sliding roof close signal not fail (Past)	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
PAST OPN SW	Open switch failure signal (Past)/ Fail or Not Fail	Fail: Sliding roof open signal failure (Past) Not Fail: Sliding roof open signal not fail (Past)	-
#CODE	Number of trouble code	Number of trouble code	-

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's Active Test allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the Active Test early in troubleshooting is one way to save time. The Data List can be displayed during the Active Test.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Perform the Active Test according to the display on the tester.

SLIDE ROOF:

Tester Display	Test Part	Control Range	Diagnostic Note
SLIDE ROOF	Operate sliding roof SLIDE CLOSE/TILT UP	CLOS/UP: Sliding roof SLIDE CLOSE or TILT UP operation occurs. OFF: Sliding roof is not operating	-
SLIDE ROOF	Operate sliding roof SLIDE OPEN/TILT DOWN	OPEN/DWN: Sliding roof SLIDE OPEN or TILT DOWN operation occurs OFF: Sliding roof is not operating	-

DIAGNOSTIC TROUBLE CODE CHART

If any trouble code is displayed during DTC check, check the circuit corresponding to the code in the table below. Proceed to the page given for the circuit.

Sliding Roof System

DTC Code	Detection Item	Trouble Area	See page
B2341	Sensor (Motor) Failure	1. Sliding roof drive gear sub-assembly (Sliding roof control ECU) 2. Roof console box assembly (Sliding roof control switch) 3. Wire harness	RF-15
B2342	Switch Failure	1. Sliding roof drive gear sub-assembly (Sliding roof control ECU) 2. Roof console box assembly (Sliding roof control switch) 3. Wire harness	RF-19
B2343	Position Initialization Incomplete	1. Sliding roof drive gear sub-assembly (Sliding roof control ECU) 2. Roof console box assembly (Sliding roof control switch) 3. Wire harness	RF-23
B2344	Position Failure	1. Sliding roof drive gear sub-assembly (Sliding roof control ECU) 2. Roof console box assembly (Sliding roof control switch) 3. Wire harness	RF-15

ON-VEHICLE INSPECTION

1. CHECK AUTO OPERATION

(a) Turn the power switch on (IG).

(b) When the roof glass is fully closed, press the OPEN switch for 0.3 seconds or more. Check that the roof glass automatically slides until it is fully opened.

(c) When the roof glass is fully open, press the CLOSE switch for 0.3 seconds or more. Check that the roof glass automatically slides until it is fully closed.

(d) When the roof glass is fully closed, press the UP switch for 0.3 seconds or more. Check that the roof glass automatically tilts until it is fully tilted upward.

(e) When the roof glass is fully open, press the DOWN switch for 0.3 seconds or more. Check that the roof glass automatically tilts until it is fully tilted downward.

(f) When the auto operation is operating, check that pressing any personal light switch stops the roof glass operation.

HINT:

When pressing the switch for 0.3 seconds or less, the roof glass moves but auto operation does not operate.

2. CHECK SLIDING ROOF OPERATION AFTER POWER SWITCH IS TURNED OFF

(a) Turn the power switch from on (IG) to off, and check that the sliding roof operates. Then open and close the driver's side door once, and check that the sliding roof does not operate.

(b) Turn the power switch from on (IG) to off and wait for approximately 43 seconds. Check that the sliding roof does not operate.

(c) Operate the auto (SLIDE OPEN/CLOSE or TILT UP/DOWN) operation. While the roof glass is in motion, turn the power switch from on (IG) to off. Check that the auto operation continues until the roof glass opens or closes fully.

RF

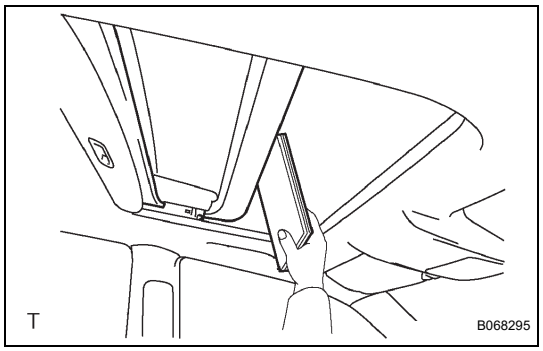
3. CHECK JAM PROTECTION FUNCTION

CAUTION:

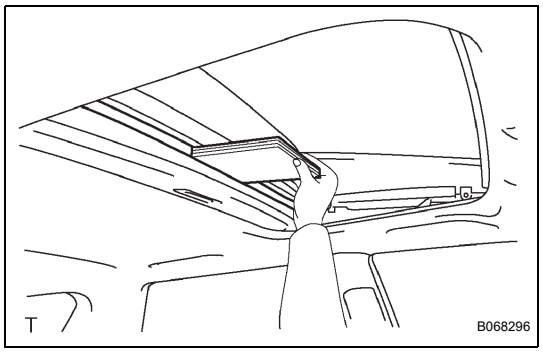
- **Do not use a part of your body; for example, your hand, to check the jam protection.**
- **Do not allow anything to become caught in the sliding roof by accident in this procedure.**
- **Perform the inspection from the inside of the vehicle.**

NOTICE:

- **Do not use hard objects such as a hammer, to avoid damage to the roof.**
- **If the jam protection does not operate, reset the sliding roof drive gear (motor).**



(a) When the sliding roof auto operation is operating and an object is caught between the vehicle body and glass, check that the roof glass opens 218 mm (8.58 in.) from the point of contact with the object, or opens fully if there is not an opening distance of 218 mm (8.58 in.).



(b) When the TILT UP/DOWN function is operating, and an object is caught between the vehicle body and the roof glass, check that the sliding roof tilts up fully.

DTC	B2341	Sensor (Motor) Failure

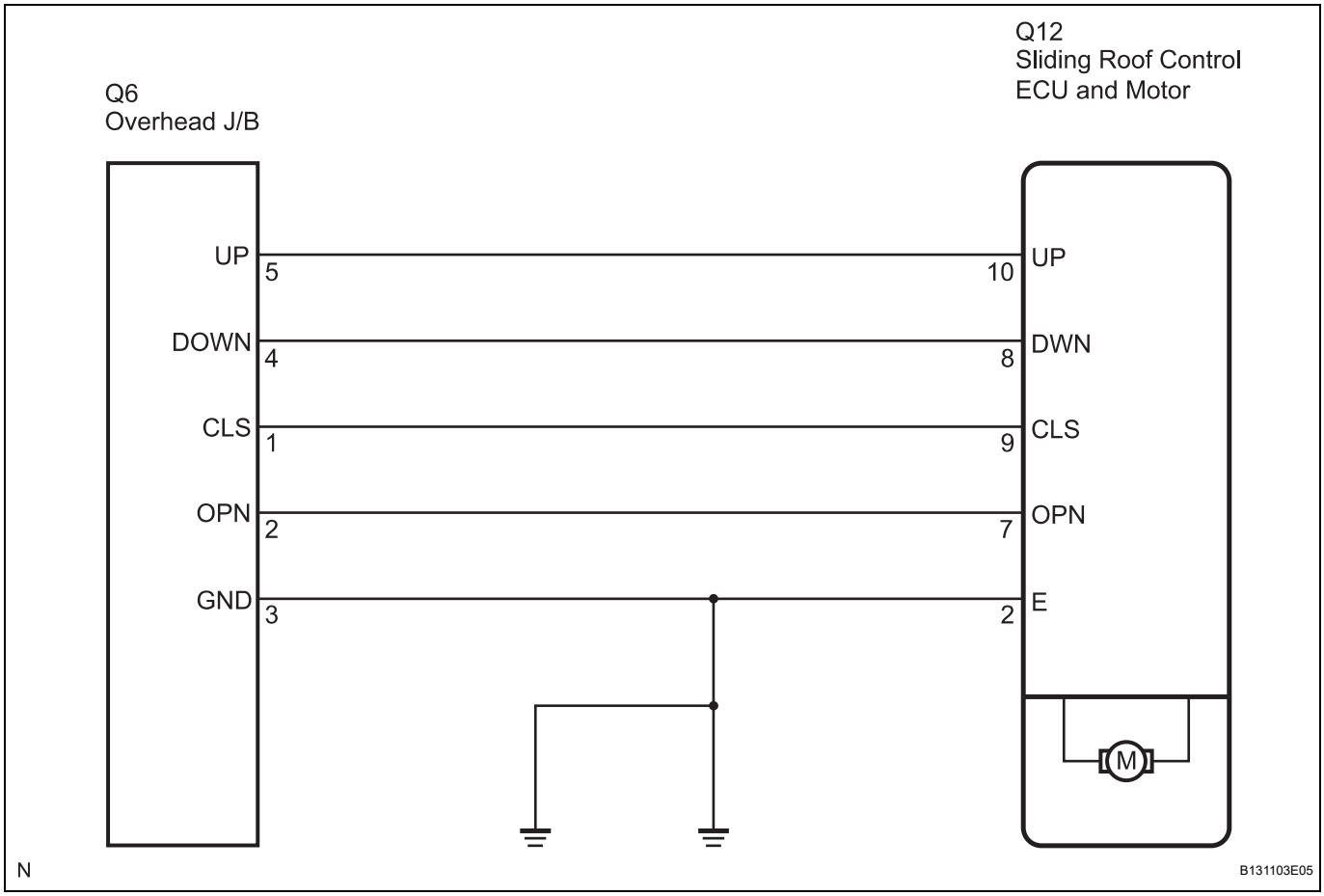
DTC	B2344	Position Failure

DESCRIPTION

When the sliding roof drive gear sub-assembly (sliding roof control ECU) detects malfunctions in the motor, and the sliding roof operation is stopped, DTC B2341 is output. When the sliding roof drive gear sub-assembly (sliding roof control ECU) detects malfunctions in the gear, and the sliding roof operation is stopped, DTC B2344 is output.

DTC No.	DTC Detection Condition	Trouble Area
B2341	Sensor (motor) Failure	• Sliding roof drive gear sub-assembly (sliding roof control ECU) • Roof console box assembly (sliding roof control switch) • Wire harness
B2344	Position Failure	• Sliding roof drive gear sub-assembly (sliding roof control ECU) • Roof console box assembly (sliding roof control switch) • Wire harness

WIRING DIAGRAM



RF

INSPECTION PROCEDURE

1	CHECK SLIDING ROOF FUNCTION

(a) Check the auto operation with the OPEN, DOWN, CLOSE, and UP switches (See page RF-13).
OK:
Auto operation operates normally with OPEN, DOWN, CLOSE, and UP switches.

NG → **Go to step 3**

OK

2	DELETE DTC

(a) Delete the DTCs (See page RF-9).

NEXT

END

3	INITIALIZE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)

(a) Check that the sliding roof drive gear sub-assembly can be initialized (See page RF-6).
OK:
Sliding roof drive gear sub-assembly can be initialized.

NG → **Go to step 6**

OK

4	CHECK SLIDING ROOF FUNCTION

(a) Check the auto operation with the OPEN, DOWN, CLOSE, and UP switches (See page RF-13).
OK:
Auto operation operates normally with OPEN, DOWN, CLOSE, and UP switches.

NG → **REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)**

OK

5	DELETE DTC

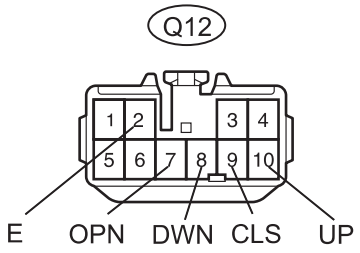
(a) Delete the DTCs (See page RF-9).

NEXT

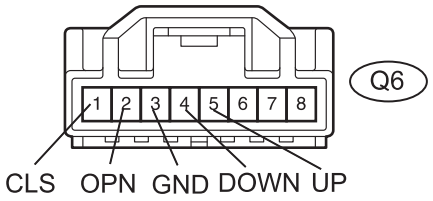
END

6	CHECK WIRE HARNESS (SLIDING ROOF CONTROL ECU - ROOF CONSOLE BOX ASSEMBLY)

Sliding Roof Control ECU Connector:



Roof Console Box Assembly Connector:



N

B131169E03

(a) Disconnect the Q12 and Q6 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

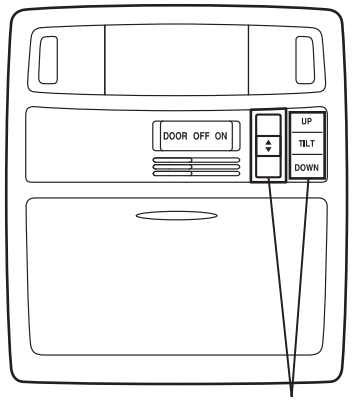
Tester Connection	Condition	Specified Condition
Q12-2 (E) - Q6-3 (GND)	Always	Below 1 Ω
Q12-7 (OPN) - Q6-2 (OPN)	Always	Below 1 Ω
Q12-8 (DWN) - Q6-4 (DOWN)	Always	Below 1 Ω
Q12-9 (CLS) - Q6-1 (CLS)	Always	Below 1 Ω
Q12-10 (UP) - Q6-5 (UP)	Always	Below 1 Ω
Q6-1 (CLS) - Body ground	Always	10 kΩ or higher
Q6-2 (OPN) - Body ground	Always	10 kΩ or higher
Q6-3 (GND) - Body ground	Always	Below 1 Ω
Q6-4 (DOWN) - Body ground	Always	10 kΩ or higher
Q6-5 (UP) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

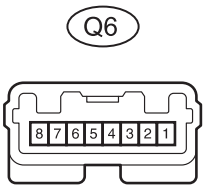
OK

7	INSPECT ROOF CONSOLE BOX ASSEMBLY (SLIDING ROOF CONTROL SWITCH)

Roof Console Box Assembly Connector:



Sliding Roof Control Switch



N B131165E02

(a) Remove the roof console box assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Switch Position	Specified Condition
Q6-1 (CLS) - Q6-3 (GND)	CLOSE	Below 100 Ω
Q6-2 (OPN) - Q6-3 (GND)	OPEN	Below 100 Ω
Q6-4 (DOWN) - Q6-3 (GND)	DOWN	Below 100 Ω
Q6-5 (UP) - Q6-3 (GND)	UP	Below 100 Ω
Q6-1 (CLS) - Q6-3 (GND)	OPEN	1 kΩ or higher
Q6-2 (OPN) - Q6-3 (GND)	CLOSE	1 kΩ or higher
Q6-4 (DOWN) - Q6-3 (GND)	UP	1 kΩ or higher
Q6-5 (UP) - Q6-3 (GND)	DOWN	1 kΩ or higher

NG → **REPLACE ROOF CONSOLE BOX ASSEMBLY (SLIDING ROOF CONTROL SWITCH)**

OK

REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)

DTC	B2342	Switch Failure

DESCRIPTION

This DTC is output when the sliding roof drive gear sub-assembly (sliding roof control ECU) detects that the OPEN, CLOSE, UP, or DOWN switch in the roof console box assembly (sliding roof control switch) is stuck for 30 seconds or more.

DTC No.	DTC Detection Condition	Trouble Area
B2342	Sliding roof drive gear sub-assembly (sliding roof control ECU) detects OPEN, CLOSE, UP, or DOWN switch in overhead junction block is stuck for 30 seconds or more	• Sliding roof drive gear sub-assembly (sliding roof control ECU) • Roof console box assembly (sliding roof control switch) • Wire harness

WIRING DIAGRAM

Refer to DTC B2341 (See page RF-15).

INSPECTION PROCEDURE

1	READ VALUE ON INTELLIGENT TESTER (SLIDE OPEN AND TILT UP SWITCH)

(a) Use the DATA LIST to check if the sliding roof switch is functioning properly.

SLIDE ROOF

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
OPEN SW	Slide switch open signal/ON or OFF	ON: OPEN switch is pressed. OFF: OPEN switch is not pressed.	-
CLOSE SW	Slide switch close signal/ON or OFF	ON: CLOSE switch is pressed. OFF: CLOSE switch is not pressed.	-
UP SW	Tilt switch up signal/ON or OFF	ON: UP switch is pressed. OFF: UP switch is not pressed.	-
DOWN SW	Tilt switch down signal/ON or OFF	ON: DOWN switch is pressed. OFF: DOWN switch is not pressed.	-

OK:
The intelligent tester displays as shown in the table according to the operation of each switch.

NG → **Go to step 4**

OK

2	CHECK SLIDING ROOF FUNCTION

(a) Check the auto operation with the OPEN, CLOSE, UP, and DOWN switches (See page RF-13).

OK:
Auto operation operates normally with OPEN, CLOSE, UP, and DOWN switches.

NG → **Go to step 7**

OK

3	DELETE DTC

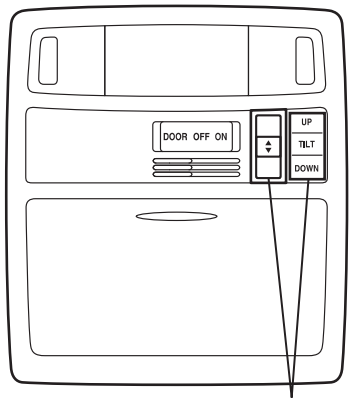
(a) Delete the DTCs (See page RF-9).

NEXT

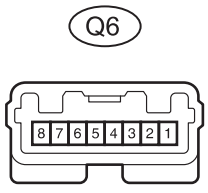
END

4	INSPECT ROOF CONSOLE BOX ASSEMBLY (SLIDING ROOF CONTROL SWITCH)

Roof Console Box Assembly Connector:



Sliding Roof Control Switch



N B131165E02

(a) Remove the roof console box assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Switch Position	Specified Condition
Q6-1 (CLS) - Q6-3 (GND)	CLOSE	Below 100 Ω
Q6-2 (OPN) - Q6-3 (GND)	OPEN	Below 100 Ω
Q6-4 (DOWN) - Q6-3 (GND)	DOWN	Below 100 Ω
Q6-5 (UP) - Q6-3 (GND)	UP	Below 100 Ω
Q6-1 (CLS) - Q6-3 (GND)	OPEN	1 kΩ or higher
Q6-2 (OPN) - Q6-3 (GND)	CLOSE	1 kΩ or higher
Q6-4 (DOWN) - Q6-3 (GND)	UP	1 kΩ or higher
Q6-5 (UP) - Q6-3 (GND)	DOWN	1 kΩ or higher

OK → Go to step 10

NG

5	REPLACE ROOF CONSOLE BOX ASSEMBLY (SLIDING ROOF CONTROL SWITCH)

(a) Temporarily replace the roof console box assembly (sliding roof control switch) with a new one or normally functioning one (See page LI-84).

NEXT

RF

6	DELETE DTC

(a) Delete the DTCs (See page RF-9).

NEXT

END

7	INITIALIZE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)

(a) Check that the sliding roof drive gear sub-assembly can be initialized (See page RF-6).
OK:
Sliding roof drive gear sub-assembly can be initialized.

NG → **Go to step 10**

OK

8	CHECK SLIDING ROOF FUNCTION

(a) Check the auto operation with the OPEN, CLOSE, UP, and DOWN switches (See page RF-13).
OK:
Auto operation operates normally with OPEN, CLOSE, UP, and DOWN switches.

NG → **REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)**

OK

9	DELETE DTC

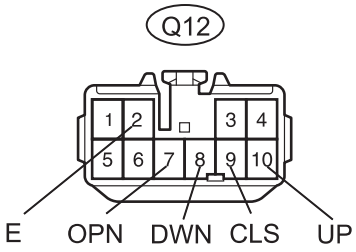
(a) Delete the DTCs (See page RF-9).

NEXT

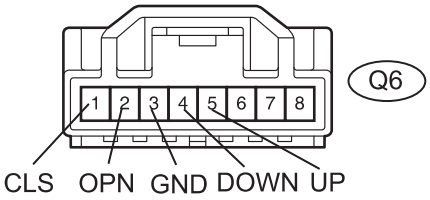
END

10	CHECK WIRE HARNESS (SLIDING ROOF CONTROL ECU - ROOF CONSOLE BOX ASSEMBLY)

Sliding Roof Control ECU Connector:



Roof Console Box Assembly Connector:



N B131169E03

(a) Disconnect the Q12 and Q6 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
Q12-2 (E) - Q6-3 (GND)	Always	Below 1 Ω
Q12-7 (OPN) - Q6-2 (OPN)	Always	Below 1 Ω
Q12-8 (DWN) - Q6-4 (DOWN)	Always	Below 1 Ω
Q12-9 (CLS) - Q6-1 (CLS)	Always	Below 1 Ω
Q12-10 (UP) - Q6-5 (UP)	Always	Below 1 Ω
Q6-1 (CLS) - Body ground	Always	10 kΩ or higher
Q6-2 (OPN) - Body ground	Always	10 kΩ or higher
Q6-3 (GND) - Body ground	Always	Below 1 Ω
Q6-4 (DOWN) - Body ground	Always	10 kΩ or higher
Q6-5 (UP) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)

DTC	B2343	Position Initialization Incomplete

DESCRIPTION

This DTC is output when the sliding roof drive gear sub-assembly (sliding roof control ECU) has not been initialized.

DTC No.	DTC Detection Condition	Trouble Area
B2343	Sliding roof drive gear sub-assembly (sliding roof control ECU) has not been initialized	• Sliding roof drive gear sub-assembly (sliding roof control ECU) • Roof console box assembly (sliding roof control switch) • Wire harness

WIRING DIAGRAM

Refer to DTC B2341 (See page RF-15).

INSPECTION PROCEDURE

1	INITIALIZE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)

(a) Check that the sliding roof drive gear sub-assembly can be initialized (See page RF-6).

OK:

Sliding roof drive gear sub-assembly can be initialized.

NG → **Go to step 3**

OK

2	CHECK SLIDING ROOF FUNCTION

(a) Check the auto operation with the OPEN, CLOSE, UP, and DOWN switches (See page RF-13).

OK:

Auto operation operates normally with OPEN, CLOSE, UP, and DOWN switches.

NG → **REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)**

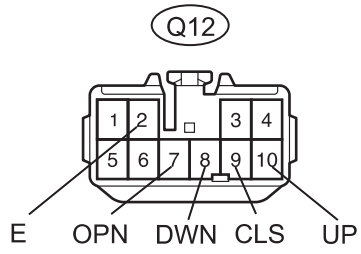
OK

END

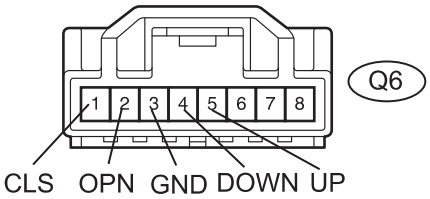
RF

3	CHECK WIRE HARNESS (SLIDING ROOF DRIVE GEAR - OVERHEAD JUNCTION BLOCK)

Sliding Roof Control ECU Connector:



Roof Console Box Assembly Connector:



N B131169E03

(a) Disconnect the Q12 and Q6 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

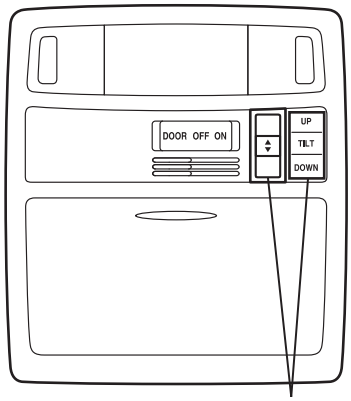
Tester Connection	Condition	Specified Condition
Q12-2 (E) - Q6-3 (GND)	Always	Below 1 Ω
Q12-7 (OPN) - Q6-2 (OPN)	Always	Below 1 Ω
Q12-8 (DWN) - Q6-4 (DOWN)	Always	Below 1 Ω
Q12-9 (CLS) - Q6-1 (CLS)	Always	Below 1 Ω
Q12-10 (UP) - Q6-5 (UP)	Always	Below 1 Ω
Q6-1 (CLS) - Body ground	Always	10 kΩ or higher
Q6-2 (OPN) - Body ground	Always	10 kΩ or higher
Q6-3 (GND) - Body ground	Always	Below 1 Ω
Q6-4 (DOWN) - Body ground	Always	10 kΩ or higher
Q6-5 (UP) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

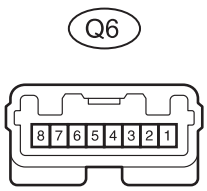
OK

4	INSPECT ROOF CONSOLE BOX ASSEMBLY (SLIDING ROOF CONTROL SWITCH)

Roof Console Box Assembly Connector:



Sliding Roof Control Switch



N B131165E02

(a) Remove the roof console box assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Switch Position	Specified Condition
Q6-1 (CLS) - Q6-3 (GND)	CLOSE	Below 100 Ω
Q6-2 (OPN) - Q6-3 (GND)	OPEN	Below 100 Ω
Q6-4 (DOWN) - Q6-3 (GND)	DOWN	Below 100 Ω
Q6-5 (UP) - Q6-3 (GND)	UP	Below 100 Ω
Q6-1 (CLS) - Q6-3 (GND)	OPEN	1 kΩ or higher
Q6-2 (OPN) - Q6-3 (GND)	CLOSE	1 kΩ or higher
Q6-4 (DOWN) - Q6-3 (GND)	UP	1 kΩ or higher
Q6-5 (UP) - Q6-3 (GND)	DOWN	1 kΩ or higher

NG → **REPLACE ROOF CONSOLE BOX ASSEMBLY (SLIDING ROOF CONTROL SWITCH)**

OK

REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)

Sliding Roof Control Switch Circuit

DESCRIPTION

The sliding roof drive gear sub-assembly (sliding roof control ECU) receives slide switch and tilt switch signals and drives its built-in motor.

WIRING DIAGRAM

Refer to DTC B2341 (See page RF-15).

INSPECTION PROCEDURE

1 **PERFORM ACTIVE TEST BY INTELLIGENT TESTER (SLIDING ROOF OPERATION)**

(a) Select the ACTIVE TEST, use the intelligent tester to generate a control command, and then check that the sliding roof slides open/close and tilts up/down.

SLIDE ROOF

Tester Display	Test Part	Control Range	Diagnostic Note
SLIDE ROOF	Operate sliding roof SLIDE CLOSE/TILT UP	CLOS/UP: Sliding roof SLIDE CLOSE or TILT UP operation occurs. OFF: Sliding roof is not operating	-
SLIDE ROOF	Operate sliding roof SLIDE OPEN/TILT DOWN	OPN/DWN: Sliding roof SLIDE OPEN or TILT DOWN operation occurs OFF: Sliding roof is not operating	-

OK:
Sliding roof operates normally.

NG → **REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)**

OK

2 **READ VALUE OF INTELLIGENT TESTER (SLIDING ROOF SWITCH)**

(a) Use the DATA LIST to check if the sliding roof switch is functioning properly.

SLIDE ROOF

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
OPEN SW	Slide switch open signal/ON or OFF	ON: OPEN switch is pressed. OFF: OPEN switch is not pressed.	-
CLOSE SW	Slide switch close signal/ON or OFF	ON: CLOSE switch is pressed. OFF: CLOSE switch is not pressed.	-
UP SW	Tilt switch up signal/ON or OFF	ON: UP switch is pressed. OFF: UP switch is not pressed.	-
DOWN SW	Tilt switch down signal/ON or OFF	ON: DOWN switch is pressed. OFF: DOWN switch is not pressed.	-

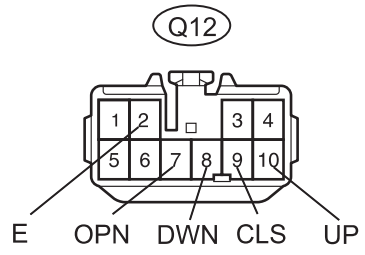
OK:
The intelligent tester displays as shown in the table according to the operation of each switch.

OK → **REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)**

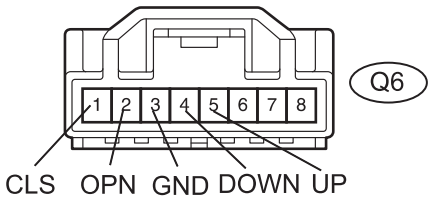
NG

3	CHECK WIRE HARNESS (SLIDING ROOF CONTROL ECU - ROOF CONSOLE BOX ASSEMBLY)

Sliding Roof Control ECU Connector:



Roof Console Box Assembly Connector:



N B131169E03

(a) Disconnect the Q12 and Q6 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
Q12-2 (E) - Q6-3 (GND)	Always	Below 1 Ω
Q12-7 (OPN) - Q6-2 (OPN)	Always	Below 1 Ω
Q12-8 (DWN) - Q6-4 (DOWN)	Always	Below 1 Ω
Q12-9 (CLS) - Q6-1 (CLS)	Always	Below 1 Ω
Q12-10 (UP) - Q6-5 (UP)	Always	Below 1 Ω
Q6-1 (CLS) - Body ground	Always	10 kΩ or higher
Q6-2 (OPN) - Body ground	Always	10 kΩ or higher
Q6-3 (GND) - Body ground	Always	Below 1 Ω
Q6-4 (DOWN) - Body ground	Always	10 kΩ or higher
Q6-5 (UP) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

RF **OK**

REPLACE ROOF CONSOLE BOX ASSEMBLY (SLIDING ROOF CONTROL SWITCH)

SYSTEM DESCRIPTION

1. BRIEF DESCRIPTION

(a) Two different types of CAN buses are used. The CAN buses are classified into two types based on typical communication speed.
The HS-CAN bus is a high-speed communication bus that is used for powertrain, chassis, and some body electrical communication. The HS-CAN bus is referred to as the "CAN bus" and it operates at speeds of approximately 500 kbps. Terminating resistors for the HS-CAN bus are located in the HV control ECU and combination meter.
The MS-CAN bus is a medium-speed communication bus that is used for body electrical communication. The MS-CAN bus is referred to as the "CAN MS bus" and it operates at speeds of approximately 250 kbps. Terminating resistors for the MS-CAN bus are located in the main body ECU and the certification ECU. The resistance of the MS-CAN bus cannot be measured from the DLC3 connector.
Communication between these networks is handled via the main body ECU, which acts as a gateway.

(b) By pairing the CANH and CANL bus wires, the CAN performs communication based on differential voltage.

(c) Many ECUs (sensors) installed on the vehicle operate by sharing information and communicating with each other.

(d) The CAN has two resistors of 120 Ω which are necessary to enable communication on the main bus wire.

2. DEFINITION OF TERMS

(a) Main bus wire

(1) The main bus wire is a wire harness between the two terminus circuits on the bus (communication line).

(b) Branch wire

(1) The branch wire is a wire harness which diverges from the main bus wire to an ECU or sensor.

(c) Terminating resistors

(1) Two resistors of 120 Ω are installed in parallel across the ends of the CAN main bus wires. They are called terminating resistors. These resistors allow the changes of the voltage differential between the CAN bus wires to be accurately judged. To allow proper function of CAN communication, it is necessary to have both terminating resistors installed. Since the two resistors are installed in parallel, a measurement of resistance between the two CAN bus wires should produce a reading of approximately 60 Ω.

3. ECUS OR SENSORS WHICH COMMUNICATE THROUGH CAN COMMUNICATION SYSTEM

(a) Skid control ECU
(b) Air conditioning amplifier
(c) Main body ECU
(d) Combination meter ECU
(e) Yaw rate sensor
(f) Steering angle sensor
(g) Center airbag sensor
(h) HV control ECU
(i) Certification ECU (with smart key system)
(j) Radio and navigation assembly
(k) Power steering ECU
(l) Accessory gateway

4. DIAGNOSTIC CODE FOR CAN COMMUNICATION SYSTEM

(a) DTCs for the CAN communication system are as follows: U0001, U0073, U0100, U0100-211, U0100-212, U0100-530, U0100-774, U0100-784, U0123, U0124, U0126, U0129, U0129-220, U0129-222, U0129-528, U0129-529, U0140-146, U0151-763, U0164-594, U0164-827, U0293, U0424-537, B1207 and B2326.

5. TROUBLESHOOTING REMARKS

(a) DTCs for the CAN communication system can be checked using the intelligent tester via the CAN VIM. The DLC3 is connected to the CAN communication system, but no DTCs exist regarding problems in the DLC3 or the DLC3 branch wires. If there is trouble in the DLC3 or the DLC3 branch wires, ECUs on the CAN network cannot output codes to the intelligent tester via the CAN VIM.
(b) Trouble in the CAN buses (communication lines) can be checked by measuring the resistance between terminals of the DLC3. However, an open circuit in a branch wire other than the DLC3 branch wires cannot be checked from the DLC3.
NOTICE:
Do not insert the tester probes directly into the DLC3. Be sure to use a service wires.

6. HOW TO DISTINGUISH THE CAN J/C CONNECTOR

(a) In the CAN communication system, the shape of all connectors connected to the CAN J/C is the same. The connectors connected to the CAN J/C can be distinguished by the colors of the bus wire and the connecting side of the junction connector.
HINT:
See "TERMINALS OF ECU" (See page CA-10) for bus wire color or the type of connecting surface.

CA

HOW TO PROCEED WITH TROUBLESHOOTING

NOTICE:

- **DTCs for the CAN communication system are as follows: U0001, U0073, U0100, U0100-211, U0100-212, U0100-530, U0100-774, U0100-784, U0123, U0124, U0129, U0129-220, U0129-222, U0129-528, U0129-529, U0140-146, U0151-763, U0164-594, U0164-827, U0293, U0424-537, B1207 and B2326.**
- **Refer to troubleshooting of each system if DTCs regarding the CAN communication system are not output.**

1	CHECK AND CLEAR DTCS

NEXT

2	CHECK FOR INSTALLED SYSTEMS (ECUS & SENSORS) THAT ADOPT CAN COMMUNICATION)

(a) Check which of the following is adopted: Navigation system and accessory gateway (See page CA-22).

NEXT

3	CHECK CAN BUS WIRE

(a) Check the CAN bus wires (See page CA-64).

NEXT

4	CHECK INTELLIGENT TESTER

(a) Select "BUS CHECK" (See page CA-22).

Result

Symptom	Proceed to
All the ECUs and sensors connected to the CAN communication system are displayed on the screen.	A (Go to step 5)
An ECU or sensor not connected to the CAN communication system is displayed on the screen.	B (CA-9)
More than one of the ECUs and sensors not connected to the CAN communication system are displayed on the screen. (If the displayed ECUs and sensors are only those relating to the "Engine" and "ECT", proceed to B.)	C (CA-134)

NOTICE:

- **The systems (ECUs, sensors) that adopt CAN communication vary depending on the vehicle and option settings. Check which systems (ECUs, sensors) are installed on the vehicle (See page CA-22).**

CA

- **Non-installed ECUs or sensors are not displayed. Do not mistake ECUs that are not installed for being in communication stop mode.**
- **If 2 or more ECUs or sensors are not displayed on the intelligent tester, perform troubleshooting for communication stop mode for each undisplayed ECU or sensor. (Open in one side of the CAN branch wires.)**

B	**GO TO "COMMUNICATION STOP MODE TABLE"**
C	**GO TO "OPEN IN ONE SIDE OF CAN BRANCH LINE"**

A

5	**DTC COMBINATION TABLE**

(a) Confirm trouble according to the combination of output DTCs regarding the CAN communication system (See page CA-22).
HINT:
Previous CAN communication system DTCs may be the cause if CAN communication system DTCs are output and all ECUs and sensors connected to the CAN communication system are displayed on the intelligent tester "BUS CHECK" screen.

NEXT

6	**CIRCUIT INSPECTION**

NEXT

7	**IDENTIFICATION OF PROBLEM**

NEXT

8	**REPAIR OR REPLACE**

NEXT

9	**CONFIRMATION TEST**

NEXT

END

PROBLEM SYMPTOMS TABLE

RESULT LIST OF HOW TO PROCEED WITH TROUBLESHOOTING:

Symptom	Suspected Area	See page
The result of "HOW TO PROCEED WITH TROUBLESHOOTING" is "Open in CAN Main Bus Line"	Open in CAN Main Bus Line	CA-68
The result of "HOW TO PROCEED WITH TROUBLESHOOTING" is "Short in CAN Bus Lines"	Short in CAN Bus Lines	CA-74
The result of "HOW TO PROCEED WITH TROUBLESHOOTING" is "Short to +B in CAN Bus Line"	Short to B+ in CAN Bus Line	CA-94
The result of "HOW TO PROCEED WITH TROUBLESHOOTING" is "Short to GND in CAN Bus Line"	Short to GND in CAN Bus Line	CA-114
The result of "HOW TO PROCEED WITH TROUBLESHOOTING" is "Open in One Side of CAN Branch Line"	Open in One Side of CAN Branch Line	CA-134

COMMUNICATION STOP MODE TABLE:

Symptom	Suspected Area	See page
"ABS/VSC/TRAC" is not displayed on the intelligent tester	Skid Control ECU Communication Stop Mode	CA-42
"A/C" is not displayed on the intelligent tester	Air Conditioning Amplifier Communication Stop Mode	CA-45
"MAIN BODY" is not displayed on the intelligent tester	Main Body ECU Communication Stop Mode	CA-54
"STEERING SENSOR" is not displayed on the intelligent tester	Steering Angle Sensor Communication Stop Mode	CA-50
"YAW/DECELERAT" is not displayed on the intelligent tester	Yaw Rate Sensor Communication Stop Mode	CA-52
"HYBRID CONTROL" is not displayed on the intelligent tester	Hybrid Vehicle Control ECU Communication Stop Mode	CA-40
"METER" is not displayed on the intelligent tester	Combination Meter ECU Communication Stop Mode	CA-58
"SRS AIRBAG" is not displayed on the intelligent tester	Center Airbag Sensor Communication Stop Mode	CA-60
"EPS" is not displayed on the intelligent tester	Power Steering ECU Communication Stop Mode	CA-48
"AVN" is not displayed on the intelligent tester	Radio and Navigation Assembly Communication Stop Mode	CA-62
"SMART ACCESS/KEY" is not displayed on the intelligent tester	Certification ECU Communication Malfunction	CA-30

TERMINALS OF ECU

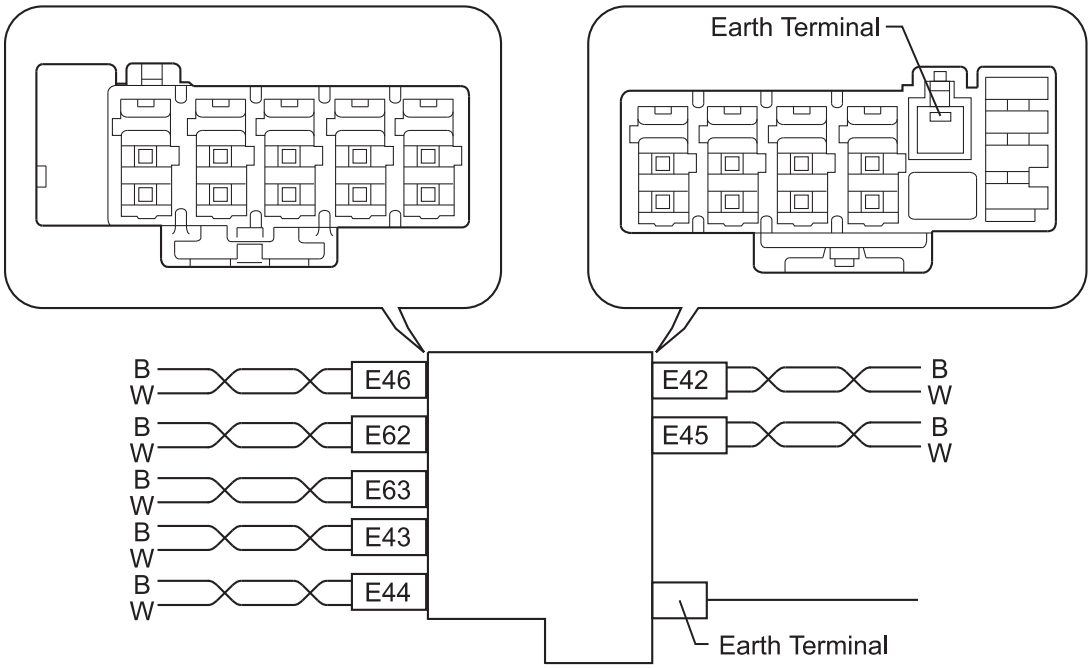
NOTICE:

- **Turn the power switch off before measuring the resistances of CAN bus main wires and CAN bus branch wires.**
- **After the power switch is turned off, check that the key reminder warning system and lighting system are not operating.**
- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches, or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.**

1. JUNCTION CONNECTOR (NO. 1 CAN J/C, NO. 2 CAN J/C)

(a) No. 1 CAN J/C

No. 1 CAN J/C "B" Side (without Earth Terminal): **No. 1 CAN J/C "A" Side (with Earth Terminal):**



C

C137761E02

No. 1 CAN J/C Connector ("A" side, with earth terminal)	Connector Color	Wire Color (CAN-H)	Wire Color (CAN-L)
CAN Main Bus Wire (E42)	White	B	W
Center Airbag Sensor Assembly (E45)	Black	B	W

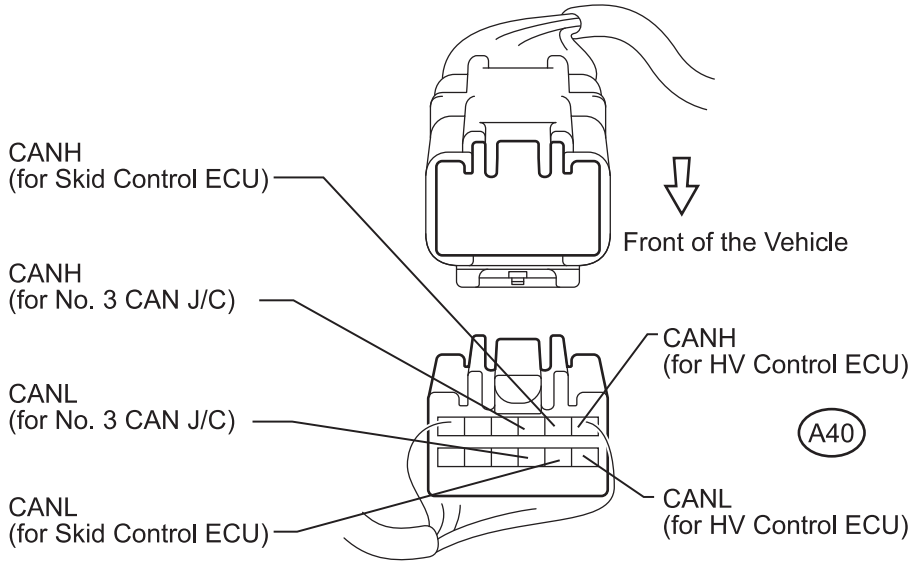
No. 1 CAN J/C Connector ("B" side, without earth terminal)	Connector Color	Wire Color (CAN-H)	Wire Color (CAN-L)
Yaw Rate Sensor (E46)	Blue	B	W
DLC3 (E62)	Gray	B	W
Steering Angle Sensor (E63)	Brown	B	W

CA

No. 1 CAN J/C Connector ("B" side, without earth terminal)	Connector Color	Wire Color (CAN-H)	Wire Color (CAN-L)
Combination Meter (E43)	White	B	W
Main Body ECU (E44)	Black	B	W

(b) No. 2 CAN J/C (FRONT OF THE VEHICLE)

No. 2 CAN J/C (Front of the Vehicle) Wire Harness View:



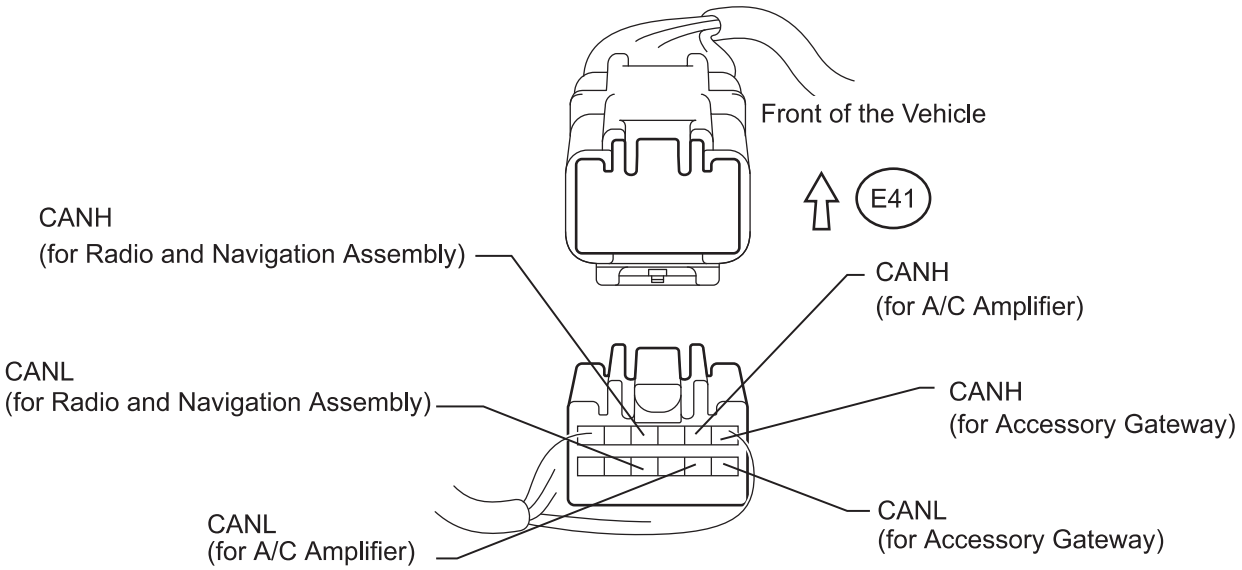
H

C137762E10

Terminal	Wiring Color	Destination
A40-1 (CANH)	B	HV control ECU (CANH)
A40-7 (CANL)	W	HV control ECU (CANL)
A40-2 (CANH)	B	Skid Control ECU (CANH)
A40-8 (CANL)	W	Skid Control ECU (CANL)
A40-3 (CANH)	B	No. 3 CAN J/C
A40-9 (CANL)	W	No. 3 CAN J/C

(c) No. 2 CAN J/C (REAR OF THE VEHICLE)

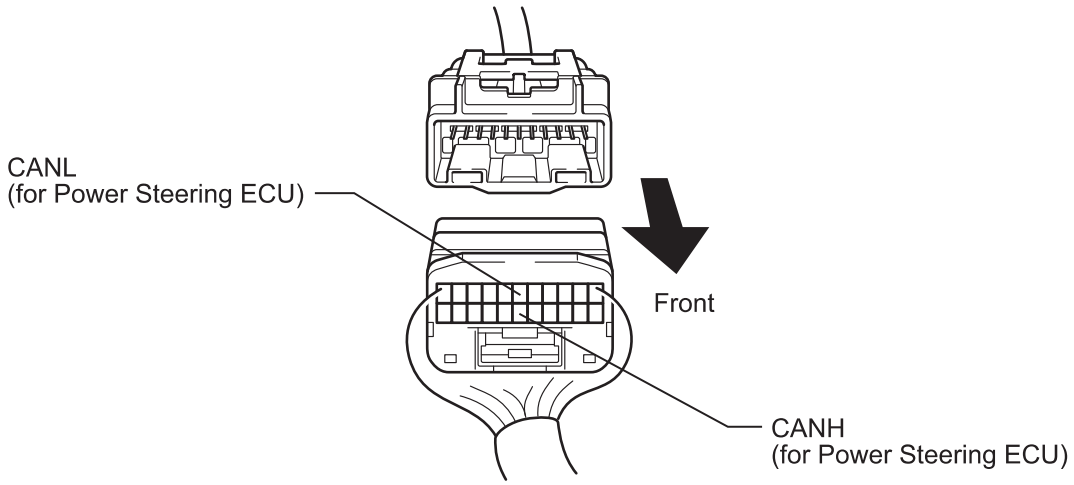
No. 2 CAN J/C (Rear of the Vehicle) Wire Harness View:



Terminal	Wiring Color	Destination
E41-1 (CANH)	B	Accessory Gateway (CANH)
E41-7 (CANL)	W	Accessory Gateway (CANL)
E41-2 (CANH)	B	A/C Amplifier (CANH)
E41-8 (CANL)	W	A/C Amplifier (CANL)
E41-4 (CANH)	B	Radio and Navigation Assembly (CANH)
E41-10 (CANL)	W	Radio and Navigation Assembly (CANL)

(d) No. 3 CAN J/C (FRONT OF THE VEHICLE)

No. 3 CAN J/C (Front of the Vehicle) Wire Harness View:

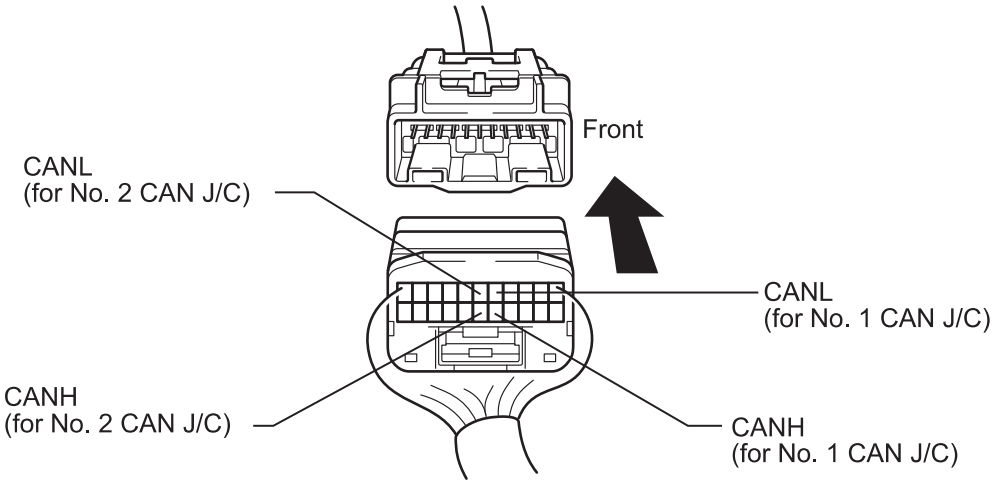


CA

Terminal	Wiring Color	Destination
A41-6 (CANH)	W	Power Steering ECU (CANH)
A41-17 (CANL)	B	Power Steering ECU (CANL)

(e) No. 3 CAN J/C (REAR OF THE VEHICLE)

No. 3 CAN J/C (Rear of the Vehicle) Wire Harness View:

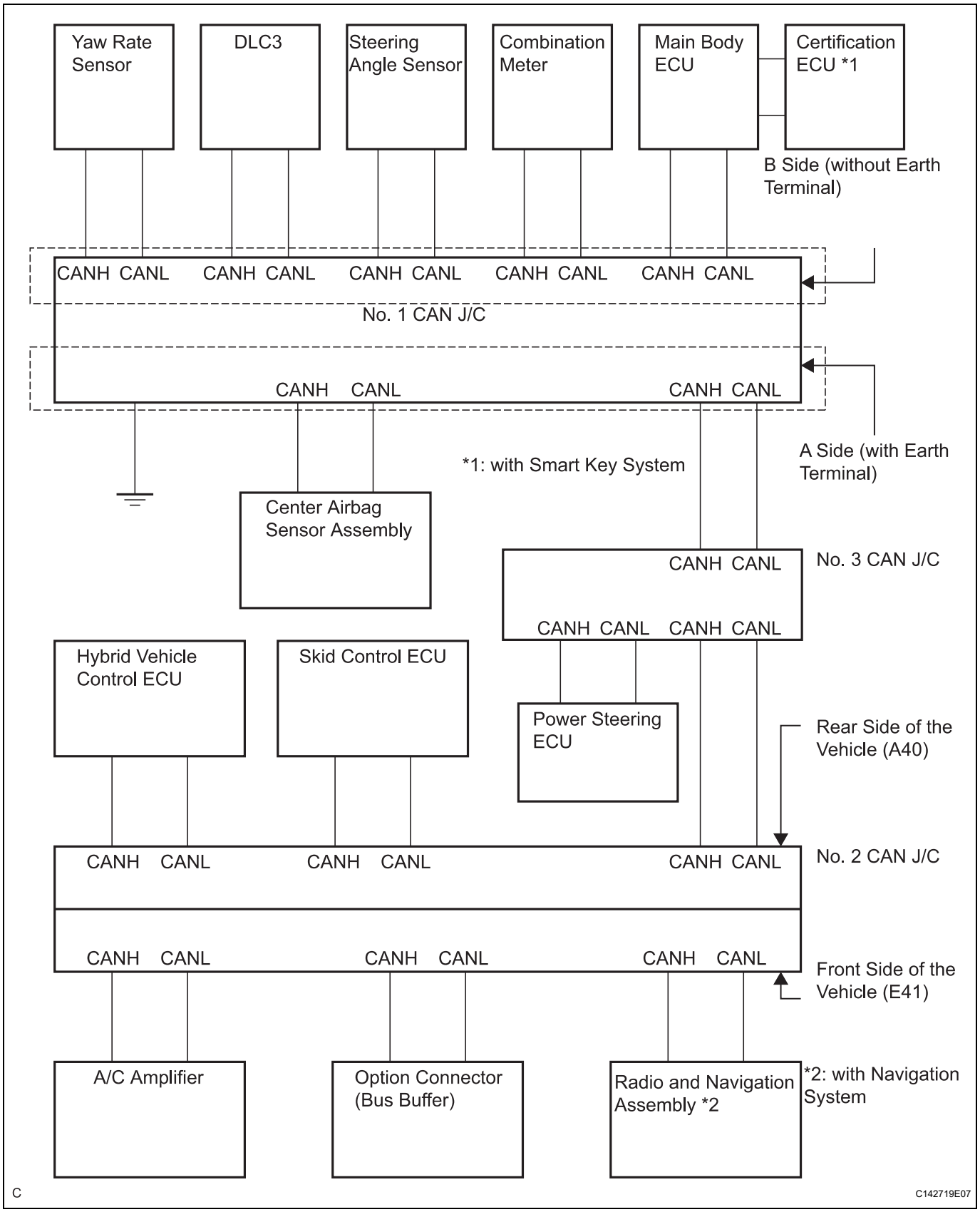


N

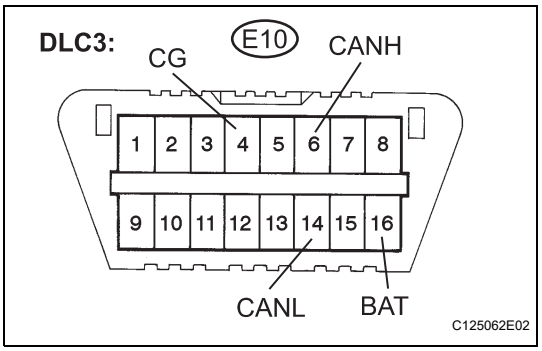
C142727E01

Terminal	Wiring Color	Destination
A42-6 (CANH)	W	No. 2 CAN J/C (CANH)
A42-17 (CANL)	B	No. 2 CAN J/C (CANL)
A42-7 (CANH)	W	No. 1 CAN J/C (CANH)
A42-18 (CANL)	B	No. 1 CAN J/C (CANL)

(f) The connection diagram of the components which are connected to the CAN J/C



CA

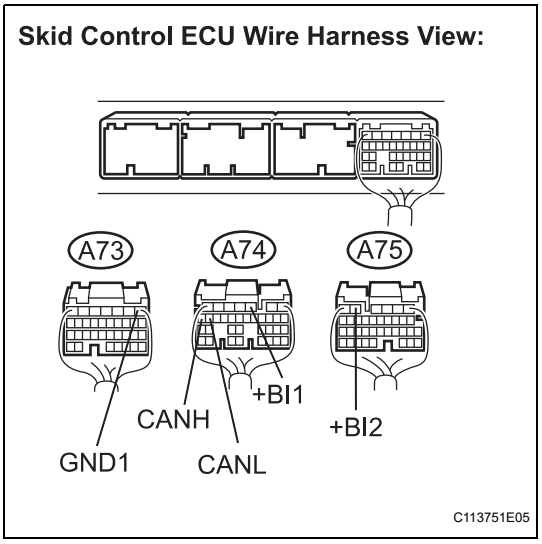


2. DLC3

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
E10-6 (CANH) - E10-14 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Power switch off	54 to 69 Ω
E10-6 (CANH) - E10-4 (CG)	B - W-B	HIGH-level CAN bus wire - Ground	Power switch off	200 Ω or higher
E10-14 (CANL) - E10-4 (CG)	W - W-B	LOW-level CAN bus wire - Ground	Power switch off	200 Ω or higher
E10-6 (CANH) - E10-16 (BAT)	B - L	HIGH-level CAN bus wire - Battery positive	Power switch off	6 kΩ or higher
E10-14 (CANL) - E10-16 (BAT)	W - L	LOW-level CAN bus wire - Battery positive	Power switch off	6 kΩ or higher



3. SKID CONTROL ECU

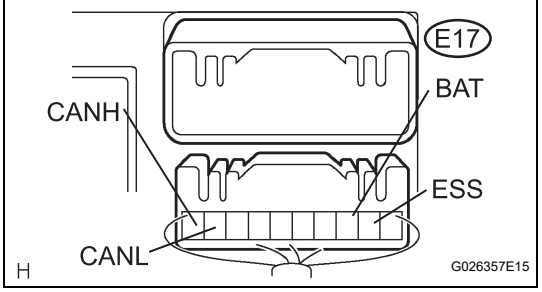
(a) Disconnect the connectors from the skid control ECU.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Wiring Color	Condition	Specified Condition
A74-19 (CANH) - A74-18 (CANL)	B - W	Disconnect the negative battery cable	54 to 69 Ω
A74-19 (CANH) - A73-1 (GND1)	B - W-B	Disconnect the negative battery cable	200 Ω or higher
A74-18 (CANL) - A73-1 (GND1)	W - W-B	Disconnect the negative battery cable	200 Ω or higher
A74-19 (CANH) - A74-3 (+BI1)	B - L	Disconnect the negative battery cable	6 kΩ or higher
A74-18 (CANL) - A74-3 (+BI1)	W - L	Disconnect the negative battery cable	6 kΩ or higher
A74-19 (CANH) - A75-5 (+BI2)	B - L-B	Disconnect the negative battery cable	6 kΩ or higher
A74-18 (CANL) - A75-5 (+BI2)	W - L-B	Disconnect the negative battery cable	6 kΩ or higher

Steering Angle Sensor Wire Harness View:



4. STEERING ANGLE SENSOR

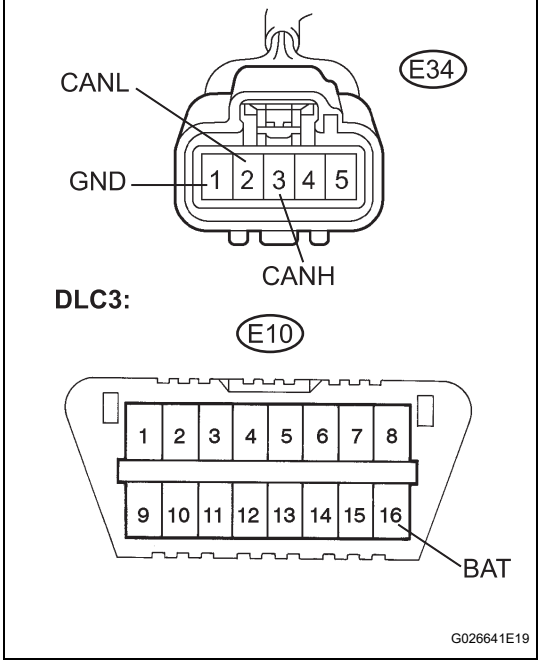
(a) Disconnect the E17 connector from the steering angle sensor.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
E17-10 (CANH) - E17-9 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Power switch off	54 to 69 Ω
E17-10 (CANH) - E17-2 (ESS)	B - W-B	HIGH-level CAN bus wire - Ground	Power switch off	200 Ω or higher
E17-9 (CANL) - E17-2 (ESS)	W - W-B	LOW-level CAN bus wire - Ground	Power switch off	200 Ω or higher
E17-10 (CANH) - E17-3 (BAT)	B - W	HIGH-level CAN bus wire - Battery positive	Power switch off	6 kΩ or higher
E17-9 (CANL) - E17-3 (BAT)	W - W	LOW-level CAN bus wire - Battery positive	Power switch off	6 kΩ or higher

Yaw Rate Sensor Connector Front View:



5. YAW RATE SENSOR

(a) Measure the resistance according to the value(s) in the table below.

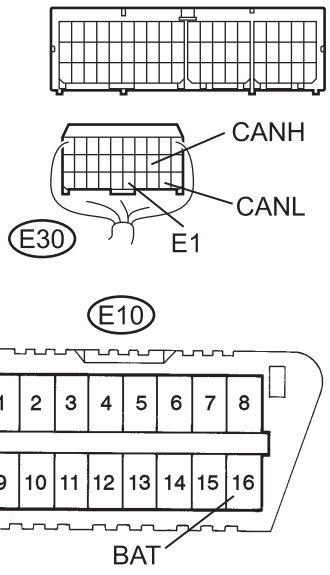
Standard resistance

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
E34-3 (CANH) - E34-2 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Power switch off	54 to 69 Ω
E34-3 (CANH) - E34-1 (GND)	B - W-B	HIGH-level CAN bus wire - Ground	Power switch off	200 Ω or higher
E34-2 (CANL) - E34-1 (GND)	W - W-B	LOW-level CAN bus wire - Ground	Power switch off	200 Ω or higher
E34-3 (CANH) - E10-16 (BAT)	B - O	HIGH-level CAN bus wire - Battery positive	Power switch off	6 kΩ or higher

CA

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
E34-2 (CANL) - E10-16 (BAT)	W - O	LOW-level CAN bus wire - Battery positive	Power switch off	6 kΩ or higher

Center Airbag Sensor Wire Harness View :



6. CENTER AIRBAG SENSOR ASSEMBLY

(a) Disconnect the E30 connector from the center airbag sensor assembly.

(b) Measure the resistance according to the value(s) in the table below.

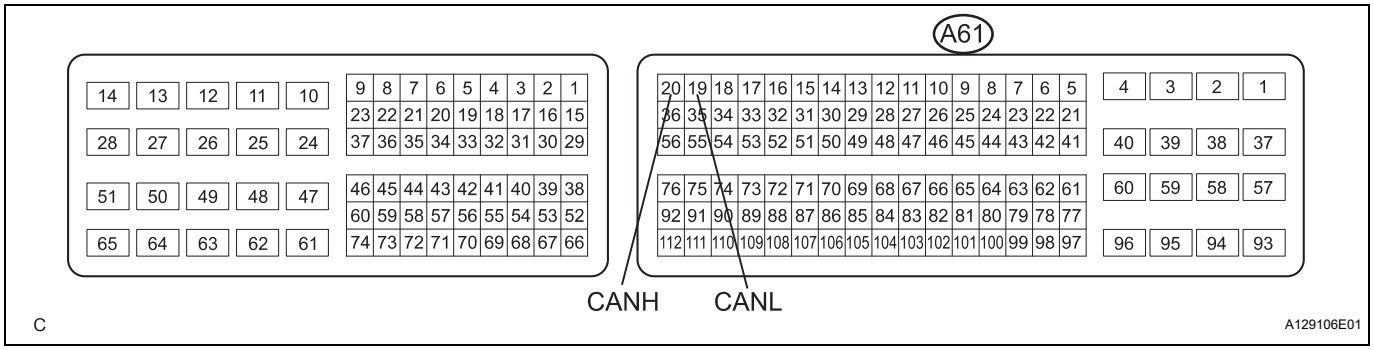
Standard resistance

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
E30-13 (CANH) - E30-22 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Power Switch off	54 to 69 Ω
E30-13 (CANH) - E30-25 (E1)	B - W-B	HIGH-level CAN bus wire - Ground	Power Switch off	200 Ω or higher
E30-22 (CANL) - E30-25 (E1)	W - W-B	LOW-level CAN bus wire - Ground	Power Switch off	200 Ω or higher
E30-13 (CANH) - E10-16 (BAT)	B - L	HIGH-level CAN bus wire - Battery positive	Power Switch off	6 kΩ or higher
E30-22 (CANL) - E10-16 (BAT)	W - L	LOW-level CAN bus wire - Battery positive	Power Switch off	6 kΩ or higher

7. HV CONTROL ECU

(a) Disconnect the A61 connector from the HV control ECU.

CA

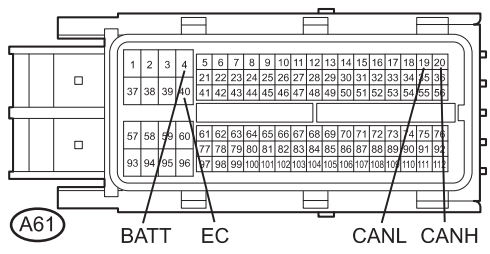


(1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Condition	Specified Condition
A61-20 (CANH) - A61-19 (CANL)	Power switch off	108 to 132 Ω

HV Control ECU (Wire Harness Side View):

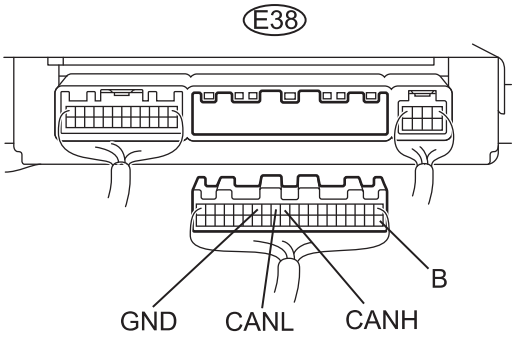


(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
A61-20 (CANH) - A61-19 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Power switch off	108 to 132 Ω
A61-20 (CANH) - A61-40 (EC)	B - W	HIGH-level CAN bus wire - Ground	Power switch off	200 Ω or higher
A61-19 (CANL) - A61-40 (EC)	B - W	LOW-level CAN bus wire - Ground	Power switch off	200 Ω or higher
A61-20 (CANH) - A61-4 (BATT)	B - W	HIGH-level CAN bus wire - Battery positive	Power switch off	6 kΩ or higher
A61-19 (CANL) - A61-4 (BATT)	B - W	LOW-level CAN bus wire - Battery positive	Power switch off	6 kΩ or higher

Air Conditioning Amplifier (Wire Harness Side):



8. AIR CONDITIONING AMPLIFIER

(a) Check harness side connector E38 of the air conditioning amplifier.

(1) Disconnect connector E38 from the air conditioning amplifier.

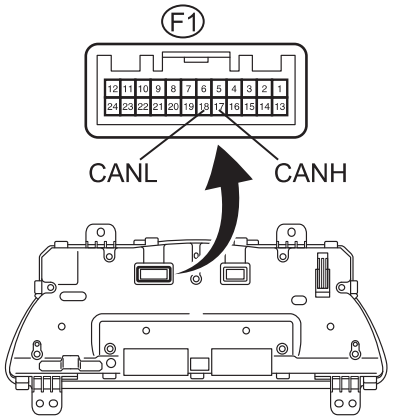
(2) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
E38-11 (CANH) - E38-12 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Power switch off	54 to 69 Ω
E38-11 (CANH) - E38-14 (GND)	B - W-B	HIGH-level CAN bus wire - Ground	Power switch off	200 Ω or higher
E38-12 (CANL) - E38-14 (GND)	W - W-B	LOW-level CAN bus wire - Ground	Power switch off	200 Ω or higher
E38-11 (CANH) - E38-21 (B)	B - GR	HIGH-level CAN bus wire - Battery positive	Power switch off	6 kΩ or higher

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
E38-12 (CANL) - E38-21 (B)	W - GR	LOW-level CAN bus wire - Battery positive	Power switch off	6 kΩ or higher

Combination Meter (Component Side):



9. COMBINATION METER ECU

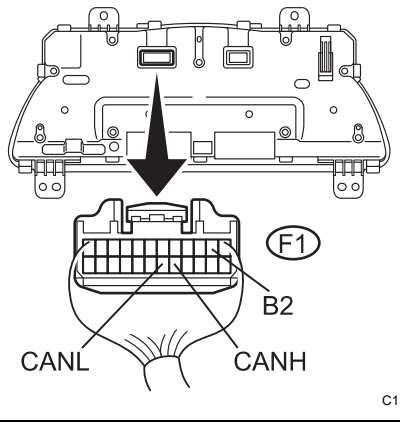
(a) Disconnect the F1 connector from the combination meter.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Condition	Specified Condition
F1-17 (CANH) - F1-18 (CANL)	Power switch off	108 to 132 Ω

Combination Meter (Wire Harness Side):



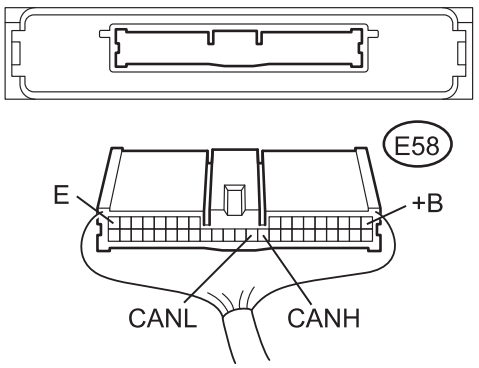
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
F1-17 (CANH) - F1-18 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Power switch off	108 to 132 Ω
F1-17 (CANH) - F1-12 (E2)	B - W-B	HIGH-level CAN bus wire - Ground	Power switch off	200 Ω or higher
F1-18 (CANL) - F1-12 (E2)	B - W-B	LOW-level CAN bus wire - Ground	Power switch off	200 Ω or higher
F1-17 (CANH) - F1-2 (B2)	B - R	HIGH-level CAN bus wire - Battery positive	Power switch off	6 kΩ or higher
F1-18 (CANL) - F1-2 (B2)	B - R	LOW-level CAN bus wire - Battery positive	Power switch off	6 kΩ or higher

CA

Certification ECU (Wire Harness Side):



10. CERTIFICATION ECU

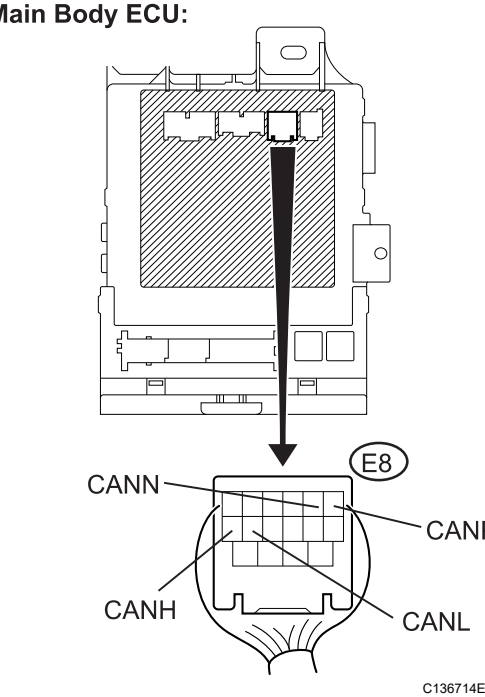
(a) Disconnect the E58 connector from the certification ECU.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
E58-27 (CANH) - E58-28 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Power switch off	108 to 132 Ω
E58-27 (CANH) - E58-17 (E)	B - W-B	HIGH-level CAN bus wire - Ground	Power switch off	200 Ω or higher
E58-28 (CANL) - E58-17 (E)	B - W-B	LOW-level CAN bus wire - Ground	Power switch off	200 Ω or higher
E58-27 (CANH) - E58-1 (+B)	B - W	HIGH-level CAN bus wire - Battery positive	Power switch off	6 kΩ or higher
E58-28 (CANL) - E58-1 (+B)	W - W	LOW-level CAN bus wire - Battery positive	Power switch off	6 kΩ or higher

Main Body ECU:



11. MAIN BODY ECU (INSTRUMENT PANEL J/B)

(a) Disconnect the E8 connector from the main body ECU.

(b) Measure the resistance according to the value(s) in the table below.

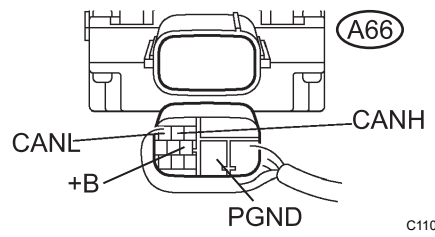
Standard resistance

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
E8-5 (CANH) - E8-6 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Power switch off	54 to 69 Ω

CA

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
E8-16 (CANP) - E8-15 (CANN)	W - L	HIGH-level CAN bus wire - LOW-level CAN bus wire	Power switch off	108 to 132 Ω

Power Steering ECU Wire Harness View:



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12. POWER STEERING ECU

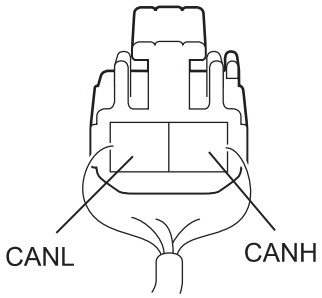
(a) Disconnect the A66 connector from the power steering ECU.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Wiring Color	Condition	Specified Condition
A66-2 (CANH) - A66-3 (CANL)	B - W	Power switch off	54 to 69 Ω
A66-2 (CANH) - A66-9 (PGND)	B - B	Power switch off	200 Ω or higher
A66-3 (CANL) - A66-9 (PGND)	W - B	Power switch off	200 Ω or higher
A66-2 (CANH) - A66-6 (+B)	B- B-W	Power switch off	6 kΩ or higher
A66-3 (CANL) - A66-6 (+B)	W - B-W	Power switch off	6 kΩ or higher

Accessory Gateway:



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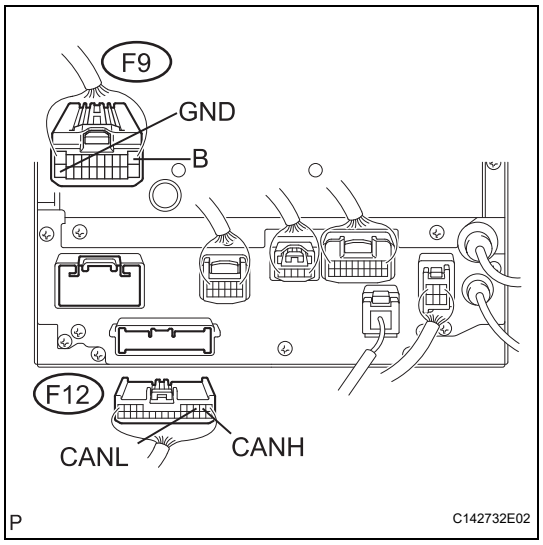
13. ACCESSORY GATEWAY

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Terminal Description	Condition	Specified Condition
E61-1 (CANH) - E61-2 (CANL)	HIGH-level CAN bus wire - LOW-level CAN bus wire	Power switch off	54 to 69 Ω

CA

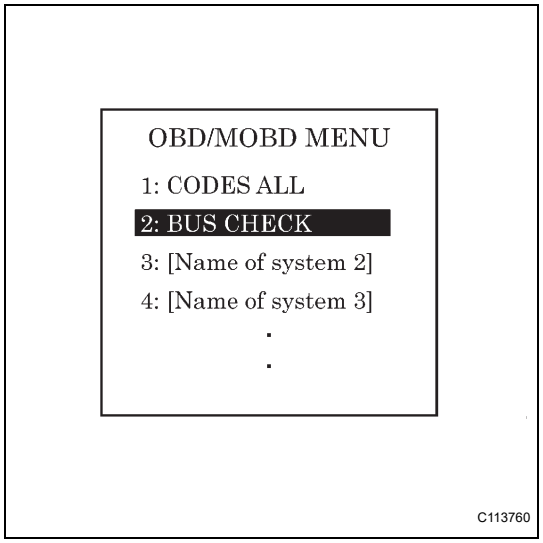


14. RADIO AND NAVIGATION ASSEMBLY (W/ NAVIGATION SYSTEM)

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Wiring Color	Condition	Specified Condition
F12-2 (CANH) - F12-3 (CANL)	B - W	Power switch off	54 to 69 Ω
F12-2 (CANH) - F9-20 (GND)	B - B	Power switch off	200 Ω or higher
F12-3 (CANL) - F9-20 (GND)	W - B	Power switch off	200 Ω or higher
F12-2 (CANH) - F9-1 (B)	B- B-W	Power switch off	6 kΩ or higher
F12-3 (CANL) - F9-1 (B)	W - B-W	Power switch off	6 kΩ or higher



DIAGNOSIS SYSTEM

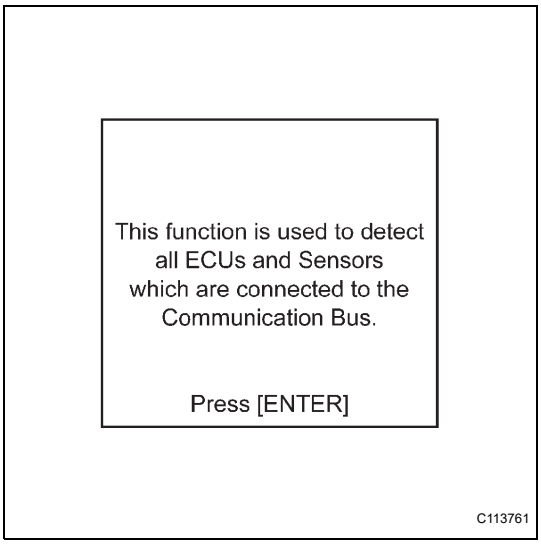
1. BUS CHECK

(a) Select "BUS CHECK" from the "OBD/MOBD MENU" screen.

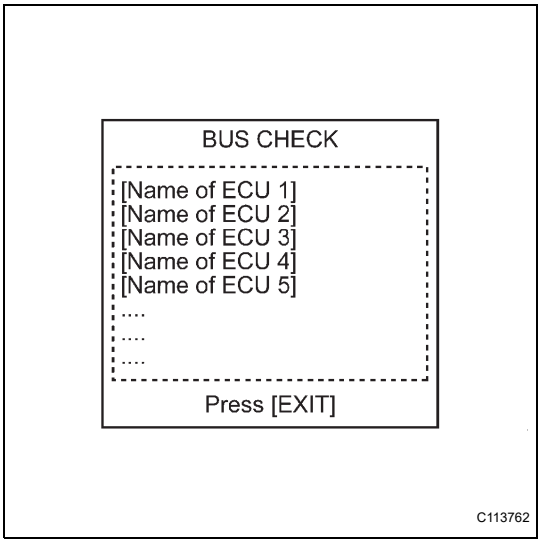
HINT:

The ECUs and sensors that are properly connected to the CAN communication system can be displayed using the intelligent tester via the CAN VIM.

CA



(b) Press "ENTER" on the intelligent tester.



(c) The screen displays the ECUs and sensors that are properly connected to the CAN communication system.
HINT:
Properly connected ECUs or sensors that are not displayed on the screen indicate that a communication stop is occurring in the system, sensor, or ECU which is not displayed.

2. CHECK FOR INSTALLED SYSTEMS (ECUS AND SENSORS) THAT USE CAN COMMUNICATION

(a) Systems (ECUs, sensors) that use CAN communication vary depending on the vehicle's optional equipment. Check which systems (ECUs, sensors) are installed on the vehicle.

ECU/Sensor name	Check method
ABS/VSC/TRC	Installed on all vehicles
STEERING SENSOR	Installed on all vehicles
YAW / DECELERAT	Installed on all vehicles
HYBRID CONTROL	Installed on all vehicles
AVN	With navigation system
SRS AIRBAG	Installed on all vehicles
A/C	Installed on all vehicles
METER	Installed on all vehicles
MAIN BODY	Installed on all vehicles
ACCESSORY G/W	With dealer option
SMART ACCESS/KEY	Installed on all vehicles
EPS	Installed on all vehicles

3. DTC TABLE BY ECU

HINT:

- For the CAN communication system, CAN communication system DTCs stored in certain ECUs can be displayed using the intelligent tester.

CA

- If CAN communication system DTCs are output, trouble cannot be determined only by the DTCs. Perform troubleshooting according to "HOW TO PROCEED WITH TROUBLESHOOTING" (See page CA-7).

(a) HV CONTROL ECU (Engine)

DTC No.	Detection Item
U0001*	Control Module Communication Bus Off
U0293	Communication Error from HV ECU

HINT:
- DTC communication uses the CAN communication system.
- *: The HV control ECU is malfunctioning if only U0001 is output. Replace the HV control ECU.

(b) HV CONTROL ECU (Hybrid control)

DTC No.	Detection Item
U0100-211	Lost Communication with ECM/PCM "A"
U0100-212	Lost Communication with ECM/PCM "A"
U0100-530	Lost Communication with ECM/PCM "A"
U0100-774	Lost Communication with ECM/PCM "A"
U0100-784	Lost Communication with ECM/PCM "A"
U0129-220	Lost Communication with Brake System Control Module
U0129-222	Lost Communication with Brake System Control Module
U0129-528	Lost Communication with Brake System Control Module
U0129-529	Lost Communication with Brake System Control Module
U0140-146	Lost Communication with Body Control Module
U0164-594	Lost Communication with HVAC Control Module
U0164-827	Lost Communication with HVAC Control Module
U0151-763	Lost Communication with Restraints Control Module
U0424-537	Invalid Data Received From HVAC Control Module

- Check for INFORMATION (See page HV-65)
- U0110-159, U0110-160, U0110-656, and U0110-657 are not CAN communication system DTCs. Therefore, refer to the troubleshooting procedures for the hybrid control system.

(c) SKID CONTROL ECU

DTC No.	Detection Item
U0073	Control Module Communication Bus Off
U0293	Lost Communication with HV Control ECU
U0123	Lost Communication with Yaw Rate Sensor Module
U0124	Lost Communication with Lateral Acceleration Sensor Module
U0126	Lost Communication with Steering Angle Sensor Module
U0131	Lost Communication with Power Steering Control Module

HINT:
DTC communication uses the CAN communication system.

(d) COMBINATION METER ECU

DTC No.	Detection Item
U0100	Lost Communication with ECM/PCM "A"
U0129	Lost Communication with Brake System Control Module

HINT:
DTC communication uses the CAN communication system.

(e) MAIN BODY ECU

DTC No.	Detection Item
B1207*	Certification ECU Communication Malfunction
B2326*	CAN MS Bus Line Communication Malfunction

HINT:
- DTC communication uses the CAN communication system.
- *: The main body ECU is malfunctioning if B1207 and/or B2326 are output alone. Refer to the DTC chart (See page CA-29).

(f) POWER STEERING ECU

DTC No.	Detection Item
U0073	Control Module Communication off
U0100	Lost Communication with ECM/PCM "A"
U0129	Lost Communication with Brake System Control Module
U0293	CAN Error from HV ECU

HINT:
DTC communication uses the CAN communication system.

(g) RADIO AND NAVIGATION ASSEMBLY

HINT:
Although the radio and navigation assembly is connected to the CAN communication system, CAN communication DTCs are not output.

(h) CENTER AIRBAG SENSOR

HINT:
Although the center airbag sensor is connected to the CAN communication system, CAN communication DTCs are not output.

(i) CERTIFICATION ECU

HINT:
Although the certification ECU is connected to the CAN communication system, CAN communication DTCs are not output.

4. DTC COMBINATION TABLE

(a) DTC COMBINATION TABLE

DTC		Trouble Mode			
Output from	**Output DTC**	**HV Control ECU Communication Stop Mode**	**Skid Control ECU Communication Stop Mode**	**Steering Angle Sensor Communication Stop Mode**	**Yaw Rate Sensor Communication Stop Mode**
HV Control ECU (HV Control)	U0100-211 *1	X	X	X	X
	U0100-212 *1	X	X	X	X
	U0100-530 *1	X	X	X	X
	U0100-774 *1	X	X	X	X
	U0100-784 *1	X	X	X	X
	U0129-220	X	○	X	X
	U0129-222 *2	X	X	X	X
	U0129-528	X	○	X	X
	U0129-529 *3	X	X	X	X
	U0140-146	X	X	X	X
	U0164-594	X	X	X	X
	U0164-827	X	X	X	X
	U0151-763	X	X	X	X
	U0424-537	X	X	X	X
HV Control ECU (Engine Control)	U0001 *1	X	X	X	X
	U0293 *1	X	X	X	X
Skid Control ECU	U0073	X	X	X	X
	U0123	X	X	X	○
	U0124	X	X	X	○
	U0126	X	X	○	X
	U0293	○	X	X	X
Power Steering ECU	U0073	X	X	X	X
	U0100	○	X	X	X
	U0129	X	X	X	X
	U0293	○	X	X	X
Combination Meter	U0100	○	X	X	X
	U0129	X	○	X	X
Main Body ECU	B1207	X	X	X	X
	B2326	X	X	X	X

HINT:

- ○: Set
- X: Not set or may be set according to the malfunctioning part when one side of the CAN bus wire opens
- *1: If only these DTC are output, refer to troubleshooting for hybrid vehicle control system.
- *2: If DTC U0129-222 is output, refer to troubleshooting for DTC U0293 of the brake control system.
- *3: If DTC U0129-529 is output, check for brake control system.

CA

DTC		Trouble Mode			
Output from	Output DTC	A/C Amplifier Communication Stop Mode	Center Airbag Sensor Assembly Communication Stop Mode	Main Body ECU Communication Stop Mode	Certification ECU Communication Stop Mode
HV Control ECU (HV Control)	U0100-211 *1	X	X	X	X
	U0100-212 *1	X	X	X	X
	U0100-530 *1	X	X	X	X
	U0100-774 *1	X	X	X	X
	U0100-784 *1	X	X	X	X
	U0129-220	X	X	X	X
	U0129-222 *2	X	X	X	X
	U0129-528	X	X	X	X
	U0129-529 *3	X	X	X	X
	U0140-146	X	X	X	X
	U0164-594	○	X	X	X
	U0164-827	○	X	X	X
	U0151-763	X	X	X	X
	U0424-537	X	X	X	X
HV Control ECU (Engine Control)	U0001 *1	X	X	X	X
	U0293 *1	X	X	X	X
Skid Control ECU	U0073	X	X	X	X
	U0123	X	X	X	X
	U0124	X	X	X	X
	U0126	X	X	X	X
	U0293	X	X	X	X
Power Steering ECU	U0073	X	X	X	X
	U0100	X	X	X	X
	U0129	X	X	X	X
	U0293	X	X	X	X
Combination Meter	U0100	X	X	X	X
	U0129	X	X	X	X
Main Body ECU	B1207	X	X	X	○
	B2326	X	X	X	○

HINT:
- ○: Set
- X: Not set or may be set according to the malfunctioning part when one side of the CAN bus wire opens
- *1: If only these DTC are output, refer to troubleshooting for hybrid vehicle control system.
- *2: If DTC U0129-222 is output, refer to troubleshooting for DTC U0293 of the brake control system.
- *3: If DTC U0129-529 is output, check for brake control system.

(b) Perform troubleshooting depending on the combination of DTCs output.

HINT:
- HV Control ECU Communication Stop Mode (See page CA-40)

CA

- Skid Control ECU Communication Stop Mode (See page CA-42)
- Steering Angle Sensor Communication Stop Mode (See page CA-50)
- Yaw Rate Sensor Communication Stop Mode (See page CA-52)
- Certification ECU Communication Stop Mode (See page CA-30)
- Center Airbag Sensor Communication Stop Mode (See page CA-60)
- Air Conditioner Amplifier ECU Communication Stop Mode (See page CA-45)
- Main Body ECU Communication Stop Mode (See page CA-54)

FAIL-SAFE CHART

1. FAIL-SAFE FUNCTION

(a) When communication fails in any of the CAN bus wire (communication lines) due to a short circuit or other causes, the fail-safe function, which is specified for each system operates to prevent the system from malfunctioning.

(b) The following chart shows the relationships between components, system functions, and effects of communication failure on these functions. (For further details, see the pages for each system.)

Function (Function Description)	Control Master	System Related	Fail-safe Operation	DTC (Driver Detectable)
Toyota Hybrid System-II (THS-II) Control (to optimize the combination between the engine and motor drive power for driving)	HV Control ECU (HV control)	HV Control ECU (Engine control)	Safe running	U0100 (Master warning light and MIL come on)
Gradient Determination (Hill start assist operation)	HV Control ECU (HV control)	Skid Control ECU	Hill start assist function stops	U0129 (VSC warning light comes on)
Regenerative Braking (the motor acts as a generator that depends on wheel rotation and generates electricity to be stored in the HV battery)	Skid Control ECU	HV Control ECU (HV control)	Regenerative braking will stop	U0073, U0293 (VSC, ABS, and ECB warning lights come on)
VDIM Control (Controls driving force while VDIM is in operation)	Skid Control ECU	• HV Control ECU (HV control) • Power Steering ECU • Steering Angle Sensor • Yaw Rate Sensor	VDIM function will stop	U0073, U0293, U0123, U0124, U0126 (VSC, ABS, and ECB warning lights come on)
Vehicle Information Display	HV Control ECU (HV control)	• Combination Meter • Radio and Navigation Assembly	Vehicle information is not displayed	None (Vehicle information is not displayed)
Smart Entry / Power Door Lock Control	Certification ECU	• Main Body ECU • Combination Meter	Unlock permitted	B1207, B2326 (Wireless door lock cannot operate)
Security Function	Certification ECU	Main Body ECU	Security function is inoperative (Theft deterrent system cannot be set)	B1207, B2326 (Security indicator light does not come on)
Illumination Control	Main Body ECU	• HV Control ECU (HV control) • Combination Meter	Light illumination rheostat inoperative	None (Rheostat inoperative)
Air Conditioning Control	A/C Amplifier	• HV Control ECU (HV control) • HV Control ECU (Engine control) • Combination Meter • Main Body ECU	Air conditioning function will stop	B1499 (Air Conditioning inoperative)
Buzzer Control	Combination Meter	• HV Control ECU (HV control) • Skid Control ECU • Certification ECU • Main Body ECU	Buzzer function will stop	U0100, U0129 (Buzzer does not sound)
Meter Display (Displays vehicle status and controls indicator lights)	Combination Meter	• HV Control ECU (HV control) • Skid Control ECU • Certification ECU • Main Body ECU • Center Airbag Sensor Assembly • Power Steering ECU	Light does not come on, illuminates abnormally, or blinks abnormally	U0100, U0129 (Abnormal operation of the indicator lights)

DIAGNOSTIC TROUBLE CODE CHART

CAN COMMUNICATION SYSTEM:

DTC Code	Detection Item	Trouble Area	See page
B1207	Certification ECU Communication Malfunction	1. CAN MS bus wire or connector 2. Certification ECU power source circuit 3. Certification ECU 4. Main body ECU	CA-30
B2326	CAN MS Bus Line Communication Malfunction	1. CAN MS bus wire or connector 2. Certification ECU power source circuit 3. Certification ECU 4. Main body ECU	CA-30

DTC	B1207	Certification ECU Communication Malfunction

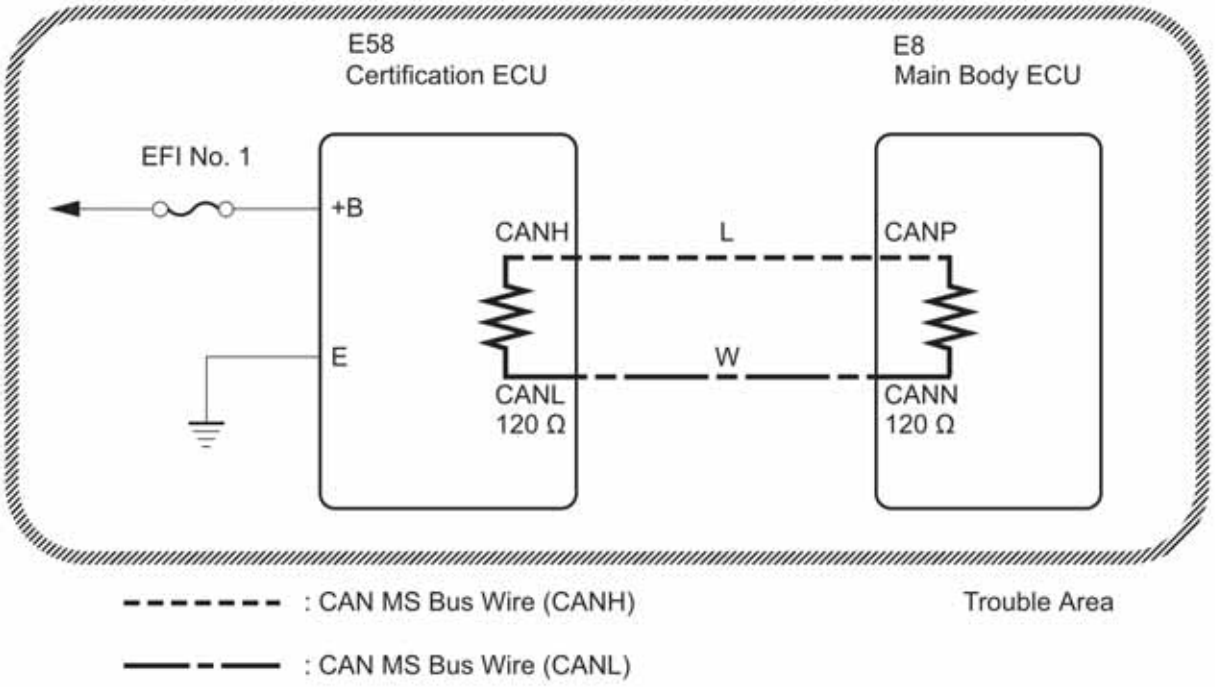
DTC	B2326	CAN MS Bus Line Communication Malfunction

DESCRIPTION

The main body ECU and certification ECU perform 2-way communication with each other via the Controller Area Network (CAN). If the certification ECU cannot communicate with the main body ECU, the main body ECU will conclude that there is a malfunction in the CAN system, and set a DTC.

DTC No.	DTC Detection Condition	Trouble Area
B1207 B2326	No communication from certification ECU	• CAN MS bus wire or connector • Certification ECU power source circuit • Certification ECU • Main body ECU

WIRING DIAGRAM



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CA

INSPECTION PROCEDURE

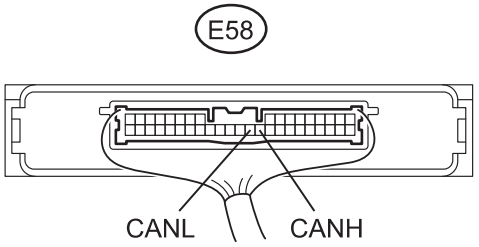
NOTICE:

- **Turn the power switch off before measuring the resistances of CAN bus main wires and CAN bus branch wires.**
- **After the power switch is turned off, check that the key reminder warning system and lighting system are not operating.**
- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches, or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.**

HINT:
Operating the power switch, any other switches, or a door triggers related ECU and sensor communication on the CAN. This communication will cause resistance value to change.

1 CHECK CAN MS BUS WIRE

Certification ECU Connector:



N C144965E01

(a) Turn the power switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition	Proceed to
E58-27 (CANH) - E58-28 (CANL)	Power switch off	54 to 69 Ω	A
E58-27 (CANH) - E58-28 (CANL)	Power switch off	69 Ω or more	B
E58-27 (CANH) - E58-28 (CANL)	Power switch off	54 Ω or less	C

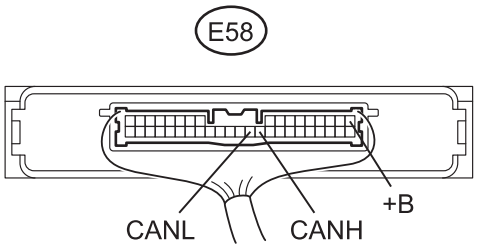
B → **Go to step 9**

C → **Go to step 11**

A

2 CHECK FOR SHORT TO +B IN CAN MS BUS WIRE

Certification ECU Connector:



N C144965E03

(a) Turn the power switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E58-27 (CANH) - E58-1 (+B)	Power switch off	6 kΩ or higher
E58-28 (CANL) - E58-1 (+B)	Power switch off	6 kΩ or higher

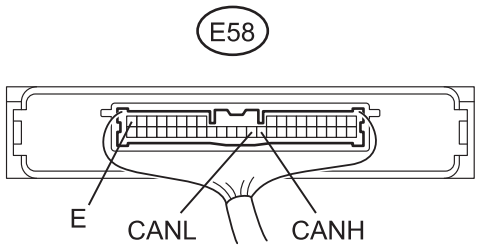
NG → **Go to step 5**

OK

CA

3	CHECK FOR SHORT TO GND IN CAN MS BUS WIRE

Certification ECU Connector:



N C144965E04

(a) Turn the power switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

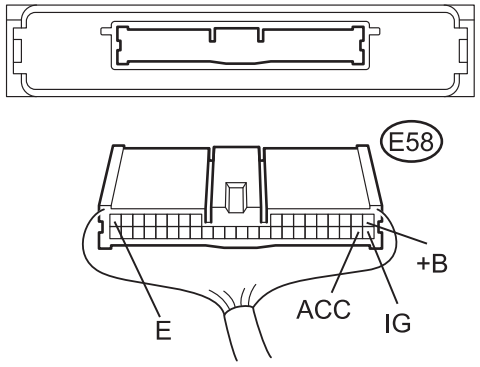
Tester Connection	Condition	Specified Condition
E58-27 (CANH) - E58-17 (E)	Power switch off	200 Ω or higher
E58-28 (CANL) - E58-17 (E)	Power switch off	200 Ω or higher

NG → **Go to step 7**

OK

4	CHECK CERTIFICATION ECU (POWER SOURCE CIRCUIT)

Certification ECU Connector:



N C144966E02

(a) Turn the power switch off.
(b) Disconnect the E58 certification ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E58-17 (E) - Body ground	Always	Below 1 Ω

(d) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E58-1 (B) - Body ground	Always	10 to 14 V
E58-18 (IG) - Body ground	Power switch on (IG)	10 to 14 V
E58-19 (ACC) - Body ground	Power switch on (ACC)	10 to 14 V

OK → **REPLACE CERTIFICATION ECU**

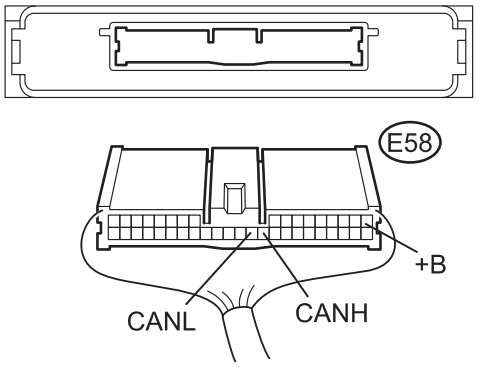
NG

REPLACE HARNESS OR CONNECTOR (FUSES - ECU, ECU - BODY GROUND)

CA

5	CHECK FOR SHORT TO +B IN CAN MS BUS WIRE (CERTIFICATION ECU)

Certification ECU Connector (Wire Harness Side):



N C144966E03

(a) Turn the power switch off.
(b) Disconnect the E58 certification ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

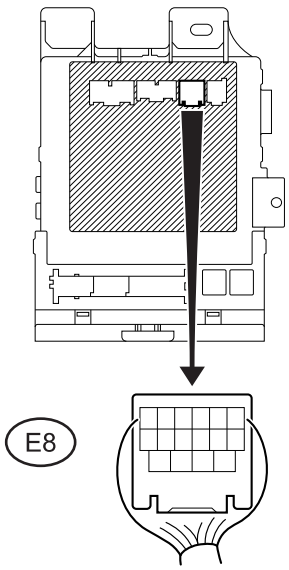
Tester Connection	Condition	Specified Condition
E58-27 (CANH) - E58-1 (+B)	Power switch off	6 kΩ or higher
E58-28 (CANL) - E58-1 (+B)	Power switch off	6 kΩ or higher

OK → **REPLACE CERTIFICATION ECU**

NG

6	CHECK FOR SHORT TO +B IN CAN MS BUS WIRE (CERTIFICATION ECU - MAIN BODY ECU)

Main Body ECU:

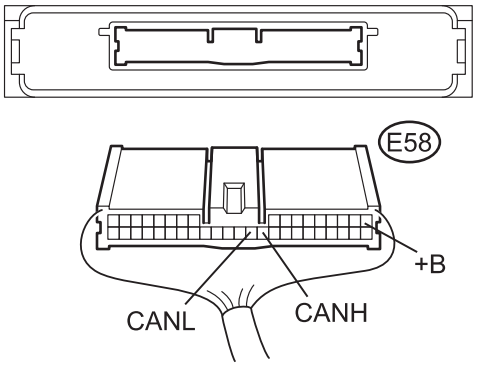


C C140857E01

(a) Turn the power switch off.
(b) Disconnect the E8 main body ECU connector.

CA

Certification ECU Connector (Wire Harness Side):



(c) Measure the resistance according to the value(s) in the table below.
HINT:
The resistance must be measured after the E58 certification ECU connector is disconnected.
Standard resistance

Tester Connection	Condition	Specified Condition
E58-27 (CANH) - E58-1 (+B)	Power switch off	6 kΩ or higher
E58-28 (CANL) - E58-1 (+B)	Power switch off	6 kΩ or higher

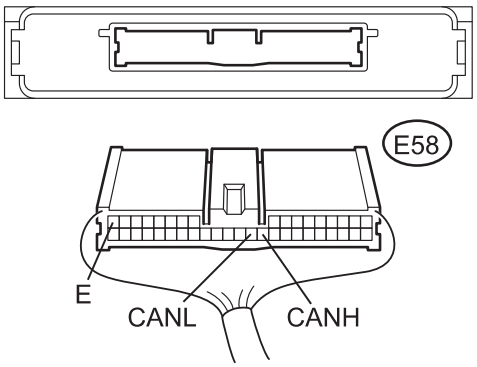
OK → **REPLACE MAIN BODY ECU**

NG

REPLACE CAN MS BUS MAIN WIRE OR CONNECTOR

7 CHECK FOR SHORT TO GND IN CAN MS BUS WIRE (CERTIFICATION ECU)

Certification ECU Connector (Wire Harness Side):



(a) Turn the power switch off.
(b) Disconnect the E58 certification ECU connector.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
E58-27 (CANH) - E58-17 (E)	Power switch off	6 kΩ or higher
E58-28 (CANL) - E58-17 (E)	Power switch off	6 kΩ or higher

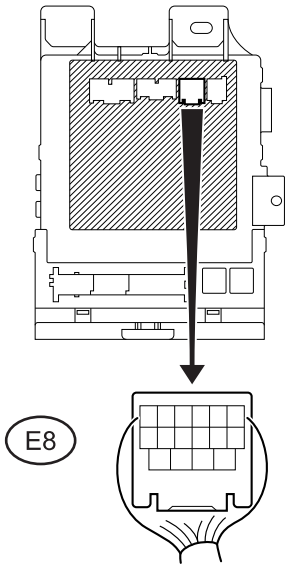
OK → **REPLACE CERTIFICATION ECU**

NG

CA

8	CHECK FOR SHORT TO GND IN CAN MS BUS WIRE

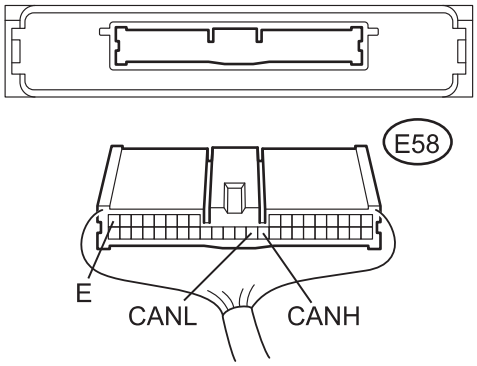
Main Body ECU:



C C140857E01

(a) Turn the power switch off.
(b) Disconnect the E8 main body ECU connector.

Certification ECU Connector (Wire Harness Side):



N C144966E04

(c) Measure the resistance according to the value(s) in the table below.
HINT:
The resistance must be measured after the E58 certification ECU connector is disconnected.
Standard resistance

Tester Connection	Condition	Specified Condition
E58-27 (CANH) - E58-17 (E)	Power switch off	6 kΩ or higher
E58-28 (CANL) - E58-17 (E)	Power switch off	6 kΩ or higher

OK → **REPLACE MAIN BODY ECU**

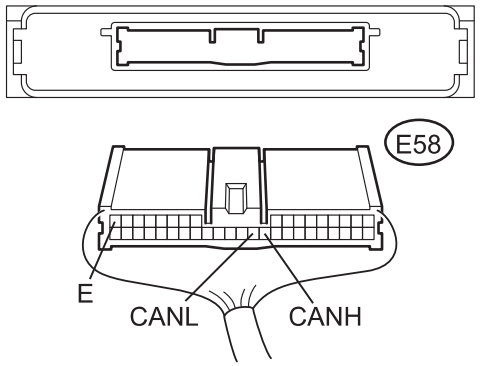
NG

REPLACE CAN MS BUS MAIN WIRE OR CONNECTOR

CA

9	CHECK CAN MS BUS MAIN WIRE OR CONNECTOR (CERTIFICATION ECU)

Certification ECU Connector (Wire Harness Side):



(a) Turn the power switch off.
(b) Disconnect the E58 certification ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

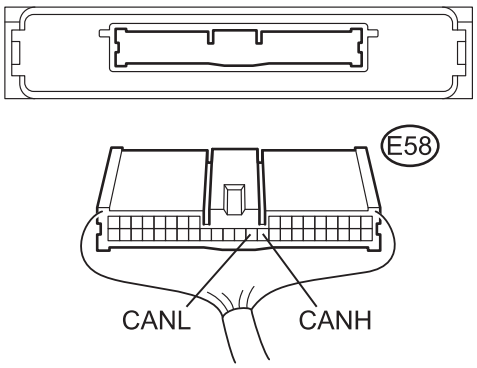
Tester Connection	Condition	Specified Condition
E58-27 (CANH) - E58-28 (CANL)	Power switch off	108 to 132 Ω or higher

OK → **REPLACE CERTIFICATION ECU**

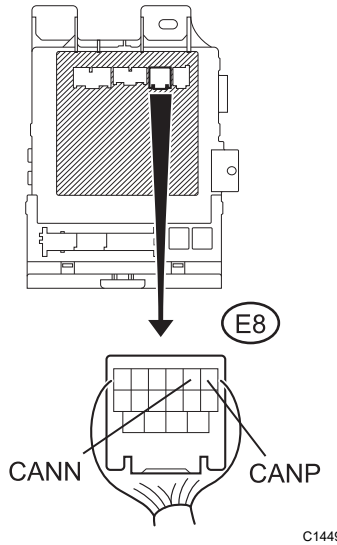
NG

10	**CHECK CAN MS BUS MAIN WIRE OR CONNECTOR (CERTIFICATION ECU - MAIN BODY ECU)**

Certification ECU Connector (Wire Harness Side):



Main Body ECU Connector (Wire Harness Side):



C

C144968E01

(a) Turn the power switch off.
(b) Disconnect the E8 main body ECU connector.
(c) Measure the resistance according to the value(s) in the table below.
HINT:
The resistance must be measured after the E58 certification ECU connector is disconnected.
Standard resistance

Tester Connection	Condition	Specified Condition
E58-27 (CANH) - E8-16 (CANP)	Always	Below 1 Ω
E58-28 (CANL) - E8-15 (CANN)	Always	Below 1 Ω

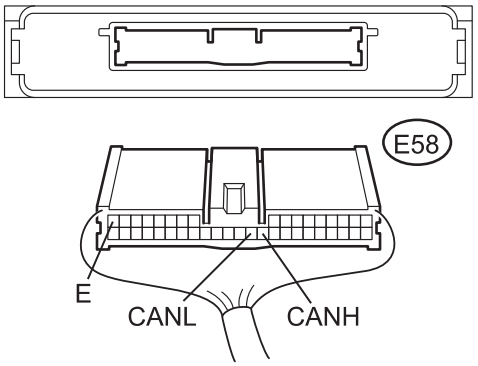
OK → **REPLACE MAIN BODY ECU**

NG

REPLACE CAN MS BUS MAIN WIRE OR CONNECTOR

11	CHECK FOR SHORT IN CAN MS BUS WIRES (CERTIFICATION ECU)

Certification ECU Connector (Wire Harness Side):



(a) Turn the power switch off.
(b) Disconnect the E58 certification ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

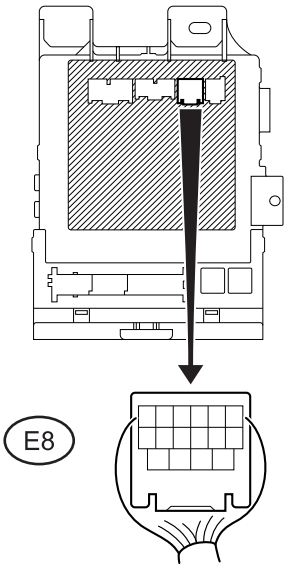
Tester Connection	Condition	Specified Condition
E58-27 (CANH) - E58-28 (CANL)	Power switch off	108 to 132 Ω

OK → **REPLACE CERTIFICATION ECU**

NG

12	CHECK FOR SHORT IN CAN MS BUS WIRES

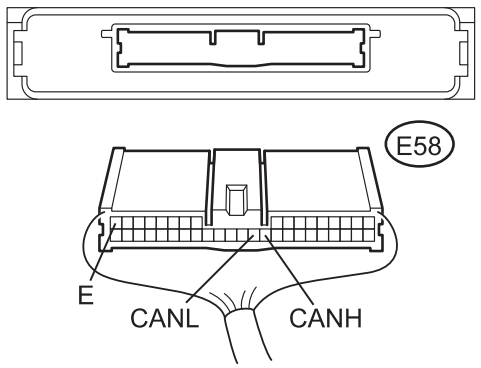
Main Body ECU:



(a) Turn the power switch off.
(b) Disconnect the E8 main body ECU connector.

CA

Certification ECU Connector (Wire Harness Side):



(c) Measure the resistance according to the value(s) in the table below.
HINT:
The resistance must be measured after the E58 certification ECU connector is disconnected.
Standard resistance

Tester Connection	Condition	Specified Condition
E58-27 (CANH) - E58-28 (CANL)	Power switch off	1 MΩ or higher

OK → **REPLACE MAIN BODY ECU**

NG

REPLACE CAN MS BUS MAIN WIRE OR CONNECTOR

CA

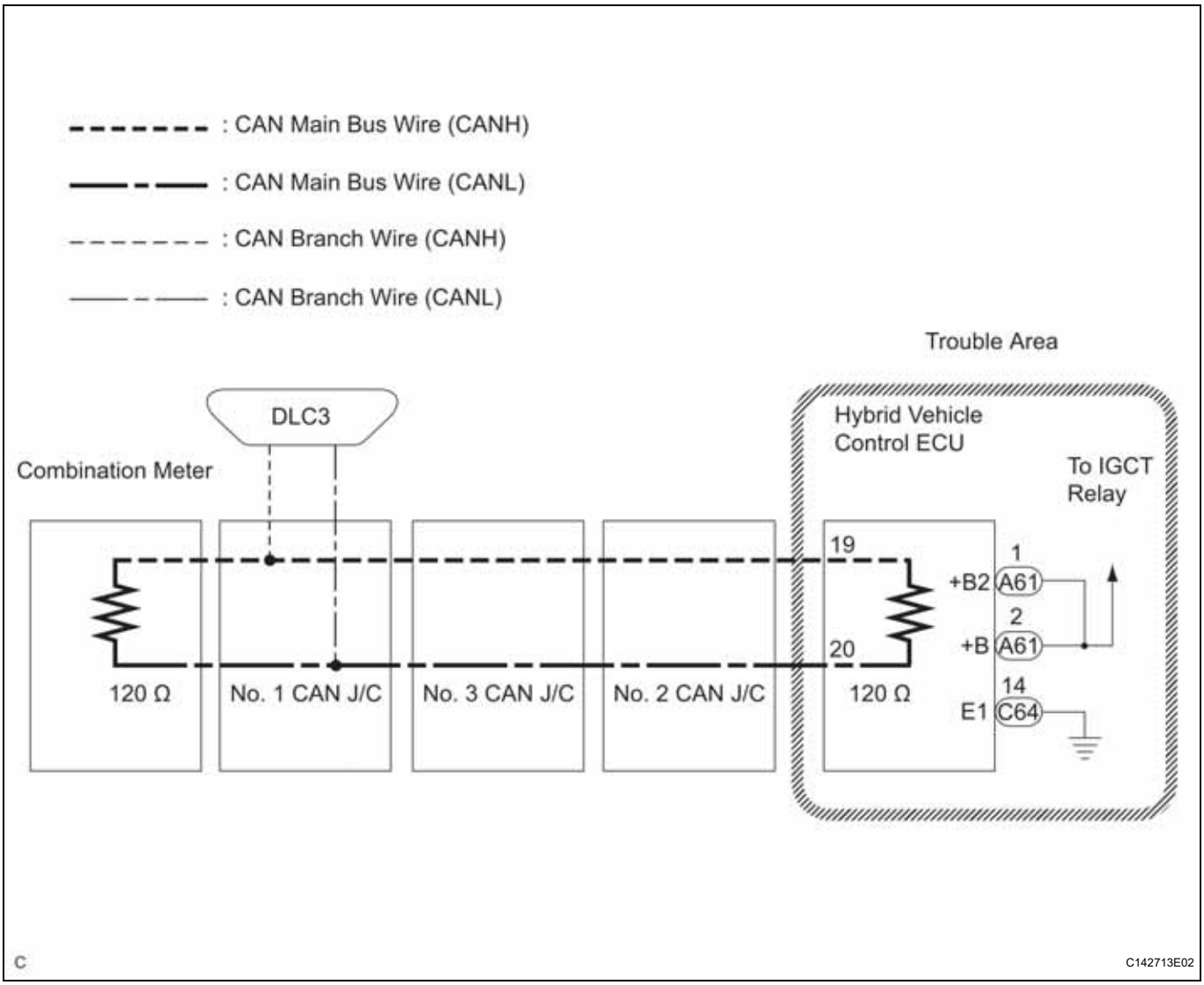
Hybrid Vehicle Control ECU Communication Stop Mode

DESCRIPTION

Detection Item	Symptom	Trouble Area
HV Control ECU Communication Stop Mode	• "HYBRID CONTROL" is not displayed on the "BUS CHECK" screen of the intelligent tester • Applies to "Hybrid Vehicle Control Communication Stop Mode" in the "DTC COMBINATION TABLE"	• Power source circuit of the HV control ECU • HV control ECU main bus wire or connector • HV control ECU

HINT:
"HYBRID CONTROL" refers to the circuit that includes the hybrid vehicle control ECU.

WIRING DIAGRAM



CA

INSPECTION PROCEDURE

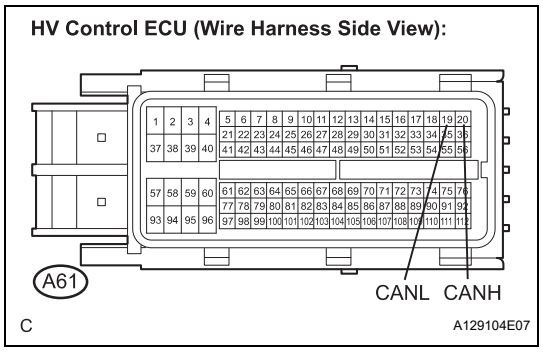
NOTICE:

- **Turn the power switch off before measuring the resistances of CAN bus main wires and CAN bus branch wires.**
- **After the power switch is turned off, check that the key reminder warning system and lighting system are not operating.**

- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches, or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.**

HINT:
Operating the power switch, any other switches, or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.

1	CHECK FOR OPEN IN CAN BUS WIRE (HV CONTROL ECU MAIN WIRE)



(a) Disconnect HV control ECU connector A61.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
A61-19 (CANH) - A61-20 (CANL)	Power switch off	108 to 132 Ω

NG → **REPLACE HV CONTROL ECU MAIN WIRE OR CONNECTOR**

OK

2	CHECK ECM POWER SOURCE CIRCUIT

(a) Check the ECM power source circuit (See page ES-356).

NG → **REPAIR OR REPLACE ECM POWER SOURCE CIRCUIT**

OK

REPLACE HV CONTROL ECU

CA

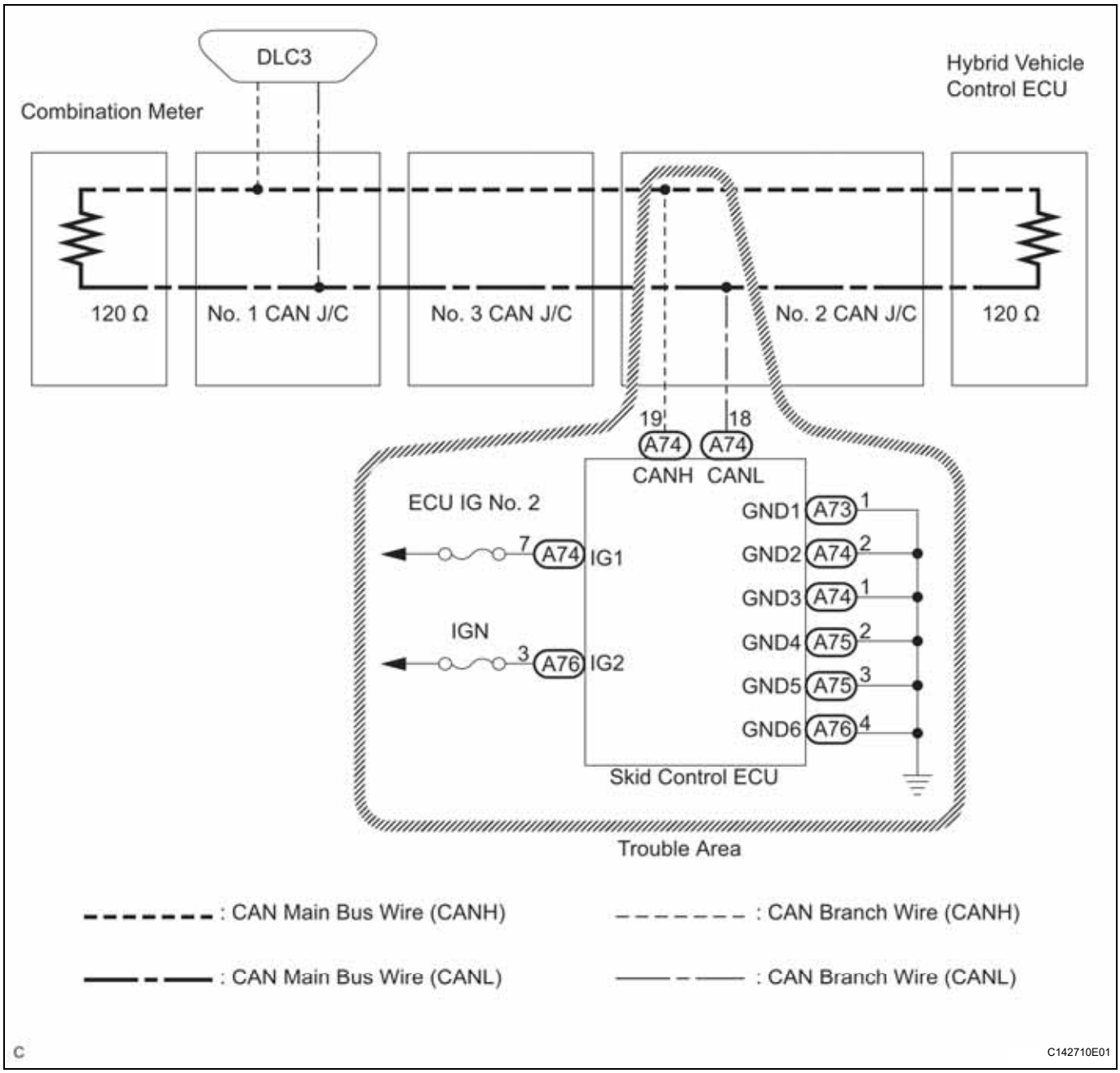
Skid Control ECU Communication Stop Mode

DESCRIPTION

Detection Item	Symptom	Trouble Area
Skid Control ECU Communication Stop Mode	• "ABS/VSC/TRAC" is not displayed on the "BUS CHECK" screen of the intelligent tester • Applies to "Skid Control ECU Communication Stop Mode" in the "DTC COMBINATION TABLE"	• Power source circuit of the skid control ECU • Skid control ECU branch wire or connector • Skid control ECU

HINT:
"ABS/VSC/TRAC" refers to the circuit that includes the skid control ECU.

WIRING DIAGRAM



CA

INSPECTION PROCEDURE

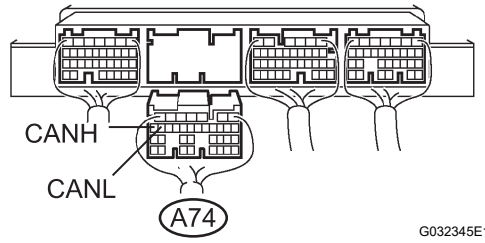
NOTICE:

- **Turn the power switch off before measuring the resistances of the CAN bus main wires and CAN bus branch wires.**
- **After the power switch is turned off, check that the key reminder warning system and lighting system are not operating.**
- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches, or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.**

HINT:
Operating the power switch, any other switches, or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.

1 CHECK FOR OPEN IN CAN BUS WIRE (SKID CONTROL ECU BRANCH WIRE)

Skid Control ECU Wire Harness View:



(a) Turn the ignition switch off.
(b) Disconnect the skid control ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

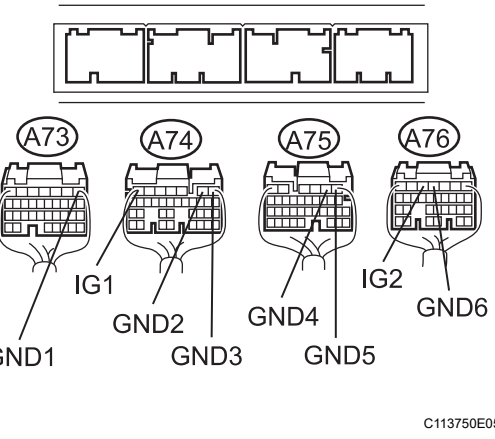
Tester Connection	Condition	Specified Value
A74-19 (CANH) - A74-18 (CANL)	Disconnect the negative battery cable	54 to 69 Ω

NG → **REPLACE SKID CONTROL ECU BRANCH WIRE OR CONNECTOR (CAN-H, CAN-L)**

OK

2 CHECK WIRE HARNESS (IG1, GND1, GND2)

Skid Control ECU Wire Harness View:



(a) Disconnect skid control ECU connectors A73, A75, and A76.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
A73-1 (GND1) - Body ground	Always	Below 1 Ω
A74-2 (GND2) - Body ground	Always	Below 1 Ω
A74-1 (GND3) - Body ground	Always	Below 1 Ω
A75-2 (GND4) - Body ground	Always	Below 1 Ω
A75-1 (GND5) - Body ground	Always	Below 1 Ω
A76-4 (GND6) - Body ground	Always	Below 1 Ω

HINT:
Measure the resistance with skid control ECU connector A74 disconnected.

CA

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Value
A74-7 (IG1) - Body ground	Power switch on (IG)	10 to 14 V
A76-5 (IG2) - Body ground	Power switch on (IG)	10 to 14 V

HINT:
Measure the voltage with skid control ECU connector A74 disconnected.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

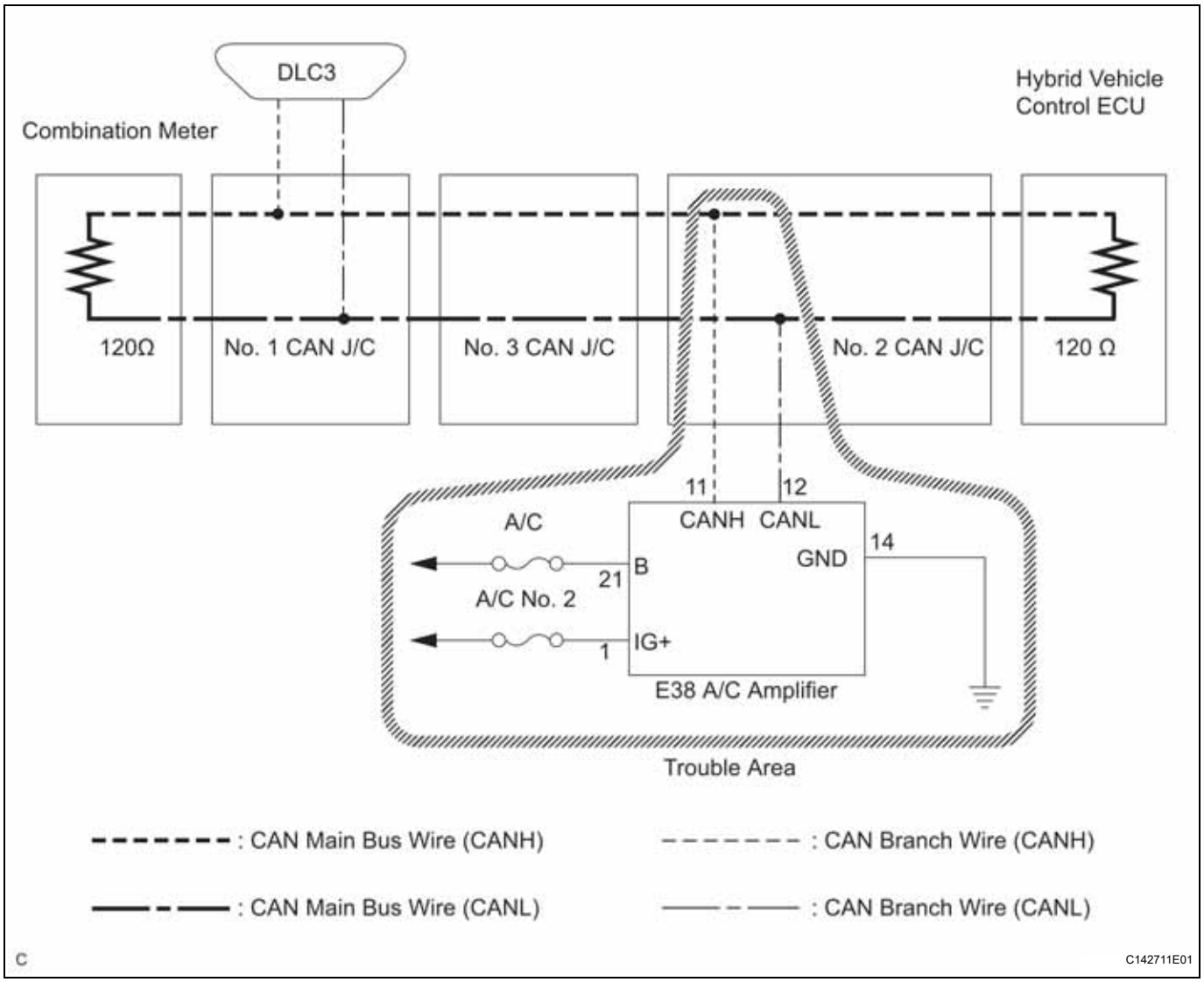
Air Conditioning Amplifier Communication Stop Mode

DESCRIPTION

Detection Item	Symptom	Trouble Area
Air Conditioning Amplifier Communication Stop Mode	• "A/C" is not displayed on the "BUS CHECK" screen of the intelligent tester • Applies to "Air Conditioning Amplifier Communication Stop Mode" in the "DTC COMBINATION TABLE"	• Power source circuit of the air conditioning amplifier • Air conditioning amplifier branch wire or connector • Air conditioning amplifier

HINT:
"A/C" refers to the circuit that includes the air conditioning amplifier.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- **Turn the power switch off before measuring the resistances of CAN bus main wires and CAN bus branch wires.**
- **After the power switch is turned off, check that the key reminder warning system and lighting system are not operating.**

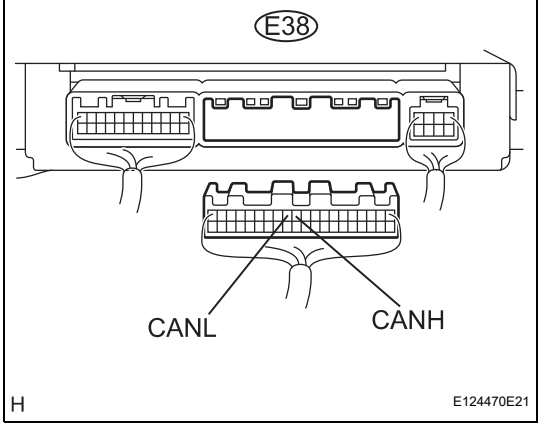
CA

- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches, or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.**

HINT:
Operating the power switch, any other switches, or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.

1	CHECK CAN BUS WIRE FOR DISCONNECTION (AIR CONDITIONING AMPLIFIER BRANCH WIRE)

Air Conditioning Amplifier (Wire Harness Side):



(a) Turn the power switch off.
(b) Disconnect the air conditioning amplifier connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

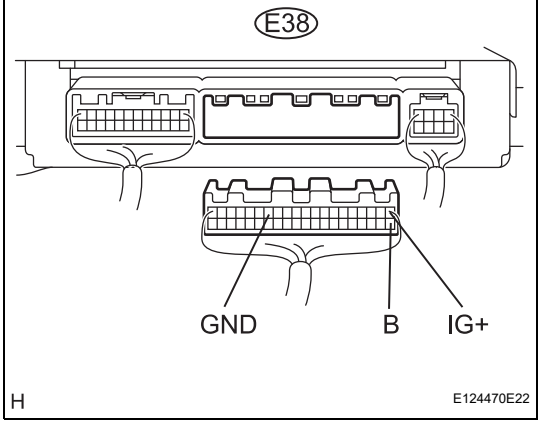
Tester Connection	Condition	Specified Condition
E38-11 (CANH) - E38-12 (CANL)	Power switch off	54 to 69 Ω

NG → **REPLACE CAN BRANCH WIRE CONNECTED TO AIR CONDITIONING AMPLIFIER (CAN-H, CAN-L)**

OK

2	CHECK HARNESS AND CONNECTOR (IG+, B, GND)

Air Conditioning Amplifier (Wire Harness Side):



(a) Disconnect the air conditioning amplifier connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E38-14 (GND) - Body Ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E38-1 (IG+) - Body Ground	Power switch on (IG)	10 to 14 V
E38-21 (B)- Body Ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

CA

OK

REPLACE AIR CONDITIONING AMPLIFIER

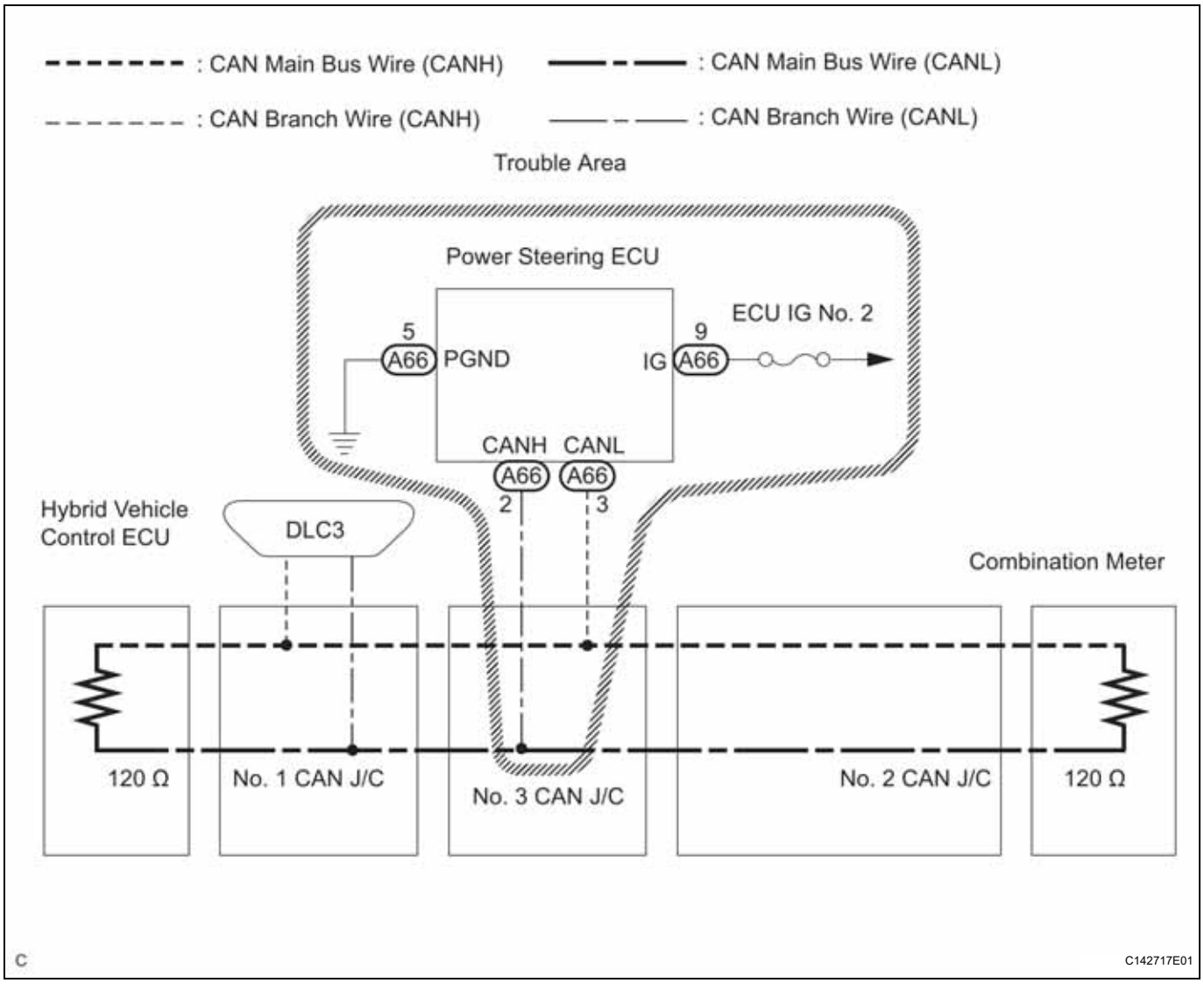
Power Steering ECU Communication Stop Mode

DESCRIPTION

Detection Item	Symptom	Trouble Area
Power Steering ECU Communication Stop Mode	"EPS" is not displayed on the "BUS CHECK" screen of the intelligent tester	• Power source circuit of the power steering ECU • Power steering ECU branch wire or connector • Power steering ECU

HINT:
"EPS" refers to the circuit that includes the power steering ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- **Turn the power switch off before measuring the resistances of CAN bus main wires and CAN bus branch wires.**
- **After the power switch is turned off, check that the key reminder warning system and lighting system are not operating.**

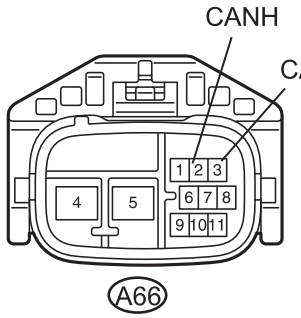
CA

- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches, or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.**

HINT:
Operating the power switch, any other switches, or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.

1	CHECK OPEN IN CAN BUS WIRE (POWER STEERING ECU BRANCH WIRE)

Power Steering ECU
Connector Front View:



(a) Turn the power switch off.
(b) Disconnect power steering ECU connector A66.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

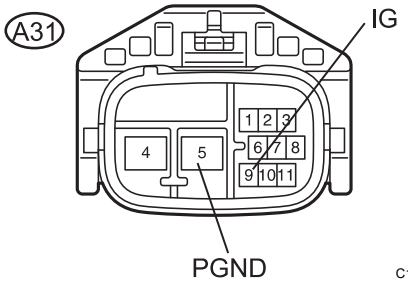
Tester Connection	Condition	Specified Value
A66-2 (CANH) - A66-3 (CANL)	Power switch off	54 to 69 Ω

NG → **REPAIR OR REPLACE POWER STEERING ECU BRANCH WIRE OR CONNECTOR (CANH, CANL)**

OK

2	CHECK WIRE HARNESS (IG, PGND)

Power Steering ECU
Connector Front View:



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
A66-5 (PGND) - Body ground	Always	Below 1 Ω

(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Value
A66-9 (IG) - Body ground	Power switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE POWER STEERING ECU

CA

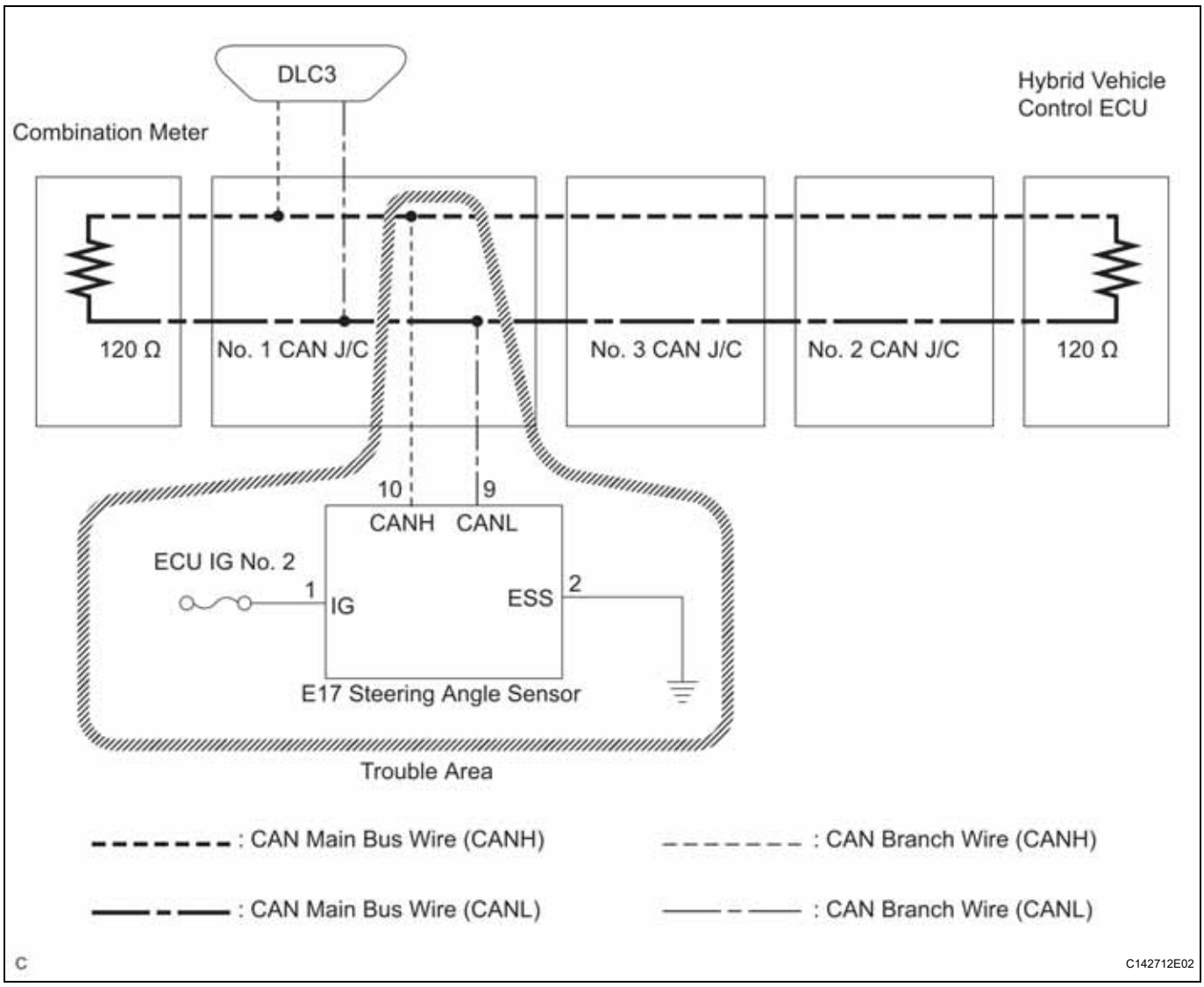
Steering Angle Sensor Communication Stop Mode

DESCRIPTION

Detection Item	Symptom	Trouble Area
Steering Angle Sensor Communication Stop Mode	• "STEERING SENSOR" is not displayed on the "BUS CHECK" screen of the intelligent tester • Applies to "Steering Angle Sensor Communication Stop Mode" in the "DTC COMBINATION TABLE"	• Power source circuit of the steering angle sensor • Steering angle sensor branch wire or connector • Steering angle sensor

HINT:
"STEERING SENSOR" refers to the circuit that includes the steering angle sensor.

WIRING DIAGRAM



CA

INSPECTION PROCEDURE

NOTICE:

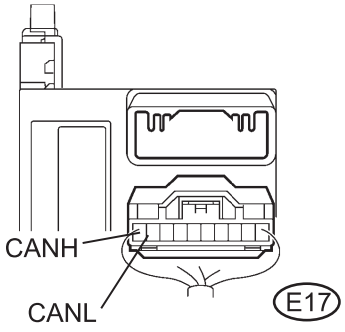
- **Turn the power switch off before measuring the resistances of CAN bus main wires and CAN bus branch wires.**

- **After the power switch is turned off, check that the key reminder warning system and lighting system are not operating.**
- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches, or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.**

HINT:
Operating the power switch, any other switches, or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.

1 CHECK FOR OPEN IN CAN BUS WIRE (STEERING ANGLE SENSOR BRANCH WIRE)

Steering Angle Sensor Connector (Wire Harness View):



G030155E40

(a) Turn the power switch off.
(b) Disconnect the steering angle sensor connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

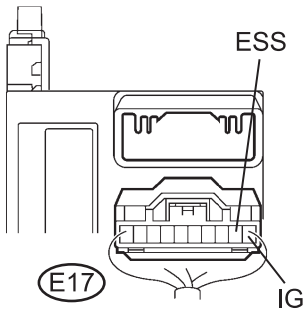
Tester Connection	Condition	Specified Value
E17-10 (CANH) - E17-9 (CANL)	Power switch off	54 to 69 Ω

NG → **REPLACE STEERING ANGLE SENSOR BRANCH WIRE OR CONNECTOR**

OK

2 CHECK WIRE HARNESS (POWER SOURCE CIRCUIT)

Steering Angle Sensor Connector (Wire Harness View):



G030155E41

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
E17-2 (ESS) - Body ground	Always	Below 1 Ω

(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Value
E17-1 (IG) - Body ground	Power switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE STEERING ANGLE SENSOR

CA

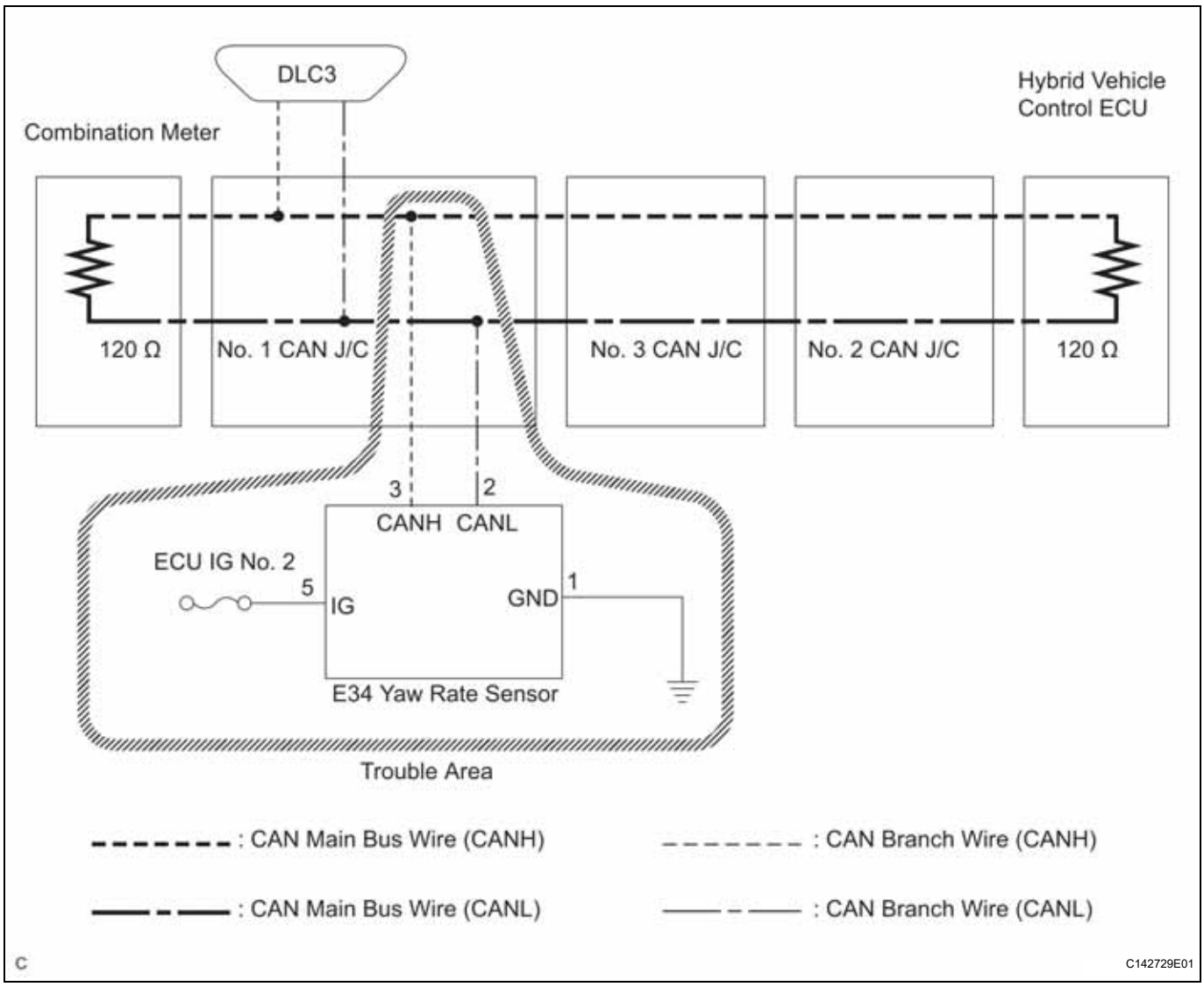
Yaw Rate Sensor Communication Stop Mode

DESCRIPTION

Detection Item	Symptom	Trouble Area
Yaw Rate Sensor Communication Stop Mode	• "YAW/DECELERAT" is not displayed on the "BUS CHECK" screen of the intelligent tester • Applies to "Yaw Rate Sensor Communication Stop Mode" in the "DTC COMBINATION TABLE"	• Power source circuit of the yaw rate sensor • Yaw rate sensor branch wire or connector • Yaw rate sensor

HINT:
"YAW/DECELERAT" refers to the circuit that includes the yaw rate sensor.

WIRING DIAGRAM



CA

INSPECTION PROCEDURE

NOTICE:

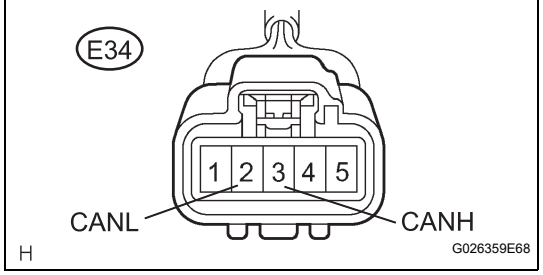
- **Turn the power switch off before measuring the resistances of CAN bus main wires and CAN bus branch wires.**

- **After the power switch is turned off, check that the key reminder warning system and lighting system are not operating.**
- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches, or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.**

HINT:
Operating the power switch, any other switches, or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.

1 CHECK FOR OPEN IN CAN BUS WIRE (YAW RATE SENSOR BRANCH WIRE)

Yaw Rate Sensor Wire Harness View:



(a) Turn the power switch off.
(b) Disconnect the yaw rate sensor connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

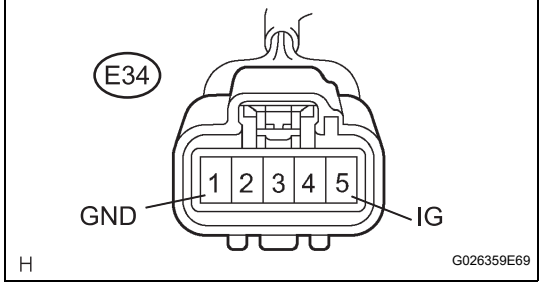
Tester Connection	Condition	Specified Value
E34-3 (CANH) - E34-2 (CANL)	Power switch off	54 to 69 Ω

NG → **REPLACE YAW RATE SENSOR BRANCH WIRE OR CONNECTOR**

OK

2 CHECK WIRE HARNESS (POWER SOURCE CIRCUIT)

Yaw Rate Sensor Wire Harness View:



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
E34-1 (GND) - Body ground	Always	Below 1 Ω

(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Value
E34-5 (IG) - Body ground	Power switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE YAW RATE AND ACCELERATION SENSOR

CA

FAIL-SAFE CHART

If any of the following DTCs are set, the ECM (Included in Hybrid Vehicle Control ECU) enters fail-safe mode to allow the vehicle to be driven temporarily.

DTC	Component	Fail-Safe Operation	Fail Safe Deactivation Condition
P0031, P0032	Air-Fuel Ratio (A/F) Sensor Heater	ECM turns off A/F sensor heater	Power switch off
P0037, P0038	Heated Oxygen Sensor (HO2S) Heater	ECM turns off HO2 sensor heater	Power switch off
	High pressure side fuel pump	• Stop the high side fuel pump • Limit the engine speed to 2,000 rpm or less	Pass condition detected
P0100, P0102 and P0103	Mass Air Flow (MAF) Meter	ECM calculates ignition timing according to engine speed and throttle valve position	Pass condition detected
P0110, P0112 and P0113	Intake Air Temperature (IAT) Sensor	ECM estimates IAT to be 20°C (68°F)	Pass condition detected
P0115, P0117 and P0118	Engine Coolant Temperature (ECT) Sensor	ECM estimates ECT to be 80°C (176°F)	Pass condition detected
P0120, P0121, P0122, P0123, P0220, P0222, P0223, P0604, P0606, P0607, P0657, P2102, P2103, P2111, P2112, P2118, P2119 and P2135	Electronic Throttle Control System (ECTS)	ECM cuts off throttle actuator current and throttle valve returns to 6.5° throttle position by return spring. ECM then adjusts engine output by controlling fuel injection (intermittent fuel-cut) and ignition timing in accordance with accelerator pedal opening angle to allow vehicle to continue at minimal speed*.	Pass condition detected and then power switch turned off
P0327, P0328, P0332 and P0333	Knock Sensor	ECM sets ignition timing to maximum retard.	Power switch off
P0351 to P0356	Igniter	ECM cuts fuel	Pass condition detected

NOTICE:

***: The vehicle can be driven slowly when the accelerator pedal is depressed gently. If the accelerator pedal is depressed quickly, the vehicle may speed up and slow down erratically.**

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

By reading the DATA LIST displayed on an intelligent tester, you can check values, including those of the switches, sensors, and actuators, without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method of shortening diagnostic time.

NOTICE:

In the table below, the values listed under Normal Condition are for reference only. Do not depend solely on these values when determining whether or not a part is faulty.

(a) Put the engine in inspection mode (See page ES-35).
(b) Warm up the engine.
(c) Turn the power switch off.
(d) Connect the intelligent tester to the DLC3.
(e) Turn the power switch on (IG).
(f) Turn the tester on.
(g) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
(h) Check the values by referring to the table below.

Tester Display	Measurement Item/Range	Normal Condition *1	Diagnostic Note
INJECTOR	Injection period of No. 1 cylinder/ Min.: 0 ms, Max.: 32.64 ms	1.5 to 2.7 ms: Idling (Inspection mode)	-
IGN ADVANCE	Ignition timing advance for No. 1 cylinder/Min.: -64 deg., Max.: 63.5 deg.	BTDC 5 to 25° : Idling (Inspection mode)	-
CALC LOAD	Calculated load by ECM/Min.: 0%, Max.: 100%	• 11 to 30%: Idling (Inspection mode) • 12.1 to 30% : Running without load (2,500 rpm)	-
VEHICLE LOAD	Vehicle load/Min.: 0%, Max.: 25700%	Actual vehicle load	-
MAF	Air flow rate from MAF meter/Min.: 0 g/s , Max.: 655 g/s	2.0 to 4.3 g/s: Idling (Inspection mode) 2.4 to 8 g/s: 2,500 rpm (without load)	If value approximately 0.0 g/s: • Mass air flow meter power source circuit open • VG circuit open or short If value 160.0 g/s or more: • E2G circuit open
ENGINE SPD	Engine speed/Min.: 0 rpm, Max.: 16,383 rpm	900 rpm: Idling (Inspection mode)	-
VEHICLE SPD	Vehicle speed/Min.: 0 km/h, Max.: 255 Km/h	Actual vehicle speed	Speed indicated on speedometer
COOLANT TEMP	Engine coolant temperature/Min.: -40°C, Max.: 140°C	80 to 100°C (176 to 212°F): After warming up	• If value -40°C (-40°F): sensor circuit open • If value 140°C (284°F): sensor circuit shorted
INTAKE AIR	Intake air temperature/Min.: -40°C, Max.: 140°C	Equivalent to ambient air temperature	• If value -40°C (-40°F): sensor circuit open • If value 140°C (284°F): sensor circuit shorted
AIR-FUEL RATIO	Air-fuel ratio/Min.: 0 ,Max.: 1.999	0.8 to 1.2 : During idling (Inspection mode)	-

Tester Display	Measurement Item/Range	Normal Condition *1	Diagnostic Note
AMBIENT TEMP	Ambient air temperature/Min.: -40°C, Max.: 215°C	Equivalent to ambient air temperature	• If the value is -40°C: sensor circuit open • If the value is 215°C: sensor circuit shorted
PURGE DENSITY	Learning value of purge density/ Min.: -50, Max.: 350	-30 to 1% Idling (Inspection mode)	Service data
EVAP PURGE FLOW	Purge flow/Min.: 0%, Max.: 102.4%	0 to 100%: Idling (Inspection mode)	-
EVAP PURGE VSV	Purge VSV control duty/Min.: 0%, Max.: 100%	0 to 20%: Idling	Order signal from ECM
VAPOR PRESS PUMP	EVAP vapor pressure/Min.: 0 kPa, Max.: 327.675 kPa	-	-
VAPOR PRESS CALC	Vapor pressure (calculated)/Min.: -5.632 kPa, Max.715.264 kPa	-	-
KNOCK CRRT VAL	Correction learning value of knocking/Min: -64 CA, Max.: 1,984 CA	0 to 21°CA: Driving at 47 mph (75 km/h)	Service data
KNOCK FB VAL	Feedback value of knocking/Min: -64 CA, Max.: 1,984 CA	-21 to 0°CA: Driving at 47 mph (75 km/h)	Service data
VAPOR PRESS TANK	Vapor pressure/Min.: 33.853 kPa, Max.: 125.596 kPa	Atmospheric pressure: Fuel tank cap removed	Pressure inside fuel tank monitored by vapor pressure sensor
CLUTCH	Clutch current/Min.: 0 A, Max.: 2.49 A	-	-
THRTL LEARN VAL	Throttle valve fully closed (learned value)/Min.: 0 V, Max.: 5 V	0.4 to 0.8 V	-
FAIL #1	Whether or not fail safe function is executed/ON or OFF	ETCS has failed: ON	-
SYS GUARD JUDGE	System guard/ON or OFF	-	ETCS service data
THROTTLE POS	Absolute throttle position sensor/ Min.: 0%, Max.: 100%	• 0 to 24%: Throttle fully closed • 64 to 96%: Throttle fully open	Read value with intrusive operation (active test)
THROTTLE IDL POS	Whether or not throttle position sensor is detecting idle/ON or OFF	Idling: ON (Inspection mode)	Read value with intrusive operation (active test)
THRTL REQ POS	Throttle requirement position/Min.: 0 V, Max.: 5 V	0.5 to 1.0 V: Idling (Inspection mode)	-
THROTLLE POS	Throttle sensor positioning/Min.: 0%, Max.: 100%	0 to 10%: Idling (Inspection mode)	Calculated value based on VTA1
THROTTLE POS #2	Throttle sensor positioning #2/ Min.: 0%, Max.: 100%	-	Calculated value based on VTA2
THROTTLE POS #1	Throttle position sensor No. 1 output voltage/Min.: 0 V, Max.: 4.9 V	-	ETCS freeze data
THROTTLE POS #2	Throttle position sensor No. 2 output voltage/Min.: 0 V, Max.: 4.9 V	-	ETCS freeze data
THROTTLE POS #1	Throttle position No. 1/Min.: 0 V, Max.: 5 V	• 0.5 to 1.2 V: Throttle fully closed • 3.2 to 4.8 V: Throttle fully open	-
THROTTLE POS #2	Throttle position No. 2/Min.: 0 V, Max.: 5 V	• 2.1 to 3.1 V: Throttle fully closed • 4.5 to 5.5 V: Throttle fully open	Read value with intrusive operation (active test)
THRTL COMND VAL	Throttle position command value/ Min.: 0 V, Max.: 4.98 V	0.5 to 4.8 V	ETCS service data
THROTTLE SSR #1	Throttle sensor opener position No. 1/Min.: 0 V, Max.: 4.98 V	0.6 to 1.0 V	ETCS service data

ES

Tester Display	Measurement Item/Range	Normal Condition *1	Diagnostic Note
THROTTLE SSR #2	Throttle sensor opener position No. 2/Min.: 0 V, Max.: 4.98 V	2.0 to 2.6 V	ETCS service data
THRTL SSR #1 AD	Throttle sensor opener position No. 1 (AD)/Min.: 0 V, Max.: 4.98 V	0.6 to 0.9 V	ETCS service data
THROTTLE MOT	Throttle motor current/Min.: 0 A, Max.: 80 A	0 to 3.0 A: Idling (Inspection mode)	-
THROTTLE MOT	Whether or not throttle motor control is permitted/ON or OFF	Idling: ON (Inspection mode)	-
THROTTLE MOT	Throttle motor/Min.: 0%, Max.: 100%	0.5 to 40%: Idling (Inspection mode)	-
THROTTLE MOT	Throttle motor current/Min.: 0 A, Max.: 19.92 A	0 to 3.0 A: Idling (Inspection mode)	-
THROTL OPN DUTY	Throttle motor opening duty ratio/ Min.: 0%, Max.: 100%	0 to 40%: During idling (Inspection mode)	When accelerator pedal depressed, duty ratio increased
THROTL CLS DUTY	Throttle motor closed duty ratio/ Min.: 0%, Max.: 100%	0 to 40%: During idling (Inspection mode)	When accelerator pedal released quickly, duty ratio increased
THROTL MOT (OPN)	Throttle motor duty ratio (open)/ Min.: 0%, Max.: 100%	-	ETCS service data
THROTL MOT (CLS)	Throttle motor duty ratio (close)/ Min.: 0%, Max.: 100%	-	ETCS service data
O2S B1 S2	Heated oxygen sensor output voltage for bank 1 sensor 2/Min.: 0 V Max.: 1.275 V	0.1 to 0.9 V: Driving at 47 mph (75 km/h)	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables technician to check voltage output of sensor
AFS B1 S1	A/F sensor output voltage for bank 1 sensor 1/Min.: 0 V Max.: 7.999 V	2.8 to 3.8 V: Idling (Inspection mode)	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables technician to check voltage output of sensor
TOTAL FT #1	Total fuel trim of bank 1 Average value for fuel trim system of bank 1/Min.: -0.5, Max.: 0.496	-0.2 to 0.2: Idling (Inspection mode)	-
SHORT FT #1	Short-term fuel trim of bank 1/ Min.: -100%, Max.: 99.2%	0 +- 20%	Short-term fuel compensation used to maintain air-fuel ratio at stoichiometric air-fuel ratio
LONG FT #1	Long-term fuel trim of bank 1/Min.: -100%, Max.: 99.2%	0 +- 20%	Overall fuel compensation carried out in long-term to compensate for continual deviation of short-term fuel trim from central value
FUEL SYS #1	Fuel system status (Bank 1)/OL or CL or OL DRIVE or OL FAULT or CL FAULT	CL: Idling after warming up (Inspection mode)	• OL (Open Loop): Has not yet satisfied conditions to go closed loop • CL (Closed Loop): Using heated oxygen sensor as feedback for fuel control • OL DRIVE: Open loop due to driving conditions (fuel enrichment) • OL FAULT: Open loop due to detected system fault • CL FAULT: Closed loop but heated oxygen sensor, which used for fuel control, malfunctioning
O2FT B1 S2	Short-term fuel trim associated with bank 1 sensor 2/Min.: -100%, Max.: 99.2%	-	Same as SHORT FT #1
AF FT B1 S1	Short-term fuel trim associated with bank 1 sensor 1/Min.: 0, Max.: 1.999	• Value less than 1 (0.000 to 0.999) =Lean • Stoichiometric air-fuel ratio=1 • Value greater than 1 (1.001 to 1.999) = RICH	-

Tester Display	Measurement Item/Range	Normal Condition *1	Diagnostic Note
AFS B1 S1	A/F sensor (bank 1 sensor 1) current/Min.: -128 mA, Max.: 127.99 mA	-0.5 to 0.5 mA: idling	-
CAT TEMP B1S1	Catalyst temperature (Bank 1, sensor 1)/Min.: -40°C, Max.: 6,513.5°C	-	-
CAT TEMP B1S2	Catalyst temperature (Bank 1, sensor 2)/Min.: -40°C, Max.: 6,513.5°C	-	-
S O2S B1S2	HO2 impedance bank 1 sensor 2/ Min.: 0 ohm, Max, 21247.68 ohm	5 to 15,000 ohm: Driving at constant vehicle speed	-
INI COOL TEMP	Initial engine coolant temperature/ Min.: -40°C, Max.: 120°C	Coolant temperature when engine started	Service data
INI INTAKE TEMP	Initial intake air temperature/Min.: -40°C, Max.: 120°C	Intake air temperature when engine started	Service data
INJ VOL	Injection volume (Cylinder 1)/Min.: 0 ml, Max.: 2.048 ml	0 to 0.5 ml	Fuel volume for 10 injections
CTP SW	Closed throttle position switch/ON or OFF	• ON: Throttle fully closed • OFF: Throttle open	-
ENG OIL PRES SW	Engine oil pressure switch signal/ 0: OFF, 1: ON	Indicating ON while engine is running	-
FUEL LID	Fuel lid position switch/Open or Close	ON: Open	-
STOP LIGHT SW	Stop light switch/ON or OFF	ON: Brake pedal depressed	-
FUEL LID SW	Fuel lid open switch/ON or OFF	ON: Open	-
+BM	Whether or not electric throttle control system power is inputted/ ON or OFF	Idling: ON (Inspection mode)	-
+BM VOLTAGE	+BM voltage/Min.: 0, Max.: 19.92	10 to 15 V: Idling (Inspection mode)	ETCS service data
BATTERY VOLTAGE	Battery voltage/Min.: 0, Max.: 65.535 V	9 to 14 V: Idling (Inspection mode)	-
ACTUATOR POWER	Actuator power supply/ON or OFF	Idling: ON (Inspection mode)	-
ATM PRESSURE	Atmospheric pressure/Min.: 0 kPa, Max.: 255 kPa	Equivalent to atmospheric pressure (absolute pressure)	-
EVAP (Purge) VSV	VSV status for EVAP control/ON or OFF	-	Active Test support data
FUEL PUMP / SPD	Fuel pump/status/ON or OFF	-	Active Test support data
VVT CTRL B1	VVT control (bank 1) status/ON or OFF	-	Active Test support data
VACUUM PUMP	Key-off EVAP system pump status/ON or OFF	-	Active Test support data
EVAP VENT VAL	Key-off EVAP system vent valve status/ON or OFF	-	Active Test support data
FAN MOTOR	Electric fan motor/ON or OFF	-	Active Test support data
EVAP VENT VAL	Key-off EVAP system vent valve status/ON or OFF	-	Active Test support data
TC/TE1	TC and TE1 terminal of DLC3/ON or OFF	-	-
FVCV	Key-off EVAP system vapor-containment valve status/ON or OFF	-	Active Test support data
FUEL FILLER OPN	Fuel lid opener motor actuating status/On or OFF	OFF: Motor is not actuated	Active Test support data
VVTL AIM ANGL #1	VVT aim angle (bank 1)/Min.: 0%, Max.: 100%	0%: Idling (Inspection mode)	VVT duty signal value during intrusive operation

Tester Display	Measurement Item/Range	Normal Condition *1	Diagnostic Note
VVT CHNG ANGL #1	VVT change angle/Min.: 0°FR, Max.: 60°FR	0 to 5°FR: Idling (Inspection mode)	Displacement angle during intrusive operation
VVT OCV DUTY B1	VVT OCV operation duty/Min.: 0%, Max.: 100%	0%: Idling (Inspection mode)	Requested duty value for intrusive operation
FC IDL	Fuel cut idle/ON or OFF	ON: Fuel cut operation	FC IDL = "ON" when throttle valve fully closed and engine speed over 2,800 rpm
FC TAU	Fuel cut TAU/ Fuel cut with very light load/ON or OFF	ON: Fuel cut operating	Fuel cut being performed under very light load to prevent incomplete engine combustion
IGNITION	Ignition counter/Min.: 0, Max.: 800	0 to 800	-
CYL #1, #2, #3, #4	Misfire ratio of cylinder 1 to 4/Min.: 0, Max.: 255	0%	This item displayed only during idling
CYL ALL	All cylinders misfire rate/Min.: 0, Max.: 255	0 to 35	-
MISFIRE RPM	Engine RPM for first misfire range/Min.: 0 rpm, Max.: 6,375 rpm	0 rpm: Misfire 0	-
MISFIRE LOAD	Engine load for first misfire range/ Min.: 0 g/rev, Max.: 3.98 g/rev	0 g/rev: Misfire 0	-
MISFIRE MARGIN	Misfire monitoring/Min.: -100%, Max.: 99.22%	-100 to 99.22%	Misfire detecting margin
#CODES	#Codes/Min.: 0, Max.: 255	-	Number of detected DTCs
CHECK MODE	Check mode/0: OFF, 1: ON	ON: Check mode ON	See page ES-34
MISFIRE TEST	Check mode result for misfire monitor/0: COMPL, 1: INCMPL	-	-
OXS2 TEST	Check mode result for HO2 sensor (bank 2)/0: COMPL, 1: INCMPL	-	-
OXS1 TEST	Check mode result for HO2 sensor (bank 1)/0: COMPL, 1: INCMPL	-	-
A/F SSR TEST B1	Check mode result for air-fuel ratio sensor (bank 1)/0: COMPL, 1: INCMPL	-	-
MIL	MIL status/ON or OFF	ON: MIL ON	-
MIL ON RUN DIST	MIL ON run distance/Min.: 0 second, Max.: 65,535 seconds	Distance after DTC detected	-
MIL ON RUN TIME	Running time from MIL ON/Min.: 0 minute, Max.: 65,535 minutes	Equivalent to running time after MIL ON	-
ENG RUN TIME	Engine run time/Min.: 0 second, Max.: 255 seconds	Time after engine start	Service data
TIME DTC CLEAR	Time after DTC cleared/Min.: 0 minute, Max.: 65,535 minutes	Equivalent to time after DTCs erased	-
DIST DTC CLEAR	Distance after DTC cleared/Min.: 0 km/h, Max.: 65,535 km/h	Equivalent to drive distance after DTCs erased	-
WU CYC DTC CLEAR	Warm-up cycle after DTC cleared/ Min.: 0, Max.: 255	-	Number of warm-up cycles after DTC cleared
OBD CERT	OBD requirement	OBD2	-
COMP MON	Comprehensive component monitor/NOT AVL or AVAIL	-	-
FUEL MON	Fuel system monitor/NOT AVL or AVAIL	-	-
MISFIRE MON	Misfire monitor/NOT AVL or AVAIL	-	-
O2S (A/FS) MON	O2S (A/FS) monitor/NOT AVL or AVAIL	-	-
EVAP MON	EVAP monitor/NOT AVL or AVAIL	-	-

Tester Display	Measurement Item/Range	Normal Condition *1	Diagnostic Note
CAT MON	Catalyst monitor/NOT AVL or AVAIL	-	-
O2S(A/FS) MON	OS2 (A/FS) monitor/INCMPL or COMPL	-	-
EVAP MON	EVAP monitor/INCMPL or COMPL	-	-
CAT MON	Catalyst monitor/INCMPL or COMPL	-	-
CCM ENA	Comprehensive component monitor/UNABLE or ENABLE	-	-
CCM CMPL	Comprehensive component monitor/COMPL or INCMPL	-	-
FUEL ENA	Fuel system monitor/UNABLE or ENABLE	-	-
FUEL CMPL	Fuel system monitor/COMPL or INCMPL	-	-
MISFIRE ENA	Misfire monitor/UNABLE or ENABLE	-	-
MISFIRE CMPL	Misfire monitor/COMPL or INCMPL	-	-
EGR ENA	EGR monitor/UNABLE or ENABLE	-	-
EGR CMPL	EGR monitor/COMPL or INCMPL	-	-
HTR ENA	O2S (A/FS) heater monitor/ UNABLE or ENABLE	-	-
HTR CMPL	O2S (A/FS) heater monitor/ COMPL or INCMPL	-	-
O2S(A/FS) ENA	O2S(A/FS) monitor/UNABLE or ENABLE	-	-
O2S (A/FS) CMPL	O2S(A/FS) monitor/COMPL or INCMPL	-	-
ACRF ENA	A/C monitor/UNABLE or ENABLE	-	-
ACRF CMPL	A/C monitor/COMPL or INCMPL	-	-
AIR ENA	2nd air monitor/UNABLE or ENABLE	-	-
AIR CMPL	2nd air monitor/COMPL or INCMPL	-	-
EVAP ENA	EVAP monitor/UNABLE or ENABLE	-	-
EVAP CMPL	EVAP monitor/COMPL or INCMPL	-	-
HCAT ENA	Heated catalyst monitor/UNABLE or ENABLE	-	-
HCAT CMPL	Heated catalyst monitor/COMPL or INCMPL	-	-
CAT ENA	Catalyst monitor/UNABLE or ENABLE	-	-
CAT CMPL	Catalyst monitor/COMPL or INCMPL	-	-
REQ ENG TRQ	Repuested engine torque/Min.: 0kW, Max.: 16383.75 kW	0 to 110 kW	Flag information for hybrid vehicle
HV TRGT ENG SPD	HV target engine speed/Min.: 0 rpm, Max.: 6375 rpm	0 to 6000 rpm	Flag information for hybrid vehicle
ACT ENGINE TRQ	Actual engine torque/Min.: -128 Nm, Max.: 510 N.m	-187 to 187 Nm	Flag information for hybrid vehicle
EST ENGINE TRQ	Estimated engine torque/Min.: 0 Nm, Max.: 510 Nm	0 to 187 Nm	Flag information for hybrid vehicle

Tester Display	Measurement Item/Range	Normal Condition *1	Diagnostic Note
ENGINE RUN TIME	Engine run time/Min.: 0 second, Max.: 255 seconds	0 to 255 seconds	Flag information for hybrid vehicle
ENGINE RUN TIME	Request engine run time/Min.: 0 second, Max.: 25.5 seconds	0 to 25.5 seconds	Flag information for hybrid vehicle
IGNITION TIME	Judgment time for ignition of engine/Min.: 0 second, Max.: 25.5 seconds	0 to 25.5 seconds	Flag information for hybrid vehicle
OUTPUT TIME	Judgment time for engine output/ Min.: 0 second, Max.: 25.5 seconds	0 to 25.5 seconds	Flag information for hybrid vehicle
EST PORT TEMP	Estimated intake port temperature/Min.: -40°C, Max.: 215°C	80 to 100°C	Flag information for hybrid vehicle
FUEL LEVEL	Fuel level/0: EMPTY, 1: NOT EMPTY	-	-
ISC LEARNING	ISC learning/0: INCMPL, 1: COMPL	-	-
FUEL CUT	Fuel cut for engine stop request/0: OFF, 1: ON	-	-
INDPNDNT OPR	Engine independent operation/0: NOT OPR, 1: OPERATE	-	-
RACING	Racing operation/0: NOT OPR, 1: OPERATE	-	-
WARM UP	Request engine warm-up/0: NOT REQ, 1: REQUEST	-	-
INDPNDNT CNTRL	Engine independent control operation/0: NOT OPR, 1: OPERATE	-	-
ISC LEARN VAL	ISC learning value/Max: 19.92L/s, Min.: 0 L/s	-	Flag information for hybrid vehicle
MODEL CODE	Model code	-	Identifying model code: AHV40L
ENGINE TYPE	Engine type	-	Identifying engine type: 2AZFXE
CYLINDER NUMBER	Cylinder number/Min.: 0, Max.: 255	-	Identifying cylinder number: 4
DESTINATION	Destination	-	Identifying destination: A (America)
MODEL YEAR	Model year/Min.: 1,900, Max.: 2,155	-	Identifying model year: 200#
SYSTEM	System identification	-	Identifying engine system: HV

HINT:
*1: If no idling conditions are specified, the transmission gear selector lever should be in the N or P position, and the A/C switch and all accessory switches should be OFF.

2. ACTIVE TEST

HINT:
Performing an ACTIVE TEST enables components including the relays, VSV (Vacuum Switching Valve) and actuators, to be operated without removing any parts. The ACTIVE TEST can be performed with an intelligent tester. Performing an ACTIVE TEST as the first step in troubleshooting is one method of shortening diagnostic time.
DATA LIST can be displayed during ACTIVE TEST.

(a) Put the engine in inspection mode (See page ES-35).
(b) Connect the intelligent tester to the DLC3.

(c) Turn the power switch on (IG).
(d) Turn the tester on.
(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
(f) Perform the ACTIVE TEST by referring to the below.

Tester Display	Test Part	Control Range	Diagnostic Note
INJ VOL	Change injection volume	Between -12.5 and 24.8%	• All injectors tested at same time • Perform test at less than 3,000 rpm • Injection volume can be changed in 1% graduations within control range
A/F CONTROL	Change injection volume	Lower by 12.5% or increase by 24.8%	• Perform test at less than 3,000 rpm • A/F CONTROL enables checking and graphing of A/F (Air Fuel Ratio) sensor and Heated Oxygen (HO2) sensor voltage outputs • To conduct test, select following menu items: ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1S1 and O2S B1S2, and press YES and ENTER followed by F4
EVAP VSV (ALONE)	Activate purge VSV control	ON/OFF	-
FUEL PUMP /SPD	Activate fuel pump (C/OPN Relay)	ON/OFF	-
TC/TE1	Turn on and off TC and TE1 connection	ON/OFF	• ON: TC and TE1 connected • OFF: TC and TE1 disconnected
FC IDL PROHBT	Prohibit idling fuel cut control	ON/OFF	-
COOLING FAN	Control electric cooling fan	ON/OFF	Test possible when following conditions met: • Power switch on (IG) • Engine is stopped
ETCS OPEN SLOW	Throttle actuator	ON: Throttle valve opens slowly	Test possible when following conditions met: • Power switch ON (IG) • Engine stopped • Accelerator pedal fully depressed (APP: 58 degrees or more)
ETCS CLOSE SLOW	Throttle actuator	ON: Throttle valve closes slowly	Same as above
ETCS OPEN FAST	Throttle actuator	ON: Throttle valve opens fast	Same as above
ETCS CLOSE FAST	Throttle actuator	ON: Throttle valve closes fast	Same as above
VVT B1	Control VVT (bank 1)	-128 to 127% This value added to present OCV control duty 100%: Maximum advance -100%: Maximum retard	Engine stall or rough idle when VVT actuator operated by 100%. Test possible during idle.
VVT CTRL B1	Turn on and off OCV (Oil Control Valve)	ON/OFF	• Engine stalls or idles roughly when OCV turned ON • Normal engine running or idling when OCV off
VACCUM PUMP	Vaccum pump	ON/OFF	-
VENT VALVE	Vent valve	ON/OFF	-
FUEL FILLER OPN	Fuel lid opener control	ON: Open	-
FVCV	Fuel vapor-containment valve control	ON: Open OFF: Close	-

ES

Tester Display	Test Part	Control Range	Diagnostic Note
FUEL CUT #1	Cylinder #1 injector fuel cut	ON/OFF	Test possible during vehicle stopping and engine idling.
FUEL CUT #2	Cylinder #2 injector fuel cut	ON/OFF	Same as above
FUEL CUT #3	Cylinder #3 injector fuel cut	ON/OFF	Same as above
FUEL CUT #4	Cylinder #4 injector fuel cut	ON/OFF	Same as above

3. SYSTEM CHECK

HINT:

Performing a SYSTEM CHECK enables the system, which consists of multiple actuators, to be operated without removing any parts. In addition, it can show whether or not any DTCs are set, and can detect potential malfunctions in the system. The SYSTEM CHECK can be performed with an intelligent tester.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK.
(e) Perform the SYSTEM CHECK by referring to the below.

Tester Display	Test Part	Control Range	Diagnostic Note
EVAP SYS CHECK (AUTO OPERATION)	Perform 9 steps in order to operate EVAP key-off monitor automatically	35°C (95°F) or less	• If no DTCs in PENDING CODE after performing this test, system functioning normally • Refer to EVAP System (See page ES-317)
EVAP SYS CHECK (MANUAL OPERATION)	Perform 9 steps in order to operate EVAP key-off monitor automatically	35°C (95°F) or less	• Used to detect malfunctioning parts • Refer to EVAP System (See page ES-317)

DIAGNOSTIC TROUBLE CODE CHART

HINT:
Parameters listed in the chart may be different than your readings depending on the type of instruments and other factors.
If any DTCs are displayed during a check mode DTC check, check the circuits for the DTCs listed in the table below. For details of each DTC, refer to the page indicated.

SFI SYSTEM:

DTC Code	Detection Item	Trouble Area	MIL	Memory	See page
P0010	Camshaft Position "A" Actuator Circuit (Bank 1)	1. Open or short in OCV circuit 2. OCV 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-54
P0011	Camshaft Position "A" - Timing Over-Advanced or System Performance (Bank 1)	1. Valve timing 2. OCV 3. OCV filter 4. Camshaft timing gear assembly 5. Hybrid vehicle control ECU	Comes on	DTC stored	ES-58
P0012	Camshaft Position "A" - Timing Over-Retarded (Bank 1)	1. Valve timing 2. OCV 3. OCV filter 4. Camshaft timing gear assembly 5. Hybrid vehicle control ECU	Comes on	DTC stored	ES-58
P0016	Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor A)	1. Mechanical system (Timing chain has jumped tooth or chain stretched) 2. Hybrid vehicle control ECU	Comes on	DTC stored	ES-64
P0031	Oxygen (A/F) Sensor Heater Control Circuit Low (Bank 1 Sensor 1)	1. Open in A/F sensor heater circuit 2. A/F sensor heater (sensor 1) 3. Integration relay (EFI MAIN relay) 4. Hybrid vehicle control ECU	Comes on	DTC stored	ES-67
P0032	Oxygen (A/F) Sensor Heater Control Circuit High (Bank 1 Sensor 1)	1. Short in A/F sensor heater circuit 2. A/F sensor heater (sensor 1) 3. Integration relay (EFI MAIN relay) 4. Hybrid vehicle control ECU	Comes on	DTC stored	ES-67
P0037	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)	1. Open in HO2 sensor heater circuit 2. HO2 sensor heater (sensor 2) 3. Integration relay (EFI MAIN relay) 4. Hybrid vehicle control ECU	Comes on	DTC stored	ES-73
P0038	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)	1. Short in HO2 sensor heater circuit 2. HO2 sensor heater (sensor 2) 3. Integration relay (EFI MAIN relay) 4. Hybrid vehicle control ECU	Comes on	DTC stored	ES-73
P0100	Mass or Volume Air Flow Circuit	1. Open or short in MAF meter circuit 2. MAF meter 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-78
P0101	Mass Air Flow Circuit Range / Performance Problem	1. Mass Air Flow (MAF) meter 2. Air induction system 3. PCV hose connections	Comes on	DTC stored	ES-85
P0102	Mass or Volume Air Flow Circuit Low Input	1. Open or short in MAF meter circuit 2. MAF meter 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-78
P0103	Mass or Volume Air Flow Circuit High Input	1. Open or short in MAF meter circuit 2. MAF meter 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-78
P0110	Intake Air Temperature Circuit Malfunction	1. Open or short in IAT sensor circuit 2. IAT sensor (built into MAF meter) 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-89
P0112	Intake Air Temperature Circuit Low Input	1. Short in IAT sensor circuit 2. IAT sensor (built into MAF meter) 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-89

DTC Code	Detection Item	Trouble Area	MIL	Memory	See page
P0113	Intake Air Temperature Circuit High Input	1. Open in IAT sensor circuit 2. IAT sensor (built into MAF meter) 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-89
P0115	Engine Coolant Temperature Circuit Malfunction	1. Open or short in ECT sensor circuit 2. ECT sensor 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-95
P0116	Engine Coolant Temperature Circuit Range / Performance Problem	1. Thermostat 2. ECT sensor	Comes on	DTC stored	ES-101
P0117	Engine Coolant Temperature Circuit Low Input	1. Short in ECT sensor 2. ECT sensor 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-95
P0118	Engine Coolant Temperature Circuit High Input	1. Open in ECT sensor circuit 2. ECT sensor 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-95
P0120	Throttle / Pedal Position Sensor / Switch "A" Circuit Malfunction	1. Throttle Position (TP) sensor (built into throttle body) 2. Hybrid vehicle control ECU	Comes on	DTC stored	ES-104
P0121	Throttle / Pedal Position Sensor / Switch "A" Circuit Range / Performance Problem	TP sensor (built into throttle body)	Comes on	DTC stored	ES-111
P0122	Throttle / Pedal Position Sensor / Switch "A" Circuit Low Input	1. TP sensor (built into throttle body) 2. Short in VTA1 circuit 3. Open in VC circuit 4. Hybrid vehicle control ECU	Comes on	DTC stored	ES-104
P0123	Throttle / Pedal Position Sensor / Switch "A" Circuit High Input	1. TP sensor (built into throttle body) 2. Open in VTA1 circuit 3. Open in E2 circuit 4. Short between VC and VTA1 circuits 5. Hybrid vehicle control ECU	Comes on	DTC stored	ES-104
P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	1. ECT sensor 2. Cooling system 3. Thermostat	Comes on	DTC stored	ES-113
P0128	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)	1. Thermostat 2. Cooling system 3. ECT sensor 4. Hybrid vehicle control ECU	Comes on	DTC stored	ES-116
P0136	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	1. Open or short in HO2 sensor (sensor 2) circuit 2. HO2 sensor (sensor 2) 3. HO2 sensor heater (sensor 2) 4. Air-fuel Ratio (A/F) sensor (sensor 1) 5. Integration relay (EFI MAIN relay) 6. Gas leakage from exhaust system	Comes on	DTC stored	ES-119
P0137	Oxygen Sensor Circuit Low Voltage (Bank 1 Sensor 2)	1. Open in HO2 sensor (sensor 2) circuit 2. HO2 sensor (sensor 2) 3. HO2 sensor heater (sensor 2) 4. Integration relay (EFI MAIN relay) 5. Gas leakage from exhaust system	Comes on	DTC stored	ES-119
P0138	Oxygen Sensor Circuit High Voltage (Bank 1 Sensor 2)	1. Short in HO2 sensor (sensor 2) circuit 2. HO2 sensor (sensor 2) 3. ECM internal circuit malfunction	Comes on	DTC stored	ES-119
P0141	Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)	1. HO2 sensor heater 2. Hybrid vehicle control ECU	Comes on	DTC stored	ES-73

DTC Code	Detection Item	Trouble Area	MIL	Memory	See page
P0171	System Too Lean (Bank 1)	1. Air induction system 2. Injector blockage 3. Mass Air Flow (MAF) meter 4. Engine Coolant Temperature (ECT) sensor 5. Fuel pressure 6. Gas leakage from exhaust system 7. Open or short in A/F sensor (sensor 1) circuit 8. A/F sensor (sensor 1) 9. A/F sensor heater (sensor 1) 10. Integration relay (EFI MAIN relay) 11. A/F sensor heater and EFI MAIN relay circuits 12. PCV valve and hose 13. PCV hose connections 14. Hybrid vehicle control ECU	Comes on	DTC stored	ES-137
P0172	System Too Rich (Bank 1)	1. Injector leakage or blockage 2. MAF meter 3. ECT sensor 4. Ignition system 5. Fuel pressure 6. Gas leakage from exhaust system 7. Open or short in A/F sensor (sensor 1) circuit 8. A/F sensor (sensor 1) 9. A/F sensor heater (sensor 1) 10. Integration relay (EFI MAIN relay) 11. A/F sensor heater and EFI MAIN relay circuits 12. Hybrid vehicle control ECU	Comes on	DTC stored	ES-137
P0220	Throttle / Pedal Position Sensor / Switch "B" Circuit	1. TP sensor (built into throttle body) 2. Hybrid vehicle control ECU	Comes on	DTC stored	ES-104
P0222	Throttle / Pedal Position Sensor / Switch "B" Circuit Low Input	1. TP sensor (built into throttle body) 2. Short in VTA2 circuit 3. Open in VC circuit 4. Hybrid vehicle control ECU	Comes on	DTC stored	ES-104
P0223	Throttle / Pedal Position Sensor / Switch "B" Circuit High Input	1. TP sensor (built into throttle body) 2. Open in VTA2 circuit 3. Open in E2 circuit 4. Short between VC and VTA2 circuits 5. Hybrid vehicle control ECU	Comes on	DTC stored	ES-104
P0300	Random / Multiple Cylinder Misfire Detected	1. Open or short in engine wire harness 2. Connector connection 3. Vacuum hose connections 4. Ignition system 5. Injector 6. Fuel pressure 7. Mass Air Flow (MAF) meter 8. Engine Coolant Temperature (ECT) sensor 9. Compression pressure 10. Valve clearance 11. Valve timing 12. PCV valve and hose 13. PCV hose connections 14. Air induction system 15. Hybrid vehicle control ECU	Comes on	DTC stored	ES-146

DTC Code	Detection Item	Trouble Area	MIL	Memory	See page
P0301	Cylinder 1 Misfire Detected	1. Open or short in engine wire harness 2. Connector connection 3. Vacuum hose connections 4. Ignition system 5. Injector 6. Fuel pressure 7. Mass Air Flow (MAF) meter 8. Engine Coolant Temperature (ECT) sensor 9. Compression pressure 10. Valve clearance 11. Valve timing 12. PCV valve and hose 13. PCV hose connections 14. Air induction system 15. Hybrid vehicle control ECU	Comes on	DTC stored	ES-146
P0302	Cylinder 2 Misfire Detected	1. Open or short in engine wire harness 2. Connector connection 3. Vacuum hose connections 4. Ignition system 5. Injector 6. Fuel pressure 7. Mass Air Flow (MAF) meter 8. Engine Coolant Temperature (ECT) sensor 9. Compression pressure 10. Valve clearance 11. Valve timing 12. PCV valve and hose 13. PCV hose connections 14. Air induction system 15. Hybrid vehicle control ECU	Comes on	DTC stored	ES-146
P0303	Cylinder 3 Misfire Detected	1. Open or short in engine wire harness 2. Connector connection 3. Vacuum hose connections 4. Ignition system 5. Injector 6. Fuel pressure 7. Mass Air Flow (MAF) meter 8. Engine Coolant Temperature (ECT) sensor 9. Compression pressure 10. Valve clearance 11. Valve timing 12. PCV valve and hose 13. PCV hose connections 14. Air induction system 15. Hybrid vehicle control ECU	Comes on	DTC stored	ES-146
P0304	Cylinder 4 Misfire Detected	1. Open or short in engine wire harness 2. Connector connection 3. Vacuum hose connections 4. Ignition system 5. Injector 6. Fuel pressure 7. Mass Air Flow (MAF) meter 8. Engine Coolant Temperature (ECT) sensor 9. Compression pressure 10. Valve clearance 11. Valve timing 12. PCV valve and hose 13. PCV hose connections 14. Air induction system 15. Hybrid vehicle control ECU	Comes on	DTC stored	ES-146
P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	1. Short in knock sensor circuit 2. Knock sensor 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-159

DTC Code	Detection Item	Trouble Area	MIL	Memory	See page
P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)	1. Open in knock sensor curcuit 2. Knock sensor 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-159
P0335	Crankshaft Position Sensor "A" Circuit	1. Open or short in CKP sensor circuit 2. CKP sensor 3. CKP sensor plate 4. Hybrid vehicle control ECU	Comes on	DTC stored	ES-163
P0340	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor)	1. Open or short in CMP sensor circuit 2. CMP sensor 3. Camshaft 4. Jumped tooth of timing chain 5. Hybrid vehicle control ECU	Comes on	DTC stored	ES-169
P0351	Ignition Coil "A" Primary / Secondary Circuit	1. Ignition system 2. Open or short in IGF1 or IGT circuit (1 to 4) between ignition coil with igniter and hybrid vehicle control ECU 3. No. 1 to No. 4 ignition coils with igniters 4. Hybrid vehicle control ECU	Comes on	DTC stored	ES-173
P0352	Ignition Coil "B" Primary / Secondary Circuit	1. Ignition system 2. Open or short in IGF1 or IGT circuit (1 to 4) between ignition coil with igniter and hybrid vehicle control ECU 3. No. 1 to No. 4 ignition coils with igniters 4. Hybrid vehicle control ECU	Comes on	DTC stored	ES-173
P0353	Ignition Coil "C" Primary / Secondary Circuit	1. Ignition system 2. Open or short in IGF1 or IGT circuit (1 to 4) between ignition coil with igniter and hybrid vehicle control ECU 3. No. 1 to No. 4 ignition coils with igniters 4. Hybrid vehicle control ECU	Comes on	DTC stored	ES-173
P0354	Ignition Coil "D" Primary / Secondary Circuit	1. Ignition system 2. Open or short in IGF1 or IGT circuit (1 to 4) between ignition coil with igniter and hybrid vehicle control ECU 3. No. 1 to No. 4 ignition coils with igniters 4. Hybrid vehicle control ECU	Comes on	DTC stored	ES-173
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	1. Front exhaust pipe (with TWC) 2. Gas leakage from exhaust system 3. Air-Fuel Ratio (A/F) sensor (sensor 1) 4. Heated Oxygen (HO2) sensor (sensor 2)	Comes on	DTC stored	ES-182
P043E	Evaporative Emission System Reference Orifice Clog Up	1. Canister pump module (Reference orifice, leak detection pump, vent valve) 2. Connector / wire harness (Canister pump module - Hybrid vehicle control ECU) 3. EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) 4. Hybrid vehicle control ECU	Comes on	DTC stored	ES-189
P043F	Evaporative Emission System Reference Orifice High Flow	1. Canister pump module (Reference orifice, leak detection pump, vent valve) 2. Connector / wire harness (Canister pump module - Hybrid vehicle control ECU) 3. EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) 4. Hybrid vehicle control ECU	Comes on	DTC stored	ES-189

DTC Code	Detection Item	Trouble Area	MIL	Memory	See page
P0441	Evaporative Emission Control System Incorrect Purge Flow	1. EVAP VSV 2. Connector / wire harness (EVAP VSV - Hybrid vehicle control ECU) 3. Hybrid vehicle control ECU 4. Pump module 5. Leakage from EVAP system 6. Leakage from EVAP line (EVAP VSV - Intake manifold)	Comes on	DTC stored	ES-194
P0450	Evaporative Emission Control System Pressure Sensor / Switch	1. Pump module 2. Hybrid vehicle control ECU	Comes on	DTC stored	ES-201
P0451	Evaporative Emission Control System Pressure Sensor Range / Performance	1. Pump module 2. Connector / wire harness (Pump module - Hybrid vehicle control ECU) 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-201
P0452	Evaporative Emission Control System Pressure Sensor / Switch Low Input	1. Pump module 2. Connector / wire harness (Pump module - Hybrid vehicle control ECU) 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-201
P0453	Evaporative Emission Control System Pressure Sensor / Switch High Input	1. Pump module 2. Connector / wire harness (Pump module - Hybrid vehicle control ECU) 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-201
P0505	Idle Control System Malfunction	1. ETCS 2. Air induction system 3. PCV hose connections 4. Hybrid vehicle control ECU	Comes on	DTC stored	ES-210
P050A	Cold Start Idle Air Control System Performance	1. Throttle body assembly 2. Mass air flow meter 3. Air induction system 4. PCV hose connections 5. VVT system 6. Air cleaner filter element 7. Hybrid vehicle control ECU	Comes on	DTC stored	ES-214
P050B	Cold Start Ignition Timing Performance	1. Throttle body assembly 2. Mass air flow meter 3. Air induction system 4. PCV hose connections 5. VVT system 6. Air cleaner filter element 7. Hybrid vehicle control ECU	Comes on	DTC stored	ES-214
P0560	System Voltage	1. Open in back up power source circuit 2. Battery 3. Battery terminals 4. EFI MAIN fuse 5. Hybrid vehicle control ECU	Comes on	DTC stored	ES-220
P0604	Internal Control Module Random Access Memory (RAM) Error	Hybrid vehicle control ECU	Comes on	DTC stored	ES-224
P0606	ECM / PCM Processor	Hybrid vehicle control ECU	Comes on	DTC stored	ES-226
P0607	Control Module Performance	Hybrid vehicle control ECU	Comes on	DTC stored	ES-229
P0657	Actuator Supply Voltage Circuit / Open	Hybrid vehicle control ECU	Comes on	DTC stored	ES-231
P1420	Evaporative Emission Canister Small Leak	1. Leakage from EVAP line (Canister - Fuel vapor-containment valve) 2. Leakage from EVAP line (Purge VSV - Canister) 3. Pump module 4. Leakage from canister	Comes on	DTC stored	ES-233
P1421	Evaporative Emission Canister Gross Leak	Same above	Comes on	DTC stored	ES-233

DTC Code	Detection Item	Trouble Area	MIL	Memory	See page
P1422	Fuel Tank Small Leak	1. Leakage from EVAP line (Canister - Fuel vapor-containment valve) 2. Leakage from EVAP line (Purge VSV - Canister) 3. Pump module 4. Leakage from canister	Comes on	DTC stored	ES-238
P1423	Fuel Tank Gross Leak	Same above	Comes on	DTC stored	ES-238
P1450	Fuel Tank Pressure Sensor	1. Fuel tank pressure sensor 2. Hybrid vehicle control ECU	Comes on	DTC stored	ES-243
P1451	Fuel Tank Pressure Sensor Range/ Performance	1. Fuel tank pressure sensor 2. Connector / wire harness (Fuel tank pressure sensor - Hybrid vehicle control ECU) 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-243
P1452	Fuel Tank Pressure Sensor Low Input	1. Fuel tank pressure sensor 2. Connector / wire harness (Fuel tank pressure sensor - Hybrid vehicle control ECU) 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-243
P1453	Fuel Tank Pressure Sensor High Input	1. Fuel tank pressure sensor 2. Connector / wire harness (Fuel tank pressure sensor - Hybrid vehicle control ECU) 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-243
P2102	Throttle Actuator Control Motor Circuit Low	1. Open in throttle actuator circuit 2. Throttle actuator 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-252
P2103	Throttle Actuator Control Motor Circuit High	1. Short in throttle actuator circuit 2. Throttle actuator 3. Throttle valve 4. Throttle body assembly 5. Hybrid vehicle control ECU	Comes on	DTC stored	ES-252
P2111	Throttle Actuator Control System - Stuck Open	1. Throttle actuator 2. Throttle body 3. Throttle valve	Comes on	DTC stored	ES-256
P2112	Throttle Actuator Control System - Stuck Closed	1. Throttle actuator 2. Throttle body 3. Throttle valve	Comes on	DTC stored	ES-256
P2118	Throttle Actuator Control Motor Current Range / Performance	1. Open in ETCS power source circuit 2. Battery 3. Battery terminals 4. ETCS fuse 5. Hybrid vehicle control ECU	Comes on	DTC stored	ES-259
P2119	Throttle Actuator Control Throttle Body Range / Performance	1. ETCS 2. Hybrid vehicle control ECU	Comes on	DTC stored	ES-266
P2135	Throttle / Pedal Position Sensor / Switch "A" / "B" Voltage Correlation	1. Short between VTA1 and VTA2 circuits 2. TP sensor (built into throttle body) 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-104
P2195	Oxygen (A/F) Sensor Signal Stuck Lean (Bank 1 Sensor 1)	1. Open or short in A/F sensor (sensor 1) circuit 2. A/F sensor (sensor 1) 3. A/F sensor heater (sensor 1) 4. Integration relay (EFI MAIN relay) 5. A/F sensor heater and EFI MAIN relay circuits 6. Hybrid vehicle control ECU 7. A/F sensor	Comes on	DTC stored	ES-269

DTC Code	Detection Item	Trouble Area	MIL	Memory	See page
P2196	Oxygen (A/F) Sensor Signal Stuck Rich (Bank 1 Sensor 1)	1. Open or short in A/F sensor (sensor 1) circuit 2. A/F sensor (sensor 1) 2. A/F sensor heater (sensor 1) 3. Integration relay (EFI MAIN relay) 4. A/F sensor heater and EFI MAIN relay circuits 5. Hybrid vehicle control ECU 6. A/F sensor	Comes on	DTC stored	ES-269
P2238	Oxygen (A/F) Sensor Pumping Current Circuit Low (Bank 1 Sensor 1)	1. Open or short in A/F sensor (sensor 1) circuit 2. A/F sensor (sensor 1) 3. A/F sensor heater (sensor 1) 4. Integration relay (EFI MAIN relay) 5. A/F sensor heater and EFI MAIN relay circuits 6. Hybrid vehicle control ECU	Comes on	DTC stored	ES-283
P2239	Oxygen (A/F) Sensor Pumping Current Circuit High (Bank 1 Sensor 1)	1. Open or short in A/F sensor (sensor 1) circuit 2. A/F sensor (sensor 1) 3. A/F sensor heater (sensor 1) 4. Integration relay (EFI MAIN relay) 5. A/F sensor heater and EFI MAIN relay circuits 6. Hybrid vehicle control ECU	Comes on	DTC stored	ES-283
P2252	Oxygen (A/F) Sensor Reference Ground Circuit Low (Bank 1 Sensor 1)	1. Open or short in A/F sensor (sensor 1) circuit 2. A/F sensor (sensor 1) 3. A/F sensor heater (sensor 1) 4. Integration relay (EFI MAIN relay) 5. A/F sensor heater and EFI MAIN relay circuits 6. Hybrid vehicle control ECU	Comes on	DTC stored	ES-283
P2253	Oxygen (A/F) Sensor Reference Ground Circuit High (Bank 1 Sensor 1)	1. Open or short in A/F sensor (sensor 1) circuit 2. A/F sensor (sensor 1) 3. A/F sensor heater (sensor 1) 4. Integration relay (EFI MAIN relay) 5. A/F sensor heater and EFI MAIN relay circuits 6. Hybrid vehicle control ECU	Comes on	DTC stored	ES-283
P2401	Evaporative Emission Leak Detection Pump Stuck OFF	1. Canister pump module (Reference orifice, leak detection pump, vent valve) 2. Connector / wire harness (Canister pump module - Hybrid vehicle control ECU) 3. EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) 4. Hybrid vehicle control ECU	Comes on	DTC stored	ES-189
P2402	Evaporative Emission Leak Detection Pump Stuck ON	1. Canister pump module (Reference orifice, leak detection pump, vent valve) 2. Connector / wire harness (Canister pump module - Hybrid vehicle control ECU) 3. EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) 4. Hybrid vehicle control ECU	Comes on	DTC stored	ES-189

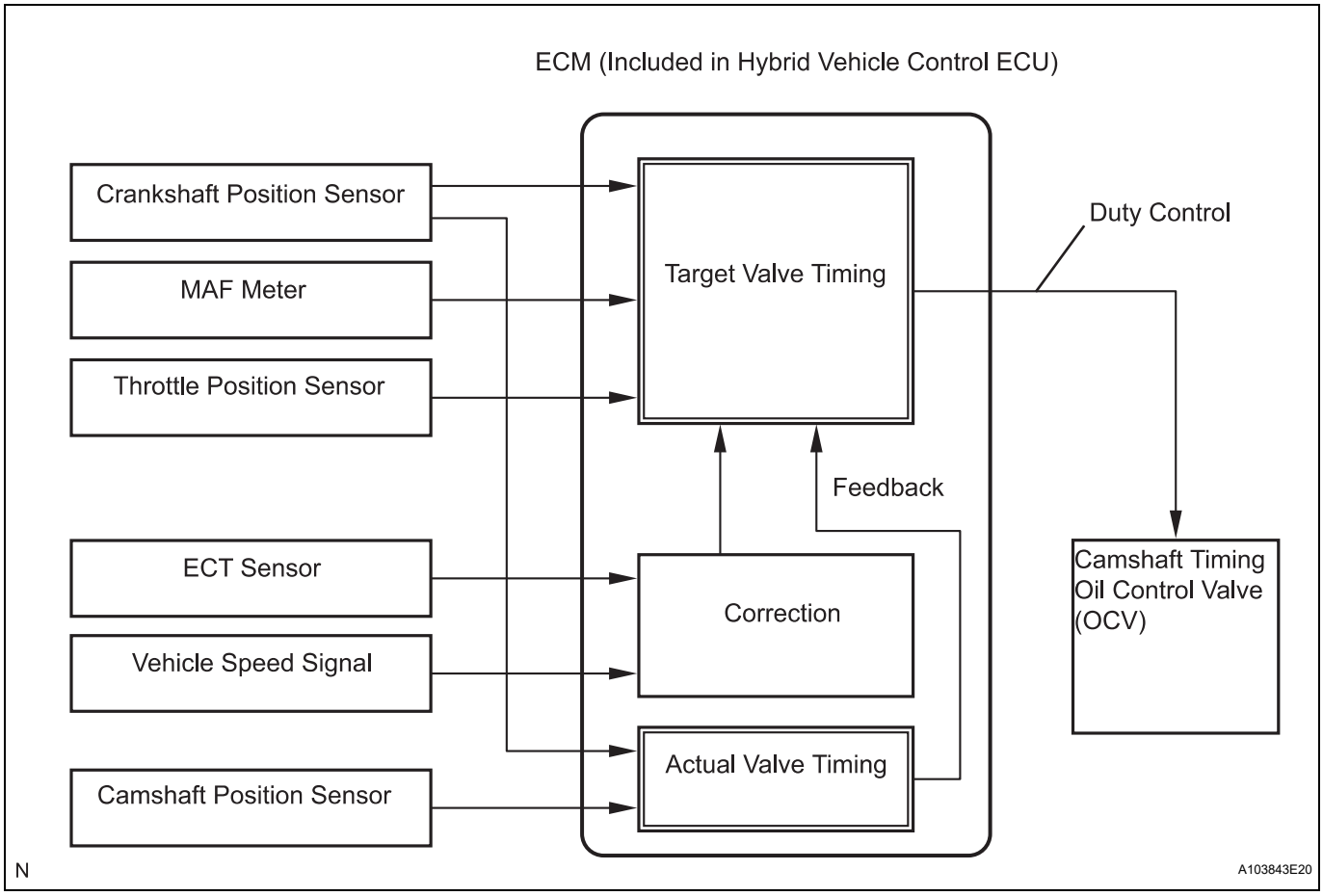
DTC Code	Detection Item	Trouble Area	MIL	Memory	See page
P2419	Evaporative Emission System Switching Valve Control Circuit Low	1. Canister pump module (Reference orifice, leak detection pump, vent valve) 2. Connector / wire harness (Canister pump module - Hybrid vehicle control ECU) 3. EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) 4. Hybrid vehicle control ECU	Comes on	DTC stored	ES-189
P2420	Evaporative Emission System Switching Valve Control Circuit High	1. Canister pump module (Reference orifice, leak detection pump, vent valve) 2. Connector / wire harness (Canister pump module - Hybrid vehicle control ECU) 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-289
P2450	Fuel Vapor-containment Valve Stuck Open	1. Fuel vapor-containment valve 2. Connector / wire harness (Fuel vapor-containment valve - Hybrid vehicle control ECU) 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-293
P2451	Fuel Vapor-containment Valve Stuck Close	1. Fuel vapor-containment valve 2. Connector / wire harness (Fuel vapor-containment valve - Hybrid vehicle control ECU) 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-293
P2610	ECM / PCM Internal Engine Off Timer Performance	Hybrid vehicle control ECU	Comes on	DTC stored	ES-298
P2A00	A/F Sensor Circuit Slow Response (Bank 1 Sensor 1)	1. Open or short in A/F sensor circuit 2. A/F sensor 3. Hybrid vehicle control ECU	Comes on	DTC stored	ES-300
P3190	Poor Engine Power	1. Air induction system 2. Throttle body 3. Fuel pressure 4. Engine 5. Mass air flow meter 6. Out of fuel 7. Engine coolant temperature sensor 8. Crankshaft position sensor 9. Camshaft position sensor 10. Hybrid vehicle control ECU	Comes on	DTC stored	ES-307
P3191	Engine does not Start	1. Air induction system 2. Throttle body 3. Fuel pressure 4. Engine 5. Mass air flow meter 6. Out of fuel 7. Engine coolant temperature sensor 8. Crankshaft position sensor 9. Camshaft position sensor 10. Hybrid vehicle control ECU	Comes on	DTC stored	ES-307
P3193	Fuel Run Out	1. Out of fuel 2. Hybrid vehicle control ECU	Comes on	DTC stored	ES-307
U0001	High Speed CAN Communication Circuit	Hybrid vehicle control ECU	Comes on	DTC stored	ES-314
U0293	Lost Communication with HV ECU	1. Wire harness 2. Hybrid vehicle control ECU	Comes on	DTC stored	ES-316

*1: Blinks when a terrible misfire is detected.

DTC	P0010	Camshaft Position "A" Actuator Circuit (Bank 1)

DESCRIPTION

The Variable Valve Timing (VVT) system includes the ECM (included in hybrid vehicle control ECU), OCV and VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal regulates the oil pressure supplied to the VVT controller. Camshaft timing control is performed according to engine operating conditions such as the intake air volume, throttle valve position and engine coolant temperature. The ECM controls the OCV, based on the signals transmitted by several sensors. The VVT controller regulates the intake camshaft angle using oil pressure through the OCV. As a result, the relative positions of the camshaft and crankshaft are optimized, the engine torque and fuel economy improve, and the exhaust emissions decrease under overall driving conditions. The ECM detects the actual intake valve timing using signals from the camshaft and crankshaft position sensors, and performs feedback control. This is how the target intake valve timing is verified by the ECM.



DTC No.	DTC Detection Conditions	Trouble Areas
P0010	Open or short in OCV circuit (1-trip detection logic)	• Open or short in OCV circuit • OCV • Hybrid vehicle control ECU

HINT:
This DTC relates to the Oil Control Valve (OCV).

MONITOR DESCRIPTION

The ECM optimizes the valve timing using the VVT system to control the intake camshaft. The VVT system includes the ECM, the OCV and the VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the intake camshaft.
After the ECM sends the target duty-cycle control signal to the OCV, the ECM monitors the OCV current to establish an actual duty-cycle. The ECM determines the existence of a malfunction and sets the DTC when the actual duty-cycle ratio varies from the target duty-cycle ratio.

MONITOR STRATEGY

Related DTCs	P0010: VVT OCV range check
Required Sensors/Components (Main)	VVT OCV
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	1 second
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None
All of following conditions met	-
Starter	OFF
Power switch	ON
Time after power switch OFF to ON	0.5 seconds or more

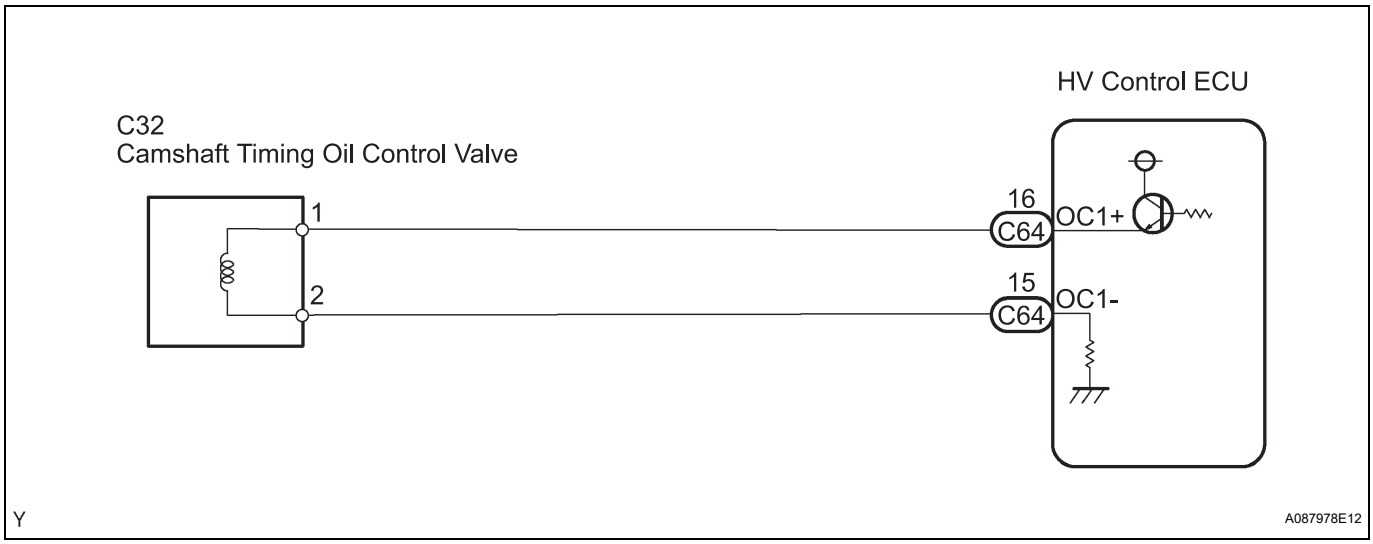
TYPICAL MALFUNCTION THRESHOLDS

One of following conditions met	-
A. All of following conditions met	-
Battery voltage	11 to 13 V
Target duty ratio	Less than 70%
Output signal duty ratio	100%
B. All of following conditions met	-
Battery voltage	13 V or more
Target duty ratio	Less than 80%
Output signal duty ratio	100%
C. Both of following conditions met	-
Current cut status	Not cut
Output signal duty ratio	3% or less

COMPONENT OPERATING RANGE

VVT OCV duty ratio	3 to 100%

WIRING DIAGRAM



ES

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM (include in hybrid vehicle control ECU) records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	PERFORM ACTIVE TEST USING INTELLIGENT TESTER (OPERATE OCV)

(a) Connect the intelligent tester to the DLC3.
(b) Put the engine in inspection mode (See page ES-35).
(c) Turn the tester on.
(d) Warm up the engine.
(e) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1.
(f) Check the engine speed while operating the Oil Control Valve (OCV) using the tester.

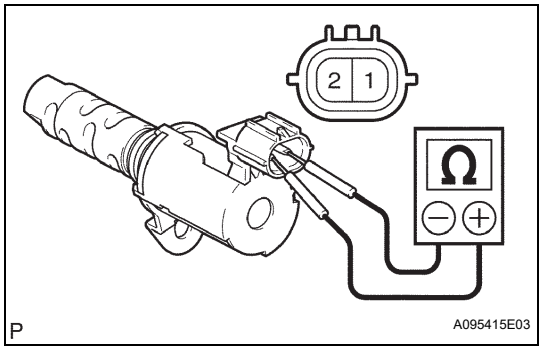
OK

Tester Operations	Specified Conditions
OCV OFF	Normal engine speed
OCV ON	Engine idles roughly or stalls (soon after OCV switched from OFF to ON)

OK → CHECK FOR INTERMITTENT PROBLEMS

NG

2 INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY



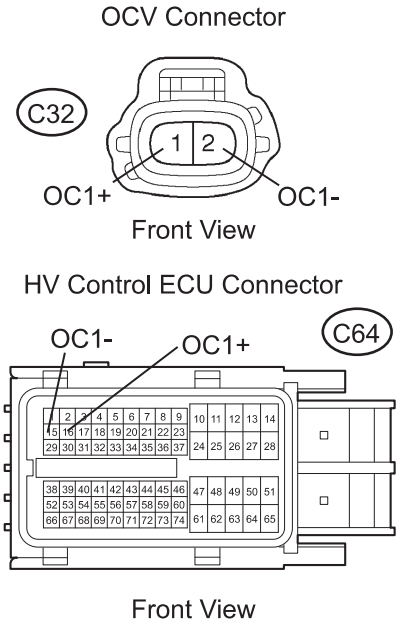
(a) Disconnect the C32 OCV connector.
(b) Measure the resistance between the terminals of the OCV.
Standard resistance:
6.9 to 7.9 Ω at 20°C (68°F)
(c) Reconnect the OCV connector.

NG → **REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY**

OK

3 CHECK HARNESS AND CONNECTOR (OCV - HV CONTROL ECU)

Wire Harness Side:



(a) Disconnect the C32 OCV connector.
(b) Disconnect the A61 hybrid vehicle control ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connections	Specified Conditions
C32-1 (OC1+) - C64-16 (OC1+)	Below 1 Ω
C32-2 (OC1-) - C64-15 (OC1-)	Below 1 Ω

Standard resistance (Check for short)

Tester Connections	Specified Conditions
C32-1 (OC1+) or C64-16 (OC1+) - Body ground	10 kΩ or higher
C32-2 (OC1-) or C64-15 (OC1-) - Body ground	10 kΩ or higher

(d) Reconnect the OCV connector.
(e) Reconnect the hybrid vehicle control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU

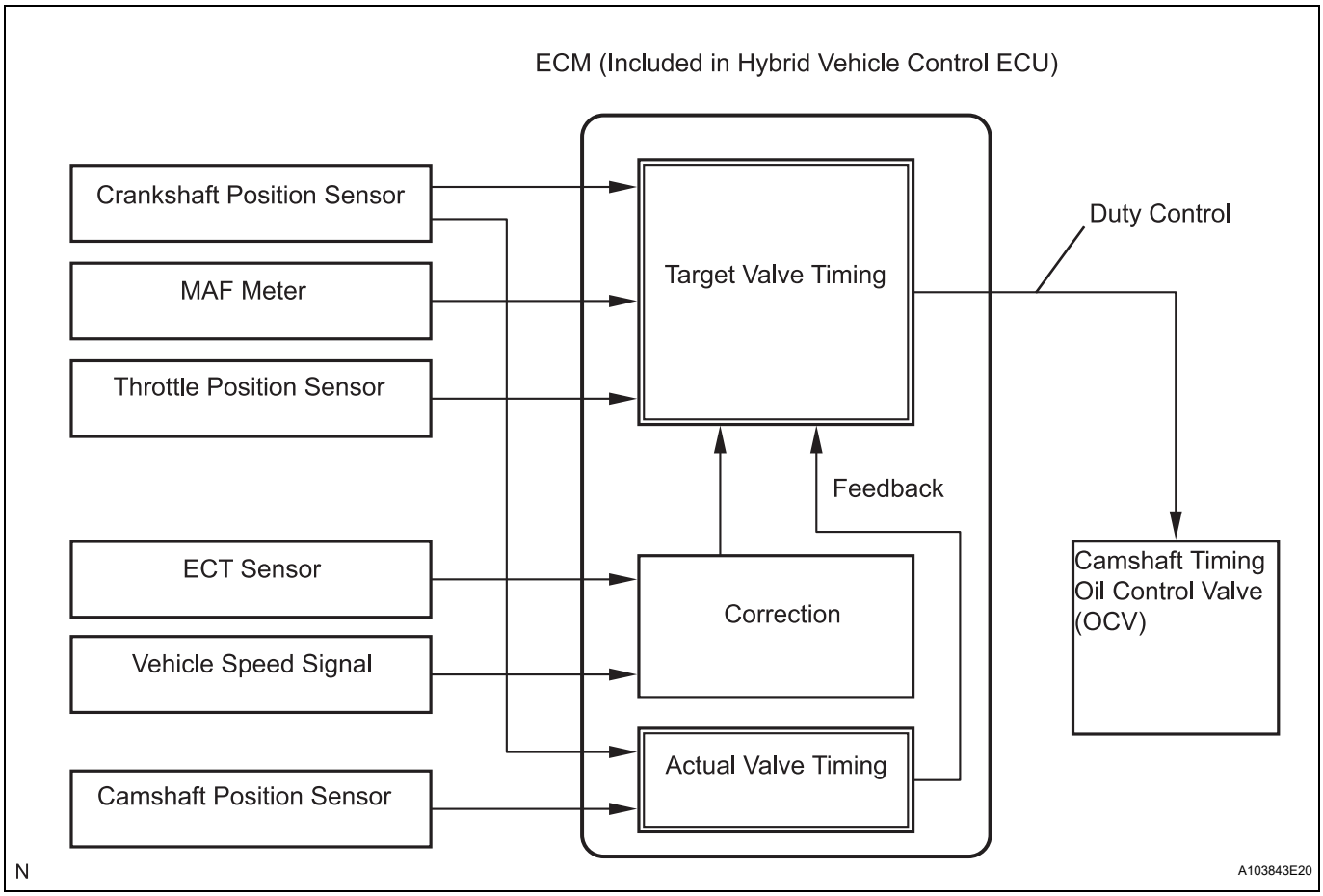
ES

DTC	P0011	Camshaft Position "A" - Timing Over-Advanced or System Performance (Bank 1)

DTC	P0012	Camshaft Position "A" - Timing Over-Retarded (Bank 1)

DESCRIPTION

The VVT system includes the ECM (include in hybrid vehicle control ECU), Oil Control Valve (OCV) and VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal regulates the oil pressure supplied to the VVT controller. Camshaft timing control is performed according to engine operating conditions such as the intake air volume, throttle valve position and engine coolant temperature. The ECM controls the OCV, based on the signals transmitted by several sensors. The VVT controller regulates the intake camshaft angle using oil pressure through the OCV. As a result, the relative positions of the camshaft and crankshaft are optimized, the engine torque and fuel economy improve, and the exhaust emissions decrease under overall driving conditions. The ECM detects the actual intake valve timing using signals from the camshaft and crankshaft position sensors, and performs feedback control. This is how the target intake valve timing is verified by the ECM.



DTC No.	DTC Detection Conditions	Trouble Areas
P0011	Advanced camshaft timing: With warm engine and engine speed of between 800 rpm and 4,000 rpm, all conditions (1), (2) and (3) met (1-trip detection logic): 1. Difference between target and actual intake valve timings more than 5°CA (Crankshaft Angle) for 4.5 seconds 2. Current intake valve timing fixed (timing changes less than 5°CA in 5 seconds) 3. Variations in VVT controller timing more than 19°CA of maximum delayed timing (malfunction in advance timing)	• Valve timing • OCV • OCV filter • Camshaft timing gear assembly • Hybrid vehicle control ECU
P0012	Retarded camshaft timing: With warm engine and engine speed of between 800 rpm and 4,000 rpm, all conditions (1), (2) and (3) met (2-trip detection logic): 1. Difference between target and actual intake valve timings more than 5°CA (Crankshaft Angle) for 4.5 seconds 2. Current intake valve timing fixed (timing changes less than 5°CA in 5 seconds) 3. Variations in VVT controller timing 19°CA or less of maximum delayed timing (malfunction in retarded timing)	• Valve timing • OCV • OCV filter • Camshaft timing gear assembly • Hybrid vehicle control ECU

ES

MONITOR DESCRIPTION

The ECM optimizes the intake valve timing using the VVT (Variable Valve Timing) system to control the intake camshaft. The VVT system includes the ECM, the Oil Control Valve (OCV) and the VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the intake camshaft. If the difference between the target and actual intake valve timings is large, and changes in the actual intake valve timing are small, the ECM interprets this as a VVT controller stuck malfunction and sets a DTC.

Example:

A DTC is set when the following conditions 1, 2 and 3 are met:

1. The difference between the target and actual intake valve timing is more than 5°CA (Crankshaft Angle) and the condition continues for more than 4.5 seconds.
2. It takes 5 seconds or more to change the valve timing by 5°CA.
3. After above conditions 1 and 2 are met, the OCV is forcibly activated 63 times or more.

DTC P0011 (Advanced Cam Timing) is subject to 1-trip detection logic.

DTC P0012 (Retarded Cam Timing) is subject to 2-trip detection logic.

These DTCs indicate that the VVT controller cannot operate properly due to OCV malfunctions or presence of foreign objects in the OCV.

The monitor will run if all of the following conditions are met:

– The engine is warm (the engine coolant temperature is 75°C [167°F] or more).
– The vehicle has been driven at more than 40 mph (64 km/h) for 3 minutes.
– The engine has idled for 3 minutes.

MONITOR STRATEGY

Related DTCs	P0011: Advanced camshaft timing P0012: Retarded camshaft timing
Required Sensors/Components (Main)	VVT OCV and VVT Actuator
Required Sensors/Components (Related)	Crankshaft position sensor, camshaft position sensor and engine coolant temperature sensor
Frequency of Operation	Once per driving cycle
Duration	Within 10 seconds

MIL Operation	Advanced camshaft timing: Immediate Retarded camshaft timing: 2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	P0100 - P0103 (MAF meter) P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0335 (CKP sensor) P0340 (CMP sensor) P0351 - P0354 (Igniter)
Battery voltage	11 V or more
Engine RPM	800 to 4,000 rpm
ECT	75°C (167°F) to 100°C (212°F)

TYPICAL MALFUNCTION THRESHOLDS

Advanced camshaft timing:

All of following conditions met	-
Crank angle between reference position and actual intake camshaft angle	62°CA or more
Valve timing	No change at advanced valve timing

Retard camshaft timing:

All of following conditions met	-
Crank angle between reference point and actual intake camshaft angle	Less than 62°CA
Valve timing	No change at retarded valve timing

If the difference between the target and actual camshaft timings is greater than the specified value, the ECM operates the VVT actuator.
Then, the ECM monitors the camshaft timing change for 5 seconds.

WIRING DIAGRAM

Refer to DTC P0010 (See page ES-56).

INSPECTION PROCEDURE

NOTICE:
DTC P0011 or P0012 may be set when foreign objects in the engine oil are caught in some parts of the system. The DTC will remain set even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.
HINT:
If DTC P0011 or P0012 is present, check the VVT (Variable Valve Timing) system.
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0011 OR P0012)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

(d) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0011 or P0012	A
P0011 or P0012 and other DTCs	B

HINT:
If any DTCs other than P0011 or P0012 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

ES

2 PERFORM ACTIVE TEST USING INTELLIGENT TESTER (OPERATE OCV)

(a) Connect the intelligent tester to the DLC3.
(b) Put the engine in inspection mode (See page ES-35).
(c) Turn the tester on.
(d) Warm up the engine.
(e) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1.
(f) Check the engine speed while operating the Oil Control Valve (OCV) using the tester.

OK

Tester Operations	Specified Conditions
OCV OFF	Normal engine speed
OCV ON	Engine idles roughly or stalls (soon after OCV switched from OFF to ON)

NG → Go to step 4

OK

3 CHECK WHETHER DTC OUTPUT RECURS (DTC P0011 OR P0012)

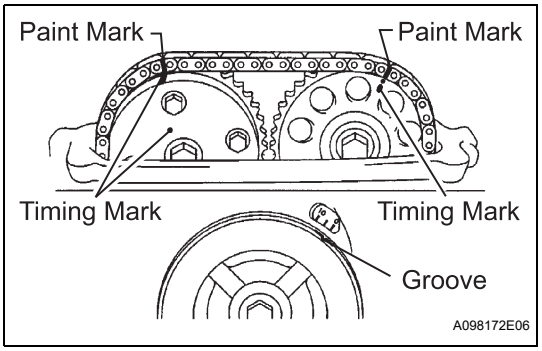
(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Clear the DTCs (See page ES-31).
(d) Put the engine in inspection mode (See page ES-35).
(e) Warm up the engine.
(f) Switch the hybrid vehicle control ECU from normal mode to check mode using the tester.
(g) Drive the vehicle for more than 10 minutes.
(h) Read the DTCs using the tester.
OK:
No DTC output.

NG → Go to step 4

OK

END

4	CHECK VALVE TIMING (CHECK FOR LOOSE AND JUMPED TEETH ON TIMING CHAIN)

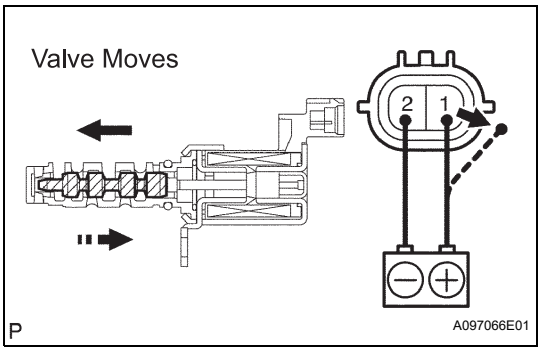


(a) Remove the cylinder head cover.
(b) Turn the crankshaft pulley, and align its groove with the timing mark "0" on the timing chain cover.
(c) Check that the timing marks on the camshaft timing sprocket and camshaft timing gear are facing upward as shown in the illustration.
If not, turn the crankshaft 1 revolution (360°), then align the marks as above.
OK:
Timing marks on camshaft timing gears are aligned as shown in the illustration.
(d) Reinstall the cylinder head cover.

NG → **ADJUST VALVE TIMING**

OK

5	INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (OCV)

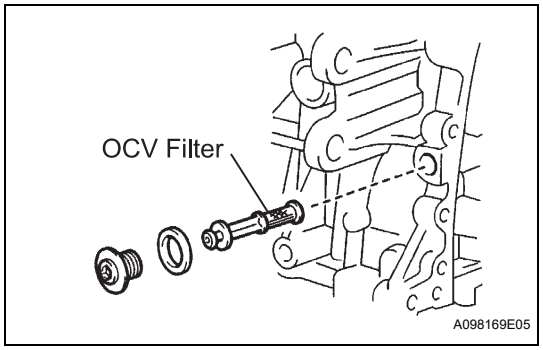


(a) Remove the OCV.
(b) Measure the resistance between the terminals of the OCV.
Standard resistance:
6.9 to 7.9 Ω at 20°C (68°F)
(c) Apply positive battery voltage to terminal 1 and negative battery voltage to terminal 2. Check the valve operation.
OK:
Valve moves quickly.
(d) Reinstall the OCV.

NG → **REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY**

OK

6	INSPECT OIL CONTROL VALVE FILTER



(a) Remove the generator.
(b) Remove the OCV filter.
(c) Check that the filter is not clogged.
OK:
Filter is not clogged.
(d) Reinstall the OCV filter.
(e) Reinstall the generator.

NG → **CLEAN OIL CONTROL VALVE FILTER**

ES

OK

7	REPLACE CAMSHAFT TIMING GEAR ASSEMBLY

NEXT

8	CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Clear the DTCs (See page ES-31).
(d) Put the engine in inspection mode (See page ES-35).
(e) Warm up the engine.
(f) Switch the hybrid vehicle control ECU from normal mode to check mode using the tester.
(g) Drive the vehicle for more than 10 minutes.
(h) Read the output DTCs using the tester.
Standard:
No DTC output.
HINT:
DTC P0011 or P0012 is output when foreign objects in engine oil are caught in some parts of the system. These codes will stay registered even if the system returns to normal after a short time. These foreign objects are then captured by the oil filter, thus eliminating the source of the problem.

OK → **SYSTEM IS OK**

NG

REPLACE HYBRID VEHICLE CONTROL ECU

DTC	P0016	Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor A)

DESCRIPTION

In the VVT (Variable Valve Timing) system, the appropriate intake valve open and close timing is controlled by the ECM (included in hybrid vehicle control ECU). The ECM performs intake valve control by performing the following: 1) controlling the camshaft and camshaft timing oil control valve, and operating the camshaft timing gear; and 2) changing the relative positions of the gaps between the camshaft and crankshaft.

DTC No.	DTC Detection Conditions	Trouble Areas
P0016	Deviation in crankshaft and camshaft position sensor signals (2-trip detection logic)	• Mechanical system (Timing chain has jumped tooth or chain stretched) • Hybrid vehicle control ECU

ES

MONITOR DESCRIPTION

The ECM optimizes the valve timing by using the VVT (Variable Valve Timing) system to control the intake camshaft. The VVT system includes the ECM, the Oil Control Valve (OCV) and the VVT controller.
The ECM sends a target duty-cycle control signal to the OCV. This control signal regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the intake camshaft.
The ECM calibrates the intake valve timing by setting the intake camshaft to the most retarded angle while the engine is idling. The ECM closes the OCV to retard the cam. The ECM stores this value as the VVT learning value. When the difference between the target and actual intake valve timings is 5°CA (Crankshaft Angle) or less, the ECM stores it.
If the VVT learning value matches the following conditions, the ECM determines the existence of a malfunction in the VVT system, and sets the DTC.

- VVT learning value: Less than 25°CA, or more than 51°CA.
- Above condition continues for 18 seconds or more.

This DTC indicates that the angle between the intake camshaft and the crankshaft is incorrect due to factors such as the timing chain having jumped a tooth.
This monitor begins to run after the engine has idled for 5 minutes.

MONITOR STRATEGY

Related DTCs	P0016: Camshaft timing misalignment at idling
Required Sensors/Components	VVT actuator
Required Sensors/Components	Camshaft position sensor, Crankshaft position sensor
Frequency of Operation	Once per driving cycle
Duration	Within 1 minute
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	P0011 (VVT system 1 - advance) P0012 (VVT system 1 - retarded) P0115 - P0118 (ECT sensor)
Engine RPM	800 to 1,000 rpm

TYPICAL MALFUNCTION THRESHOLDS

One of following conditions met	-
VVT learning value when camshaft maximum retarded	Less than 27.8°CA

VVT learning value when camshaft maximum retarded	More than 48°CA

WIRING DIAGRAM

Refer to DTC P0335 (See page ES-163).

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

ES

1	**CHECK VALVE TIMING (CHECK FOR LOOSE AND JUMPED TOOTH OF TIMING CHAIN) (See page ES-68)**

NG → **Go to step 3**

OK

2	**REPLACE HYBRID VEHICLE CONTROL ECU**

NEXT → **Go to step 4**

3	**ADJUST VALVE TIMING**

NEXT

4	**CHECK WHETHER DTC OUTPUT RECURS**

NOTICE:

After replacing the hybrid vehicle control ECU or adjusting intake valve timing, confirm that the DTC output does not recur.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Clear DTCs (See page ES-31).
(e) Switch the hybrid vehicle control ECU from normal mode to check mode using the tester (See page ES-34).
(f) Put the engine in inspection mode (See page ES-35).
(g) Warm up the engine.
(h) Allow the engine to idle for 1 minute or more, and then drive the vehicle for 1 minute or more.
(i) Confirm that no DTC is set, using the tester.

OK:

No DTC output

NEXT

END

DTC	P0031	Oxygen (A/F) Sensor Heater Control Circuit Low (Bank 1 Sensor 1)

DTC	P0032	Oxygen (A/F) Sensor Heater Control Circuit High (Bank 1 Sensor 1)

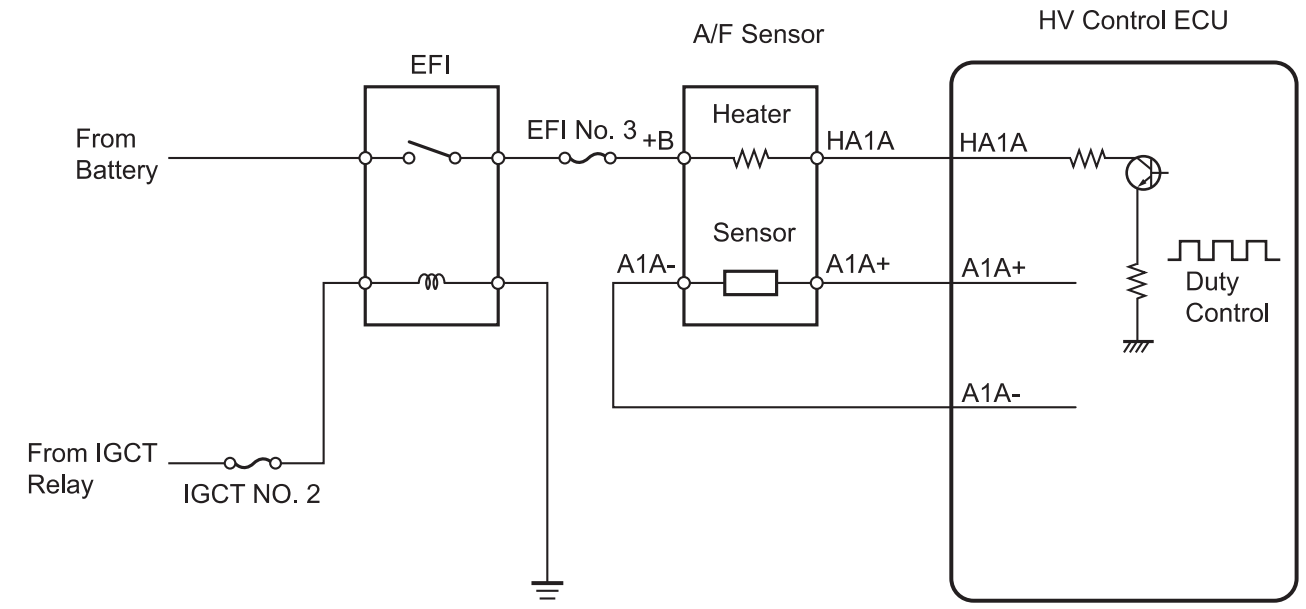
HINT:
- Although the DTC titles say oxygen sensor, these DTCs relate to the Air-Fuel Ratio (A/F) sensor.
- Sensor 1 refers to the sensor mounted in front of the Three-Way Catalytic Converter (TWC) and located near the engine assembly.

ES

DESCRIPTION

Refer to DTC P2195 (See page ES-269).
HINT:
- When either of these DTCs is set, the ECM (included in hybrid vehicle control ECU) enters fail-safe mode. In fail-safe mode, the ECM turns off the A/F sensor heater. Fail-safe mode continues until the power switch is turned off.
- The ECM provides a pulse width modulated control circuit to adjust the current through the heater. The A/F sensor heater circuit uses a relay on the B+ side of the circuit.

Reference (System Diagram of Bank 1 Sensor 1):



DTC No.	DTC Detection Conditions	Trouble Areas
P0031	Air-Fuel Ratio (A/F) sensor heater current less than 0.8 A (1-trip detection logic)	• Open in A/F sensor heater circuit • A/F sensor heater (sensor 1) • Integration relay (EFI MAIN relay) • Hybrid vehicle control ECU
P0032	Air-Fuel Ratio (A/F) sensor heater current more than 10 A (1-trip detection logic)	• Short in A/F sensor heater circuit • A/F sensor heater (sensor 1) • Integration relay (EFI MAIN relay) • Hybrid vehicle control ECU

MONITOR DESCRIPTION

The ECM uses information from the Air-Fuel Ratio (A/F) sensor to regulate the air-fuel ratio and keep it close to the stoichiometric level. This maximizes the ability of the Three-Way Catalytic Converter (TWC) to purify the exhaust gases.

The A/F sensor detects oxygen levels in the exhaust gas and transmits the information to the ECM. The inner surface of the sensor element is exposed to the outside air. The outer surface of the sensor element is exposed to the exhaust gas. The sensor element is made of platinum coated zirconia and includes an integrated heating element.

The zirconia element generates a small voltage when there is a large difference in the oxygen concentrations between the exhaust gas and outside air. The platinum coating amplifies this voltage generation.

The A/F sensor is more efficient when heated. When the exhaust gas temperature is low, the sensor cannot generate useful voltage signals without supplementary heating. The ECM regulates the supplementary heating using a duty-cycle approach to adjust the average current in the sensor heater element. If the heater current is outside the normal range, the signal transmitted by the A/F sensor becomes inaccurate, as a result, the ECM is unable to regulate air-fuel ratio properly.

When the current in the A/F sensor heater is outside the normal operating range, the ECM interprets this as a malfunction in the sensor heater and sets a DTC.

Example:

The ECM sets DTC P0032 when the current in the A/F sensor heater is more than 10 A. Conversely, when the heater current is less than 0.8 A, DTC P0031 is set.

MONITOR STRATEGY

Related DTCs	P0031: A/F sensor heater open/short (Low electrical current) P0032: A/F sensor heater open/short (High electrical current)
Required Sensors/Components (Main)	A/F sensor heater
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	10 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs not present	None

P0031:

Battery voltage	10.5 V or more
A/F sensor heater duty-cycle ratio	50% or more
Time after engine start	10 seconds or more

P0032:

Time after engine start	10 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

P0031:

A/F sensor heater current	Less than 0.8 A

P0032:

A/F sensor heater current	More than 10 A

COMPONENT OPERATING RANGE

A/F sensor heater current	0.9 to 9.9 A

WIRING DIAGRAM

Refer to DTC P2195 (See page ES-273).

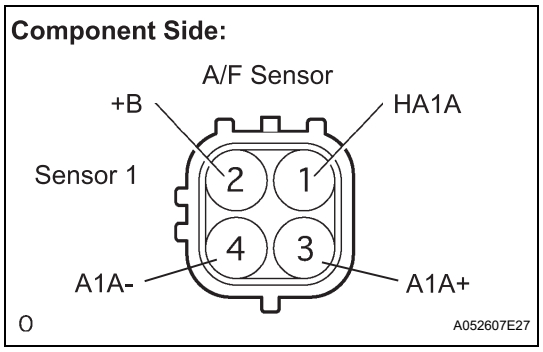
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

ES

1 INSPECT AIR-FUEL RATIO SENSOR (HEATER RESISTANCE)



(a) Disconnect the C15 A/F sensor connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

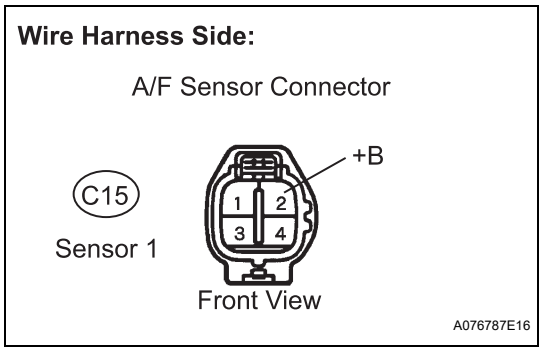
Tester Connections	Specified Conditions
1 (HA1A) - 2 (+B)	1.8 to 3.4 Ω at 20°C (68°F)
1 (HA1A) - 4 (A1A-)	10 kΩ or higher

(c) Reconnect the A/F sensor connector.

NG → REPLACE AIR-FUEL RATIO SENSOR

OK

2 CHECK TERMINAL VOLTAGE (+B OF A/F SENSOR)



(a) Disconnect the C15 A/F sensor connector.

(b) Turn the power switch on (IG).

(c) Measure the voltage between the terminal of the C15 A/F sensor connector and body ground.

Standard voltage

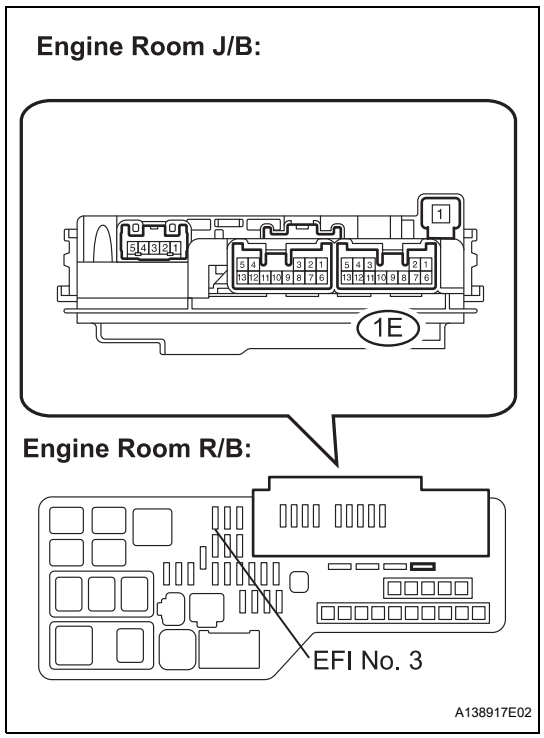
Tester Connections	Specified Conditions
C15-2 (+B) - Body ground	9 to 14 V

(d) Reconnect the A/F sensor connector.

OK → Go to step 5

NG

3	INSPECT INTEGRATION RELAY (EFI RELAY)



(a) Remove the integration relay from the engine room R/B and J/B.
(b) Inspect the EFI No. 3 fuse.
  (1) Remove the EFI No. 3 fuse from the integration relay.
  (2) Measure the EFI No. 3 fuse resistance.
    Standard resistance:
    Below 1 Ω
  (3) Reinstall the EFI No. 3 fuse.
(c) Inspect the EFI relay.
  (1) Measure the EFI relay resistance.
    Standard resistance

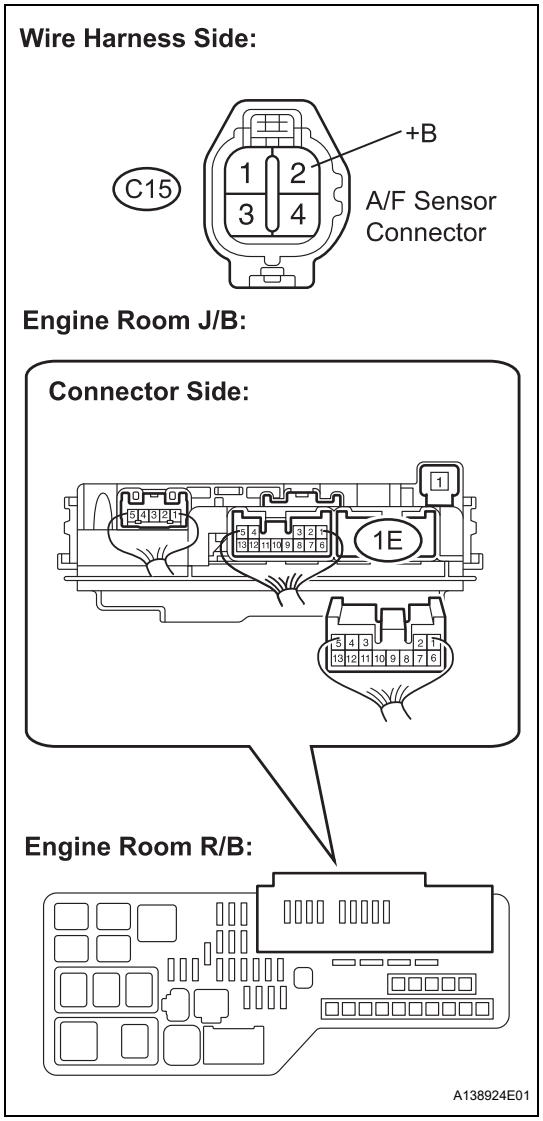
Tester Connections	Specified Conditions
1E-7 - 1E-12	10 kΩ or higher
	Below 1 Ω (Apply battery voltage between terminals 1E-9 and 1E-10)

(d) Reinstall the integration relay.

NG → **REPLACE INTEGRATION RELAY**

OK

4	CHECK HARNESS AND CONNECTOR (A/F SENSOR - EFI RELAY)



(a) Disconnect the C15 A/F sensor connector.
(b) Remove the integration relay from the engine room R/B and J/B.
(c) Measure the resistance.

Standard resistance (Check for open)

Tester Connections	Specified Conditions
C15-2 (+B) - 1E-7 (Engine room R/B and J/B)	Below 1 Ω

Standard resistance (Check for short)

Tester Connections	Specified Conditions
C15-2 (+B) or 1E-7 (Engine room R/B and J/B) - Body ground	10 kΩ or higher

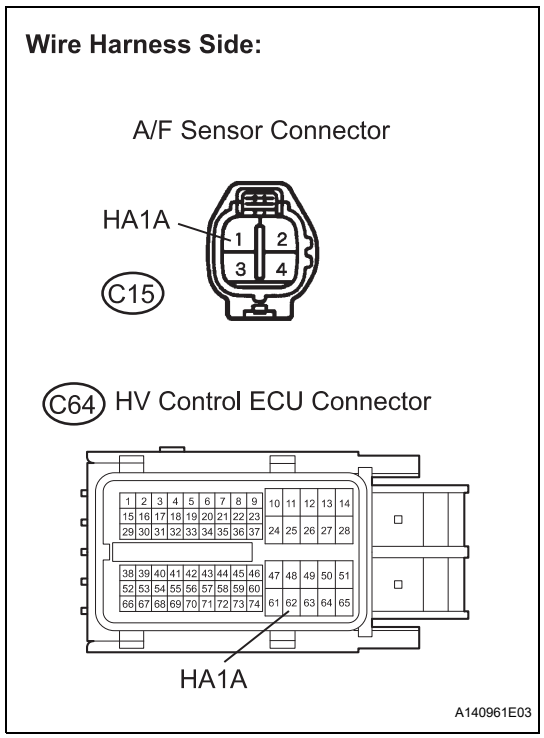
(d) Reconnect the A/F sensor connector.
(e) Reinstall the integration relay.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK ECM POWER SOURCE CIRCUIT

5	CHECK HARNESS AND CONNECTOR (A/F SENSOR - HV CONTROL ECU)



(a) Disconnect the C15 A/F sensor connector.
(b) Disconnect the C64 hybrid vehicle control ECU connector.
(c) Measure the resistance.

Standard resistance (Check for open)

Tester Connections	Specified Conditions
C15-1 (HA1A) - C64-62 (HA1A)	Below 1 Ω

Standard resistance (Check for short)

Tester Connections	Specified Conditions
C15-1 (HA1A) or C64-62 (HA1A) - Body ground	10 kΩ or higher

(d) Reconnect the A/F sensor connector.
(e) Reconnect the hybrid vehicle control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6	CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-31).
(e) Put the engine in inspection mode (See page ES-35).
(f) Allow the engine to idle for 1 minute or more.
(g) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(h) Read the DTCs.

Result

Display (DTC Output)	Proceed to
No output	A
P0031 or P0032	B

B → **REPLACE HYBRID VEHICLE CONTROL ECU**

A

CHECK FOR INTERMITTENT PROBLEMS

DTC	P0037	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)

DTC	P0038	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)

DTC	P0141	Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)

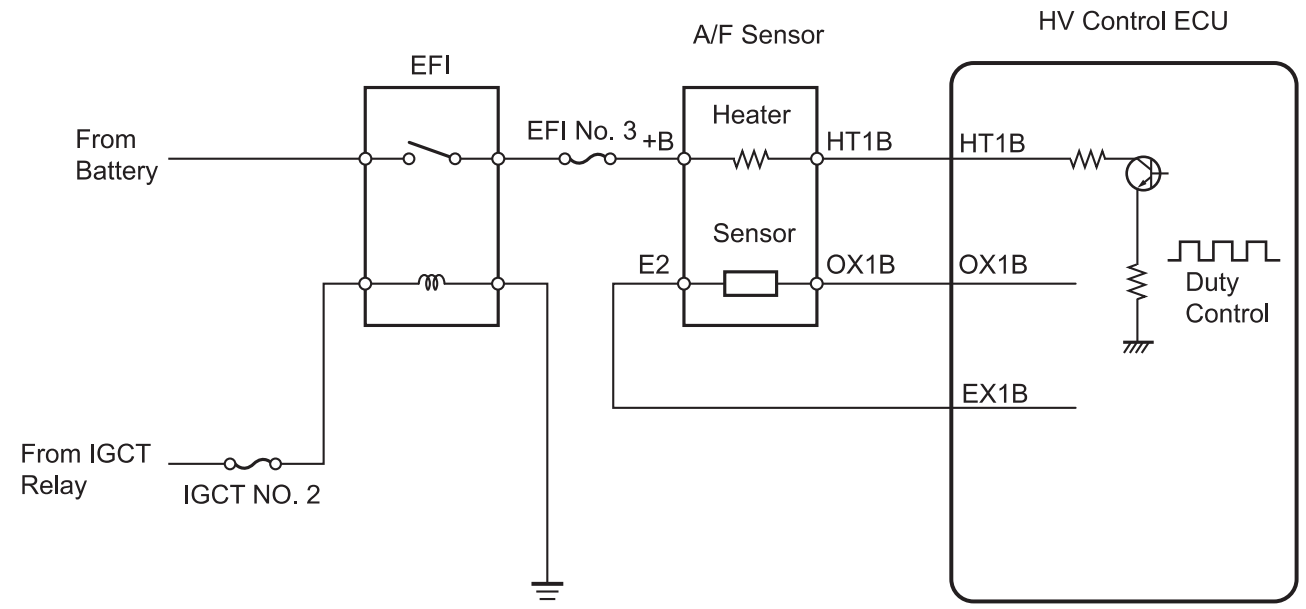
DESCRIPTION

Refer to DTC P0136 (See page ES-119).

HINT:

- When any of these DTCs are set, the ECM (included in hybrid vehicle control ECU) enters fail-safe mode. In fail-safe mode, the ECM turns off the Heated Oxygen (HO2) Sensor heater. Fail-safe mode continues until the power switch is turned off.
- The ECM provides a pulse width modulated control circuit to adjust the current through the heater. The HO2 sensor heater circuit uses a relay on the B+ side of the circuit.

Reference (System Diagram of Bank 1 Sensor 2):



DTC No.	DTC Detection Conditions	Trouble Areas
P0037	Heated Oxygen (HO2) sensor heater current less than 0.3 A (1-trip detection logic)	• Open in HO2 sensor heater circuit • HO2 sensor heater (sensor 2) • Integration relay (EFI MAIN relay) • Hybrid vehicle control ECU
P0038	Heated Oxygen (HO2) sensor heater current more than 2 A (1-trip detection logic)	• Short in HO2 sensor heater circuit • HO2 sensor heater (sensor 2) • Integration relay (EFI MAIN relay) • Hybrid vehicle control ECU
P0141	Cumulative heater resistance correction value exceeds the acceptable threshold. (2-trip detection logic)	• HO2 sensor heater • Hybrid vehicle control ECU

MONITOR DESCRIPTION

The sensing position of the Heated Oxygen (HO2) sensor has a zirconia element which is used to detect the oxygen concentration in the exhaust gas. If the zirconia element is at the appropriate temperature, and the difference between the oxygen concentrations surrounding the inside and outside surfaces of the sensor is large, the zirconia element generates voltage signals. In order to increase the oxygen concentration detecting capacity of the zirconia element, the ECM supplements the heat from the exhaust with heat from a heating element inside the sensor.

Heated oxygen sensor heater range check (P0037 and P0038):

The ECM monitors the current applied to the O2 sensor heater to check the heater for malfunctions. If the current is below the threshold value, the ECM determines that there is an open circuit in the heater. If the current is above the threshold value, the ECM determines that there is a short circuit in the heater.

The ECM constantly monitors the current applied to the heater. If the ECM detects an open or short circuit, the ECM turns the MIL on and sets a DTC.

If a malfunction is detected, the ECM cuts off the current applied to the heater.

Example:

The ECM sets DTC P0038 when the current in the HO2 sensor heater is more than 2 A. Conversely, when the heater current is less than 0.3 A, DTC P0037 is set.

MONITOR STRATEGY

Related DTCs	P0037: Heated oxygen sensor heater range check (Low electrical current) P0038: Heated oxygen sensor heater range check (High electrical current) P0141: Heated oxygen sensor heater performance
Required Sensors/Components (Main)	Heated oxygen sensor heater
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous: P0037 and P0038 Once per driving cycle: P0141
Duration	1 second: P0037 and P0038 10 seconds: P0141
MIL Operation	Immediate: P0037 and P0038 2 driving cycles: P0141
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs not present	None

P0037:

Battery voltage	10.5 to 20 V

P0038:

Battery voltage	10.5 to 20 V

TYPICAL MALFUNCTION THRESHOLDS

P0037:

Heater current	Less than 0.3 A

P0038:

Heater current	More than 2 A

COMPONENT OPERATING RANGE

Heated Oxygen (HO2) sensor heater current	0.4 to 1 A (when engine idles, HO2 sensor warmed up and battery voltage 11 to 14 V)

WIRING DIAGRAM

Refer to DTC P0136 (See page ES-126).

CONFIRMATION DRIVING PATTERN

These DTCs are detected when the engine idles for 110 seconds or more.

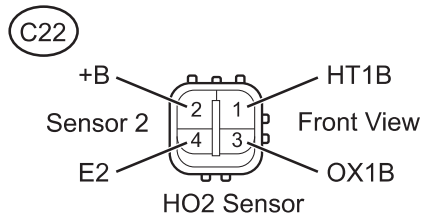
INSPECTION PROCEDURE

HINT:
Sensor 2 refers to the sensor mounted behind the Three-Way Catalytic Converter (TWC) and located far from the engine assembly.
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

ES

1 INSPECT HEATED OXYGEN SENSOR (HEATER RESISTANCE)

Component Side :



A115661E07

(a) Disconnect the C22 Heated Oxygen (HO2) sensor connector.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connections	Specified Conditions
1 (HT1B) - 2 (+B)	11 to 16 Ω at 20°C (68°F)
1 (HT1B) - 4 (E2)	10 kΩ or higher

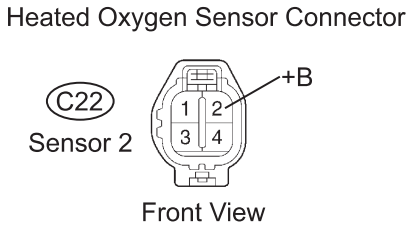
(c) Reconnect the HO2 sensor connector.

NG → REPLACE HEATED OXYGEN SENSOR

OK

2 CHECK TERMINAL VOLTAGE (+B OF HO2 SENSOR)

Wire Harness Side:



A072895E14

(a) Disconnect the C22 HO2 sensor connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage between the terminals of the C22 HO2 sensor connector and body ground.
Standard voltage

Tester Connections	Specified Conditions
C22-2 (+B) - Body ground	9 to 14 V

(d) Reconnect the HO2 sensor connector.

OK → Go to step 5

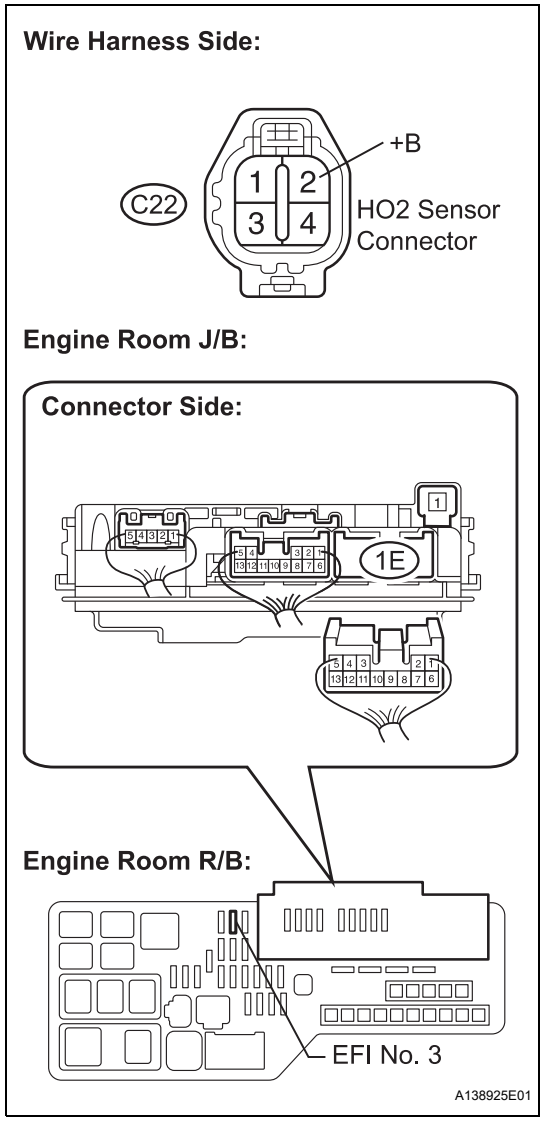
NG

3	INSPECT INTEGRATION RELAY (EFI RELAY) (See page ES-76)

NG → REPLACE INTEGRATION RELAY

OK

4	CHECK HARNESS AND CONNECTOR (HO2 SENSOR - EFI RELAY)



(a) Check the EFI No. 3 fuse.
(b) Disconnect the C22 HO2 sensor connector.
(c) Remove the integration relay from the engine room R/B and J/B.
(d) Measure the resistance.

Standard resistance (Check for open)

Tester Connections	Specified Conditions
C22-2 (+B) - 1E-6 (Engine room R/B and J/B)	Below 1 Ω

Standard resistance (Check for short)

Tester Connections	Specified Conditions
C22-2 (+B) or 1E-6 (Engine room R/B and J/B) - Body ground	10 kΩ or higher

(e) Reconnect the HO2 sensor connector.
(f) Reinstall the integration relay.

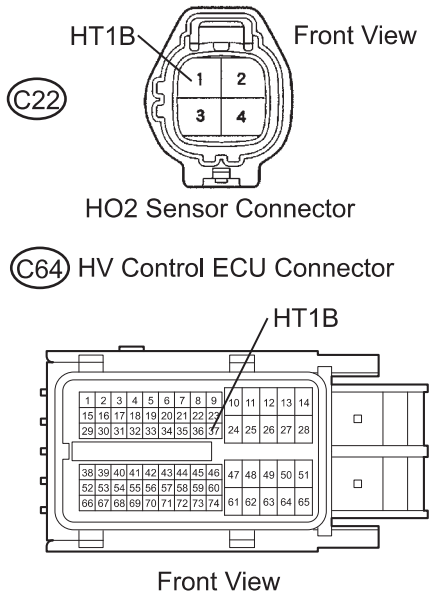
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

CHECK ECM POWER SOURCE CIRCUIT

5 CHECK HARNESS AND CONNECTOR (HO2 SENSOR - HV CONTROL ECU)

Wire Harness Side:



(a) Disconnect the C22 HO2 sensor connector.
(b) Disconnect the C64 hybrid vehicle control ECU connector.
(c) Measure the resistance.

Standard resistance (Check for open)

Tester Connections	Specified Conditions
C22-1 (HT1B) - C64-37 (HT1B)	Below 1 Ω

Standard resistance (Check for short)

Tester Connections	Specified Conditions
C22-1 (HT1B) or C64-37 (HT1B) - Body ground	10 kΩ or higher

(d) Reconnect the HO2 sensor connector.
(e) Reconnect the hybrid vehicle control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-31).
(e) Put the engine in inspection mode (See page ES-35).
(f) Allow the engine to idle for 2 minutes or more.
(g) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(h) Read the DTCs.

Result

Display (DTC Output)	Proceed to
No output	A
P0037 and/or P0038	B

B → **REPLACE HYBRID VEHICLE CONTROL ECU**

A

CHECK FOR INTERMITTENT PROBLEMS

DTC	P0100	Mass or Volume Air Flow Circuit

DTC	P0102	Mass or Volume Air Flow Circuit Low Input

DTC	P0103	Mass or Volume Air Flow Circuit High Input

DESCRIPTION

The Mass Air Flow (MAF) meter is a sensor that measures the amount of air flowing through the throttle valve.

The ECM (included in hybrid vehicle control ECU) uses this information to determine the fuel injection time and to provide the appropriate air-fuel ratio.

ES

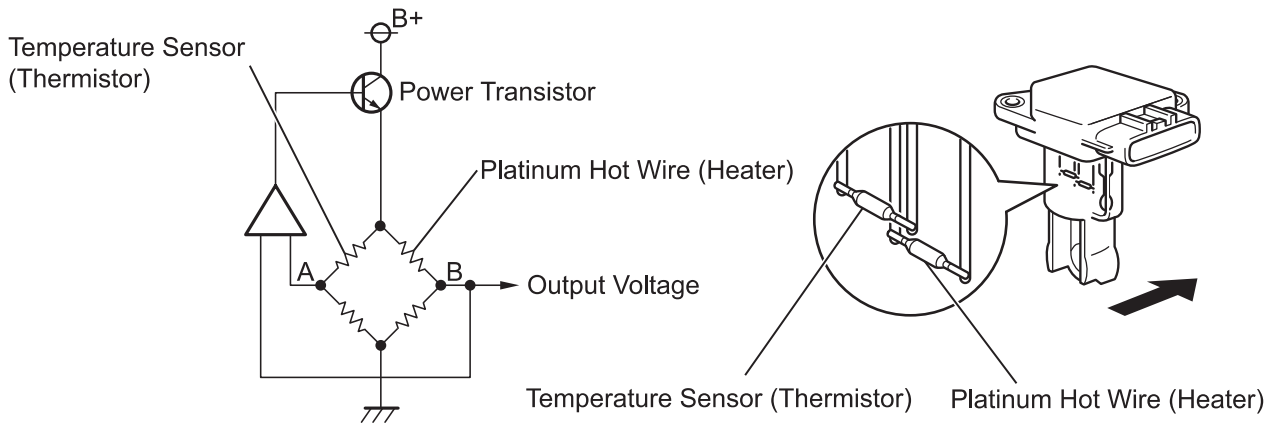
Inside the MAF meter, there is a heated platinum wire which is exposed to the flow of intake air.

By applying a specific electrical current to the wire, the ECM heats it to a given temperature. The flow of incoming air cools both the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components in the MAF meter. The voltage level is proportional to the airflow through the sensor, and the ECM uses it to calculate the intake air volume.

The circuit is constructed so that the platinum hot wire and the temperature sensor create a bridge circuit, and the power transistor is controlled so that the potentials of A and B remain equal to maintain the predetermined temperature.

HINT:

When any of these DTCs are set, the ECM enters fail-safe mode. During fail-safe mode, the ignition timing is calculated by the ECM, according to the engine RPM and throttle valve position. Fail-safe mode continues until a pass condition is detected.



DTC No.	DTC Detection Conditions	Trouble Areas
P0100	MAF meter voltage less than 0.2 V, or more than 4.9 V for 3 seconds (1-trip detection logic)	• Open or short in MAF meter circuit • MAF meter • Hybrid vehicle control ECU
P0102	MAF meter voltage less than 0.2 V for 3 seconds (1-trip detection logic)	• Open or short in MAF meter circuit • MAF meter • Hybrid vehicle control ECU
P0103	MAF meter voltage more than 4.9 V for 3 seconds (1-trip detection logic)	• Open or short in MAF meter circuit • MAF meter • Hybrid vehicle control ECU

HINT:
When any of these DTCs are set, check the air-flow rate by selecting the following menu items on the intelligent tester: DIAGNOSIS / ENHANCED OBD II/ DATA LIST / PRIMARY / MAF.

Mass Air Flow Rate (g/sec.)	Malfunctions
Approximately 0.0	• Open in Mass Air Flow (MAF) meter power source circuit • Open or short in VG circuit
271.0 or more	• Open in E2G circuit

MONITOR DESCRIPTION

If there is a defect in the MAF meter or an open or short circuit, the voltage level deviates from the normal operating range. The ECM interprets this deviation as a malfunction in the MAF meter and sets a DTC.
Example:
When the sensor output voltage remains less than 0.2 V, or more than 4.9 V, for more than 3 seconds, the ECM sets a DTC.
If the malfunction is not repaired successfully, a DTC is set 3 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0100: MAF meter range check (Fluctuating) P0102: MAF meter range check (Low voltage) P0103: MAF meter range check (High voltage)
Required Sensors/Components (Main)	MAF meter
Required Sensors/Components (Related)	Crankshaft position sensor
Frequency of Operation	Continuous
Duration	3 seconds
MIL Operation	Immediate: Engine RPM less than 4,000 rpm 2 driving cycles: Engine RPM 4,000 rpm or more
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None

TYPICAL MALFUNCTION THRESHOLDS

P0100:

MAF meter voltage	Less than 0.2 V, or more than 4.9 V

P0102:

MAF meter voltage	Less than 0.2 V

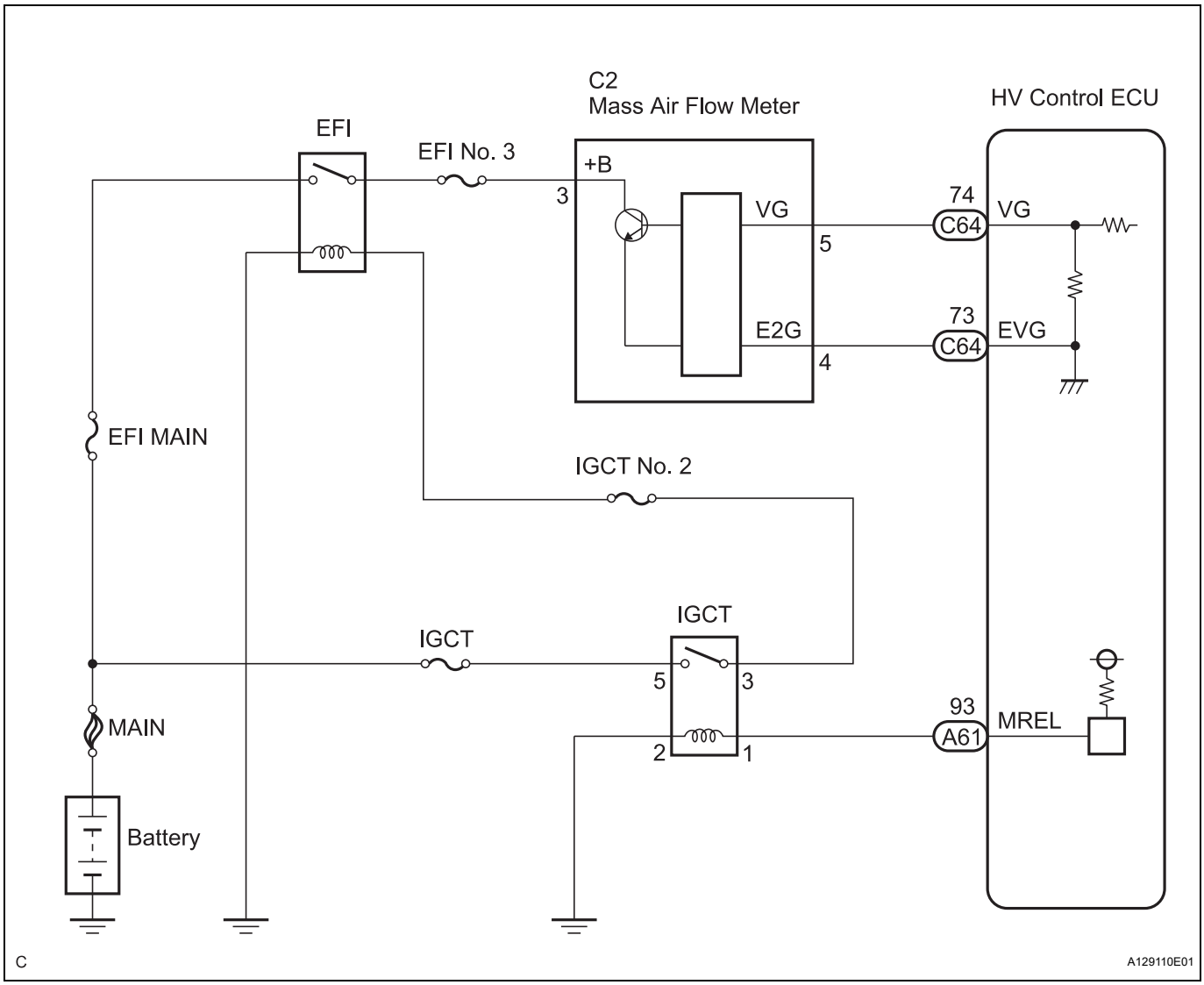
P0103:

MAF meter voltage	More than 4.9 V

COMPONENT OPERATING RANGE

MAF meter voltage	Between 0.4 V and 2.2 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ VALUE USING INTELLIGENT TESTER (MASS AIR FLOW RATE)

(a) Connect the intelligent tester to the DLC3.
(b) Put the engine in inspection mode (See page ES-35).
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / MAF.
(e) Read the values displayed on the tester.

Result

Mass Air Flow Rate (g/sec.)	Proceed to
0.0	A

Mass Air Flow Rate (g/sec.)	Proceed to
271.0 or more	B
Between 1.0 and 270.0 (*1)	C

HINT:
*1: The value must change when the throttle valve is opened or closed with the engine running.

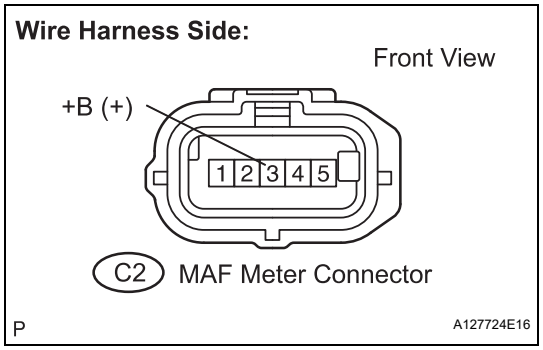
B → Go to step 6

C → CHECK FOR INTERMITTENT PROBLEMS

A

ES

2 INSPECT MASS AIR FLOW METER (POWER SOURCE VOLTAGE)



(a) Disconnect the C2 Mass Air Flow (MAF) meter connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage between the terminal of the wire harness side connector and body ground.
Standard voltage

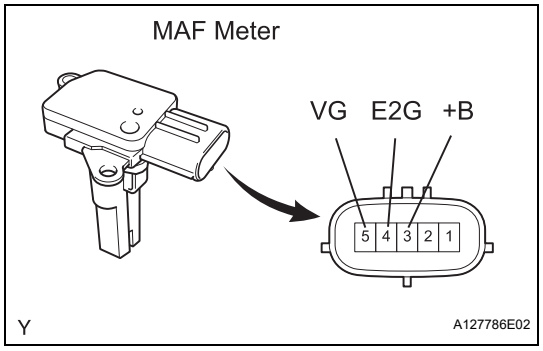
Tester Connections	Specified Conditions
C2-3 (+B) - Body ground	9 to 14 V

(d) Reconnect the MAF meter connector.

NG → Go to step 5

OK

3 INSPECT MASS AIR FLOW METER (VG VOLTAGE)



(a) Output voltage inspection.
(1) Apply battery voltage across terminals +B and E2G.
(2) Connect the positive (+) tester probe to terminal VG, and the negative (-) tester probe to terminal E2G.
(3) Measure the voltage.
Standard voltage

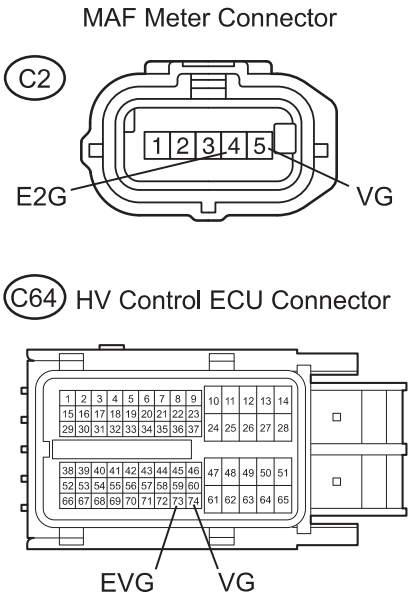
Tester Connections	Specified Conditions
5 (VG) - 4 (E2G)	0.2 to 4.9 V

NG → REPLACE MASS AIR FLOW METER

OK

4	CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - HV CONTROL ECU)

Wire Harness Side:



(a) Disconnect the C2 MAF meter connector.
(b) Disconnect the C64 hybrid vehicle control ECU connector.
(c) Measure the resistance.

Standard resistance (Check for open)

Tester Connections	Specified Conditions
C2-5 (VG) - C64-74 (VG)	Below 1 Ω
C2-4 (E2G) - C64-73 (EVG)	Below 1 Ω

Standard resistance (Check for short)

Tester Connections	Specified Conditions
C2-5 (VG) or C64-74 (VG) - Body ground	10 kΩ or higher

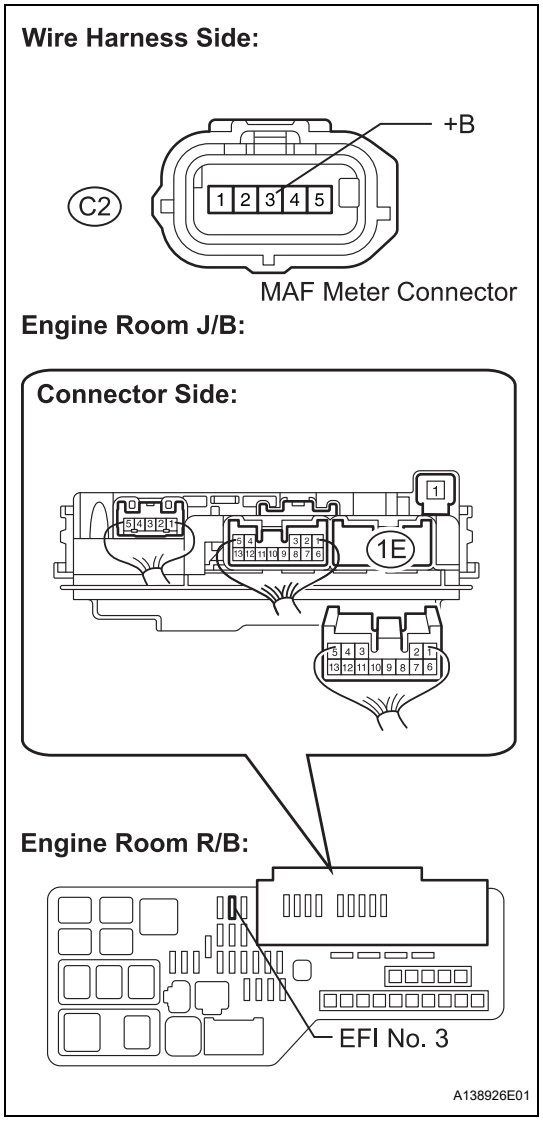
(d) Reconnect the MAF meter connector.
(e) Reconnect the hybrid vehicle control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU

5	CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - INTEGRATION RELAY)



(a) Check the EFI No. 1 fuse.
(b) Disconnect the C2 MAF meter connector.
(c) Remove the integration relay from the engine room R/B and J/B.
(d) Measure the resistance.

Standard resistance (Check for open)

Tester Connections	Specified Conditions
C2-3 (+B) - 1E-6	Below 1 Ω

Standard resistance (Check for short)

Tester Connections	Specified Conditions
C2-3 (+B) or 1E-6 - Body ground	10 kΩ or higher

(e) Reconnect the MAF meter connector.
(f) Reinstall the integration relay.

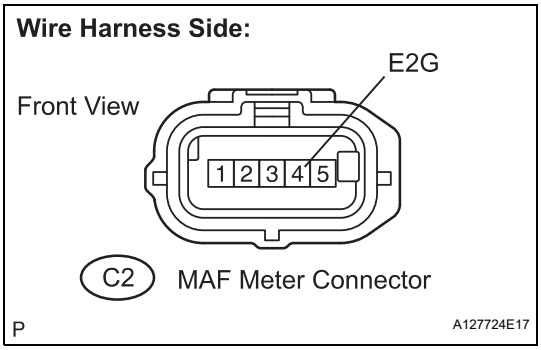
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK ECU POWER SOURCE CIRCUIT

ES

6	CHECK HARNESS AND CONNECTOR (SENSOR GROUND)



(a) Disconnect the C2 MAF meter connector.
(b) Measure the resistance.

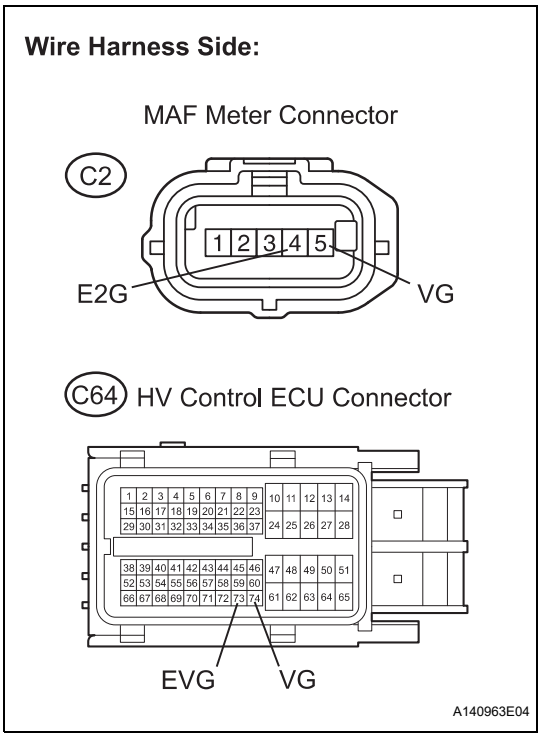
Standard resistance

Tester Connections	Specified Conditions
C2-4 (E2G) - Body ground	Below 1 Ω

OK → **REPLACE MASS AIR FLOW METER**

NG

7	CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - HV CONTROL ECU)



(a) Disconnect the C2 MAF meter connector.
(b) Disconnect the C64 hybrid vehicle control ECU connector.
(c) Measure the resistance.

Standard resistance (Check for open)

Tester Connections	Specified Conditions
C2-5 (VG) - C64-74 (VG)	Below 1 Ω
C2-4 (E2G) - C64-73 (EVG)	Below 1 Ω

Standard resistance (Check for short)

Tester Connections	Specified Conditions
C2-5 (VG) or C64-74 (VG) - Body ground	10 kΩ or higher

(d) Reconnect the MAF meter connector.
(e) Reconnect the hybrid vehicle control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU

DTC	P0101	Mass Air Flow Circuit Range / Performance Problem

DESCRIPTION

Refer to DTC P0100 (See page ES-78).

DTC No.	DTC Detection Conditions	Trouble Areas
P0101	Conditions (a), (b) and (c) continue for more than 10 seconds (2-trip detection logic): (a) Engine speed is less than 2,000 rpm (b) Engine coolant temperature is 70°C (158°F) or higher (c) Output voltage of MAF meter more than 2.2 V (varies with throttle position sensor voltage).	• Mass Air Flow (MAF) meter • Air induction system • PCV hose connections
	Condition (a) and (b) continue for more than 6 seconds (2-trip detection logic): (a) Engine speed is more than 500 rpm (b) Output voltage of MAF meter less than 0.93 V (varies with throttle position sensor voltage).	

ES

MONITOR DESCRIPTION

The MAF meter is a sensor that measures the amount of air flowing through the throttle valve. The ECM (include in hybrid vehicle control ECU) uses this information to determine the fuel injection time and to provide an appropriate air-fuel ratio. Inside the MAF meter, there is a heated platinum wire which is exposed to the flow of intake air. By applying a specific electrical current to the wire, the ECM heats it to a specific temperature. The flow of incoming air cools both the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components of the MAF meter. The voltage level is proportional to the airflow through the sensor, and the ECM uses it to calculate the intake air volume.

The ECM monitors the average engine load value ratio to check the MAF meter for malfunctions. The average engine load value ratio is obtained by comparing the average engine load calculated from the MAF meter output to the average engine load estimated from the driving conditions, such as the engine speed and the throttle opening angle. If the average engine load value ratio is below the threshold value, the ECM determines that the intake air volume is low, and if the average engine load value ratio is above the threshold value, the ECM determines that the intake air volume is high.

If this is detected in 2 consecutive driving cycles, the MIL is illuminated and a DTC is set.

MONITOR STRATEGY

Related DTCs	P0101: Mass air flow meter rationality
Required Sensors/Components (Main)	Mass air flow meter
Required Sensors/Components (Related)	Crankshaft Position (CKP) sensor, Engine Coolant Temperature (ECT) sensor and Throttle Position (TP) sensor
Frequency of Operation	Continuous
Duration	10 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for closed loop) P0335 (CKP sensor) P0340 (CMP sensor)
Speed	Less than 2,000 rpm

Engine coolant temperature	70°C (158°F) or more

Mass Air Flow Meter Rationality (High Voltage):

Engine speed	Less than 2,000 rpm
Engine coolant temperature	70 °C (158 °F) or higher
IAT sensor circuit	OK
ECT sensor circuit	OK
CKP sensor circuit	OK
TP sensor circuit	OK
Canister pressure sensor circuit	OK
EVAP leak detection pump	OK
EVAP vent valve	OK

ES

Mass Air Flow Meter Rationality (Low Voltage):

Engine speed	More than 500 rpm
Fuel out	OFF

TYPICAL MALFUNCTION THRESHOLDS

Mass Air Flow Meter Rationality (High Voltage):

Mass air flow meter voltage	More than 2.2 V (Varies with throttle position sensor voltage)

Mass Air Flow Meter Rationality (Low Voltage):

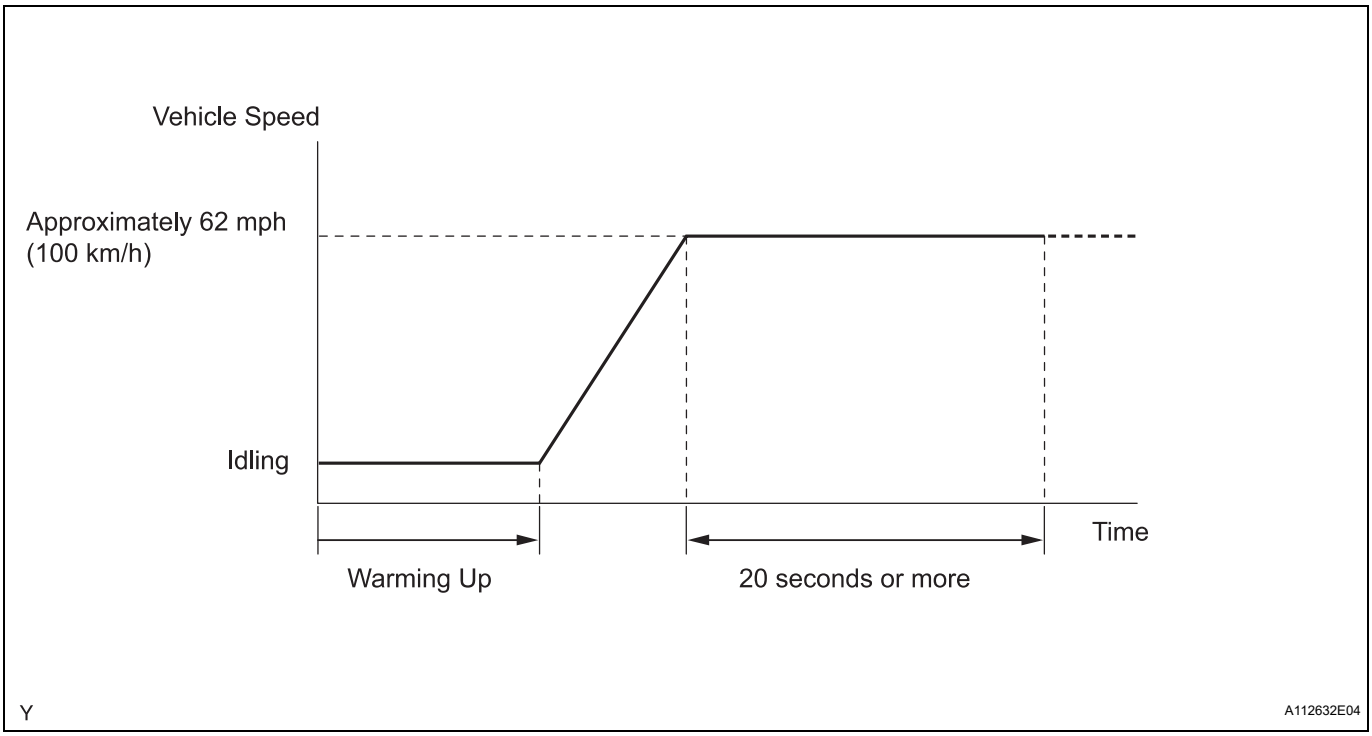
Mass air flow meter voltage	Less than 0.93 V (Varies with throttle position sensor voltage)

WIRING DIAGRAM

Refer to DTC P0100 (See page ES-80).

CONFIRMATION DRIVING PATTERN

HINT:
Performing this confirmation pattern will activate the mass air flow performance monitor.



1. Connect the intelligent tester to the DLC3.

2. Turn the power switch on (IG).
3. Turn the tester on.
4. Clear the DTCs (See page ES-31).
5. Put the engine in inspection mode (See page ES-35).
6. Warm it up until the engine coolant temperature reaches 70°C (158°F) or higher.
7. Drive the vehicle at approximately 62 mph (100 km/h) for 20 seconds or more.
8. On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES and check if any DTCs (any pending DTCs) are set.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

ES

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0101)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0101	A
P0101 and other DTCs	B

HINT:
If any DTCs other than P0101 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

2	CHECK AIR INDUCTION SYSTEM

(a) Check the air induction system for vacuum leakage.
OK:
No leakage from air induction system.

NG → REPAIR OR REPLACE AIR INDUCTION SYSTEM

OK

3	CHECK PCV HOSE (HOSE CONNECTION)

OK:
PCV hose is connected correctly and is not damaged.

NG → REPAIR OR REPLACE PCV HOSE

OK

REPLACE MASS AIR FLOW METER

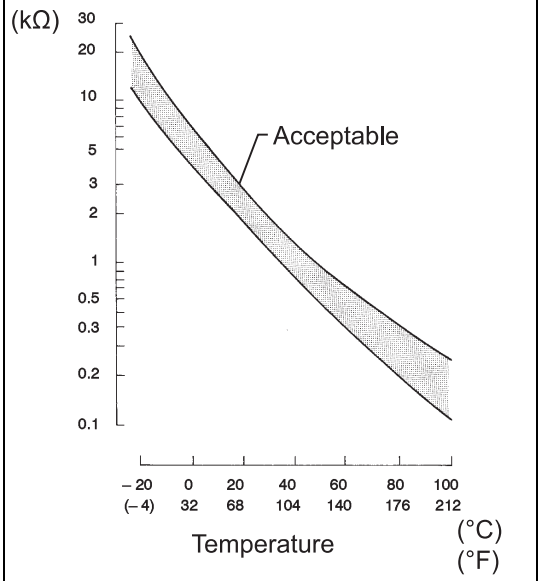
DTC	P0110	Intake Air Temperature Circuit Malfunction

DTC	P0112	Intake Air Temperature Circuit Low Input

DTC	P0113	Intake Air Temperature Circuit High Input

DESCRIPTION

Fig. 1



The Intake Air Temperature (IAT) sensor, mounted on the Mass Air Flow (MAF) meter, monitors the IAT. The IAT sensor has a built-in thermistor with a resistance that varies according to the temperature of the intake air. When the IAT is low, the resistance of the thermistor increases. When the temperature is high, the resistance drops. These variations in resistance are transmitted to the ECM (include in hybrid vehicle control ECU) as voltage changes (see Fig. 1).

The IAT sensor is powered by a 5 V supply from the THA terminal of the ECM, via resistor R.

Resistor R and the IAT sensor are connected in series. When the resistance value of the IAT sensor changes, according to changes in the IAT, the voltage at terminal THA also varies. Based on this signal, the ECM increases the fuel injection volume when the engine is cold to improve drivability.

HINT:

When any of DTCs P0110, P0112 and P0113 are set, the ECM enters fail-safe mode. During fail-safe mode, the IAT is estimated to be 20°C (68°F) by the ECM. Fail-safe mode continues until a pass condition is detected.

DTC No.	DTC Detection Conditions	Trouble Areas
P0110	Open or short in IAT sensor circuit for 0.5 seconds (1-trip detection logic)	• Open or short in IAT sensor circuit • IAT sensor (built into MAF meter) • Hybrid vehicle control ECU
P0112	Short in IAT sensor circuit for 0.5 seconds (1-trip detection logic)	• Short in IAT sensor circuit • IAT sensor (built into MAF meter) • Hybrid vehicle control ECU
P0113	Open in IAT sensor circuit for 0.5 seconds (1-trip detection logic)	• Open in IAT sensor circuit • IAT sensor (built into MAF meter) • Hybrid vehicle control ECU

HINT:
When any of these DTCs are set, check the IAT by selecting the following menu items on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.

Temperature Displayed	Malfunctions
-40°C (-40°F)	Open circuit
140°C (284°F) or higher	Short circuit

MONITOR DESCRIPTION

The ECM monitors the sensor voltage and uses this value to calculate the IAT. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a malfunction in the IAT sensor and sets a DTC.

ES

Example:
If the sensor output voltage is more than 4.91 V for 0.5 seconds or more, the ECM determines that there is an open in the IAT sensor circuit, and sets DTC P0113. Conversely, if the output voltage is less than 0.18 V for 0.5 seconds or more, the ECM determines that there is a short in the sensor circuit, and sets DTC P0112.
If the malfunction is not repaired successfully, a DTC is set 0.5 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0110: IAT sensor range check (Fluctuating) P0112: IAT sensor range check (Low voltage) P0113: IAT sensor range check (High voltage)
Required Sensors/Components (Main)	IAT sensor
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None

TYPICAL MALFUNCTION THRESHOLDS

P0110:

IAT sensor voltage	Less than 0.18 V, or more than 4.91 V

P0112:

IAT sensor voltage [IAT]	Less than 0.18 V [More than 140°C (284°F)]

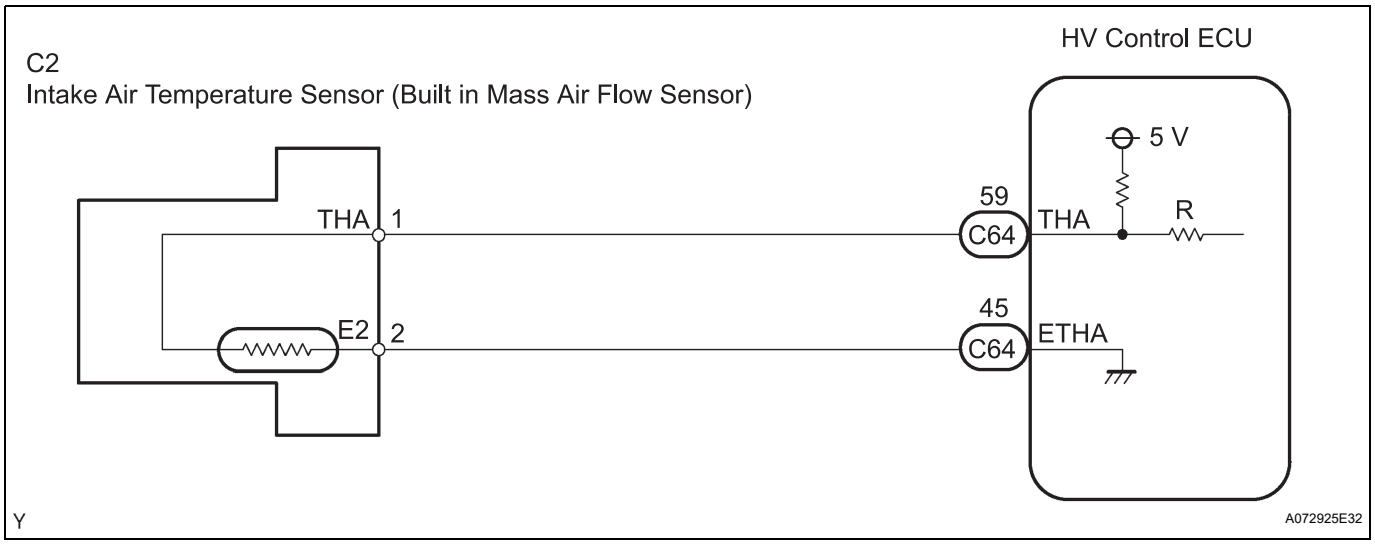
P0113:

IAT sensor voltage [IAT]	More than 4.91 V [Less than -40°C (-40°F)]

COMPONENT OPERATING RANGE

IAT sensor voltage [IAT]	0.18 to 4.91 V [-40°C to 140°C (-40°F to 284°F)]

WIRING DIAGRAM



ES

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ DTC OUTPUT

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0110	A
P0112	B
P0113	C

B	Go to step 6
C	Go to step 3

A

2	READ VALUE USING INTELLIGENT TESTER (INTAKE AIR TEMPERATURE)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.

(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.
(e) Read the value displayed on the tester.
Standard:
Same as actual Intake Air Temperature (IAT).

Result

Temperature Displayed	Proceed to
-40°C (-40°F)	A
140°C (284°F) or higher	B
Same as actual IAT	C

ES

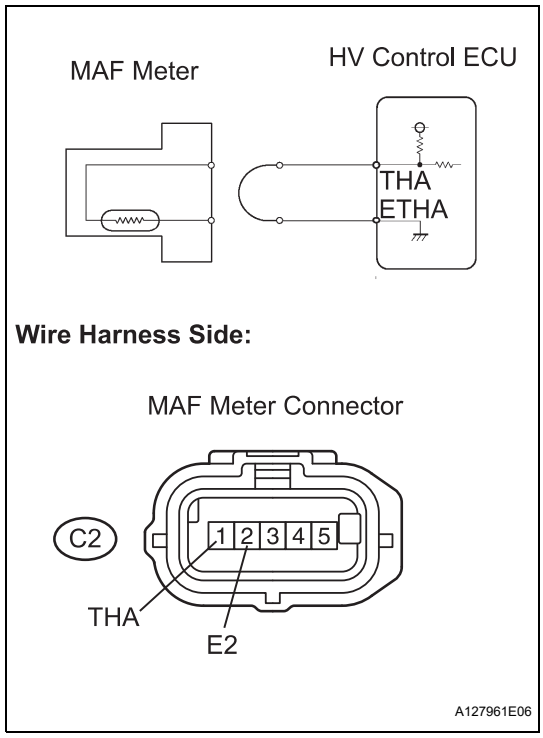
HINT:
- If there is an open circuit, the intelligent tester indicates -40°C (-40°F).
- If there is a short circuit, the intelligent tester indicates 140°C (284°F) or higher.

B → **Go to step 5**

C → **CHECK FOR INTERMITTENT PROBLEMS**

A

3 READ VALUE USING INTELLIGENT TESTER (CHECK FOR OPEN IN WIRE HARNESS)

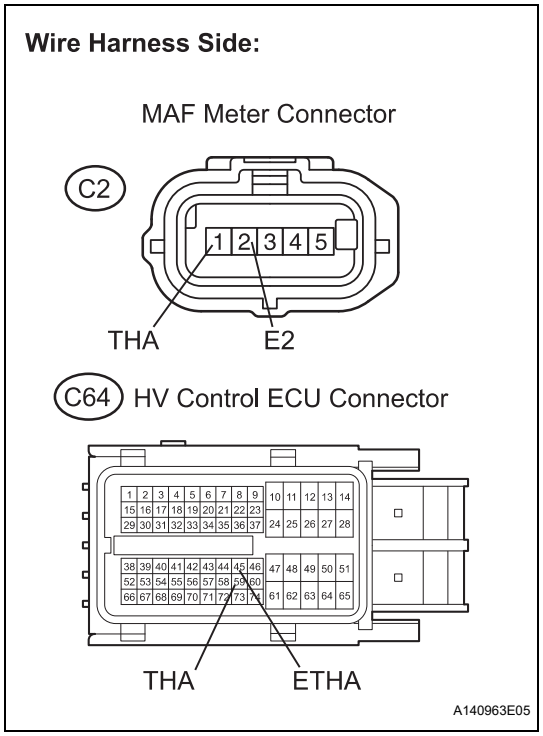


(a) Confirm good connection of the Mass Air Flow (MAF) meter.
(b) Disconnect the C2 MAF meter connector.
(c) Connect terminals THA and E2 of the MAF meter wire harness side connector.
(d) Connect the intelligent tester to the DLC3.
(e) Turn the power switch on (IG).
(f) Turn the tester on.
(g) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.
(h) Read the value displayed on the tester.
Standard value:
140°C (284°F) or higher
(i) Reconnect the MAF meter connector.

OK → **REPLACE MASS AIR FLOW METER**

NG

4 CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - HV CONTROL ECU)



(a) Confirm good connection of the hybrid vehicle control ECU connectors.
(b) Disconnect the C2 MAF meter connector.
(c) Disconnect the C64 hybrid vehicle control ECU connector.
(d) Measure the resistance.
Standard resistance

Tester Connections	Specified Conditions
C2-1 (THA) - C64-59 (THA)	Below 1 Ω
C2-2 (E2) - C64-45 (ETHA)	Below 1 Ω

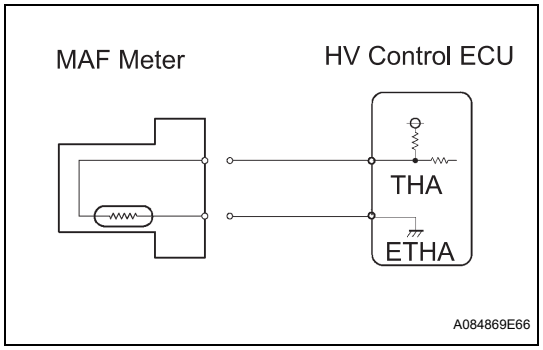
(e) Reconnect the MAF meter connector.
(f) Reconnect the hybrid vehicle control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU

5 READ VALUE USING INTELLIGENT TESTER (CHECK FOR SHORT IN WIRE HARNESS)



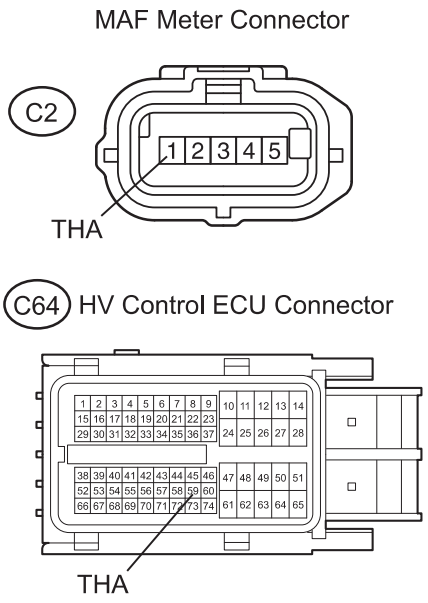
(a) Disconnect the C2 MAF meter connector.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Turn the tester on.
(e) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.
(f) Read the value displayed on the tester.
Standard value:
-40°C (-40°F)
(g) Reconnect the MAF meter connector.

OK → **REPLACE MASS AIR FLOW METER**

NG

6	CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - HV CONTROL ECU)

Wire Harness Side:



(a) Disconnect the C2 MAF meter connector.
(b) Disconnect the C64 hybrid vehicle control ECU connector.
(c) Measure the resistance.
Standard resistance

Tester Connections	Specified Conditions
C2-1 (THA) or C64-59 (THA) - Body ground	10 kΩ or higher

(d) Reconnect the MAF meter connector.
(e) Reconnect the hybrid vehicle control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU

ES

DTC	P0115	Engine Coolant Temperature Circuit Malfunction

DTC	P0117	Engine Coolant Temperature Circuit Low Input

DTC	P0118	Engine Coolant Temperature Circuit High Input

DESCRIPTION

A thermistor, whose resistance value varies according to the ECT, is built into the Engine Coolant Temperature (ECT) sensor.

The structure of the sensor and its connection to the ECM (included in hybrid vehicle control ECU) are the same as those of the Intake Air Temperature (IAT) sensor.

HINT:

When any of DTCs P0115, P0117 and P0118 are set, the ECM enters fail-safe mode. During fail-safe mode, the ECT is estimated to be 80°C (176°F) by the ECM. Fail-safe mode continues until a pass condition is detected.

DTC No.	DTC Detection Conditions	Trouble Areas
P0115	Open or short in ECT sensor circuit for 0.5 seconds (1-trip detection logic)	• Open or short in ECT sensor circuit • ECT sensor • Hybrid vehicle control ECU
P0117	Short in ECT sensor circuit for 0.5 seconds (1-trip detection logic)	• Short in ECT sensor • ECT sensor • Hybrid vehicle control ECU
P0118	Open in ECT sensor circuit for 0.5 seconds (1-trip detection logic)	• Open in ECT sensor circuit • ECT sensor • Hybrid vehicle control ECU

HINT:

When any of these DTCs are set, check the ECT by selecting the following menu items on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.

Temperature Displayed	Malfunctions
-40°C (-40°F)	Open circuit
140°C (284°F) or higher	Short circuit

MONITOR DESCRIPTION

The Engine Coolant Temperature (ECT) sensor is used to monitor the ECT. The ECT sensor has a thermistor with a resistance that varies according to the temperature of the engine coolant. When the coolant temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. These variations in resistance are reflected in the output voltage from the sensor. The ECM monitors the sensor voltage and uses this value to calculate the ECT. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the ECT sensor and sets a DTC.

Example:

If the sensor output voltage is more than 4.91 V for 0.5 seconds or more, the ECM determines that there is an open in the ECT sensor circuit, and sets DTC P0118. Conversely, if the voltage output is less than 0.14 V for 0.5 seconds or more, the ECM determines that there is a short in the sensor circuit, and sets DTC P0117.

If the malfunction is not repaired successfully, a DTC is set 0.5 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0115: ECT sensor range check (Fluctuating) P0117: ECT sensor range check (Low voltage) P0118: ECT sensor range check (High voltage)
Required Sensors/Components (Main)	ECT sensor
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

ES

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None

TYPICAL MALFUNCTION THRESHOLDS

P0115:

ECT sensor voltage	Less than 0.14 V, or more than 4.91 V

P0117:

ECT sensor voltage [ECT]	Less than 0.14 V [More than 140°C (284°F)]

P0118:

ECT sensor voltage [ECT]	More than 4.91 V [Less than -40°C (-40°F)]

COMPONENT OPERATING RANGE

ECT sensor voltage [ECT]	0.14 to 4.91 V [-40°C to 140°C (-40°F to 284°F)]

WIRING DIAGRAM

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data, from the time the malfunction occurred.

1	READ OUTPUT DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0115	A
P0117	B
P0118	C

B → **Go to step 5**

C → **Go to step 3**

A

2	READ VALUE USING INTELLIGENT TESTER (ENGINE COOLANT TEMPERATURE)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
(e) Read the value displayed on the tester.

Standard value:
Between 80°C and 100°C (167°F and 212°F) with warm engine.

Result

Temperature Displayed	Proceed to
-40°C (-40°F)	A
140°C (284°F) or higher	B
Between 80°C and 100°C (176°F and 212°F)	C

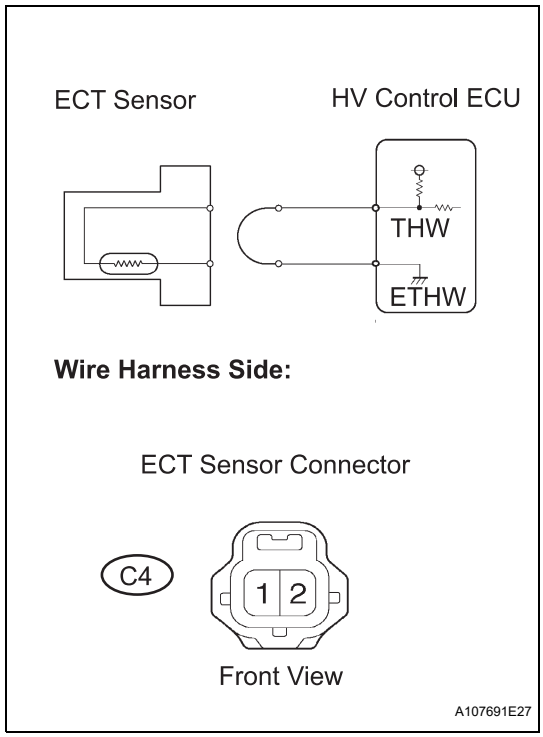
HINT:
- If there is an open circuit, the intelligent tester indicates -40°C (-40°F).
- If there is a short circuit, the intelligent tester indicates 140°C (284°F) or higher.

B → **Go to step 5**

C → CHECK FOR INTERMITTENT PROBLEMS

A

3	READ VALUE USING INTELLIGENT TESTER (CHECK FOR OPEN IN WIRE HARNESS)

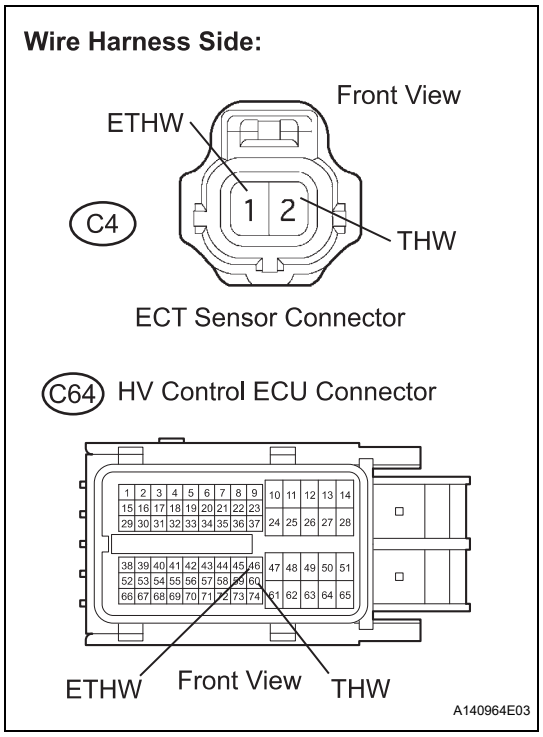


(a) Confirm good condition of the Engine Coolant Temperature (ECT) sensor.
(b) Disconnect the C4 ECT sensor connector.
(c) Connect terminals 1 and 2 of the ECT sensor connector on the wire harness side.
(d) Connect the intelligent tester to the DLC3.
(e) Turn the power switch on (IG).
(f) Turn the tester on.
(g) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
(h) Read the value displayed on the tester.
Standard value:
140°C (284°F) or higher.
(i) Reconnect the ECT sensor connector.

OK → REPLACE ENGINE COOLANT TEMPERATURE SENSOR

NG

4	CHECK HARNESS AND CONNECTOR (ENGINE COOLANT TEMPERATURE SENSOR - HV CONTROL ECU)



(a) Confirm good connection of the hybrid vehicle control ECU connectors.
(b) Disconnect the C4 ECT sensor connector.
(c) Disconnect the C64 hybrid vehicle control ECU connector.
(d) Measure the resistance.
Standard resistance

Tester Connections	Specified Conditions
C4-2 (THW) - C64-60 (THW)	Below 1 Ω
C4-1 (E2) - C64-46 (ETHW)	Below 1 Ω

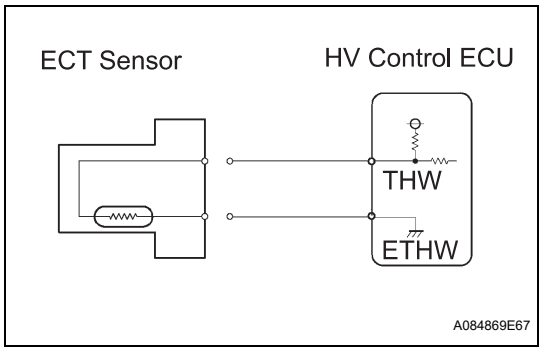
(e) Reconnect the ECT sensor connector.
(f) Reconnect the hybrid vehicle control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU

5	READ VALUE USING INTELLIGENT TESTER (CHECK FOR SHORT IN WIRE HARNESS)



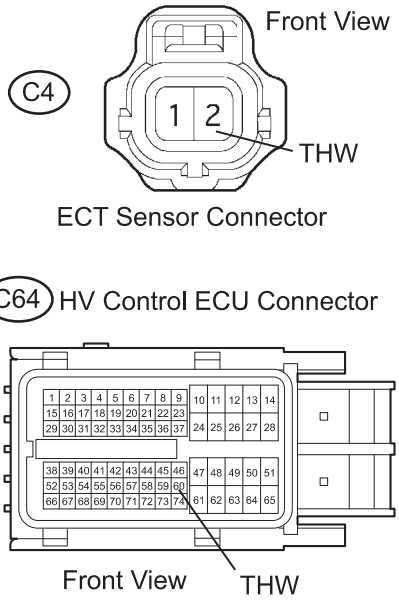
(a) Disconnect the C4 ECT sensor connector.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Turn the tester on.
(e) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
(f) Read the value displayed on the tester.
Standard value:
-40°C (-40°F)
(g) Reconnect the ECT sensor connector.

OK → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

NG

6	CHECK HARNESS AND CONNECTOR (ENGINE COOLANT TEMPERATURE SENSOR - HV CONTROL ECU)

Wire Harness Side:



(a) Disconnect the C4 ECT sensor connector.
(b) Disconnect the C64 hybrid vehicle control ECU connector.
(c) Measure the resistance.
Standard resistance

Tester Connections	Specified Conditions
C4-2 (THW) or C64-60 (THW) - Body ground	10 kΩ or higher

(d) Reconnect the ECT sensor connector.
(e) Reconnect the hybrid vehicle control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU

DTC	P0116	Engine Coolant Temperature Circuit Range / Performance Problem

DESCRIPTION

Refer to DTC P0115 (See page ES-95).

DTC No.	DTC Detection Conditions	Trouble Areas
P0116	When either of following conditions met (2-trip detection logic): • When cold engine started and engine warmed up, Engine Coolant Temperature (ECT) sensor value does not change. • After warmed up engine started, ECT sensor value does not change when engine stopped and then next cold engine start performed.	• Thermostat • ECT sensor

ES

MONITOR DESCRIPTION

Engine coolant temperature (ECT) sensor cold start monitor

When a cold engine start is performed and then the engine is warmed up, if the ECT sensor value does not change, it is determined that a malfunction has occurred. If this is detected in 2 consecutive driving cycles, the MIL is illuminated and a DTC is set.

ECT sensor soak monitor

After a warmed up engine is started, if the ECT sensor value does not change when the engine is stopped and then the next cold engine start is performed, it is determined that a malfunction has occurred. If this is detected in 2 consecutive driving cycles, the MIL is illuminated and a DTC is set.

MONITOR STRATEGY

Related DTCs	P0116: Engine coolant temperature (ECT) sensor output stuck at low engine coolant temperature P0116: ECT sensor output stuck at high engine coolant temperature
Required Sensors/Components (Main)	ECT sensor
Required Sensors/Components (Related)	Crankshaft position sensor, intake air temperature sensor and mass air flow meter
Frequency of Operation	Once per driving cycle
Duration	250 seconds
MIL Operation	2 driving cycles: ETC sensor output stuck at low engine coolant temperature 6 driving cycles: ECT sensor output stuck at high engine coolant temperature
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Engine Coolant Temperature Sensor Output Stuck at Low Engine Coolant Temperature:

Monitor runs whenever following DTCs not present	P0100 to P0103: Mass air flow meter
Cumulative idle off period	250 seconds or more
Speed increase by 18.6 mph (30km/h) or more	10 times or more
Engine coolant temperature at engine start	35 to 60°C (95 to 140°F)
Intake air temperature after engine start	-6.7°C (20°F) or more

Engine Coolant Temperature Sensor Output Stuck at High Engine Coolant Temperature:

Monitor runs whenever following DTCs not present	P0100 to P0103: Mass air flow meter
Engine coolant temperature at engine start	60°C (140°F) or more
Intake air temperature after engine start	-6.7°C (20°F) or more
Stop and go *1	Once or more

Steady driving and stop *2	Once or more
Engine running time after engine start	0.3 seconds or more

*1: The vehicle stopped for 20 seconds or more and accelerated to more than 43.5 mph (70 km/h) within 40 seconds.
*2: 1) the vehicle is driven at 40.4 mph (65 km/h) or more for 30 seconds or more and the vehicle speed reaches 43.5 mph (70 km/h); 2) the vehicle is decelerated from 40.4 mph (65 km/h) to 1.86 mph (3 km/h) or less within 35 seconds; and 3) the vehicle is stopped for 10 seconds.

TYPICAL MALFUNCTION THRESHOLDS

Engine Coolant Temperature Sensor Output Stuck at Low Engine Coolant Temperature:

Variation of engine coolant temperature	Less than 3°C (5.4°F)

ES

Engine Coolant Temperature Sensor Output Stuck at High Engine Coolant Temperature:

Variation of engine coolant temperature	1°C (1.8°F) or less

COMPONENT OPERATING RANGE

ECT	ECT sensor value changes in accordance with actual ECT

INSPECTION PROCEDURE

HINT:
- If any of DTCs P0115, P0117, P0118 or P0125 are set simultaneously with DTC P0116, the ECT sensor may have an open or a short circuit. Troubleshoot those DTCs first.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0116)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0116	A
P0116 and other DTCs	B

B → GO TO DTC CHART

A

2	INSPECT THERMOSTAT

(a) Remove the thermostat (See page CO-12).
(b) Measure the valve opening temperature of the thermostat.

Standard value:
80°C to 84°C (176°F to 183°F)
HINT:
In addition to the above check, confirm that the valve is completely closed when the temperature is below the standard.

(c) Reinstall the thermostat (See page CO-13).

NG → **REPLACE THERMOSTAT**

OK

REPLACE ENGINE COOLANT TEMPERATURE SENSOR

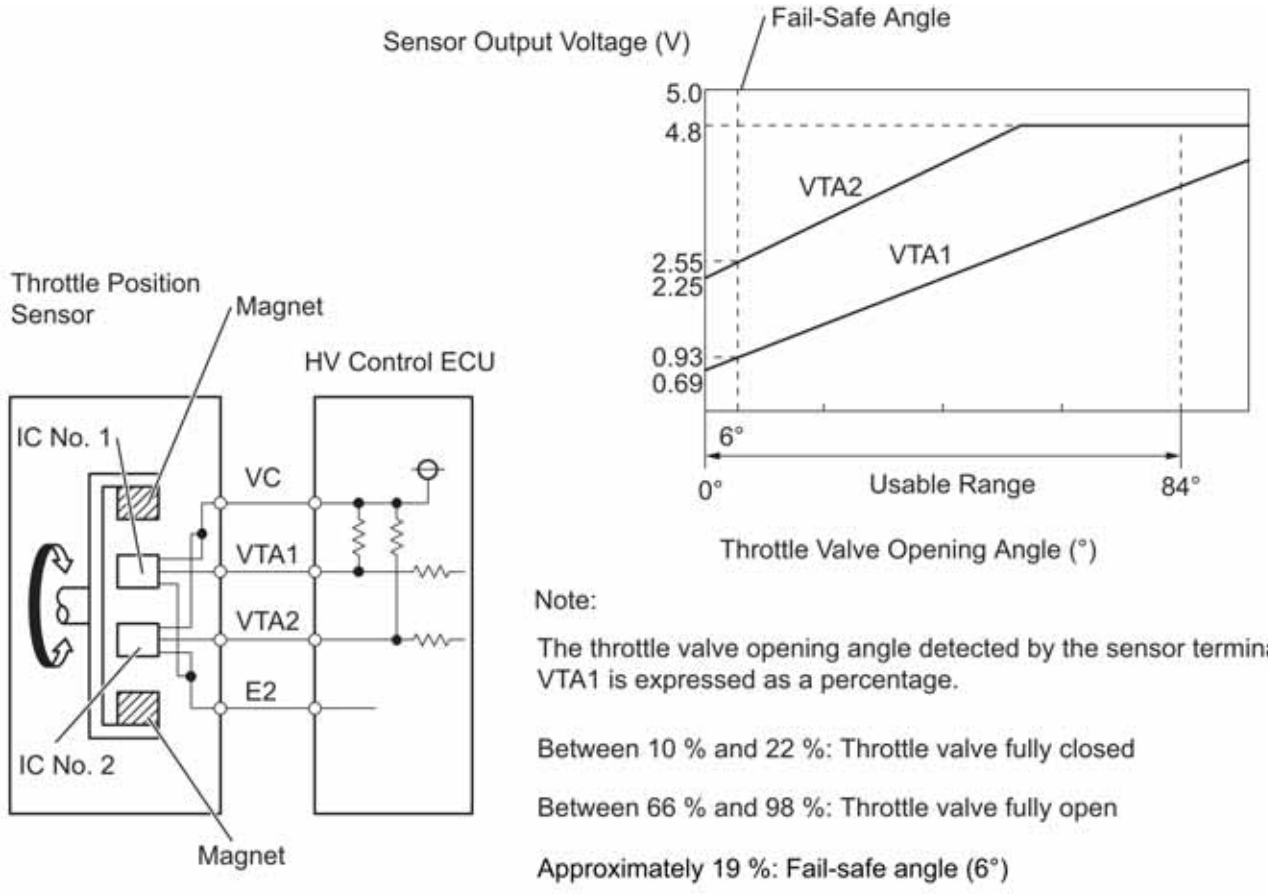
DTC	P0120	Throttle / Pedal Position Sensor / Switch "A" Circuit Malfunction
DTC	P0122	Throttle / Pedal Position Sensor / Switch "A" Circuit Low Input
DTC	P0123	Throttle / Pedal Position Sensor / Switch "A" Circuit High Input
DTC	P0220	Throttle / Pedal Position Sensor / Switch "B" Circuit
DTC	P0222	Throttle / Pedal Position Sensor / Switch "B" Circuit Low Input
DTC	P0223	Throttle / Pedal Position Sensor / Switch "B" Circuit High Input
DTC	P2135	Throttle / Pedal Position Sensor / Switch "A" / "B" Voltage Correlation

ES

HINT:
These DTCs relate to the Throttle Position (TP) sensor.

DESCRIPTION

The TP sensor is mounted on the throttle body, and detects the opening angle of the throttle valve. This sensor is a non-contact type. It uses Hall-effect elements in order to yield accurate signals even in extreme driving conditions, such as at high speeds as well as very low speeds.
The TP sensor has two sensor circuits which each transmits a signal, VTA1 and VTA2. VTA1 is used to detect the throttle valve angle and VTA2 is used to detect malfunctions in VTA1. The sensor signal voltages vary between 0 V and 5 V in proportion to the throttle valve opening angle, and are transmitted to the VTA terminals of the ECM (included in hybrid vehicle control ECU).
As the valve closes, the sensor output voltage decreases and as the valve opens, the sensor output voltage increases. The ECM calculates the throttle valve opening angle according to these signals and controls the throttle actuator in response to driver inputs. These signals are also used in calculations such as air-fuel ratio correction, power increase correction and fuel-cut control.



Note:

The throttle valve opening angle detected by the sensor terminal VTA1 is expressed as a percentage.

Between 10 % and 22 %: Throttle valve fully closed

Between 66 % and 98 %: Throttle valve fully open

Approximately 19 %: Fail-safe angle (6°)

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DTC No.	DTC Detection Conditions	Trouble Areas
P0120	Output voltage of VTA1 quickly fluctuates beyond lower and upper malfunction thresholds for 2 seconds when accelerator pedal depressed (1-trip detection logic)	• Throttle Position (TP) sensor (built into throttle body) • Hybrid vehicle control ECU
P0122	Output voltage of VTA1 0.2 V or less for 2 seconds when accelerator pedal depressed (1-trip detection logic)	• TP sensor (built into throttle body) • Short in VTA1 circuit • Open in VC circuit • Hybrid vehicle control ECU
P0123	Output voltage of VTA1 4.535 V or more for 2 seconds when accelerator pedal depressed (1-trip detection logic)	• TP sensor (built into throttle body) • Open in VTA1 circuit • Open in E2 circuit • Short between VC and VTA1 circuits • Hybrid vehicle control ECU
P0220	Output voltage of VTA2 quickly fluctuates beyond lower and upper malfunction thresholds for 2 seconds when accelerator pedal depressed (1-trip detection logic)	• TP sensor (built into throttle body) • Hybrid vehicle control ECU

DTC No.	DTC Detection Conditions	Trouble Areas
P0222	Output voltage of VTA2 1.75 V or less for 2 seconds when accelerator pedal depressed (1-trip detection logic)	• TP sensor (built into throttle body) • Short in VTA2 circuit • Open in VC circuit • Hybrid vehicle control ECU
P0223	Output voltage of VTA2 4.8 V or more, and VTA1 between 0.2 V and 2.02 V for 2 seconds when accelerator pedal depressed (1-trip detection logic)	• TP sensor (built into throttle body) • Open in VTA2 circuit • Open in E2 circuit • Short between VC and VTA2 circuits • Hybrid vehicle control ECU
P2135	Either condition (a) or (b) met (1-trip detection logic): (a) Difference between output voltages of VTA1 and VTA2 0.02 V or less for 0.5 seconds or more (b) Output voltage of VTA1 0.2 V or less, and VTA2 1.75 V or less, for 0.4 seconds or more	• Short between VTA1 and VTA2 circuits • TP sensor (built into throttle body) • Hybrid vehicle control ECU

ES

HINT:

- When any of these DTCs are set, check the throttle valve opening angle by selecting the following menu items on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / THROTTLE POS #1 AND THROTTLE POS #2.
- THROTTLE POS #1 denotes the VTA1 signal, and THROTTLE POS #2 denotes the VTA2 signal.

Reference (Normal Condition):

Tester Display	Accelerator Pedal Fully Released	Accelerator Pedal Fully Depressed
THROTTLE POS #1	0.5 to 1.1 V	3.3 to 4.9 V
THROTTLE POS #2	2.1 to 3.1 V	4.6 to 5.0 V

MONITOR DESCRIPTION

The ECM uses the Throttle Position (TP) sensor to monitor the throttle valve opening angle. There are several checks that the ECM performs to confirm proper operation of the TP sensor.

- A specific voltage difference is expected between the sensor terminals, VTA1 and VTA2, for each throttle valve opening angle. If the difference between VTA1 and VTA2 is incorrect, the ECM interprets this as a malfunction in the sensor, and sets a DTC.
- VTA1 and VTA2 each have a specific voltage range. If VTA1 or VTA2 is outside the normal operating range, the ECM interprets this as a malfunction in the sensor, and sets a DTC.
- VTA1 and VTA2 should never be close to the same voltage level. If VTA1 is within 0.02 V of VTA2, the ECM determines that there is a short circuit in the sensor, and sets a DTC.

If the malfunction is not repaired successfully, a DTC is set 10 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0120: Throttle position sensor 1 range check (Fluctuating) P0122: Throttle position sensor 1 range check (Low voltage) P0123: Throttle position sensor 1 range check (High voltage) P0220: Throttle position sensor 2 range check (Fluctuating) P0222: Throttle position sensor 2 range check (Low voltage) P0223: Throttle position sensor 2 range check (High voltage) P2135: Throttle position sensor range check (Correlation)
Required Sensors/Components (Main)	Throttle position sensor
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	2 seconds: P0120, P0122, P0123, P0220, P0222 and P0223 (Accelerator pedal ON) 0.5 seconds: P2135 Case 1 0.4 seconds: P2135 Case 2
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None
Either of following condition A or B met	-
A. Power switch ON (IG)	0.012 seconds or more
B. Electronic throttle actuator power	ON

TYPICAL MALFUNCTION THRESHOLDS

P0120:

VTA1 voltage	0.2 V or less, or 4.535 V or more

P0122:

VTA1 voltage	0.2 V or less

P0123:

VTA1 voltage	4.535 V or more

P0220:

VTA2 voltage	1.75 V or less, or 4.8 V or more

P0222:

VTA2 voltage	1.75 V or less

P0223:

VTA2 voltage when VTA1 0.2 V or more, and 2.02 V or less	4.8 V or more

P2135 Case 1:

Difference between VTA1 and VTA2 voltages	0.02 V or less

P2135 Case 2:

VTA1 voltage	0.2 V or less
VTA2 voltage	1.75 V or less

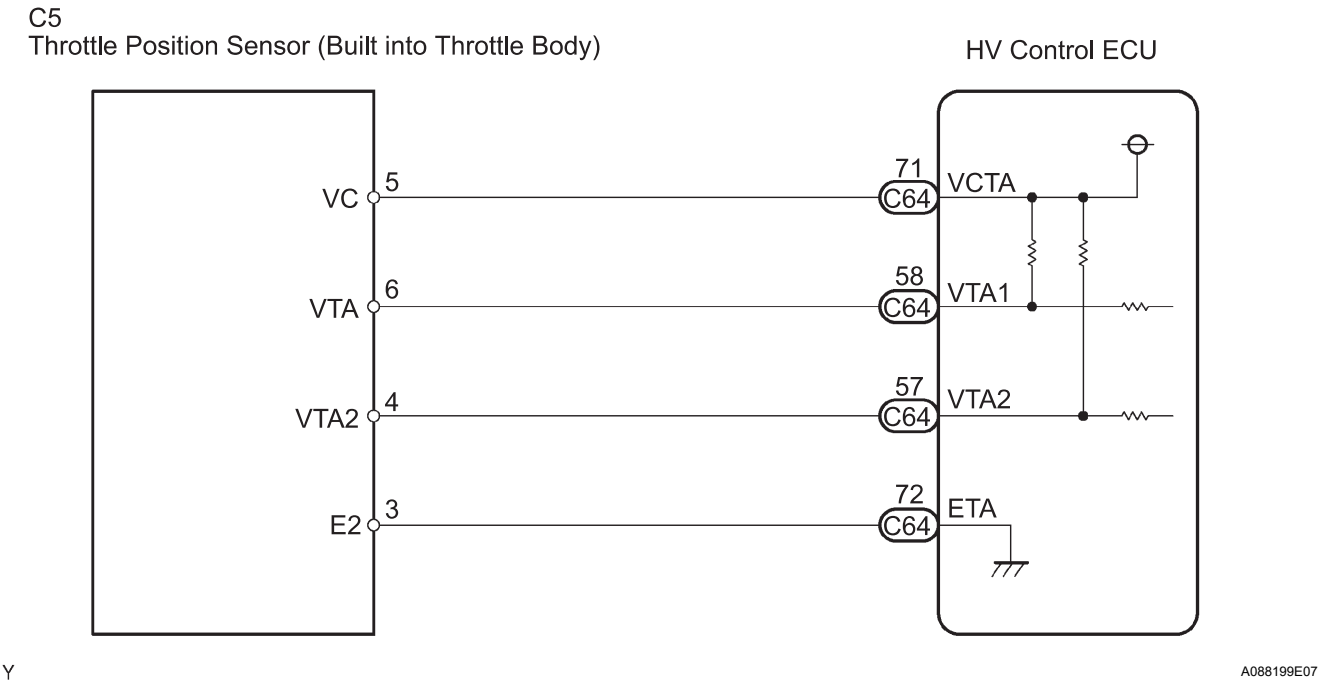
COMPONENT OPERATING RANGE

VTA1 voltage	0.69 to 4.05 V
VTA2 voltage	2.25 to 4.8 V

FAIL-SAFE

When any of these DTCs, as well as other DTCs relating to ETCS (Electronic Throttle Control System) malfunctions, are set, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator off, and the throttle valve is returned to a 6° throttle angle by the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing, in accordance with the accelerator pedal opening angle, to allow the vehicle to continue at a minimal speed. If the accelerator pedal is depressed gently, the vehicle can be driven slowly.
Fail-safe mode continues until a pass condition is detected, and the power switch is then turned off.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ VALUE USING INTELLIGENT TESTER (THROTTLE POS #1 AND THROTTLE POS #2)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / THROTTLE POS #1 and THROTTLE POS #2.
(d) Check the values displayed on the tester.

Result

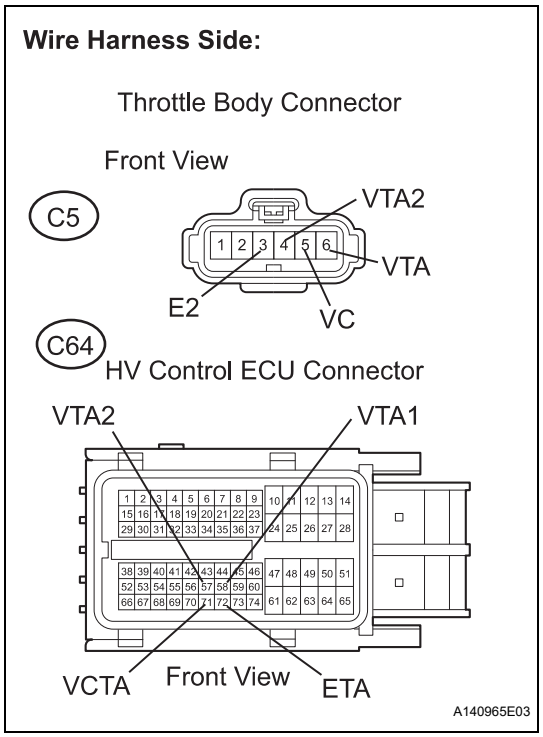
TP#1 (VTA1) When Accelerator Pedal Released	TP#2 (VTA2) When Accelerator Pedal Released	TP#1 (VTA1) When Accelerator Pedal Depressed	TP#2 (VTA2) When Accelerator Pedal Depressed	Trouble Areas	Proceed to
0 V to 0.2 V	0 V to 0.2 V	0 V to 0.2 V	0 V to 0.2 V	VC circuit open	A
4.5 V to 5.0 V	4.5 V to 5.0 V	4.5 V to 5.0 V	4.5 V to 5.0 V	E2 circuit open	
0 V to 0.2 V, or 4.5 V to 5.0 V	2.4 V to 3.4 V (Fail-safe)	0 V to 0.2 V, or 4.5 V to 5.0 V	2.4 V to 3.4 V (Fail-safe)	VTA1 circuit open or ground short	
0.7 V to 1.3 V (Fail-safe)	0 V to 0.2 V, or 4.5 V to 5.0 V	0.7 V to 1.3 V (Fail-safe)	0 V to 0.2 V, or 4.5 V to 5.0 V	VTA2 circuit open or ground short	
0.5 V to 1.1 V	2.1 V to 3.1 V	3.3 V to 4.9 V (Not fail-safe)	4.6 V to 5.0 V (Not fail-safe)	TP sensor circuit normal	B

HINT:
TP#1 denotes THROTTLE POS #1, and TP#2 denotes THROTTLE POS #2.

B → Go to step 5

A

2 CHECK HARNESS AND CONNECTOR (THROTTLE POSITION SENSOR - HV CONTROL ECU)



(a) Disconnect the C5 throttle body connector.
(b) Disconnect the C64 hybrid vehicle control ECU connector.
(c) Measure the resistance.

Standard resistance (Check for open)

Tester Connections	Specified Conditions
C5-5 (VC) - C64-71 (VCTA)	Below 1 Ω
C5-6 (VTA) - C64-58 (VTA1)	Below 1 Ω
C5-4 (VTA2) - C64-57 (VTA2)	Below 1 Ω
C5-3 (E2) - C64-72 (ETA)	Below 1 Ω

Standard resistance (Check for short)

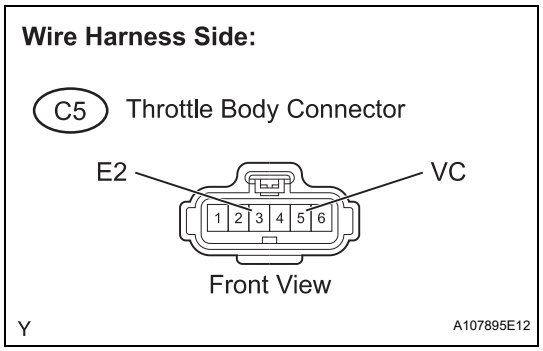
Tester Connections	Specified Conditions
C5-5 (VC) or C64-71 (VCTA) - Body ground	10 kΩ or higher
C5-6 (VTA) or C64-58 (VTA1) - Body ground	10 kΩ or higher
C5-4 (VTA2) or C64-57 (VTA2) - Body ground	10 kΩ or higher

(d) Reconnect the throttle body connector.
(e) Reconnect the hybrid vehicle control ECU connector.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 INSPECT HYBRID VEHICLE CONTROL ECU (VC VOLTAGE)



(a) Disconnect the C5 throttle body connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage between the terminals of the throttle body connector.

Standard voltage

Tester Connections	Specified Conditions
C5-5 (VC) - C5-3 (E2)	4.5 to 5.5 V

(d) Reconnect the throttle body connector.

NG → REPLACE HYBRID VEHICLE CONTROL ECU

OK

4	REPLACE THROTTLE BODY ASSEMBLY

NEXT

5	CHECK WHETHER DTC OUTPUT RECURS (THROTTLE POSITION SENSOR DTCS)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Clear the DTCs (See page ES-31).
(d) Put the engine in inspection mode (See page ES-35).
(e) Allow the engine to idle for 15 seconds or more.
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(g) Read the DTCs.

ES

Result

Display (DTC Output)	Proceed to
P0120, P0122, P0123, P0220, P0222, P0223, and/or P2135	A
No output	B

B → SYSTEM IS OK

A

REPLACE HYBRID VEHICLE CONTROL ECU

DTC	P0121	Throttle / Pedal Position Sensor / Switch "A" Circuit Range / Performance Problem

HINT:
This DTC relates to the Throttle Position (TP) sensor.

DESCRIPTION

Refer to DTC P0120 (See page ES-104).

DTC No.	DTC Detection Conditions	Trouble Areas
P0121	Difference between VTA1 and VTA2 voltages less than 0.8 V, or more than 1.6 V for 2 seconds (1-trip detection logic)	TP sensor (built into throttle body)

MONITOR DESCRIPTION

The ECM uses the TP sensor to monitor the throttle valve opening angle.
This sensor transmits two signals: VTA1 and VTA2. VTA1 is used to detect the throttle opening angle and VTA2 is used to detect malfunctions in VTA1. The ECM (included in hybrid vehicle control ECU) performs several checks to confirm proper operation of the TP sensor and VTA1.
For each throttle opening angle, a specific voltage difference is expected between the outputs of VTA1 and VTA2. If the output voltage difference between the two signals deviates from the normal range, the ECM interprets this as a malfunction of the TP sensor. The ECM illuminates the MIL and sets the DTC. If the malfunction is not repaired successfully, the DTC is set 2 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0121: TP sensor rationality
Required Sensors/Components (Main)	TP sensor
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	Within 2 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	P0120 - P0223, P2135 (TP sensor)
Either of following conditions A or B set	-
A. Power switch	ON
B. Electric throttle motor power	ON

TYPICAL MALFUNCTION THRESHOLDS

Difference in voltage between VAT1 and VTA2 TP sensor 1 - [TP sensor 2 x 0.8 (corrected by learning value)]	Less than 0.8 V, or more than 1.6 V

FAIL-SAFE

When this DTC, as well as other DTCs relating to ETCS (Electronic Throttle Control System) malfunctions, is set, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator off, and the throttle valve is returned to a 6° throttle angle by the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing, in accordance with the accelerator pedal opening angle, to allow the vehicle to continue at a minimal speed. If the accelerator pedal is depressed gently, the vehicle can be driven slowly.
Fail-safe mode continues until a pass condition is detected, and the power switch is then turned off.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

ES

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0121)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC output)	Proceed to
P0121	A
P0121 and other DTCs	B

B → GO TO DTC CHART

A

REPLACE THROTTLE BODY ASSEMBLY

DTC	P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control

DESCRIPTION

Refer to DTC P0115 (See page ES-95).

DTC No.	DTC Detection Conditions	Trouble Areas
P0125	Engine Coolant Temperature (ECT) does not reach closed-loop enabling temperature for 20 minutes (this period varies with ECT at engine start) (2-trip detection logic)	• ECT sensor • Cooling system • Thermostat

MONITOR DESCRIPTION

The resistance of the ECT sensor varies in proportion to the actual ECT. The ECT supplies a constant voltage to the sensor and monitors the signal output voltage of the sensor. The signal voltage output varies according to the changing resistance of the sensor. After the engine is started, the ECT is monitored through this signal. If the ECT sensor indicates that the engine is not yet warm enough for closed-loop fuel control, despite a specified period of time having elapsed since the engine was started, the ECM (included in hybrid vehicle control ECU) interprets this as a malfunction in the sensor or cooling system and sets the DTC.

Example:

The ECT is 0°C (32°F) at engine start. After about 1 minute running time, the ECT sensor still indicates that the engine is not warm enough to begin closed-loop fuel (air-fuel ratio feedback) control. The ECM interprets this as a malfunction in the sensor or cooling system and sets the DTC.

MONITOR STRATEGY

Related DTCs	P0125: Insufficient engine coolant temperature for closed-loop fuel control
Required Sensors/Components (Main)	Thermostat, cooling system
Required Sensors/Components (Related)	Engine coolant temperature sensor and mass air flow meter
Frequency of Operation	Once per driving cycle
Duration	56.4 seconds or more: Engine coolant temperature is -8.34°C (-15°F) or more at engine start 100.3 seconds or more: Engine coolant temperature is -19.45 to -8.34°C (-35 to -15°F) at engine start 20 minutes or more: Engine coolant temperature is less than -19.45°C (-35°F) at engine start
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor)
Thermostat failure	Not detected

TYPICAL MALFUNCTION THRESHOLDS

Time until actual engine coolant temperature reaches closed-loop fuel control enabling temperature	56.4 seconds or more: Engine coolant temperature is -8.34°C (-15°F) or more at engine start 100.3 seconds or more: Engine coolant temperature is -19.45 to -8.34°C (-35 to -15°F) at engine start 20 minutes or more: Engine coolant temperature is less than -19.45°C (-35°F) at engine start

WIRING DIAGRAM

Refer to DTC P0115 (See page ES-96).

INSPECTION PROCEDURE

HINT:

- If any of DTCs P0115, P0116, P0117 or P0118 are set simultaneously with DTC P0125, the Engine Coolant Temperature (ECT) sensor may have an open or a short circuit. Troubleshoot those DTCs first.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

ES

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0125)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0125	A
P0125 and other DTCs	B

HINT:
If any DTCs other than P0125 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

2	INSPECT THERMOSTAT

(a) Remove the thermostat (See page CO-12).
(b) Check the valve opening temperature of the thermostat.
Standard value:
80 to 84°C (176 to 183°F)
HINT:
In addition to the above check, confirm that the valve is completely closed when the temperature is below the standard.
(c) Reinstall the thermostat (See page CO-13).

NG → REPLACE THERMOSTAT

OK

3	CHECK COOLING SYSTEM

(a) Check for defects in the cooling system that might cause the system to be too cold, such as abnormal radiator fan operation or any malfunctions.

NG → **REPAIR OR REPLACE COOLING SYSTEM**

OK ↓

REPLACE ENGINE COOLANT TEMPERATURE SENSOR

DTC	P0128	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)

HINT:
This DTC relates to the thermostat.

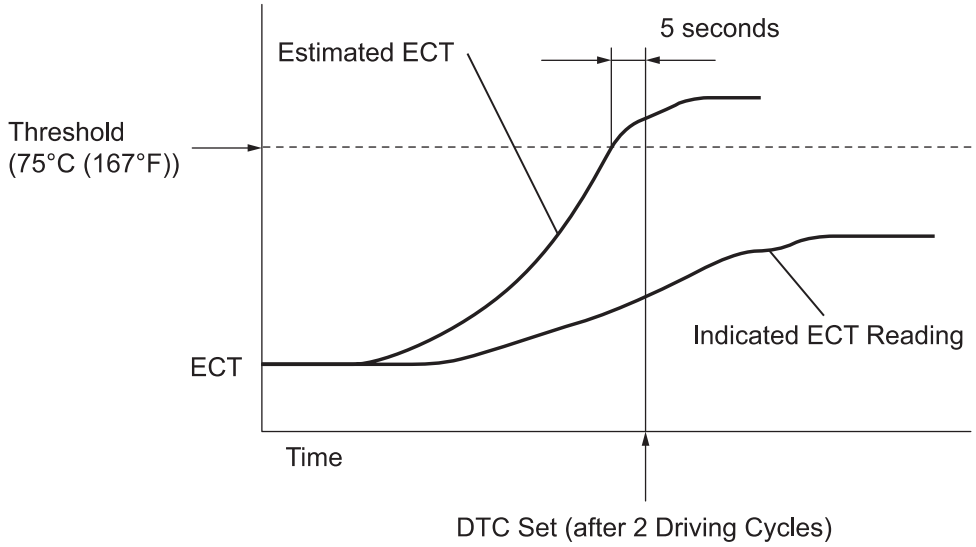
DESCRIPTION

This DTC is set when the Engine Coolant Temperature (ECT) does not reach 75°C (167°F) despite sufficient engine warm-up time having elapsed.

DTC No.	DTC Detection Conditions	Trouble Areas
P0128	Conditions (a), (b) and (c) met for 5 seconds (2-trip detection logic): (a) Cold start (b) Engine warmed up (c) ECT less than 75°C (167°F)	• Thermostat • Cooling system • ECT sensor • Hybrid vehicle control ECU

ES

MONITOR DESCRIPTION



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The ECM (included in hybrid vehicle control ECU) estimates the ECT based on the starting temperature, engine loads, and engine speeds. The ECM then compares the estimated temperature with the actual ECT. When the estimated ECT reaches 75°C (167°F), the ECM checks the actual ECT. If the actual ECT is less than 75°C (167°F), the ECM interprets this as a malfunction in the thermostat or the engine cooling system and sets the DTC.

MONITOR STRATEGY

Related DTCs	P0128: Coolant Thermostat

Required Sensors/Components (Main)	Thermostat
Required Sensors/Components (Related)	Engine Coolant Temperature (ECT) sensor, Intake Air Temperature (IAT) sensor, Vehicle speed sensor
Frequency of Operation	Once per driving cycle
Duration	650 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	P0010 (VVT OCV) P0011 (VVT System 1 - Advance) P0012 (VVT System 1 - Retard) P0031, P0032 (A/F sensor heater - Sensor 1) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for Closed Loop) P0171, P0172 (Fuel system) P0300 - P0304 (Misfire) P0335 (CKP sensor) P0340 (CMP sensor) P0351 - P0354 (Igniter) P0500 (VSS) P2196 (A/F sensor - rationality) P2A00 (A/F sensor - slow response)
Battery voltage	11 V or more
Either of following conditions 1 or 2 met:	-
1. All of following conditions met:	-
• ECT at engine start - IAT at engine start	-15°C to 7°C (-27°F to 12.6°F)
• ECT at engine start	-10°C to 56°C (14°F to 133°F)
• IAT at engine start	-10°C to 56°C (14°F to 133°F)
2. All of following conditions met:	-
• ECT at engine start - IAT at engine start	More than 7°C (12.6°F)
• ECT at engine start	56°C (133°F) or less
• IAT at engine start	-10°C (14°F) or more
Accumulated time at vehicle speed of 80 mph (128 km/h) or more	Less than 20 seconds

TYPICAL MALFUNCTION THRESHOLDS

Duration that both following conditions (a) and (b) met	5 seconds or more
(a) Estimated ECT	75°C (167°F) or more
(b) ECT sensor output	Below 75°C (167°F)

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0128)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).

(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0128	A
P0128 and other DTCs	B

HINT:
If any DTCs other than P0128 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

2 CHECK COOLING SYSTEM

(a) Check for defects in the cooling system that might cause the system to be too cold, such as abnormal radiator fan operation or any malfunctions.

NG → REPAIR OR REPLACE COOLING SYSTEM

OK

3 INSPECT THERMOSTAT

(a) Remove the thermostat (See page CO-12).
(b) Measure the valve opening temperature of the thermostat.
Standard value:
80 to 84°C (176 to 183°F)
HINT:
In addition to the above check, confirm that the valve is completely closed when the temperature is below the standard.
(c) Reinstall the thermostat (See page CO-13).

NG → REPLACE THERMOSTAT

OK

REPLACE HYBRID VEHICLE CONTROL ECU

DTC	P0136	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)

DTC	P0137	Oxygen Sensor Circuit Low Voltage (Bank 1 Sensor 2)

DTC	P0138	Oxygen Sensor Circuit High Voltage (Bank 1 Sensor 2)

DESCRIPTION

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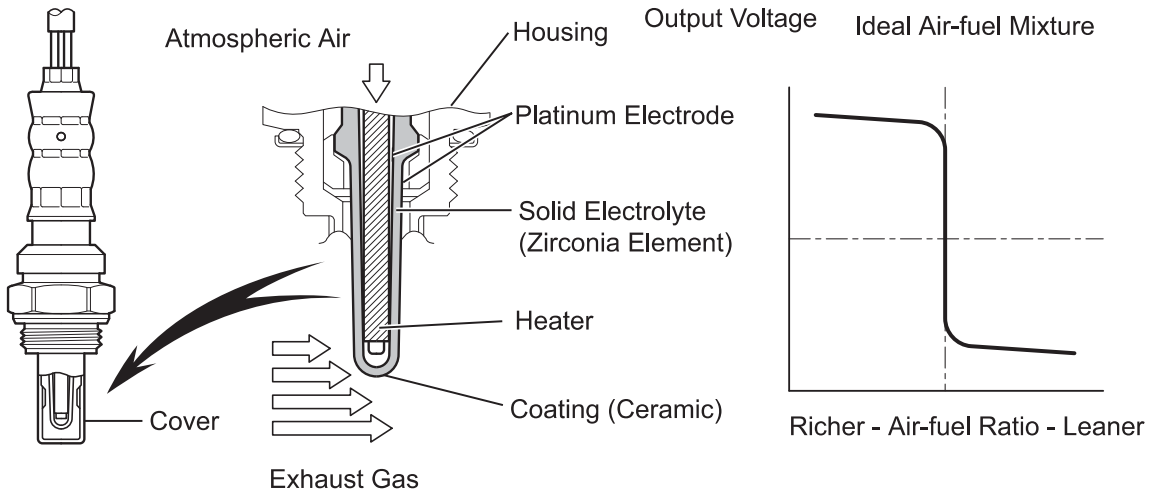
A three-way catalytic converter (TWC) is used in order to convert the carbon monoxide (CO), hydrocarbon (HC), and nitrogen oxide (NOx) into less harmful substances. To allow the TWC to function effectively, it is necessary to keep the air-fuel ratio of the engine near the stoichiometric air-fuel ratio. For the purpose of helping the ECM to deliver accurate air-fuel ratio control, the Heated Oxygen (HO2) sensor is used.
The HO2 sensor is located behind the TWC, and detects the oxygen concentration in the exhaust gas. Since the sensor is integrated with the heater that heats the sensing portion, it is possible to detect the oxygen concentration even when the intake air volume is low (the exhaust gas temperature is low).
When the air-fuel ratio becomes lean, the oxygen concentration in the exhaust gas is rich. The HO2 sensor informs the ECM that the post-TWC air-fuel ratio is lean (low voltage, i.e. less than 0.45 V).
Conversely, when the air-fuel ratio is richer than the stoichiometric air-fuel level, the oxygen concentration in the exhaust gas becomes lean. The HO2 sensor informs the ECM that the post-TWC air-fuel ratio is rich (high voltage, i.e. more than 0.45 V). The HO2 sensor has the property of changing its output voltage drastically when the air-fuel ratio is close to the stoichiometric level.
The ECM uses the supplementary information from the HO2 sensor to determine whether the air-fuel ratio after the TWC is rich or lean, and adjusts the fuel injection time accordingly. Thus, if the HO2 sensor is working improperly due to internal malfunctions, the ECM is unable to compensate for deviations in the primary air-fuel ratio control.



DTC No.	DTC Detection Conditions	Trouble Areas
P0136	• Abnormal voltage output: During active air-fuel ratio control, following conditions (a) and (b) met for certain period of time (2-trip detection logic): (a) Heated Oxygen (HO2) sensor voltage does not decrease to less than 0.59 V (b) HO2 sensor voltage does not increase to more than 0.21 V • Low impedance: Sensor impedance less than 5 Ω for more than 30 seconds when ECM presumes sensor to be warmed up and operating normally (2-trip detection logic)	• Open or short in HO2 sensor (sensor 2) circuit • HO2 sensor (sensor 2) • HO2 sensor heater (sensor 2) • Air-fuel Ratio (A/F) sensor (sensor 1) • Integration relay (EFI MAIN relay) • Gas leakage from exhaust system
P0137	• Low voltage (open): During active air-fuel ratio control, following conditions (a) and (b) met for certain period of time (2-trip detection logic): (a) HO2 sensor voltage output less than 0.21 V (b) Target air-fuel ratio rich • High impedance: Sensor impedance 15 kΩ or more for more than 90 seconds when ECM presumes sensor to be warmed up and operating normally (2-trip detection logic)	• Open in HO2 sensor (sensor 2) circuit • HO2 sensor (sensor 2) • HO2 sensor heater (sensor 2) • Integration relay (EFI MAIN relay) • Gas leakage from exhaust system
P0138	• High voltage (short): During active air-fuel ratio control, following conditions (a) and (b) met for certain period of time (2-trip detection logic): (a) HO2 sensor voltage output more than 0.59 V (b) Target air-fuel ratio lean • Extremely high voltage (short): HO2 sensor voltage output exceeds 1.2 V for more than 10 seconds (2-trip detection logic)	• Short in HO2 sensor (sensor 2) circuit • HO2 sensor (sensor 2) • ECM internal circuit malfunction

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MONITOR DESCRIPTION

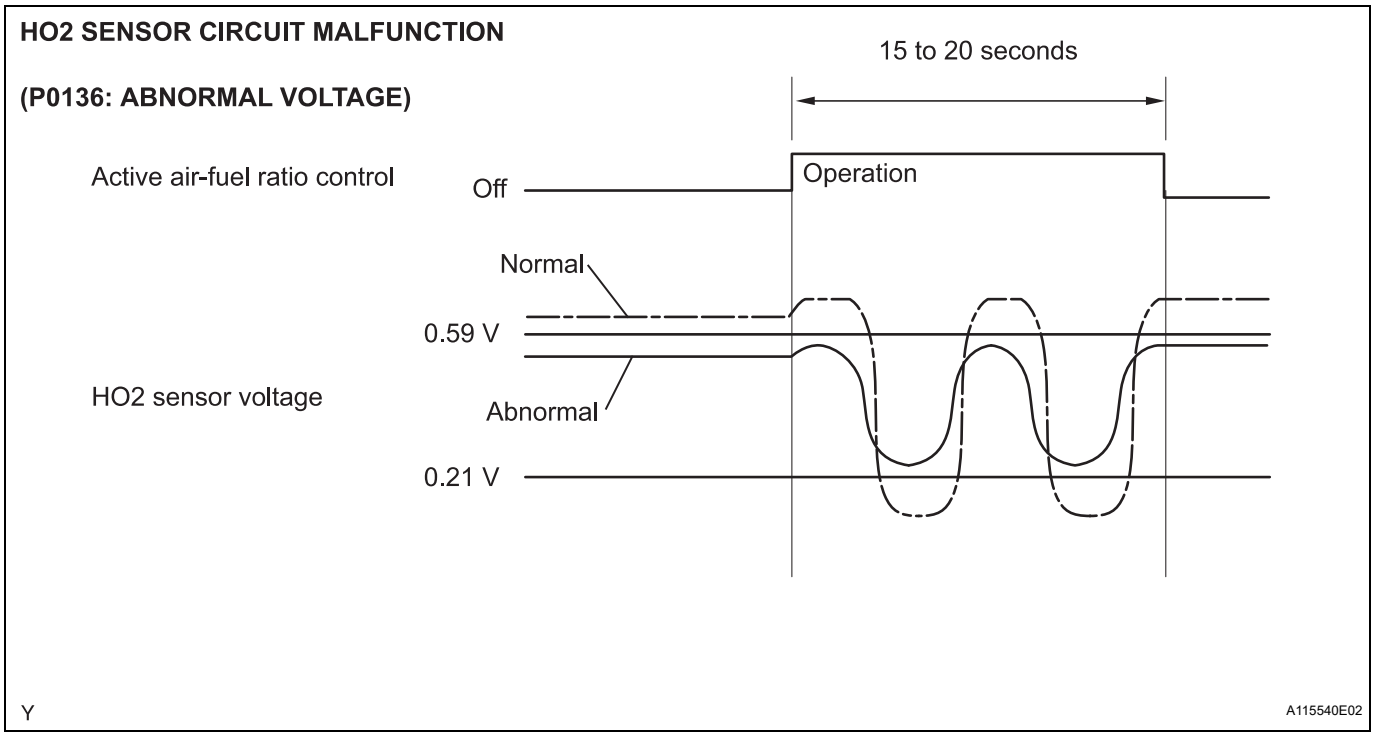
Active Air-Fuel Ratio Control

The ECM usually performs air-fuel ratio feedback control so that the Air-Fuel Ratio (A/F) sensor output indicates a near stoichiometric air-fuel level. This vehicle includes active air-fuel ratio control in addition to regular air-fuel ratio control. The ECM performs active air-fuel ratio control to detect any deterioration in the Three-Way Catalytic Converter (TWC) and Heated Oxygen (HO2) sensor malfunctions (refer to the diagram below).

Active air-fuel ratio control is performed for approximately 15 to 20 seconds while driving with a warm engine. During active air-fuel ratio control, the air-fuel ratio is forcibly regulated to become lean or rich by the ECM. If the ECM detects a malfunction, one of the following DTCs is set: DTC P0136 (abnormal voltage output), P0137 (open circuit) and P0138 (short circuit).

Abnormal Voltage Output of HO2 Sensor (DTC P0136)

While the ECM is performing active air-fuel ratio control, the air-fuel ratio is forcibly regulated to become rich or lean. If the sensor is not functioning properly, the voltage output variation is small. For example, when the HO2 sensor voltage does not decrease to less than 0.21 V and does not increase to more than 0.59 V during active air-fuel ratio control, the ECM determines that the sensor voltage output is abnormal and sets DTC P0136.



Open or Short in Heated Oxygen (HO2) Sensor Circuit (DTC P0137 or P0138)

During active air-fuel ratio control, the ECM calculates the Oxygen Storage Capacity (OSC)* of the Three-Way Catalytic Converter (TWC) by forcibly regulating the air-fuel ratio to become rich or lean. If the HO2 sensor has an open or short, or the voltage output of the sensor decreases significantly, the OSC indicates an extraordinarily high value. Even if the ECM attempts to continue regulating the air-fuel ratio to become rich or lean, the HO2 sensor output does not change.

While performing active air-fuel ratio control, when the target air-fuel ratio is rich and the HO2 sensor voltage output is 0.21 V or less (lean), the ECM interprets this as an abnormally low sensor output voltage and sets DTC P0137. When the target air-fuel ratio is lean and the voltage output is 0.59 V or more (rich) during active air-fuel ratio control, the ECM determines that the sensor voltage output is abnormally high, and sets DTC P0138.

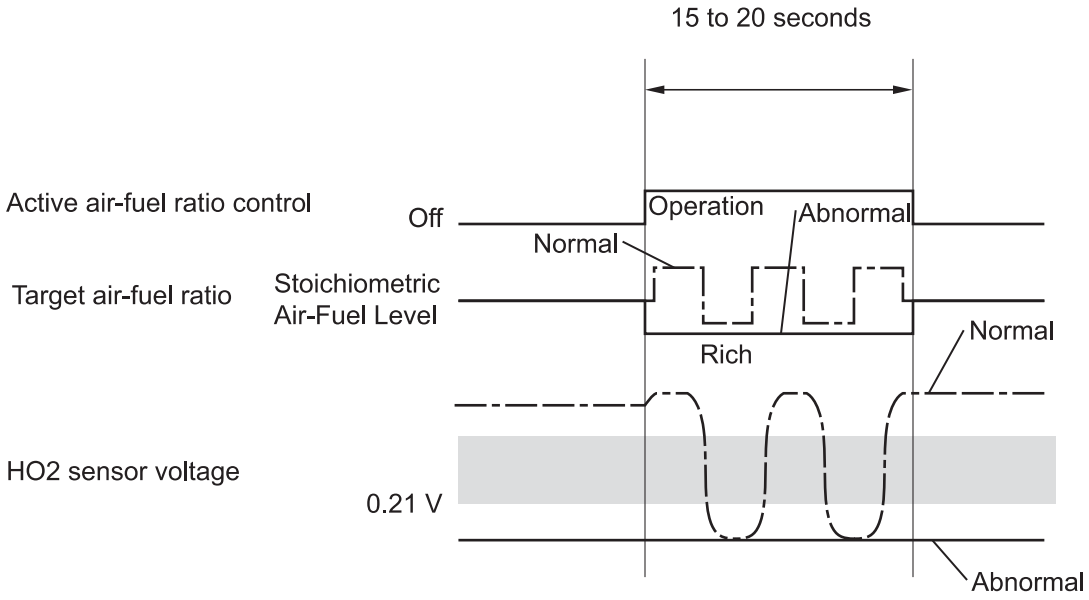
HINT:

DTC P0138 is also set if the HO2 sensor voltage output is more than 1.2 V for 10 seconds or more.

*: The TWC has the capability to store oxygen. The OSC and the emission purification capacity of the TWC are mutually related. The ECM determines whether the catalyst has deteriorated based on the calculated OSC value (See page ES-182).

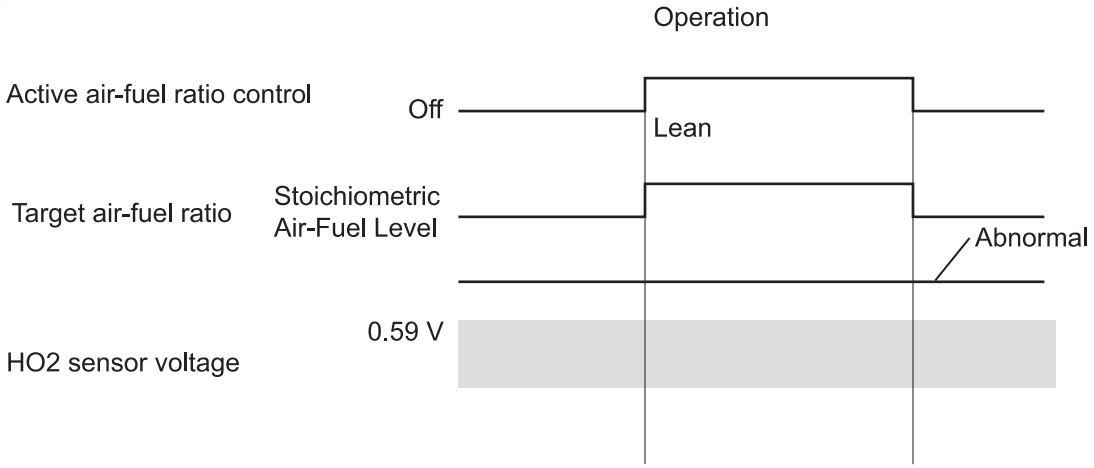
HO2 SENSOR CIRCUIT LOW VOLTAGE

(P0137: OPEN)



HO2 SENSOR CIRCUIT HIGH VOLTAGE

(P0138: SHORT)



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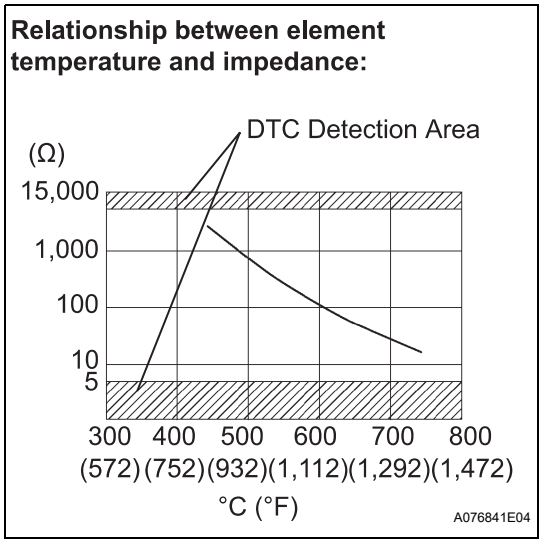
High or Low Impedance of Heated Oxygen (HO2) Sensor (DTC P0136 or P0137)



During normal air-fuel ratio feedback control, there are small variations in the exhaust gas oxygen concentration. In order to continuously monitor the slight variations in the HO2 sensor signal while the engine is running, the impedance* of the sensor is measured by the ECM. The ECM determines that there is a malfunction in the sensor when the measured impedance deviates from the standard range.
*: The effective resistance in an alternating current electrical circuit.
HINT:

- The impedance cannot be measured using an ohmmeter.
- DTC P0136 indicates deterioration of the HO2 sensor. The ECM sets this DTC by calculating the impedance of the sensor when the typical enabling conditions are satisfied (2 driving cycles).
- DTC P0137 indicates an open or short circuit in the HO2 sensor (2 driving cycles). The ECM sets this DTC when the impedance of the sensor exceeds the threshold 15 kΩ.

MONITOR STRATEGY

Related DTCs	P0136: Heated oxygen sensor output voltage (Abnormal voltage output) P0136: Heated oxygen sensor impedance (Low) P0137: Heated oxygen sensor output voltage (Low voltage) P0137: Heated oxygen sensor impedance (High) P0138: Heated oxygen sensor output voltage (High voltage) P0138: Heated oxygen sensor output voltage (Extremely high)
Required Sensors/Components (Main)	Heated oxygen sensor
Required Sensors/Components (Related)	Crankshaft position sensor, engine coolant temperature sensor, mass air flow meter and throttle position sensor
Frequency of Operation	Once per driving cycle: Active air-fuel ratio control detection Continuous: Other
Duration	20 seconds: Active air-fuel ratio control detection 60 seconds: Heated oxygen sensor impedance (High) 30 seconds: Heated oxygen sensor impedance (Low) 10 seconds: Output voltage (Stuck high)
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs not present	P0031, 32 (A/F Sensor heater - Sensor 1) P0037, 38 (O2 Sensor heater - Sensor 2) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0171, P0172 (Fuel system) P0300 - P0304 (Misfire) P0335 (CKP sensor) P0340 (CMP sensor) P0455, P0456 (EVAP system) P0500 (VSS) P2196 (A/F Sensor - rationality) P2A00 (A/F Sensor - slow response)

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Heated Oxygen Sensor Output Voltage (Abnormal Voltage Output, High Voltage and Low Voltage):

Active air-fuel ratio control	Executing
Active air-fuel ratio control begins when all of following conditions met:	-
Battery voltage	11 V or more
Engine coolant temperature	75°C (167°F) or more
Idling	ON
Engine RPM	Less than 3,200 rpm
A/F sensor status	Activated
Fuel system status	Closed loop
Fuel cut	OFF
Engine load	10 to 70%
Shift position	1 or more

Heated Oxygen Sensor Impedance (Low):

Battery voltage	11 V or more
Estimated rear HO2 sensor temperature	Less than 700°C (1,292°F)
ECM monitor	Completed
DTC P0606	Not set

Heated Oxygen Sensor Impedance (High):

Battery voltage	11 V or more
Estimated rear HO2 sensor temperature	450°C (842°F) or more
ECM monitor	Completed
DTC P0606	Not set

Heated Oxygen Sensor Output Voltage (Extremely High):

Battery voltage	11 V or more
Time after engine start	2 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

Heated Oxygen Sensor Output Voltage (Abnormal Voltage Output):

Either of following conditions met:	1 or 2
1. All of following conditions (a), (b) and (c) met	-
(a) Commanded air-fuel ratio	14.3 or less
(b) Rear HO2 sensor voltage	0.21 to 0.59 V
(c) OSC (Oxygen Storage Capacity of Catalyst)	2.3 g or more
2. All of following conditions (d), (e) and (f) met	-
(d) Commanded air-fuel ratio	14.9 or more

(e) Rear HO2 sensor voltage	0.21 to 0.59 V
(f) OSC	2.3 g or more

Heated Oxygen Sensor Output Voltage (Low):

All of following conditions (a), (b) and (c) met	-
(a) Commanded air-fuel ratio	14.3 or less
(b) Rear HO2 sensor voltage	Less than 0.21 V
(c) OSC	2.3 g or more

Heated Oxygen Sensor Output Voltage (High):

All of following conditions (a), (b) and (c) met	-
(a) Commanded air-fuel ratio	14.9 or more
(b) Rear HO2 sensor voltage	More than 0.59 V
(c) OSC	2.3 g or more

ES

Heated Oxygen Sensor Impedance (Low):

Duration of following condition met	30 seconds or more
Heated oxygen sensor impedance	Less than 5 Ω

Heated Oxygen Sensor Impedance (High):

Duration of following condition met	60 seconds or more
Heated oxygen sensor impedance	15 kΩ or more

Heated Oxygen Sensor Output Voltage (Extremely High):

Duration of following condition met	10 seconds or more
Heated oxygen sensor voltage	1.2 V or more

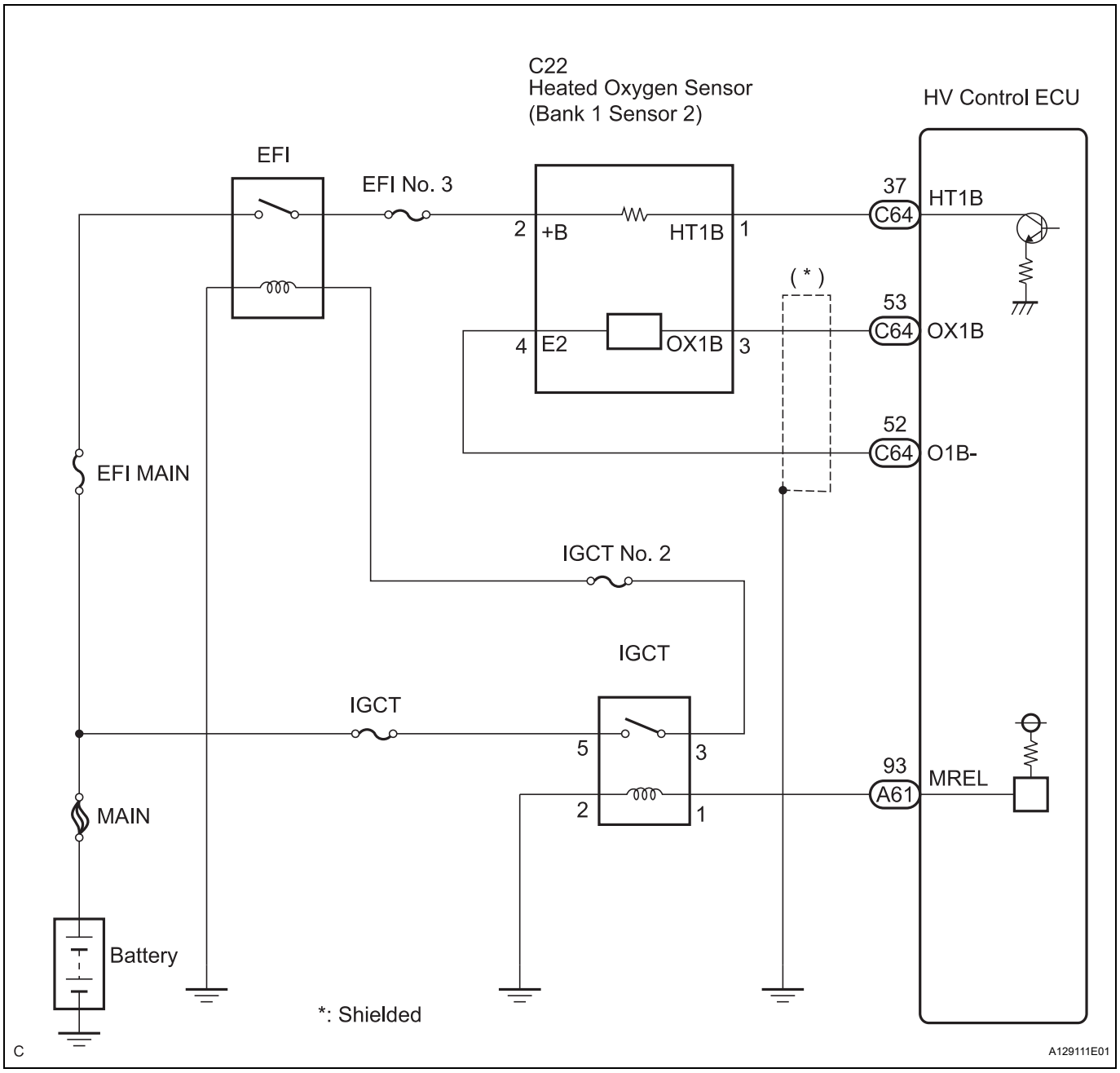
COMPONENT OPERATING RANGE

Duration of following condition met	30 seconds or more
Heated oxygen sensor voltage	Varies between 0.1 and 0.9 V

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-182).

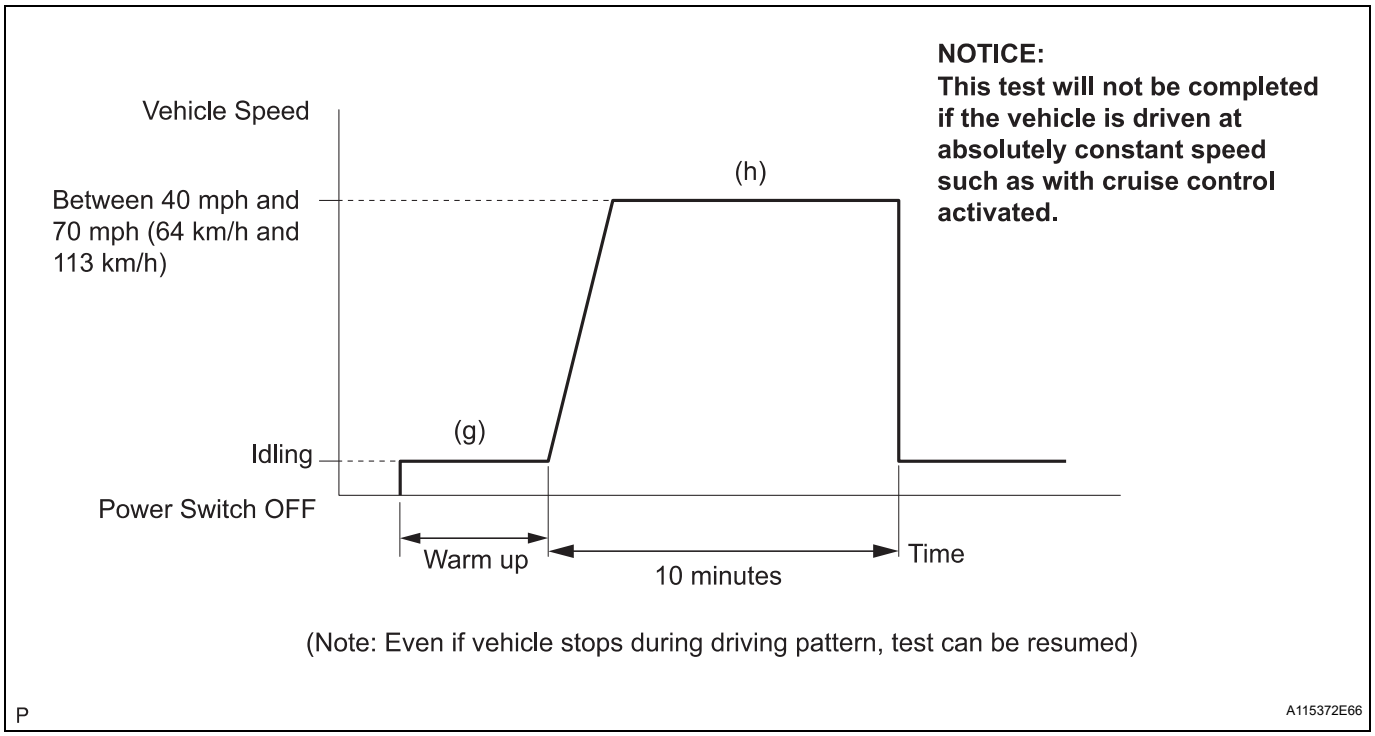
WIRING DIAGRAM

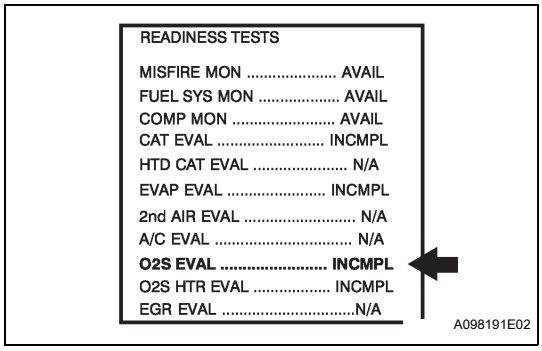


CONFIRMATION DRIVING PATTERN

HINT:

- This confirmation driving pattern is used in the "PERFORM CONFIRMATION DRIVING PATTERN" procedure of the following diagnostic troubleshooting procedure.
- Performing this confirmation pattern will activate the Heated Oxygen (HO2) sensor monitor. (The catalyst monitor is performed simultaneously.) This is very useful for verifying the completion of a repair.





(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Clear the DTCs (if set) (See page ES-31).
(e) Select the following menu items: DIAGNOSIS / CARB OBD II / READINESS TESTS.
(f) Check that O2S EVAL is INCMPL (incomplete).
(g) Put the engine in inspection mode (See page ES-35), and warm it up.
(h) Drive the vehicle at between 40 mph and 70 mph (64 km/h and 113 km/h) for at least 10 minutes.
(i) Note the state of the Readiness Tests items. Those items will change to COMPL (complete) as the O2S EVAL monitor operates.
(j) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES and check if any DTCs (any pending DTCs) are set.
HINT:
If O2S EVAL does not change to COMPL, and any pending DTCs fail to be set, extend the driving time.

INSPECTION PROCEDURE

HINT:
Sensor 2 refers to the sensor mounted behind the Three-Way Catalytic Converter (TWC) and located far from the engine assembly.
HINT:
Intelligent tester only:

Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Air-Fuel Ratio (A/F) sensor, Heated Oxygen (HO2) sensor and other potential trouble areas are malfunctioning.
The following instructions describe how to conduct the A/F CONTROL operation using the intelligent tester.
(a) Connect the intelligent tester to the DLC3.
(b) Put the engine in inspection mode (See page ES-35).
(c) Turn the tester on.
(d) Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
(e) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(f) Perform the A/F CONTROL operation with the engine idling (press the RIGHT or LEFT button to change the fuel injection volume).
(g) Monitor the voltage outputs of the A/F and HO2 sensors (AFS B1 S1 and O2S B1 S2) displayed on the tester.

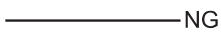
ES

HINT:
- The A/F CONTROL operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.
- The sensors react in accordance with increases and decreases in the fuel injection volume.

Standard

Tester Display (Sensor)	Injection Volumes	Status	Voltages
AFS B1 S1 (A/F)	+25%	Rich	Less than 3.0
	-12.5%	Lean	More than 3.35
O2S B1 S2 (HO2)	+25%	Rich	More than 0.5
	-12.5%	Lean	Less than 0.4

NOTICE:
The A/F sensor has an output delay of a few seconds and the HO2 sensor has a maximum output delay of approximately 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Areas
1	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		-
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage More than 0.5 V Less than 0.4 V		
2	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• A/F sensor • A/F sensor heater • A/F sensor circuit
	Output Voltage Almost no reaction		Output Voltage More than 0.5 V Less than 0.4 V		
3	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• HO2 sensor • HO2 sensor heater • HO2 sensor circuit
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage Almost no reaction		

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Areas
4	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• Injector • Fuel pressure • Gas leakage from exhaust system (Air-fuel ratio extremely lean or rich)
	Output Voltage Almost no reaction	NG	Output Voltage Almost no reaction	NG	

Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the A/F and HO2 sensors.
To display the graph, select the following menu items on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1 S1 and O2S B1 S2; then press the YES button and then the ENTER button followed by the F4 button.
HINT:

- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- If the OX1B wire from the hybrid vehicle control ECU connector is short-circuited to the +B wire, DTC P0138 will be set.

ES

1	READ OUTPUT DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTCs.

Result

Display (DTC output)	Proceed to
P0138	A
P0137	B
P0136	C

B → Go to step 14

C → Go to step 7

A

2	READ VALUE USING INTELLIGENT TESTER (OUTPUT VOLTAGE OF HEATED OXYGEN SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / O2S B1 S2.
(d) Allow the engine to idle.
(e) Read the Heated Oxygen (HO2) sensor output voltage while idling.

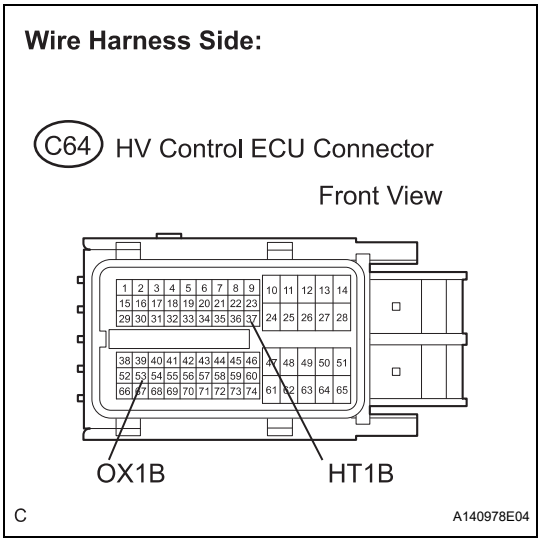
Result

HO2 Sensor Output Voltages	Proceed to
More than 1.2 V	A
Less than 1.0 V	B

B → Go to step 5

A

3 CHECK HARNESS AND CONNECTOR (CHECK FOR SHORT)



(a) Turn the power switch off and wait for 5 minutes.
(b) Disconnect the C64 hybrid vehicle control ECU connector.
(c) Measure the resistance.
Standard resistance

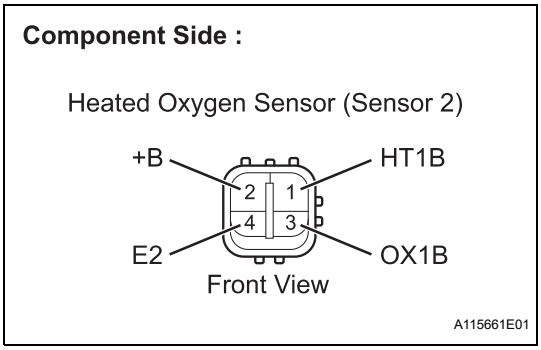
Tester Connections	Specified Conditions
C64-37 (HT1B) - C64-53 (OX1B)	10 kΩ or higher

(d) Reconnect the hybrid vehicle control ECU connector.

OK → REPLACE HYBRID VEHICLE CONTROL ECU

NG

4 INSPECT HEATED OXYGEN SENSOR (CHECK FOR SHORT)



(a) Disconnect the C22 HO2 sensor connector.
(b) Measure the resistance.
Standard resistance

Tester Connections	Specified Conditions
2 (+B) - 4 (E2)	10 kΩ or higher
2 (+B) - 3 (OX1B)	10 kΩ or higher

(c) Reconnect the HO2 sensor connector.

NG → REPLACE HEATED OXYGEN SENSOR

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

5	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

6	CHECK WHETHER DTC OUTPUT RECURS (DTC P0138)

(a) On the intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(b) Read the DTCs.

ES

Result

Display (DTC Output)	Proceed to
P0138	A
No output	B

B → CHECK FOR INTERMITTENT PROBLEMS

A

REPLACE HEATED OXYGEN SENSOR

7	READ VALUE USING INTELLIGENT TESTER (OUTPUT VOLTAGE OF HEATED OXYGEN SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Put the engine in inspection mode (See page ES-35).
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / O2S B1 S2.
(e) After warming up the engine, run the engine at an engine speed of 2,500 rpm for 3 minutes.
(f) Read the output voltage of the HO2 sensor when the engine rpm is suddenly increased.
HINT:
Quickly accelerate the engine to 4,000 rpm 3 times using the accelerator pedal.
Standard voltage:
Fluctuates between 0.4 V or less and 0.5 V or more.

NG → **Go to step 14**

OK

8	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

9	CHECK WHETHER DTC OUTPUT RECURS (DTC P0136)

(a) On the intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(b) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0136	A
No output	B

B → CHECK FOR INTERMITTENT PROBLEMS

A

10	REPLACE HEATED OXYGEN SENSOR

NEXT

11	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

12	CHECK WHETHER DTC OUTPUT RECURS (DTC P0136)

(a) On the intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(b) Read the DTCs.

Result

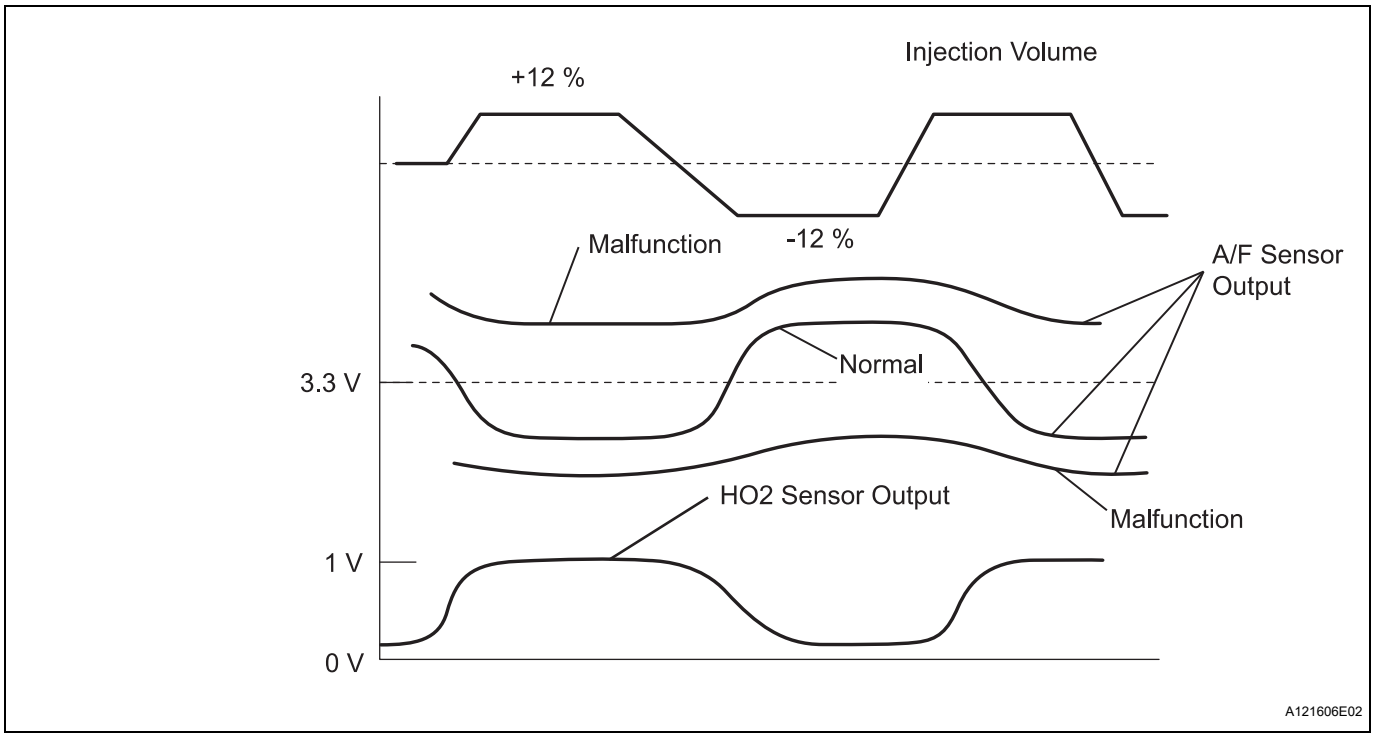
Display (DTC Output)	Proceed to
P0136	A
No output	B

B → END

A

13	PERFORM ACTIVE TEST USING INTELLIGENT TESTER (INJECTION VOLUME)

(a) Connect the intelligent tester to the DLC3.



(b) Put the engine in inspection mode (See page ES-35).
(c) Turn the tester on.
(d) Warm up the engine.
(e) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / INJ VOL.
(f) Change the fuel injection volume using the tester, monitoring the voltage output of Air-Fuel Ratio (A/F) and HO2 sensors displayed on the tester.
HINT:
- Change the fuel injection volume within the range of -12% and +12%. The injection volume can be changed in 1% graduations within the range.
- The A/F sensor is displayed as AFS B1 S1, and the HO2 sensor is displayed as O2S B1 S2, on the intelligent tester.

Result

Tester Display (Sensor)	Voltage Variations	Proceed to
AFS B1 S1 (A/F)	Alternates between more and less than 3.3 V	OK
	Remains at more than 3.3 V	NG
	Remains at less than 3.3 V	NG

HINT:
A normal HO2 sensor voltage (O2S B1 S2) reacts in accordance with increases and decreases in fuel injection volumes. When the A/F sensor voltage remains at either less or more than 3.3 V despite the HO2 sensor indicating a normal reaction, the A/F sensor is malfunctioning.

NG → **REPLACE AIR-FUEL RATIO SENSOR**

OK

CHECK AND REPAIR EXTREMELY RICH OR LEAN ACTUAL AIR FUEL RATIO (FUEL SYSTEM, EXHAUST GAS LEAKAGE, ETC.)

14	**CHECK FOR EXHAUST GAS LEAK**

OK:
No gas leakage.

NG → **REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT**

OK

15	**INSPECT HEATED OXYGEN SENSOR (HEATER RESISTANCE)**

(a) Check the heated oxygen sensor resistance (See page EC-26).

NG → **REPLACE HEATED OXYGEN SENSOR**

OK

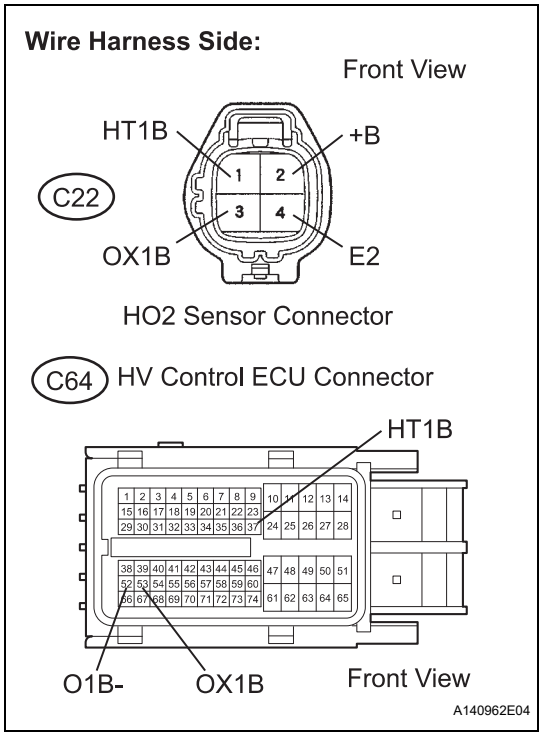
16	**INSPECT INTEGRATION RELAY (EFI RELAY)**

(a) Check the EFI relay (See page ES-407).

NG → **REPLACE INTEGRATION RELAY (EFI RELAY)**

OK

17	CHECK HARNESS AND CONNECTOR (HEATED OXYGEN SENSOR - HV CONTROL ECU)



(a) Disconnect the C22 HO2 sensor connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage between the +B terminal of the HO2 sensor connector and body ground.

Standard voltage

Tester Connections	Specified Conditions
C22-2 (+B) - Body ground	9 to 14 V

(d) Turn the power switch off.
(e) Disconnect the C64 hybrid vehicle control ECU connector.
(f) Measure the resistance.

Standard resistance (Check for open)

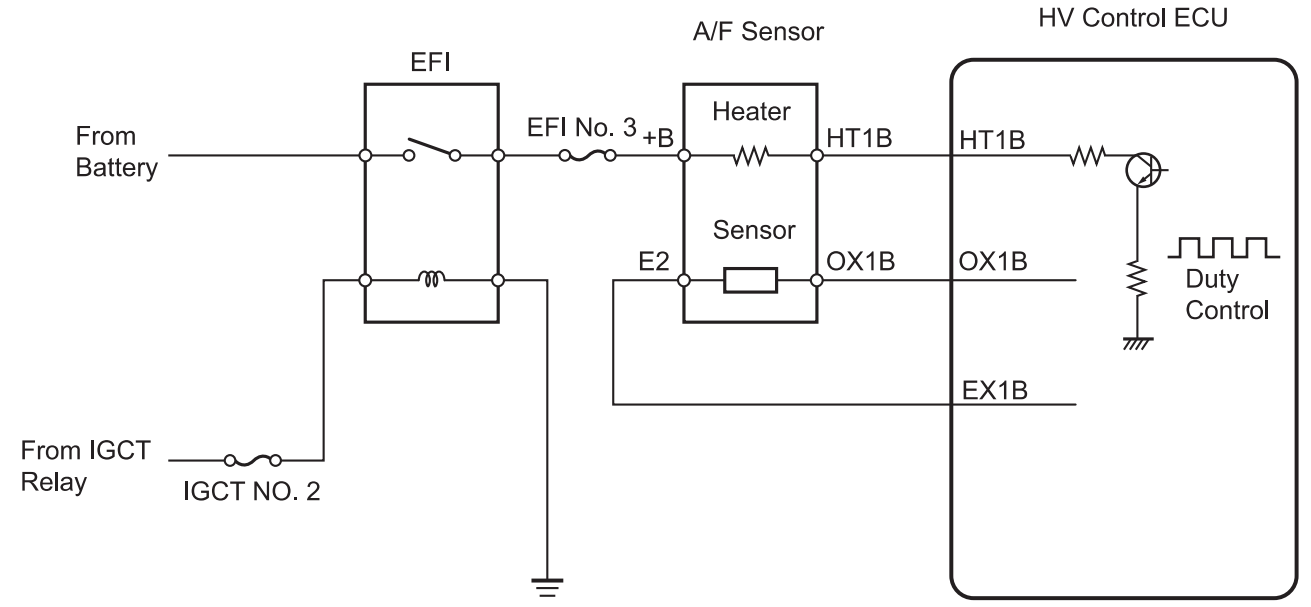
Tester Connections	Specified Conditions
C22-1 (HT1B) - C64-37 (HT1B)	Below 1 Ω
C22-3 (OX1B) - C64-53 (OX1B)	Below 1 Ω
C22-4 (E2) - C64-52 (O1B-)	Below 1 Ω

Standard resistance (Check for short)

Tester Connections	Specified Conditions
C22-1 (HT1B) or C64-37 (HT1B) - Body ground	10 kΩ or higher
C22-3 (OX1B) or C64-53 (OX1B) - Body ground	10 kΩ or higher
C22-4 (E2) or C64-52 (O1B-) - Body ground	10 kΩ or higher

(g) Reconnect the HO2 sensor connector.
(h) Reconnect the hybrid vehicle control ECU connector.

Reference (System Diagram of Bank 1 Sensor 2):



NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HEATED OXYGEN SENSOR

DTC	P0171	System Too Lean (Bank 1)

DTC	P0172	System Too Rich (Bank 1)

DESCRIPTION

The fuel trim is related to the feedback compensation value, not to the basic injection time. The fuel trim consists of both the short-term and the long-term fuel trims.

The short-term fuel trim is fuel compensation that is used to constantly maintain the air-fuel ratio at stoichiometric levels. The signal from the Air-Fuel Ratio (A/F) sensor indicates whether the air-fuel ratio is rich or lean compared to the stoichiometric ratio. This triggers a reduction in the fuel injection volume if the air-fuel ratio is rich and an increase in the fuel injection volume if it is lean.

Factors such as individual engine differences, wear over time and changes in operating environment cause short-term fuel trim to vary from the central value. The long-term fuel trim, which controls overall fuel compensation, compensates for long-term deviations in the fuel trim from the central value caused by the short-term fuel trim compensation.

If both the short-term and long-term fuel trims are lean or rich beyond predetermined values, it is interpreted as a malfunction, and the ECM (included in hybrid vehicle control ECU) illuminates the MIL and sets a DTC.

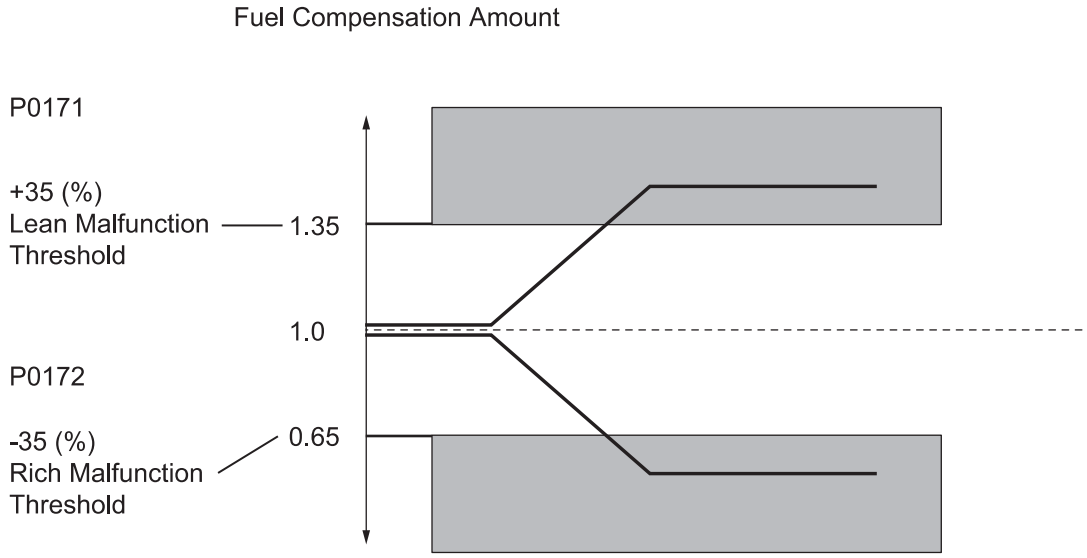
DTC No.	DTC Detection Conditions	Trouble Areas
P0171	With warm engine and stable air-fuel ratio feedback, fuel trim considerably in error to lean side (2-trip detection logic)	• Air induction system • Injector blockage • Mass Air Flow (MAF) meter • Engine Coolant Temperature (ECT) sensor • Fuel pressure • Gas leakage from exhaust system • Open or short in A/F sensor (sensor 1) circuit • A/F sensor (sensor 1) • A/F sensor heater (sensor 1) • Integration relay (EFI MAIN relay) • A/F sensor heater and EFI MAIN relay circuits • PCV valve and hose • PCV hose connections • Hybrid vehicle control ECU
P0172	With warm engine and stable air-fuel ratio feedback, fuel trim considerably in error to rich side (2-trip detection logic)	• Injector leakage or blockage • MAF meter • ECT sensor • Ignition system • Fuel pressure • Gas leakage from exhaust system • Open or short in A/F sensor (sensor 1) circuit • A/F sensor (sensor 1) • A/F sensor heater (sensor 1) • Integration relay (EFI MAIN relay) • A/F sensor heater and EFI MAIN relay circuits • Hybrid vehicle control ECU

HINT:

- When DTC P0171 is set, the actual air-fuel ratio is on the lean side. When DTC P0172 is set, the actual air-fuel ratio is on the rich side.
- If the vehicle runs out of fuel, the air-fuel ratio is lean and DTC P0171 may be set. The MIL is then illuminated.
- When the total of the short-term and long-term fuel trim values is within 20% (and the engine coolant temperature is more than 75°C [167°F]), the system is functioning normally.

MONITOR DESCRIPTION

Under closed-loop fuel control, fuel injection volumes that deviate from those estimated by the ECM cause changes in the long-term fuel trim compensation value. The long-term fuel trim is adjusted when there are persistent deviations in the short-term fuel trim values. Deviations from the ECM's estimated fuel injection volumes also affect the average fuel trim learning value, which is a combination of the average short-term fuel trim (fuel feedback compensation value) and the average long-term fuel trim (learning value of the air-fuel ratio). If the average fuel trim learning value exceeds the malfunction threshold, the ECM interprets this as a fault in the fuel system and sets a DTC.
Example:
The average fuel trim learning value is +35% or more or -35% or less, the ECM interprets this as a fuel system malfunction.



MONITOR STRATEGY

Related DTCs	P0171: Fuel trim lean P0172: Fuel trim rich
Required Sensors/Components (Main)	Fuel system
Required Sensors/Components (Related)	A/F sensor, Mass air flow meter, Crankshaft position sensor
Frequency of Operation	Continuous
Duration	Within 10 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	P0010 (VVT OCV) P0011 (VVT System 1 - Advance) P0012 (VVT System 1 - Retard) P0031, P0032 (A/F sensor heater - Sensor 1) P0100 - P0103 (MAF meter) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0335 (CKP sensor) P0340 (CMP sensor) P0351 - P0354 (Igniter) P0500 (VSS)
Fuel system status	Closed loop
Battery voltage	11 V or more
Either of following conditions 1 or 2 set	-
1. Engine RPM	Below 1,400 rpm
2. Intake air amount per revolution	0.22 g/rev or more
Catalyst monitor	Not executed

TYPICAL MALFUNCTION THRESHOLDS

Purge-cut	Executing
Either of following conditions 1 or 2 met	-
1. Average of short-term fuel trim and long-term fuel trim	35% or more (varies with ECT)
2. Average of short-term fuel trim and long-term fuel trim	-35% or less (varies with ECT)

WIRING DIAGRAM

Refer to DTC P2195 (See page ES-273).

INSPECTION PROCEDURE

HINT:

- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- A low A/F sensor voltage could be caused by a rich air-fuel mixture. Check for conditions that would cause the engine to run rich.
- A high A/F sensor voltage could be caused by a lean air-fuel mixture. Check for conditions that would cause the engine to run lean.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0171 OR P0172)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0171 or P0172	A
P0171 or P0172 and other DTCs	B

HINT:
If any DTCs other than P0171 or P0172 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

2	PERFORM ACTIVE TEST USING INTELLIGENT TESTER (A/F CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Put the engine in inspection mode (See page ES-35).
(c) Turn the tester on.
(d) Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
(e) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(f) Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
(g) Monitor the output voltages of the A/F and HO2 sensors (AFS B1S1 and O2S B1S2) displayed on the tester.

Result:

The A/F sensor reacts in accordance with increases and decreases in the fuel injection volume:
+25% = Rich output:
Less than 3.0 V
-12.5% = Lean output:
More than 3.35 V

NOTICE:
The A/F sensor has an output delay of a few seconds and the HO2 sensor has a maximum output delay of approximately 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Areas
1	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		-
	Output Voltage More than 3.35 V Less than 3.0 V	OK	Output Voltage More than 0.5 V Less than 0.4 V	OK	
2	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• A/F sensor • A/F sensor heater • A/F sensor circuit
	Output Voltage Almost no reaction	NG	Output Voltage More than 0.5 V Less than 0.4 V	OK	

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Areas
3	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		Extremely rich or lean actual air-fuel ratio • Injector leakage or blockage • Gas leakage from exhaust system • Fuel pressure • MAF meter • ECT sensor • Air induction system • PCV hose connections
	Output Voltage Almost no reaction	NG	Output Voltage Almost no reaction	NG	

ES

Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the A/F and HO2 sensors.
To display the graph, select the following menu items on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1S1 and O2S B1S2; then press the YES button and then the ENTER button followed by the F4 button.

Result

Result	Proceed to
Case 1	C
Case 2	B
Case 3	A

B → **Go to step 11**

C → **Go to step 15**

A

3	READ VALUE USING INTELLIGENT TESTER (MAF)

(a) Connect the intelligent tester to the DLC3.
(b) Put the engine in inspection mode (See page ES-35).
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / MAF and COOLANT TEMP.
(e) Allow the engine to idle until the COOLANT TEMP reaches 75°C (167°F) or more.
(f) Read the MAF with the engine in an idling condition and at an engine speed of 2,500 rpm.
Standard:
MAF while engine idling:
Between 1 g/sec. and 3 g/sec. (shift position: N, A/C: OFF).
MAF at an engine speed of 2,500 rpm:
Between 2 g/sec. and 6 g/sec. (shift position: N, A/C: OFF).

NG → REPLACE MASS AIR FLOW METER

OK

4	READ VALUE USING INTELLIGENT TESTER (COOLANT TEMP)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
(d) Read the COOLANT TEMP twice, when the engine is both cold and warmed up.

Standard:
With cold engine:
Same as ambient air temperature.
With warm engine:
Between 75°C and 100°C (167°F and 212°F).

NG → REPLACE ENGINE COOLANT TEMPERATURE SENSOR

OK

5	CHECK PCV HOSE (HOSE CONNECTIONS)

(a) Check PCV hose connections.

OK:
PCV hose is connected correctly and is not damaged.

NG → REPAIR OR REPLACE PCV HOSE

OK

6	CHECK AIR INDUCTION SYSTEM

(a) Check the air induction system for vacuum leakage.

OK:
No leakage from air induction system.

NG → REPAIR OR REPLACE AIR INDUCTION SYSTEM

OK

7	CHECK FOR SPARK AND IGNITION (See page ES-160)

NG → REPAIR OR REPLACE IGNITION SYSTEM

OK

8	CHECK FOR EXHAUST GAS LEAK

(a) Check for exhaust gas leakage.
OK:
No gas leakage.

NG → **REPAIR OR REPLACE EXHAUST SYSTEM**

OK ↓

9	CHECK FUEL PRESSURE

(a) Check the fuel pressure (See page FU-9).
Standard pressure:
304 to 343 kPa (3.1 to 3.5 kgf/cm^2, 44.1 to 49.7 psi)

NG → **REPAIR OR REPLACE FUEL SYSTEM**

OK ↓

10	INSPECT FUEL INJECTOR (INJECTION AND VOLUME)

(a) Check the injection volume (See page FU-14).
Standard injection volume:
45 to 58 cm^3 (2.9 to 3.5 cu in.) per 15 seconds

NG → **REPLACE FUEL INJECTOR**

OK ↓

11	INSPECT AIR-FUEL RATIO SENSOR (HEATER RESISTANCE) (See page ES-75)

NG → **REPLACE AIR-FUEL RATIO SENSOR**

OK ↓

12	INSPECT INTEGRATION RELAY (EFI RELAY) (See page ES-76)

NG → **REPLACE INTEGRATION RELAY**

OK ↓

13	CHECK HARNESS AND CONNECTOR (A/F SENSOR - HV CONTROL ECU) (See page ES-287)

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

ES

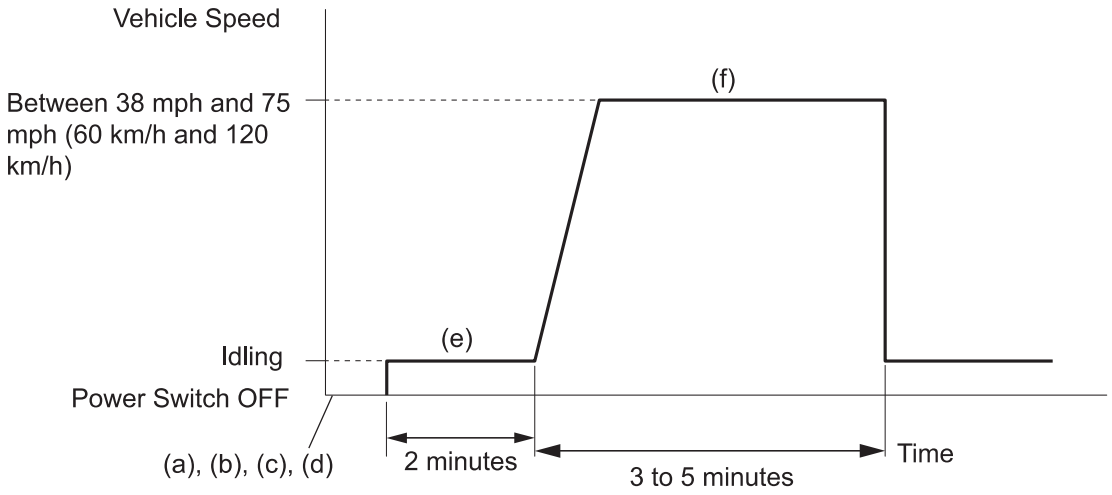
OK

14	REPLACE AIR-FUEL RATIO SENSOR

NEXT

15	PERFORM CONFIRMATION DRIVING PATTERN

ES



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(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Clear the DTCs (See page ES-31).
(d) Switch the ECM from normal mode to check mode using the tester (See page ES-34).
(e) Put the engine in inspection mode (See page ES-35), and warm it up with all the accessories switched OFF.
(f) Drive the vehicle at between 38 mph and 75 mph (60 km/h and 120 km/h) and at an engine speed of between 1,400 rpm and 3,200 rpm for 3 to 5 minutes.
HINT:
If the system is still malfunctioning, the MIL will be illuminated during step (f).
NOTICE:
If the conditions in this test are not strictly followed, no malfunction will be detected.

NEXT

16	CHECK WHETHER DTC OUTPUT RECURS (DTC P0171 OR P0172)

(a) On the intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(b) Read the DTCs.

Result

Display (DTC Output)	Proceed to
No output	A
P0171 or P0172	B

B → Go to step 3

A → END

DTC	P0300	Random / Multiple Cylinder Misfire Detected

DTC	P0301	Cylinder 1 Misfire Detected

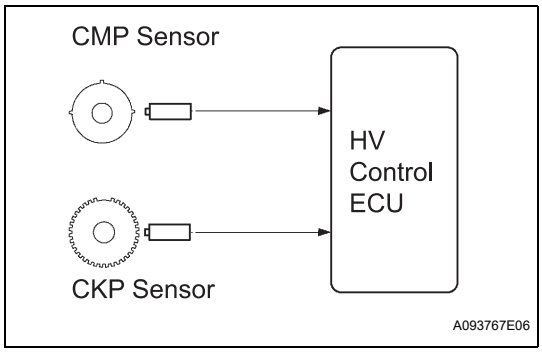
DTC	P0302	Cylinder 2 Misfire Detected

DTC	P0303	Cylinder 3 Misfire Detected

DTC	P0304	Cylinder 4 Misfire Detected

ES

DESCRIPTION



When the engine misfires, high concentrations of hydrocarbons (HC) enter the exhaust gas. Extremely high HC concentration levels can cause increases in exhaust emission levels. High concentrations of HC can also cause increases in the Three-Way Catalytic Converter (TWC) temperature, which may cause damage to the TWC. To prevent these increases in emissions and to limit the possibility of thermal damage, the ECM (included in hybrid vehicle control ECU) monitors the misfire rate. When the temperature of the TWC reaches the point of thermal degradation, the ECM blinks the MIL. To monitor misfires, the ECM uses both the Camshaft Position (CMP) sensor and the Crankshaft Position (CKP) sensor. The CMP sensor is used to identify any misfiring cylinders and the CKP sensor is used to measure variations in the crankshaft rotation speed. Misfires are counted when the crankshaft rotation speed variations exceed predetermined thresholds.
If the misfire rate exceeds the threshold level, and could cause emission deterioration, the ECM illuminates the MIL and sets a DTC.

DTC No.	DTC Detection Conditions	Trouble Areas
P0300	Simultaneous misfiring of several cylinders detected (2-trip detection logic)	• Open or short in engine wire harness • Connector connection • Vacuum hose connections • Ignition system • Injector • Fuel pressure • Mass Air Flow (MAF) meter • Engine Coolant Temperature (ECT) sensor • Compression pressure • Valve clearance • Valve timing • PCV valve and hose • PCV hose connections • Air induction system • Hybrid vehicle control ECU
P0301 P0302 P0303 P0304	Misfiring of specific cylinder detected (2-trip detection logic)	

When DTCs for misfiring cylinders are randomly set, but DTC P0300 is not set, misfires have been detected in different cylinders at different times. DTC P0300 is only set when several misfiring cylinders are detected at the same time.

MONITOR DESCRIPTION

The ECM illuminates the MIL and sets a DTC when either of the following conditions, which could cause emission deterioration, is detected (2-trip detection logic).

- Within the first 1,000 crankshaft revolutions of the engine starting, an excessive misfiring rate (approximately 20 to 50 misfires per 1,000 crankshaft revolutions) occurs once.
- After the first 1,000 crankshaft revolutions, an excessive misfiring rate (approximately 20 to 50 misfires per 1,000 crankshaft revolutions) occurs 4 times in sequential crankshaft revolutions.

The ECM flashes the MIL and sets a DTC when either of the following conditions, which could cause Three-Way Catalytic Converter (TWC) damage, is detected (2-trip detection logic).

- In every 200 crankshaft revolutions at a high engine rpm, the threshold misfiring percentage is recorded once.
- In every 200 crankshaft revolutions at a normal engine rpm, the threshold misfiring percentage is recorded 3 times.

MONITOR STRATEGY

Related DTCs	P0300: Multiple cylinder misfire P0301: Cylinder 1 misfire P0302: Cylinder 2 misfire P0303: Cylinder 3 misfire P0304: Cylinder 4 misfire
Required Sensors/Components (Main)	Crankshaft position sensor and camshaft position sensor
Required Sensors/Components (Related)	Engine coolant temperature and intake air temperature sensors and mass air flow meter
Frequency of Operation	Continuous
Duration	1,000 to 4,000 crankshaft revolutions: Emission related misfire 200 to 600 crankshaft revolutions: Catalyst damaged misfire
MIL Operation	2 driving cycles: Emission related misfire MIL flashes immediately: Catalyst damaged misfire
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Misfire:

Monitor runs whenever following DTCs not present	P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0327, P0328 (Knock sensor) P0335 (CKP sensor) P0340 (CMP sensor) P0500 (VSS)
Battery voltage	8 V or more
VVT system	Not operated by scan tool
Engine RPM	750 to 6,400 rpm
Either of following conditions (a) or (b) met	-
(a) ECT at engine start	More than -7°C (19°F)
(b) ECT	More than 20°C (68°F)
Fuel cut	OFF

Monitor period of emission-related-misfire:

First 1,000 revolutions after engine start, or check mode	Crankshaft 1,000 revolutions
Except above	Crankshaft 1,000 revolutions x 4

Monitor period of catalyst-damaged-misfire (MIL blinks):

All of following conditions 1, 2 and 3 met	Crankshaft 200 revolutions x 3
1. Driving cycles	1st

2. Check mode	OFF
3. Engine RPM	Less than 3.500 rpm
Except above	Crankshaft 200 revolutions

TYPICAL MALFUNCTION THRESHOLDS

Monitor period of emission-related-misfire:

Misfire rate	2.2% or more

Monitor period of catalyst-damaged-misfire (MIL blinks):

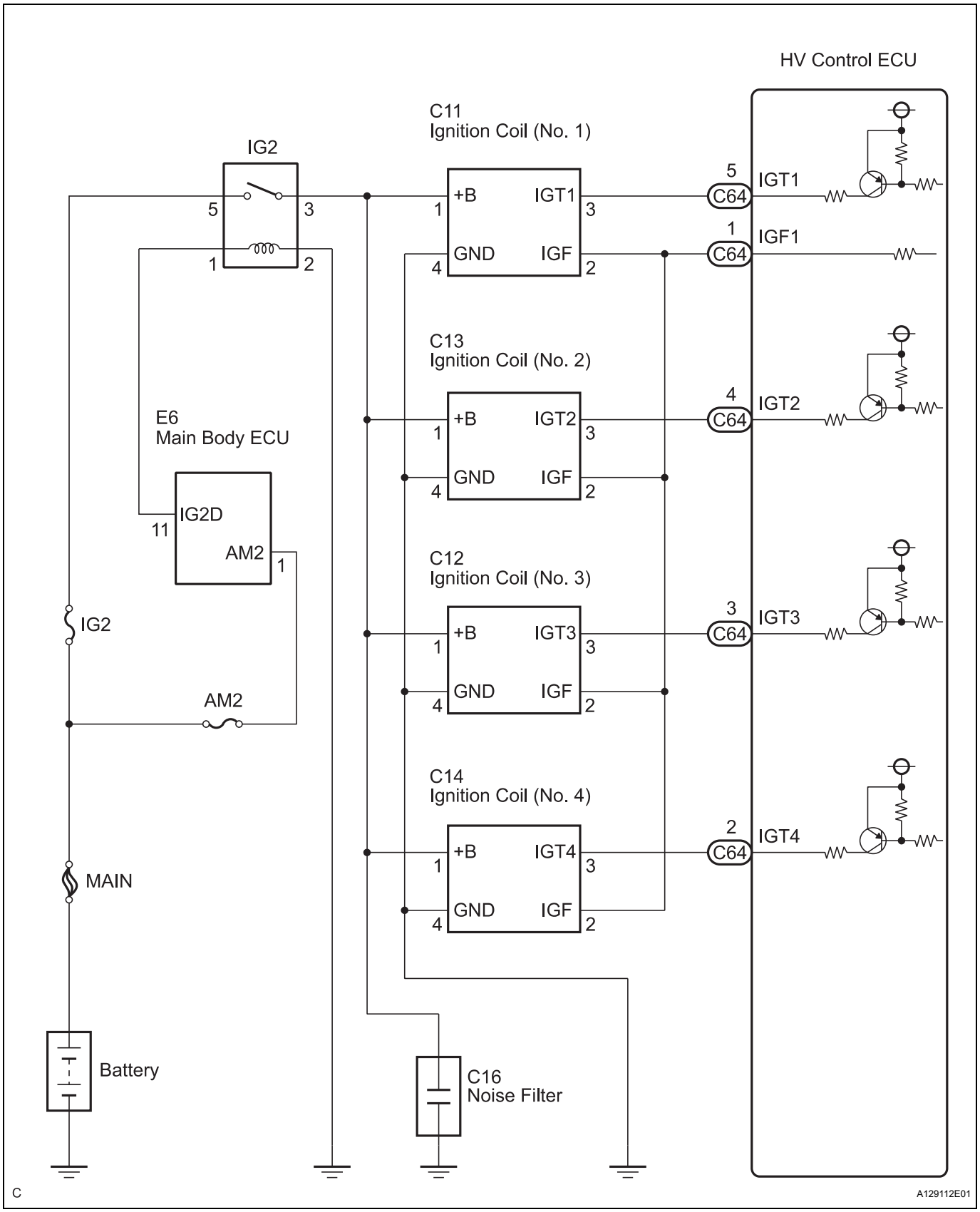
Number of misfire per 200 revolutions	118 or more (varies with intake air amount and RPM)

MONITOR RESULT

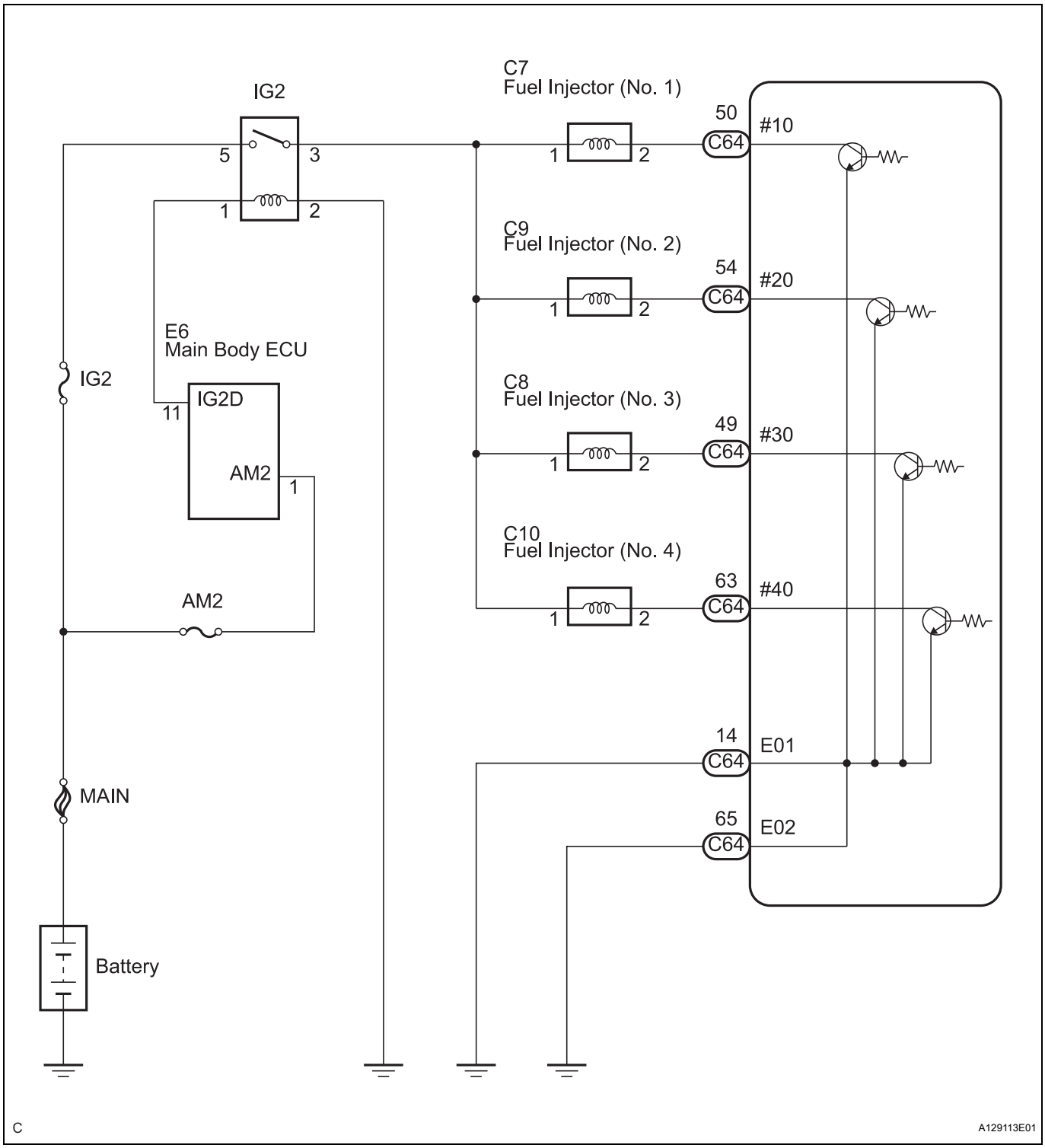
Refer to CHECKING MONITOR STATUS (See page ES-14).

WIRING DIAGRAM

Wiring diagram of the ignition system.



Wiring diagram of the injector circuit.



CONFIRMATION DRIVING PATTERN

1. Connect the intelligent tester to the DLC3.
2. Turn the power switch on (IG).
3. Turn the tester on.
4. Record the DTC(s) and freeze frame data.
5. Using the tester, switch the ECM from normal mode to check mode (See page ES-17).
6. Read the misfire counts of each cylinder (CYL #1 to #4) with the engine in an idling condition. If any misfire count is displayed, skip the following confirmation driving pattern.

7. Drive the vehicle several times with the conditions, such as an engine rpm and engine load, shown in MISFIRE RPM and MISFIRE LOAD in the DATA LIST.
   HINT:
   In order to store misfire DTCs, it is necessary to drive the vehicle for the period of time shown in the table below, with the MISFIRE RPM and MISFIRE LOAD in the DATA LIST.

Engine RPM	Duration
Idling	3.5 minutes or more
1,000	3 minutes or more
2,000	1.5 minutes or more
3,000	1 minute or more

8. Check whether misfires have occurred by checking DTCs and freeze frame data.
   HINT:
   Do not turn the power switch off until the stored DTC(s) and freeze frame data have been recorded. When the ECM returns to normal mode (default), the stored DTC(s), freeze frame data and other data will be erased.
9. Record the DTC(s), freeze frame data and misfire counts.
10. Turn the power switch off and wait for at least 5 seconds.

ES

INSPECTION PROCEDURE

HINT:

- If any DTCs other than misfire DTCs are output, troubleshoot those DTCs first.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- If the misfire does not recur when the vehicle is brought to the workshop, reproduce the conditions stored in the freeze frame data.
- If the misfire still cannot be reproduced even though the conditions stored in the freeze frame data have been duplicated, one of the following factors is considered to be a possible cause of the problem:
  (a) The fuel level is low.
  (b) Improper fuel is used.
  (c) The spark plugs are dirty.
  (d) The problem is complex due to multiple factors.
- After finishing repairs, check that no misfires occur in each cylinder (CYL #1, #2, #3 and #4).
- Be sure to confirm that no misfiring cylinder DTCs are set again by conducting the confirmation driving pattern, after the repairs.
- For 6 and 8 cylinder engines, the ECM intentionally does not set the specific misfiring cylinder DTCs at a high engine RPM. If misfires only occur during high engine RPM driving, only DTC P0300 is set.
  In the event of DTC P0300 being present, perform the following operations:
  (a) Clear the DTC (See page ES-31).
  (b) Start the engine and conduct the confirmation driving pattern.
  (c) Read the misfiring rates of each cylinder or DTC(s) using the tester.
  (d) Repair the cylinder(s) that has a high misfiring rate or is indicated by the DTC.
  (e) After finishing repairs, conduct the confirmation driving pattern again, in order to verify that DTC P0300 is not set.
- When either SHORT FT #1 or LONG FT #1 in the freeze frame data is outside the range of +-20%, the air-fuel ratio may be rich (-20% or less) or lean (+20% or more).
- When the COOLANT TEMP in the freeze frame data is less than 75°C (167°F), misfires occurred only while warming up the engine.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO MISFIRE DTCS)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0300, P0301, P0302, P0303 and/or P0304	A
P0300, P0301, P0302, P0303 and/or P0304 and other DTCs	B

HINT:
If any DTCs other than P0300, P0301, P0302, P0303 and P0304 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

2	READ VALUE USING INTELLIGENT TESTER (MISFIRE RPM AND MISFIRE LOAD)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / MISFIRE / MISFIRE RPM and MISFIRE LOAD.
(d) Read and note the MISFIRE RPM and MISFIRE LOAD (engine load) values.
HINT:
The MISFIRE RPM and MISFIRE LOAD values indicate the vehicle conditions under which the misfire occurred.

NEXT

3	CHECK PCV HOSE (HOSE CONNECTIONS)

OK:
PCV hose is connected correctly and is not damaged.

NG → REPAIR OR REPLACE PCV HOSE

OK

4	CHECK MISFIRE COUNT (CYL #1, #2, #3 AND #4)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-31).

(e) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / MISFIRE / CYL #1, #2, #3 and #4.
(f) Put the engine in inspection mode (See page ES-35).
(g) Read each value for CYL #1 to #4 displayed on the tester. If no misfire counts occur in any cylinders, perform the following procedures:
  (1) Shift the gear selector lever to the D position.
  (2) Check CYL #1 to #4.
  (3) If misfire counts are still not displayed, perform steps (h) and (i) and then check the misfire counts again.
(h) Drive the vehicle with the MISFIRE RPM and MISFIRE LOAD noted in the "READ VALUE USING INTELLIGENT TESTER (MISFIRE RPM AND MISFIRE LOAD)" procedures above.
(i) Read the CYL #1 to #4 or DTCs displayed on the tester.

Result

Misfire Count	Proceed to
Most misfires occur in only 1 or 2 cylinders	A
3 cylinders or more have equal misfire counts	B

HINT:
- If it is difficult to reproduce misfires for each cylinder, check the DATA LIST item, MISFIRE MARGIN. Try to find vehicle driving conditions that lower the MISFIRE MARGIN value. Values above 30% are considered normal.
- If the freeze frame data's record of the ECT is below 75°C (167°F), misfire may be detected only when the engine is cold.
- If the freeze frame data's record of the ENGINE RUN TIME is below 120 seconds, misfire may be detected immediately after the engine is started.

B → Go to step 14

A

5	PERFORM ACTIVE TEST USING INTELLIGENT TESTER (FUEL CUT #1 TO #4)

(a) Put the engine in inspection mode (See page ES-35).
(b) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / FUEL CUT#1 (to #4).
(c) If a cylinder has a high misfire count, cut fuel to that cylinder. Compare the misfire count of the cylinder before fuel cut and after fuel cut.

Result

Misfire Count in Each Cylinder	Proceed to
Misfire count of cylinder before fuel cut and after fuel cut roughly the same	A
Misfire count of cylinder before fuel cut lower than after fuel cut	B

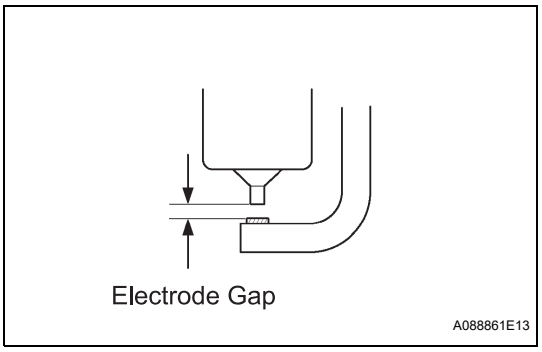
NOTICE:
This ACTIVE TEST cannot be performed while the vehicle is being driven.
HINT:
If the misfire count of the cylinder before and after the fuel cut are roughly the same, the cylinder is misfiring.
If the misfire count of the cylinder before the fuel cut is lower than after the fuel cut, the cylinder misfires sometimes.

B → **Go to step 11**

A

ES

6 CHECK SPARK PLUG



(a) Remove the ignition coil and the spark plug of the misfiring cylinder.
(b) Measure the spark plug electrode gap.
Standard gap:
1.0 to 1.1 mm (0.039 to 0.043 in.)
(c) Check the electrode for carbon deposits.
Recommended spark plug:

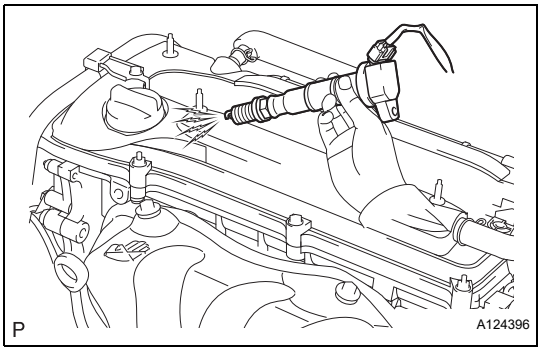
Manufacturers	Products
DENSO	SK20R11
NGK	IFR6A11

NOTICE:
If the electrode gap is larger than the standard, replace the spark plug. Do not adjust the electrode gap.

NG → **REPLACE SPARK PLUG**

OK

7 CHECK FOR SPARKS AND IGNITION



(a) Remove the ignition coil from the cylinder head.
(b) Install the spark plug onto the ignition coil.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the power switch on (IG) and turn the tester on.
(e) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / FUEL CUT ALL.
(f) Attach the spark plug assembly to the cylinder head.
(g) Perform the FUEL CUT ALL operation (press the RIGHT or LEFT button to change to ON).
NOTICE:
When FUEL CUT ALL is OFF and the engine is cranked, fuel injection will occur.
(h) Crank the engine for less than 2 seconds and check the spark.
OK:
Sparks jump across electrode gap.

(i) Install the ignition coil.

NG → Go to step 9

OK

8	CHECK CYLINDER COMPRESSION PRESSURE (MISFIRING CYLINDER)

(a) Measure the cylinder compression pressure of the misfiring cylinder.

OK → Go to step 10

NG

ES

CHECK ENGINE TO DETERMINE CAUSE OF LOW COMPRESSION

9	CHANGE WITH NORMAL SPARK PLUG AND CHECK SPARK OF MISFIRING CYLINDER (MISFIRING CYLINDER)

(a) Change the installed spark plug with a spark plug that functions normally.

(b) Perform a spark test.

CAUTION:
Always disconnect all injector connectors.
NOTICE:
Do not crank the engine for more than 2 seconds.

(1) Install the spark plug to the ignition coil and connect the ignition coil connector.
(2) Disconnect the injector connector.
(3) Ground the spark plug.
(4) Check if sparks occur while the engine is being cranked.

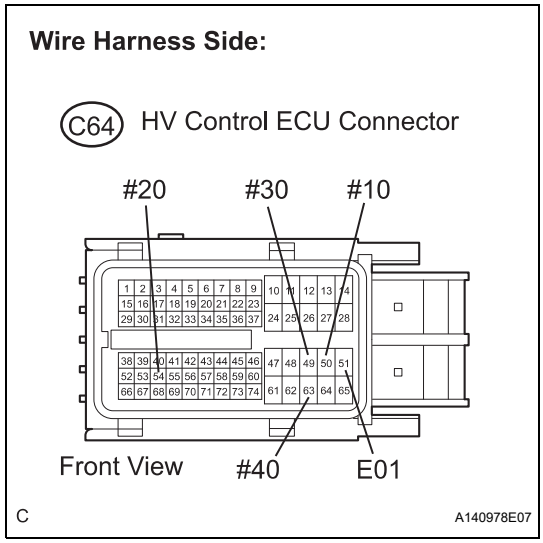
OK:
Sparks jump across electrode gap.

NG → REPLACE IGNITION COIL ASSEMBLY

OK

REPLACE SPARK PLUG

10 INSPECT HV CONTROL ECU TERMINAL VOLTAGE (MISFIRING CYLINDER)



(a) Disconnect the C64 hybrid vehicle control ECU connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage between the terminals of the hybrid vehicle control ECU connector.

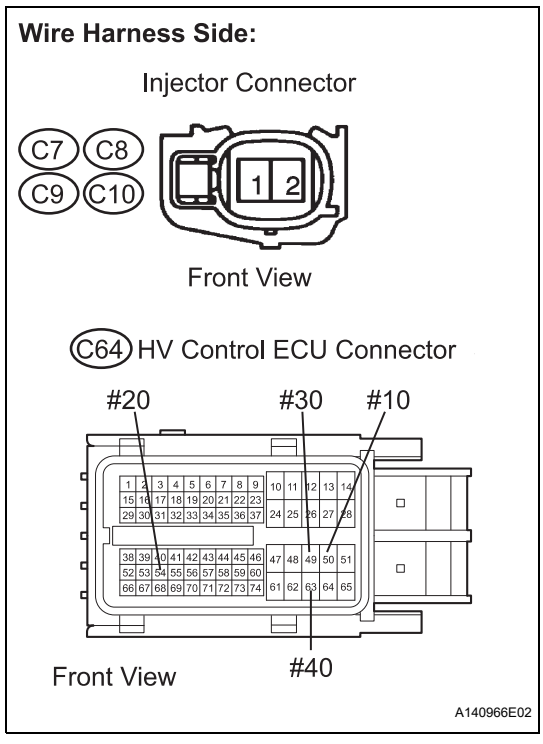
Standard voltage

Tester Connections	Specified Conditions
C64-50 (#10) - C64-51 (E01)	9 to 14 V
C64-54 (#20) - C64-51 (E01)	9 to 14 V
C64-49 (#30) - C64-51 (E01)	9 to 14 V
C64-63 (#40) - C64-51 (E01)	9 to 14 V

OK → **Go to step 12**

NG

11 CHECK HARNESS AND CONNECTOR (INJECTOR - HV CONTROL ECU)



(a) Disconnect the injector connector (of the misfiring cylinder).
(b) Disconnect the C64 hybrid vehicle control ECU connector.
(c) Turn the power switch on (IG).
(d) Measure the resistance and voltage between the injector and the hybrid vehicle control ECU connector terminals.

Standard voltage

Cylinder	Tester Connections	Specified Conditions
No. 1	C7-1 - Ground	9 to 14 V
No. 2	C9-1 - Ground	9 to 14 V
No. 3	C8-1 - Ground	9 to 14 V
No. 4	C10-1 - Ground	9 to 14 V

Standard resistance

Cylinder	Tester Connections	Specified Conditions
No. 1	C7-2 - Ground	10 kΩ or higher
	C7-2 - C64-50 (#10)	Below 1 Ω
No. 2	C9-2 - Ground	10 kΩ or higher
	C9-2 - C64-54 (#20)	Below 1 Ω
No. 3	C8-2 - Ground	10 kΩ or higher
	C8-2 - C64-49 (#30)	Below 1 Ω
No. 4	C10-2 - Ground	10 kΩ or higher
	C10-2 - C64-63 (#40)	Below 1 Ω

(e) Reconnect the injector connector.
(f) Reconnect the hybrid vehicle control ECU connector.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

12 CHECK FUEL INJECTOR (MISFIRING CYLINDER)

(a) Check the injector injection (whether fuel volume is high or low, and whether injection pattern is poor).

NG → REPLACE FUEL INJECTOR ASSEMBLY

OK

13 CHECK VALVE CLEARANCE (MISFIRING CYLINDER)

NG → ADJUST VALVE CLEARANCE

OK

14 CHECK AIR INDUCTION SYSTEM

(a) Check the air induction system for vacuum leakage.
OK:
No leakage from air induction system.

NG → REPAIR OR REPLACE AIR INDUCTION SYSTEM

OK

15 CHECK VALVE TIMING

NG → ADJUST VALVE TIMING

OK

16 CHECK FUEL PRESSURE

(a) Check the fuel pressure (See page FU-9).

NG → CHECK AND REPLACE FUEL PUMP, PRESSURE REGULATOR, FUEL PIPE LINE AND FILTER

OK

ES

17	READ VALUE USING INTELLIGENT TESTER (COOLANT TEMP) (See page ES-148)

NG → REPLACE ENGINE COOLANT TEMPERATURE SENSOR

OK ↓

18	READ VALUE USING INTELLIGENT TESTER (MAF) (See page ES-147)

NG → REPLACE MASS AIR FLOW METER

OK ↓

CHECK FOR INTERMITTENT PROBLEMS

DTC	P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)

DTC	P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)

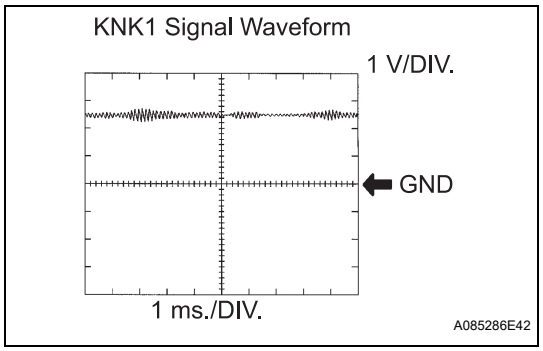
DESCRIPTION

Flat type knock sensors (non-resonant type) have structures that can detect vibrations over a wide band of frequencies: between approximately 6 kHz and 15 kHz.
The knock sensor is fitted onto the engine block to detect engine knocking.
The knock sensor contains a piezoelectric element which generates a voltage when it becomes deformed. The voltage is generated when the engine block vibrates due to knocking. Any occurrence of engine knocking can be suppressed by delaying the ignition timing.

ES

DTC No.	DTC Detection Condition	Trouble Area
P0327	Output voltage of knock sensor less than 0.5 V (1-trip detection logic)	• Short in knock sensor circuit • Knock sensor • Hybrid vehicle control ECU
P0328	Output voltage of knock sensor more than 4.5 V (1-trip detection logic)	• Open in knock sensor circuit • Knock sensor • Hybrid vehicle control ECU

HINT:
When any of DTCs P0327 and P0328 are set, the ECM (included in hybrid vehicle control ECU) enters fail-safe mode. During fail-safe mode, the ignition timing is delayed to its maximum retardation. Fail-safe mode continues until the power switch is turned off.
Reference: Inspection using an oscilloscope



The correct waveform is as shown.

Items	Contents
Terminals	KNK1 - EKNK
Equipment Settings	1 V/DIV. 1 ms./DIV.
Conditions	Keep engine speed at 4,000 rpm with warm engine

MONITOR DESCRIPTION

If the output voltage transmitted by the knock sensor remains low or high for more than 1 second, the ECM (included in hybrid vehicle control ECU) interprets this as a malfunction in the sensor circuit, and sets a DTC.
The monitor for DTCs P0327 and P0328 begins to run when 5 seconds have elapsed since the engine was started.
If the malfunction is not repaired successfully, either DTC P0327 or P0328 is set 5 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0327: Knock sensor range check (Low voltage) P0328: Knock sensor range check (High voltage)
Required Sensors/Components (Main)	Knock sensor
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	1 second
MIL Operation	Immediate
Sequence of Operation	None

ES

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
Battery voltage	10.5 V or more
Time after engine start	5 seconds or more
Power switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

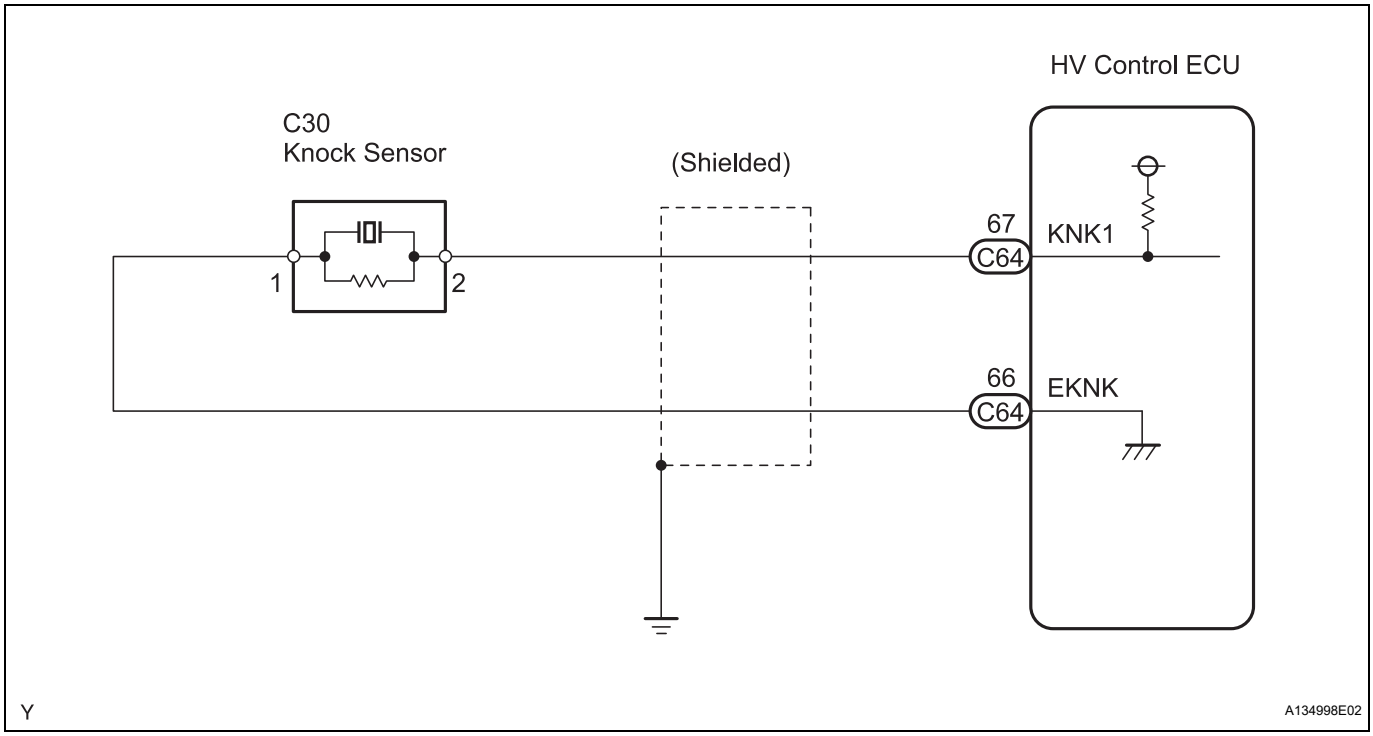
Knock Sensor Range Check (Low voltage) P0327:

Knock sensor voltage	Less than 0.5 V

Knock Sensor Range Check (High voltage) P0328:

Knock sensor voltage	More than 4.5 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ VALUE USING INTELLIGENT TESTER (KNOCK FB VAL)

(a) Connect the intelligent tester to the DLC3.
(b) Put the engine in inspection mode (See page ES-35).
(c) Turn the tester on.
(d) Warm up the engine.
(e) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / USER DATA / KNOCK FB VAL.
(f) Read the values displayed on the tester while driving the vehicle.

Standard:

The values change.

HINT:

Malfunction does not occur	Knock Feedback Values change
Malfunctions occur	Knock Feedback Values do not change

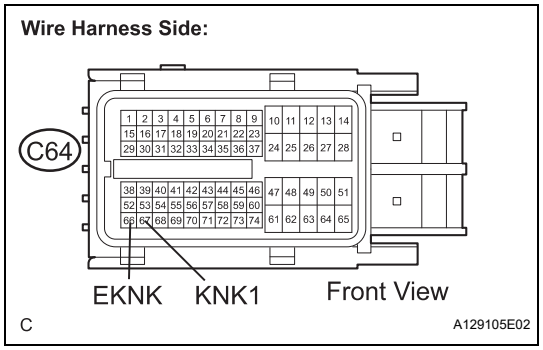
The knock feedback value change can be confirmed by running the engine with a high load, for example, by activating the air conditioning system and revving up the engine.

NG → **Go to step 2**

OK

CHECK FOR INTERMITTENT PROBLEMS

2	CHECK HARNESS AND CONNECTOR (ECM - KNOCK SENSOR)



(a) Disconnect the C64 hybrid vehicle control ECU connector.
(b) Measure the resistance between the terminals.

Standard

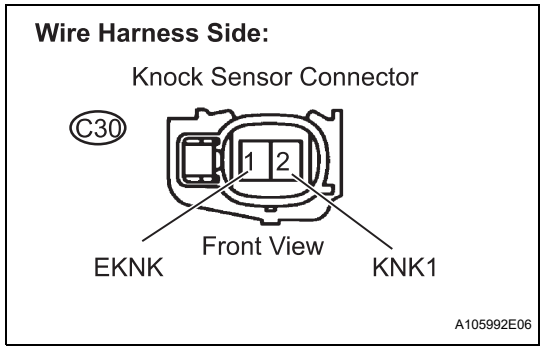
Tester Connection	Specified Condition
C64-67 (KNK1) - C64-66 (EKNK)	120 to 280 kΩ at 20°C (68°F)

(c) Reconnect the hybrid vehicle control ECU connector.

NG → **Go to step 4**

OK

3	INSPECT ECM (KNK1 VOLTAGE)



(a) Disconnect the C30 knock sensor connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage between the knock sensor terminals.

Standard voltage

Tester Connection	Specified Condition
C30-2 (KNK1) - C30-1 (EKNK)	4.5 to 5.5 V

(d) Reconnect the knock sensor connector.

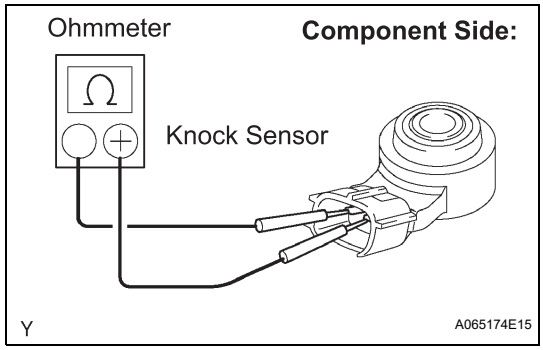
NOTICE:
Fault may be intermittent. Check the wire harness and connectors carefully and retest.

NG → **REPLACE HYBRID VEHICLE CONTROL ECU**

OK

CHECK FOR INTERMITTENT PROBLEMS

4	INSPECT KNOCK SENSOR



(a) Remove the knock sensor.
(b) Measure the resistance between the terminals.

Standard resistance

Tester Connection	Specified Condition
2 (KNK1) - 1 (EKNK)	120 to 280 kΩ at 20°C (68°F)

(c) Reinstall the knock sensor.

NG → **REPLACE KNOCK SENSOR**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

ES

DTC	P0335	Crankshaft Position Sensor "A" Circuit

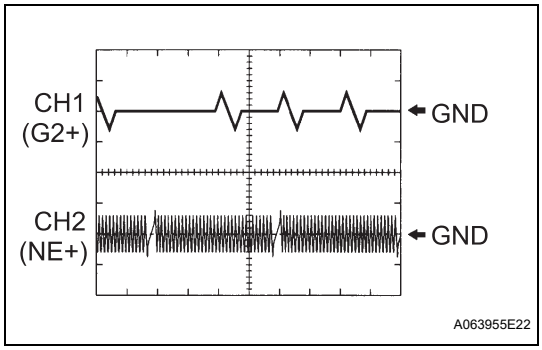
DESCRIPTION

The Crankshaft Position (CKP) sensor system consists of a CKP sensor plate and a pickup coil.
The sensor plate has 34 teeth and is installed on the crankshaft. The pickup coil is made of wound copper wire, an iron core and magnet. The sensor plate rotates and, as each tooth passes through the pickup coil, a pulse signal is created. The pickup coil generates 34 signals per engine revolution. Based on these signals, the ECM (included in hybrid vehicle control ECU) calculates the crankshaft position and engine RPM. Using these calculations, the fuel injection time and ignition timing are controlled.

DTC No.	DTC Detection Conditions	Trouble Areas
P0335	When either condition below is met: • No CKP sensor signal to ECM while cranking (1-trip detection logic) • No CKP sensor signal to ECM at engine speed of 600 rpm or more (1-trip detection logic)	• Open or short in CKP sensor circuit • CKP sensor • CKP sensor plate • Hybrid vehicle control ECU

ES

Reference: Inspection using an oscilloscope.



HINT:
- The correct waveform is as shown.
- G2+ stands for the Camshaft Position (CMP) sensor signal, and NE+ stands for the CKP sensor signal.
- Grounding failure of the shielded wire may cause noise in waveforms.

Items	Contents
Terminals	CH1: G2+ - G2- CH2: NE+ - NE-
Equipment Settings	5 V/DIV. 20 ms./DIV.
Conditions	Cranking or idling

MONITOR DESCRIPTION

If there is no signal from the CKP sensor despite the engine revolving, the ECM interprets this as a malfunction of the sensor.
If the malfunction is not repaired successfully, a DTC is set 10 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0335: CKP sensor range check or rationality
Required Sensors/Components (Main)	CKP sensor
Required Sensors/Components (Related)	CMP sensor
Frequency of Operation	Continuous
Duration	3 times
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs not present	None

Case 1:

Time after starter OFF to ON	0 seconds or more
Number of CMP sensor signal pulse	6 times
Battery voltage	7 V or more
CMP sensor circuit failure	Not detected
Power switch	ON

Case 2:

Starter	OFF
Engine speed	600 rpm or more
Time after starter from ON to OFF	3 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

Case 1:

Number of CKP sensor signal pulse	44 or less, and 58 or more

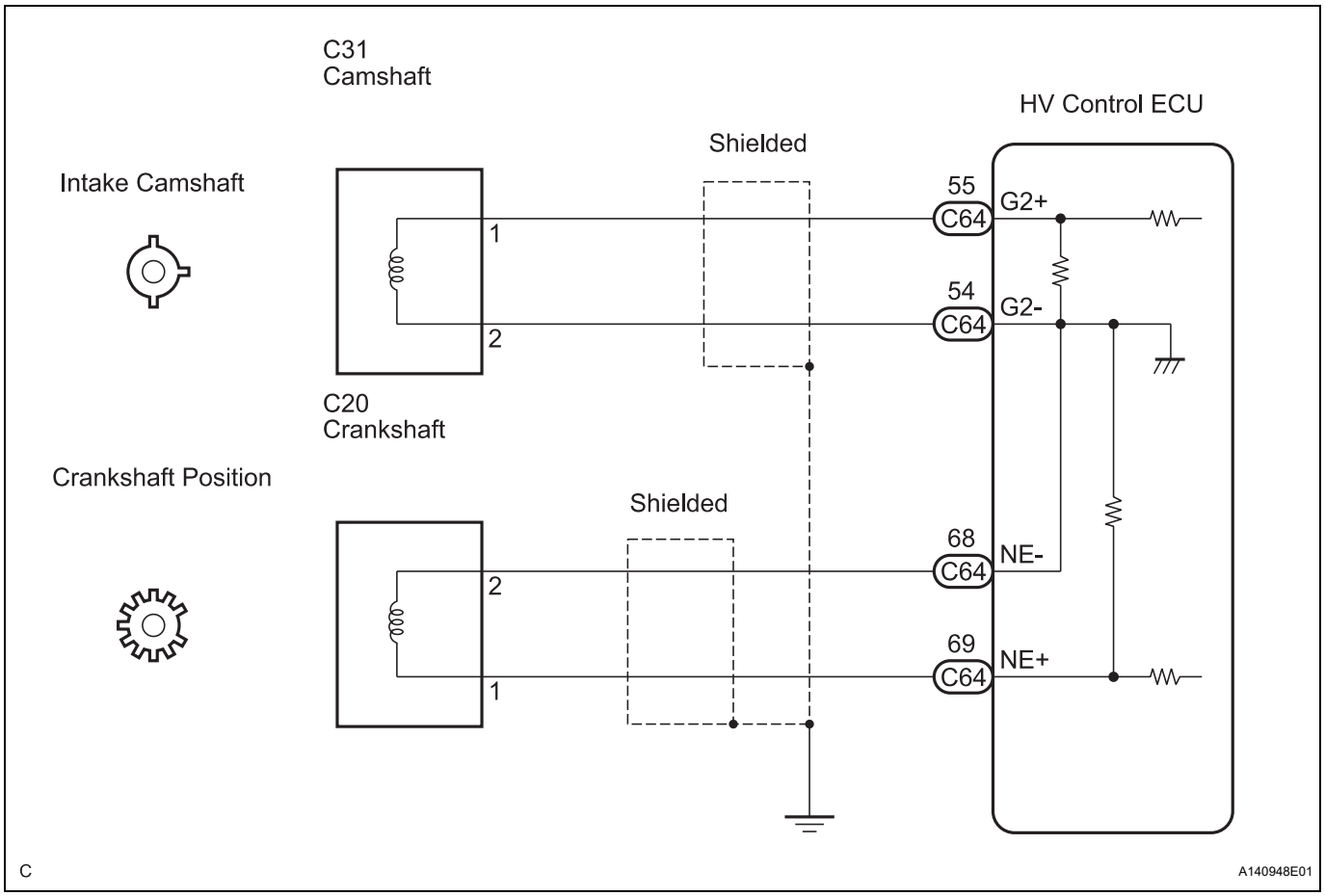
Case 2:

Engine speed signal	No signal

COMPONENT OPERATING RANGE

CKP sensor	• CKP sensor output voltage fluctuates while crankshaft revolving • 34 CKP sensor signals per crankshaft revolution

WIRING DIAGRAM



ES

INSPECTION PROCEDURE

HINT:

- If no problem is found through this diagnostic troubleshoot procedure, troubleshoot the engine mechanical systems.
- Check the engine speed. The engine speed can be checked by using the intelligent tester. To check, follow the operation below:
  (a) Connect the intelligent tester to the DLC3.
  (b) Put the engine in inspection mode (See page ES-35).
  (c) Turn the tester on.
  (d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / ENGINE SPD.
  The engine speed may be indicated as zero despite the engine revolving normally. This is caused by a lack of NE signals from the Crankshaft Position (CKP) sensor. Alternatively, the engine speed may be indicated as lower than the actual engine speed if the CKP sensor output voltage is insufficient.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**READ VALUE USING INTELLIGENT TESTER (ENGINE SPD)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).

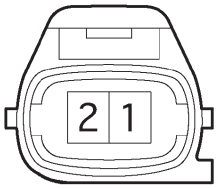
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / ENGINE SPD.
(e) Put the engine in inspection mode (See page ES-35).
(f) Read the values displayed on the tester while the engine is running.
Standard:
Correct values are displayed.
HINT:
- To check the engine speed change, display the graph on the tester.
- If the engine does not start, check the engine speed while cranking.
- If the engine speed indicated on the tester remains zero (0), there may be an open or short in the Crankshaft Position (CKP) sensor circuit.

OK → **CHECK FOR INTERMITTENT PROBLEMS**

NG

2	INSPECT CRANKSHAFT POSITION SENSOR (RESISTANCE)

Component Side:



CKP Sensor

G037727E07

(a) Disconnect the C20 CKP sensor connector.
(b) Measure the resistance between terminals 1 and 2.
Standard resistance

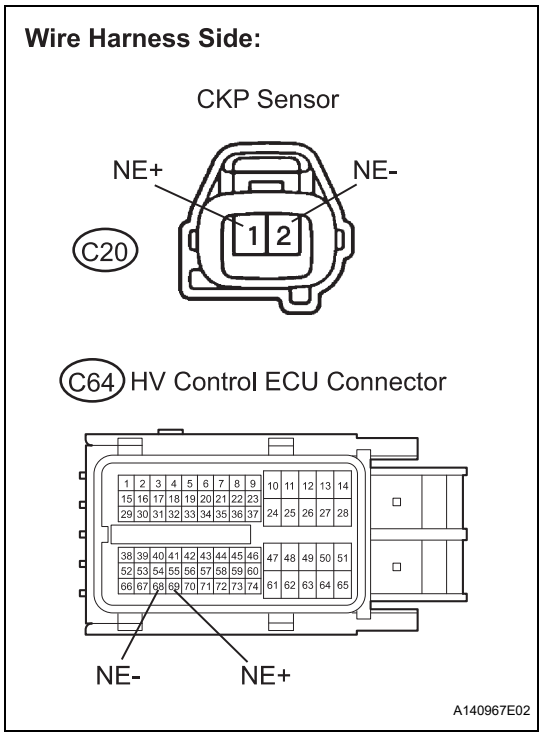
Tester Connections	Conditions	Specified Conditions
1 - 2	Cold	985 to 1,600 Ω
1 - 2	Hot	1,265 to 1,890 Ω

HINT:
Terms "cold" and "hot" refer to the temperature of the sensor. "Cold" means approximately -10 to 50°C (14 to 122°F). "Hot" means approximately 50 to 100°C (122 to 212°F).
(c) Reconnect the CKP sensor connector.

NG → **REPLACE CRANKSHAFT POSITION SENSOR**

OK

3 CHECK HARNESS AND CONNECTOR (CRANKSHAFT POSITION SENSOR - HV CONTROL ECU)



(a) Disconnect the C20 CKP sensor connector.
(b) Disconnect the C64 hybrid vehicle control ECU connector.
(c) Measure the resistance.

Standard resistance (Check for open)

Tester Connections	Specified Conditions
C20-1 (NE+) - C64-69 (NE+)	Below 1 Ω
C20-2 (NE-) - C64-68 (NE-)	Below 1 Ω

Standard resistance (Check for short)

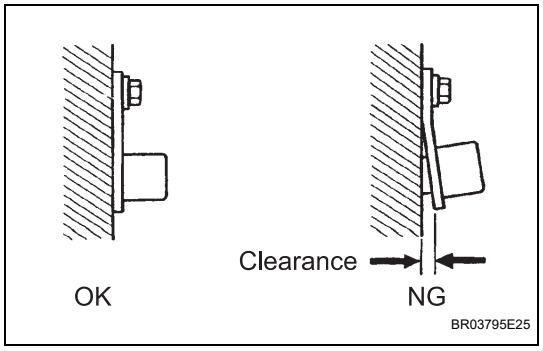
Tester Connections	Specified Conditions
C20-1 (NE+) or C64-69 (NE+) - Body ground	10 kΩor higher
C20-2 (NE-) or C64-68 (NE-) - Body ground	10 kΩor higher

(d) Reconnect the hybrid vehicle control ECU connector.
(e) Reconnect the CKP sensor connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 CHECK CRANKSHAFT POSITION SENSOR (SENSOR INSTALLATION)



(a) Check the CKP sensor installation.

OK:

Sensor is installed correctly.

NG → **SECURELY REINSTALL SENSOR**

OK

5 CHECK CRANKSHAFT POSITION SENSOR PLATE (TEETH OF SENSOR PLATE)

(a) Check the teeth of the sensor plate.

OK:

Sensor plate does not have any cracks or deformation.

NG → **REPLACE CRANKSHAFT POSITION SENSOR PLATE**

OK

6	REPLACE CRANKSHAFT POSITION SENSOR

NEXT

7	CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-31).
(e) Put the engine in inspection mode (See page ES-35).
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(g) Read the DTCs.

Result

Display (DTC Output)	Proceed to
No output	A
P0335	B

HINT:
If the engine does not start, replace the hybrid vehicle control ECU.

B → REPLACE HYBRID VEHICLE CONTROL ECU

A

END

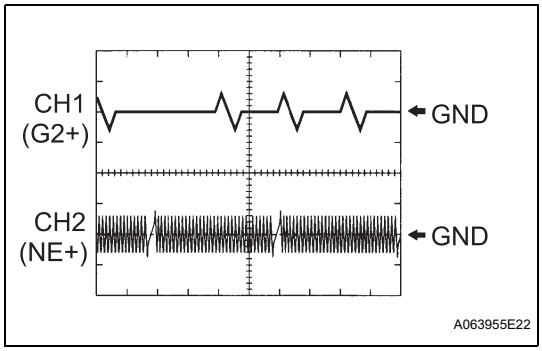
DTC	P0340	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor)

DESCRIPTION

The Camshaft Position (CMP) sensor consists of a magnet and an iron core which is wrapped with copper wire, and is installed onto the cylinder head. When the camshaft rotates, each of 3 teeth on the camshaft passes through the CMP sensor. This activates the internal magnet in the sensor, generating a voltage in the copper wire. The camshaft rotation is synchronized with the crankshaft rotation. When the crankshaft turns twice, the voltage is generated 3 times in the CMP sensor. The generated voltage in the sensor acts as a signal, allowing the ECM (included in hybrid vehicle control ECU) to detect the camshaft position. This signal is then used to control ignition timing, fuel injection timing, and the VVT system.

DTC No.	DTC Detection Conditions	Trouble Areas
P0340	Camshaft/Crankshaft misalignment detected at engine speed of 600 rpm or more (1 trip detection logic)	• Open or short in CMP sensor circuit • CMP sensor • Camshaft • Jumped tooth of timing chain • Hybrid vehicle control ECU

HINT:
DTC P0340 indicates a malfunction relating to the CMP sensor (+) circuit (the wire harness between the ECM and CMP sensor, and the CMP sensor itself).
Reference: Inspection using an oscilloscope



HINT:
- The correct waveform is as shown in the illustration.
- G2+ stands for the CMP sensor signal, and NE+ stands for the Crankshaft Position (CKP) sensor signal.
- Grounding failure of the shielded wire may cause noise in waveforms.

Items	Contents
Terminals	CH1: G2+ - G2- CH2: NE+ - NE-
Equipment Settings	5 V/DIV., 20 ms./DIV.
Conditions	Cranking or idling

MONITOR DESCRIPTION

If no signal is transmitted by the CMP sensor despite the engine revolving, or the rotation of the camshaft and the crankshaft is not synchronized, the ECM interprets this as a malfunction of the sensor.
If the malfunction is not repaired successfully, a DTC is set 10 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0340: Camshaft position sensor range check P0340: Camshaft position/crankshaft position misalignment
Required Sensors/Components (Main)	Camshaft Position (CMP) sensor

Required Sensors/Components (Related)	Crankshaft Position (CKP) sensor
Frequency of Operation	Continuous
Duration	5 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None
Engine speed	600 rpm or more
Starter	OFF

ES

TYPICAL MALFUNCTION THRESHOLDS

Camshaft Position Sensor Range Check:

CMP sensor signal	No signal

Camshaft Position/Crankshaft Position Misalignment:

Camshaft position and crankshaft position phase	Misaligned

COMPONENT OPERATING RANGE

CMP sensor	• CMP sensor output voltage fluctuates while camshaft revolving • 3 CMP sensor signals per 2 crankshaft revolutions

WIRING DIAGRAM

Refer to DTC P0335 (See page ES-165).

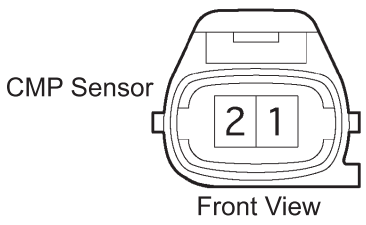
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	INSPECT CAMSHAFT POSITION SENSOR (RESISTANCE)

Component Side:



(a) Disconnect the C31 Camshaft Position (CMP) sensor connector.

(b) Measure the resistance between terminals 1 and 2.

Standard resistance

Tester Connections	Conditions	Specified Conditions
1 - 2	Cold	835 to 1,400 Ω
1 - 2	Hot	1,060 to 1,645 Ω

HINT:

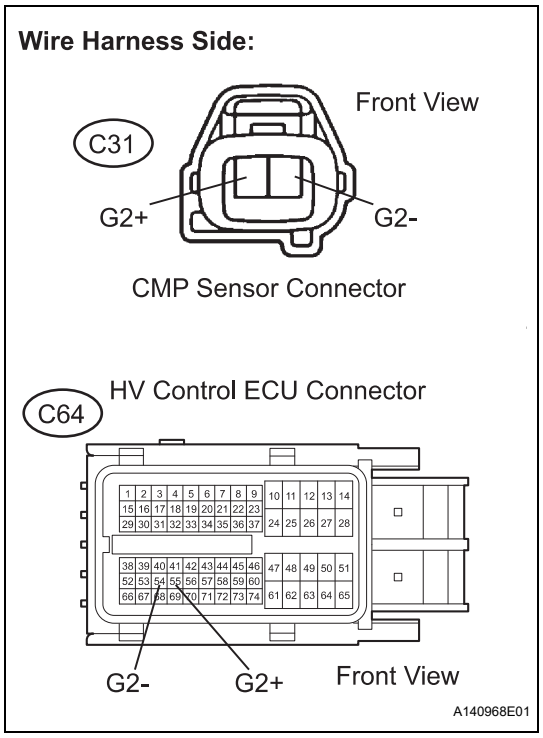
Terms "cold" and "hot" refer to the temperature of the sensor. "Cold" means approximately -10 to 50°C (14 to 122°F). "Hot" means approximately 50 to 100°C (122 to 212°F).

(c) Reconnect the CMP sensor connector.

NG → REPLACE CAMSHAFT POSITION SENSOR

OK

2 CHECK HARNESS AND CONNECTOR (CAMSHAFT POSITION SENSOR - HV CONTROL ECU)



(a) Disconnect the C31 CMP sensor connector.
(b) Disconnect the C64 hybrid vehicle control ECU connector.
(c) Measure the resistance.

Standard resistance (Check for open)

Tester Connections	Specified Conditions
C31-1 (G2+) - C64-55 (G2+)	Below 1 Ω
C31-2 (G2-) - C64-54 (G2-)	Below 1 Ω

Standard resistance (Check for short)

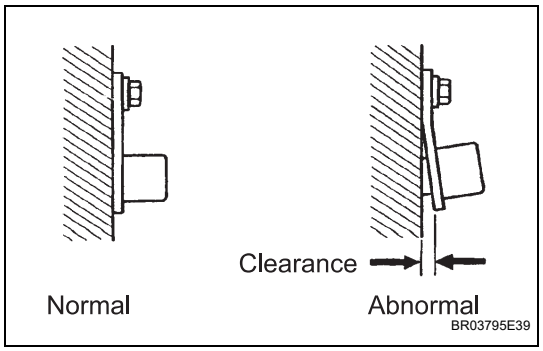
Tester Connections	Specified Conditions
C31-1 (G2+) or C64-55 (G2+) - Body ground	10 kΩor higher
C31-2 (G2-) or C64-54 (G2-) - Body ground	10 kΩor higher

(d) Reconnect the hybrid vehicle control ECU connector.
(e) Reconnect the CMP sensor connector.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 CHECK CAMSHAFT POSITION SENSOR (SENSOR INSTALLATION)



(a) Check the CMP sensor installation.

OK:

Sensor is installed correctly.

NG → SECURELY REINSTALL SENSOR

OK

4 CHECK VALVE TIMING (See page ES-68)

NG → ADJUST VALVE TIMING

OK

5	CHECK CAMSHAFT

(a) Check the teeth of the camshaft.
OK:
Camshaft teeth do not have any cracks or deformation.

NG → **REPLACE CAMSHAFT**

OK

ES

6	REPLACE CAMSHAFT POSITION SENSOR

NEXT

7	CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-31).
(e) Put the engine in inspection mode (See page ES-35).
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
(g) Read the DTCs.

Result

Display (DTC Output)	Proceed to
No output	A
P0340	B

HINT:
If the engine does not start, replace the hybrid vehicle control ECU.

B → **REPLACE HYBRID VEHICLE CONTROL ECU**

A

END

DTC	P0351	Ignition Coil "A" Primary / Secondary Circuit

DTC	P0352	Ignition Coil "B" Primary / Secondary Circuit

DTC	P0353	Ignition Coil "C" Primary / Secondary Circuit

DTC	P0354	Ignition Coil "D" Primary / Secondary Circuit

DESCRIPTION

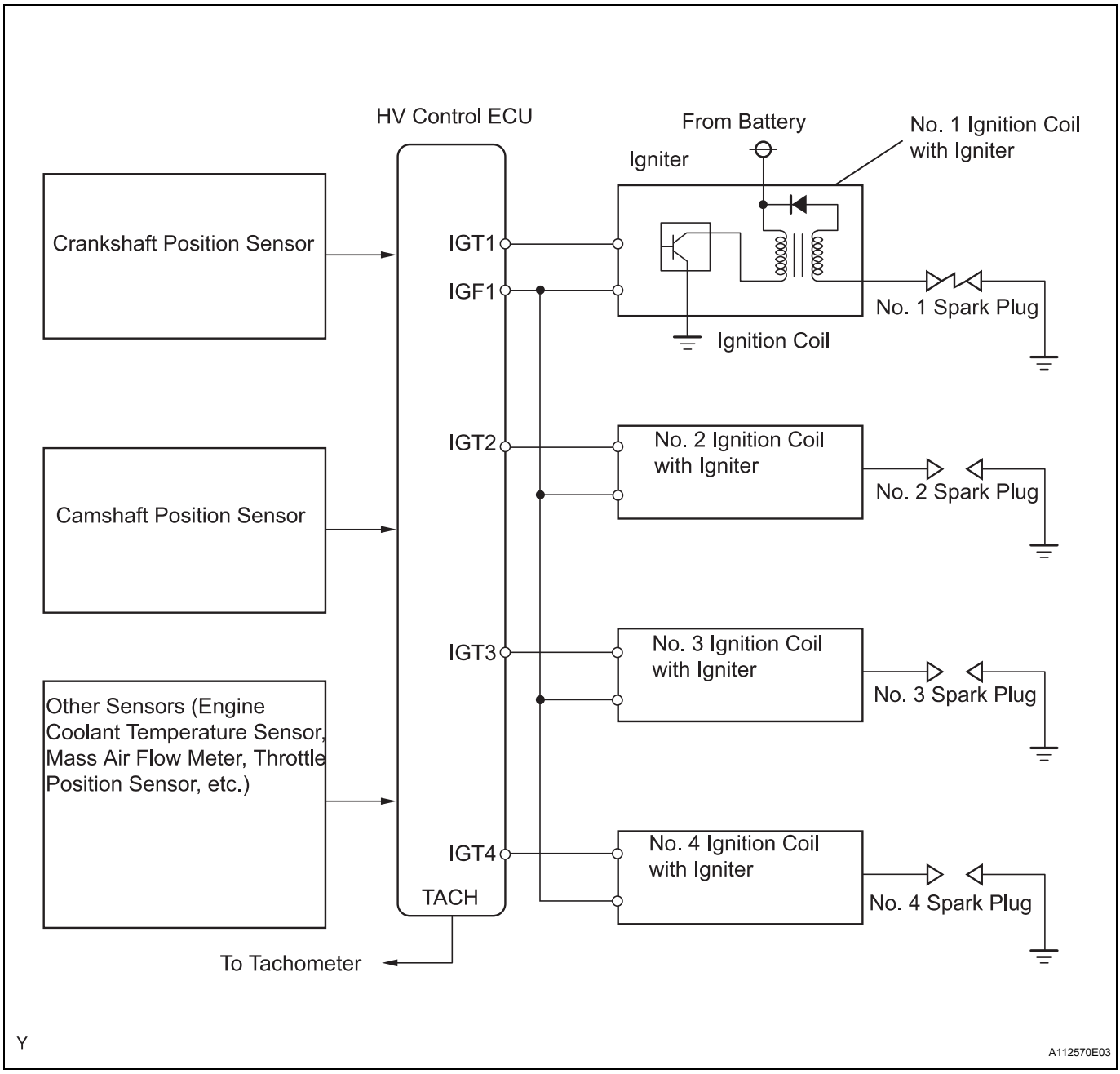
HINT:

- These DTCs indicate malfunctions relating to the primary circuit.
- If DTC P0351 is set, check the No. 1 ignition coil with igniter circuit.
- If DTC P0352 is set, check the No. 2 ignition coil with igniter circuit.
- If DTC P0353 is set, check the No. 3 ignition coil with igniter circuit.
- If DTC P0354 is set, check the No. 4 ignition coil with igniter circuit.

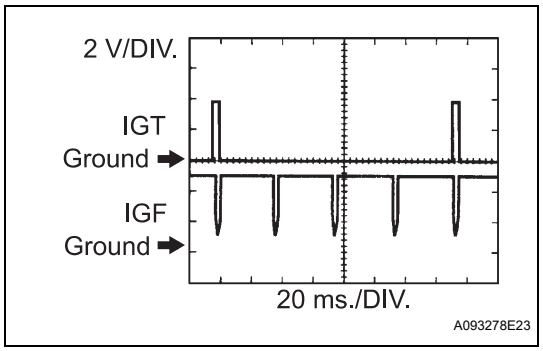
A Direct Ignition System (DIS) is used on this vehicle.

The DIS is a 1-cylinder ignition system in which each cylinder is ignited by one ignition coil and one spark plug is connected to the end of each secondary wiring. A powerful voltage, generated in the secondary wiring, is applied directly to each spark plug. The sparks of the spark plugs pass from the center electrode to the ground electrodes.

The ECM (included in hybrid vehicle control ECU) determines the ignition timing and transmits the ignition (IGT) signals to each cylinder. Using the IGT signal, the ECM turns the power transistor inside the igniter on and off. The power transistor, in turn, switches on and off the current to the primary coil. When the current to the primary coil is cut off, a powerful voltage is generated in the secondary coil. This voltage is applied to the spark plugs, causing them to spark inside the cylinders. As the ECM cuts the current to the primary coil, the igniter sends back an ignition confirmation (IGF) signal to the ECM, for each cylinder ignition.



DTC No.	DTC Detection Conditions	Trouble Areas
P0351 P0352 P0353 P0354	No IGF signal to ECM while engine running (1-trip detection logic)	• Ignition system • Open or short in IGF1 or IGT circuit (1 to 4) between ignition coil with igniter and hybrid vehicle control ECU • No. 1 to No. 4 ignition coils with igniters • Hybrid vehicle control ECU

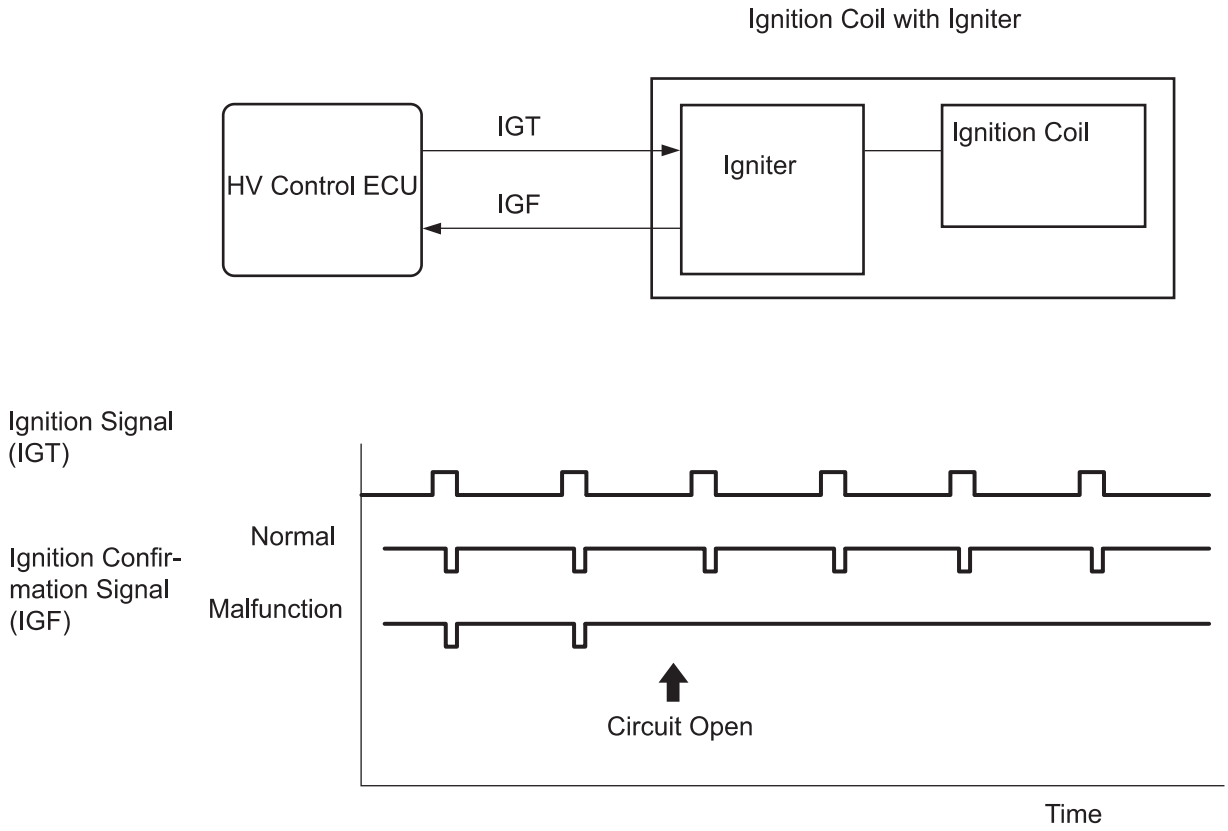


Reference: Inspection using an oscilloscope.
While cranking or idling the engine, check the waveform between terminals IGT (1 to 4) and E1, and IGF1 and E1 of the ECM connector.

ES

Items	Contents
Terminals	CH1: IGT1, IGT2, IGT3, IGT4 - E1 CH2: IGF1 - E1
Equipment Settings	2 V/DIV. 20 ms./DIV.
Conditions	Cranking or idling

MONITOR DESCRIPTION



If the ECM does not receive any IGF signals despite transmitting the IGT signal, it interprets this as a fault in the igniter and sets a DTC.
If the malfunction is not repaired successfully, a DTC is set 1 second after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0351: Igniter (cylinder 1) malfunction P0352: Igniter (cylinder 2) malfunction P0353: Igniter (cylinder 3) malfunction P0354: Igniter (cylinder 4) malfunction
Required Sensors/Components (Main)	Igniter
Required Sensors/Components (Related)	Crankshaft position sensor
Frequency of Operation	Continuous
Duration	0.512 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None
Either of following conditions A or B met	-

A. Engine RPM	1,500 rpm or less
B. Starter	OFF
Either of following conditions C or D met	-
C. Both of following conditions (a) and (b) met	-
(a) Engine speed	500 rpm or less
(b) Battery voltage	6 V or more
D. All of following conditions (a), (b) and (c) met	-
(a) Engine speed	More than 500 rpm
(b) Battery voltage	10 V or more
(c) Number of sparks after CPU reset	5 sparks or more

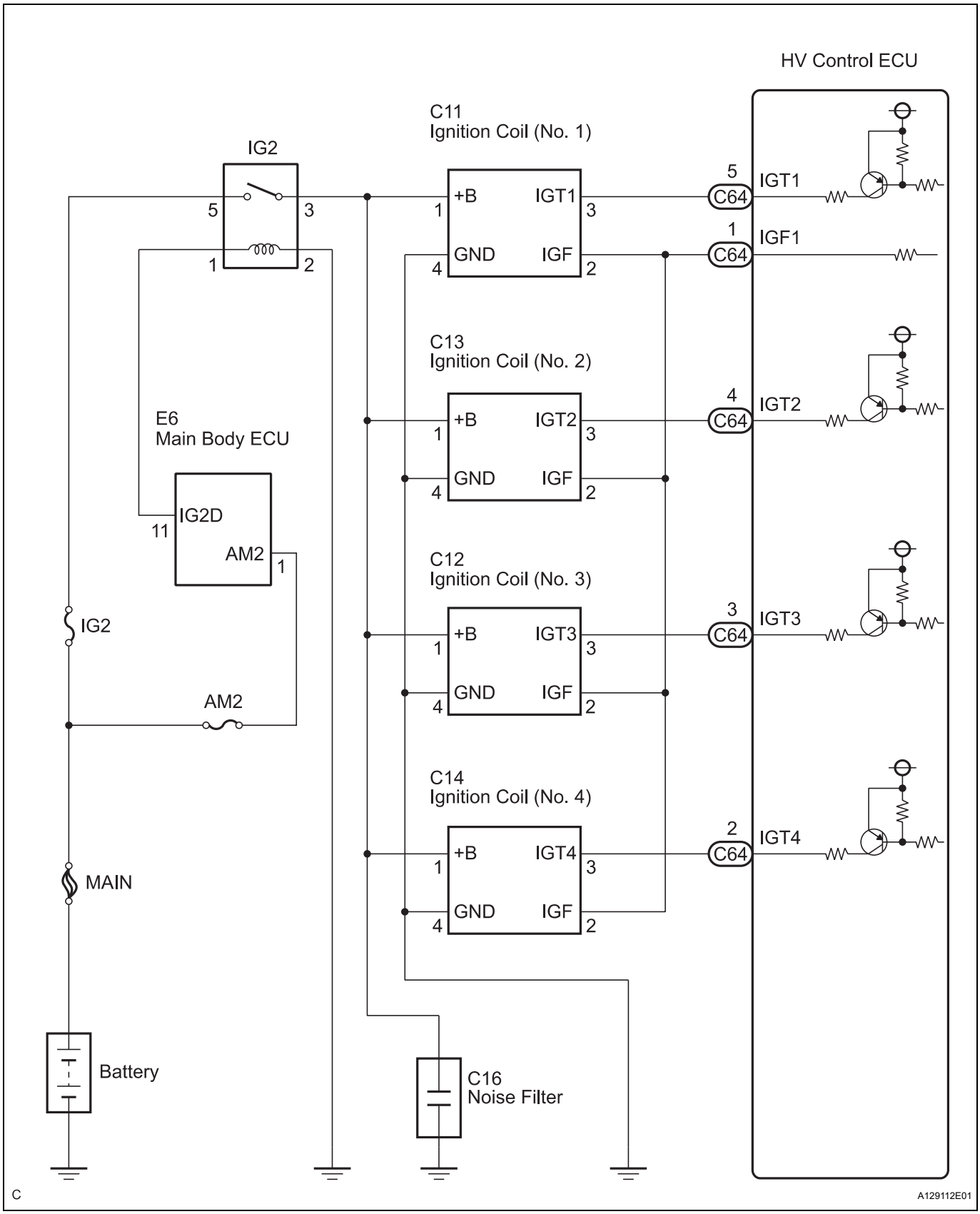
TYPICAL MALFUNCTION THRESHOLDS

IGF signal	ECM does not receive any IGF signal despite ECM sending IGT signal to igniter

COMPONENT OPERATING RANGE

IGF signal	Igniter transmits IGF signal when it receives IGT signal from ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

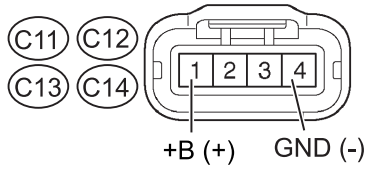
HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	INSPECT IGNITION COIL ASSEMBLY (POWER SOURCE)

Wire Harness Side:

Ignition Coil with Igniter Connector



Front View

Y

A054393E75

(a) Disconnect the ignition coil with igniter connector.

(b) Measure the resistance.

Standard resistance (Check for open)

Tester Connections	Specified Conditions
C11-4 (GND) - Body ground	Below 1 Ω
C12-4 (GND) - Body ground	Below 1 Ω
C13-4 (GND) - Body ground	Below 1 Ω
C14-4 (GND) - Body ground	Below 1 Ω

(c) Turn the power switch on (IG).

(d) Measure the voltage between the terminals of the wire harness side connector.

Standard voltage

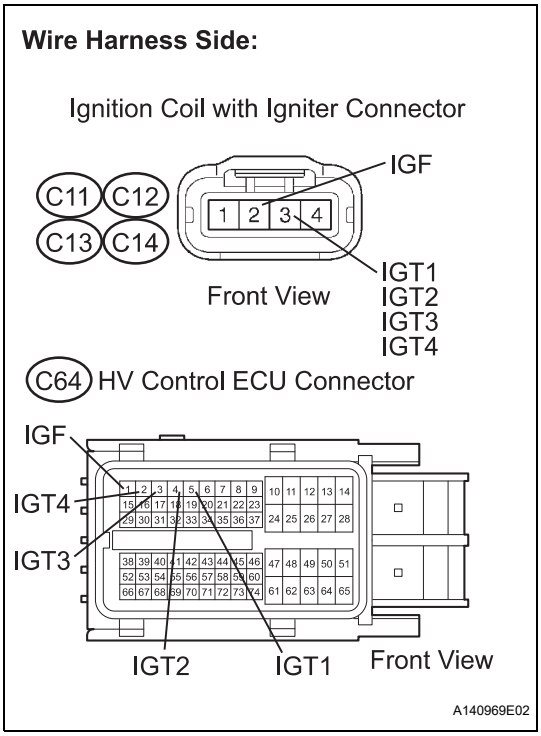
Tester Connections	Specified Conditions
C11-1 (+B) - C11-4 (GND)	9 to 14 V
C12-1 (+B) - C12-4 (GND)	9 to 14 V
C13-1 (+B) - C13-4 (GND)	9 to 14 V
C14-1 (+B) - C14-4 (GND)	9 to 14 V

(e) Reconnect the ignition coil with igniter connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	CHECK HARNESS AND CONNECTOR (IGNITION COIL ASSEMBLY - HV CONTROL ECU)



(a) Disconnect the ignition coil with connector.
(b) Disconnect the C64 hybrid vehicle control ECU connector.
(c) Measure the resistance.

Standard resistance (Check for open)

Tester Connections	Specified Conditions
C11-2 (IGF) - C64-1 (IGF1)	Below 1 Ω
C12-2 (IGF) - C64-1 (IGF1)	Below 1 Ω
C13-2 (IGF) - C64-1 (IGF1)	Below 1 Ω
C14-2 (IGF) - C64-1 (IGF1)	Below 1 Ω

Standard resistance (Check for open)

Tester Connections	Specified Conditions
C11-3 (IGT1) - C64-5 (IGT1)	Below 1 Ω
C12-3 (IGT2) - C64-4 (IGT2)	Below 1 Ω
C13-3 (IGT3) - C64-3 (IGT3)	Below 1 Ω
C14-3 (IGT4) - C64-2 (IGT4)	Below 1 Ω

Standard resistance (Check for short)

Tester Connections	Specified Conditions
C11-2 (IGF) or C64-1 (IGF1) - Body ground	10 kΩ or higher
C12-2 (IGF) or C64-1 (IGF1) - Body ground	10 kΩ or higher
C13-2 (IGF) or C64-1 (IGF1) - Body ground	10 kΩ or higher
C14-2 (IGF) or C64-1 (IGF1) - Body ground	10 kΩ or higher

Standard resistance (Check for short)

Tester Connections	Specified Conditions
C11-3 (IGT1) or C64-5 (IGT1) - Body ground	10 kΩ or higher
C12-3 (IGT2) or C64-4 (IGT2) - Body ground	10 kΩ or higher
C13-3 (IGT3) or C64-3 (IGT3) - Body ground	10 kΩ or higher
C14-3 (IGT4) or C64-2 (IGT4) - Body ground	10 kΩ or higher

(d) Reconnect the hybrid vehicle control ECU connector.
(e) Reconnect the ignition coil with igniter connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK WHETHER DTC OUTPUT RECURS (DTC P0351, P0352, P0353 OR P0354)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Clear the DTCs (See page ES-31).
(d) Shuffle arrangement of the ignition coils with igniters (among No. 1 to No. 4 cylinders).
NOTICE:
Do not shuffle the connectors.
(e) Perform a simulation test.

(f) Check the DTCs displayed on the tester.

Result

Display (DTC Output)	Proceed to
Same DTC output	A
Different ignition coil DTC output	B

B → **REPLACE IGNITION COIL ASSEMBLY**

A

REPLACE HYBRID VEHICLE CONTROL ECU

DTC	P0420	Catalyst System Efficiency Below Threshold (Bank 1)

MONITOR DESCRIPTION

The ECM (included in hybrid vehicle control ECU) uses sensors mounted in front of and behind the Three-Way Catalytic Converter (TWC) to monitor its efficiency.
The first sensor, the Air-Fuel Ratio (A/F) sensor, sends pre-catalyst information to the ECM. The second sensor, the Heated Oxygen (HO2) sensor, sends post-catalyst information to the ECM.
In order to detect any deterioration in the TWC, the ECM calculates the Oxygen Storage Capacity (OSC) of the TWC. This calculation is based on the voltage output of the HO2 sensor while performing active air-fuel ratio control, rather than the conventional detecting method, which uses the locus ratio.
The OSC value is an indication of the oxygen storage capacity of the TWC. When the vehicle is being driven with a warm engine, active air-fuel ratio control is performed for approximately 15 to 20 seconds. When it is performed, the ECM deliberately sets the air-fuel ratio to lean or rich levels. If the rich-lean cycle of the HO2 sensor is long, the OSC becomes greater. There is a direct correlation between the OSCs of the HO2 sensor and the TWC.
The ECM uses the OSC value to determine the state of the TWC. If any deterioration has occurred, it illuminates the MIL and sets the DTC.

DTC No.	DTC Detection Conditions	Trouble Areas
P0420	OSC value smaller than standard value under active air-fuel ratio control (2-trip detection logic)	• Front exhaust pipe (with TWC) • Gas leakage from exhaust system • Air-Fuel Ratio (A/F) sensor (sensor 1) • Heated Oxygen (HO2) sensor (sensor 2)

MONITOR STRATEGY

Related DTCs	P0420: Catalyst Deterioration
Required Sensors/Components (Main)	A/F sensor and HO2 sensor
Required Sensors/Components (Related)	Intake air temperature sensor, mass air flow meter, crankshaft position sensor and engine coolant temperature sensor
Frequency of Operation	Once per driving cycle
Duration	About 30 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	P0011 (VVT System 1 - Advance) P0012 (VVT System 1 - Retard) P0031, 32 (A/F Sensor heater - Sensor 1) P0037, 38 (O2 Sensor heater - Sensor 2) P0100 - P0103 (MAF meter) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0136 (O2 Sensor - Sensor 2) P0171, P0172 (Fuel system) P0300 - P0304 (Misfire) P0335 (CKP sensor) P0340 (CMP sensor) P0351 - P0354 (Igniter) P0500 (VSS) P2196 (A/F Sensor - rationality) P2A00 (A/F Sensor - slow response)
Battery voltage	11 V or more
Intake air temperature	-10°C (14°F) or more

Engine coolant temperature	75°C (167°F) or more
Atmospheric pressure	76 kPa (570 mmHg) or more
Idling	OFF
Engine RPM	Less than 3,200 rpm
A/F sensor status	Activated
Fuel system status	Closed loop
Engine load	10 to 70%
All of following conditions (a), (b) and (c) met	-
(a) Mass air flow rate	10 to 28 g/sec.
(b) Estimated front catalyst temperature	600 to 800°C (1,112 to 1,472°F)
(c) Estimated rear catalyst temperature	430 to 675°C (800 to 1,247°F)
Rear HO2 sensor heater monitor	Completed

ES

TYPICAL MALFUNCTION THRESHOLDS

Oxygen Storage Capacity (OSC) of Three-Way Catalytic Converter (TWC)	Less than 0.07 g

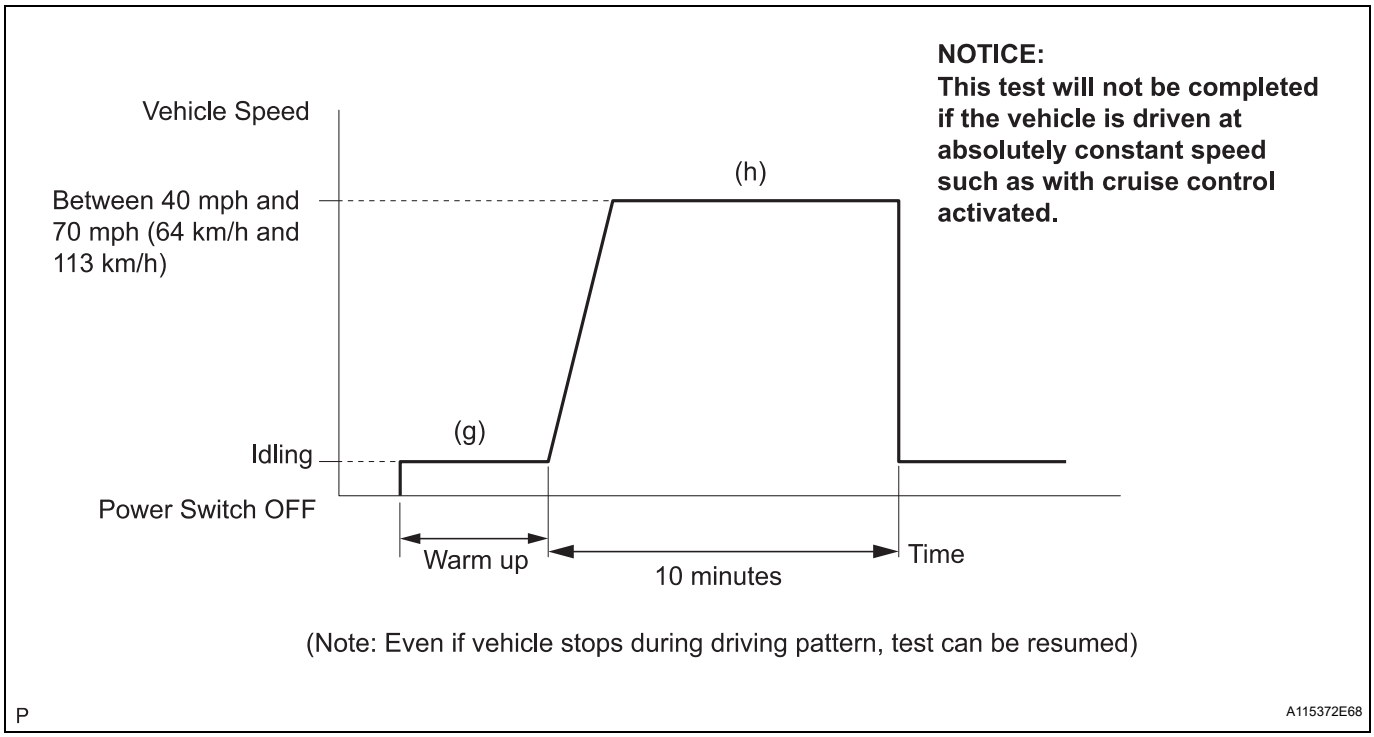
MONITOR RESULT

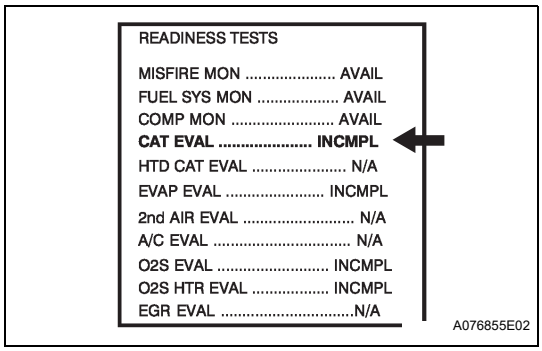
Refer to CHECKING MONITOR STATUS (See page ES-14).

CONFIRMATION DRIVING PATTERN

HINT:

Performing this confirmation pattern will activate the catalyst monitor. This is very useful for verifying completion of a repair.

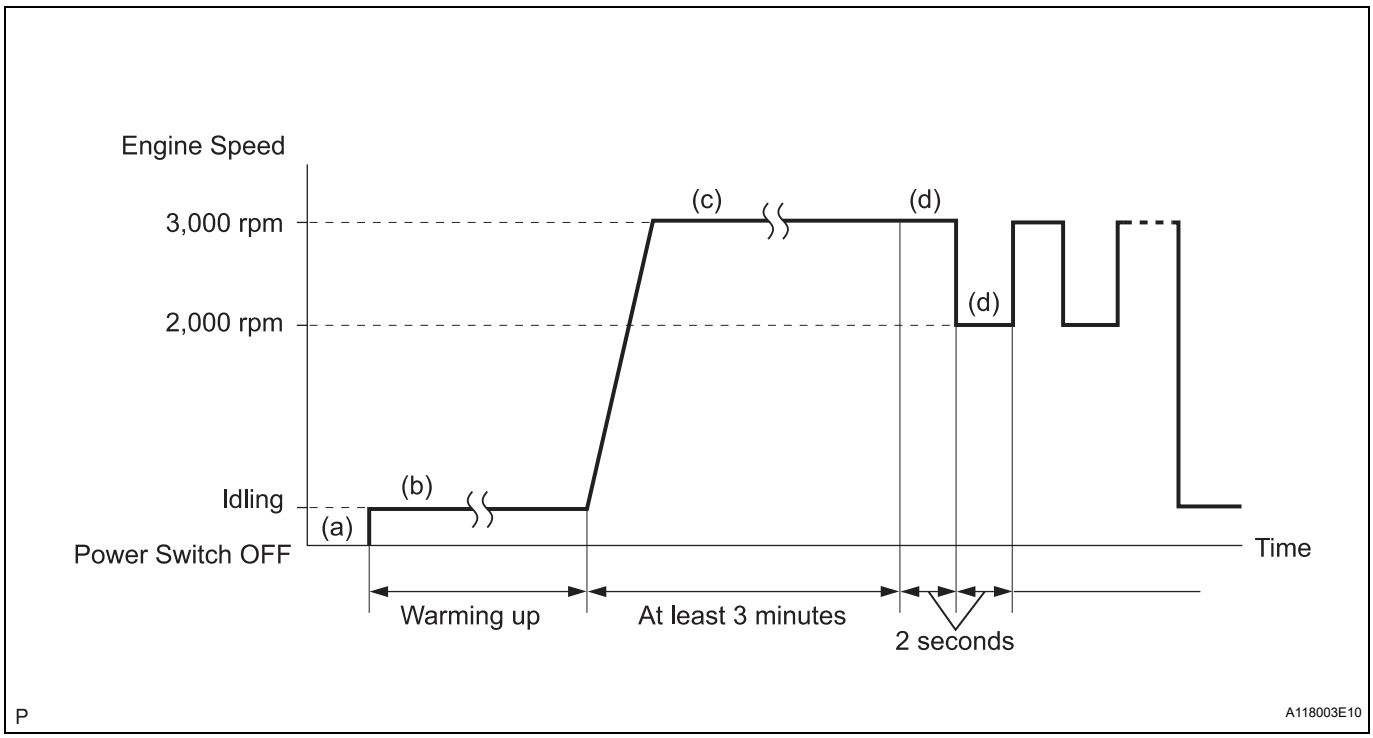




(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Clear the DTCs (if set) (See page ES-31).
(e) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / USER DATA / CAT CMPL.
(f) Check that CAT CMPL is INCMPL (incomplete).
(g) Put the engine in inspection mode (See page ES-35), and warm it up.
(h) Drive the vehicle at between 40 mph and 70 mph (64 km/h and 113 km/h) for at least 10 minutes.
(i) Note the state of the Readiness Tests items. Those items will change to COMPL (complete) as CAT CMPL monitor operates.
(j) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES and check if any DTCs (any pending DTCs) are set.
HINT:
If CAT CMPL does not change to COMPL, and any pending DTCs fail to be set, extend the driving time.

CONDITIONING FOR SENSOR TESTING

HINT:
Perform the operation with the engine speeds and time durations described below prior to checking the waveforms of the A/F and HO2 sensors. This is in order to activate the sensors sufficiently to obtain the appropriate inspection results.



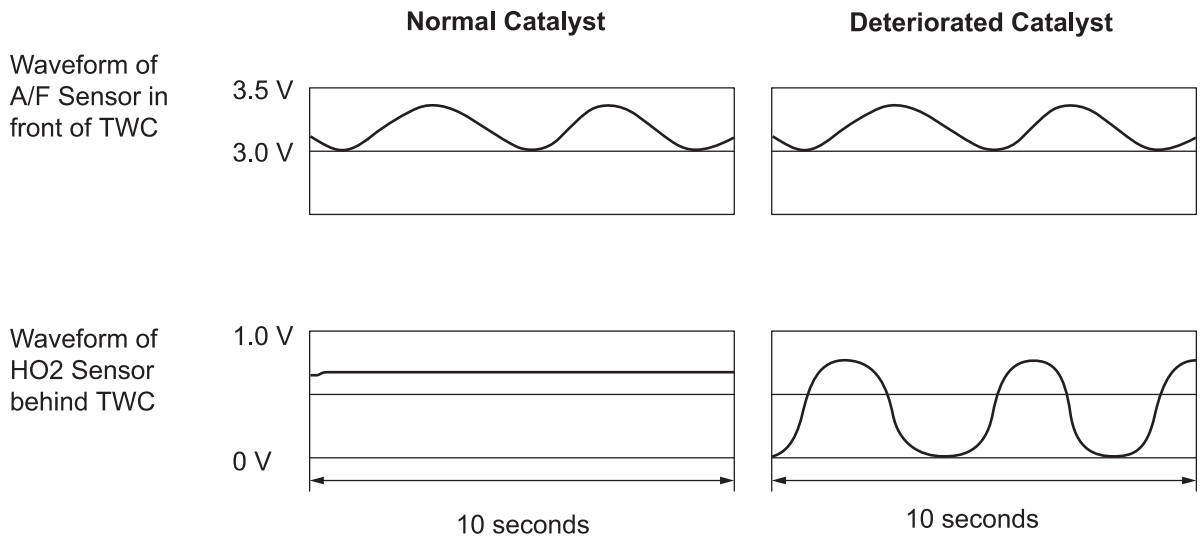
(a) Connect the intelligent tester to the DLC3.

(b) Put the engine in inspection mode (See page ES-35), and warm it up with all the accessories switched OFF, until the engine coolant temperature stabilizes.
(c) Run the engine at an engine speed of between 2,500 rpm and 3,000 rpm for at least 3 minutes.
(d) While running the engine at 3,000 rpm and 2,000 rpm alternating at 2 second intervals, check the waveforms of the A/F and HO2 sensors using the tester.
HINT:

- If either voltage output of the Air-Fuel Ratio (A/F) or Heated Oxygen (HO2) sensor does not fluctuate, or there is a noise in the waveform of either sensor, the sensor may be malfunctioning.
- If the voltage outputs of both the sensors remain lean or rich, the air-fuel ratio may be extremely lean or rich. In such cases, perform the following A/F CONTROL using the intelligent tester.
- If the Three-Way Catalytic Converter (TWC) has deteriorated, the HO2 sensor (located behind the TWC) voltage output fluctuates up and down frequently, even under normal driving conditions (active air-fuel ratio control is not performed).

ES

Voltage output when active air-fuel ratio control not performed:



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0420)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0420	A

Display (DTC Output)	Proceed to
P0420 and other DTCs	B

HINT:
If any DTCs other than P0420 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

2 PERFORM ACTIVE TEST USING INTELLIGENT TESTER (A/F CONTROL)

ES

(a) Connect the intelligent tester to the DLC3.
(b) Put the engine in inspection mode (See page ES-35).
(c) Turn the tester on.
(d) Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
(e) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(f) Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
(g) Monitor the voltage outputs of the A/F and HO2 sensors (AFS B1 S1 and O2S B1 S2) displayed on the tester.

Result:

A/F sensor reacts in accordance with increases and decreases in fuel injection volume:
+25% = Rich output:
Less than 3.0 V
-12.5% = Lean output:
More than 3.35 V

NOTICE:
The A/F sensor has an output delay of a few seconds and the HO2 sensor has a maximum output delay of approximately 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Areas
1	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• Catalyst • Exhaust gas leakage
	Output Voltage More than 3.35 V Less than 3.0 V	OK	Output Voltage More than 0.5 V Less than 0.4 V	OK	
2	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• A/F sensor • A/F sensor heater • A/F sensor circuit
	Output Voltage Almost no reaction	NG	Output Voltage More than 0.5 V Less than 0.4 V	OK	

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Areas
3	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• HO2 sensor • HO2 sensor heater • HO2 sensor circuit
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage Almost no reaction		
4	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		Extremely rich or lean actual air-fuel ratio • Injector • Fuel pressure • Gas leakage from exhaust system
	Output Voltage Almost no reaction		Output Voltage Almost no reaction		

ES

Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the A/F and HO2 sensors.
To display the graph, select the following menu items on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1 S1 and O2S B1 S2; then press the YES button and then the ENTER button followed by the F4 button.

Result

Result	Proceed to
Case 1	A
Case 2	B
Case 3	C
Case 4	D

B → **REPLACE AIR-FUEL RATIO SENSOR**

C → **Go to step 4**

D → **CHECK CAUSE OF EXTREMELY RICH OR LEAN ACTUAL AIR-FUEL RATIO, REPLACE FAULTY AREA AND GO TO NEXT STEP**

A

3 INSPECT FOR EXHAUST GAS LEAK

OK:
No gas leakage.

NG → **REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT**

OK

REPLACE THREE-WAY CATALYTIC CONVERTER (BOTH FRONT AND REAR CATALYSTS (FRONT EXHAUST PIPE))

4	INSPECT FOR EXHAUST GAS LEAK

OK:
No gas leakage.

NG → REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT

OK

REPLACE HEATED OXYGEN SENSOR

DTC	P043E	Evaporative Emission System Reference Orifice Clog Up

DTC	P043F	Evaporative Emission System Reference Orifice High Flow

DTC	P2401	Evaporative Emission Leak Detection Pump Stuck OFF

DTC	P2402	Evaporative Emission Leak Detection Pump Stuck ON

DTC	P2419	Evaporative Emission System Switching Valve Control Circuit Low

DTC SUMMARY

DTC No.	Monitoring Item	DTC Detection Condition	Trouble Area	Detection Timing	Detection Logic
P043E	Reference orifice clogged	P043E, P043F, P2401, P2402 and P2419 present when one of following conditions met during key-off EVAP monitor: • Reference orifice clogged • Reference orifice high-flow • Leak detection pump ON stuck • Leak detection pump OFF stuck • Vent valve ON (close) stuck	• Canister pump module (Reference orifice, leak detection pump, vent valve) • Connector / wire harness (Canister pump module - Hybrid vehicle control ECU) • EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) • Hybrid vehicle control ECU	Power switch OFF	2-trips
P043F	Reference orifice high-flow				
P2401	Leak detection pump stuck OFF				
P2402	Leak detection pump stuck ON				
P2419	Vent valve stuck closed				

DESCRIPTION

Refer to the EVAP System (See page ES-317).

INSPECTION PROCEDURE

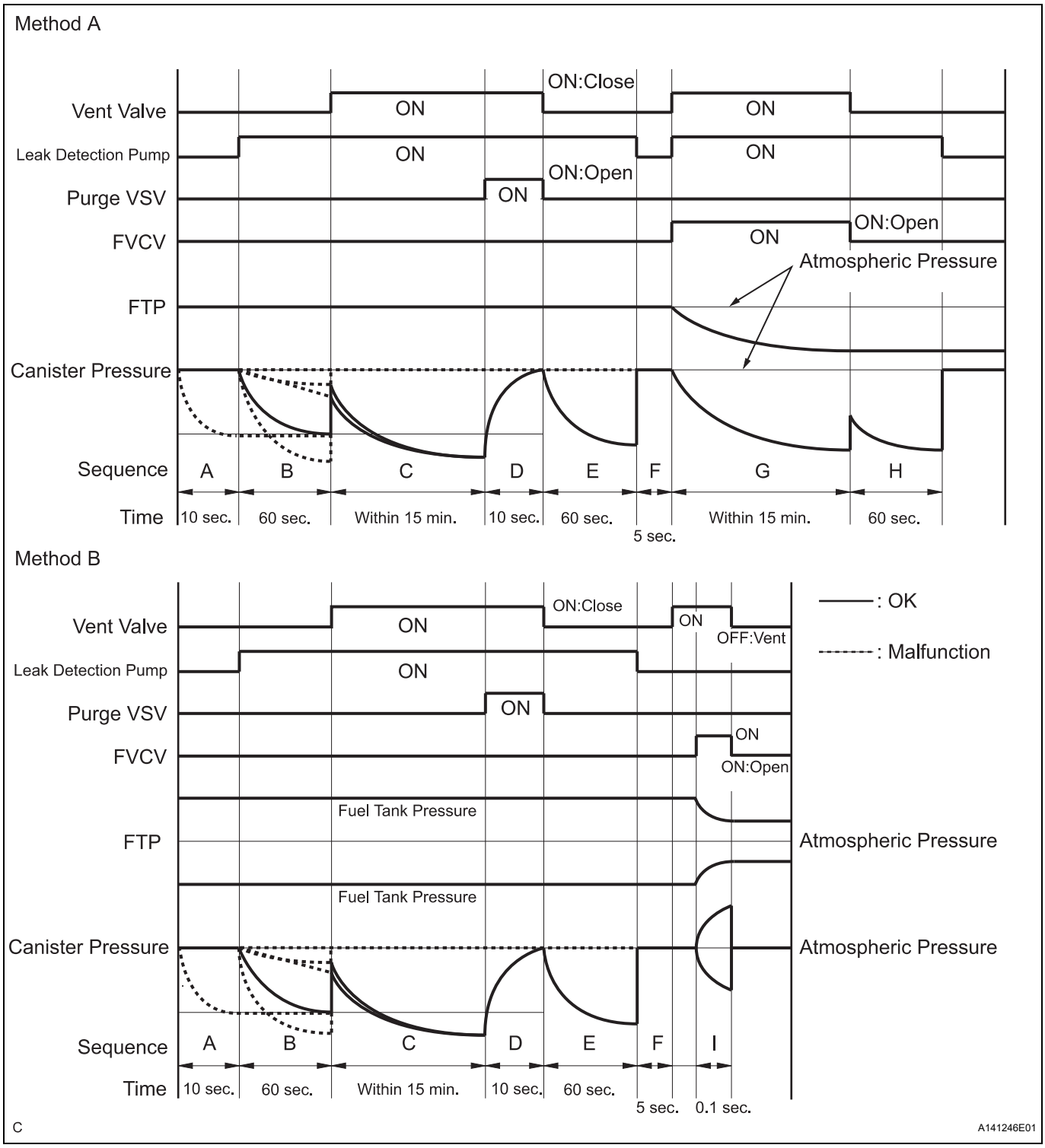
Refer to the EVAP System (See page ES-328).

MONITOR DESCRIPTION

In sequence B and E, the leak detection pump creates negative pressure (vacuum) through the reference orifice. The EVAP system pressure is then measured by the ECM, using the canister pressure sensor, to determine the reference pressure. If the pressure is one of the following conditions, the ECM illuminates the MIL and sets the DTC (2-trip detection logic).

- Canister pressure is lower than the malfunction criterion (ex. 724 mmHg).
- Canister pressure is higher than the malfunction criterion (ex. 752 mmHg).

- Canister pressure is not saturated within 60 seconds.
- Canister pressure difference of sequence B and sequence E is large.



MONITOR STRATEGY

Required Sensors/Components (Main)	Canister pump module
Required Sensors/Components (Related)	A/F sensor, rear HO2S, IAT sensor, MAF meter, crankshaft position sensor, ECT sensor
Frequency of Operation	Once per driving cycle
Duration	Within 2 minutes
MIL Operation	2 driving cycles

Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	-
EVAP key-off monitor runs when all of the following conditions are met:	-
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg)
Battery voltage	10.5 V or more
Vehicle speed	Below 2.5 mph (4 km/h)
Power switch	OFF
Engine condition	Not running
Canister pressure sensor malfunction (P0450, P0451, P0452 and P0453)	Not detected
FTP sensor malfunction (P1451, P1452 and P1453)	Not detected
Purge VSV	Not operated by scan tool
Vent valve	Not operated by scan tool
Leak detection pump	Not operated by scan tool
Both of the following conditions are met before power switch OFF	Conditions 1 and 2
1. Duration that vehicle is being driven	5 minutes or more
2. Purge flow	Executed
ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)
Time after engine stopped	5 hours

ES

Example of restart time

First time	7 hours
Second time	9 hours and 30 minutes

Key-off monitor sequence 1 to 15

1. Atmospheric pressure measurement

Next sequence is run if the following condition is met:	-
Atmospheric pressure change for 10 seconds	Less than 0.3 kPa (2.25 mmHg) for 1 second

2. First reference pressure measurement

Next sequence is run if all of the following conditions are met:	Conditions 1, 2 and 3
1. EVAP pressure 1.9 seconds after reference pressure measurement	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.057 kPa (-36.38 to -7.93 mmHg)
3. Reference pressure	Saturated

3. Vent valve stuck closed check

Next sequence is run if the following condition is met:	-
EVAP pressure change for 10 seconds after vent valve ON (Closed)	0.3 kPa (2.25 mmHg) or more

4. Vacuum introduction for canister

Next sequence is run if the following condition is met:	-
Vacuum introduction time	15 minutes or less

5. Purge VSV stuck closed check

Next sequence is run if the following condition is met:	-
EVAP pressure change for 10 seconds after Purge VSV ON (Open).	0.3 kPa (2.25 mmHg) or more

6. Second reference pressure measurement

Next sequence is run if all of the following conditions are met:	Conditions 1, 2, 3 and 4
1. EVAP pressure 1.9 sec. after reference pressure measurement	-1 kPa (-7.5 mmHg) or less

2. Reference pressure	-4.85 to -1.057 kPa (-36.4 to -7.93 mmHg)
3. Reference pressure	Saturated
4. Reference pressure difference between the first and second	Less than 0.7 kPa (5.25 mmHg)

7. Canister leak

Next sequence is run if the following condition is met:	-
Canister leak when vacuum introduction was complete	Second reference pressure or less

8. Fuel vapor-containment valve (FVCV stuck closed check)

Next sequence is run if both of the following conditions are met:	Conditions 1 and 2
1. FTP when EVAP monitor started	-2 kPa (-15 mmHg) or less, or 3 kPa (22.5 mmHg) or more
2. FTP change while FVCV and vent valve are open	0.5 kPa (3.75 mmHg) or more

ES

9. Vacuum introduction for fuel tank

Next sequence is run if both of the following conditions are met:	Conditions 1 and 2
1. FTP when EVAP monitor started	-2 to 3 kPa (-15 to 22.5 mmHg)
2. Vacuum introduction time	15 minutes or less

10. FVCV stuck closed check

Next sequence is run if the following condition is met:	
FTP change when vacuum introduction for fuel tank	0.5 kPa (3.75 mmHg)

11. FTP sensor stuck check

Next sequence is run if the following condition is met:	
FTP change when FVCV closed	0.35 kPa (2.6 mmHg) or less

12 Third reference pressure measurement

Next sequence is run if all of the following conditions are met:	Conditions 1, 2, 3, and 4
1. FTP 1.9 seconds after reference pressure measurement	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.057 kPa (-36.4 to -7.93 mmHg)
3. Reference pressure	Saturated
4. Reference pressure difference between the second and third	Less than 0.7 kPa (5.25 mmHg)

13. Fuel tank leak check

Sequence is run if the following condition is met:	
FTP when vacuum introduction for fuel tank was complete	Less than third reference pressure

14. FTP sensor stuck check

Next sequence is run if the following condition is met:	-
FTP change while FVCV and vent valve are open	Less than 0.35 kPa (2.6 mmHg)

15. Atmospheric pressure measurement

Monitor is complete if the following condition is met:	-
Atmospheric pressure difference between sequence 1 and 8	0.3 kPa (2.25 mmHg) or less

TYPICAL MALFUNCTION THRESHOLDS

"Saturated" indicates that the EVAP pressure change is less than 0.1 kPa (0.75 mmHg) in 30 seconds.

One of the following conditions is met:	-
FTP just after reference pressure measurement began	More than -1 kPa (-7.5 mmHg)
Reference pressure	Less than -4.85 kPa (-36.4 mmHg)
Reference pressure	-1.057 kPa (-7.93 mmHg) or more
Reference pressure	Not saturated
Reference pressure difference between the first and second	0.7 kPa (5.25 mmHg) or more

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-325).

DTC	P0441	Evaporative Emission Control System Incorrect Purge Flow

DTC SUMMARY

DTC No.	Monitoring Item	DTC Detection Condition	Trouble Area	Detection Timing	Detection Logic
P0441	Purge VSV (Vacuum Switching Valve) stuck open	Vacuum pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure is measured. 0.02 inch leak pressure standard is measured at the start and at the end of leak check. If stabilized pressure is higher than [second 0.02 inch leak pressure standard x 0.2], ECM determines that Purge VSV stuck open	• Purge VSV • Connector / wire harness (Purge VSV - Hybrid Vehicle Control ECU) • Hybrid vehicle control ECU • Pump module • Leakage from EVAP system	Power switch off	2-trips
P0441	Purge VSV stuck closed	After EVAP leak check is performed, Purge VSV turned ON (open), and atmospheric air is introduced into EVAP system. 0.02 inch leak pressure standard is measured at the start and at the end of the check. If pressure does not return to near atmospheric pressure, ECM determines that purge valve stuck closed	• Purge VSV • Connector / wire harness (Purge VSV - Hybrid Vehicle Control ECU) • Hybrid vehicle control ECU • Pump module • Leakage from EVAP system	Power switch off	2-trips
P0441	Purge flow	While engine running, the following conditions are successively met: • Negative pressure is not created in EVAP system when Purge VSV turned ON (open) • EVAP system pressure change is less than 0.5 kPa (3.75 mmHg) when vent valve turned ON (closed) • Atmospheric pressure change between before and after purge flow monitor is less than 0.1 kPa (0.75 mmHg)	• Purge VSV • Connector / wire harness (Purge VSV - Hybrid Vehicle Control ECU) • Leakage from EVAP line (Purge VSV - Intake manifold) • Hybrid vehicle control ECU	While engine running	2-trips

DESCRIPTION

Refer to the EVAP System (See page ES-317).

MONITOR DESCRIPTION

The two monitors, Key-Off and Purge Flow, are used to detect malfunctions relating to DTC P0441. The Key-Off monitor is initiated by the ECM (included in the hybrid vehicle control ECU) internal timer, known as the soak timer, 5 hours* after the power switch is turned off. The purge flow monitor runs while the engine is running.

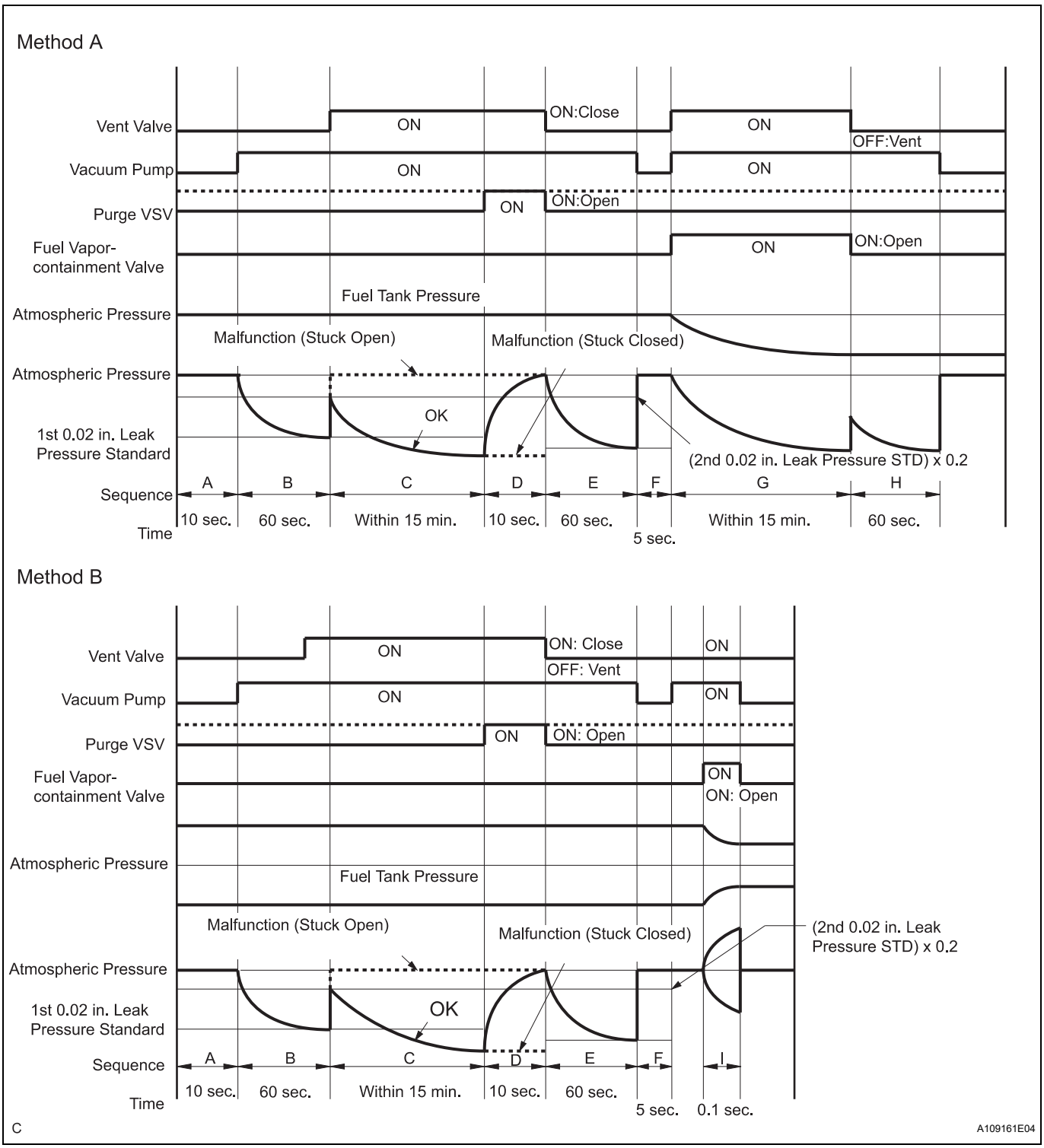
1. KEY-OFF MONITOR

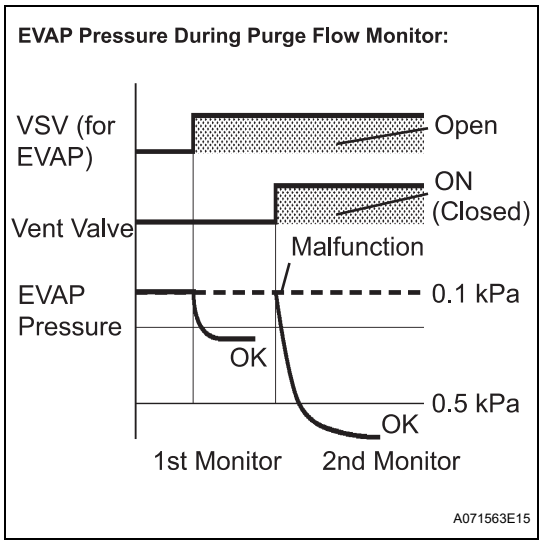
(a) Purge VSV stuck open

In operation C, the vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The EVAP system pressure is then measured by the ECM (included in the hybrid vehicle control ECU) using the pressure sensor. If the stabilized system pressure is higher than [second 0.02 inch leak pressure standard x 0.2], the ECM (included in the hybrid vehicle control ECU) interprets this as the Purge VSV (Vacuum Switching Valve) being stuck open. The ECM illuminates the MIL and sets the DTC (2-trip detection logic).

(b) Purge VSV stuck closed

In operation D, the pressure sensor measures the EVAP (Evaporative Emission) system pressure. The pressure measurement for Purge VSV monitor begins when the Purge VSV is turned ON (open) after the EVAP leak check. When the measured pressure indicates an increase of 0.3 kPa (2.25 mmHg) or more, the Purge VSV is functioning normally. If the pressure does not increase, the ECM (included in the hybrid vehicle control ECU) interprets this as the Purge VSV being stuck closed. The ECM illuminates the MIL and sets the DTC (2-trip detection logic).





2. PURGE FLOW MONITOR

The purge flow monitor consists of the two step monitors. The 1st monitor is conducted every time and the 2nd monitor is activated if necessary.

- The 1st monitor
  While the engine is running and the Purge VSV (Vacuum Switching Valve) is ON (open), the ECM (included in the hybrid vehicle control ECU) monitors the purge flow by measuring the EVAP pressure change. If negative pressure is not created, the ECM begins the 2nd monitor.
- The 2nd monitor
  The vent valve is turned ON (closed) and the EVAP pressure is then measured. If the variation in the pressure is less than 0.5 kPa (3.75 mmHg), the ECM (included in the hybrid vehicle control ECU) interprets this as the Purge VSV being stuck closed. The ECM illuminates the MIL and sets DTC P0441 (2-trip detection logic).

Atmospheric pressure check:
In order to ensure reliable malfunction detection, the variation in atmospheric pressure, before and after conduction of the purge flow monitor is measured by the ECM.

ES

MONITOR STRATEGY

Required Sensors/Components	Purge VSV and pump module
Frequency of Operation	Once per driving cycle
Duration	Within 15 minutes
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor is run whenever this DTC is not present	P0011 (VVT System 1 - Advance) P0012 (VVT System 1 - Retard) P0021 (VVT System 2 - Advance) P0022 (VVT System 2 - Retard) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120-P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0171, P0172 (Fuel system) P0300 - P0308 (Misfire) P0335 (CKP sensor) P0340, P0341 (CMP sensor) P0351 - P0356 (Ignitor) P0450 - P0453 (EVAP pressure sensor) P0500 (VSS)

Purge flow:

Engine	Running
ECT	4.4°C (40°F) or more
IAT	4.4°C (40°F) or more
Pressure sensor or pump module malfunction (P0450, P0452, P0453)	Not detected

Purge VSV	Not operated by scan tool
EVAP system check	Not detected by scan tool
Battery voltage	10 V or more
Purge duty cycle	8% or more

Purge VSV stuck open and closed:

Key-off monitor is run when all of the following conditions are met:	-
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg)
Battery voltage	10.5 V or more
Vehicle speed	2.5 mph (4 km/h) or less
Power switch	OFF
Engine Condition	Not running
Key-off duration	5 hours or 7 hours or 9 hours and 30 minutes
Pressure sensor of pump module malfunction (P1450, P1452, P1453)	Not detected
Purge VSV	Not operated by scan tool
Vent valve	Not operated by scan tool
Leak detection pump	Not operated by scan tool
Both of the following conditions (a) and (b) are met before key off:	
(a) Duration that vehicle is being driven	5 minutes or more
(b) Purge flow	Performed
ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)

Key-off monitor sequence 1 to 15

1. Atmospheric pressure measurement

Next sequence is run if the following condition is met:	-
Atmospheric pressure change for 10 seconds	Less than 0.3 kPa (2.25 mmHg) for 1 second

2. First reference pressure measurement

Next sequence is run if all of the following conditions are met:	Conditions 1, 2 and 3
1. EVAP pressure 1.9 seconds after reference pressure measurement	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.057 kPa (-36.38 to -7.93 mmHg)
3. Reference pressure	Saturated

3. Vent valve stuck closed check

Next sequence is run if the following condition is met:	-
EVAP pressure change for 10 seconds after vent valve ON (Closed)	0.3 kPa (2.25 mmHg) or more

4. Vacuum introduction for canister

Next sequence is run if both of the following conditions are met:	Conditions 1 and 2
1. Vacuum introduction time	15 minutes or less
2. FTP	Saturated

5. Purge VSV stuck closed check

Next sequence is run if the following condition is met:	-
EVAP pressure change for 10 seconds after Purge VSV ON (Open).	0.3 kPa (2.25 mmHg) or more

6. Second reference pressure measurement

Next sequence is run if all of the following conditions are met:	Conditions 1, 2, 3 and 4
1. EVAP pressure when 1.9 sec. after reference pressure measurement	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.057 kPa (-36.4 to -7.93 mmHg)
3. Reference pressure	Saturated
4. Reference pressure difference between the first and second	0.7 kPa (5.25 mmHg) or less

7. Canister leak

Next sequence is run if the following condition is met:	-
Canister leak when vacuum introduction was complete	Second reference pressure or less

8. Fuel vapor-containment valve (FVCV stuck closed check)

Sequence 14 is run if all of the following conditions are met:	Conditions 1 and 2
1. FTP when EVAP monitor started	-2 kPa (-15 mmHg) or less, or 3 kPa (22.5 mmHg) or more
2. FTP change while FVCV and vent valve are open	0.5 kPa (3.75 mmHg) or more

9. Vacuum introduction for fuel tank

Next sequence is run if both of the following conditions are met:	Conditions 1 and 2
1. FTP when EVAP monitor started	-2 to 3 kPa (-15 to 22.5 mmHg)
2. Vacuum introduction time	15 minutes or less

10. FVCV stuck closed check

Next sequence is run if the following condition is met:	
FTP change when vacuum introduction for fuel tank	0.5 kPa (3.75 mmHg)

11. FTP sensor stuck check

Next sequence is run if the following condition is met:	
FTP change when FVCV closed	0.35 kPa (2.6 mmHg) or less

12. Third reference pressure measurement

Next sequence is run if all of the following conditions are met:	Conditions 1, 2, 3, and 4
1. FTP 1.9 seconds after reference pressure measurement	-1 kPa (-7.5 mmHg) or more
2. Reference pressure	-4.85 to -1.057 kPa (-36.4 to -7.93 mmHg)
3. Reference pressure	Saturated
4. Reference pressure difference between second and third	Less than 0.7 kPa (5.25 mmHg)

13. Fuel tank leak check

Sequence is run if the following condition is met:	
FTP when vacuum introduction for fuel tank was complete	Less than third reference pressure

14. FTP sensor stuck check

Next sequence is run if the following condition is met:	-
FTP change while FVCV and vent valve are open	Less than 0.35 kPa (2.6 mmHg)

15. Atmospheric pressure measurement

Monitor is complete if the following condition is met:	-
Atmospheric pressure difference between sequence 1 and 8	0.3 kPa (2.25 mmHg) or less

TYPICAL MALFUNCTION THRESHOLDS

Purge VSV stuck open:

EVAP pressure when vacuum introduction for canister was complete	Higher than reference pressure x 0.2

Purge VSV stuck open and closed:

EVAP pressure change for 10 seconds after purge VSV ON	Less than 0.3 kPa (2.25 mmHg)

Purge flow:

Both of the following conditions are met:	Conditions (a) and (b)
(a) EVAP pressure change when purge operation is started	Less than 0.1 kPa (0.75 mmHg)
(b) EVAP pressure change during purge operation when vent valve is closed	Less than 0.5 kPa (3.75 mmHg)

MONITOR RESULT

Refer to the EVAP System (See page ES-317).

INSPECTION PROCEDURE

Refer to the EVAP System (See page ES-317).

DTC	P0450	Evaporative Emission Control System Pressure Sensor / Switch

DTC	P0451	Evaporative Emission Control System Pressure Sensor Range / Performance

DTC	P0452	Evaporative Emission Control System Pressure Sensor / Switch Low Input

DTC	P0453	Evaporative Emission Control System Pressure Sensor / Switch High Input

DTC SUMMARY

DTC No.	Monitoring Item	DTC Detection Condition	Trouble Area	Detection Timing	Detection Logic
P0450	Pressure sensor abnormal voltage fluctuation	Sensor output voltage rapidly fluctuates beyond upper and lower malfunction thresholds for 0.5 seconds.	• Pump module • Hybrid vehicle control ECU	• EVAP monitoring (Power switch off) • Power switch ON (IG)	1-trip
P0451	Pressure sensor abnormal voltage fluctuation	Sensor output voltage fluctuates frequently in certain time period.	• Pump module • Connector / wire harness (Pump module - Hybrid Vehicle Control ECU) • Hybrid vehicle control ECU	• EVAP monitoring (Power switch off) • Engine switch running	2-trips
P0451	Pressure sensor constant voltage	Sensor output voltage does not vary in certain time period.	• Pump module • Connector / wire harness (Pump module - Hybrid Vehicle Control ECU) • Hybrid vehicle control ECU	• EVAP monitoring (Power switch off)	2-trips
P0452	Pressure sensor voltage low	Sensor output voltage is less than 0.45 V for 0.5 seconds.	• Pump module • Connector / wire harness (Pump module - Hybrid Vehicle Control ECU) • Hybrid vehicle control ECU	• EVAP monitoring (Power switch off) • Power switch ON (IG)	1-trip
P0453	Pressure sensor voltage high	Sensor output voltage is more than 4.9 V for 0.5 seconds.	• Pump module • Connector / wire harness (Pump module - Hybrid Vehicle Control ECU) • Hybrid vehicle control ECU	• EVAP monitoring (Power switch off) • Power switch ON (IG)	1-trip

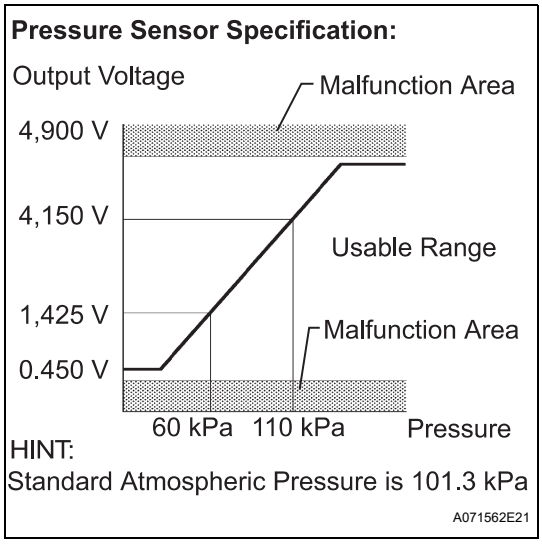
HINT:
The pressure sensor is built into the pump module.

DESCRIPTION

Refer to the EVAP System (See page ES-317).

MONITOR DESCRIPTION

1. DTC P0450: Pressure sensor abnormal voltage fluctuation
   If the pressure sensor output voltage rapidly fluctuates between less than 0.45 V and more than 4.9 V, the ECM interprets this as an open or short circuit malfunction in the pressure sensor or its circuit, and stops the EVAP (Evaporative Emission) system monitor. The ECM (included in the hybrid vehicle control ECU) then illuminates the MIL and sets the DTC (1-trip detection logic).



2. DTC P0451: Pressure sensor abnormal voltage fluctuation or being constant
   If the pressure sensor output voltage fluctuates rapidly for 10 seconds, the ECM (included in the hybrid vehicle control ECU) stops the EVAP system monitor. The ECM interprets this as the pressure sensor voltage fluctuating, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC.
   Alternatively, if the sensor output voltage does not change for 10 seconds, the ECM interprets this as the sensor voltage being constant, and stops the monitor. The ECM then illuminates the MIL and sets the DTC.
   (Both the malfunctions are detected by 2-trip detection logic).
3. DTC P0452: Pressure sensor voltage low
   If the pressure sensor output voltage is below 0.45 V, the ECM (included in the hybrid vehicle control ECU) interprets this as an open or short circuit malfunction in the pressure sensor or its circuit, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (1-trip detection logic).
4. DTC P0453: Pressure sensor voltage high
   If the pressure sensor voltage output is 4.9 V or more, the ECM (included in the hybrid vehicle control ECU) interprets this as an open or short circuit malfunction in the pressure sensor or its circuit, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (1-trip detection logic).

MONITOR STRATEGY

Required Sensors/Components	Pump module
Frequency of Operation	Once per driving cycle: P0451 sensor constant voltage Continuous: P0451 sensor abnormal voltage fluctuation, P0450, P0452 and P0453
Duration	0.5 seconds: P0450, P0452, P0453 Within 15 seconds: P0451
MIL Operation	Immediate: P0450, P0452, P0453 2 driving cycles: P0451

Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

P0451 (Noise Monitor):

Atmospheric pressure	70 kPa (525 mmHg) to 110 kPa (825 mmHg)
Battery voltage	8 V or more
Intake air temperature	4.4 to 35°C (40 to 95°F)
EVAP pressure sensor malfunction (P0450, P0452, P0453)	Not detected
Either of the following conditions is met:	A or B
A. Power switch	ON
B. Soak time (Power switch off time)	5 hours

Example of restart time:

First time	7 hours
Second time	9 hours and 30 minutes

P0451 (Stuck Monitor):

Atmospheric pressure	Less than 70 kPa (525 mmHg) or 110 kPa (825 mmHg) or more
Battery voltage	10.5 V or more
Intake air temperature	4.4 to 35°C (40 to 95°F)
EVAP pressure sensor malfunction (P0450, P0452, P0453)	Not detected
Soak time (Power switch off time)	5 hours

Example of restart time:

First time	7 hours
Second time	9 hours and 30 minutes

P0450, P0452 and P0453:

The monitor will run whenever these DTCs are not present	None
Battery voltage	8 V or more
Starter	OFF
Power switch	ON

TYPICAL MALFUNCTION THRESHOLDS

1. P0450: Pressure sensor chattering

EVAP Pressure	Less than 42.11 kPa (315.82 mmHg), or more than 123.761 kPa (928.207 mmHg)

2. P0451: Pressure sensor noise

Frequency that EVAP pressure change is 0.3 kPa or more	10 times or more in 10 seconds

3. P0451: Pressure sensor stuck

EVAP pressure change during reference pressure measurement	Less than 0.65 kPa (4.87 mmHg)

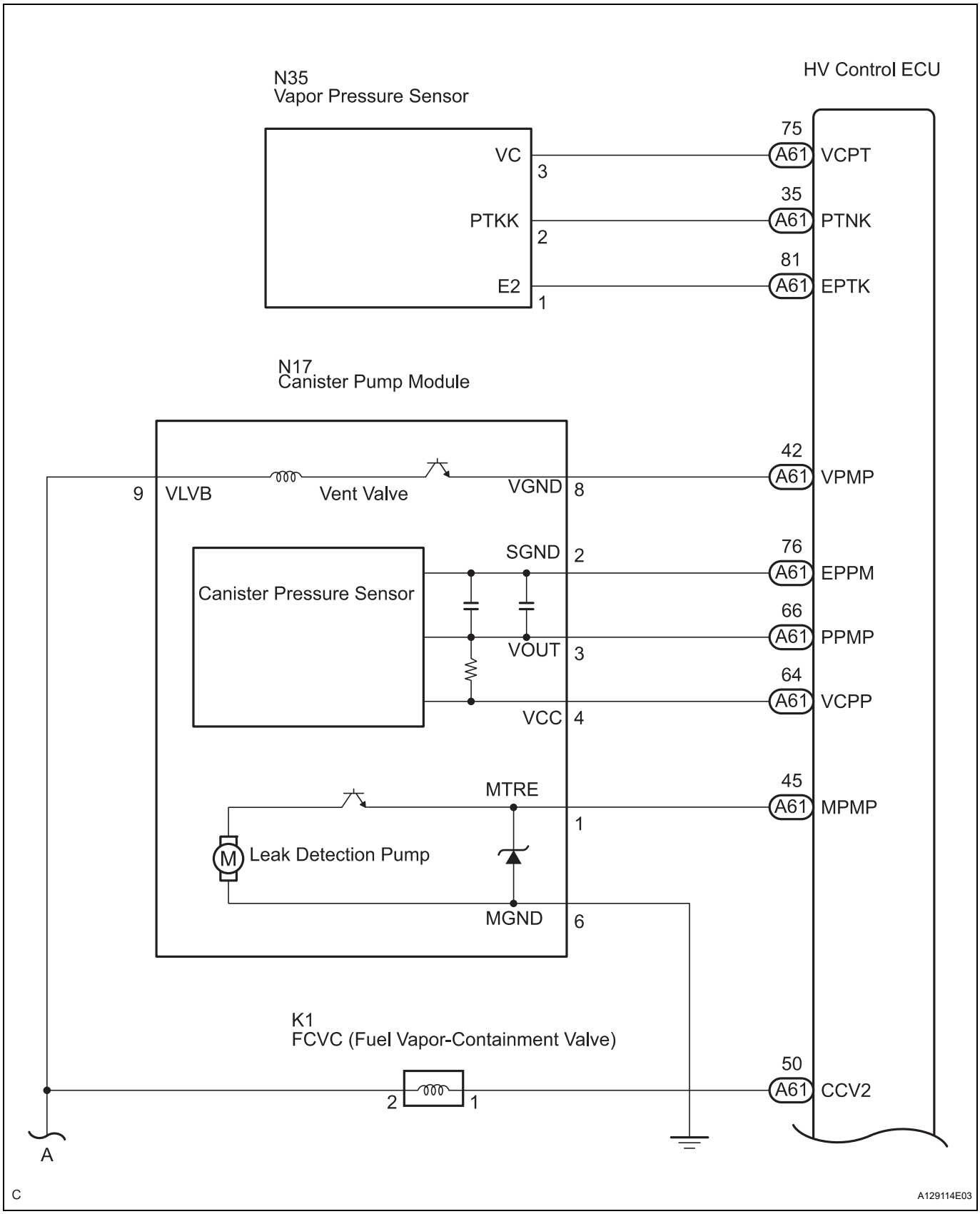
4. P0452: Pressure sensor low voltage

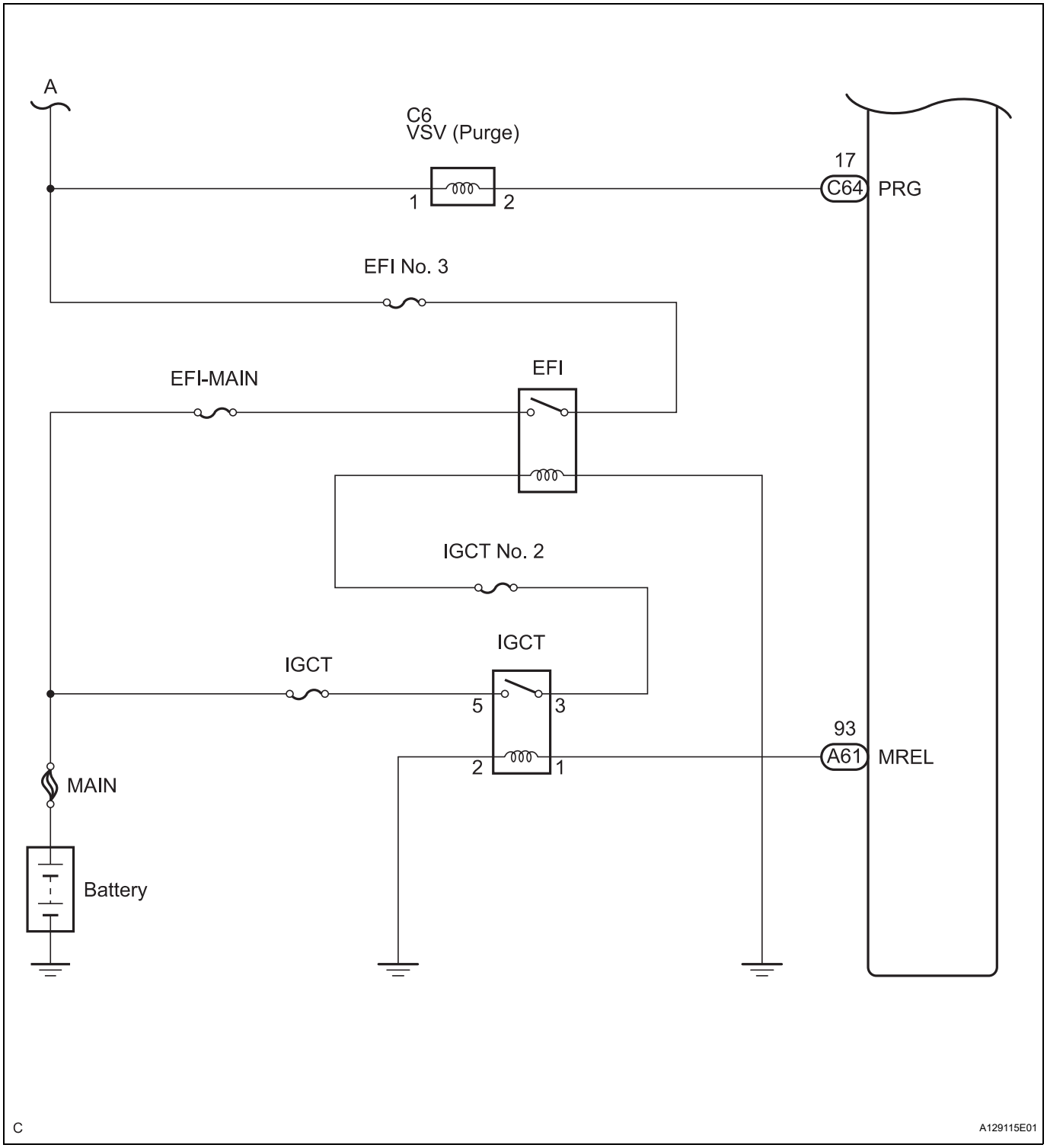
EVAP Pressure	Less than 42.11 kPa (315.82 mmHg)

5. P0453: Pressure sensor high voltage

EVAP Pressure	More than 123.761 kPa (928.207 mmHg)

WIRING DIAGRAM





INSPECTION PROCEDURE

NOTICE:

- **When a vehicle is brought into the workshop, leave it as it is. Do not change the vehicle condition. For example, do not tighten the fuel tank cap.**
- **Do not disassemble the pump module.**
- **The intelligent tester is required to conduct the following diagnostic troubleshooting procedure.**

1	CONFIRM DTC AND EVAP PRESSURE

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / EVAP / VAPOR PRESS PUMP.
(g) Read the EVAP (Evaporative Emission) pressure displayed on the tester.

ES

Result

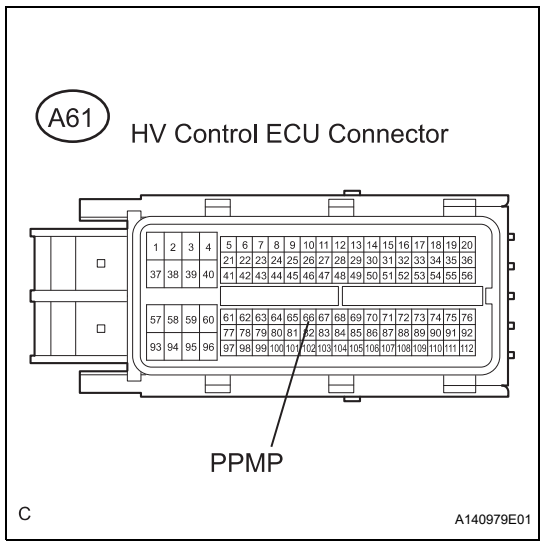
Display (DTC Output)	Test Result	Suspected Trouble Area	Proceed to
P0451	-	• Pressure sensor	C
P0450 and/or P0452	Less than 45 kPa (338 mmHg)	• Wire harness/connector (Hybrid Vehicle Control ECU - pressure sensor) • Pressure sensor • Short in hybrid vehicle control ECU	A
P0450 and/or P0453	More than 120 kPa (900 mmHg)	• Wire harness/connector (Hybrid Vehicle Control ECU - pressure sensor) • Pressure sensor • Open in hybrid vehicle control ECU	B

B → Go to step 4

C → GO TO EVAP INSPECTION PROCEDURE

A

2	CHECK HARNESS AND CONNECTOR (PUMP MODULE CONTROL ECU)



(a) Turn the power switch off.
(b) Disconnect the A61 hybrid vehicle control ECU connector.
(c) Measure the resistance between the PPMP terminal of the hybrid vehicle control ECU connector and body ground.

Result

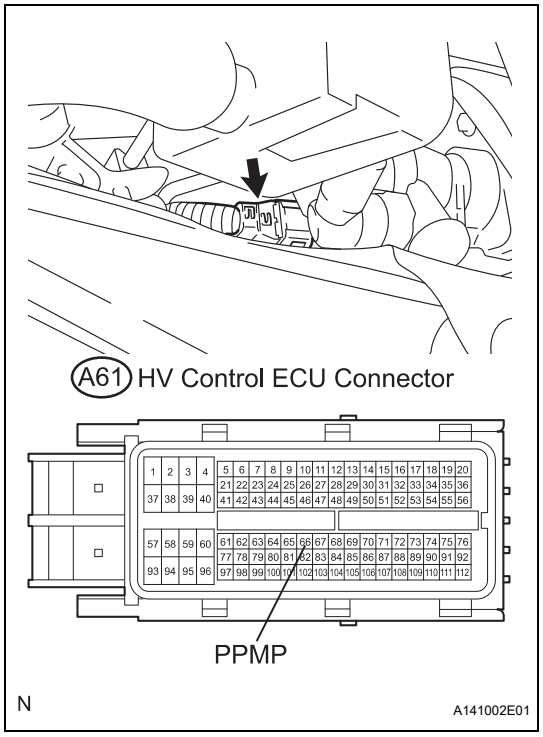
Test Result	Suspected Trouble Area	Proceed to
10 Ω or less	• Wire harness/ connector (HV Control ECU - pressure sensor) • Short in pressure sensor circuit	A
10 kΩ or more	• Wire harness/ connector (Hybrid Vehicle Control ECU - pressure sensor) • Short in hybrid vehicle control ECU	B

(d) Reconnect the hybrid vehicle control ECU connector.

B	Go to step 7

A

3 CHECK HARNESS AND CONNECTOR (PUMP MODULE - HV CONTROL ECU)



(a) Disconnect the N17 canister connector.
(b) Disconnect the A61 hybrid vehicle control ECU connector.
(c) Measure the resistance between the PPMP terminal of the hybrid vehicle control ECU connector and body ground.

Result

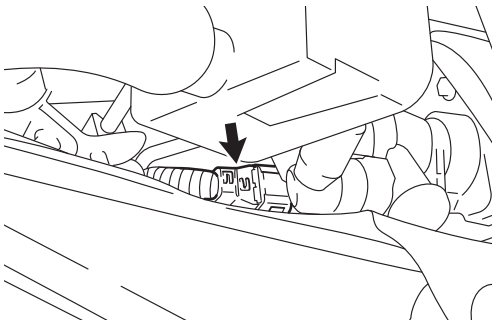
Test Result	Suspected Trouble Area	Proceed to
10 kΩ or more	• Short in pressure sensor circuit	A
10 Ω or less	• Short in wire harness/connector (Hybrid Vehicle Control ECU - pressure sensor)	B

(d) Reconnect the canister connector.
(e) Reconnect the hybrid vehicle control ECU connector.

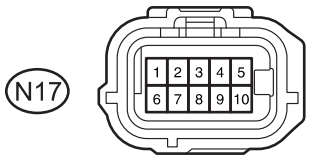
A	Go to step 5
B	Go to step 6

ES

4	CHECK HARNESS AND CONNECTOR (PUMP MODULE - HV CONTROL ECU)



Wire Harness Side (Front View):



Canister Connector

N A140992E01

(a) Disconnect the N17 canister connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage and resistance according to the value(s) in the table below.

Standard

Tester Connection	Specified Condition
N17-4 - Body ground	4.5 to 5.0 V
N17-3 - Body ground	4.5 to 5.0 V
N17-2 - Body ground	100 Ω or less

Result

Test Result	Suspected Trouble Area	Proceed to
Voltage and resistance within standard ranges	• Open in pressure sensor circuit	A
Voltage and resistance outside standard ranges	• Open in wire harness/connector (Hybrid Vehicle Control ECU - pressure sensor)	B

(d) Reconnect the canister connector.

A	Go to step 5
B	Go to step 6

5	REPLACE CHARCOAL CANISTER

NEXT	Go to step 8

6	REPAIR OR REPLACE HARNESS OR CONNECTOR

HINT:
If the exhaust tail pipe has been removed, go to the next step before reinstalling it.

NEXT	Go to step 8

7	REPLACE HYBRID VEHICLE CONTROL ECU

NEXT	Go to step 8

8	CHECK WHETHER DTC OUTPUT RECURS (AFTER REPAIR)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Wait for at least 60 seconds.

(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
HINT:
If no pending DTC is displayed on the tester, the repair has been successfully completed.

NEXT

COMPLETED

DTC	P0505	Idle Control System Malfunction

DESCRIPTION

The idling speed is controlled by the ETCS (Electronic Throttle Control System). The ETCS is comprised of: 1) the one valve type throttle body; 2) the throttle actuator, which operates the throttle valve; 3) the Throttle Position (TP) sensor, which detects the opening angle of the throttle valve; 4) the Accelerator Pedal Position (APP) sensor, which detects the accelerator pedal position; and 5) the ECM (included in hybrid vehicle control ECU), which controls the ETCS. Based on the target idling speed, the ECM controls the throttle actuator to provide the proper throttle valve opening angle.

DTC No.	DTC Detection Conditions	Trouble Areas
P0505	Idling speed continues to vary greatly from target idling speed (2-trip detection logic)	• ETCS • Air induction system • PCV hose connections • Hybrid vehicle control ECU

ES

MONITOR DESCRIPTION

The ECM monitors the idling speed and idling air flow volume to conduct Idle Speed Control (ISC). The ECM determines that the ISC system is malfunctioning if the following conditions are met:

- The learned idling air flow volume remains at the maximum or minimum volume 5 times or more during a drive cycle.
- After driving at 6.25 mph (10 km/h) or more, the actual engine idling speed varies from the target idling speed by between 100 rpm and 200 rpm, 5 times or more during a drive cycle.

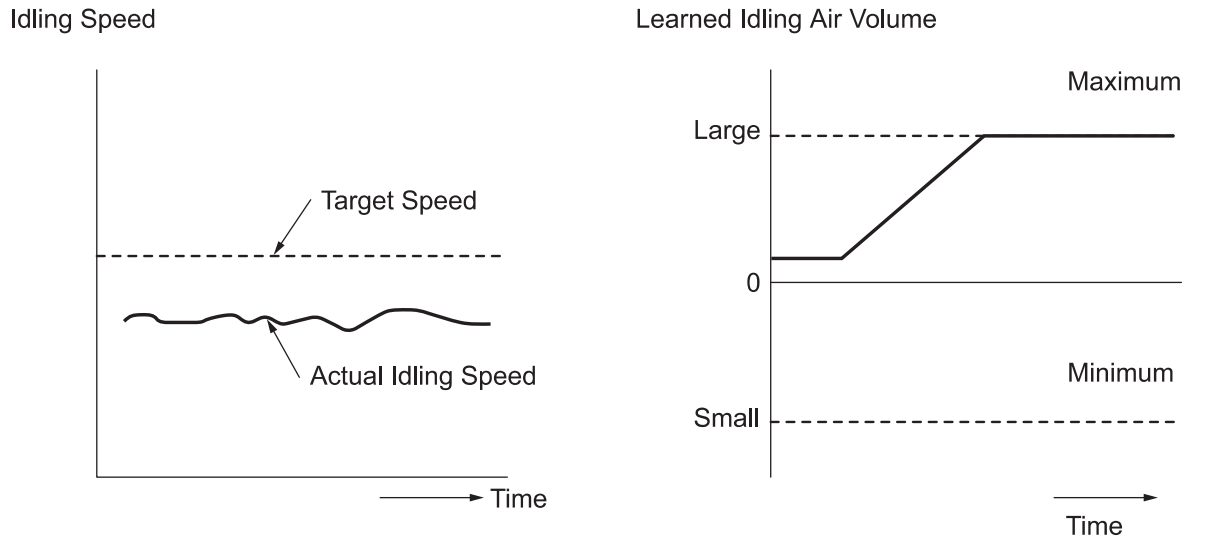
Example:

If the actual idling speed varies from the target idling speed by more than 200 rpm* 5 times during a drive cycle, the ECM illuminates the MIL and sets the DTC.

HINT:

*: Threshold idling speed varies with engine load.

Example:



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MONITOR STRATEGY

Related DTCs	P0505: ISC function
Required Sensors/Components (Main)	ETCS
Required Sensors/Components (Related)	Crankshaft position sensor, engine coolant temperature sensor, and vehicle speed sensor
Frequency of Operation	Once per driving cycle: Functional check Continuous: Range check
Duration	10 minutes: Functional check 10 seconds: Range check
MIL Operation	2 driving cycles: Functional check Immediate: Range check
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Engine	Running

TYPICAL MALFUNCTION THRESHOLDS

Either of following conditions 1 or 2 met	-
1. Frequency that both of following conditions (a) and (b) set	5 times or more
(a) Engine rpm - Target engine rpm	Less than -100 rpm, or more than 150 rpm
(b) Vehicle condition	Stop after vehicle was driven by 6.25 mph (10 km/h) or more
2. Frequency that both of following conditions (c) and (d) set	Once
(c) Engine rpm - Target engine rpm	Less than -100 rpm, or more than 150 rpm

(d) IAC flow rate learning value	1.1 L/sec. or less, or 7 L/sec. or more

INSPECTION PROCEDURE

HINT:

- The following conditions may also cause DTC P0505 to be set:
  (a) The throttle valve is not fully closed. (e.g. The accelerator pedal is slightly depressed by something such as a floor carpet overlapping the accelerator pedal.)
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

ES

1 CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0505)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Select the following the menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0505	A
P0505 and other DTCs	B

HINT:
If any DTCs other than P0505 are output, troubleshoot those DTCs first.

B → **GO TO DTC CHART**

A

2 CHECK PCV HOSE (HOSE CONNECTIONS)

OK:
PCV hose is connected correctly and is not damaged.

NG → **REPAIR OR REPLACE PCV HOSE**

OK

3 CHECK AIR INDUCTION SYSTEM

(a) Check the air induction system for vacuum leakage.
OK:
No leakage from air induction system.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

4	CHECK THROTTLE VALVE

(a) Check the throttle valve condition.
OK:
Throttle valve is not contaminated with foreign objects and moves smoothly.

NG → **REPLACE THROTTLE BODY ASSEMBLY**

OK

REPLACE HYBRID VEHICLE CONTROL ECU

DTC	P050A	Cold Start Idle Air Control System Performance

DTC	P050B	Cold Start Ignition Timing Performance

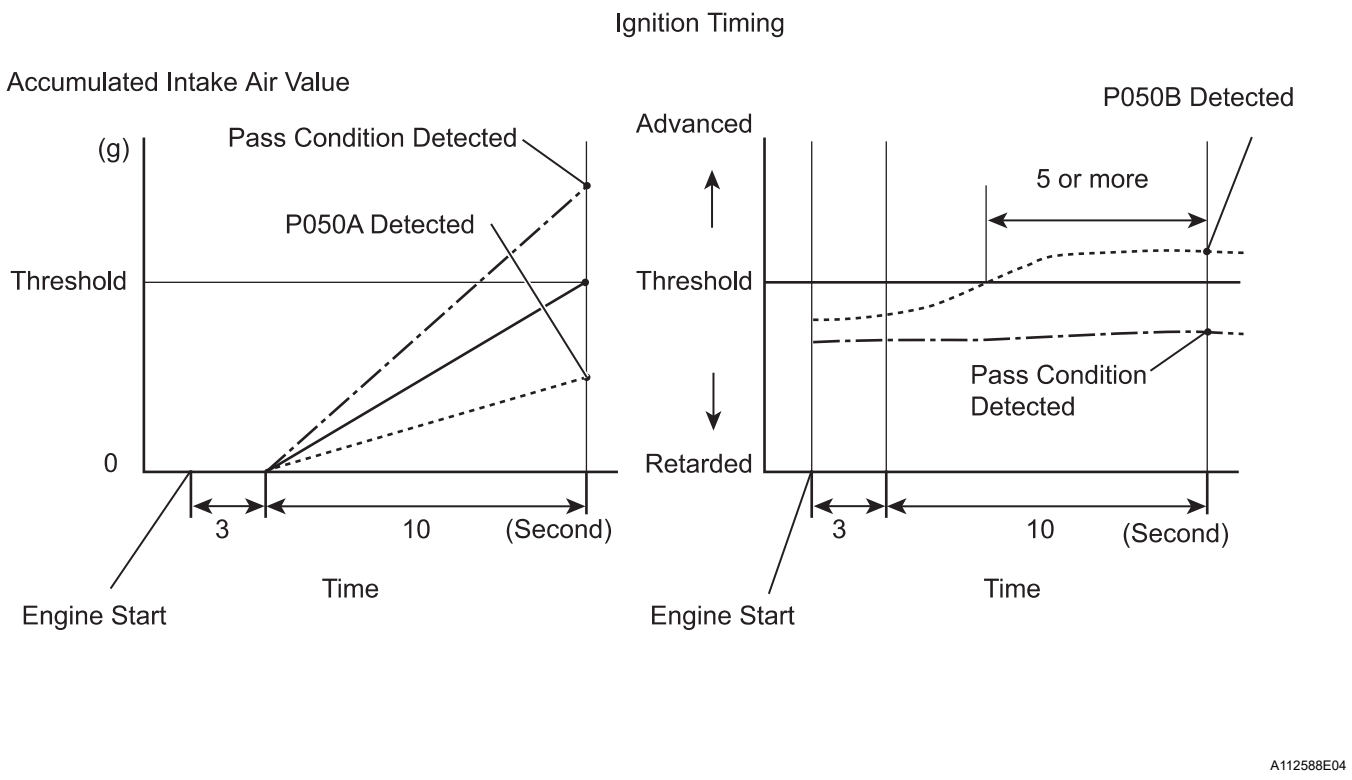
DESCRIPTION

The Electronic Throttle Control System (ETCS) controls the engine idling speed. The ETCS operates the throttle actuator to open and close the throttle valve, and adjusts the intake air amount to achieve the target idling speed.
In addition, the ECM (included in hybrid vehicle control ECU) retards the ignition timing and the ETCS increases the intake air amount to quickly increase the catalyst temperature at cold start to reduce emissions.

ES

DTC No.	DTC Detection Conditions	Trouble Areas
P050A	Accumulated intake air amount during 10 seconds of idling after cold start is less than threshold (2-trip detection logic)	• Throttle body assembly • Mass air flow meter • Air induction system • PCV hose connections • VVT system • Air cleaner filter element • Hybrid vehicle control ECU
P050B	Ignition timing retard value insufficient for 5 seconds or more during 10 seconds of P050A monitoring duration at cold start (2-trip detection logic)	• Throttle body assembly • Mass air flow meter • Air induction system • PCV hose connections • VVT system • Air cleaner filter element • Hybrid vehicle control ECU

MONITOR DESCRIPTION



The ECM monitors the intake air amount during idling and the ignition timing.
When the Engine Coolant Temperature (ECT) is between -10°C and 50°C (14°F and 122°F), the ECM calculates the idling intake air amount for 10 seconds, beginning 3 seconds after the engine starts.
When the accumulated value is below the threshold, the ECM interprets this as a malfunction in the Idle Speed Control (ISC) system at cold start.
The ECM also monitors the ignition timing at cold start, and judges it to be incorrect when it is advanced to the same value for a warm engine for 5 seconds or more of the 10-second monitoring period.
Example:
P050A is detected when all conditions below are met (2-trip detection logic):
1. The ECT is between -10°C and 50°C (14°F and 122°F) when the engine starts.
2. The engine idles for 13 seconds after engine start.
3. The accumulated intake air amount is below the threshold.

The ECM sets the DTC and illuminates the MIL 13 seconds after the engine is next started.

NOTICE:

When the negative battery terminal is disconnected during inspection or repairs, the ISC learning values are cleared. The ISC learning must be performed by warming up the engine and idling for 5 minutes with the ECT at 75°C (167°F) or more because DTCs cannot be detected with the ISC learning values cleared.

MONITOR STRATEGY

Related DTCs	P050A: Idle speed control problem at cold P050B: Idle ignition timing problem at cold
Required Sensors/Components (Main)	Mass air flow meter
Required Sensors/Components (Related)	Engine Coolant Temperature (ECT) sensor, throttle position sensor, vehicle speed sensor

Frequency of Operation	Once per driving cycle
Duration	10 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

P050A:

Battery voltage	8 V or more
Time after engine start	3 seconds or more
Starter	OFF
ECT at engine start	-10°C (14°F) or more
ECT	-10 to 50°C (14 to 122°F)
Engine idling time	3 seconds or more
Fuel-cut	OFF
Vehicle speed	Less than 1.875 mph (3 km/h)
Time after shift position changed (A/T)	1 second or more
Atmospheric pressure	76 kPa (570 mmHg) or more

P050B:

Battery voltage	8 V or more
Time after engine start	3 seconds or more
Starter	OFF
ECT at engine start	-10°C (14°F) or more
ECT	-10 to 50°C (14 to 122°F)
Engine idling time	3 seconds or more
Fuel-cut	OFF
Vehicle speed	Less than 1.875 mph (3 km/h)

TYPICAL MALFUNCTION THRESHOLDS

P050A:

Accumulated air flow amount (A/T)	Varies with ECT (Example: Less than 1.44 g)

P050B:

Accumulated time when ignition timing retard value insufficient	5 seconds or more

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P050A AND/OR P050B)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Select the following the menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P050A and/or P050B	A
P050A and/or P050B and other DTCs	B

HINT:
If any DTCs other than P050A and P050B are output, troubleshoot those DTCs first.

B → **GO TO DTC CHART**

A

2 READ VALUE USING INTELLIGENT TESTER (FUEL TRIM)

HINT:
Calculate the total fuel trim values to check the characteristic deviation of the mass air flow meter.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / SHORT FT #1 and LONG FT #1.
(e) Read the values displayed on the tester.
(f) Add together the SHORT FT #1 and LONG FT #1 values to obtain the total FUEL TRIM.
OK:
Total of SHORT FT #1 and LONG FT #1 values is between -20% and 20%.

OK → **Go to step 12**

NG

3 PERFORM ACTIVE TEST USING INTELLIGENT TESTER (OPERATE OCV)

(a) Connect the intelligent tester to the DLC3.
(b) Put the engine in inspection mode (See page ES-35).
(c) Turn the tester on.
(d) Warm up the engine.
(e) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1.
(f) Check the engine speed while operating the Oil Control Valve (OCV) using the tester.

OK

Tester Operations	Specified Conditions
OCV OFF	Normal engine speed
OCV ON	Engine idles roughly or stalls (soon after OCV switched from OFF to ON)

NG → **Go to step 8**

OK

4	CHECK PCV HOSE (HOSE CONNECTIONS)

OK:
PCV hose is connected correctly and is not damaged.

NG → **Go to step 9**

OK

5	CHECK AIR INDUCTION SYSTEM

ES

(a) Check the air induction system for vacuum leakage.
OK:
No leakage from air induction system.

NG → **Go to step 10**

OK

6	CHECK AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY

(a) Visually check that the air cleaner filter element is not excessively contaminated with dirt or oil.
OK:
Air cleaner filter element is not excessively contaminated with dirt or oil.

NG → **Go to step 11**

OK

7	REPLACE MASS AIR FLOW METER

NEXT → **Go to step 15**

8	CHECK AND REPAIR VVT SYSTEM

NEXT → **Go to step 15**

9	REPAIR OR REPLACE PCV HOSE

NEXT → **Go to step 15**

10	REPAIR OR REPLACE AIR INDUCTION SYSTEM

NEXT → **Go to step 15**

11	REPLACE AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY

NEXT → Go to step 15

12	CHECK THROTTLE VALVE

(a) Check for deposits around the throttle valve and throttle valve condition.

OK:

No deposits around throttle valve and throttle valve moves smoothly.

NG → Go to step 14

OK

13	REPLACE HYBRID VEHICLE CONTROL ECU

NEXT → Go to step 15

14	REPAIR OR REPLACE THROTTLE BODY ASSEMBLY

NEXT → Go to step 15

15	CHECK WHETHER DTC OUTPUT RECURS (DTC P050A AND/OR P050B)

NOTICE:

In this operation, the engine must be cold (the same level as the engine coolant temperature recorded in the freeze frame data).

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-31).
(e) Switch the ECM from normal mode to check mode using the tester (See page ES-34).
(f) Start the engine to idle for a minute.

OK:

Stable fast idling.

(g) Read the DTCs.

OK:

No DTC output.

NEXT

END

DTC	P0560	System Voltage

DESCRIPTION

The battery supplies electricity to the ECM (included in hybrid vehicle control ECU) even when the power switch is off. This power allows the ECM to store data such as DTC history, freeze frame data and fuel trim values. If the battery voltage falls below a minimum level, the memory is cleared and the ECM determines that there is a malfunction in the power supply circuit. When the engine is next started, the ECM illuminates the MIL and sets the DTC.

DTC No.	DTC Detection Conditions	Trouble Areas
P0560	Open in ECM back up power source circuit (1-trip detection logic)	• Open in back up power source circuit • Battery • Battery terminals • EFI MAIN fuse • Hybrid vehicle control ECU

ES

HINT:
If DTC P0560 is set, the ECM does not store other DTCs or the data stored in the ECM are partly erased.

MONITOR STRATEGY

Related DTCs	P0560: ECM system voltage
Required Sensors/Components (Main)	ECM
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	3 seconds
MIL Operation	Immediate (MIL illuminated after next engine start)
Sequence of Operation	None

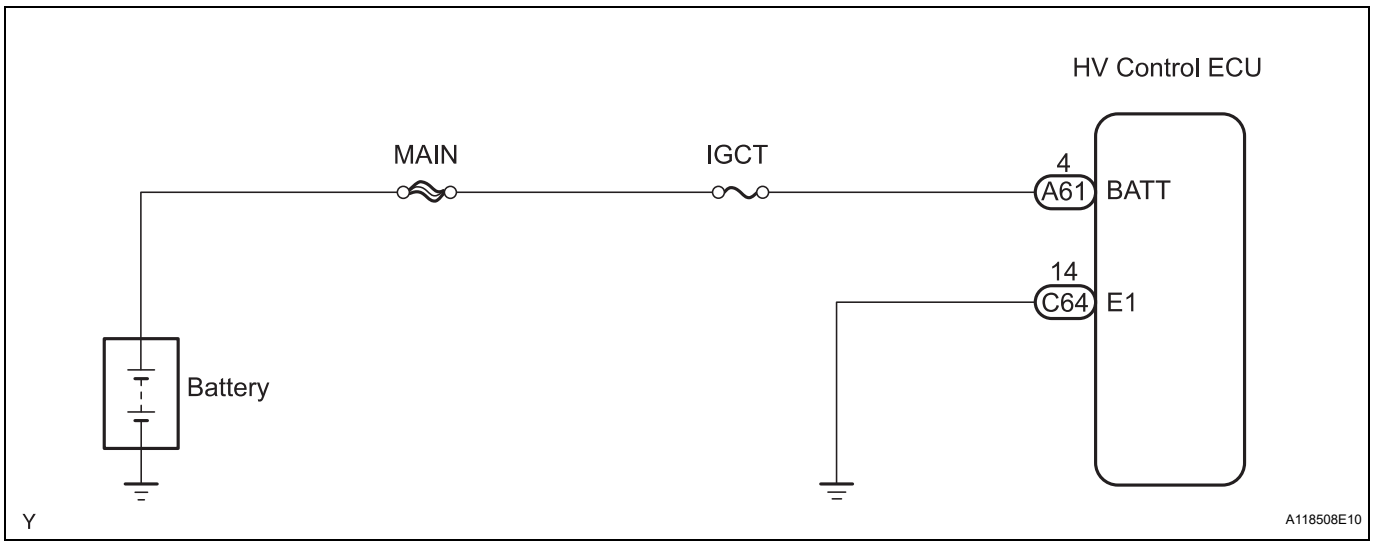
TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None

TYPICAL MALFUNCTION THRESHOLDS

ECM power source	Less than 3.5 V

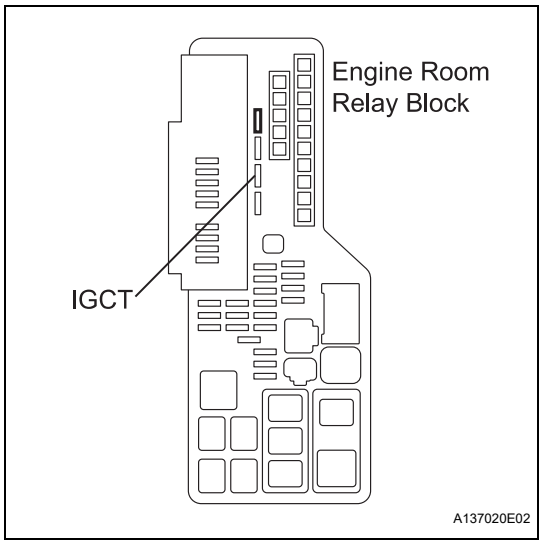
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK FUSE (IGCT FUSE)

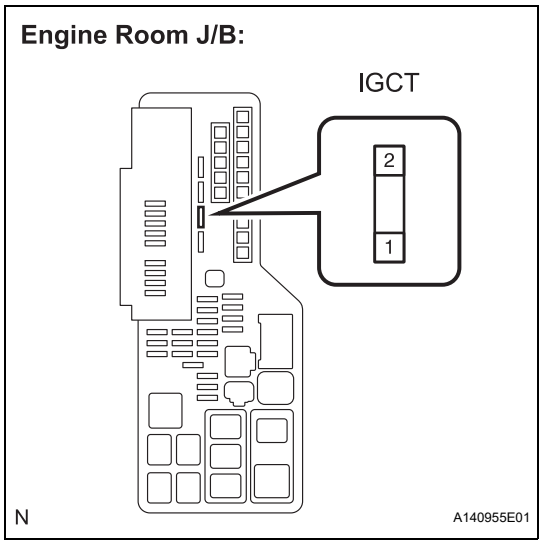


(a) Remove the EFI MAIN fuse and P/I fuse from the engine room R/B and J/B.
(b) Measure the resistance of the IGCT fuse.
Standard resistance:
Below 1 Ω
(c) Reinstall the IGCT fuse.

NG → **CHECK FOR SHORTS IN ALL HARNESSES AND CONNECTORS CONNECTED TO FUSE AND REPLACE FUSE**

OK

2	CHECK HARNESS AND CONNECTOR (HV CONTROL ECU - IGCT FUSE, IGCT FUSE - BATTERY)



(a) Check the harness and the connector between the IGCT fuse and hybrid vehicle control ECU.
(1) Remove the IGCT fuse from the engine room R/B and J/B.
(2) Disconnect the A61 hybrid vehicle control ECU connector.
(3) Measure the resistance.
Standard resistance (Check for open)

Tester Connections	Specified Conditions
2 (IGCT fuse) - A61-4 (BATT)	Below 1 Ω

Standard resistance (Check for short)

Tester Connections	Specified Conditions
2 (IGCT fuse) or A61-4 (BATT) - Body ground	10 kΩ or higher

(4) Reconnect the hybrid vehicle control ECU connector.
(5) Reinstall the IGCT fuse.
(b) Check the harness and the connector between the IGCT fuse and battery.
(1) Remove the IGCT fuse from the engine room R/B and J/B.

(2) Disconnect the positive battery terminal.
(3) Measure the resistance.

Standard resistance (Check for open)

Tester Connections	Specified Conditions
Battery positive terminal - 1 (IGCT fuse)	Below 1 Ω

Standard resistance (Check for short)

Tester Connections	Specified Conditions
Battery positive terminal or 1 (IGCT fuse) - Body ground	10 kΩ or higher

(4) Reconnect the positive battery terminal.
(5) Reinstall the IGCT fuse.

ES

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 INSPECT BATTERY

(a) Check that the battery is not depleted.
OK:
Battery is not depleted

NG → **REPLACE BATTERY**

OK

4 CHECK BATTERY TERMINAL

(a) Check that the battery terminals are not loose or corroded.
OK:
Battery terminals are not loose or corroded

NG → **REPAIR OR REPLACE BATTERY TERMINAL**

OK

5 CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Clear the DTCs (See page ES-31).
(d) Turn the power switch off and turn the tester off.
(e) Put the engine in inspection mode (See page ES-35).
(f) Turn the tester on.
(g) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(h) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0560	A

Display (DTC Output)	Proceed to
No output	B

B → CHECK FOR INTERMITTENT PROBLEMS

A

REPLACE HYBRID VEHICLE CONTROL ECU

DTC	P0604	Internal Control Module Random Access Memory (RAM) Error

DESCRIPTION

The ECM (included in hybrid vehicle control ECU) continuously monitors its internal memory status. This self-check ensures that the ECM is functioning properly. It is diagnosed by internal "mirroring" of the main CPU and sub CPU to detect the Random Access Memory (RAM) errors. If outputs from these CPUs are different and deviate from the standards, the ECM will illuminate the MIL and set a DTC immediately.

DTC	DTC Setting Condition	Trouble Area
P0604	ECM RAM errors	Hybrid vehicle control ECU

ES

MONITOR STRATEGY

Related DTC	P0604: ECM RAM error
Required sensors/Components	ECM
Frequency of Operation	Continuous
Duration	16 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor will run whenever this DTC is not present	None

TYPICAL MALFUNCTION THRESHOLDS

Main CPU and sub CPU mirroring	Fail

INSPECTION PROCEDURE

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0604)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the engine switch on (IG).
(c) Turn the tester on.
(d) Clear the DTC.
(e) Turn the engine switch off.
(f) Disconnect the battery negative terminal and wait for 1 minute.
(g) Connect the battery negative terminal.
(h) Turn the engine switch on (IG).
(i) Enter the following menus: DIAGNOSIS / ENHANCED II / DTC INFO / CURRENT CODES.
(j) Read the DTCs.

Result

Display (DTC output)	Proceed to
P0604	A
No output DTC	B

B → CHECK FOR INTERMITTENT PROBLEMS

A

REPLACE HYBRID VEHICLE CONTROL ECU

DTC	P0606	ECM / PCM Processor

DESCRIPTION

The ECM (included in hybrid vehicle control ECU) continuously monitors its internal processors (CPUs), A/F sensor transistors and heated oxygen sensor (HO2S) transistors. This self-check ensures that the ECM is functioning properly. These are diagnosed by internal "mirroring" of the main and sub CPUs to detect the processors error. If outputs from the processors deviate from the standards, the ECM will illuminate the MIL and set a DTC immediately.

DTC	DTC Setting Condition	Trouble Area
P0606	• ECM CPUs malfunction • A/F sensor transistors malfunction • HO2S transistors malfunction	• Exhaust gas leak • HO2 Sensor • Hybrid vehicle control ECU

ES

MONITOR STRATEGY

Related DTC	P0606: ECM range check
Required sensors/Components (main)	ECM
Required sensors/Components (sub)	APP sensor, TP sensor, Brake switch, Cruise control, A/F sensor HO2S
Frequency of Operation	Continuous
Duration	60 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor will run whenever this DTC is not present	None
Engine	Running
Estimated A/F sensor temperature	450 to 800°C (842 to 1,472°F)
Estimated HO2S temperature	450 to 800°C (842 to 1,472°F)

TYPICAL MALFUNCTION THRESHOLDS

Difference of main APP and sub APP	0.3 V or more
Difference of main TP and sub TP	0.3 V or more
Difference of main brake switch signal and sub brake switch signal	Different
Cruise control	Fail
A/F sensor transistors	Fail
HO2S transistors	Fail

INSPECTION PROCEDURE

1	CHECK FOR EXHAUST GAS LEAK

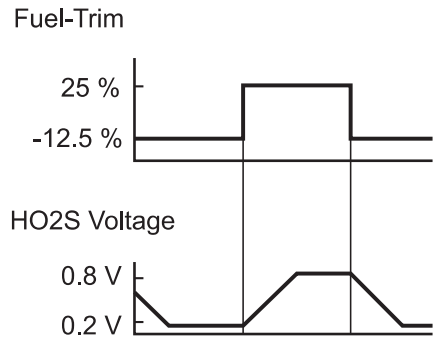
(a) Allow the engine to idle.
(b) Check for exhaust gas leak around the heated oxygen sensor.
OK:
No leak from the heated oxygen sensor.

NG → REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT

OK

2 CHECK HEATED OXYGEN SENSOR

Fuel-Trim and Rear HO2S Voltage Cross-reference



(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the tester on.
(c) Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
(d) Enter the following menus: DIAGNOSIS / ENHANCED II / ACTIVE TEST / A/F CONTROL.
(e) Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
(f) Monitor the voltage outputs of the HO2 sensor displayed on the tester.
HINT:
- The A/F CONTROL operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.
- Each sensor reacts in accordance with increases in the fuel injection volume.

Standard voltage

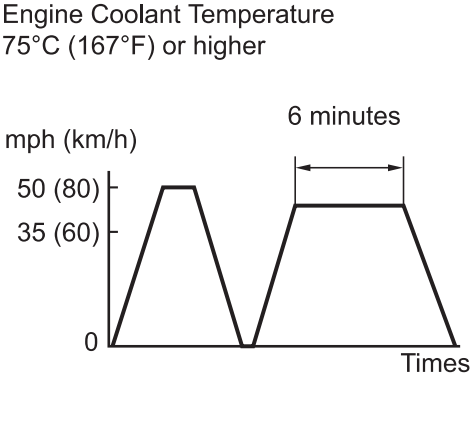
Tester Display (Sensor)	Injection Volume	Voltage
O2S B1S2 or O2S B2S2	-12.5%	Less than 0.2 V
	+25%	More than 0.8 V

NG → REPLACE HEATED OXYGEN SENSOR

OK

3 CHECK WHETHER DTC OUTPUT RECURS (IN ADDITION TO DTC P0606)

Monitor Drive Pattern for P0606



(a) Connect the intelligent tester to the DLC3.
(b) Turn the engine switch on (IG).
(c) Turn the tester on.
(d) Clear the DTC.
(e) Turn the engine switch off.
(f) Disconnect the battery negative terminal and wait for 1 minute.
(g) Connect the battery negative terminal.
(h) Start the engine.
(i) Perform the drive pattern.
(1) Warm up the engine.
(2) Accelerate the vehicle to 50 mph (80 km/h) and stop the vehicle.
(3) Drive the vehicle at 35 to 50 mph (60 to 80 km/h) for 5 minutes or more.
(j) Enter the following menus: DIAGNOSIS / ENHANCED II / DTC INFO / CURRENT CODES.

(k) Read the DTCs.
Result

Display (DTC output)	Proceed to
P0606	A
No output DTC	B

B → CHECK FOR INTERMITTENT PROBLEMS

A → REPLACE HYBRID VEHICLE CONTROL ECU

DTC	P0607	Control Module Performance

DESCRIPTION

The ECM (included in hybrid vehicle control ECU) continuously monitors its main and sub CPUs. This self-check ensures that the ECM is functioning properly. If outputs from the CPUs are different and deviate from the standards, the ECM will illuminate the MIL and set a DTC immediately.
The ECM also monitors the cruise control cancel circuit. If this circuit malfunctions, the ECM will set a DTC immediately (MIL is not illuminated).

DTC No.	DTC Detection Condition	Trouble Area
P0607	• ECM main CPU error • ECM sub CPU error • Cruise control cancel circuit malfunction	Hybrid vehicle control ECU

NOTICE:
First check for an exhaust gas leak around the HO2S if P0606 is present. An exhaust gas leak generates noise in the HO2S output. The ECM may interpret this as an HO2S transistor malfunction.

MONITOR STRATEGY

Related DTC	P0607: ECM CPU malfunction
Required sensors/Components	ECM
Frequency of Operation	Continuous
Duration	Within 1 second
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor will run whenever this DTC is not present	None

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met:	Condition A or B
A. All of the following conditions are met:	Conditions (a), (b) and (c)
(a) CPU reset	1 time or more
(b) Leaned TP - learned APP	0.4 V or more
Throttle actuator	OFF
B. CPU reset	2 times or more

INSPECTION PROCEDURE

1	CHECK WHETHER DTC OUTPUT RECURS (IN ADDITION TO DTC P0607)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the engine switch on (IG).
(c) Turn the tester on.
(d) Clear the DTC.
(e) Turn the engine switch off.
(f) Disconnect the battery negative terminal and wait for 1 minute.
(g) Connect the battery negative terminal.

(h) Turn the engine switch on (IG).
(i) Enter the following menus: DIAGNOSIS / ENHANCED II / DTC INFO / CURRENT CODES.
(j) Read the DTCs.

Result

Display (DTC output)	Proceed to
P0607	A
No output DTC	B

B → **CHECK FOR INTERMITTENT PROBLEMS**

A

ES

REPLACE HYBRID VEHICLE CONTROL ECU

DTC	P0657	Actuator Supply Voltage Circuit / Open

DESCRIPTION

The ECM (included in hybrid vehicle control ECU) monitors the output voltage to the throttle actuator. This self-check ensures that the ECM is functioning properly. The output voltage usually is 0 V when the engine switch is turned off. If the output voltage is higher than 7 volts when the engine switch is turned off, the ECM will illuminate the MIL and set a DTC when the engine switch is turned on.

DTC	DTC Setting Condition	Trouble Area
P0657	Throttle actuator power supply error	Hybrid vehicle control ECU

MONITOR STRATEGY

Related DTC	P0657: ETCS power supply
Required sensors/Components (main)	ECM
Required sensors/Components (sub)	Throttle actuator
Frequency of Operation	Once per driving cycle
Duration	Within 1 second
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor will run whenever this DTC is not present	None
Engine switch	From ON to OFF

TYPICAL MALFUNCTION THRESHOLDS

Throttle actuator power supply	7 V or more

INSPECTION PROCEDURE

1	CHECK WHETHER DTC OUTPUT RECURS (IN ADDITION TO DTC P0657)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the engine switch on (IG).
(c) Turn the tester on.
(d) Clear the DTC.
(e) Turn the engine switch off.
(f) Disconnect the battery negative terminal and wait for 1 minute.
(g) Connect the battery negative terminal.
(h) Turn the engine switch on (IG) for 10 seconds.
(i) Turn the engine switch off.
(j) Turn the engine switch on (IG).
(k) Enter the following menus: DIAGNOSIS / ENHANCED II / DTC INFO / CURRENT CODES.
(l) Read the DTCs.

Result

Display (DTC output)	Proceed to
P0657	A

Display (DTC output)	Proceed to
No output DTC	B

B → CHECK FOR INTERMITTENT PROBLEMS

A

REPLACE HYBRID VEHICLE CONTROL ECU

DTC	P1420	Evaporative Emission Canister Small Leak

DTC	P1421	Evaporative Emission Canister Gross Leak

DTC SUMMARY

DTC No.	Monitoring Item	DTC Detection Condition	Trouble Area	Detection Timing	Detection Logic
P1420	EVAP small leak	Vacuum pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure is measured. 0.02 inch leak pressure standard is measured at the start and at the end of leak check. If stabilized pressure is higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system has a small leakage.	• Leakage from EVAP line (Canister -Fuel vapor-containment valve) • Leakage from EVAP line (Purge VSV - Canister) • Pump module • Leakage from canister	Power switch off	2-trips
P1421	EVAP gross leak	Vacuum pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure is measured. 0.02 inch leak pressure standard is measured at the start and at the end of leak check. If stabilized pressure is higher than [second 0.02 inch leak pressure standard x 0.2], ECM determines that purge VSV stuck open	Same above	Power switch off	2-trips

ES

DESCRIPTION

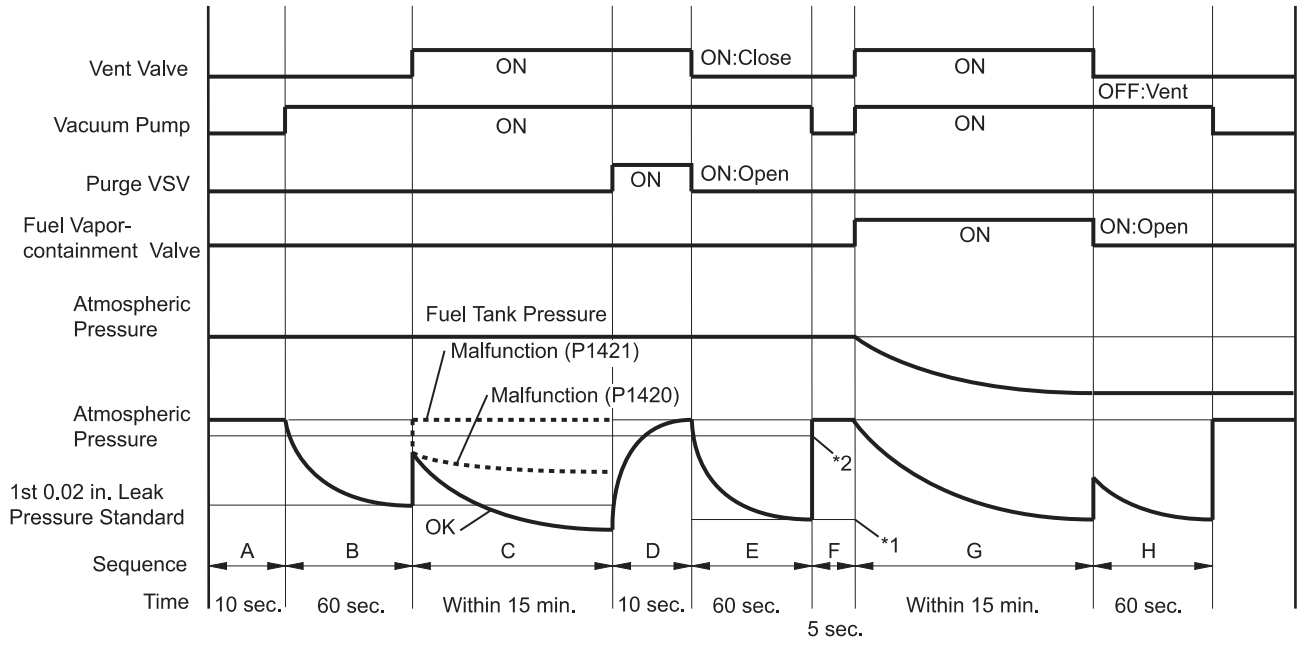
Refer to EVAP System (See page ES-317).

MONITOR DESCRIPTION

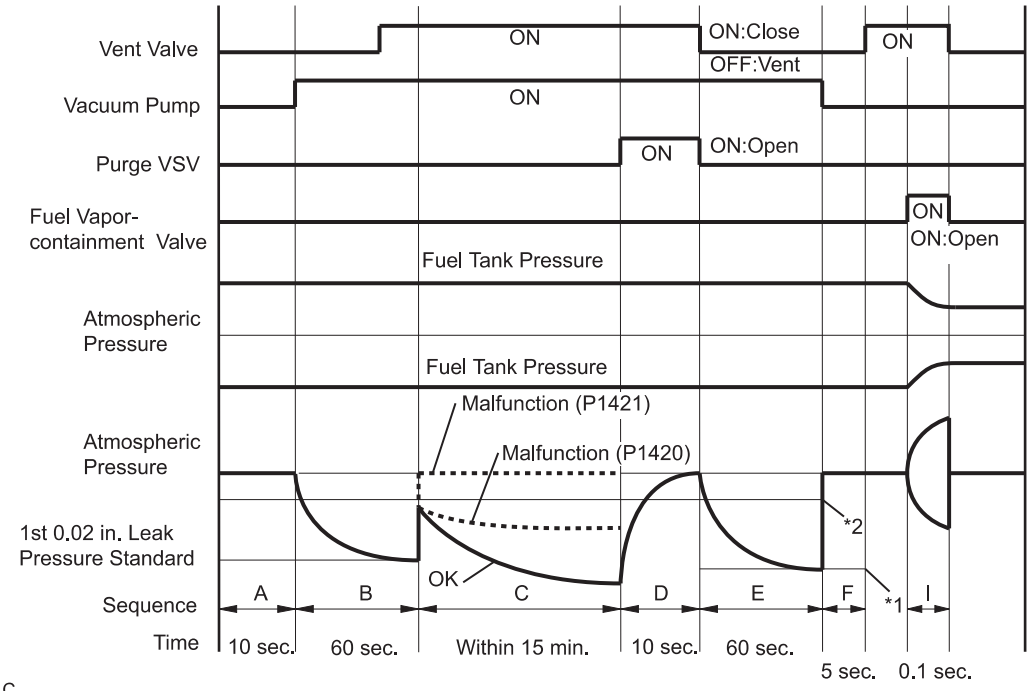
1. P1420: EVAP (Evaporative Emission) very small leak
   In operation C, the vacuum pump creates negative pressure (vacuum) in the EVAP system and the EVAP system pressure is measured. If the stabilized system pressure is higher than the second 0.02 inch leak pressure standard, the ECM (included in the hybrid vehicle control ECU) determines that the EVAP system has a large leakage. The ECM illuminates the MIL and sets the DTC (2-trip detection logic).

2. P1421: EVAP very gross leak
In operation C, the vacuum pump creates negative pressure (vacuum) in the EVAP system and the EVAP system pressure is measured. If the stabilized system pressure is higher than (second 0.02 inch leak pressure standard x 0.2) (near atmospheric pressure), the ECM (included in the hybrid vehicle control ECU) determines that the EVAP system has a large leakage. The ECM illuminates the MIL and sets the DTC (2-trip detection logic).

Method A



Method B



*1: Second 0.02 in. Leak Pressure Standard

*2: (Second 0.02 in. Leak Pressure Standard) x 0.2

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MONITOR STRATEGY

Required Sensors/Components	Purge VSV and pump module
Frequency of Operation	Once per driving cycle

Duration	Within 15 minutes (varies with the amount of fuel in tank)
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	
EVAP key-off monitor runs when all of the following conditions are met:	-
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg)
Battery voltage	10.5 V or more
Vehicle speed	Below 2.5 mph (4 km/h)
Power switch	OFF
Engine condition	Not running
Pressure sensor (built in pump module) malfunction (P0450, P0451, P0452 and/or P0453)	Not detected
Purge VSV	Not operated by scan tool
Vent valve	Not operated by scan tool
Leak detection pump	Not operated by scan tool
Both of the following conditions are met before power switch OFF	Conditions 1 and 2
1. Duration that vehicle is being driven	5 minutes or more
2. Purge flow	Executed
ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)
Time after engine stopped	5 hours

Example of restart time:

First time	7 hours
Second time	9 hours and 30 minutes

Key-off monitor sequence 1 to 15
1. Atmospheric pressure measurement

Next sequence is run if the following condition is met:	-
Atmospheric pressure change for 10 sec.	Less than 0.3 kPa (2.25 mmHg) for 1 second

2. First reference pressure measurement

Next sequence is run if all of the following conditions are met:	Conditions 1, 2 and 3
1. EVAP pressure 1.9 seconds after reference pressure measurement	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.057 kPa (-36.38 to -7.93 mmHg)
3. Reference pressure	Saturated within 1 minute

3. Vent valve stuck closed check

Next sequence is run if the following condition is met:	-
EVAP change for 10 seconds after vent valve ON (Closed)	0.3 kPa (2.25 mmHg) or more

4. Vacuum introduction for canister

Next sequence is run if both of the following conditions are met:	Conditions 1 and 2
1. Vacuum introduction time	12 minutes or less
2. EVAP pressure	Saturated

5. Purge VSV stuck closed check

Next sequence is run if the following condition is met:	-
EVAP pressure change for 10 seconds after purge VSV ON (Open).	0.3 kPa (2.25 mmHg) or more

6. Second reference pressure measurement

Next sequence is run if all of the following conditions are met:	Conditions 1, 2 and 3
1. EVAP pressure 1.9 sec. after reference pressure measurement began	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.057 kPa (-36.4 to -7.93 mmHg)
3. Reference pressure	Saturated
4. Reference pressure difference between the first and second	0.7 kPa (5.25 mmHg) or less

7. Canister leak check

Next sequence is run if the following condition is met:	-
EVAP pressure when vacuum introduction was complete	Less than second reference pressure

8. Fuel vapor-containment valve (FVCV stuck closed check)

Sequence 14 is run if all of the following conditions are met:	Conditions 1 and 2
1. FTP when EVAP monitor started	-2 kPa (-15 mmHg) or less, or 3 kPa (22.5 mmHg) or more
2. FTP change while FVCV and vent valve are open	0.5 kPa (3.75 mmHg) or more

9. Vacuum introduction for fuel tank

Next sequence is run if both of the following conditions are met:	Conditions 1 and 2
1. FTP when EVAP monitor started	-2 to 3 kPa (-15 to 22.5 mmHg)
2. Vacuum introduction time	15 minutes or less

10. FVCV stuck closed check

Next sequence is run if the following condition is met:	
FTP change when vacuum introduction for fuel tank	0.5 kPa (3.75 mmHg)

11. FTP sensor stuck check

Next sequence is run if the following condition is met:	
FTP change when FVCV closed	0.35 kPa (2.6 mmHg) or less

12. Third reference pressure measurement

Next sequence is run if all of the following conditions are met:	Conditions 1, 2, 3, and 4
1. FTP 1.9 seconds after reference pressure measurement began	-1 kPa (-7.5 mmHg) or more
2. Reference pressure	-4.85 to -1.057 kPa (-36.4 to -7.93 mmHg)
3. Reference pressure	Saturated
4. Reference pressure difference between the second and third	Less than 0.7 kPa (5.25 mmHg)

13. Fuel tank leak check

Sequence is run if the following condition is met:	
FTP when vacuum introduction for fuel tank was complete	Less than third reference pressure

14. FTP sensor stuck check

Next sequence is run if the following condition is met:	-
FTP change while FVCV and vent valve are open	Less than 0.35 kPa (2.6 mmHg)

15. Atmospheric pressure measurement

Monitor is complete if the following condition is met:	-
Atmospheric pressure difference between sequence 1 and 8	0.3 kPa (2.25 mmHg) or less

TYPICAL MALFUNCTION THRESHOLDS

"Saturated" indicates that the EVAP pressure change is less than 0.75 mmHg (0.1 kPa) in 30 seconds.

P1421: EVAP gross leak

EVAP pressure when vacuum introduction complete	Higher than reference pressure x 0.2

P1420: EVAP small leak

EVAP pressure when vacuum introductions complete	Between conditions 1 and 2
Condition 1	Higher than second reference pressure
Condition 2	Lower than reference pressure x 0.2
Atmospheric pressure (absolute pressure)	70 kPa (525 mmHg) or more, and less than 110 kPa (825 mmHg)

MONITOR RESULT

Refer to EVAP System (See page ES-325).

INSPECTION PROCEDURE

Refer to EVAP System (See page ES-328).

DTC	P1422	Fuel Tank Small Leak

DTC	P1423	Fuel Tank Gross Leak

DTC SUMMARY

DTC No.	Monitoring Item	Malfunction Detection Condition	Trouble Area	Detection Timing	Detection Logic
P1422	Fuel tank small leak	Vacuum pump creates negative pressure (vacuum) in fuel tank and fuel tank pressure is measured. 0.02 inch leak pressure standard is measured at the start and at the end of leak check. If stabilized pressure is higher than third 0.02 inch leak pressure standard, ECM (Included in Hybrid Vehicle Control ECU) determines that fuel tank has a small leakage.	• Leakage from EVAP line (Canister - Fuel vapor-containment valve) • Leakage from EVAP line (Purge VSV - Canister) • Pump module • Leakage from canister	Power switch off	2-trips
P1423	Fuel tank gross leak	Vacuum pump creates negative pressure (vacuum) in fuel tank and fuel tank pressure is measured. 0.02 inch leak pressure standard is measured at the start and at the end of leak check. If stabilized pressure is higher than [third 0.02 inch leak pressure standard x 0.2], ECM (Included in Hybrid Vehicle Control ECU) determines that fuel tank has a large leakage.	Same above	Power switch off	2-trips

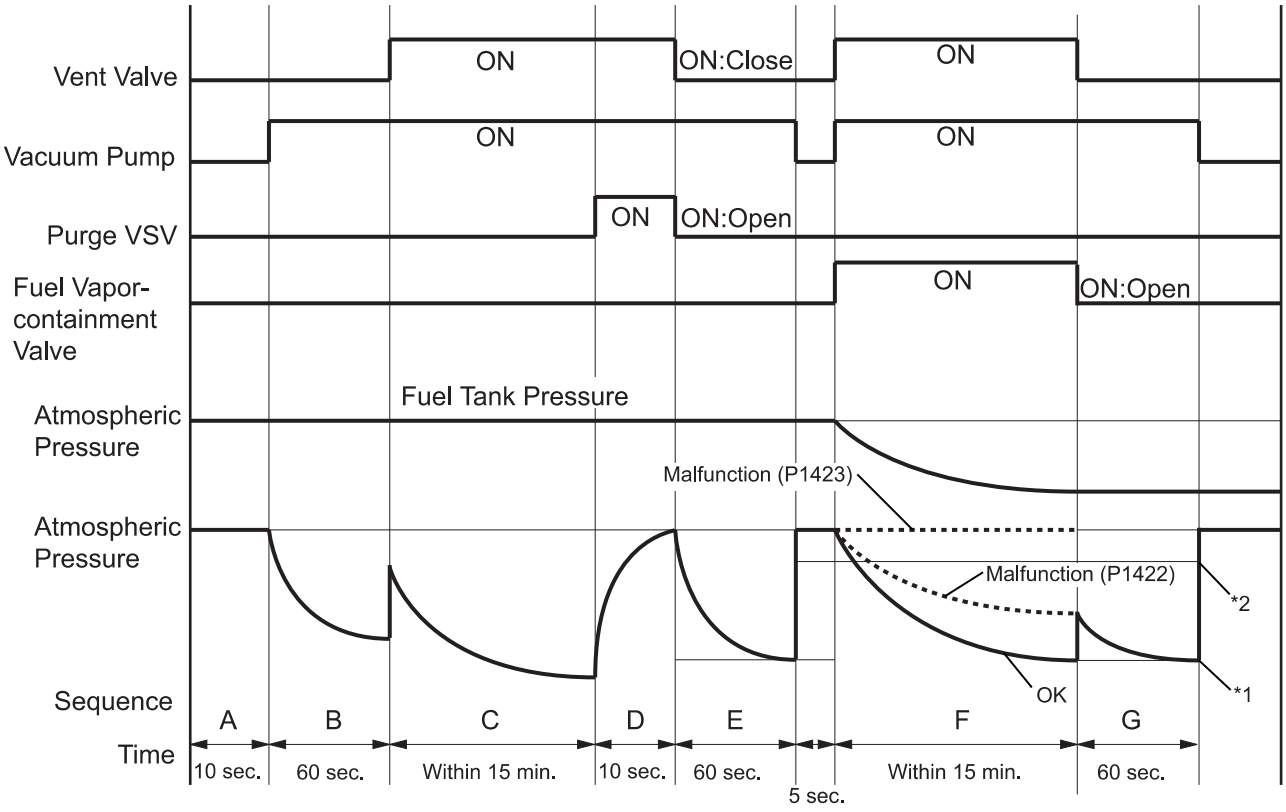
DESCRIPTION

Refer to the EVAP System (See page ES-317).

MONITOR DESCRIPTION

1. P1422: Fuel tank very small leak
   In operation G, the vacuum pump creates negative pressure (vacuum) in the fuel tank and the fuel tank pressure is measured. If the stabilized system pressure is higher than the third 0.02 inch leak pressure standard, the ECM (included in the hybrid vehicle control ECU) determines that the fuel tank has a large leakage. The ECM illuminates the MIL and sets the DTC (2-trip detection logic).

2. P1423: Fuel tank gross leak
In operation G, the vacuum pump creates negative pressure (vacuum) in the fuel tank and the fuel tank pressure is measured. If the stabilized system pressure is higher than [third 0.02 inch leak pressure standard x 0.2] (near atmospheric pressure), the ECM (included in the hybrid vehicle control ECU) determines that the fuel tank has a large leakage. The ECM illuminates the MIL and sets the DTC (2-trip detection logic).



*1: Third 0.02 in. Leak Pressure Standard

*2: (Third 0.02 in. Leak Pressure Standard) x 0.2

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MONITOR STRATEGY

Required Sensors/Components	Fuel tank and pump module
Frequency of Operation	Once per driving cycle

Duration	Within 15 minutes (varies with the amount of fuel in tank)
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	
EVAP key-off monitor runs when all of the following conditions are met:	-
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg)
Battery voltage	10.5 V or more
Vehicle speed	Below 2.5 mph (4 km/h)
Power switch	OFF
Engine condition	Not running
FTP sensor malfunction (P1450, P1452 and/or P1453)	Not detected
Purge VSV	Not operated by scan tool
Vent valve	Not operated by scan tool
Leak detection pump	Not operated by scan tool
Both of the following conditions are met before power switch OFF:	Conditions 1 and 2
1. Duration that vehicle is being driven	5 minutes or more
2. Purge flow	Executed
ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)
Time after engine stopped	5 hours

Example of restart time:

First time	7 hours
Second time	9 hours and 30 minutes

Key-off monitor sequence 1 to 15
1. Atmospheric pressure measurement

Next sequence is run if the following condition is met:	-
Atmospheric pressure change for 10 seconds	Less than 0.3 kPa (2.25 mmHg) for 1 second

2. First reference pressure measurement

Next sequence is run if all of the following conditions are met:	Conditions 1, 2, and 3
1. EVAP pressure 1.9 seconds after reference pressure measurement	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.057 kPa (-36.38 to -7.93 mmHg)
3. Reference pressure	Saturated

3. Vent valve stuck closed check

Next sequence is run if the following condition is met:	-
EVAP pressure change for 10 seconds after vent valve ON (Closed)	0.3 kPa (2.25 mmHg) or more

4. Vacuum introduction for canister

Next sequence is run if both of the following conditions are met:	Conditions 1 and 2
1. Vacuum introduction time	15 minutes or less
2. FTP	Saturated

5. Purge VSV stuck closed check

Next sequence is run if the following condition is met:	-
EVAP pressure change for 10 seconds after purge VSV ON (Open)	0.3 kPa (2.25 mmHg) or more

6. Second reference pressure measurement

Next sequence is run if all of the following conditions are met:	Conditions 1, 2, 3 and 4

1. EVAP pressure 1.9 sec. after reference pressure measurement	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.057 kPa (-36.4 to -7.93 mmHg)
3. Reference pressure	Saturated
4. Reference pressure difference between the first and second	0.7 kPa (5.25 mmHg) or less

7. Canister leak

Next sequence is run if the following condition is met:	-
Canister leak when vacuum introduction was complete	Second reference pressure or less

8. Fuel vapor-containment valve (FVCV stuck closed check)

Sequence 14 is run if all of the following conditions are met:	Conditions 1 and 2
1. FTP when EVAP monitor started	-2 kPa (-15 mmHg) or less, or 3 kPa (22.5 mmHg) or more
2. FTP change while FVCV and vent valve are open	0.5 kPa (3.75 mmHg) or more

ES

9. Vacuum introduction for fuel tank

Next sequence is run if both of the following conditions are met:	Conditions 1 and 2
1. FTP when EVAP monitor started	-2 to 3 kPa (-15 to 22.5 mmHg)
2. Vacuum introduction time	15 minutes or less

10. FVCV stuck closed check

Next sequence is run if the following condition is met:	
FTP change when vacuum introduction for fuel tank	0.5 kPa (3.75 mmHg)

11. FTP sensor stuck check

Next sequence is run if the following condition is met:	
FTP change when FVCV closed	0.35 kPa (2.6 mmHg) or less

12. Third reference pressure measurement

Next sequence is run if all of the following conditions are met:	Conditions 1, 2, 3, and 4
1. FTP 1.9 seconds after reference pressure measurement began	-1 kPa (-7.5 mmHg) or more
2. Reference pressure	-4.85 to -1.057 kPa (-36.4 to -7.93 mmHg)
3. Reference pressure	Saturated
4. Reference pressure difference between the second and third	Less than 0.7 kPa (5.25 mmHg)

13. Fuel tank leak check

Sequence is run if the following condition is met:	
FTP when vacuum introduction for fuel tank was complete	Less than third reference pressure

14. FTP sensor stuck check

Next sequence is run if the following condition is met:	-
FTP change while FVCV and vent valve are open	Less than 0.35 kPa (2.6 mmHg)

15. Atmospheric pressure measurement

Monitor is complete if the following condition is met:	0.3 kPa (2.25 mmHg) or less
Atmospheric pressure difference between sequence 1 and 8	0.3 kPa (2.25 mmHg) or less

TYPICAL MALFUNCTION THRESHOLDS

"Saturated" indicateds that the fuel tank pressure change is less than 0.1 kPa (0.75 mmHg) in 30 seconds.

P1423: Fuel tank gross leak

FTP when vacuum introduction complete	Higher than reference pressure x 0.2

P1422: Fuel tank small leak

FTP when vacuum introduction is complete	Between conditions 1 and 2
Condition 1	Higher than the second reference pressure

Condition 2	Lower than reference pressure x 0.2
Atmospheric pressure (absolute pressure)	70 kPa (525 mmHg) or more, and less than 110 kPa (825 mmHg)

MONITOR RESULT

Refer to EVAP System (See page ES-325).

INSPECTION PROCEDURE

Refer to EVAP System (See page ES-328).

DTC	P1450	Fuel Tank Pressure Sensor

DTC	P1451	Fuel Tank Pressure Sensor Range/Performance

DTC	P1452	Fuel Tank Pressure Sensor Low Input

DTC	P1453	Fuel Tank Pressure Sensor High Input

DTC SUMMARY

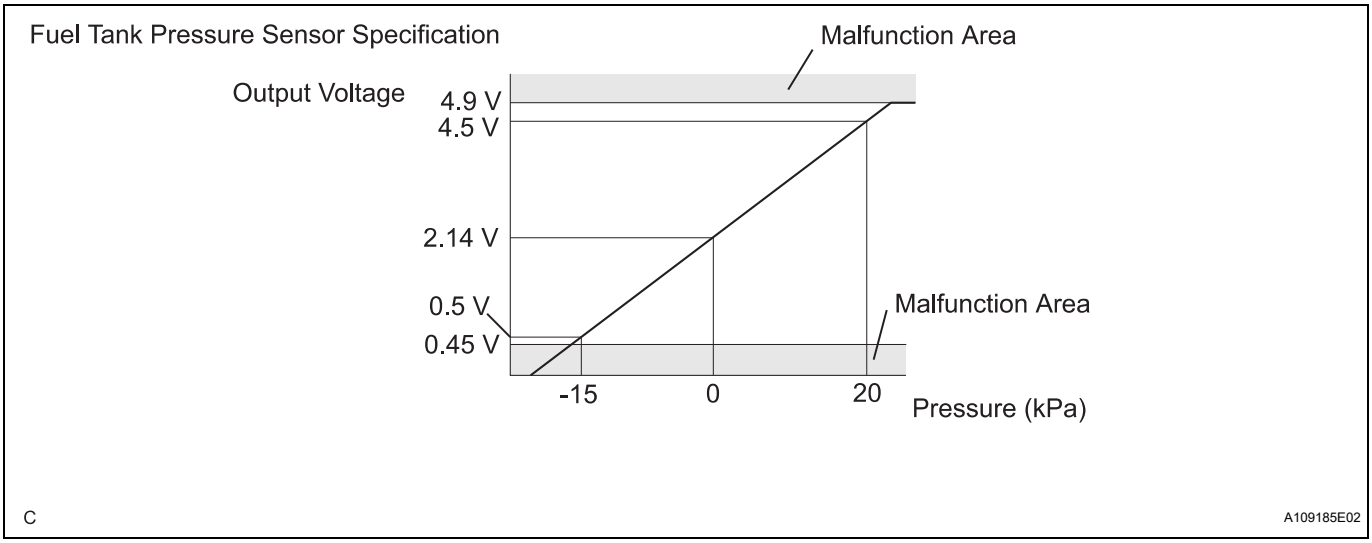
DTC No.	Monitoring Item	DTC Detection Condition	Trouble Area	Detection Timing	Detection Logic
P1450	Pressure sensor abnormal voltage fluctuation	Sensor output voltage rapidly fluctuates beyond upper and lower malfunction thresholds for 0.5 seconds.	• Fuel tank pressure sensor • Hybrid vehicle control ECU	• Power switch on	1-trip
P1451	Pressure sensor abnormal voltage fluctuation	Sensor output voltage fluctuates frequently in certain time period.	• Fuel tank pressure sensor • Connector / wire harness (Fuel tank pressure sensor - Hybrid Vehicle Control ECU) • Hybrid vehicle control ECU	• EVAP monitoring (power switch off) • Engine running	2-trips
P1451	Pressure sensor constant voltage	Sensor output voltage does not vary in certain time period.	• Fuel tank pressure sensor • Connector / wire harness (Fuel tank pressure sensor - Hybrid Vehicle Control ECU) • Hybrid vehicle control ECU	• EVAP monitoring (power switch off)	2-trips
P1452	Pressure sensor voltage low	Sensor output voltage is less than 0.45 V for 0.5 seconds.	• Fuel tank pressure sensor • Connector / wire harness (Fuel tank pressure sensor - Hybrid Vehicle Control ECU) • Hybrid vehicle control ECU	• EVAP monitoring (power switch off) • Power switch on	1-trip
P1453	Pressure sensor voltage high	Sensor output voltage is more than 4.9 V for 0.5 seconds.	• Fuel tank pressure sensor • Connector / wire harness (Fuel tank pressure sensor - Hybrid Vehicle Control ECU) • Hybrid vehicle control ECU	• EVAP monitoring (power switch off) • Power switch on	1-trip

DESCRIPTION

Refer to EVAP System (See page ES-317).

MONITOR DESCRIPTION

1. DTC P1451: Pressure sensor abnormal voltage fluctuation or being constant
   If the pressure sensor output voltage fluctuates rapidly for 10 seconds, the ECM (included in the hybrid vehicle control ECU) stops the EVAP system monitor. The ECM interprets this as the pressure sensor voltage fluctuating, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC.
   Alternatively, if the sensor output voltage does not change for 10 seconds, the ECM interprets this as the sensor voltage being constant, and stops the monitor. The ECM then illuminates the MIL and sets the DTC.
   (Both the malfunctions are detected by 2-trip detection logic).



2. DTC P1452: Pressure sensor voltage low
   If the pressure sensor output voltage is below 0.45 V, the ECM (included in the hybrid vehicle control ECU) interprets this as an open or short circuit malfunction in the pressure sensor or its circuit, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (1-trip detection logic).
3. DTC P1453: Pressure sensor voltage high
   If the pressure sensor voltage output is 4.9 V or more, the ECM (included in the hybrid vehicle control ECU) interprets this as an open or short circuit malfunction in the pressure sensor or its circuit, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (1-trip detection logic).

MONITOR STRATEGY

Required Sensors/Components	Pump module
Frequency of Operation	Once per driving cycle: P1451 sensor constant voltage Continuous: P1451 sensor abnormal voltage fluctuation, P1452 and P1453
Duration	0.5 seconds: P1452, P1453 Within 15 seconds: P1451
MIL Operation	Immediate: P1452, P1453 2 driving cycles: P1451
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

P1451: (Noise Monitor)

Atmospheric pressure	70 kPa (525 mmHg) to 110 kPa (825 mmHg)
Battery voltage	10.5 V or more
Intake air temperature	4.4 to 35°C (40 to 95°F)

EVAP pressure sensor malfunction (P1450, P1452, P1453)	Not detected
Either of the following conditions is met	A or B
A. Engine	Running
B. Soak time (power switch off time)	5 hours

Example of restart time:

First time	7 hours
Second time	9 hours and 30 minutes

P1451: (Stuck Monitor)

Atmospheric pressure	Less than 70 kPa (525 mmHg) or 110 kPa (825 mmHg) or more
Battery voltage	10.5 V or more
Intake air temperature	4.4 to 35°C (40 to 95°F)
EVAP pressure sensor malfunction (P1450, P1452, P1453)	Not detected
Soak time (power switch off time)	5 hours

Example of restart time:

First time	7 hours
Second time	9 hours and 30 minutes

P1450, P1452 and P1453:

The monitor will run whenever these DTCs are not present	None
Battery voltage	8 V or more
Starter	OFF
Power switch	ON

TYPICAL MALFUNCTION THRESHOLDS

1. P1450: Fuel tank pressure sensor

Fuel tank pressure	Less than -17.187 kPa (-128.93 mmHg), or more than 23.5 kPa (176.69 mmHg)

2. P1451: Pressure sensor noise

Frequency that fuel tank pressure change is 0.3 kPa or more	10 times or more in 10 seconds

3. P1451: Pressure sensor stuck

Fuel tank pressure change during reference pressure measurement	Less than 0.35 kPa (2.63 mmHg)

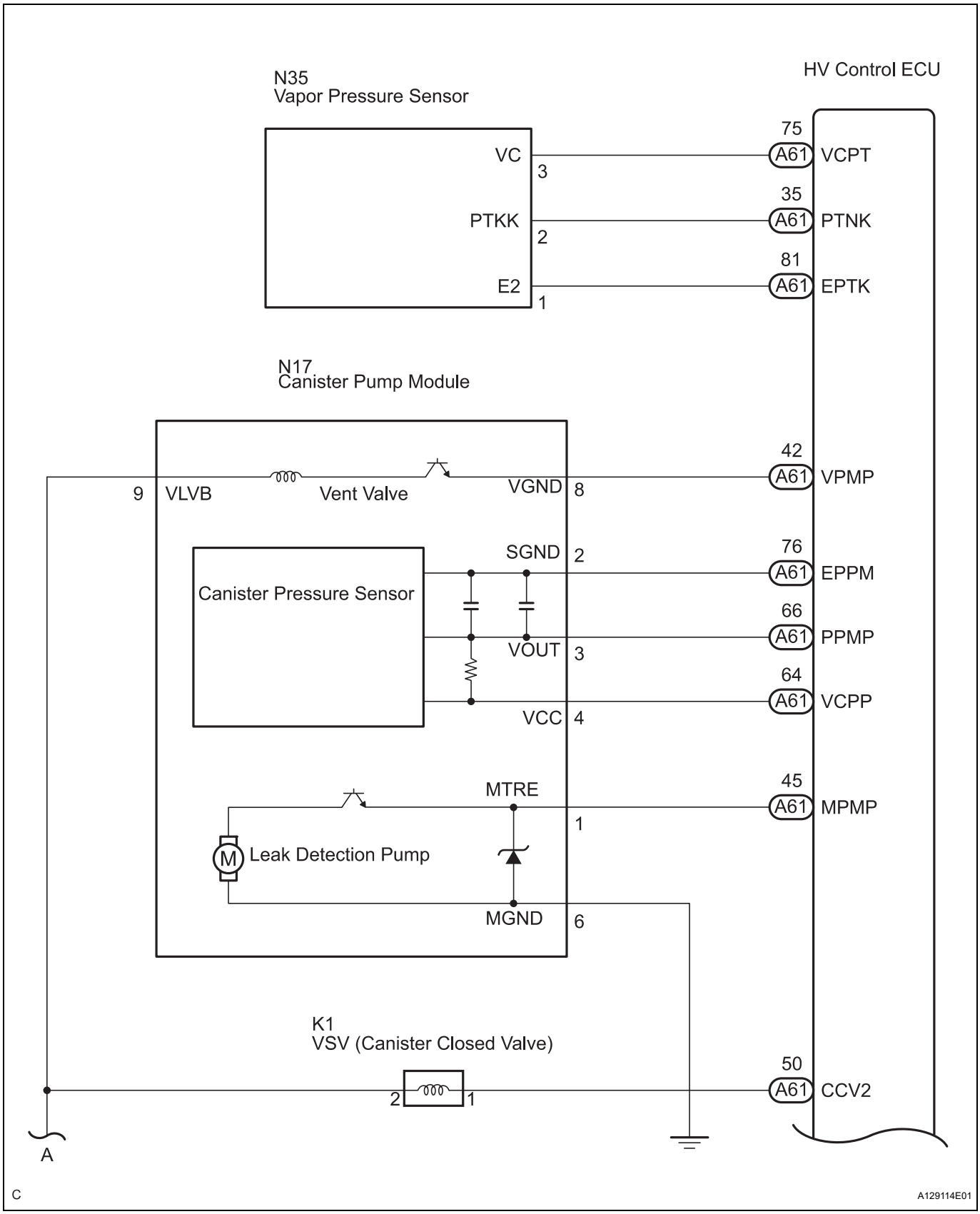
4. P1452: Pressure sensor low voltage

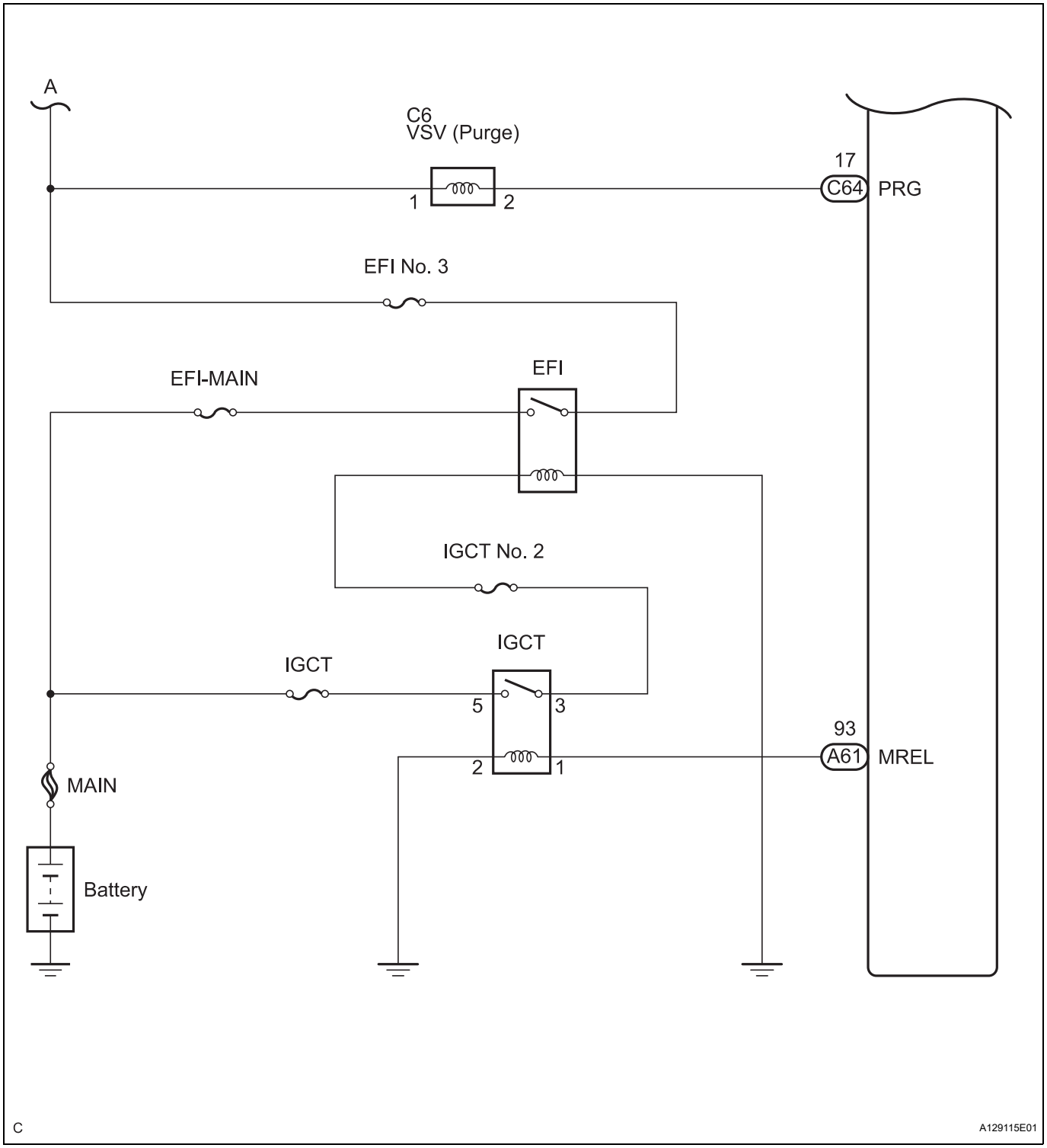
Fuel tank pressure	Less than -17.187 kPa (-128.93 mmHg)

5. P1453: Pressure sensor high voltage

Fuel tank pressure	More than 23.5 kPa (176.69 mmHg)

WIRING DIAGRAM





INSPECTION PROCEDURE

NOTICE:

- **When a vehicle is brought into the workshop, leave it as it is. Do not change the vehicle condition. For example, do not tighten the fuel tank cap.**
- **Do not disassemble the pump module.**
- **The intelligent tester is required to conduct the following diagnostic troubleshooting procedure.**

1	CONFIRM DTC AND FUEL TANK PRESSURE

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / EVAP / VAPOR PRESS TANK.
(g) Read the EVAP (Evaporative Emission) pressure displayed on the tester.

ES

Result

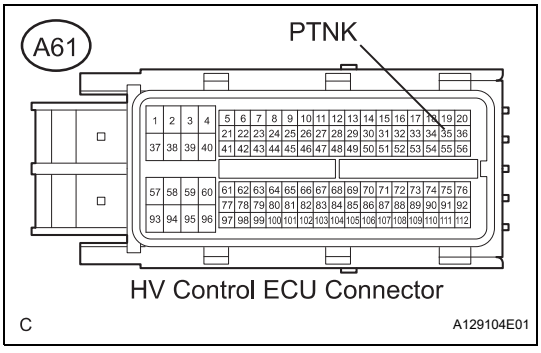
Display (DTC Output)	Test Result	Suspected Trouble Area	Proceed to
P1451	-	• Pressure sensor	C
P1450 and/or P1452	Less than -17.187 kPa (-128.93 mmHg)	• Wire harness/connector (Hybrid Vehicle Control ECU - pressure sensor) • Pressure sensor • Short in ECM (included in hybrid vehicle control ECU) circuit	A
P1450 and/or P1453	More than 23.5 kPa (176.69 mmHg)	• Wire harness/connector (Hybrid Vehicle Control ECU - pressure sensor) • Pressure sensor • Open in ECM (included in hybrid vehicle control ECU) circuit	B

B → Go to step 4

C → GO TO EVAP INSPECTION PROCEDURE

A

2	CHECK HARNESS AND CONNECTOR (FUEL TANK PRESSURE SENSOR - HV CONTROL ECU)



(a) Turn the power switch off.
(b) Disconnect the A61 hybrid vehicle control ECU connector.
(c) Measure the resistance between the PTNK terminal of the hybrid vehicle control ECU connector and body ground.

Result

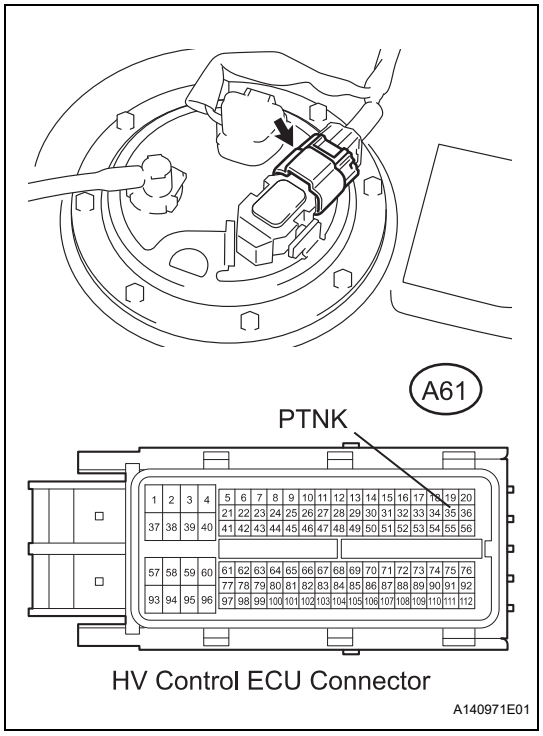
Test Result	Suspected Trouble Area	Proceed to
10 Ω or less	• Wire harness/connector (Hybrid Vehicle Control ECU - pressure sensor) • Short in pressure sensor circuit	A
10 kΩ or more	• Wire harness/connector (Hybrid Vehicle Control ECU - pressure sensor) • Short in ECM (included in hybrid vehicle control ECU) circuit	B

(d) Reconnect the hybrid vehicle control ECU connector.

B	Go to step 7

A

3	CHECK HARNESS AND CONNECTOR (VAPOR PRESSURE SENSOR - HV CONTROL ECU)



(a) Remove the fuel tank assembly.
(b) Disconnect the N35 vapor pressure sensor connector.
(c) Disconnect the A61 hybrid vehicle control ECU connector.
(d) Measure the resistance between the PTNK terminal of the hybrid vehicle control ECU connector and body ground.

ES

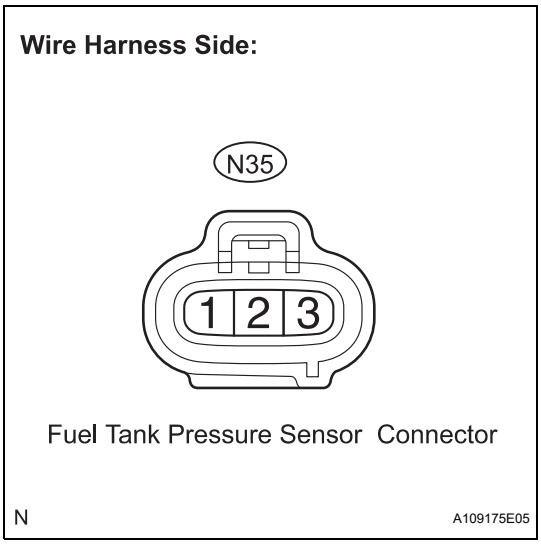
Result

Test Result	Suspected Trouble Area	Proceed to
10 kΩ or more	Short in pressure sensor circuit	A
10 Ω or less	Short in wire harness/connector (Hybrid Vehicle Control ECU - pressure sensor)	B

(e) Reconnect the pressure sensor connector.
(f) Reconnect the hybrid vehicle control ECU connector.

A	Go to step 5
B	Go to step 6

4	CHECK HARNESS AND CONNECTOR (VAPOR PRESSURE SENSOR - HV CONTROL ECU)



(a) Remove the fuel tank assembly.
(b) Disconnect the N35 vapor pressure sensor connector.
(c) Turn the power switch on (IG).
(d) Measure the voltage and resistance according to the value(s) in the table below.

Standard

Tester Connection	Specified Condition
N35-3 - Body ground	4.5 to 5.0 V
N35-2 - Body ground	100 Ω or less

Result

Test Result	Suspected Trouble Area	Proceed to
Voltage and resistance within standard ranges	Open in pressure sensor circuit	A
Voltage and resistance outside standard ranges	Open in wire harness/connector (Hybrid Vehicle Control ECU - pressure sensor)	B

(e) Reconnect the canister connector.

B → Go to step 6

A

5	REPLACE FUEL TANK PRESSURE SENSOR

NEXT → Go to step 8

6	REPAIR OR REPLACE HARNESS AND CONNECTOR

HINT:
If the exhaust tail pipe has been removed, go to the next step before reinstalling it.

NEXT → Go to step 8

7	REPLACE HYBRID VEHICLE CONTROL ECU

NEXT → Go to step 8

8	CHECK WHETHER DTC OUTPUT RECURS (AFTER REPAIR)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Wait for at least 60 seconds.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
HINT:
If no pending DTC is displayed on the tester, the repair has been successfully completed.

NEXT

ES

COMPLETED

DTC	P2102	Throttle Actuator Control Motor Circuit Low

DTC	P2103	Throttle Actuator Control Motor Circuit High

DESCRIPTION

The throttle actuator is operated by the ECM (included in hybrid vehicle control ECU) and opens and closes the throttle valve using gears.
The opening angle of the throttle valve is detected by the Throttle Position (TP) sensor, which is mounted on the throttle body. The TP sensor provides feedback to the ECM. This feedback allows the ECM to appropriately control the throttle actuator and monitor the throttle opening angle as the ECM responds to driver inputs.

HINT:
This ETCS (Electronic Throttle Control System) does not use a throttle cable.

DTC No.	DTC Detection Conditions	Trouble Areas
P2102	Conditions (a) and (b) continue for 2.0 seconds (1-trip detection logic): (a) Throttle actuator duty ratio 80% or more (b) Throttle actuator current 0.5 A or less	• Open in throttle actuator circuit • Throttle actuator • Hybrid vehicle control ECU
P2103	Either of following conditions met (1-trip detection logic): • Hybrid IC diagnosis signal failure • Hybrid IC current limiter port failure	• Short in throttle actuator circuit • Throttle actuator • Throttle valve • Throttle body assembly • Hybrid vehicle control ECU

MONITOR DESCRIPTION

The ECM monitors the electrical current through the electronic actuator, and detects malfunctions and open circuits in the throttle actuator based on this value. If the current is outside the standard range, the ECM determines that there is a malfunction in the throttle actuator. In addition, if the throttle valve does not function properly (for example, stuck on), the ECM determines that there is a malfunction. The ECM then illuminates the MIL and sets a DTC.
Example:
When the electrical current is less than 0.5 A and the throttle actuator duty ratio exceeds 80%, the ECM interprets this as the current being outside the standard range, and illuminates the MIL and sets a DTC. If the malfunction is not repaired successfully, a DTC is set when the engine is quickly revved up to a high rpm several times after the engine has idled for 5 seconds after engine start.

MONITOR STRATEGY

Related DTCs	P2102: Throttle actuator current (low current) P2103: Throttle actuator current (high current)
Required Sensors/Components (Main)	Throttle actuator (throttle body)
Required Sensors/Components (Related)	None
Frequency of Operation	Continuous
Duration	2 seconds: P2102 0.1 seconds or 0.6 seconds: P2103
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None

P2102:

Throttle actuator	Activated

Duty-cycle ratio to open throttle actuator	80% or more
Throttle actuator power supply	8 V or more

P2103:

Throttle actuator	Activated
Throttle actuator power supply	8 V or more
Battery voltage	8 V or more
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

P2102:

Throttle actuator current	Less than 0.5 A

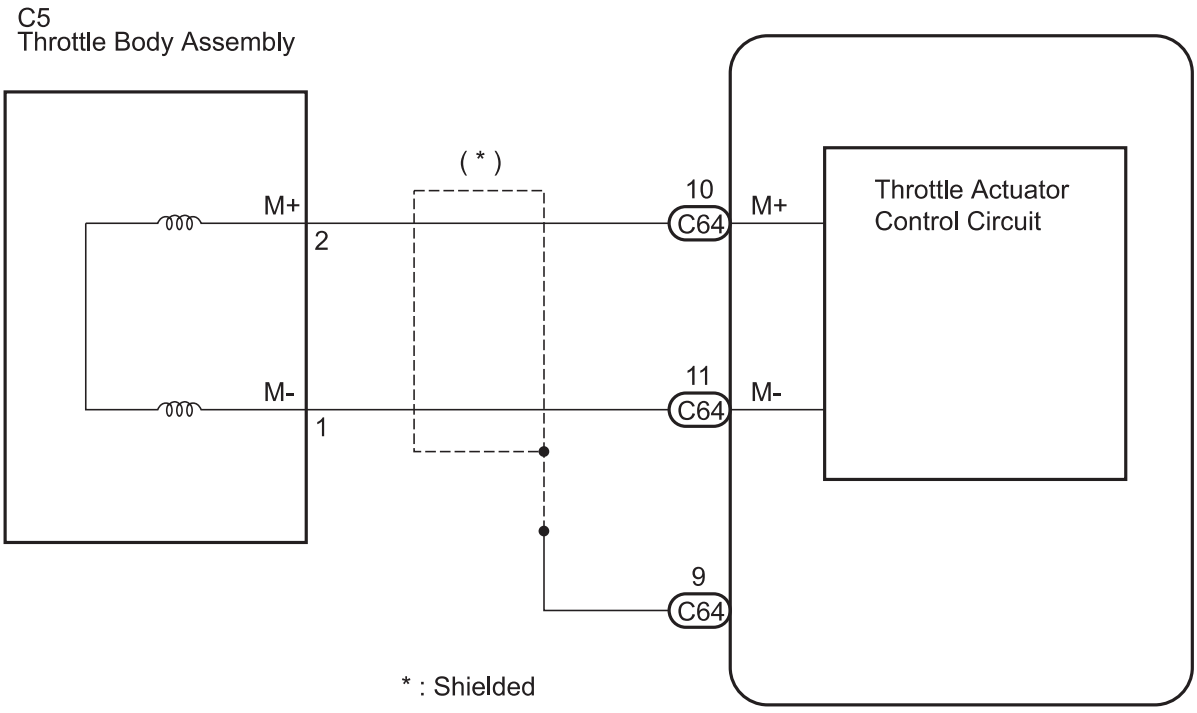
P2103:

Hybrid IC current limiter port	Fail

FAIL-SAFE

When either of these DTCs, or other DTCs relating to ETCS (Electronic Throttle Control System) malfunctions, are set, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator off, and the throttle valve is returned to a 6° throttle angle by the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing, in accordance with the accelerator pedal opening angle, to allow the vehicle to continue at a minimal speed. If the accelerator pedal is depressed gently, the vehicle can be driven slowly.
Fail-safe mode continues until a pass condition is detected, and the power switch is then turned off.

WIRING DIAGRAM



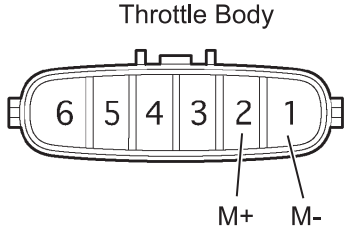
INSPECTION PROCEDURE

HINT:

- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- The throttle actuator current (THROTTLE MOT) and the throttle actuator duty ratio (THROTL OPN DUTY / THROTL CLS DUTY) can be read using the intelligent tester. However, the ECM shuts off the throttle actuator current when the ETCS malfunctions.

1	INSPECT THROTTLE BODY (RESISTANCE OF THROTTLE ACTUATOR)

Component Side:



(a) Disconnect the C5 throttle body connector.
(b) Measure the resistance of the throttle actuator.
Standard resistance

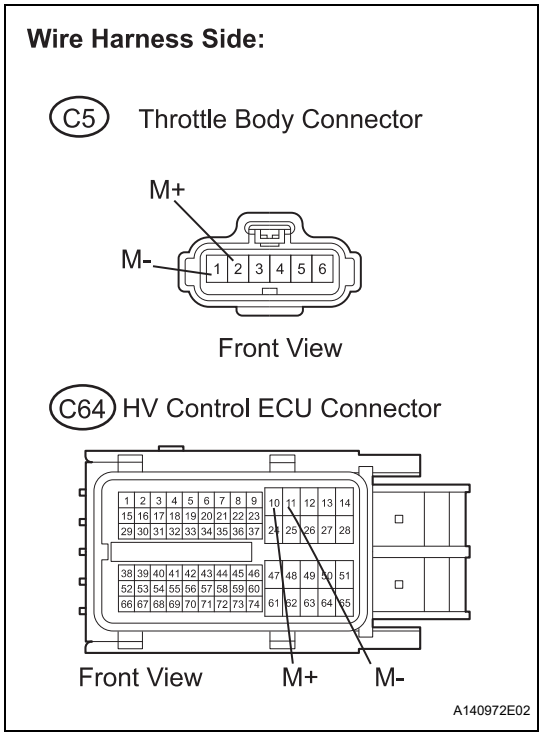
Tester Connections	Specified Conditions
2 (M+) - 1 (M-)	0.3 to 100 Ω at 20°C (68°F)

(c) Reconnect the throttle body connector.

NG	REPLACE THROTTLE BODY ASSEMBLY

OK

2 CHECK HARNESS AND CONNECTOR (THROTTLE ACTUATOR - HV CONTROL ECU)



(a) Disconnect the C5 throttle body connector.
(b) Disconnect the C64 hybrid vehicle control ECU connector.
(c) Measure the resistance.

Standard resistance (Check for open)

Tester Connections	Specified Conditions
C5-2 (M+) - C64-10 (M+)	Below 1 Ω
C5-1 (M-) - C64-11 (M-)	Below 1 Ω

ES

Standard resistance (Check for short)

Tester Connections	Specified Conditions
C5-2 (M+) or C64-10 (M+) - Body ground	10 kΩ or higher
C5-1 (M-) or C64-11 (M-) - Body ground	10 kΩ or higher

(d) Reconnect the throttle body connector.
(e) Reconnect the hybrid vehicle control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 INSPECT THROTTLE BODY ASSEMBLY

(a) Check for foreign objects between the throttle valve and the housing.

OK:

No foreign objects between throttle valve and housing.

NG → **REMOVE FOREIGN OBJECT AND CLEAN THROTTLE BODY**

OK

4 INSPECT THROTTLE VALVE

(a) Check if the throttle valve opens and closes smoothly.

OK:

Throttle valve opens and closes smoothly.

NG → **REPLACE THROTTLE BODY ASSEMBLY**

OK

REPLACE HYBRID VEHICLE CONTROL ECU

DTC	P2111	Throttle Actuator Control System - Stuck Open

DTC	P2112	Throttle Actuator Control System - Stuck Closed

SYSTEM DESCRIPTION

The throttle actuator is operated by the ECM (included in hybrid vehicle control ECU), and opens and closes the throttle valve using gears. The opening angle of the throttle valve is detected by the Throttle Position (TP) sensor, which is mounted on the throttle body. The TP sensor provides feedback to the ECM in order that it can control the throttle actuator, and therefore the throttle valve, appropriately in response to driver inputs.

HINT:

This ETCS (Electronic Throttle Control System) does not use a throttle cable.

DTC No.	DTC Detection Condition	Trouble Area
P2111	ECM (included in hybrid vehicle control ECU) signals throttle actuator to close, but stuck (1-trip detection logic)	• Throttle actuator • Throttle body • Throttle valve
P2112	ECM signals throttle actuator to open, but stuck (1-trip detection logic)	• Throttle actuator • Throttle body • Throttle valve

MONITOR DESCRIPTION

The ECM (included in hybrid vehicle control ECU) determines that there is a malfunction in the ETCS when the throttle valve remains at a fixed angle despite a high drive current from the ECM. The ECM illuminates the MIL and sets a DTC.

If the malfunction is not repaired successfully, a DTC is set when the accelerator pedal is fully depressed and released quickly (to fully open and close the throttle valve) after the engine is next started.

MONITOR STRATEGY

Related DTCs	P2111: Throttle actuator stuck open P2112: Throttle actuator stuck closed
Required Sensors/Components (Main)	Throttle actuator
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs not present	None

P2111 (Throttle actuator stuck open):

All of following conditions met	-
System guard*	ON
Throttle actuator current	2 A or more
Duty cycle to close throttle	80% or more

P2112 (Throttle actuator stuck closed):

All of following conditions met	-
System guard*	ON

Throttle actuator current	2 A or more
Duty cycle to open throttle	80% or more

TYPICAL MALFUNCTION THRESHOLDS

P2111 (Throttle actuator stuck open):

TP sensor voltage change	No change

P2112 (Throttle actuator stuck closed):

TP sensor voltage change	No change

FAIL-SAFE

When either of these DTCs, as well as other DTCs relating to ETCS (Electronic Throttle Control System) malfunctions, is set, the ECM (included in hybrid vehicle control ECU) enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator off, and the throttle valve is returned to a 6° throttle angle by the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing, in accordance with the accelerator pedal opening angle, to allow the vehicle to continue at a minimal speed. If the accelerator pedal is depressed gently, the vehicle can be driven slowly.
Fail-safe mode continues until a pass condition is detected, and the power switch is then turned off.

ES

WIRING DIAGRAM

Refer to DTC P2102 (See page ES-254).

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data, from the time the malfunction occurred.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P2111 or P2112)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P2111 or P2112	A
P2111 or P2112 and other DTCs	B

HINT:
If any DTCs other than P2111 or P2112 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

2	INSPECT THROTTLE BODY (VISUALLY CHECK THROTTLE VALVE)

(a) Check for contamination between the throttle valve and the housing. If necessary, clean the throttle body. And check that the throttle valve moves smoothly.
OK:
Throttle valve is not contaminated with foreign objects and moves smoothly.

NG → **REPLACE THROTTLE BODY ASSEMBLY**

OK

ES

3	CHECK WHETHER DTC OUTPUT RECURS (DTC P2111 OR P2112)

(a) Connect the intelligent tester to the DLC3.
(b) Put the engine in inspection mode (See page ES-34).
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-31).
(e) Put the engine in inspection mode (See page ES-35).
(f) Fully depress and release the accelerator pedal quickly (to fully open and close the throttle valve).
(g) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES
(h) Read the DTCs.

Result

Display (DTC Output)	Proceed to
No DTC	A
P2111 or P2112	B

B → **REPLACE HYBRID VEHICLE CONTROL ECU**

A

CHECK FOR INTERMITTENT PROBLEMS

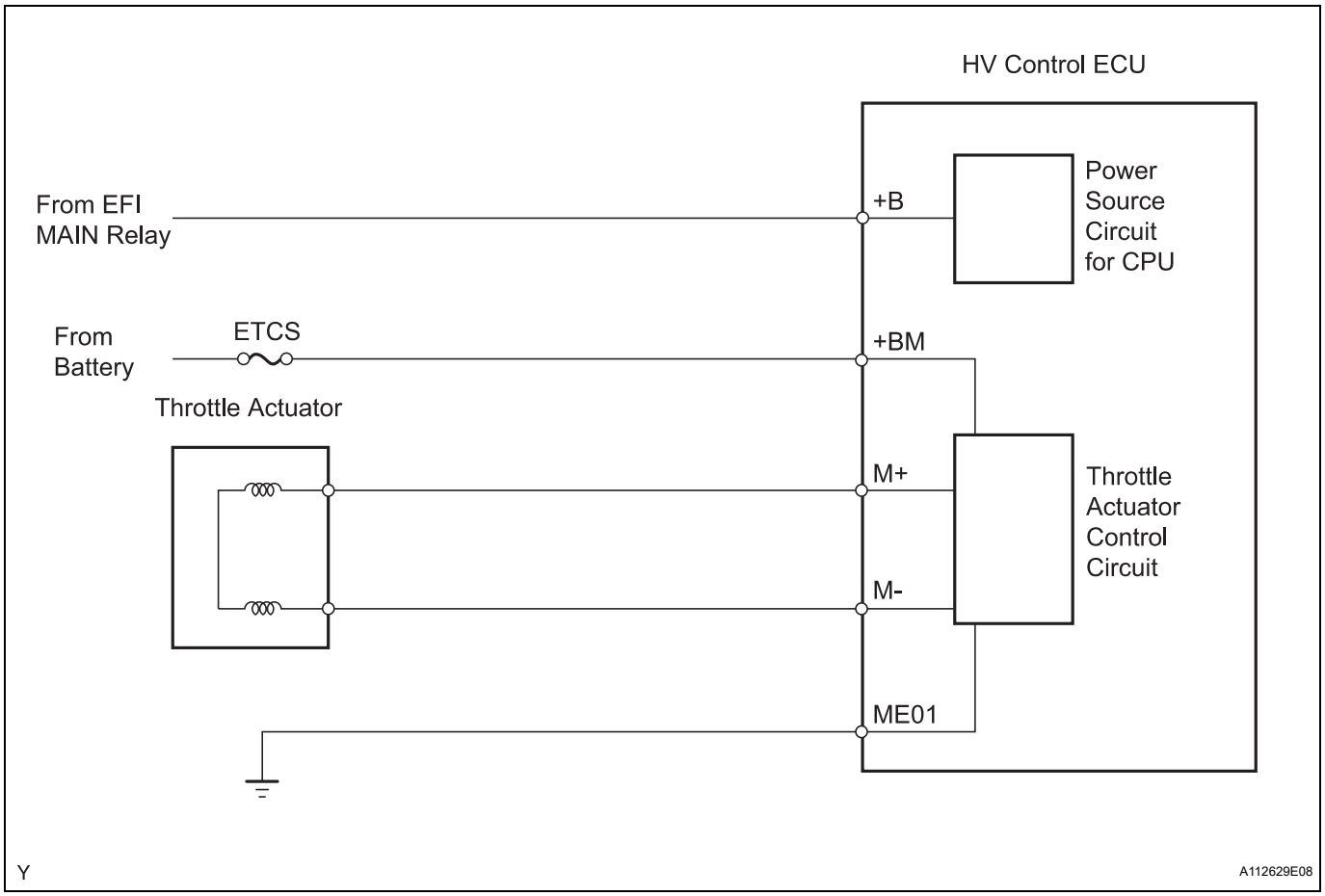
DTC	P2118	Throttle Actuator Control Motor Current Range / Performance

DESCRIPTION

The ETCS (Electronic Throttle Control System) has a dedicated power supply circuit. The voltage (+BM) is monitored and when it is low (less than 4 V), the ECM (included in hybrid vehicle control ECU) determines that there is a malfunction in the ETCS and cuts off the current to the throttle actuator. When the voltage becomes unstable, the ETCS itself becomes unstable. For this reason, when the voltage is low, the current to the throttle actuator is cut. If repairs are made and the system returns to normal, turn the power switch off. The ECM then allows the current to flow to the throttle actuator so that it can be restarted.

HINT:

The ETCS does not use a throttle cable.



DTC No.	DTC Detection Conditions	Trouble Areas
P2118	Open in ETCS power source (+BM) circuit (1-trip detection logic)	• Open in ETCS power source circuit • Battery • Battery terminals • ETCS fuse • Hybrid vehicle control ECU

MONITOR DESCRIPTION

The ECM monitors the battery supply voltage applied to the throttle actuator.

When the power supply voltage (+BM) drops below 4 V for 0.8 seconds or more, the ECM interprets this as an open in the power supply circuit (+BM). The ECM illuminates the MIL and sets the DTC.

If the malfunction is not repaired successfully, the DTC is set 5 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P2118: Throttle actuator power supply
Required Sensors/Components (Main)	Throttle actuator, throttle valve, ETCS fuse
Required Sensors/Components (Related)	None
Frequency of Operation	Continuous
Duration	0.8 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

ES

Monitor runs whenever following DTCs not present	None
Battery voltage	8 V or more
Electronic throttle actuator power	ON

TYPICAL MALFUNCTION THRESHOLDS

Throttle actuator power supply voltage (+BM)	Less than 4 V

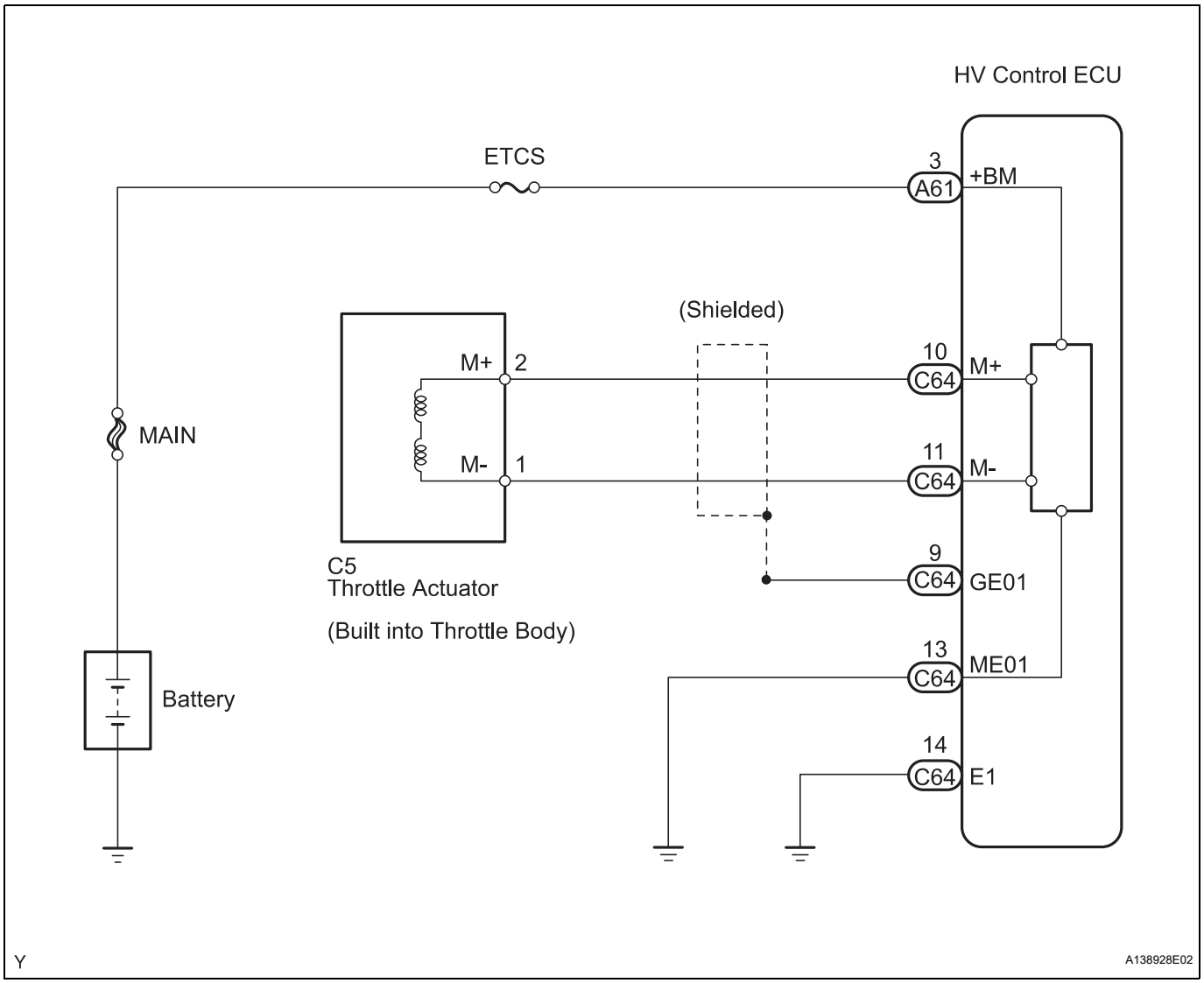
COMPONENT OPERATING RANGE

Throttle actuator power supply voltage (+BM)	9 to 14 V

FAIL-SAFE

When this DTC, or other DTCs relating to ETCS (Electronic Throttle Control System) malfunctions, are set, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator off, and the throttle valve is returned to a 6° throttle angle by the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing, in accordance with the accelerator pedal opening angle, to allow the vehicle to continue at a minimal speed. If the accelerator pedal is depressed gently, the vehicle can be driven slowly.
Fail-safe mode continues until a pass condition is detected, and the power switch is then turned off.

WIRING DIAGRAM



ES

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

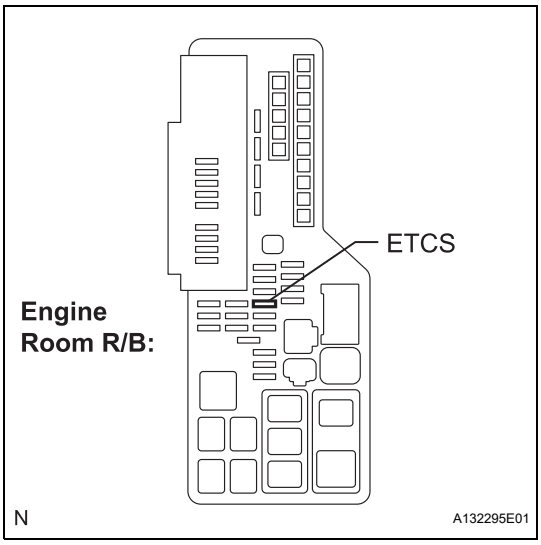
1	READ VALUE USING INTELLIGENT TESTER (+BM VOLTAGE)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / +BM VOLTAGE.
(e) Read the value displayed on the tester.
Standard voltage:
9 to 14 V

OK → Go to step 5

NG

2	CHECK FUSE (ETCS FUSE)



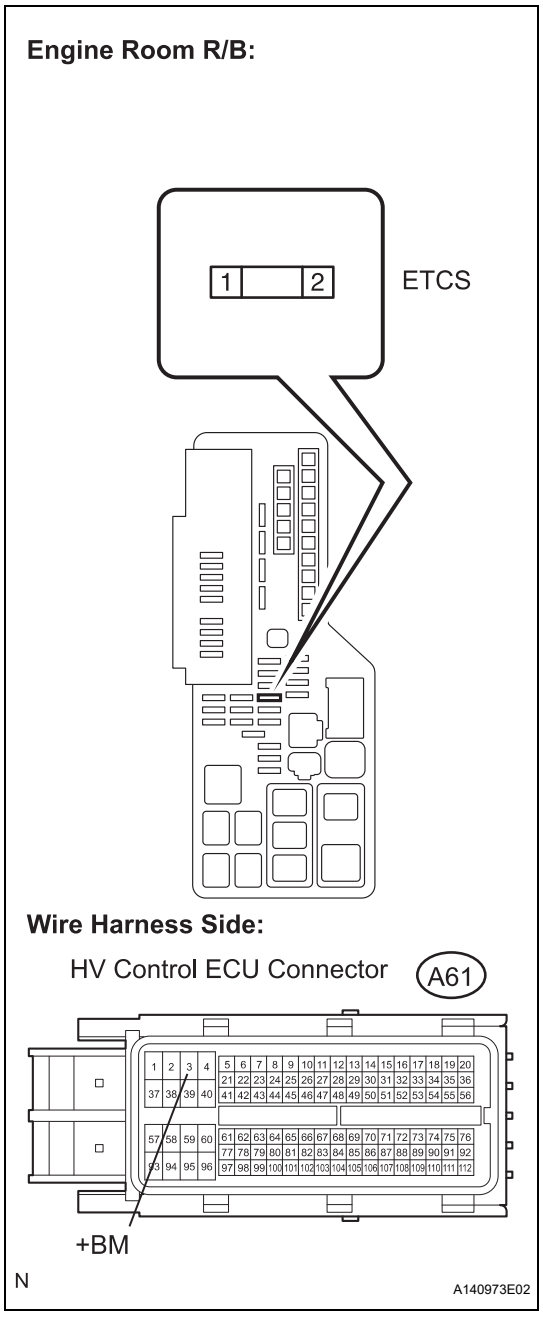
(a) Remove the ETCS fuse from the engine room R/B and J/B.
(b) Measure the ETCS fuse resistance.
Standard resistance:
Below 1 Ω
(c) Reinstall the ETCS fuse.

NG → **CHECK FOR SHORTS IN ALL HARNESSES AND CONNECTORS CONNECTED TO FUSE AND REPLACE FUSE**

OK

ES

3	CHECK HARNESS AND CONNECTOR (HV CONTROL ECU - ETCS FUSE, ETCS FUSE - BATTERY)



(a) Check the harness and connector between the ETCS fuse and hybrid vehicle control ECU.
  (1) Remove the ETCS fuse from the engine room relay block.
  (2) Disconnect the A61 hybrid vehicle control ECU connector.
  (3) Measure the resistance.

Standard resistance (Check for open)

Tester Connections	Specified Conditions
2 (ETCS fuse) - A61-3 (+BM)	Below 1 Ω

Standard resistance (Check for short)

Tester Connections	Specified Conditions
2 (ETCS fuse) or A61-3 (+BM) - Body ground	10 kΩ or higher

  (4) Reinstall the ETCS fuse.
  (5) Reconnect the hybrid vehicle control ECU connector.

(b) Check the harness and connector between the ETCS fuse and positive battery cable.
  (1) Remove the ETCS fuse from the engine room relay block.
  (2) Disconnect the cable from the positive (+) battery terminal.
  (3) Measure the resistance.

Standard resistance (Check for open)

Tester Connections	Specified Conditions
Positive battery cable - 1 (ETCS fuse)	Below 1 Ω

Standard resistance (Check for short)

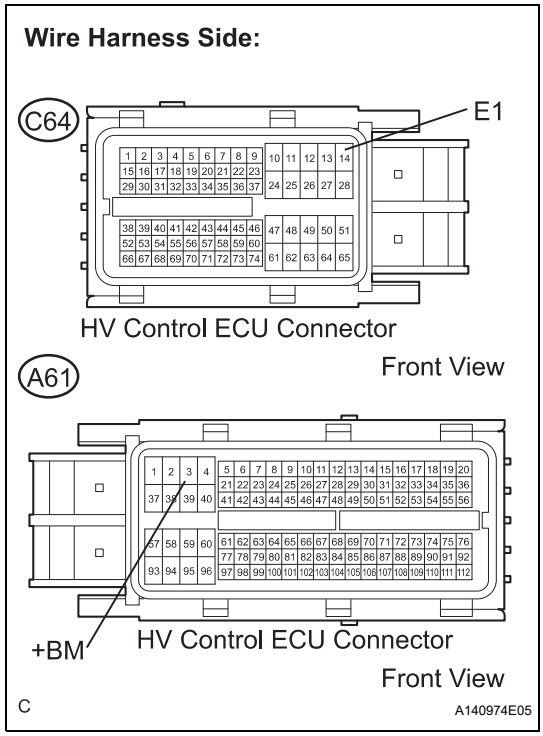
Tester Connections	Specified Conditions
Positive battery cable or 1 (ETCS fuse) - Body ground	10 kΩ or higher

  (4) Reinstall the ETCS fuse.
  (5) Reconnect the cable to the positive (+) battery terminal.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	INSPECT HYBRID VEHICLE CONTROL ECU (+BM VOLTAGE)



(a) Disconnect the A61 and C64 hybrid vehicle control ECU connectors.

(b) Measure the voltage between the terminals of the A61 and C64 hybrid vehicle control ECU connectors.

Standard voltage

Tester Connections	Specified Conditions
A61-3 (+BM) - C64-14 (E1)	9 to 14 V

(c) Reconnect the hybrid vehicle control ECU connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (TERMINAL E1 - BODY GROUND)**

OK

REPLACE HYBRID VEHICLE CONTROL ECU

5	INSPECT BATTERY

(a) Check that the battery is not depleted.

OK:

Battery is not depleted

NG → **REPLACE BATTERY**

OK

6	CHECK BATTERY TERMINAL

(a) Check that the battery terminals and hybrid vehicle control ECU ground are not loose or corroded.

OK:

Battery terminals and hybrid vehicle control ECU ground are not loose or corroded

NG → **REPAIR OR REPLACE BATTERY TERMINAL**

OK

CHECK FOR INTERMITTENT PROBLEMS

DTC	P2119	Throttle Actuator Control Throttle Body Range / Performance

DESCRIPTION

The Electronic Throttle Control System (ETCS) is composed of the throttle actuator, Throttle Position (TP) sensor, Accelerator Pedal Position (APP) sensor, and ECM (included in hybrid vehicle control ECU). The ECM operates the throttle actuator to regulate the throttle valve in response to driver inputs. The TP sensor detects the opening angle of the throttle valve, and provides the ECM with feedback so that the throttle valve can be appropriately controlled by the ECM.

DTC No.	DTC Detection Conditions	Trouble Areas
P2119	Throttle valve opening angle continues to vary greatly from target opening angle (1-trip detection logic)	• ETCS • Hybrid vehicle control ECU

ES

MONITOR DESCRIPTION

The ECM determines the actual opening angle of the throttle valve from the TP sensor signal. The actual opening angle is compared to the target opening angle commanded by the ECM. If the difference between these two values is outside the standard range, the ECM interprets this as a malfunction in the ETCS. The ECM then illuminates the MIL and sets the DTC.
If the malfunction is not repaired successfully, the DTC is set when the accelerator pedal is quickly released (to close the throttle valve) after the engine speed reaches 5,000 rpm by the accelerator pedal being fully depressed (fully open the throttle valve).

MONITOR STRATEGY

Related DTCs	P2119: ETCS malfunction
Required Sensors/Components (Main)	Throttle actuator
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	Within 1 second
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None

TYPICAL MALFUNCTION THRESHOLDS

Either of following conditions A or B met	-
A. Difference between commanded closed throttle position and current closed throttle position	0.3 V or more for 1 second
B. Difference between commanded open throttle position and current open throttle position	0.3 V or more for 0.6 seconds

FAIL-SAFE

When this DTC, or other DTCs relating to ETCS (Electronic Throttle Control System) malfunctions, are set, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator off, and the throttle valve is returned to a 6° throttle angle by the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing, in accordance with the accelerator pedal opening angle, to allow the vehicle to continue at a minimal speed. If the accelerator pedal is depressed gently, the vehicle can be driven slowly.

Fail-safe mode continues until a pass condition is detected, and the power switch is then turned off.

WIRING DIAGRAM

Refer to DTC P2102 (See page ES-254).

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

ES

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P2119)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P2119	A
P2119 and other DTCs	B

HINT:
If any DTCs other than P2119 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

2	CHECK WHETHER DTC OUTPUT RECURS (DTC P2119)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-31).
(e) Allow the engine to idle for 15 seconds.
CAUTION:
Exercise extreme care and take precautions in steps (f) and (g) below. Failure to do so may result in the vehicle unexpectedly rolling away.
(f) Securely apply the parking brake and move the gear selector lever to the D position.
(g) While depressing the brake pedal securely, fully depress the accelerator pedal for 5 seconds.
(h) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

HINT:
The output voltage of the throttle position sensor can be checked during step (g) using the intelligent tester. Variations in the output voltage indicate that the throttle actuator is in operation. To check the output voltage using the intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / THROTTLE POS #1.
OK:
No DTC output.

(i) Read the DTCs.

NG → **REPLACE THROTTLE BODY ASSEMBLY**

ES

OK

CHECK FOR INTERMITTENT PROBLEMS

DTC	P2195	Oxygen (A/F) Sensor Signal Stuck Lean (Bank 1 Sensor 1)

DTC	P2196	Oxygen (A/F) Sensor Signal Stuck Rich (Bank 1 Sensor 1)

HINT:
- Although the DTC titles say oxygen sensor, these DTCs relate to the Air-Fuel Ratio (A/F) sensor.
- Sensor 1 refers to the sensor mounted in front of the Three-Way Catalytic Converter (TWC) and located near the engine assembly.

ES

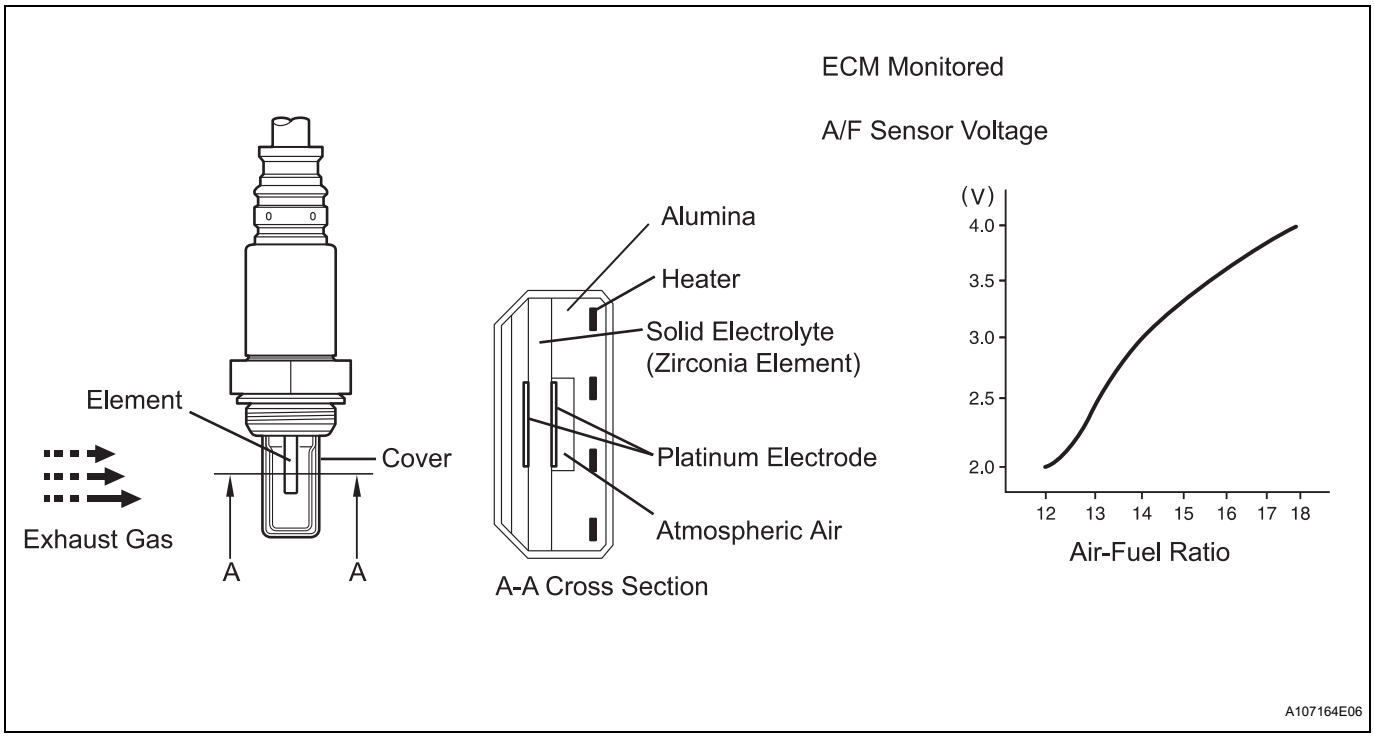
DESCRIPTION

The A/F sensor generates a voltage* that corresponds to the actual air-fuel ratio. This sensor voltage is used to provide the ECM (included in hybrid vehicle control ECU) with feedback so that it can control the air-fuel ratio. The ECM determines the deviation from the stoichiometric air-fuel ratio level, and regulates the fuel injection time. If the A/F sensor malfunctions, the ECM is unable to control the air-fuel ratio accurately.

The A/F sensor is of the planar type and is integrated with the heater, which heats the solid electrolyte (zirconia element). This heater is controlled by the ECM. When the intake air volume is low (the exhaust gas temperature is low), a current flows into the heater to heat the sensor, in order to facilitate accurate air-fuel ratio detection. In addition, the sensor and heater portions are narrower than the conventional type. The heat generated by the heater is conducted to the solid electrolyte through the alumina, therefore the sensor activation is accelerated.

A three-way catalytic converter (TWC) is used in order to convert the carbon monoxide (CO), hydrocarbon (HC), and nitrogen oxide (NOx) into less harmful substances. To allow the TWC to function effectively, it is necessary to keep the air-fuel ratio of the engine near the stoichiometric air-fuel ratio.

*: Value changes inside the ECM. Since the A/F sensor is the current output element, a current is converted into a voltage inside the ECM. Any measurements taken at the A/F sensor or ECM connectors will show a constant voltage.



DTC No.	DTC Detection Conditions	Trouble Areas
P2195	Conditions (a) and (b) continue for 10 seconds or more (2-trip detection logic): (a) A/F sensor voltage more than 3.8 V (b) Heated Oxygen (HO2) sensor voltage 0.15 V or more	• Open or short in A/F sensor (sensor 1) circuit • A/F sensor (sensor 1) • A/F sensor heater (sensor 1) • Integration relay (EFI MAIN relay) • A/F sensor heater and EFI MAIN relay circuits • Hybrid vehicle control ECU
	While fuel-cut operation performed (during vehicle deceleration), A/F sensor current 3.6 mA or more for 3 seconds (2-trip detection logic)	• A/F sensor • Hybrid vehicle control ECU
P2196	Conditions (a) and (b) continue for 10 seconds or more (2-trip detection logic): (a) A/F sensor voltage less than 2.8 V for 10 seconds (b) HO2 sensor voltage less than 0.6 V	• Open or short in A/F sensor (sensor 1) circuit • A/F sensor (sensor 1) • A/F sensor heater (sensor 1) • Integration relay (EFI MAIN relay) • A/F sensor heater and EFI MAIN relay circuits • Hybrid vehicle control ECU
	While fuel-cut operation performed (during vehicle deceleration), A/F sensor current less than 1.0 mA for 3 seconds (2-trip detection logic)	• A/F sensor • Hybrid vehicle control ECU

ES

HINT:
- When either of these DTCs is set, check the A/F sensor output voltage by selecting the following menu items on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / AFS B1 S1.
- Short-term fuel trim values can also be read using the intelligent tester.
- The ECM regulates the voltages at the A1A+ and A1A- terminals of the ECM to a constant level. Therefore, the A/F sensor output voltage cannot be confirmed without using the intelligent tester.
- If the A/F sensor is malfunctioning, the ECM sets DTC P2195 or P2196.

MONITOR DESCRIPTION

Sensor voltage detection monitor

Under the air-fuel ratio feedback control, if the A/F sensor output voltage indicates rich or lean for a certain period of time, the ECM determines that there is a malfunction in the A/F sensor. The ECM illuminates the MIL and sets a DTC.

Example:

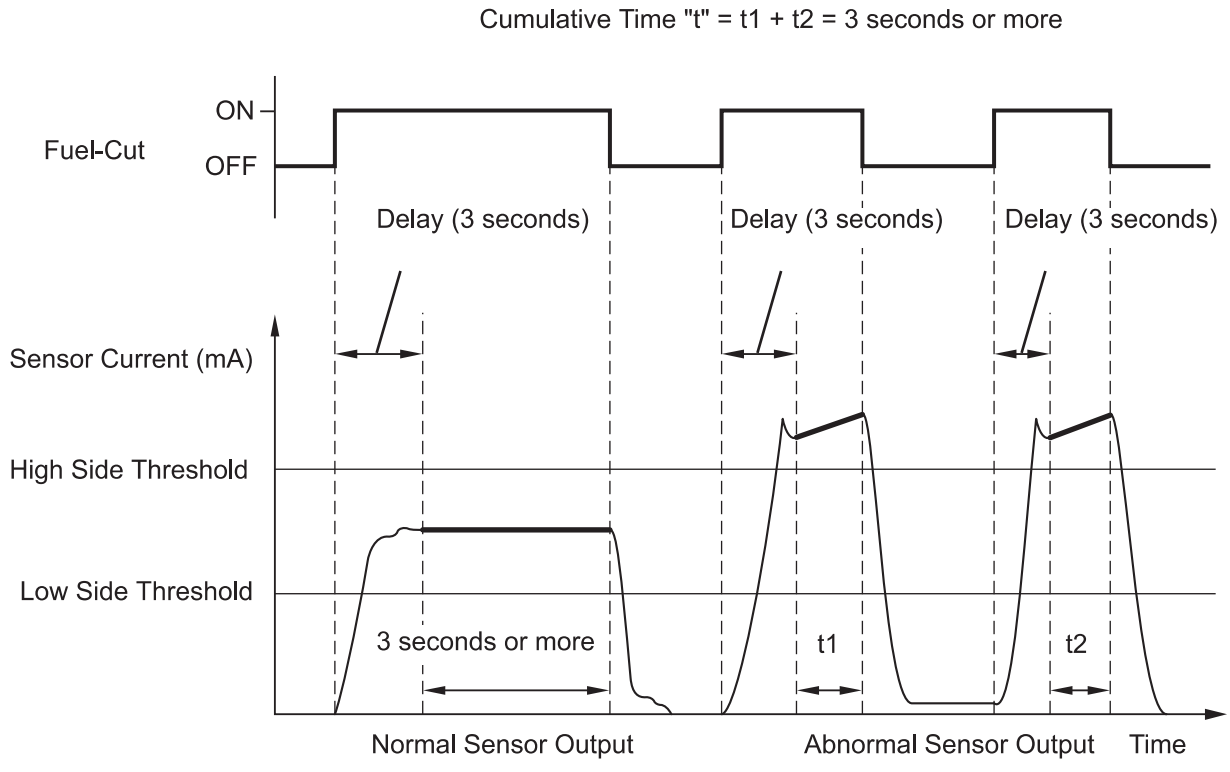
If the A/F sensor output voltage is less than 2.8 V (very rich condition) for 10 seconds, despite the rear HO2 sensor output voltage being less than 0.6 V, the ECM sets DTC P2196. Alternatively, if the A/F sensor output voltage is more than 3.8 V (very lean condition) for 10 seconds, despite the rear HO2 sensor output voltage being 0.15 V or more, DTC P2195 is set.

Sensor current detection monitor

A rich air-fuel mixture causes a low A/F sensor current, and a lean air-fuel mixture causes a high A/F sensor current. Therefore, the sensor output becomes low during acceleration, and it becomes high during deceleration with the throttle valve fully closed. The ECM monitors the A/F sensor current during fuel-cut and detects any abnormal current values.

If the A/F sensor output is 3.6 mA or more for more than 3 seconds of cumulative time, the ECM interprets this as a malfunction in the A/F sensor and sets DTC P2195 (high-side stuck). If the A/F sensor output is less than 1.0 mA for more than 3 seconds of cumulative time, the ECM sets DTC P2196 (low-side stuck).

A/F Sensor Current Monitor:



MONITOR STRATEGY

Related DTCs	P2195: A/F sensor signal stuck lean P2196: A/F sensor signal stuck rich
Required Sensors/Components (Main)	A/F sensor
Required Sensors/Components (Related)	HO2 sensor
Frequency of Operation	Continuous
Duration	10 seconds: Sensor voltage detection monitor 3 seconds: Sensor current detection monitor
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs not present	P0031, P0032 (A/F sensor heater - Sensor 1) P0037, P0038 (O2 sensor heater - Sensor 2) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0136 (O2 Sensor - Sensor 2) P0171, P0172 (Fuel system) P0300 - P0304 (Misfire) P0335 (CKP sensor) P0340 (CMP sensor) P0455, P0456 (EVAP system) P0500 (VSS)

Sensor voltage detection monitor (Lean side malfunction P2195):

Duration while all of following conditions met	2 seconds or more
Rear HO2 sensor voltage	0.15 V or more
Time after engine start	30 seconds or more
A/F sensor status	Activated
Fuel system status	Closed-loop
Engine	Running

Sensor voltage detection monitor (Rich side malfunction P2196):

Duration while all of following conditions met	2 seconds or more
Rear HO2 sensor voltage	Below 0.6 V
Time after engine start	30 seconds or more
A/F sensor status	Activated
Fuel system status	Closed-loop
Engine	Running

Sensor current detection monitor P2195 and P2196:

Battery voltage	11 V or more
Atmospheric pressure	76 kPa (570 mmHg) or more
A/F sensor status	Activated
Continuous time of fuel cut	3 to 10 seconds
ECT	75°C (167°F) or more

TYPICAL MALFUNCTION THRESHOLDS

Sensor voltage detection monitor (Lean side malfunction P2195):

A/F sensor voltage	More than 3.8 V for 10 seconds

Sensor voltage detection monitor (Rich side malfunction P2196):

A/F sensor voltage	Less than 2.8 V for 10 seconds

Sensor current detection monitor (High side malfunction P2195):

A/F sensor current during fuel cut	3.6 mA or more

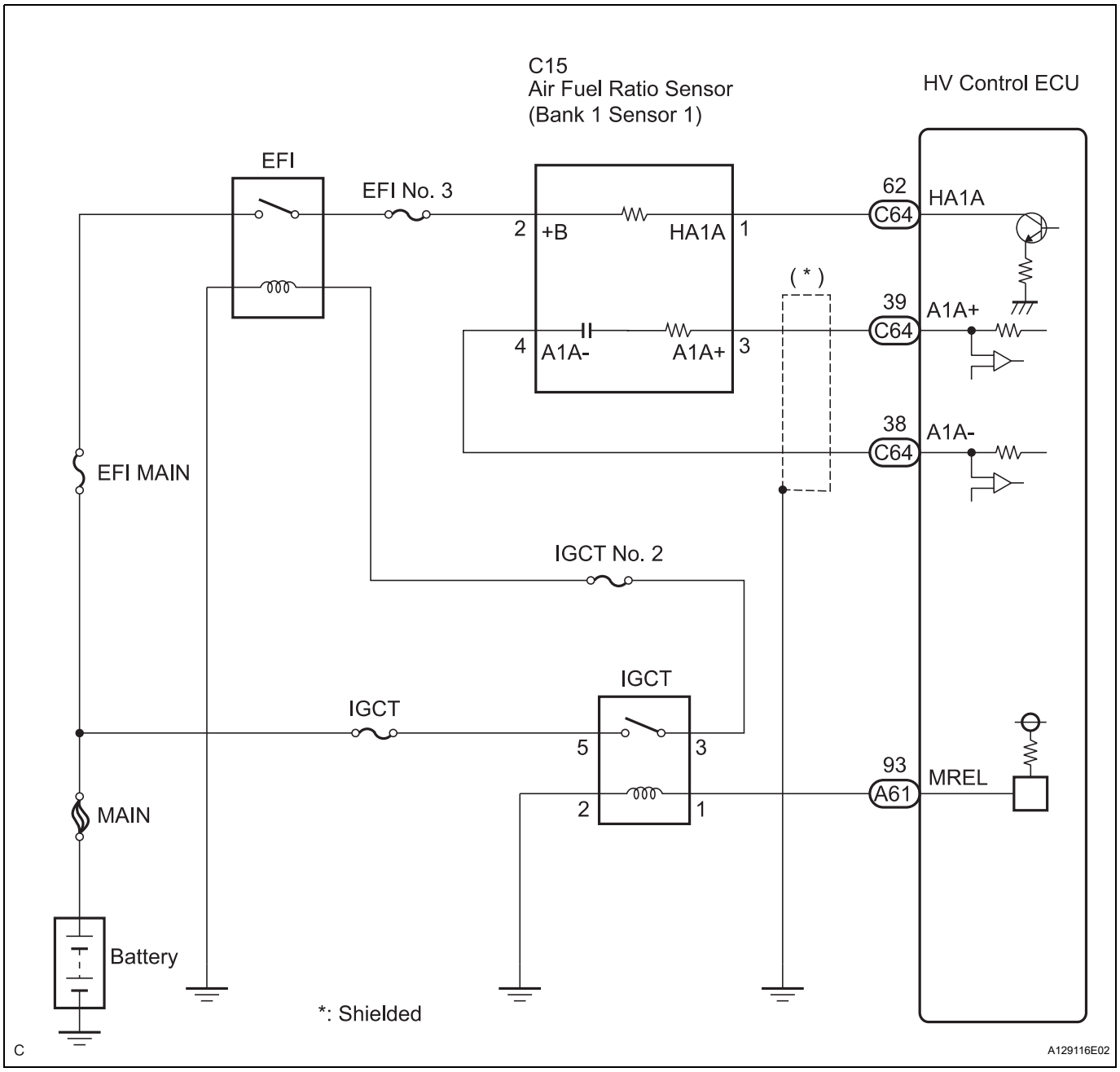
Sensor current detection monitor (Rich side malfunction P2196):

A/F sensor current during fuel cut	Less than 1 mA

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-14).

WIRING DIAGRAM

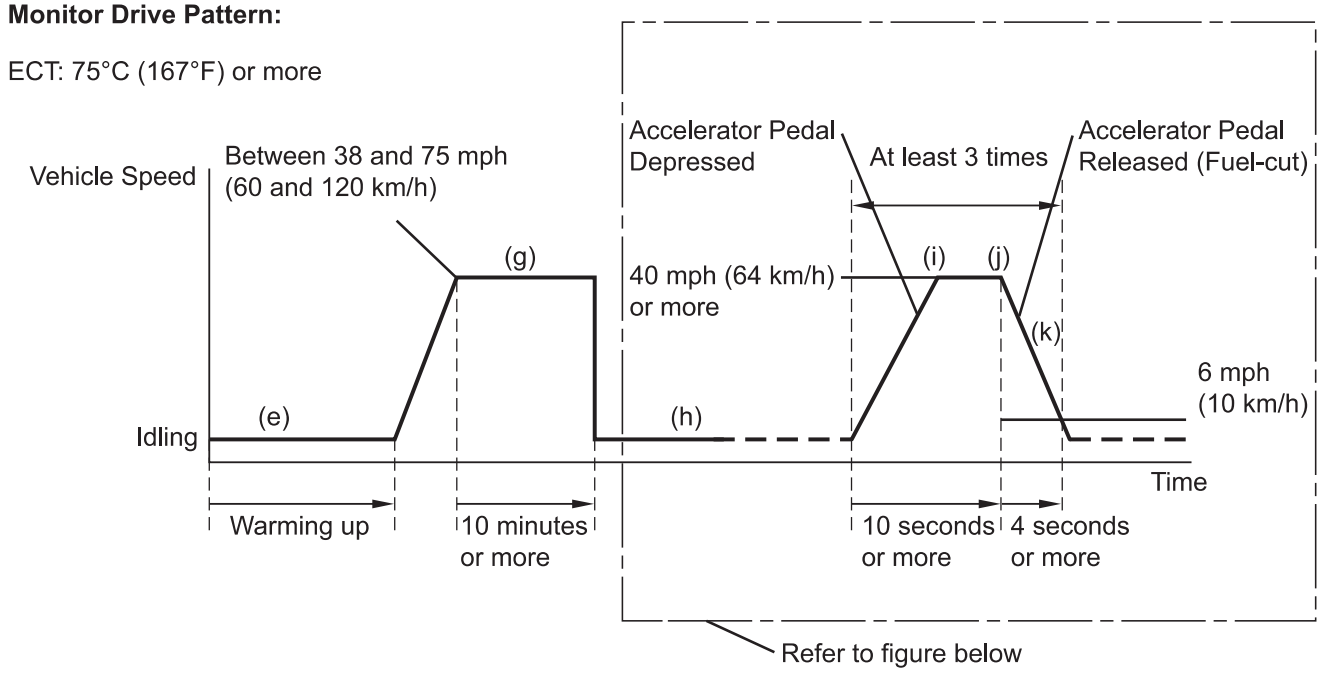


ES

CONFIRMATION DRIVING PATTERN

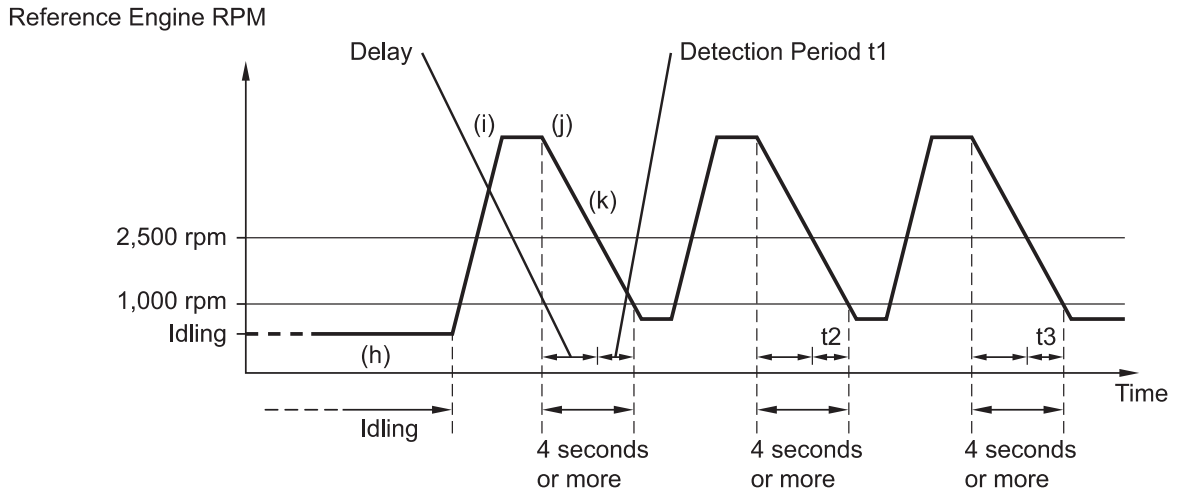
This confirmation driving pattern is used in the "PERFORM CONFIRMATION DRIVING PATTERN" procedure of the following diagnostic troubleshooting procedure.

Monitor Drive Pattern:



Driving Pattern Detail for (h) through (k):

Cumulative Detection Period "t" = t1 + t2 + t3 = 3 seconds or more



(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-31).
(e) Put the engine in inspection mode (See page ES-35), warm it up until the ECT reaches 75°C (167°F) or higher.
(f) On the intelligent tester, select the following menu items to check the fuel-cut status: DIAGNOSIS / ENHANCED OBD II / DATA LIST / USER DATA / FC IDL.
(g) Drive the vehicle at between 38 mph (60 km/h) and 75 mph (120 km/h) for at least 10 minutes.
(h) Change the transmission to the 2nd gear.

(i) Drive the vehicle at a proper vehicle speed to perform fuel-cut operation.
HINT:
Fuel-cut is performed when the following conditions are met:
- Accelerator pedal is fully released.
- Engine speed is 2,500 rpm or more (fuel injection resumes at 1,000 rpm).

(j) Accelerate the vehicle to 40 mph (64 km/h) or more by depressing the accelerator pedal for at least 10 seconds.
(k) Soon after performing step (j) above, release the accelerator pedal for at least 4 seconds without depressing the brake pedal, in order to execute fuel-cut control.
(l) Allow the vehicle to decelerate until the vehicle speed declines to less than 6 mph (10 km/h).
(m) Repeat steps from (h) through (k) above at least 3 times in one driving cycle.
HINT:
Completion of all A/F sensor monitors is required to change the value in TEST RESULT.
CAUTION:
Strictly observe posted speed limits, traffic laws, and road conditions when performing these drive patterns.

INSPECTION PROCEDURE

HINT:
Intelligent tester only:
Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Air-fuel Ratio (A/F) sensor, Heated Oxygen (HO2) sensor and other potential trouble areas are malfunctioning.
The following instructions describe how to conduct the A/F CONTROL operation using the intelligent tester.
(a) Connect the intelligent tester to the DLC3.
(b) Put the engine in inspection mode (See page ES-35).
(c) Turn the tester on.
(d) Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
(e) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(f) Perform the A/F CONTROL operation with the engine idling (press the RIGHT or LEFT button to change the fuel injection volume).
(g) Monitor the output voltages of the A/F and HO2 sensors (AFS B1 S1 and O2S B1 S2) displayed on the tester.
HINT:
- The A/F CONTROL operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.
- The sensors react in accordance with increases and decreases in the fuel injection volume.

Standard

Tester Display (Sensor)	Injection Volume	Status	Voltages
AFS B1 S1 (A/F)	+25%	Rich	Less than 3.0
	-12.5%	Lean	More than 3.35
O2S B1 S2 (HO2)	+25%	Rich	More than 0.5
	-12.5%	Lean	Less than 0.4

NOTICE:
The A/F sensor has an output delay of a few seconds and the HO2 sensor (sensor 2) output has a maximum output delay of approximately of 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Areas
1	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		-
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage More than 0.5 V Less than 0.4 V		
2	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• A/F sensor • A/F sensor heater • A/F sensor circuit
	Output Voltage Almost no reaction		Output Voltage More than 0.5 V Less than 0.4 V		
3	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• HO2 sensor • HO2 sensor heater • HO2 sensor circuit
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage Almost no reaction		
4	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• Injector • Fuel pressure • Gas leakage from exhaust system (Air-fuel ratio extremely lean or rich)
	Output Voltage Almost no reaction		Output Voltage Almost no reaction		

Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the A/F and HO2 sensors.
To display the graph, select the following menu items on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1 S1 and O2S B1 S2, and press the YES button and then the ENTER button followed by the F4 button.
HINT:

- DTC P2A00 may be set when the air-fuel ratio is stuck rich or lean.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- A low A/F sensor voltage could be caused by a rich air-fuel mixture. Check for conditions that would cause the engine to run rich.
- A high A/F sensor voltage could be caused by a lean air-fuel mixture. Check for conditions that would cause the engine to run lean.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO P2195 OR P2196)

(a) Connect an intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P2195 or P2196	A
P2195 or P2196 and other DTCs	B

HINT:
If any DTCs relating to the A/F sensor (DTCs for the A/F sensor heater or A/F sensor admittance) are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

ES

2 READ VALUE USING INTELLIGENT TESTER (TEST VALUE OF A/F SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Clear the DTCs (See page ES-31).
(d) Drive the vehicle in accordance with the drive pattern described in CONFIRMATION DRIVING PATTERN.
(e) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / MONITOR INFO / MONITOR STATUS.
(f) Check that the status of O2S MON is COMPL.
If the status is still INCMPL, drive the vehicle according to the driving pattern again.
HINT:
- AVAIL indicates that the component has not been monitored yet.
- COMPL indicates that the component is functioning normally.
- INCMPL indicates that the component is malfunctioning.

(g) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / MONITOR INFO / TEST RESULT / RANGE B1 S1; then press the ENTER button.
(h) Check the test value of the A/F sensor output current during fuel-cut.

Result

Test Value	Proceed to
Within normal range (1.0 mA or more, and less than 3.6 mA)	A
Outside normal range (Less than 1.0 mA, or 3.6 mA or more)	B

B → Go to step 12

A

3 READ VALUE USING INTELLIGENT TESTER (OUTPUT VOLTAGE OF A/F SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Put the engine in inspection mode (See page ES-35).
(c) Turn the tester on.

(d) Warm up the A/F sensor at an engine speed of 2,500 rpm for 90 seconds.
(e) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / SNAPSHOT / MANUAL SNAPSHOT / USER DATA / AFS B1 S1 and ENGINE SPD.
(f) Check the A/F sensor voltage 3 times, when the engine is in each of the following conditions:
(1) While idling (check for at least 30 seconds)
(2) At an engine speed of approximately 2,500 rpm (without any sudden changes in engine speed)
(3) Drive the vehicle at a constant speed of between 40 mph and 70 mph (65 km/h and 113 km/h) and then quickly release the accelerator pedal so that the throttle valve is fully closed.

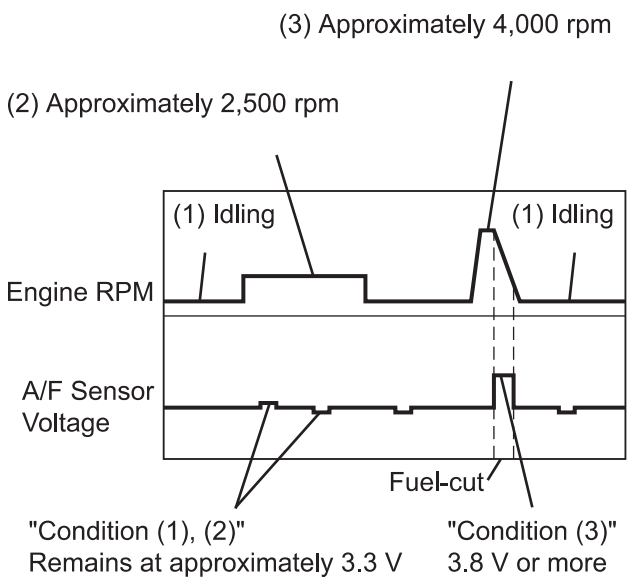
ES

Standard voltage

Conditions	A/F Sensor Voltage Variations	Reference
(1) and (2)	Remains at approximately 3.3 V	Between 3.1 V and 3.5 V
(3)	Increases to 3.8 V or more	This occurs during engine deceleration (when fuel-cut performed)

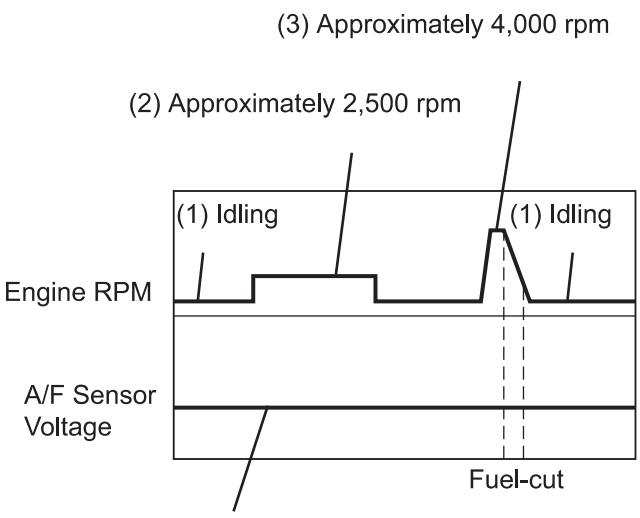
HINT:
- For more information, see the diagrams below.

Normal Condition:



N

Malfunction Condition:



A107161E17

- If the output voltage of the A/F sensor remains at approximately 3.3 V (see Malfunction Condition diagram) under any conditions, including those above, the A/F sensor may have an open circuit. (This will also happen if the A/F sensor heater has an open circuit.)

- If the output voltage of the A/F sensor remains at either approximately 3.8 V or more, or 2.8 V or less (see Malfunction Condition diagram) under any conditions, including those above, the A/F sensor may have a short circuit.
- The ECM stops fuel injection (fuel cut) during engine deceleration. This causes a lean condition and results in a momentary increase in the A/F sensor output voltage.
- The ECM must establish a closed throttle valve position learning value to perform fuel cut. If the battery terminal has been reconnected, the vehicle must be driven over 10 mph (16 km/h) to allow the ECM to learn the closed throttle valve position.
- When the vehicle is driven:
  The output voltage of the A/F sensor may be below 2.8 V during fuel enrichment. For the vehicle, this is translated to a sudden increase in speed with the accelerator pedal fully depressed when trying to overtake another vehicle. The A/F sensor is functioning normally.
- The A/F sensor is a current output element; therefore, the current is converted into a voltage inside the ECM. Measuring the voltage at the connectors of the A/F sensor or ECM will show a constant voltage result.

ES

NG → Go to step 9

OK

4	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

5	CHECK WHETHER DTC OUTPUT RECURS (DTC P2195 OR P2196)

(a) Read the DTCs using the intelligent tester.
(b) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

Result

Display (DTC Output)	Proceed to
P2195 or P2196	A
No output	B

B → END

A

6	REPLACE AIR-FUEL RATIO SENSOR

NEXT

7	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

ES

8	CHECK WHETHER DTC OUTPUT RECURS (DTC P2195 OR P2196)

(a) Read the DTCs using the intelligent tester.
(b) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

Result

Display (DTC Output)	Proceed to
No output	A
P2195 or P2196	B

B → REPLACE HYBRID VEHICLE CONTROL ECU

A

END

9	INSPECT AIR-FUEL RATIO SENSOR (HEATER RESISTANCE) (See page ES-75)

NG → REPLACE AIR-FUEL RATIO SENSOR

OK

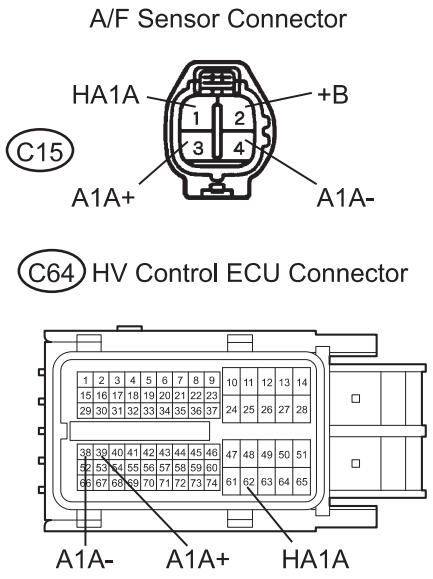
10	INSPECT INTEGRATION RELAY (EFI RELAY) (See page ES-76)

NG → REPLACE INTEGRATION RELAY (EFI MAIN RELAY)

OK

11 CHECK HARNESS AND CONNECTOR (A/F SENSOR - HV CONTROL ECU)

Wire Harness Side:



(a) Disconnect the C15 A/F sensor connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage between the +B terminal of the A/F sensor connector and body ground.

Standard voltage

Tester Connections	Specified Conditions
C15-2 (+B) - Body ground	9 to 14 V

(d) Turn the power switch off.
(e) Disconnect the C64 hybrid vehicle control ECU connector.
(f) Measure the resistance.

Standard resistance (Check for open)

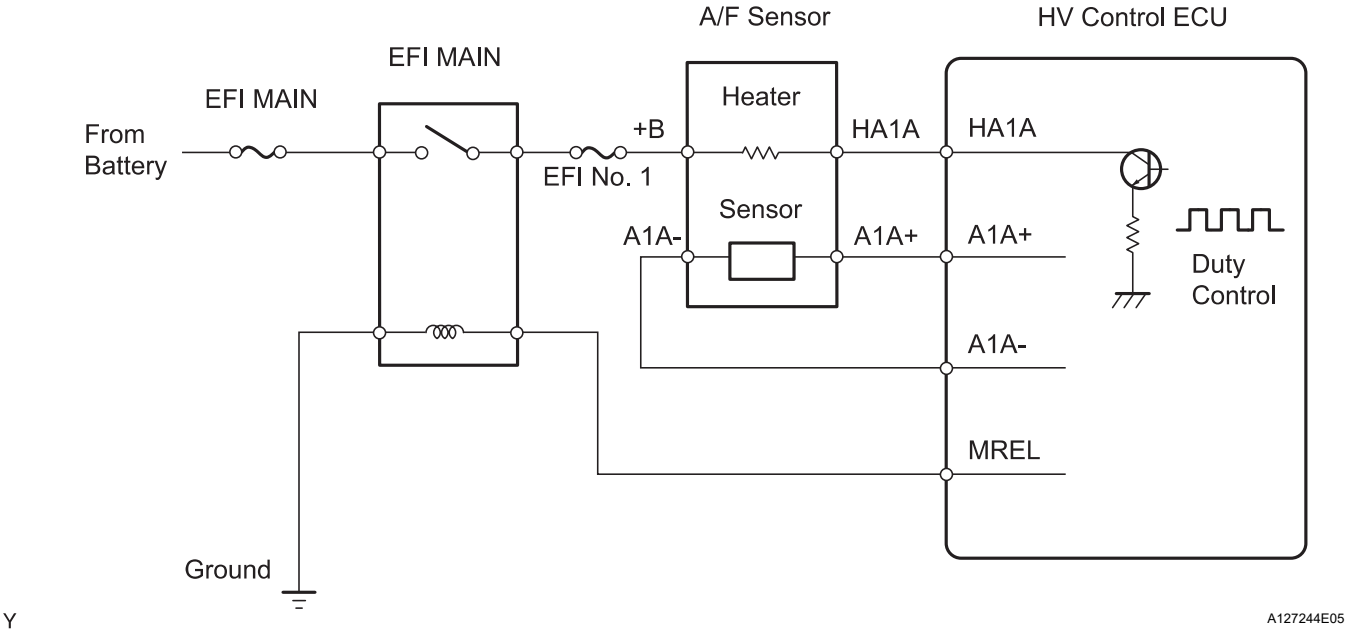
Tester Connections	Specified Conditions
C15-1 (HA1A) - C64-62 (HA1A)	Below 1 Ω
C15-3 (A1A+) - C64-39 (A1A+)	Below 1 Ω
C15-4 (A1A-) - C64-38 (A1A-)	Below 1 Ω

Standard resistance (Check for short)

Tester Connections	Specified Conditions
C15-1 (HA1A) or C64-62 (HA1A) - Body ground	10 kΩ or higher
C15-3 (A1A+) or C64-39 (A1A+) - Body ground	10 kΩ or higher
C15-4 (A1A-) or C64-38 (A1A-) - Body ground	10 kΩ or higher

(g) Reconnect the hybrid vehicle control ECU connector.
(h) Reconnect the A/F sensor connector.

Reference (System Diagram of Sensor 1):



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

12	REPLACE AIR-FUEL RATIO SENSOR

NEXT

13	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

ES

14	CHECK WHETHER DTC OUTPUT RECURS (DTC P2195 OR P2196)

(a) Read the DTCs using the intelligent tester.
(b) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

Result

Display (DTC Output)	Proceed to
No output	A
P2195 or P2196	B

B → REPLACE HYBRID VEHICLE CONTROL ECU

A

END

DTC	P2238	Oxygen (A/F) Sensor Pumping Current Circuit Low (Bank 1 Sensor 1)

DTC	P2239	Oxygen (A/F) Sensor Pumping Current Circuit High (Bank 1 Sensor 1)

DTC	P2252	Oxygen (A/F) Sensor Reference Ground Circuit Low (Bank 1 Sensor 1)

DTC	P2253	Oxygen (A/F) Sensor Reference Ground Circuit High (Bank 1 Sensor 1)

DESCRIPTION

Refer to DTC P2195 (See page ES-269).

DTC No.	DTC Detection Conditions	Trouble Areas
P2238	• Case 1: Condition (a) or (b) continues for 5.0 seconds or more (2-trip detection logic): (a) AF+ voltage 0.5 V or less (b) (AF+) - (AF-) = 0.1 V or less • Case 2: A/F sensor admittance: Less than 0.022 1/Ω (2-trip detection logic)	• Open or short in A/F sensor (sensor 1) circuit • A/F sensor (sensor 1) • A/F sensor heater (sensor 1) • Integration relay (EFI MAIN relay) • A/F sensor heater and EFI MAIN relay circuits • Hybrid vehicle control ECU
P2239	AF+ voltage more than 4.5 V for 5.0 seconds or more (2-trip detection logic)	• Open or short in A/F sensor (sensor 1) circuit • A/F sensor (sensor 1) • A/F sensor heater (sensor 1) • Integration relay (EFI MAIN relay) • A/F sensor heater and EFI MAIN relay circuits • Hybrid vehicle control ECU
P2252	AF- voltage 0.5 V or less for 5.0 seconds or more (2-trip detection logic)	• Open or short in A/F sensor (sensor 1) circuit • A/F sensor (sensor 1) • A/F sensor heater (sensor 1) • Integration relay (EFI MAIN relay) • A/F sensor heater and EFI MAIN relay circuits • Hybrid vehicle control ECU
P2253	AF- voltage more than 4.5 V for 5.0 seconds or more (2-trip detection logic)	• Open or short in A/F sensor (sensor 1) circuit • A/F sensor (sensor 1) • A/F sensor heater (sensor 1) • Integration relay (EFI MAIN relay) • A/F sensor heater and EFI MAIN relay circuits • Hybrid vehicle control ECU

MONITOR DESCRIPTION

The Air-Fuel Ratio (A/F) sensor varies its output voltage in proportion to the air-fuel ratio. If the A/F sensor impedance (alternating current resistance) or output voltage deviates greatly from the standard range, the ECM determines that there is an open or short in the A/F sensor circuit.

MONITOR STRATEGY

Related DTCs	P2238: A/F sensor open circuit between AF+ and AF- P2238: A/F sensor short circuit between AF+ and AF- P2238: A/F sensor short circuit between AF+ and GND P2239: A/F sensor short circuit between AF+ and +B P2252: A/F sensor short circuit between AF- and GND P2253: A/F sensor short circuit between AF- and +B
Required Sensors/Components (Main)	A/F sensor
Required Sensors/Components (Related)	Engine Coolant Temperature (ECT) sensor, crankshaft position sensor
Frequency of Operation	Once per driving cycle
Duration	10 seconds: A/F sensor open circuit between AF+ and AF- 5 seconds: Other
MIL Operation	2 driving cycles
Sequence of Operation	None

ES

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	P0031, P0032 (A/F sensor heater - Sensor 1) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0171, P0172 (Fuel system) P0300 - P0304 (Misfire) P0335 (CKP sensor) P0340 (CMP sensor) P0455, P0456 (EVAP system) P0500 (VSS)

P2238 (open circuit between AF+ and AF-):

AF+ terminal voltage	0.5 to 4.5 V
AF- terminal voltage	0.5 to 4.5 V
Difference between AF+ and AF- terminal voltages	0.1 to 0.8 V
ECT	5°C (41°F) or more (varies with ECT at engine start)
Engine	Running
Fuel-cut	OFF
Time after fuel-cut OFF	10 seconds or more
A/F sensor heater	ON
Battery voltage	10.5 V or more
Power switch	ON
Time after power switch is OFF to ON	5 seconds or more

Other:

Battery voltage	10.5 V or more
Power switch	ON
Time after power switch is OFF to ON	5 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

P2238 (Open circuit between AF+ and AF-):

A/F sensor admittance	Below 0.022 1/Ω

P2238 (Short circuit between AF+ and GND):

AF+ terminal voltage	0.5 V or less

P2238 (Short circuit between AF+ and AF-):

Difference between AF+ and AF- terminal voltages	0.1 V or less

P2239 (Short circuit between AF+ and +B):

AF+ terminal voltage	More than 4.5 V

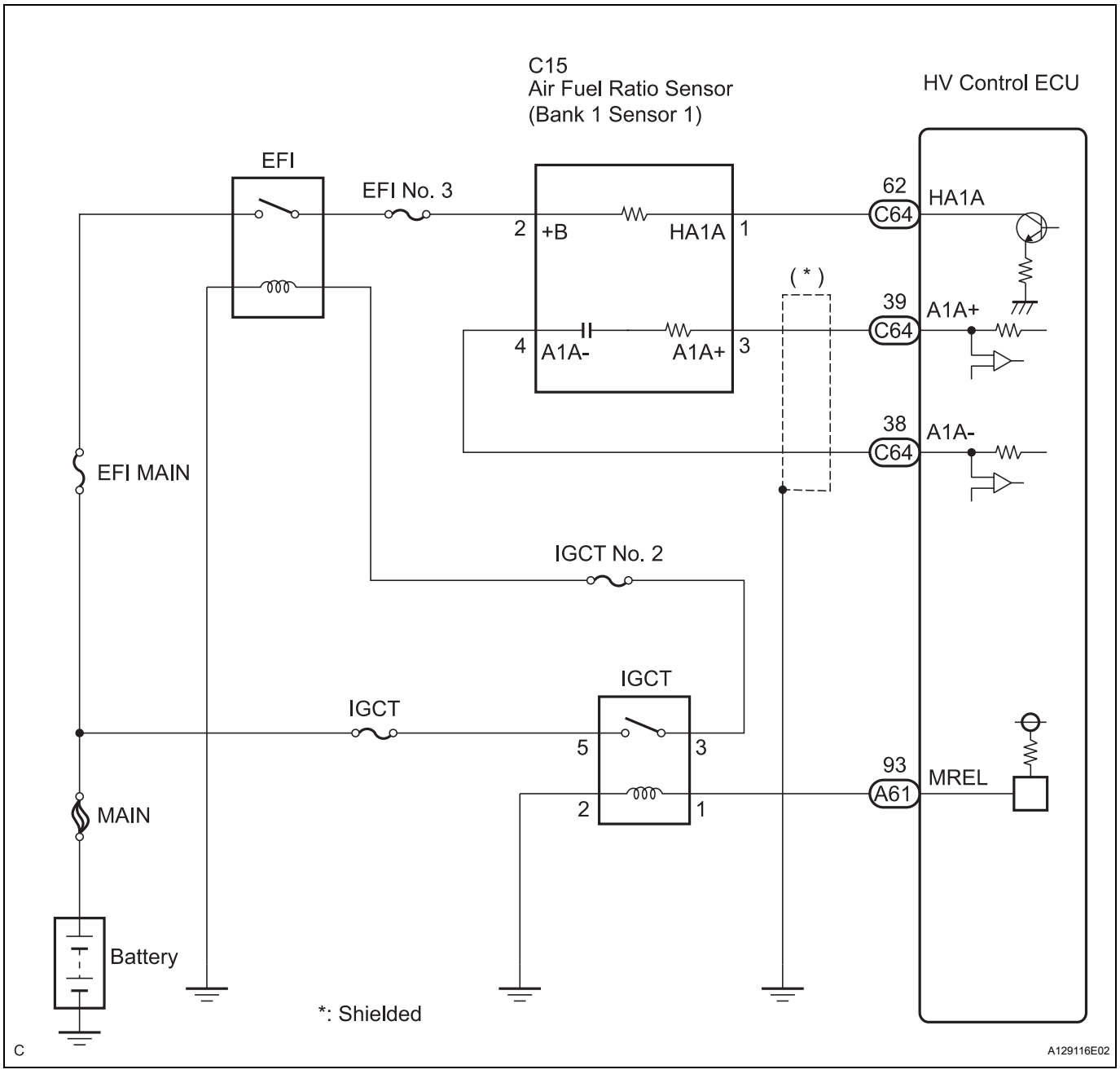
P2252 (Short circuit between AF- and GND):

AF- terminal voltage	0.5 V or less

P2253 (Short circuit between AF- and +B):

AF- terminal voltage	More than 4.5 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- Although the DTC titles say oxygen sensor, these DTCs relate to the Air-Fuel Ratio (A/F) sensor.

- Sensor 1 refers to the sensor mounted in front of the Three-Way Catalytic Converter (TWC) and located near the engine assembly.

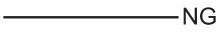
HINT:
Intelligent tester only:
Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Air-Fuel Ratio (A/F) sensor, Heated Oxygen (HO2) sensor and other potential trouble areas are malfunctioning.
The following instructions describe how to conduct the A/F CONTROL operation using the intelligent tester.
(a) Connect the intelligent tester to the DLC3.
(b) Put the engine in inspection mode (See page ES-35).
(c) Turn the tester on.
(d) Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
(e) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(f) Perform the A/F CONTROL operation with the engine idling (press the RIGHT or LEFT button to change the fuel injection volume).
(g) Monitor the output voltages of the A/F and HO2 sensors (AFS B1 S1 and O2S B1 S2) displayed on the tester.

HINT:
- The A/F CONTROL operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.
- The sensors react in accordance with increases and decreases in the fuel injection volume.

Standard

Tester Display (Sensor)	Injection Volume	Status	Voltages
AFS B1 S1 (A/F)	+25%	Rich	Less than 3.0
	-12.5%	Lean	More than 3.35
O2S B1 S2 (HO2)	+25%	Rich	More than 0.5
	-12.5%	Lean	Less than 0.4

NOTICE:
The A/F sensor has an output delay of a few seconds and the HO2 sensor has a maximum output delay of approximately 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Areas
1	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		-
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage More than 0.5 V Less than 0.4 V		
2	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• A/F sensor • A/F sensor heater • A/F sensor circuit
	Output Voltage Almost no reaction		Output Voltage More than 0.5 V Less than 0.4 V		

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Areas
3	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• HO2 sensor • HO2 sensor heater • HO2 sensor circuit
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage Almost no reaction		
4	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• Injector • Fuel pressure • Gas leakage from exhaust system (Air-fuel ratio extremely lean or rich)
	Output Voltage Almost no reaction		Output Voltage Almost no reaction		

ES

Following the A/F CONTROL procedure enables technicians to check and graph the output voltages of both the A/F and HO2 sensors.
To display the graph, select the following menu items on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1 S1 and O2S B1 S2; then press the YES button and then the ENTER button followed by the F4 button.
HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**INSPECT AIR-FUEL RATIO SENSOR (HEATER RESISTANCE) (See page ES-75)**

NG → **REPLACE AIR-FUEL RATIO SENSOR**

OK

2	**INSPECT INTEGRATION RELAY (EFI RELAY) (See page ES-76)**

NG → **REPLACE INTEGRATION RELAY (EFI MAIN RELAY)**

OK

3	**CHECK HARNESS AND CONNECTOR (A/F SENSOR - HV CONTROL ECU) (See page ES-287)**

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	REPLACE AIR-FUEL RATIO SENSOR

NEXT

5	CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Clear the DTCs (See page ES-31).
(d) Put the engine in inspection mode (See page ES-35).
(e) Allow the engine to idle for 5 minutes or more.
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
(g) Read the pending DTCs.

ES

Result

Display (DTC Output)	Proceed to
No output	A
P2238, P2239, P2252 or P2253	B

B → REPLACE HYBRID VEHICLE CONTROL ECU

A

END

DTC	P2420	Evaporative Emission System Switching Valve Control Circuit High

DTC SUMMARY

DTCs	Monitoring Item	Malfunction Detection Condition	Trouble Area	Detection Timing	Detection Logic
P2420	Vent valve stuck open (vent)	Vent valve open stuck is detected during EVAP key-off monitor	• Canister pump module (Reference orifice, leak detection pump, vent valve) • Connector / wire harness (Canister pump module - Hybrid vehicle control ECU) • Hybrid vehicle control ECU	Power switch OFF	2-trips

ES

DESCRIPTION

The description can be found in EVAP (Evaporative Emission) System (See page ES-317).

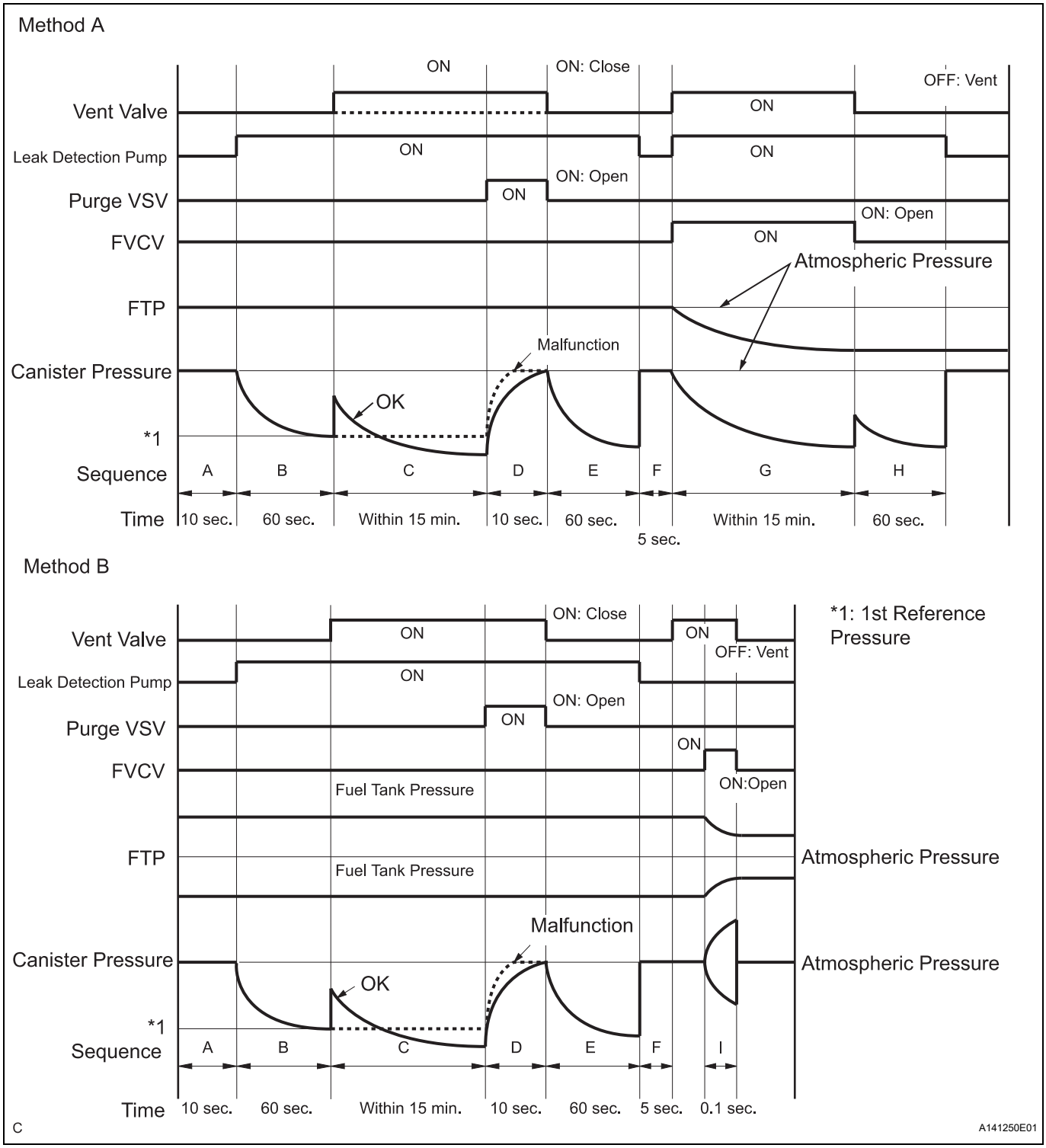
INSPECTION PROCEDURE

Refer to EVAP System (See page ES-328).

MONITOR DESCRIPTION

Vent valve stuck open (vent)

In operation C, the vent valve turns ON (closes) and the EVAP system pressure is then measured by the ECM, using the canister pressure sensor, to conduct an EVAP leak check. If the pressure does not increase when the vent valve is open, the ECM interprets this as the vent valve being stuck open. The ECM illuminates the MIL and sets the DTC.



MONITOR STRATEGY

Required Sensors/Components (Main)	Purge VSV and canister pump module
Frequency of Operation	Once per driving cycle
Duration	Within 15 minutes
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	-
EVAP key-off monitor runs when all of the following conditions are met:	-
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg)
Battery voltage	10.5 V or more
Vehicle speed	Below 2.5 mph (4 km/h)
Power switch	OFF
Engine condition	Not running
Canister pressure sensor malfunction (P0450, P0451, P0452 and P0453)	Not detected
FTP sensor malfunction (P1451, P1452 and P1453)	Not detected
Purge VSV	Not operated by scan tool
Vent valve	Not operated by scan tool
Leak detection pump	Not operated by scan tool
Both of the following conditions are met before power switch OFF	Conditions 1 and 2
1. Duration that vehicle is being driven	5 minutes or more
2. Purge flow	Executed
ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)
Time after engine stopped	5 hours

Example of restart time

First time	7 hours
Second time	9 hours and 30 minutes

Key-off monitor sequence 1 to 15

1. Atmospheric pressure measurement

Next sequence is run if the following condition is met:	-
Atmospheric pressure change for 10 seconds	Less than 0.3 kPa (2.25 mmHg) for 1 second

2. First reference pressure measurement

Next sequence is run if all of the following conditions are met:	Conditions 1, 2 and 3
1. EVAP pressure 1.9 seconds after reference pressure measurement	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.057 kPa (-36.38 to -7.93 mmHg)
3. Reference pressure	Saturated

3. Vent valve stuck closed check

Next sequence is run if the following condition is met:	-
EVAP pressure change for 10 seconds after vent valve ON (Closed)	0.3 kPa (2.25 mmHg) or more

4. Vacuum introduction for canister

Next sequence is run if the following condition is met:	-
Vacuum introduction time	15 minutes or less

5. Purge VSV stuck closed check

Next sequence is run if the following condition is met:	-
EVAP pressure change for 10 seconds after Purge VSV ON (Open).	0.3 kPa (2.25 mmHg) or more

6. Second reference pressure measurement

Next sequence is run if all of the following conditions are met:	Conditions 1, 2, 3 and 4
1. EVAP pressure 1.9 sec. after reference pressure measurement	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.057 kPa (-36.4 to -7.93 mmHg)
3. Reference pressure	Saturated

4. Reference pressure difference between the first and second	Less than 0.7 kPa (5.25 mmHg)

7. Canister leak

Next sequence is run if the following condition is met:	-
Canister leak when vacuum introduction was complete	Second reference pressure or less

8. Fuel vapor-containment valve (FVCV stuck closed check)

Next sequence is run if both of the following conditions are met:	Conditions 1 and 2
1. FTP when EVAP monitor started	-2 kPa (-15 mmHg) or less, or 3 kPa (22.5 mmHg) or more
2. FTP change while FVCV and vent valve are open	0.5 kPa (3.75 mmHg) or more

9. Vacuum introduction for fuel tank

Next sequence is run if both of the following conditions are met:	Conditions 1 and 2
1. FTP when EVAP monitor started	-2 to 3 kPa (-15 to 22.5 mmHg)
2. Vacuum introduction time	15 minutes or less

ES

10. FVCV stuck closed check

Next sequence is run if the following condition is met:	
FTP change when vacuum introduction for fuel tank	0.5 kPa (3.75 mmHg)

11. FTP sensor stuck check

Next sequence is run if the following condition is met:	
FTP change when FVCV closed	0.35 kPa (2.6 mmHg) or less

12 Third reference pressure measurement

Next sequence is run if all of the following conditions are met:	Conditions 1, 2, 3, and 4
1. FTP 1.9 seconds after reference pressure measurement	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.057 kPa (-36.4 to -7.93 mmHg)
3. Reference pressure	Saturated
4. Reference pressure difference between the second and third	Less than 0.7 kPa (5.25 mmHg)

13. Fuel tank leak check

Sequence is run if the following condition is met:	
FTP when vacuum introduction for fuel tank was complete	Less than third reference pressure

14. FTP sensor stuck check

Next sequence is run if the following condition is met:	-
FTP change while FVCV and vent valve are open	Less than 0.3 kPa (2.25 mmHg)

15. Atmospheric pressure measurement

Monitor is complete if the following condition is met:	-
Atmospheric pressure difference between sequence 1 and 8	0.35 kPa (2.6 mmHg) or less

TYPICAL MALFUNCTION THRESHOLDS

"Saturated" indicates that the EVAP pressure change is less than 0.286 kPa (2.14 mmHg) in 60 seconds.

Vent valve stuck open (vent)

EVAP pressure change after EVAP canister vent valve is ON	Less than 0.3 kPa (2.25 mmHg)

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-325).

DTC	P2450	Fuel Vapor-containment Valve Stuck Open

DTC	P2451	Fuel Vapor-containment Valve Stuck Close

DTC SUMMARY

DTC No.	Monitoring Item	DTC Detection Condition	Trouble Area	Detection Timing	Detection Logic
P2450	Fuel vapor-containment valve stuck open	One of the following condition is met when FTP is between -2 kPa (-15 mmHg) and 3 kPa (22.5 mmHg). • FTP change when vacuum introduction for fuel tank is less than 0.5 kPa (3.75 mmHg) • EVAP pressure change when FVCV is open is less than 0.9 kPa (6.75 mmHg)	• Fuel vapor-containment valve • Connector / wire harness (Fuel vapor-containment valve - Hybrid Vehicle Control ECU) • Hybrid vehicle control ECU	Power switch off	2-trips
P2451	Fuel vapor-containment valve stuck closed	One of the following conditions are met when FTP is between -2 kPa (-15 mmHg) and 3 kPa (22.5 mmHg). • FTP change when vacuum introduction for canister is less than 0.5 kPa (3.75 mmHg) • EVAP pressure when vacuum introduction for canister was complete is higher than (third reference pressure x 0.2)	• Fuel vapor-containment valve • Connector / wire harness (Fuel vapor-containment valve - Hybrid Vehicle Control ECU • Hybrid vehicle control ECU	Power switch off	2-trips

DESCRIPTION

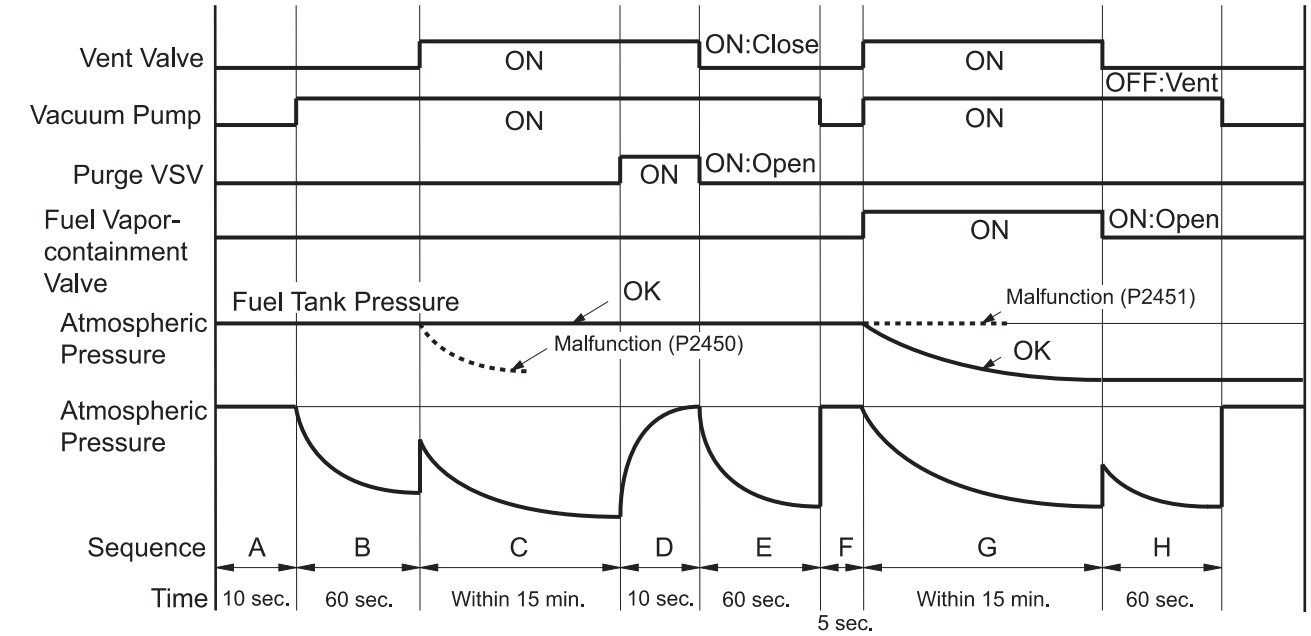
Refer to EVAP System (See page ES-317).

MONITOR DESCRIPTION

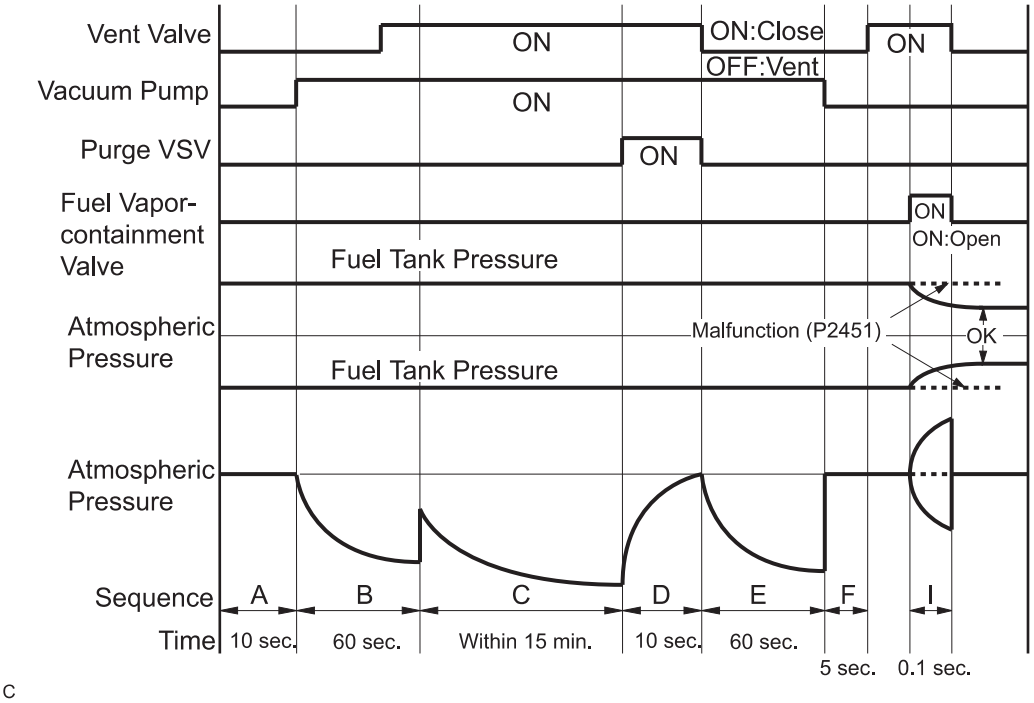
1. P2450: Fuel vapor-containment valve (FVCV) stuck open
   During sequence C, the vacuum pump creates vacuum pressure in the EVAP system. If the pressure in the fuel tank drops, the ECM (included in hybrid vehicle control ECU) determines that the fuel vapor-containment valve is stuck open. The ECM then illuminates the MIL and sets the DTC. (This DTC is set according to 2-trip detection logic.)

2. P2451: Fuel vapor-containment valve (FVCV) stuck closed (vent)
During sequence G, the fuel vapor-containment valve opens to allow vacuum pressure generated by the vacuum pump into the fuel tank. If the pressure in the fuel tank does not drop, the ECM determines that the fuel vapor-containment valve is stuck closed. The ECM then illuminates the MIL and sets the DTC. (This DTC is set according to 2-trip detection logic.)
During sequence I, the fuel vapor-containment valve opens to allow atmospheric pressure into the fuel tank. If there is no change in fuel tank pressure, the ECM determines that the fuel vapor-containment valve is stuck closed. The ECM then illuminates the MIL and sets the DTC. (This DTC is set according to 2-trip detection logic.)

Method A



Method B



C

A109164E03

MONITOR STRATEGY

Required Sensors/Components	Pump module
Frequency of Operation	Once per driving cycle: P0451 sensor constant voltage Continuous: P0451 sensor abnormal voltage fluctuation, P0450, P0452 and P0453
Duration	0.5 seconds: P0450, P0452, P0453 Within 15 seconds: P0451
MIL Operation	Immediate: P0450, P0452, P0453 2 driving cycles: P0451
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

EVAP key-off monitor runs when all of the following conditions are met:	-
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg)
Battery voltage	10.5 V or more
Vehicle speed	Below 2.5 mph (4 km/h)
Power switch	OFF
FTP sensor malfunction (P0450, P0451, P0452 and P0453)	Not detected
Purge VSV	Not operated by scan tool
Vent valve	Not operated by scan tool
Leak detection pump	Not operated by scan tool
Both of the following conditions are met before power switch OFF:	Conditions 1 and 2
1. Duration that vehicle is being driven	5 minutes or more
2. EVAP purge operation	Performed
ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)
Time after engine stop	5 hours

Example of restart time:

First time	7 hours
Second time	9 hours and 30 minutes

Key-off monitor sequence 1 to 15

1. Atmospheric pressure measurement

Next sequence is run if the following condition is met:	-
Atmospheric pressure change for 10 seconds	Less than 0.3 kPa (2.25 mmHg) for 1 second

2. First reference pressure measurement

Next sequence is run if all of the following conditions are met:	Conditions 1, 2 and 3
1. EVAP pressure 1.9 seconds after reference pressure measurement	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.057 kPa (-36.38 to -7.93 mmHg)
3. Reference pressure	Saturated

3. Vent valve stuck closed check

Next sequence is run if the following condition is met:	-
EVAP pressure change for 10 seconds after vent valve ON (Closed)	0.3 kPa (2.25 mmHg) or more

4. Vacuum introduction for canister

Next sequence is run if both of the following conditions are met:	Conditions 1 and 2
1. Vacuum introduction time	15 minutes or less
2. FTP	Saturated

5. Purge VSV stuck closed check

Next sequence is run if the following condition is met:	-
EVAP pressure change for 10 seconds after purge VSV ON (Open)	0.3 kPa (2.25 mmHg) or more

6. Second reference pressure measurement

Next sequence is run if all of the following conditions are met:	Conditions 1, 2, 3 and 4
1. EVAP pressure 1.9 sec. after reference pressure measurement	-1kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.057 kPa (-36.4 to -7.92 mmHg)
3. Reference pressure	Saturated
4. Reference pressure difference between the first and second	0.7 kPa (5.25 mmHg) or less

7. Canister leak

Next sequence is run if the following condition is met:	-
Canister leak when vacuum introduction was complete	Second reference pressure or less

8. Fuel vapor-containment valve (FVCV stuck closed check)

Sequence 14 is run if all of the following conditions are met:	Conditions 1 and 2
1. FTP when EVAP monitor started	-2 kPa (-15 mmHg) or less, or 3 kPa (22.5 mmHg) or more
2. FTP change while FVCV and vent valve are open	3.75 mmHg (0.5 kPa) or more

9. Vacuum introduction for fuel tank

Next sequence is run if both of the following conditions are met:	Conditions 1 and 2
1. FTP when EVAP monitor started	-2 to 3 kPa (-15 to 22.5 mmHg)
2. Vacuum introduction time	15 minutes or less

10. FVCV stuck closed check

Next sequence is run if the following condition is met:	
FTP change when vacuum introduction for fuel tank	0.5 kPa (5.25 mmHg)

11. FTP sensor stuck check

Next sequence is run if the following condition is met:	
FTP change when FVCV closed	0.35 kPa (2.6 mmHg) or less

12. Third reference pressure measurement

Next sequence is run if all of the following conditions are met::	Conditions 1, 2, 3, and 4
1. FTP 1.9 seconds after reference pressure measurement began	-1 kPa (-7.5 mmHg) or more
2. Reference pressure	-4.85 to -1.057 kPa (-36.4 to -7.93 mmHg)
3. Reference pressure	Saturated
4. Reference pressure difference between the second and third	Less than 0.7 kPa (5.25 mmHg)

13. Fuel tank leak check

Sequence is run if the following conditions is met:	
FTP when vacuum introduction for fuel tank was complete	Less than third reference pressure

14. FTP sensor stuck check

Next sequence is run if the following condition is met:	-
FTP change while FVCV and vent valve are open	Less than 0.35 kPa (2.6 mmHg)

15. Atmospheric pressure measurement

Monitor is complete if the following condition is met:	-
Atmospheric pressure difference between sequence 1 and 8	0.3 kPa (2.25 mmHg) or less

TYPICAL MALFUNCTION THRESHOLDS

"Saturated" indicates that the EVAP pressure change is less than 0.286 kPa (2.14 mmHg) in 60 seconds.

P2450: Fuel vapor-containment valve stuck open

One of the following conditions is met when FTP is between -2 kPa (-15 mmHg) and 3 kPa (22.5 mmHg)	1 or 2
1. Both of the following conditions met	(a) or (b)
(a) FTP	-2 to 3 kPa (-15 to 22.5 mmHg)
(b) FTP change when vacuum introduction for fuel tank	More than 0.5 kPa (3.75 mmHg)
1. Both of the following conditions met	(a) or (b)
(a) FTP	-2 to 3 kPa (-15 to 22.5 mmHg)
(b) Canister pressure change when FVCV is open	More than 0.9 kPa (6.75 mmHg)

P2451: Fuel vapor-containment valve stuck closed

One of the following conditions is met when FTP is between -2 kPa (-15 mmHg) and 3 kPa (22.5 mmHg)	1 or 2
1. FTP change when vacuum introduction for fuel tank	Less than 0.5 kPa (3.75 mmHg)
2. Canister pressure when vacuum introduction for canister was complete	Higher than reference pressure x 0.2

ES

MONITOR RESULT

Refer to EVAP System (See page ES-325).

INSPECTION PROCEDURE

Refer to EVAP System (See page ES-328).

DTC	P2610	ECM / PCM Internal Engine Off Timer Performance

DTC SUMMARY

DTC No.	Monitoring Item	Malfunction Detection Condition	Trouble Area	Detection Timing	Detection Logic
P2610	Soak timer (built into hybrid vehicle control ECU)	Hybrid vehicle control ECU internal malfunction	Hybrid vehicle control ECU	Engine running	2-trips

DESCRIPTION

To ensure the accuracy of the EVAP (Evaporative Emission) monitor values, the soak timer, which is built into the ECM (included in the hybrid vehicle control ECU), measures 5 hours (+/- 15 minutes) from when the power switch is turned off, before the monitor begins to run. This allows the fuel to cool down, which stabilizes the Fuel Tank Pressure (FTP). When 5 hours have elapsed, the ECM turns on.

MONITOR DESCRIPTION

5 hours after the power switch is turned off, the soak timer activates the ECM (included in the hybrid vehicle control ECU) to begin the EVAP system monitor. While the engine is running, the ECM monitors the synchronization of the soak timer and the CPU clock. If these two are not synchronized, the ECM interprets this as a malfunction. The ECM illuminates the MIL and sets the DTC (2-trip detection logic).

MONITOR STRATEGY

Required Sensors/Components	Hybrid vehicle control ECU
Frequency of Operation	Once per driving cycle
Duration	600 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Case 1:

The monitor will run whenever these DTCs are not present	None
Power switch	ON
Engine	Running
Battery voltage	8 V or more
Starter	OFF

Case 2 and Case 3:

Soak time	20 minutes or more
Battery voltage	8 V or more
Power switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

Case 1:

Soak timer measurement when hybrid vehicle control ECU CPU clock counts 10 minutes	Less than 7 minutes or more than 13 minutes

Case 2:

History hybrid vehicle control ECU had woken up by internal engine off timer	Yes
How long vehicle has been soaked	Less than programmed period

Case 3:

History hybrid vehicle control ECU had woken up by internal engine off timer	No
How long vehicle has been soaked	More than or equal to programmed period

INSPECTION PROCEDURE

HINT:

- DTC P2610 is set if an internal ECM (included in the hybrid vehicle control ECU) problem is detected. Diagnostic procedures are not required. ECM replacement is required.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data, from the time the malfunction occurred.

1	**REPLACE HYBRID VEHICLE CONTROL ECU**

NEXT

2	**CHECK WHETHER DTC OUTPUT RECURS**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Clear the DTCs (See page ES-31).
(d) Put the engine in inspection mode (See page ES-35).
(e) Wait for 10 minutes or more.
(f) On the tester, enter the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC / INFO / PENDING CODEs.
(g) If no pending DTC is displayed, the repair has been successfully completed.

NEXT

END

DTC	P2A00	A/F Sensor Circuit Slow Response (Bank 1 Sensor 1)

HINT:
Sensor 1 refers to the sensor mounted in front of the Three-Way Catalytic Converter (TWC) and located near the engine assembly.

DESCRIPTION

Refer to DTC P2195 (See page ES-269).

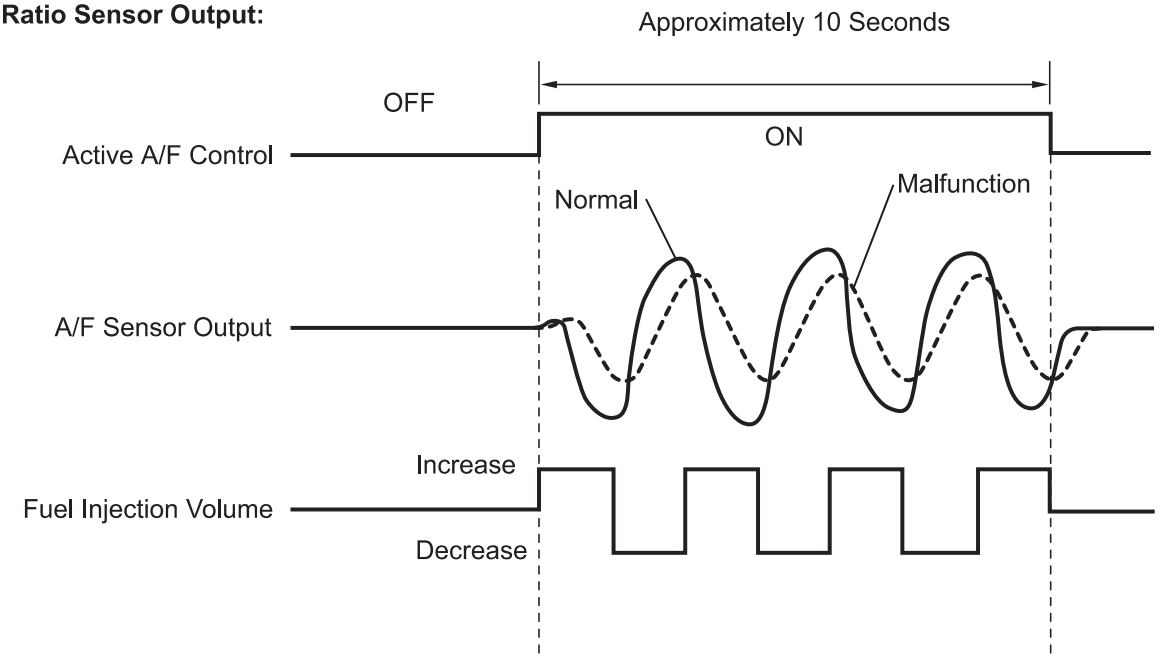
DTC No.	DTC Detection Conditions	Trouble Areas
P2A00	Calculated value of air-fuel ratio (A/F) sensor response rate deterioration level less than threshold (2-trip detection logic)	• Open or short in A/F sensor circuit • A/F sensor • Hybrid vehicle control ECU

ES

MONITOR DESCRIPTION

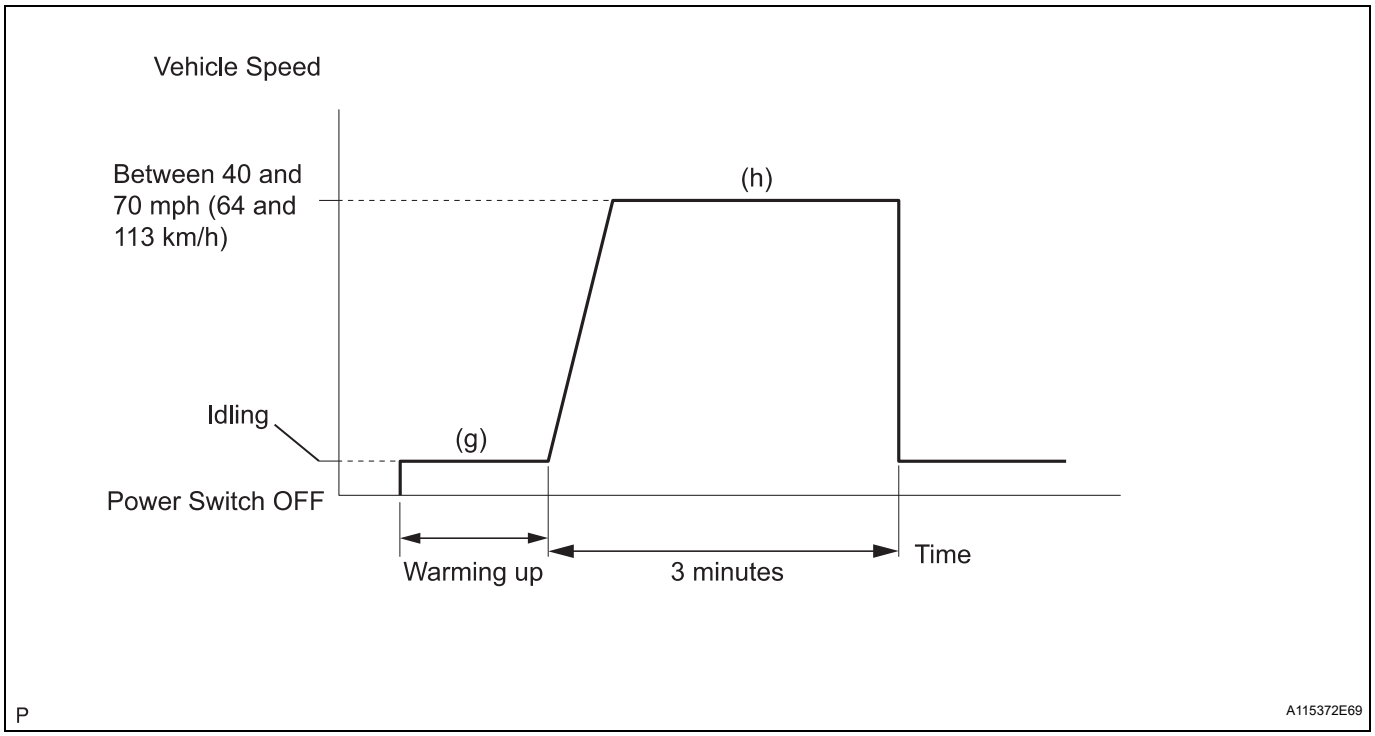
After the engine is warmed up, the ECM (included in hybrid vehicle control ECU) performs air-fuel ratio feedback control to maintain the air-fuel ratio at the stoichiometric level. In addition, active A/F control is performed for approximately 10 seconds after the preconditions are met in order to measure the A/F sensor response rate. During active A/F control, the ECM forcibly increases and decreases the injection volume a certain amount, based on the stoichiometric air-fuel ratio learned during normal air-fuel ratio control, and measures the A/F sensor response rate. The ECM receives a signal from the A/F sensor while performing active A/F control and uses it to calculate the A/F sensor response rate deterioration level.
If the A/F sensor response rate deterioration level is less than the threshold, the ECM interprets this as a malfunction and sets the DTC.

Air-Fuel Ratio Sensor Output:

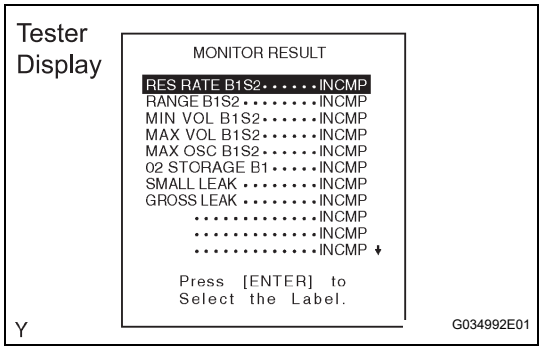


CONFIRMATION DRIVING PATTERN

HINT:
Performing this confirmation pattern will activate the A/F sensor response monitor.



(a) Connect the intelligent tester to the DLC3.



(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Clear the DTCs (if set) (See page ES-31).
(e) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / MONITOR INFO / MONITOR RESULT.
(f) Check that RES RATE B1S1 is INCOMP.
(g) Put the engine in inspection mode (See page ES-35), and warm it up.
(h) Drive the vehicle at a constant speed of between 40 mph and 70 mph (64 km/h and 113 km/h) for 3 minutes.
(i) Check the monitor result values on the intelligent tester by selecting the following menu items: DIAGNOSIS / ENHANCED OBD II / MONITOR INFO / TEST RESULT.
(j) If the values indicated on the tester do not change, perform READINESS MONITOR DRIVE PATTERN for the A/F sensor and the heated oxygen sensor (See page ES-17).
HINT:
Completion of all A/F sensor monitors is required to change the value in TEST RESULT.
(k) Note the value of the Monitor Result.
(l) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
(m) Check if any DTCs (any pending DTCs) are set.

MONITOR STRATEGY

Related DTCs	P2A00: Air-Fuel Ratio (A/F) sensor slow response
Required Sensors/Components (Main)	A/F sensor
Required Sensors/Components (Related)	Vehicle speed sensor, crankshaft position sensor
Frequency of Operation	Once per driving cycle
Duration	10 to 15 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	P0031, 32 (A/F Sensor heater - Sensor 1) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0171, P0172 (Fuel system) P0300 - P0304 (Misfire) P0335 (CKP sensor) P0340 (CMP sensor) P0455, P0456 (EVAP system) P0500 (VSS) P2196 (A/F Sensor - rationality)
Active A/F control	Performing
Active A/F control performed when following conditions met	-
Engine coolant temperature	75°C (167°F) or more
Battery voltage	11 V or more
Idle	OFF
Engine RPM	Less than 4,000 rpm
A/F sensor status	Activated
Fuel-cut	OFF
Engine load	10 to 70%
Shift position	1 or more
Catalyst monitor	Not yet
Intake air amount	2.5 to 11 g/sec.

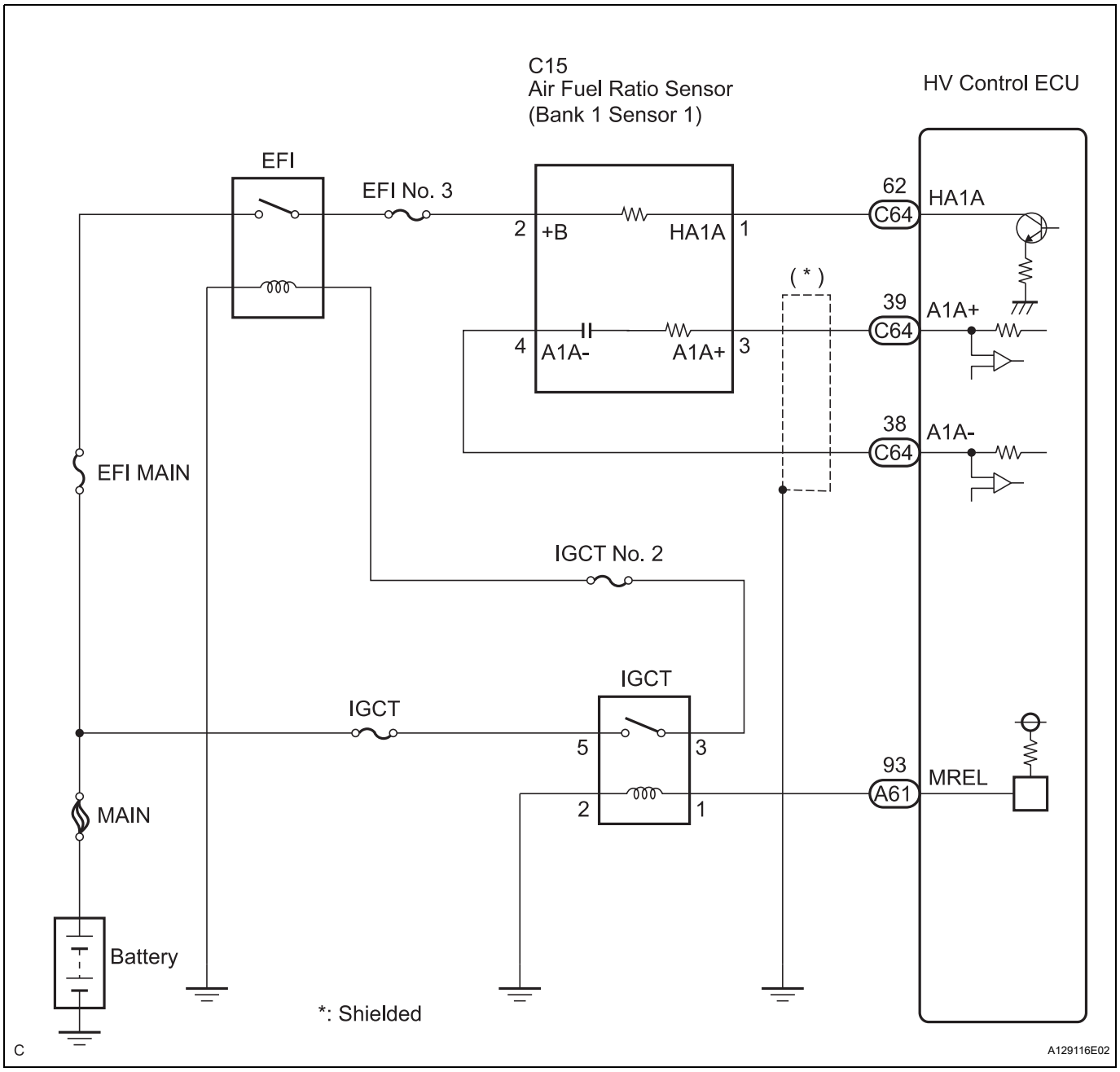
TYPICAL MALFUNCTION THRESHOLDS

Response rate deterioration level	Less than 0.25 V

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-14).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Intelligent tester only:

Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Air-Fuel Ratio (A/F) sensor, Heated Oxygen (HO2) sensor and other potential trouble areas are malfunctioning.

The following instructions describe how to conduct the A/F CONTROL operation using the intelligent tester.

(a) Connect the intelligent tester to the DLC3.

(b) Put the engine in inspection mode (See page ES-35).

(c) Turn the tester on.

(d) Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.

(e) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(f) Perform the A/F CONTROL operation with the engine idling (press the RIGHT or LEFT button to change the fuel injection volume).
(g) Monitor the voltage outputs of the A/F and HO2 sensors (AFS B1 S1 and O2S B1 S2) displayed on the tester.
HINT:

- The A/F CONTROL operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.
- The sensors react in accordance with increases and decreases in the fuel injection volume.

Standard

Tester Display (Sensor)	Injection Volumes	Status	Voltages
AFS B1 S1 (A/F)	+25%	Rich	Less than 3.0
	-12.5%	Lean	More than 3.35
O2S B1 S2 (HO2)	+25%	Rich	More than 0.5
	-12.5%	Lean	Less than 0.4

NOTICE:
The A/F sensor has an output delay of a few seconds and the HO2 sensor has a maximum output delay of approximately 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Areas
1	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		-
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage More than 0.5 V Less than 0.4 V		
2	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• A/F sensor • A/F sensor heater • A/F sensor circuit
	Output Voltage Almost no reaction		Output Voltage More than 0.5 V Less than 0.4 V		
3	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• HO2 sensor • HO2 sensor heater • HO2 sensor circuit
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage Almost no reaction		
4	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• Injector • Fuel pressure • Gas leakage from exhaust system (Air-fuel ratio extremely lean or rich)
	Output Voltage Almost no reaction		Output voltage Almost no reaction		

Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the A/F and HO2 sensors.
To display the graph, select the following menu items on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1 S1 and O2S B1 S2; and press the YES button and then the ENTER button followed by the F4 button.

HINT:
- DTC P2A00 may be set when the air-fuel ratio is stuck rich or lean.
- A low A/F sensor voltage could be caused by a rich air-fuel mixture. Check for conditions that would cause the engine to run rich.
- A high A/F sensor voltage could be caused by a lean air-fuel mixture. Check for conditions that would cause the engine to run lean.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P2A00)

ES

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P2A00	A
P2A00 and other DTCs	B

If any DTCs relating to the A/F sensor (DTCs for the A/F sensor heater or A/F sensor admittance) are output, troubleshoot those DTCs first.

B → **GO TO DTC CHART**

A

2 INSPECT AIR-FUEL RATIO SENSOR (HEATER RESISTANCE) (See page ES-75)

NG → **REPLACE AIR-FUEL RATIO SENSOR**

OK

3 CHECK HARNESS AND CONNECTOR (HV CONTROL ECU - AIR-FUEL RATIO SENSOR) (See page ES-287)

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 PERFORM CONFIRMATION DRIVING PATTERN

NEXT

5	CHECK WHETHER DTC OUTPUT RECURS (DTC P2A00)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
(d) Read the pending DTCs.

Result

Display (DTC Output)	Proceed to
P2A00	A
No output	B

ES

B → CHECK FOR INTERMITTENT PROBLEMS

A

6	REPLACE AIR-FUEL RATIO SENSOR

NEXT

7	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

8	CHECK WHETHER DTC OUTPUT RECURS (DTC P2A00)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
(d) Read the pending DTCs.

Result

Display (DTC Output)	Proceed to
No output	A
P2A00	B

B → REPLACE HYBRID VEHICLE CONTROL ECU

A

END

DTC	P3190	Poor Engine Power

DTC	P3191	Engine does not Start

DTC	P3193	Fuel Run Out

DESCRIPTION

From the HV ECU, the ECM (included in hybrid vehicle control ECU) receives data such as power output required for the engine (required output), estimated torque produced by the engine (estimated torque), engine RPM of control target (target RPM), whether the engine is in start mode or not. Then, based on the required output and target RPM, the ECM (included in hybrid vehicle control ECU) calculates a target torque that is to be produced by the engine and compares it with the estimated torque. If the estimated torque is very low compared with the target torque, or the engine start mode continues for the specific duration calculated by water temperature, an abnormal condition is detected.

ES

DTC No.	DTC Detection Condition	Trouble Area
P3190	Following conditions continue at a fixed engine RPM or a fixed length of time: • Communication with HV ECU is normal • Engine RPM is a fixed value or more • Engine start mode is not active • Target torque is a fixed value • Ratio of estimated torque against target torque is less than 20%	• Air induction system • Throttle body • Fuel pressure • Engine • Mass Air flow meter • Out of fuel • Engine coolant temperature sensor • Crankshaft position sensor • Camshaft position sensor • Hybrid vehicle control ECU
P3191	Following conditions continue at a fixed engine RPM or a fixed length of time: • Communication with HV ECU is normal • Engine RPM is a fixed value or more • Engine start mode is active	• Air induction system • Throttle body • Fuel pressure • Engine • Mass Air flow meter • Out of fuel • Engine coolant temperature sensor • Crankshaft position sensor • Camshaft position sensor • Hybrid vehicle control ECU
P3193	Following conditions are met: • Fuel low level signal input into ECM (Included in hybrid vehicle control ECU) • Detection condition for P3190 or P3191 is satisfied	• Out of fuel • Hybrid vehicle control ECU

MONITOR DESCRIPTION

The ECM (Included in hybrid vehicle control ECU) and hybrid vehicle control ECU are connected by a communication line called CAN. The ECM (included in hybrid vehicle control ECU) sends information on the engine speed and other data to the hybrid vehicle control ECU while the hybrid vehicle control ECU sends the information such as a requirement for the engine power to the ECM (included in hybrid vehicle control ECU) using the CAN communication line. When the communication between the ECM (included in hybrid vehicle control ECU) and hybrid vehicle control ECU is normal and the following items becomes specific conditions, the ECM (included in hybrid vehicle control ECU) will illuminate the MIL and set a DTC.

1. Engine speed
2. Power switch
3. Target torque
4. Ratio of target torque against estimated torque
5. Fuel level

MONITOR STRATEGY

Related DTCs	P3190: Poor engine power P3191: Engine does not start P3193: Fuel run out
Required sensors/components	Main sensors: Crankshaft position sensor Related sensors: Hybrid vehicle control ECU
Frequency of operation	Continuous
Duration	100 engine revolutions and 6 seconds
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ES

Monitor runs whenever following DTCs not present	None
Fuel cut operation	Not operated
Engine speed	650 rpm or more (varies with engine coolant temperature)

TYPICAL MALFUNCTION THRESHOLDS

Case1: P3190

Time for low engine torque	100 engine revolutions or more, and 6 seconds or more (varies with engine coolant temperature)
Fuel level	Not empty

Case2: P3191

Engine start no-determination time (received from HV ECU)	100 engine revolutions or more, and 6 seconds or more (varies with engine coolant temperature)
Fuel level	Not empty

Case3: P3193

Time for low engine torque or Engine start no-determination time	100 engine revolutions or more, and 6 seconds or more (varies with engine coolant temperature)
Fuel level	Empty

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester or the OBD II scan tool. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P3190, P3191 AND/OR P3193)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the intelligent tester or the OBD II scan tool on.
(d) On the intelligent tester, select the items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs using the intelligent tester or the OBD II scan tool.

Result

Display (DTC output)	Proceed to
P3190, P3191 and/or P3193	A

Display (DTC output)	Proceed to
P3190, P3191 and/or P3193, and other DTCs	B

HINT:
If any other codes besides P3190, P3191 and/or P3193 are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART

A

2 CHECK FOR FUEL (SHORTAGE OF FUEL)

NG → REFILL FUEL

OK

3 CHECK AIR INDUCTION SYSTEM

OK:
The air induction system has no leakage and blockages.

NG → REPAIR OR REPLACE AIR INDUCTION SYSTEM

OK

4 CHECK FOR SYMPTOMS

(a) Check for unusual noise or vibration when starting the engine or when the engine is revving up.

OK:
Unusual noise and vibration do not occur.

NG → REPAIR OR REPLACE MALFUNCTIONING PARTS, COMPONENT AND AREA

OK

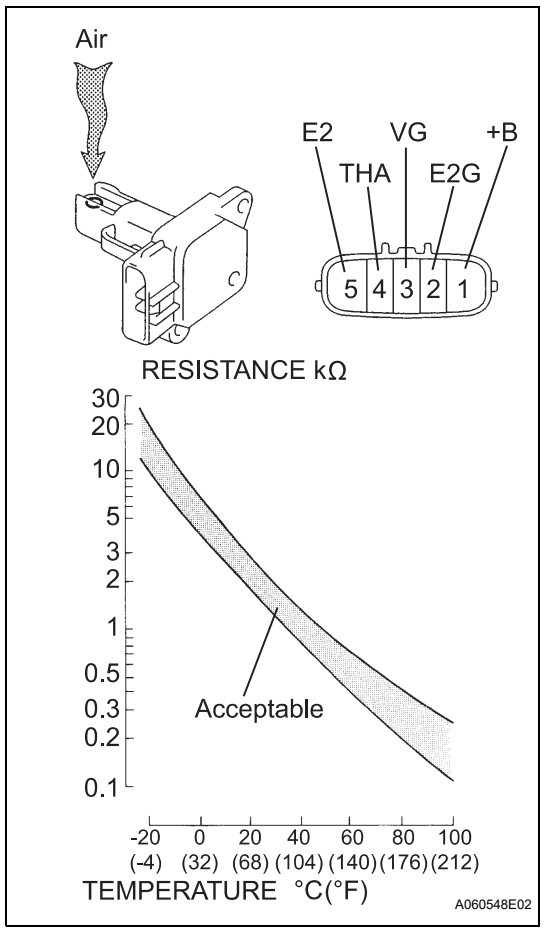
5 CHECK FUEL PRESSURE

(a) Check the fuel pressure (See page FU-9).
Standard:
304 to 343 kPa (3.1 to 3.5 kgf/cm^2, 44.1 to 49.7 psi)

NG → CHECK AND REPLACE FUEL SYSTEM

OK

6	INSPECT MASS AIR FLOW METER ASSEMBLY



(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / MAF.
Standard:
0.54 g/s or less
(d) Inspect resistance.
(1) Measure the resistance between the terminals of the mass air flow meter.
Standard resistance

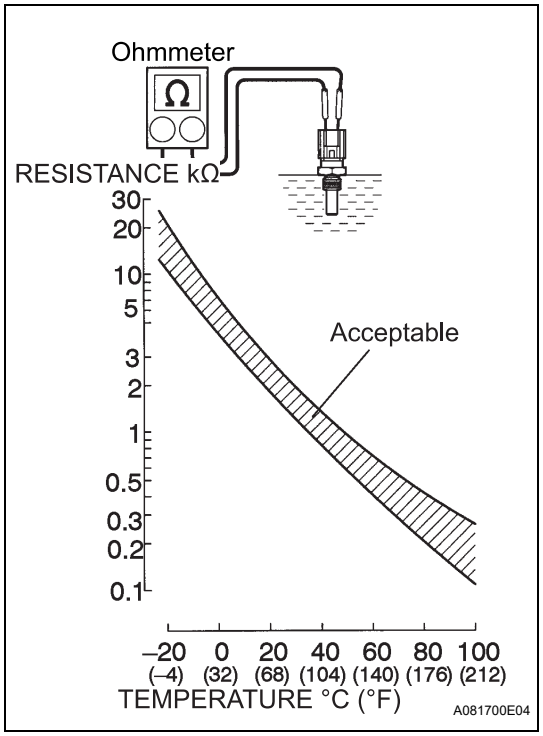
Tester Connection	Specified Condition
THA (4) - E2 (5)	13.6 to 18.4 kΩ at -20°C (-4°F)
THA (4) - E2 (5)	2.21 to 2.69 kΩ at 20°C (68°F)
THA (4) - E2 (5)	0.49 to 0.67 kΩ at 60°C (140°F)

(e) Reinstall the mass air flow meter.

NG → **REPLACE MASS AIR FLOW METER ASSEMBLY**

OK

7 INSPECT ENGINE COOLANT TEMPERATURE SENSOR



(a) Remove the engine coolant temperature sensor.
(b) Measure the resistance between the terminals of the engine coolant temperature sensor.
Standard resistance

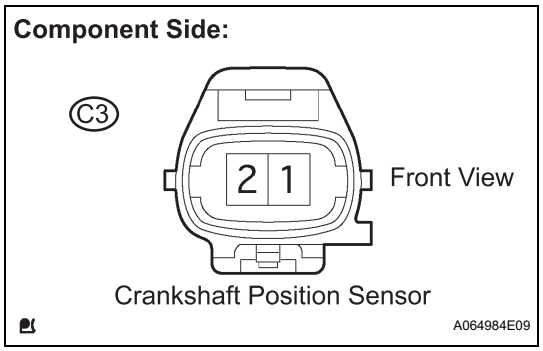
Tester Connection	Specified Condition
1 - 2	2 to 3 kΩ at 20°C (68°F)
1 - 2	0.2 to 0.4 kΩ at 80°C (176°F)

NOTICE:
In case of checking the engine coolant temperature sensor in water, be careful not to allow water to contact the terminals. After checking, dry the sensor.
HINT:
Alternate procedure: Connect an ohmmeter to the installed engine coolant temperature sensor and read the resistance. Use an infrared thermometer to measure the engine temperature in the immediate vicinity of the sensor. Compare these values to the resistance/ temperature graph. Change the engine temperature (warm up or allow to cool down) and repeat the test.
(c) Reinstall the engine coolant temperature sensor.

NG → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

OK

8 INSPECT CRANKSHAFT POSITION SENSOR



(a) Disconnect the C3 crankshaft position sensor connector.
(b) Measure the resistance between the terminals of the crankshaft position sensor connector.
Standard resistance

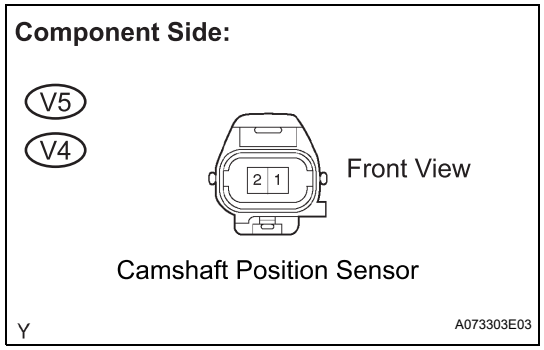
Tester Connection	Specified Condition
1 - 2	985 to 1,600 Ω at cold
1 - 2	1,265 to 1,890 Ω at hot

(c) Reconnect the crankshaft position sensor connector.
NOTICE:
Terms "cold" and "hot" refer to the temperature of the coils. "Cold" means approximately -10°C to 50°C (14°F to 122°F). "Hot" means approximately 50°C to 100°C (122°F to 212°F).

NG → **REPLACE CRANKSHAFT POSITION SENSOR**

OK

9 INSPECT CAMSHAFT POSITION SENSOR



(a) Disconnect the V5 and V4 camshaft position sensor connectors.
(b) Measure the resistance between the terminals of camshaft position sensor connector.
Standard resistance

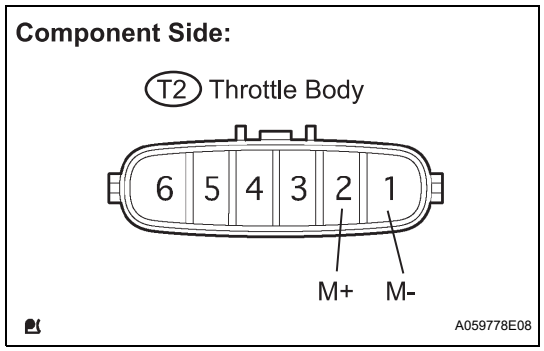
Tester Connection	Specified Condition
1 - 2	1,630 to 2,740 Ω at cold
1 - 2	2,065 to 3, 225 Ω at hot

(c) Reconnect the camshaft position sensor connector.
NOTICE:
Terms "cold" and "hot" refer to the temperature of the coils. "Cold" means approximately -10°C to 50°C (14°F to 122°F). "Hot" means approximately 50°C to 100°C (122°F to 212°F).

NG → **REPLACE CAMSHAFT POSITION SENOR**

OK

10 INSPECT THROTTLE CONTROL MOTOR



(a) Disconnect the throttle control motor connector.
(b) Using an ohmmeter, measure the motor resistance between terminals 1 (M-) and 2 (M+).
Standard resistance

Tester Connection	Specified Condition
1 - 2	0.3 to 100 Ω at 20°C (68°F)

NG → **REPLACE THROTTLE BODY ASSEMBLY**

OK

11 INSPECT THROTTLE POSITION SENSOR

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester on.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / THROTTLE SSR #1 and THROTTLE SSR #2.
(d) Check the values displayed on the tester.

Standard voltage

Item	Condition	Specified Condition
THROTTLE SSR #1	Throttle fully closed	2.15 to 2.35 V
	Throttle fully open	4.5 to 5.0 V

Item	Condition	Specified Condition
THROTTLE SSR #2	Throttle fully closed	0.66 to 0.76 V
	Throttle fully open	3.8 to 4.2 V

NG → REPLACE THROTTLE BODY ASSEMBLY

OK

REPLACE HYBRID VEHICLE CONTROL ECU

DTC	U0001	High Speed CAN Communication Circuit

DESCRIPTION

The engine control unit and the transmission control unit are located inside the ECM (Included in hybrid vehicle control ECU). The engine control unit intercommunicates with the transmission control ECU using the Controller Area Network (CAN).
If there is a problem in this intercommunication, the ECM sets a DTC.

DTC No.	DTC Detection Condition	Trouble Area
U0001	Following conditions are met for 2 seconds (1-trip detection logic): (a) Power switch on (IG) (b) Battery voltage is 10.5 V or more (c) No intercommunication between engine control ECU and hybrid vehicle control ECU	Hybrid vehicle control ECU

ES

MONITOR STRATEGY

Related DTCs	U0001: Verify communication
Required Sensors/Components (Main)	Hybrid vehicle control ECU
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	10.6 seconds
MIL Operation	immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Battery Voltage	10.5 V or more (0.5 second or more)
Power switch	ON

TYPICAL MALFUNCTION THRESHOLDS

Communication between hybrid vehicle control ECU and TCM	No communication

INSPECTION PROCEDURE

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC U0001)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC output)	Proceed to
U0001	A
U0001 and other DTCs	B

B → GO TO DTC CHART

A

REPLACE HYBRID VEHICLE CONTROL ECU

DTC	U0293	Lost Communication with HV ECU

DESCRIPTION

The controller Area Network (CAN) is a serial data communication system for real-time applications. It is a multiplex communication system designed for on-vehicle use that provides a superior communication speed of 500 kbps and a capability to detect malfunctions. Through the combination of the CANH and CANL bus lines, the CAN is able to maintain communication based on differential voltage.

DTC No.	DTC Detecting Condition	Trouble Area
U0293	When communication with hybrid vehicle control ECU is interrupted	• Wire harness • Hybrid vehicle control ECU

MONITOR STRATEGY

Related DTCs	U0001: Lost communication with hybrid vehicle control ECU
Required Sensors/Components (Main)	ECM
Frequency of Operation	Continuous
Duration	0.68 seconds
MIL Operation	immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Battery Voltage	10.5 V or more (0.5 second or more)
Power switch	ON

TYPICAL MALFUNCTION THRESHOLDS

Communication signal	No signal from hybrid vehicle control ECU

INSPECTION PROCEDURE

Refer to CAN Communication System (See page CA-7).

EVAP System

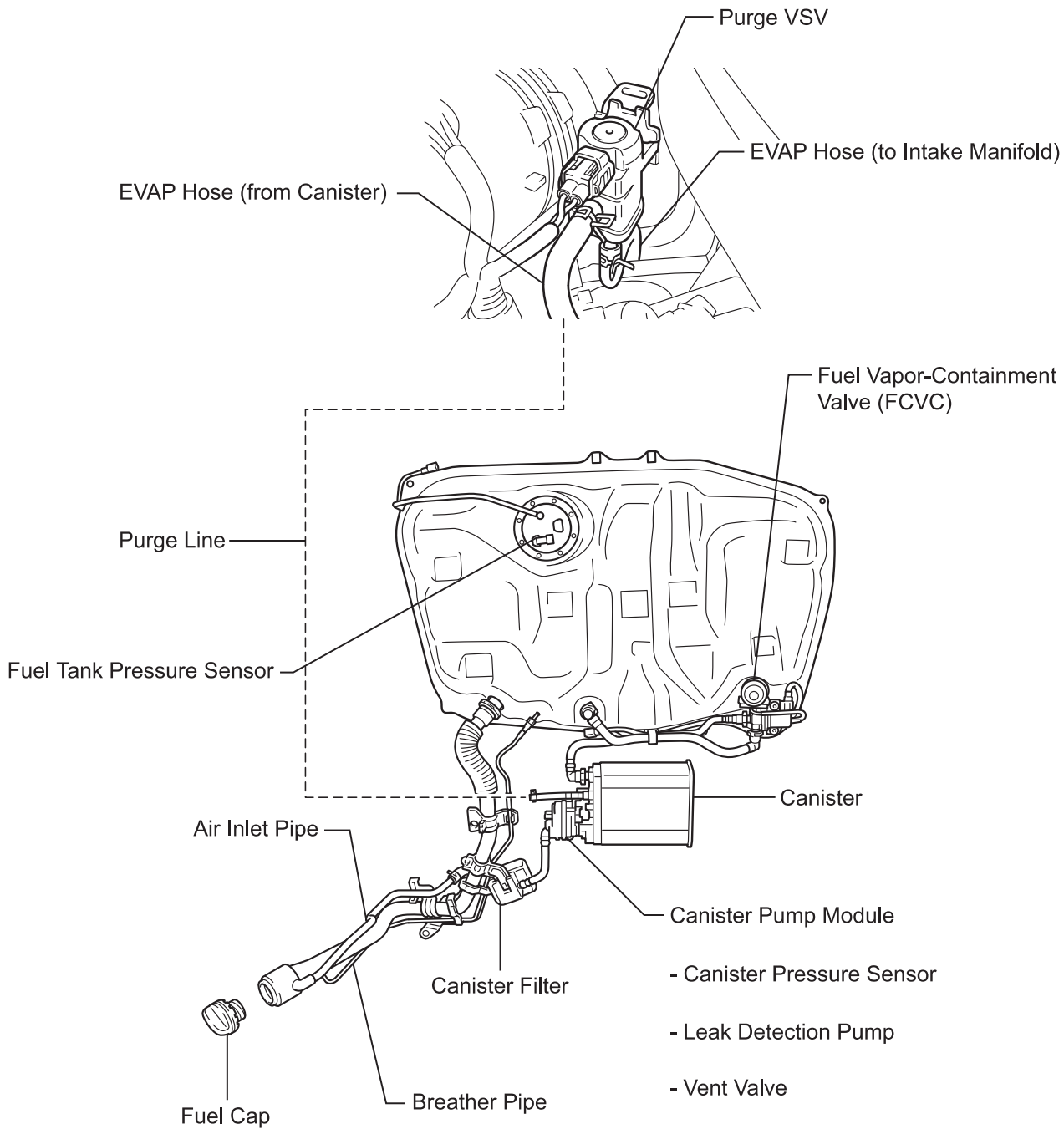
DESCRIPTION

While the engine is running, if a predetermined condition (closed loop, etc.) is met, the purge VSV is opened by the ECM (included in hybrid vehicle control ECU) and stored fuel vapors in the canister are purged to the intake manifold. The ECM will change the duty cycle ratio of the purge VSV to control purge flow volume.

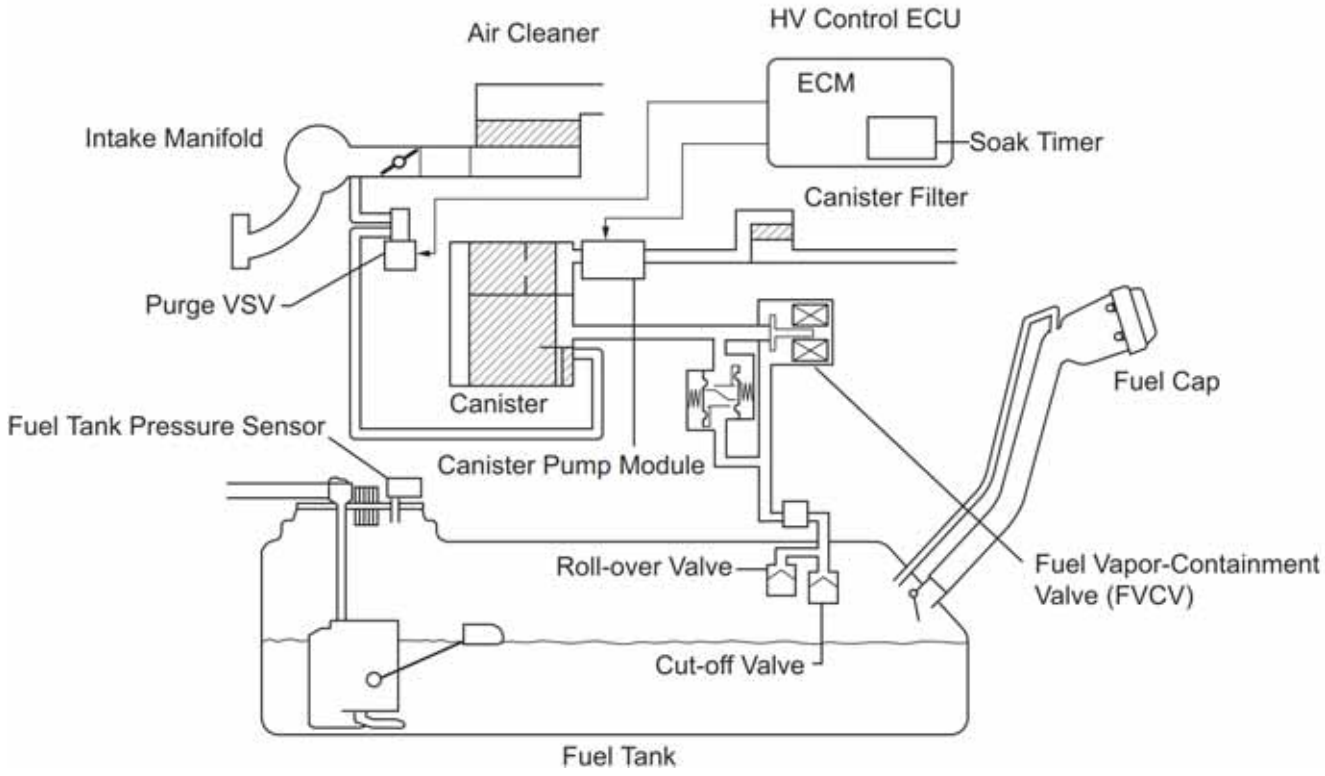
Purge flow volume is also determined by the intake manifold pressure. Atmospheric pressure is allowed into the canister through the vent valve to ensure that purge flow is maintained when negative pressure (vacuum) is applied to the canister.

The ECM monitors the condition of both the key-off monitor and purge flow monitor to ensure proper operation of the EVAP system.

Location of EVAP (Evaporative Emission) System:



EVAP System Circuit



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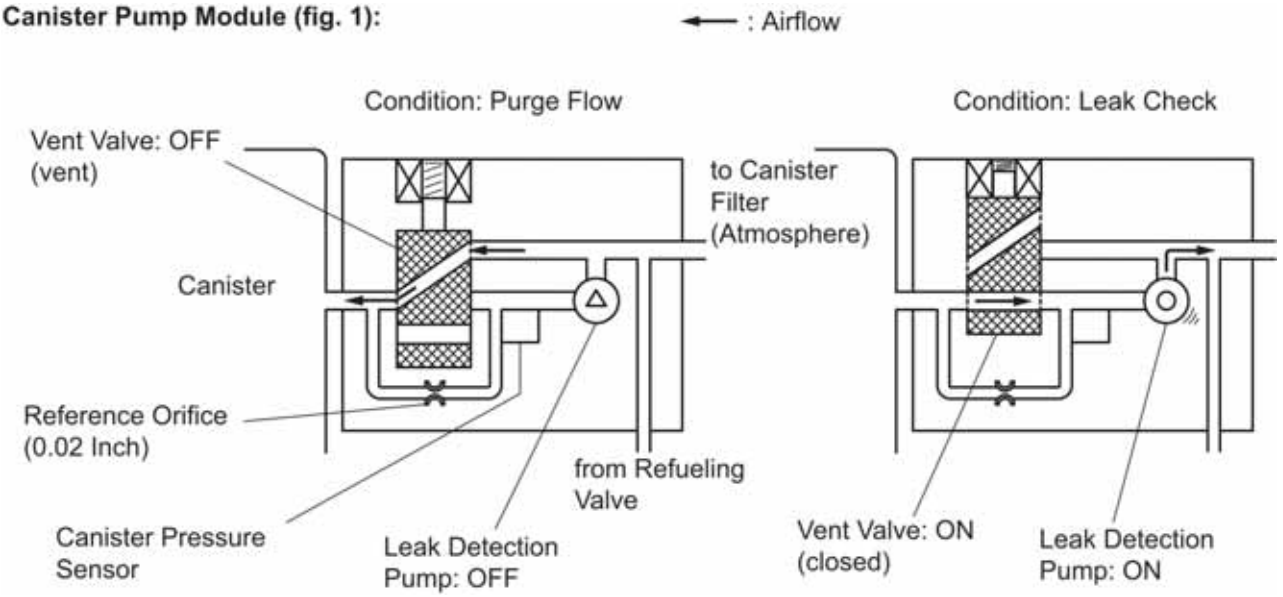
Component	Operation
Canister	Contains activated charcoal to absorb EVAP that is created in fuel tank.
Cut-off valve	Located in the fuel tank. Valve closes by its own weight when vehicle is overturned to prevent fuel from spilling out.
Purge VSV	Opens or closes line between canister and intake manifold. ECM opens and closes purge VSV to control EVAP purge flow. ECM opens purge valve to purge vapor gas that was absorbed by canister to intake manifold. ECM controls EVAP volume purged to intake manifold by duty cycle (current-carrying time) to purge valve. (ON: Open, OFF: Closed)
Roll-over valve	Located in fuel tank. Valve floats and closes when fuel tank is filled to 100%. Also, valve closes by its own weight when vehicle is over turned to prevent fuel from spilling out.
Soak timer	Built into ECM. Soak timer counts power switch OFF time.
Fuel vapor-containment valve (FVCV)	Opens and closes line between fuel tank and canister. When vehicle is stopped, this valve closes to keep vapor in the tank and prevent it from being absorbed in canister. During refueling, valve opens and vapor is absorbed in canister. When driving, valve acts to change pressure in the tank slightly positive.
Fuel tank pressure sensor	Converts fuel tank pressure into voltage and outputs that voltage. ECM supplies a constant voltage of 5 V to pressure sensor and uses feedback from sensor to monitor fuel tank pressure. (fig. 3)
Canister pump module	(a) to (e) below are canister pump module components. Canister pump module cannot be disassembled.
(a) Vent valve	Vents and closes EVAP system. When ECM turns valve ON, EVAP system is closed. When, ECM turns valve OFF, EVAP system is vented. Negative pressure (vacuum) created in EVAP system to check EVAP leaks by closing purge VSV, turning on vent valve (closed) and operating vacuum pump (refer to fig. 1).
(b) Canister pressure sensor	Indicates EVAP pressure as voltage 5 V is applied by ECM. ECM detects EVAP system pressure using this voltage (refer to fig. 2).
(c) Check valve	Composed of nylon ball and spring. Valve blocks off atmosphere from the vacuum pump.
(d) Leak detection pump	Negative pressure (vacuum) is created in EVAP system for leak check.

Component	Operation
(e) Reference orifice	Diameter is 0.02 inch. Negative pressure (vacuum) is created in reference orifice to measure reference pressure by closing purge VSV, turning off vent valve (vent) and operating leak detection pump. Reference pressure indicates criterion of EVAP small leak.

Canister Pump Module (fig. 1):



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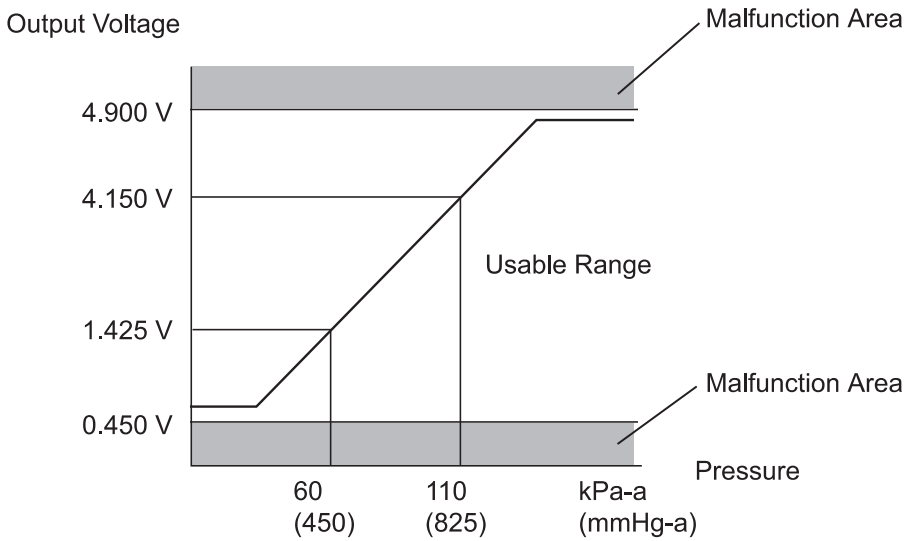
Canister Pressure Sensor Specification (fig. 2):



HINT:

Standard atmospheric pressure is 101.3 kPa-a (760 mmHg-a)

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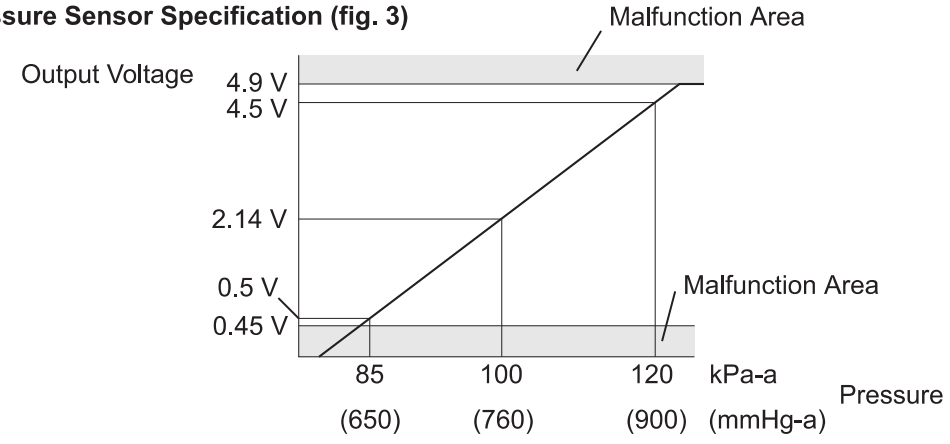
Fuel Tank Pressure Sensor Specification (fig. 3)



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Key-off monitor

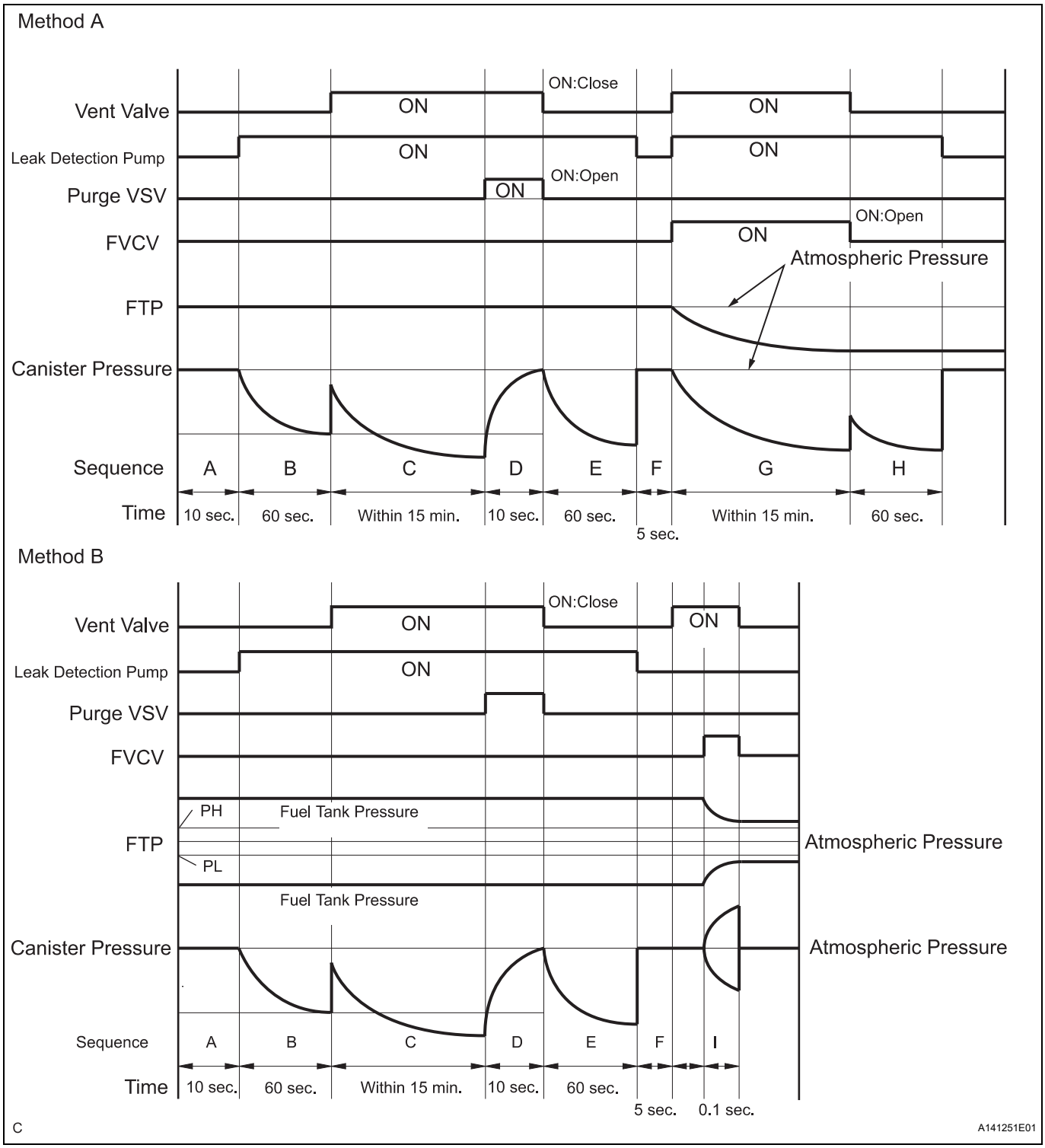
This monitoring system checks for canister pump module malfunctions and leaks from the EVAP and closed tank systems. Be sure to leave the vehicle for at least 5 hours to sufficiently cool the fuel and stabilize fuel tank pressure. This makes EVAP system monitoring more accurate.

HINT:

If the engine coolant temperature is 35°C (95°F) or more, 5 hours after the power switch has been turned off, the ECM will begin performing a monitor check after another 2 hours. If the engine coolant temperature is still 35°C (95°F) or more, 7 hours after the power switch has been turned off, the ECM will begin performing a monitor check after another 2.5 hours.

There are two methods for monitoring the EVAP system.

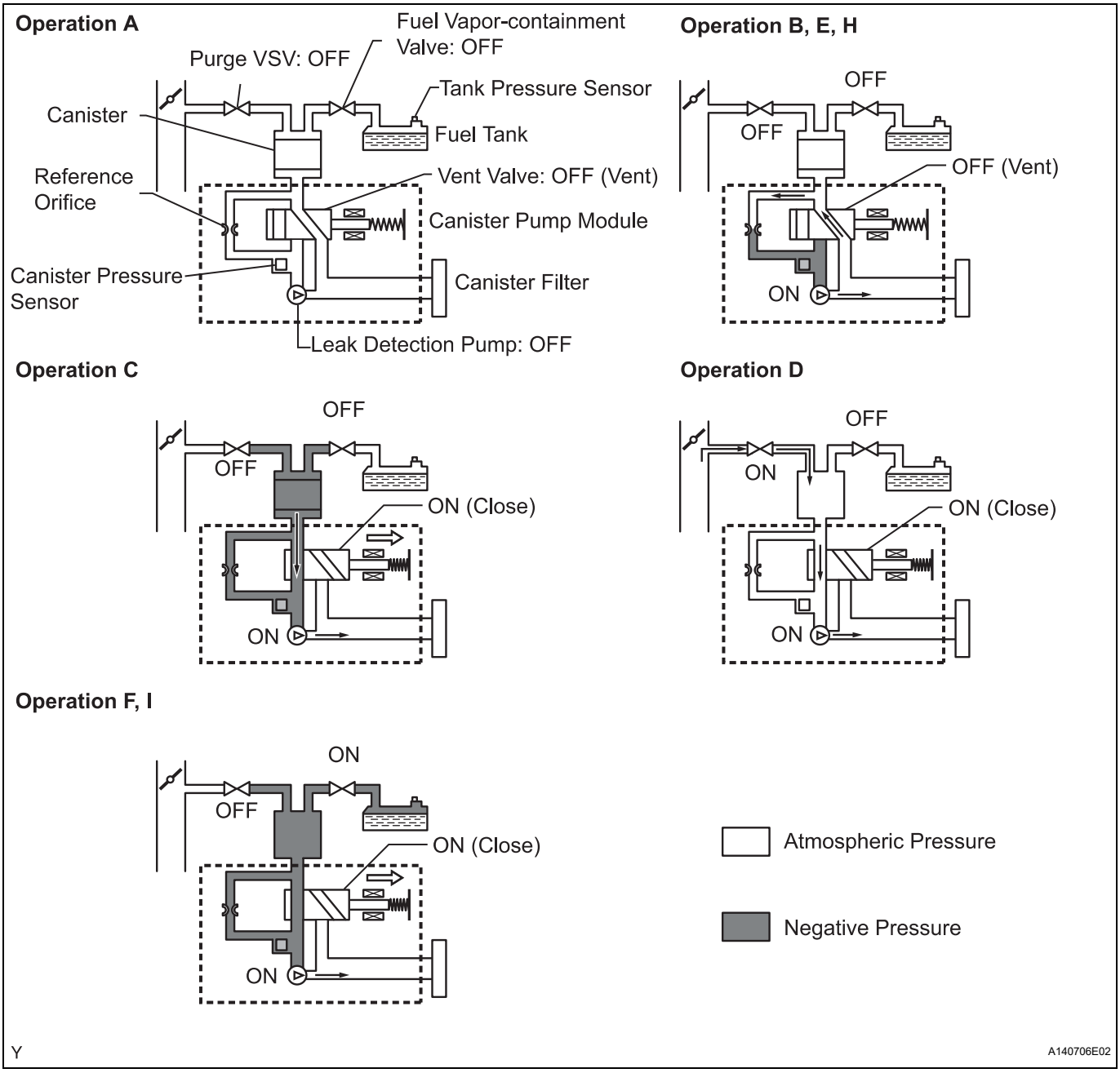
1. If the fuel tank pressure is higher or lower than the atmospheric pressure, the system determines that there are no leaks in the closed tank system and the system will check for leaks from the piping and canister between the purge VSV and canister pump module. (Method A)
2. If the fuel tank pressure is almost the same as the atmospheric pressure, vacuum pressure will enter the fuel tank and the system will check for leaks from the fuel tank after checking for leaks from the canister. (Method B)



Sequence	Operation	Description	Duration
-	ECM activation	Activated by soak timer, 5 hours (7 or 9.5 hours) after power switch turned OFF.	-
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure is measured by ECM in order to register atmospheric pressure. If pressure in EVAP system is not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds
B	First reference pressure measurement	In order to determine reference pressure standard, leak detection pump creates negative pressure (vacuum) through reference orifice and then ECM checks if leak detection pump and vent valve operate normally.	60 seconds

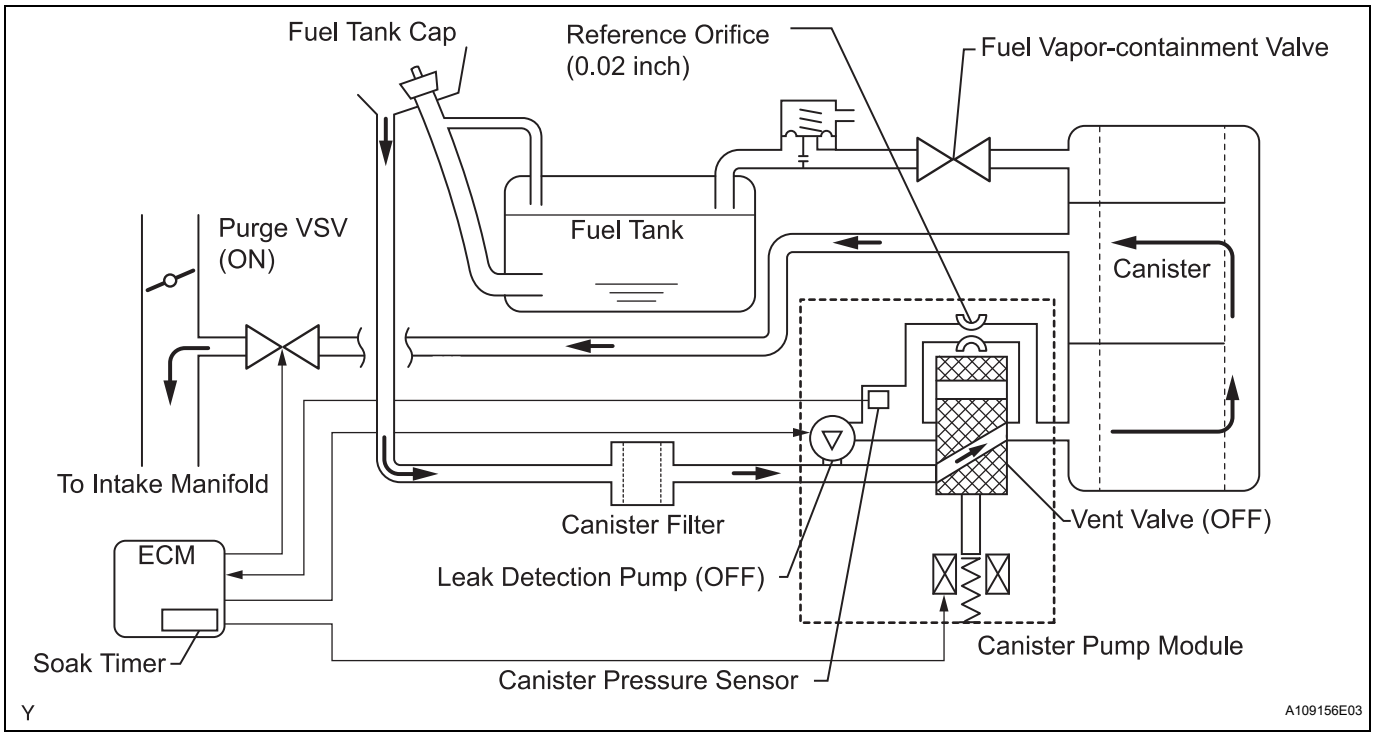
Sequence	Operation	Description	Duration
C	EVAP system pressure measurement	Vent valve is turned ON (closed) to shut EVAP system. Negative pressure (vacuum) is created in EVAP system, and EVAP system pressure is then measured. Write down measured values as they will be used in leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 minutes
D	Purge VSV monitor	Purge VSV opens and then EVAP system pressure is measured by ECM. Large increase indicates normal.	10 seconds
E	Second reference pressure measurement	After second reference pressure measurement, leak check is performed by comparing the first and second reference pressure standards. If stabilized system pressure is higher than the second reference pressure standard, ECM determines that EVAP system has a leakage.	60 seconds
F		Fuel tank pressure is compared with atmospheric pressure. If tank pressure is higher than PH or lower than PL, ECM determines that EVAP system is normal and runs sequence I in method B. If tank pressure is around atmospheric pressure, ECM performs sequence G in method A.	5 seconds
G	Fuel tank pressure measurement	Vent valve is turned ON (closed). Fuel vapor-containment valve opens to allow negative pressure into the fuel tank and fuel tank pressure is measured. Write down measured values because they will be used in leak check. If fuel tank pressure does not stabilize within 15 minutes, ECM stops monitoring.	15 minutes*
H	Third reference pressure measurement	After 3rd reference pressure measurement, leak check of fuel tank is performed. If recorded fuel tank pressure is higher than 3rd reference pressure, ECM determines that EVAP system has leakage.	60 seconds
I	Fuel vapor-containment valve close stuck check	Fuel vapor-containment valve is opened for a certain period of time to check whether the valve is stuck closed.	0.1 second
J	Final check	Atmospheric pressure is measured and then monitoring result is recorded by ECM.	-

HINT:
*: If there is only a small amount of fuel in the fuel tank, stabilizing the EVAP pressure takes longer than usual.



Purge flow monitor

If EVAP system pressure change is less than 7.5 mmHg (1 kPa) when the engine is running and the purge VSV is turned ON (closed), the ECM determines that the purge flow is insufficient.



RELATED DTCS

DTC No.	Monitoring Item
P043E	Reference orifice low flow (built into canister pump module)
P043F	Reference orifice high flow (built into canister pump module)
P0441	• Purge VSV close stuck • Purge VSV open stuck • Insufficient purge flow
P1420	Small leak from canister
P1421	Gross leak from canister
P1422	Small leak from fuel tank
P1423	Gross leak from fuel tank
P2401	Leak detection pump OFF stuck (built into canister pump module)
P2402	Leak detection pump ON stuck (built into canister pump module)
P2419	Vent valve ON (close) stuck (built into canister pump module)
P2420	Vent valve OFF (vent) stuck (built into canister pump module)
P2450	Fuel vapor-containment valve open stuck
P2451	Fuel vapor-containment valve close stuck

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-14).

CONFIRMATION DRIVING PATTERN

1. KEY-OFF MONITOR DRIVE PATTERN

(a) Connect the intelligent tester to the DLC3.

(b) Confirm the following conditions are satisfied:

- The fuel level is less than 90%.
- The altitude is less than 8,000 ft. (2,400 m).
- The vehicle is stopped (the vehicle speed is less than 2 mph).
- The ECT is 4.4 to 35°C (40 to 95°F).

- The IAT is 4.4 to 35°C (40 to 95°F).

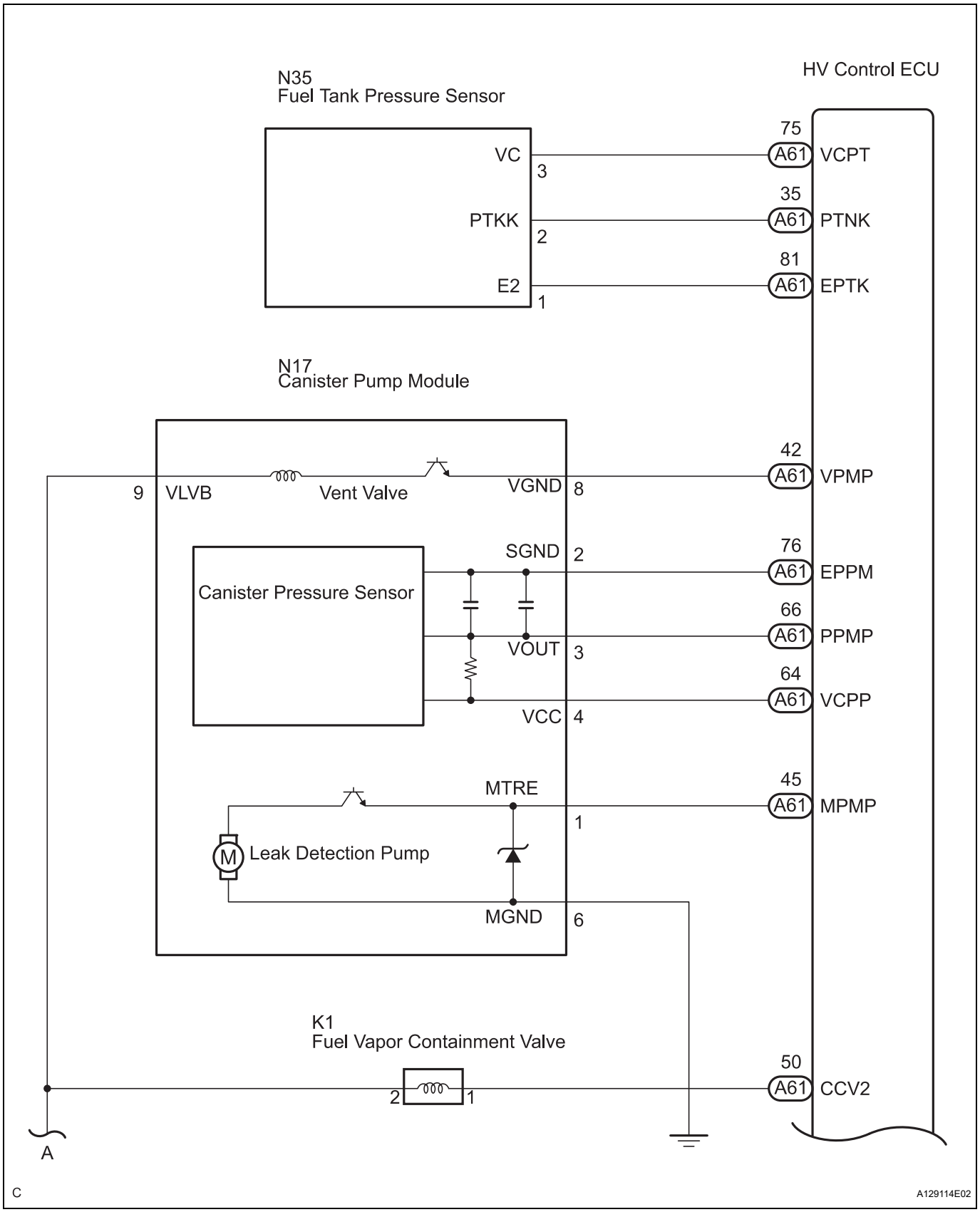
(c) Perform the drive pattern:
(1) Allow the engine to idle for 5 minutes or more.
(2) Turn the power switch off and wait 6 hours.
(d) Check the monitor status with the intelligent tester.

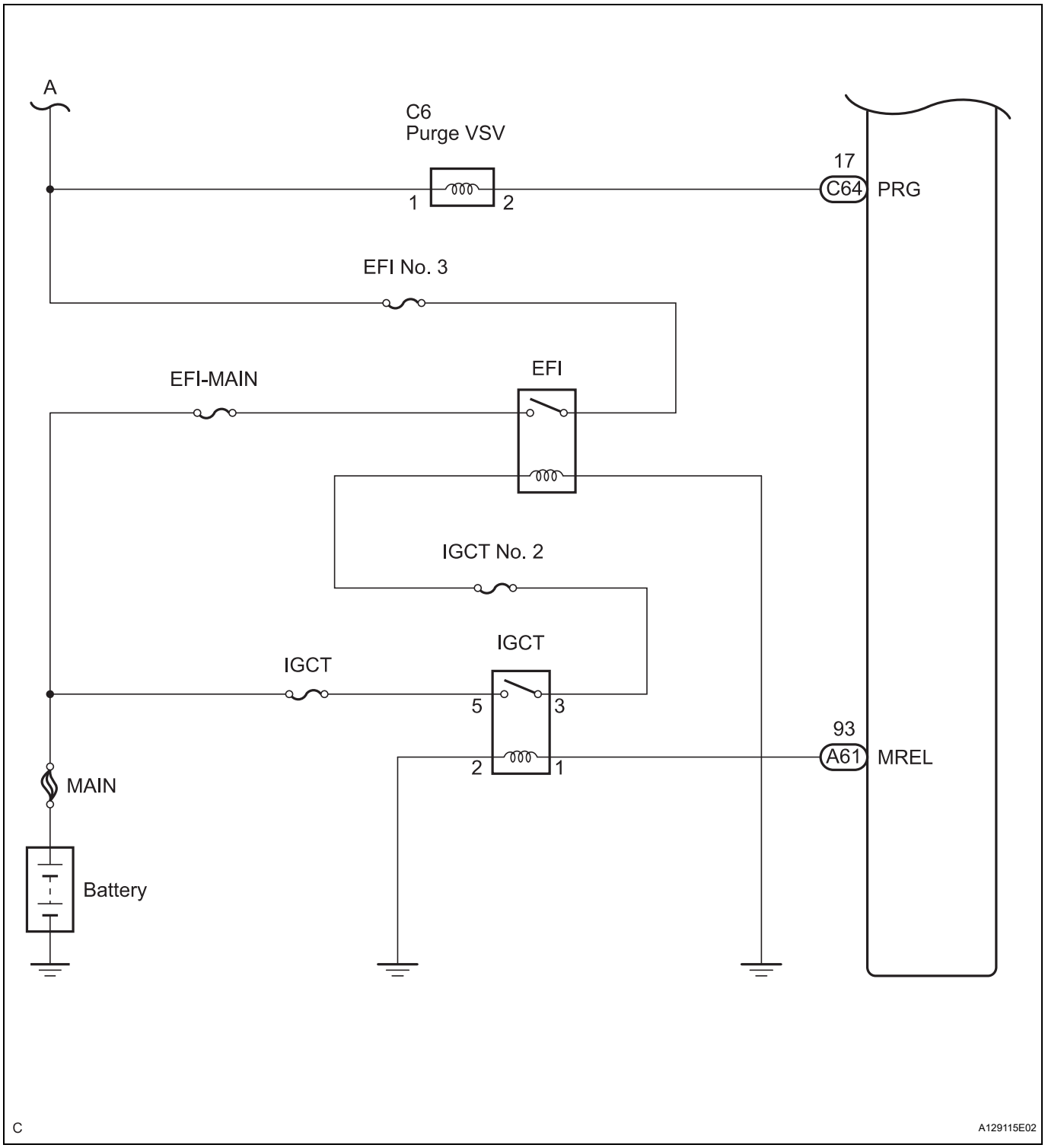
2. PURGE FLOW MONITOR DRIVE PATTERN (P0441)

(a) Connect the intelligent tester to the DLC3.
(b) Confirm that the following conditions are satisfied:
- The Engine Coolant Temperature (ECT) is more than 4.4°C (40°F).
- The Intake Air Temperature (IAT) is more than 4.4°C (40°F).

(c) Perform the drive pattern:
(1) Remove and reinstall the fuel cap to release the fuel tank pressure.
(2) Warm up the engine until the ECT reaches 75°C (167°F) or more.
(3) Run the engine at 2,500 rpm once.
(4) Allow the engine to idle and turn on the air conditioning (A/C) for 1 minute.
(d) Check the monitor status with the intelligent tester.

WIRING DIAGRAM





INSPECTION PROCEDURE

1	**CONFIRM DTC**

(a) Turn the power switch off and wait 10 seconds.
(b) Turn the power switch on (IG).
(c) Turn the power switch off and wait 10 seconds.
(d) Connect the intelligent tester to the DLC3.
(e) Turn the power switch on (IG) and turn the tester on.

(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(g) Confirm the DTCs.

DTC and Malfunction Cross-Reference:

DTC	Suspected Malfunction
P043E, P043F, P2401, P2402 and P2419	• Reference orifice low flow • Reference orifice high flow • Leak detection pump OFF stuck • Leak detection pump ON stuck • Vent valve ON (close) stuck
P2420	Vent valve OFF (vent) stuck
P0441	Purge VSV close stuck
P0441 and P1421	• Gross leak from canister • Purge VSV open stuck
P1420	Small leak from canister
P1422	Small leak from fuel tank
P1423	Gross leak from fuel tank
P1423 and P2450	FVCV open stuck
P2451	FVCV close stuck

ES

NEXT

2	PERFORM SYSTEM CHECK (EVAP SYSTEM CHECK (AUTOMATIC OPERATION))

NOTICE:

- **In EVAP SYSTEM CHECK (AUTOMATIC OPERATION), a series of 6 EVAP SYSTEM CHECK steps are performed automatically. A maximum of 15 minutes is required.**
- **Do not perform EVAP SYSTEM CHECK when the fuel tank is more than 90% full because the cut-off valve may be closed and the leak check of the fuel tank is unavailable.**
- **Do not run the engine.**
- **When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing an EVAP SYSTEM CHECK, keep the temperature below 35°C (95°F).**

(a) Clear the DTCs with the intelligent tester.
(b) Remove the fuel tank cap and reinstall the fuel cap.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / EVAP SYS CHECK / AUTO OPERATION.
(d) After EVAP SYSTEM CHECK is completed, check for DTCs.

Result

DTC	Result	Proceed to
Set	**A malfunction occurs and troubleshooting can be performed**	**A**
Not set	**No malfunctions occur and it is difficult to perform troubleshooting**	**B**
DTC is not set and any of the current DTCs (P1422, P1423, or P2450) is set	**DTCs have set because of the fuel cap loosening**	**C**

B	Go to step 33
C	END

A

3 IDENTIFICATION OF TROUBLE AREAS

(a) Identification of trouble areas according to DTCs.
(b) Refer to the table below to determine the next procedure according to the output DTCs.

Result

DTC	Suspected Malfunction	Proceed to
P0441, P1420, P1421, P1422, P1423, P2450 and/or P2451	• Purge VSV open stuck • Purge VSV close stuck • Gross leak from canister • Small leak from canister • Gross leak from fuel tank • Small leak from fuel tank • FVCV open stuck • FVCV close stuck	A
P043E, P043F, P2401, P2402, P2419 and/or P2420	• Reference orifice low flow • Reference orifice high flow • Leak detection pump OFF stuck • Leak detection pump ON stuck • Vent valve ON (close) stuck • Vent valve OFF (vent) stuck	B

B	Go to step 11

A

4 IDENTIFICATION OF TROUBLE AREAS

(a) Identification of trouble areas according to DTCs.
(b) Refer to the table below to determine the next procedure according to the output DTCs.

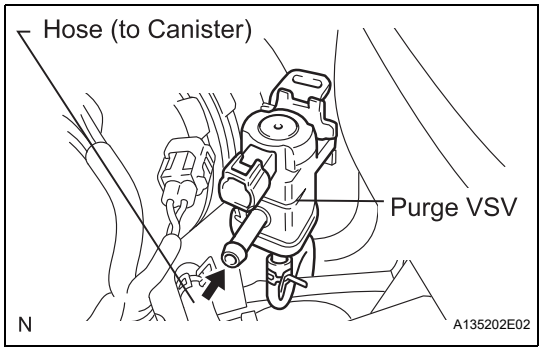
Result

DTC	Suspected Malfunction	Proceed to
P0441	Purge VSV close stuck	A
P0441 and P1421	•Gross leak from canister •Purge VSV open stuck	B
P1420	Small leak from canister	
P1422	Small leak from fuel tank	C
P1423	Gross leak from fuel tank	
P1423 and P2450	FVCV open stuck	D
P2451	FVCV close stuck	

B	Go to step 18
C	Go to step 21
D	Go to step 23

A

5	CHECK VACUUM HOSE (PURGE VSV - INTAKE MANIFOLD)



(a) Disconnect the hose (to intake manifold) from the purge VSV.
(b) Put the engine in inspection mode (See page ES-35).
(c) Use your finger and confirm that the purge VSV has suction.

ES

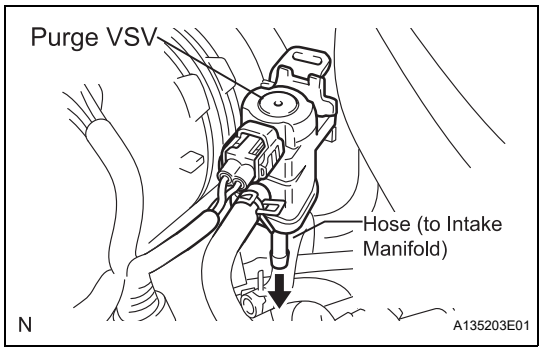
Result

Result	Proceed to
There is suction. Conclusion: EVAP hose between purge VSV and intake manifold is normal.	OK
There is no suction. Conclusion: Problem in intake manifold or hose between purge VSV and intake manifold	NG

NG → Go to step 32

OK

6	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (PURGE VSV)



(a) Disconnect the hose (to canister) from the purge VSV.
(b) Put the engine in inspection mode (See page ES-35).
(c) Enter the following menu: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / EVAP VSV (ALONE).
(d) Turn the purge VSV OFF (Purge VSV: OFF).
(e) Use your finger and confirm that the purge VSV has no suction.
(f) Turn the purge VSV ON (Purge VSV: ON).
(g) Use your finger to confirm that the purge VSV has suction.

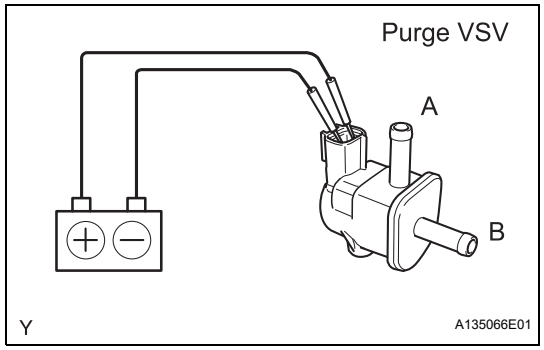
OK:

Purge VSV functions normally

OK → Go to step 32

NG

7	CHECK PURGE VSV



(a) Remove the purge VSV.
(b) Apply compressed air to the purge VSV, confirm that no air flows from A to B as shown in the illustration.
(c) Apply battery voltage to the purge VSV.
(d) While applying compressed air, confirm that air flows from A to B as shown in the illustration.

ES

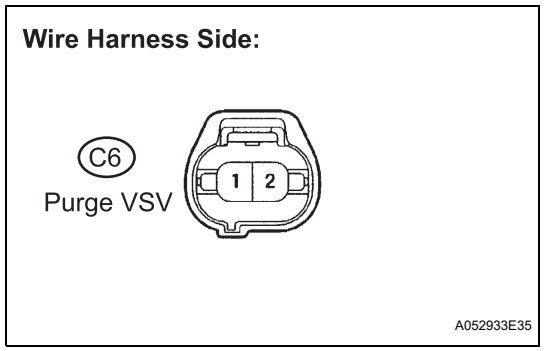
Result

Result	Proceed to
Air flows from A to B. Conclusion: purge VSV is normal.	OK
No air flows from A to B. Conclusion: purge VSV is malfunctioning.	NG

NG → Go to step 27

OK

8	CHECK HARNESS AND CONNECTOR (PURGE VSV - EFI NO.2 FUSE)



(a) Disconnect the C6 purge VSV connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage between terminal 1 of the E18 connector and body ground.

Result

Result	Proceed to
11 to 14 V Conclusion: No problem exists on power source's wires.	OK
Except above Conclusion: Problem in wire or connector between purge VSV and ECM.	NG

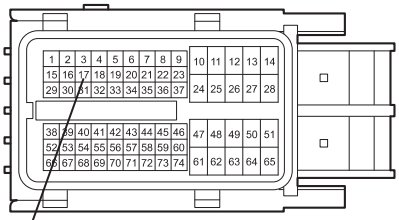
NG → Go to step 31

OK

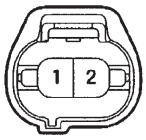
9	CHECK HARNESS AND CONNECTOR (PURGE VSV - HV CONTROL ECU)

Wire Harness Side:

C64 HV Control ECU Connector



C6 Purge VSV Connector



A140999E01

(a) Disconnect the C64 hybrid vehicle control ECU connector and the C6 purge VSV connector.
(b) Measure the resistance.
Standard resistance

Tester Connection	Specified Condition
PRG (C64-17) - C6-2	10 Ω or less
PRG (C64-17) - Body ground	10 kΩ or more
C6-2 - Body ground	10 kΩ or more

NG → **Go to step 31**

ES

OK

10	REPLACE HYBRID VEHICLE CONTROL ECU

NEXT

PERFORM SYSTEM CHECK (EVAP SYSTEM CHECK AGAIN (AUTOMATIC OPERATION))

11	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (VACUUM PUMP)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VACUUM PUMP.
(d) Turn the leak detection pump ON with the tester.
(e) Touch the canister pump module and check if the pump is moving.

OK:
Pump operates

NG → **Go to step 13**

OK

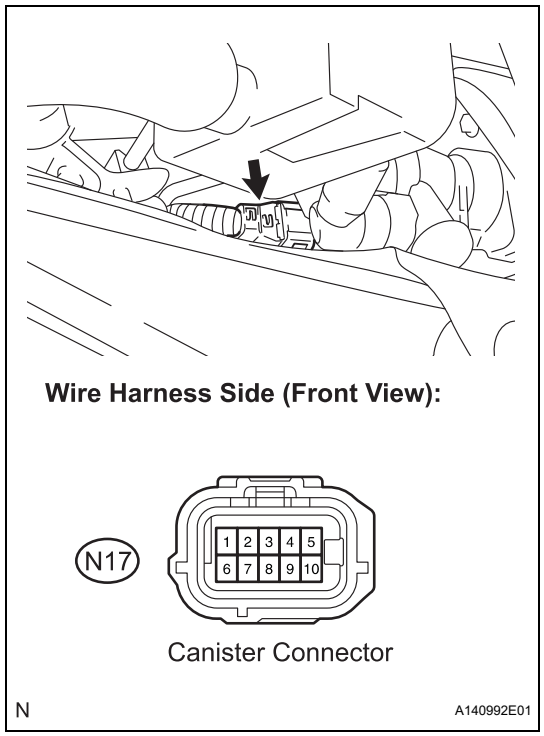
12	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (VENT VALVE)

(a) Remove the canister lower cover.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VENT VALVE.
(e) Touch the canister pump module, use the tester to turn the vent valve ON and OFF, and check if the vent valve is moving.
OK:
Vent valve vibration can be felt.

ES

OK	Go to step 28
NG	Go to step 16

13	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (VACUUM PUMP)



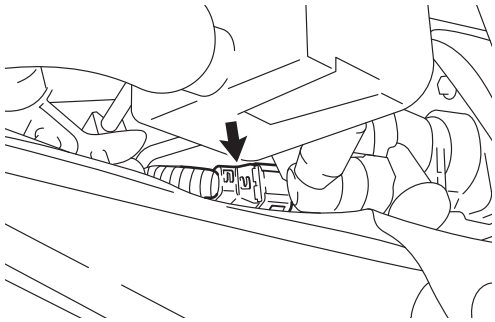
(a) Turn the power switch off.
(b) Remove the canister lower cover.
(c) Disconnect the canister pump module connector.
(d) Connect the intelligent tester to the DLC3.
(e) Turn the power switch on (IG).
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VACUUM PUMP.
(g) Turn the leak detection pump ON with the tester.
(h) Measure the voltage between MTRB terminal 1 of the canister pump module connector and body ground when the leak detection pump is turned ON and OFF using the tester.
Standard voltage:
10 to 14 V

NG	Go to step 15

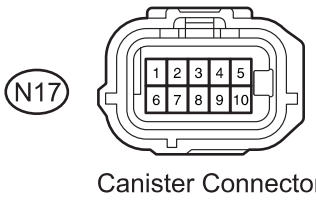
OK

14	CHECK HARNESS AND CONNECTOR (CANISTER PUMP MODULE - BODY GROUND)

(a) Remove the canister lower cover.



Wire Harness Side (Front View):



Canister Connector

N A140992E01

(b) Disconnect the canister pump module connector.
(c) Measure the resistance between the MGND terminal of the canister pump module and body ground.
Standard resistance:
Below 1 Ω

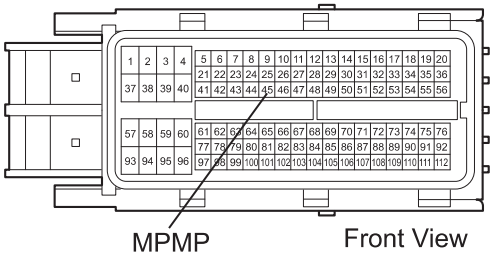
OK	**Go to step 28**
NG	**Go to step 32**

ES

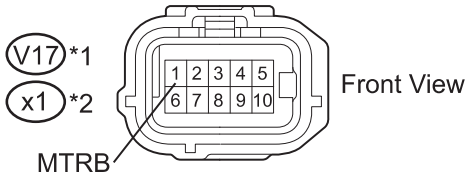
15 CHECK HARNESS AND CONNECTOR (ECM - CANISTER PUMP MODULE)

Wire Harness Side:

A61 HV Control ECU Connector



Canister Pump Module Connector



*1: without Active Stabilizer

*2: with Active Stabilizer

A140997E01

(a) Disconnect the A53 ECM connector.
(b) Disconnect the canister pump module connector.
(c) Measure the resistance between the MPMP terminal of the ECM connector and the MTRB terminal of the canister pump module connector.
Standard resistance:
without Active Stabilizer

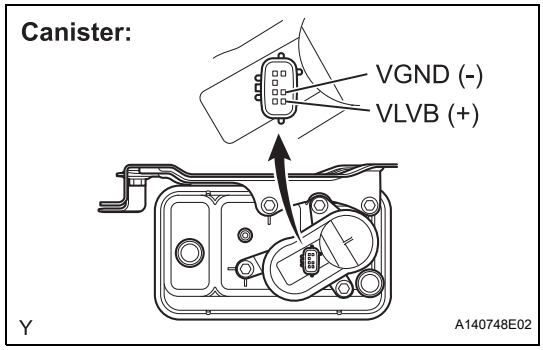
Tester Connection	Specified Condition
MPMP (A53-16) - MTRB (V17-1)	10 Ω or less
MPMP (A53-16) or MTRB (V17-1) - Body ground	10 kΩ or more

with Active Stabilizer

Tester Connection	Specified Condition
MPMP (A53-16) - MTRB (x1-1)	10 Ω or less
MPMP (A53-16) or MTRB (x1-1) - Body ground	10 kΩ or more

OK	**Go to step 26**
NG	**Go to step 32**

16	INSPECT CANISTER PUMP MODULE (VENT VALVE OPERATION)



(a) Turn the power switch off.
(b) Remove the canister lower cover.
(c) Disconnect the canister pump module connector.
(d) Apply battery voltage to the VLVB and VGND terminals of the canister pump module.
(e) Touch the canister pump module to confirm the vent valve operation.

ES

Result

Test Results	Suspected Trouble Areas	Proceed to
Operating	1. Wire harness between vent valve and ECM 2. ECM	A
Not operating	Vent valve	B

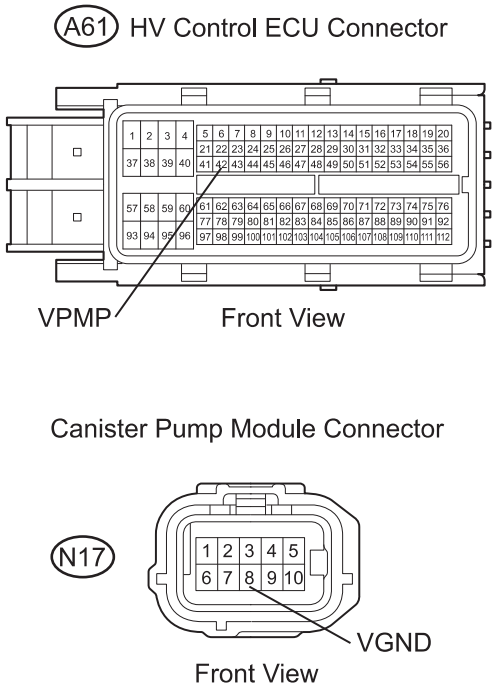
(f) Reconnect the canister connector.

B → Go to step 28

A

17	CHECK HARNESS AND CONNECTOR (CANISTER PUMP MODULE - HV CONTROL ECU)

Wire Harness Side:



(a) Disconnect the A61 hybrid vehicle control ECU connector.
(b) Disconnect the canister pump module connector.
(c) Measure the resistance between the VPMP terminal of the ECM connector and the VGND terminal of the canister pump module connector.

Standard resistance

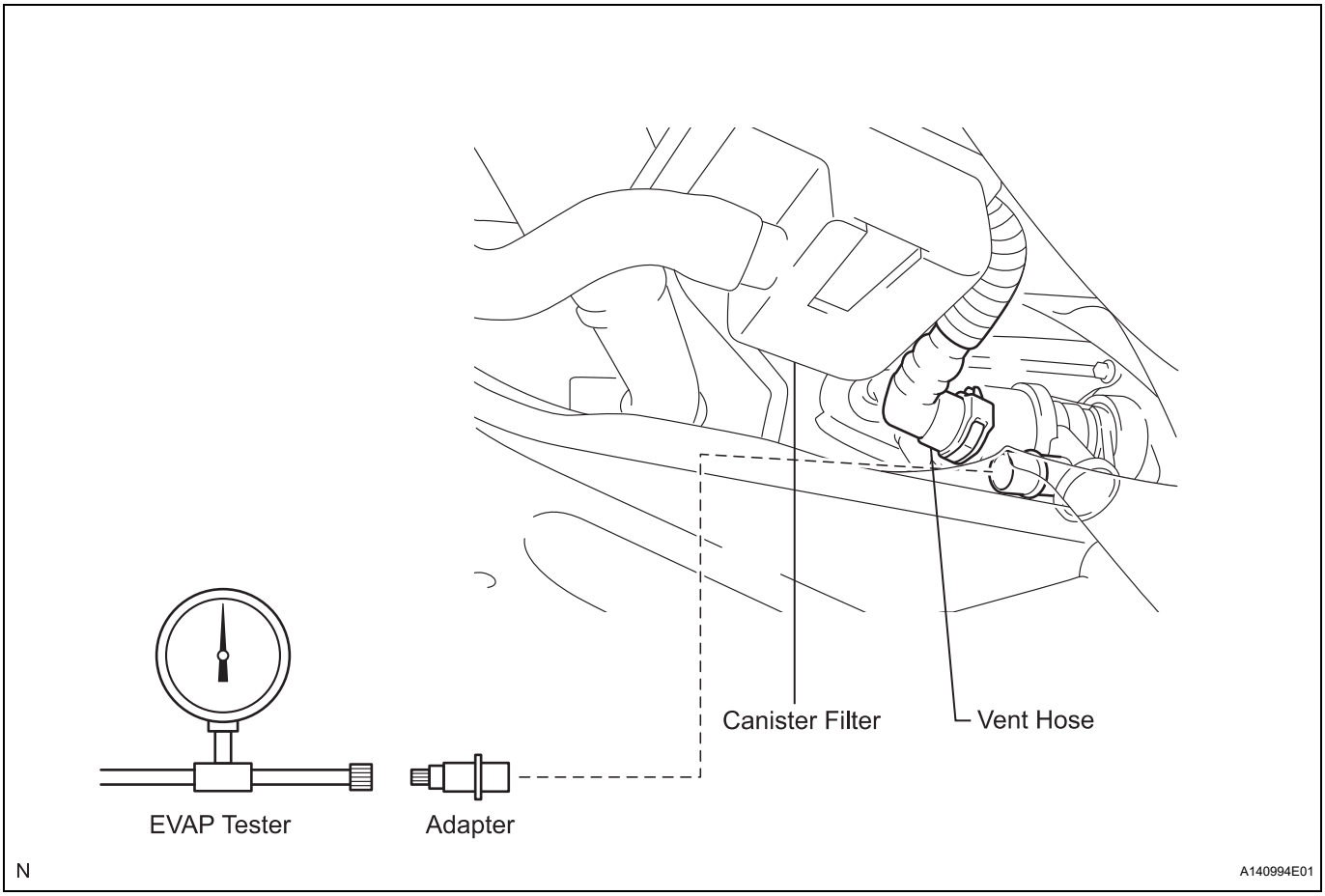
Tester Connection	Specified Condition
VPMP (A61-42) - VGND (N17-8)	10 Ω or less
VPMP (A61-42) or VGND (N17-8) - Body ground	10 kΩ or more

(d) Reconnect the hybrid vehicle control ECU connector.
(e) Reconnect the canister pump module connector.

OK	Go to step 26
NG	Go to step 31

ES

18	LOCATE EVAP LEAK PART (PURGE VSV - CANISTER)



(a) Disconnect the vent hose.
(b) Connect the EVAP tester to the vent hose with the adapter.
(c) Pressurize the EVAP system to 3.2 to 3.7 kPa (24 to 28 mmHg).
(d) Apply soapy water to the piping and connecting parts of the EVAP system.
(e) Look for areas where bubbles appear. This indicates the leak point.
(f) Repair or replace the leak point.
HINT:
Disconnect the hose between the canister and the fuel tank from the canister. Block the canister side and conduct an inspection. In this way, the fuel tank can be excluded as an area suspected of causing fuel leaks.

NEXT

19	REPLACE MALFUNCTIONING PARTS, COMPONENT AND AREA

NEXT

PERFORM SYSTEM CHECK (EVAP SYSTEM CHECK AGAIN (AUTOMATIC OPERATION))

20	CHECK FUEL TANK CAP ASSEMBLY

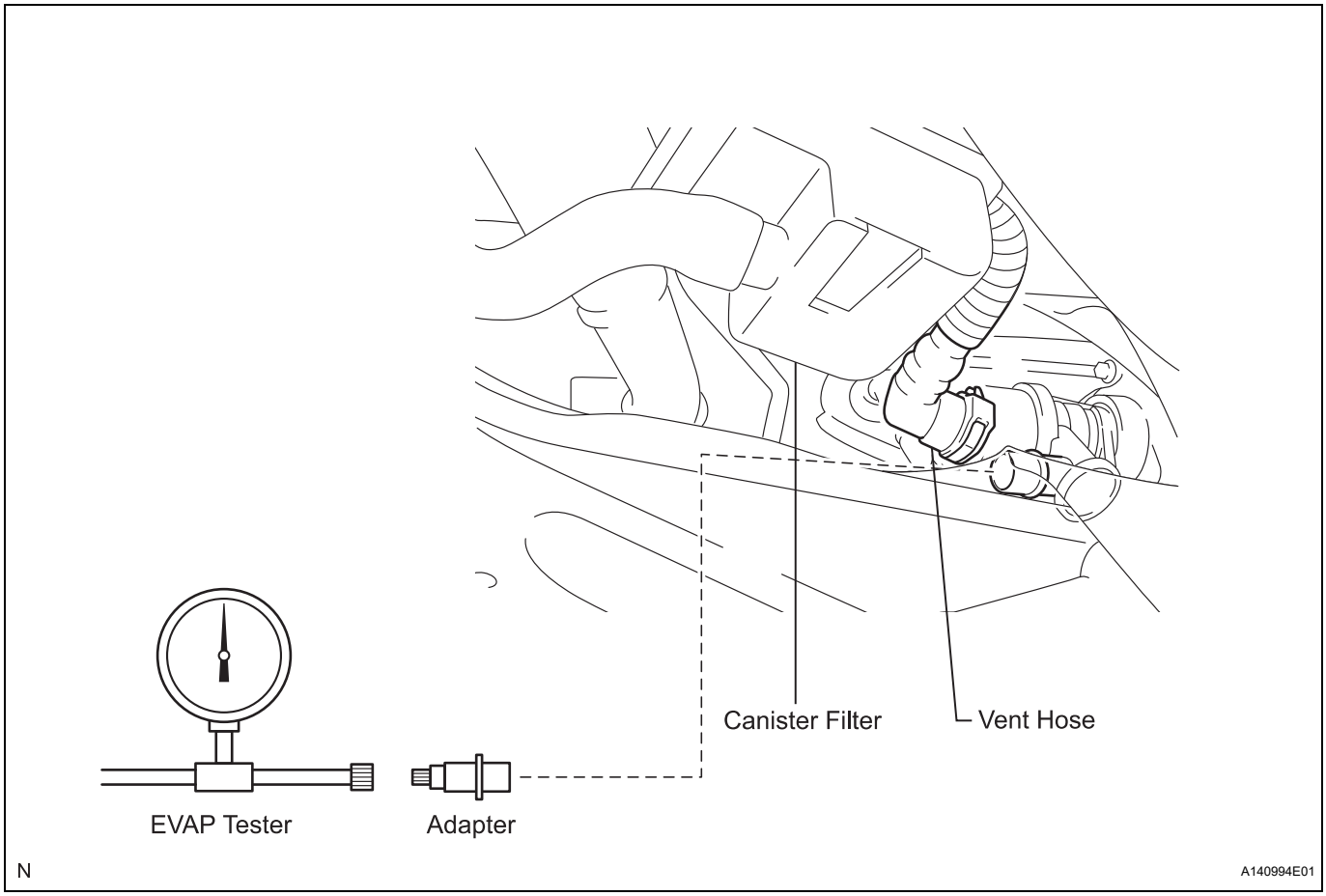
(a) Check if the fuel cap is tightened until a few "click" sounds are heard.

(b) If you have the EVAP tester, check the fuel cap using the fuel cap adaptor.
   (1) Install the fuel cap to the fuel cap adaptor, and connect the hose from the EVAP tester's pump.
   (2) Pressurize the fuel cap adaptor to between 24 and 28 mmHg for 45 seconds.
   (3) Stop the pump and seal the fuel cap adaptor.
   (4) Wait 2 minutes.
   (5) Confirm that the pressure is higher than 15 mmHg.
   OK:
   Higher than 15 mmHg

NG → **Go to step 30**

OK

21	LOCATE EVAP LEAK PART (FUEL VAPOR-CONTAINMENT VALVE - FUEL TANK)



(a) Disconnect the vent hose.
(b) Connect the EVAP tester to the vent hose with the adapter.
(c) Connect the intelligent tester to DLC3.
(d) Turn the power switch on (IG).
(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / FVCV.
(f) Turn the fuel vapor-containment valve ON with the tester.
(g) Pressurize the EVAP system to 3.2 to 3.7 kPa (24 to 28 mmHg).
(h) Apply soapy water to the piping and connecting parts of the EVAP system.
(i) Look for areas where bubbles appear. This indicates the leak point.
(j) Repair or replace the leak point.
HINT:
Disconnect the hose between the canister and the fuel tank from the canister. Block the canister side and conduct an inspection. In this way, the fuel tank can be excluded as an area suspected of causing fuel leaks.

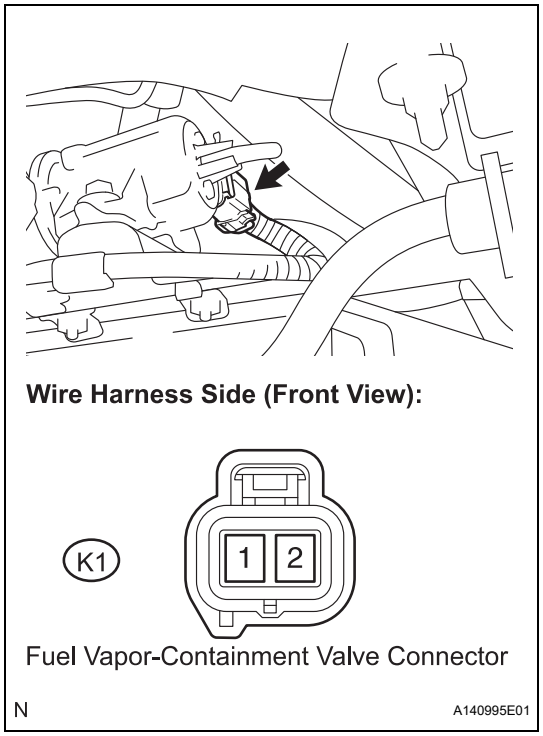
NEXT

22	REPLACE MALFUNCTIONING PART

NEXT

PERFORM SYSTEM CHECK (EVAP SYSTEM CHECK AGAIN (AUTOMATIC OPERATION))

23	CHECK FUEL VAPOR-CONTAINMENT VALVE ASSEMBLY (POWER SOURCE CIRCUIT)



(a) Disconnect the K1 fuel vapor-containment valve connector.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / TANK CLS VALVE.
(e) Turn the fuel vapor-containment valve ON with the tester.
(f) Measure the voltage between terminals 5 and 6 of the eV1 connector.
Standard voltage:
10 to 14 V

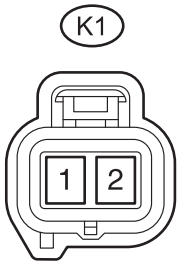
OK	Go to step 29

NG

ES

24	CHECK HARNESS AND CONNECTOR (FUEL VAPOR-CONTAINMENT VALVE - EFI NO. 2 FUSE)

Wire Harness Side (Front View):



Fuel Vapor-Containment Valve Connector

N A141003E01

(a) Disconnect the K1 fuel vapor-containment valve.
(b) Measure the voltage between terminal eV1-6 and body ground.
Standard voltage:
10 to 14 V

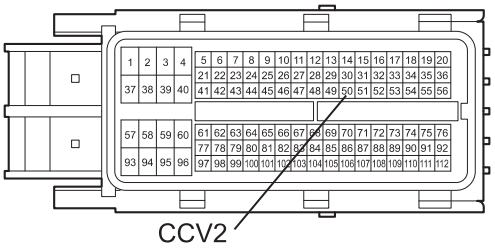
NG → **Go to step 31**

OK

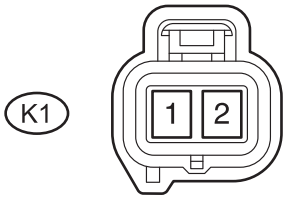
25	CHECK HARNESS AND CONNECTOR (FUEL VAPOR-CONTAINMENT VALVE ASSEMBLY - ECM)

Wire Harness Side:

A61 HV Control ECU Connector



Wire Harness Side (Front View):



Fuel Vapor-Containment Valve Connector

Y A141000E01

(a) Disconnect the A61 hybrid vehicle control ECU connector.
(b) Disconnect the K1 fuel vapor-containment valve.
(c) Measure the resistance.
Standard resistance

Tester Connection	Specified Condition
CCV2 (A61-50) - K1-1	10 Ω or less
CCV2 (A61-50) or K1-1 - Body ground	10 kΩ or more

NG → **Go to step 31**

OK

26	REPLACE HYBRID VEHICLE CONTROL ECU

NEXT

PERFORM SYSTEM CHECK (EVAP SYSTEM CHECK AGAIN (AUTOMATIC OPERATION))

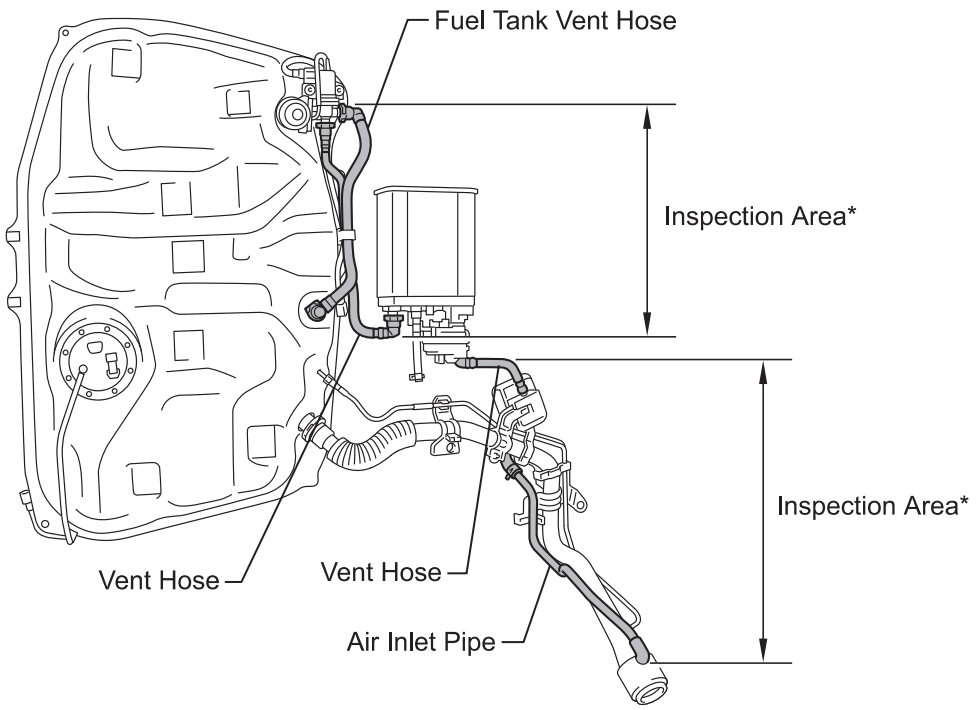
27	REPLACE PURGE VSV

NEXT

PERFORM SYSTEM CHECK (EVAP SYSTEM CHECK AGAIN (AUTOMATIC OPERATION))

28	REPLACE CANISTER ASSEMBLY

(a) Replace the canister assembly (See page EC-9).
NOTICE:
When replacing the canister, check the canister pump module interior and related pipes for water, fuel and other liquids. If liquids are present, check for disconnections and/or cracks in the following: 1) the pipe from the air inlet port to the canister pump module; 2) the canister filter; and 3) the hose from the canister to the fuel tank.



*: Check for disconnection and/or crack

N

A140996E02

NEXT

PERFORM SYSTEM CHECK (EVAP SYSTEM CHECK AGAIN (AUTOMATIC OPERATION))

29	REPLACE FUEL VAPOR-CONTAINMENT VALVE

NEXT

PERFORM SYSTEM CHECK (EVAP SYSTEM CHECK AGAIN (AUTOMATIC OPERATION))

30	REPLACE FUEL TANK CAP

NEXT

PERFORM SYSTEM CHECK (EVAP SYSTEM CHECK AGAIN (AUTOMATIC OPERATION))

31	REPAIR OR REPLACE HARNESS AND CONNECTOR

NEXT

PERFORM SYSTEM CHECK (EVAP SYSTEM CHECK AGAIN (AUTOMATIC OPERATION))

32	REPAIR OR REPLACE VACUUM HOSE

NEXT

PERFORM SYSTEM CHECK (EVAP SYSTEM CHECK AGAIN (AUTOMATIC OPERATION))

33	PERFORM SYSTEM CHECK (EVAP SYSTEM CHECK (MANUAL OPERATION))

HINT:
In the manual operation check, the EVAP system can be checked in signal steps. Valve operation and pressure in each step can also be checked.

(a) Clear the DTCs (See page ES-31).
(b) Remove the fuel tank cap and reinstall the fuel cap.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / EVAP SYS CHECK / MANUAL OPERATION.

NOTICE:

- **In EVAP SYSTEM CHECK (AUTO OPERATION), the series of 9 EVAP SYSTEM CHECK steps is performed automatically. It takes a maximum of approximately 18 minutes.**
- **Do not perform EVAP SYSTEM CHECK when the fuel tank is more than 90% full because the cut-off valve may be closed, making the leak check of the fuel tank unavailable.**
- **Do not run the engine in this step.**
- **When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing EVAP SYSTEM CHECK, keep the temperature below 35°C (95°F).**

Tester Display

Display	Detail
Atm Press Check	The number of steps and step names are displayed
PURGE VSV	Purge VSV condition is displayed: ON (Open) / OFF (Closed)
VENT VALVE	Vent valve condition is displayed: ON (Closed) / OFF (Vent)
LEAK DETECTION PUMP	Leak detection pump condition is displayed: ON / OFF

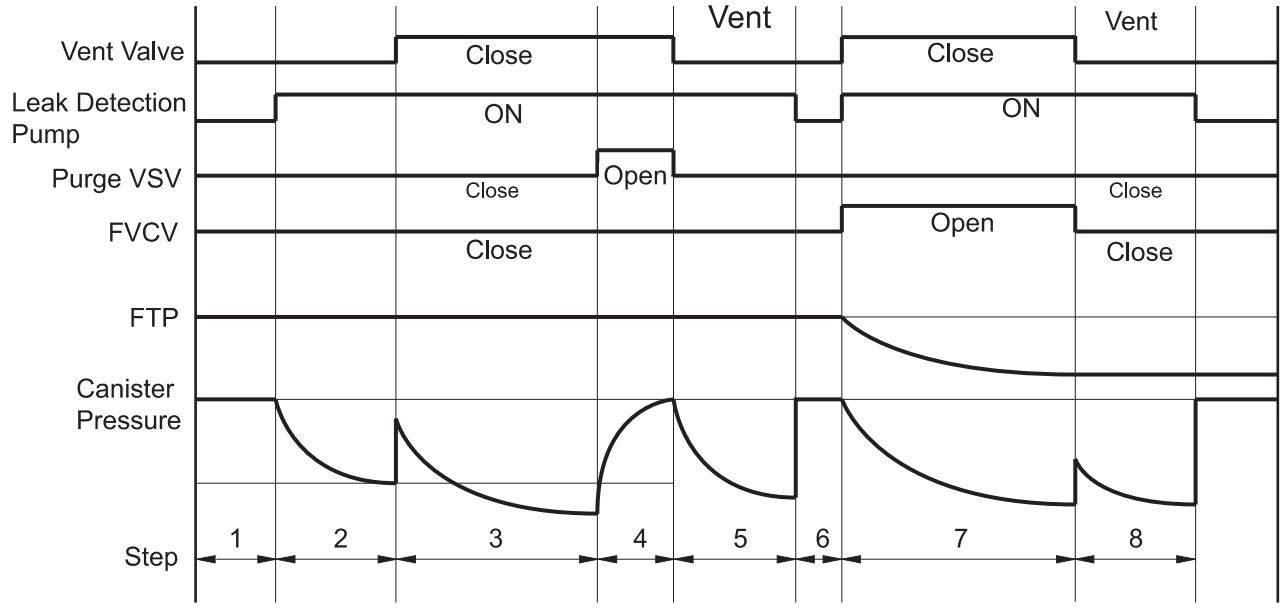
Display	Detail
FVCV	Fuel vapor-containment valve condition is displayed: ON (Open) / OFF (Closed)
TANK PRESS	Fuel tank pressure (Gauge pressure)
VAPOR PRESS	EVAP pressure (Gauge pressure)
VAPOR PRESS	EVAP pressure (Absolute pressure)
Time (Step)	Elapsed time for each step
Time (VSV)	Accumulated purge VSV open time
Time (PUMP)	Accumulated leak detection pump operating time

Manual Operation Step

ES

Step	Operation
1. Atm Press Check 1	Atmospheric pressure measurement
2. Ref Press Check 1	First reference pressure measurement
3. Leak Check	EVAP system pressure measurement
4. Purge VSV Check	Purge VSV monitor
5. Ref Press Check 2	Second reference pressure measurement
6. Resetting	Resetting
7. Tank Leak Check	Fuel tank pressure measurement
8. Ref Press Check 3	Third reference pressure measurement

Timing Chart



C

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NEXT

34	PERFORM SYSTEM CHECK (EVAP SYSTEM CHECK (MANUAL OPERATION STEP 1))

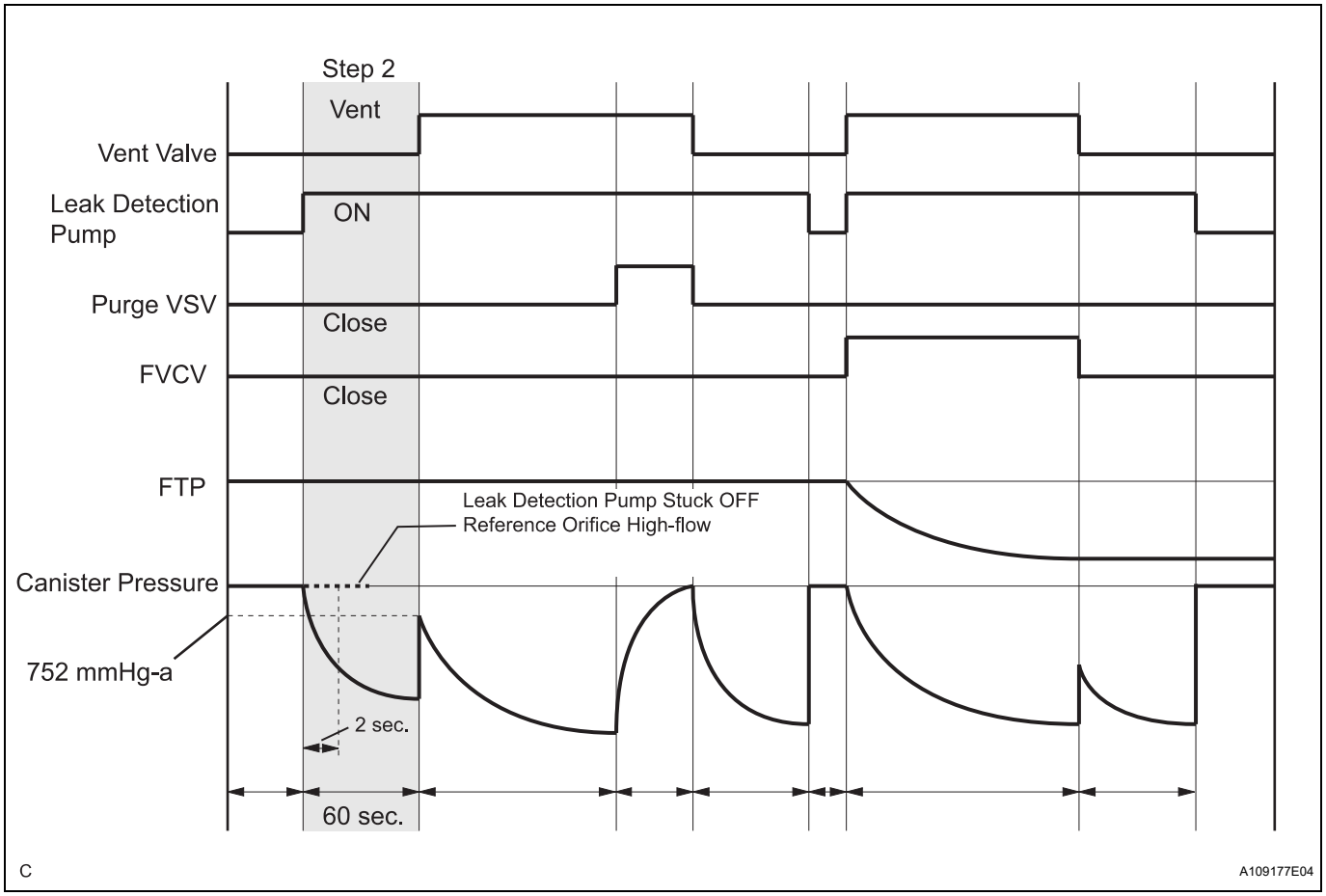
(a) Select step 1 and wait 10 seconds.

NEXT

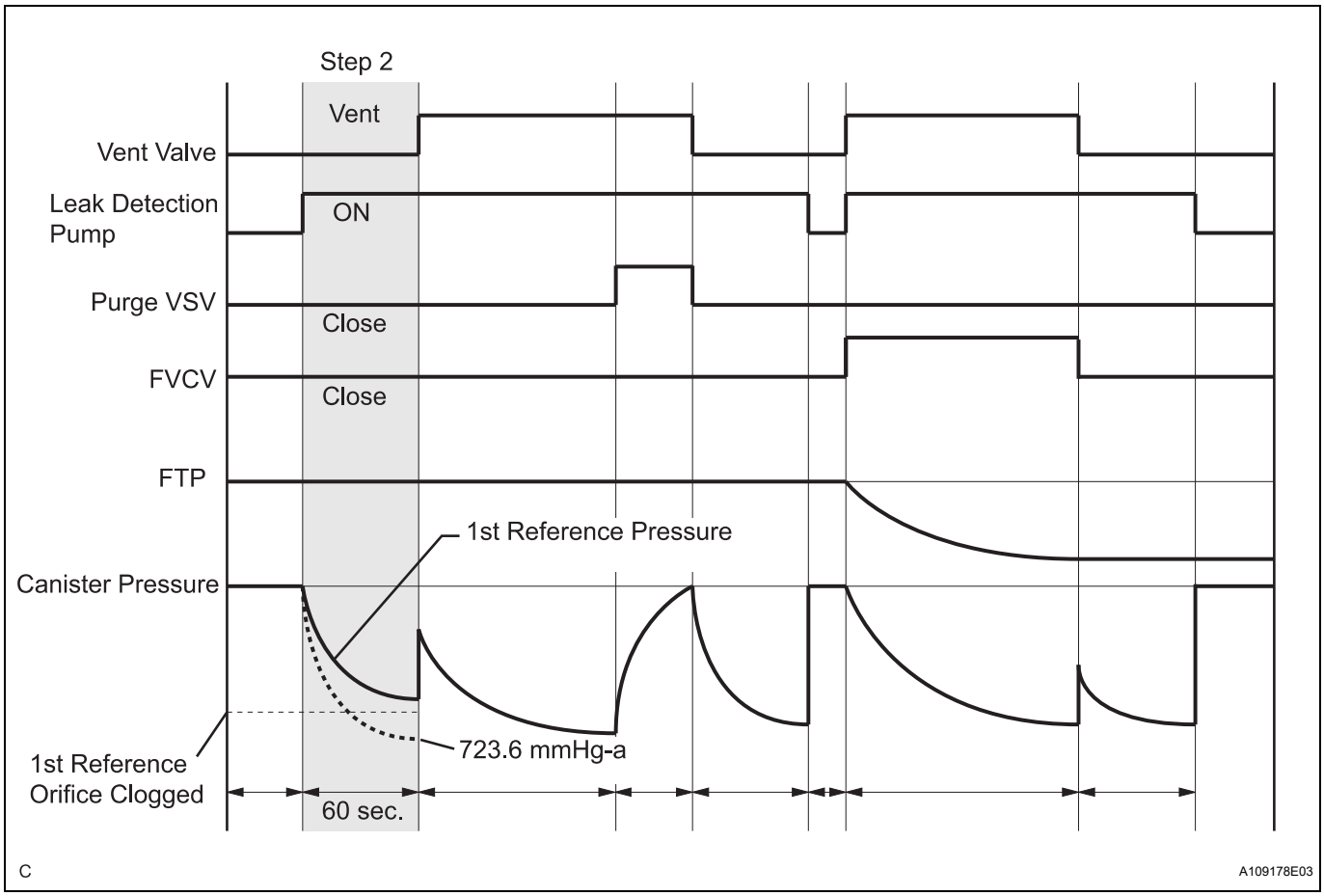
35	PERFORM SYSTEM CHECK (EVAP SYSTEM CHECK (MANUAL OPERATION STEP 2))

(a) Perform step 2.
(b) Check the EVAP pressure 2 seconds after the leak detection pump is activated*.
*: The leak detection pump begins to operate at the start of step 2.

ES



(c) Check the EVAP pressure again when it has stabilized. This pressure is the first reference pressure standard.



Result

Test Result	Suspected Trouble Area	Proceed to
EVAP pressure in step (b) is between 723.6 mmHg-a and 752 mmHg-a	Not yet determined	A
EVAP pressure in step (b) is 752 mmHg-a or more	• Reference orifice high-flow • Leak detection pump stuck OFF	B
EVAP pressure in step (b) is below 723.6 mmHg-a	Reference orifice clogged	C

B → Go to step 11

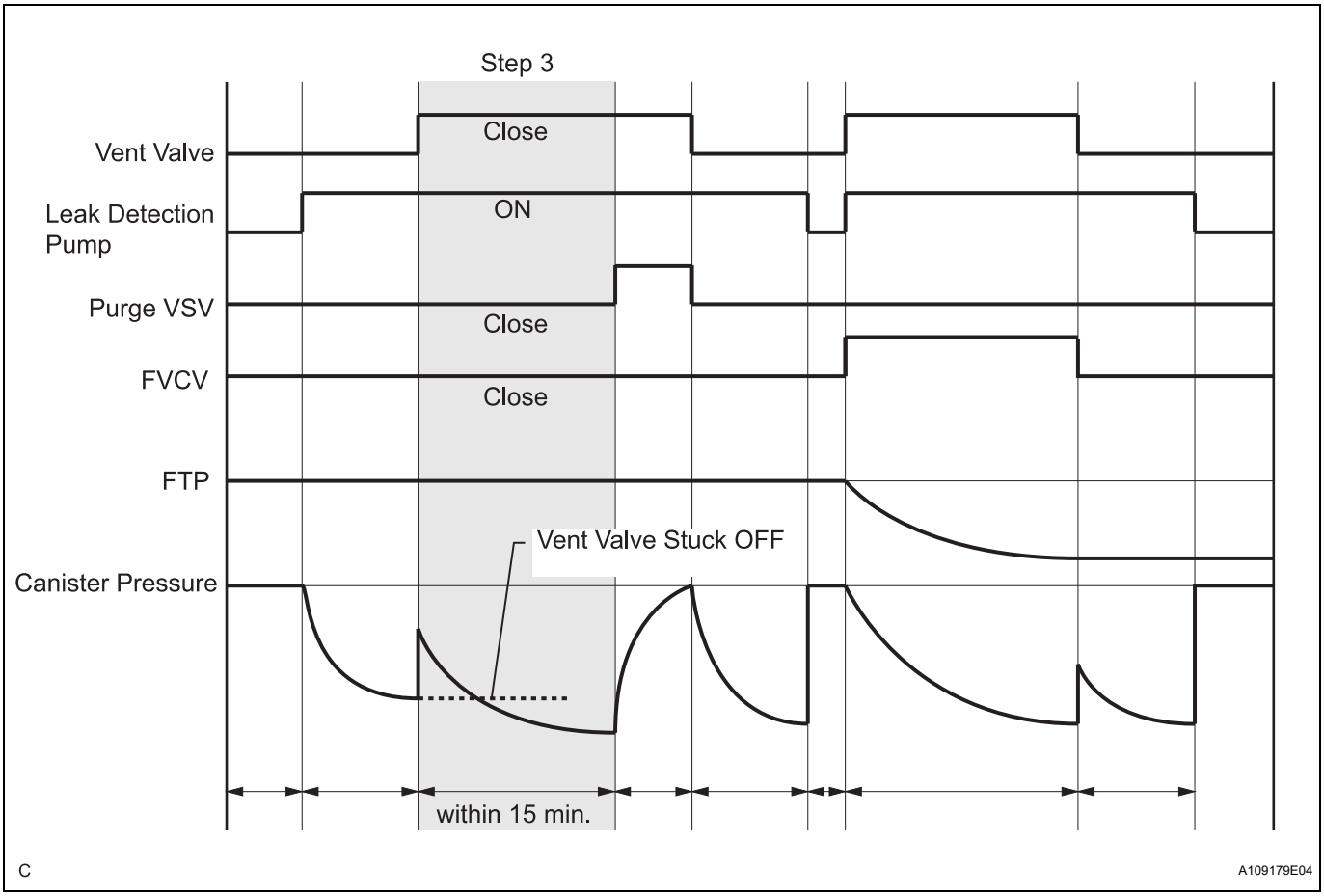
C → Go to step 28

A

36	PERFORM SYSTEM CHECK (EVAP SYSTEM CHECK (MANUAL OPERATION STEP 3))

(a) Perform step 3.

(b) Check the EVAP pressure change in step 3.

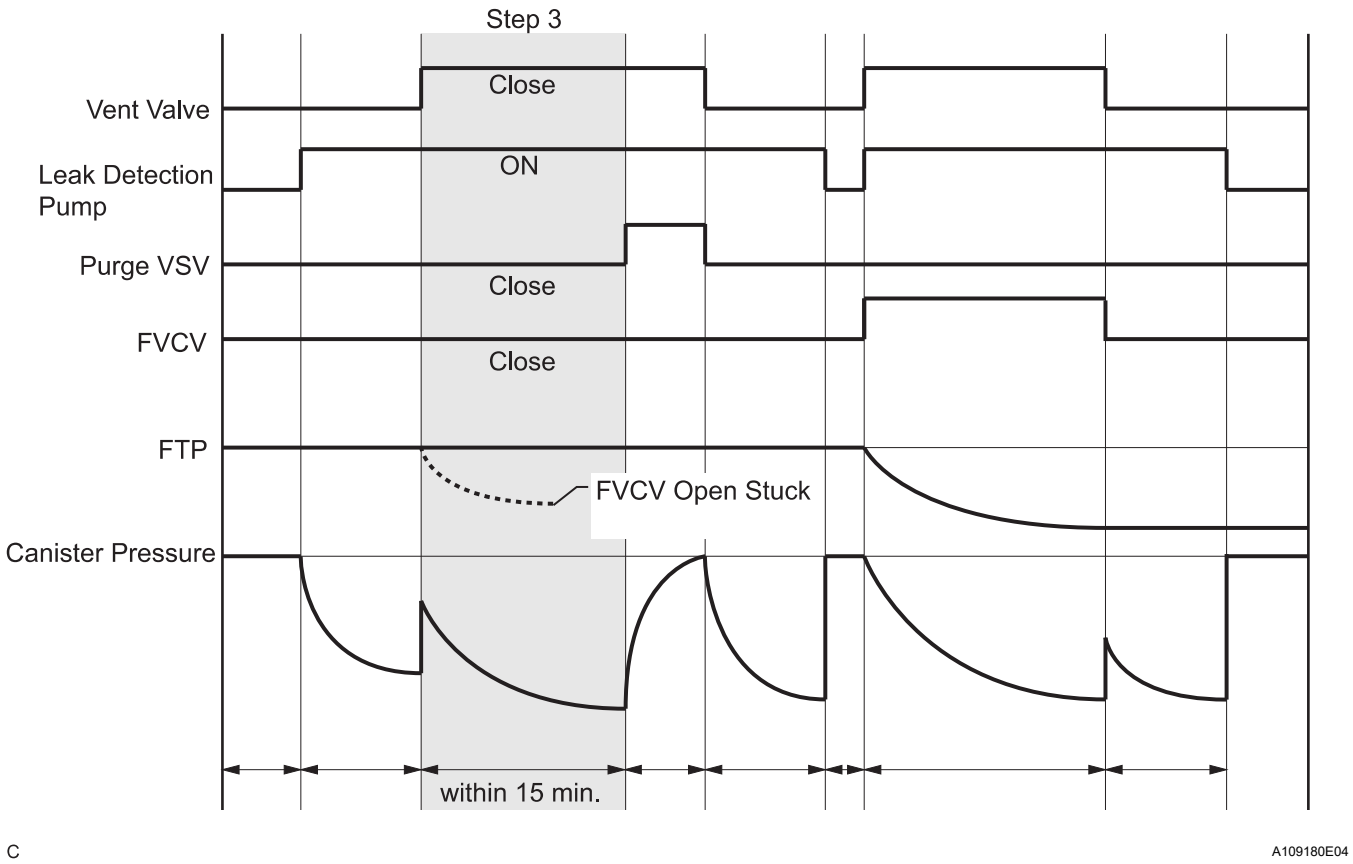


Result

Test Result	Suspected Trouble Area	Proceed to
EVAP pressure change in step (b) is 762 mmHg-a or more	Not yet determined	A
EVAP pressure in step (b) is below 762 mmHg-a	Vent valve stuck OFF	B

ES

(c) Check the fuel tank pressure change in step 3.

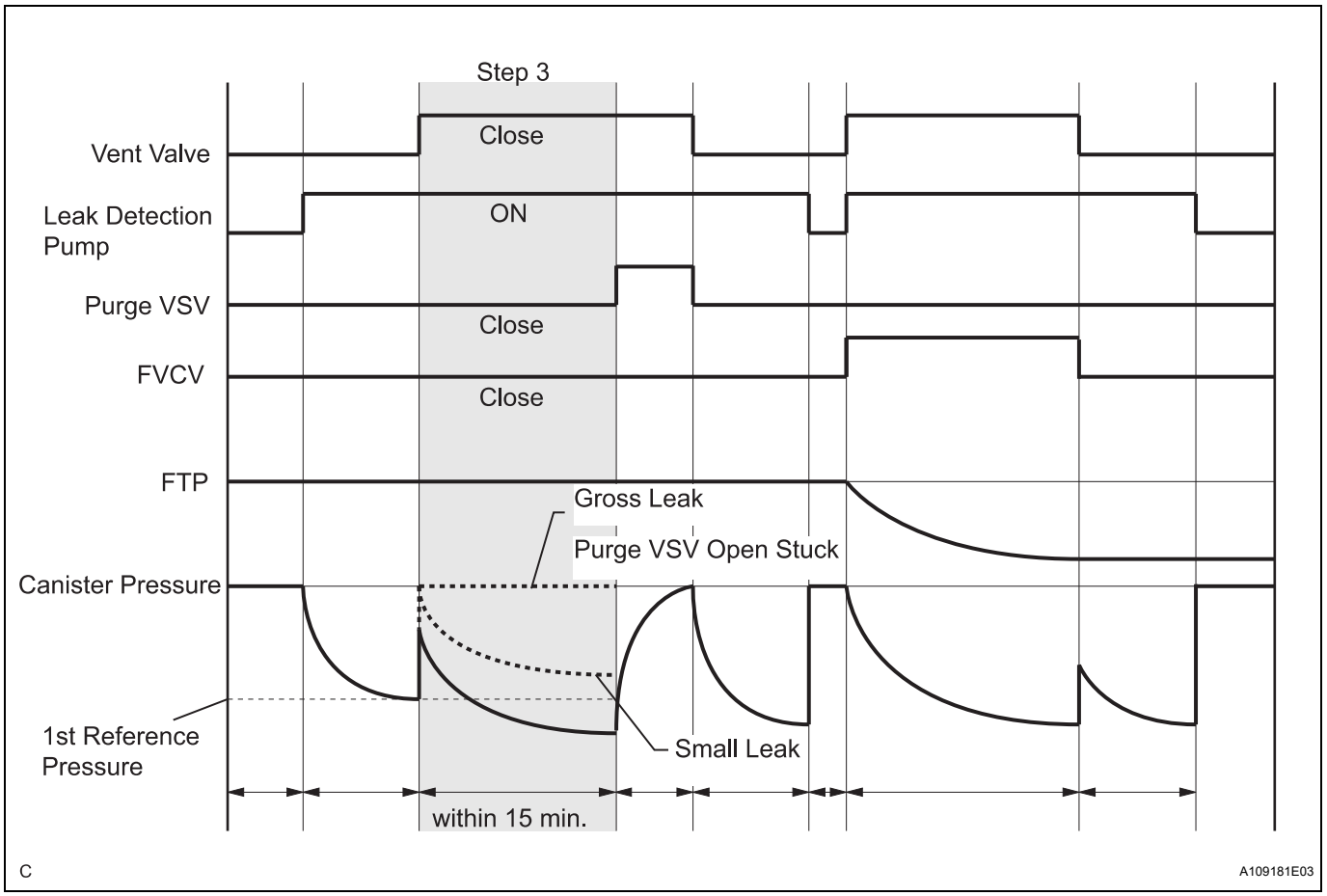


Result

Test Result	Suspected Trouble Area	Proceed to
Fuel tank pressure in step (b) is below 763.7 mmHg-a	**Not yet determined**	**A**
Fuel tank pressure change in step (b) is 763.7 mmHg-a or more	**Fuel vapor-containment valve (FVCV) ON (open) stuck**	**C**

(d) Check the EVAP pressure again when it has stabilized. This pressure is the canister leak pressure standard.

(e) Compare the first reference pressure with the canister leak pressure.



Result

Test Result	Suspected Trouble Area	Proceed to
Lower than first reference pressure	Not yet determined	A
First reference pressure or higher	• Purge VSV open stuck • Leakage from line between purge VSV and canister	D

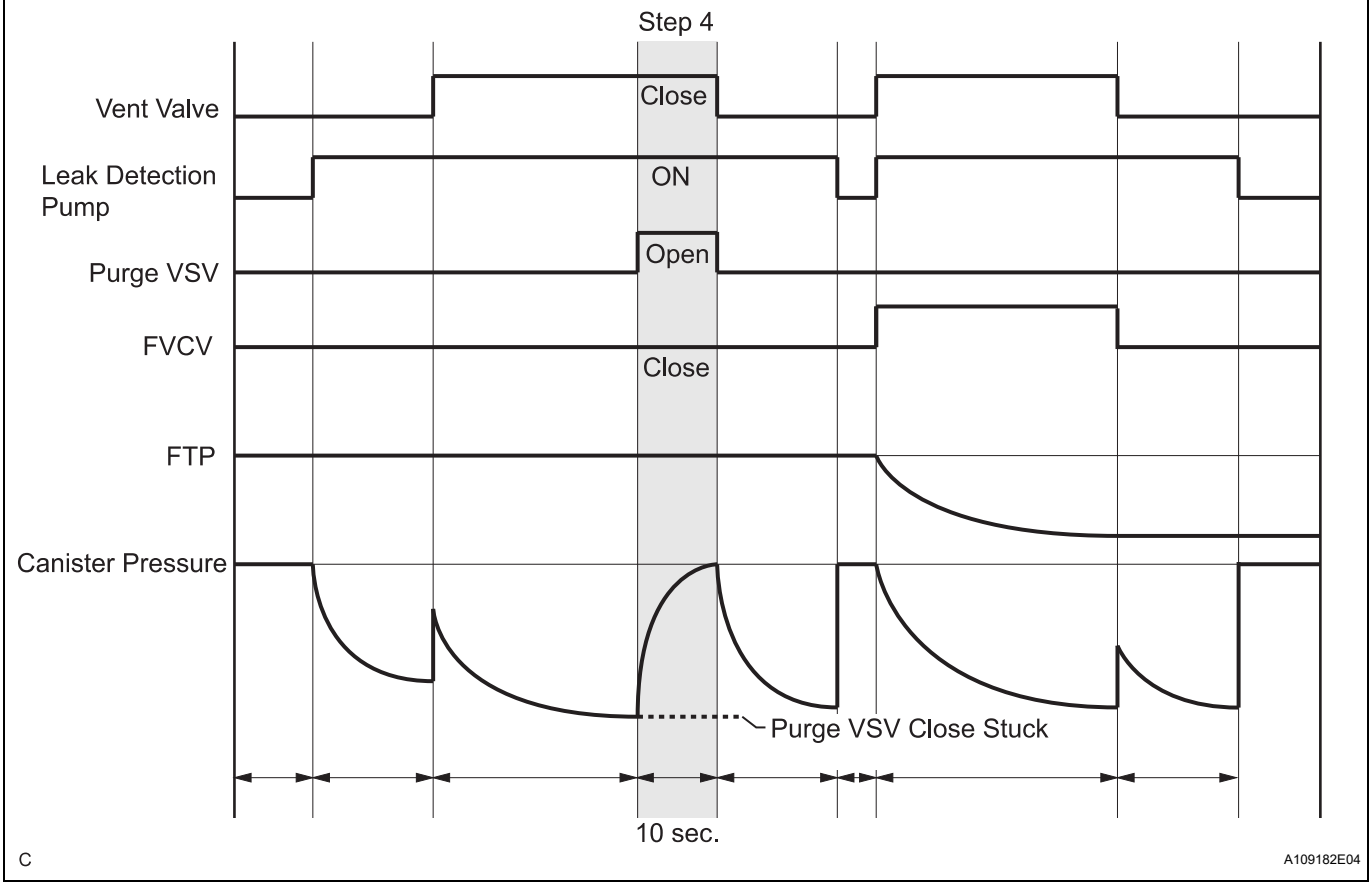
B	Go to step 16
C	Go to step 23
D	Go to step 18

A

37	PERFORM SYSTEM CHECK (EVAP SYSTEM CHECK (MANUAL OPERATION STEP 4))

(a) Perform step 4.

(b) Check the EVAP pressure change in step 4.



Result

Test Result	Suspected Trouble Area	Proceed to
EVAP pressure change in step (b) is 762 mmHg-a or more	Not yet determined	A
EVAP pressure in step (b) is below 762 mmHg-a	Purge VSV close stuck	B

B → Go to step 5

A

38	PERFORM SYSTEM CHECK (EVAP SYSTEM CHECK (MANUAL OPERATION STEP 5))

(a) Perform step 5 and wait 60 seconds.
(b) Check the EVAP pressure. This pressure is the second reference pressure standard.

NEXT

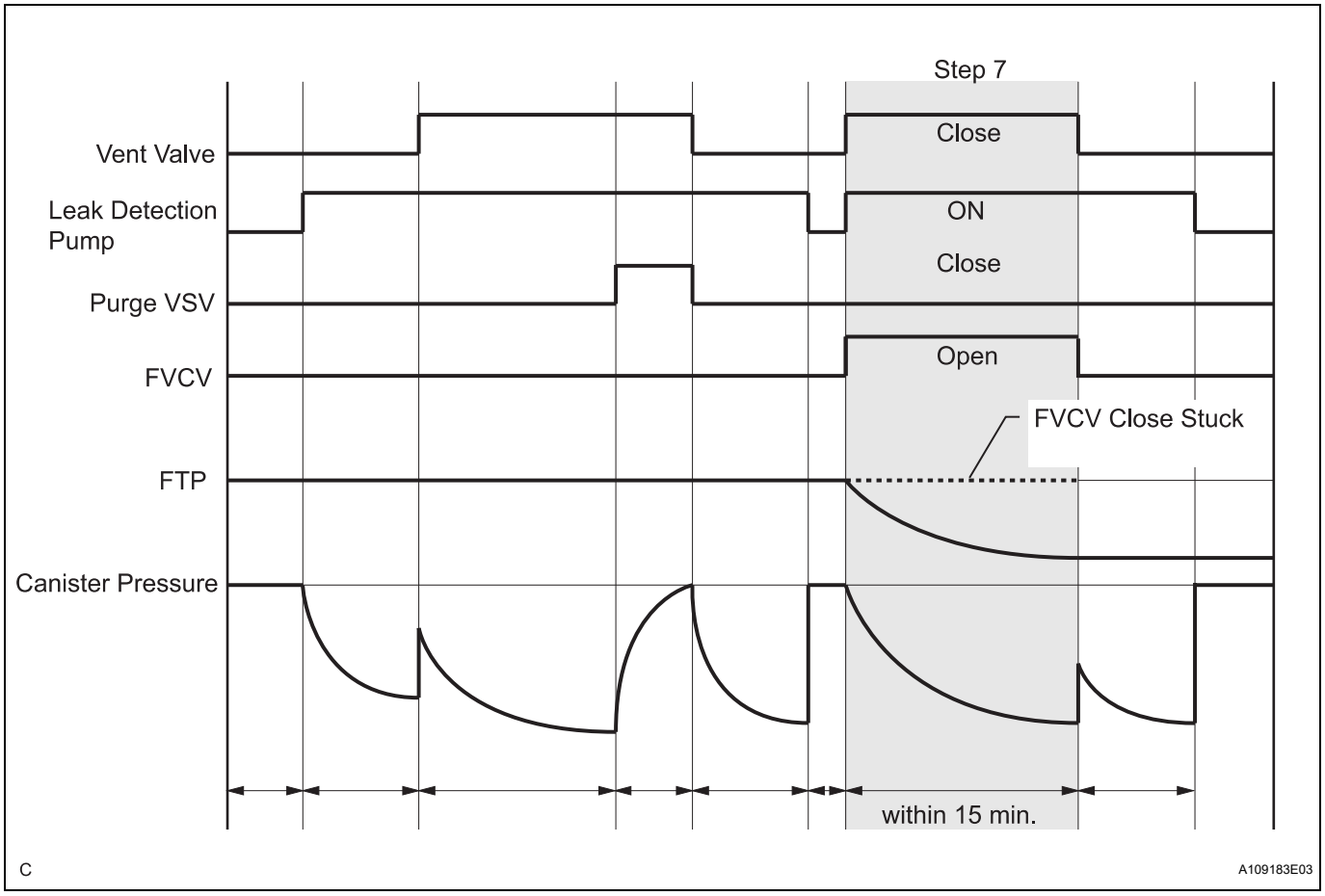
39	PERFORM SYSTEM CHECK (EVAP SYSTEM CHECK (MANUAL OPERATION STEP 6))

(a) Perform step 6 and wait 5 seconds.

NEXT

40	PERFORM SYSTEM CHECK (EVAP SYSTEM CHECK (MANUAL OPERATION STEP 7))

(a) Perform step 7.
(b) Check that the tank pressure and EVAP pressure change.
(c) Check the tank pressure again when it has stabilized. This pressure is the fuel tank leak pressure standard.



Result

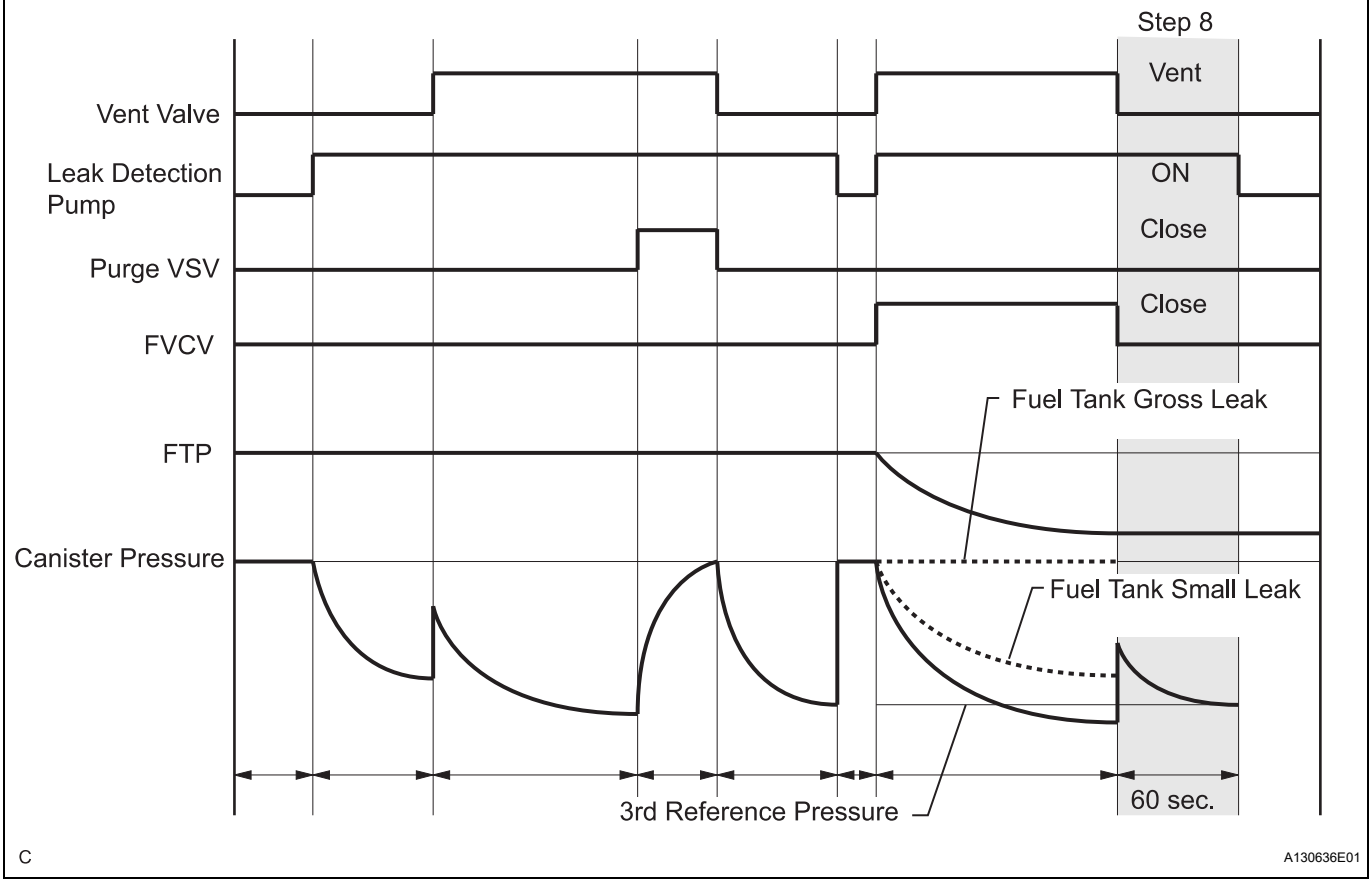
Test Result	Suspected Trouble Area	Proceed to
Tank pressure change is more than 766.7 mmHg-a and EVAP pressure is more than 752.5 mmHg-a	Not yet determined	A
Tank pressure change is less than 766.7 mmHg-a and EVAP pressure is less than 752.5 mmHg-a	Fuel vapor-containment valve (FVCV) OFF (close) stuck	B

B → Go to step 23

A

41	PERFORM SYSTEM CHECK (EVAP SYSTEM CHECK (MANUAL OPERATION STEP 8))

(a) Perform step 8 and wait 60 seconds.
(b) Check the EVAP pressure. This pressure is the third reference pressure standard.
(c) Compare the tank pressure checked in step 8 with the third reference pressure.



Result

Test Result	Suspected Trouble Area	Proceed to
Lower than third reference pressure	Not yet determined	A
Third reference pressure or higher	Leakage from line between fuel vapor-containment valve and fuel tank	B

B → **Go to step 20**

A

42	PERFORM CONFIRMATION DRIVING PATTERN

(a) KEY-OFF MONITOR DRIVE PATTERN
  (1) Connect the intelligent tester to the DLC3.
  (2) Confirm the following conditions are satisfied:
    - The fuel level is less than 90%.
    - The altitude is less than 8,000 ft. (2,400 m).
    - The vehicle is stopped (the vehicle speed is less than 2 mph).
    - The ECT is 4.4 to 35°C (40 to 95°F.)
    - The IAT is 4.4 to 35°C (40 to 95°F).
    - Drive the vehicle in a city area or on free-way for 10 minutes or more.
  (3) Perform the drive pattern:
    1. Allow the engine to idle for 5 minutes or more.
    2. Turn the power switch off and wait 6 hours.

(4) Check the monitor status with the intelligent tester.

(b) PURGE FLOW MONITOR DRIVE PATTERN (P0441)

(1) Connect the intelligent tester to the DLC3.

(2) Confirm that the following conditions are satisfied:

- The Engine Coolant Temperature (ECT) is more than 4.4°C (40°F).
- The Intake Air Temperature (IAT) is more than 4.4°C (40°F).

(3) Perform the drive pattern:

1. Remove and reinstall the fuel cap to release the fuel tank pressure.
2. Warm up the engine until the ECT reaches 75°C (167°F) or more.
3. Drive vehicle in a city area or on free-way for 10 minutes or more.

(4) Check the monitor status with the intelligent tester.

NEXT

PERFORM EVAP SYSTEM (EVAP SYSTEM CHECK AGAIN (AUTOMATIC OPERATION))

ECM Power Source Circuit

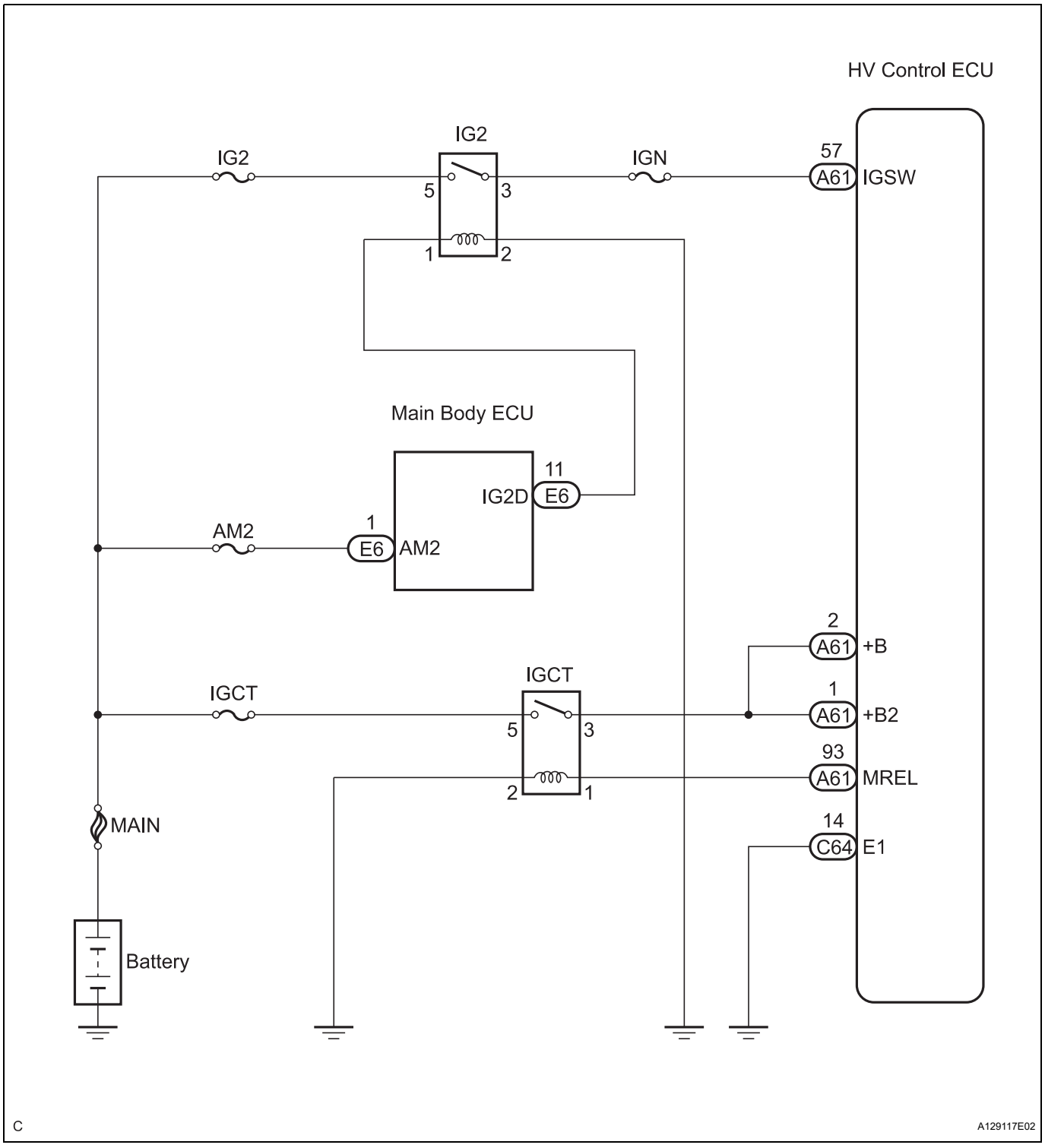
DESCRIPTION

When the power switch is turned on (IG), the battery voltage is applied to terminal IGSW of the hybrid vehicle control ECU. The hybrid vehicle control ECU MREL output signal causes a current to flow to the coil, closing the contacts of the IGCT relay and supplying power to terminal +B of the hybrid vehicle control ECU.

If the power switch is turned off, the hybrid vehicle control ECU holds the IGCT relay ON for a maximum of 2 seconds to allow for the initial setting of the throttle valve.

When the power switch is turned on (IG), voltage from the hybrid vehicle control ECU MREL terminal applies to the IGCT relay. This causes the contacts of the IGCT relay to close, which supplies power to terminal +B or +B1 of the hybrid vehicle control ECU.

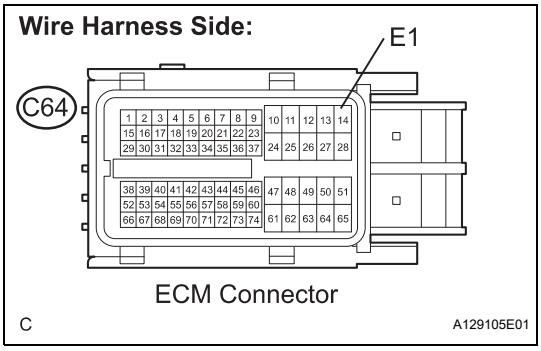
WIRING DIAGRAM



ES

INSPECTION PROCEDURE

1 CHECK HARNESS AND CONNECTOR (HV CONTROL ECU - BODY GROUND)



(a) Disconnect the C64 hybrid vehicle control ECU connector.
(b) Measure the resistance between the terminal and body ground.
Standard resistance

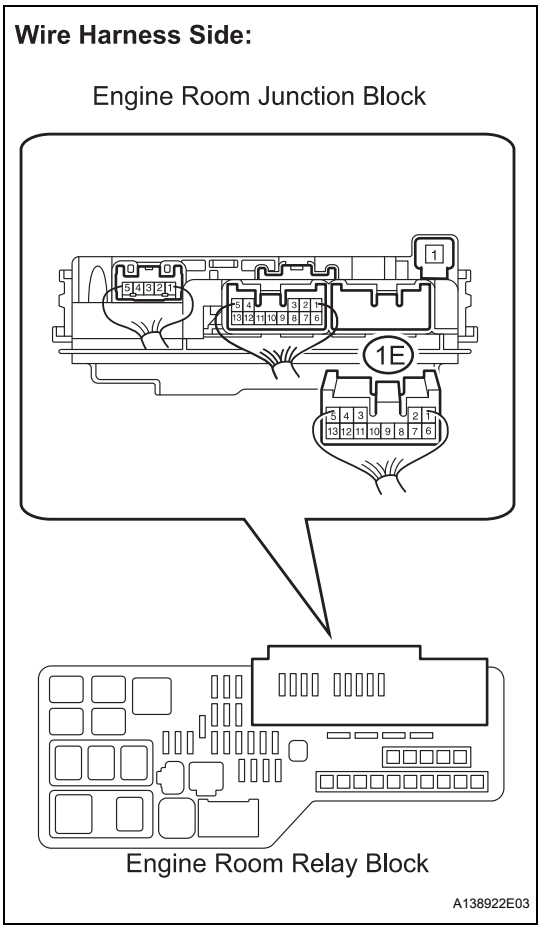
Tester Connection	Specified Condition
E1 (C64-81) - Body ground	Below 1 Ω

(c) Reconnect the hybrid vehicle control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 CHECK ENGINE ROOM JUNCTION BLOCK (IGCT RELAY VOLTAGE)



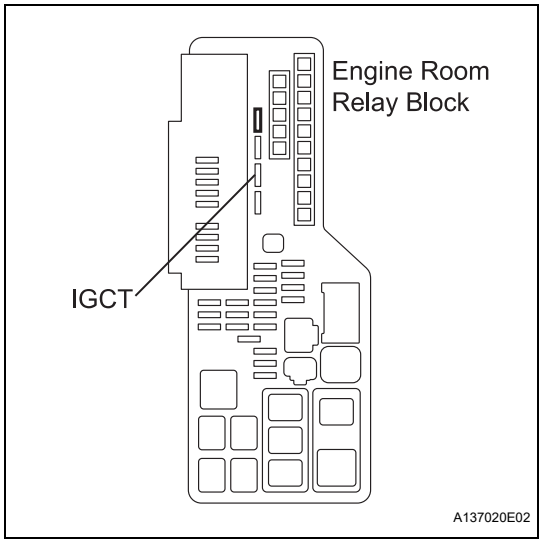
(a) Remove the engine room junction block from the engine room R/B.
(b) Turn the power switch on (IG).
(c) Measure the voltage between the terminal and body ground.
Standard voltage

Tester Connection	Specified Condition
5 - Body ground	9 to 14 V

OK → **Go to step 5**

NG

3	INSPECT IGCT FUSE



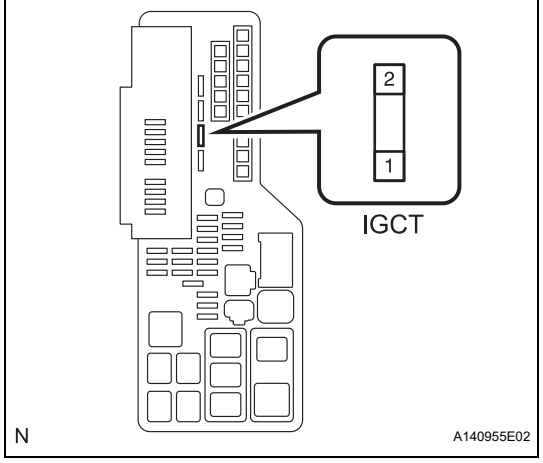
(a) Remove the IGCT fuse from the engine room R/B.
(b) Measure the IGCT fuse resistance.
Standard resistance:
Below 1 Ω
(c) Reinstall the IGCT fuse.

NG → **REPLACE IGCT FUSE**

OK

4	CHECK HARNESS AND CONNECTOR (IGCT FUSE - BATTERY)

Engine Room Relay Block:



(a) Disconnect the positive battery terminal.
(b) Remove the IGCT fuse from the engine room R/B.
(c) Measure the resistance between the terminals.
Standard resistance (Check for open)

Tester Connection	Specified Condition
1 - Positive battery terminal	Below 1 Ω

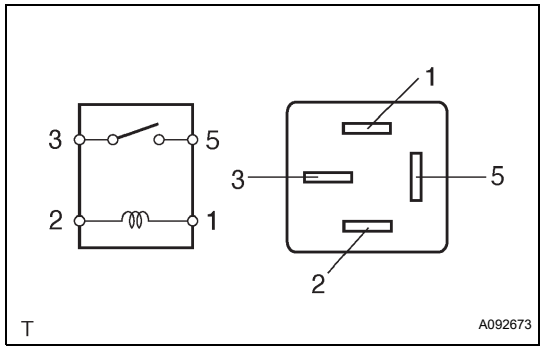
(d) Reinstall the IGCT fuse.
(e) Reconnect the positive battery terminal.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

5 INSPECT IGCT RELAY



(a) Remove the IGCT relay from the engine room R/B.
(b) Measure the resistance between the terminals.
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (Apply battery voltage between terminals 1 and 2)

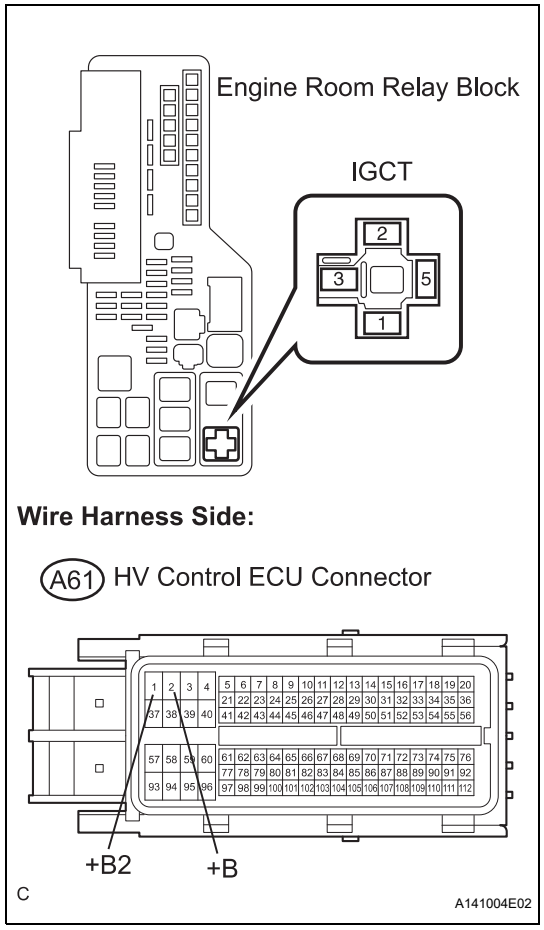
(c) Reinstall the IGCT relay.

ES

NG → **REPLACE IGCT RELAY**

OK

6 CHECK HARNESS AND CONNECTOR (HV CONTROL ECU - IGCT RELAY)



(a) Disconnect the A61 hybrid vehicle control ECU connector.
(b) Remove the engine IGCT relay from the engine room R/B.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance (Check for open)

Tester Connection	Specified Condition
IGCT relay (3) - +B (A61-2)	Below 1 Ω
IGCT relay (3) - +B2 (A61-1)	Below 1 Ω

Standard resistance (Check for short)

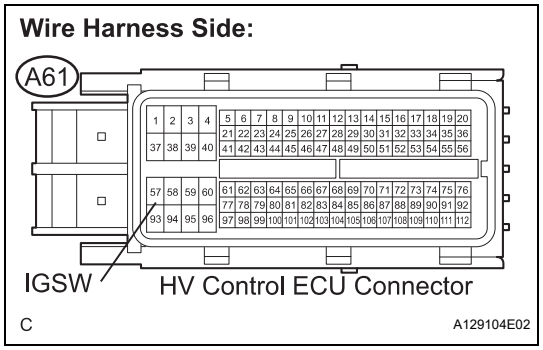
Tester Connection	Specified Condition
IGCT relay (3) or +B (A61-2) - Body ground	10 kΩ or higher
IGCT relay (3) or +B2 (A61-1) - Body ground	10 kΩ or higher

(d) Reinstall the engine room junction block.
(e) Reconnect the hybrid vehicle control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

7 INSPECT ECM (IGSW VOLTAGE)



(a) Disconnect the A61 hybrid vehicle control ECU connector.
(b) Measure the voltage between the terminal and body ground.
Standard voltage

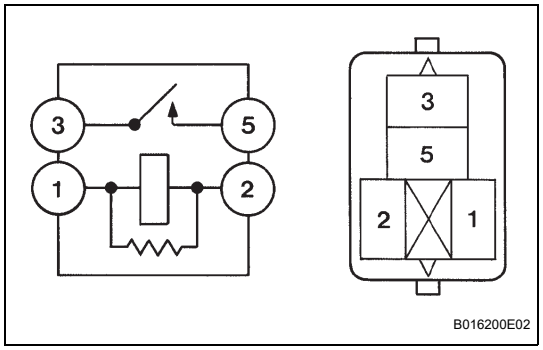
Tester Connection	Specified Condition
IGSW (A61-57) - Body ground	9 to 14 V

(c) Reconnect the hybrid vehicle control ECU connector.

OK → **Go to step 10**

NG

8 INSPECT IG2 RELAY



(a) Remove the IG2 relay from the engine room R/B.
(b) Measure the resistance between the terminals.
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (Apply battery voltage between terminals 1 and 2)

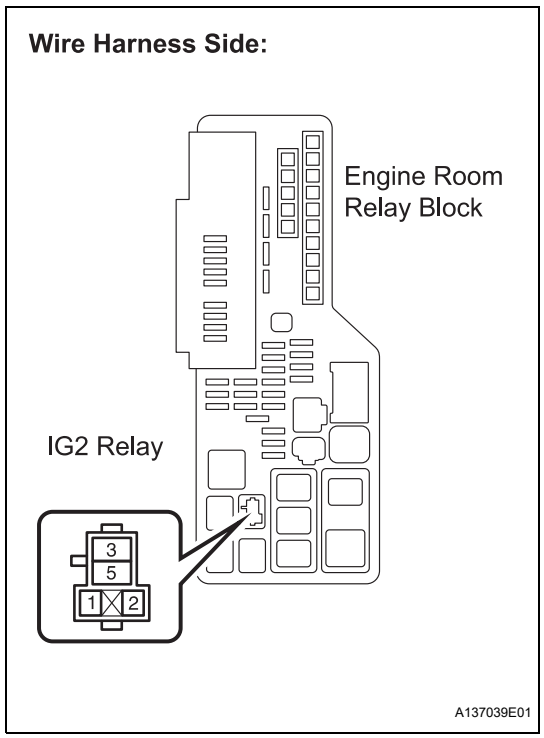
(c) Reinstall the IG2 relay.

NG → **REPLACE IG2 RELAY**

OK

ES

9	CHECK HARNESS AND CONNECTOR (IG2 RELAY - BODY GROUND)



(a) Remove the IG2 relay from the engine room R/B.
(b) Measure the resistance between the terminal and body ground.
Standard resistance

Tester Connection	Specified Condition
IG2 relay terminal 2 - Body ground	Below 1 Ω

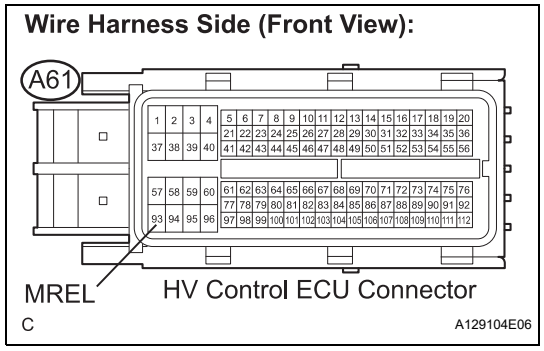
(c) Reinstall the IG2 relay.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

GO TO SMART ACCESS SYSTEM WITH PUSH-BUTTON START

10	CHECK HARNESS AND CONNECTOR (HV CONTROL ECU - BODY GROUND)



(a) Disconnect the A61 hybrid vehicle control ECU connector.
(b) Measure the resistance between the terminal and body ground.
Standard resistance

Tester Connection	Specified Condition
MREL (A61-93) - Body ground	Below 1 Ω

(c) Reconnect the hybrid vehicle control ECU connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

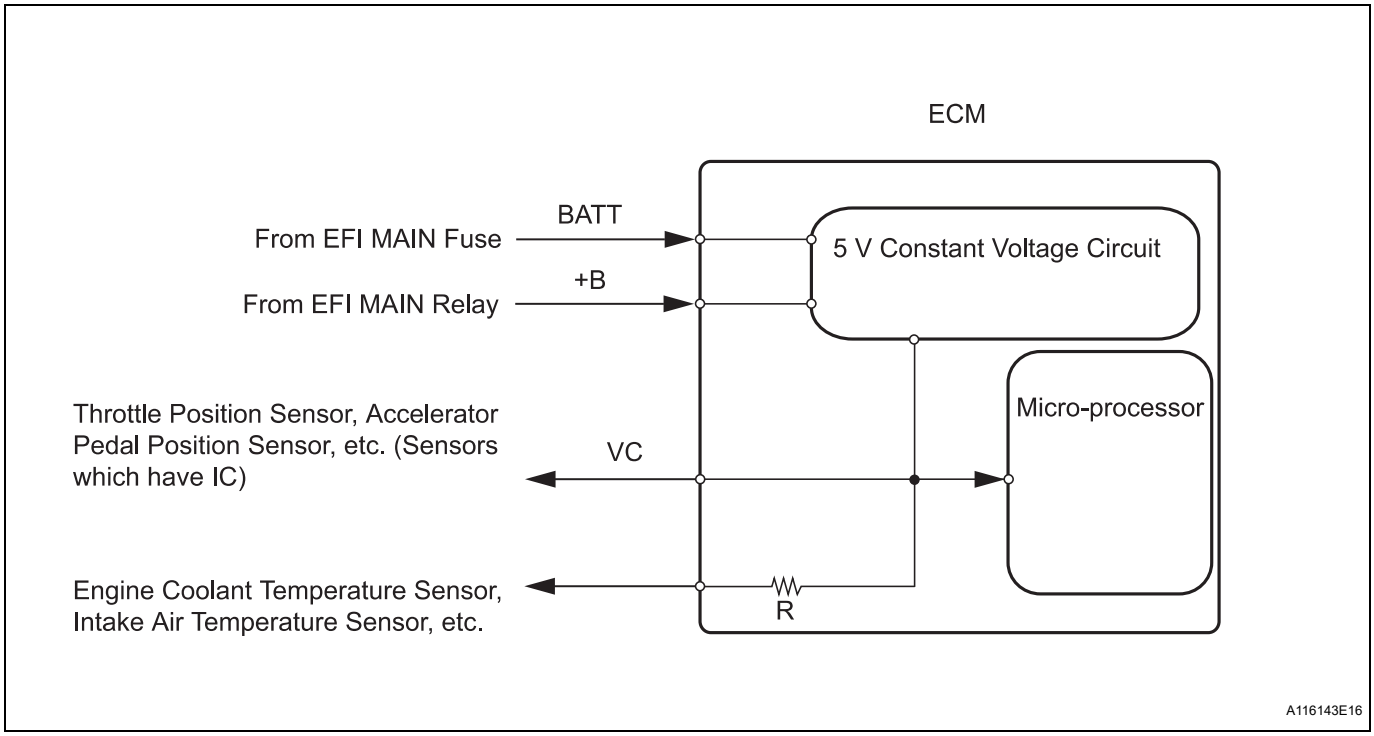
OK

REPLACE HYBRID VEHICLE CONTROL ECU

VC Output Circuit

DESCRIPTION

The ECM constantly generates 5 V power from the battery voltages supplied to the +B (BATT) terminal to operate the Micro-processor. The ECM also provides this power to the sensors through the VC output circuit.

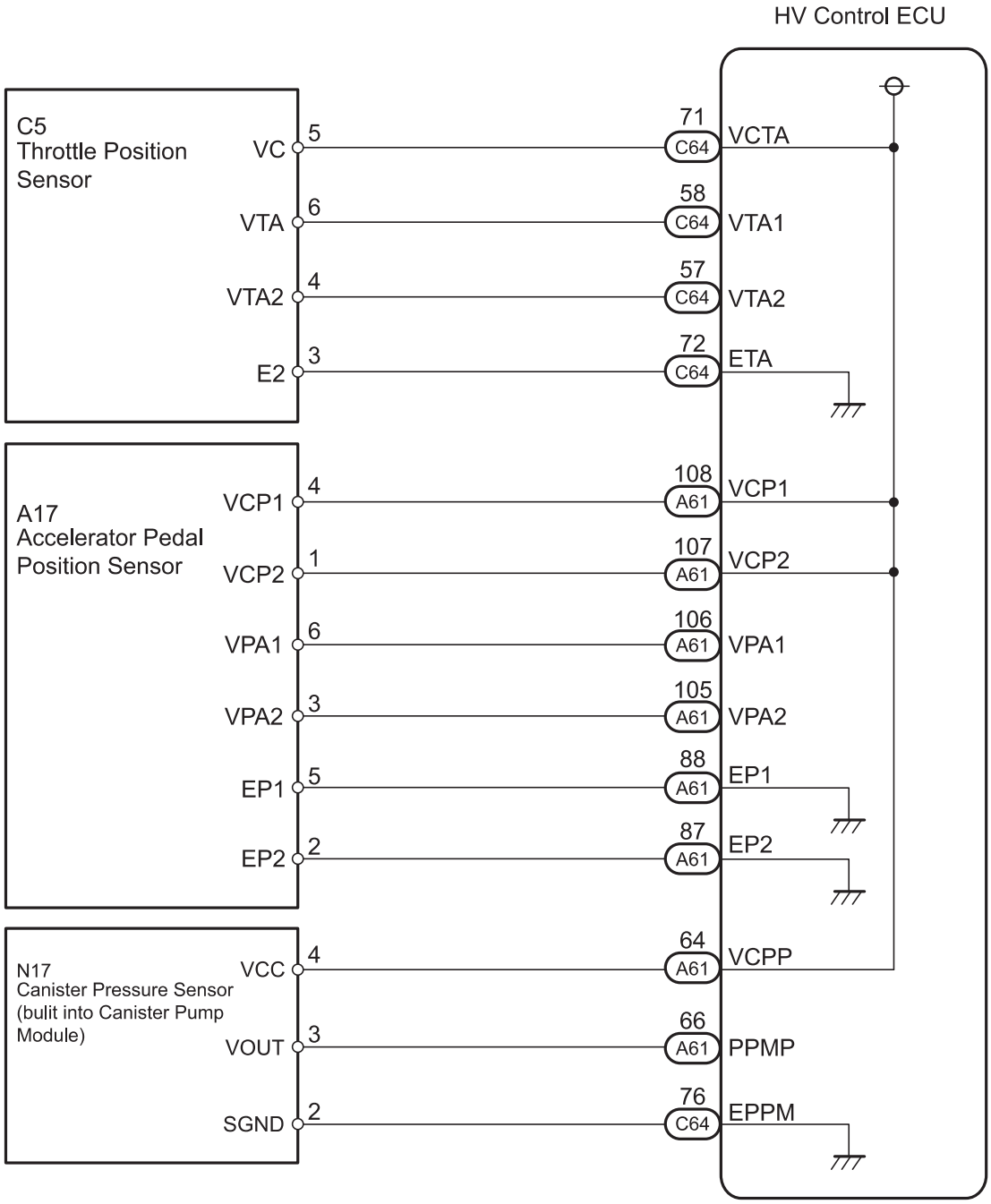


When the VC circuit is short-circuited, the Micro-processor in the ECM (included in hybrid vehicle control ECU) and sensors that are supplied with power through the VC circuit are deactivated because the power is not supplied from the VC circuit. Under this condition, the system does not start up and the MIL does not illuminate even if the system malfunctions.

HINT:

Under normal conditions, the MIL is illuminated for several seconds when the power switch is first turned on. The MIL goes off when the engine is started.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**CHECK MIL**

(a) Check that the Malfunction Indicator Lamp (MIL) lights up when turning the power switch on (IG).
OK:
MIL lights up

OK → SYSTEM IS OK

NG

2	CHECK COMMUNICATION BETWEEN INTELLIGENT TESTER AND ECM

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and tester on.
(c) Check the communication between the tester and hybrid vehicle control ECU.

Result

Result	Proceed to
Communication is possible	A
Communication is not possible	B

A → GO TO MIL CIRCUIT

B

3	CHECK MIL (THROTTLE POSITION SENSOR)

(a) Disconnect the C5 throttle body connector.
(b) Turn the power switch on (IG).
(c) Check the MIL.

Result

Result	Proceed to
MIL illuminates	A
MIL does not illuminate	B

(d) Reconnect the throttle body connector.

A → REPLACE THROTTLE BODY ASSEMBLY

B

4	CHECK MIL (ACCELERATOR PEDAL POSITION SENSOR)

(a) Disconnect the A17 accelerator pedal position sensor connector.
(b) Turn the power switch on (IG).
(c) Check the MIL.

Result

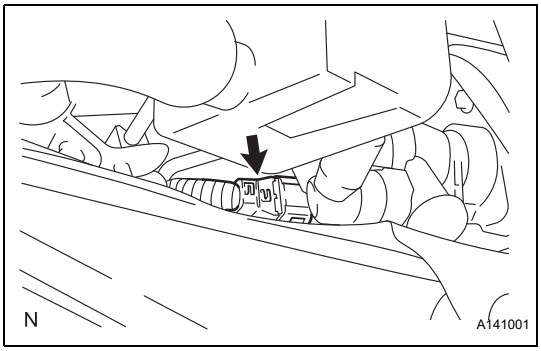
Result	Proceed to
MIL illuminates	A
MIL does not illuminate	B

(d) Reconnect the accelerator pedal position sensor connector.

A → REPLACE ACCELERATOR PEDAL POSITION SENSOR

B

5	CHECK MIL (CANISTER PUMP MODULE)



(a) Disconnect the N17 canister pump module connector.
(b) Turn the power switch on (IG).
(c) Check the MIL.

ES

Result

Result	Proceed to
MIL illuminates	A
MIL does not illuminate	B

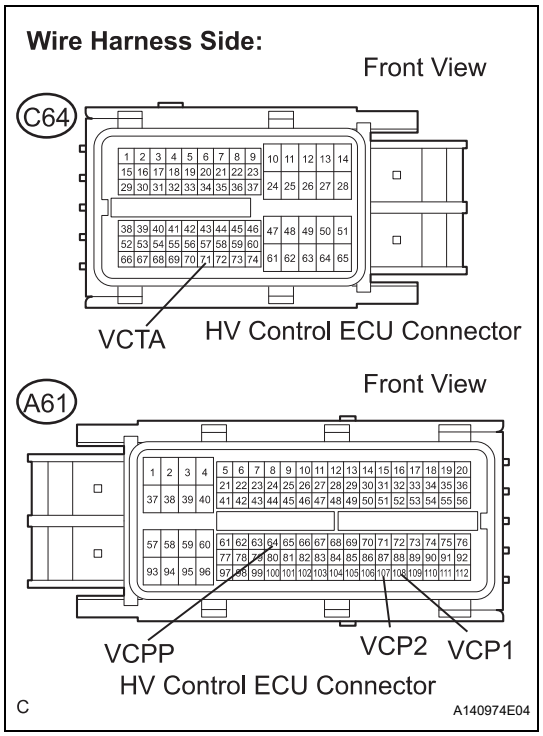
(d) Reconnect the canister pump module connector.

A → **REPLACE CHARCOAL CANISTER ASSEMBLY**

B

6	CHECK HARNESS AND CONNECTOR

(a) Disconnect the C5 throttle body connector.
(b) Disconnect the A17 accelerator pedal position sensor connector.
(c) Disconnect the N17 canister pump module connector.



(d) Disconnect the A61 and C64 hybrid vehicle control ECU connectors.

(e) Measure the resistance.

Standard resistance (Check for short)

Tester Connections	Specified Conditions
C64-71 (VCTA) - Body ground	10 kΩ or higher
A61-108 (VCP1) - Body ground	10 kΩ or higher
A61-107 (VCP2) - Body ground	10 kΩ or higher
A61-64 (VCPP) - Body ground	10 kΩ or higher

(f) Reconnect the throttle body connector.

(g) Reconnect the accelerator pedal position sensor connector.

(h) Reconnect the canister pump module connector.

(i) Reconnect the battery current sensor connector.

(j) Reconnect the hybrid vehicle control ECU connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU

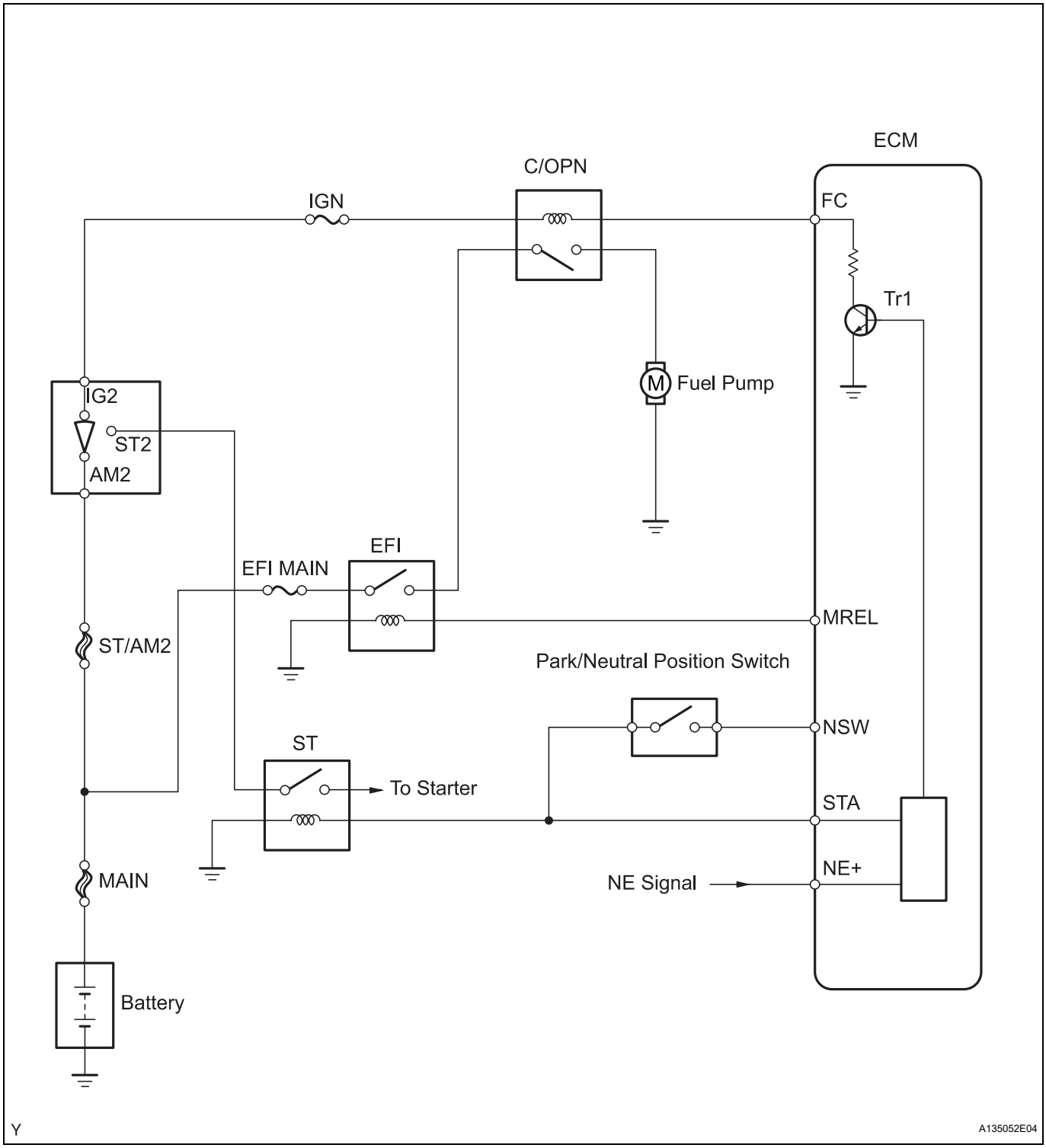
ES

Fuel Pump Control Circuit

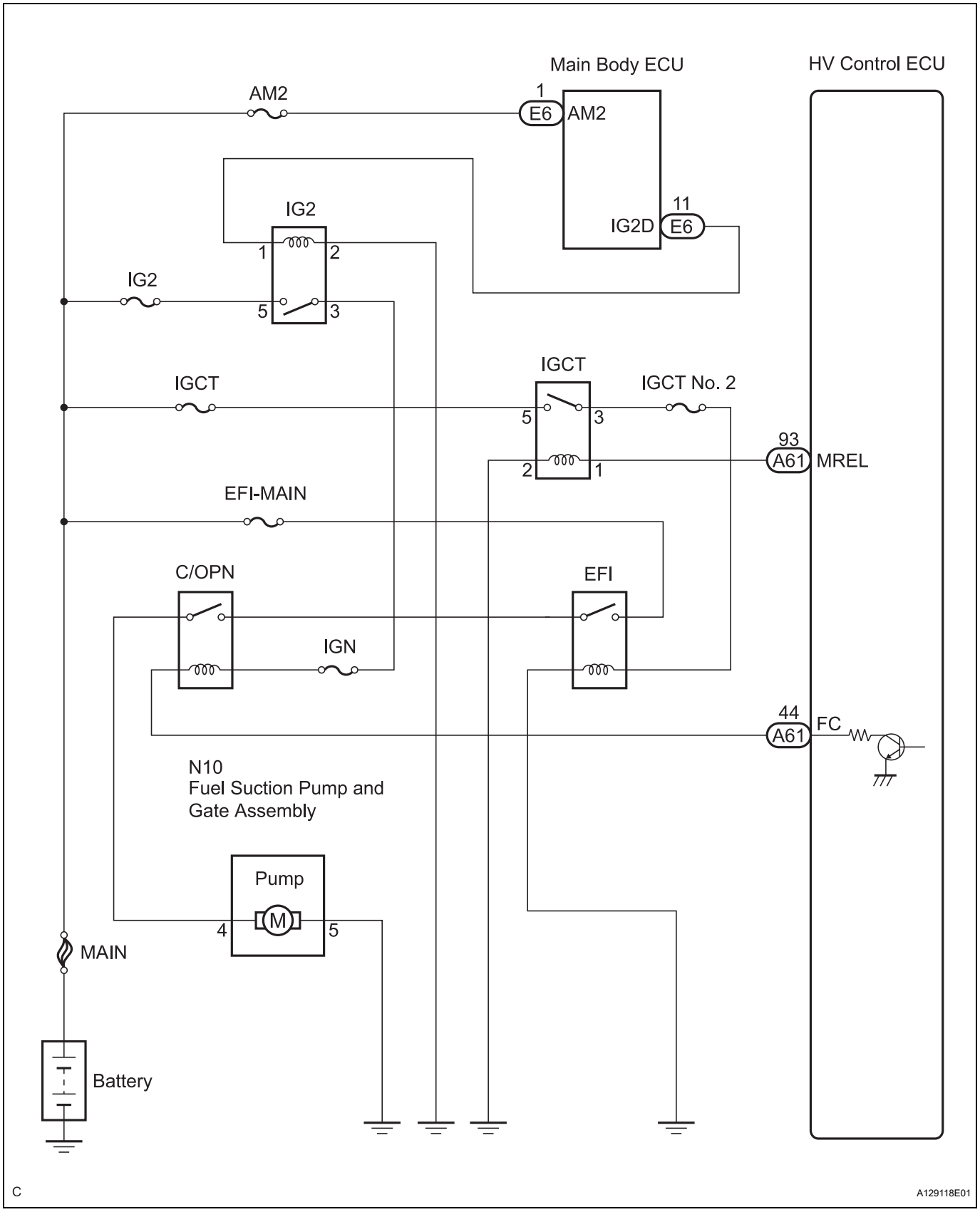
DESCRIPTION

When the engine is cranked, the starter relay drive signal output from the STAR terminal of the ECM (included in hybrid vehicle control ECU) is input into the STA terminal of the ECM, and NE signal generated by the crankshaft position sensor is also input into the NE+ terminal. Thus, the ECM interprets that the engine is cranked, and turns the transistor Tr1 in the ECM internal circuit ON. The current flows to the C/OPN (Circuit Opening) relay by turning the Tr1 ON. Then, the fuel pump operates.
While the NE signal is input into the ECM, when the engine is running, the ECM turns the Tr1 on continuously.

ES



WIRING DIAGRAM



ES

INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST USING INTELLIGENT TESTER (OPERATE C/OPN RELAY)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / FUEL PUMP / SPD.
(d) Check whether the fuel pump operation sound occurs when performing the Active Test on the tester.
OK:
Fuel pump operating sound occurs.

ES

NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

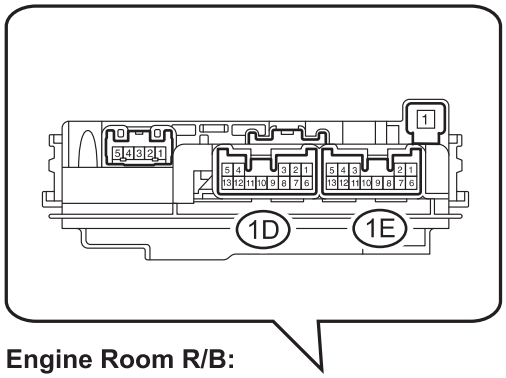
2	CHECK ECM POWER SOURCE CIRCUIT

NG → **REPAIR OR REPLACE ECM POWER SOURCE CIRCUIT**

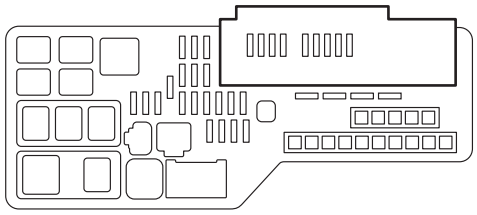
OK

3	INSPECT ENGINE ROOM J/B (C/OPN RELAY)

Engine Room J/B:



Engine Room R/B:



A138918E02

(a) Remove the engine room J/B from the engine room R/B.
(b) Inspect the C/OPN relay.
(1) Measure the C/OPN relay resistance.
Standard resistance

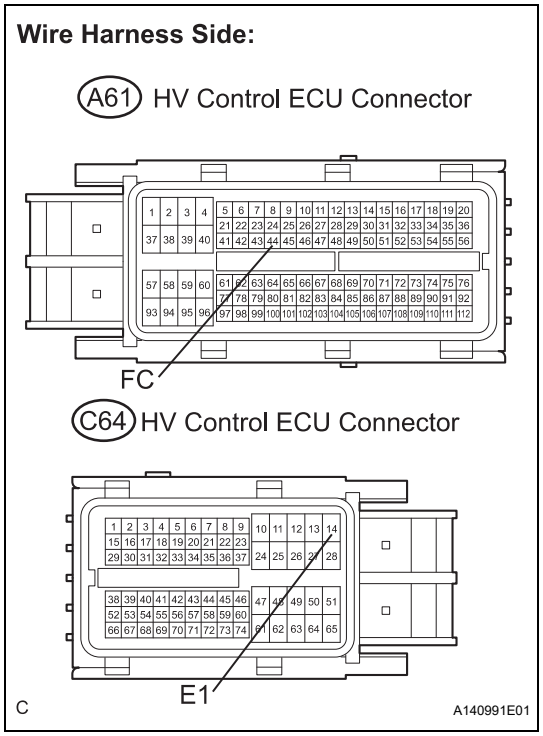
Tester Connection	Specified Condition
1E-7 - 1E-13	10 kΩ or higher
	Below 1 Ω (Apply battery voltage between terminals 1D-12 and 1E-8)

(c) Reinstall the engine room J/B.

NG → **REPLACE ENGINE ROOM J/B**

OK

4 INSPECT ECM (FC VOLTAGE)



(a) Disconnect the A61 and C64 hybrid vehicle control ECU connectors.

(b) Measure the voltage between the terminals of the A24 and C24 ECM connectors.

Standard voltage

Tester Connection	Specified Condition
A61-44 (FC) - C64-14 (E1)	9 to 14 V

(c) Reconnect the hybrid vehicle control ECU connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (ECM - BATTERY)**

ES

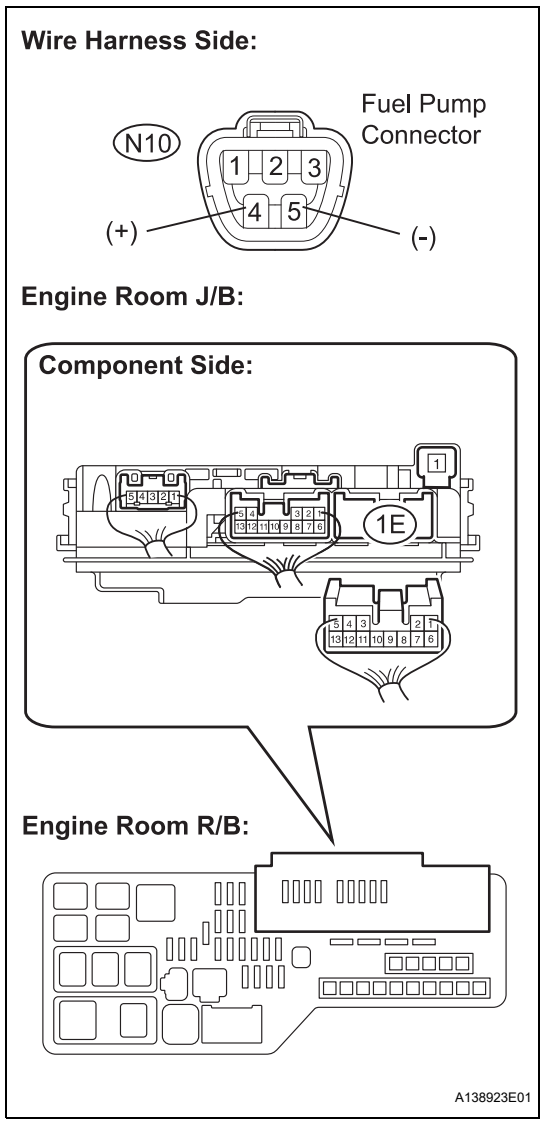
OK

5 INSPECT FUEL PUMP

NG → **REPLACE FUEL PUMP**

OK

6	CHECK HARNESS AND CONNECTOR (C/OPN RELAY - FUEL PUMP - BODY GROUND)



(a) Check the harness and the connectors between the engine room J/B and the fuel pump.
  (1) Remove the engine room J/B from the engine room R/B.
  (2) Disconnect the 1E engine room J/B connector.
  (3) Disconnect the N10 fuel pump connector.
  (4) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
1E-13 - N10-4 (Fuel pump)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
1E-13 or N10-4 (Fuel pump) - Body ground	10 kΩ or higher

(b) Check the harness and the connectors between the fuel pump and body ground.
  (1) Disconnect the N10 fuel pump connector.
  (2) Measure the resistance.

Standard resistance (Check for open)

Tester Connection	Specified Condition
N10-5 (Fuel pump) - Body ground	Below 1 Ω

(c) Reconnect the engine room J/B connector.
(d) Reconnect the fuel pump connector.
(e) Reinstall the engine room J/B.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

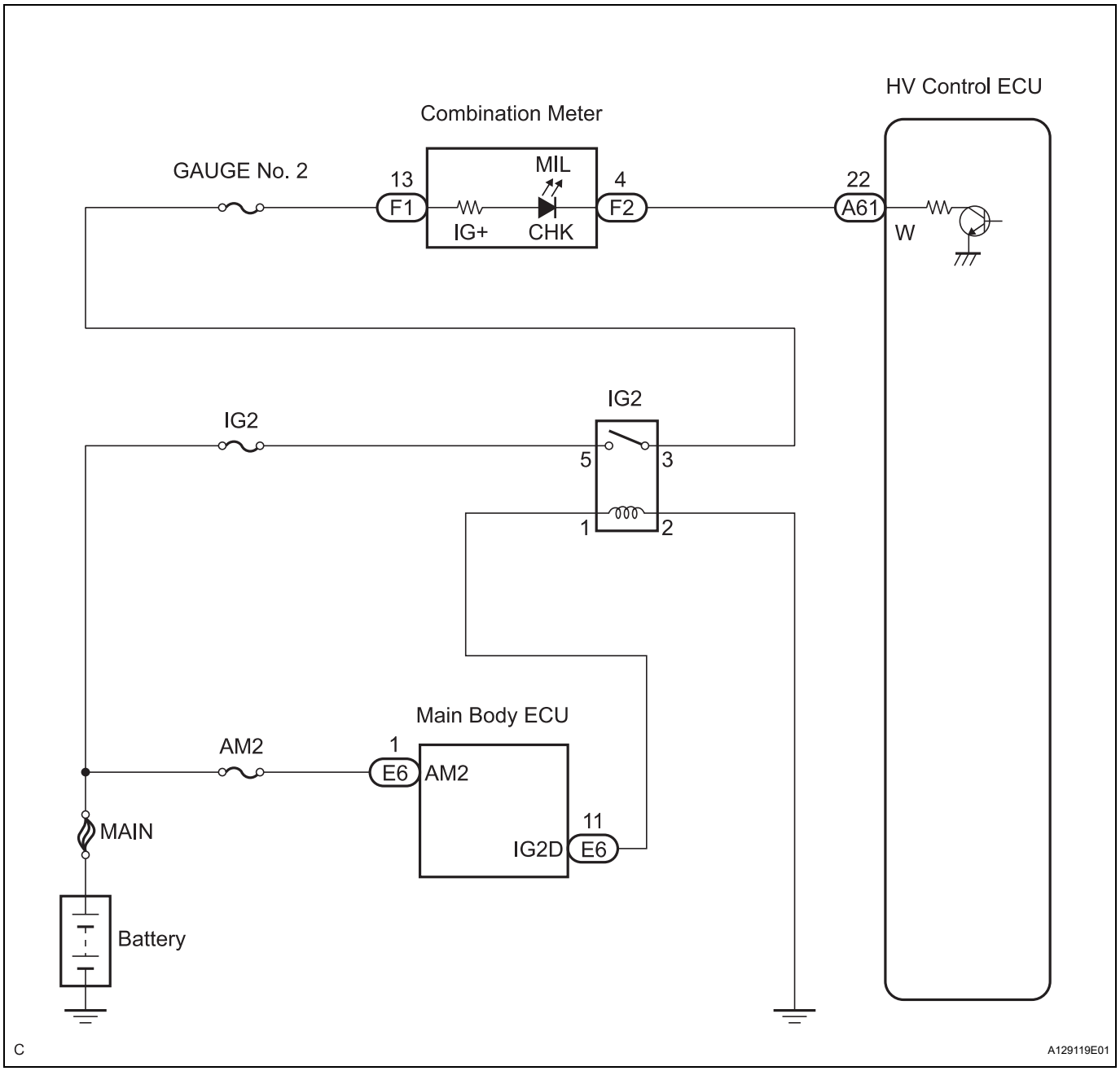
REPLACE HYBRID VEHICLE CONTROL ECU

MIL Circuit

DESCRIPTION

The MIL (Malfunction Indicator Lamp) is used to indicate vehicle malfunction detections by the ECM (included in hybrid vehicle control ECU). When the power switch on (IG), power is supplied to the MIL circuit, and the ECM provides the circuit ground which illuminates the MIL.
The MIL operation can be checked visually: When the power switch is first turned on (IG), the MIL should be illuminated and should then turn off. If the MIL remains illuminated or is not illuminated, conduct the following troubleshooting procedure using the intelligent tester.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK MIL CONDITION (MIL IS ILLUMINATED)

(a) Perform troubleshooting in accordance with the table below.

Conditions	Proceed to
MIL remains ON	A
MIL does not illuminate	B

B → **Go to step 5**

ES

A

2	CHECK MIL CONDITION (WHETHER MIL TURNS OFF)

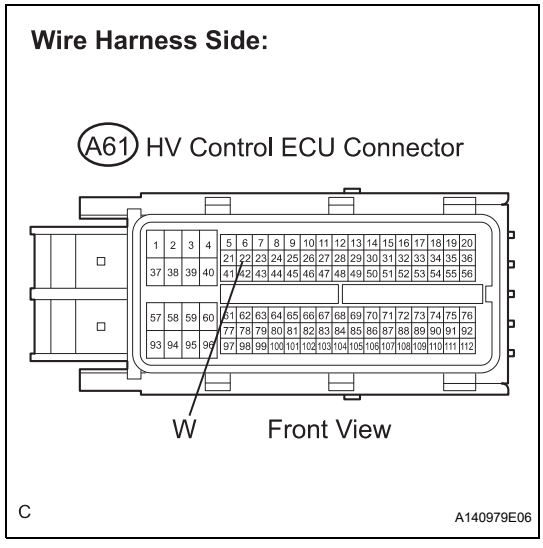
(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Check if any DTCs have been stored. Note down any DTCs.
(e) Clear the DTCs (See page ES-31).
(f) Check if the MIL goes off.
Standard:
MIL should go off.

OK → **REPAIR CIRCUITS INDICATED BY OUTPUT DTCS**

NG

3	CHECK HARNESS AND CONNECTOR (CHECK FOR SHORT IN WIRE HARNESS)

Wire Harness Side:

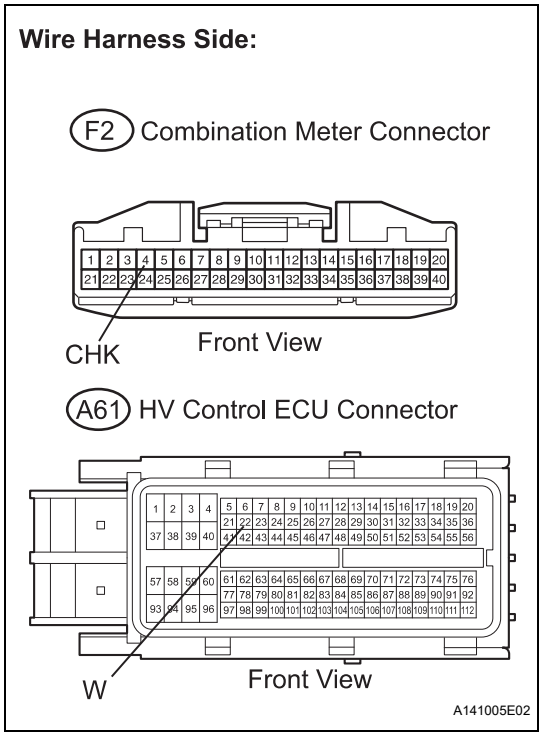


(a) Disconnect the A61 hybrid vehicle control ECU connector.
(b) Turn the power switch on (IG).
(c) Check that the MIL is not illuminated.
OK:
MIL is not illuminated.
(d) Reconnect the hybrid vehicle control ECU connector.

OK → **REPLACE HYBRID VEHICLE CONTROL ECU**

NG

4 CHECK HARNESS AND CONNECTOR (COMBINATION METER - HV CONTROL ECU)



(a) Disconnect the A61 hybrid vehicle control ECU connector.
(b) Disconnect the F2 combination meter connector.
(c) Measure the resistance.
Standard resistance (Check for short)

Tester Connections	Specified Conditions
A61-22 (W) or F2-4 (CHK) - Body ground	10 kΩ or higher

(d) Reconnect the hybrid vehicle control ECU connector.
(e) Reconnect the combination meter connector.

ES

OK → **REPAIR OR REPLACE COMBINATION METER ASSEMBLY**

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

5 CHECK MIL CONDITION (MIL ILLUMINATED)

(a) Check if the MIL is illuminated when the power switch is turned on (IG).
OK:
MIL should be illuminated.

OK → **SYSTEM IS OK**

NG

6 CHECK THAT ENGINE START

(a) Turn the power switch on (IG).
(b) Put the engine in inspection mode (See page ES-35).
Result

Result	Proceed to
Engine starts	A
Engine does not start*	B

HINT:
*: The intelligent tester cannot communicate with the hybrid vehicle control ECU.

B → GO TO VC OUTPUT CIRCUIT

A

7	INSPECT COMBINATION METER ASSEMBLY (MIL CIRCUIT)

(a) Check the MIL circuit (See page ME-17).

NG → REPAIR OR REPLACE COMBINATION METER ASSEMBLY

ES

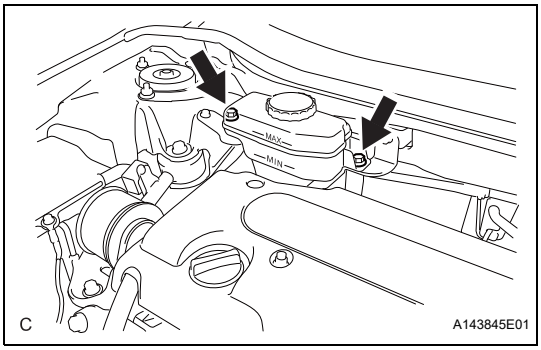
OK

CHECK AND REPLACE HARNESS OR CONNECTOR (COMBINATION METER - HV CONTROL ECU)

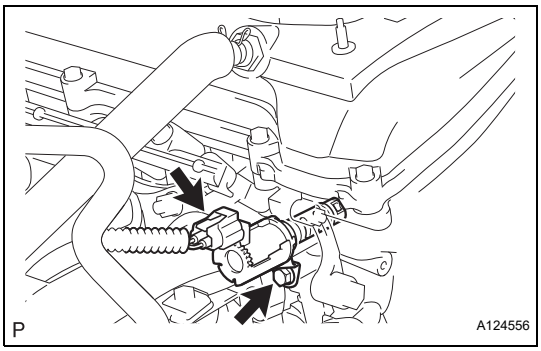
REMOVAL

1. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-90)**

2. **SEPARATE BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY**
   (a) Remove the 2 bolts and separate the brake master cylinder reservoir sub-assembly.



3. **REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY**
   (a) Disconnect the camshaft timing oil control valve assembly connector.
   (b) Remove the bolt and camshaft timing oil control valve assembly.



INSPECTION

1. INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

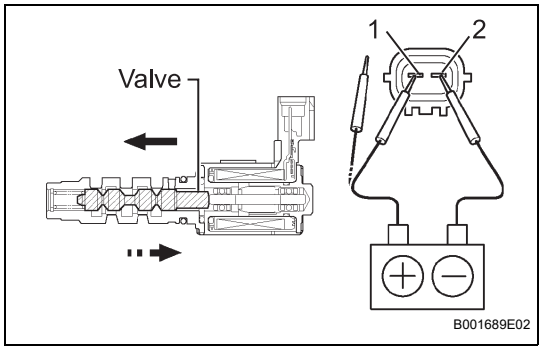
(a) Resistance inspection.

(1) Using an ohmmeter, measure the resistance between the terminals.

Standard resistance:

6.9 to 7.9 Ω at 20°C (68°F)

If necessary, replace the camshaft timing oil control valve assembly.



(b) Movement inspection.

(1) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, and check the movement of the valve.

NOTICE:

Confirm that the valve moves freely and does not stick in any position.

If necessary, replace the camshaft timing oil control valve assembly.

HINT:

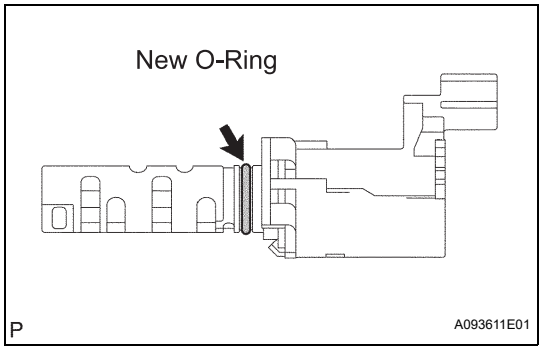
Accumulation of foreign objects causes subtle pressure leaks. The subtle pressure leaks will cause the camshaft to advance, and this will cause a DTC to be set.

ES

INSTALLATION

1. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

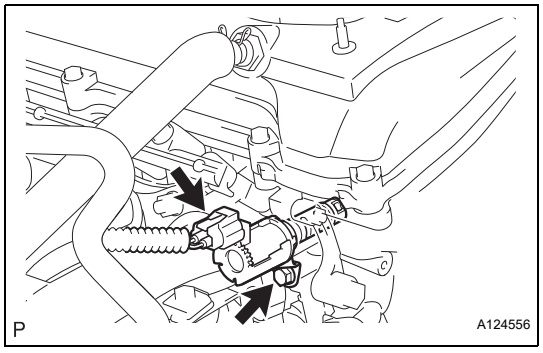
(a) Apply a light coat of engine oil to an O-ring of the camshaft timing oil control valve assembly sensor.

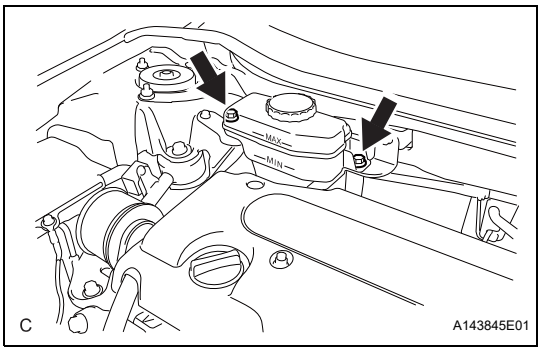


(b) Install the camshaft timing oil control valve assembly with the bolt.

Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

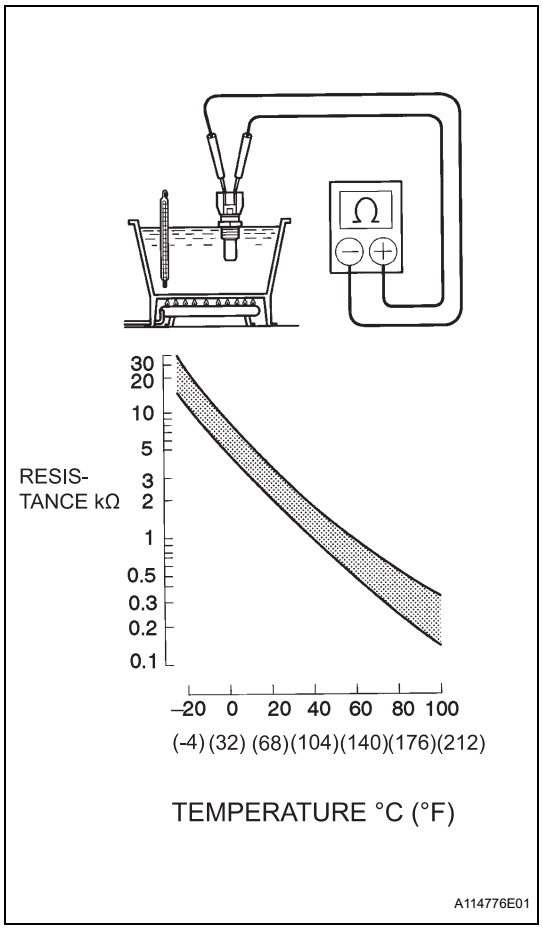
(c) Connect the camshaft timing oil control valve assembly connector.





2. **INSTALL BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY**
   (a) Install the brake master cylinder reservoir sub-assembly with the 2 bolts.
   Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

3. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-114)**



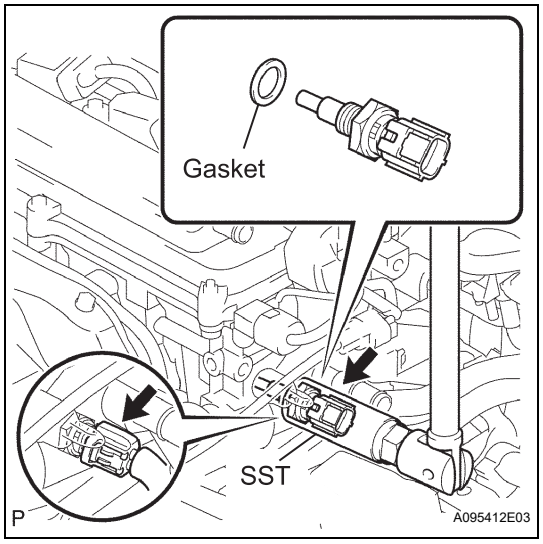
INSPECTION

1. **INSPECT ENGINE COOLANT TEMPERATURE SENSOR**
   (a) Using an ohmmeter, measure the resistance between the terminals.
   Standard resistance

Condition	Specified Condition
20°C (68°F)	2.32 to 2.59 kΩ
80°C (176°F)	0.310 to 0.326 kΩ

If the result is not as specified, replace the sensor.
NOTICE:
In case of checking the water temperature sensor in water, do not allow water to go into the terminals. After checking, dry the sensor.

ES

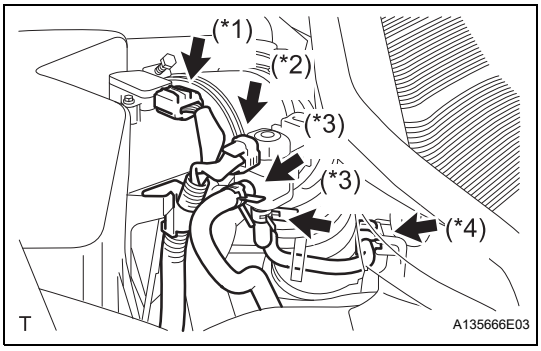


INSTALLATION

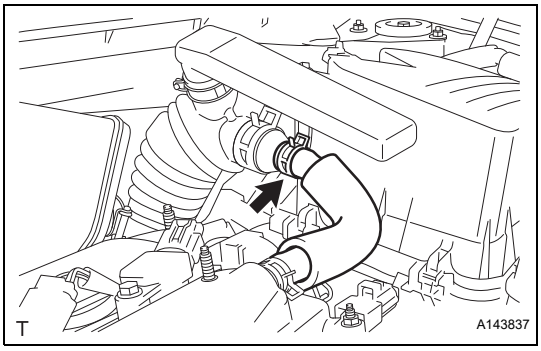
1. **INSTALL ENGINE COOLANT TEMPERATURE SENSOR**
   (a) Install a new gasket onto the engine coolant temperature sensor.
   (b) Using SST, install the engine coolant temperature sensor.
   SST 09817-33190
   Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)
   (c) Connect the engine coolant temperature sensor connector.
2. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-113)**
3. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-398)**
4. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-113)**
5. **ADD ENGINE COOLANT (See page CO-5)**
6. **INSPECT FOR COOLANT LEAK (See page CO-1)**
7. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-114)**

REMOVAL

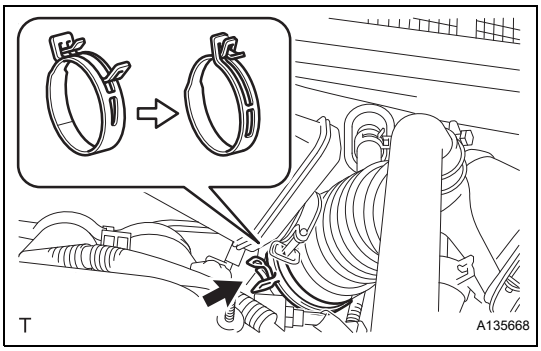
1. **DRAIN ENGINE COOLANT (See page CO-5)**
2. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-90)**
3. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY**



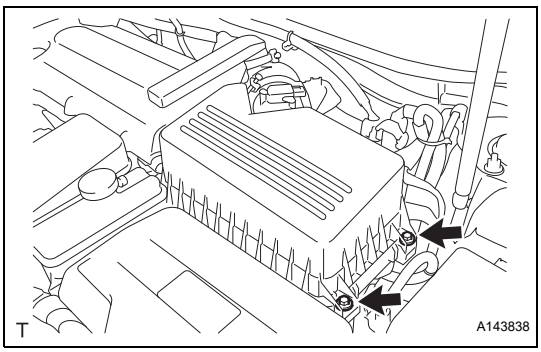
(a) Disconnect the mass air flow meter connector (*1).
(b) Disconnect the purge VSV connector (*2).
(c) Disconnect the 2 purge VSV vacuum hoses (*3).
(d) Disconnect the purge line hose from the clamp (*4).



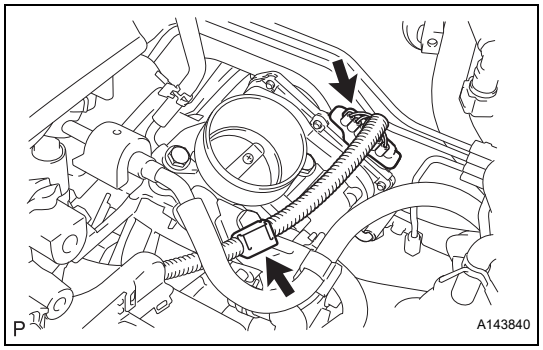
(e) Disconnect the No. 2 ventilation hose from the air cleaner hose.



(f) Lock the No. 1 air cleaner hose clamp, and then disconnect the No. 1 air cleaner hose from the throttle body.

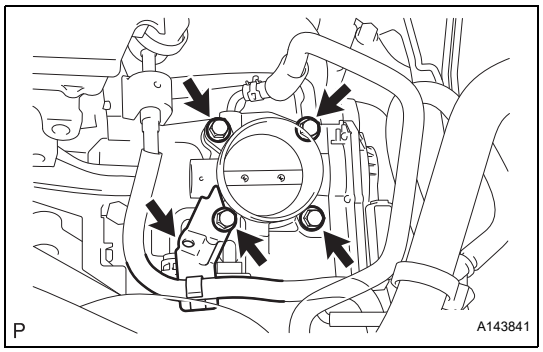


(g) Remove the 2 bolts and air cleaner cap.
(h) Remove the air cleaner filter element from the air cleaner case.

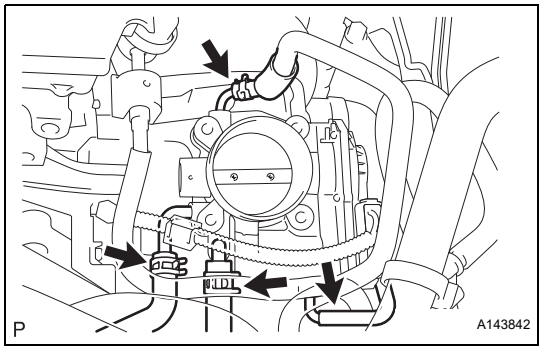


4. REMOVE THROTTLE BODY

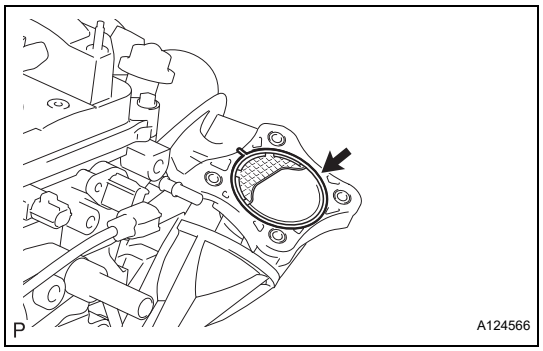
(a) Disconnect the throttle position sensor connector and wire harness clamp.



(b) Remove the 4 bolts, and then remove the fuel pipe support and throttle body.



(c) Disconnect the purge line hose from the throttle body.
(d) Disconnect the water by-pass hose from the throttle body.
(e) Disconnect the No. 2 water by-pass hose from the throttle body.
(f) Disconnect the No. 1 throttle body hose from the throttle body.



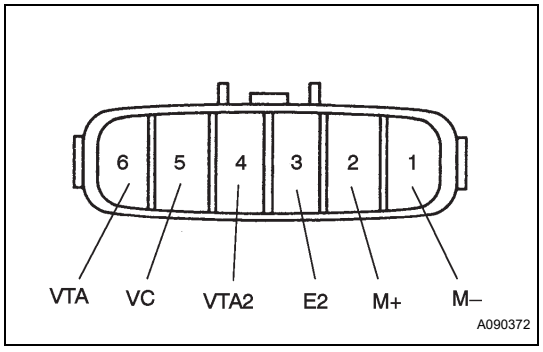
(g) Remove the gasket from the intake manifold.

INSPECTION

1. INSPECT THROTTLE BODY ASSEMBLY

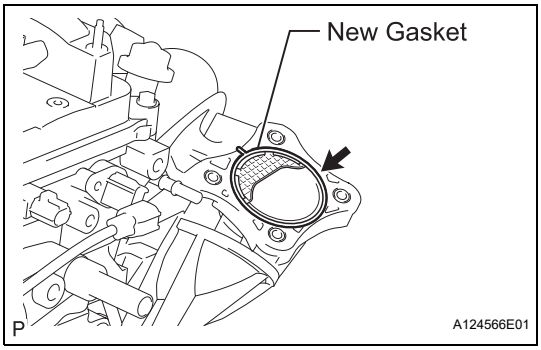
(a) Using an ohmmeter, measure the resistance between the terminals.

Standard resistance



Symbols (terminal No.)	Resistance	Temperature
M+ (2) - M- (1)	0.3 to 100 Ω	20°C (68°F)

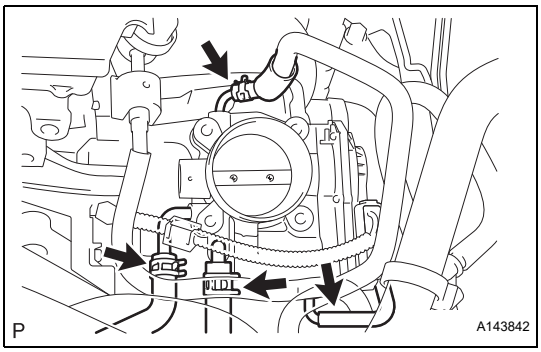
If the result is not as specified, replace the throttle body assembly.



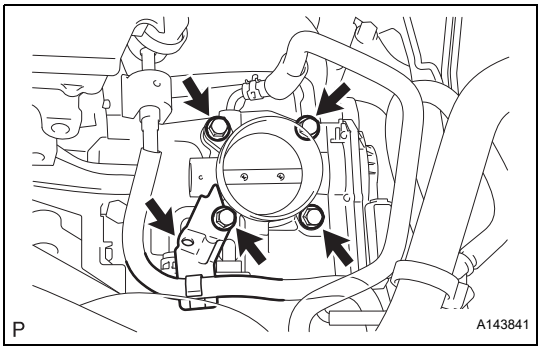
INSTALLATION

1. INSTALL THROTTLE BODY

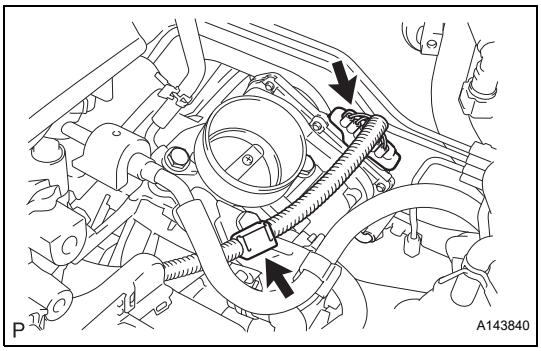
(a) Install a new gasket onto the intake manifold.



(b) Connect the purge line hose to the throttle body.
(c) Connect the water by-pass hose to the throttle body.
(d) Connect the No. 2 water by-pass hose to the throttle body.
(e) Connect the No. 1 throttle body hose to the throttle body.



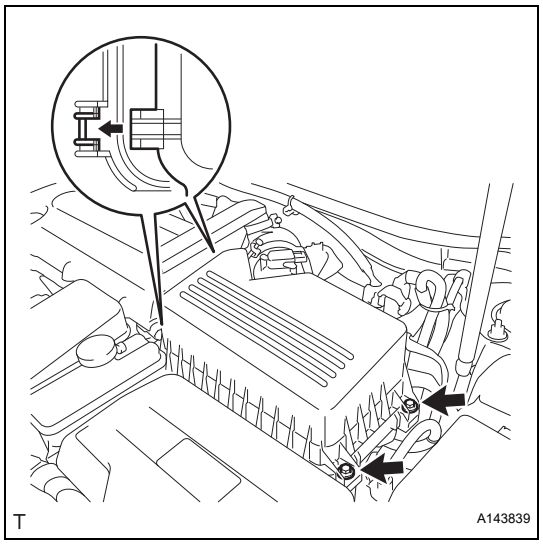
(f) Install the throttle body and fuel pipe clamp with the 4 bolts.
Torque: 30 N*m (305 kgf*cm, 22 ft.*lbf)
(g) Connect the fuel tube into the clamp.



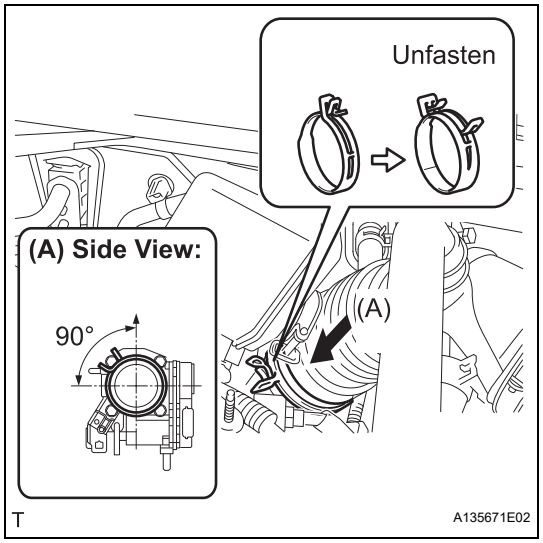
(h) Connect the throttle position sensor connector.
(i) Connect the wire harness clamp.

2. INSTALL AIR CLEANER CAP SUB-ASSEMBLY

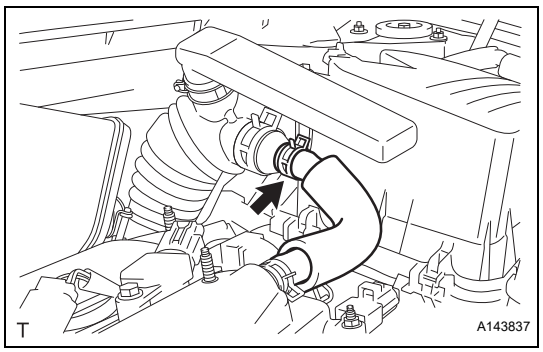
(a) Install the air cleaner filter element onto the air cleaner case.



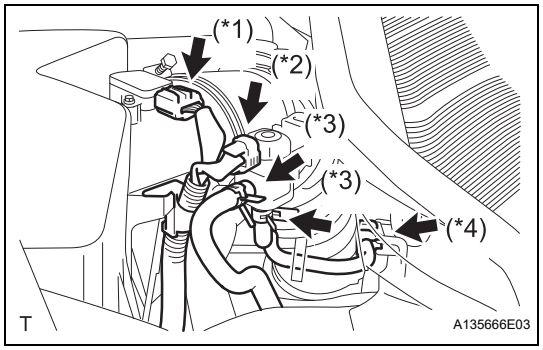
(b) Insert the hinges. Install the air cleaner cap sub-assembly with the 2 bolts.



(c) Align the matchmarks of the No. 1 air cleaner hose and throttle body. Connect the air cleaner hose No. 1 to the throttle body and unfasten the No. 1 air cleaner hose clamp.
NOTICE:
Make sure that the hose clamp is at the correct angle.



(d) Connect the No. 2 ventilation hose to the air cleaner hose.



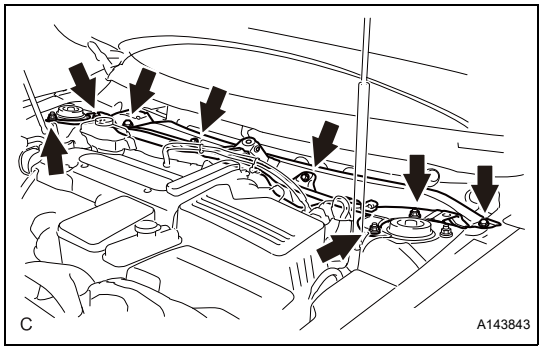
(e) Connect the purge line hose to the clamp (*1).
(f) Connect the 2 purge VSV vacuum hoses (*2).
(g) Connect the purge VSV connector (*3).
(h) Connect the mass air flow meter connector (*4).

3. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-113)**
4. **ADD ENGINE COOLANT (See page CO-5)**
5. **INSPECT FOR COOLANT LEAK (See page CO-1)**

6. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY**
(See page EM-114)

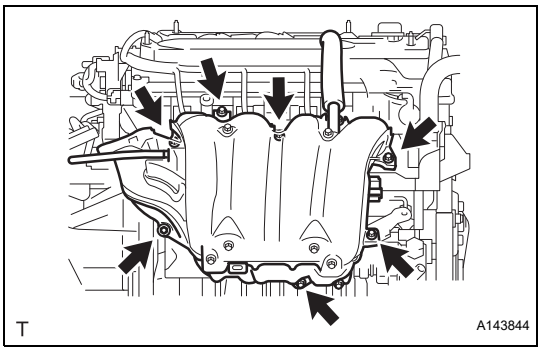
REMOVAL

1. DISCHARGE FUEL SYSTEM PRESSURE (See page FU-36)
2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
3. REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-90)
4. DRAIN ENGINE COOLANT (See page CO-5)
5. REMOVE WINDSHIELD WIPER ARM AND BLADE ASSEMBLY LH (See page WW-9)
6. REMOVE WINDSHIELD WIPER ARM AND BLADE ASSEMBLY RH (See page WW-9)
7. REMOVE FRONT FENDER TO COWL SIDE SEAL LH (See page WW-9)
8. REMOVE FRONT FENDER TO COWL SIDE SEAL RH (See page WW-9)
9. REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-10)
10. SEPARATE BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY
11. REMOVE WINDSHIELD WIPER MOTOR AND LINK (See page WW-10)
12. REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY
    (a) Remove the 4 bolts, 4 nuts and cowl top panel outer sub-assembly.

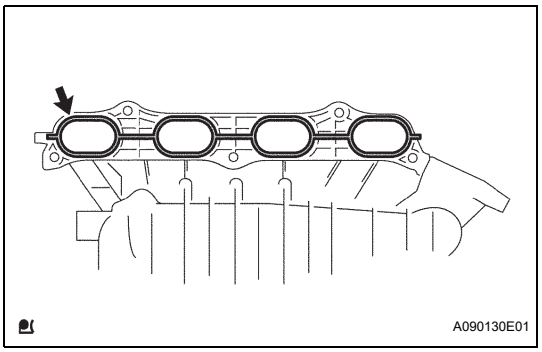


13. REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-395)
14. REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-90)
15. REMOVE THROTTLE BODY (See page ES-396)
16. DISCONNECT FUEL TUBE (See page FU-12)
17. REMOVE FUEL DELIVERY PIPE WITH INJECTOR (See page FU-13)
18. REMOVE INTAKE MANIFOLD
    (a) Disconnect the union to check valve hose from the brake booster.

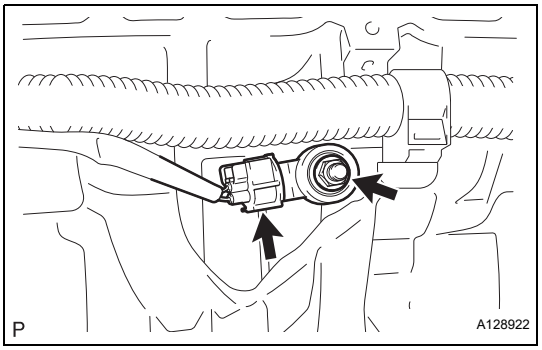
ES



(b) Disconnect the camshaft timing oil control valve connector.
(c) Remove the wire harness clamp.
(d) Remove the union to check valve hose from the vacuum hose clamp.
(e) Remove the 5 bolts, 2 nuts and intake manifold.



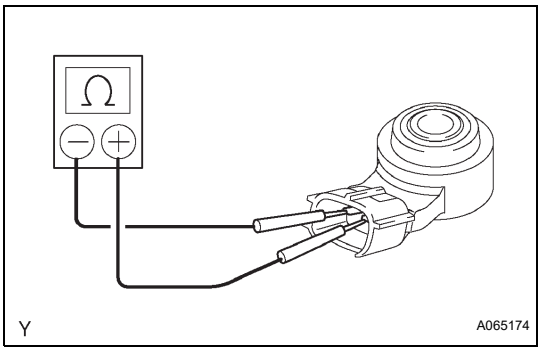
(f) Remove the gasket from the intake manifold.



19. REMOVE KNOCK SENSOR
(a) Disconnect the knock sensor connector.
(b) Remove the nut and knock sensor.

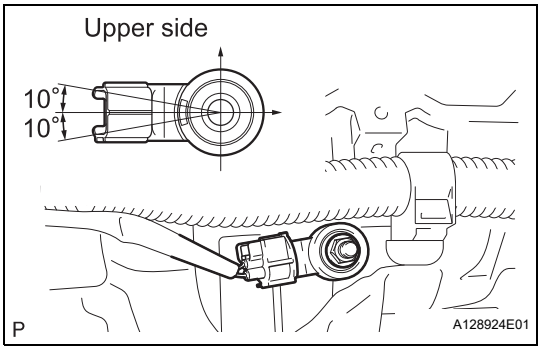
INSPECTION

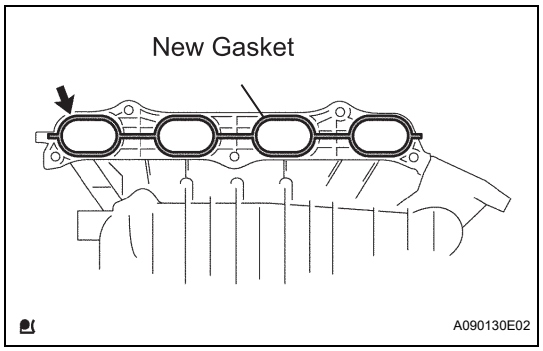
1. KNOCK CONTROL SENSOR
(a) Using an ohmmeter, measure the resistance between the terminals.
Standard resistance:
120 to 280 kΩ at 20°C (68°F)
If the resistance is not specified, replace the sensor.



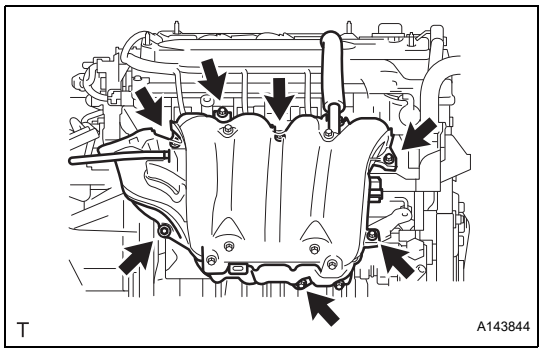
INSTALLATION

1. INSTALL KNOCK SENSOR
(a) Install the knock sensor with the nut.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)
NOTICE:
Make sure that the knock sensor is in the correct position.
(b) Connect the knock sensor connector.



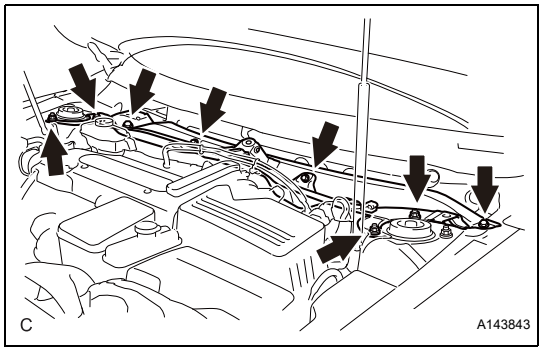


2. **INSTALL INTAKE MANIFOLD**
   (a) Install a new gasket into the intake manifold.



   (b) Install the intake manifold with the 5 bolts and 2 nuts.
   Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)
   (c) Fit the union to check valve hose into the vacuum hose clamp.
   (d) Install the wire harness clamp.
   (e) Connect the camshaft timing oil control valve connector.
   (f) Connect the union to check valve hose to the brake booster.

3. **INSTALL FUEL DELIVERY PIPE WITH INJECTOR (See page FU-15)**
4. **INSTALL FUEL TUBE (See page FU-16)**
5. **INSTALL THROTTLE BODY (See page ES-397)**
6. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-113)**
7. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-398)**
8. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-113)**
9. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-113)**
10. **ADD ENGINE COOLANT (See page CO-5)**
11. **INSPECT FOR COOLANT LEAK (See page CO-1)**
12. **INSPECT FOR FOR FUEL LEAK (See page FU-9)**
13. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-114)**



14. **INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY**
   (a) Install the cowl top panel outer sub-assembly with the 4 bolts and 4 nuts.
   Torque: Bolt
   5.0 N*m (51 kgf*cm, 44 in.*lbf)
   Nut
   85 N*m (867 kgf*cm, 63 ft.*lbf)
15. **INSTALL BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY (See page ES-383)**

ES

16. **INSTALL WINDSHIELD WIPER MOTOR AND LINK (See page WW-13)**
17. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-14)**
18. **INSTALL FRONT FENDER TO COWL SIDE SEAL LH (See page WW-14)**
19. **INSTALL FRONT FENDER TO COWL SIDE SEAL RH (See page WW-14)**
20. **INSTALL WINDSHIELD WIPER ARM AND BLADE ASSEMBLY LH (See page WW-14)**
21. **INSTALL WINDSHIELD WIPER ARM AND BLADE ASSEMBLY RH (See page WW-15)**
22. **PERFORM INITIALIZATION**
    (a) Perform initialization procedure (See page IN-43).
    NOTICE:
    Some vehicle systems require initialization after reconnecting the cable to the negative battery terminal.

2007 *Camry Hybrid* Repair Manual

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HOW TO USE THIS MANUAL

GENERAL INFORMATION

1. GENERAL DESCRIPTION

(a) This manual is written in accordance with SAE J2008.
  (1) Diagnosis
  (2) Removing / Installing, Replacing, Disassembling / Reassembling, Checking and Adjusting
  (3) Final Inspection

(b) The following procedures are omitted from this manual. However, these procedures must be performed.
  (1) Use a jack or lift to perform operations
  (2) Clean all removed parts
  (3) Perform a visual check

2. INDEX

(a) An alphabetical INDEX section is provided at the end of the manual as a reference to help you find the item to be repaired.

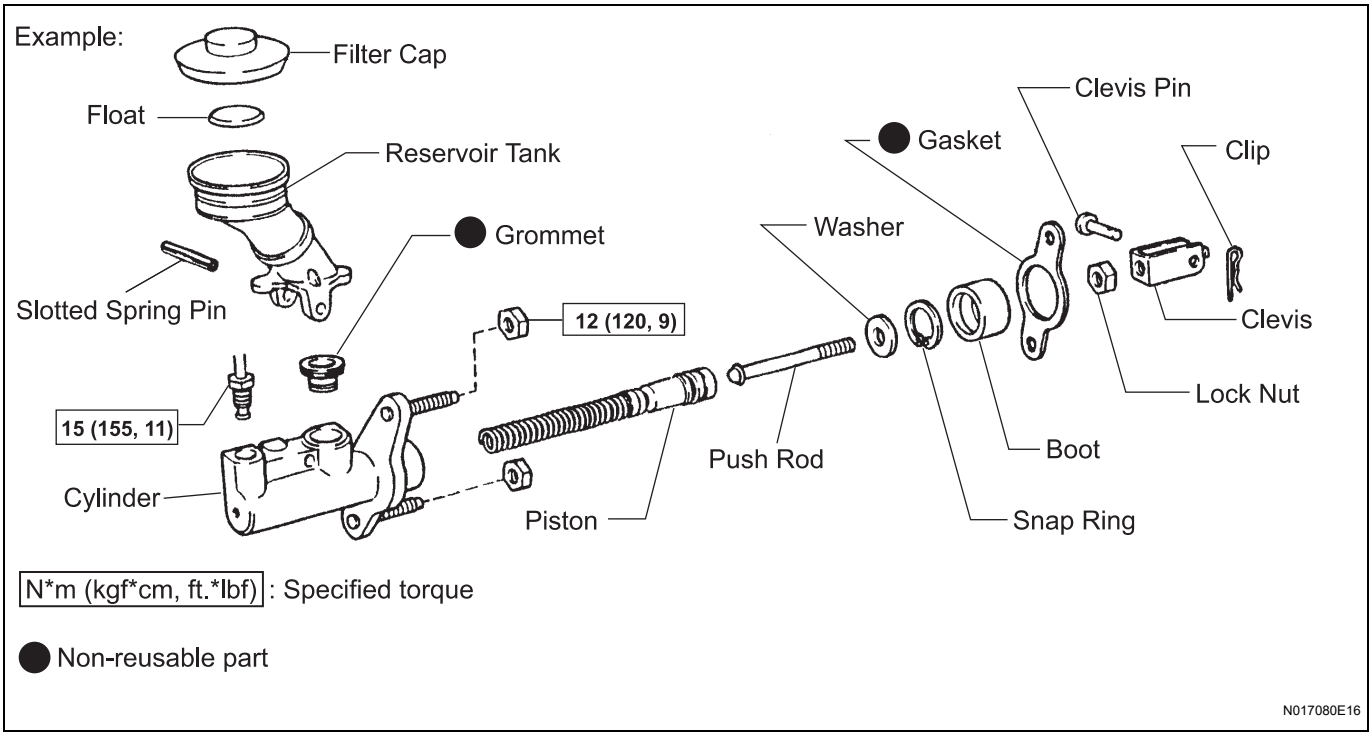
3. PREPARATION

(a) Use of Special Service Tools (SST) and Special Service Materials (SSM) may be required, depending on the repair procedure. Be sure to use SST and SSM when they are required and follow the working procedure properly. A list of SST and SSM is in the "Preparation" section of this manual.

4. REPAIR PROCEDURES

(a) A component illustration is placed under the title where necessary.

(b) Non-reusable parts, grease application areas, precoated parts and torque specifications are noted in the component illustrations.
The following illustration is an example.



(c) Torque specifications, grease application areas and non-reusable parts are emphasized in the procedures.
HINT:
There are cases where such information can only be explained by using an illustration. In these cases, torque, oil and other information are described in the illustration.

(d) Only items with key points are described in the text. What to do and other details are explained using illustrations next to the text. Both the text and illustrations are accompanied by standard values and notices.

Illustration	What to do and where to do it
Task heading	What work will be performed
Explanation text	How to perform the task Also has information such as specifications and warnings, which are written in boldface text

(e) Illustrations of similar vehicle models are sometimes used. In these cases, minor details may be different from the actual vehicle.

(f) Procedures are presented in a step-by-step format.

5. SERVICE SPECIFICATIONS

(a) SPECIFICATIONS are presented in boldface text throughout the manual. The specifications are also found in the "Service Specifications" section for reference.

6. TERM DEFINITIONS

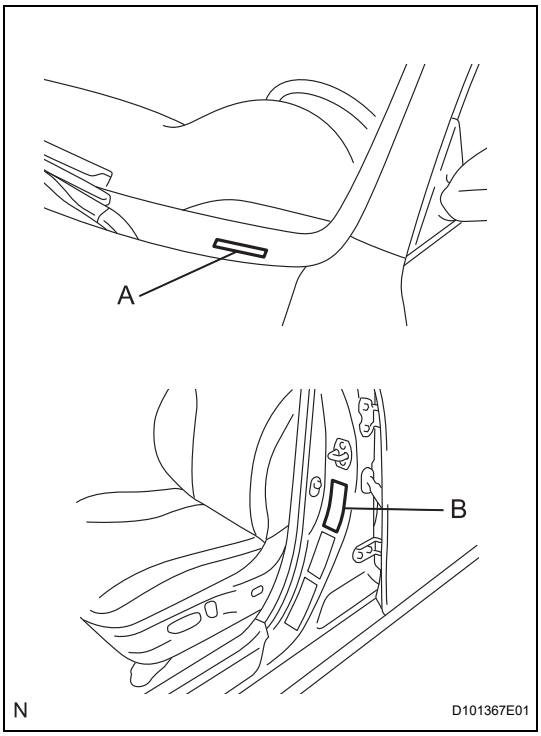
CAUTION	Possibility of injury to you or other people.
NOTICE	Possibility of damage to components being repaired.
HINT	Provides additional information to help you perform repairs.

7. INTERNATIONAL SYSTEM OF UNITS

(a) The units used in this manual comply with the International System of Units (SI UNIT) standard. Units from the metric system and the English systems are also provided.
Example:
Torque: 30 N*m (310 kgf*cm, 22 ft.*lbf)

IDENTIFICATION INFORMATION

VEHICLE IDENTIFICATION AND SERIAL NUMBERS

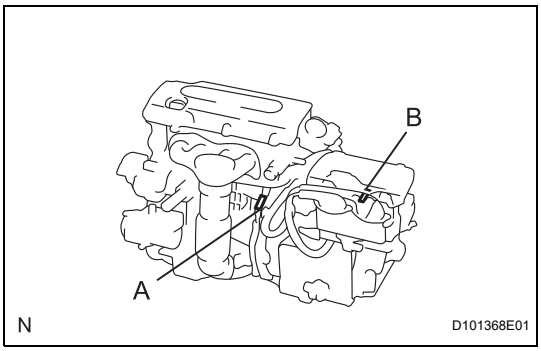


1. VEHICLE IDENTIFICATION NUMBER

(a) The vehicle identification number is stamped on the vehicle body and on the certification label, as shown in the illustration.

A:
Vehicle Identification Number

B:
Certification Label



2. ENGINE SERIAL NUMBER AND TRANSAXLE SERIAL NUMBER

(a) The engine serial number is stamped on the cylinder block of the engine, and the transaxle serial number is stamped on the housing, as shown in the illustration.

A:
Engine Serial Number

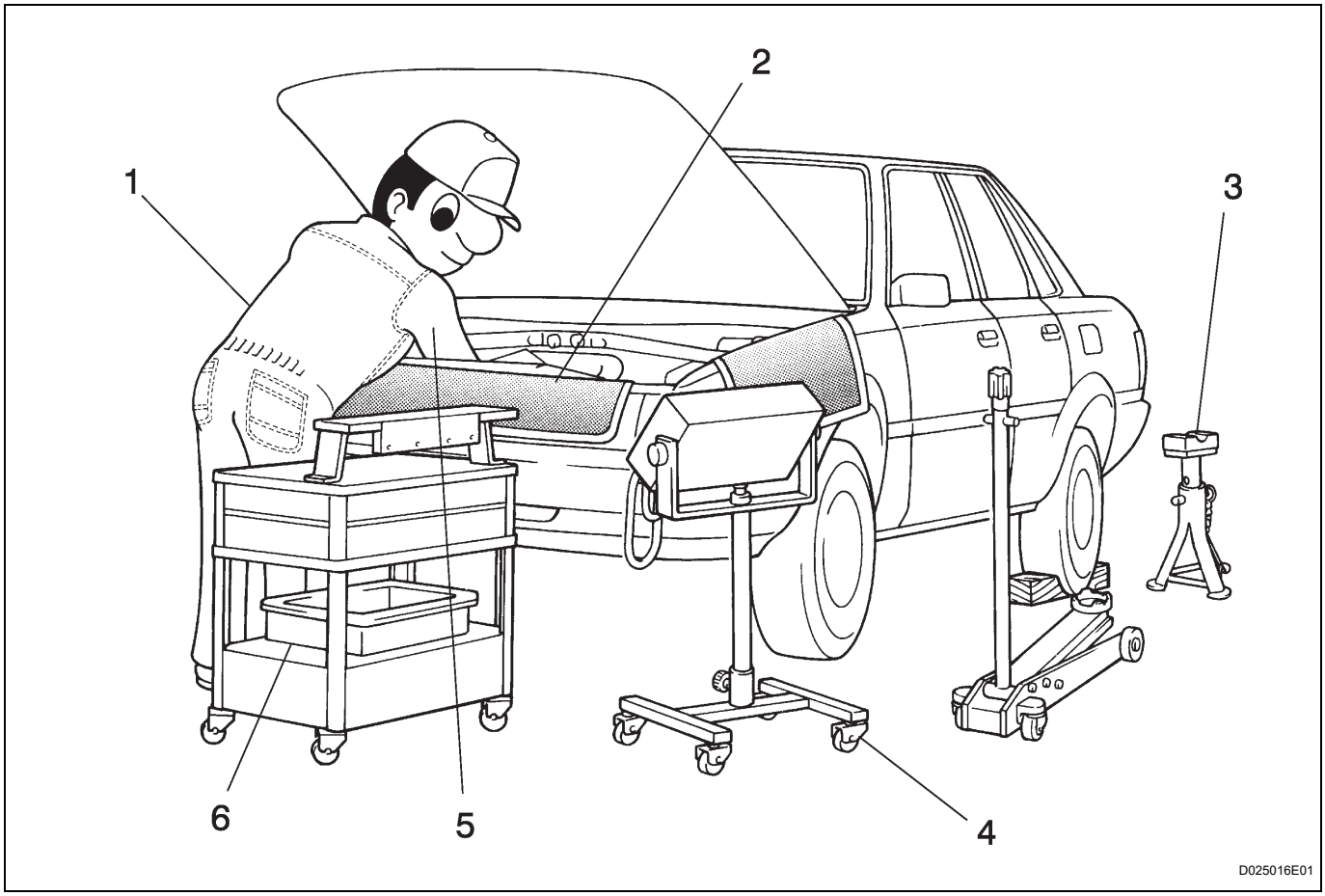
B:
Transaxle Serial Number

REPAIR INSTRUCTION

PRECAUTION

1. BASIC REPAIR HINT

(a) HINTS ON OPERATIONS

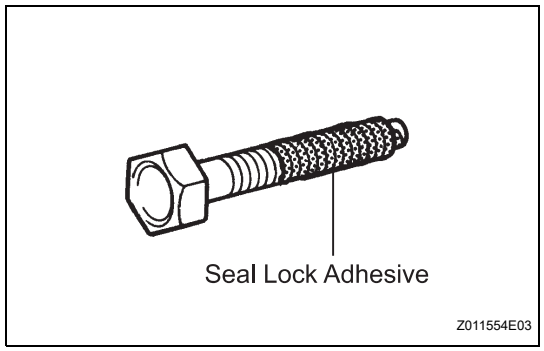


1	Attire	• Always wear a clean uniform. • Hat and safety shoes must be worn.
2	Vehicle protection	Prepare a grille cover, fender cover, seat cover and floor mat before starting the operation.
3	Safety operation	• When working in a pair or groups, be sure to check safety for one another. • When working with the engine running, make sure to provide ventilation for exhaust fumes in the workshop. • If working on high temperature, high pressure, rotating, moving, or vibrating parts, wear appropriate safety equipment and take extra care not to injure yourself or others. • When jacking up the vehicle, be sure to support the specified location with a safety stand. • When lifting up the vehicle, use appropriate safety equipment.
4	Preparation of tools and measuring gauge	Before starting operation, prepare a tool stand, SST, gauge, oil and parts for replacement.
5	Removal and installation, disassembly and assembly operations	• Diagnose with a thorough understanding of proper procedures and of the reported problem. • Before removing the parts, check the general condition of the assembly and for deformation and damage. • When the assembly is complicated, take notes. For example, note the total number of electrical connections, bolts, or hoses removed. Add matchmarks to insure reassembly of components in the original positions. Temporarily mark hoses and their fittings if needed. • Clean and wash the removed parts if necessary and assemble them after a thorough check.

6	Removed parts	• Place the removed parts in a separate box to avoid mixing them up with the new parts or contaminating the new parts. • For non-reusable parts such as gaskets, O-rings, and self-locking nuts, replace them with new ones as instructed in this manual. • Retain the removed parts for customer inspection if requested.

IN

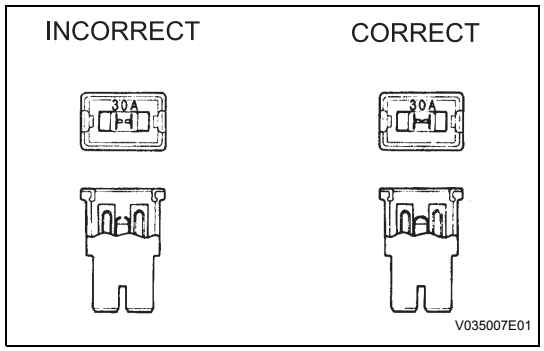
(b) JACKING UP AND SUPPORTING VEHICLE
(1) Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations.



(c) PRECOATED PARTS
(1) Precoated parts are bolts and nuts that are coated with a seal lock adhesive at the factory.
(2) If a precoated part is retightened, loosened or moved in any way, it must be recoated with the specified adhesive.
(3) When reusing a precoated part, clean off the old adhesive and dry the part with compressed air. Then apply new seal lock adhesive appropriate to that part.
(4) Some seal lock agents harden slowly. You may have to wait for the seal lock adhesive to harden.

(d) GASKETS
(1) When necessary, use a sealer on gaskets to prevent leaks.

(e) BOLTS, NUTS AND SCREWS
(1) Carefully follow all the specifications for tightening torques. Always use a torque wrench.



(f) FUSES
(1) When inspecting a fuse, check that the wire of the fuse is not broken.
(2) When replacing fuses, be sure that the new fuse has the correct amperage rating. Do not exceed the rating or use one with a lower rating.

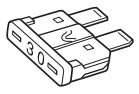
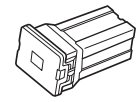
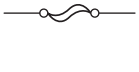
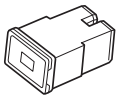
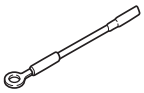
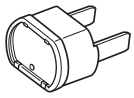
Illustration	Symbol	Part Name	Abbreviation
 N	N	FUSE	FUSE

Illustration	Symbol	Part Name	Abbreviation
 N	 N	MEDIUM CURRENT FUSE	M-FUSE
 N	N	HIGH CURRENT FUSE	H-FUSE
 N	N	FUSIBLE LINK	FL
 N	N	CIRCUIT BREAKER	CB

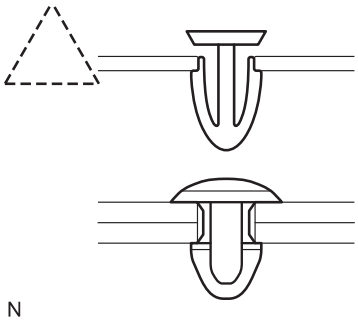
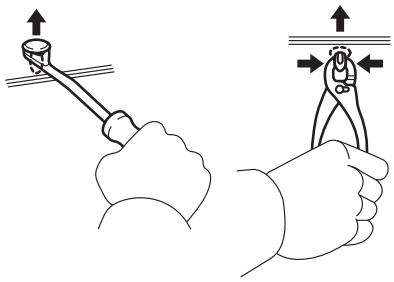
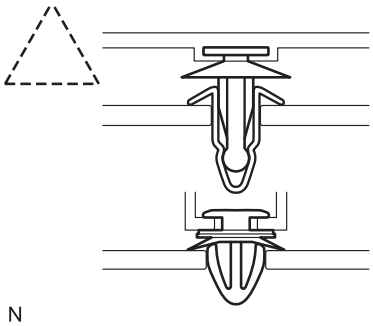
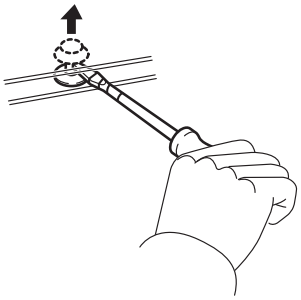
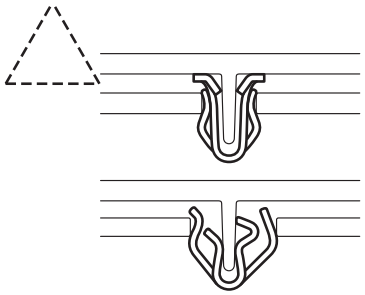
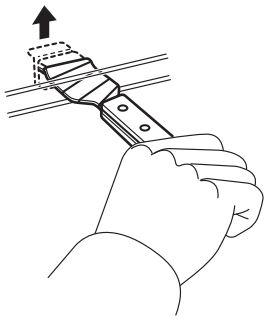
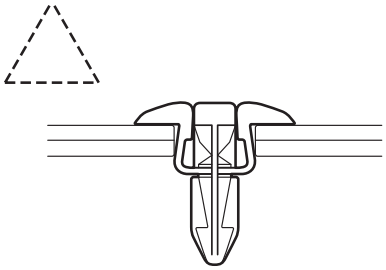
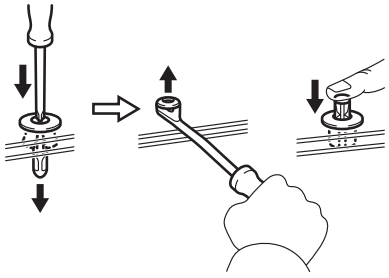
(g) CLIPS

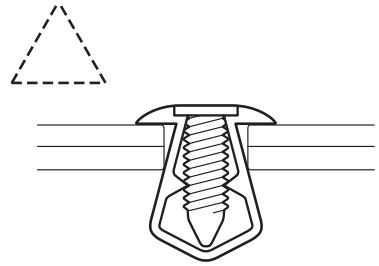
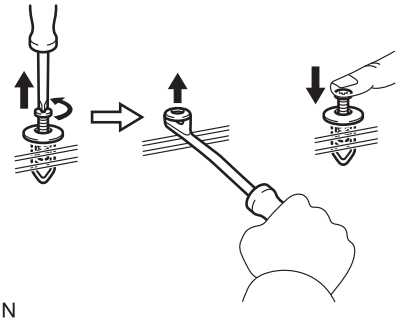
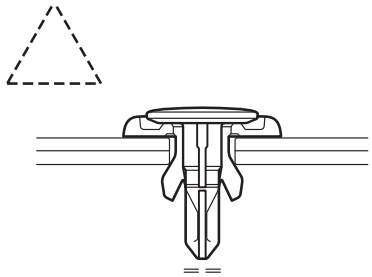
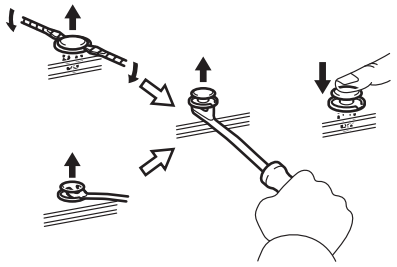
(1) The removal and installation methods of typical clips used for vehicle body parts are shown in the table below.

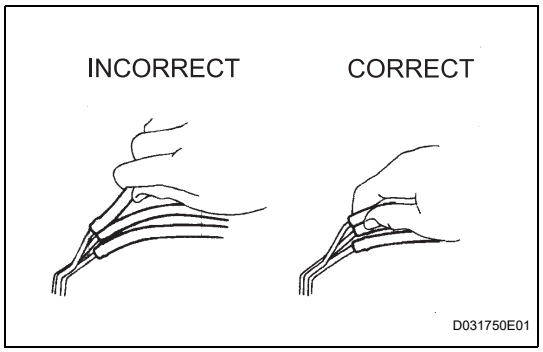
HINT:

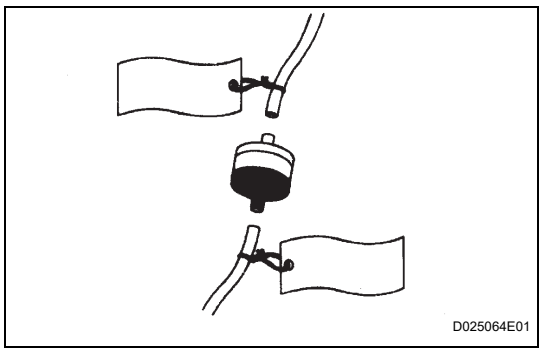
If clips are damaged during work, always replace the damaged clip with a new one.

IN

Shape (Example)	Removal/Installation
 N	Remove clips with clip remover or pliers.  N
 N	Remove fasteners with clip remover or screwdriver.  N
 N	Remove clips with wide scraper to prevent panel damage.  N
 N	Remove clips by pushing center pin through and prying out shell.  N

Shape (Example)	Removal/Installation
 N	Remove clips by unscrewing center pin and prying out shell.  N
 N	Remove clips by prying out pin and then prying out shell.  N





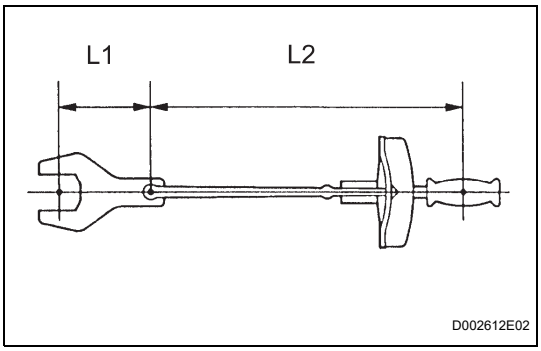
(h) REMOVAL AND INSTALLATION OF VACUUM HOSES

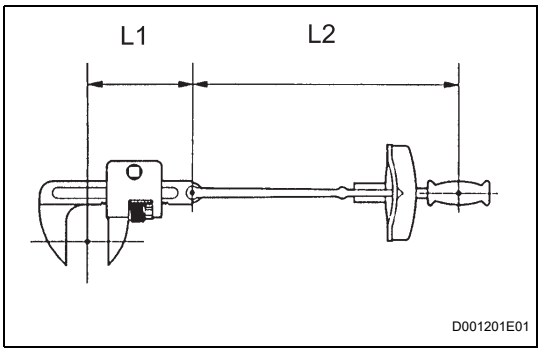
(1) To disconnect a vacuum hose, pull and twist from the end of the hose. Do not pull from the middle of the hose as this may damage the hose.

(2) When disconnecting vacuum hoses, use tags to identify where they should be reconnected.

(3) After completing any hose related repairs, double check that the vacuum hoses are properly connected. The label under the hood shows the proper layout.

(4) When using a vacuum gauge, never force the hose onto a connector that is too large. If a hose has been stretched, air may leak. Use a step-down adapter if necessary.





(i) TORQUE WHEN USING TORQUE WRENCH WITH EXTENSION TOOL

(1) Use the formula below to calculate special torque values for situations where SST or an extension tool is combined with the torque wrench.

Formula:

T' = L2/(L1 + L2) * T

T'	**Reading of torque wrench {N*m (kgf*cm, ft.*lbf)}**
T	**Torque {N*m (kgf*cm, ft.*lbf)}**
L1	**Length of SST or extension tool {cm (in.)}**
L2	**Length of torque wrench {cm (in.)}**

NOTICE:

If an extension tool or SST is combined with a torque wrench and the wrench is used to tighten to a torque specification in this manual, the actual torque will be excessive and parts will be damaged.

2. PRECAUTIONS FOR HIGH-VOLTAGE CIRCUIT INSPECTION AND SERVICE

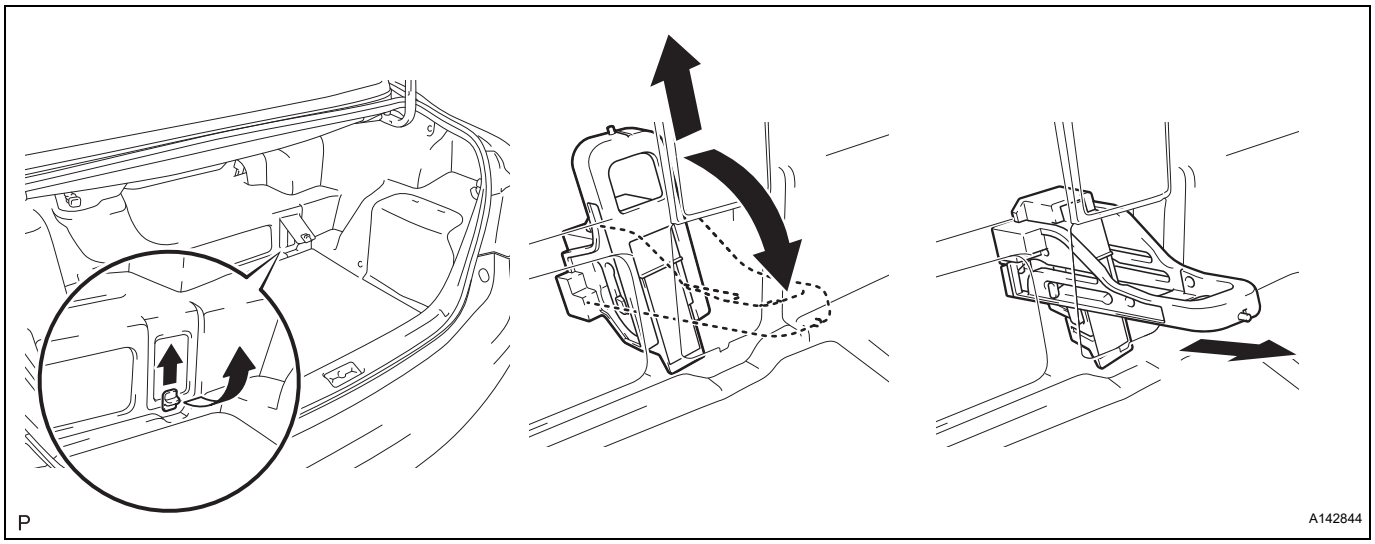
NOTICE:

The hybrid system contains a 244.8 V high-voltage system with a strong alkali solution of potassium hydroxide. Be sure to follow the instructions in this manual to handle the system correctly. Failure to do so may result in serious injury or electrocution.

(a) Engineer must undergo special training to be able to perform high-voltage system inspection and servicing.

(b) All high-voltage wire harness connectors are colored orange. The HV battery and other high-voltage components have "High Voltage" caution labels. Do not carelessly touch these wires and components.

(c) Before inspecting or servicing the high-voltage system, be sure to follow safety measures, such as wearing insulated gloves and removing the service plug to prevent electrocution. Carry the removed service plug in your pocket to prevent other technicians from reinstalling it while your are servicing the vehicle.



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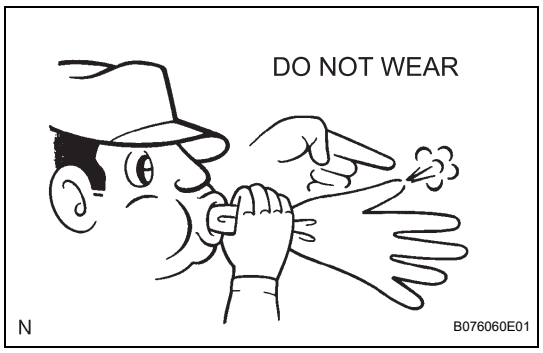
NOTICE:

- **Before removing the service plug, confirm power switch off.**
- **Do not put the vehicle into the READY-on state after removing the service plug grip as the ECU may be damaged.**

(d) After removing the service plug, wait 10 minutes before touching any of the high-voltage connectors and terminals.
HINT:
10 minutes are required to discharge the high-voltage condenser inside the inverter.



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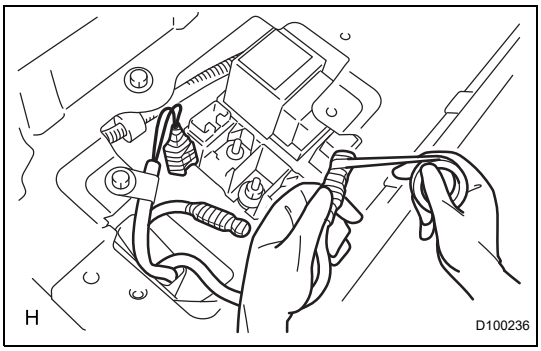
(e) Before wearing insulated gloves, make sure that they are not cracked, ruptured, torn, or damaged in any way. Do not wear wet insulated gloves.

(f) When servicing the vehicle, do not carry metal objects like mechanical pencils or scales that can be dropped accidentally and cause a short circuit.

(g) Before touching a bare high-voltage terminal, wear insulated gloves and use a tester to make sure that the terminal voltage is 0 V.



(h) After disconnecting or exposing a high-voltage connector or terminal, insulate it immediately using insulation tape.

(i) The screw of a high-voltage terminal should be tightened firmly to the specified torque. Both insufficient and excessive torque can cause failure.

(j) Use the "CAUTION: HIGH VOLTAGE. DO NOT TOUCH DURING OPERATION" sign to notify other engineers that a high-voltage system is being inspected and/or repaired.

IN

Person in charge: _____

CAUTION:
HIGH VOLTAGE. DO
NOT TOUCH DURING
OPERATION.

CAUTION:
HIGH VOLTAGE. DO NOT TOUCH DURING OPERATION.

Person in charge: _____

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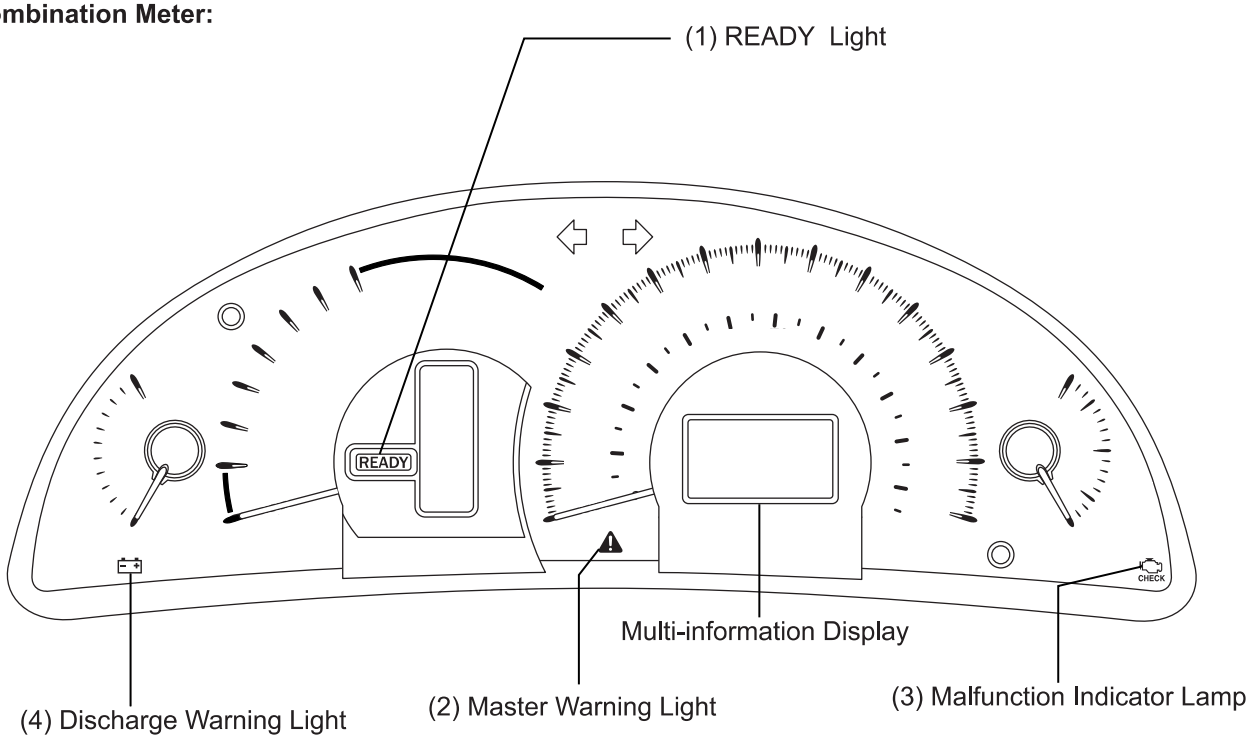
(k) After servicing the high-voltage system and before reinstalling the service plug, check again that you have not left a part or tool inside, that the high-voltage terminal screws are firmly tightened, and that the connectors are correctly connected.

(l) Do not place the battery upside down while removing and installing it.

3. ACTIONS TO BE TAKEN WHEN THE WARNING LIGHT IS LIT

Combination Meter:



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Multi-information Display:

(5) LOW T. BATT STOP THE VEHICLE SHIFT TO P

(6) CHECK HYBRID SYSTEM

(7) HYBRID SYSTEM OVER HEAT

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(a) If one of the warning lights (2) to (7) becomes lit, connect an intelligent tester to the DLC3 connector to check the DTCs (Diagnostic Trouble Codes). Then, refer to the applicable troubleshooting steps in this manual to inspect and repair the affected area. The foregoing actions are also required if the READY light does not illuminate when the vehicle is first started.

Combination Meter

Warning Light	Outline
(1) READY Light	This light blinks when the driver simultaneously presses the brake pedal and turns on the power switch while the shift lever is in the P position. Thereafter, the light changes to illumination when the system starts, thus informing the driver that the vehicle is drivable.
(2) Master Warning Light	The primary function of this warning light, which illuminates simultaneously with the sounding of a warning buzzer, is to inform the driver in case of a certain condition is detected.
(3) Malfunction Indicator Lamp	Turns on when there is a malfunction in the engine control system.
(4) Discharge Warning Light	Turn on when there is a malfunction in the DC 12 V charging system (converter assembly).

Multi-information Display

Multi-information Display	Outline
(5) LOW T. BATT STOP THE VEHICLE SHIFT TO P	This warning display indicates to the driver that the SOC is lower than the minimum standard value (%). At the same time, the master warning light blinks and the buzzer sounds.
(6) CHECK HYBRID SYSTEM	This warning display indicates to the driver that a malfunction has occurred in the THS II system. At the same time, the master warning light illuminates and the buzzer sounds. However, these are inactive for 5 seconds after the power source is turned to power switch on (IG).
(7) HYBRID SYSTEM OVER HEAT	This warning display indicates to the driver that the temperatures of any parts related to the THS II system exceed the standard value. At the same time, the master warning light illuminates and the buzzer sounds.

4. ACTIONS TO BE TAKEN WHEN BATTERIES ARE DEPLETED

HINT:

The CAMRY HV uses a 12 V auxiliary and a 244.8 V hybrid vehicle battery. Therefore, there are two recharging methods when the batteries are depleted.

(a) Perform this procedure when the auxiliary battery is fully depleted.

HINT:

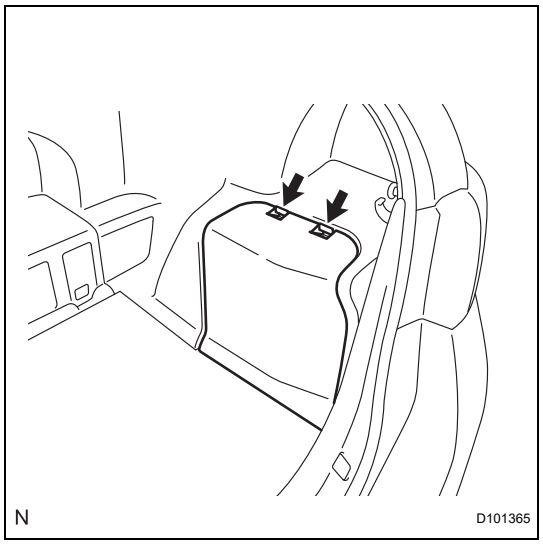
The following problems indicate that the auxiliary battery is depleted:

- No display appears on the instrument panel when the power switch is set to on (IG).
- The hybrid system does not start.
- The headlights are dim.
- The sound from the horn is weak.

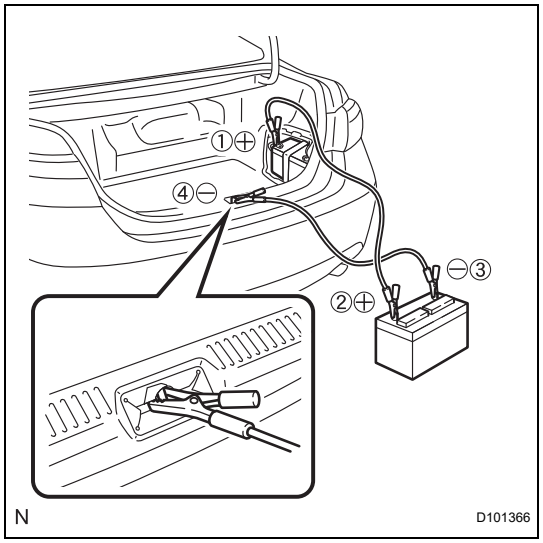
CAUTION:

Never use a quick charger.

(1) Move the shift lever to the P position and engage the parking brake.



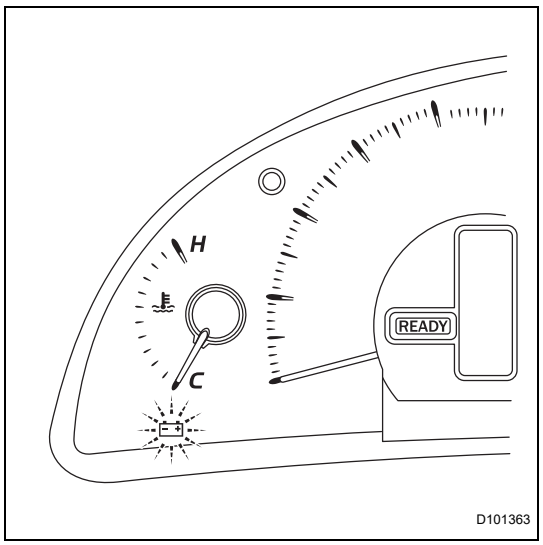
(2) Release the 2 claws, then remove the auxiliary battery cover.



(3) Using a booster cable, connect the 12 V battery of the rescue vehicle and the auxiliary battery of the stalled vehicle, as shown in the illustration.

Connecting Sequence	Connecting Location
1	Positive battery terminal of stalled vehicle
2	Positive battery terminal of rescue vehicle
3	Negative battery terminal of rescue vehicle
4	Luggage compartment door striker

(4) Start the engine of the rescue vehicle and run the engine at a speed slightly higher than usual.



(5) Put the vehicle into the READY-on state to start the hybrid system.
NOTICE:
Immediately disconnect the booster cable in the reverse order of connection after the hybrid system and the engine have started. Do not leave the booster cable connected because it is not designed for recharging purposes.
If the hybrid system fails to start and the discharge warning light turns ON, the HV battery may be depleted.

(b) When the hybrid vehicle battery is depleted:
Replace the hybrid vehicle battery.
HINT:
When the hybrid vehicle battery is depleted, the HYBRID VEHICLE BATTERY WARNING illuminates, and DTC P3000-389 is stored in the hybrid vehicle control ECU.

5. SPECIAL NOTES FOR VEHICLE INSPECTION

CAUTION:

If the vehicle is run in the inspection mode, for such as a speedometer test, DTC ●●●●● may be output. Therefore, if the warning light comes on, after canceling the inspection mode, check for DTCs using the intelligent tester and clear the DTCs.

(a) Vehicle conditions

(1) Before activating inspection mode, turn the air conditioning off, start the engine with the shift lever in the P position, and check that the engine stops within several seconds after starting (engine warm up check).

(2) Activate inspection mode and inspect the vehicle.

Shift position for each test

Test item	Inspection mode	Shift position
1. Speedometer test	Inspection mode	D

(3) Reset inspection mode immediately after completion of inspection.

CAUTION:

After canceling the inspection mode, turn the power switch on (IG) again and check that the warning light is OFF.

(b) Special notes for speedometer test

CAUTION:

- **Be sure to perform the test in the inspection mode (See page IN-65).**
- **Do not use the speedometer tester to perform rapid starting or quick acceleration/ deceleration without first setting the proper load on the vehicle. Failing to set the load may damage the transaxle.**

(1) Depress the accelerator pedal slowly and gradually accelerate the vehicle. Make a measurement.

(2) After the measurement, use the brake to gradually decelerate the vehicle.

(c) Special notes for using the chassis dynamometer

(1) Always set an appropriate load before starting the test.

NOTICE:

- **Be sure to perform the test in the inspection mode (See page IN-65).**
- **Suddenly acceleration or deceleration of the vehicle on a chassis dynamometer under minimal load may damage the transaxle.**

6. ACTIONS TO BE TAKEN FOR VEHICLE DAMAGED BY IMPACT

NOTICE:

The hybrid system contains a 244.8 V high-voltage system with a strong alkali solution of potassium hydroxide. Be sure to follow the instructions in this manual to handle the system correctly. Failure to do so may result in serious injury or electrocution.

(a) Items to be prepared or operation at the accident site

- Protective clothing (insulated gloves, rubber gloves, goggles, and safety shoes)
- Saturated boric acid solution 20 L (obtain 800 g of boric acid powder, put it into a container, and dissolve it in water)
- Red litmus paper
- ABC fire extinguisher (effective against both oil flames and electrical flames)
- A shop rag or piece of cloth (for wiping off the electrolyte)
- Insulation tape (for insulating cable)
- Electrical tester

(b) Actions to be taken at the accident site

NOTICE:

Do not touch a bare cable that may have high-voltage. If the cable must be touched or if accidental contact is unavoidable, wear insulated gloves and insulate the cable using insulation tape.

- If the vehicle catches on fire, use an ABC fire extinguisher to extinguish the fire. Trying to extinguish a fire using only a small amount of water can be more dangerous than effective. Use a substantial amount of water or wait for firefighters.
- Visually check the HV battery and the immediate area for any electrolyte leakage. Do not touch any leaked liquid because it could be highly alkaline electrolyte.
- Work on the vehicle only after the vehicle has been pulled out of the water.

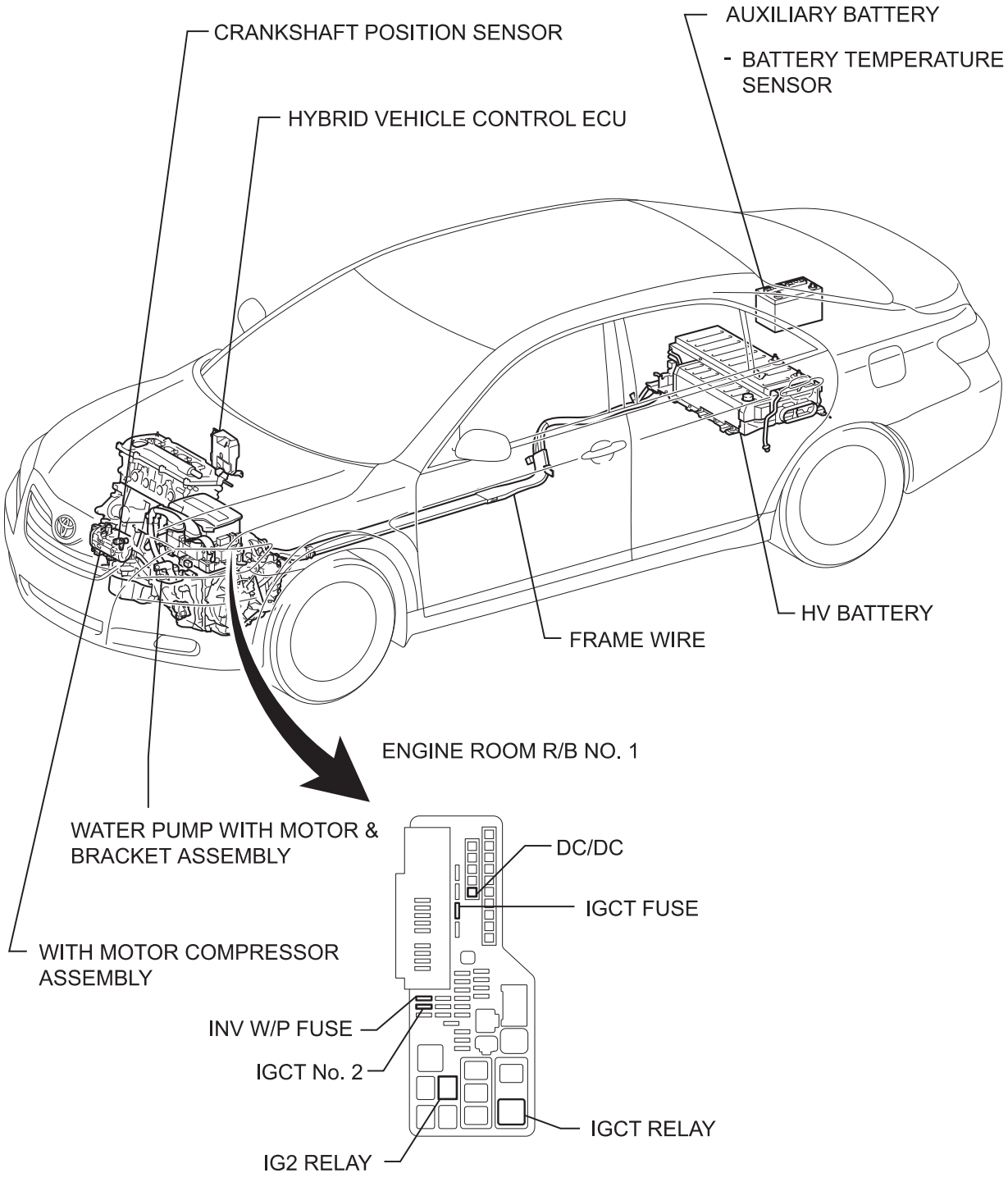
(1) Check the vicinity of the hybrid vehicle battery for any leakage of the electrolyte.

NOTICE:

Do not touch any leaked liquid because it could be highly alkaline electrolyte. Wear rubber gloves and goggles, neutralize the liquid with saturated boric acid solution, and then apply red litmus paper to the leak. Check that the paper does not turn blue. Wipe the neutralized liquid with a shop rag or piece of cloth.

(2) If damage to any of the high-voltage components and cable is suspected, cut the high-voltage circuit using the procedure on the following pages.

IN



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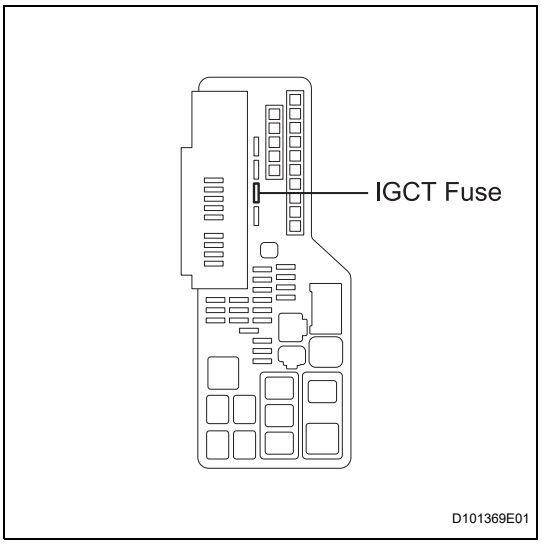
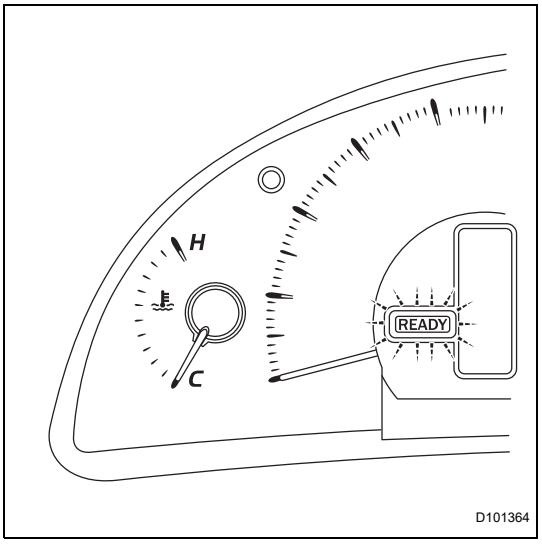




(3) Turn the power switch off.
HINT:
If the power switch cannot be turned off, remove the IGCT fuse from the engine room R/B No. 1 or disconnect the cable from the negative terminal of the auxiliary battery.

(4) Wear insulated gloves, and then remove the service plug.
NOTICE:
Be sure to install the service plug before turning the power switch on (IG). Starting the hybrid system with the service plug removed may damage the ECU.

(c) Moving the damaged vehicle
If any of the following conditions are met, tow the vehicle away using a tow truck.
- One or more of the high-voltage components and cables are damaged.
- The driving, traction, or fuel system is damaged.
- The master warning light is on.
- The READY light does not come on when the vehicle is in the READY-on state.

CAUTION:
- **Before towing the vehicle away using a tow truck, disconnect the cable from the negative (-) terminal of the auxiliary battery and remove the service plug.**

NOTICE:
Perform the procedure below if the READY light turns off , or there are abnormal noises, unusual smells, or strong vibrations while driving:

(1) Park the vehicle in a safe place.
(2) Shift the shift lever to the "P" position, and apply the parking brake.
(3) Turn the power switch off, and disconnect the power cable from the negative (-) terminal of the auxiliary battery.
(4) Remove the service plug while wearing insulated gloves.

(d) Actions required after moving the damaged vehicle
(1) Procedure
If you see any liquid on the road surface, it could be highly alkaline electrolyte leakage.
Wear rubber gloves and goggles, neutralize the liquid with saturated boric acid solution, and then apply red litmus paper to the leak. Check that the paper does not turn blue. Wipe the neutralized liquid with a shop rag or piece of cloth.

(e) Items to be prepared (when repairing damaged vehicles)
- Protective clothing (Insulated gloves, rubber gloves, goggles, and safety shoes)

- Saturated boric acid solution 20 L (obtain 800 g of boric acid powder, put it into a container, and dissolve it in water)
- Red litmus paper
- A shop rag or piece of cloth (for wiping off the electrolyte)
- Vinyl tape (for insulating cable)
- Electrical tester

(f) Precautions to be observed when servicing the damaged vehicle

NOTICE:

Always follow instructions to ensure safety.

(1) Wear insulated or rubber gloves, goggles, and safety shoes.

(2) Check the HV battery and immediate area for any electrolyte leakage.
Do not touch any leaked liquid because it could be highly alkaline electrolyte. Wear rubber gloves and goggles, neutralize the liquid with saturated boric acid solution, and then apply red litmus paper to the leak. Check that the paper does not turn blue. Wipe the neutralized liquid with a shop rag or piece of cloth.
NOTICE:
- **If the electrolyte comes in contact with your skin, use a saturated boric acid solution or a large amount of water to wash it off. If the electrolyte comes in contact with an article of clothing, take it off immediately.**
- **If the electrolyte comes in contact with your eyes, call out loudly for help. Do not rub your eyes. Wash them immediately with a large amount of water and seek medical care.**

(3) Do not touch a bare cable that could be a high voltage cable. If the cable must be touched or if accidental contact is unaroidable, follow the following instructions: 1) wear insulated or rubber gloves and goggles, 2) measure the voltage between the cable and the body ground using an electrical tester, and 3) insulate the cable using insulation tape.

(4) If damage to any of the high-voltage components and cables is suspected, cut the high-voltage circuit using the procedure below.
NOTICE:
Do not touch a bare cable that may have high-voltage. If the cable must be touched or if accidental contact is unavoidable, wear insulated gloves and insulate the cable using insulation tape.

(5) Turn the power switch off.
HINT:
If the power switch cannot be turned off, remove the IGCT fuse from the HV relay block or disconnect the cable from the negative terminal of the auxiliary battery.
(6) Wear insulated gloves, and then remove the service plug.

(g) Precautions to be taken when disposing of the vehicle
(1) Disposing of HV battery
When scrapping the vehicle, remove the HV battery from the vehicle and return it to the location specified by the manufacturer. Any damaged HV battery should also be returned to the specified location.

CAUTION:
- **After removing the battery, keep it away from water. Water may heat the battery, which results in fire.**
- **Accidents such as electric shocks could result if the vehicle and its hybrid vehicle battery are disposed of improperly or abandoned. Therefore, make sure to return any hybrid battery to the prescribed recovery route through a TOYOTA dealer.**

(h) Precautions to be observed when towing
(1) Tow the damaged vehicle with its front and rear wheels lifted off the ground.
CAUTION:
Towing the damaged vehicle with its front wheels on the ground may cause the motor to generate electricity. This electricity could, depending on the nature of the damage, leak and cause a fire.

(i) Towing with the 4 wheels on the ground
CAUTION:
- **If the damaged vehicle needs to be towed using a rope, do not exceed 30 km/h (19 mph) and tow a limit distance and then have the vehicle towed by a truck.**
- **Turn the power switch on (IG) and shift the selector lever to the N position.**
- **If any abnormality is present in the damaged vehicle during towing, stop towing immediately.**

7. FOR VEHICLES EQUIPPED WITH SRS AIRBAG AND SEAT BELT PRETENSIONER

The CAMRY HV is equipped with a Supplemental Restraint System (SRS).

CAUTION:

Failure to carry out the service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing and lead to serious injury. Furthermore, if a mistake is made when servicing SRS, it is possible that the SRS may fail to operate properly. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the following section carefully.

(a) GENERAL NOTICE

(1) As malfunctions of the SRS are difficult to confirm, the Diagnostic Trouble Codes (DTCs) become the most important source of information when troubleshooting. When troubleshooting the SRS, always check the DTCs before disconnecting the battery.

(2) Work must be started at least 90 seconds after the power switch is turned off and after the cable is disconnected from the negative (-) battery terminal.

The SRS is equipped with a back-up power source. If work is started within 90 seconds after turning the power switch off and disconnecting the cable from the negative (-) battery terminal, the SRS may deploy.

When the cable is disconnected from the negative (-) battery terminal, clock and audio system memory is erased. Before starting work, make a note of the settings of each memory system. When work is finished, reset the clock and audio system as before.

CAUTION:

Never use a back-up power source (battery or other) to avoid erasing system memory. The back-up power source may inadvertently power the SRS and cause it to deploy.

(3) In minor collisions where the SRS does not deploy, the steering pad, front passenger airbag assembly, driver side knee airbag assembly, front seat side airbag assembly, curtain shield airbag assembly and front seat outer belt assembly should be inspected before further use of the vehicle.
(See page RS-348 for steering pad)
(See page RS-385 for front passenger airbag assembly)
(See page RS-415 for front seat side airbag assembly)
(See page RS-365 for driver side knee airbag assembly)
(See page RS-409 for curtain shield airbag assembly)
(See page SB-24 for front seat outer belt assembly)

(4) Never use SRS parts from another vehicle. When replacing parts, use new parts.

(5) Before repairs, remove the airbag sensor assemblies if impacts are likely to be applied to the sensor during repairs.

(6) Never disassemble and attempt to repair all airbag sensor assemblies and all airbag assemblies.
1. Steering pad
2. Front passenger airbag assembly
3. Driver side knee airbag assembly
4. Front seat side airbag assembly
5. Curtain shield airbag assembly
6. Front seat outer belt assembly

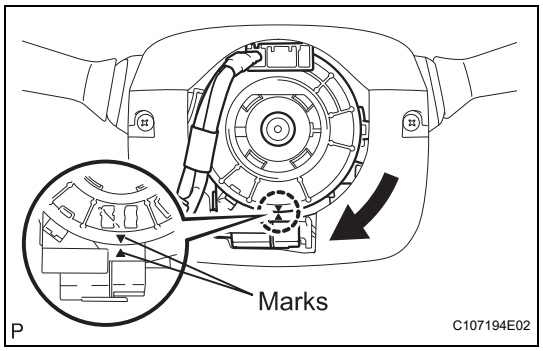
(7) Replace the airbag sensor assemblies and the airbag assemblies if: 1) damage has occurred from being dropped, or 2) cracks, dents or other defects in the case, bracket or connector are present.

(8) Do not directly expose the airbag sensor assembly or airbag assembly to hot air or flames.

(9) Use a voltmeter / ohmmeter with high impedance (minimum = 10 kΩ) for troubleshooting electrical circuits.

(10) Information labels are attached to the SRS components. Follow the instructions on the labels.

(11) After work on the SRS is completed, check the SRS warning light.

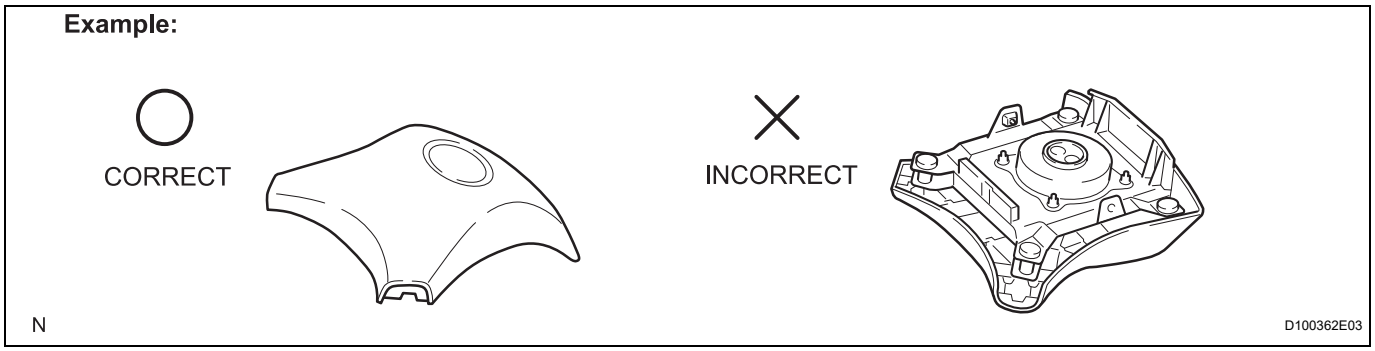


(b) SPIRAL CABLE

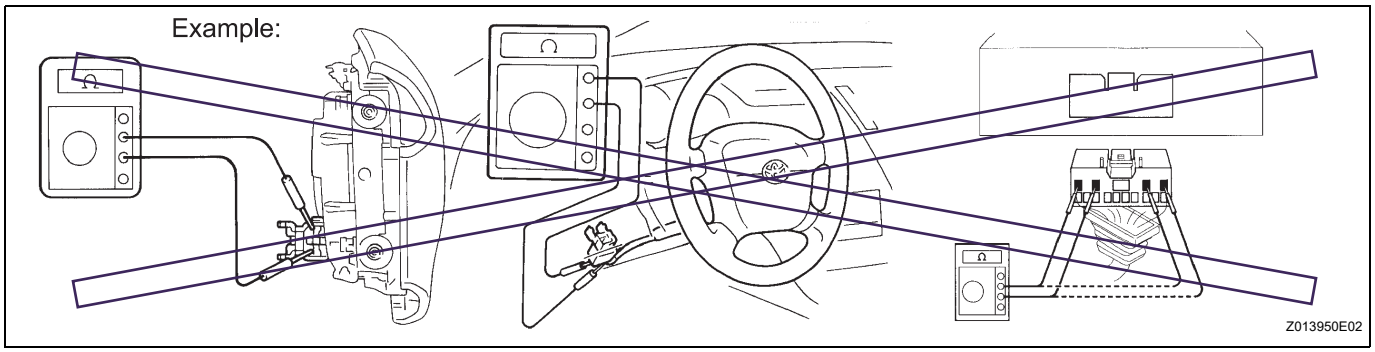
(1) The steering wheel must be fitted correctly to the steering column with the spiral cable at the neutral position, as cable disconnection and other problems may occur. Refer to the information about correct installation of the steering wheel (See page RS-359).

(c) STEERING PAD

(1) Always place a removed or new steering pad surface upward as shown in the illustration. Placing the horn button with the pad surface facing down could cause a serious accident if the airbag inflates. Also, do not place anything on top of the horn button.



(2) Never measure the resistance of the airbag squib. This may cause the airbag to inflate, which could cause serious injury.



(3) Grease or detergents of any kind should not be applied to the horn button.

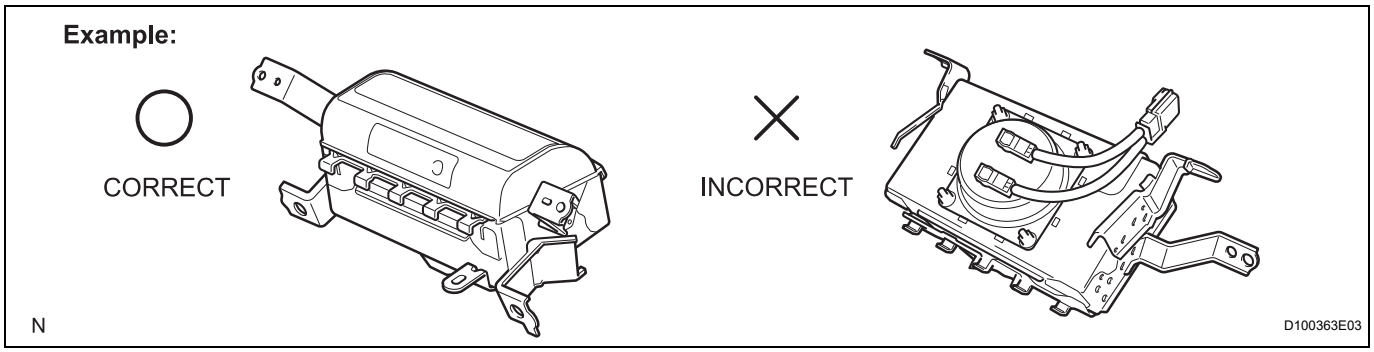
(4) Store the horn button assembly in an area where the ambient temperature is below 93°C (200°F), the humidity is not high and there is no electrical noise.

(5) When using electric welding anywhere on the vehicle, disconnect the airbag ECU connectors (4 pins). These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current entering the squib wiring.

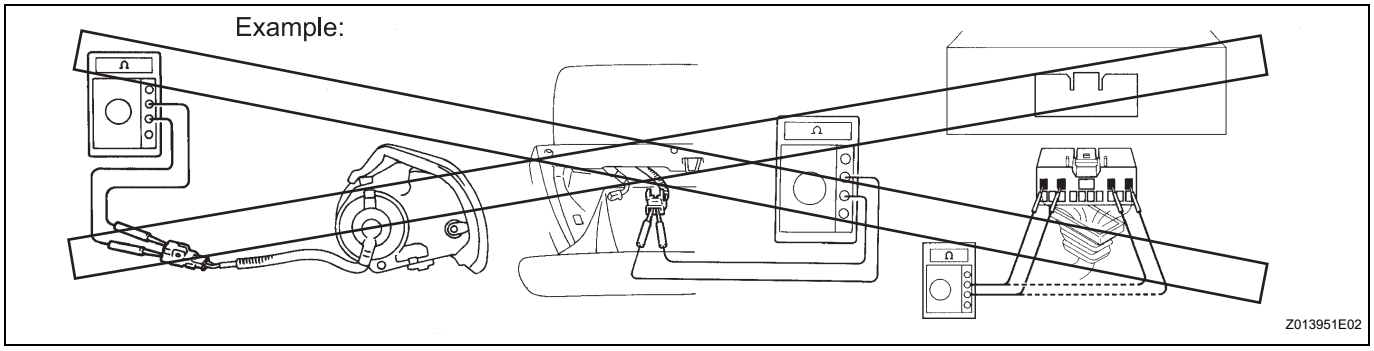
(6) When disposing of the vehicle or the horn button assembly by itself, the airbag should be deployed using SST before disposal (See page RS-348). Activate the airbag in a safe place away from electrical noise.

(d) FRONT PASSENGER AIRBAG ASSEMBLY

(1) Always place a removed or new front passenger airbag assembly with the pad surface facing upward as shown in the illustration. Placing the airbag assembly with the airbag inflation direction facing down could cause a serious accident if the airbag inflates.



(2) Never measure the resistance of the airbag squib. This may cause the airbag to inflate, which could cause serious injury.



(3) Grease or detergents of any kind should not be applied to the front passenger airbag assembly.

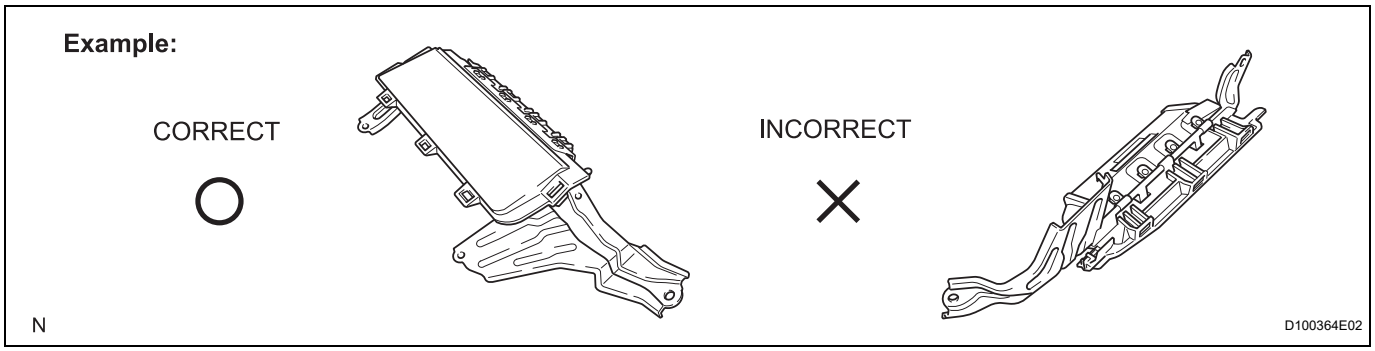
(4) Store the airbag assembly in an area where the ambient temperature is below 93°C (200°F), the humidity is not high and there is no electrical noise.

(5) When using electric welding anywhere on the vehicle, disconnect the airbag ECU connectors (4 pins). These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current entering the squib wiring.

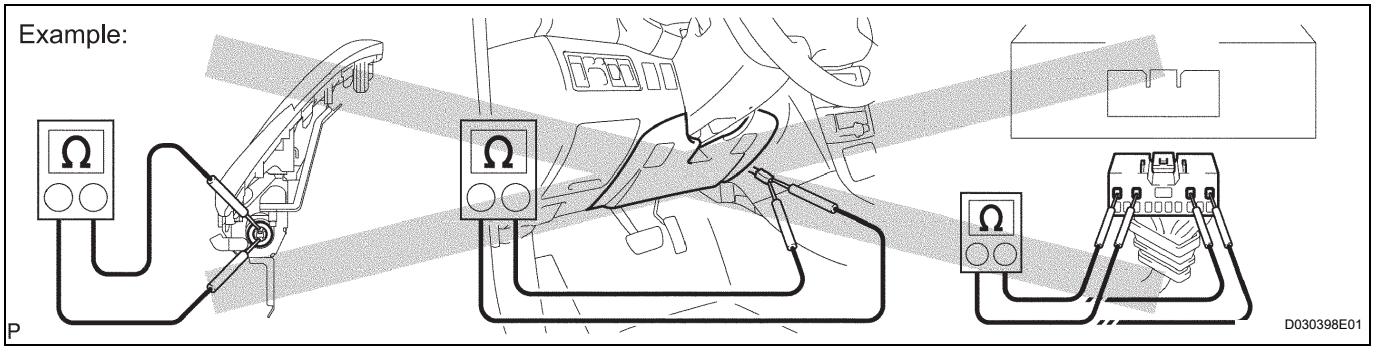
(6) When disposing of the vehicle or the airbag assembly unit by itself, the airbag should be deployed using SST before disposal (See page RS-385). Activate in a safe place, away from electrical noise.

(e) DRIVER SIDE KNEE AIRBAG ASSEMBLY

(1) Always place a removed or new knee airbag assembly with the airbag inflation direction facing upward. Placing the airbag assembly with the airbag inflation direction facing downward could cause a serious accident if the airbag inflates.



(2) Never measure the resistance of the airbag squib. This may cause the airbag to inflate, which could cause serious injury.



(3) Grease or detergents of any kind should not be applied to the knee airbag assembly.

(4) Store the knee airbag assembly where the ambient temperature is below 93°C (200°F), the humidity is not high and there is no electrical noise.

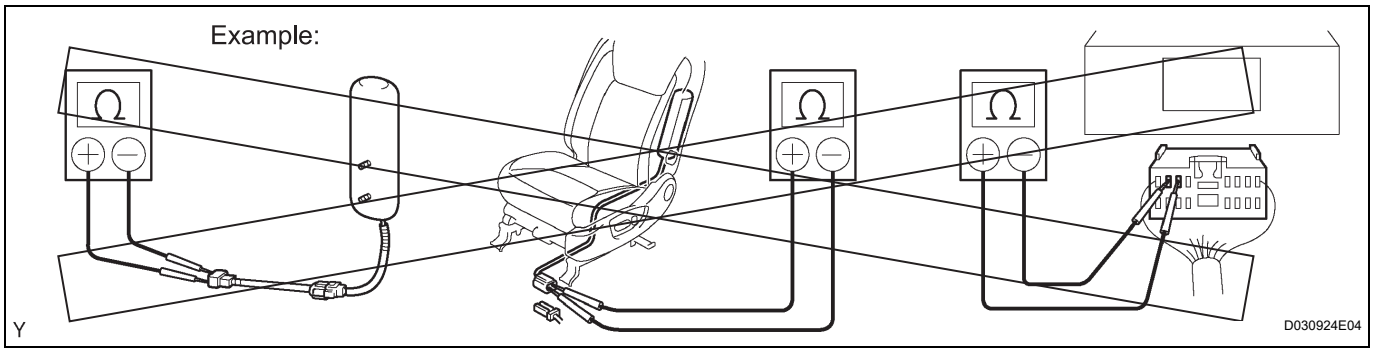
(5) When using electric welding anywhere on the vehicle, disconnect the airbag ECU connectors (2 pins). These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current entering the squib wiring.

(6) When disposing of a vehicle or knee airbag assembly unit by itself, the airbag should be inflated using SST before disposal (See page RS-365). Activate in a safe place, away from electrical noise.

(f) FRONT SEAT SIDE AIRBAG ASSEMBLY

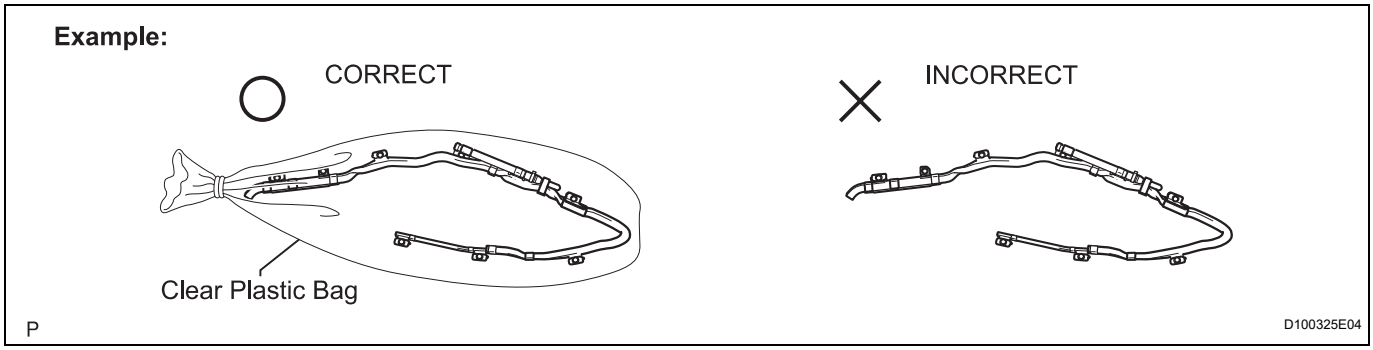
(1) Always place a removed or new front seat side airbag assembly with the airbag inflation direction facing up.

(2) Never measure the resistance of the airbag squib. This may cause the airbag to inflate, which could cause serious injury.



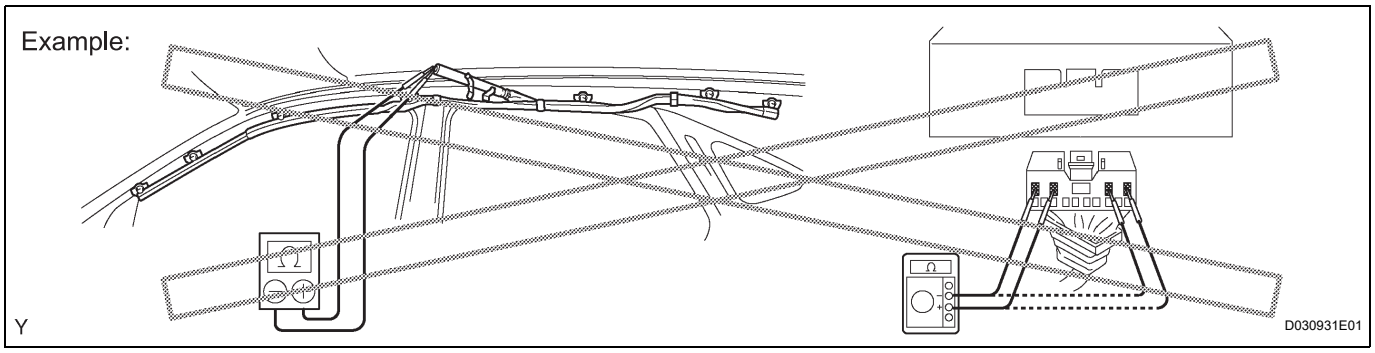
(3) Grease or detergents of any kind should not be applied to the front seat side airbag assembly.
(4) Store the airbag assembly in an area where the ambient temperature is below 93°C (200°F), the humidity is not high and there is no electrical noise.
(5) When using electric welding anywhere on the vehicle, disconnect the airbag ECU connectors (2 pins). These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current entering the squib wiring.
(6) When disposing of a vehicle or the airbag assembly unit by itself, the airbag should be deployed using SST before disposal (See page RS-415). Activate in a safe place away from electrical noise.

(g) CURTAIN SHIELD AIRBAG ASSEMBLY
(1) Always place a removed or new curtain shield airbag assembly in a clear plastic bag, and keep it in a safe place.



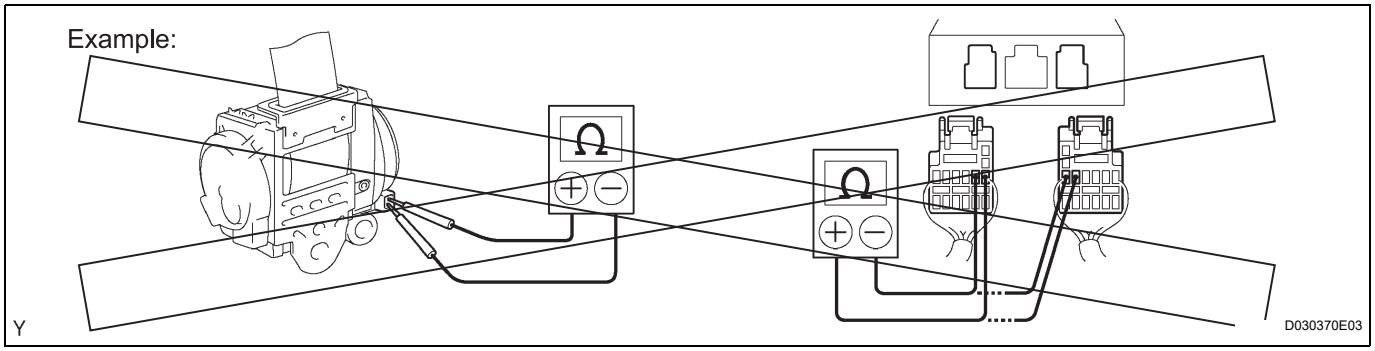
CAUTION:
The plastic bag is not reusable.
NOTICE:
Never disassemble the curtain shield airbag assembly.

(2) Never measure the resistance of the airbag squib. This may cause the airbag to inflate, which could cause serious injury.



(3) Grease or detergents of any kind should not be applied to the curtain shield airbag assembly.
(4) Store the airbag assembly in an area where the ambient temperature is below 93°C (200°F), the humidity is not high and there is no electrical noise.
(5) When using electric welding anywhere on the vehicle, disconnect the airbag ECU connectors (4 pins). These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current entering the squib wiring.
(6) When disposing of a vehicle or the airbag assembly unit by itself, the airbag should be deployed using SST before disposal (See page RS-409). Activate in a safe place away from electrical noise.

(h) FRONT SEAT OUTER BELT ASSEMBLY AND REAR SEAT OUTER BELT ASSEMBLY (SEAT BELT PRETENSIONER)
(1) Never measure the resistance of the seat outer belt. This may cause the pretensioner of the seat belt to activate, which could cause serious injury.

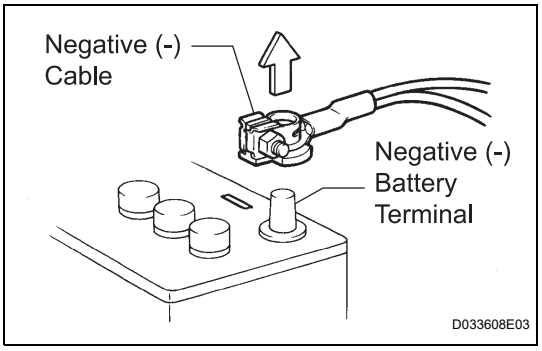


(2) Never disassemble the seat outer belt.
(3) Never install the seat outer belt on another vehicle.
(4) Store the seat outer belt in an area where the ambient temperature is below 80°C (176°F), the humidity is not high and there is no electrical noise.

(5) When using electric welding anywhere on the vehicle, disconnect the airbag ECU connectors (2 pins). These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current entering the squib wiring.
(6) When disposing of a vehicle or the seat outer belt unit by itself, the seat outer belt should be activated before disposal (See page SB-24). Activate in a safe place away from electrical noise.
(7) As the seat outer belt is hot after being activated, allow some time for it to cool down sufficiently before disposal. Never apply water to cool down the seat outer belt.
(8) Grease, detergents, oil or water should not be applied to the front seat outer belt.

(i) AIRBAG SENSOR ASSEMBLY
(1) Never reuse an airbag sensor assembly that has been involved in a collision where the SRS has deployed.
(2) The connectors to the airbag sensor assembly should be connected or disconnected with the sensor placed on the floor. If the connectors are connected or disconnected while the airbag sensor assembly is not placed on the floor, the SRS may activate.
(3) Work must be started at least 90 seconds after the power switch is turned off and the cable is disconnected from the negative (-) battery terminal, even if only loosening the set bolts of the airbag sensor assembly.

(j) WIRE HARNESS AND CONNECTOR
(1) The SRS wire harness is integrated with the instrument panel wire harness assembly. All the connectors in the system are standard yellow. If the SRS wire harness becomes disconnected or the connector becomes broken, repair or replace it.



8. ELECTRONIC CONTROL

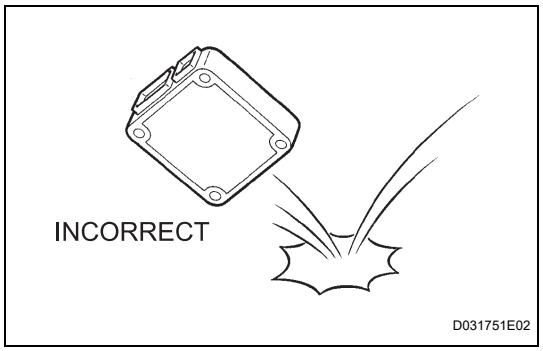
(a) REMOVAL AND INSTALLATION OF BATTERY TERMINAL

NOTICE:

Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

(1) Before performing electronic work, disconnect the cable from the negative (-) battery terminal to prevent component and wire damage caused by accidental short circuits.

(2) When disconnecting the cable, turn the power switch and headlight dimmer switch off and loosen the cable nut completely. Perform these operations without twisting or prying the cable. Then disconnect the cable.
(3) Clock settings, radio settings, audio system memory, DTCs and other data are erased when the cable is disconnected from the negative (-) battery terminal. Write down any necessary data before disconnecting the cable.



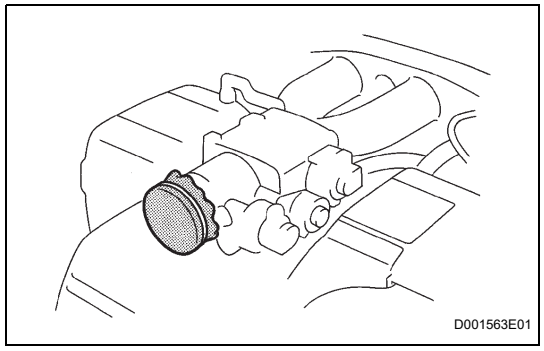
(b) HANDLING OF ELECTRONIC PARTS
(1) Do not open the cover or case of the ECU unless absolutely necessary. If the IC terminals are touched, the IC may be rendered inoperative by static electricity.
(2) Do not pull the wires when disconnecting electronic connectors. Pull the connector itself.
(3) Do not drop electronic components, such as sensors or relays. If they are dropped on a hard surface, they should be replaced.
(4) When cleaning the engine with steam, protect the electronic components, air filter and emission-related components from water.
(5) Never use an impact wrench to remove or install temperature switches or temperature sensors.
(6) When measuring the resistance between terminals of a wire connector, insert the tester probe carefully to prevent terminals from bending.

9. REMOVAL AND INSTALLATION OF FUEL CONTROL PARTS

(a) PLACE FOR REMOVING AND INSTALLING FUEL SYSTEM PARTS
(1) Work in a location with good air ventilation that does not have welders, grinders, drills, electric motors, stoves, or any other engine sources.
(2) Never work in a pit or near a pit as vaporized fuel will collect in those places.

(b) REMOVING AND INSTALLING FUEL SYSTEM PARTS
(1) Prepare a fire extinguisher before starting the operation.
(2) To prevent static electricity, install a ground wire to the fuel changer, vehicle and fuel tank, do not spray the surrounding area with water. Be careful when performing work in this area, as the work surface will become slippery. Do not clean up gasoline spills with water, as this may cause the gasoline to spread, and possibly create a fire hazard.
(3) Avoid using electric motors, working lights and other electric equipments that can cause sparks or high temperatures.

(4) Avoid using iron hammers as they may create sparks.
(5) Dispose of fuel-contaminated cloth separately using a fire resistant container.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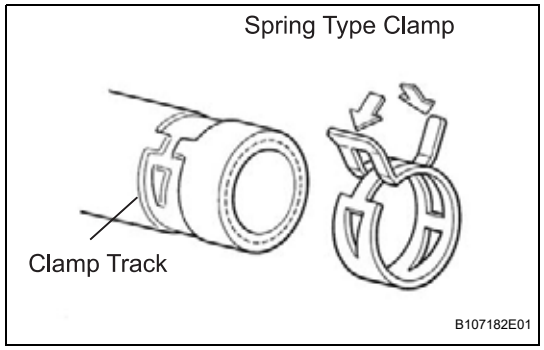
10. REMOVAL AND INSTALLATION OF ENGINE INTAKE PARTS

(a) If any metal particles enter inlet system parts, this may damage the engine.
(b) When removing and installing inlet system parts, cover the openings of the removed parts and engine openings. Use gummed tape or other suitable materials.
(c) When installing inlet system parts, check that no metal particles have entered the engine or the installed parts.



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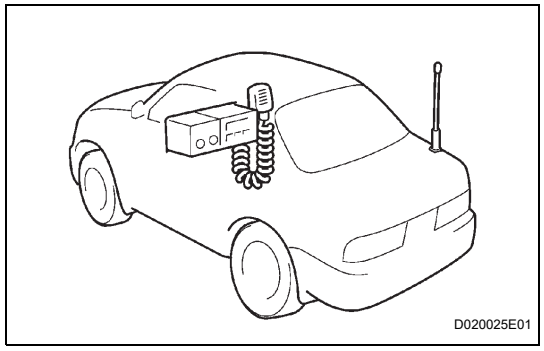
11. HANDLING OF HOSE CLAMPS

(a) Before removing the hose, check the clamp position so that it can be reinstalled in the same position.
(b) Replace any deformed or dented clamps with new ones.
(c) When reusing a hose, attach the clamp on the clamp track portion of the hose.
(d) For a spring type clamp, you may spread the tabs slightly after installation by pushing in the direction of the arrows as shown in the illustration.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12. FOR VEHICLES EQUIPPED WITH MOBILE COMMUNICATION SYSTEMS

(a) Install the antenna far away from the ECU and sensors of the vehicle electronic systems as possible.
(b) Install an antenna feeder at least 20 cm (7.87 in.) away from the ECU and sensors of the vehicle electronic systems. For details about ECU and sensors locations, refer to the section on the applicable components.
(c) Keep the antenna and feeder separate from other wirings as much as possible. This will prevent signals sent from the communication equipment from affecting vehicle equipment and vice-versa.
(d) Check that the antenna and feeder are correctly adjusted.
(e) Do not install any high-powered mobile communication system.

13. FOR VEHICLES EQUIPPED WITH TRACTION CONTROL (TRC) AND VEHICLE STABILITY CONTROL (VSC) SYSTEMS

When testing with a 2-wheel drum tester such as a speedometer tester, a combination tester for jacking up the front wheels and turning the wheels, perform the following procedure to enter the inspection mode and stop the TRC and VSC systems.

(a) NOTICES WHEN USING DRUM TESTER

(b) Activating inspection mode (Not using the intelligent tester)
HINT:
Perform procedures "A" to "D" within 60 seconds.
(1) Turn the power switch on (IG) (Procedure "A").
(2) Fully depress the accelerator pedal twice with the shift P position (Procedure "B").
(3) Fully depress the accelerator pedal twice with the shift N position (Procedure "C").
(4) Fully depress the accelerator pedal twice with the shift P position (Procedure "D").
(5) Check that the HV system warning light blinked on the multi-information display (Procedure "E").
(6) Start the engine by turning the power switch while depressing the brake pedal (Procedure "F").

(c) Activating inspection mode (Using the intelligent tester)
(1) Connect the intelligent tester to the DLC3.
(2) Turn the power switch on (IG).
(3) Turn the intelligent tester on.
(4) Select following menu items: DIAGNOSIS / OBD/MOBD / HV ECU / ACTIVE TEST / INSPECTION MOD1 / ON.
(5) Check that the HV system warning light blinks on the multi-information display and the master warning light are illuminated in the combination meter.
(6) Start the engine by turning the power switch while depressing the brake pedal.

(d) NOTICES OF RELATED OPERATIONS TO VSC
(1) Do not carry out unnecessary installation and removal as it might affect the adjustment of VSC related parts.
(2) Be sure to follow the instructions for work preparation and final confirmation of proper operation of the VSC system.

14. FOR VEHICLES EQUIPPED WITH CATALYTIC CONVERTER

CAUTION:

If a large amount of unburned gasoline or gasoline vapors flow into the converter, it may cause overheating and create a fire hazard. To prevent this, observe the following precautions:

(a) Use only unleaded gasoline.
(b) Avoid idling the engine for more than 20 minutes.
(c) Avoid performing unnecessary spark jump tests.
(1) Perform a spark jump test only when absolutely necessary. Perform this test as rapidly as possible.
(2) While testing, never race the engine.
(d) Avoid a prolonged engine compression measurement. Engine compression measurements must be performed as rapidly as possible.

(e) Do not run the engine when the fuel tank is nearly empty. This may cause the engine to misfire and create an extra load on the converter.

HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS

GENERAL INFORMATION

A large number of ECU controlled systems are used in the CAMRY HV. In general, ECU controlled systems are considered to be very intricate, requiring a high level of technical knowledge to troubleshoot. However, most problem checking procedures only involve inspecting the ECU controlled system's circuits one by one. An adequate understanding of the system and a basic knowledge of electricity is enough to perform effective troubleshooting, accurate diagnoses and necessary repairs.

FOR USING INTELLIGENT TESTER

– Before using the intelligent tester, read the tester operator's manual thoroughly.
– If the tester cannot communicate with the ECU controlled systems when the tester is connected to the DLC3 with the power switch on (IG) and the tester turned on, there is a problem on the vehicle side or tester side.
  (1) If communication is normal when the tester is connected to another vehicle, inspect the diagnosis data link line (Bus (+) line) or ECU power circuit of the vehicle.
  (2) If communication is still not possible when the tester is connected to another vehicle, the problem is probably in the tester itself. Perform the Self Test procedures outlined in the tester operator's manual.

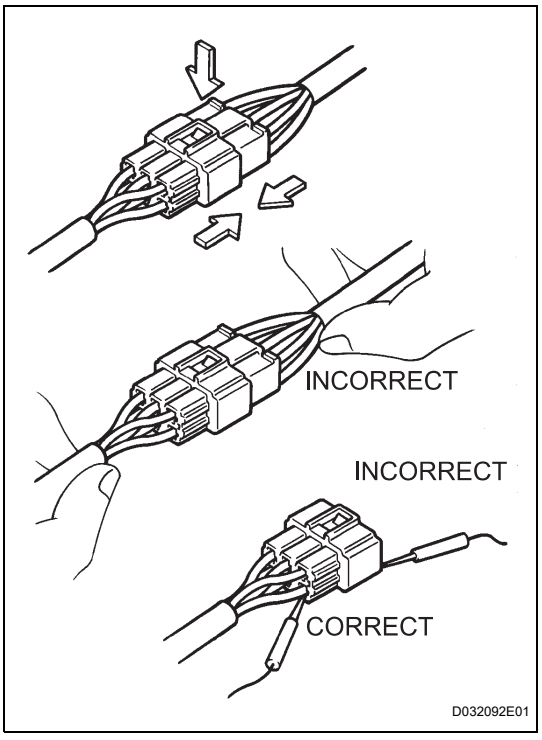
IN

ELECTRONIC CIRCUIT INSPECTION PROCEDURE

1. BASIC INSPECTION

(a) WHEN MEASURING RESISTANCE OF ELECTRONIC PARTS

(1) Unless otherwise stated, all resistance measurements should be made at an ambient temperature of 20°C (68°F). Resistance measurements may be inaccurate if measured at high temperatures, i.e. immediately after the engine has been stopped. Measurements should be made after the engine has cooled down.



(b) HANDLING CONNECTORS

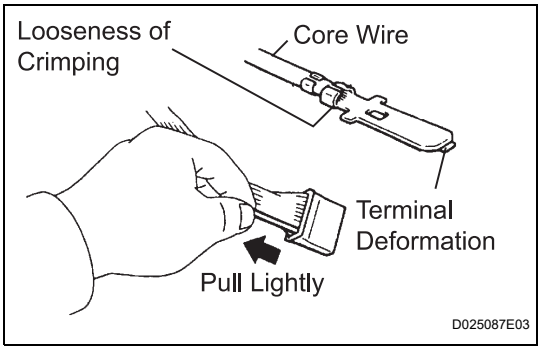
(1) When disconnecting a connector, first squeeze the mating connector housing halves tightly together to release the lock, and then press the lock claw and separate the connector.

(2) When disconnecting a connector, do not pull on the harnesses. Grasp the connector directly and separate it.

(3) Before connecting a connector, check that there are no deformations, damage, looseness or missing terminals.

(4) When connecting a connector, press firmly until it locks with a "click" sound.

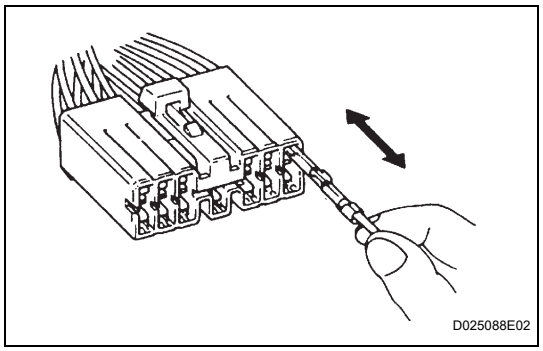
(5) If checking a connector with a TOYOTA electrical tester, check the connector from the backside (harness side) using a mini test lead.
NOTICE:
- **As a waterproof connector cannot be checked from the backside, check it by connecting a sub-harness.**
- **Do not damage the terminals by moving the inserted tester needle.**



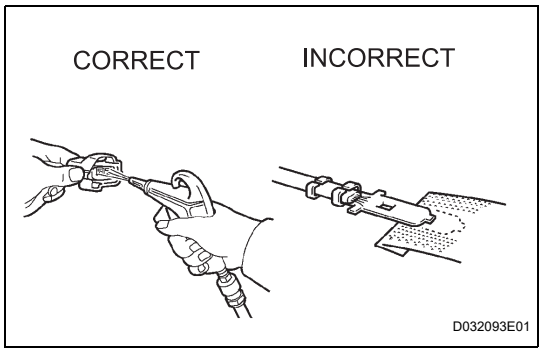
(c) CHECKING CONNECTORS

(1) Checking when a connector is connected: Squeeze the connector together to confirm that they are fully connected and locked.

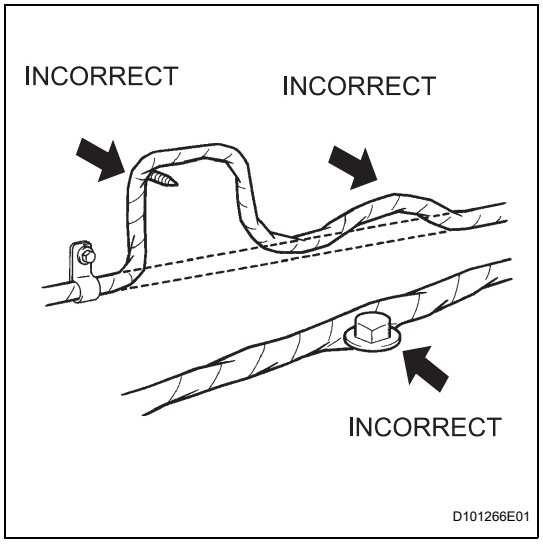
(2) Checking when a connector is disconnected: Check by pulling the wire harness lightly from the backside of the connector. Look for unlatched terminals, missing terminals, loose crimps or broken conductor wires. Check visually for corrosion, metallic or foreign matter and water, and bent, rusted, overheated, contaminated, or deformed terminals.



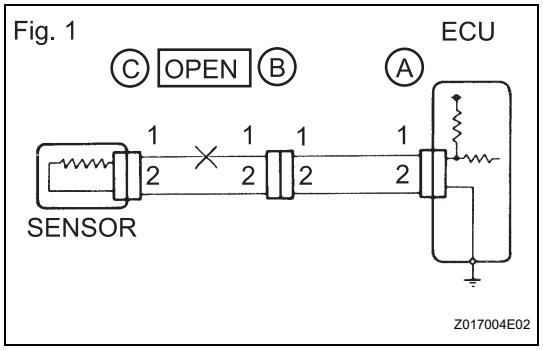
(3) Checking the contact pressure of the terminal:
Prepare a spare male terminal. Insert it into a female terminal, and check for ample tension when inserting and after full engagement.
NOTICE:
When testing a gold-plated female terminal, always use a gold-plated male terminal.



(d) REPAIR METHOD OF CONNECTOR TERMINAL
(1) If there is any foreign matter on the terminal, clean the contact point with compressed air or a cloth. Never rub the contact point using sandpaper as the plating may come off.
(2) If there is abnormal contact pressure, replace the female terminal. If the male terminal is gold-plated (gold color), use a gold-plated female terminal; if it is silver-plated (silver color), use a silver-plated female terminal.
(3) Damaged, deformed, or corroded terminals should be replaced. If the terminal does not lock into the housing, the housing may have to be replaced.



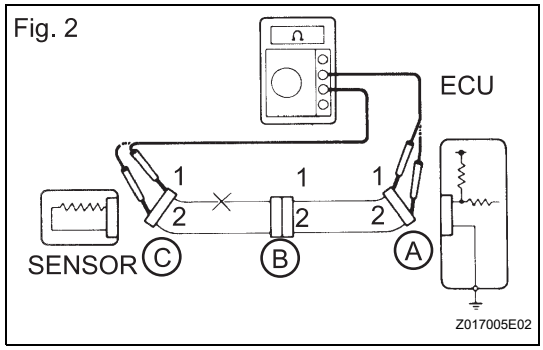
(e) HANDLING OF WIRE HARNESS
(1) If removing a wire harness, check the wiring and clamping before proceeding so that it can be restored in the same way.
(2) Never twist, pull or slacken the wire harness more than necessary.
(3) The wire harness should never come into contact with a high temperature part, or rotating, moving, vibrating or sharp-edged parts. Avoid contact with panel edges, screw tips and other sharp items.
(4) When installing parts, never pinch the wire harness.
(5) Never cut or break the cover of the wire harness. If it is cut or broken, replace it or repair it with vinyl tape.



2. CHECK FOR OPEN CIRCUIT

(a) For an open circuit in the wire harness in Fig. 1, the resistance or voltage, as described below.

Fig. 2



(b) Check the resistance.

(1) Disconnect connectors A and C and measure the resistance between the terminals of the connectors.

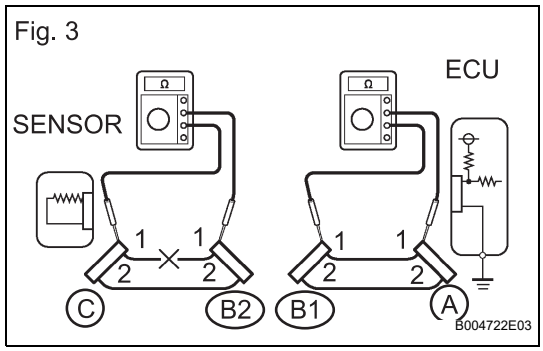
Standard resistance (Fig. 2)

Tester Connection	Specified Condition
Connector A terminal 1 - Connector C terminal 1	10 kΩ or higher
Connector A terminal 2 - Connector C terminal 2	Below 1 Ω

HINT:

Measure the resistance while lightly shaking the wire harness vertically and horizontally. If the results match the examples above, an open circuit exists between terminal 1 of connector A and terminal 1 of connector C.

Fig. 3



(2) Disconnect connector B and measure the resistance between the terminals of the connectors.

Standard resistance (Fig. 3)

Tester Connection	Specified Condition
Connector A terminal 1 - Connector B1 terminal 1	Below 1 Ω
Connector B2 terminal 2 - Connector C terminal 2	10 kΩ or higher

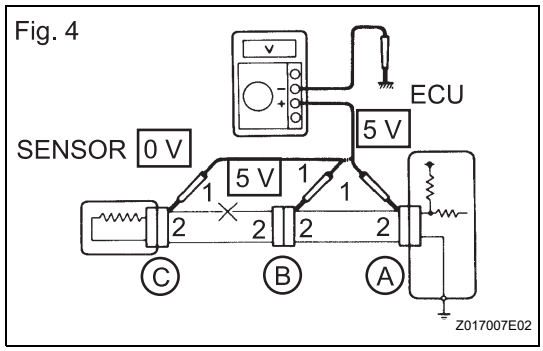
If the results match the examples above, an open circuit exists between terminal 1 of connector B2 and terminal 1 of connector C.

(c) Check the voltage.

(1) In a circuit in which voltage is applied to the ECU connector terminal, an open circuit can be checked by conducting a voltage check.
With each connector still connected, measure the voltage between the body ground and these terminals (in this order): 1) terminal 1 of connector A, 2) terminal 1 of connector B, and 3) terminal 1 of connector C.

Standard voltage (Fig. 4)

Fig. 4



Tester Connection	Specified Condition
Connector A terminal 1 - Body ground	5 V
Connector B terminal 1 - Body ground	5 V
Connector C terminal 1 - Body ground	Below 1 V

If the results match the examples above, an open circuit exists in the wire harness between terminal 1 of connector B and terminal 1 of connector C.

Fig. 5

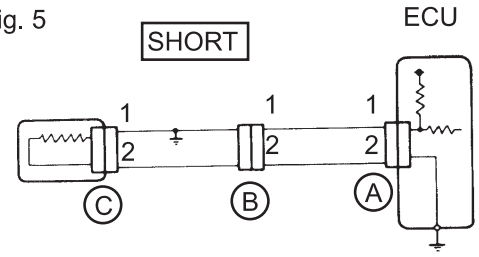


Fig. 6

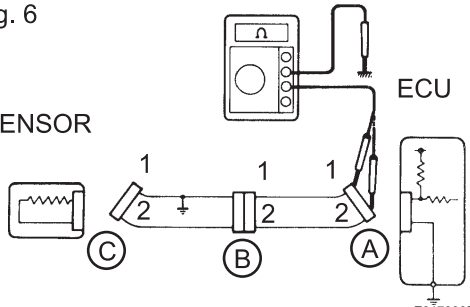
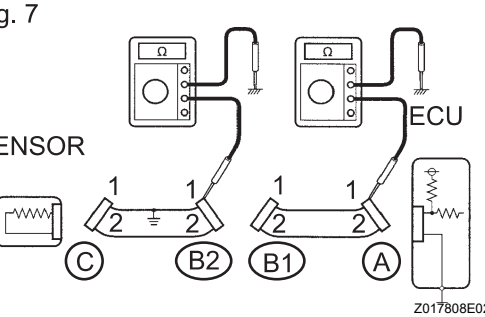


Fig. 7



3. CHECK FOR SHORT CIRCUIT

(a) If the wire harness is ground shorted (Fig. 5), locate the section by conducting a resistance check with the body ground (below).

(b) Check the resistance with the body ground.

(1) Disconnect connectors A and C and measure the resistance.

Standard resistance (Fig. 6)

Tester Connection	Specified Condition
Connector A terminal 1 - Body ground	Below 1 Ω
Connector A terminal 2 - Body ground	10 kΩ or higher

HINT:

Measure the resistance while lightly shaking the wire harness vertically and horizontally. If your results match the examples above, an open circuit exists between terminal 1 of connector A and terminal 1 of connector C.

(2) Disconnect connector B and measure the resistance.

Standard resistance (Fig. 7)

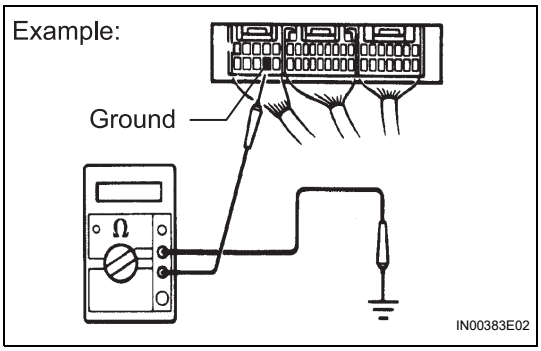
Tester Connection	Specified Condition
Connector A terminal 1 - Body ground	10 kΩ or higher
Connector B2 terminal 2 - Body ground	Below 1 Ω

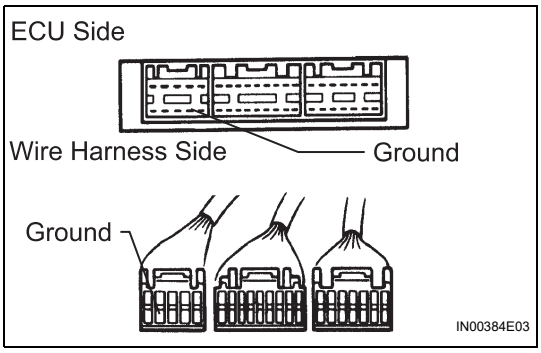
If the results match the examples above, a short circuit exists between terminal 1 of connector B2 and terminal 1 of connector C.

4. CHECK AND REPLACE ECU

NOTICE:

- **The connector should not be disconnected from the ECU. Perform the inspection from the backside of the connector on the wire harness side.**
- **When no measuring condition is specified, perform the inspection with the engine stopped and the power switch on (IG).**
- **Check that the connectors are fully seated. Check for loose, corroded or broken wires.**





(a) First, check the ECU ground circuit. If it is faulty, repair it. If it is normal, the ECU could be faulty. Temporarily replace the ECU with a normally functioning one and check if the symptoms occur. If the trouble symptoms disappear, replace the original ECU.

(1) Measure the resistance between the ECU ground terminal and body ground.
Standard resistance:
Below 1 Ω

(2) Disconnect the ECU connector. Check the ground terminal on the ECU side and wire harness side for bending, corrosion or foreign matter. Lastly, check the contact pressure of the female terminals.

TERMS

ABBREVIATIONS USED IN MANUAL

Abbreviations	Meaning
ABS	Anti-Lock Brake System
A/C	Air Conditioner
AC	Alternating Current
ACC	Accessory
ACIS	Acoustic Control Induction System
ACM	Active Control Engine Mount
ACSD	Automatic Cold Start Device
A.D.D	Automatic Disconnecting Differential
A/F	Air-Fuel Ratio
AHC	Active Height Control Suspension
ALR	Automatic Locking Retractor
ALT	Alternator
AMP	Amplifier
ANT	Antenna
APPROX.	Approximately
ASSY	Assembly
A/T, ATM	Automatic Transmission (Transaxle)
ATF	Automatic Transmission Fluid
AUTO	Automatic
AUX	Auxiliary
AVG	Average
AVS	Adaptive Variable Suspension
AWD	All Wheel Drive Vehicle
B+	Battery Voltage
BA	Brake Assist
BACS	Boost Altitude Compensation System
BAT	Battery
BDC	Bottom Dead Center
B/L	Bi-Level
B/S	Bore-Stroke Ratio
BTDC	Before Top Dead Center
BVSV	Bimetallic Vacuum Switching Valve
CAN	Controller Area Network
CB	Circuit Breaker
CCo	Catalytic Converter For Oxidation
CCV	Canister Closed Valve
CD	Compact Disc
CF	Cornering Force
CG	Center of Gravity
CH	Channel
CKD	Complete Knock Down
COMB.	Combination
CPE	Coupe
CPS	Combustion Pressure Sensor
CPU	Central Processing Unit
CRS	Child Restraint System

IN

Abbreviations	Meaning
CTR	Center
C/V	Check Valve
CV	Control Valve
CW	Curb Weight
DC	Direct Current
DEF	Defogger
DFL	Deflector
DIFF.	Differential
DIFF. LOCK	Differential Lock
D/INJ	Direct Injection
DLC	Data Link Connector
DLI	Distributorless Ignition
DOHC	Double Overhead Camshaft
DP	Dash Pot
DS	Dead Soak
DSP	Digital Signal Processor
DTC	Diagnostic Trouble Code
DVD	Digital Versatile Disc
EBD	Electric Brake Force Distribution
EC	Electrochromic
ECAM	Engine Control And Measurement System
ECD	Electronically Controlled Diesel
ECDY	Eddy Current Dynamometer
ECT	Electronic Controlled Automatic Transmission
ECU	Electronic Control Unit
ED	Electro-Deposited Coating
EDU	Electronic Driving Unit
EDIC	Electric Diesel Injection Control
EFI	Electronic Fuel Injection
E/G	Engine
EGR	Exhaust Gas Recirculation
EGR-VM	EGR-Vacuum Modulator
ELR	Emergency Locking Retractor
EPS	Electric Power Steering
ENG	Engine
ES	Easy & Smooth
ESA	Electronic Spark Advance
ETCS-i	Electronic Throttle Control System-intelligent
EVAP	Evaporative Emission Control
EVP	Evaporator
E-VRV	Electric Vacuum Regulating Valve
EX	Exhaust
FE	Fuel Economy
FF	Front-Engine-Front-Wheel-Drive
F/G	Fuel Gauge
FIPG	Formed In Place Gasket
FL	Fusible Link
F/P	Fuel Pump
FPU	Fuel Pressure Up

Abbreviations	Meaning
FR	Front
F/W	Flywheel
FW/D	Flywheel Damper
FWD	Front-Wheel-Drive
GAS	Gasoline
GND	Ground
GPS	Global Positioning System
GSA	Gear Shift Actuator
H/B	Hatchback
H-FUSE	High Current Fuse
HI	High
HID	High Intensity Discharge (Headlight)
HPU	Hydraulic Power Unit
HSG	Housing
HT	Hard Top
HV	Hybrid Vehicle
HWS	Heated Windshield System
IC	Integrated Circuit
IDI	Indirect Diesel Injection
IFS	Independent Front Suspension
IG	Ignition
IIA	Integrated Ignition Assembly
IN	Intake (Manifold, Valve)
INT	Intermittent
I/P	Instrument Panel
IRS	Independent Rear Suspension
ISC	Idle Speed Control
J/B	Junction Block
J/C	Junction Connector
KD	Kick-Down
KDSS	Kinetic Dynamic Suspension System
LAN	Local Area Network
LB	Liftback
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LH	Left-Hand
LHD	Left-Hand Drive
LIN	Local Interconnect Network
L/H/W	Length, Height, Width
LLC	Long-Life Coolant
LNG	Liquefied Natural Gas
LO	Low
LPG	Liquefied Petroleum Gas
LSD	Limited Slip Differential
LSP & BV	Load Sensing Proportioning and Bypass Valve
LSPV	Load Sensing Proportioning Valve
MAP	Manifold Absolute Pressure
MAX.	Maximum
MIC	Microphone

IN

Abbreviations	Meaning
MIL	Malfunction Indicator Lamp
MIN.	Minimum
MG1	Motor Generator No. 1
MG2	Motor Generator No. 2
MMT	Multi-mode Manual Transmission
MP	Multipurpose
MPI	Multipoint Electronic Injection
MPX	Multiplex Communication System
M/T, MTM	Manual Transmission (Transaxle)
MT	Mount
MTG	Mounting
N	Neutral
NA	Natural Aspiration
NO.	Number
O2S	Oxygen Sensor
OC	Oxidation Catalyst
OCV	Oil Control Valve
O/D	Overdrive
OEM	Original Equipment Manufacturing
OHC	Overhead Camshaft
OHV	Overhead Valve
OPT	Option
ORVR	On-board Refilling Vapor Recovery
O/S	Oversize
P & BV	Proportioning and Bypass Valve
PBD	Power Back Door
PCS	Power Control System
PCV	Positive Crankcase Ventilation
PKB	Parking Brake
PPS	Progressive Power Steering
PROM	Programmable Read Only Memory
PS	Power Steering
PSD	Power Slide Door
PTC	Positive Temperature Coefficient
PTO	Power Take-Off
PZEV	Partial Zero Emission Vehicle
P/W	Power Window
R & P	Rack and Pinion
RAM	Random Access Memory
R/B	Relay Block
RBS	Recirculating Ball Type Steering
R/F	Reinforcement
REAS	Relative Absorber System
RFS	Rigid Front Suspension
RH	Right-Hand
RHD	Right-Hand Drive
RLY	Relay
ROM	Read Only Memory
RR	Rear

Abbreviations	Meaning
RRS	Rigid Rear Suspension
RSE	Rear Seat Entertainment
RWD	Rear-Wheel Drive
SC	Supercharger
SCV	Swirl Control Valve
SDN	Sedan
SEN	Sensor
SICS	Starting Injection Control System
SOC	State Of Charge
SOHC	Single Overhead Camshaft
SPEC	Specification
SPI	Single Point Injection
SRS	Supplemental Restraint System
SSM	Special Service Materials
SST	Special Service Tools
STD	Standard
STJ	Cold-Start Fuel Injection
SW	Switch
SYS	System
T/A	Transaxle
TACH	Tachometer
TBI	Throttle Body Electronic Fuel Injection
TC	Turbocharger
TCCS	TOYOTA Computer-Controlled System
TCM	Transmission Control Module
TCV	Timing Control Valve
TDC	Top Dead Center
TEMP.	Temperature
TFT	TOYOTA Free-Tronic
TIS	Total Information System for Vehicle Development
T/M	Transmission
TMC	TOYOTA Motor Corporation
TMMIN	PT. TOYOTA Motor Manufacturing Indonesia
TMMK	TOYOTA Motor Manufacturing Kentucky, Inc.
TMT	TOYOTA Motor Thailand Co. Ltd.
TRAC/TRC	Traction Control System
TURBO	Turbocharge
TVIP	TOYOTA Vehicle Intrusion Protection
TWC	Three-Way Catalyst
U/D	Underdrive
U/S	Undersize
VCV	Vacuum Control Valve
VDIM	Vehicle Dynamics Integrated Management
VENT	Ventilator
VIM	Vehicle Interface Module
VGRS	Variable Gear Ratio Steering
VIN	Vehicle Identification Number
VPS	Variable Power Steering
VSC	Vehicle Stability Control

Abbreviations	Meaning
VSV	Vacuum Switching Valve
VTV	Vacuum Transmitting Valve
VVT-i	Variable Valve Timing-intelligent
W/	With
WGN	Wagon
W/H	Wire Harness
W/O	Without
1ST	First
2ND	Second
2WD	Two Wheel Drive Vehicle (4 x 2)
3RD	Third
4TH	Fourth
4WD	Four Wheel Drive Vehicle (4 x 4)
4WS	Four Wheel Steering System
5TH	Fifth

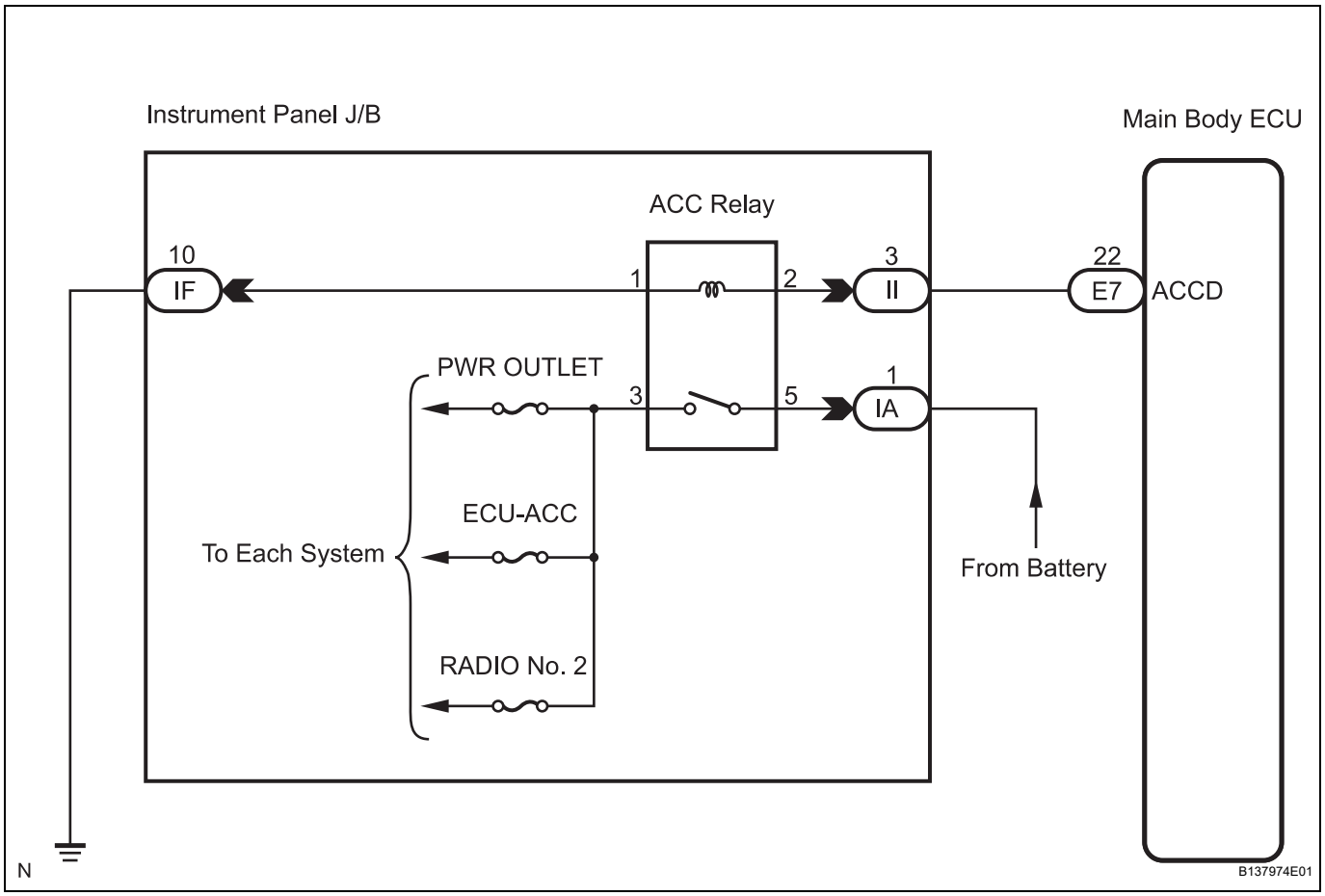
DTC	B2274	ACC Monitor Malfunction

DESCRIPTION

This DTC is output when there is a problem in the ACCD output circuit, which is from the inside of the main body ECU to the ACC relay.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2274	ACC relay actuation circuit inside main body ECU or other related circuit is malfunctioning	• Main body ECU • ACC relay • Wire harness or connector

WIRING DIAGRAM



ST

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Read the Data List according to the displays on the tester.
HINT:
When using the intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ACC RELAY MON	Status of ACC Relay Monitor / ON or OFF	ON: Power switch on (IG) (ACC) OFF: Power switch off	-

OK:
"ON" (Power switch on (ACC)) appears on the screen.

NG → **Go to step 3**

OK

2 CHECK POWER SWITCH CONDITION

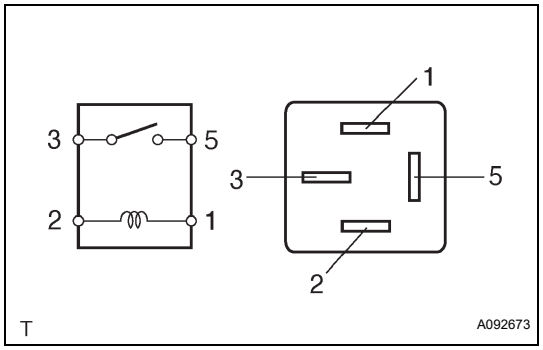
(a) Check the power source mode change.
(1) When the key is inside the vehicle and the shift lever is in the P position, check that pressing the power switch causes the power source mode to change as follows:
OK:
off → on (ACC) → on (IG) → off
HINT:
- If power mode does not change to ON (IG and ACC) (See page ST-91).
- If power mode does not change to ON (IG) (See page ST-99).
- If power mode does not change to ON (ACC) (See page ST-108).

NG → **GO TO OTHER PROBLEM**

OK

ST

3	INSPECT RELAY (ACC RELAY)



(a) Remove the ACC relay from the instrument panel J/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

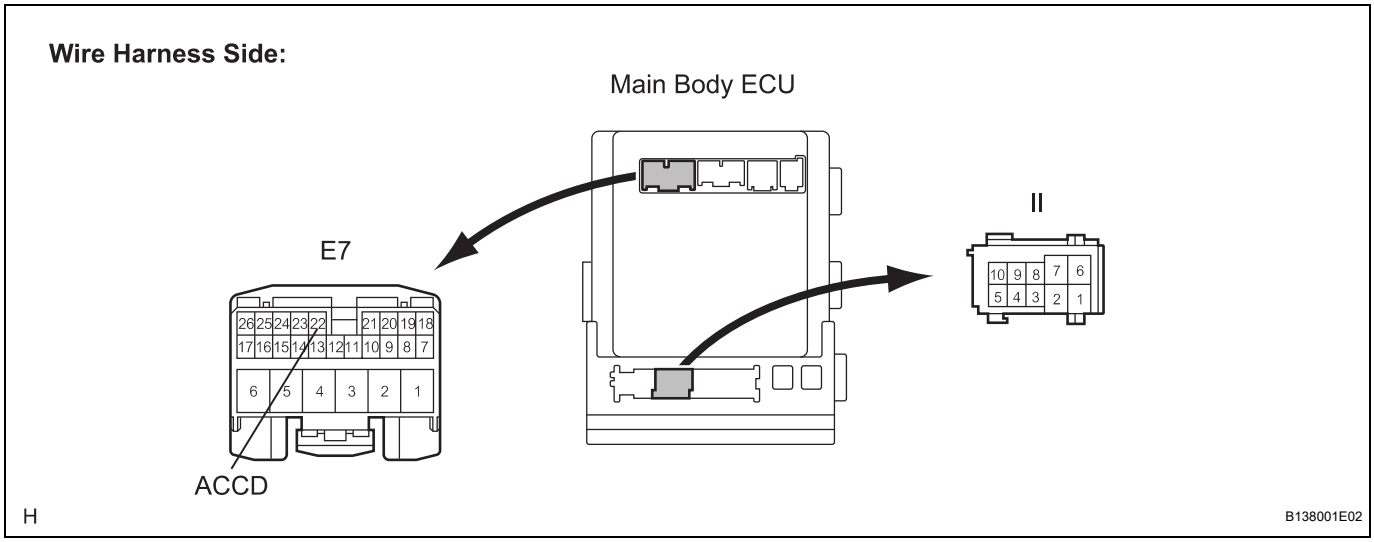
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → REPLACE RELAY

OK

4	CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - MAIN BODY ECU)

(a) Disconnect the E7 ECU connector.



(b) Disconnect the II J/B connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

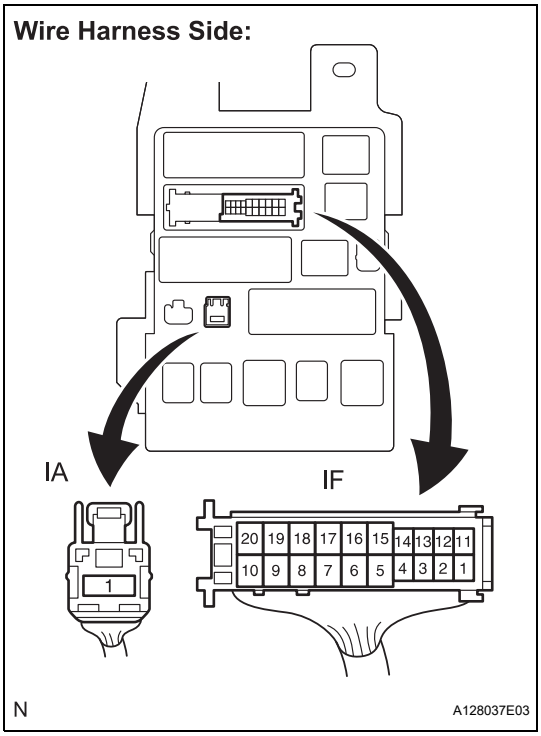
Terminal No. (Symbol)	Condition	Specified Condition
II-3 - E7-22 (ACCD)	Always	Below 1 Ω
E7-22 or II-3 - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

ST

5	CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - BATTERY AND BODY GROUND)



(a) Disconnect the IF and IA J/B connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminal No.	Condition	Specified Condition
IF-10 - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

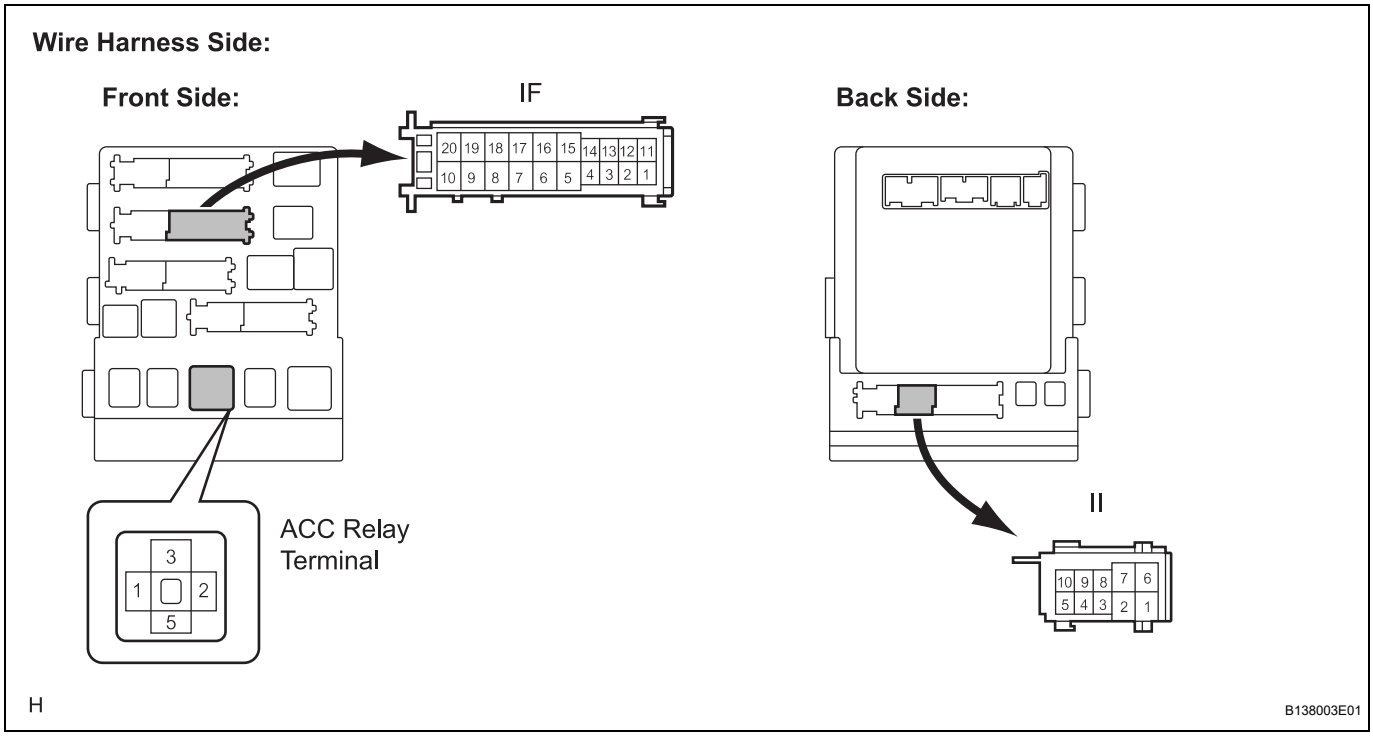
Terminal No.	Condition	Specified Condition
IA-1 - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6	INSPECT INSTRUMENT PANEL J/B

(a) Measure the resistance according to the value(s) in the table below.



Standard resistance

Terminal No.	Condition	Specified Condition
ACC relay terminal 1 - IF-10	Always	Below 1 Ω
ACC relay terminal 2 - II-3	Always	Below 1 Ω
IF-10 - Body ground	Always	10 kΩ or higher
II-3 - Body ground	Always	10 kΩ or higher

NG → REPLACE INSTRUMENT PANEL J/B

OK

REPLACE MAIN BODY ECU

DTC	B2275	STSW Monitor Malfunction

DESCRIPTION

This DTC is output when there is an open, short, or any other problem in the HV control system on (READY) request output circuit inside the main body ECU or in the external circuit.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2275	STSW output circuit (HV control system activation request signal circuit) inside main body ECU or other related circuit is malfunctioning	• Main body ECU • HV control ECU • Wire harness or connector

WIRING DIAGRAM

ST

INSPECTION PROCEDURE

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page ST-21).
HINT:
After all DTCs are cleared, turn the power switch on (IG) and depress the brake pedal. After 15 seconds have elapsed, check if the trouble occurs again.
(b) Check for DTCs again.
OK:
No DTC is output.

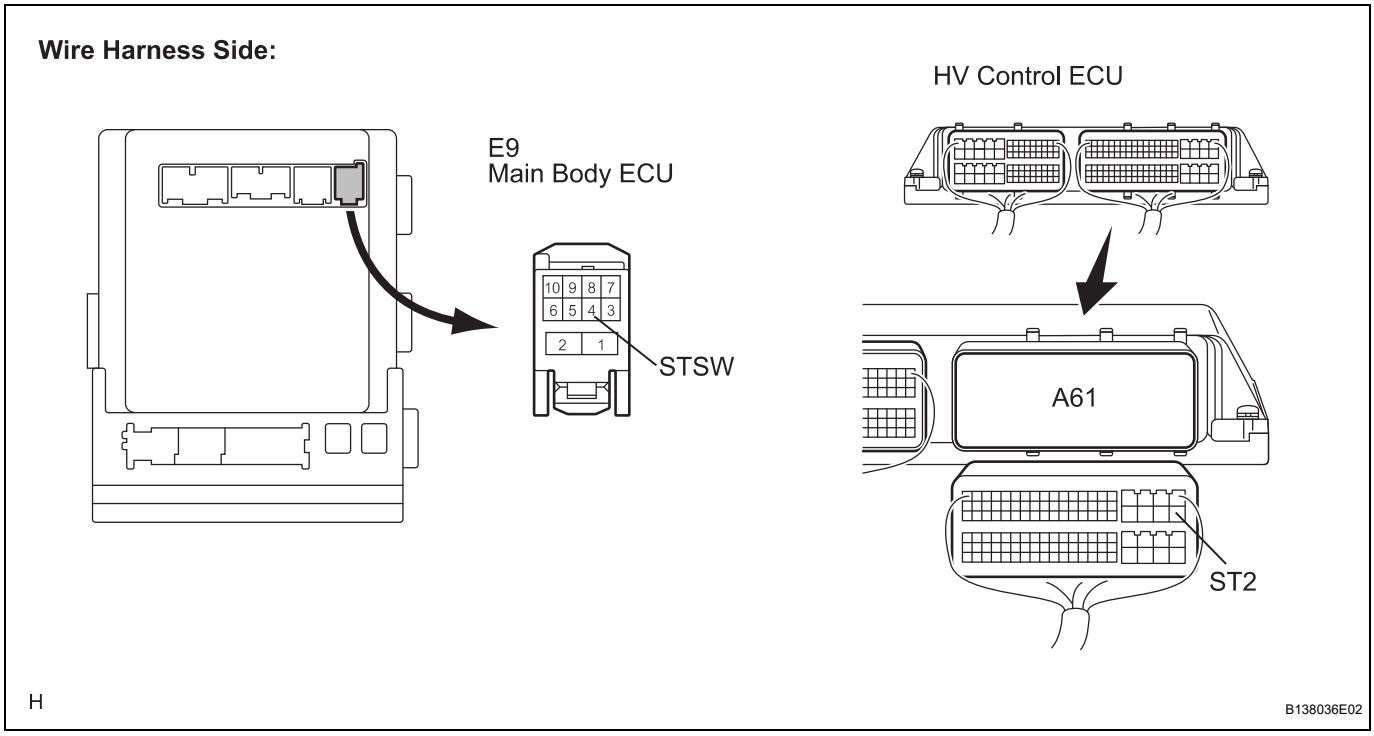
NG	Go to step 2

OK

CHECK INTERMITTENT PROBLEMS

2	CHECK WIRE HARNESS (MAIN BODY ECU - HV CONTROL ECU)

(a) Disconnect the E9 ECU connector.



(b) Disconnect the A61 ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

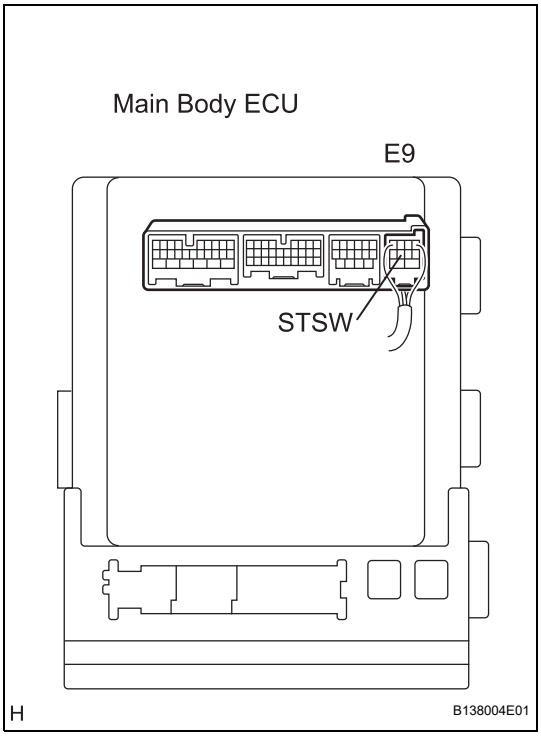
Terminal No. (Symbol)	Condition	Specified Condition
E9-4 (STSW) - A61-37 (ST2)	Always	Below 1 Ω
E9-4 (STSW) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

ST

3	INSPECT MAIN BODY ECU



(a) Reconnect the connectors.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

Terminal No. (Symbol)	Condition	Specified Condition
E9-4 (STSW) - Body ground	Brake pedal depressed, shift lever P position, power switch is pushed once	Output voltage at terminal AM1 or AM2 is -2 V or more.

NG → **REPLACE MAIN BODY ECU**

OK

ST

4	CHECK MAIN BODY ECU OPERATION

(a) After replacing the main body ECU with a normally functioning ECU, check the power source mode change.
(1) When the key is inside the vehicle, the brake pedal is depressed and the shift lever is in the P position, check that pressing the power switch causes the power source mode to change to on (READY).
OK:
Power switch on (READY).
HINT:
If power mode does not change to ON (READY) (See page ST-116).

NG → **GO TO OTHER PROBLEM**

OK

END (MAIN BODY ECU DEFECTIVE)

DTC	B2277	Detecting Vehicle Submersion

DESCRIPTION

This DTC is output when the submersion circuit monitor inside the main body ECU detects that the vehicle is submerged in water.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2277	Submersion circuit monitor inside main body ECU detects that vehicle is submerged in water	Main body ECU

INSPECTION PROCEDURE

1	CHECK FOR WATER DAMAGE

(a) Check the main body ECU, peripheral components, and wire harnesses for traces of water.
OK:
There are no traces of water.

NG → **TAKE APPROPRIATE MEASURES AGAINST CAUSE OF WATER DAMAGE AND REPLACE MAIN BODY ECU**

OK

2	CHECK DTC OUTPUT

(a) Delete the DTCs (See page ST-21).
HINT:
After all DTCs are cleared, check if the trouble occurs again 30 seconds after the power switch is turned on (IG).
(b) Check for DTCs again.
OK:
No DTC is output.

NG → **REPLACE MAIN BODY ECU**

OK

END

ST

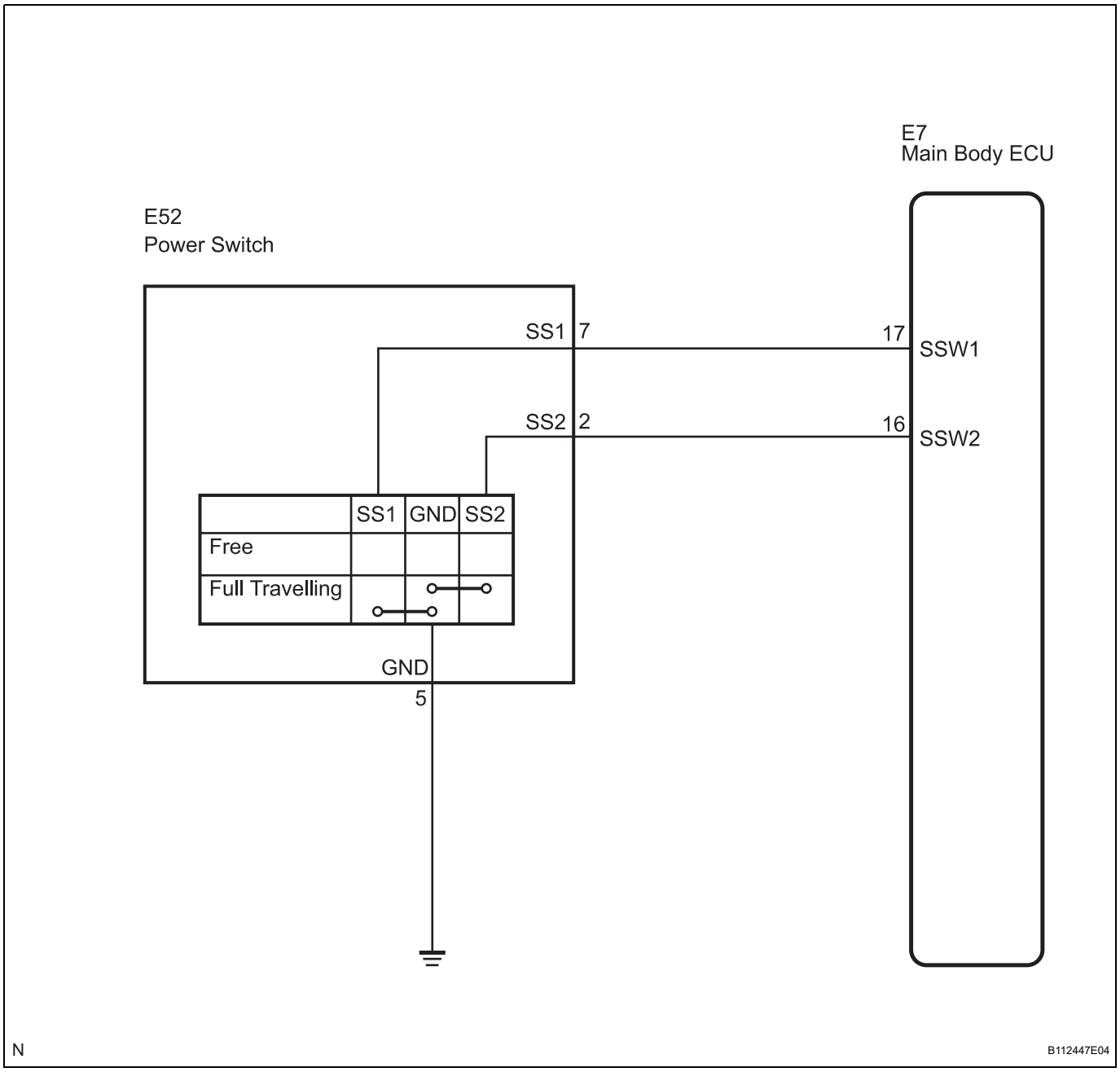
DTC	B2278	Power Switch Circuit Malfunction

DESCRIPTION

This DTC is output when 1) a malfunction is detected between the main body ECU and the power switch; or 2) either of the switches inside the power switch is malfunctioning.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2278	Communication is abnormal between the main body ECU and power switch or the power switch is defective	• Power switch • Main body ECU • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Check the DATA LIST for proper functioning of the start switch.
HINT:
When using the intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

ST

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
STSW1	Start Switch 1/ON or OFF	ON: Power switch is pushed OFF: Power switch is not pushed	-
START SW2	Start Switch 2/ON or OFF	ON: Power switch is pushed OFF: Power switch is not pushed	-

OK:
"ON" (Power switch on (IG)) and "OFF" (Power switch off) appear on the screen.

NG → **Go to step 3**

OK

2 CHECK POWER SWITCH CONDITION

(a) Check the power source mode change.
(1) When the key is inside the vehicle and the shift lever is in the P position, check that pressing the power switch causes the power source mode to change as follows:
OK:
off → on (ACC) → on (IG) → off
HINT:
- If power mode does not change to ON (IG and ACC) (See page ST-91).
- If power mode does not change to ON (IG) (See page ST-99).
- If power mode does not change to ON (ACC) (See page ST-108).

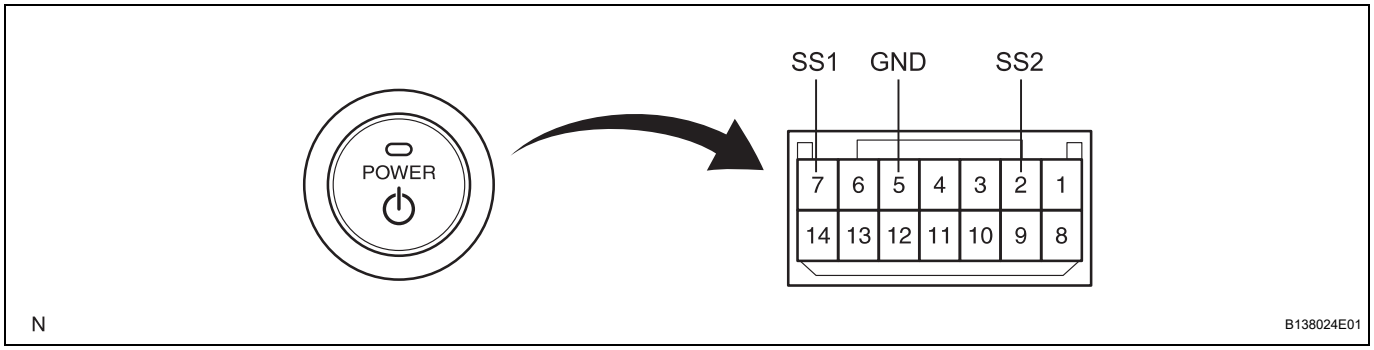
NG → **GO TO OTHER PROBLEM**

OK

END

3 INSPECT POWER SWITCH

(a) Remove the power switch.



(b) Disconnect the switch connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Switch Condition	Specified Condition
7 (SS1) - 5 (GND)	Pushed	Below 1 Ω
2 (SS2) - 5 (GND)	Pushed	Below 1 Ω
7 (SS1) - 5 (GND)	Not pushed	10 kΩ or higher
2 (SS2) - 5 (GND)	Not pushed	10 kΩ or higher

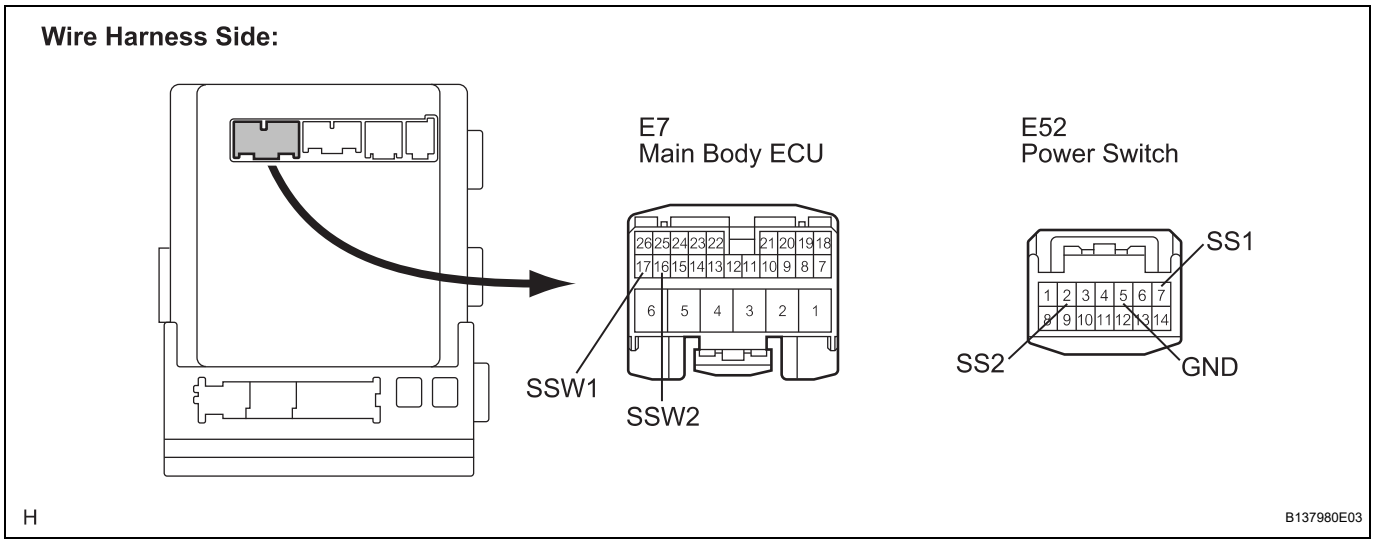
HINT:
This switch is a momentary type switch.

NG → **REPLACE POWER SWITCH**

OK

4 CHECK WIRE HARNESS (POWER SWITCH - MAIN BODY ECU AND BODY GROUND)

(a) Disconnect the E7 ECU connector.



(b) Disconnect the E52 switch connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E52-7 (SS1) - E7-17 (SSW1)	Always	Below 1 Ω
E52-2 (SS2) - E7-16 (SSW2)	Always	Below 1 Ω
E52-5 (GND) - Body ground	Always	Below 1 Ω
E52-7 (SS1) or E7-17 (SSW1) - Body ground	Always	10 kΩ or higher
E52-2 (SS2) or E7-16 (SSW2) - Body ground	Always	10 kΩ or higher

ST

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MAIN BODY ECU

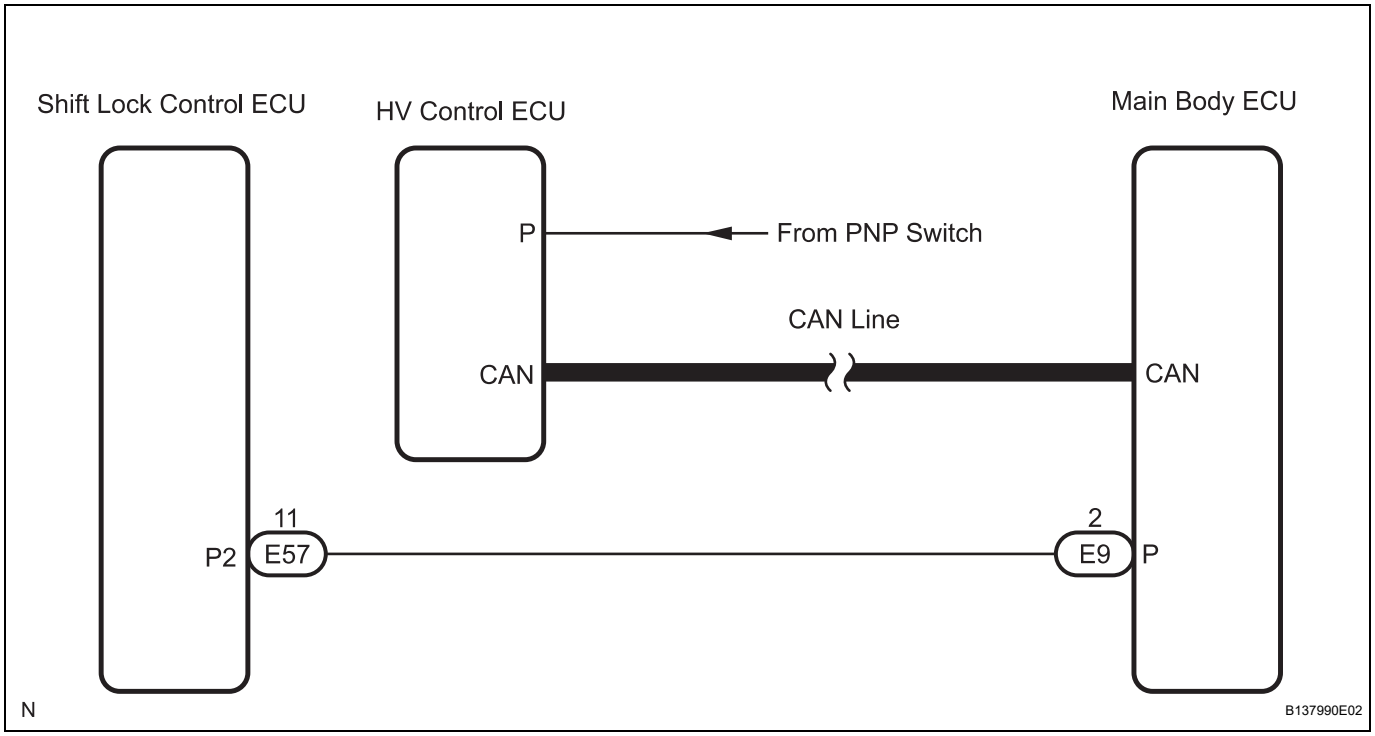
DTC	B2281	"P" Signal Malfunction

DESCRIPTION

The HV control ECU and the shift lock control ECU are connected by a cable and the CAN. If the cable information and CAN information are inconsistent, this DTC will be output.
HINT:
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2281	Cable information and CAN information between main body ECU and shift lock control ECU are inconsistent	• Main body ECU • Shift lock control ECU • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Read the DATA LIST according to the displays on the tester.

MAIN BODY:

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
SHIFT P SIG	Shift P Signal / ON or OFF	ON: Shift P signal ON (Shift position is P) OFF: Shift P signal OFF (Shift position is not P)	-

OK:
"ON" (P signal is ON) and "OFF" (P signal is OFF) appear on the screen.

HINT:
If the result is not as specified, there may be a malfunction with the shift lock control ECU (See page SR-32).

NG	Go to step 2

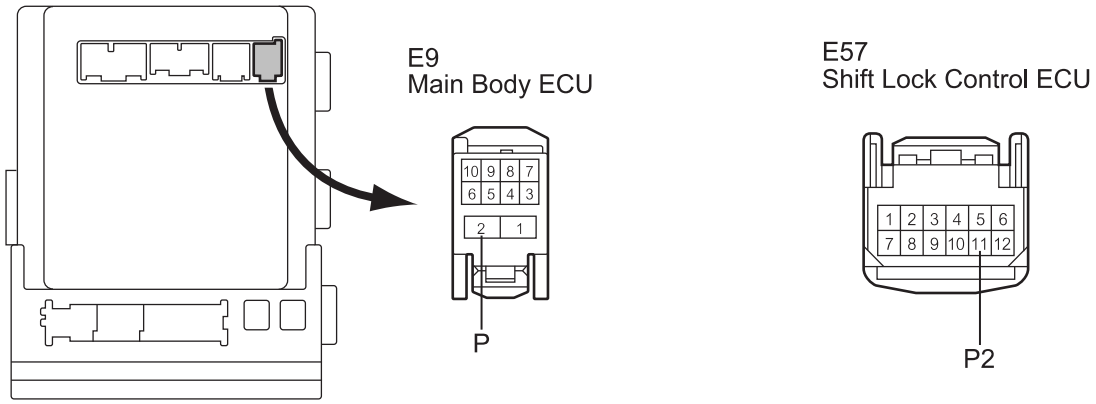
OK

GO TO SHIFT LOCK CONTROL SWITCH

2	CHECK WIRE HARNESS (MAIN BODY ECU - SHIFT LOCK CONTROL ECU)

(a) Disconnect the E9 and E57 ECU connectors.

Wire Harness Side:



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(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminal No. (Symbol)	Condition	Specified Condition
E9-2 (P) - E57-11 (P2)	Always	Below 1 Ω
E9-2 (P) - Body ground	Always	10 kΩ or higher

NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3	CHECK MAIN BODY ECU OPERATION

(a) After replacing the main body ECU with a normally functioning ECU, check the power source mode change.
(1) When the key is inside the vehicle, the brake pedal is depressed and the shift lever is in P, check that pressing the power switch causes the power source mode to change to on (READY).
OK:
Power switch on (READY).
HINT:
If power mode does not change to ON (READY) (See page ST-116).

NG → **GO TO OTHER PROBLEM**

OK

END (MAIN BODY ECU DEFECTIVE)

DTC	B2282	Vehicle Speed Signal Malfunction

DESCRIPTION

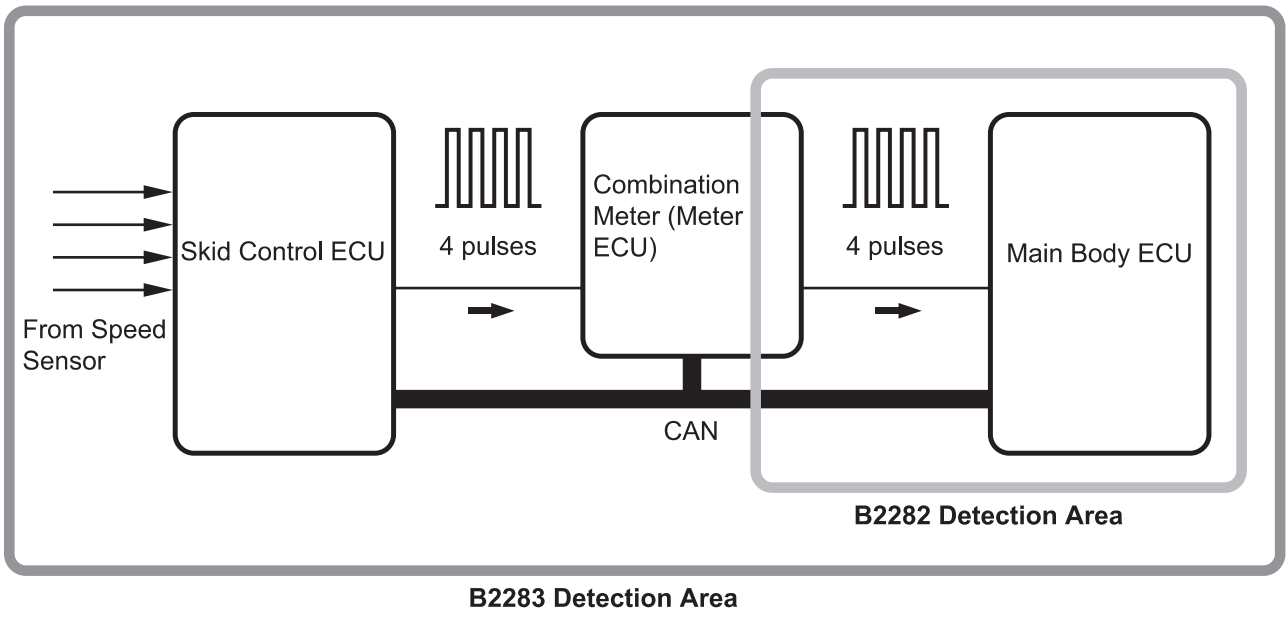
The main body ECU and the combination meter are connected by a cable and the CAN. DTC B2282 is output when: 1) the cable information and CAN information are inconsistent; and 2) a malfunction is detected between the vehicle speed sensor and combination meter.

HINT:

When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.

After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2282	When both conditions below are met: • Cable information and CAN information between the main body ECU and the combination meter are inconsistent • Malfunction is detected between the vehicle speed sensor and the combination meter	• CAN communication system • Combination meter system • Main body ECU • Wire harness or connector



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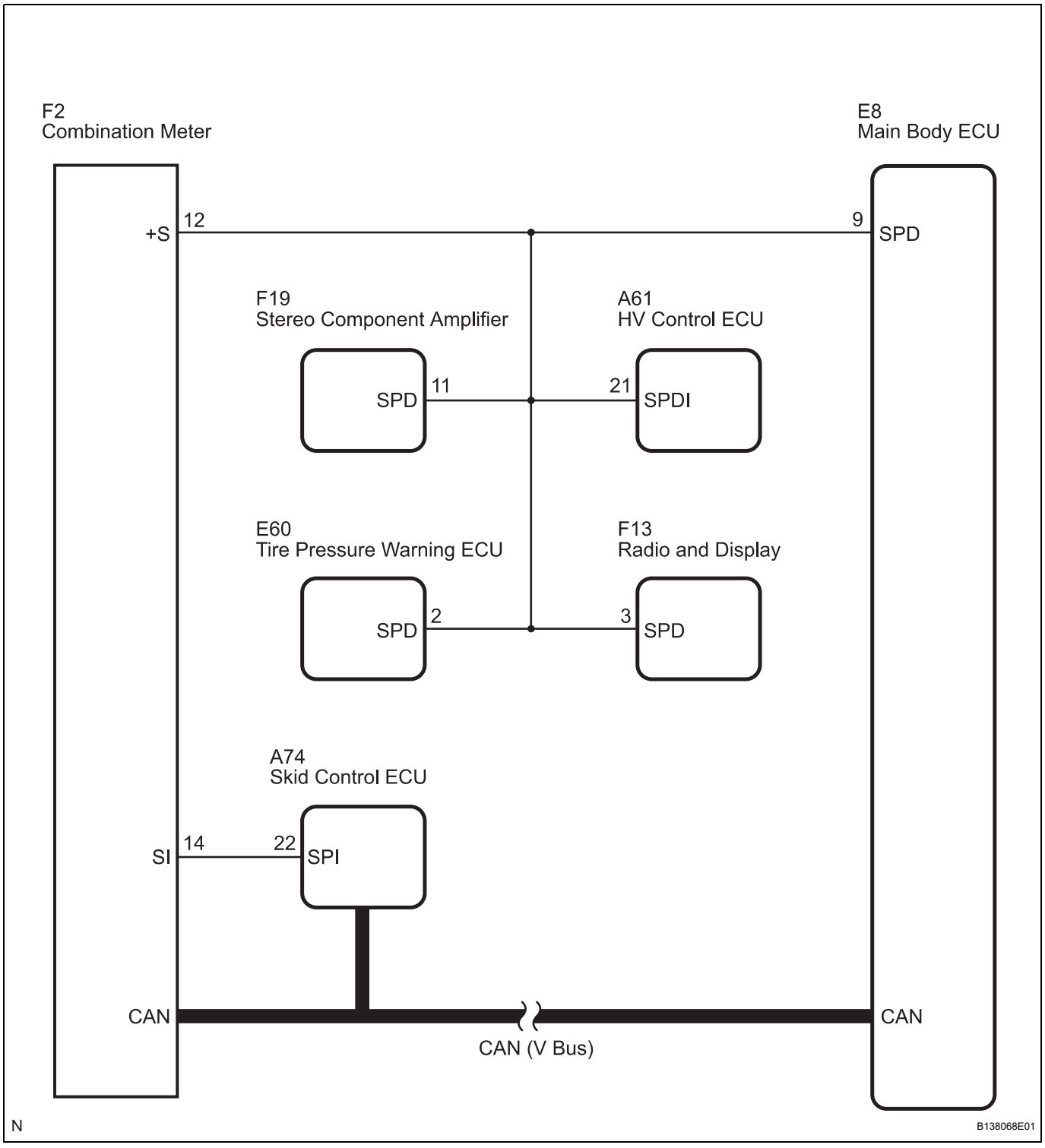
ST

WIRING DIAGRAM



HINT:

- A voltage of 12 V or 5 V is output from each ECU and then input to the combination meter. The signal is changed to a pulse signal at the transistor in the combination meter. Each ECU controls the respective system based on the pulse signal.
- If a short occurs in an ECU, all systems in the diagram above will not operate normally.

ST

INSPECTION PROCEDURE

1	CHECK OPERATION OF SPEEDOMETER

(a) Drive the vehicle and check if the function of the speedometer in the combination meter is normal.
OK:
Actual vehicle speed and the speed indicated on the speedometer are the same.
HINT:
- The vehicle speed sensor is functioning normally when the indication on the speedometer is normal.
- The meter CPU receives vehicle speed signals from the skid control ECU via the CAN communication lines. The vehicle speed sensor detects the voltage that varies according to the vehicle speed. The skid control ECU supplies power to the vehicle speed sensor. The skid control ECU detects vehicle speed signals based on the pulses of the voltage.

OK → **Go to step 3**

NG

2	CHECK DTC OUTPUT (CAN COMMUNICATION SYSTEM)

(a) Delete the DTCs (See page ST-21).
(b) Check for CAN communication system DTCs (See page CA-7).
HINT:
If the DTCs for the CAN communication system malfunction are output, inspect those DTCs first (See page CA-22).
OK:
No DTC is output.

NG → **GO TO CAN COMMUNICATION SYSTEM**

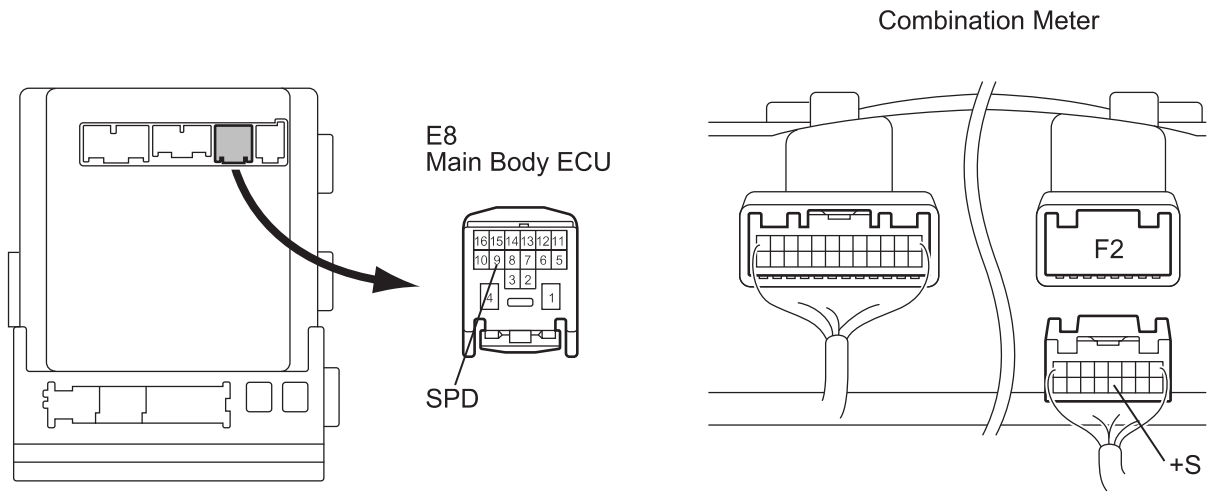
OK

GO TO COMBINATION METER SYSTEM

3	CHECK WIRE HARNESS (MAIN BODY ECU - COMBINATION METER)

(a) Disconnect the E8 ECU connector.

Wire Harness Side:



(b) Disconnect the F2 meter connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

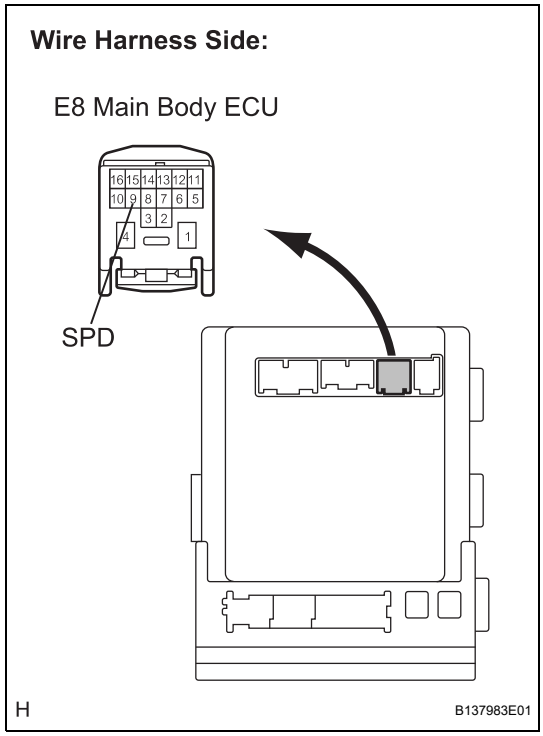
Tester Connection (Symbols)	Condition	Specified Condition
E8-9 (SPD) - F2-12 (+S) - Body ground	Always	Below 1 Ω

ST

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	CHECK WIRE HARNESS (MAIN BODY ECU - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E8-9 (SPD) - Body ground	Always	10 kΩ or higher

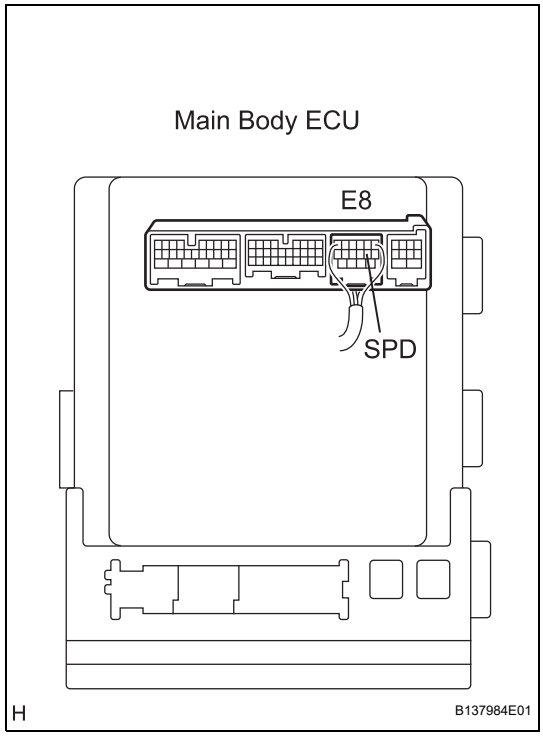
HINT:
If the result of the inspection for a short circuit is not as specified, there may be a short in the ECU.

NG → **REPAIR OR REPLACE HARNESS, CONNECTOR OR EACH ECU**

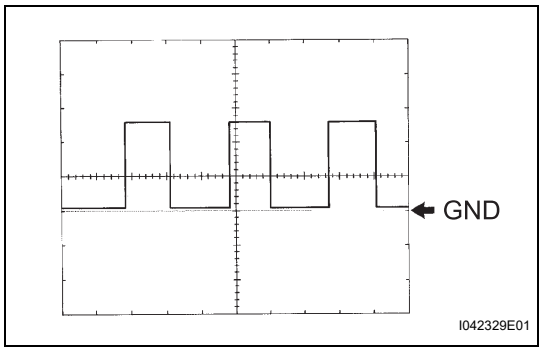
OK

ST

5	INSPECT MAIN BODY ECU (SPEED SIGNAL)



(a) Check the input signal waveform.
(1) Reconnect the connectors.
(2) Remove the combination meter assembly with the connector(s) still connected.
(3) Connect an oscilloscope to terminal E8-9 (SPD) and body ground.
(4) Turn the power switch on (IG).
(5) Turn the wheel slowly.



(6) Check the signal waveform according to the condition(s) in the table below.

Item	Condition
Tool setting	5 V/DIV., 10 ms./DIV.
Vehicle condition	Driving at approx. 20 km/h (12 mph)

OK:

The waveform is displayed as shown in the illustration.

HINT:

As the vehicle speed increases, the cycle of the signal waveform narrows.

NG → **REPLACE COMBINATION METER**

OK

REPLACE MAIN BODY ECU

ST

DTC	B2283	Vehicle Speed Sensor Malfunction

DESCRIPTION

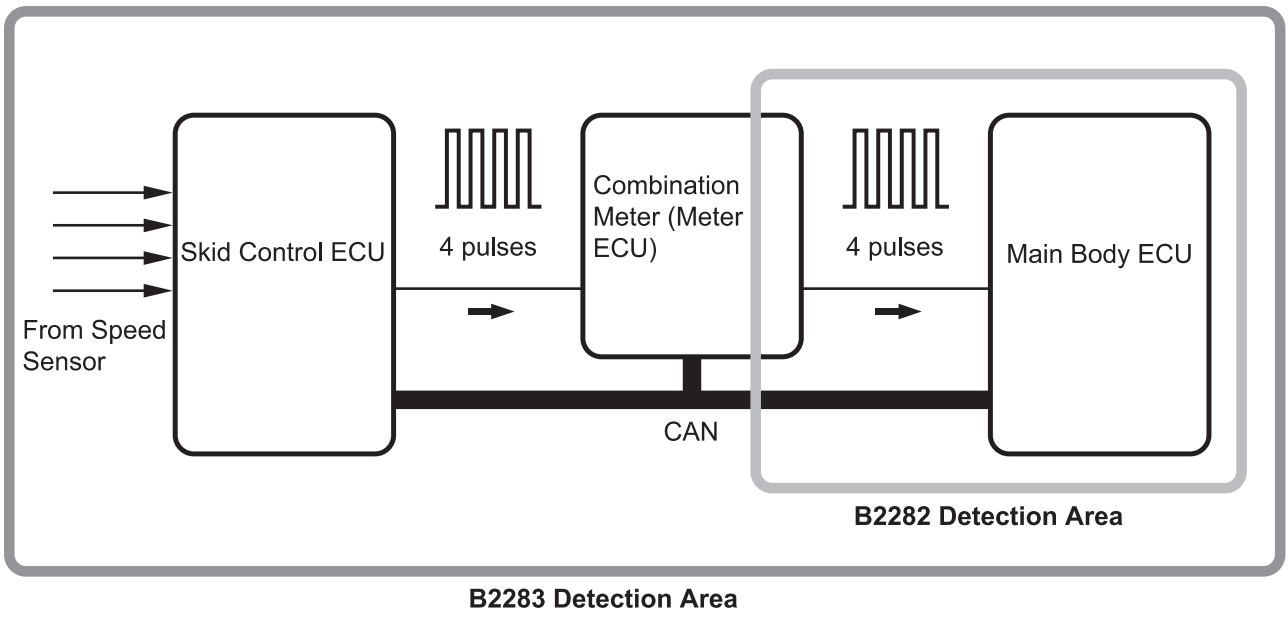
The skid control ECU converts these signals into 4-pulse signals and sends them to the combination meter. After this signal is converted into a more precise rectangular waveform by the waveform shaping circuit inside the combination meter, it is then transmitted to the main body ECU. The main body ECU determines the vehicle speed based on the frequency of these pulse signals.

HINT:

When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.

After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2283	When both conditions below are met: • Over-deceleration in vehicle speed • Vehicle speed and engine speed or HV motor speed do not match	• DTC B2282 detection area • Combination meter • Speed sensor • Skid control ECU • Main body ECU • Wire harness or connector



N

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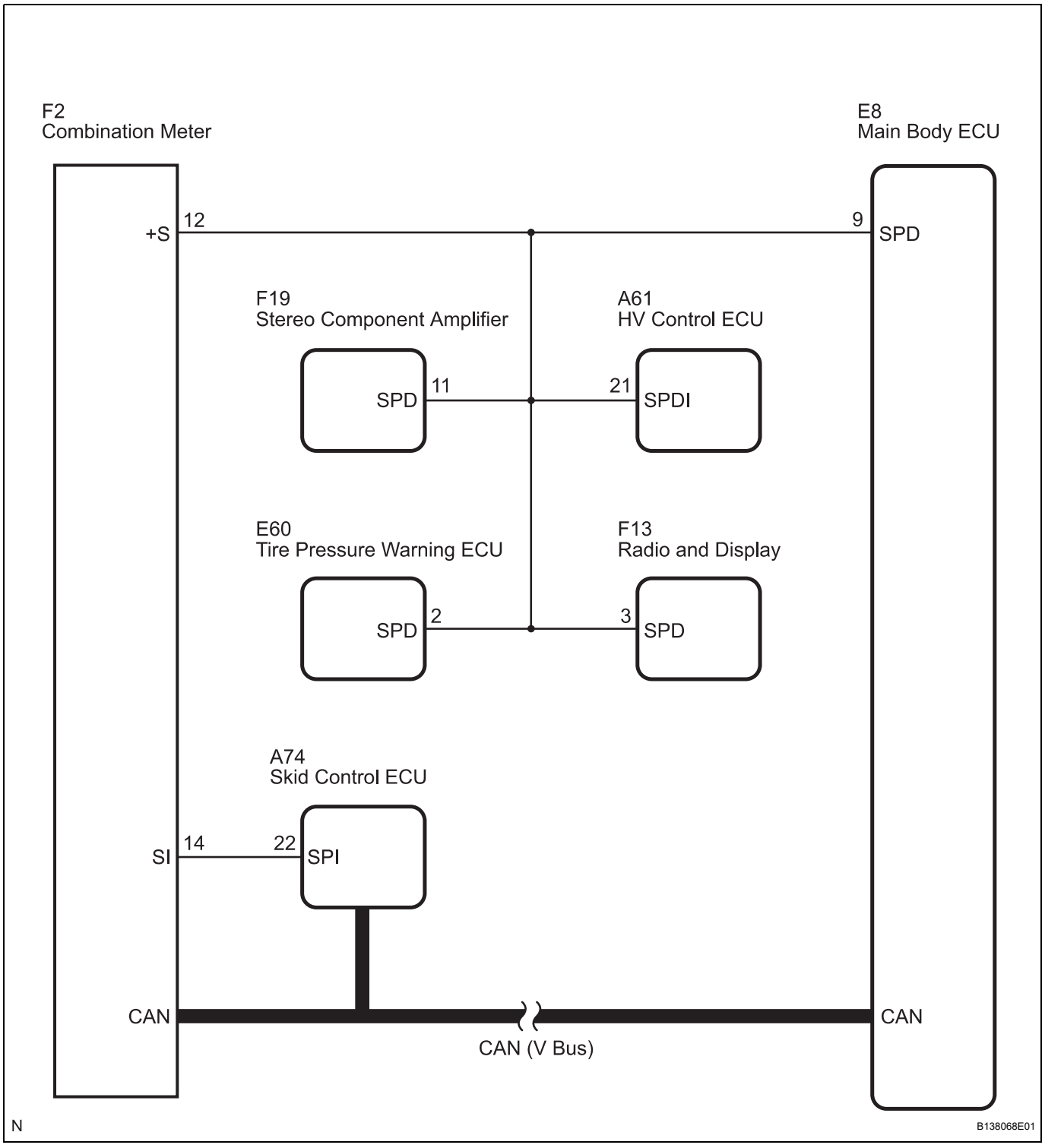
WIRING DIAGRAM



HINT:

- A voltage of 12 V or 5 V is output from each ECU and then input to the combination meter. The signal is changed to a pulse signal at the transistor in the combination meter. Each ECU controls the respective system based on the pulse signal.
- If a short occurs in an ECU, all systems in the diagram above will not operate normally.

ST

INSPECTION PROCEDURE

1	CHECK DTC OUTPUT (SMART KEY SYSTEM)

(a) Delete the DTCs (See page ST-21).
(b) After all DTCs are cleared, check if the trouble occurs again 320 seconds after the power switch is turned on (IG).
(c) Check for DTC B2282 and DTC B2283.

Result

Display (DTC output)	Proceed to
"DTC B2283" only	A
"DTC B2283" and "DTC B2282"	B
No DTC	C

HINT:
If DTC B2282 and DTC B2283 are output, perform troubleshooting for DTC B2282 first (See page ST-54).

B → **GO TO DTC B2282**

C → **CHECK INTERMITTENT PROBLEMS**

A

2	CHECK OPERATION OF SPEEDOMETER

(a) Drive the vehicle and check if the function of the speedometer in the combination meter is normal.
OK:
Actual vehicle speed and the speed indicated on the speedometer are the same.
HINT:
- The vehicle speed sensor is functioning normally when the indication on the speedometer is normal.
- The meter CPU receives vehicle speed signals from the skid control ECU via the CAN communication lines. The vehicle speed sensor detects the voltage that varies according to the vehicle speed. The skid control ECU supplies power to the vehicle speed sensor. The skid control ECU detects vehicle speed signals based on the pulses of the voltage.

OK → **Go to step 4**

NG

3	CHECK DTC OUTPUT (BRAKE CONTROL)

(a) Delete the DTCs (See page ST-21).
(b) Check for DTCs.
OK:
No DTC is output.

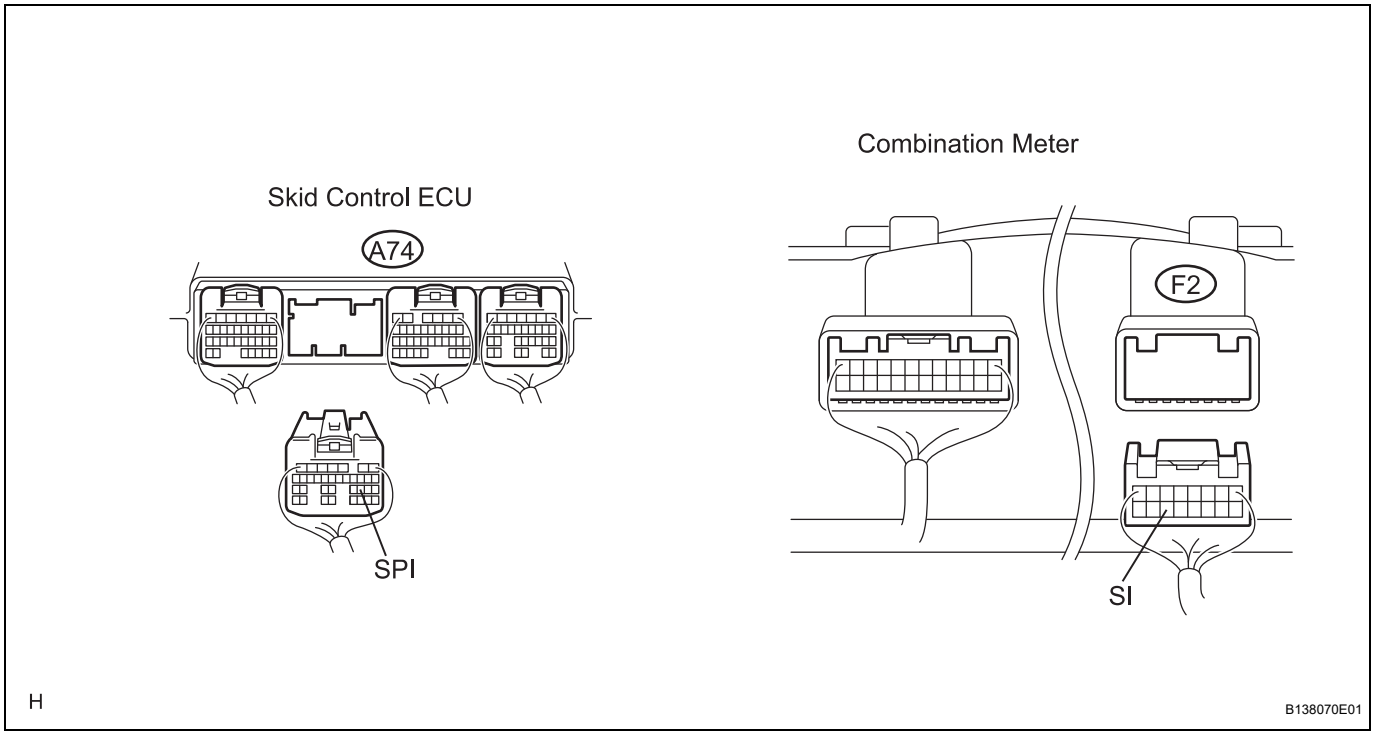
NG → GO TO BRAKE CONTROL SYSTEM

OK

REPLACE MAIN BODY ECU

4	CHECK WIRE HARNESS (SKID CONTROL ECU - COMBINATION METER)

(a) Disconnect the F2 meter connector.



(b) Disconnect the A74 ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

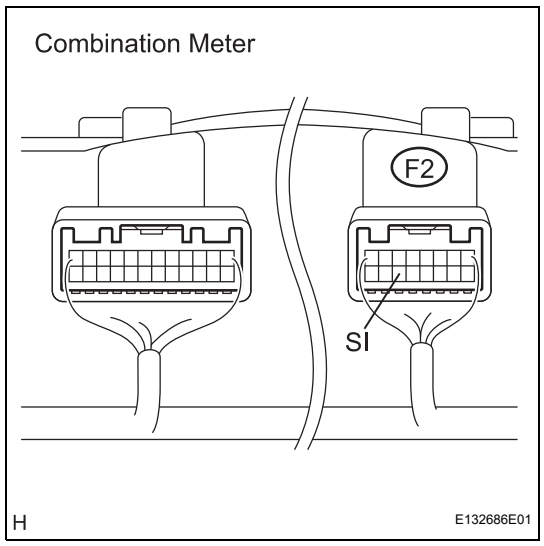
Tester Connection (Symbols)	Condition	Specified Condition
A74-22 (SPI) - F2-14 (SI)	Always	Below 1 Ω
A74-22 (SPI) or F2-14 (SI) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

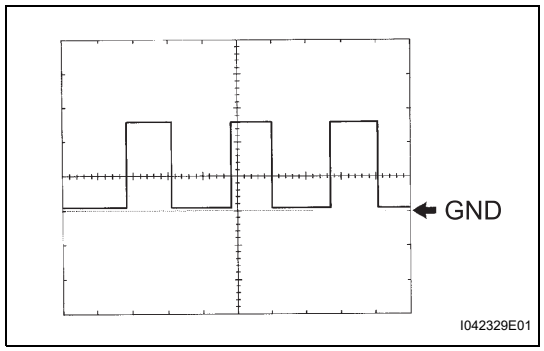
OK

ST

5	INSPECT MAIN BODY ECU (SPEED SIGNAL)



(a) Check the input signal waveform.
(1) Reconnect the connectors.
(2) Remove the combination meter assembly with the connector(s) still connected.
(3) Connect an oscilloscope to terminal F2-14 (SI) and body ground.
(4) Turn the power switch on (IG).
(5) Turn the wheel slowly.



(6) Check the signal waveform according to the condition(s) in the table below.

Item	Condition
Tool setting	5 V/DIV., 10 ms./DIV.
Vehicle condition	Driving at approx. 20 km/h (12 mph)

OK:
The waveform is displayed as shown in the illustration.
HINT:
As the vehicle speed increases, the cycle of the signal waveform narrows.

NG → **REPLACE SKID CONTROL ECU**

OK

REPLACE COMBINATION METER

ST

DTC	B2284	Brake Signal Malfunction

DESCRIPTION

This DTC is output when: 1) the brake signal circuit between the main body ECU and the stop light switch is malfunctioning; and 2) the CAN information is inconsistent.

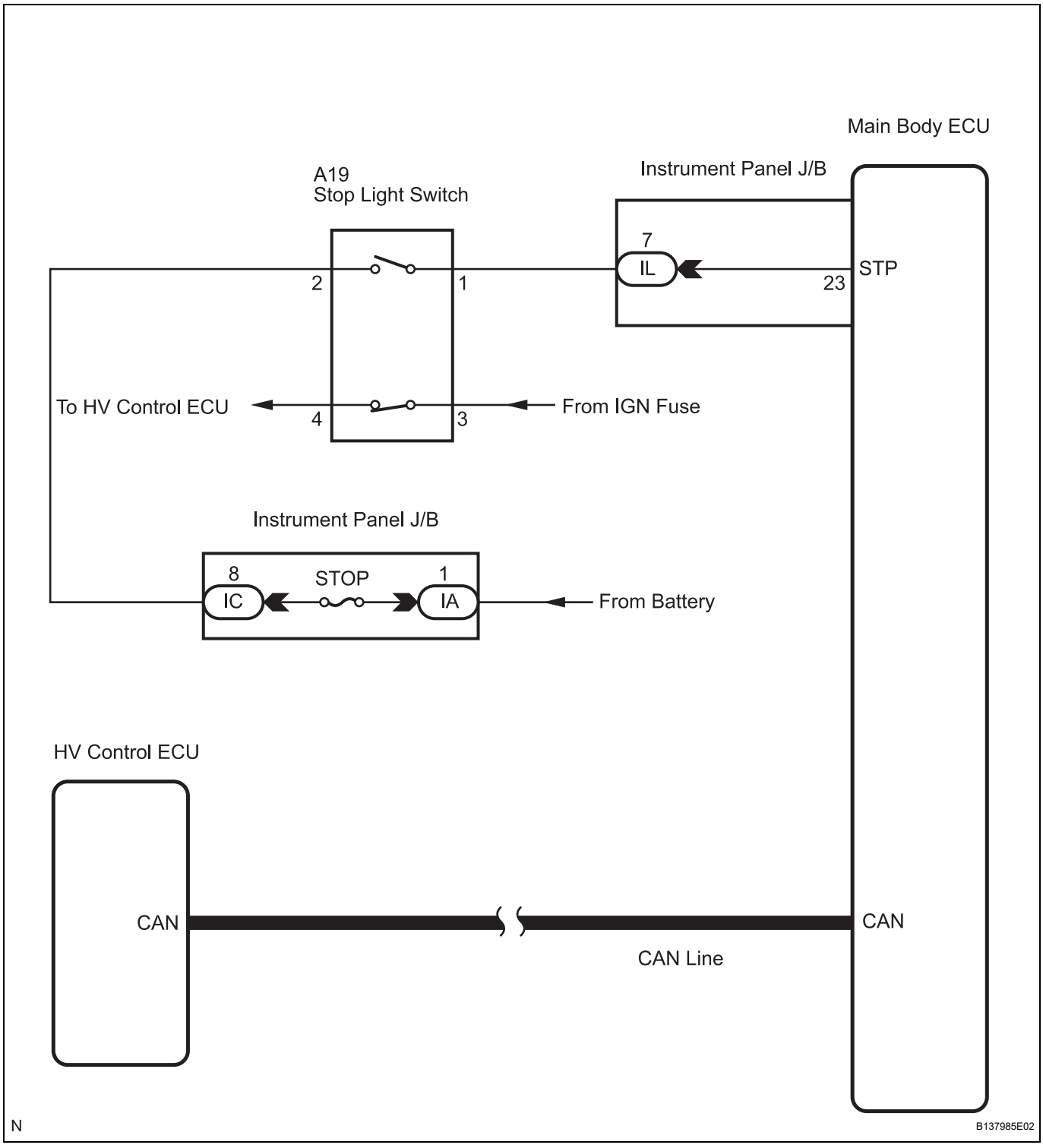
HINT:

When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.

After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2284	Communication or communication line is abnormal between the main body ECU and the stop light switch	• Stop light switch • CAN communication system • HV control ECU • Main body ECU • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Before performing the inspection, depress the brake pedal and check that the stop lights come on. If the stop lights do not come on when the brake pedal is depressed, refer to the page shown in the brackets (See page LI-12).

1	READ VALUE OF INTELLIGENT TESTER (STOP LIGHT SWITCH)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Check the DATA LIST for proper functioning of the stop light switch.

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
STOP LAMP SW	Stop light switch/ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-

OK:
ON (brake pedal depressed) and OFF (brake pedal released) appear on the screen.

NG → **Go to step 4**

OK

2	CHECK DTC OUTPUT (CAN COMMUNICATION SYSTEM)

(a) Delete the DTCs (See page ST-21).
(b) Check for CAN communication system DTCs (See page CA-7).
HINT:
If the DTCs for the CAN communication system malfunction are output, inspect those DTCs first (See page CA-22).
OK:
No DTC is output.

NG → **GO TO CAN COMMUNICATION SYSTEM**

OK

3	CHECK DTC OUTPUT (HYBRID CONTROL SYSTEM)

(a) Delete the DTCs (See page ST-21).
(b) Check for hybrid control system DTCs (See page HV-46).
OK:
No DTC is output.

NG → **GO TO HYBRID CONTROL SYSTEM**

OK

REPLACE MAIN BODY ECU

ST

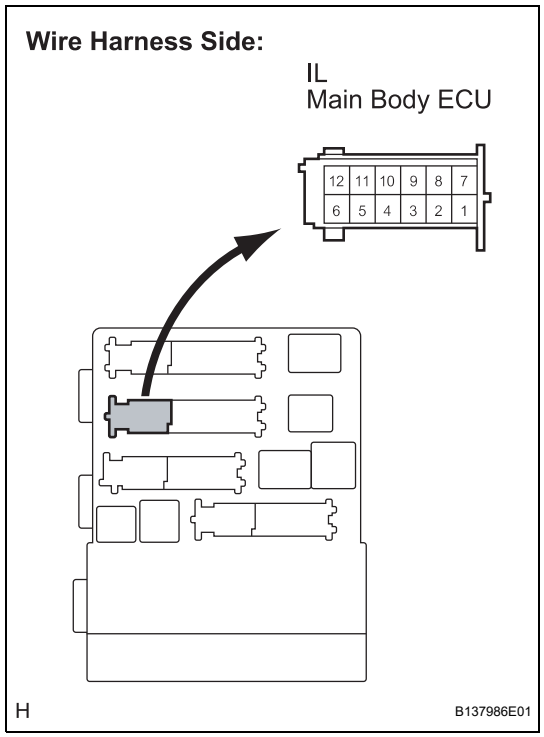
4	INSPECT FUSE (STOP)

(a) Remove the STOP fuse from the instrument panel J/B.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

5	CHECK WIRE HARNESS (BATTERY - MAIN BODY ECU)



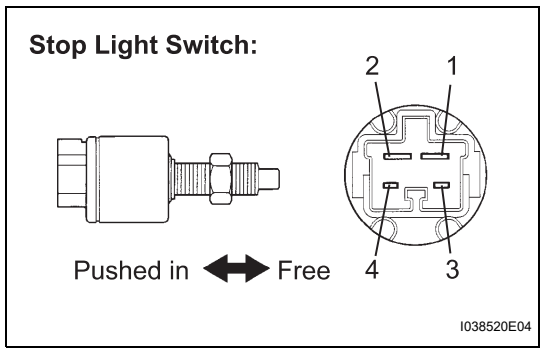
(a) Disconnect the IL ECU connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
IL-7 - Body ground	Brake pedal released	Below 1 V
IL-7 - Body ground	Brake pedal depressed	10 to 14 V

OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

NG

6	INSPECT STOP LIGHT SWITCH



(a) Remove the switch.
(b) Measure the resistance of the switch.
Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Switch pin free	Below 1 Ω
3 - 4	Switch pin free	10 kΩ or higher
1 - 2	Switch pin pushed in	10 kΩ or higher
3 - 4	Switch pin pushed in	Below 1 Ω

NG → **REPLACE STOP LIGHT SWITCH**

ST

OK

REPLACE MAIN BODY ECU

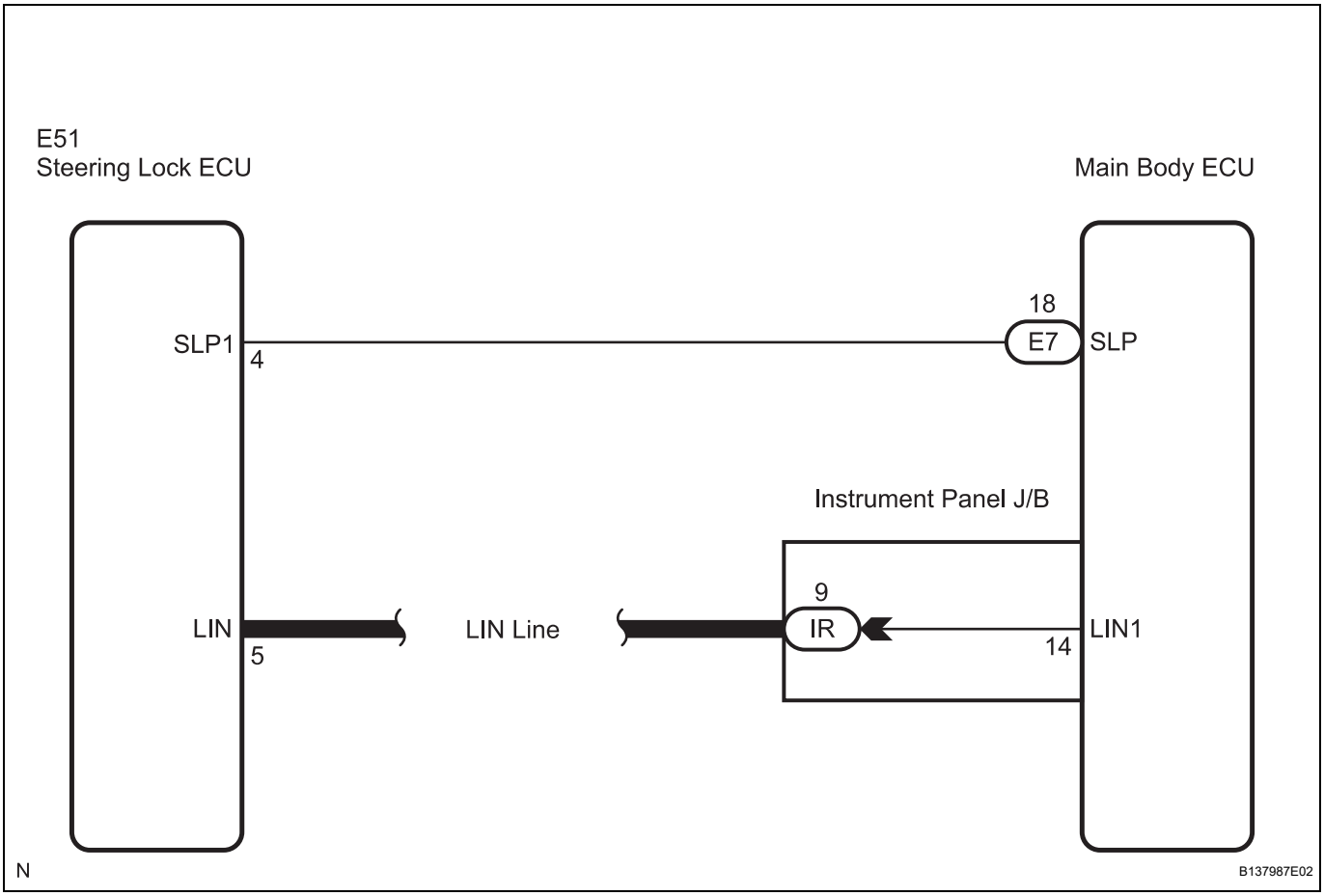
DTC	B2285	Steering Lock Position Signal Circuit Malfunction

DESCRIPTION

This DTC is output when serial communication signals and LIN communication signals in the circuit between the main body ECU and steering lock actuator (steering lock ECU) are inconsistent.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU or steering lock ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2285	Cable and LIN information between the main body ECU and the steering lock ECU are inconsistent	• Main body ECU • Steering lock ECU • Wire harness or connector

WIRING DIAGRAM



ST

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.

(b) Check the DATA LIST for proper functioning of the steering lock function.
HINT:
When using the intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
STR UNLOCK SW	Steering lock condition/ON or OFF	ON: Steering is unlocked (Power switch on (ACC)) OFF: Steering is locked (Power switch off)	-

OK:
"ON "(Steering is unlocked) and "OFF" (Steering is locked) appear on the screen.

NG → **Go to step 3**

OK

2 CHECK FOR DTCS

(a) Delete the DTCs (See page ST-21).
(b) Check for DTC B2285, DTC B2287 and DTC B2785.

Result

Display (DTC output)	Proceed to
"DTC B2285" only	A
"DTC B2287" and/or "DTC B2785"	B
No DTC	C

HINT:
- If DTC B2287 is output (See page ST-77).
- If DTC B2785 is output (See page EI-30).

B → **GO TO DTC CHART**

C → **CHECK INTERMITTENT PROBLEMS**

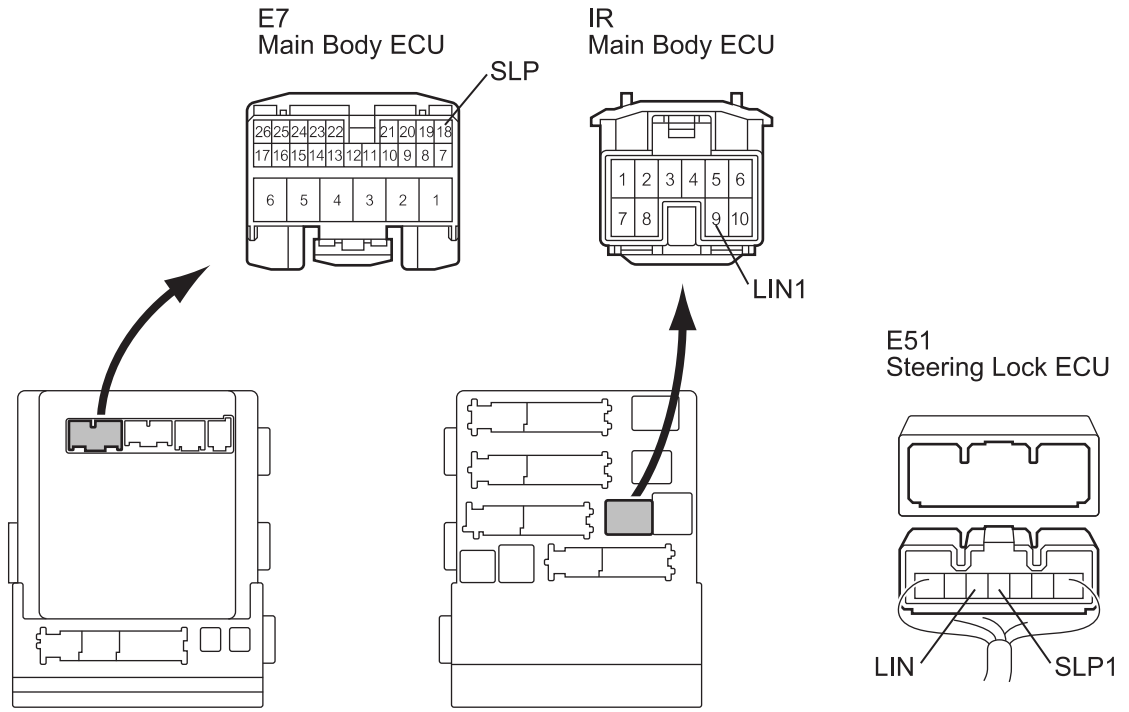
A

REPLACE MAIN BODY ECU

3 CHECK WIRE HARNESS (MAIN BODY ECU - STEERING LOCK ECU)

(a) Disconnect the IR, E7 and E51 ECU connectors.

Wire Harness Side:



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E7-18 (SLP) - E51-4 (SLP1)	Always	Below 1 Ω
IR-9 (LIN1) - E51-5 (LIN)	Always	Below 1 Ω
E7-18 (SLP) or E51-4 (SLP1) - Body ground	Always	10 kΩ or higher
IR-9 (LIN1) or E51-5 (LIN) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

ST

4	CHECK MAIN BODY ECU OPERATION

(a) After replacing the main body ECU with a normally functioning ECU, check the power source mode change.
  (1) When the key is inside the vehicle, the brake pedal is depressed and the shift lever is in P, check that pressing the power switch causes the power source mode to change to on (READY).
  OK:
  Power switch on (READY).

NG → **REPLACE STEERING LOCK ECU**

OK

END (MAIN BODY ECU DEFECTIVE)

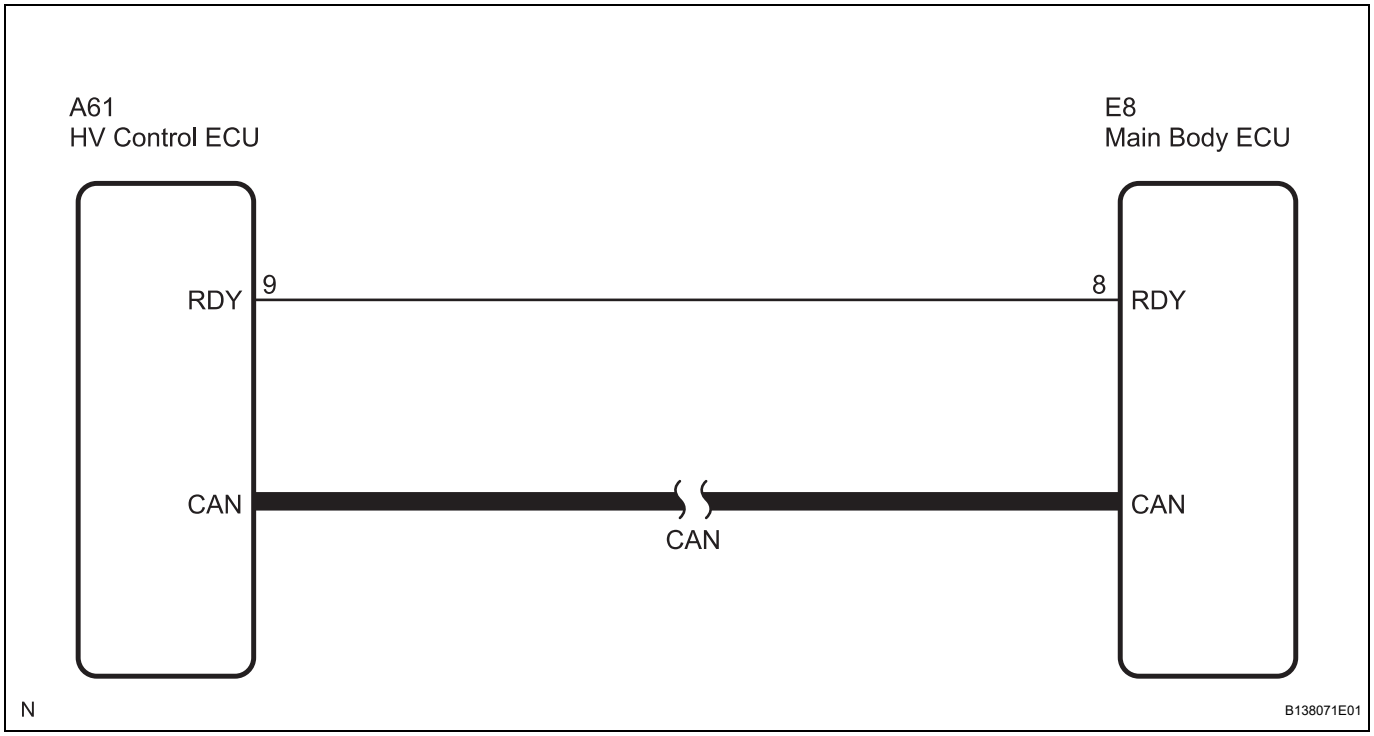
DTC	B2286	Runnable Signal Malfunction

DESCRIPTION

This DTC is output when serial communication signals and CAN communication signals in the circuit between the main body ECU and HV control ECU are inconsistent.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2286	Serial communication signals and CAN communication signals in the circuit between the main body ECU and HV control ECU are inconsistent.	• CAN communication system • HV control ECU • Main body ECU • Wire harness or connector

WIRING DIAGRAM



ST

INSPECTION PROCEDURE

1	CHECK DTC OUTPUT (CAN COMMUNICATION SYSTEM)

(a) Delete the DTCs (See page ST-21).
(b) Check for the CAN communication system DTC U0146.
HINT:
If the DTCs for the CAN communication system malfunction are output, inspect those DTCs first (See page CA-7).

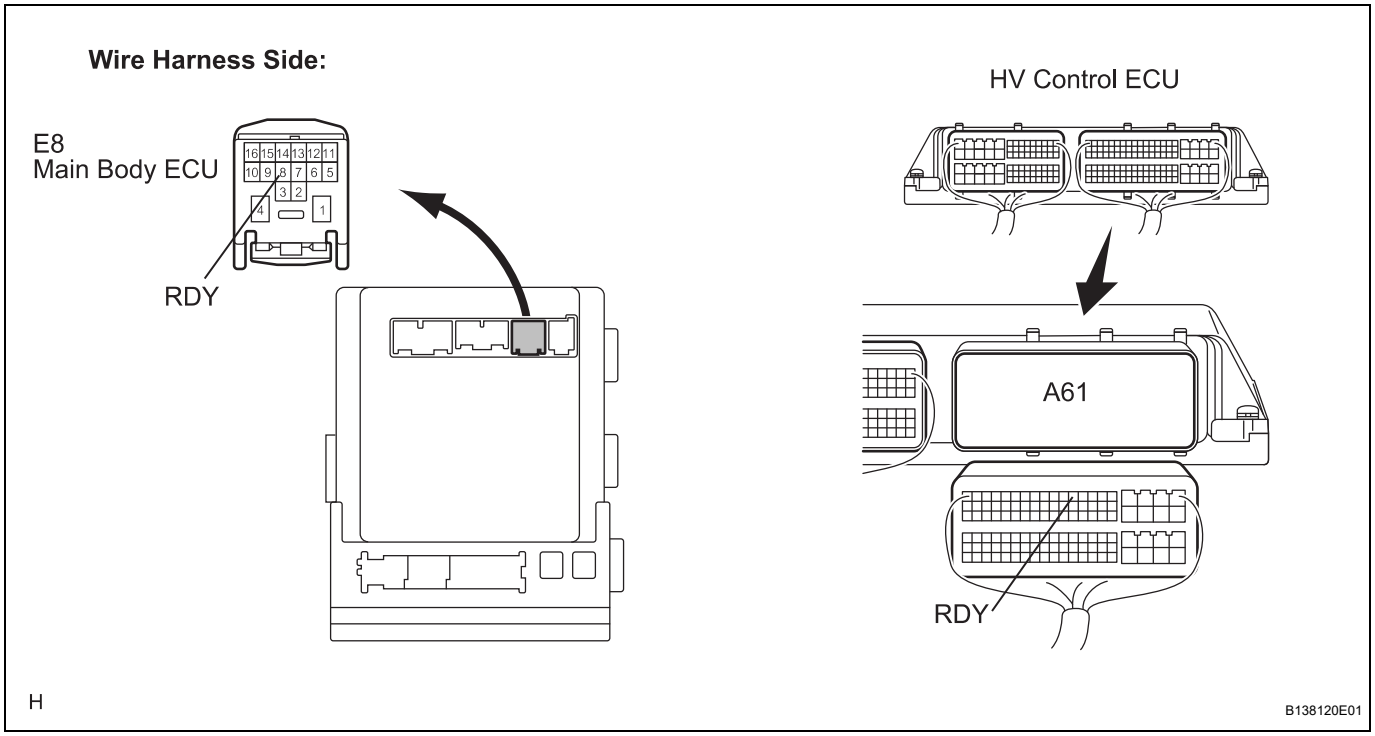
OK:
No DTC is output.

NG → **GO TO CAN COMMUNICATION SYSTEM**

OK

2 CHECK WIRE HARNESS (MAIN BODY ECU - ECM)

(a) Disconnect the A61 ECU connector.



(b) Disconnect the E8 ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E8-8 (RDY) - A61-9 (RDY)	Always	Below 1 Ω
E8-8 (RDY) or A61-9 (RDY) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 READ VALUE OF INTELLIGENT TESTER

(a) Reconnect the connectors.
(b) Connect the intelligent tester to the DLC3.
(c) Check the DATA LIST for proper functioning of the HV control system on (READY).

ST

HINT:
When using the intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
READY SIG	HV control system on (READY)/ ON or OFF	ON: System is on (READY) OFF: System is off	-

OK:
OFF (system is off) and ON (system is on (READY)) appear on the screen.

NG → **REPLACE HYBRID VEHICLE CONTROL ECU**

OK

REPLACE MAIN BODY ECU

DTC	B2287	LIN Communication Master Malfunction

DESCRIPTION

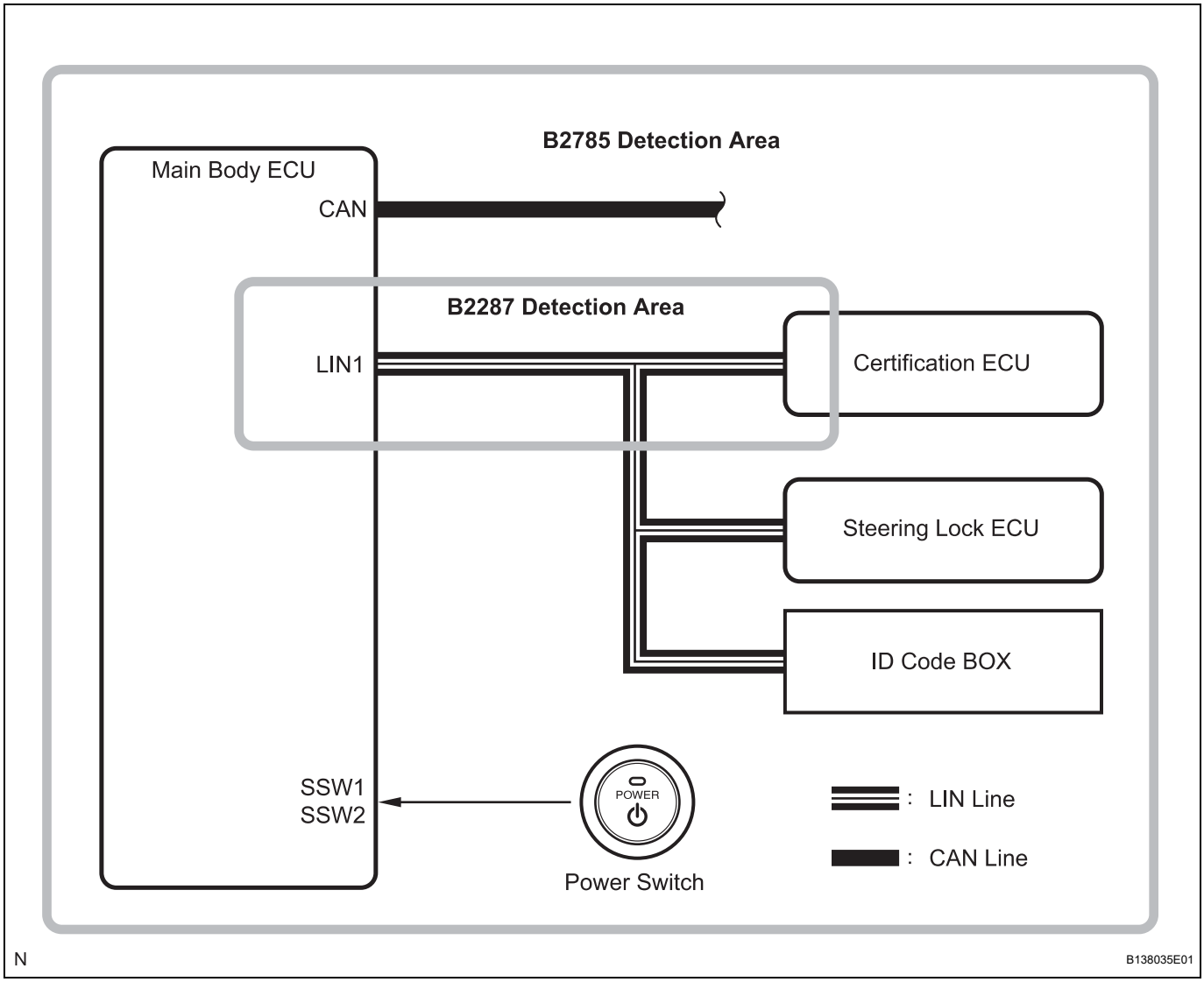
This DTC is output when there is a LIN communication problem between the main body ECU and certification ECU.

HINT:

When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.

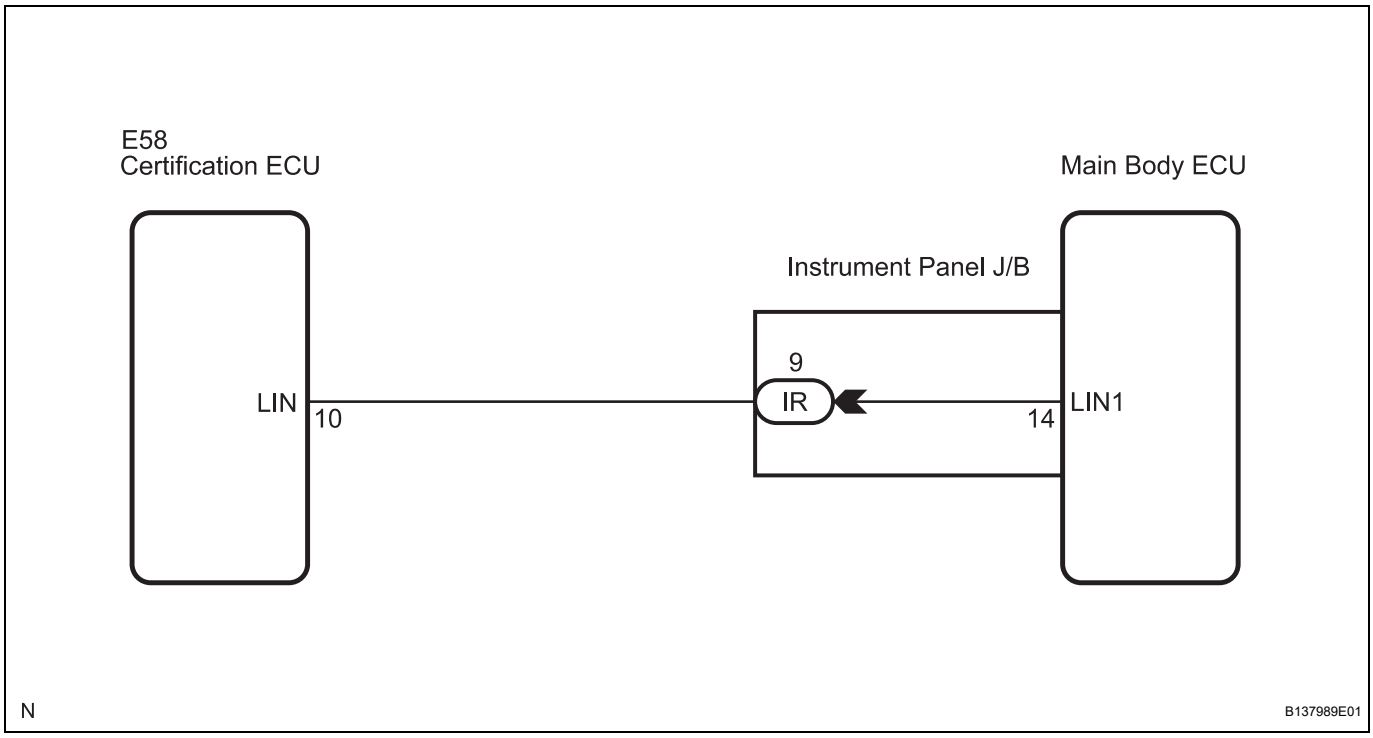
After the main body ECU or certification ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2287	Communication or communication line is abnormal between the main body ECU and the certification ECU	• Main body ECU • Certification ECU • Wire harness or connector



ST

WIRING DIAGRAM



INSPECTION PROCEDURE

ST

1	CHECK FOR DTCS

(a) Delete the DTCs (See page ST-21).
(b) Check for DTC B2287 and B2785.

Result

Display (DTC output)	Proceed to
"DTC B2287" only	A
"DTC B2287" and "DTC B2785"	B
No DTC	C

HINT:
If DTC B2785 is output, perform troubleshooting for DTC B2785 first (See page EI-30).

B → GO TO DTC B2785

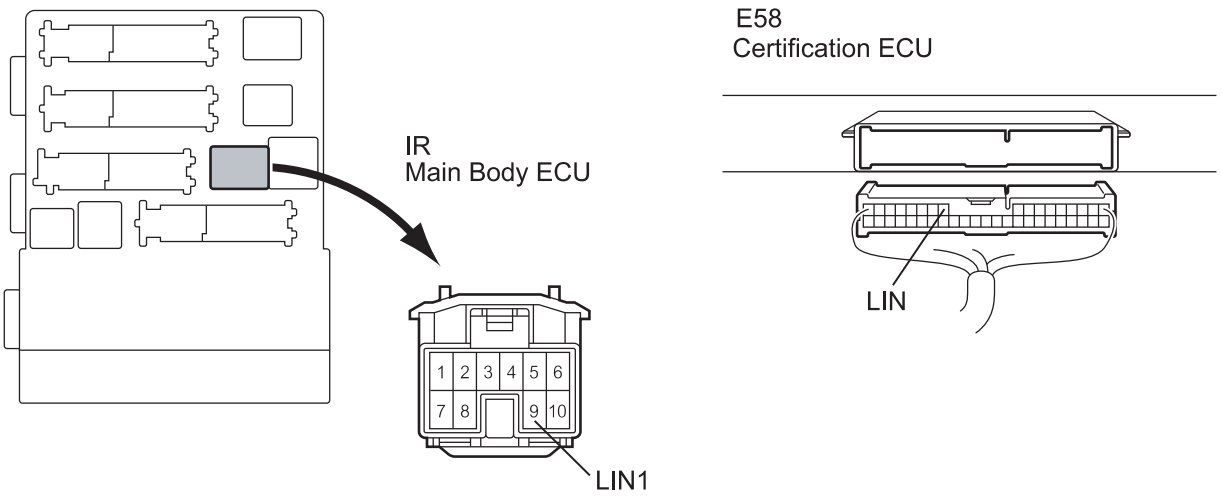
C → CHECK INTERMITTENT PROBLEMS

A

2	CHECK WIRE HARNESS (MAIN BODY ECU - CERTIFICATION ECU)

(a) Disconnect the E58 and IR ECU connectors.

Wire Harness Side:



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
IR-9 (LIN1) - E58-10 (LIN)	Always	Below 1 Ω
IR-9 (LIN1) or E58-10 (LIN) - Body ground	Always	10 kΩ or higher

ST

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK MAIN BODY ECU OPERATION

(a) After replacing the main body ECU with a normally functioning ECU, check the power source mode change.
(1) When the key is inside the vehicle, the brake pedal is depressed and the shift lever is in P, check that pressing the power switch causes the power source mode to change to on (READY).

OK:

Power switch on (READY).

NG → **REPLACE CERTIFICATION ECU**

OK

END (MAIN BODY ECU DEFECTIVE)

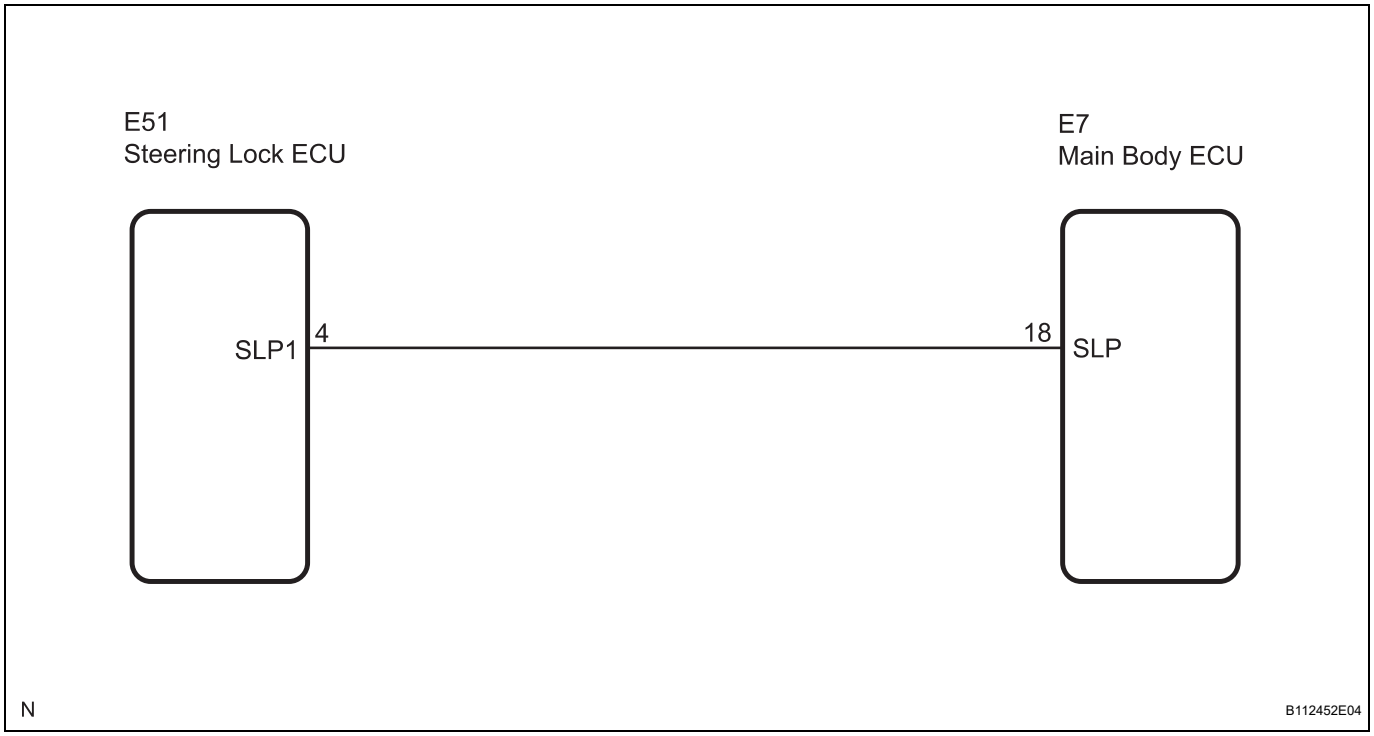
DTC	B2288	Steering Lock Signal Circuit Malfunction

DESCRIPTION

This DTC is output when the main body ECU cannot detect the unlock condition of the steering lock within a specified time.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2288	After turning power switch from off to on (IG), the steering wheel does not unlock for a certain period of time (ECU unlocks steering wheel only when it receives an unlock signal from LIN communication and cable)	• Main body ECU • Steering lock ECU • Wire harness or connector

WIRING DIAGRAM



ST

INSPECTION PROCEDURE

1	CHECK FOR DTCS

(a) Delete the DTCs (See page ST-21).
(b) After all DTCs are cleared, check if the trouble occurs again 5 seconds after the power switch is turned on (IG).
(c) Check for DTCs again.
OK:
DTC B2287, DTC B2781 and DTC B2785 are not output.

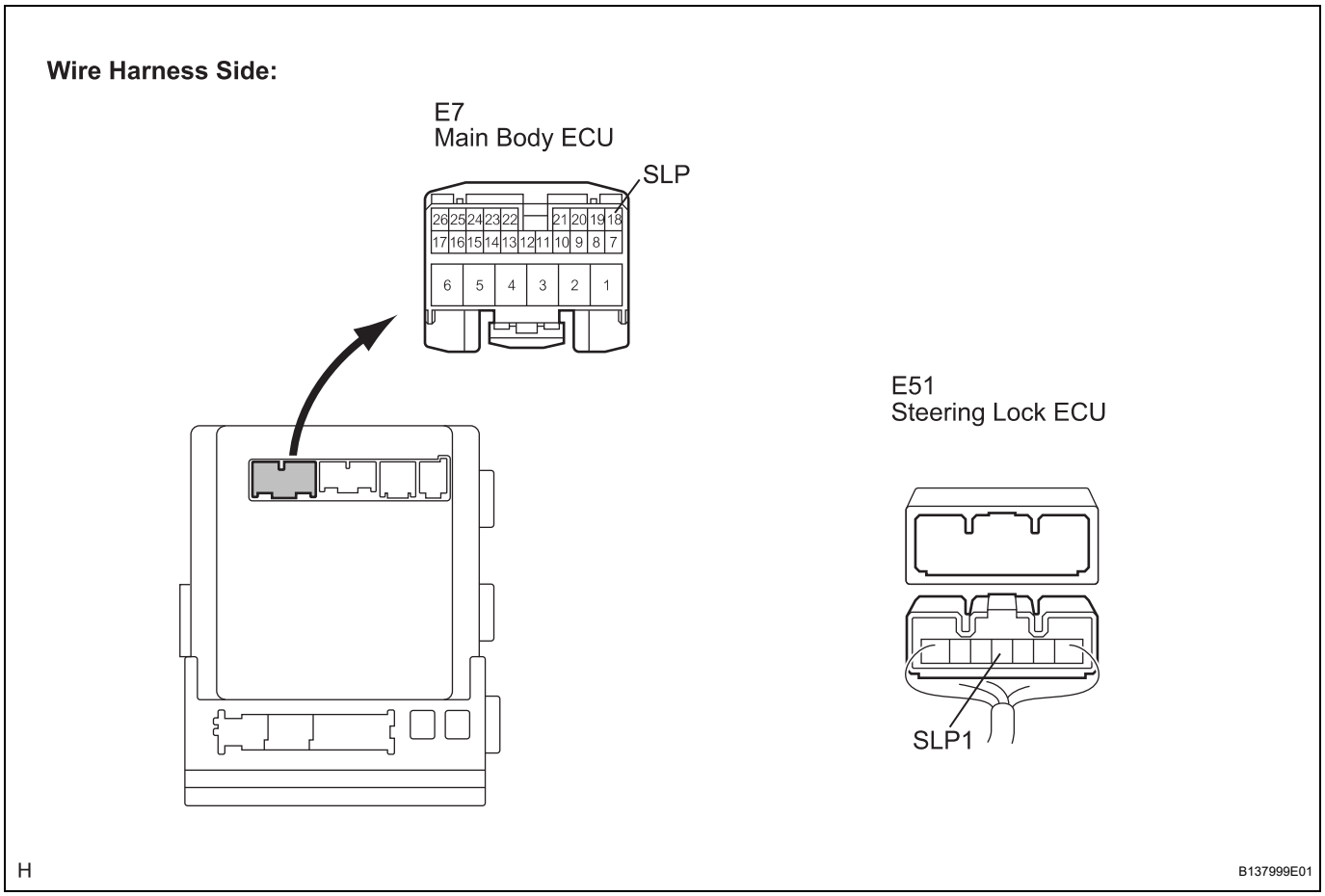
HINT:
- If DTC B2271 is output (See page ST-26).
- If DTC B2287 is output (See page ST-77).
- If DTC B2785 is output (See page EI-30).

NG → **GO TO DTC CHART**

OK

2	CHECK WIRE HARNESS (MAIN BODY ECU - STEERING LOCK ECU)

(a) Disconnect the E7 and E51 ECU connectors



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E7-18 (SLP) - E51-4 (SLP1)	Always	Below 1 Ω
E7-18 (SLP) or E51-4 (SLP1) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK MAIN BODY ECU OPERATION

(a) After replacing the main body ECU with a normally functioning ECU, check that the steering lock/unlock function operates normally.
OK:
Steering lock/unlock function operates normally.
HINT:
If steering lock/unlock function does not operate, refer to PROBLEM SYMPTOMS TABLE of the electrical steering lock (steering wheel cannot be unlocked) (See page SR-10).

NG → **GO TO ELECTRIC STEERING LOCK**

OK

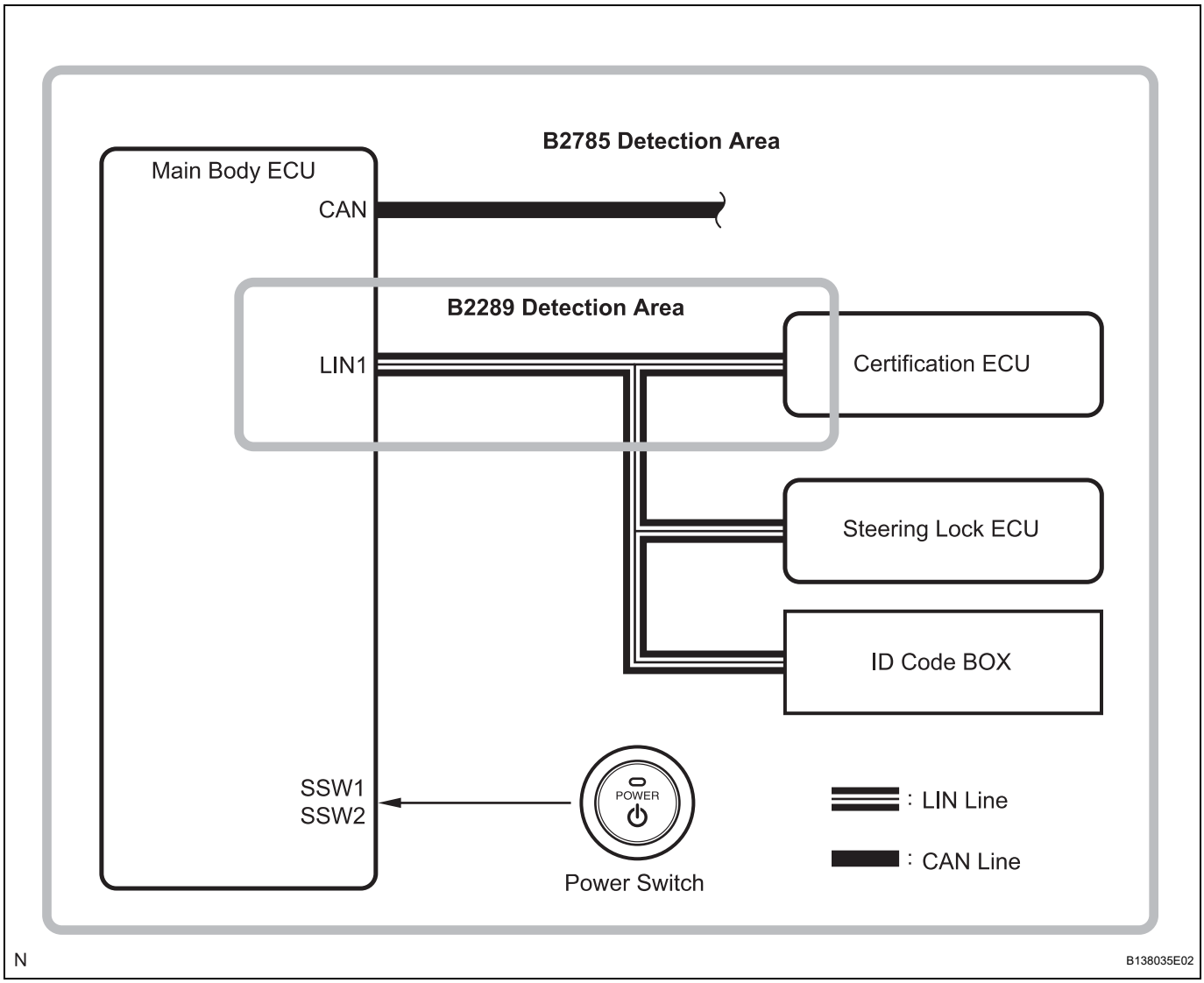
END (MAIN BODY ECU DEFECTIVE)

DTC	B2289	Key Collation Waiting Time Over

DESCRIPTION

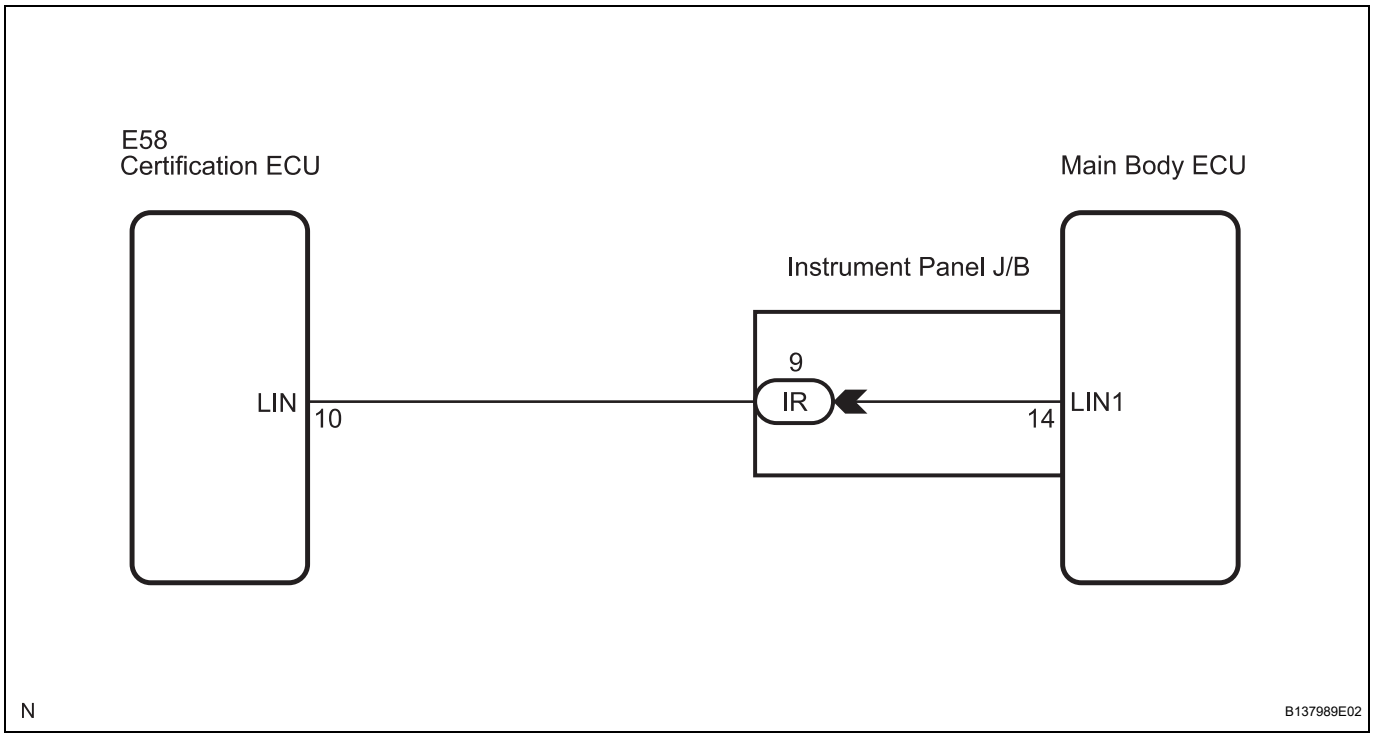
This DTC is output when there is a LIN communication problem between the main body ECU and certification ECU or when there is a problem in the engine immobiliser system.
HINT:
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

DTC No.	DTC Detection Condition	Trouble Area
B2289	Either condition below is met: • Cable and CAN are abnormal between the main body ECU and the engine immobiliser system • The engine immobiliser system is malfunctioning	• Main body ECU • Engine immobiliser system • Wire harness or connector • Certification ECU



ST

WIRING DIAGRAM



INSPECTION PROCEDURE

ST

1	CHECK FOR DTCS

(a) Delete the DTCs (See page ST-21).
(b) Check for DTC B2289 and B2785.

Result

Display (DTC output)	Proceed to
"DTC B2289" only	A
"DTC B2785" only	B
No DTC	C

HINT:
If DTC B2785 is output, perform troubleshooting for DTC B2785 first (See page EI-30).

B → **GO TO DTC B2785**

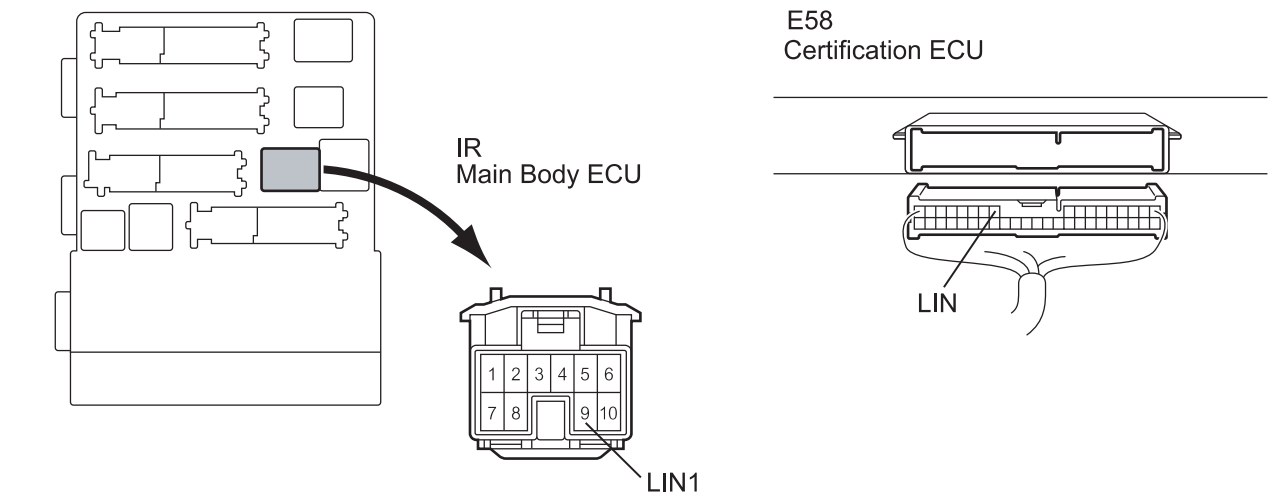
C → **CHECK INTERMITTENT PROBLEMS**

A

2	CHECK WIRE HARNESS (MAIN BODY ECU - CERTIFICATION ECU)

(a) Disconnect the E58 and IR ECU connectors.

Wire Harness Side:



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
IR-9 (LIN1) - E58-10 (LIN)	Always	Below 1 Ω
IR-9 (LIN1) or E58-10 (LIN) - Body ground	Always	10 kΩ or higher

ST

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK MAIN BODY ECU OPERATION

(a) After replacing the main body ECU with a normally functioning ECU, check that the power source mode to change on (READY).

OK:

Power switch on (READY).

HINT:

If power mode change to on (READY), refer to PROBLEM SYMPTOMS TABLE of the smart key system (entry) (matching for the inside of the cabin cannot be performed) (See page DL-121).

NG → **GO TO SMART KEY SYSTEM (ENTRY)**

OK

END (MAIN BODY ECU DEFECTIVE)

Power Switch Indicator Circuit

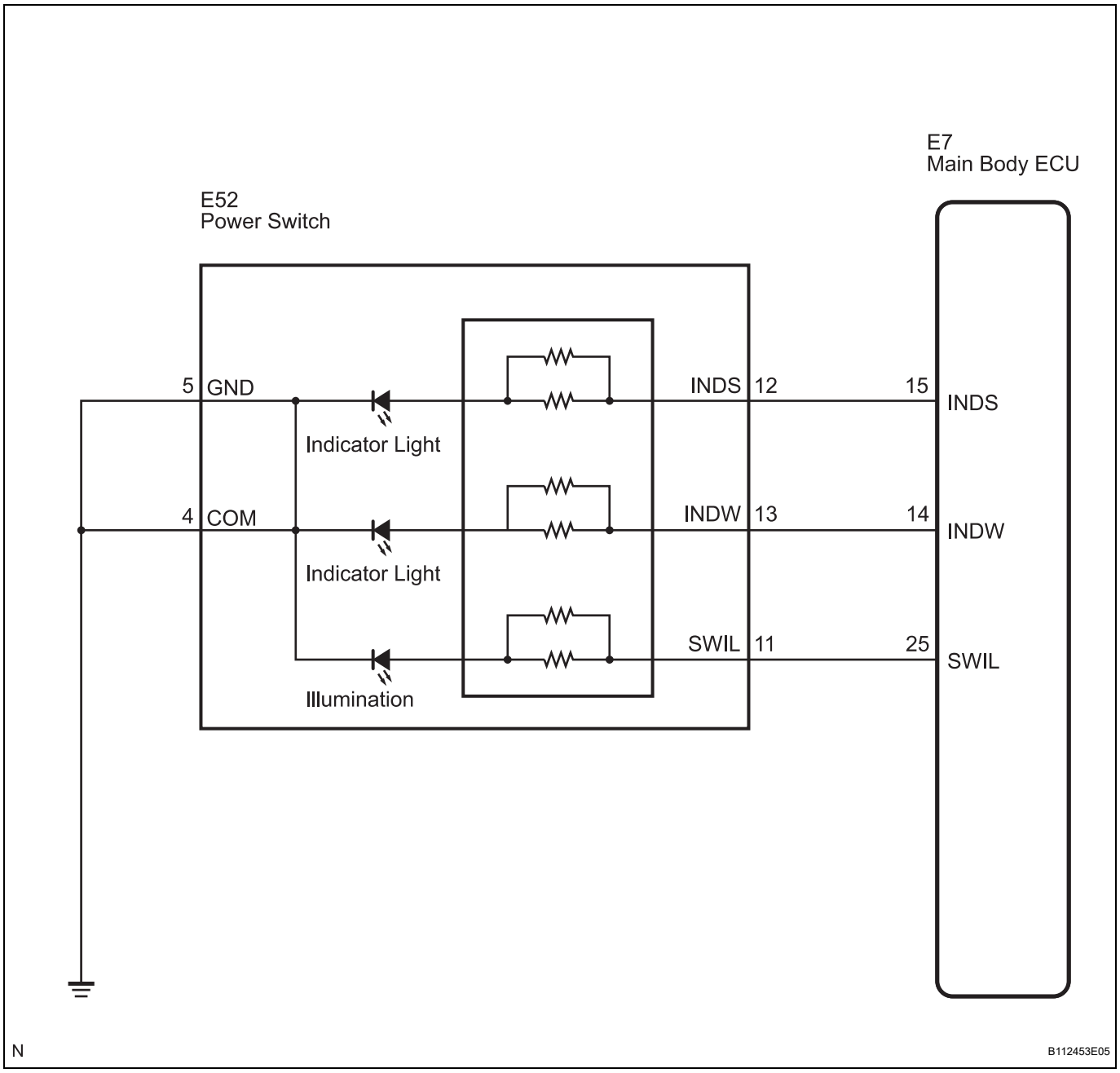
DESCRIPTION

HV control system on (READY) conditions or system malfunctions can be checked by the status of the power switch indicator light.

Power switch indicator light condition:

Power Source Mode/Condition	Indicator Light Condition	
	Brake pedal released	Brake pedal depressed, shift lever in P
off	OFF	ON (Green) (When key and vehicle IDs match)
on (ACC, IG)	ON (Amber)	ON (Green)
HV control system on (READY)	OFF	OFF
Steering lock not unlocked	Flashes (Green) for 15 sec.	Flashes (Green) for 15 sec.
System malfunction	Flashes (Amber) for 15 sec.	Flashes (Amber) for 15 sec.

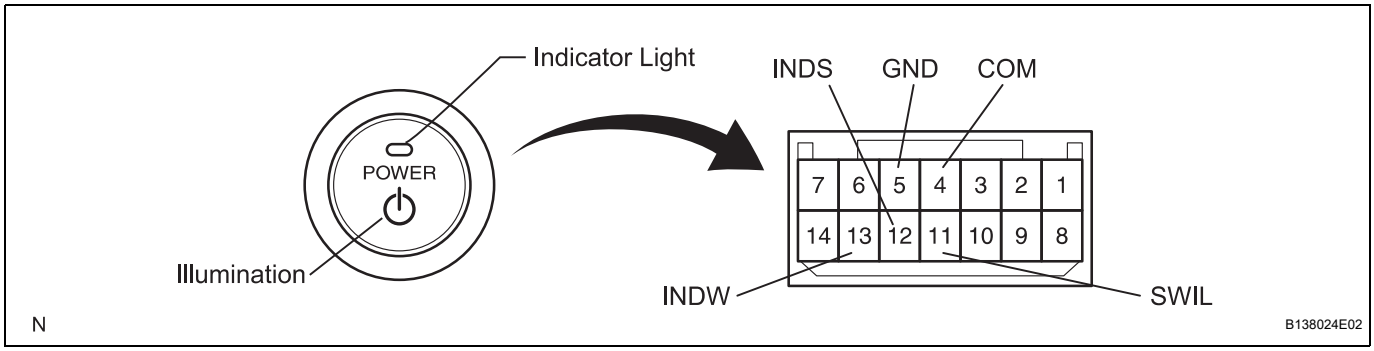
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**INSPECT POWER SWITCH**

(a) Remove the power switch.



(b) Apply battery voltage between the terminals of the switch, and check the illumination condition of the switch.

NOTICE:

- **If the positive (+) lead and the negative (-) lead are incorrectly connected, the power switch indicator will not illuminate.**
- **If the voltage is too low, the indicator will not illuminate.**

OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 11 (SWIL) Battery negative (-) → Terminal 4 (COM) or 5 (GND)	Illuminates
Battery positive (+) → Terminal 12 (INDS) Battery negative (-) → Terminal 4 (COM) or 5 (GND)	Illuminates
Battery positive (+) → Terminal 13 (INDW) Battery negative (-) → Terminal 4 (COM) or 5 (GND)	Illuminates

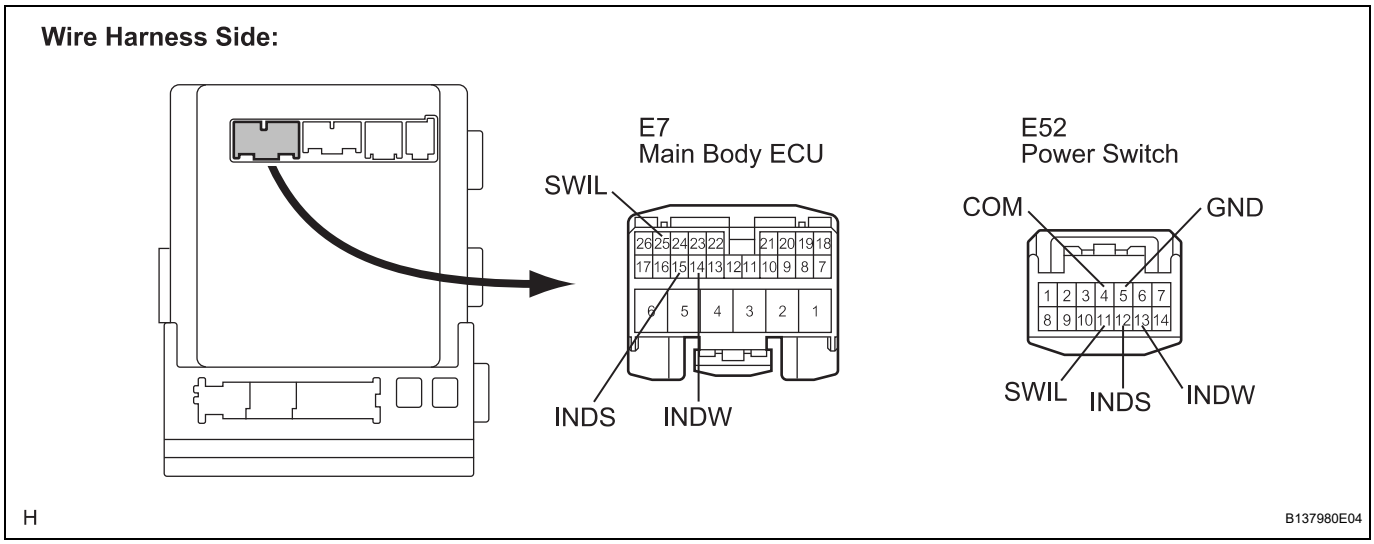
ST

NG → **REPLACE POWER SWITCH**

OK

2 CHECK WIRE HARNESS (POWER SWITCH - MAIN BODY ECU AND BODY GROUND)

(a) Disconnect the E52 switch connector.



(b) Disconnect the E7 ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E52-11 (SWIL) - E7-25 (SWIL)	Always	Below 1 Ω
E52-12 (INDS) - E7-15 (INDS)	Always	Below 1 Ω
E52-13 (INDW) - E7-14 (INDW)	Always	Below 1 Ω
E52-5 (GND) - Body ground	Always	Below 1 Ω
E52-4 (COM) - Body ground	Always	Below 1 Ω
E52-11 (SWIL) or E7-25 (SWIL) - Body ground	Always	10 kΩ or higher
E52-12 (INDS) or E7-15 (INDS) - Body ground	Always	10 kΩ or higher
E52-13 (INDW) or E7-14 (INDW) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MAIN BODY ECU

Power Source Mode does not Change to ON (IG and ACC)

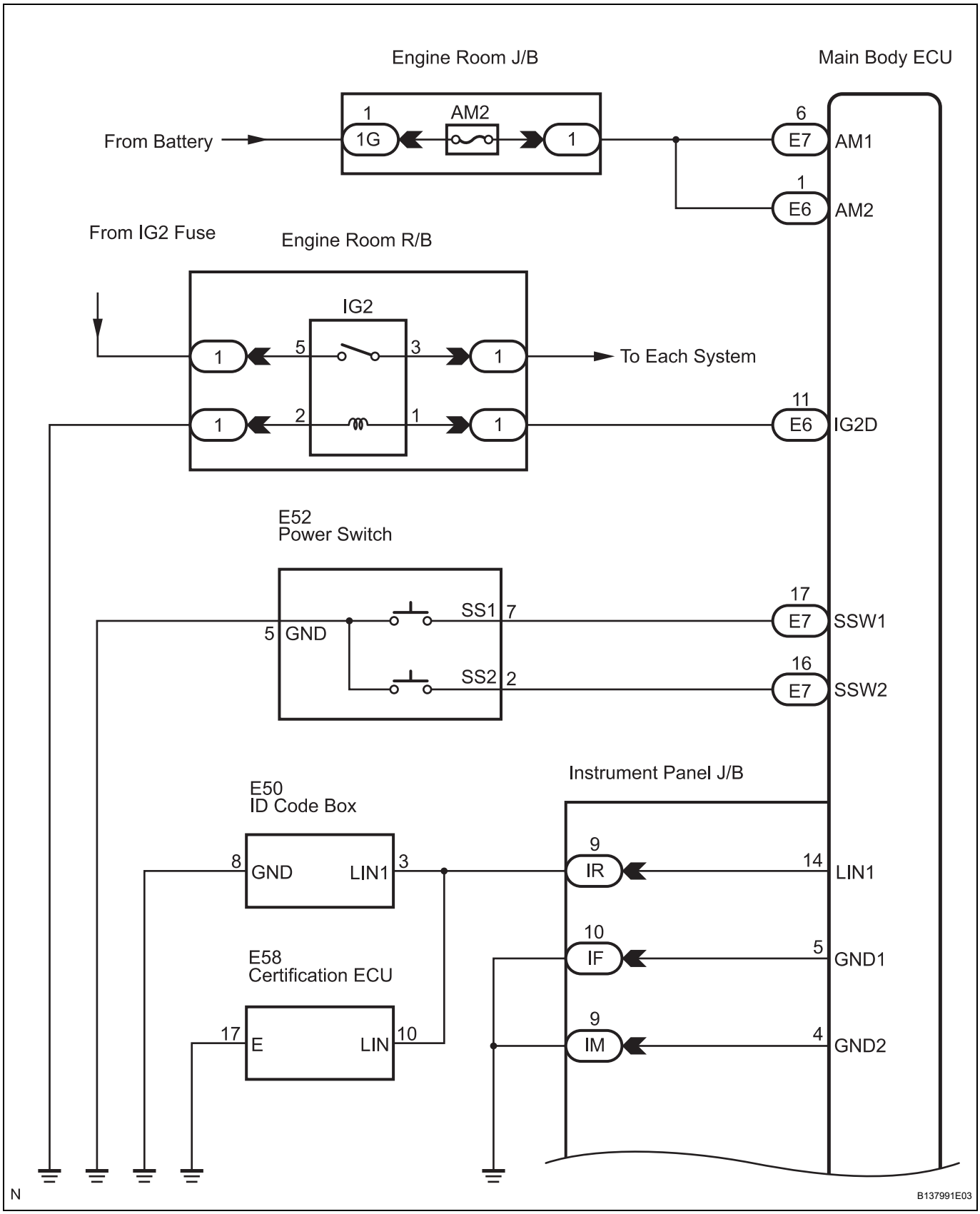
DESCRIPTION

When the power switch is pushed with the electrical key in the cabin, the main body ECU receives signals to switch the power source mode.

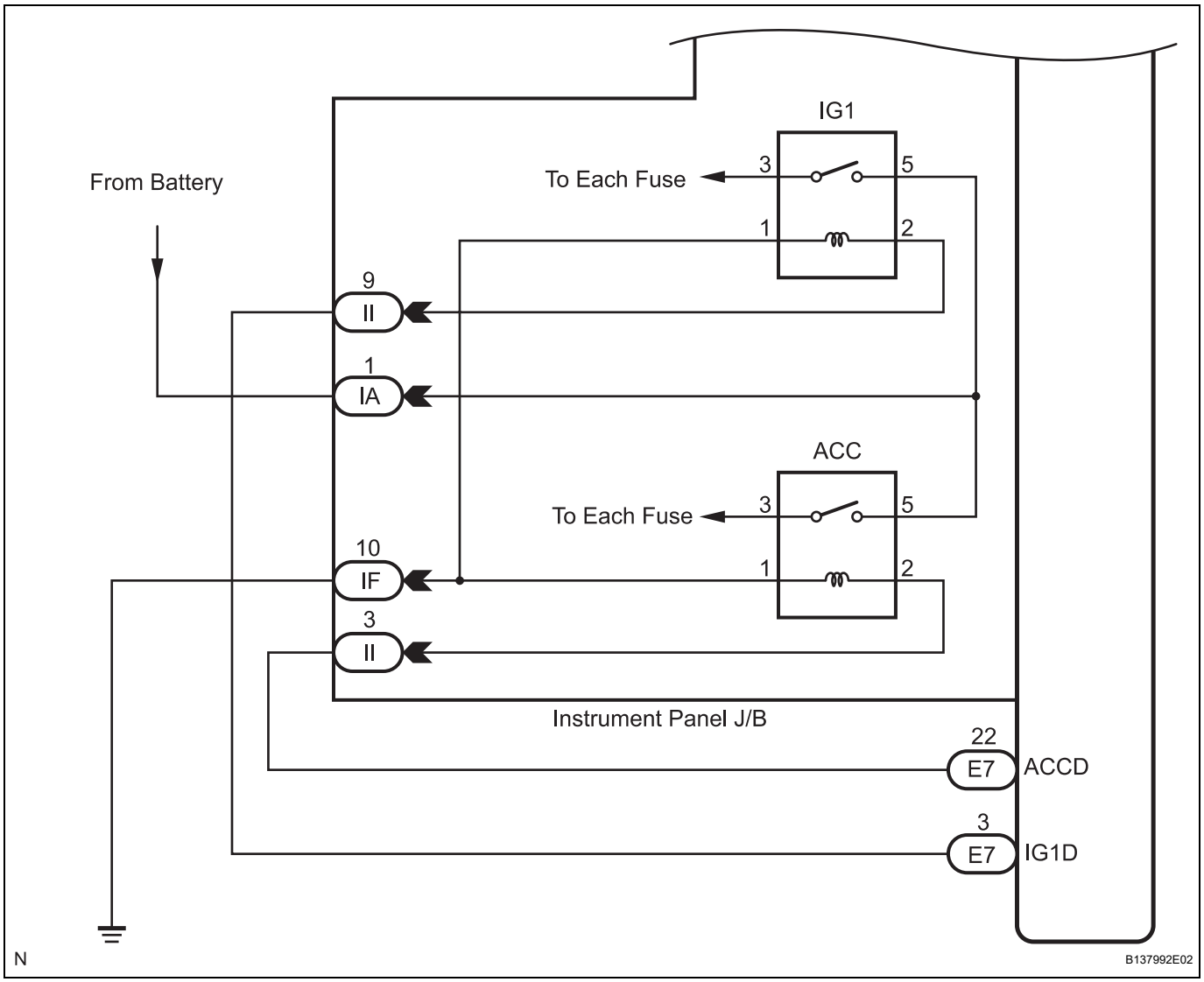
HINT:

To allow use of the intelligent tester to inspect the push-button start function when the power switch is off, repeat opening and closing any of the doors. Opening and closing a door establishes communication between the intelligent tester and the main body ECU. (Opening and closing a door can also be simulated by operating a door courtesy light switch.)

WIRING DIAGRAM

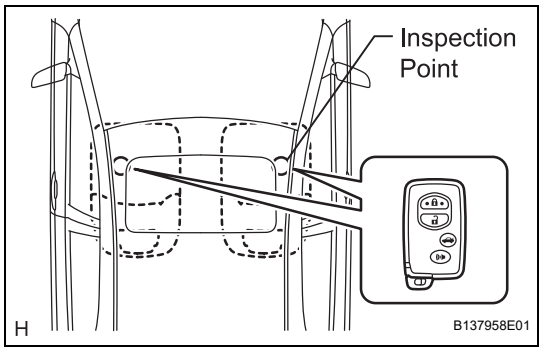


ST



INSPECTION PROCEDURE

1	CHECK ENTRY FUNCTION DETECTION AREA



(a) Inspect entry detection area.

(1) When the electrical key is in either of the 2 inspection points in the illustration, the shift lever is in the P position and brake pedal is depressed, check that the power switch indicator illuminates in green.

OK:

Power switch illuminates in green.

HINT:

- If the power switch does not illuminate, perform troubleshooting according to the PROBLEM SYMPTOMS TABLE of the smart key system (start) (power switch indicator light does not come on) (See page ST-13) and the smart key system (entry) (matching for inside of the cabin cannot be performed) (See page DL-121).

ST

NG → GO TO OTHER PROBLEM

OK

2	INSPECT FUSE (AM2)

(a) Remove the AM2 fuse from the engine room J/B.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → REPLACE FUSE

OK

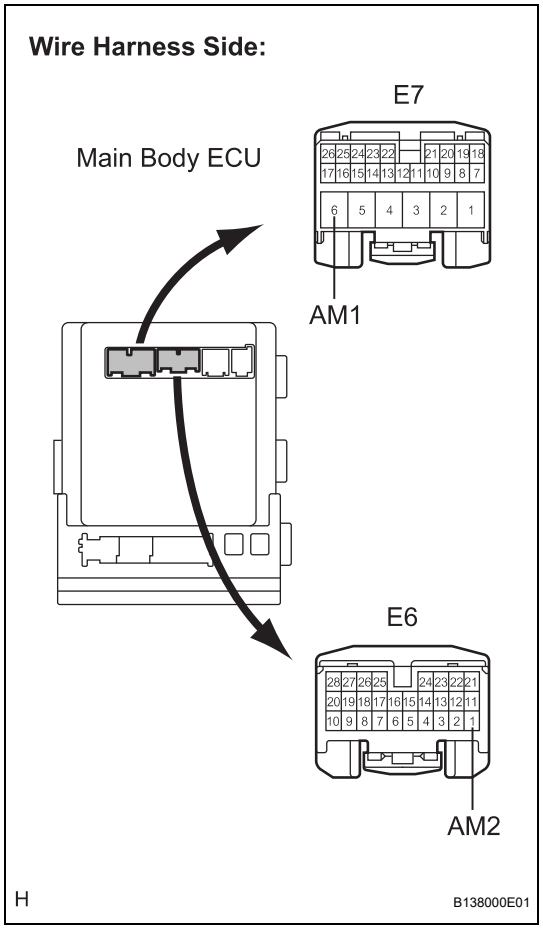
3	CHECK CONNECTORS

(a) Check that the connectors are securely connected and the terminals are not deformed or loose.
OK:
The connectors are securely connected and the terminals are not deformed or loose.

NG → REPAIR OR REPLACE CONNECTORS

OK

4	CHECK WIRE HARNESS (MAIN BODY ECU - BATTERY)



(a) Disconnect the E6 and E7 ECU connectors.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

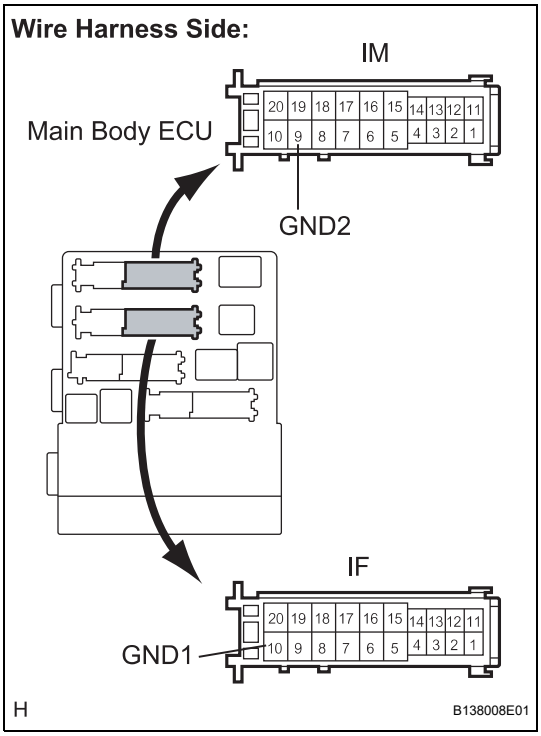
Tester Connection (Symbols)	Condition	Specified Condition
E7-6 (AM1) - Body ground	Always	10 to 14 V
E6-1 (AM2) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

ST

5 CHECK WIRE HARNESS (MAIN BODY ECU - BODY GROUND)



(a) Disconnect the IF and IM ECU connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
IF-10 (GND1) - Body ground	Always	Below 1 Ω
IM-9 (GND2) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

ST

6 CHECK FOR DTCS

(a) Delete the DTCs (See page ST-21).
HINT:
After all the DTCs are cleared, check if the trouble occurs again 5 seconds after the power switch is turned on (IG).
(b) Check for DTCs again.
HINT:
If the DTCs for the smart key system malfunction are output, inspect those DTCs first (See page ST-23).
OK:
No DTC is output.

NG → **GO TO DTC CHART**

OK

7 READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Check the DATA LIST for proper functioning of the start switches 1 and 2.

HINT:
When using the intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
STSW1	Start Switch 1/ON or OFF	ON: Power switch is pushed OFF: Power switch is not pushed	-
START SW2	Start Switch 2/ON or OFF	ON: Power switch is pushed OFF: Power switch is not pushed	-

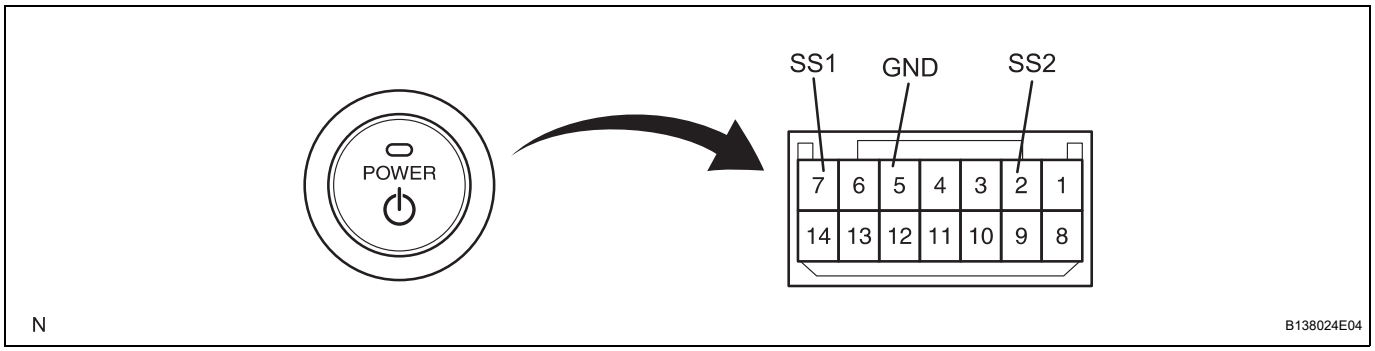
OK:
"ON" (Power switch on (IG)) and "OFF" (Power switch off) appear on the screen.

OK → **REPLACE MAIN BODY ECU**

NG

8 INSPECT POWER SWITCH

(a) Remove the power switch.



(b) Measure the resistance of the switch.
Standard resistance

Tester Connection	Switch Condition	Specified Condition
7 (SS1) - 5 (GND)	Pushed	Below 1 Ω
2 (SS2) - 5 (GND)	Pushed	Below 1 Ω
7 (SS1) - 5 (GND)	Not pushed	10 kΩ or higher
2 (SS2) - 5 (GND)	Not pushed	10 kΩ or higher

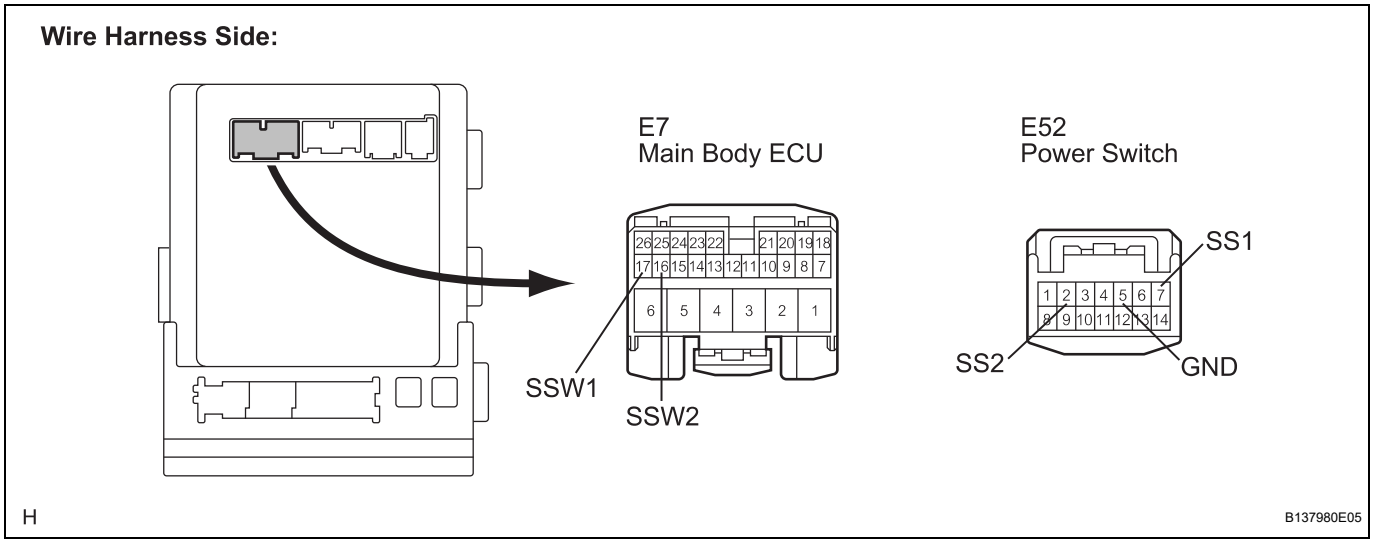
NG → **REPLACE POWER SWITCH**

OK

9 CHECK WIRE HARNESS (MAIN BODY ECU AND BODY GROUND - POWER SWITCH)

(a) Disconnect the E7 ECU connector.

ST



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E52-7 (SS1) - E7-17 (SSW1)	Always	Below 1 Ω
E52-2 (SS2) - E7-16 (SSW2)	Always	Below 1 Ω
E52-5 (GND) - Body ground	Always	Below 1 Ω
E52-7 (SS1) or E7-17 (SSW1) - Body ground	Always	10 kΩ or higher
E52-2 (SS2) or E7-16 (SSW2) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MAIN BODY ECU

ST

Power Source Mode does not Change to ON (IG)

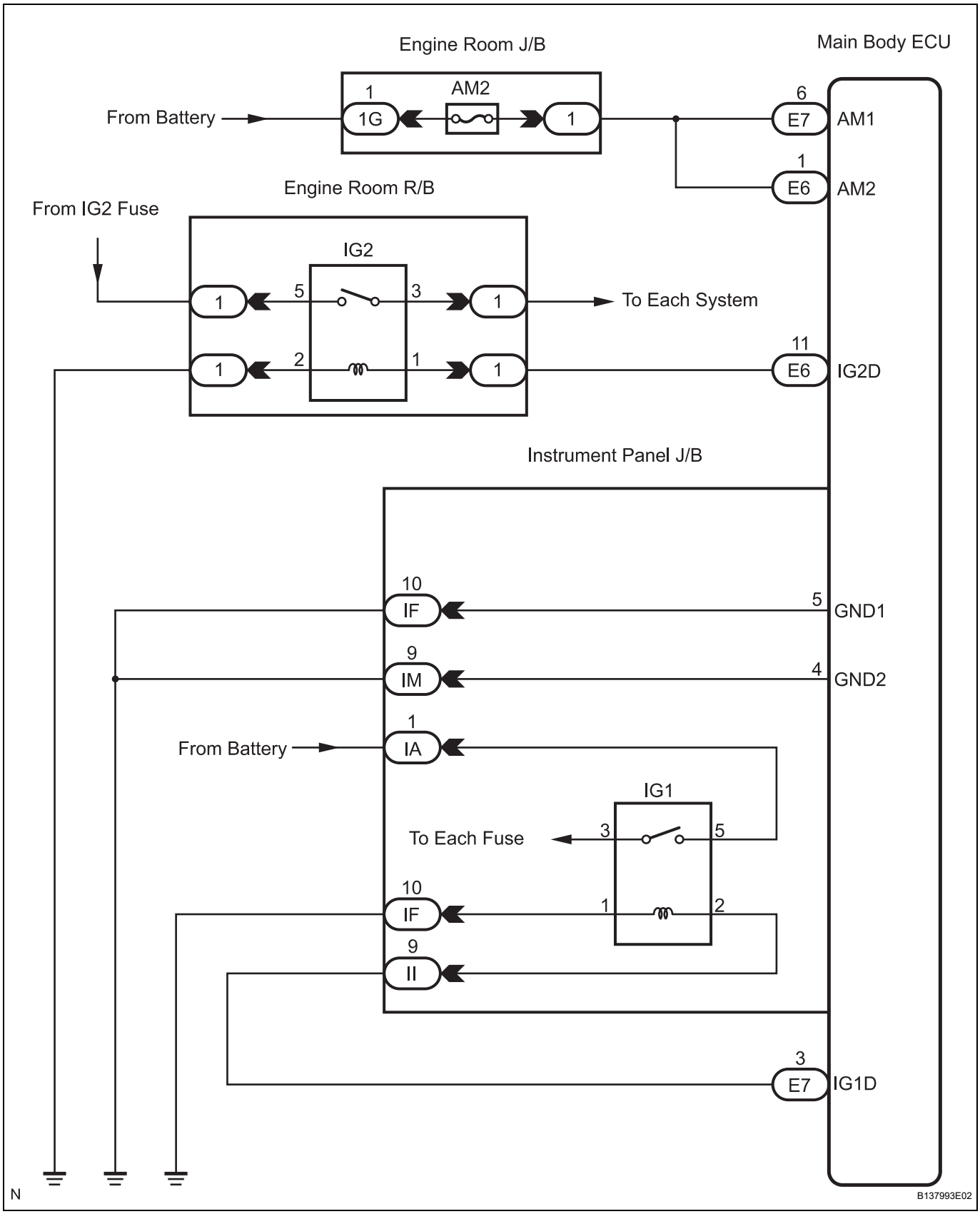
DESCRIPTION

When the power switch is pushed with the electrical key in the cabin, the main body ECU receives signals to switch the power source mode.

HINT:

To allow use of the intelligent tester to inspect the push-button start function when the power switch is off, repeat opening and closing any of the doors. Opening and closing a door establishes communication between the intelligent tester and the main body ECU. (Opening and closing a door can also be simulated by operating a door courtesy light switch.)

WIRING DIAGRAM



ST

INSPECTION PROCEDURE

1	INSPECT FUSE (AM2)

(a) Remove the AM2 fuse from the engine room J/B.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

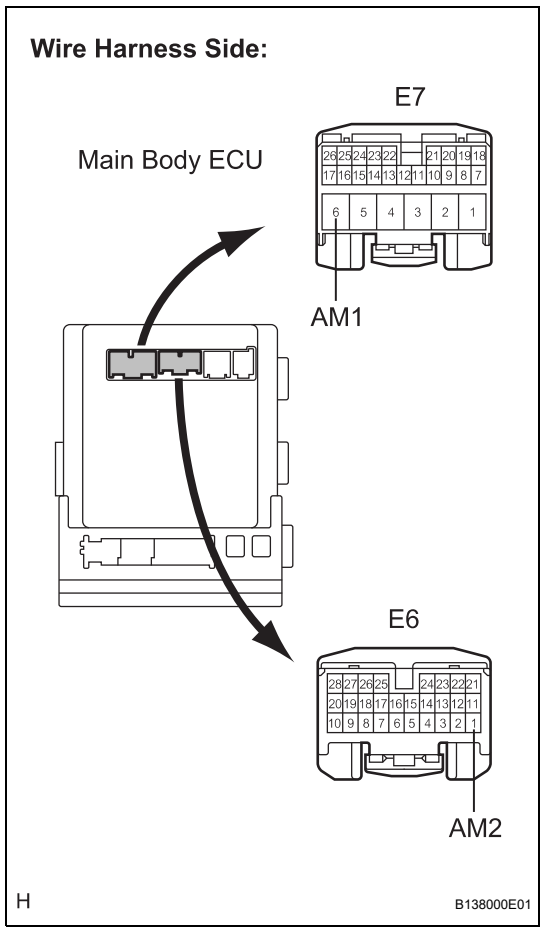
2	CHECK CONNECTORS

(a) Check that the connectors are securely connected and the terminals are not deformed or loose.
OK:
The connectors are securely connected and the terminals are not deformed or loose.

NG → **REPAIR OR REPLACE CONNECTORS**

OK

3	CHECK WIRE HARNESS (MAIN BODY ECU - BATTERY)



(a) Disconnect the E6 and E7 ECU connectors.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

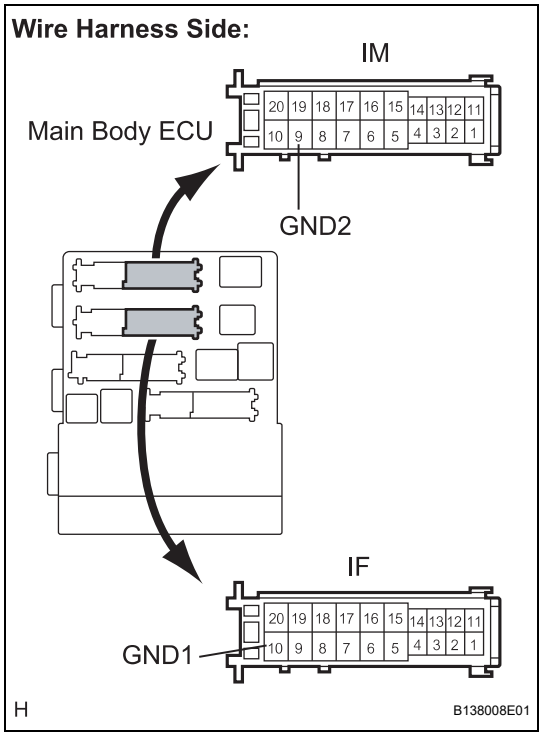
Tester Connection (Symbols)	Condition	Specified Condition
E7-6 (AM1) - Body ground	Always	10 to 14 V
E6-1 (AM2) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

ST

4 CHECK WIRE HARNESS (MAIN BODY ECU - BODY GROUND)



(a) Disconnect the IF and IM ECU connectors.
(b) Measure the resistance according to the value(s) in the table below.

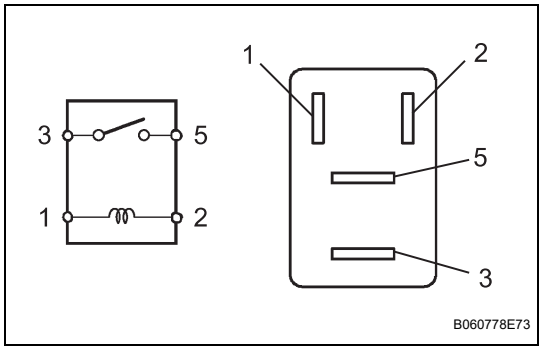
Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
IF-10 (GND1) - Body ground	Always	Below 1 Ω
IM-9 (GND2) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 INSPECT RELAY (IG2 RELAY)



(a) Remove the IG2 relay from the engine room R/B No. 2.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

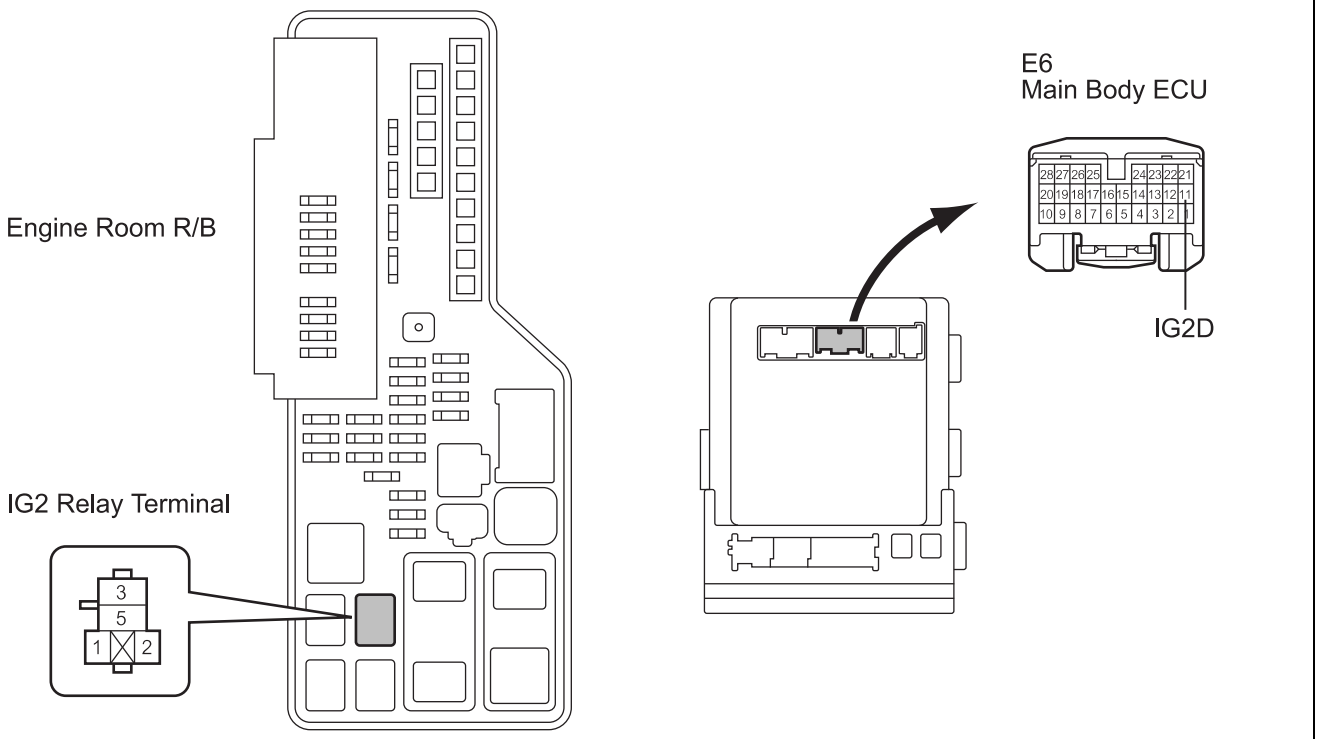
OK

6 CHECK WIRE HARNESS (ENGINE ROOM R/B - MAIN BODY ECU AND BODY GROUND)

(a) Remove the IG2 relay from the engine room R/B.

ST

Wire Harness Side:



ST

(b) Disconnect the E6 ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

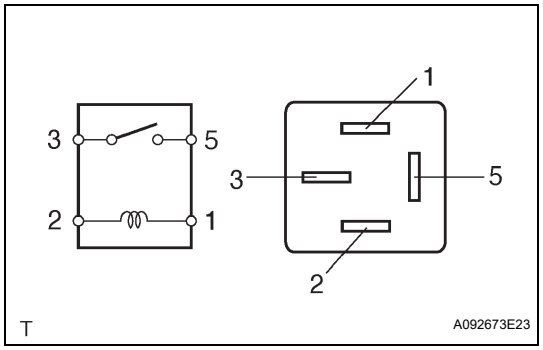
Standard resistance

Terminal No. (Symbol)	Specified Condition
Engine Room R/B IG2 relay terminal 1 - E6-11 (IG2D)	Below 1 Ω
Engine Room R/B IG2 relay terminal 2 - Body ground	Below 1 Ω
E6-11 (IG2D) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

7 INSPECT RELAY (IG1 RELAY)



(a) Remove the IG1 relay from the instrument panel J/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

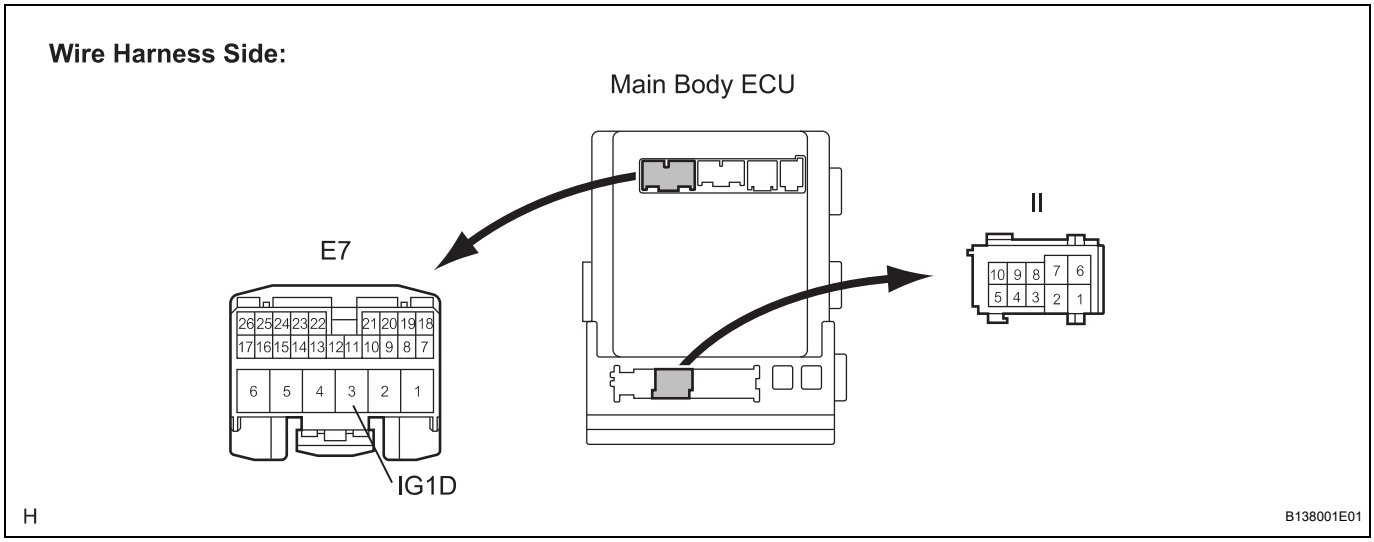
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

8 CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - MAIN BODY ECU)

(a) Disconnect the II J/B connector.



(b) Disconnect the E7 ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

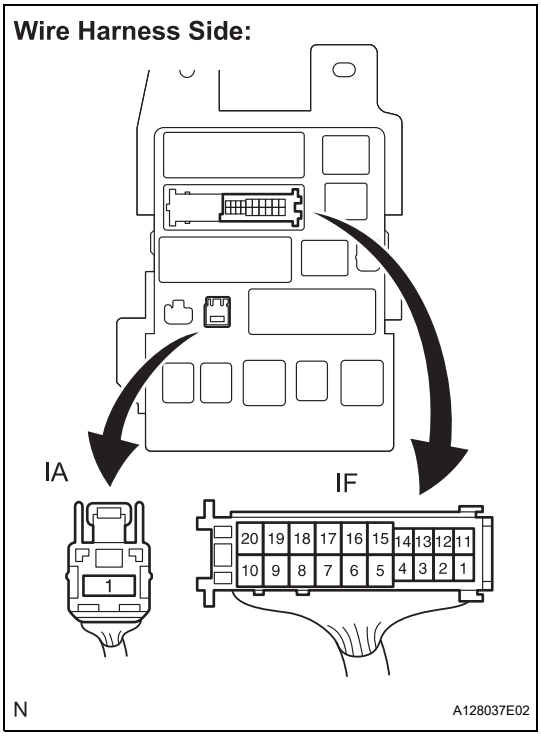
Terminal No. (Symbol)	Condition	Specified Condition
II-9 - E7-3 (IG1D)	Always	Below 1 Ω
E7-3 (IG1D) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

ST

9	CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - BATTERY AND BODY GROUND)



(a) Disconnect the IF and IA J/B connectors.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Terminal No.	Condition	Specified Condition
IF-10 - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

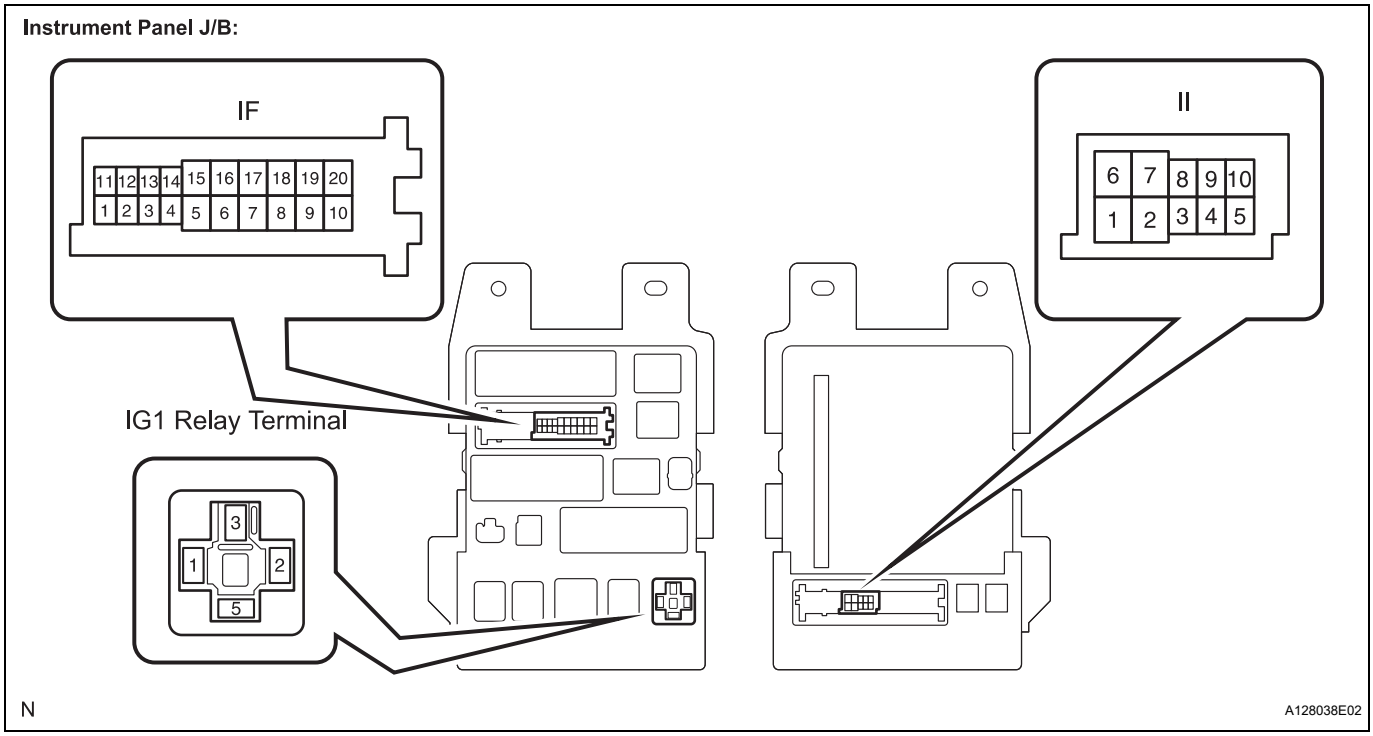
Terminal No.	Condition	Specified Condition
IA-1 - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

10	INSPECT INSTRUMENT PANEL J/B

(a) Measure the resistance according to the value(s) in the table below.



Standard resistance

Terminal No.	Condition	Specified Condition
IF-10 - IG1 relay terminal-1	Always	Below 1 Ω
II-9 - IG1 relay terminal-2	Always	Below 1 Ω
IF-10 - Body ground	Always	10 kΩ or higher
II-9 - Body ground	Always	10 kΩ or higher

OK → REPLACE MAIN BODY ECU

NG

REPLACE INSTRUMENT PANEL J/B

ST

Power Source Mode does not Change to ON (ACC)

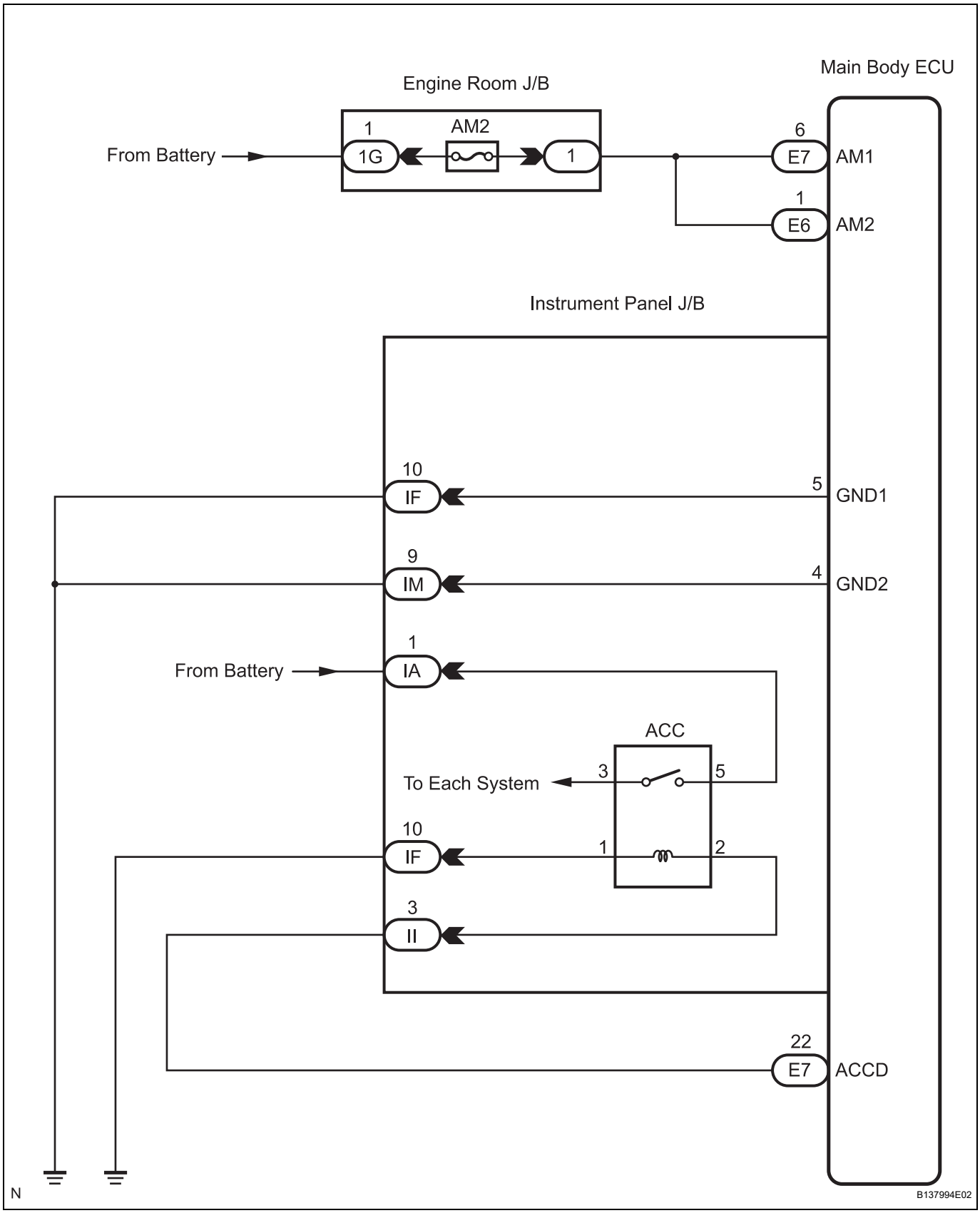
DESCRIPTION

When the power switch is pushed with the electrical key in the cabin, the main body ECU receives signals to switch the power source mode.

HINT:

To allow use of the intelligent tester to inspect the push-button start function when the power switch is off, repeat opening and closing any of the doors. Opening and closing a door establishes communication between the intelligent tester and the main body ECU. (Opening and closing a door can also be simulated by operating a door courtesy light switch.)

WIRING DIAGRAM



ST

INSPECTION PROCEDURE

1	INSPECT FUSE (AM2)

(a) Remove the AM2 fuse from the engine room J/B.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

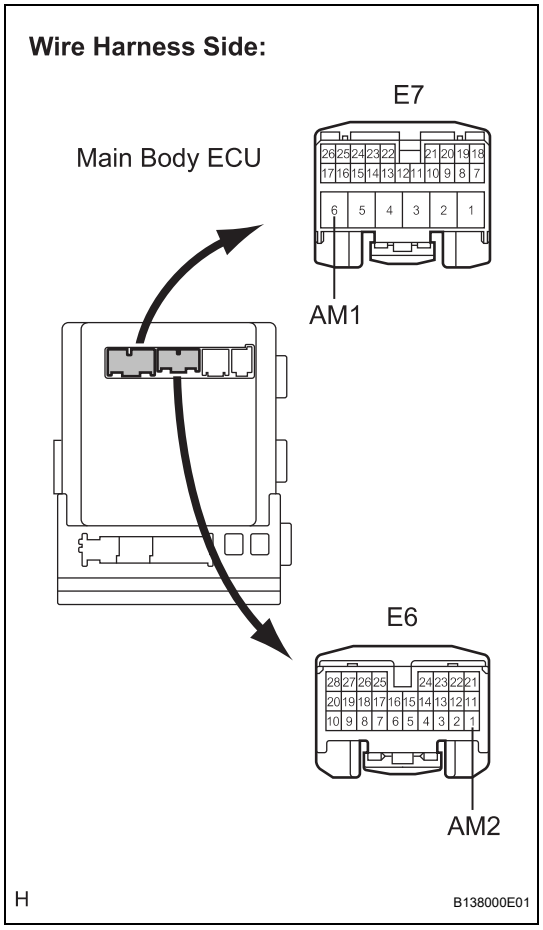
2	CHECK CONNECTORS

(a) Check that the connectors are securely connected and the terminals are not deformed or loose.
OK:
The connectors are securely connected and the terminals are not deformed or loose.

NG → **REPAIR OR REPLACE CONNECTORS**

OK

3	CHECK WIRE HARNESS (MAIN BODY ECU - BATTERY)



(a) Disconnect the E6 and E7 ECU connectors.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

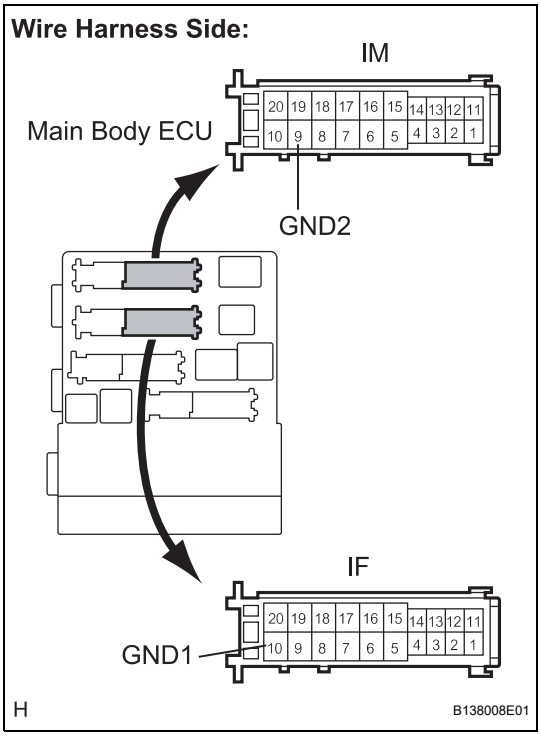
Tester Connection (Symbols)	Condition	Specified Condition
E7-6 (AM1) - Body ground	Always	10 to 14 V
E6-1 (AM2) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

ST

4 CHECK WIRE HARNESS (MAIN BODY ECU - BODY GROUND)



(a) Disconnect the IF and IM ECU connectors.
(b) Measure the resistance according to the value(s) in the table below.

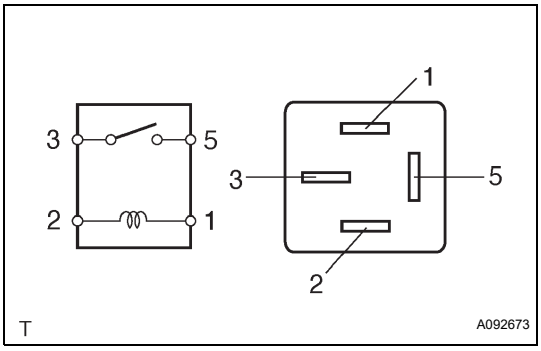
Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
IF-10 (GND1) - Body ground	Always	Below 1 Ω
IM-9 (GND2) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 INSPECT RELAY (ACC RELAY)



(a) Remove the ACC relay from the instrument panel J/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

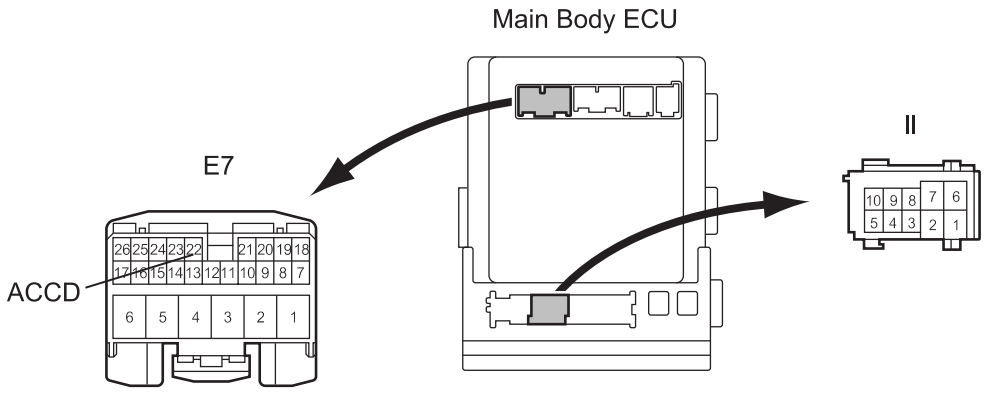
NG → **REPLACE RELAY**

OK

6 CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - MAIN BODY ECU)

(a) Disconnect the E7 ECU connector.

Wire Harness Side:



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(b) Disconnect the II J/B connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

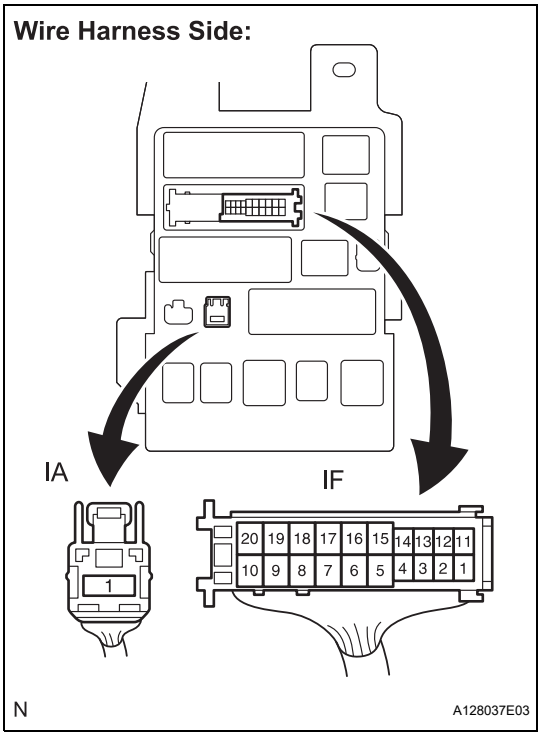
Terminal No. (Symbol)	Condition	Specified Condition
II-3 - E7-22 (ACCD)	Always	Below 1 Ω
E7-22 or II-3 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

ST

7	CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - BATTERY AND BODY GROUND)



(a) Disconnect the IF and IA J/B connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminal No.	Condition	Specified Condition
IF-10 - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

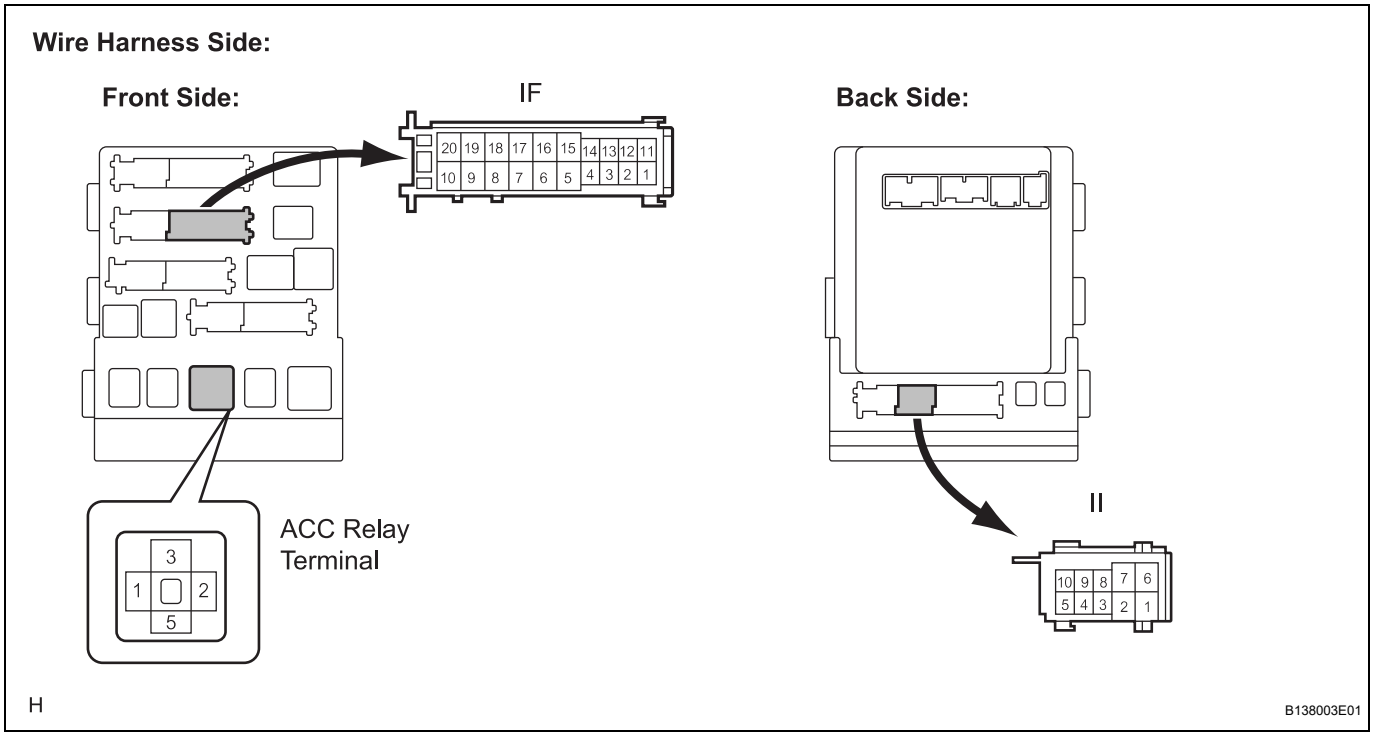
Terminal No.	Condition	Specified Condition
IA-1 - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

8	INSPECT INSTRUMENT PANEL J/B

(a) Measure the resistance according to the value(s) in the table below.



Standard resistance

Terminal No.	Condition	Specified Condition
ACC relay terminal 1 - IF-10	Always	Below 1 Ω
ACC relay terminal 2 - II-3	Always	Below 1 Ω
IF-10 - Body ground	Always	10 kΩ or higher
II-3 - Body ground	Always	10 kΩ or higher

NG → REPLACE INSTRUMENT PANEL J/B

OK

REPLACE MAIN BODY ECU

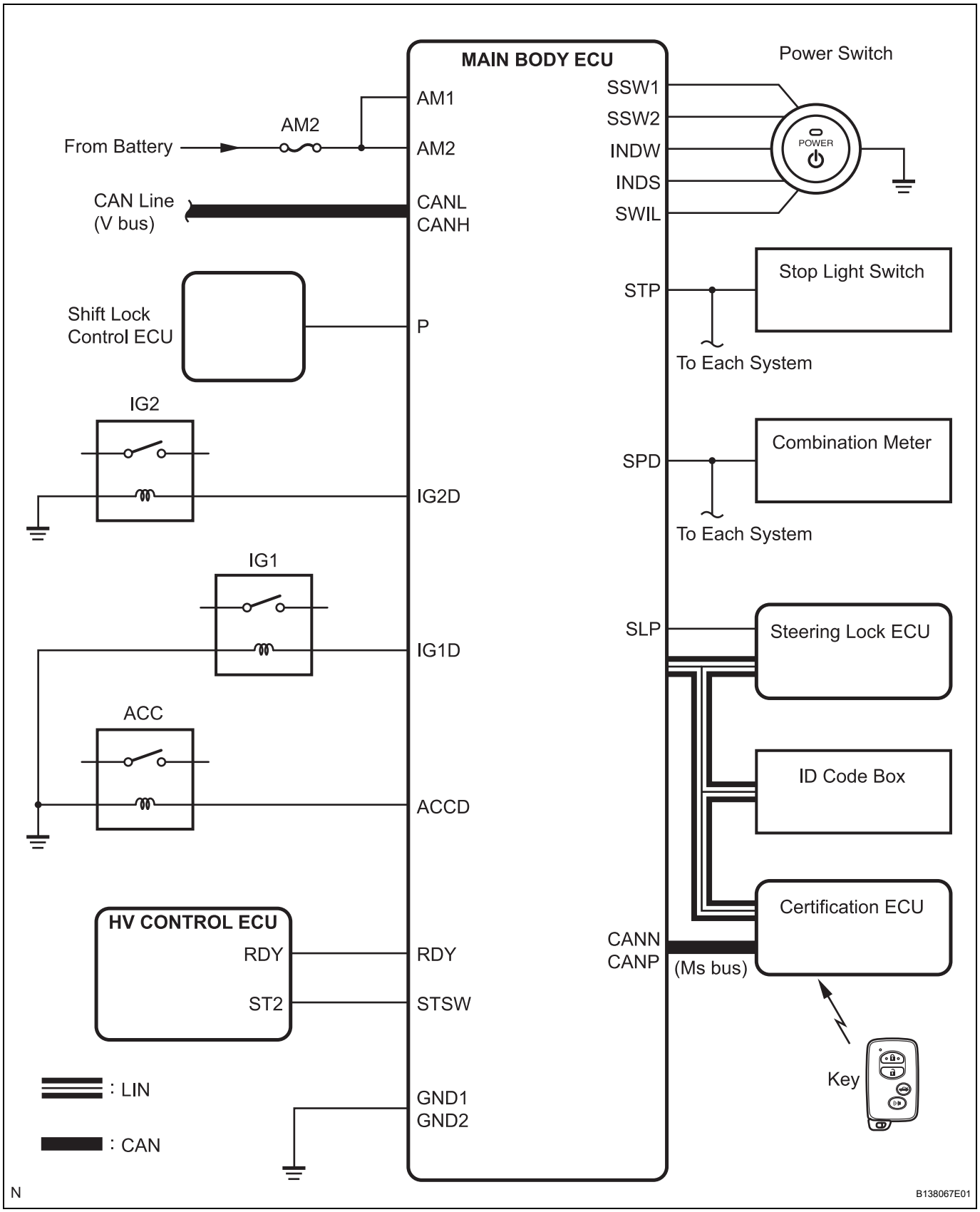
Power Source Mode does not Change to ON (READY)

DESCRIPTION

1. POWER SWITCH ON (READY) FUNCTION

(a) If the power switch is pressed with the shift lever in the P position and the brake pedal depressed, the main body ECU determines that it is a HV control system on (READY) request.
(b) The certification ECU and other ECUs perform key verification via the LIN communication line.
(c) The main body ECU activates the ACC relay.
(d) The main body ECU activates the IG1 and IG2 relays.
(e) The certification ECU outputs a steering UNLOCK signal. The signal is sent to the main body ECU via the steering lock ECU.
(f) The main body ECU sends an on (READY) request signal to the HV control ECU.
(g) When HV control system on (READY) requests signal, the main body ECU determines that the HV control system has been on (READY).
The ECU reactivates turns off the power switch indicator light.

Symbols of main body ECU	Signals
STP	Stop light switch ON signal
SSW1/SSW2	Power switch ON signal
ACCD	ACC relay operation signal
IG1D	IG1 relay operation signal
SLP	Steering lock position signal
IG2D	IG2 relay operation signal
P	Park/neutral position switch signal
RDY	HV control system on (READY) detection signal
STSW	HV control system on (READY) request signal



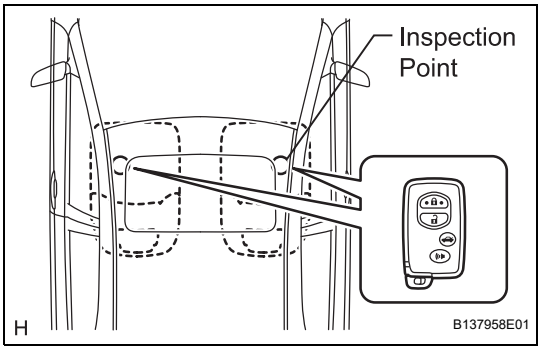
ST

INSPECTION PROCEDURE

HINT:

After the main body ECU, certification ECU, steering lock ECU, ID code box and/or HV control ECU are/is replaced, perform the registration procedures for the engine immobiliser system (See page EI-9).

1	CHECK ENTRY FUNCTION DETECTION AREA



(a) Inspect entry detection area.
(1) When the electrical key is in either of the 2 inspection points in the illustration, the shift lever is in the P position and the brake pedal is depressed, check that the power switch indicator illuminates in green.
OK:
Power switch illuminates in green.
HINT:
If the power switch does not illuminate, perform troubleshooting according to the PROBLEM SYMPTOMS TABLE of the smart key system (starting function) (power switch indicator light does not come on) (See page ST-13) and the smart key system (entry door lock function) (matching for the inside of the cabin cannot be performed) (See page DL-121).

NG → **GO TO OTHER PROBLEM**

OK

2	CHECK IF POWER SWITCH ON (READY) (INITIALIZE STEERING LOCK)

(a) Make sure that the shift lever is in the P position.
(b) Open and close the driver's door with the power switch off. Check if the HV control system can be started.
OK:
HV control system can be started.
HINT:
After the battery is discharged and then recharged, the HV control system may not start unless the steering lock is initialized using the above procedure (See page SR-9).

OK → **END**

NG

3	CHECK FOR DTC

(a) Delete the DTCs (See page ST-21).
(b) Check for DTCs again.
OK:
No DTC is output.
HINT:
- If smart key system (starting function) DTCs are output (See page ST-23).
- If smart key system (entry door lock function) DTCs are output (See page DL-133).

ST

- If electrical steering lock DTCs are output (See page SR-16).
- If engine immobiliser system DTCs are output (See page EI-27).
- If HV control system DTCs are output (See page HV-46).

NG → GO TO DTC CHART

OK

4 CHECK POWER SWITCH CONDITION

(a) Check the power source mode change.
(1) When the key is inside the vehicle and the shift lever is in the P position, check that pressing the power switch causes the power source mode to change as follows:
OK:
off → on (ACC) → on (IG) → off
HINT:
- If power mode does not change to ON (IG and ACC) (See page ST-91).
- If power mode does not change to ON (IG) (See page ST-99).
- If power mode does not change to ON (ACC) (See page ST-108).

NG → GO TO OTHER PROBLEM

OK

5 READ VALUE OF INTELLIGENT TESTER (P SIGNAL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Read the DATA LIST according to the displays on the tester screen.

MAIN BODY:

Item	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
SHIFT P SIG	Shift P signal/ON or OFF	ON: Shift position is P (Power switch on (ACC)) OFF: Shift position is not P (Power switch off)	-

OK:
ON (P signal is ON) and OFF (P signal is OFF) appear on the screen.
HINT:
If the result is not as specified, perform troubleshooting for DTC B2281 first (See page ST-51).

NG → GO TO DTC B2281

OK

6	READ VALUE OF INTELLIGENT TESTER (STOP LIGHT SWITCH)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Check the DATA LIST for proper functioning of the stop light switch.

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
STOP LAMP SW	Stop light Switch/ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-

OK:
ON (brake pedal depressed) and OFF (brake pedal released) appear on the screen.
HINT:
If the result is not as specified, perform troubleshooting for DTC B2284 first (See page ST-65).

NG → **GO TO DTC B2284**

OK

7	READ VALUE OF INTELLIGENT TESTER (STEERING LOCK)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
STR UNLOCK SW	Steering lock condition/ON or OFF	ON: Steering is unlocked (Power switch on (ACC)) OFF: Steering is locked (Power switch off)	-

OK:
ON (steering is unlocked) and OFF (steering is locked) appear on the screen.
HINT:
If the result is not as specified, perform troubleshooting for DTCs B2285 and B2288 first (See page ST-23).

NG → **GO TO DTC B2285 AND B2288**

OK

8	CHECK STEERING LOCK

(a) Check if the steering lock is released when turning the power switch on (ACC).
OK:
The steering lock is released.

ST

NG → GO TO STEERING LOCK SYSTEM

OK

9	READ VALUE OF INTELLIGENT TESTER (L CODE)

(a) Reconnect the connectors.
(b) Connect the intelligent tester to the DLC3.
HINT:
When using intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.
(c) Turn the power switch on (IG).

SMART KEY (Certification ECU):

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
L CODE CHK	L code check/ON or NG	OK: Normal NG: Malfunction	Electrical key in the cabin

OK:
OK is displayed on the screen.
HINT:
If the result is not as specified, there may be a malfunction with the steering lock ECU or the ID code box.

NG → GO TO ENGINE IMMOBILISER SYSTEM

OK

10	READ VALUE OF INTELLIGENT TESTER (ON (READY))

(a) Connect the intelligent tester to the DLC3.
HINT:
When using the intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.
(b) Turn the power switch on (IG).

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
READY SIG	HV control system on (READY) response/ON or OFF	ON: System is on (READY) OFF: System is off	-

OK:
ON and OFF appear on the screen.

NG → REPLACE CERTIFICATION ECU

OK

11	READ VALUE OF INTELLIGENT TESTER (S CODE)

(a) Connect the intelligent tester to the DLC3.
HINT:
When using the intelligent tester with the power switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.
(b) Turn the power switch on (IG).

SMART KEY (Certification ECU):

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
S CODE CHK	S code check/OK or NG	OK: Normal NG: Malfunction	-

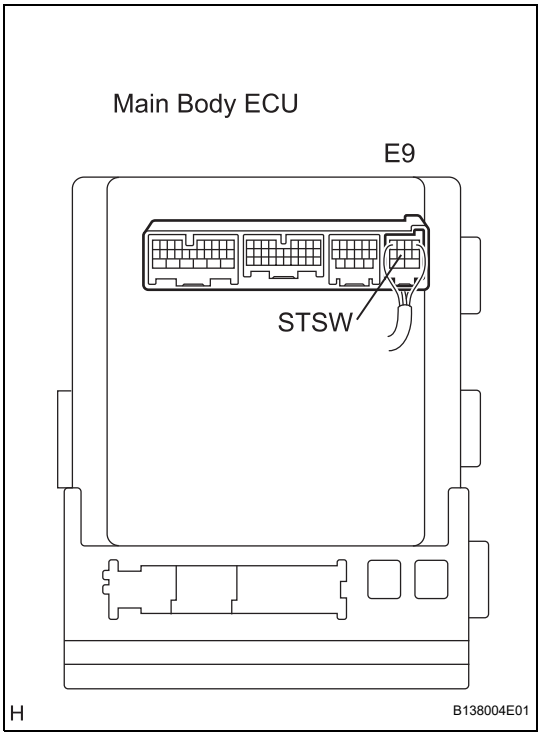
OK:
OK is displayed on the screen.
HINT:
If the result is not as specified, there may be a malfunction with the certification ECU or the ID code box.

NG → **GO TO ENGINE IMMOBILISER SYSTEM**

OK

ST

12	INSPECT MAIN BODY ECU (STSW VOLTAGE)



(a) Disconnect the A61 HV control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

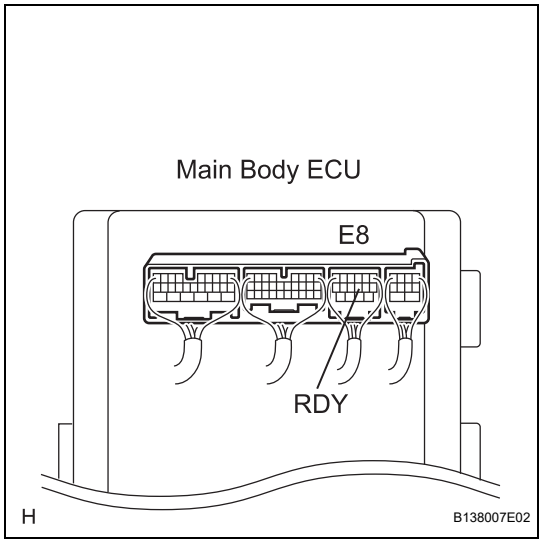
Tester Connection (Symbols)	Condition	Specified Condition
E9-4 (STSW) - Body ground	Brake pedal depressed, shift lever P position, power switch is pushed once	Output voltage at terminal AM1 or AM2 is - 2 V or more.

HINT:
If the result is not as specified, perform troubleshooting for DTC B2275 first (See page ST-42).

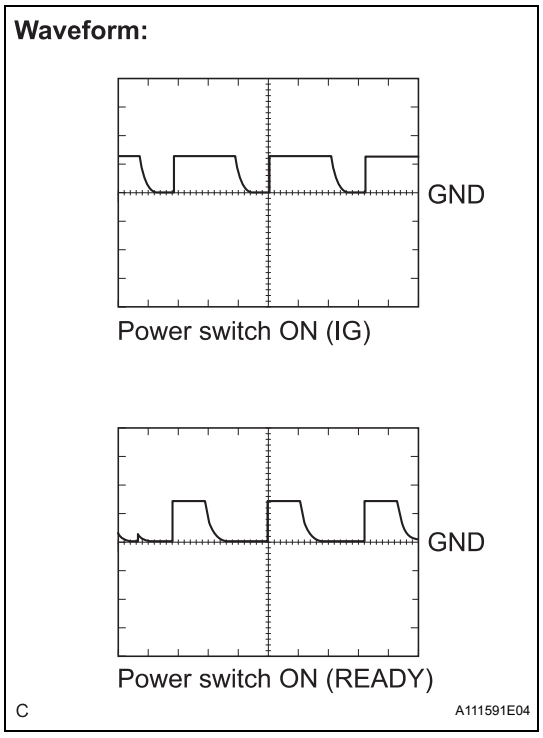
NG → **GO TO DTC B2275**

OK

13	INSPECT HYBRID VEHICLE CONTROL ECU (RDY SIGNAL)



(a) Check the input signal waveform.
(1) Reconnect the HV control ECU connector.
(2) Connect an oscilloscope to terminal E8-8 (RDY) and body ground.
(3) Turn the power switch on (IG).



(4) Check the signal waveform according to the condition(s) in the table below.

Item	Condition
Tool setting	10 V/DIV., 10 ms./DIV.
Vehicle condition	Power switch on (IG) or on (READY)

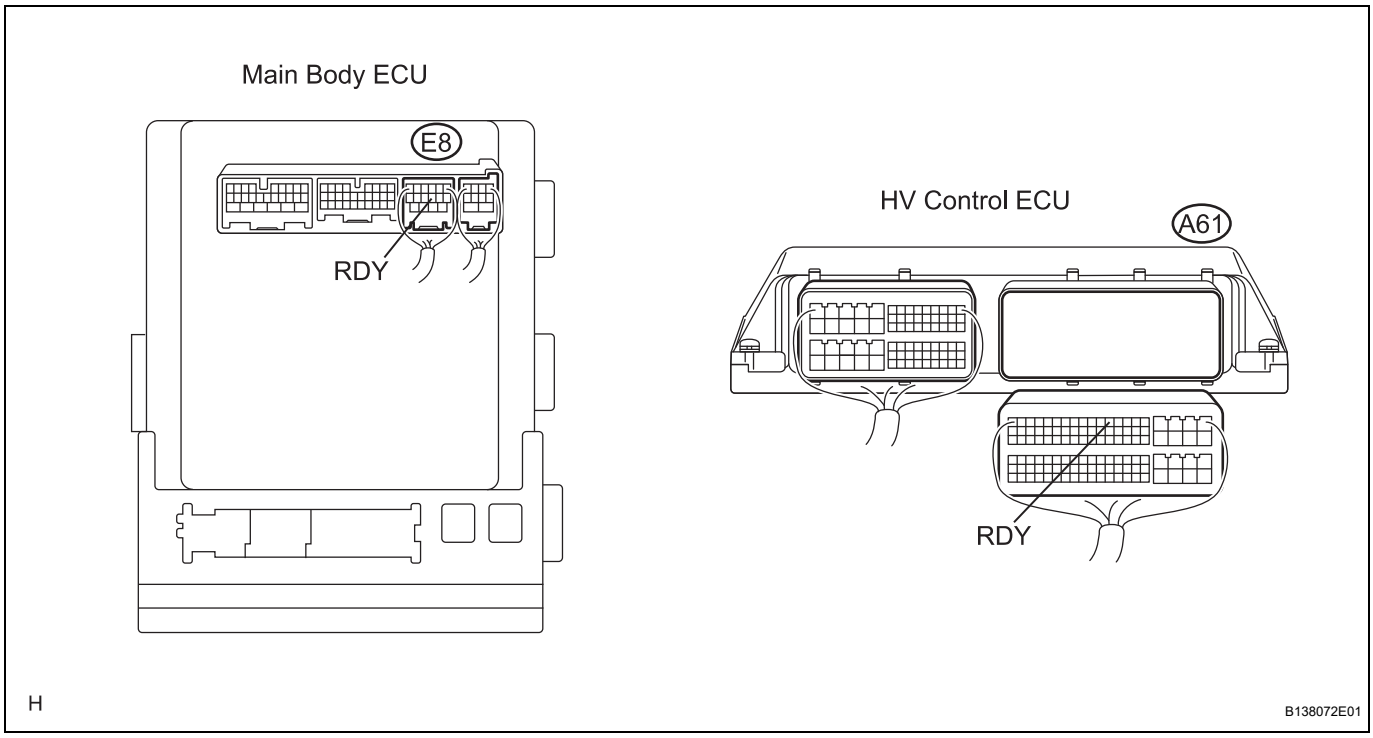
OK:
The waveform is displayed as shown in the illustration.
HINT:
As the vehicle speed increases, the cycle of the signal waveform narrows.

OK	Go to step 15

NG

14	CHECK WIRE HARNESS (MAIN BODY ECU - HV CONTROL ECU)

(a) Disconnect the E8 and A61 ECU connectors.



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E8-8 (RDY) - A61-9 (RDY)	Always	Below 1 Ω
E8-8 (RDY) or A61-9 (RDY) - Body ground	Always	10 kΩ or higher

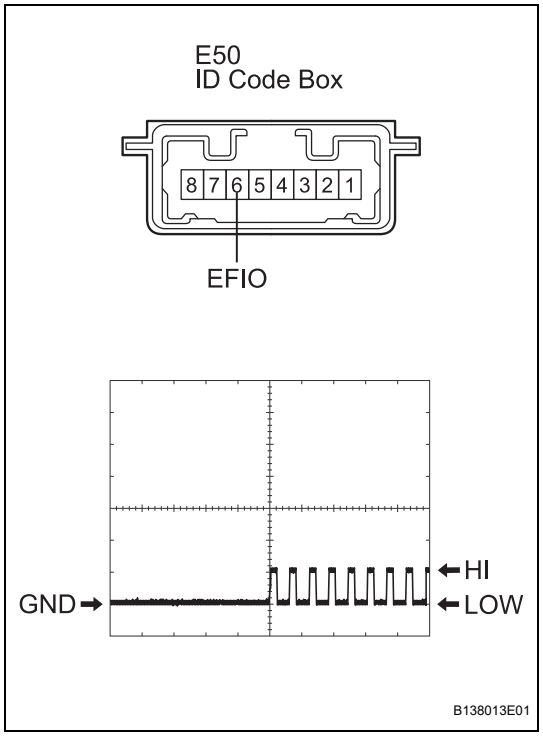
ST

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU

15	INSPECT ID CODE BOX



(a) Check the input signal waveform.
  (1) Connect an oscilloscope to terminal E50-6 (EFIO) and body ground.
  (2) Turn the power switch on (IG).
  (3) Check the signal waveform according to the condition(s) in the table below.

Item	Condition
Tool setting	10 V/DIV., 100 ms./DIV.
Vehicle condition	Power switch on (IG)

NG → **REPLACE ID CODE BOX**

OK

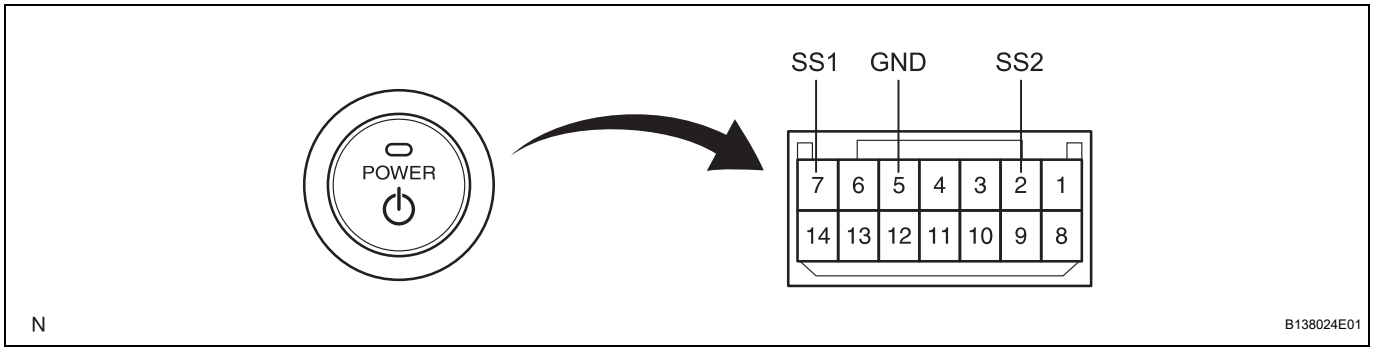
REPLACE MAIN BODY ECU

ST

INSPECTION

1. INSPECT POWER SWITCH

(a) Measure the resistance according to the value(s) in the table below.



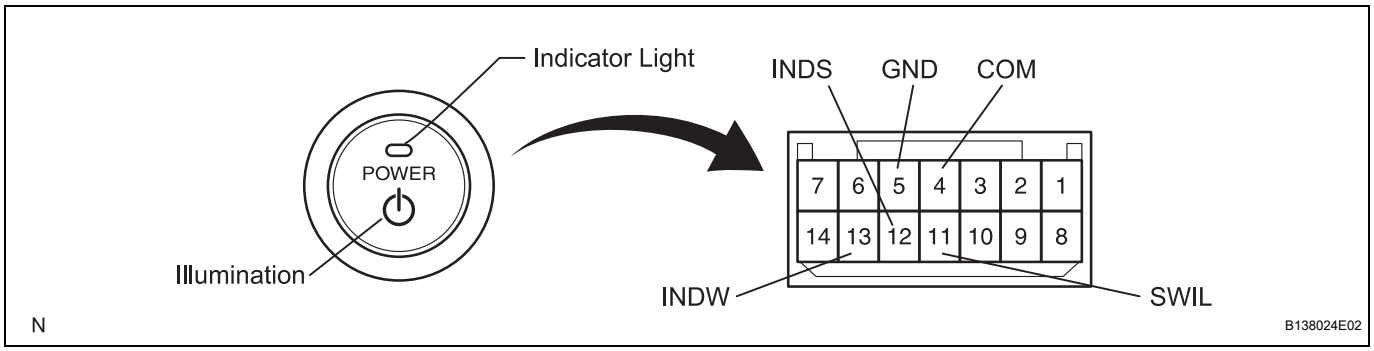
Standard resistance

Tester Connection	Switch Condition	Specified Condition
7 (SS1) - 5 (GND)	Pushed	Below 1 Ω
2 (SS2) - 5 (GND)	Pushed	Below 1 Ω
7 (SS1) - 5 (GND)	Not pushed	10 kΩ or higher
2 (SS2) - 5 (GND)	Not pushed	10 kΩ or higher

If the result is not as specified, replace the power switch.

(b) Apply battery voltage between the terminals of the switch, and check the illumination condition of the switch.

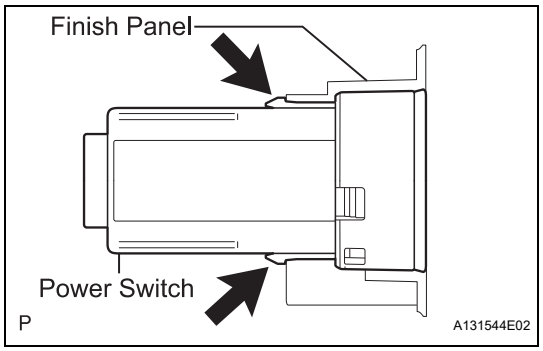
ST



Standard resistance

Measurement Condition	Specified Condition
Battery positive (+) →Terminal 11 (SWIL) Battery negative (-) →Terminal 4 (COM) or 5 (GND)	Illuminates
Battery positive (+) →Terminal 12 (INDS) Battery negative (-) →Terminal 4 (COM) or 5 (GND)	Illuminates
Battery positive (+) →Terminal 13 (INDW) Battery negative (-) →Terminal 4 (COM) or 5 (GND)	Illuminates

If the result is not as specified, replace the power switch.



INSTALLATION

1. **INSTALL POWER SWITCH**
   (a) Attach the 2 claws to install the power switch.
2. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-34)**

OPERATION HISTORY DATA

1. OPERATION HISTORY DATA

HINT:

The HV control ECU records inappropriate operations performed by the driver and the number of abnormal conditions that have been input to the ECU as operation history data.

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG) and turn the intelligent tester on.

(c) Select the following menu items: DIAGNOSIS / OBD/MOBD / HV ECU / DATA LIST.

(d) Select the menu to view the number of special operations or controls that have been effected.

HINT:

- LATEST OPER: Among the past occurrences, the number of special operations or controls that have been effected during the most recent 1 trip detection.
- LATEST TRIP: The number of trips after the occurrence of LATEST OPER.
- BEF LATST OPER: The number of occurrences during the trip previous to the LATEST OPER.
- BEF LATST TRIP: The number of trips after the occurrence of BEF LATST OPER.

Special operation and history data:

Intelligent Tester Display	Count Condition
SHIFT BEF READY (Shift gear before READY)	Shift lever moved with READY light blinking
N RANGE CTRL 1 (N range control in half shift)	Shift position cannot be determined
N RANGE CTRL 2 (N range control by busy shift)	N position control effected due to frequent shifting operation
STEP ACCEL IN N (Step accelerator in N range)	Accelerator pedal depressed in N position
AUX. BATT LOW (Auxiliary Battery Low)	Auxiliary battery voltage below 9.5 V
HV INTERMITTENT (HV ECU Intermittent problems)	Instantaneous open circuit at IGSW terminal of HV control ECU
MG2 TEMP HI (MG2 (motor) temperature high)	Motor temperature rose above 168°C (334°F)
MG1 TEMP HI (MG1 (generator) temperature high)	Generator temperature rose above 168°C (334°F)
MG2 INV TEMP HI (MG2 (motor) Inverter temperature high)	Motor inverter temperature rose above 120°C (248°F)
MG1 INV TEMP HI (MG1 (generator) Inverter temperature high)	Generator inverter temperature rose above 120°C (248°F)
MAIN BATT LOW (Main Battery low voltage)	Battery state of charge dropped below 30%
RESIST OVR HEAT (Resister over heat)	System main resistor overheated
COOLANT HEAT (Coolant heating)	Inverter coolant forecast temperature rose above 65°C (149°F)
CONVERTER HEAT (Converter heating)	Boost converter temperature rose above 120°C (248°F)

Intelligent Tester Display	Count Condition
BKWRD DIR SHIFT (Shift backward direction)	Shifted to R while moving forward or shifted to D or B while moving in reverse
PREVENT STAYING (Prevention control of staying)	Engine speed stays in resonance frequency band
ACCEL AND BRK (Accelerator and brake depressing)	Both accelerator and brake pedals depressed

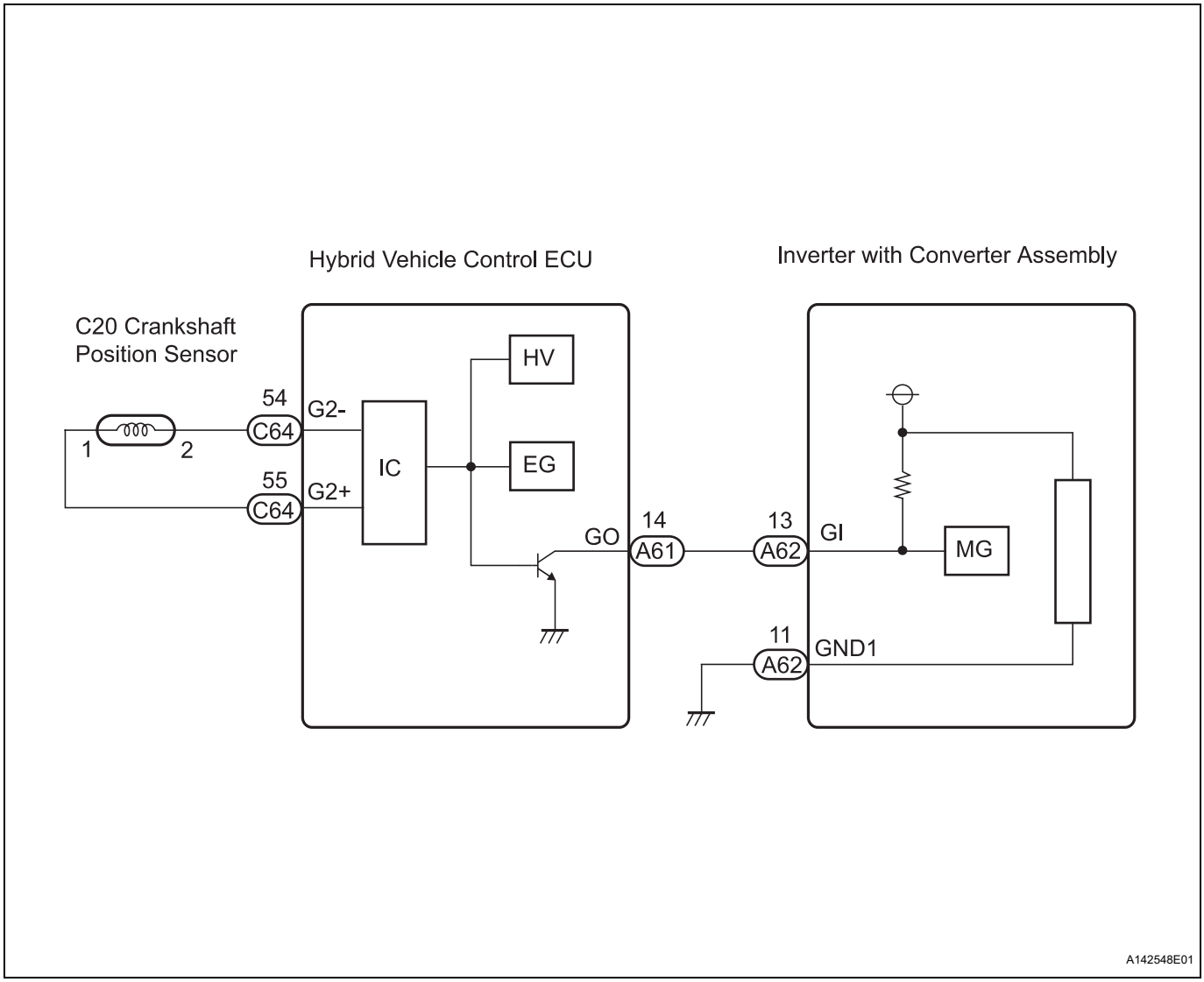
DTC	P0343-747	Camshaft Position Sensor "A" Circuit High Input

DESCRIPTION

The crankshaft position sensor sends the engine speed signal (NE) to the engine CPU and HV CPU of the hybrid vehicle control ECU. The hybrid vehicle control ECU compares the input engine speed signals (NE) in the engine CPU and HV CPU. If any abnormality is found, this DTC will be output.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0343	747	GI signal is not input for 2 sec. or more while the engine is running.	• Wire harness or connector • Hybrid vehicle control ECU • Inverter with converter assembly

WIRING DIAGRAM



HV

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (ENGINE CONTROL SYSTEM)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBDII / ENGINE / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
Any two or more of the following DTCs are output simultaneously.

DTC No.	Relevant Diagnosis
P0340	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor)

HV

YES → **GO TO DTC CHART (P0340) (See page ES-45)**

NO

2	CHECK ENGINE START

(a) Check if the engine can start.
(b) Connect the intelligent tester to the DLC3.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBDII / ENGINE / DTC INFO / CURRENT DTC.
(d) Read output DTCs.

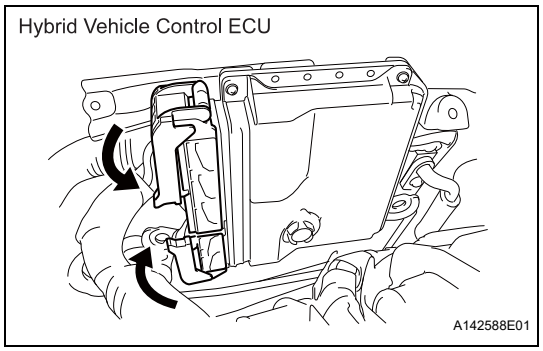
Result

Result	Proceed to
The engine cannot start.	B
The engine can start and DTC P0340 is output within 10 seconds.	B
The engine can start and DTC P0340 is not output.	A

B → **GO TO DTC CHART (P0340) (See page ES-45)**

A

3	CHECK CONNECTOR CONNECTION CONDITION (HYBRID VEHICLE CONTROL ECU CONNECTOR)



(a) Check the connections of the hybrid vehicle control ECU connectors.

OK:

The connectors are connected securely and there are no contact problems.

NG → **CONNECT SECURELY**

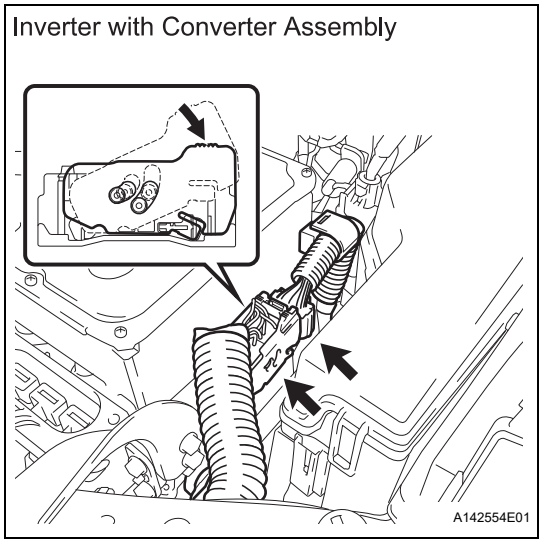
OK

4	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY)

CAUTION:
Be sure to wear insulated gloves.

(a) Turn the power switch off and remove the service plug grip (See page HV-1).

NOTICE:
Do not turn the power switch on (READY) with the service plug grip removed as this may cause a malfunction.



(b) Check the connections of the inverter with converter assembly connectors.

OK:

The connectors are connected securely and there are no contact problems.

NG → **CONNECT SECURELY**

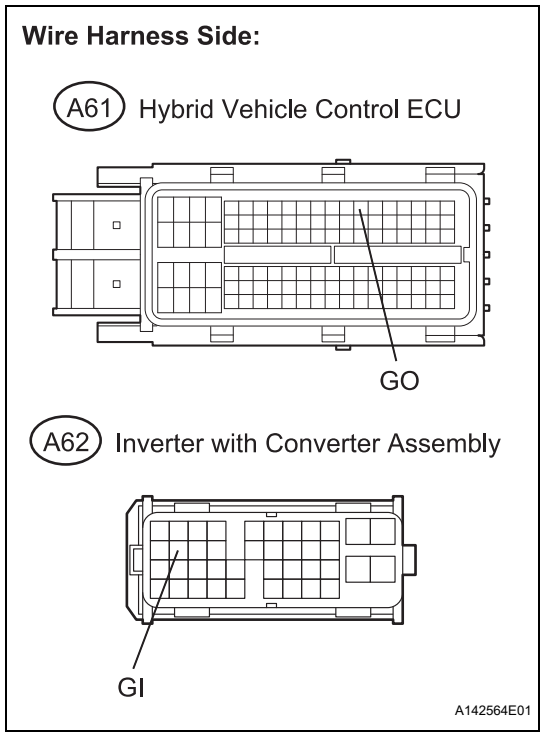
OK

5	CHECK HARNESS AND CONNECTOR (HV CONTROL ECU - INVERTER WITH CONVERTER ASSEMBLY)

(a) Disconnect the A61 hybrid vehicle control ECU connector.

(b) Disconnect the A62 inverter with converter assembly connector.

HV



(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
GO (A61-14) - GI (A62-13)	Below 1 Ω

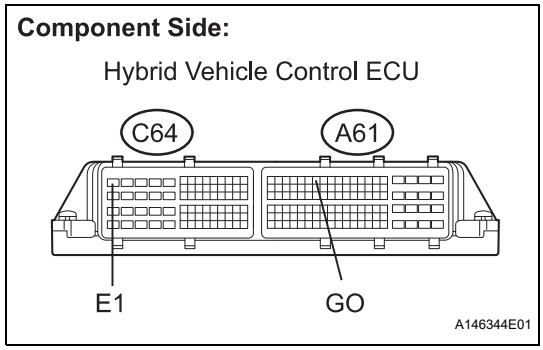
Standard resistance (Check for short)

Tester Connection	Specified Condition
GO (A61-14) or GI (A62-13) - Body ground	10 kΩ or more

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 CHECK HYBRID VEHICLE CONTROL ECU



(a) Remove the hybrid vehicle control ECU (See page HV-569).

(b) Measure the resistance according to the value(s) in the table below.

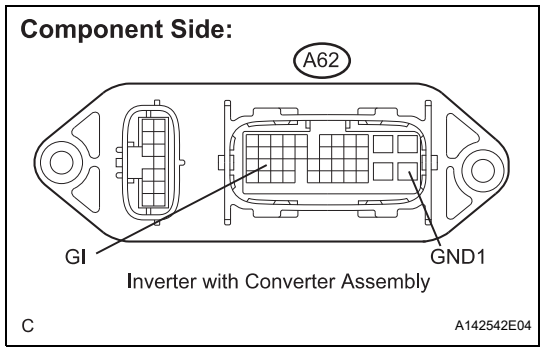
Standard resistance

Tester Connection	Specified Condition
GO (A61-14) - E1 (C64-14)	100 Ω or more

NG → **REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)**

OK

7 CHECK INVERTER WITH CONVERTER ASSEMBLY



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
GI (A62-13) - GND1 (A62-11)	10 kΩ or more

HINT:
After the inspection, check for DTCs. If DTC P0343-747 is output again, replace the inverter with converter assembly.

NG → **REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)**

OK

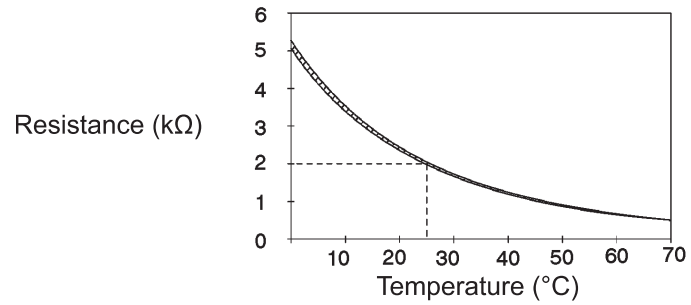
REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

DTC	P0516-769	Battery Temperature Sensor Circuit Low

DTC	P0517-770	Battery Temperature Sensor Circuit High

DESCRIPTION

The auxiliary battery temperature sensor detects the auxiliary battery temperature. The resistance of the thermistor built into the auxiliary battery temperature sensor changes in accordance with changes in the auxiliary battery temperature. The lower the auxiliary battery temperature, the more the thermistor resistance. Conversely, the more the temperature, the lower the resistance. The auxiliary battery temperature sensor is connected to the hybrid vehicle control ECU. A voltage of 5 V is supplied to the auxiliary battery temperature sensor from the THB terminal of the hybrid vehicle control ECU through its internal resistor R. This means that resistor R and the auxiliary battery temperature sensor are connected in series. The voltage at the THB terminal and the resistance value change in accordance with changes in the auxiliary battery temperature. Based on this signal, the hybrid vehicle control ECU reduces the charging current when the auxiliary battery temperature is high to protect the auxiliary battery.



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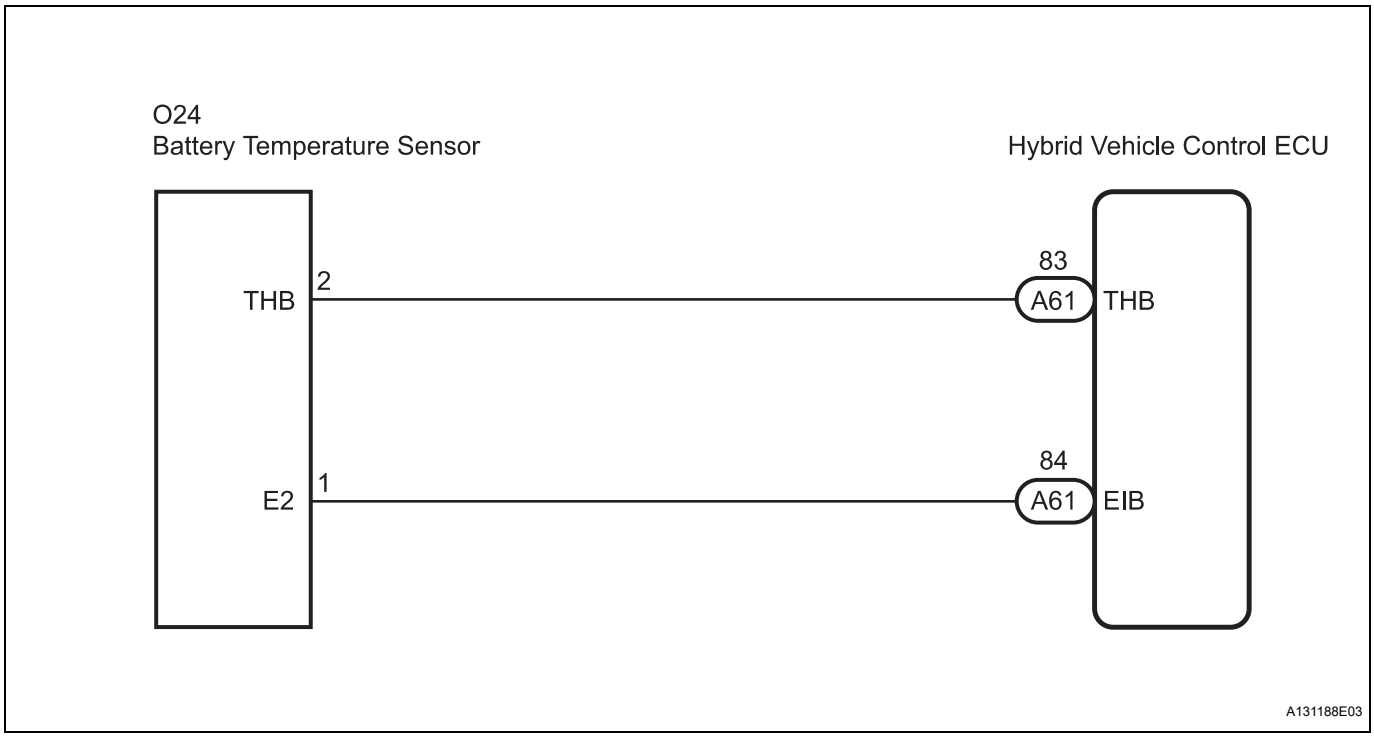
DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0516	769	Malfunction in the auxiliary battery temperature sensor circuit (short to GND)	• Auxiliary battery (battery temperature sensor) • Wire harness or connector • Hybrid vehicle control ECU
P0517	770	Malfunction in the auxiliary battery temperature sensor circuit (open or +B short circuit)	• Auxiliary battery (battery temperature sensor) • Wire harness or connector • Hybrid vehicle control ECU

HV

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

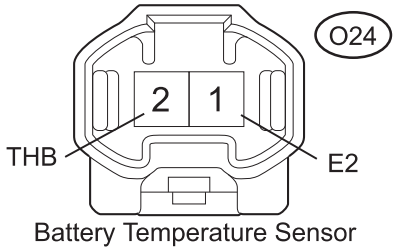
- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

HV

1	INSPECT BATTERY (AUXILIARY BATTERY TEMPERATURE SENSOR)

Component Side:



(a) Disconnect the O24 auxiliary battery temperature sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

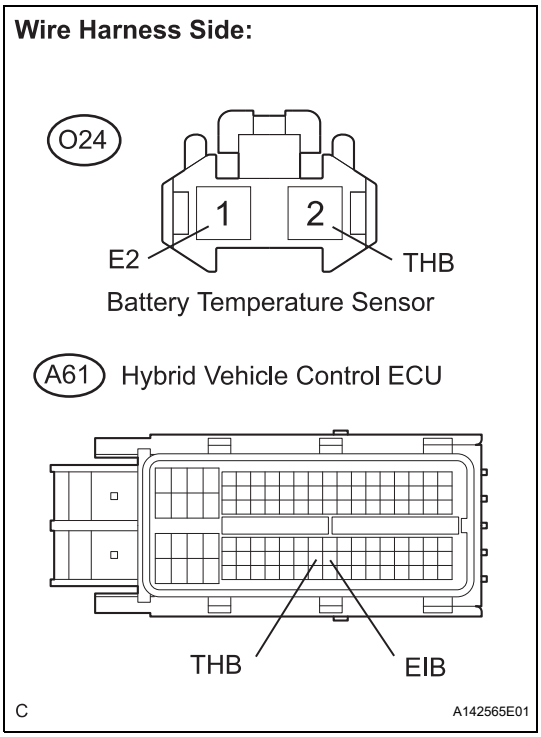
Tester Connection	Temperature	Specified Condition
THB (O24-2) - E2 (O24-1)	0°C (32°F)	5.0 to 5.3 kΩ
	20°C (68°F)	2.3 to 2.5 kΩ
	40°C (104°F)	1.1 to 1.3 kΩ

HINT:
The auxiliary battery temperature sensor is not available separately. If it requires replacement, replace the battery.

NG → REPLACE AUXILIARY BATTERY

OK

2 CHECK HARNESS AND CONNECTOR (HV CONTROL ECU - BATTERY TEMPERATURE SENSOR)



(a) Disconnect the A61 hybrid vehicle control ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
THB (A61-83) - THB (O24-2)	Below 1 Ω
EIB (A61-84) - E2 (O24-1)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
THB (A61-83) or THB (O24-2) - Body ground	10 kΩ or more
EIB (A61-84) or E2 (O24-1) - Body ground	10 kΩ or more

(c) Turn the power switch on (IG).

(d) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
THB (A61-83) or THB (O24-2) - Body ground	Below 1 V

NOTICE:
Turning the power switch on (IG) with the hybrid vehicle control ECU connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 CHECK FOR INTERMITTENT PROBLEMS

(a) Check for intermittent problems (See page HV-17).

NG → REPAIR OR REPLACE MALFUNCTIONING PARTS, COMPONENT AND AREA

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

HV

DTC	P0560-117	System Voltage

DESCRIPTION

Battery power is constantly supplied to the BATT terminal of the hybrid vehicle control ECU to allow DTCs and freeze frame data to be retained in memory even though the power switch is turned off. The back-up power is supplied even when the power switch is off.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0560	117	Malfunction in the hybrid vehicle control ECU back-up power source circuit	• Wire harness or connector • Hybrid vehicle control ECU

MONITOR DESCRIPTION

If a period of time has elapsed with a low voltage at the BATT terminal of the hybrid vehicle control ECU, the hybrid vehicle control ECU will determine that a malfunction has occurred in the back-up power supply system, and set a DTC. The MIL will illuminate the next time the engine is started.

MONITOR STRATEGY

Related DTCs	P0560 (INF 117): Battery signal malfunction
Required sensors / components	Main: Back-up power source circuit Sub: Hybrid vehicle control ECU
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	1 driving cycle
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

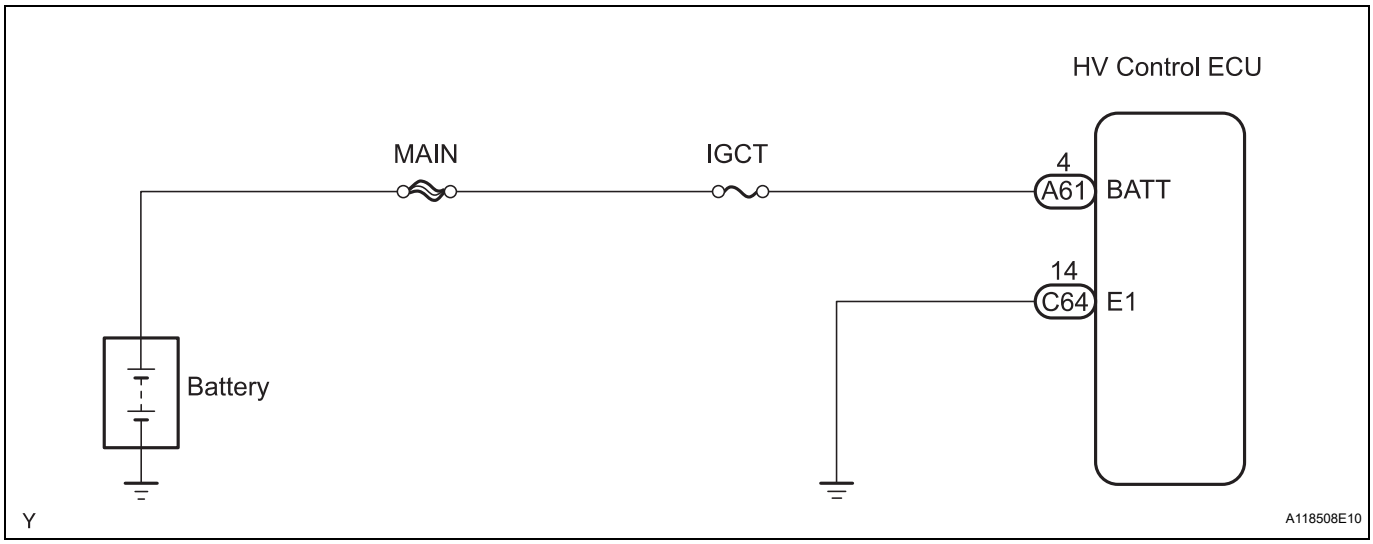
TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Auxiliary battery voltage	Between 9 and 14 V

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HV

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**CHECK CONNECTOR CONNECTION CONDITION (HYBRID VEHICLE CONTROL ECU CONNECTOR) (See page HV-79)**

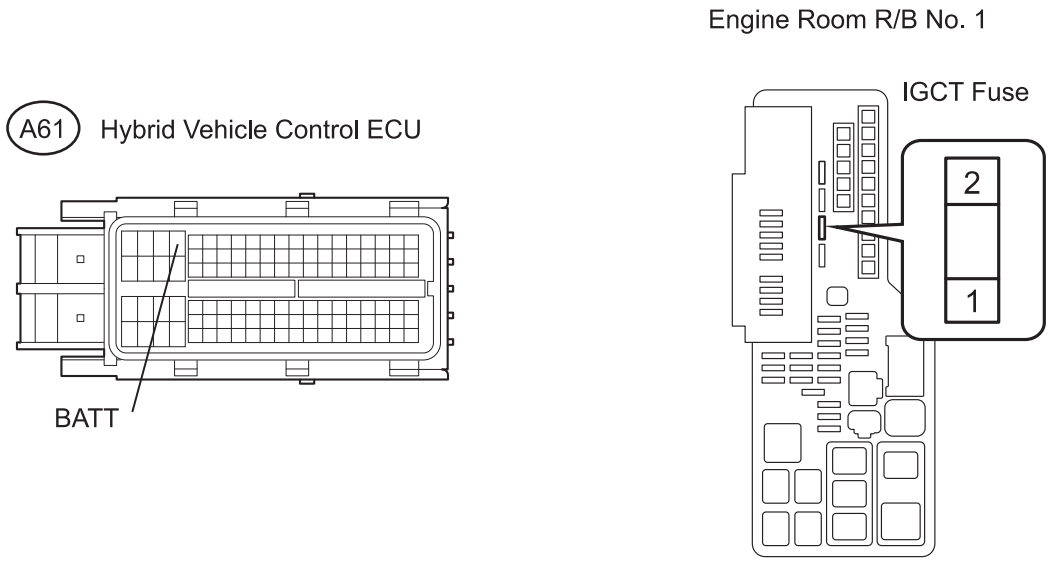
NG → **CONNECT SECURELY**

OK

2	**CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - IGCT FUSE)**

(a) Turn the power switch off.
(b) Remove the IGCT fuse from the engine room R/B No. 1.
(c) Disconnect the A61 hybrid vehicle control ECU connector.
(d) Measure the resistance according to the value(s) in the table below.

Wire Harness Side:



Standard Resistance (Check for open)

Tester Connection	Specified Condition
BATT (A61-4) - Engine room R/B No. 1 IGCT fuse terminal 2	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
BATT (A61-4) or Engine room R/B No. 1 IGCT fuse terminal 2 - Body ground	10 kΩ or more

HV

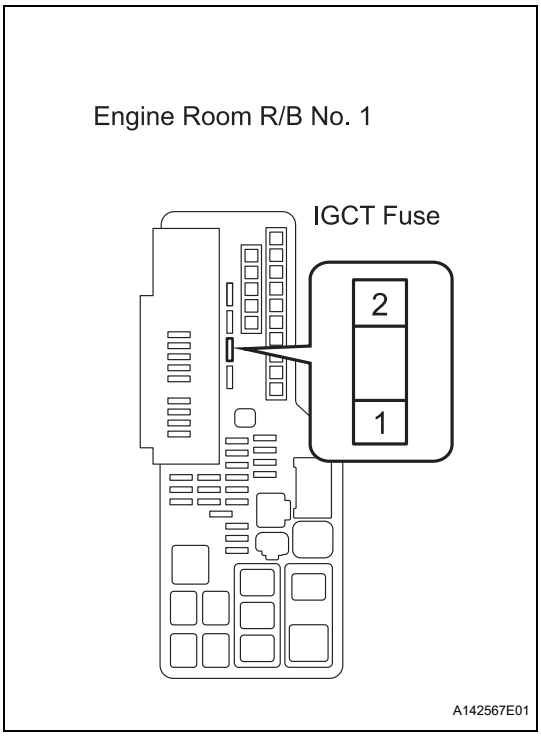
NOTICE:
When taking measurements with a tester, do not apply excessive force to the tester probes to avoid damaging the fuse holder or terminals.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	**CHECK HARNESS AND CONNECTOR (IGCT NO. 1 FUSE - BATTERY POSITIVE TERMINAL)**

(a) Disconnect the positive and negative terminals from the auxiliary battery.



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
Engine room R/B No. 1 IGCT fuse terminal 1 - positive (+) battery terminal	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
Engine room R/B No. 1 IGCT fuse terminal 1 - Body ground	10 kΩ or more

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	RECONFIRM DTC OUTPUT (HV)

HV

HINT:
If DTC P0560-117 is output after this inspection, replace the hybrid vehicle control ECU. If the DTC is not output, check for intermittent problems (See page HV-17) because there may be a malfunction in the wire harness or connector.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Recheck for DTCs.

Result:

DTC P0560-117 is output again.

NO → **CHECK FOR INTERMITTENT PROBLEMS (See page HV-17)**

YES

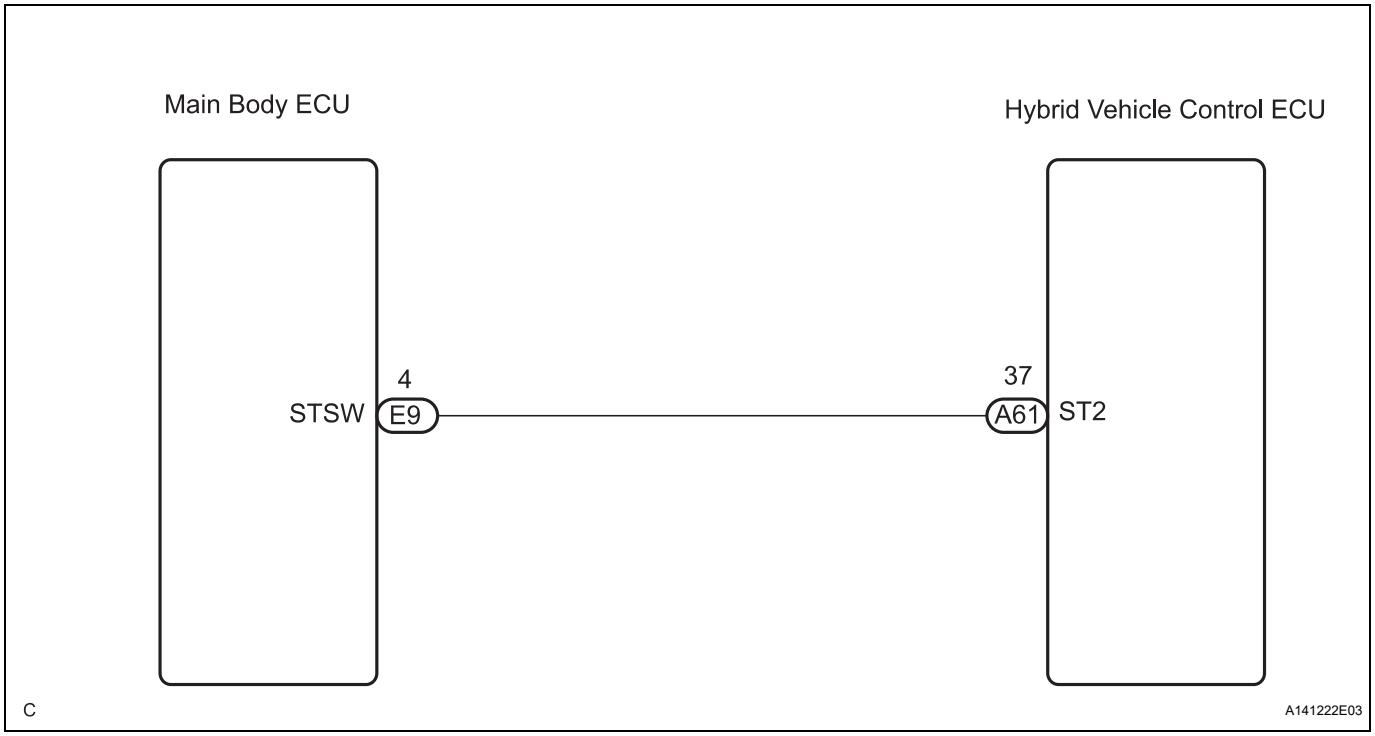
REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

DTC	P0617-142	Starter Relay Circuit High

DESCRIPTION

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0617	142	An ST signal from the hybrid vehicle control ECU is present when the power switch is off.	• Wire harness or connector • Hybrid vehicle control ECU • Main body ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

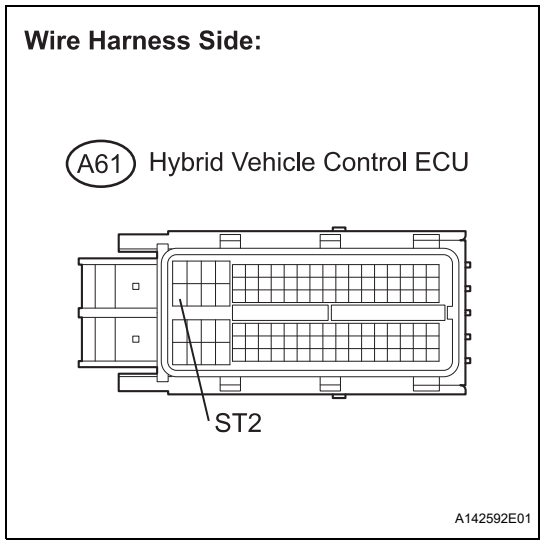
HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK HARNESS AND CONNECTOR (ST2 TERMINAL VOLTAGE)

(a) Disconnect the A61 hybrid vehicle control ECU connector.

HV



(b) Measure the voltage according to the value(s) in the table below when the power switch is off.

Standard voltage

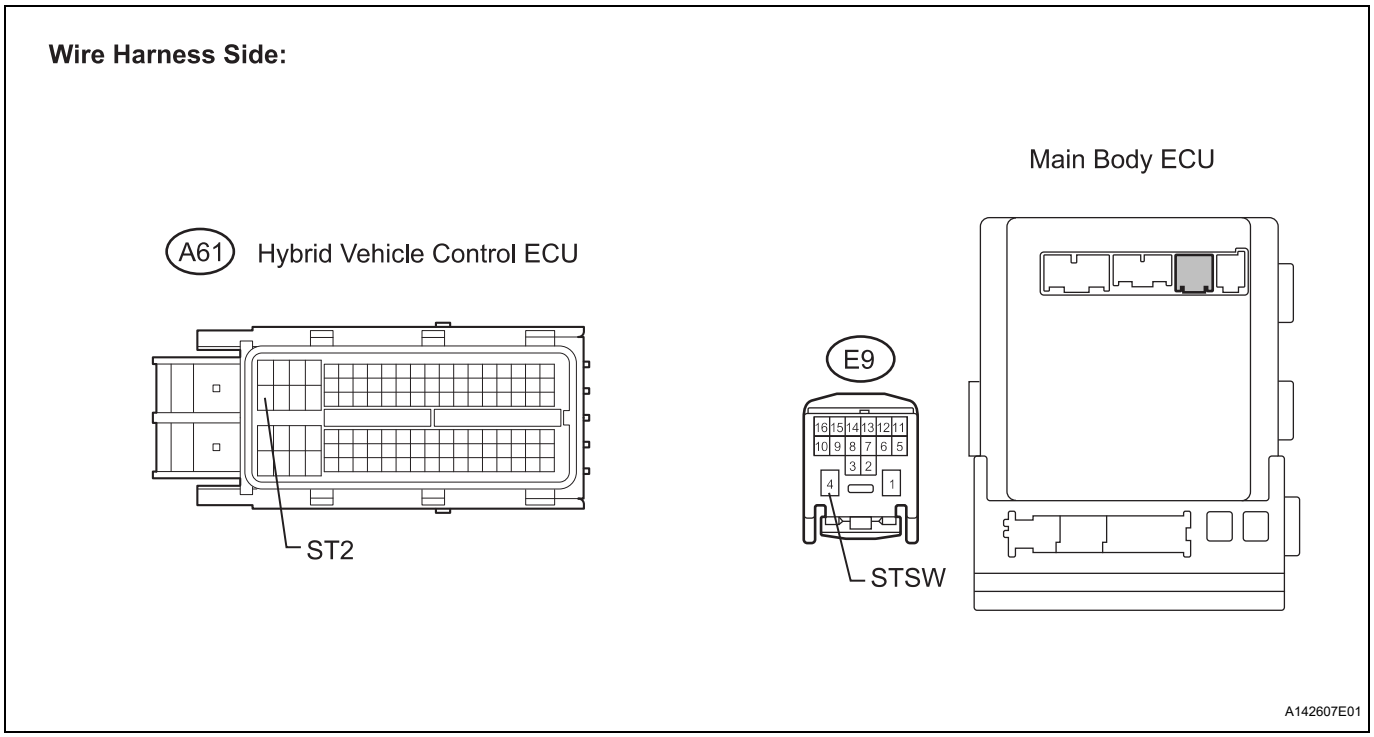
Tester Connection	Specified Condition
ST2 (A61-37) - Body ground	Below 1 V

OK → **Go to step 3**

NG

2	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - MAIN BODY ECU)

(a) Disconnect the E9 main body ECU connector .
(b) Measure the voltage according to the value(s) in the table below when the power switch is off.



Standard voltage

Tester Connection	Specified Condition
ST2 (A61-37) or STSW (E9-4) - Body ground	Below 1 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MAIN BODY ECU

3	CLEAR DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Read and record the DTCs and freeze frame data.
(d) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CLEAR CODES.
(e) Clear the DTCs.

NEXT

4	RECONFIRM DTC OUTPUT

(a) Turn the power switch off and leave the vehicle as it is for approximately 5 seconds.
(b) Turn the power switch on (IG) again.
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Recheck for DTCs.
Result:
DTC P0617-142 is output again.

NO → **CHECK FOR INTERMITTENT PROBLEMS (See page HV-17)**

YES

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

DTC	P062F-143	EEPROM Malfunction

DESCRIPTION

The hybrid vehicle control ECU monitors its internal operation and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P062F	143	ECU internal error	Hybrid vehicle control ECU

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	REPLACE HYBRID VEHICLE CONTROL ECU

HINT:
See page HV-569

NEXT

HV

COMPLETED

DTC	P0630-804	VIN not Programmed or Mismatch-ECM / PCM

DESCRIPTION

DTC P0630 is set if the Vehicle Identification Number (VIN) is not stored in the hybrid vehicle control ECU or the input VIN is not accurate. Input the VIN with the intelligent tester (See page HV-18).

DTC No.	INF No.	DTC Detection Condition	Trouble Area
P0630	804	• VIN not stored in hybrid vehicle control ECU • Input VIN in hybrid vehicle control ECU not accurate	Hybrid vehicle control ECU

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

NOTICE:

If P0630 is set, the VIN must be input to the hybrid vehicle control ECU using the intelligent tester. However, all DTCs are cleared automatically by the tester when inputting the VIN. If DTCs other than P0630-804 are set, check them first.

HV

NEXT

2	INPUT VIN WITH INTELLIGENT TESTER

(a) Input the VIN with the intelligent tester (See page HV-18).

NOTICE:

Be sure to check the auxiliary battery voltage before performing VIN writing because VIN writing cannot be performed if the auxiliary battery voltage is below 10 V.

NEXT

3	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).

(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.

(d) Check if DTCs are output.

OK:

DTC P0630-804 is not output.

NG → **REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)**

OK

COMPLETED

DTC	P0705-757	Transmission Range Sensor Circuit

DTC	P0705-758	Transmission Range Sensor Circuit

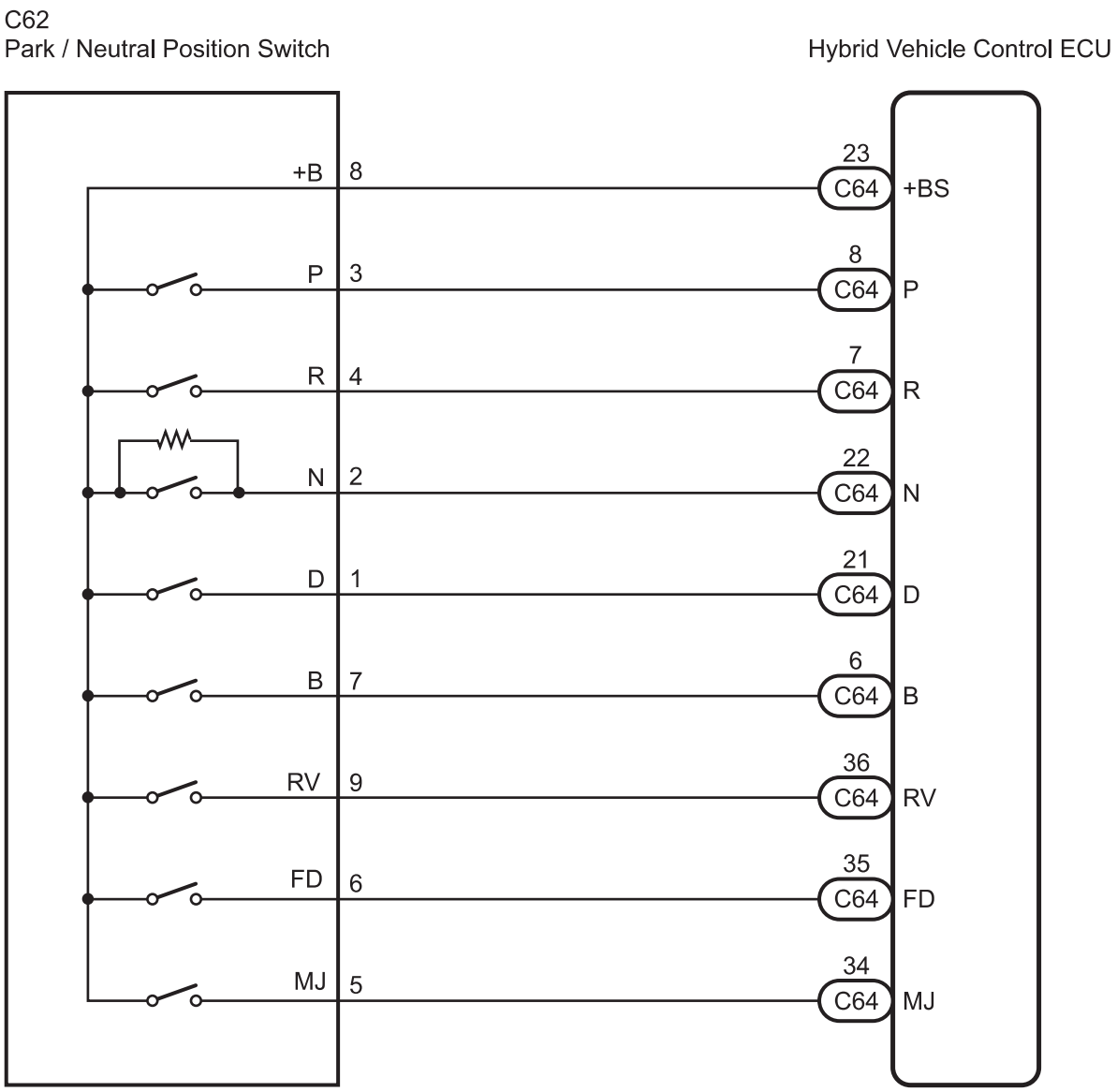
DTC	P0851-775	Park / Neutral Switch Input Circuit Low

DESCRIPTION

The park / neutral position switch can send 8 different switch signals to the hybrid vehicle control ECU. The hybrid vehicle control ECU uses the signals to detect the shift lever position (P, R, N, D or B). The hybrid vehicle control ECU also uses this information to determine intended direction of travel (forward or reverse).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0705	757	Park / neutral position switch pattern problem	• Wire harness or connector • Park / neutral position switch • Hybrid vehicle control ECU
P0705	758	Shifting malfunction (open circuit in MJ)	• Wire harness or connector • Park / neutral position switch • Hybrid vehicle control ECU
P0851	775	N signal line malfunction	• Wire harness or connector • Park / neutral position switch • Hybrid vehicle control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**

- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CLEAR DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Read and record the DTCs and freeze frame data.
(d) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CLEAR CODES.
(e) Clear the DTCs.

NEXT

2	READ VALUE OF INTELLIGENT TESTER (SHIFT POSITION)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) While slowly moving the shift lever from P to B, and then back to the P position, read the data list (SHIFT POSITION) displayed on the intelligent tester.
HINT:
Make sure to move the shift lever slowly.

Result

	Shift Position				
Data List	P	R	N	D	B
SHIFT SW P	ON	OFF	OFF	OFF	OFF
SHIFT SW R	OFF	ON	OFF	OFF	OFF
SHIFT SW N	OFF	OFF	ON	OFF	OFF
SHIFT SW D	OFF	OFF	OFF	ON	OFF
SHIFT SW B	OFF	OFF	OFF	OFF	ON
SHIFT SW RV	OFF	ON	OFF	OFF	OFF
SHIFT SW FD	OFF	OFF	OFF	ON	ON
SHIFT SW MJ	ON	ON	ON	ON	ON

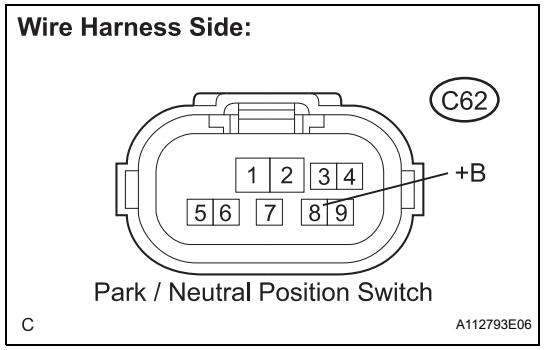
(d) Check if DTCs are output.
Result:
DTCs P0705-757, P0705-758, and P0851-775 are not output.

OK → **Go to step 6**

NG

HV

3	CHECK HARNESS AND CONNECTOR (POWER SOURCE CIRCUIT)



(a) Disconnect the C62 park / neutral position switch connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

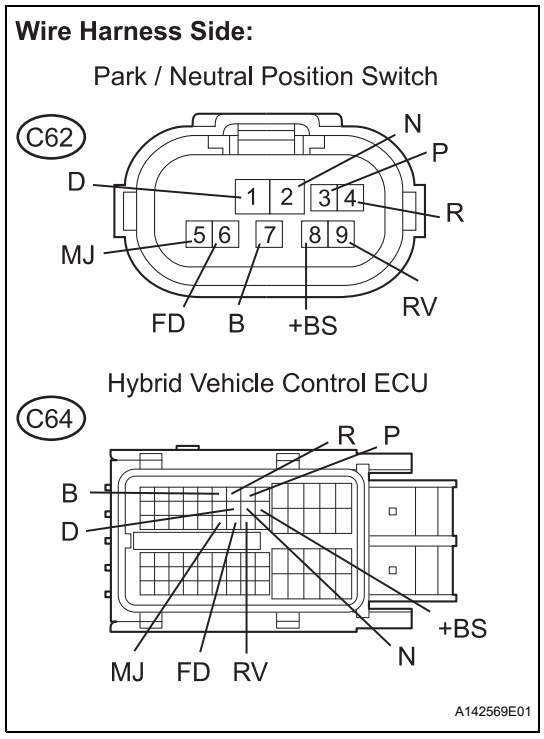
Tester Connection	Specified Condition
+B (C62-8) - Body ground	10 to 14 V

NOTICE:
Turning the power switch on (IG) with the park / neutral position switch connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - PARK / NEUTRAL POSITION SWITCH)



(a) Disconnect the C64 hybrid vehicle control ECU connector.
(b) Disconnect the C62 park / neutral position switch connector .
(c) Measure the voltage according to the value(s) in the table below when the power switch is on (IG).

Standard voltage

Tester Connection	Specified Condition
+BS (C64-23) - Body ground	Below 1 V
P (C64-8) - Body ground	Below 1 V
R (C64-7) - Body ground	Below 1 V
N (C64-22) - Body ground	Below 1 V
D (C64-21) - Body ground	Below 1 V
B (C64-6) - Body ground	Below 1 V
MJ (C64-34) - Body ground	Below 1 V
FD (C64-35) - Body ground	Below 1 V
RV (C64-36) - Body ground	Below 1 V

NOTICE:
Turning the power switch on (IG) with the park / neutral position switch connector and hybrid vehicle control ECU connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(d) Turn the power switch off.
(e) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
+BS (C64-23) - +B (C62-8)	Below 1 Ω
P (C64-8) - P (C62-3)	Below 1 Ω
R (C64-7) - R (C62-4)	Below 1 Ω
N (C64-22) - N (C62-2)	Below 1 Ω
D (C64-21) - D (C62-1)	Below 1 Ω
B (C64-6) - B (C62-7)	Below 1 Ω
MJ (C64-34) - MJ (C62-5)	Below 1 Ω
FD (C64-35) - FD (C62-6)	Below 1 Ω
RV (C64-36) - RV (C62-9)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
+BS (C64-23) or +B (C62-8) - Body ground	10 kΩ or more
P (C64-8) or P (C62-3) - Body ground	10 kΩ or more
R (C64-7) or R (C62-4) - Body ground	10 kΩ or more
N (C64-22) or N (C62-2) - Body ground	10 kΩ or more
D (C64-21) or D (C62-1) - Body ground	10 kΩ or more
B (C64-6) or B (C62-7) - Body ground	10 kΩ or more
MJ (C64-34) or MJ (C62-5) - Body ground	10 kΩ or more
FD (C64-35) or FD (C62-6) - Body ground	10 kΩ or more
RV (C64-36) or RV (C62-9) - Body ground	10 kΩ or more

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

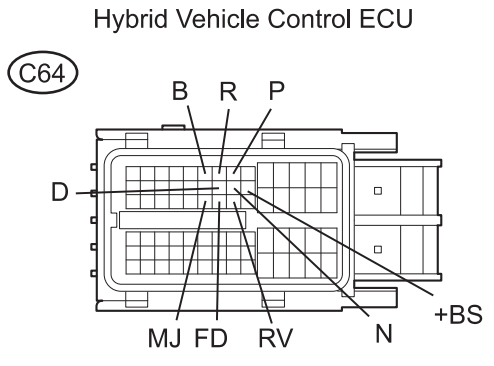
OK

HV

5 CHECK PARK / NEUTRAL POSITION SWITCH

(a) Connect the park / neutral position switch connector.
(b) Measure the resistance according to the value(s) in the table below.

Wire Harness Side:



Standard resistance (Check for open)

Shift Lever Position	Tester Connection	Specified Condition
P	+BS (C64-23) - P (C64-8) +BS (C64-23) - MJ (C64-34)	Below 1 Ω

Shift Lever Position	Tester Connection	Specified Condition
R	+BS (C64-23) - R (C64-7) +BS (C64-23) - MJ (C64-34) +BS (C64-23) - RV (C64-36)	Below 1 Ω
N	+BS (C64-23) - N (C64-22) +BS (C64-23) - MJ (C64-34)	Below 1 Ω
D	+BS (C64-23) - D (C64-21) +BS (C64-23) - MJ (C64-34) +BS (C64-23) - FD (C64-35)	Below 1 Ω
B	+BS (C64-23) - B (C64-6) +BS (C64-23) - MJ (C64-34)	Below 1 Ω

Standard resistance (Check for short)

Shift Lever Position	Tester Connection	Specified Condition
P	+BS (C64-23) or P (C64-8) - Body ground and other terminal +BS (C64-23) or MJ (C64-34) - Body ground and other terminal	10 kΩ or more
R	+BS (C64-23) or R (C64-7) - Body ground and other terminal +BS (C64-23) or MJ (C64-34) - Body ground and other terminal +BS (C64-23) or RV (C64-36) - Body ground and other terminal	10 kΩ or more
N	+BS (C64-23) or N (C64-22) - Body ground and other terminal +BS (C64-23) or MJ (C64-34) - Body ground and other terminal	10 kΩ or more
D	+BS (C64-23) or D (C64-21) - Body ground and other terminal +BS (C64-23) or MJ (C64-34) - Body ground and other terminal +BS (C64-23) or FD (C64-35) - Body ground and other terminal	10 kΩ or more
B	+BS (C64-23) or B (C64-6) - Body ground and other terminal +BS (C64-23) or MJ (C64-34) - Body ground and other terminal	10 kΩ or more

HINT:
The resistance between terminals +BS and N should be 4.2 to 5.2 kΩ.

NG → **REPLACE PARK / NEUTRAL POSITION SWITCH**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

6 CHECK FOR INTERMITTENT PROBLEMS

(a) Check for intermittent problems (See page HV-17).

NG → **REPAIR OR REPLACE MALFUNCTIONING PARTS, COMPONENT AND AREA**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

DTC	P0A01-725	Motor Electronics Coolant Temperature Sensor Circuit Range / Performance

DTC	P0A01-726	Motor Electronics Coolant Temperature Sensor Circuit Range / Performance

DESCRIPTION

Refer to the description for DTC P0A02-719 (See page HV-99).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A01	725	Sudden change in HV coolant temperature sensor output	• Wire harness or connector • Inverter cooling system • Cooling fan system • Water pump with motor & bracket assembly • Inverter with converter assembly • Hybrid vehicle control ECU
P0A01	726	HV coolant temperature sensor output deviation	• Wire harness or connector • Inverter cooling system • Cooling fan system • Water pump with motor & bracket assembly • Inverter with converter assembly • Hybrid vehicle control ECU

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

HV

1	CHECK DTC (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A93-346	Inverter cooling system malfunction

YES → GO TO DTC CHART

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

3	CHECK QUANTITY OF HV COOLANT (See page HV-325)

B → ADD COOLANT

C → CHECK FOR COOLANT LEAKS AND ADD COOLANT

A

4	CHECK COOLANT HOSE (See page HV-326)

NG → CORRECT THE PROBLEM

OK

5	CHECK CONNECTOR CONNECTION CONDITION (HYBRID VEHICLE CONTROL ECU CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

6	CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR & BRACKET ASSEMBLY CONNECTOR) (See page HV-326)

NG → CONNECT SECURELY

OK

7	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (WATER PUMP) (See page HV-327)

NG → Go to step 10

OK

8	CHECK CONNECTOR CONNECTION CONDITION (COOLING FAN MOTOR CONNECTOR) (See page HV-327)

NG → CONNECT SECURELY

HV

OK

9	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (COOLING FAN) (See page HV-328)

NG → CHECK COOLING FAN SYSTEM (See page CO-3)

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY

10	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (WATER PUMP) (See page HV-328)

NG → ADD COOLANT

OK

11	CHECK WATER PUMP WITH MOTOR & BRACKET ASSEMBLY (See page HV-329)

NG → Go to step 13

OK

12	CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR & BRACKET ASSEMBLY - HV CONTROL ECU) (See page HV-330)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

13	CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR POWER SOURCE CIRCUIT) (See page HV-330)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE WATER PUMP WITH MOTOR & BRACKET ASSEMBLY

DTC	P0A02-719	Motor Electronics Coolant Temperature Sensor Circuit Low

DTC	P0A03-720	Motor Electronics Coolant Temperature Sensor Circuit High

DESCRIPTION

The hybrid vehicle control ECU detects HV coolant temperature through the coolant temperature sensor built into the inverter with converter assembly. The inverter cooling system is the same as that for MG2 or MG1, and operates independently of the engine cooling system. The hybrid vehicle control ECU controls the inverter cooling system to prevent overheating based on signals from the HV coolant temperature sensor. The ECU also monitors cooling system operation and detects malfunctions in the HV coolant temperature sensor and the circuit.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A02	719	Short to GND in the HV coolant temperature sensor circuit	Inverter with converter assembly
P0A03	720	Open or short to +B in the HV coolant temperature sensor circuit	Inverter with converter assembly

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HV

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	REPLACE INVERTER WITH CONVERTER ASSEMBLY

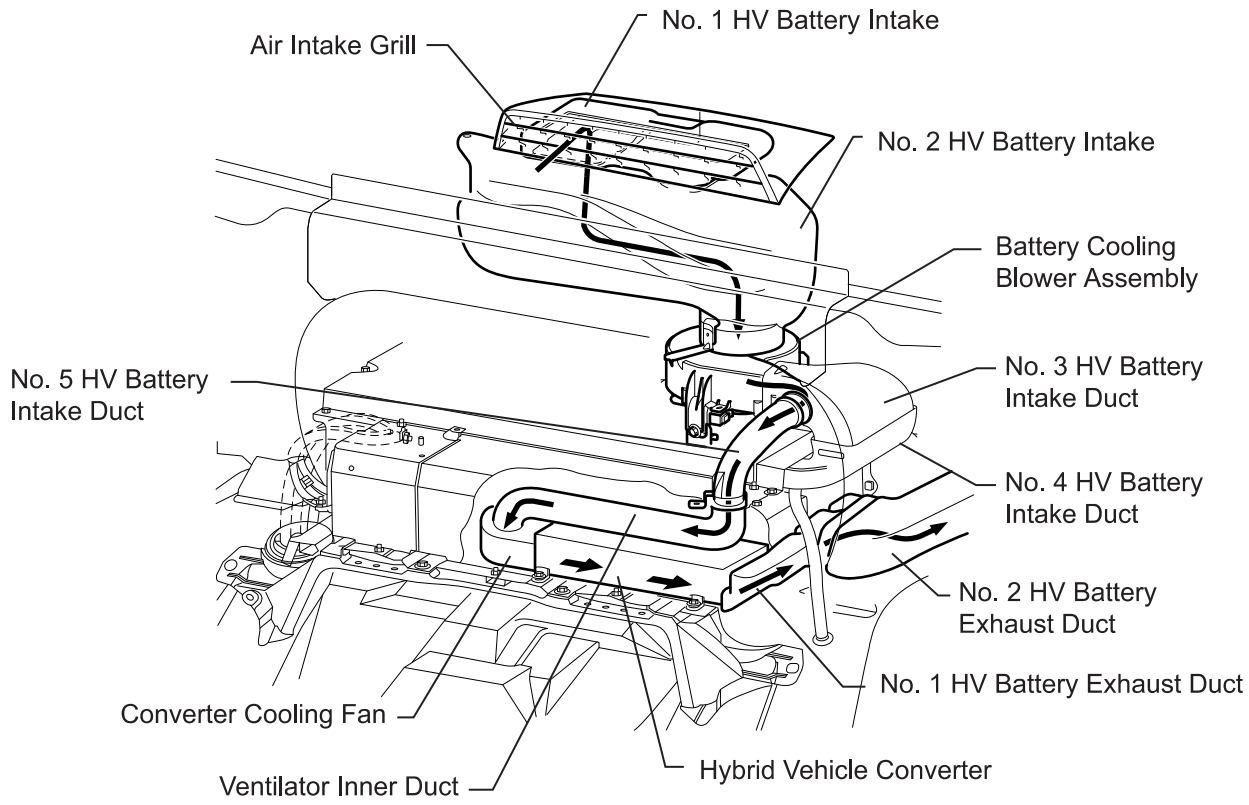
NEXT

COMPLETED

DTC	P0A08-101	DC / DC Converter Status Circuit

DESCRIPTION

The cooling fan of the HV battery and cooling fan in the hybrid vehicle converter are used to cool the hybrid vehicle converter (DC/DC converter).



DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A08	101	Overheating of the hybrid vehicle converter	• Duct • Hybrid vehicle converter • Auxiliary battery

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**

- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.
Placing an object on the package tray trim panel assembly, which is the inlet of the duct, may cause the duct to be unable to take in air. In this case, DTCs may be set.

1	CHECK PACKAGE TRAY TRIM PANEL ASSEMBLY

(a) Check that the air intake grill of the package tray trim panel assembly is not clogged.
OK:
The air intake grill is not clogged.

NG → **REMOVE FOREIGN OBJECT**

OK

2	CHECK AIR DUCT (ALL)

(a) Check if the duct is installed correctly.
OK:
The duct is installed correctly.
(b) Check the duct for clogging.
OK:
The duct is not clogged.

NG → **REPAIR OR REPLACE AIR DUCT (ALL)**

OK

3	REPLACE HYBRID VEHICLE CONVERTER

(a) Replace the hybrid vehicle converter (See page HB-123).

NEXT

4	CHECK AUXILIARY BATTERY

(a) Turn the power switch on (READY).
(b) Leave the vehicle for 5 minutes.
(c) Measure the voltage of the auxiliary battery.
Standard voltage:
More than 10.5 V

NG → **CHECK AND REPLACE AUXILIARY BATTERY**

OK

COMPLETED

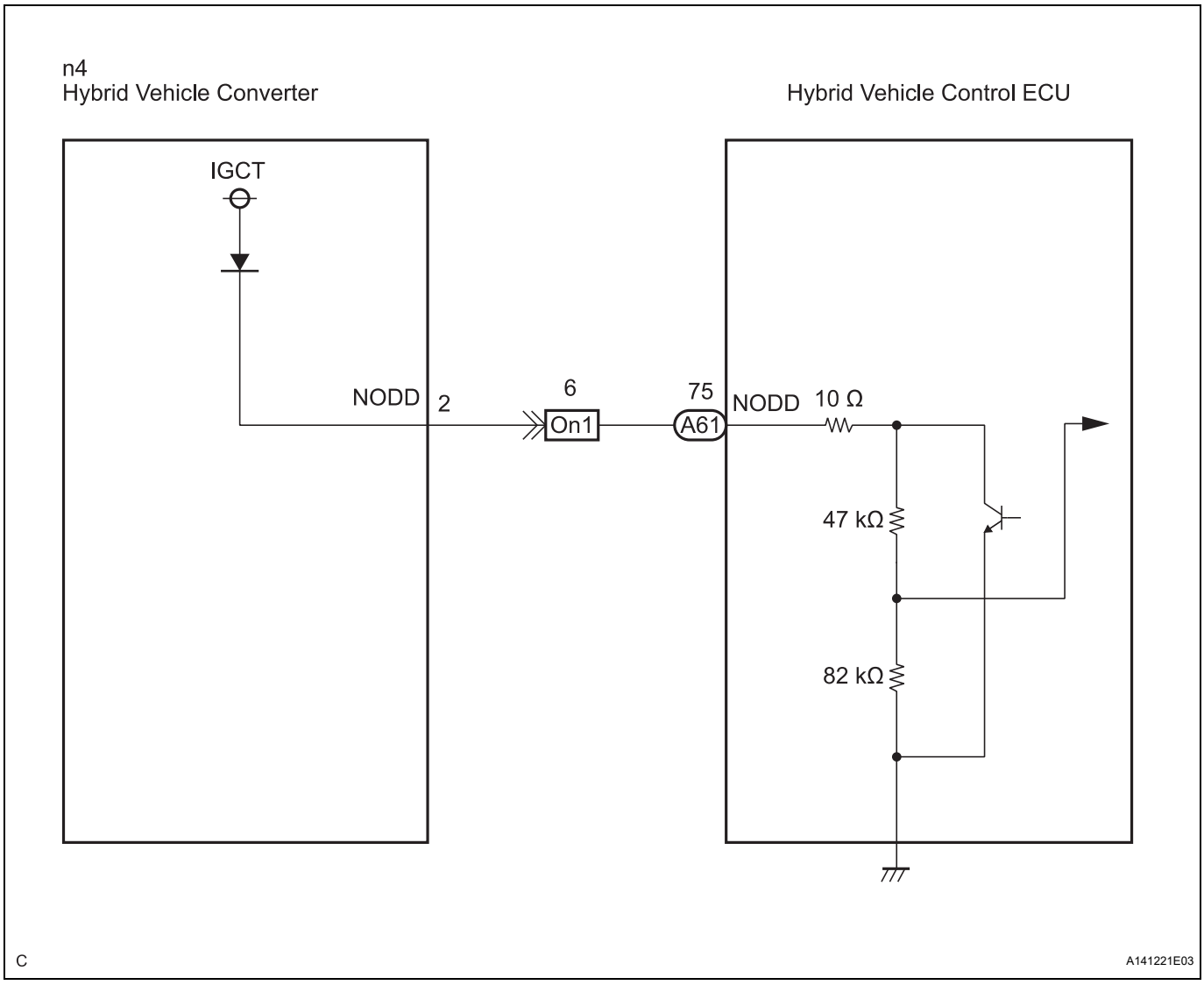
DTC	P0A08-264	DC / DC Converter Status Circuit

DESCRIPTION

For a description of the hybrid vehicle converter (DC/DC converter), (See page HV-109).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A08	264	Malfunction in the hybrid vehicle converter	• Wire harness or connector • Fusible link or fuse • Frame wire • Hybrid vehicle converter (DC/DC connector) • Hybrid vehicle control ECU

WIRING DIAGRAM



HV

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A94-547, 548, 549, 550, 124, 125, 126, 127	Boost converter circuit
P0ABC-226, P0ADB-227, P0ADB-229, P0AF0-228	SMR circuit
P3004-131, 803	High-voltage system
P0AE6-225	SMRP circuit

HV

YES → GO TO DTC CHART

NO

2	CHECK CONNECTOR CONNECTION CONDITION (HYBRID VEHICLE CONTROL ECU CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

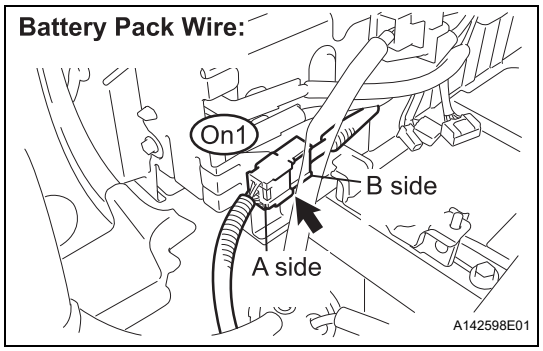
OK

3	CHECK CONNECTOR CONNECTION CONDITION (BATTERY PACK WIRE CONNECTOR) (See page HV-118)

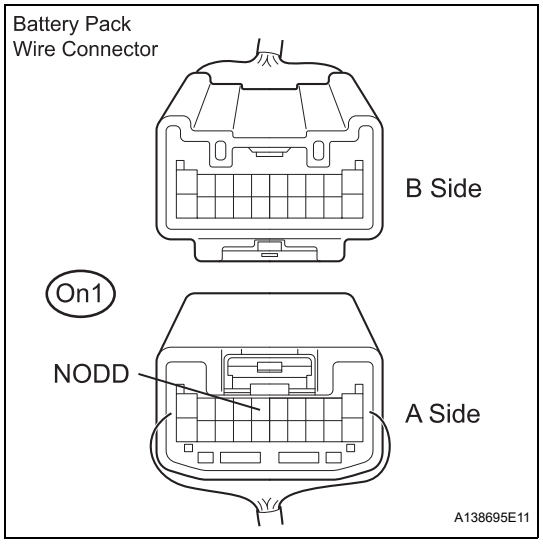
NG → CONNECT SECURELY

OK

4	CHECK HARNESS AND CONNECTOR (RESISTANCE VALUE OF NODD INSIDE HYBRID VEHICLE CONTROL ECU)



(a) Disconnect the On1 battery pack wire connector (See page HB-81).



(b) Measure the resistance according to the value(s) in the table below.

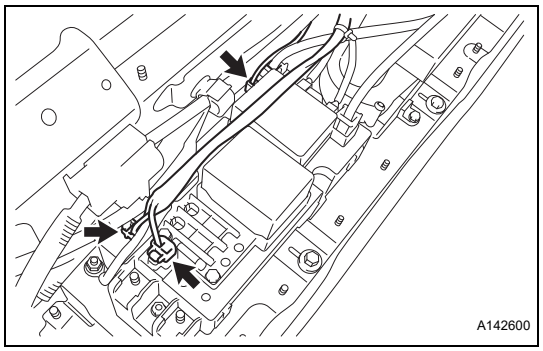
Standard resistance

Tester Connection	Specified Condition
NODD (On1-6) - Body ground	120 to 140 kΩ

NG → **Go to step 11**

OK

5	CHECK CONNECTOR CONNECTION CONDITION (HV RELAY ASSEMBLY CONNECTOR)



CAUTION:
Be sure to wear insulated gloves.

(a) Turn the power switch off and remove the service plug grip (See page HV-1).

NOTICE:
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Check the connections of the HV relay assembly connectors.

Result:

The connectors are connected securely and there are no contact problems.

HINT:

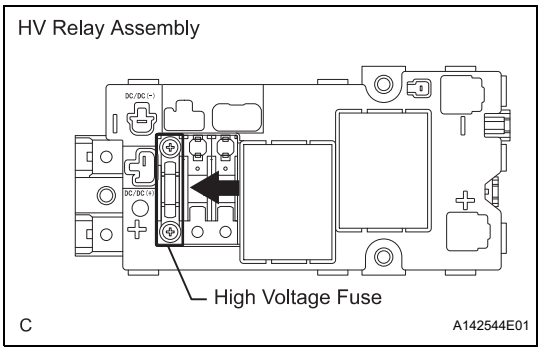
For the removal procedure of the HV relay assembly connector, (See page HB-104).

HV

NG → CONNECT SECURELY

OK

6	CHECK HV RELAY ASSEMBLY (HIGH VOLTAGE FUSE)



CAUTION:
Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.
(b) Remove the HV relay assembly (See page HB-104).
(c) Measure the resistance according the the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
High voltage fuse terminal	Below 1 Ω

NG → REPLACE HIGH VOLTAGE FUSE

OK

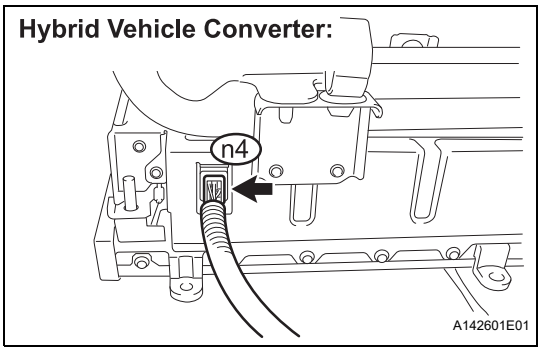
7	CHECK CONNECTOR CONNECTION CONDITION (HYBRID VEHICLE CONVERTER CONNECTOR) (See page HV-120)

NG → CONNECT SECURELY

OK

HV

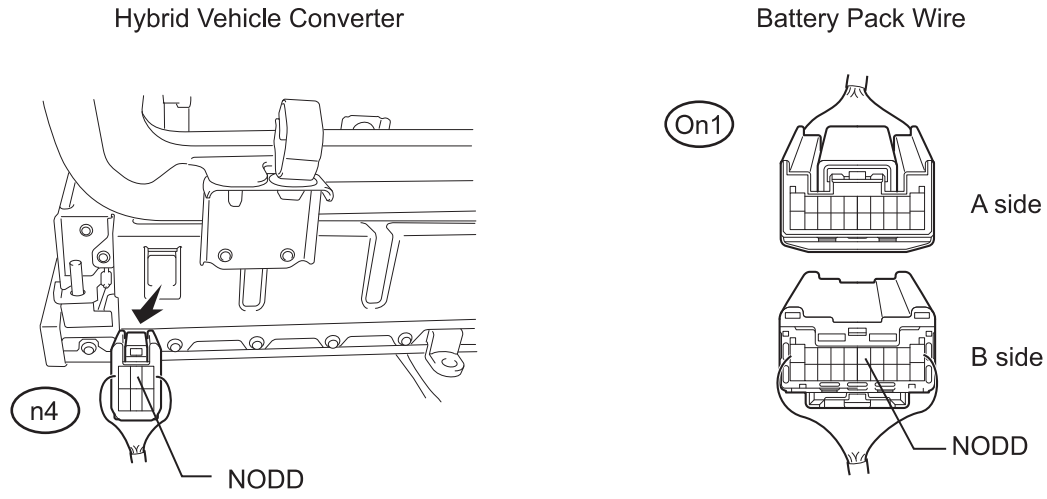
8	CHECK HARNESS AND CONNECTOR (BATTERY PACK WIRE - HYBRID VEHICLE CONVERTER)



CAUTION:
Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.
(b) Disconnect the n4 hybrid vehicle converter connector (See page HB-123).
(c) Measure the resistance according to the value(s) in the table below.

Wire Harness Side:



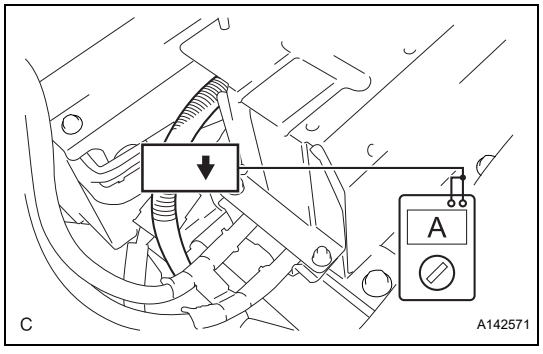
Standard resistance

Tester Connection	Specified Condition
NODD (On1-6) - NODD (n4-2)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

9 INSPECT HYBRID VEHICLE CONVERTER



(a) Connect all the disconnected connectors.
(b) Install the service plug grip.
(c) Measure the current output from the hybrid vehicle converter with the headlight position switch and blower motor switch in the HI position, and the rear window defogger turned on (*1).
(d) Measure the auxiliary battery voltage according to the previous conditions (*1).

Result

Item	Specified Condition
Current flowing from the hybrid vehicle converter	60 to 140 A
Auxiliary battery voltage	13 to 15 V

NG → **REPLACE HYBRID VEHICLE CONVERTER (See page HB-123)**

OK

HV

10	CHECK FOR INTERMITTENT PROBLEMS

(a) Check for intermittent problems (See page HV-17).

YES → **REPAIR OR REPLACE MALFUNCTIONING PARTS, COMPONENT AND AREA**

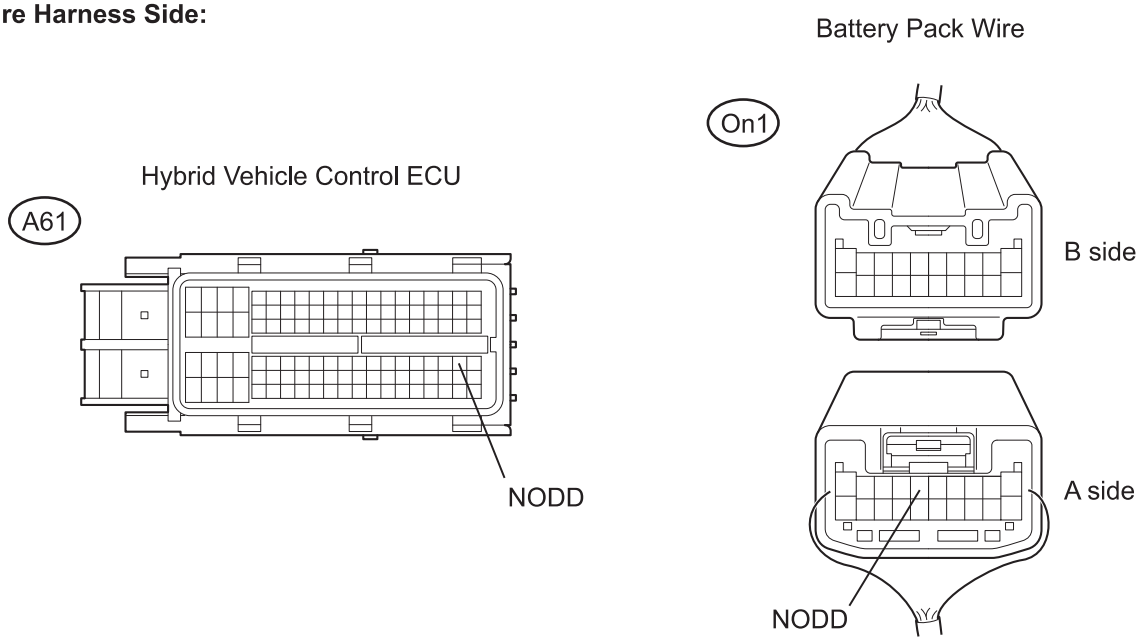
NO

REPLACE HYBRID VEHICLE CONVERTER (See page HB-123)

11	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - BATTERY PACK WIRE CONNECTOR)

(a) Disconnect the A61 hybrid vehicle control ECU connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Wire Harness Side:



Standard voltage

Tester Connection	Specified Condition
NODD (A61-75) - Body ground	Below 1 V

NOTICE:
Turning the power switch on (IG) with the hybrid vehicle control ECU connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(d) Turn the power switch off.

(e) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
NODD (A61-75) - NODD (On1-6)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
NODD (A61-75) or NODD (On1-6) - Body ground	10 kΩ or more

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

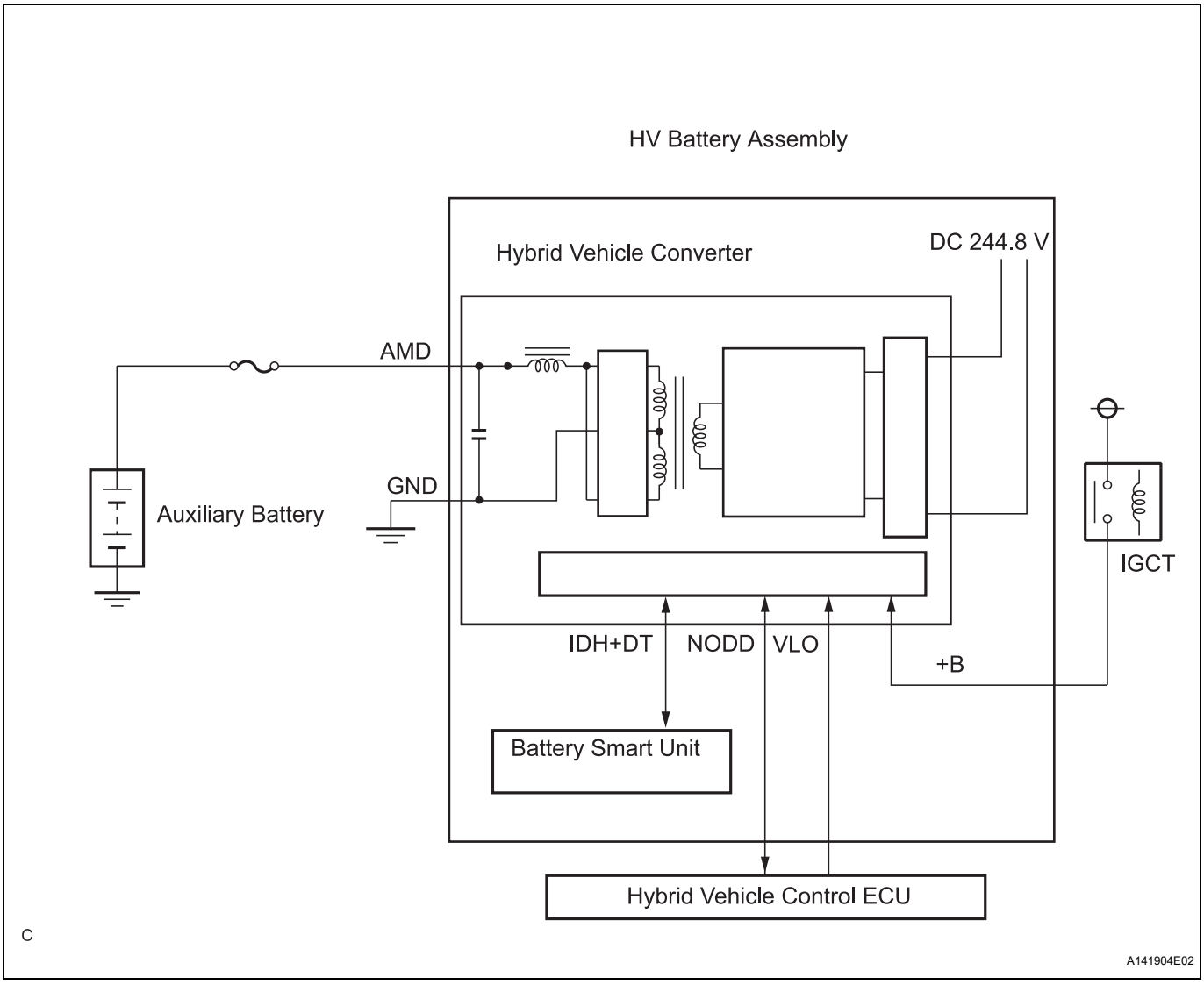
DTC	P0A09-265	DC / DC Converter Status Circuit Low Input

DESCRIPTION

The hybrid vehicle converter (DC/DC converter) converts the DC 244.8 V of the HV battery into DC 12 V in order to supply power to areas such as the vehicle's lighting, audio, and ECU systems. In addition, it charges the auxiliary battery.

A transistor bridge circuit initially converts DC 244.8 V into alternating current, and a transformer lowers its voltage. Then, it is rectified and smoothed (into DC) and converted into DC 12 V.

The hybrid vehicle converter controls the output voltage in order to keep a constant voltage at the terminals of the auxiliary battery.



The hybrid vehicle control ECU uses the NODD signal line to transmit a stop command to the hybrid vehicle converter and receive signals indicating the normal or abnormal condition of the 12 V charging system.

If the vehicle is being driven with an inoperative hybrid vehicle converter, the voltage of the auxiliary battery will drop, which will prevent the continued operation of the vehicle. Therefore, the hybrid vehicle control ECU monitors the operation of the hybrid vehicle converter and alerts the driver if it detects a malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A09	265	Open or short to GND in the hybrid vehicle converter (NODD) signal line	• Wire harness or connector • Hybrid vehicle converter (DC/DC converter) • Hybrid vehicle control ECU

WIRING DIAGRAM

Refer to the wiring diagram (See page HV-102).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1 CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0AE6-225 is also output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC (P0AE6-225)**

NO

2 CHECK CONNECTOR CONNECTION CONDITION (HYBRID VEHICLE CONTROL ECU CONNECTOR) (See page HV-79)

NG → **CONNECT SECURELY**

OK

3 CHECK CONNECTOR CONNECTION CONDITION (BATTERY PACK WIRE CONNECTOR) (See page HV-120)

NG → **CONNECT SECURELY**

HV

OK

4	CHECK HARNESS AND CONNECTOR (RESISTANCE VALUE OF NODD INSIDE HYBRID VEHICLE CONTROL ECU) (See page HV-109)

NG → Go to step 7

OK

5	CHECK CONNECTOR CONNECTION CONDITION (HYBRID VEHICLE CONVERTER CONNECTOR) (See page HV-120)

NG → CONNECT SECURELY

OK

6	CHECK HARNESS AND CONNECTOR (BATTERY PACK WIRE CONNECTOR - HYBRID VEHICLE CONVERTER) (See page HV-110)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

HV

REPLACE HYBRID VEHICLE CONVERTER (See page HB-123)

7	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - BATTERY PACK WIRE CONNECTOR) (See page HV-112)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

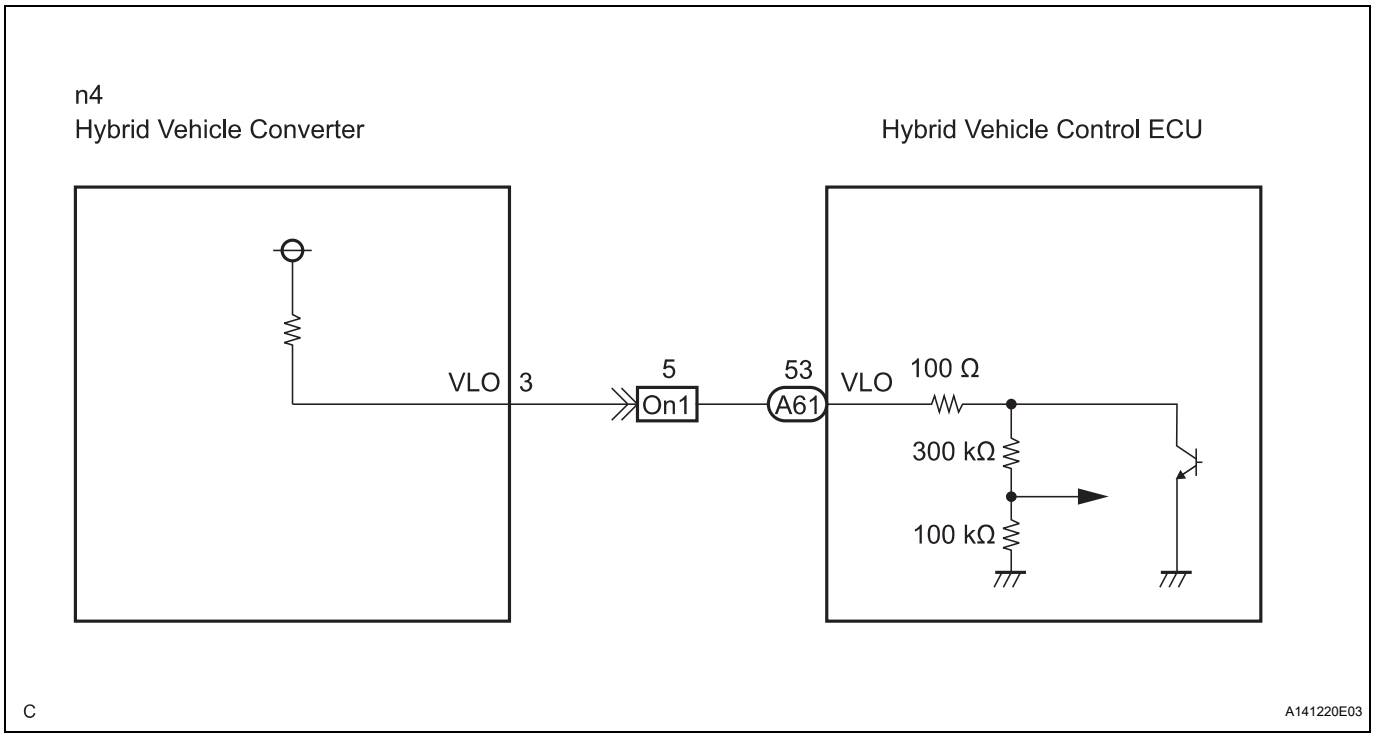
DTC	P0A09-591	DC / DC Converter Status Circuit Low Input

DESCRIPTION

The hybrid vehicle converter (DC/DC converter) controls output voltage based on voltage switching signals sent from the hybrid vehicle control ECU.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A09	591	Hybrid vehicle converter voltage switching (VLO) signal circuit malfunction (Open or short to GND)	• Hybrid vehicle converter (DC/DC converter) • Hybrid vehicle control ECU • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks.**
  After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).

HV

(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0AE6-225 is also output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC (P0AE6-225)**

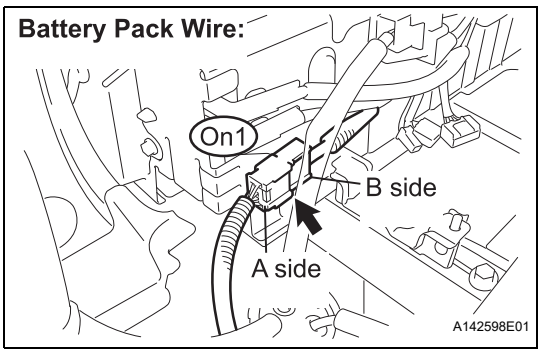
NO

2	CHECK CONNECTOR CONNECTION CONDITION (HYBRID VEHICLE CONTROL ECU CONNECTOR) (See page HV-79)

NG → **CONNECT SECURELY**

OK

3	CHECK CONNECTOR CONNECTION CONDITION (BATTERY PACK WIRE CONNECTOR)



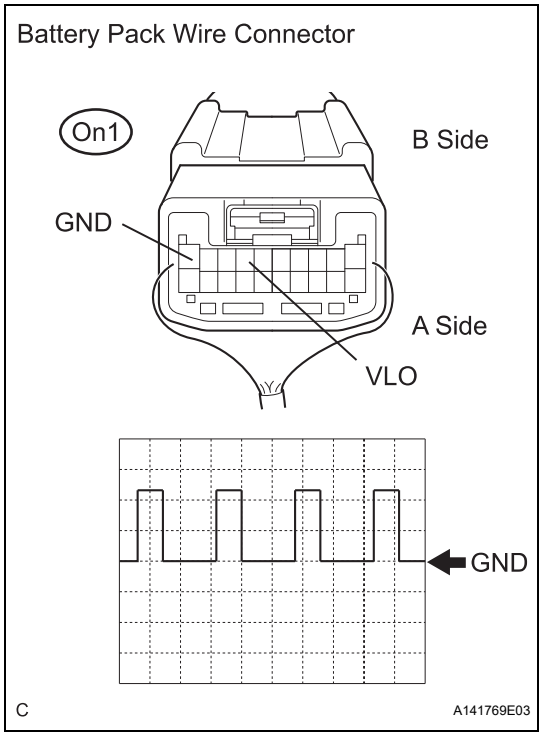
(a) Check the connection of the battery pack wire connector.
OK:
The connector is connected securely and there are no contact problems.
HINT:
For the removal and installation procedures related to inspection of the connection of the battery pack wire connector, (See page HB-81).

NG → **CONNECT SECURELY**

OK

HV

4 CHECK HYBRID VEHICLE CONTROL ECU



(a) Connect an oscilloscope between the battery pack wire terminals specified in the table below, and measure the waveform.

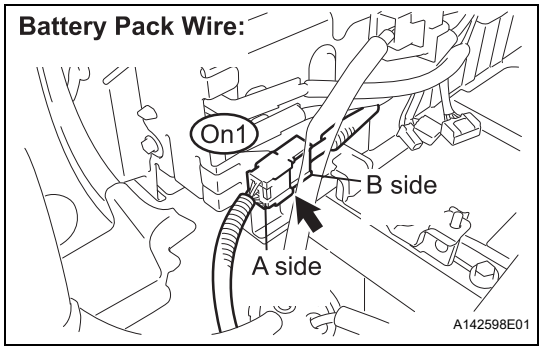
Item	Contents
Terminal	VLO (On1-7) - GND (On1-10)
Equipment Setting	5 V/DIV, 50 ms./DIV
Condition	Power switch on (IG)

HINT:
Perform this inspection with the battery pack wire connected.

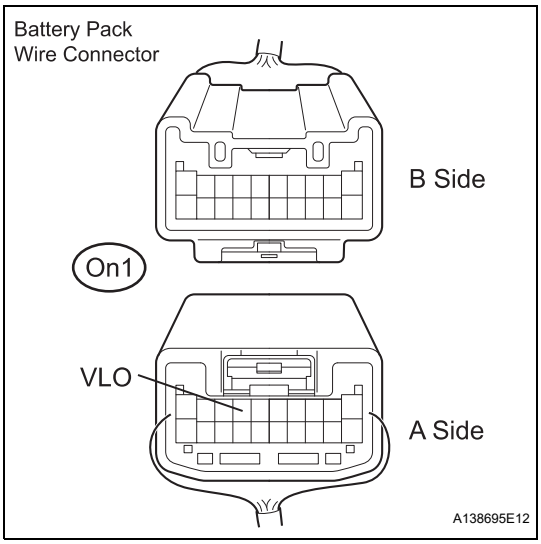
OK → **Go to step 9**

NG

5 CHECK HARNESS AND CONNECTOR (RESISTANCE VALUE INSIDE HV CONTROL ECU)



(a) Disconnect the battery pack wire connector.



(b) Measure the resistance according to the value(s) in the table below.

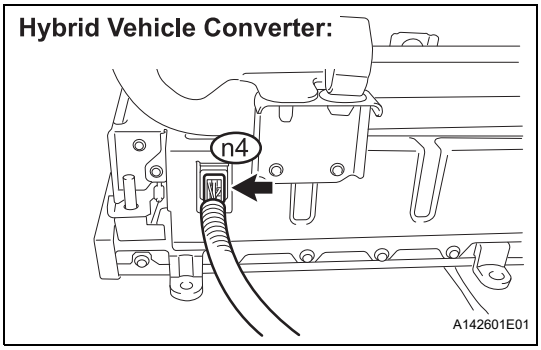
Standard resistance

Tester Connection	Specified Condition
VLO (On1-7) - Body ground	370 to 430 kΩ

NG → **Go to step 8**

OK

6	CHECK CONNECTOR CONNECTION CONDITION (HYBRID VEHICLE CONVERTER CONNECTOR)



CAUTION:
Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.
(b) Check the connection of the hybrid vehicle converter connector.

OK:

The connector is connected securely and there are no contact problems.

NG → **CONNECT SECURELY**

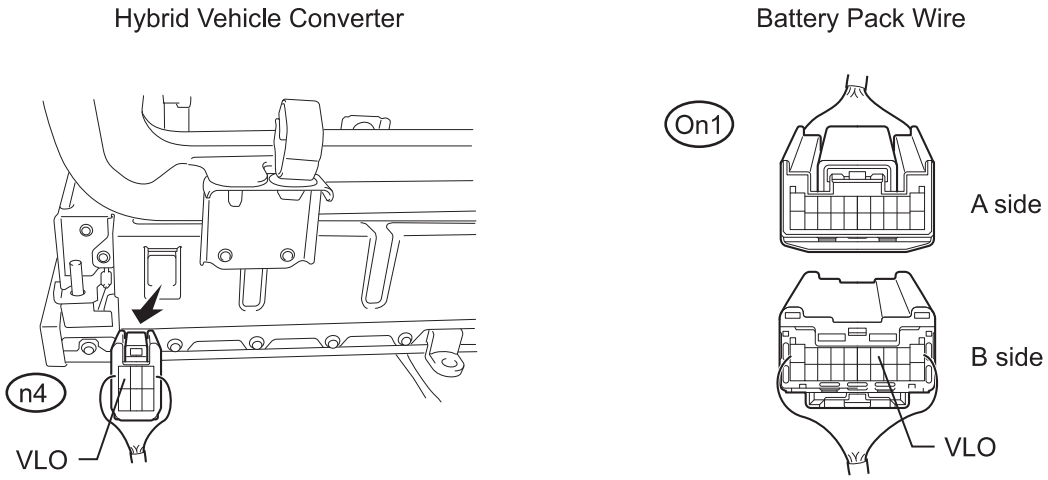
OK

7	CHECK HARNESS AND CONNECTOR (BATTERY PACK WIRE CONNECTOR - HYBRID VEHICLE CONVERTER)

CAUTION:
Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.
(b) Disconnect the n4 hybrid vehicle converter connector (See page HB-123).
(c) Measure the resistance according to the value(s) in the table below.

Wire Harness Side:



Standard resistance (Check for open)

Tester Connection	Specified Condition
VLO (On1-7) - VLO (n4-3)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
VLO (On1-7) or VLO (n4-3) - Body ground	10 kΩ or more

HV

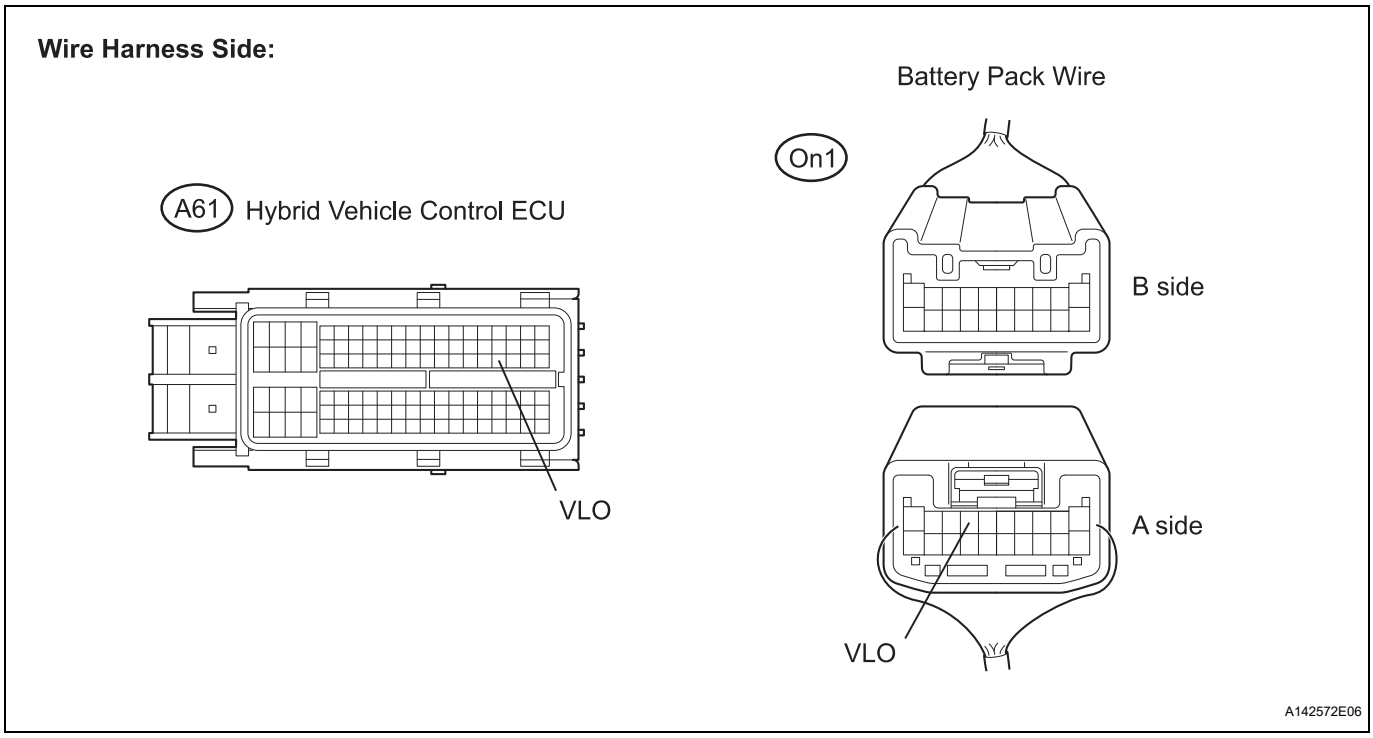
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONVERTER (See page HB-123)

8	CHECK HARNESS AND CONNECTOR (HV CONTROL ECU - BATTERY PACK WIRE CONNECTOR)

(a) Disconnect the A61 hybrid vehicle control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.



Standard resistance (Check for open)

Tester Connection	Specified Condition
VLO (A61-53) - VLO (On1-7)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
VLO (A61-53) or VLO (On1-7) - Body ground	10 kΩ or more

HV

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

9	CLEAR DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Read and record the DTCs and freeze frame data.
(d) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CLEAR CODES.
(e) Clear the DTCs.

NEXT

10	RECONFIRM DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).

(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0A09-591 is output.
(e) Clear the DTCs.

YES → **REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)**

NO

11	CHECK FOR INTERMITTENT PROBLEMS

(a) Check for intermittent problems (See page HV-17).

NG → **REPAIR OR REPLACE MALFUNCTIONING PARTS, COMPONENT AND AREA**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

DTC	P0A0D-350	High Voltage System Inter-Lock Circuit High

DTC	P0A0D-351	High Voltage System Inter-Lock Circuit High

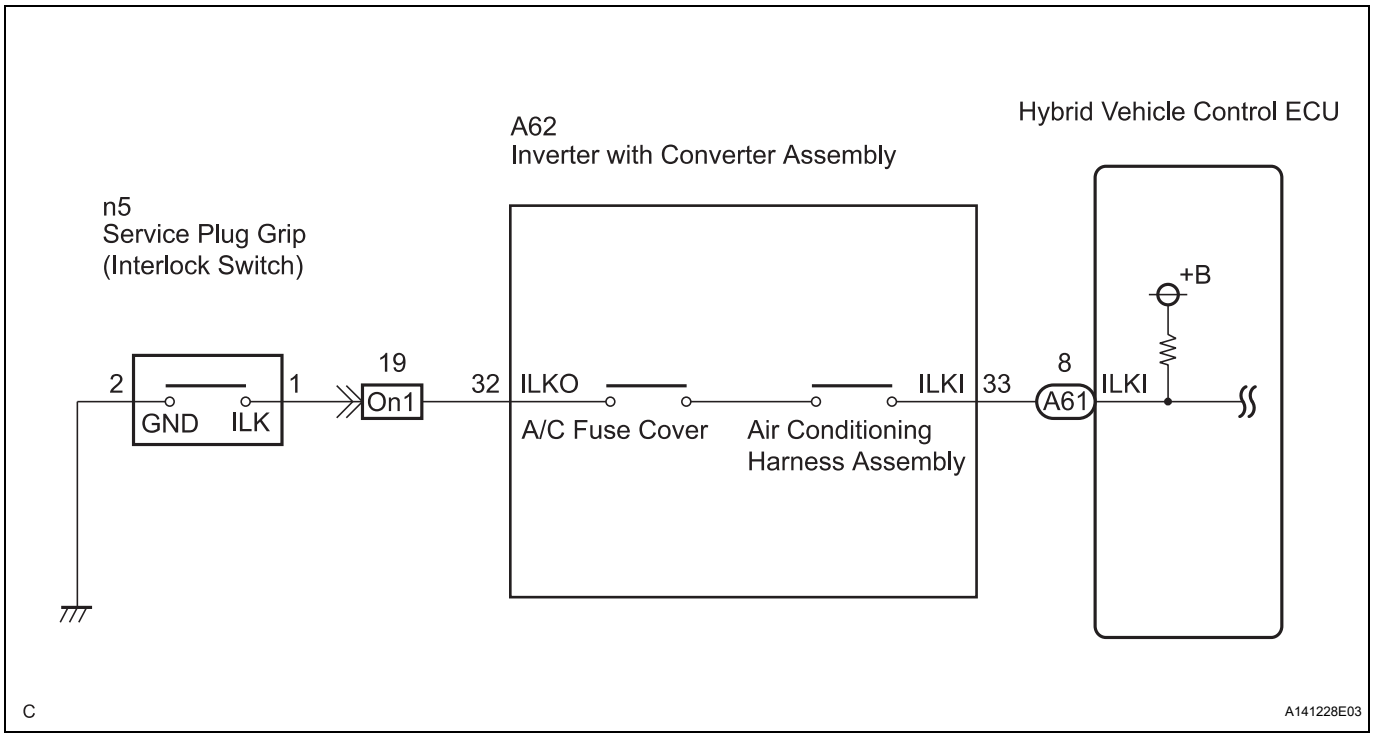
DESCRIPTION

When the hybrid vehicle control ECU detects that a safety device is operated, it will prohibit the hybrid system operation or shut off the system main relay. There are three safety devices in three different locations. The first safety device is located at the service plug grip. The second one is located at the air conditioner fuse maintenance A/C fuse cover of the inverter with converter assembly. The third one is located at the air conditioning harness assembly that is connected to the inverter with converter assembly. If the service plug grip, A/C fuse cover, or air conditioning harness assembly is removed, the interlock signal line will be open. If the vehicle is being driven, this condition will be determined to be an open malfunction and the system main relay will not be shut off. If the safety devices are installed correctly, the system returns to normal when the power switch is turned on (IG).

DTCNo.	INF Code	DTC Detection Condition	Trouble Area
P0A0D	350	Operating any of the safety devices with the vehicle stopped (ILK signal is ON)	• Wire harness or connector • Hybrid vehicle control ECU • Service plug grip • Inverter with converter assembly • Air conditioning harness assembly
P0A0D	351	Interlock signal line opens while the vehicle is being driven	• Wire harness or connector • Hybrid vehicle control ECU • Service plug grip • Inverter with converter assembly • Air conditioning harness assembly

HV

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0A1D is output.

YES → **GO TO DTC CHART**

NO

2	CLEAR DTC (HV)

(a) Turn the power switch on (IG).
(b) Read and record the DTCs and freeze frame data.
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CLEAR CODES.
(d) Clear the DTCs.

NEXT

3	RECONFIRM DTC OUTPUT (HV)

(a) Turn the power switch on (IG).
(b) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(c) Recheck for DTCs.
Result:
DTC P0A0D-350 or P0A0D-351 is output again.

NO → **Go to step 11**

YES

HV

4	CHECK SERVICE PLUG GRIP

CAUTION:
Be sure to wear insulated gloves.

(a) Check if the service plug grip is installed correctly.
Result:
The service plug grip is installed correctly.
HINT:
For the removal and installation procedures, (See page HV-1).

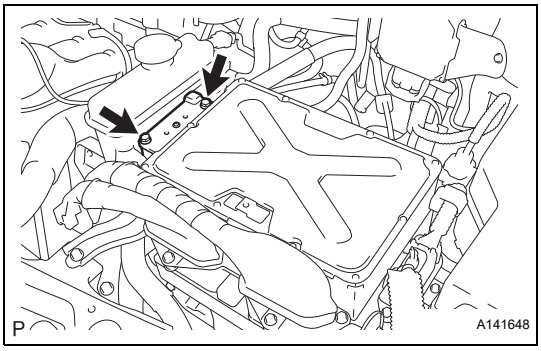
NO → **CONNECT SECURELY**

YES

5	CHECK INVERTER WITH CONVERTER (A/C FUSE COVER INSTALLATION CONDITION)

CAUTION:
Be sure to wear insulated gloves.

(a) Turn the power switch off and remove the service plug grip (See page HV-1).
(b) Check if the A/C fuse cover of the inverter with converter assembly is installed correctly.
Result:
The A/C fuse cover of the inverter with converter assembly is installed correctly.



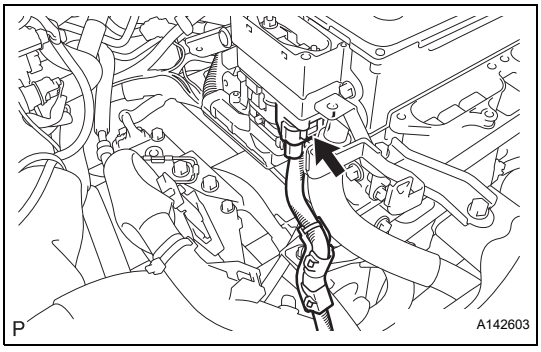
NO → **CONNECT SECURELY**

YES

6	CHECK AIR CONDITIONING HARNESS ASSEMBLY (AIR CONDITIONING HARNESS ASSEMBLY CONNECTION CONDITION)

CAUTION:
Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.
(b) Check if the air conditioning harness assembly connector is connected correctly.
Result:
The air conditioning harness assembly connector is connected correctly.



NO → **CONNECT SECURELY**

HV

YES

7	CHECK HYBRID VEHICLE CONTROL ECU

CAUTION:
Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.
NOTICE:
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

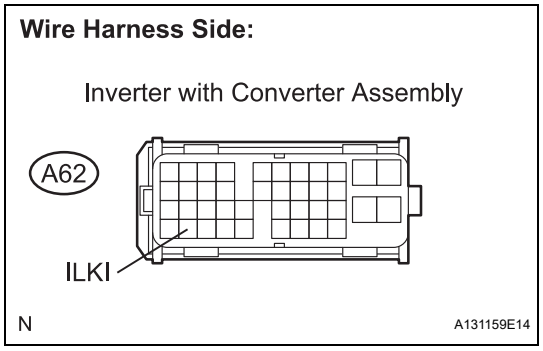
(b) Disconnect the A62 inverter with converter assembly connector.

(c) Turn the power switch on (IG).

(d) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Specified Condition
ILKI (A62-33) - Body ground	9 to 14 V

NOTICE:
Turning the power switch on (IG) with the inverter with converter assembly connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.



NG → Go to step 17

OK

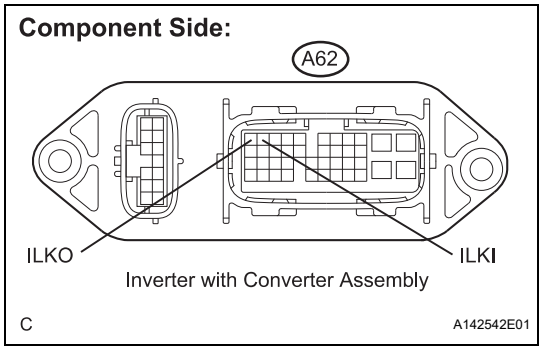
8	CHECK INVERTER WITH CONVERTER ASSEMBLY

CAUTION:
Be sure to wear insulated gloves.

(a) Turn the power switch off.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
ILKI (A62-33) - ILKO (A62-32)	1 Ω or less



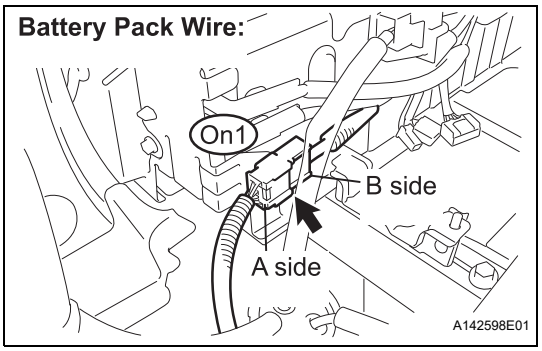
NG → Go to step 15

OK

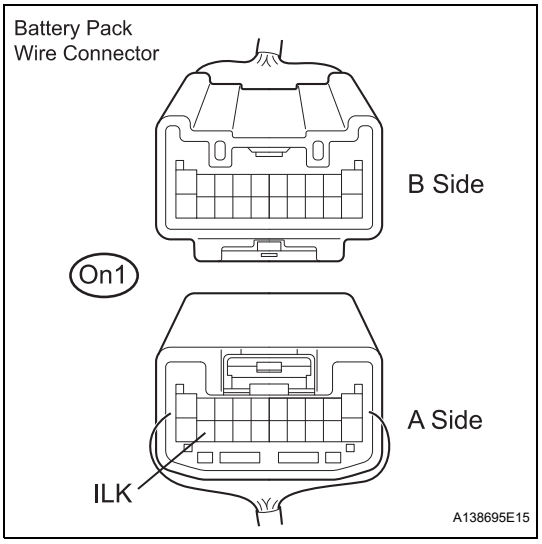
9	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - BATTERY PACK WIRE)

(a) Connect the inverter with converter assembly connector.

HV



(b) Disconnect the On1 battery pack wire connector (See page HB-81).
(c) Turn the power switch on (IG).



(d) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Specified Condition
ILK (On1-19) - Body ground	9 to 14 V

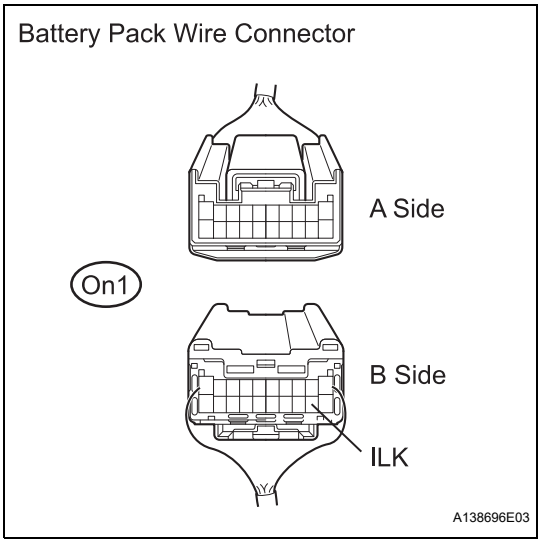
NOTICE:
Turning the power switch on (IG) with the battery pack wire connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

HV

10	CHECK HARNESS AND CONNECTOR (BATTERY PACK WIRE - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
ILK (On1-19) - Body ground	Below 1 Ω

NG → **Go to step 12**

OK

11	CHECK CONNECTOR CONNECTION CONDITION (INTERLOCK CIRCUIT)

(a) Check the connections of each connector.

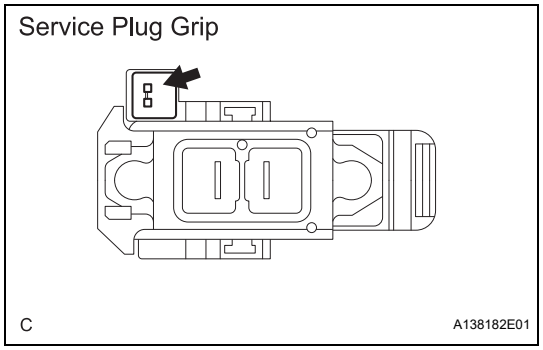
Result:
Dirt or foreign objects have not entered the connection, or there is no evidence of contamination.

NG → **REPAIR OR REPLACE CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

12 CHECK SERVICE PLUG GRIP



CAUTION:
Be sure to wear insulated gloves.

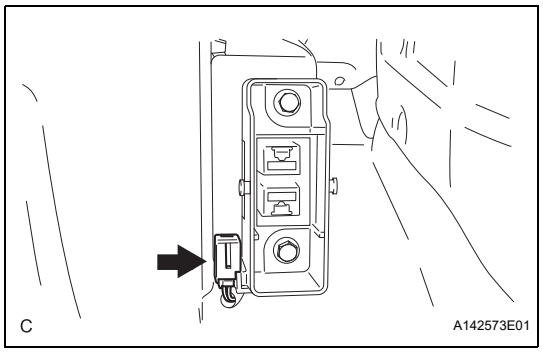
(a) Turn the power switch off and remove the service plug grip (See page HV-1).
NOTICE:
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Check the condition of the service plug grip interlock.
Result:
Dirt or foreign objects have not entered the connection, or there is no evidence of contamination.

NG → **REPLACE SERVICE PLUG GRIP**

OK

13 CHECK HARNESS AND CONNECTOR (INTERLOCK CONNECTOR CONNECTION CONDITION)



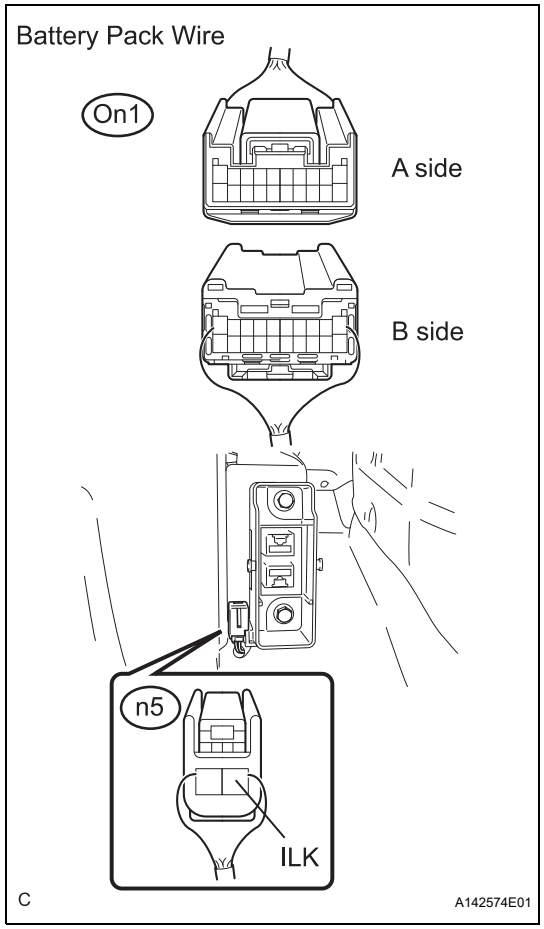
(a) Check that the interlock connector at the service plug grip installation socket is connected correctly.
Result:
The connector is connected correctly.

NG → **CONNECT SECURELY**

OK

HV

14	CHECK HARNESS AND CONNECTOR (BATTERY PACK WIRE CONNECTOR - SERVICE PLUG GRIP)



CAUTION:
Be sure to wear insulated gloves.

(a) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
ILK (On1-19) - ILK (n5-1)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (BATTERY PACK WIRE CONNECTOR - SERVICE PLUG GRIP)**

OK

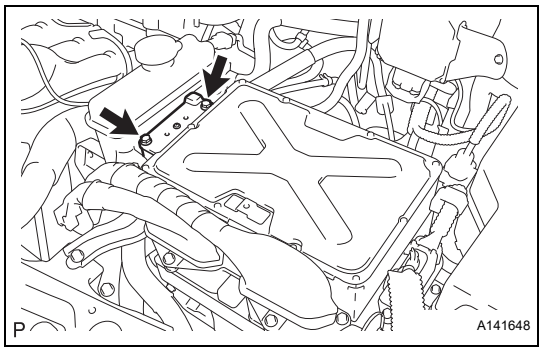
REPAIR OR REPLACE HARNESS OR CONNECTOR (SERVICE PLUG GRIP - BODY GROUND)

15	CHECK INVERTER WITH CONVERTER ASSEMBLY (A/C FUSE COVER OF INVERTER WITH CONVERTER)

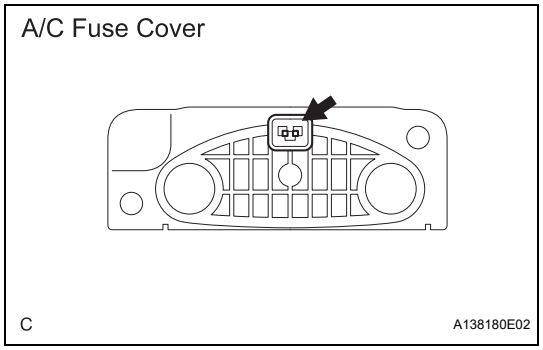
CAUTION:
Be sure to wear insulated gloves.

(a) Turn the power switch off and remove the service plug grip (See page HV-1).
NOTICE:
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

HV



(b) Remove the A/C fuse cover from the inverter with converter assembly.



(c) Check the condition of the A/C fuse cover interlock.
Result:
Dirt or foreign objects have not entered the connection, or there is no evidence of contamination.

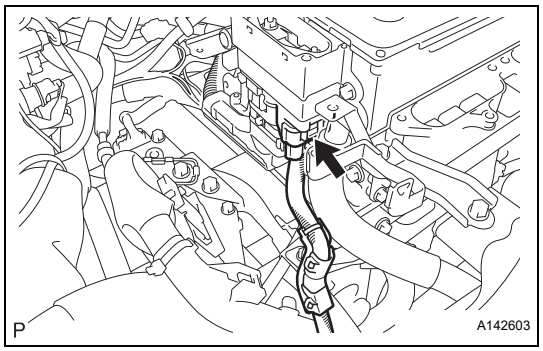
NG	**REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)**

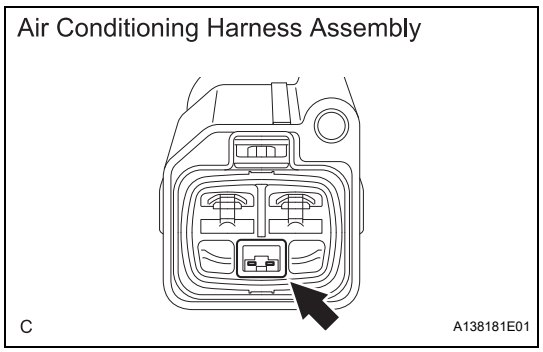
OK

16 CHECK AIR CONDITIONING HARNESS ASSEMBLY (INTERLOCK)

CAUTION:
Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.
(b) Remove the air conditioning harness assembly from the inverter with converter assembly.





(c) Check the condition of the air conditioning harness assembly interlock.
Result:
Dirt or foreign objects have not entered the connection, or there is no evidence of contamination.

NG	**REPLACE AIR CONDITIONING HARNESS ASSEMBLY**

HV

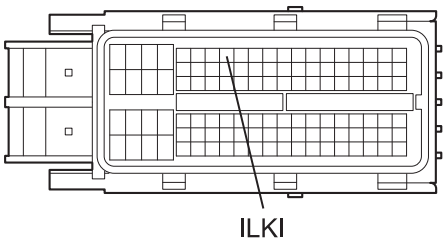
OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

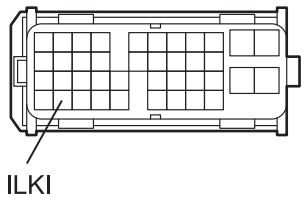
17	CHECK HARNESS AND CONNECTOR (HV CONTROL ECU - INVERTER WITH CONVERTER ASSEMBLY)

Wire Harness Side:

A61 Hybrid Vehicle Control ECU



A62 Inverter with Converter Assembly



A142564E02

(a) Turn the power switch off.
(b) Disconnect the A61 hybrid vehicle control ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
ILKI (A61-8) - ILKI (A62-33)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

HV

DTC	P0A0F-204	Engine Failed to Start

DTC	P0A0F-205	Engine Failed to Start

DTC	P0A0F-533	Engine Failed to Start

DTC	P0A0F-534	Engine Failed to Start

DESCRIPTION

The hybrid vehicle control system performs the fail-safe control based on an abnormal signal from the EFI system.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A0F	204	Abnormal signal input from the ECM (abnormal engine output)	• Hybrid vehicle control ECU • Engine control system
P0A0F	205	Abnormal signal input from the ECM (engine is unable to start)	• Hybrid vehicle control ECU • Engine control system
P0A0F	533	Abnormal signal input from the ECM (abnormal engine output when running out of fuel)	• Hybrid vehicle control ECU • Engine control system
P0A0F	534	Abnormal signal input from the ECM (fuel level not sufficient to start the engine)	• Hybrid vehicle control ECU • Engine control system

HV

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (ENGINE CONTROL SYSTEM)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBDII / ENGINE / DTC INFO / CURRENT CODES.
(d) Read output DTC.

OK:

DTCs are output

YES → GO TO DTC CHART

NO

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

DTC	P0A0F-238	Engine Failed to Start

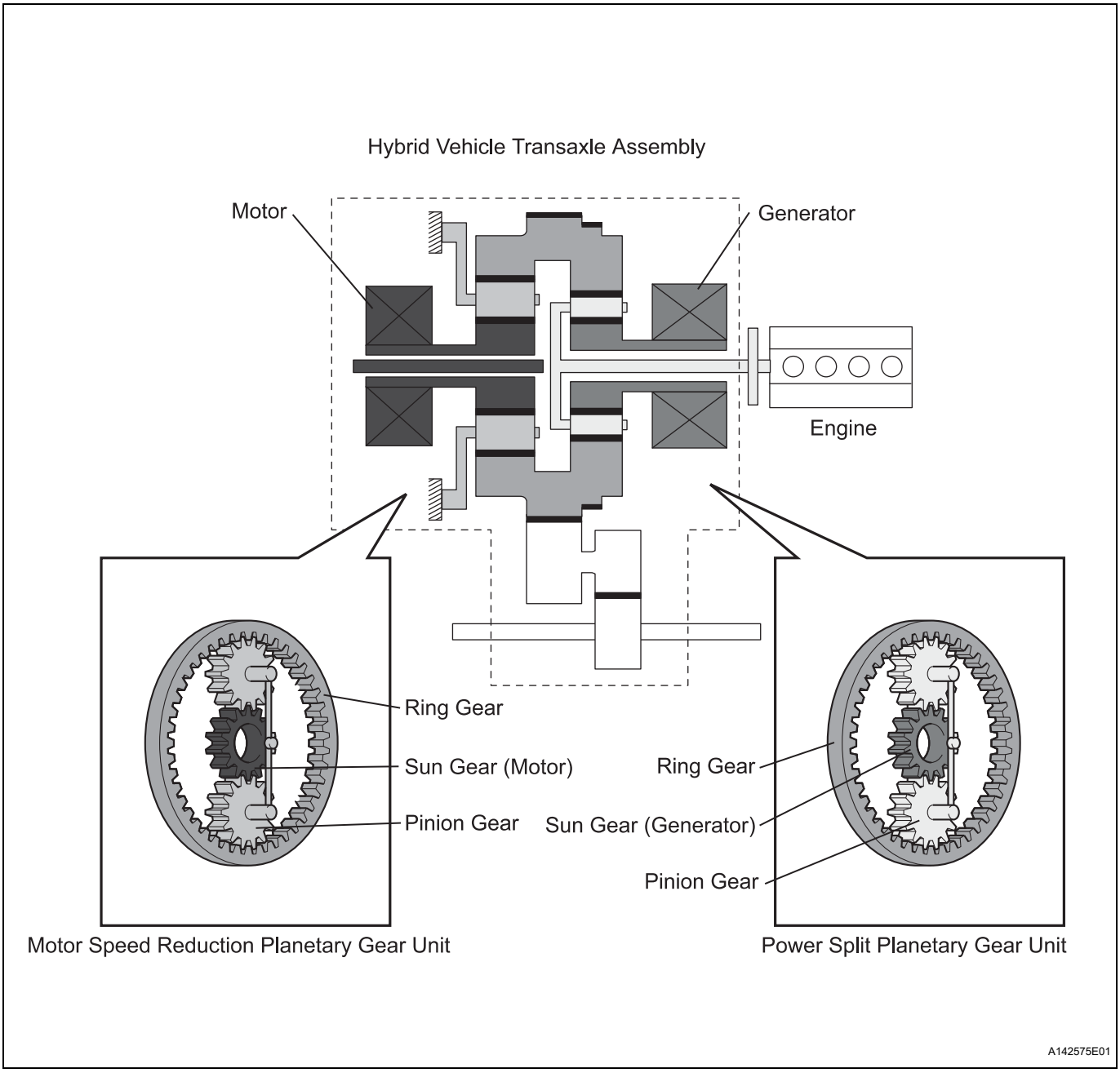
DESCRIPTION

The hybrid vehicle control ECU detects this DTC and effects fail-safe control if the engine or transaxle gear has seized up, or foreign objects have been caught in either of them.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A0F	238	Engine does not start even though cranking it (transaxle input malfunction [engine system])	• Engine • Hybrid vehicle transaxle assembly (shaft, gear) • Transmission input damper • Wire harness or connector • Hybrid vehicle control ECU

HINT:

If this DTC is output, the engine or transaxle gear may be seized up. Be sure to check the level of the engine oil, transaxle oil (ATF), and coolant before inspection.



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (ENGINE CONTROL SYSTEM)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBDII / ENGINE / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTCs are output.

YES → **GO TO DTC CHART**

NO

2	CHECK CRANKSHAFT PULLEY REVOLUTION (P POSITION)

(a) Turn the power switch off, move the shift lever to the P position, and lift up the vehicle.
(b) Turn the crankshaft pulley by hand to check if the crankshaft rotates.
CAUTION:
Do not turn the power switch on (READY) while performing this inspection. Be sure to turn the power switch off before performing this inspection, to prevent the engine from starting.
OK:
The crankshaft rotates.

NG → **Go to step 11**

OK

3	CHECK HARNESS AND CONNECTOR (HV CONTROL ECU - CRANKSHAFT POSITION SENSOR) (See page ES-167)

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	INSPECT CRANKSHAFT POSITION SENSOR (See page ES-166)

NG → **REPLACE CRANKSHAFT POSITION SENSOR**

OK

5	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.

HV

(b) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(c) Check if DTCs are output.
(d) Confirm and record the DTCs, freeze frame data, and information for the HV system.

NEXT

6	CLEAR DTC

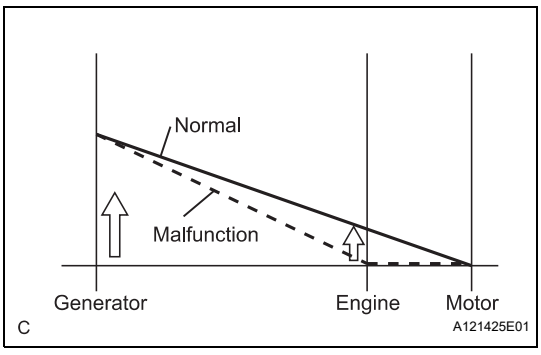
(a) Connect the intelligent tester to the DLC3.
(b) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CLEAR CODES.
(c) Clear the DTCs of the HV system.

NEXT

7	CHECK READY LIGHT ON

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DATA LIST / MG1 REV and ENGINE SPD.
(d) Depress the brake pedal and turn the power switch on (READY).
OK:
The READY light comes on.
HINT:
- If the READY light does not come on and the reading on the intelligent tester shows DTC P0A90-239 (hybrid vehicle transaxle input malfunction [shaft damaged]), or the READY light comes on and MG1 turns but the engine does not crank, replace the hybrid vehicle transaxle assembly.
- If this DTC (P0A0F-238) is output, the HV battery may be dead and DTC P3000-388 or P3000-389 may be output.

(e) Refer to the graph for data list confirmation of "MG1 REV" and "ENGINE SPD".



Engine speed	Generator speed
Approx. 900 rpm	Approx. 3,200 rpm
Approx. 1,500 rpm	Approx. 5,400 rpm

NG → **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)**

OK

8	CHECK ENGINE RACING

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DATA LIST / MG1 REV and ENGINE SPD.
(d) While the READY light is on, depress the accelerator pedal for 10 seconds with the shift lever in the P position.
OK:
The engine revs up.
HINT:
If the engine does not rev up and the reading on the intelligent tester shows DTC P3147-239 (hybrid vehicle transaxle input malfunction [shaft damaged]), or the Generator turns but the engine does not crank, replace the hybrid vehicle transaxle assembly.

NG → **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)**

OK

9	CHECK CREEP MOVEMENT

(a) Connect the intelligent tester to the DLC3.
(b) Depress the brake pedal, move the shift lever to the D position, and release the brake pedal.
OK:
The wheels turn (creeping along).
HINT:
If the wheels do not turn and the reading on the intelligent tester shows DTC P3147 (transaxle malfunction), replace the hybrid vehicle transaxle assembly.

NG → **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)**

OK

10	ENGINE SPEED

(a) Connect the intelligent tester to the DLC3.
(b) While driving at the vehicle speed of more than 6 mph (10 km/h), fully depress the accelerator pedal to raise the engine speed.
OK:
Engine speed increases smoothly.

HINT:
If the engine over-revs or the reading on the intelligent tester shows DTC P3147-241 (transaxle input malfunction [torque limiter slipping]), replace the transmission input damper.

NG → **REPLACE TRANSMISSION INPUT DAMPER ASSEMBLY**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

11	CHECK FRONT TIRE REVOLUTION

(a) Lift up the vehicle.
(b) Move the shift lever to the N position with the power switch off.
CAUTION:
Do not turn the power switch on (READY) while performing this inspection. Be sure to turn the power switch off before performing this inspection, to prevent the engine from starting.
(c) Turn the crank pulley by hand to check if the front tires rotate.
OK:
The front tires do not rotate.

NG → **CHECK AND REPAIR ENGINE**

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A10-263	DC / DC Converter Status Circuit High Input

DESCRIPTION

Refer to the circuit description for DTC P0A08-264 (See page HV-109).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A10	263	+B short in hybrid vehicle converter (DC/DC converter) NODD signal line	• Wire harness or connector • Hybrid vehicle converter (DC/DC converter) • Hybrid vehicle control ECU

WIRING DIAGRAM

Refer to the wiring diagram for P0A08-264 (See page HV-102).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

HV

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

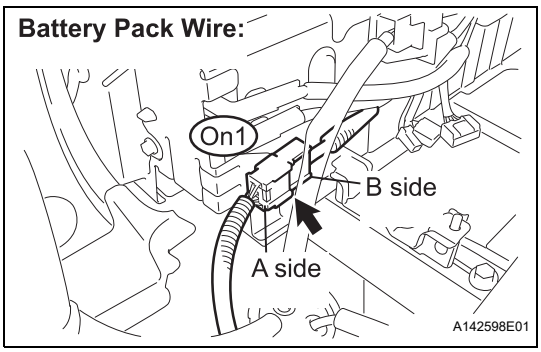
Result:

DTC P0A10-263 and other DTCs are output.

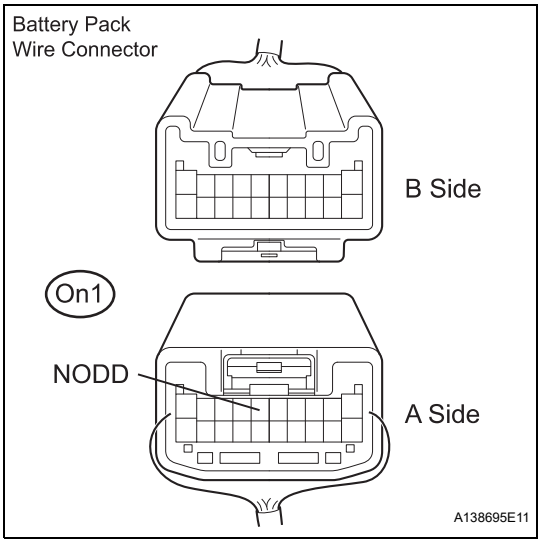
YES → **GO TO DTC CHART**

NO

2	CHECK HARNESS AND CONNECTOR



(a) Disconnect the On1 battery pack wire connector (See page HB-81).
(b) Turn the power switch on (IG).



(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

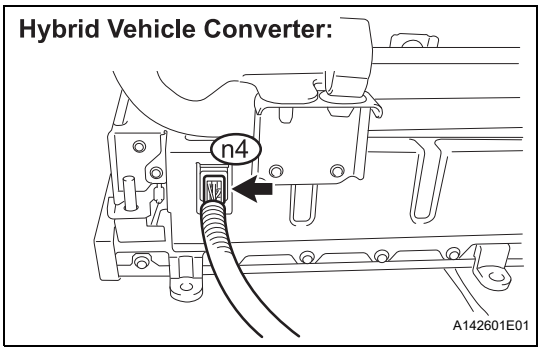
Tester Connection	Specified Condition
NODD (On1-6) - Body ground	Below 1 V

NOTICE:
Turning the power switch on (IG) with the battery pack wire connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

NG → **Go to step 4**

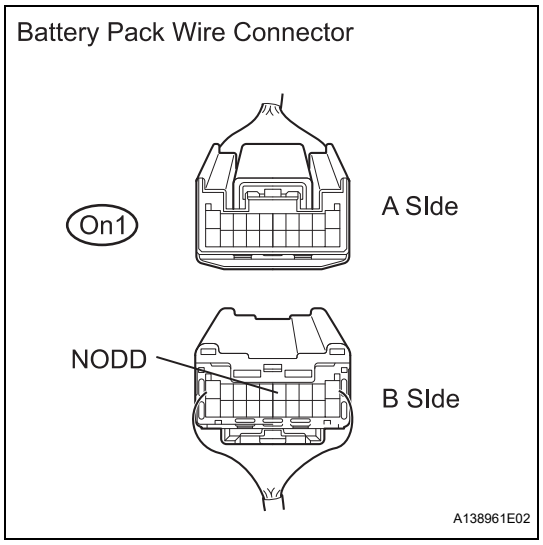
OK

3	CHECK HARNESS AND CONNECTOR (BATTERY PACK WIRE CONNECTOR - HYBRID VEHICLE CONVERTER)



CAUTION:
Be sure to wear insulated gloves.
(a) Check that the service plug grip is not installed.
(b) Disconnect the n4 hybrid vehicle converter connector (See page HB-123).
(c) Turn the power switch on (IG).

HV



(d) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
NODD (On1-6) - Body ground	Below 1 V

NOTICE:
Turning the power switch on (IG) with the battery pack wire connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(e) Turn the power switch off.

(f) Measure the resistance according to the value(s) in the table below.

Standard resistance

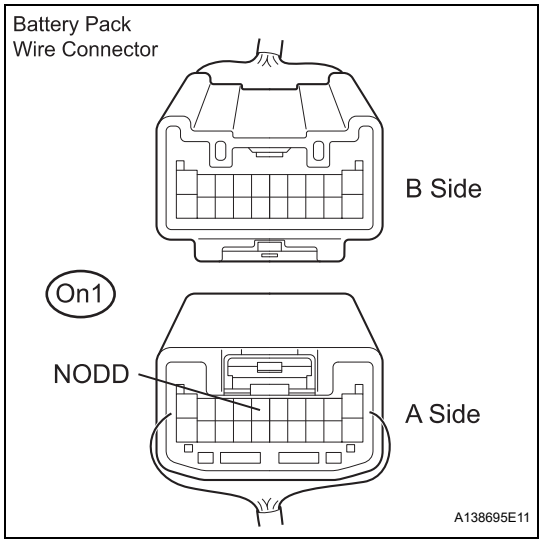
Tester Connection	Specified Condition
NODD (On1-6) - Each of the other terminals	10 kΩ or more

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONVERTER (See page HB-123)

4 CHECK HARNESS AND CONNECTOR (HV CONTROL ECU - BATTERY PACK WIRE)



(a) Disconnect the A61 hybrid vehicle control ECU connector.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
NODD (On1-6) - Body ground	Below 1 V

NOTICE:
Turning the power switch on (IG) with the battery pack wire connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

HV

DTC	P0A10-592	DC / DC Converter Status Circuit High Input

DESCRIPTION

Refer to the circuit description for DTC P0A09-591 (See page HV-112).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A10	592	Hybrid vehicle converter (DC/DC converter) voltage switching (VLO) signal circuit malfunction (+B short)	Hybrid vehicle control ECU

WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A09-591 (See page HV-112).

INSPECTION PROCEDURE

CAUTION:

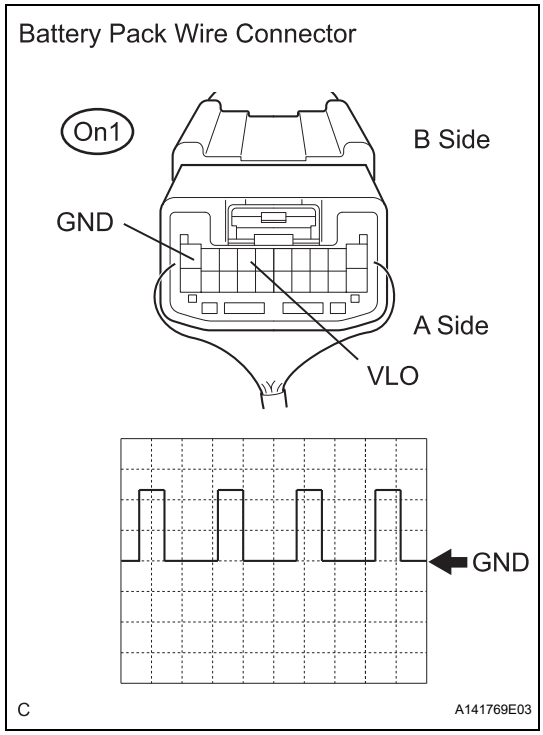
- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

HV

1	CHECK HYBRID VEHICLE CONTROL ECU



(a) Connect an oscilloscope between the battery pack wire terminals specified in the table below, and measure the waveform.

Item	Contents
Terminal	VLO (On1-7) - GND (On1-10)
Equipment Setting	5 V/DIV., 50 ms./DIV.
Condition	Power switch on (IG)

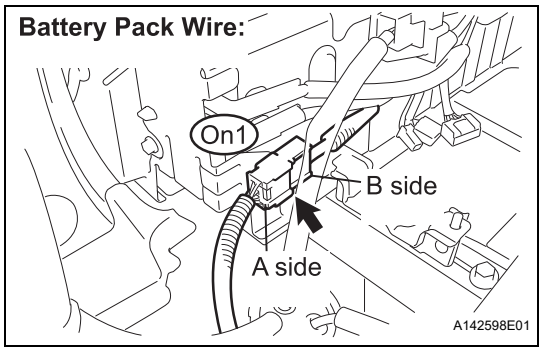
HINT:

Perform this inspection with the battery pack wire connected.

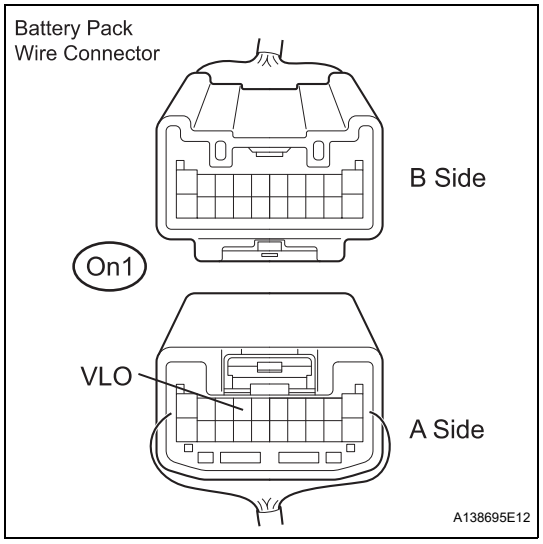
OK → **Go to step 4**

NG

2	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - BATTERY PACK WIRE CONNECTOR)



(a) Disconnect the battery pack wire connector.
(b) Turn the power switch on (IG).



(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

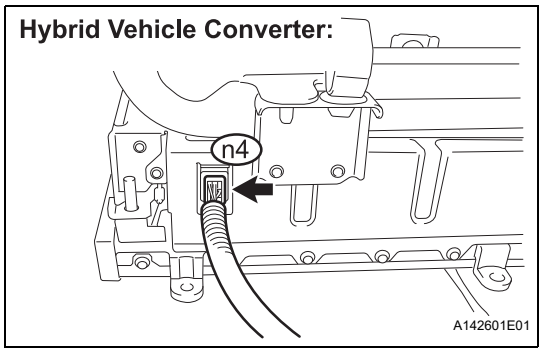
Tester Connection	Specified Condition
VLO (On1-7) - Body ground	Below 1 V

NOTICE:
Turning the power switch on (IG) with the hybrid vehicle control ECU connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONVERTER - BATTERY PACK WIRE CONNECTOR)



(a) Turn the power switch off.

CAUTION:
Be sure to wear insulated gloves.

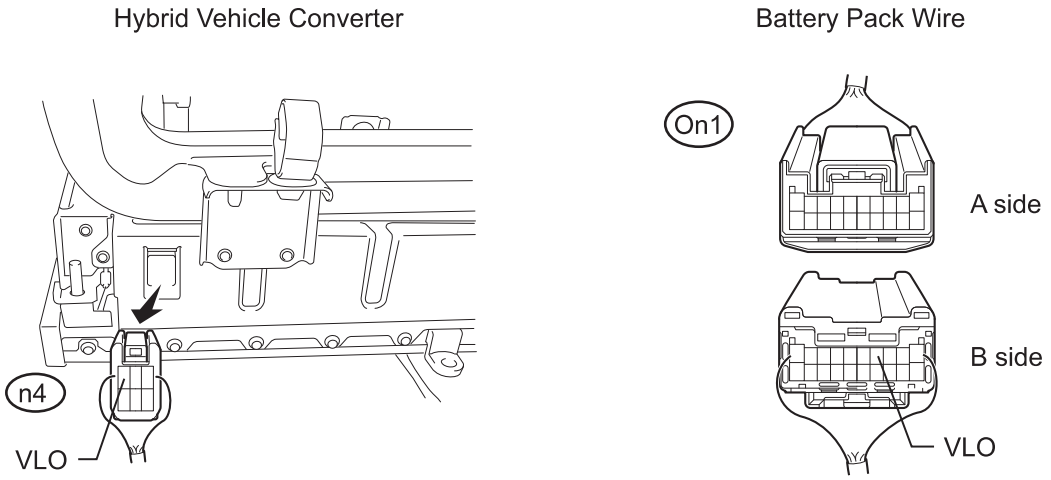
(b) Turn the power switch off and remove the service plug grip.

NOTICE:
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Disconnect the n4 hybrid vehicle converter connector.
(d) Measure the voltage according to the value(s) in the table below.

HV

Wire Harness Side:



Standard voltage

Tester Connection	Specified Condition
VLO (On1-7) or VLO (n4-3) - Body ground	Below 1 V

NOTICE:
Turning the power switch on (IG) with the hybrid vehicle control ECU connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

HV

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

4	CLEAR DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG)
(c) Read and record the DTCs and freeze frame data.
(d) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CLEAR CODES.
(e) Clear the DTCs.

NEXT

5	RECONFIRM DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Read output DTCs.
Result:
DTC P0A10-592 is output.

YES → **REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)**

NO

6	CHECK FOR INTERMITTENT PROBLEMS

(a) Check for intermittent problems (See page HV-17).

NG → **REPAIR OR REPLACE MALFUNCTIONING PARTS, COMPONENT AND AREA**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

DTC	P0A1A-151	Generator Control Module
DTC	P0A1A-155	Generator Control Module
DTC	P0A1A-156	Generator Control Module
DTC	P0A1A-166	Generator Control Module
DTC	P0A1A-658	Generator Control Module
DTC	P0A1A-659	Generator Control Module
DTC	P0A1A-791	Generator Control Module

DESCRIPTION

The inverter with converter assembly (MG ECU) monitors its internal operation and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1A	151	Run pulse error	Inverter with converter assembly (MG ECU)
P0A1A	155	A/D error	Inverter with converter assembly (MG ECU)
P0A1A	156	ROM-RAM error	Inverter with converter assembly (MG ECU)
P0A1A	166	R/D converter NM stop error	Inverter with converter assembly (MG ECU)
P0A1A	658	ALU error	Inverter with converter assembly (MG ECU)
P0A1A	659	Communication error (from MG1 to MG2)	Inverter with converter assembly (MG ECU)
P0A1A	791	R/D converter communication error	Inverter with converter assembly (MG ECU)

MONITOR DESCRIPTION

The MG ECU performs many diagnostic tests to verify proper operation of internal ECU systems. For one of these diagnostics, the MG ECU checks the result of the generator CPU self-test. If the MG ECU detects a "Fail" from the generator CPU self-test, it will conclude that there is an internal malfunction in the generator CPU. The hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A1A (INF 151): RUN pulse malfunction P0A1A (INF 155): A/D malfunction (1 MG CPU) P0A1A (INF 156): RAM and ROM destruction P0A1A (INF 166): RD converter NM signal stop abnormality P0A1A (INF 658): MG CPU ALU malfunction P0A1A (INF 659): MG CPU communication malfunction (1 MG CPU to 2 MG CPU) P0A1A (INF 791): RD converter communication malfunction

Required sensors / components	Inverter with converter (MG ECU)
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	1 driving cycle
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Hybrid vehicle control ECU	DTC P0A1A (INF 151/155/156/166/658/659/791) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HV

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**REPLACE INVERTER WITH CONVERTER ASSEMBLY**

NEXT

COMPLETED

DTC	P0A1A-200	Generator Control Module

DTC	P0A1A-792	Generator Control Module

DTC	P0A1A-793	Generator Control Module

DESCRIPTION

The inverter with converter assembly (MG ECU) monitors its internal operation and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1A	200	Generator R/D resolver angle error	• Inverter with converter assembly (MG ECU) • Hybrid vehicle transaxle assembly (Generator resolver) • Wire harness or connector
P0A1A	792	REF frequency error	• Inverter with converter assembly (MG ECU) • Hybrid vehicle transaxle assembly (Generator resolver) • Wire harness or connector
P0A1A	793	REF signal open error	• Inverter with converter assembly (MG ECU) • Hybrid vehicle transaxle assembly (Generator resolver) • Wire harness or connector

MONITOR DESCRIPTION

HV

The MG ECU (in the inverter with converter assembly) performs many diagnostic tests to verify proper operation of internal ECU systems. For this diagnostic monitor, the MG ECU checks for an R/D (Resolver/Digital converter) malfunction involving the generator resolver. If MG ECU detects an R/D error, it will conclude that there is an internal malfunction involving the generator resolver. The hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A1A (INF 200): RD converter resolver angle abnormality P0A1A (INF 792): REF malfunction (frequency abnormality) P0A1A (INF 793): REF malfunction (REF signal abnormality)
Required sensors / components	Inverter with converter (MG ECU)
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	1 driving cycle
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

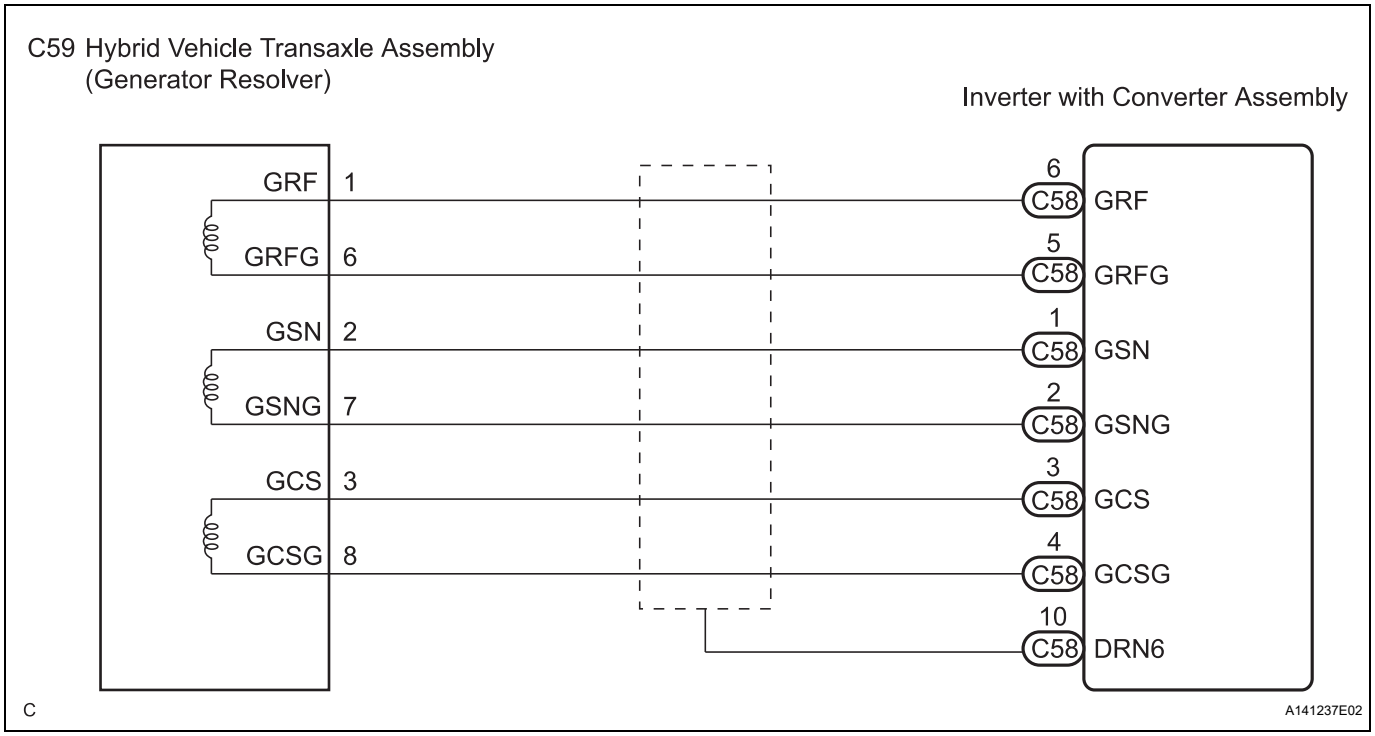
TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Hybrid vehicle control ECU	DTC P0A1A (INF 200/792/793) is not detected

WIRING DIAGRAM



HV

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A4B-253, P0A4C-513, P0A4D-255	Generator resolver circuit

YES → GO TO DTC CHART

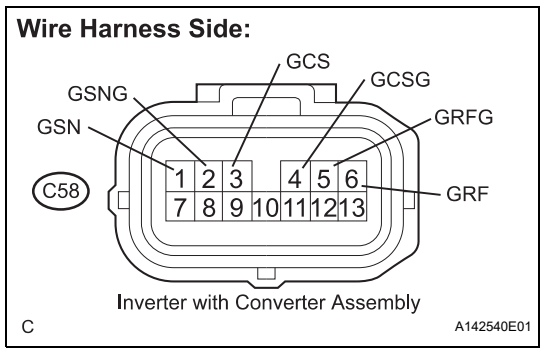
NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

3	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER)



CAUTION:
Be sure to wear insulated gloves.

(a) Turn the power switch off and remove the service plug grip (See page HV-1).
NOTICE:
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect the C58 inverter with converter assembly connector.

(c) Turn the power switch on (IG).

(d) Measure the voltage according to the value(s) in the table below.
Standard voltage

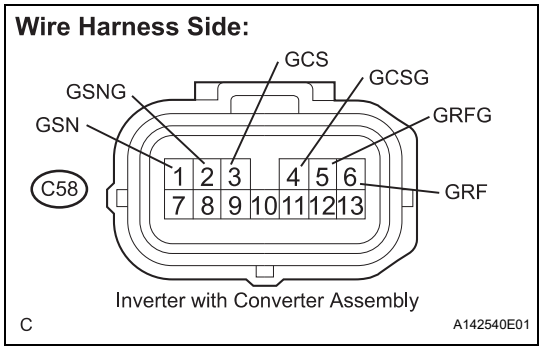
Tester Connection	Specified Condition
GRF (C58-6) - Body ground	Below 1 V
GRFG (C58-5) - Body ground	Below 1 V
GSN (C58-1) - Body ground	Below 1 V
GSNG (C58-2) - Body ground	Below 1 V
GCS (C58-3) - Body ground	Below 1 V
GCSG (C58-4) - Body ground	Below 1 V

NOTICE:
Turning the power switch on (IG) with the inverter with converter assembly connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4 CHECK GENERATOR RESOLVER



(a) Turn the power switch off.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance (Check for open)

Tester Connection	Specified Condition
GRF (C58-6) - GRFG (C58-5)	5.8 to 11.8 Ω
GSN (C58-1) - GSNG (C58-2)	11.7 to 17.7 Ω
GCS (C58-3) - GCSG (C58-4)	11.7 to 17.7 Ω

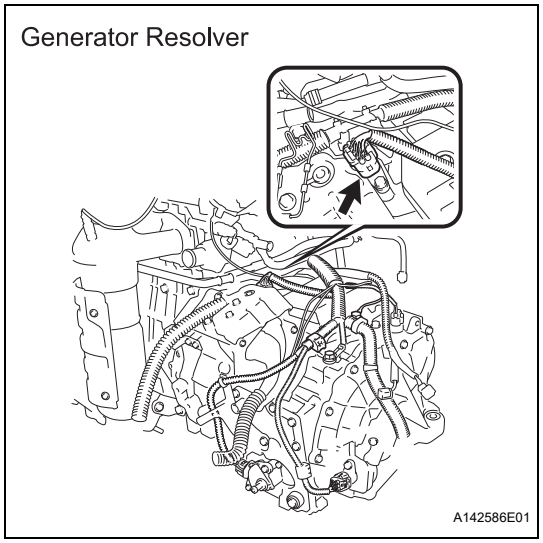
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance (Check for short)

Tester Connection	Specified Condition
GRF (C58-6) or GRFG (C58-5) - Body ground	10 kΩ or more
GSN (C58-1) or GSNG (C58-2) - Body ground	10 kΩ or more
GCS (C58-3) or GCSG (C58-4) - Body ground	10 kΩ or more

OK → **REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)**

NG

5 CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR)



(a) Check the connection of the generator resolver connector.
OK:
The connector is connected securely and there are no contact problems.

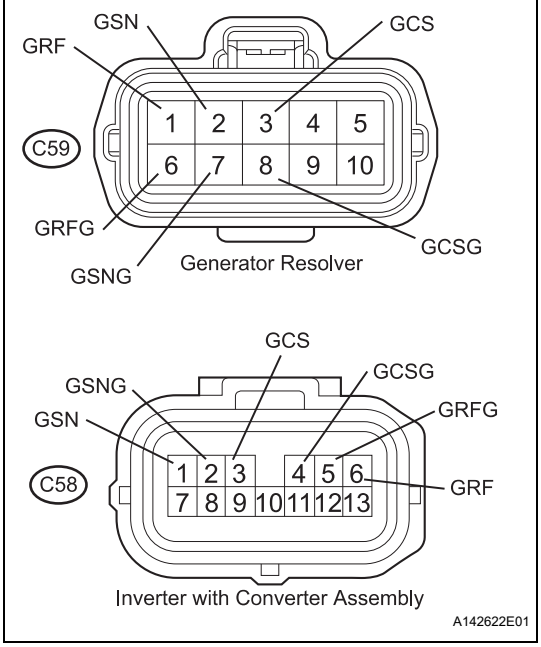
NG → **CONNECT SECURELY**

OK

HV

6	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER)

Wire Harness Side:



(a) Disconnect the C59 generator resolver connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
GRF (C58-6) - GRF (C59-1)	Below 1 Ω
GRFG (C58-5) - GRFG (C59-6)	Below 1 Ω
GSN (C58-1) - GSN (C59-2)	Below 1 Ω
GSNG (C58-2) - GSNG (C59-7)	Below 1 Ω
GCS (C58-3) - GCS (C59-3)	Below 1 Ω
GCSG (C58-4) - GCSG (C59-8)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
GRF (C58-6) or GRF (C59-1) - Body ground	10 kΩ or more
GRFG (C58-5) or GRFG (C59-6) - Body ground	10 kΩ or more
GSN (C58-1) or GSN (C59-2) - Body ground	10 kΩ or more
GSNG (C58-2) or GSNG (C59-7) - Body ground	10 kΩ or more
GCS (C58-3) or GCS (C59-3) - Body ground	10 kΩ or more
GCSG (C58-4) or GCSG (C59-8) - Body ground	10 kΩ or more

HINT:
The generator resolver is not available separately. If it requires replacement, replace the hybrid vehicle transaxle assembly.

HV

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A1B-163	Drive Motor "A" Control Module
DTC	P0A1B-164	Drive Motor "A" Control Module
DTC	P0A1B-192	Drive Motor "A" Control Module
DTC	P0A1B-193	Drive Motor "A" Control Module
DTC	P0A1B-198	Drive Motor "A" Control Module
DTC	P0A1B-511	Drive Motor "A" Control Module
DTC	P0A1B-512	Drive Motor "A" Control Module
DTC	P0A1B-661	Drive Motor "A" Control Module
DTC	P0A1B-786	Drive Motor "A" Control Module
DTC	P0A1B-794	Drive Motor "A" Control Module

DESCRIPTION

The inverter with converter assembly (MG ECU) monitors its internal operation and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1B	163	IPM positive power source error	Inverter with converter assembly (MG ECU)
P0A1B	164	IPM negative power source error	Inverter with converter assembly (MG ECU)
P0A1B	192	A/D error	Inverter with converter assembly (MG ECU)
P0A1B	193	ROM-RAM error	Inverter with converter assembly (MG ECU)
P0A1B	198	R/D converter NM stop error	Inverter with converter assembly (MG ECU)
P0A1B	511	Standard voltage for analog signal offset	Inverter with converter assembly (MG ECU)
P0A1B	512	Standard voltage for analog signal	Inverter with converter assembly (MG ECU)
P0A1B	661	Communication error (from MG2 to MG1)	Inverter with converter assembly (MG ECU)
P0A1B	786	ALU error	Inverter with converter assembly (MG ECU)
P0A1B	794	R/D converter communication error	Inverter with converter assembly (MG ECU)

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**REPLACE INVERTER WITH CONVERTER ASSEMBLY**

NEXT

COMPLETED

DTC	P0A1B-168	Drive Motor "A" Control Module

DTC	P0A1B-795	Drive Motor "A" Control Module

DTC	P0A1B-796	Drive Motor "A" Control Module

DESCRIPTION

The inverter with converter assembly (MG ECU) monitors its internal operation and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1B	168	Motor R/D resolver angle error	• Inverter with converter assembly (MG ECU) • Hybrid vehicle transaxle assembly (Motor resolver) • Wire harness or connector
P0A1B	795	REF frequency error	• Inverter with converter assembly (MG ECU) • Hybrid vehicle transaxle assembly (Motor resolver) • Wire harness or connector
P0A1B	796	REF signal open error	• Inverter with converter assembly (MG ECU) • Hybrid vehicle transaxle assembly (Motor resolver) • Wire harness or connector

MONITOR DESCRIPTION

The MG ECU (in the inverter with converter assembly) performs many diagnostic tests to verify proper operation of internal ECU systems. For this diagnostic monitor, the MG ECU checks for an R/D (Resolver/Digital converter) malfunction involving the motor resolver. If the MG ECU detects an R/D converter error, it will conclude that there is an internal malfunction involving the motor resolver. The hybrid vehicle control ECU will illuminate the MIL and set a DTC.

HV

MONITOR STRATEGY

Related DTCs	P0A1B (INF 168): RD converter resolver angle abnormality P0A1B (INF 795): REF malfunction (frequency abnormality) P0A1B (INF 796): REF malfunction (REF signal abnormality)
Required sensors / components	Inverter with converter (MG ECU)
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	1 driving cycle
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

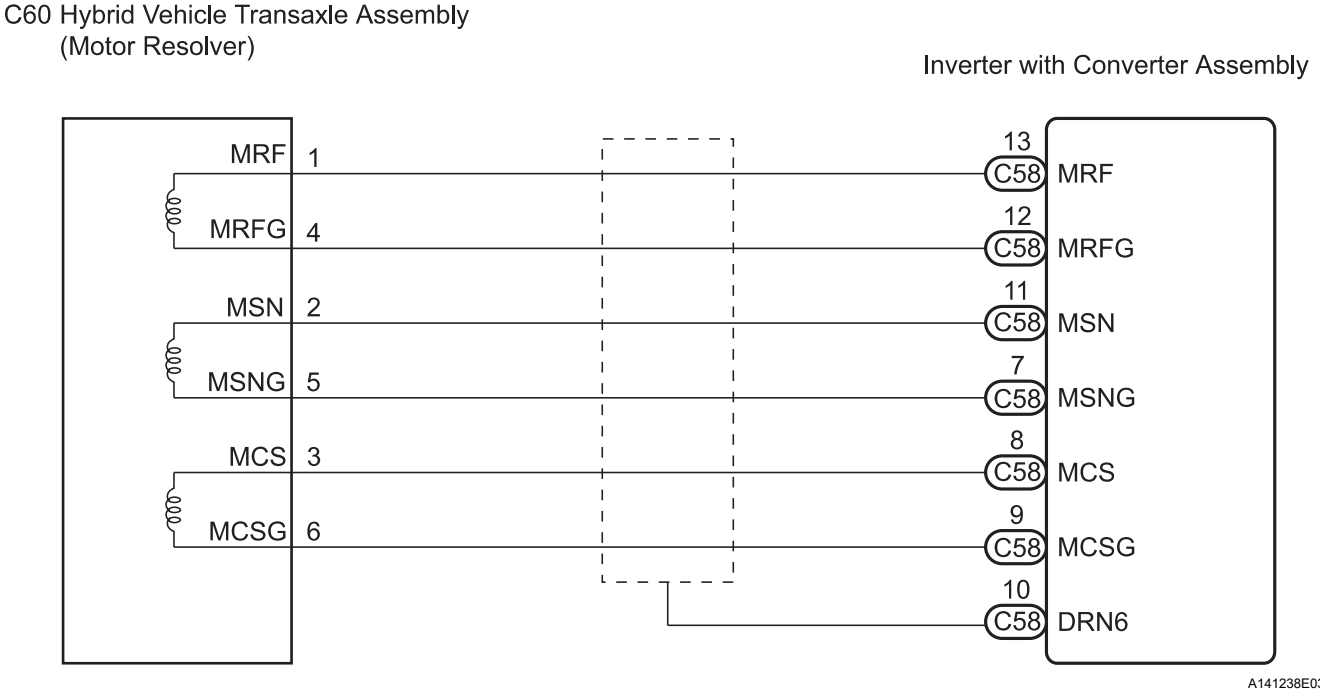
TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Hybrid vehicle control ECU	DTC P0A1B (INF 168/795/796) is not detected

WIRING DIAGRAM



HV

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks.**
  After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A3F-243, P0A40-500, P0A41-245	Motor resolver circuit

YES → GO TO DTC CHART

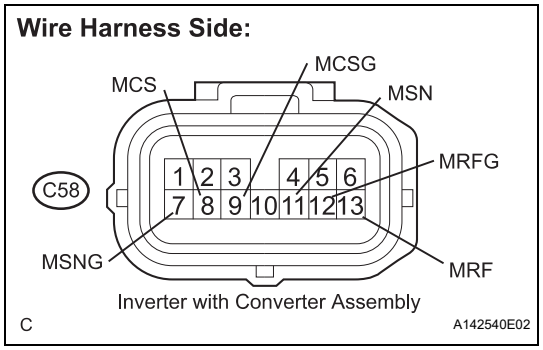
NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

3	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER)



CAUTION:
Be sure to wear insulated gloves.

(a) Turn the power switch off and remove the service plug grip (See page HV-1).
NOTICE:
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect the C58 inverter with converter assembly connector.

(c) Turn the power switch on (IG).

(d) Measure the voltage according to the value(s) in the table below.
NOTICE:
Turning the power switch on (IG) with the low voltage connector of the inverter with converter assembly disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.
Standard voltage

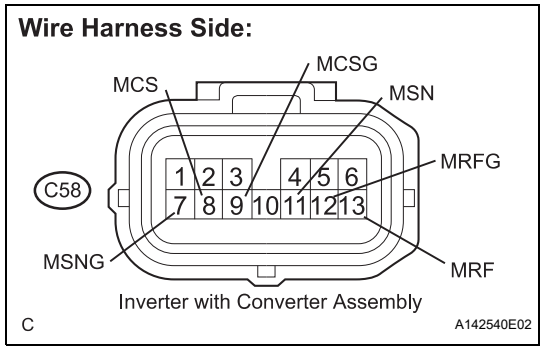
Tester Connection	Specified Condition
MRF (C58-13) - Body ground	Below 1 V
MRFG (C58-12) - Body ground	Below 1 V
MSN (C58-11) - Body ground	Below 1 V
MSNG (C58-7) - Body ground	Below 1 V
MCS (C58-8) - Body ground	Below 1 V
MCSG (C58-9) - Body ground	Below 1 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

HV

4	CHECK MOTOR RESOLVER



(a) Turn the power switch off.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance (Check for open)

Tester Connection	Specified Condition
MRF (C58-13) - MRFG (C58-12)	5.8 to 11.3 Ω
MSN (C58-11) - MSNG (C58-7)	11.7 to 17.7 Ω
MCS (C58-8) - MCSG (C58-9)	11.7 to 17.7 Ω

(c) Measure the resistance according to the value(s) in the table below.
Standard resistance (Check for short)

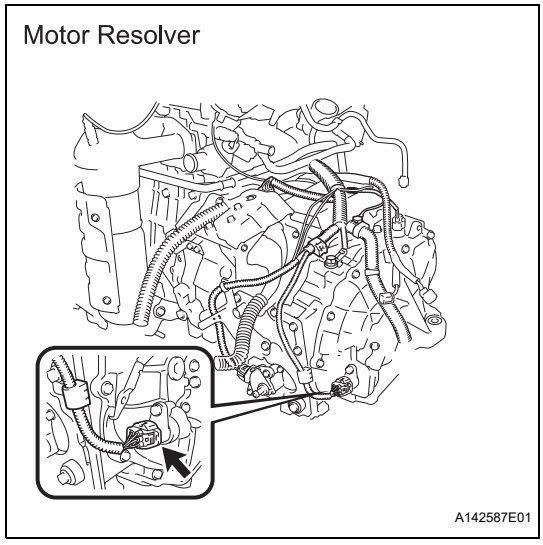
Tester Connection	Specified Condition
MRF (C58-13) or MRFG (C58-12) - Body ground	10 kΩ or more
MSN (C58-11) or MSNG (C58-7) - Body ground	10 kΩ or more
MCS (C58-8) or MCSG (C58-9) - Body ground	10 kΩ or more

OK → **REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)**

NG

5	CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR)

HV



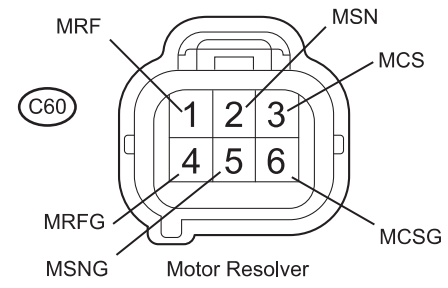
(a) Check the connection of the motor resolver connector.
OK:
The connector is connected securely and there are no contact problems.

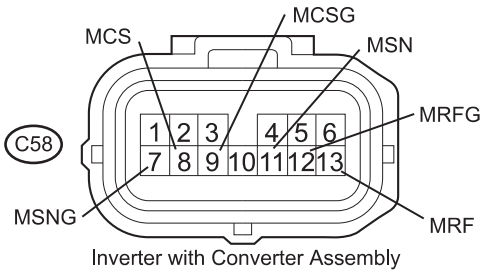
NG → **CONNECT SECURELY**

OK

6	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER)

Wire Harness Side:





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(a) Disconnect the C60 motor resolver connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
MRF (C58-13) - MRF (C60-1)	Below 1 Ω
MRFG (C58-12) - MRFG (C60-4)	Below 1 Ω
MSN (C58-11) - MSN (C60-2)	Below 1 Ω
MSNG (C58-7) - MSNG (C60-5)	Below 1 Ω
MCS (C58-8) - MCS (C60-3)	Below 1 Ω
MCSG (C58-9) - MCSG (C60-6)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
MRF (C58-13) or MRF (C60-1) - Body ground	10 kΩ or more
MRFG (C58-12) or MRFG (C60-4) - Body ground	10 kΩ or more
MSN (C58-11) or MSN (C60-2) - Body ground	10 kΩ or more
MSNG (C58-7) or MSNG (C60-5) - Body ground	10 kΩ or more
MCS (C58-8) or MCS (C60-3) - Body ground	10 kΩ or more
MCSG (C58-9) or MCSG (C60-6) - Body ground	10 kΩ or more

HINT:
The motor resolver is not available separately. If it requires replacement, replace the hybrid vehicle transaxle assembly.

HV

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A1B-788	Drive Motor "A" Control Module

DESCRIPTION

If the inverter with converter assembly (MG ECU) is reset due to a problem with the power source in the inverter, the hybrid vehicle control ECU will set this DTC.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1B	788	Error in reset signal from power source IC	• Wire harness or connector • Inverter with converter assembly (MG ECU) • Hybrid vehicle transaxle assembly

HINT:
Clearing the DTCs using the intelligent tester when DTC U0110-657 is detected and the problem is still occurring will cause DTC P0A1B-788 to be stored. However, it is not necessary to perform inspection for DTC P0A1B-788 because DTC P0A1B-788 indicates a communication system malfunction.

MONITOR DESCRIPTION

If an abnormal power source IC CPU reset is detected in the MG ECU, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A1B (INF 788): Reset from power IC
Required sensors / components	Inverter with converter (MG ECU)
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	1 driving cycle
Sequence of operation	None

HV

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

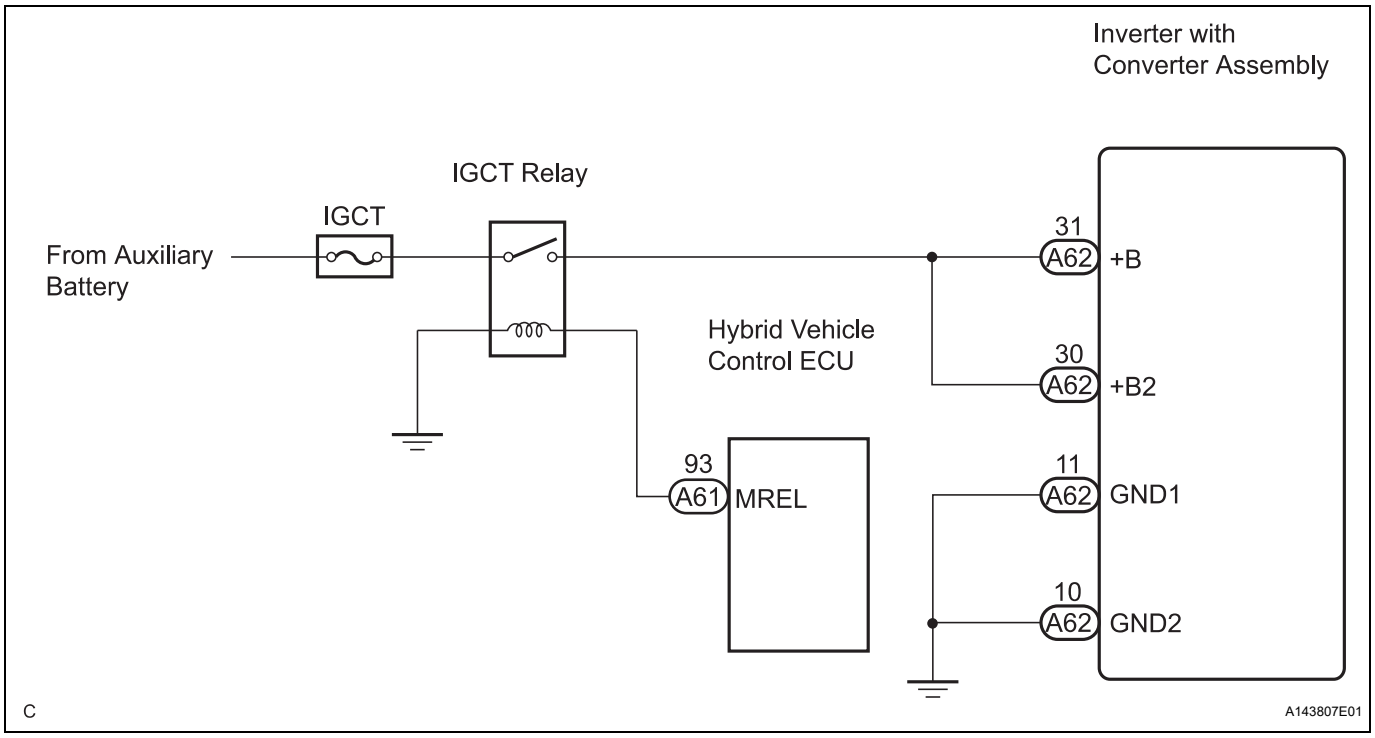
TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Hybrid vehicle control ECU	DTC P0A1B (INF 788) is not detected

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

HV

1	**CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)**

NG → **CONNECT SECURELY**

OK

2	**CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - ENGINE ROOM R/B NO. 1)**

CAUTION:

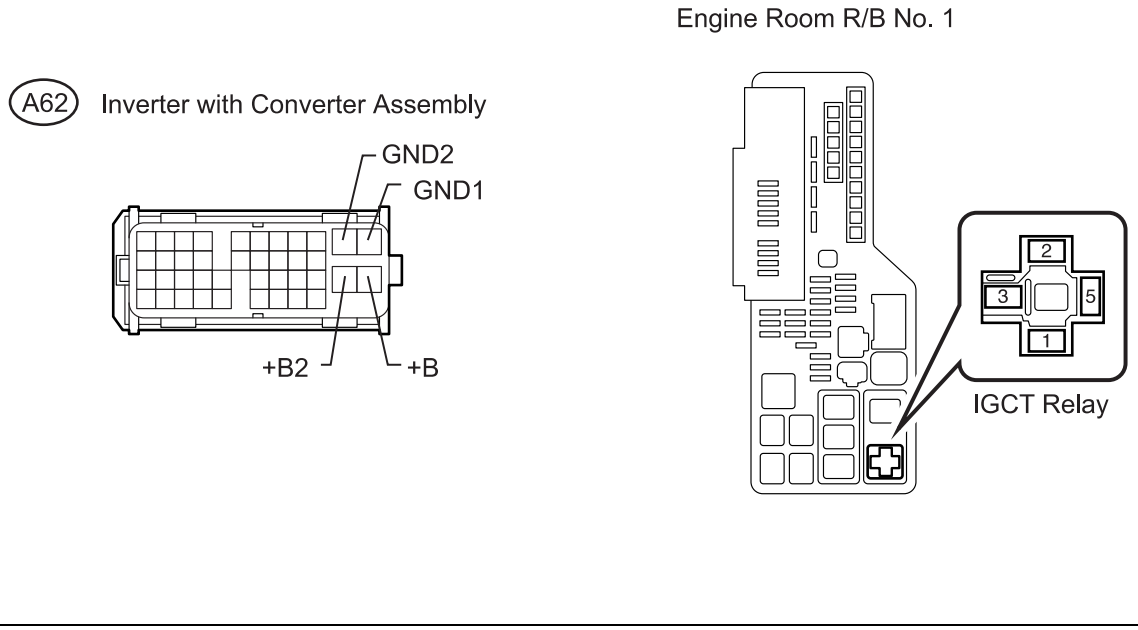
Be sure to wear insulated gloves.

(a) Turn the power switch off and remove the service plug grip (See page HV-1).

NOTICE:
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Remove the IGCT relay from the engine room R/B No. 1.
(c) Disconnect the A62 inverter with converter assembly connector.
(d) Measure the resistance according to the value(s) in the table below.

Wire Harness Side:



A143867E01

Standard resistance (Check for open)

Tester Connection	Specified Condition
+B (A62-31) - IGCT relay terminal 1	Below 1 Ω
+B2 (A62-30) - IGCT relay terminal 1	Below 1 Ω
GND1 (A62-11) - Body ground	Below 1 Ω
GND2 (A62-10) - Body ground	Below 1 Ω

Standard resistance (Check for short)

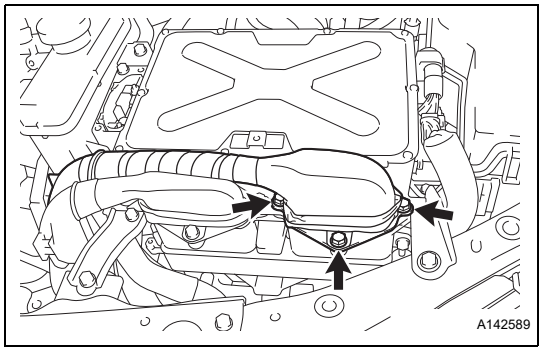
Tester Connection	Specified Condition
+B (A62-31) or +B2 (A62-30) - Body ground	10 kΩ or more

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	**CHECK INVERTER WITH CONVERTER ASSEMBLY (MOTOR CABLE CONNECTION CONDITION)**

CAUTION:
Be sure to wear insulated gloves.

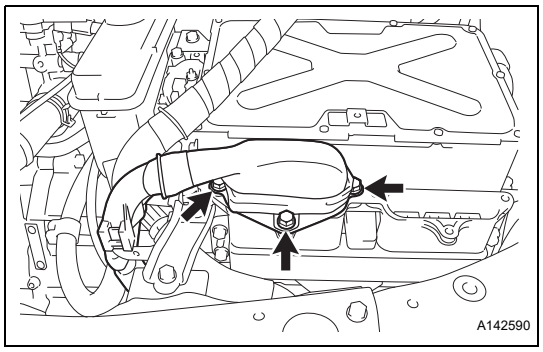


(a) Check that the service plug grip is not installed.
(b) Check that the bolts for the motor cable are tightened to the specified torque.
NOTICE:
Make sure that the tightening torque of the bolts is between 6.4 and 9.6 N*m (65 and 98 kgf*cm, 57 and 85 in.*lbf).
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

NG → **TIGHTEN TO SPECIFIED TORQUE**

OK

4	CHECK INVERTER WITH CONVERTER ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION)

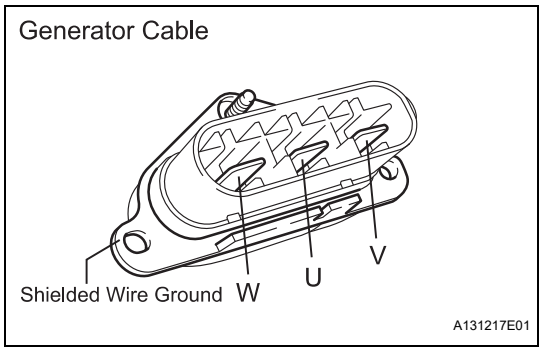


CAUTION:
Be sure to wear insulated gloves.
(a) Check that the service plug grip is not installed.
(b) Check that the bolts for the generator cable are tightened to the specified torque.
NOTICE:
Make sure that the tightening torque of the bolts is between 6.4 and 9.6 N*m (65 and 98 kgf*cm, 57 and 85 in.*lbf).
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

NG → **TIGHTEN TO SPECIFIED TORQUE**

OK

5	INSPECT HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1)



CAUTION:
Be sure to wear insulated gloves.
(a) Check that the service plug grip is not installed.
(b) Disconnect the generator cable and motor cable from the inverter with converter assembly (See page HV-558).
(c) Using a milliohmmeter, measure the resistance according to the value(s) in the table below. (Check MG1 for an interphase short.)
HINT:
If the MG1 temperature is high, the resistance varies greatly. Therefore, measure the resistance at least 8 hours after the vehicle is stopped.
Standard resistance

Tester Connection	Specified Condition
U - V	59 to 65 mΩ
V - W	56 to 62 mΩ
W - U	56 to 62 mΩ

HINT:
To correct the variation of the measured resistance due to temperature, use the following formula to calculate the resistance at 20°C.
R20 = Rt / {1 + 0.00393 X (T - 20)}
The calculation is based on the following:
R20: Resistance at 20°C (mΩ)
Rt: Measured resistance (mΩ)
T: Temperature when the resistance is measured (°C)

(d) Using a megohmmeter (500 V range), measure the resistance according to the value(s) in the table below.

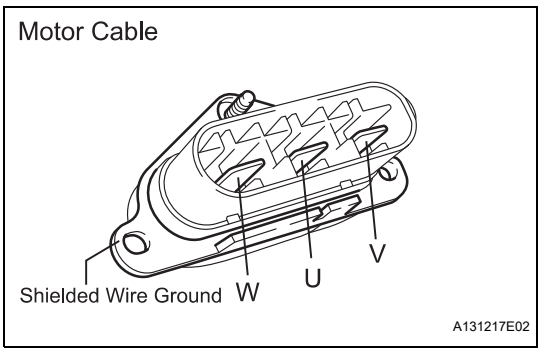
Standard resistance

Tester Connection	Specified Condition
U - Body ground and shielded wire ground	10 MΩ or more
V - Body ground and shielded wire ground	10 MΩ or more
W - Body ground and shielded wire ground	10 MΩ or more

NG → **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)**

OK

6 INSPECT HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2)



CAUTION:
Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.
(b) Disconnect the generator cable and motor cable from the inverter with converter assembly (See page HV-558).
(c) Using a milliohmmeter, measure the resistance according to the value(s) in the table below. (Check MG2 for an interphase short.)
HINT:
If the MG2 temperature is high, the resistance varies greatly. Therefore, measure the resistance at least 8 hours after the vehicle is stopped.

Standard resistance

Tester Connection	Specified Condition
U - V	69.5 to 76.5 m Ω
V - W	66.5 to 73.5 m Ω
W - U	66.5 to 73.5 m Ω

HINT:
To correct the variation of the measured resistance due to temperature, use the following formula to calculate the resistance at 20°C.
R20 = Rt / {1 + 0.00393 X (T - 20)}
The calculation is based on the following:
R20: Resistance at 20°C (mΩ)
Rt: Measured resistance (mΩ)
T: Temperature when the resistance is measured (°C)

(d) Using a megohmmeter (500 V range), measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
U - Body ground and shielded wire ground	10 MΩ or more
V - Body ground and shielded wire ground	10 MΩ or more
W - Body ground and shielded wire ground	10 MΩ or more

NG → **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)**

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

DTC	P0A1D-103	Hybrid Powertrain Control Module

DESCRIPTION

The hybrid vehicle control ECU monitors its internal operation and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1D	103	ECU internal error	Hybrid vehicle control ECU

MONITOR DESCRIPTION

The hybrid vehicle control ECU performs diagnostic monitoring to verify proper operation of internal ECU systems. In this diagnostic monitor, the hybrid vehicle control ECU checks the communication bus off count and the message register of the CAN (Controller Area Network) controller. If the hybrid vehicle control ECU detects an error in the communication bus off count or message register, it will conclude that there is a malfunction in the hybrid vehicle control ECU. The hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A1D (INF 103): Register value stuck
Required sensors / components	Hybrid vehicle control ECU
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

HV

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Hybrid vehicle control ECU	DTC P0A1D (INF 103) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**REPLACE HYBRID VEHICLE CONTROL ECU**

HINT:
See page HV-569

NEXT

COMPLETED

DTC	P0A1D-134	Hybrid Powertrain Control Module

DTC	P0A1D-135	Hybrid Powertrain Control Module

DTC	P0A1D-570	Hybrid Powertrain Control Module

DESCRIPTION

The hybrid vehicle control ECU monitors its internal operation and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1D	134	ECU internal error	Hybrid vehicle control ECU
P0A1D	135	ECU internal error	Hybrid vehicle control ECU
P0A1D	570	ECU internal error	Hybrid vehicle control ECU

MONITOR DESCRIPTION

The hybrid vehicle control ECU performs diagnostic monitoring to verify proper operation of vehicle systems. One of these monitors the rationality of internal analog (signal) to digital conversions. The hybrid vehicle control ECU monitors the internal A/D (Analog/Digital converter) value. If there is an A/D converter malfunction, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

HV

Related DTCs	P0A1D (INF 134/135/570): Internal AD converter malfunction
Required sensors / components	HV control ECU
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Hybrid vehicle control ECU	DTC P0A1D (INF 134/135/570) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**REPLACE HYBRID VEHICLE CONTROL ECU**

HINT:
See page HV-569

NEXT

COMPLETED

DTC	P0A1D-140	Hybrid Powertrain Control Module

DESCRIPTION

The hybrid vehicle control ECU monitors its internal operation and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1D	140	ECU internal error	Hybrid vehicle control ECU

MONITOR DESCRIPTION

The hybrid vehicle control ECU performs many diagnostic tests to verify proper operation of internal ECU systems. One of these tests checks for errors after a memory read/write diagnostic test. If the hybrid vehicle control ECU detects this malfunction inside the ECU, it will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A1D (INF 140): Random Access Memory destruction
Required sensors / components	Hybrid vehicle control ECU
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

HV

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Hybrid vehicle control ECU	DTC P0A1D (INF 140) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**REPLACE HYBRID VEHICLE CONTROL ECU**

HINT:
See page HV-569

NEXT

COMPLETED

DTC	P0A1D-141	Hybrid Powertrain Control Module

DESCRIPTION

The hybrid vehicle control ECU monitors its internal operation and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1D	141	ECU internal error	Hybrid vehicle control ECU

MONITOR DESCRIPTION

The hybrid vehicle control ECU performs many diagnostic tests to verify proper operation of internal ECU systems. One of these tests checks for errors in the ROM (Read Only Memory) circuits of the hybrid vehicle control ECU. If the hybrid vehicle control ECU detects this malfunction inside the ECU, it will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A1D (INF 141): Read Only Memory destruction
Required sensors / components	Hybrid vehicle control ECU
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

HV

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Hybrid vehicle control ECU	DTC P0A1D (INF 141) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**REPLACE HYBRID VEHICLE CONTROL ECU**

HINT:
See page HV-569

NEXT

COMPLETED

DTC	P0A1D-144	Hybrid Powertrain Control Module

DTC	P0A1D-145	Hybrid Powertrain Control Module

DESCRIPTION

The hybrid vehicle control ECU monitors its internal operation and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1D	144	ECU internal error	Hybrid vehicle control ECU
P0A1D	145	ECU internal error	Hybrid vehicle control ECU

MONITOR DESCRIPTION

The hybrid vehicle control ECU performs many diagnostic tests to verify proper operation of internal ECU systems. In one of these diagnostics, the hybrid vehicle control ECU performs a self-test. If the hybrid vehicle control ECU detects an internal problem during this self-test, it will conclude that there is an internal malfunction. The hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A1D (INF 144/145): Primary check malfunction
Required sensors / components	Hybrid vehicle control ECU
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

HV

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Hybrid vehicle control ECU	DTC P0A1D (INF 144/145) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**REPLACE HYBRID VEHICLE CONTROL ECU**

HINT:
See page HV-569

NEXT

COMPLETED

DTC	P0A1D-148	Hybrid Powertrain Control Module

DESCRIPTION

The hybrid vehicle control ECU monitors its internal operation and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1D	148	ECU internal error	Hybrid vehicle control ECU

MONITOR DESCRIPTION

The hybrid vehicle control ECU performs many diagnostic tests to verify proper operation of internal ECU systems. In one of these diagnostics, the hybrid vehicle control ECU performs a self-test. If the hybrid vehicle control ECU detects an internal problem during this self-test, it will conclude that there is an internal malfunction. The hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A1D (INF 148): HV CPU malfunction
Required sensors / components	HV control ECU
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

HV

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Hybrid vehicle control ECU	DTC P0A1D (INF 148) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**REPLACE HYBRID VEHICLE CONTROL ECU**

HINT:
See page HV-569

NEXT

COMPLETED

DTC	P0A1D-162	Hybrid Powertrain Control Module

DTC	P0A1D-821	Hybrid Powertrain Control Module

DTC	P0A1D-822	Hybrid Powertrain Control Module

DTC	P0A1D-823	Hybrid Powertrain Control Module

DESCRIPTION

The hybrid vehicle control ECU monitors its internal operation and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1D	162	ECU internal error	Hybrid vehicle control ECU
P0A1D	821	ECU internal error	Hybrid vehicle control ECU
P0A1D	822	ECU internal error	Hybrid vehicle control ECU
P0A1D	823	ECU internal error	Hybrid vehicle control ECU

MONITOR DESCRIPTION

The hybrid vehicle control ECU performs diagnostic monitoring to verify proper operation of internal ECU systems. For this diagnostics monitor, the hybrid vehicle control ECU checks the communication bus off count and the message register of the CAN (Controller Area Network) controller. If the hybrid vehicle control ECU detects an error in the communication bus off count or message register, it will conclude that there is a malfunction in the hybrid vehicle control ECU. The hybrid vehicle control ECU will illuminate the MIL and set a DTC.

HV

MONITOR STRATEGY

Related DTCs	P0A1D (INF 162/821/822/823): Lost communication with ECM/PCM
Required sensors / components	Hybrid vehicle control ECU
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Hybrid vehicle control ECU	DTC P0A1D (INF 162/821/822/823) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**REPLACE HYBRID VEHICLE CONTROL ECU**

HINT:
See page HV-569

NEXT

COMPLETED

DTC	P0A1D-179	Hybrid Powertrain Control Module

DESCRIPTION

The hybrid vehicle control ECU monitors its internal operation and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1D	179	ECU internal error	Hybrid vehicle control ECU

MONITOR DESCRIPTION

The hybrid vehicle control ECU performs many diagnostic tests to verify proper operation of internal ECU systems. In one of these diagnostics, the hybrid vehicle control ECU performs a self-test. If the hybrid vehicle control ECU detects an internal problem during this self-test, it will conclude that there is an internal malfunction. The hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A1D (INF 179): HV CPU malfunction
Required sensors / components	HV control ECU
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

HV

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Hybrid vehicle control ECU	DTC P0A1D (INF 179) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**REPLACE HYBRID VEHICLE CONTROL ECU**

HINT:
See page HV-569

NEXT

COMPLETED

DTC	P0A1D-187	Hybrid Powertrain Control Module

DESCRIPTION

The hybrid vehicle control ECU monitors its internal operation and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1D	187	ECU internal error	Hybrid vehicle control ECU

MONITOR DESCRIPTION

The hybrid vehicle control ECU performs diagnostic monitoring to verify proper operation of internal and external ECU systems. In one of these diagnostics, the hybrid vehicle control ECU monitors the important RAM range of the hybrid vehicle control ECU. If the hybrid vehicle control ECU detects an error in the important RAM circuits, it will conclude that there is an internal malfunction in the hybrid vehicle control ECU. The hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A1D (INF 187): Specific random access memory destruction
Required sensors / components	Hybrid vehicle control ECU
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

HV

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Hybrid vehicle control ECU	DTC P0A1D (INF 187) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**REPLACE HYBRID VEHICLE CONTROL ECU**

HINT:
See page HV-569

NEXT

COMPLETED

DTC	P0A1D-390	Hybrid Powertrain Control Module

DTC	P3004-133	Power Cable Malfunction

DESCRIPTION

The hybrid vehicle control ECU monitors its internal operation and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1D	390	Charge control error	Hybrid vehicle control ECU
P3004	133	A high-voltage wiring system error signal is detected in the hybrid vehicle control ECU	Hybrid vehicle control ECU

MONITOR DESCRIPTION

When the hybrid vehicle control ECU detects that the HV battery has received too much charge, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A1D (INF 390): HV CPU malfunction
Required sensors / components	Hybrid vehicle control ECU
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

HV

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Hybrid vehicle control ECU	DTC P0A1D (INF 390) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTCs other than P0A1D-390 and P3004-133 are output.

YES → **GO TO DTC CHART**

NO

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

DTC	P0A1D-393	Hybrid Powertrain Control Module

DESCRIPTION

The hybrid vehicle control ECU monitors its internal operation and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1D	393	ECU internal error	Hybrid vehicle control ECU

MONITOR DESCRIPTION

The hybrid vehicle control ECU performs many diagnostic tests to verify proper operation of internal ECU systems. In one of these diagnostics, the hybrid vehicle control ECU performs a self-test. If the hybrid vehicle control ECU detects an internal problem during this self-test, it will conclude that there is an internal malfunction. The hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A1D (INF 393): HV CPU operation malfunction
Required sensors / components	Hybrid vehicle control ECU
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

HV

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Hybrid vehicle control ECU	DTC P0A1D (INF 393) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**REPLACE HYBRID VEHICLE CONTROL ECU**

HINT:
See page HV-569

NEXT

COMPLETED

DTC	P0A1D-721	Hybrid Powertrain Control Module
DTC	P0A1D-722	Hybrid Powertrain Control Module
DTC	P0A1D-723	Hybrid Powertrain Control Module
DTC	P0A1D-765	Hybrid Powertrain Control Module
DTC	P0A1D-787	Hybrid Powertrain Control Module

DESCRIPTION

The hybrid vehicle control ECU monitors its internal operation and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1D	721	ECU internal error	Hybrid vehicle control ECU
P0A1D	722	ECU internal error	Hybrid vehicle control ECU
P0A1D	723	ECU internal error	Hybrid vehicle control ECU
P0A1D	765	ECU internal error	Hybrid vehicle control ECU
P0A1D	787	ECU internal error	Hybrid vehicle control ECU

MONITOR DESCRIPTION

The hybrid vehicle control ECU performs many diagnostic tests to verify proper operation of internal ECU systems. In one of these diagnostics, the hybrid vehicle control ECU checks the result of the ECM self-test. If the hybrid vehicle control ECU detects a "Fail" from the ECM self-test, it will conclude that there is an internal malfunction in the ECM. The hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A1D (INF 721/722/723/765/787): Monitor CPU malfunction
Required sensors / components	Hybrid vehicle control ECU
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Hybrid vehicle control ECU	DTC P0A1D (INF 721/722/723/765/787) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**REPLACE HYBRID VEHICLE CONTROL ECU**

HINT:
See page HV-569

NEXT

COMPLETED

DTC	P0A1F-129	Battery Energy Control Module

DESCRIPTION

The battery smart unit (battery energy control module) sends HV battery voltage information to the hybrid vehicle control ECU via serial communication.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1F	129	HV battery voltage circuit malfunction	Battery smart unit

MONITOR DESCRIPTION

The hybrid vehicle control ECU calculates the differences among the received HV battery voltage, boost converter voltage, and inverter voltage. If any of the differences exceed prescribed values, the hybrid vehicle control ECU determines that there is a malfunction in a battery smart unit circuit. When the hybrid vehicle control ECU detects a malfunction, it will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A1F (INF 129): Rationality
Required sensors / components	Battery smart unit
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

HV

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	DTC P0A1F (INF 129) is not detected

INSPECTION PROCEDURE

NOTICE:

Performing the check procedures for a long time with the shift lever in the N position may cause DTC P3000-388 to be set.

HINT:

To determine if conditions are normal, turn the power switch on (READY), move the shift lever to the N position, and check HV battery voltage (PWR RESOURCE VB), pre-boost voltage (VL), and post-boost voltage (VH) in the data list. This check should be performed after the battery smart unit is replaced. When the system is normal, the PWR RESOURCE VB, VL, and VH values should be almost equal (voltage boosting will not occur when the shift lever is in neutral). If the difference between each voltage exceeds the values specified below, there is a malfunction in the battery smart unit.

Inspection voltage	Maximum voltage difference
Difference between HV battery voltage (PWR RESOURCE VB) and pre-boost voltage (VL)	50 V

Inspection voltage	Maximum voltage difference
Difference between HV battery voltage (PWR RESOURCE VB) and post-boost voltage (VH)	70 V
Difference between pre-boost voltage (VL) and post-boost voltage (VH)	90 V

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**REPLACE BATTERY SMART UNIT**

NEXT

COMPLETED

DTC	P0A1F-150	Battery Energy Control Module

DTC	P0A1F-157	Battery Energy Control Module

DESCRIPTION

Refer to description for DTC P0A1F-129 (See page HV-187).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A1F	150	Power source voltage of the battery smart unit is insufficient during precharge.	• Battery smart unit • Wire harness or connector
P0A1F	157	Power source voltage of the battery smart unit is insufficient during precharge.	• Battery smart unit • Wire harness or connector

MONITOR DESCRIPTION

The hybrid vehicle control ECU calculates the differences among the received HV battery voltage, boost converter voltage, and inverter voltage. If any of the differences exceed prescribed values, the hybrid vehicle control ECU determines that there is a malfunction in a battery smart unit circuit. When the hybrid vehicle control ECU detects a malfunction, it will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A1F (INF 150): Rationality P0A1F (INF 157): Rationality
Required sensors / components	Battery smart unit
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	DTC P0A1F (INF 150/157) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**

- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

- Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.
- After completing repairs, restart the system (turn the power switch on (READY)) and recheck for DTCs (See page HV-36).

1	CHECK AUXILIARY BATTERY

(a) Measure the voltage between the terminals of the auxiliary battery.
Standard voltage:
11 to 14 V (Battery electrolyte temperature: 20°C (68°F))

NG → **CHARGE OR REPLACE AUXILIARY BATTERY**

OK

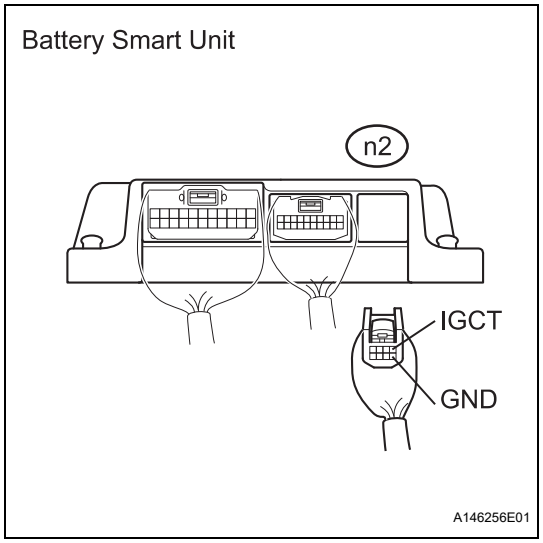
2	CHECK HARNESS AND CONNECTOR (IGCT VOLTAGE)

CAUTION:
Be sure to wear insulated gloves.

(a) Turn the power switch off and remove the service plug grip (See page HV-1).
(b) Remove the luggage compartment trim cover front (See page HB-81).
(c) Disconnect the frame wire (See page HV-579).
(d) Remove the battery bracket sub-assembly (See page HB-81).
(e) Connect the auxiliary battery positive terminal cable of the frame wire.
(f) Disconnect the n2 battery smart unit connector.
(g) Turn the power switch on (IG).
(h) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Specified Condition
IGCT (n2-1) - GND (n2-5)	8.6 V or more

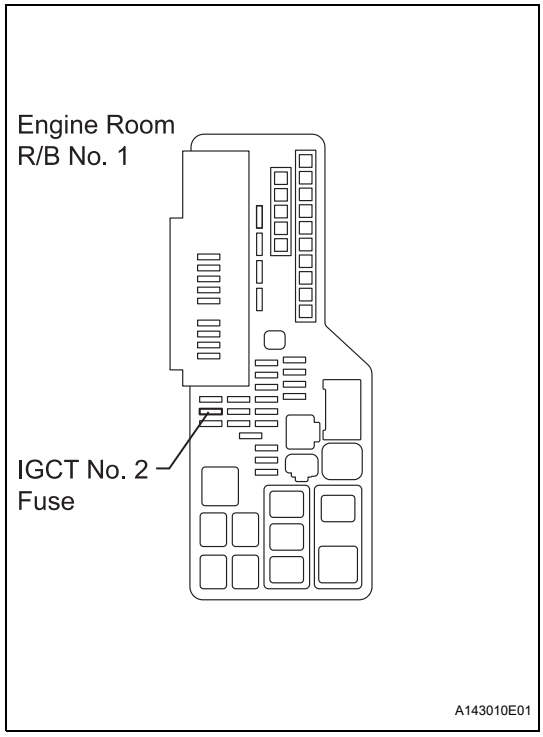
OK → **REPLACE BATTERY SMART UNIT (See page HB-99)**



HV

NG

3	CHECK FUSE (IGCT NO. 2)



(a) Remove the IGCT No. 2 fuse from the engine room R/B No. 1.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
IGCT No. 2 fuse terminal	Below 1 Ω

NG → REPLACE FUSE

OK

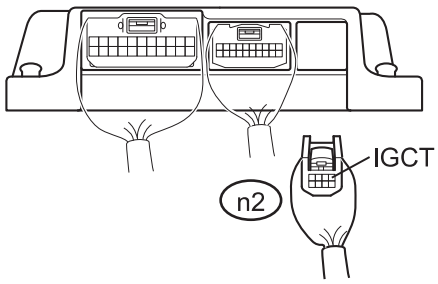
HV

4	CHECK HARNESS AND CONNECTOR (BATTERY SMART UNIT - ENGINE ROOM R/B NO. 1)

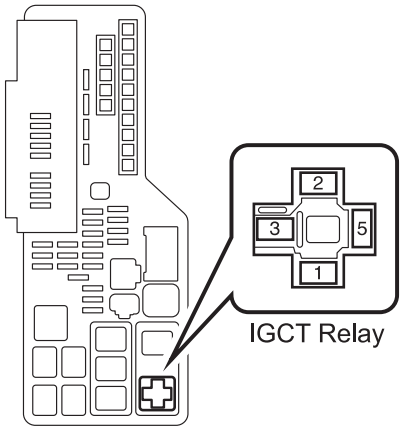
CAUTION:
Be sure to wear insulated gloves.

(a) Install the IGCT No. 2 fuse to the engine room R/B No. 1.
(b) Remove the IGCT relay from the engine room R/B No. 1.
(c) Disconnect connector N2 from the battery smart unit.

Battery Smart Unit



Engine Room R/B No. 1



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(d) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
IGCT (n2-1) - Engine room R/B No. 1 IGCT Relay terminal 3	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK AND REPAIR POWER SOURCE CIRCUIT

HV

DTC	P0A2B-248	Drive Motor "A" Temperature Sensor Circuit Range / Performance

DTC	P0A2B-250	Drive Motor "A" Temperature Sensor Circuit Range / Performance

DESCRIPTION

Refer to the circuit description for DTC P0A2C-247 (See page HV-194).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A2B	248	Motor temperature sensor malfunction	Hybrid vehicle transaxle assembly (Motor temperature sensor)
P0A2B	250	Motor temperature sensor performance problem	Hybrid vehicle transaxle assembly (Motor temperature sensor)

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

HV

1	REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY

NEXT

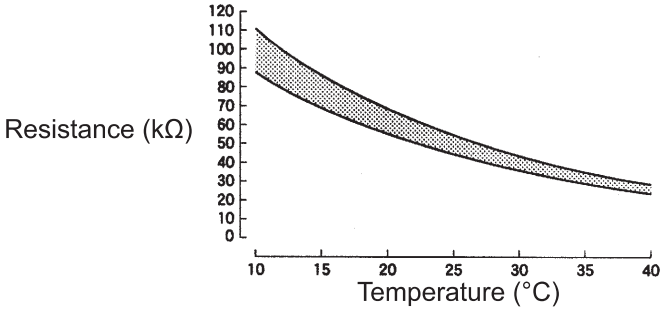
COMPLETED

DTC	P0A2C-247	Drive Motor "A" Temperature Sensor Circuit Low

DTC	P0A2D-249	Drive Motor "A" Temperature Sensor Circuit High

DESCRIPTION

The resistance of the thermistor built into the motor temperature sensor changes in accordance with changes in MG2 temperature. The lower the MG2 temperature, the more the thermistor resistance. Conversely, the more the temperature, the lower the resistance.



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DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A2C	247	GND short in motor temperature sensor circuit	• Wire harness or connector • Hybrid vehicle control ECU • Hybrid vehicle transaxle assembly (Motor temperature sensor)
P0A2D	249	Open or +B short in motor temperature sensor circuit	• Wire harness or connector • Hybrid vehicle control ECU • Hybrid vehicle transaxle assembly (Motor temperature sensor)

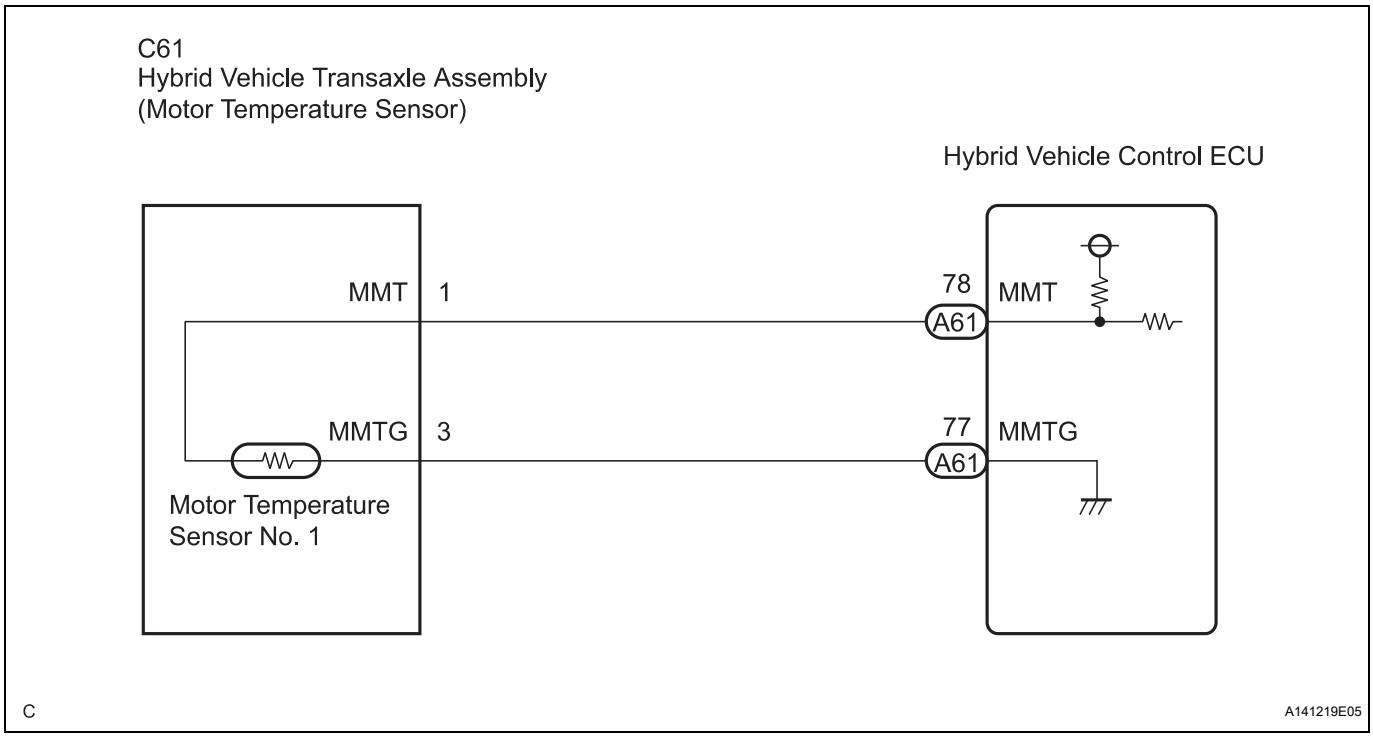
HV

HINT:

After confirming that DTC P0A2C-247 or P0A2D-249 is output, use the intelligent tester to check "MOTOR1 TEMP" in the HV ECU data list.

Displayed Temperature	Malfunction
-50°C (-58°F)	Open or +B short circuit
205°C (401°F)	GND short

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HV

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**CHECK CONNECTOR CONNECTION CONDITION (HYBRID VEHICLE CONTROL ECU CONNECTOR) (See page HV-79)**

NG → **CONNECT SECURELY**

OK

2	**CHECK CONNECTOR CONNECTION CONDITION (MOTOR TEMPERATURE SENSOR CONNECTOR)**

(a) Check the connections of the motor temperature sensor connectors.

OK:

The connectors are connected securely and there are no contact problems.

NG → CONNECT SECURELY

OK

3 READ VALUE OF INTELLIGENT TESTER (MOTOR1 TEMP)

(a) Turn the power switch on (IG).
(b) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DATA LIST / MOTOR1 TEMP.
(c) Read the data list.
Result

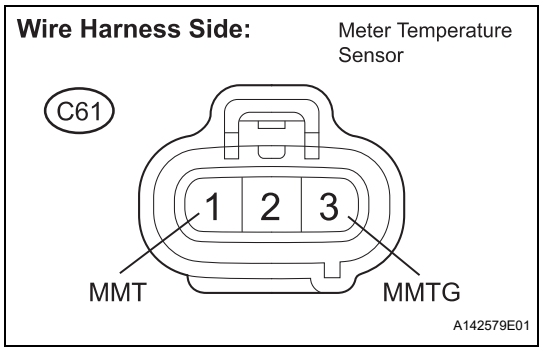
A	B	C
-50°C (-58°F)	205°C (401°F) or more	Same as actual temperature

B → Go to step 6

C → CHECK FOR INTERMITTENT PROBLEMS (See page HV-17)

A

4 READ VALUE OF INTELLIGENT TESTER (MOTOR1 TEMP)



(a) Disconnect the C61 motor temperature sensor connector.
(b) Connect terminals 1 and 3 of the motor temperature sensor vehicle side connector.
(c) Turn the power switch on (IG).
(d) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DATA LIST / MOTOR1 TEMP.
(e) Read the data list.
Displayed temperature:
205°C (401°F) or more

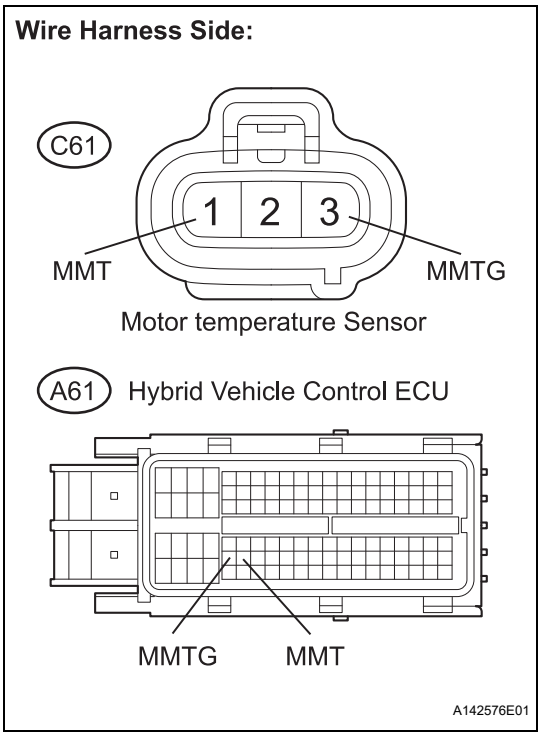
OK → REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

NG

5 CHECK HARNESS AND CONNECTOR (HV CONTROL ECU - MOTOR TEMPERATURE SENSOR)

(a) Disconnect the A61 hybrid vehicle control ECU connector.
(b) Turn the power switch on (IG).

HV



(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
MMT (A61-78) - Body ground	Below 1 V
MMTG (A61-77) - Body ground	Below 1 V

NOTICE:
Turning the power switch on (IG) with the hybrid vehicle control ECU connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(d) Turn the power switch off.

(e) Disconnect the C61 motor temperature sensor connector.

(f) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
MMT (A61-78) - MMT (C61-1)	Below 1 Ω
MMTG (A61-77) - MMTG (C61-3)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
MMT (A61-78) or MMT (C61-1) - Body ground	10 kΩ or more
MMTG (A61-77) or MMTG (C61-3) - Body ground	10 kΩ or more

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

6 READ VALUE OF INTELLIGENT TESTER (MOTOR1 TEMP)

(a) Disconnect the motor temperature sensor connector.

(b) Turn the power switch on (IG).

(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DATA LIST / MOTOR1 TEMP.

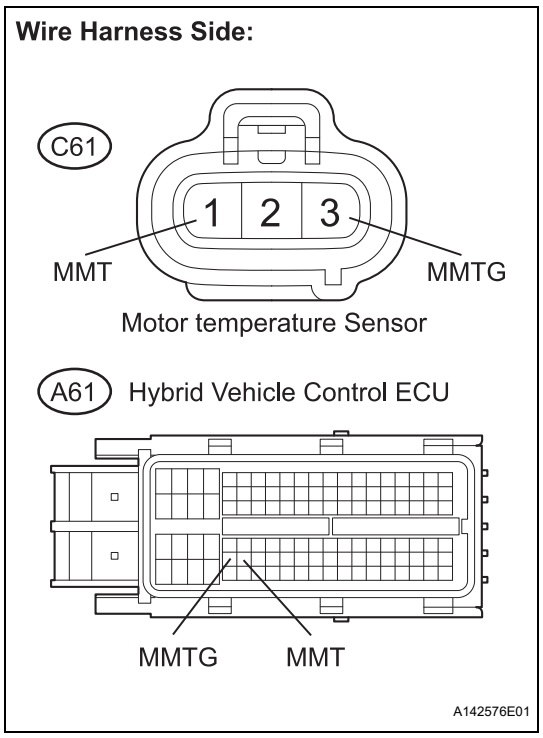
(d) Read the data list.

Displayed temperature:
-50°C (-50°F)

OK → **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)**

NG

7	CHECK HARNESS AND CONNECTOR (HV CONTROL ECU - MOTOR TEMPERATURE SENSOR)



(a) Disconnect the A61 hybrid vehicle control ECU connector.
(b) Disconnect the motor temperature sensor connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
MMT (A61-78) - MMT (C61-1)	Below 1 Ω
MMTG (A61-77) - MMTG (C61-3)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
MMT (A61-78) or MMT (C61-1) - Body ground	10 kΩ or more
MMTG (A61-77) or MMTG (C61-3) - Body ground	10 kΩ or more

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

HV

DTC	P0A37-258	Generator Temperature Sensor Circuit Range / Performance

DTC	P0A37-260	Generator Temperature Sensor Circuit Range / Performance

DESCRIPTION

Refer to the circuit description for DTC P0A2C-247 (See page HV-194).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A37	258	Generator temperature sensor malfunction	Hybrid vehicle transaxle assembly (Generator temperature sensor)
P0A37	260	Generator temperature sensor performance problem	Hybrid vehicle transaxle assembly (Generator temperature sensor)

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

HV

1	REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY

NEXT

COMPLETED

DTC	P0A38-257	Generator Temperature Sensor Circuit Low

DTC	P0A39-259	Generator Temperature Sensor Circuit High

DESCRIPTION

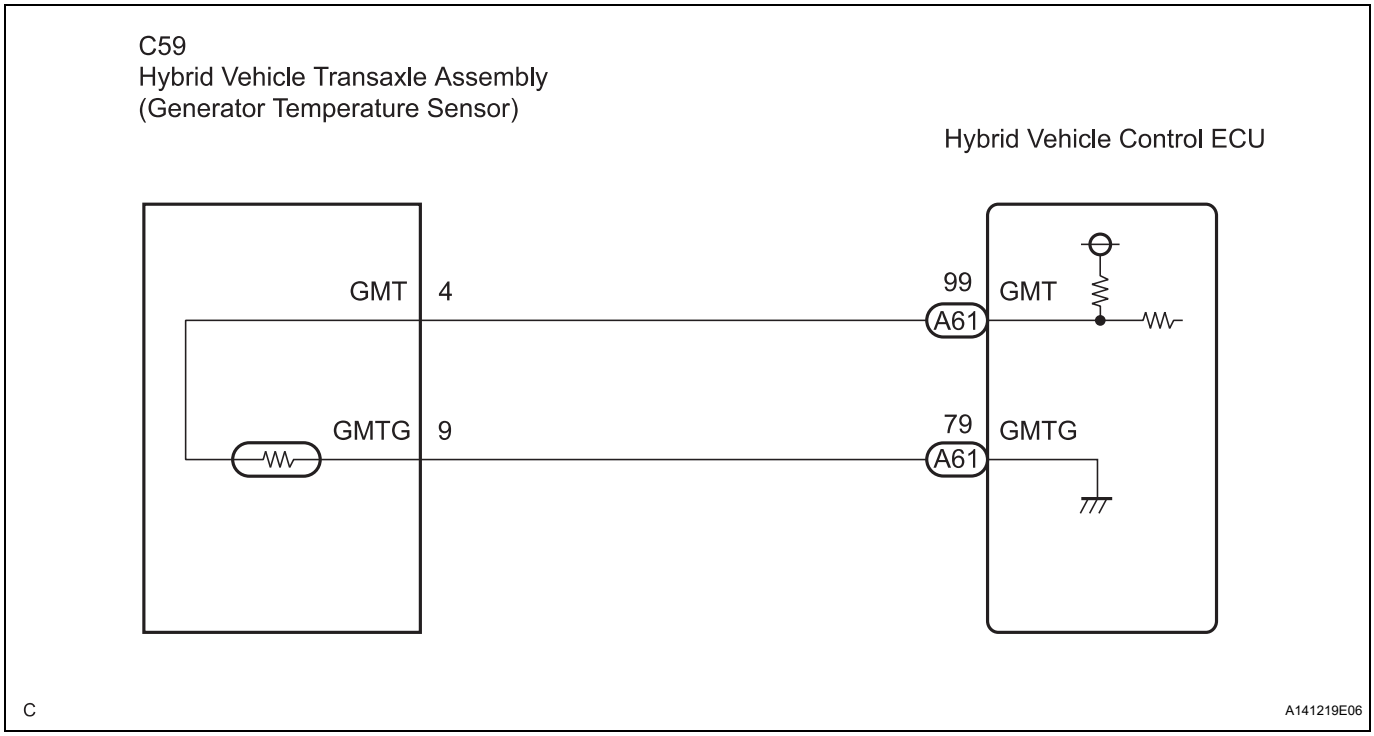
Refer to the circuit description for DTC P0A2C-247 (See page HV-194).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A38	257	GND short in generator temperature sensor circuit	• Wire harness or connector • Hybrid vehicle control ECU • Hybrid vehicle transaxle assembly (Generator temperature sensor)
P0A39	259	Open or +B short in generator temperature sensor circuit	• Wire harness or connector • Hybrid vehicle control ECU • Hybrid vehicle transaxle assembly (Generator temperature sensor)

HINT:
After confirming that DTC P0A38-257 or P0A39-259 is output, use the intelligent tester to check "MOTOR2 TEMP" in the HV ECU data list.

Displayed Temperature	Malfunction
-50°C (-58°F)	Open or +B short circuit
205°C (401°F)	GND short

WIRING DIAGRAM



HV

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**CHECK CONNECTOR CONNECTION CONDITION (HYBRID VEHICLE CONTROL ECU CONNECTOR) (See page HV-79)**

NG → **CONNECT SECURELY**

OK

2	**CHECK CONNECTOR CONNECTION CONDITION (GENERATOR TEMPERATURE SENSOR CONNECTOR)**

(a) Check the connections of the generator temperature sensor connector.
OK:
The connector is connected securely and there are no contact problems.

NG → **CONNECT SECURELY**

OK

3	**READ VALUE OF INTELLIGENT TESTER (MOTOR2 TEMP)**

(a) Turn the power switch on (IG).
(b) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DATA LIST / MOTOR2 TEMP.
(c) Read the data list.
Result

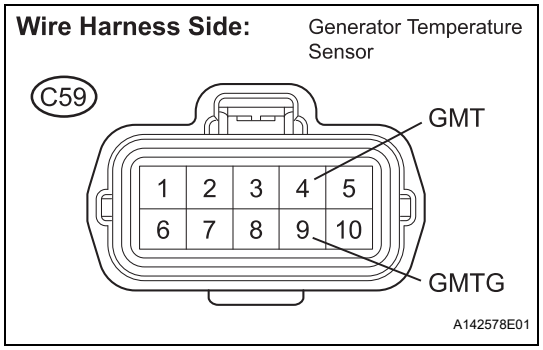
A	B	C
-50°C (-58°F)	205°C (401°F) or more	Same as actual temperature

B → **Go to step 6**

C → **CHECK FOR INTERMITTENT PROBLEMS (See page HV-17)**

A

4	READ VALUE OF INTELLIGENT TESTER (MOTOR2 TEMP)

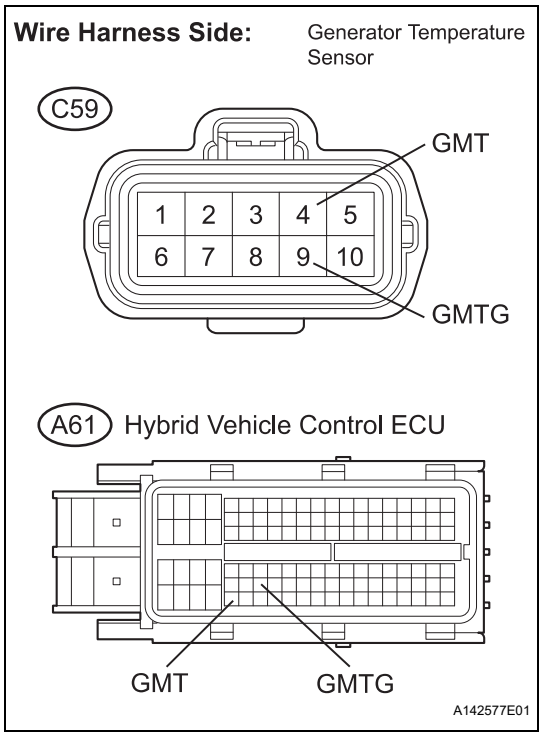


(a) Disconnect the C59 generator temperature sensor connector.
(b) Connect terminals 4 and 9 of the generator temperature sensor vehicle side connector.
(c) Turn the power switch on (IG).
(d) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DATA LIST / MOTOR2 TEMP.
(e) Read the data list.
Displayed temperature:
205°C (401°F) or more

OK → **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)**

NG

5	CHECK HARNESS AND CONNECTOR (HV CONTROL ECU - GENERATOR TEMPERATURE SENSOR)



(a) Disconnect the A61 hybrid vehicle control ECU connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Specified Condition
GMT (A61-99) - Body ground	Below 1 V
GMTG (A61-79) - Body ground	Below 1 V

NOTICE:
Turning the power switch on (IG) with the hybrid vehicle control ECU connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.
(d) Turn the power switch off.
(e) Disconnect the generator temperature sensor connector.
(f) Measure the resistance according to the value(s) in the table below.
Standard resistance (Check for open)

Tester Connection	Specified Condition
GMT (A61-99) - GMT (C59-4)	Below 1 Ω
GMTG (A61-79) - GMTG (C59-9)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
GMT (A61-99) or GMT (C59-4) - Body ground	10 kΩ or more
GMTG (A61-79) or GMTG (C59-9) - Body ground	10 kΩ or more

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

HV

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

6	READ VALUE OF INTELLIGENT TESTER (MOTOR2 TEMP)

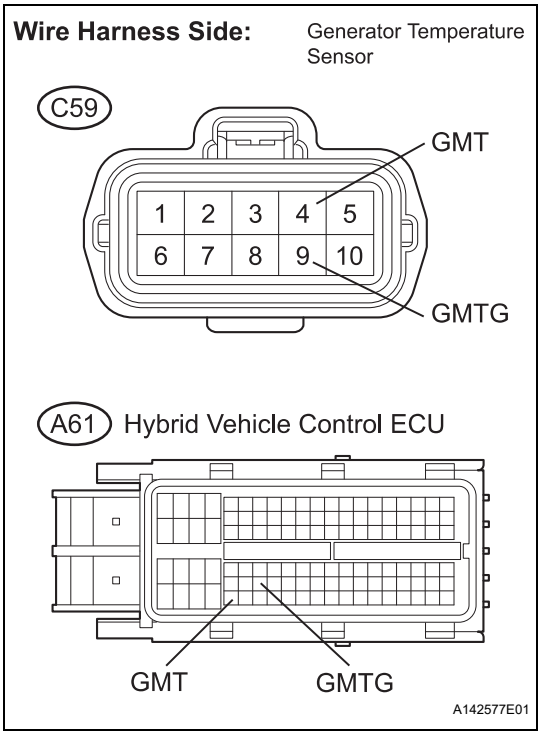
(a) Disconnect the generator temperature sensor connector.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DATA LIST / MOTOR2 TEMP.
(d) Read the data list.
Displayed temperature:
-50°C (-58°F)

OK → **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)**

NG

7	CHECK HARNESS AND CONNECTOR (HV CONTROL ECU - GENERATOR TEMPERATURE SENSOR)

HV



(a) Disconnect the A61 hybrid vehicle control ECU connector.
(b) Disconnect the C59 generator temperature sensor connector.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance (Check for open)

Tester Connection	Specified Condition
GMT (A61-99) - GMT (C59-4)	Below 1 Ω
GMTG (A61-79) - GMTG (C59-9)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
GMT (A61-99) or GMT (C59-4) - Body ground	10 kΩ or more
GMTG (A61-79) or GMTG (C59-9) - Body ground	10 kΩ or more

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

DTC	P0A3F-243	Drive Motor "A" Position Sensor Circuit

DTC	P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance

DTC	P0A41-245	Drive Motor "A" Position Sensor Circuit Low

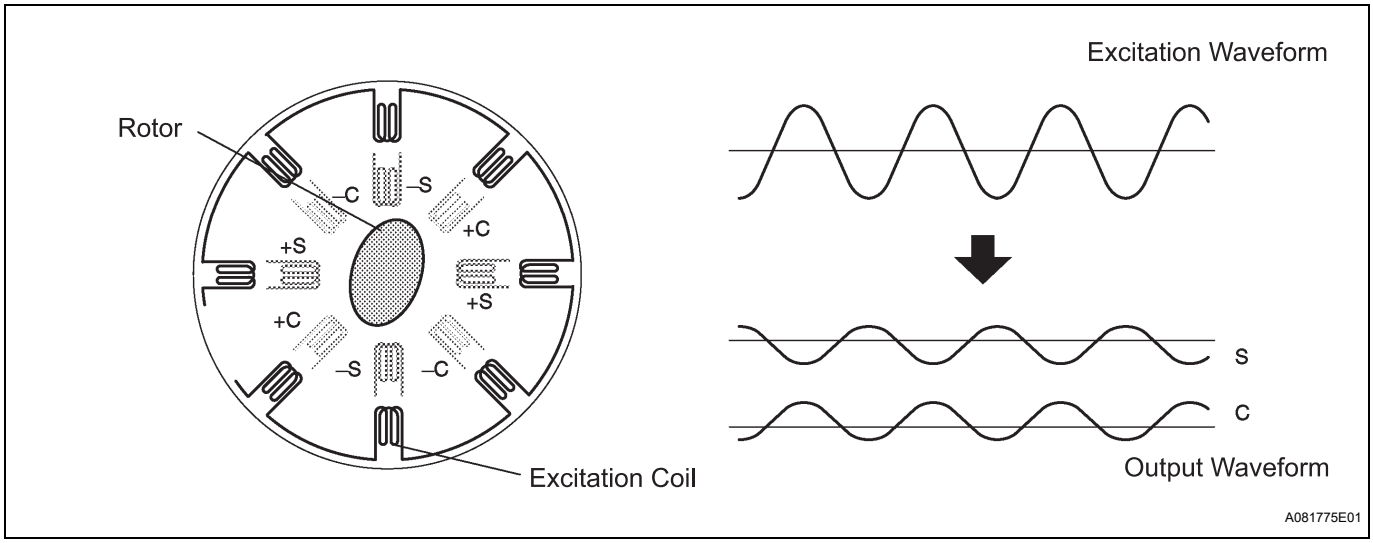
DESCRIPTION

A resolver is a sensor that detects the position of the magnetic poles, which are indispensable for ensuring highly efficient control of MG2 and MG1.

The resolver stator contains an excitation coil and 2 detection coils. The gap between the stator and rotor changes as the rotor turns because the rotor is oval shaped. An alternating current with a predetermined frequency flows through the excitation coil, and detection coils S and C output alternating currents in accordance with the sensor rotor position.

The MG ECU detects the absolute position of the rotor according to the phases of detection coils S and C and the height of their waveforms. Furthermore, the CPU calculates the amount of change in the position within a predetermined length of time, in order to use the resolver as a speed sensor.

The MG ECU monitors signals output from the motor resolver and detects malfunctions.



DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A3F	243	Interphase short in motor resolver circuit	• Wire harness or connector • Hybrid vehicle transaxle assembly (Motor resolver) • Inverter with converter assembly
P0A40	500	Motor resolver output is out of normal range	• Wire harness or connector • Hybrid vehicle transaxle assembly (Motor resolver) • Inverter with converter assembly
P0A41	245	Open or short in motor resolver circuit	• Wire harness or connector • Hybrid vehicle transaxle assembly (Motor resolver) • Inverter with converter assembly

MONITOR DESCRIPTION

The MG ECU monitors the motor resolver output signal. If the MG ECU detects output signals that are out of the normal range or specification, it will conclude that there is a malfunction in the motor resolver. The hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A3F (INF 243): Short circuit between phases P0A40 (INF 500): Range check P0A41 (INF245): Circuit discontinuity / short circuit
Required sensors / components	Motor resolver
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

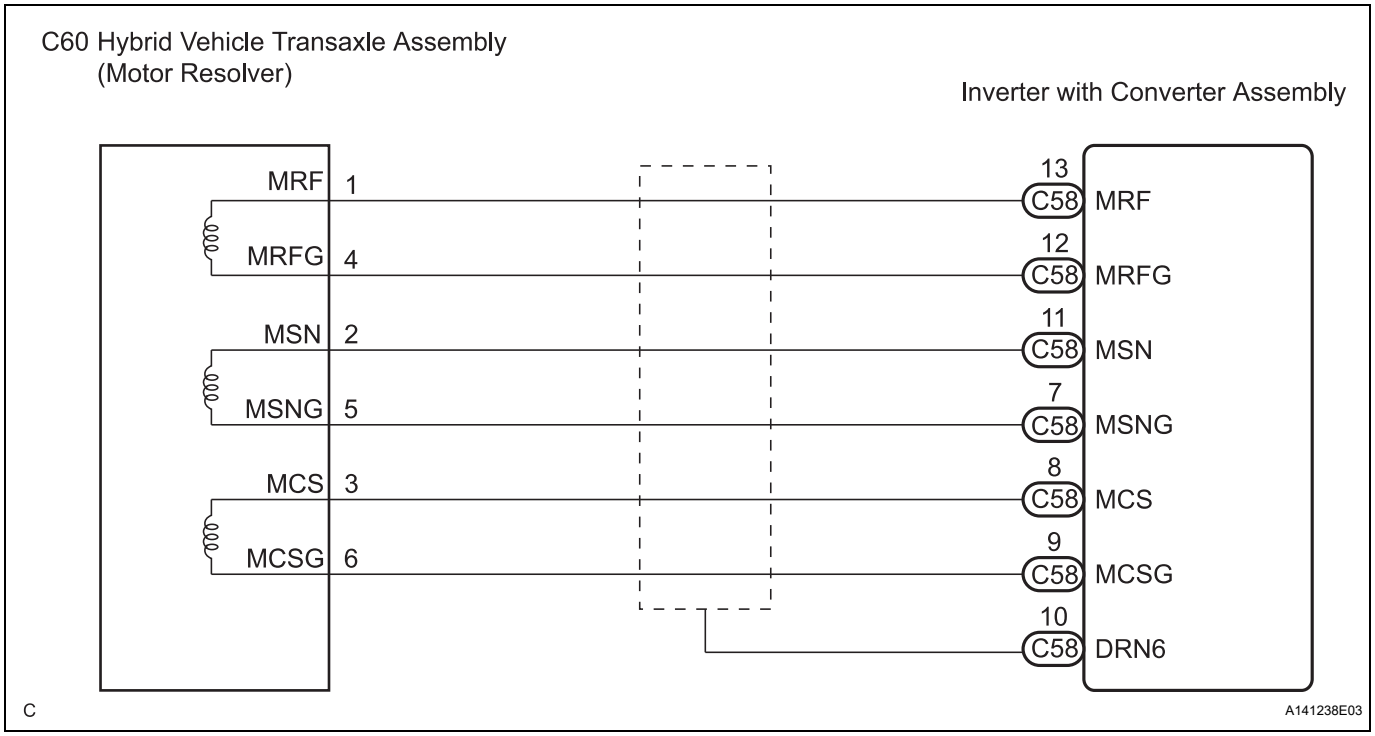
TMC's intellectual property	-

COMPONENT OPERATING RANGE

Motor resolver	DTC P0A3F (INF 243) is not detected DTC P0A40 (INF 500) is not detected DTC P0A41 (INF 245) is not detected

HV

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. (Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.)**

NOTICE:

Check for output DTCs again after the repair has been completed. If P0A78-286 or P0A7A-324 is output, replace the inverter with converter assembly.

HINT:

- Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.
- If the problem symptom cannot be reproduced, performing a road test on a road on which the vehicle tends to vibrate will make it easier to reproduce the symptom.
- If INF code 243 is output, there may be an interphase short in the motor resolver circuit due to an intrusion of water into the resolver. Therefore, if the problem symptom cannot be reproduced, replace the hybrid vehicle transaxle assembly last.

1	**CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)**

NG → **CONNECT SECURELY**

OK

2	**CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-159)**

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	**CHECK MOTOR RESOLVER (See page HV-160)**

OK → **REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)**

NG

4	**CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) (See page HV-160)**

NG → **CONNECT SECURELY**

OK

5	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-161)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A4B-253	Generator Position Sensor Circuit

DTC	P0A4C-513	Generator Position Sensor Circuit Range / Performance

DTC	P0A4D-255	Generator Position Sensor Circuit Low

DESCRIPTION

A resolver is a sensor that detects the position of the magnetic poles, which are indispensable for ensuring highly efficient control of MG2 and MG1.
The generator resolver structure and method of connection with the inverter with converter assembly are the same as those of the motor resolver.
The inverter with converter assembly monitors output signals from the generator resolver and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A4B	253	Interphase short in the generator resolver circuit	• Wire harness or connector • Hybrid vehicle transaxle assembly (Generator resolver) • Inverter with converter assembly
P0A4C	513	Generator resolver output is out of the normal range	• Wire harness or connector • Hybrid vehicle transaxle assembly (Generator resolver) • Inverter with converter assembly
P0A4D	255	Open or short in the generator resolver circuit	• Wire harness or connector • Hybrid vehicle transaxle assembly (Generator resolver) • Inverter with converter assembly

HV

MONITOR DESCRIPTION

The MG ECU monitors the generator resolver output signal. If the MG ECU detects output signals that are out of the normal range or specification, it will conclude that there is a malfunction of the generator resolver. The hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A4B (INF 253): Short circuit between phases P0A4C (INF 513): Range check P0A4D (INF 255): Circuit discontinuity / short circuit
Required sensors / components	Generator resolver
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

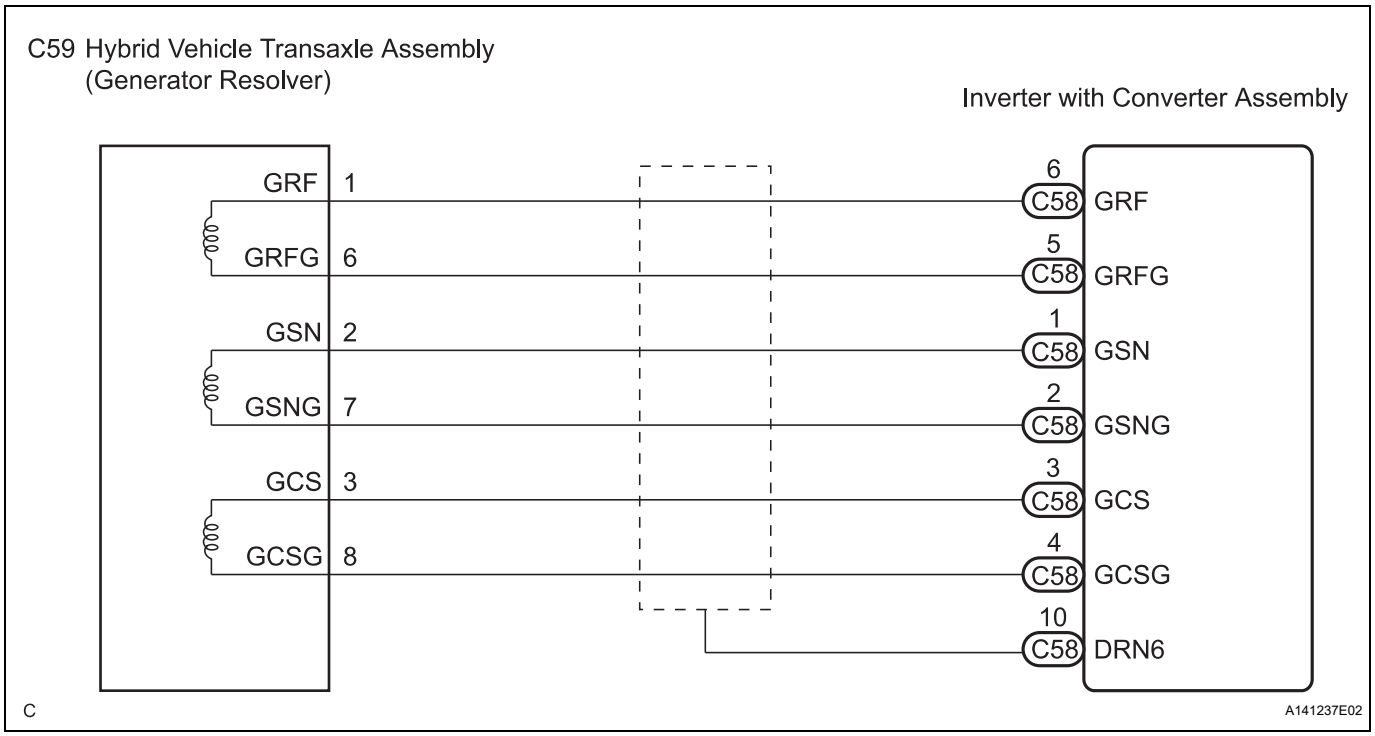
TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Generator resolver	DTC P0A4B (INF 253) is not detected DTC P0A4C (INF 513) is not detected DTC P0A4D (INF 255) is not detected

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. (Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.)**

NOTICE:

Check for output DTCs again after the repair has been completed. If P0A78-286 or P0A7A-324 is output, replace the inverter with converter assembly.

HINT:

- Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.
- If the problem symptom cannot be reproduced, performing a road test on a road on which the vehicle tends to vibrate will make it easier to reproduce the symptom.

HV

- If INF code 253 is output, there may be an interphase short in the generator resolver circuit due to an intrusion of water into the resolver. Therefore, if the problem symptom cannot be reproduced, replace the hybrid vehicle transaxle assembly last.

1	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK ↓

2	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-152)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

3	CHECK GENERATOR RESOLVER (See page HV-153)

OK → REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

NG ↓

4	CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) (See page HV-153)

NG → CONNECT SECURELY

OK ↓

5	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-154)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A51-174	Drive Motor "A" Current Sensor Circuit

DESCRIPTION

The inverter with converter assembly (MG ECU) monitors its internal operation and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A51	174	Inverter with converter assembly (MG ECU) internal error	Inverter with converter assembly

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	REPLACE INVERTER WITH CONVERTER ASSEMBLY

NEXT

HV

COMPLETED

DTC	P0A60-288	Drive Motor "A" Phase V Current
DTC	P0A60-290	Drive Motor "A" Phase V Current
DTC	P0A60-294	Drive Motor "A" Phase V Current
DTC	P0A60-501	Drive Motor "A" Phase V Current
DTC	P0A63-296	Drive Motor "A" Phase W Current
DTC	P0A63-298	Drive Motor "A" Phase W Current
DTC	P0A63-302	Drive Motor "A" Phase W Current
DTC	P0A63-502	Drive Motor "A" Phase W Current

DESCRIPTION

The inverter with converter assembly (MG ECU) monitors the inverter current sensor. The MG ECU detects malfunctions in the sensor system and does not detect malfunctions in the high-voltage system.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A60	288	Malfunction in motor inverter current sensor (phase V sub sensor)	• Inverter with converter assembly • Service plug grip
P0A60	290	Malfunction in motor inverter current sensor (phase V main sensor)	• Inverter with converter assembly • Service plug grip
P0A60	294	Malfunction in motor inverter current sensor (Performance problem or open phase V)	• Inverter with converter assembly • Service plug grip
P0A60	501	Malfunction in motor inverter current sensor (phase V main and sub sensors offset)	• Inverter with converter assembly • Service plug grip
P0A63	296	Malfunction in motor inverter current sensor (phase W sub sensor)	• Inverter with converter assembly • Service plug grip
P0A63	298	Malfunction in motor inverter current sensor (phase W main sensor)	• Inverter with converter assembly • Service plug grip
P0A63	302	Malfunction in motor inverter current sensor (Performance problem or open phase W)	• Inverter with converter assembly • Service plug grip
P0A63	502	Malfunction in motor inverter current sensor (phase W main and sub sensors offset)	• Inverter with converter assembly • Service plug grip

MONITOR DESCRIPTION

The hybrid vehicle control ECU monitors the motor inverter current sensor. If the hybrid vehicle control ECU detects a fault, it will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A60 (INF 288/290/294/501): Phase V, sub sensor P0A63 (INF 296/298/302/502): Phase W, sub sensor
Required sensors / components	Motor inverter current sensor, motor resolver
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A60 (INF 288/290/294/501) is not detected DTC P0A63 (INF 296/298/302/502) is not detected

HV

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)**

NG → **Go to step 3**

OK

2	REPLACE INVERTER WITH CONVERTER ASSEMBLY

HINT:
If any DTCs indicating malfunctions in the current sensor circuit are output, overcurrent to the electric vehicle fuse is suspected. In this case, replace the electric vehicle fuse installed on the service plug grip.

NEXT

REPLACE SERVICE PLUG GRIP

3	CONNECT SECURELY

HINT:
If any DTCs indicating malfunctions in the current sensor circuit are output, overcurrent to the electric vehicle fuse is suspected. In this case, replace the electric vehicle fuse installed on the service plug grip.

NEXT

REPLACE SERVICE PLUG GRIP

DTC	P0A72-326	Generator Phase V Current

DTC	P0A72-328	Generator Phase V Current

DTC	P0A72-333	Generator Phase V Current

DTC	P0A72-515	Generator Phase V Current

DTC	P0A75-334	Generator Phase W Current

DTC	P0A75-336	Generator Phase W Current

DTC	P0A75-341	Generator Phase W Current

DTC	P0A75-516	Generator Phase W Current

HV

DESCRIPTION

The inverter with converter assembly (MG ECU) monitors the inverter current sensor. The MG ECU detects malfunctions in the sensor system and does not detect malfunctions in the high-voltage system.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A72	326	Malfunction in generator inverter current sensor (phase V sub sensor)	• Inverter with converter assembly • Service plug grip
P0A72	328	Malfunction in generator inverter current sensor (phase V main sensor)	• Inverter with converter assembly • Service plug grip
P0A72	333	Malfunction in generator inverter current sensor (Performance problem or open phase V)	• Inverter with converter assembly • Service plug grip
P0A72	515	Malfunction in generator inverter current sensor (phase V main and sub sensors offset)	• Inverter with converter assembly • Service plug grip
P0A75	334	Malfunction in generator inverter current sensor (phase W sub sensor)	• Inverter with converter assembly • Service plug grip
P0A75	336	Malfunction in generator inverter current sensor (phase W main sensor)	• Inverter with converter assembly • Service plug grip
P0A75	341	Malfunction in generator inverter current sensor (Performance problem or open phase W)	• Inverter with converter assembly • Service plug grip
P0A75	516	Malfunction in generator inverter current sensor (phase W main and sub sensors offset)	• Inverter with converter assembly • Service plug grip

MONITOR DESCRIPTION

The hybrid vehicle control ECU monitors the generator inverter current sensor. If the hybrid vehicle control ECU detects a fault, it will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A72 (INF 326/328/333/515): Phase V, sub sensor P0A75 (INF 334/336/341/516): Phase W, sub sensor
Required sensors / components	Generator inverter current sensor, Generator resolver
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A72 (INF 326/328/333/515) is not detected DTC P0A75 (INF 334/336/341/516) is not detected

HV

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)**

NG → **Go to step 3**

OK

2	REPLACE INVERTER WITH CONVERTER ASSEMBLY

HINT:
If any DTCs indicating malfunctions in the current sensor circuit are output, overcurrent to the electric vehicle fuse is suspected. In this case, replace the electric vehicle fuse installed on the service plug grip.

NEXT

REPLACE SERVICE PLUG GRIP

3	CONNECT SECURELY

HINT:
If any DTCs indicating malfunctions in the current sensor circuit are output, overcurrent to the electric vehicle fuse is suspected. In this case, replace the electric vehicle fuse installed on the service plug grip.

NEXT

REPLACE SERVICE PLUG GRIP

DTC	P0A78-113	Drive Motor "A" Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).
If the motor inverter overheats, or has a circuit malfunction or internal short, the inverter transmits this information to the MFIV terminal of the MG ECU via the motor inverter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	113	Motor inverter fail signal detection (overcurrent due to system malfunction)	• Wire harness or connector • Hybrid vehicle transaxle assembly • Inverter with converter assembly

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

HV

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 523, 586, 505, 287, 506, 503, 279, 504, 306, 806, 807, 808	Drive Motor "A" Inverter Performance

DTC No.	Relevant Diagnosis
P0A94-585, 587, 589, 590, 554, 555, 556, 547, 548, 549, 442	DC/DC Converter Performance
P0A7A-517, 325, 518, 344, 809, 810, 811	Generator Inverter Performance
P0A92-521	Hybrid Generator Performance
P0A90-509	Drive Motor "A" Performance

HINT:
P0A78-113 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → GO TO DTC CHART

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

3	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-159)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4	CHECK MOTOR RESOLVER (See page HV-160)

NG → Go to step 7

OK

5	CHECK INVERTER WITH CONVERTER ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) (See page HV-164)

NG → TIGHTEN TO SPECIFIED TORQUE

OK

6	CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2) (See page HV-166)

NG → REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

7	CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) (See page HV-160)

NG → CONNECT SECURELY

OK

8	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-161)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A78-121	Drive Motor "A" Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	121	Motor inverter overvoltage signal detection (overvoltage due to system malfunction)	• HV relay assembly • Inverter with converter assembly • Service plug grip • Frame wire • Hybrid vehicle transaxle assembly

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A78-266, 267, 523, 586, 284, 505, 287, 506, 113, 286, 503, 279, 504, 306, 806, 807, 808, 128	Drive Motor "A" Inverter Performance

DTC No.	Relevant Diagnosis
P0A94-585, 587, 589, 590, 553, 554, 555, 556, 172, 557, 547, 548, 549, 442	DC/DC Converter Performance
P0A7A-322, 517, 325, 518, 122, 324, 344, 809, 810, 811, 130	Generator Inverter Performance
P0A92-521	Hybrid Generator Performance
P0A90-509	Drive Motor "A" Performance
P3004-803	High Voltage Power Resource
P0ADB-227	Hybrid Battery Positive Contactor Control Circuit Low
P0ADC-226	Hybrid Battery Positive Contactor Control Circuit High
P0ADF-229	Hybrid Battery Negative Contactor Control Circuit Low

HINT:
P0A78-121 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → GO TO DTC CHART

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

HV

3	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-152)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4	CHECK GENERATOR RESOLVER (See page HV-153)

NG → Go to step 15

OK

5	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-159)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

6	CHECK MOTOR RESOLVER (See page HV-160)

NG → Go to step 13

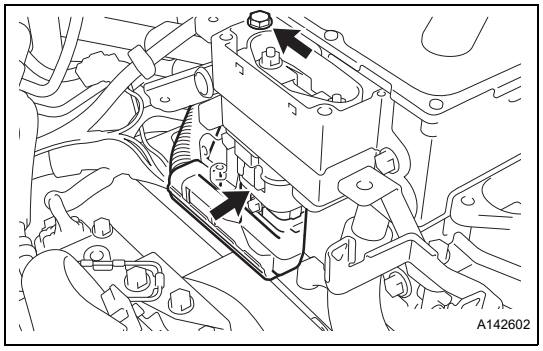
OK

7	CHECK INVERTER WITH CONVERTER ASSEMBLY (HIGH VOLTAGE CONNECTOR CONNECTION CONDITION)

CAUTION:
Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.
NOTICE:
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Check the connection of the high voltage connector of the inverter with converter assembly.
OK:
The connector is connected securely and there are no contact peoblems.



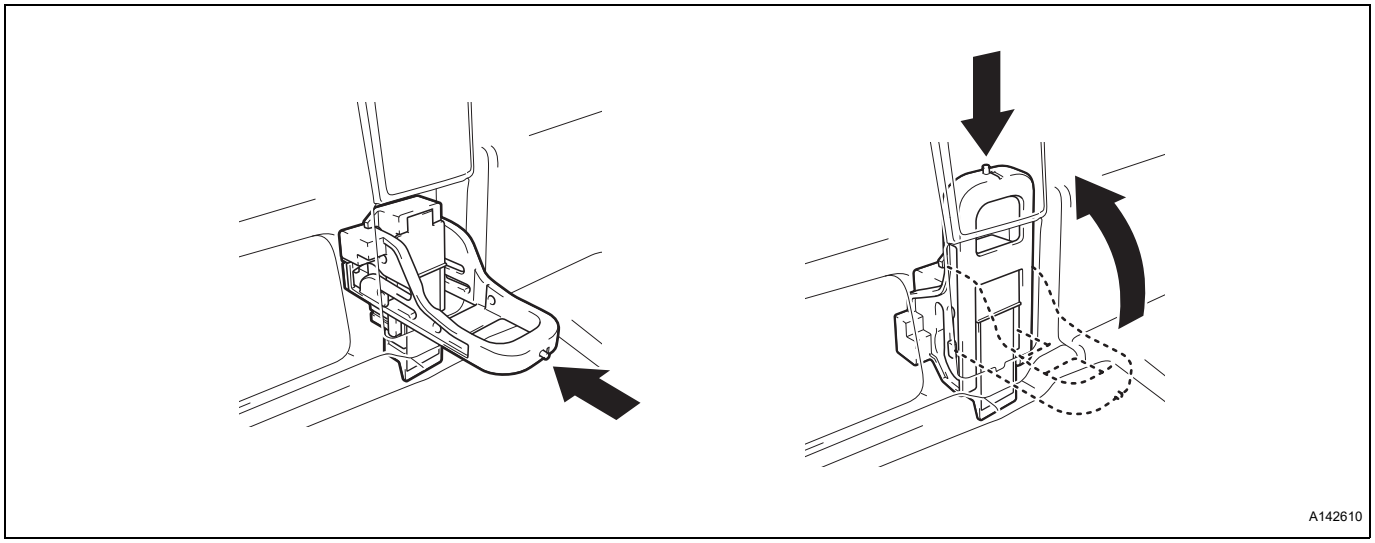
NG → CONNECT SECURELY

OK

8	CHECK SERVICE PLUG GRIP

CAUTION:
Be sure to wear insulated gloves.

(a) Check the connection of the service plug grip.

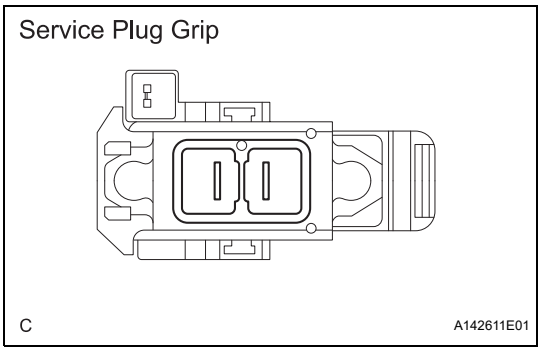


OK:
Dirt or foreign objects have not entered the connection, or there is no evidence of contamination.

NG → **REPLACE SERVICE PLUG GRIP**

OK

9 CHECK SERVICE PLUG GRIP



(a) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
Service plug grip terminal	Below 1 Ω

NG → **REPLACE SERVICE PLUG GRIP**

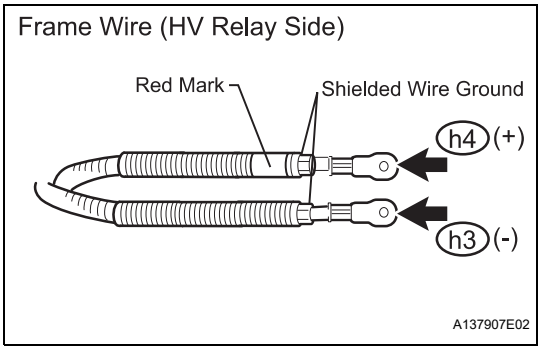
OK

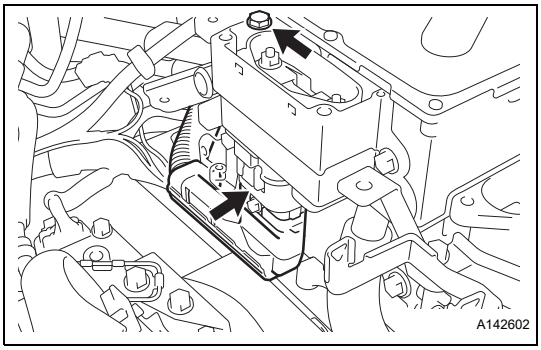
10 CHECK FRAME WIRE

CAUTION:
Be sure to wear insulated gloves and protective goggles.

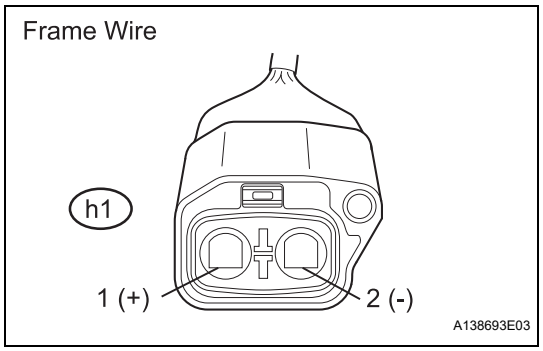
(a) Check that the service plug grip is not installed.
(b) Disconnect the frame wire from the HV relay.
(c) Using a megohmmeter (500 V range), measure the insulation resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
h4-1 - Body ground and shielded wire ground	10 MΩ or more
h3-1 - Body ground and shielded wire ground	10 MΩ or more





(d) Disconnect the frame wire from the high voltage connector of the inverter with converter assembly.



(e) Measure the resistance according to the value(s) in the table below.

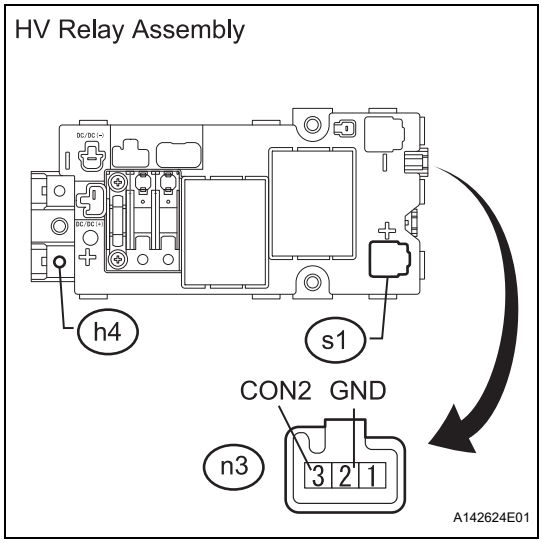
Standard resistance

Tester Connection	Specified Condition
h4-1 (high voltage +) - h1-1 (high voltage +)	Below 1 Ω
h3-1 (high voltage -) - h1-2 (high voltage -)	Below 1 Ω

NG → **REPLACE FRAME WIRE**

OK

11 INSPECT HV RELAY ASSEMBLY (SMRB)



CAUTION:
Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

(b) Remove the HV relay assembly from the vehicle (See page HB-104).

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
h4-1 - s1-1	Below 1 Ω (When battery voltage (12 V) applied to terminals n3-2 and n3-3)

(d) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
CON2 (n3-3) - GND (n3-2)	18.8 to 32.1 Ω at -35 to 80°C (-31 to 176°F)

NG → **REPLACE HV RELAY ASSEMBLY (See page HB-104)**

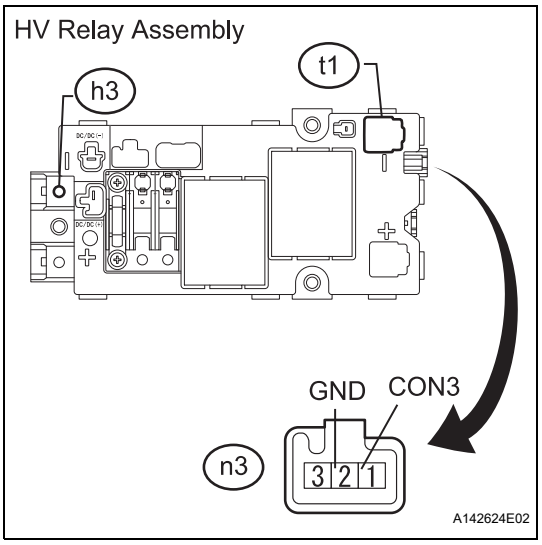
OK

12 INSPECT HV RELAY ASSEMBLY (SMRG)

CAUTION:
Be sure to wear insulated gloves and protective goggles.

(a) Check that the service plug grip is not installed.

HV



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
h3-1 - t1-1	Below 1 Ω (When battery voltage applied to terminals n3-1 and n3-2)

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
CON3 (n3-1) - GND (n3-2)	18.8 to 32.1 Ω at -35 to 80°C (-31 to 176°F)

NG → REPLACE HV RELAY ASSEMBLY (See page HB-104)

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

13	CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) (See page HV-160)

NG → CONNECT SECURELY

OK

14	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-161)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

15	CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) (See page HV-153)

NG → CONNECT SECURELY

OK

HV

16	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-154)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A78-128	Drive Motor "A" Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).
If an abnormal amount of current flows through the motor inverter, the MG ECU detects it and sends a signal to inform the hybrid vehicle control ECU of the malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	128	Abnormal motor current value detection (System malfunction)	• Wire harness or connector • Hybrid vehicle transaxle assembly • Inverter with converter assembly

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

HV

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 523, 586, 505, 287, 506, 503, 279, 504, 306, 806, 807, 808	Drive Motor "A" Inverter Performance

DTC No.	Relevant Diagnosis
P0A94-585, 587, 589, 590, 554, 555, 556, 547, 548, 549, 442	DC/DC Converter Performance
P0A7A-517, 325, 518, 344, 809, 810, 811	Generator Inverter Performance
P0A92-521	Hybrid Generator Performance
P0A90-509	Drive Motor "A" Performance

HINT:
P0A78-128 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → GO TO DTC CHART

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

3	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-159)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4	CHECK MOTOR RESOLVER (See page HV-160)

NG → Go to step 7

OK

5	CHECK INVERTER WITH CONVERTER ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) (See page HV-164)

NG → TIGHTEN TO SPECIFIED TORQUE

OK

6	CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2) (See page HV-166)

NG → REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

7	CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) (See page HV-160)

NG → CONNECT SECURELY

OK

8	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-161)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

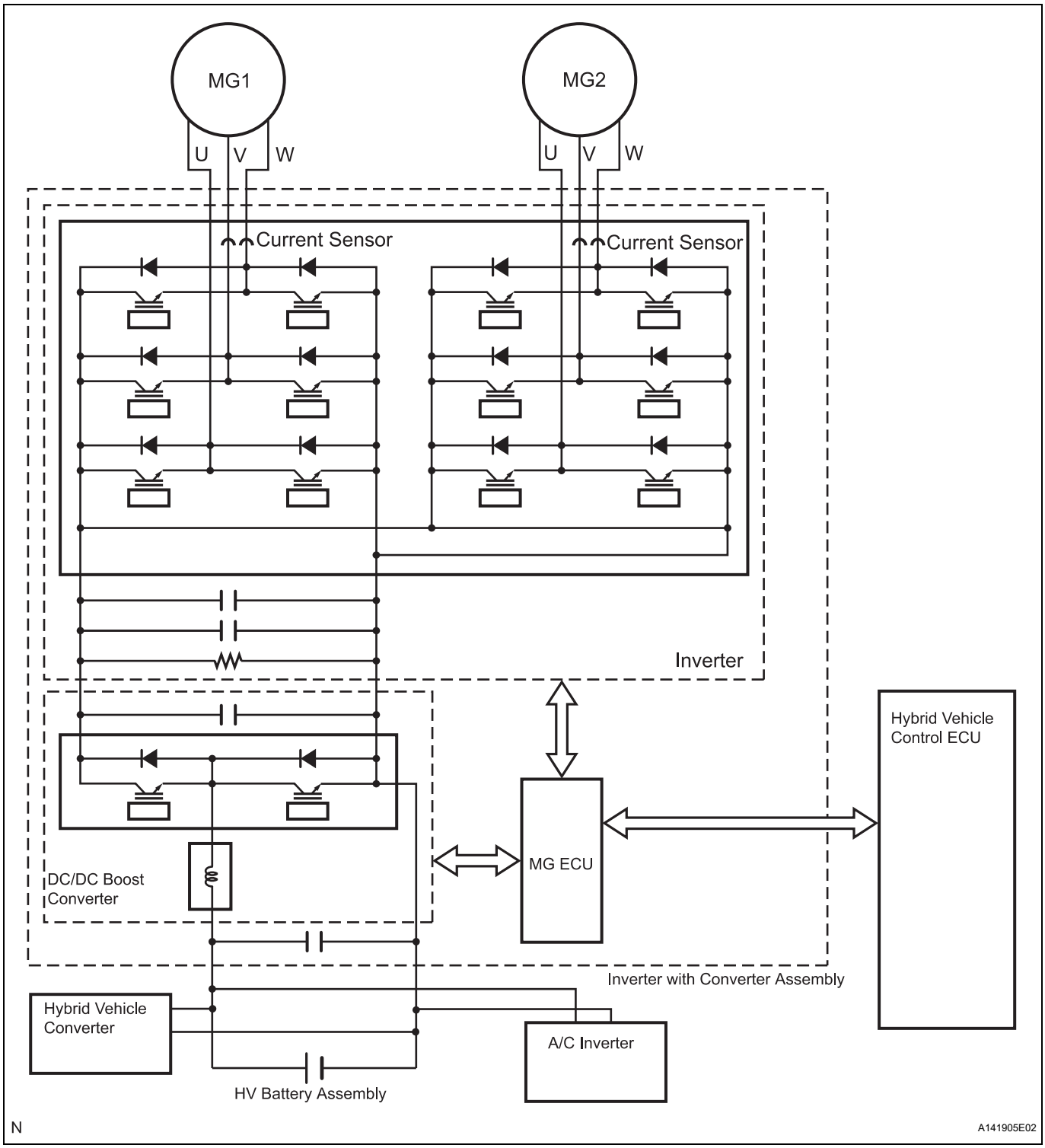
REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A78-266	Drive Motor "A" Inverter Performance

DTC	P0A78-267	Drive Motor "A" Inverter Performance

DESCRIPTION

The inverter converts high-voltage direct current from the HV battery and alternating current for MG2 and MG1. The inverter contains a three-phase bridge circuit, which consists of six power transistors each for MG2 and MG1, that converts direct current to three-phase alternating current. The MG ECU controls the actuation of the power transistors. The inverter transmits information that is necessary for effecting control, such as the amperage and voltage, to the MG ECU.



The MG ECU uses a voltage sensor, which is built into the inverter, to detect boosted high voltage to allow control of the voltage boost.

The inverter voltage sensor outputs voltage that varies between 0 and 5 V in accordance with the changes in the high voltage. The higher the high voltage, the higher the output voltage, and the lower the high voltage, the lower the output voltage.

The MG ECU monitors the inverter voltage and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	266	Open or short to GND in the inverter voltage (VH) signal line	Inverter with converter assembly
P0A78	267	Short to +B in the inverter voltage (VH) signal line	Inverter with converter assembly

MONITOR DESCRIPTION

The MG ECU monitors the inverter voltage (VH) sensor circuit. If the MG ECU detects an open or short in the VH sensor circuit, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A78 (INF 266): VH malfunction (GND short and disconnection) P0A78 (INF 267): VH malfunction (+B short)
Required sensors / components	Motor inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	1 driving cycle
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A78 (INF 266/267) is not detected

HV

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**REPLACE INVERTER WITH CONVERTER ASSEMBLY**

NEXT

COMPLETED

DTC	P0A78-279	Drive Motor "A" Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	279	Motor inverter overvoltage signal detection (overvoltage due to inverter with converter assembly malfunction)	Inverter with converter assembly

MONITOR DESCRIPTION

If the motor inverter detects overvoltage, it transmits an overvoltage signal to the MG ECU. Upon receiving this signal, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A78 (INF 279): OVH detection (Over high voltage malfunction)
Required sensors / components	Motor inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

HV

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A78 (INF 279) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 523, 586, 505, 287, 506, 806, 807, 808	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590, 554, 555, 556	DC/DC Converter Performance
P0A7A-517, 325, 518, 809, 810, 811	Generator Inverter Performance
P3004-803	High Voltage Power Resource
P0ADB-227	Hybrid Battery Positive Contactor Control Circuit Low
P0ADC-226	Hybrid Battery Positive Contactor Control Circuit High
P0ADF-229	Hybrid Battery Negative Contactor Control Circuit Low

HINT:
P0A78-279 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

HV

YES → GO TO DTC CHART

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

DTC	P0A78-282	Drive Motor "A" Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	282	Motor inverter overvoltage signal detection (circuit malfunction)	Inverter with converter assembly

MONITOR DESCRIPTION

If the motor inverter detects a circuit malfunction, it transmits a motor inverter overvoltage signal to the MG ECU. Upon receiving this signal, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A78 (INF 282): OVH detection (Circuit malfunction)
Required sensors / components	Motor inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

HV

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A78 (INF 282) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK ↓

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

DTC	P0A78-284	Drive Motor "A" Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).
If the motor inverter overheats, or has a circuit malfunction or internal short, the inverter transmits this information to the MFIV terminal of the MG ECU via the motor inverter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	284	Motor inverter fail signal detection (overheat)	• Wire harness or connector • Inverter cooling system • Cooling fan system • Water pump with motor & bracket assembly • Hybrid vehicle transaxle assembly • Inverter with converter assembly • Hybrid vehicle control ECU

MONITOR DESCRIPTION

If the motor inverter overheats, it transmits an inverter fail signal to the MG ECU. Upon receiving this signal, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A78 (INF 284): MFIV detection (Over heat malfunction)
Required sensors / components	Motor inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

HV

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A78 (INF 284) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

NOTICE:
After inspection, be sure to replace the inverter with converter assembly
HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 523, 586, 505, 287, 506, 503, 279, 504, 306, 806, 807, 808	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590, 554, 555, 556, 547, 548, 549, 442	DC/DC Converter Performance
P0A7A-517, 325, 518, 344, 809, 810, 811	Generator Inverter Performance
P0A92-521	Hybrid Generator Performance
P0A90-509	Drive Motor "A" Performance

HINT:
DTC P0A78-284 may be set due to a malfunction which also causes DTCs in the table above to be set. First troubleshoot the output DTCs in the table above. After troubleshooting all output DTCs, be sure to replace the inverter with converter assembly.

YES → **GO TO DTC CHART**

NO

2	CHECK QUANTITY OF HV COOLANT (See page HV-325)

B → **ADD COOLANT**

HV

C → CHECK FOR COOLANT LEAKS AND ADD COOLANT

A

3	CHECK COOLANT HOSE (See page HV-326)

NG → CORRECT THE PROBLEM

OK

4	CHECK CONNECTOR CONNECTION CONDITION (HYBRID VEHICLE CONTROL ECU CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

5	CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR & BRACKET ASSEMBLY CONNECTOR) (See page HV-326)

NG → CONNECT SECURELY

OK

HV

6	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (WATER PUMP) (See page HV-327)

NG → Go to step 16

OK

7	CHECK CONNECTOR CONNECTION CONDITION (COOLING FAN MOTOR CONNECTOR) (See page HV-327)

NG → CONNECT SECURELY

OK

8	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (COOLING FAN) (See page HV-327)

NG → CHECK COOLING FAN SYSTEM (See page CO-3)

OK

9	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK ↓

10	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-159)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

11	CHECK MOTOR RESOLVER (See page HV-160)

NG → Go to step 14

OK ↓

12	CHECK INVERTER WITH CONVERTER ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) (See page HV-164)

NG → TIGHTEN TO SPECIFIED TORQUE

OK ↓

13	CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2) (See page HV-166)

NG → REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

OK ↓

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

14	CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) (See page HV-160)

NG → CONNECT SECURELY

OK ↓

HV

15	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-161)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

16	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (WATER PUMP) (See page HV-328)

OK → ADD COOLANT

NG

17	CHECK WATER PUMP WITH MOTOR & BRACKET ASSEMBLY (See page HV-329)

NG → Go to step 19

OK

HV

18	CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR & BRACKET ASSEMBLY - HV CONTROL ECU) (See page HV-330)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

19	CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR POWER SOURCE CIRCUIT) (See page HV-330)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE WATER PUMP WITH MOTOR & BRACKET ASSEMBLY

DTC	P0A78-286	Drive Motor "A" Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).
If the motor inverter overheats, or has a circuit malfunction or internal short, the inverter transmits this information to the MFIV terminal of the MG ECU via the motor inverter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	286	Motor inverter fail signal detection (circuit malfunction)	• Wire harness or connector • Inverter cooling system • Cooling fan system • Water pump with motor & bracket assembly • Hybrid vehicle transaxle assembly • Inverter with converter assembly • Hybrid vehicle control ECU

MONITOR DESCRIPTION

If the motor inverter detects a circuit malfunction, it transmits a motor inverter fail signal to the MG ECU. Upon receiving this signal, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A78 (INF 286): MFIV detection (Circuit malfunction)
Required sensors / components	Motor inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

HV

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A78 (INF 286) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

NOTICE:
After inspection, be sure to replace the inverter with converter assembly.
HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result:

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 523, 586, 284, 505, 287, 506, 113, 503, 279, 504, 306, 806, 807, 808, 128	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590, 554, 555, 556, 547, 548, 549, 442	DC/DC Converter Performance
P0A7A-322, 517, 325, 518, 122, 344, 809, 810, 811, 130	Generator Inverter Performance
P0A92-521	Hybrid Generator Performance
P0A90-509	Drive Motor "A" Performance

HINT:
DTC P0A78-286 may be set due to a malfunction which also causes DTCs in the table above to be set. First troubleshoot the output DTCs in the table above. After troubleshooting all output DTCs, be sure to replace the inverter with converter assembly.

YES → **GO TO DTC CHART**

NO

2	CHECK QUANTITY OF HV COOLANT (See page HV-325)

B → **ADD COOLANT**

C → CHECK FOR COOLANT LEAKS AND ADD COOLANT

A

3	CHECK COOLANT HOSE (See page HV-326)

NG → CORRECT THE PROBLEM

OK

4	CHECK CONNECTOR CONNECTION CONDITION (HYBRID VEHICLE CONTROL ECU CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

5	CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR & BRACKET ASSEMBLY) (See page HV-326)

NG → CONNECT SECURELY

OK

6	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (WATER PUMP) (See page HV-327)

NG → Go to step 16

OK

7	CHECK CONNECTOR CONNECTION CONDITION (COOLING FAN MOTOR CONNECTOR) (See page HV-327)

NG → CONNECT SECURELY

OK

8	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (COOLING FAN) (See page HV-327)

NG → CHECK COOLING FAN SYSTEM (See page CO-3)

OK

9	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY) (See page HV-79)

NG → CONNECT SECURELY

OK ↓

10	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-159)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

11	CHECK MOTOR RESOLVER (See page HV-160)

NG → Go to step 14

OK ↓

12	CHECK INVERTER WITH CONVERTER ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) (See page HV-164)

NG → TIGHTEN TO SPECIFIED TORQUE

OK ↓

13	CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2) (See page HV-166)

NG → REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

OK ↓

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

14	CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) (See page HV-160)

NG → CONNECT SECURELY

OK ↓

15	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-161)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

16	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (WATER PUMP) (See page HV-328)

OK → ADD COOLANT

NG ↓

17	CHECK WATER PUMP WITH MOTOR & BRACKET ASSEMBLY (See page HV-329)

NG → Go to step 19

OK ↓

18	CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR & BRACKET ASSEMBLY - HV CONTROL ECU) (See page HV-330)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

19	CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR POWER SOURCE CIRCUIT) (See page HV-330)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

REPLACE WATER PUMP WITH MOTOR & BRACKET ASSEMBLY

DTC	P0A78-287	Drive Motor "A" Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).
If the motor inverter overheats, or has a circuit malfunction or internal short, the inverter transmits this information to the MFIV terminal of the MG ECU via the motor inverter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	287	Motor inverter fail signal detection (overcurrent due to inverter assembly malfunction)	Inverter with converter assembly

MONITOR DESCRIPTION

If excessive amperage flows through the motor inverter due to an internal short, the motor inverter will transmit an inverter fail signal to the MG ECU. Upon receiving this signal, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A78 (INF 287): MFIV detection (Load short circuit)
Required sensors / components	Motor inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

HV

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A78 (INF 287) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 523, 586	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590	DC/DC Converter Performance

HINT:
P0A78-287 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

HV

YES → GO TO DTC CHART

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

DTC	P0A78-306	Drive Motor "A" Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).
The MG ECU controls motor torque according to driving conditions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	306	Motor torque execution monitoring malfunction	• Hybrid vehicle transaxle assembly • Inverter with converter assembly

MONITOR DESCRIPTION

If the difference between the requested MG2 torque and the actual MG2 torque exceeds a predetermined value, the MG ECU determines that there is a malfunction in the execution or monitoring of the MG2 torque. Then, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A78 (INF 306): Discrepancy between motor monitored torque and commanded torque
Required sensors / components	Motor inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

HV

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A78 (INF 306) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 510, 523, 586, 505, 287, 506, 503, 279, 504, 806, 807, 808	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590, 554, 555, 556, 547, 548, 549	DC/DC Converter Performance
P0A7A-517, 522, 325, 518, 809, 810, 811	Generator Inverter Performance
P0AA6 (all INF codes)	Hybrid Battery Voltage System Isolation Fault
P3004-132	Power Cable Malfunction
P3233-750	Short to B+ in Blocking of HV Gate Connection

HINT:
P0A78-306 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

HV

YES → GO TO DTC CHART

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

3	CHECK INVERTER WITH CONVERTER ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) (See page HV-164)

NG → TIGHTEN TO SPECIFIED TORQUE

OK

4	CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2) (See page HV-166)

OK → REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

NG

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A78-503	Drive Motor "A" Inverter Performance

DTC	P0A78-504	Drive Motor "A" Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	503	Motor inverter overvoltage signal detection (overvoltage due to MG ECU malfunction)	• Wire harness or connector • Inverter with converter assembly • Hybrid vehicle transaxle assembly
P0A78	504	Motor inverter overvoltage signal detection (overvoltage due to hybrid vehicle transaxle assembly malfunction)	• Wire harness or connector • Inverter with converter assembly • Hybrid vehicle transaxle assembly

MONITOR DESCRIPTION

If the motor inverter detects overvoltage, it transmits an overvoltage signal to the MG ECU. Upon receiving this signal, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A78 (INF 503/504): OVH detection (Over high voltage malfunction)
Required sensors / components	Motor inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A78 (INF 503/504) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**

- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 523, 586, 505, 287, 506, 806, 807, 808	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590, 554, 555, 556	DC/DC Converter Performance
P0A7A-517, 325, 518, 809, 810, 811	Generator Inverter Performance
P3004-803	High Voltage Power Resource
P0ADB-227	Hybrid Battery Positive Contactor Control Circuit Low
P0ADC-226	Hybrid Battery Positive Contactor Control Circuit High
P0ADF-229	Hybrid Battery Negative Contactor Control Circuit Low

HINT:
P0A78-503 or 504 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → **GO TO DTC CHART**

NO

HV

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK ↓

3	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-159)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

4	CHECK MOTOR RESOLVER (See page HV-160)

OK → Go to step 7

NG ↓

5	CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) (See page HV-160)

NG → CONNECT SECURELY

OK ↓

6	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVRTER ASSEMBLY - MOTOR RESOLVER) (See page HV-161)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

7	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-152)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

8	CHECK GENERATOR RESOLVER (See page HV-153)

OK → REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

NG

9	CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) (See page HV-153)

NG → CONNECT SECURELY

OK

10	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-154)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A78-505	Drive Motor "A" Inverter Performance

DTC	P0A78-506	Drive Motor "A" Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).
If an abnormal amount of current flows through the motor inverter, the MG ECU detects it and sends a signal to inform the hybrid vehicle control ECU of the malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	505	Motor inverter fail signal detection (overcurrent due to MG ECU malfunction)	• Wire harness or connector • Hybrid vehicle transaxle assembly • Inverter with converter assembly
P0A78	506	Motor inverter fail signal detection (overcurrent due to hybrid vehicle transaxle assembly malfunction)	• Wire harness or connector • Hybrid vehicle transaxle assembly • Inverter with converter assembly

MONITOR DESCRIPTION

The MG ECU monitors the motor inverter electric current. If the current exceeds the threshold for a specified period of time, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A78 (INF 505/506): MFIV detection (Load short circuit)
Required sensors / components	Motor inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A78 (INF 505/506) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 523, 586	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590	DC/DC Converter Performance

HINT:
P0A78-505 or 506 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → **GO TO DTC CHART**

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK ↓

3	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-159)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

4	CHECK MOTOR RESOLVER (See page HV-160)

NG → Go to step 5

OK ↓

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

5	CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) (See page HV-160)

NG → CONNECT SECURELY

OK ↓

6	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-161)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A78-510	Drive Motor "A" Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).
Upon receiving a motor gate shutdown signal from the MG ECU, the inverter forcibly stops MG2 by turning off all power transistors that are actuating MG2.
The MG ECU monitors the motor gate shutdown signal line and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	510	Motor inverter gate malfunction	Inverter with converter assembly

HINT:
- If DTC P0A78-510 is output, the hybrid system cannot be restarted until the DTC is cleared.
- If the malfunction is not reproduced, leave the vehicle for 1 minute with the shift lever in the N position in order to easily reproduce the malfunction.

MONITOR DESCRIPTION

The MG ECU monitors the current that flows in MG2. If the current flows in MG2 while the vehicle is stationary with the power switch on (IG) or the shift lever in the N position, the MG ECU will detect a malfunction. The hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A78 (INF 510): Malfunction of inverter gate shutdown circuit
Required sensors / components	Motor inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

HV

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A78 (INF 510) is not detected

INSPECTION PROCEDURE

CAUTION:
- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)**

NG → **CONNECT SECURELY**

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

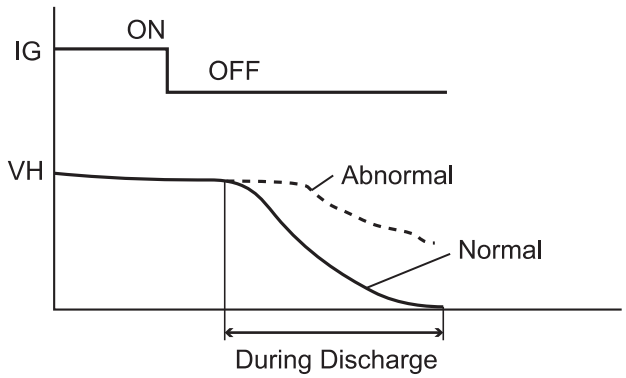
DTC	P0A78-523	Drive Motor "A" Inverter Performance

DESCRIPTION

Refer to the circuit description for DTC P0A78-266 (See page HV-232).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	523	Inverter voltage (VH) sensor offset malfunction	Inverter with converter assembly

HINT:
Turning the power switch off causes the voltage in the inverter to discharge. The inverter voltage is almost 0 V after discharge. The DTC will be stored if the inverter voltage is more than the specified value after discharge.



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HV

MONITOR DESCRIPTION

The hybrid vehicle control ECU monitors the inverter voltage (VH) sensor signal. If the hybrid vehicle control ECU detects a fault in the sensor signal, the hybrid vehicle control ECU interprets this as a VH sensor failure. The hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A78 (INF 523): Voltage (VH) sensor deviation
Required sensors / components	Motor inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A78 (INF 523) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0AE2-773, 161	SMRP
P0AE0-228	SMRG
P0ADC-226	SMRB
P0A1A-156, 658, 151, 155, P0A1B-511, 164, 163, 512, 193, 786, 788, 659, 661, P0A78-266, 267, P0A94-442	VH sensor circuit
P0A1A-200, 791, 792, 793, P0A1B-192, 168, 794, 795, 796, P0A3F-243, P0A41-245, P0A40-500, P0A4B-253, P0A4C-513, P0A4D-255	MG resolver circuit

HV

YES → GO TO DTC CHART

NO

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

DTC	P0A78-586	Drive Motor "A" Inverter Performance

DESCRIPTION

Refer to the circuit description for DTC P0A78-266 (See page HV-232).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	586	Inverter voltage (VH) sensor performance problem	Inverter with converter assembly

MONITOR DESCRIPTION

The hybrid vehicle control ECU monitors the inverter voltage (VH) sensor signal. If the hybrid vehicle control ECU detects a fault in the sensor signal, the hybrid vehicle control ECU interprets this as a VH sensor failure. The hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A78 (INF 586): Voltage (VH) sensor deviation
Required sensors / components	Motor inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

HV

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Hybrid vehicle control ECU	DTC P0A78 (INF 586) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1A, P0A1B	MG ECU circuit malfunction
P0A1D	Hybrid vehicle control ECU circuit malfunction

YES → GO TO DTC CHART

NO → REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

DTC	P0A78-806	Drive Motor "A" Inverter Performance

DTC	P0A78-808	Drive Motor "A" Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).
If an abnormal amount of current flows through the motor inverter, the MG ECU detects it and sends a signal to inform the hybrid vehicle control ECU of the malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	806	Abnormal motor current value detection (MG ECU malfunction)	• Wire harness or connector • Hybrid vehicle transaxle assembly • Inverter with converter assembly
P0A78	808	Abnormal motor current value detection (Hybrid vehicle transaxle assembly malfunction)	• Wire harness or connector • Hybrid vehicle transaxle assembly • Inverter with converter assembly

MONITOR DESCRIPTION

The MG ECU monitors the motor inverter electric current. If the current exceeds the threshold for a specified period of time, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A78 (INF 806/808): Motor inverter abnormal current
Required sensors / components	Motor inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A78 (INF 806/808) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 523, 586	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590	DC/DC Converter Performance

HINT:
P0A78-806 or 808 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → **GO TO DTC CHART**

NO

HV

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK ↓

3	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-159)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

4	CHECK MOTOR RESOLVER (See page HV-160)

NG → Go to step 5

OK ↓

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

HV

5	CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) (See page HV-160)

NG → CONNECT SECURELY

OK ↓

6	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-161)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A78-807	Drive Motor "A" Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).
If an abnormal amount of current flows through the motor inverter, the MG ECU detects it and sends a signal to inform the hybrid vehicle control ECU of the malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	807	Abnormal motor current value detection (Inverter malfunction)	• Wire harness or connector • Inverter with converter assembly

MONITOR DESCRIPTION

The MG ECU monitors the motor inverter electric current. If the current exceeds the threshold for a specified period of time, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A78 (INF 807): Motor Inverter Abnormal Current
Required sensors / components	Motor inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

HV

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A78 (INF 807) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 523, 586	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590	DC/DC Converter Performance

HV

HINT:
P0A78-807 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → GO TO DTC CHART

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

DTC	P0A7A-122	Generator Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).
If the generator inverter circuit is opened or shorted, or if the circuit overheats, the information is transmitted from the inverter to the GFIV terminal of the MG ECU via the generator inverter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	122	Generator inverter fail signal detection (overcurrent due to system malfunction)	• Fuel level • Hybrid vehicle transaxle assembly • Engine assembly • Inverter with converter assembly • Wire harness or connector

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

HV

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance

DTC No.	Relevant Diagnosis
P0A78-266, 267, 523, 586, 505, 287, 506, 503, 279, 504, 306, 806, 807, 808	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590, 554, 555, 556, 547, 548, 549, 442	DC/DC Converter Performance
P0A7A-517, 325, 518, 344, 809, 810, 811	Generator Inverter Performance
P0A92-521	Hybrid Generator Performance
P0A90-509	Drive Motor "A" Performance

HINT:
P0A7A-122 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES > **GO TO DTC CHART**

NO

2 CHECK AMOUNT OF GASOLINE

(a) Turn the power switch on (IG).
(b) Check the amount of fuel by referring to the fuel gauge in the meter.
OK:
Proper amount of fuel is in the tank.

NG > **REFUEL VEHICLE**

HV

OK

3 CHECK ENGINE START

(a) Turn the power switch on (READY).
(b) Check if the engine starts.
HINT:
Depressing the accelerator pedal with the shift lever in the P position will cause the engine to start.
OK:
The engine starts.

OK > **Go to step 6**

NG

4 INSPECT CRANKSHAFT PULLEY REVOLUTION (P POSITION)

(a) Turn the power switch off, move the shift lever to the P position, and lift up the vehicle.
(b) Turn the crankshaft pulley using hand tools to check if the crankshaft pulley can rotate.

CAUTION:
Do not turn the power switch on (READY) while performing this inspection. Be sure to turn the power switch off before performing this inspection, to prevent the engine from starting.
OK:
The crankshaft pulley rotates.

OK	Go to step 6

NG

5	INSPECT CRANKSHAFT PULLEY REVOLUTION (N POSITION)

(a) Lower the vehicle.
(b) Turn the power switch off, move the shift lever to the N position, and lift up the vehicle.
(c) Turn the crankshaft pulley using hand tools to check if the crankshaft pulley can rotate.

CAUTION:
Do not turn the power switch on (READY) while performing this inspection. Be sure to turn the power switch off before performing this inspection, to prevent the engine from starting.
OK:
The crankshaft pulley rotates.

OK	REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

NG

REPAIR OR REPLACE ENGINE ASSEMBLY

6	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG	CONNECT SECURELY

OK

7	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-152)

NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

8	CHECK GENERATOR RESOLVER (See page HV-153)

NG → Go to step 11

OK

9	CHECK INVERTER WITH CONVERTER ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) (See page HV-165)

NG → TIGHTEN TO SPECIFIED TORQUE

OK

10	CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1) (See page HV-165)

NG → REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

11	CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) (See page HV-153)

NG → CONNECT SECURELY

OK

12	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-154)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A7A-130	Generator Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).
If an abnormal amount of current flows through the generator inverter, the MG ECU detects it and sends a signal to inform the hybrid vehicle control ECU of the malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	130	Abnormal generator current value detection (System)	• Fuel level • Hybrid vehicle transaxle assembly • Engine assembly • Inverter with converter assembly • Wire harness or connector

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

HV

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance

DTC No.	Relevant Diagnosis
P0A78-266, 267, 523, 586, 505, 287, 506, 503, 279, 504, 306, 806, 807, 808	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590, 554, 555, 556, 547, 548, 549, 442	DC/DC Converter Performance
P0A7A-517, 325, 518, 344, 809, 810, 811	Generator Inverter Performance
P0A92-521	Hybrid Generator Performance
P0A90-509	Drive Motor "A" Performance

HINT:
P0A7A-130 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → GO TO DTC CHART

NO

2 CHECK AMOUNT OF GASOLINE (See page HV-278)

NG → REFUEL VEHICLE

OK

3 CHECK ENGINE START (See page HV-278)

OK → Go to step 6

NG

4 INSPECT CRANKSHAFT PULLEY REVOLUTION (P POSITION) (See page HV-278)

OK → Go to step 6

NG

5 INSPECT CRANKSHAFT PULLEY REVOLUTION (N POSITION) (See page HV-279)

OK → REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

NG

REPAIR OR REPLACE ENGINE ASSEMBLY

6	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK ↓

7	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-152)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

8	CHECK GENERATOR RESOLVER (See page HV-153)

NG → Go to step 11

OK ↓

9	CHECK INVERTER WITH CONVERTER ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) (See page HV-165)

NG → TIGHTEN TO SPECIFIED TORQUE

OK ↓

10	CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1) (See page HV-165)

NG → REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

OK ↓

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

11	CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) (See page HV-153)

NG → CONNECT SECURELY

OK ↓

12	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-154)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A7A-322	Generator Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).
If the generator inverter circuit is opened or shorted, or if the circuit overheats, the information is transmitted from the inverter to the GFIV terminal of the MG ECU via the generator inverter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	322	Generator inverter fail signal detection (overheating)	• Inverter cooling system • Water pump with motor & bracket assembly • Hybrid vehicle transaxle assembly • Inverter with converter assembly • Engine assembly • Fuel level • Cooling fan system • Hybrid vehicle control ECU

MONITOR DESCRIPTION

If the generator inverter overheats, it transmits an inverter fail signal to the MG ECU. Upon receiving this signal, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A7A (INF 322): GFIV detection (Overheat malfunction)
Required sensors / components	Generator inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

HV

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A7A (INF 322) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

NOTICE:
After inspection, be sure to replace the inverter with converter assembly.
HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 523, 586, 505, 287, 506, 503, 279, 504, 306, 806, 807, 808	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590, 554, 555, 556, 547, 548, 549, 442	DC/DC Converter Performance
P0A7A-517, 325, 518, 344, 809, 810, 811	Generator Inverter Performance
P0A92-521	Hybrid Generator Performance
P0A90-509	Drive Motor "A" Performance

HINT:
DTC P0A7A-322 may be set due to a malfunction which also causes DTCs in the table above to be set. First troubleshoot the output DTCs in the table above. After troubleshooting all output DTCs, be sure to replace the inverter with converter assembly.

YES → **GO TO DTC CHART**

NO

2	CHECK AMOUNT OF GASOLINE (See page HV-278)

NG → **REFUEL VEHICLE**

OK

3	CHECK ENGINE START (See page HV-278)

OK → Go to step 6

NG

4	INSPECT CRANKSHAFT PULLEY REVOLUTION (P POSITION) (See page HV-278)

OK → Go to step 6

NG

5	INSPECT CRANKSHAFT PULLEY REVOLUTION (N POSITION) (See page HV-279)

OK → REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

NG

REPAIR OR REPLACE ENGINE ASSEMBLY

6	CHECK QUANTITY OF HV COOLANT (See page HV-325)

B → ADD COOLANT

C → CHECK FOR COOLANT LEAKS AND ADD COOLANT

A

7	CHECK COOLANT HOSE (See page HV-326)

NG → CORRECT THE PROBLEM

OK

8	CHECK CONNECTOR CONNECTION CONDITION (HYBRID VEHICLE CONTROL ECU CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

HV

9	CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR & BRACKET ASSEMBLY CONNECTOR) (See page HV-326)

NG → CONNECT SECURELY

OK

10	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (WATER PUMP) (See page HV-327)

NG → Go to step 20

OK

11	CHECK CONNECTOR CONNECTION CONDITION (COOLING FAN MOTOR CONNECTOR) (See page HV-327)

NG → CONNECT SECURELY

OK

12	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (COOLING FAN) (See page HV-327)

NG → CHECK COOLING FAN SYSTEM (See page CO-3)

OK

13	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

14	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-152)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

15	CHECK GENERATOR RESOLVER (See page HV-153)

NG → Go to step 18

HV

OK

16	CHECK INVERTER WITH CONVERTER ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) (See page HV-165)

NG → TIGHTEN TO SPECIFIED TORQUE

OK

17	CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1) (See page HV-165)

NG → REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

18	CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) (See page HV-153)

NG → CONNECT SECURELY

OK

19	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-154)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

20	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (WATER PUMP) (See page HV-328)

OK → ADD COOLANT

NG

21	CHECK WATER PUMP WITH MOTOR & BRACKET ASSEMBLY (See page HV-329)

NG → Go to step 23

OK

22	CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR & BRACKET ASSEMBLY - HV CONTROL ECU) (See page HV-330)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

23	CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR POWER SOURCE CIRCUIT) (See page HV-330)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE WATER PUMP WITH MOTOR & BRACKET ASSEMBLY

DTC	P0A7A-324	Generator Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).
If the generator inverter circuit is opened or shorted, or if the circuit overheats, the information is transmitted from the inverter to the GFIV terminal of the MG ECU via the generator inverter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	324	Generator inverter fail signal detection (circuit malfunction)	• Inverter cooling system • Water pump with motor & bracket assembly • Hybrid vehicle transaxle assembly • Inverter with converter assembly • Engine assembly • Fuel level • Cooling fan system • Hybrid vehicle control ECU

MONITOR DESCRIPTION

If the generator inverter detects a circuit malfunction, it will transmit a generator inverter fail signal to the MG ECU. Upon receiving this signal, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A7A (INF 324): GFIV detection (Circuit malfunction)
Required sensors / components	Generator inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

HV

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A7A (INF 324) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

NOTICE:
After inspection, be sure to replace the inverter with converter assembly.
HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 523, 586, 284, 505, 287, 506, 113, 503, 279, 504, 306, 806, 807, 808, 128	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590, 554, 555, 556, 547, 548, 549, 442	DC/DC Converter Performance
P0A7A-322, 517, 325, 518, 122, 344, 809, 810, 811, 130	Generator Inverter Performance
P0A92-521	Hybrid Generator Performance
P0A90-509	Drive Motor "A" Performance

HINT:
DTC P0A7A-324 may be set due to a malfunction which also causes DTCs in the table above to be set. First troubleshoot the output DTCs in the table above. After troubleshooting all output DTCs, be sure to replace the inverter with converter assembly.

YES > **GO TO DTC CHART**

NO

2	CHECK AMOUNT OF GASOLINE (See page HV-278)

NG > **REFUEL VEHICLE**

HV

OK

3	CHECK ENGINE START (See page HV-278)

OK → Go to step 6

NG

4	INSPECT CRANKSHAFT PULLEY REVOLUTION (P POSITION) (See page HV-278)

OK → Go to step 6

NG

5	INSPECT CRANKSHAFT PULLEY REVOLUTION (N POSITION) (See page HV-279)

OK → REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

NG

REPAIR OR REPLACE ENGINE ASSEMBLY

6	CHECK QUANTITY OF HV COOLANT (See page HV-325)

B → ADD COOLANT

C → CHECK FOR COOLANT LEAKS AND ADD COOLANT

A

7	CHECK COOLANT HOSE (See page HV-326)

NG → CORRECT THE PROBLEM

OK

8	CHECK CONNECTOR CONNECTION CONDITION (HYBRID VEHICLE CONTROL ECU CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

HV

9	CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR & BRACKET ASSEMBLY CONNECTOR) (See page HV-326)

NG → CONNECT SECURELY

OK

10	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (WATER PUMP) (See page HV-327)

NG → Go to step 20

OK

11	CHECK CONNECTOR CONNECTION CONDITION (COOLING FAN MOTOR CONNECTOR) (See page HV-327)

NG → CONNECT SECURELY

OK

12	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (COOLING FAN) (See page HV-327)

NG → CHECK COOLING FAN SYSTEM (See page CO-3)

OK

13	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

14	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-152)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

15	CHECK GENERATOR RESOLVER (See page HV-153)

NG → Go to step 18

HV

OK

16	CHECK INVERTER WITH CONVERTER ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) (See page HV-165)

NG → TIGHTEN TO SPECIFIED TORQUE

OK

17	CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1) (See page HV-165)

NG → REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

18	CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) (See page HV-153)

NG → CONNECT SECURELY

OK

19	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-154)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

20	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (WATER PUMP) (See page HV-328)

OK → ADD COOLANT

NG

21	CHECK WATER PUMP WITH MOTOR & BRACKET ASSEMBLY (See page HV-329)

NG → Go to step 23

OK

22	CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR & BRACKET ASSEMBLY - HV CONTROL ECU) (See page HV-330)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

23	CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR POWER SOURCE CIRCUIT) (See page HV-330)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE WATER PUMP WITH MOTOR & BRACKET ASSEMBLY

DTC	P0A7A-325	Generator Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).
If the generator inverter circuit is opened or shorted, or if the circuit overheats, the information is transmitted from the inverter to the GFIV terminal of the MG ECU via the generator inverter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	325	Generator inverter fail signal detection (overcurrent due to inverter assembly malfunction)	Inverter with converter assembly

MONITOR DESCRIPTION

If excessive amperage flows through the generator inverter due to an internal short, the generator inverter will transmit an inverter fail signal to the MG ECU. Upon receiving this signal, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A7A (INF 325): GFIV detection (Load short circuit)
Required sensors / components	Generator inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A7A (INF 325) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 523, 586	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590	DC/DC Converter Performance

HV

HINT:
P0A7A-325 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → GO TO DTC CHART

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

DTC	P0A7A-344	Generator Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).
The MG ECU controls generator torque according to driving conditions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	344	Generator torque execution monitoring malfunction	• Hybrid vehicle transaxle assembly • Inverter with converter assembly

MONITOR DESCRIPTION

If the difference between the requested MG1 torque and the actual MG1 torque exceeds a predetermined value, the MG ECU determines that there is a malfunction in the execution or monitoring of the MG1 torque. Then, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A7A (INF 344): Discrepancy between generator monitored torque and commanded torque
Required sensors / components	Generator inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A7A (INF 344) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 510, 523, 586, 505, 287, 506, 503, 279, 504, 806, 807, 808	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590, 554, 555, 556, 547, 548, 549	DC/DC Converter Performance
P0A7A-517, 522, 325, 518, 809, 810, 811	Generator Inverter Performance
P0AA6 (all INF codes)	Hybrid Battery Voltage System Isolation Fault
P3004-132	Power Cable Malfunction
P3233-750	Short to B+ in Blocking of HV Gate Connection

HV

HINT:
P0A7A-344 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → **GO TO DTC CHART**

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → **CONNECT SECURELY**

OK

3	CHECK INVERTER WITH CONVERTER ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) (See page HV-165)

NG → TIGHTEN TO SPECIFIED TORQUE

OK

4	CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1) (See page HV-165)

NG → REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

DTC	P0A7A-517	Generator Inverter Performance

DTC	P0A7A-518	Generator Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).
If the generator inverter circuit is opened or shorted, or if the circuit overheats, the information is transmitted from the inverter to the GFIV terminal of the MG ECU via the generator inverter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	517	Generator inverter fail signal detection (overcurrent due to MG ECU malfunction)	• Wire harness or connector • Hybrid vehicle transaxle assembly • Inverter with converter assembly
P0A7A	518	Generator inverter fail signal detection (overcurrent due to hybrid vehicle transaxle assembly malfunction)	• Wire harness or connector • Hybrid vehicle transaxle assembly • Inverter with converter assembly

MONITOR DESCRIPTION

If excessive amperage flows through the generator inverter due to an internal short, the generator inverter will transmit an inverter fail signal to the MG ECU. Upon receiving this signal, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A7A (INF 517/518): GFIV detection (Load short circuit)
Required sensors / components	Generator inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A7A (INF 517/518) is not detected

WIRING DIAGRAM

Refer to wiring diagram for P0A1A-200 (See page HV-146).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 523, 586	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590	DC/DC Converter Performance

HINT:
P0A7A-517 or 518 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → **GO TO DTC CHART**

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK ↓

3	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-152)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

4	CHECK GENERATOR RESOLVER (See page HV-153)

NG → REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

OK ↓

5	CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) (See page HV-153)

NG → CONNECT SECURELY

OK ↓

6	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-154)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A7A-522	Generator Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).
If the inverter receives a generator gate shutdown signal from the MG ECU, it will turn all power transistors off which are activating the generator to forcibly stop generator operation. The MG ECU monitors the generator gate shutdown signal line and detects malfunctions.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	522	Generator inverter gate malfunction	Inverter with converter assembly

HINT:
- If DTC P0A7A-522 is output, the hybrid system cannot be restarted until the DTC is cleared.
- If the malfunction is not reproduced, leave the vehicle for 1 minute with the shift lever in the N position in order to easily reproduce the malfunction.

MONITOR DESCRIPTION

The MG ECU monitors the current that flows in MG1. If current flows in MG1 while the vehicle is stationary with the power switch on (IG) or the shift lever in the N position, the MG ECU will detect a malfunction. The hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A7A (INF 522): Malfunction of Inverter gate shut down circuit
Required sensors / components	Generator inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A7A (INF 522) is not detected

INSPECTION PROCEDURE

CAUTION:
- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)**

NG → **CONNECT SECURELY**

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

DTC	P0A7A-809	Generator Inverter Performance

DTC	P0A7A-811	Generator Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).
If an abnormal amount of current flows through the generator inverter, the MG ECU detects it and sends a signal to inform the hybrid vehicle control ECU of the malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	809	Abnormal generator current value detection (MG ECU malfunction)	• Wire harness or connector • Hybrid vehicle transaxle assembly • Inverter with converter assembly
P0A7A	811	Abnormal generator current value detection (hybrid vehicle transaxle assembly malfunction)	• Wire harness or connector • Hybrid vehicle transaxle assembly • Inverter with converter assembly

MONITOR DESCRIPTION

If the MG ECU detects that the generator inverter current exceeds the threshold level for a period of time, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A7A (INF 809/811): Generator inverter abnormal current
Required sensors / components	Generator inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A7A (INF 809/811) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 523, 586	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590	DC/DC Converter Performance

HINT:
P0A7A-809 or 811 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → **GO TO DTC CHART**

NO

HV

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK ↓

3	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-152)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

4	CHECK GENERATOR RESOLVER (See page HV-153)

OK → REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

NG ↓

5	CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) (See page HV-153)

NG → CONNECT SECURELY

OK ↓

6	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-154)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A7A-810	Generator Inverter Performance

DESCRIPTION

For a description of the inverter, (See page HV-232).
If an abnormal amount of current flows through the generator inverter, the MG ECU detects it and sends a signal to inform the hybrid vehicle control ECU of the malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	810	Abnormal generator current value detection (inverter malfunction)	Inverter with converter assembly

MONITOR DESCRIPTION

If the MG ECU detects that the generator inverter current exceeds the threshold level for a period of time, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A7A (INF 810): Generator inverter abnormal current
Required sensors / components	Generator inverter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

HV

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A7A (INF 810) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 523, 586	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590	DC/DC Converter Performance

HV

HINT:
P0A7A-810 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → **GO TO DTC CHART**

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → **CONNECT SECURELY**

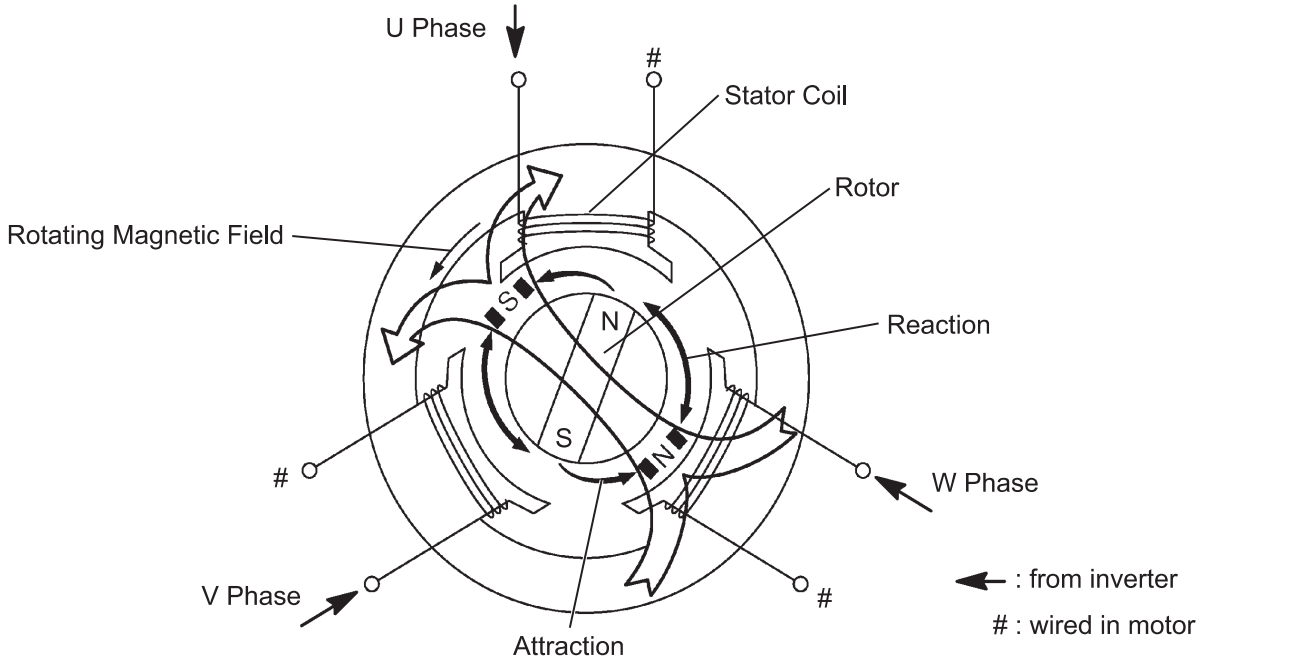
OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

DTC	P0A90-251	Drive Motor "A" Performance

DESCRIPTION

When three-phase alternating current flows through the three-phase windings of the stator coil, a rotating magnetic field is generated in MG2. The system controls the rotation of the magnetic field in accordance with the rotating position and speed of the rotor. As a result, the permanent magnets provided in the rotor are pulled in the direction of rotation, generating torque. The generated torque is almost proportional to the amount of current. The system controls MG2 speed by regulating the frequency of the alternating current. Furthermore, the system properly controls the rotating magnetic field and the angle of the rotor magnets in order to generate high torque in an efficient manner, even at high speeds.



DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A90	251	Motor magnetic force deterioration or same phase short circuit	Hybrid vehicle transaxle assembly

SYSTEM DESCRIPTION

The MG ECU monitors MG2. If the MG ECU detects a reduction in the magnetic force of MG2 or an in-phase short, it interprets this as an MG2 failure. The hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A90 (INF 251): Magnetic force deterioration / same phase short circuit
Required sensors / components	Hybrid vehicle motor, inverter, motor resolver
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A90 (INF 251) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1A (all INF codes), P0A1B (all INF codes)	**MG ECU circuit malfunction**
P0A1D (all INF codes)	**HV ECU circuit malfunction**
P0A3F-243, P0A40-500, P0A41-245	**Motor resolver circuit**
P0A4B-253, P0A4C-513, P0A4D-255	**Generator resolver circuit**
P0A51-174	**MG ECU circuit malfunction**
P0A60 (all INF codes), P0A63 (all INF codes)	**Motor current sensor circuit**
P0A72 (all INF codes), P0A75 (all INF codes)	**Generator current sensor circuit**
P0A78-306, 510, 586, 266, 267, 523	**Motor inverter malfunction**
P0A7A-344, 522	**Generator inverter malfunction**
P0A90-509	**Motor system malfunction**
P0A92-521	**Generator system malfunction**
P0A94-585, 587, 589, 590	**Boost converter circuit**
P0AA6 (all INF codes)	**Hybrid Battery Voltage System Isolation Fault**
P3004-132	**Power Cable Malfunction**
P3233-750	**HV gate shutdown wiring malfunction**

HINT:
P0A90-251 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → GO TO DTC CHART

NO

2 SIMULATION TEST

(a) Connect the intelligent tester to the DLC3.
(b) Test-drive the vehicle at a speed of 40 km/h for approximately 1 minute.
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result

DTC output	Proceed to
P0A78-306 or P0A90-509 is output	A
P0A90-251 is output or no DTC is output	B

A → GO TO DTC CHART

B

HV

3 CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

4 CHECK INVERTER WITH CONVERTER ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) (See page HV-164)

NG → TIGHTEN TO SPECIFIED TORQUE

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A90-509	Drive Motor "A" Performance

DESCRIPTION

For a description of MG2, (See page HV-307).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A90	509	Motor system malfunction	• Wire harness or connector • Hybrid vehicle transaxle assembly • Inverter with converter assembly

MONITOR DESCRIPTION

The MG ECU monitors the MG2 system. If the MG ECU detects a malfunction of the MG2 system, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A90 (INF 509): Motor system malfunction (No motor torque)
Required sensors / components	Hybrid vehicle motor, inverter, motor resolver
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

HV

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A90 (INF 509) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 510, 523, 586, 505, 287, 506, 503, 279, 504, 806, 807, 808	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590, 554, 555, 556, 547, 548, 549	DC/DC Converter Performance
P0A7A-517, 522, 325, 518, 809, 810, 811	Generator Inverter Performance
P0AA6 (all INF codes)	Hybrid Battery Voltage System Isolation Fault
P3004-132	Power Cable Malfunction
P3233-750	Short to B+ in Blocking of HV Gate Connection

HV

HINT:
P0A90-509 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → **GO TO DTC CHART**

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → **CONNECT SECURELY**

OK

3	CHECK INVERTER WITH CONVERTER ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) (See page HV-164)

NG → TIGHTEN TO SPECIFIED TORQUE

OK

4	CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2) (See page HV-166)

OK → REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

NG

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A92-261	Hybrid Generator Performance

DESCRIPTION

For a description of MG1, (See page HV-307).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A92	261	Generator magnetic force deterioration or same phase short circuit	Hybrid vehicle transaxle assembly

MONITOR DESCRIPTION

The MG ECU monitors MG1. If the MG ECU detects a reduction in the magnetic force of MG1 or an in-phase short, it interprets this as an MG1 failure. The hybrid vehicle control ECU will illuminate the MIL and set a DTC.

TYPICAL ENABLING CONDITIONS

Related DTCs	P0A92 (INF 261): Magnetic force deterioration / same phase short circuit
Required sensors / components	Hybrid vehicle generator, inverter, generator resolver
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

HV

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A92 (INF 261) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1A (all INF codes), P0A1B (all INF codes)	MG ECU circuit malfunction
P0A1D (all INF codes)	HV ECU circuit malfunction
P0A3F-243, P0A40-500, P0A41-245	Motor resolver circuit malfunction
P0A4B-253, P0A4C-513, P0A4D-255	Generator resolver circuit malfunction
P0A51-174	MG ECU circuit malfunction
P0A60 (all INF codes), P0A63 (all INF codes)	Motor current sensor circuit
P0A72 (all INF codes), P0A75 (all INF codes)	Generator current sensor circuit
P0A78-306, 510, 586, 266, 267, 523	Motor inverter malfunction
P0A7A-344, 522	Generator inverter malfunction
P0A90-509	MG2 malfunction
P0A92-521	MG1 malfunction
P0A94-585, 587, 589, 590	Boost converter circuit
P0AA6 (all INF codes)	Hybrid Battery Voltage System Isolation Fault
P3004-132	Power Cable Malfunction
P3233-750	HV gate shutdown wiring malfunction

HINT:
P0A92-261 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

HV

YES → GO TO DTC CHART

NO

2	SIMULATION TEST

(a) Connect the intelligent tester to the DLC3.
(b) Leave the vehicle for 1 minute with the engine on (with MG1 rotating)
HINT:
If the accelerator pedal is depressed with the shift lever in the P position, the engine will start.
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result

DTC output	Proceed to
P0A7A-344 or P0A92-521 is output	A
P0A92-261 is output or no DTC is output	B

A → GO TO DTC CHART

B

3	CHECK INVERTER WITH CONVERTER ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) (See page HV-165)

NG → TIGHTEN TO SPECIFIED TORQUE

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A92-521	Hybrid Generator Performance

DESCRIPTION

For a description of MG1, (See page HV-307).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A92	521	Generator system malfunction	• Hybrid vehicle transaxle assembly • Inverter with converter assembly

MONITOR DESCRIPTION

The MG ECU monitors the MG1 system. If the MG ECU detects a malfunction of the MG1 system, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A92 (INF 521): Discrepancy between commanded and actual voltage
Required sensors / components	Hybrid vehicle generator, inverter, generator resolver
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

HV

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A92 (INF 521) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 510, 523, 586, 505, 287, 506, 503, 279, 504, 806, 807, 808	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590, 554, 555, 556, 547, 548, 549	DC/DC Converter Performance
P0A7A-517, 522, 325, 518, 809, 810, 811	Generator Inverter Performance
P0AA6 (all INF codes)	Hybrid Battery Voltage System Isolation Fault
P3004-132	Power Cable Malfunction
P3233-750	Short to B+ in Blocking of HV Gate Connection

HV

HINT:
P0A92-521 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → **GO TO DTC CHART**

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → **CONNECT SECURELY**

OK

3	CHECK INVERTER WITH CONVERTER ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) (See page HV-165)

NG → TIGHTEN TO SPECIFIED TORQUE

OK

4	CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1) (See page HV-165)

OK → REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

NG

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A93-346	Inverter Cooling System Performance

DESCRIPTION

The inverter converts the boosted high-voltage direct-current from the HV battery into alternating current for MG2 and MG1. The inverter generates heat during the conversion process, and this heat could damage the inverter if a cooling system is unavailable. Therefore, similar to MG2 and MG1, the inverter is cooled by a special cooling system consisting of an electric water pump, cooling fan, and radiator. This cooling system is independent of the engine cooling system. The hybrid vehicle control ECU monitors the electric water pump, cooling fan, and cooling system, and detects malfunctions.

DTCNo.	INF Code	DTC Detection Condition	Trouble Area
P0A93	346	Inverter cooling system malfunction (HV coolant malfunction)	• Wire harness or connector • Inverter cooling system • Water pump with motor & bracket assembly • Hybrid vehicle control ECU • Inverter with converter assembly • Cooling fan system

MONITOR DESCRIPTION

If the hybrid vehicle control ECU detects a malfunction of the electric water pump, fan or radiator, the ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A93 (INF 346): HV cooling water malfunction
Required sensors / components	Water pump, radiator fan, inverter, boost converter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

HV

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Inverter cooling system	DTC P0A93 (INF 346) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**

- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A02-719, P0A03-720	Inverter coolant temperature circuit

YES > GO TO DTC CHART

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG > CONNECT SECURELY

OK

HV

3	CHECK QUANTITY OF HV COOLANT

(a) Check for coolant leaks.
(b) Check the coolant in the water reserve tank assembly is above the low level.

Result

Result	Proceed to
Coolant leaks are not evident. The coolant level in the water reserve tank assembly is above the low level.	A
Coolant leaks are not evident. The coolant level in the water reserve tank assembly is below the low level.	B
Coolant leaks are evident.	C

HINT:
After repairing the coolant leaks and adding coolant, perform the WATER PUMP and COOLING FAN SPD active tests and make sure that there are no malfunctions.

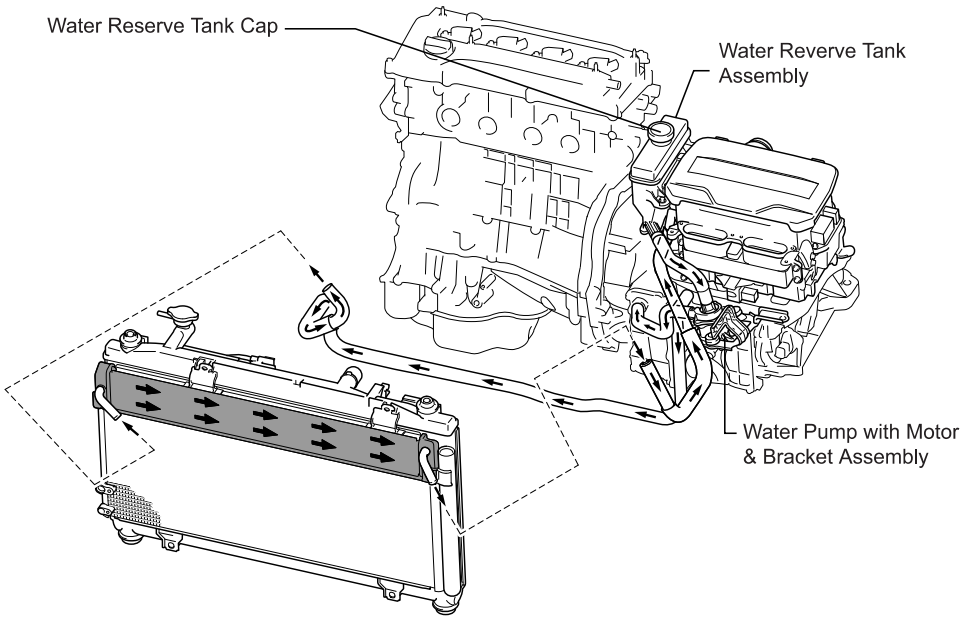
B > ADD COOLANT

C > CHECK FOR COOLANT LEAKS AND ADD COOLANT

A

4	CHECK COOLANT HOSE

(a) Check if the hoses of the cooling system are kinked or clogged.



NG → CORRECT THE PROBLEM

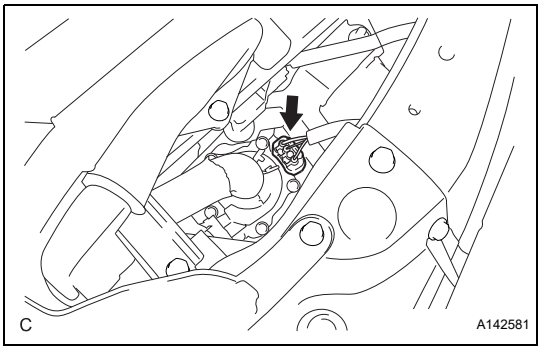
OK

5	CHECK CONNECTOR CONNECTION CONDITION (HYBRID VEHICLE CONTROL ECU CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

6	CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR & BRACKET ASSEMBLY CONNECTOR)



(a) Check the connection of the water pump with motor & bracket assembly connector.

OK:

The connector is connected securely and there are no contact problems.

NG → CONNECT SECURELY

OK

7	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (WATER PUMP)

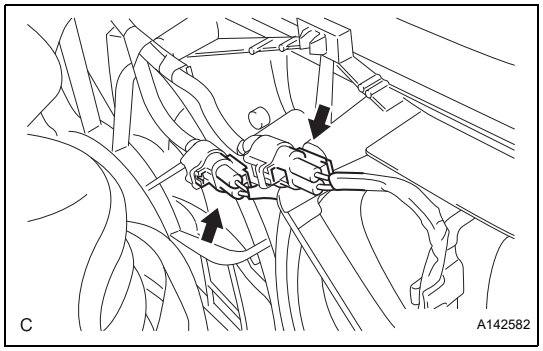
(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / ACTIVE TEST / WATER PUMP.
(d) Perform the WATER PUMP active test.
(e) During the WATER PUMP active test, open the water reserve tank cap and check that there are ripples in the coolant. Continue the active test for at least 1 minute.
Result:
There are ripples in the coolant in the water reserve tank assembly for 1 minute.
NOTICE:
Turning the power switch off or finishing the active test with the water reserve tank cap open will cause the coolant to overflow. Be sure to close the water reserve tank cap before turning the power switch off or finishing the active test.
HINT:
The water pump motor operates even in inspection mode.

NG → **Go to step 11**

OK

HV

8	CHECK CONNECTOR CONNECTION CONDITION (COOLING FAN MOTOR CONNECTOR)



(a) Check the connections of the cooling fan motor connectors.
OK:
The connectors are connected securely and there are no contact problems.

NG → **CONNECT SECURELY**

OK

9	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (COOLING FAN)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBDII / ACTIVE TEST / COOLING FAN SPD.
(d) Perform the COOLING FAN SPD active test.

OK:
The cooling fan rotates.

NG → **CHECK COOLING FAN SYSTEM (See page CO-3)**

OK

10	READ VALUE OF INTELLIGENT TESTER

(a) Stop the engine and leave the vehicle for at least 1 hour.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DATA TEST / INV COOLANT TMP, CONVERTER TEMP, MG1 INVERT TEMP, MG2 INVERT TEMP.
(e) Read the data list.
Result:
The displayed INV COOLANT TMP value is at least 20°C (68°F) higher than MG2 INVERT TEMP, CONVERTER TEMP, and MG 1 INVERT TEMP.
NOTICE:
The lower limit temperature that can be displayed for MG2 INVERT TEMP, CONVERTER TEMP, and MG1 INVERT TEMP is 15°C (59°F). The lower limit temperature for INV COOLANT TMP is -40°C (-40°F). The INV COOLANT TMP value displayed on the intelligent tester may be lower than the others, but this is not a malfunction.

NG → **REPLACE WATER PUMP WITH MOTOR & BRACKET ASSEMBLY**

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

11	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (WATER PUMP)

(a) Connect the intelligent tester to the DLC3.
(b) Compress the inlet hose for the water pump with motor & bracket assembly several times.
(c) Turn the power switch on (IG).
(d) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / ACTIVE TEST / WATER PUMP.
(e) Perform the WATER PUMP active test.
(f) During the WATER PUMP active test, open the water reserve tank cap and check that there are ripples in the coolant. Continue the active test for at least 1 minute.
Result:
There are ripples in the coolant in the water reserve tank assembly for 1 minute.

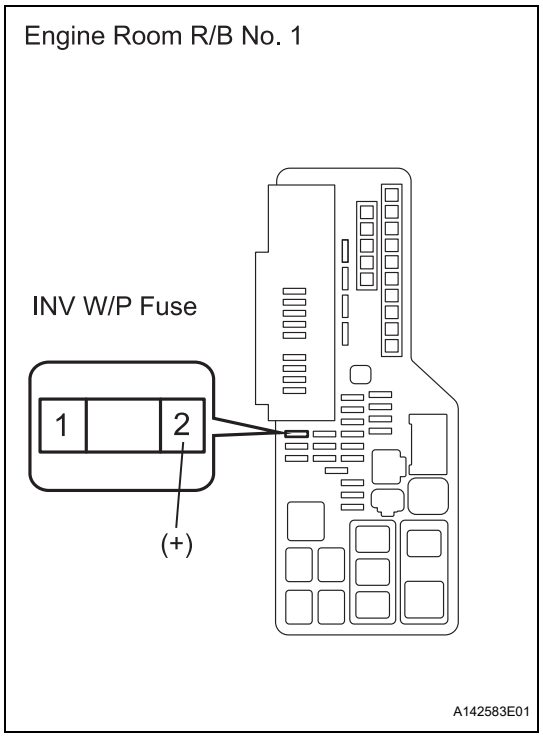
HV

NOTICE:
Turning the power switch off or finishing the active test with the water reserve tank cap open will cause the coolant to overflow. Be sure to close the water reserve tank cap before turning the power switch off or finishing the active test.
HINT:
- Keep compressing the water pump inlet hose until the coolant level in the water reserve tank assembly stops dropping.
- The water pump motor operates even in maintenance mode.
- After repairing the coolant leaks and adding coolant, perform the WATER PUMP and COOLING FAN SPD active tests and make sure that there are no malfunctions.

OK	ADD COOLANT

NG

12	CHECK WATER PUMP WITH MOTOR & BRACKET ASSEMBLY



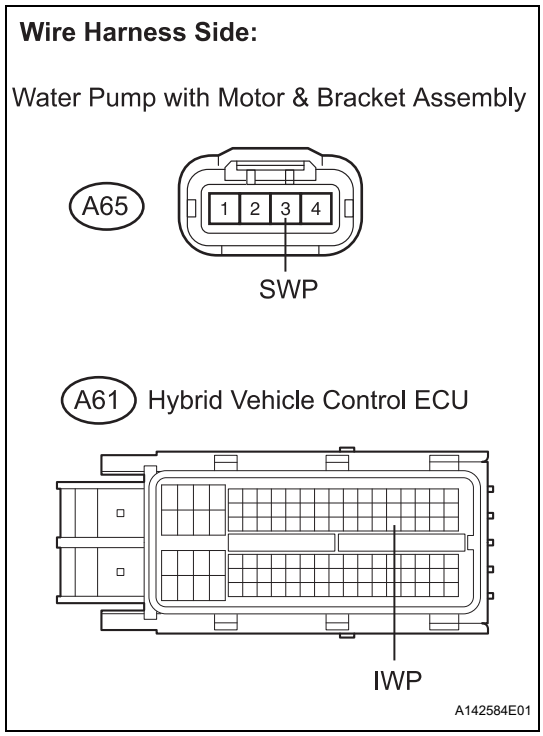
(a) Disconnect the A61 hybrid vehicle control ECU connector.
(b) Remove the INV W/P fuse from the engine room R/B No. 1.
(c) Apply 12 V to terminal 2 of the socket for the fuse in the engine room R/B No. 1 and check that the water pump operates.
OK:
The water pump operates.
(d) Install the INV W/P fuse to the engine room R/B No. 1.

NG	Go to step 14

OK

HV

13	CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR & BRACKET ASSEMBLY - HV CONTROL ECU)



(a) Disconnect the A65 water pump with motor & bracket assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
IWP (A61-52) - SWP (A65-3)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
IWP (A61-52) or SWP (A65-3) - Body ground	10 kΩ or more

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

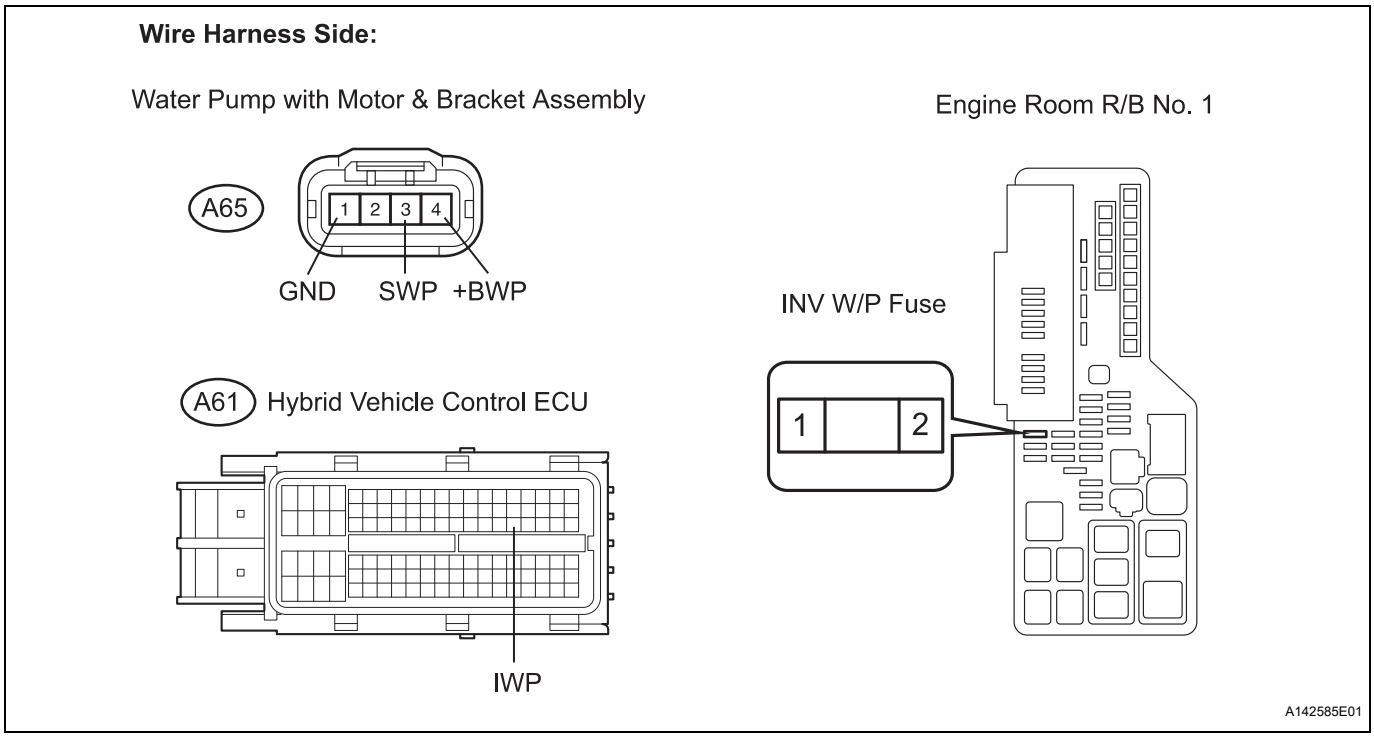
HV

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

14	CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR POWER SOURCE CIRCUIT)

(a) Remove the INV W/P fuse from the engine room R/B No. 1.

(b) Measure the resistance according to the value(s) in the table below.



Standard resistance (Check for open)

Tester Connection	Specified Condition
IWP (A61-61) - SWP (A65-3)	Below 1 Ω
GND (A65-1) - Body ground	Below 1 Ω
Engine room R/B No. 1 INV W/P fuse terminal 2 - +BWP (A65-4)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
IWP (A61-52) or SWP (A65-3) - Body ground	10 kΩ or more

HV

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE WATER PUMP WITH MOTOR & BRACKET ASSEMBLY

DTC	P0A94-127	DC / DC Converter Performance

DESCRIPTION

For a description of the boost converter, (See page HV-336).
If the boost converter detects a circuit malfunction or overvoltage, it transmits this information to the OVL terminal of the MG ECU via the boost converter overvoltage signal line.

DTCNo.	INF Code	DTC Detection Condition	Trouble Area
P0A94	127	Boost converter overvoltage signal detection (overvoltage due to system malfunction)	• HV relay assembly • Inverter with converter assembly • Service plug grip • Frame wire • Hybrid vehicle transaxle assembly

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

HV

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance

DTC No.	Relevant Diagnosis
P0A78-266, 267, 523, 586, 284, 505, 287, 506, 113, 286, 503, 279, 504, 306, 806, 807, 808, 128	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590, 553, 554, 555, 556, 172, 557, 547, 548, 549, 442	DC/DC Converter Performance
P0A7A-322, 517, 325, 518, 122, 324, 344, 809, 810, 811, 130	Generator Inverter Performance
P0A92-521	Hybrid Generator Performance
P0A90-509	Drive Motor "A" Performance
P3004-803	High Voltage Power Resource
P0ADB-227	Hybrid Battery Positive Contactor Control Circuit Low
P0ADC-226	Hybrid Battery Positive Contactor Control Circuit High
P0ADF-229	Hybrid Battery Negative Contactor Control Circuit Low

HINT:
P0A94-127 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → GO TO DTC CHART

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

3	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-152)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4	CHECK GENERATOR RESOLVER (See page HV-153)

NG → Go to step 15

OK

5	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-159)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

6	CHECK MOTOR RESOLVER (See page HV-160)

NG → Go to step 13

OK

7	CHECK INVERTER WITH CONVERTER ASSEMBLY (HIGH VOLTAGE CONNECTOR CONNECTION CONDITION) (See page HV-229)

NG → CONNECT SECURELY

OK

8	CHECK SERVICE PLUG GRIP (See page HV-229)

NG → REPLACE SERVICE PLUG GRIP

OK

9	CHECK SERVICE PLUG GRIP (See page HV-230)

NG → REPLACE SERVICE PLUG GRIP

OK

10	CHECK FRAME WIRE (See page HV-230)

NG → REPLACE FRAME WIRE (See page HV-579)

OK

11	INSPECT HV RELAY ASSEMBLY (SMRB) (See page HV-231)

NG → REPLACE HV RELAY ASSEMBLY (See page HB-104)

OK

12	INSPECT HV RELAY ASSEMBLY (SMRG) (See page HV-231)

NG → REPLACE HV RELAY ASSEMBLY (See page HB-104)

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

13	CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) (See page HV-160)

NG → CONNECT SECURELY

OK

14	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-161)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

15	CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) (See page HV-153)

NG → CONNECT SECURELY

OK

16	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-154)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A94-172	DC / DC Converter Performance

DESCRIPTION

For a description of the boost converter, (See page HV-336).

DTCNo.	INF Code	DTC Detection Condition	Trouble Area
P0A94	172	Boost converter fail signal detection (overcurrent due to system malfunction)	• Fuel level • Wire harness or connector • Hybrid vehicle transaxle assembly • Inverter with converter assembly • Engine assembly

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

HV

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 523, 586, 284, 505, 287, 506, 113, 286, 503, 279, 504, 306, 806, 807, 808, 128	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590, 554, 555, 556, 547, 548, 549, 442	DC/DC Converter Performance

DTC No.	Relevant Diagnosis
P0A7A-322, 517, 325, 518, 122, 324, 344, 809, 810, 811, 130	Generator Inverter Performance
P0A92-521	Hybrid Generator Performance
P0A90-509	Drive Motor "A" Performance
P0AA6-526	Hybrid Battery Voltage System Isolation Fault
P0AA6-613	Hybrid Battery Voltage Isolation Sensor Circuit

HINT:
P0A94-172 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → GO TO DTC CHART

NO

2 CHECK AMOUNT OF GASOLINE (See page HV-278)

NG → REFUEL VEHICLE

OK

3 CHECK ENGINE START (See page HV-278)

OK → Go to step 6

NG

4 INSPECT CRANKSHAFT PULLEY REVOLUTION (P POSITION) (See page HV-278)

OK → Go to step 6

NG

5 INSPECT CRANKSHAFT PULLEY REVOLUTION (N POSITION) (See page HV-279)

NG → REPAIR OR REPLACE ENGINE ASSEMBLY

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

HV

6	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

7	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-152)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

8	CHECK GENERATOR RESOLVER (See page HV-153)

NG → Go to step 15

OK

9	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-159)

HV

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

10	CHECK MOTOR RESOLVER (See page HV-160)

NG → Go to step 17

OK

11	CHECK INVERTER WITH CONVERTER ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) (See page HV-165)

NG → TIGHTEN TO SPECIFIED TORQUE

OK

12	CHECK INVERTER WITH CONVERTER ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) (See page HV-164)

NG → TIGHTEN TO SPECIFIED TORQUE

OK

13	CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1) (See page HV-165)

NG → REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

OK

14	CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2) (See page HV-166)

NG → REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

15	CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) (See page HV-153)

NG → CONNECT SECURELY

OK

16	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-154)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

17	CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) (See page HV-160)

NG → CONNECT SECURELY

OK

HV

18	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-161)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

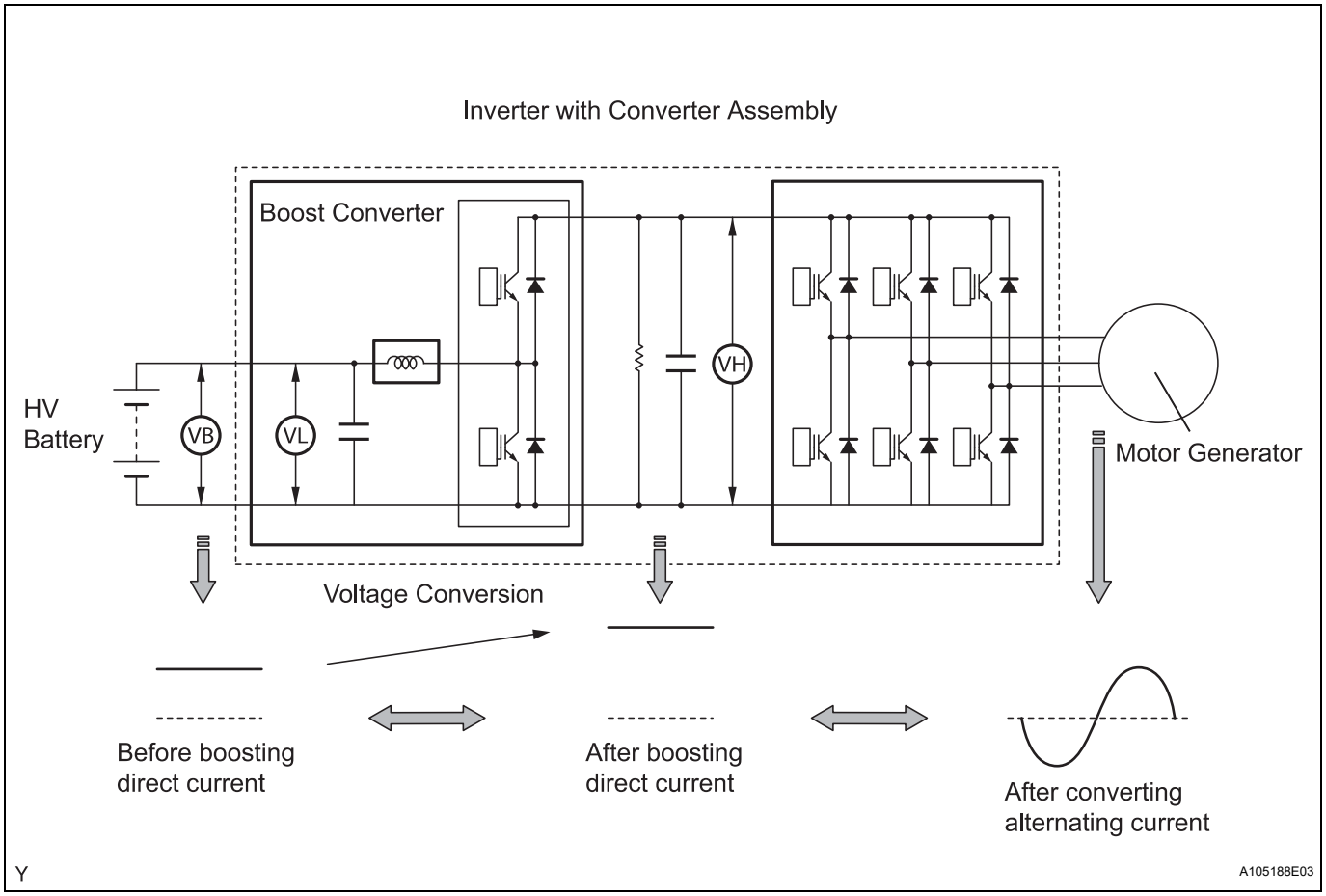
OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A94-442	DC / DC Converter Performance

DESCRIPTION

The boost converter boosts the 244.8 V DC from the HV battery to a maximum of approximately 650 V DC. The inverter converts the voltage that has been boosted by the boost converter into alternating current, which is used for driving MG2 and MG1. When MG1 and MG2 operate as a generator, the alternating-current voltage from MG1 and MG2 is converted into direct-current voltage by the inverter. Then the boost converter drops this voltage to a direct-current voltage rating of 244.8 V in order to charge the HV battery.



The MG ECU uses a voltage sensor (VL) that is built into the boost converter to detect the high voltage before it is boosted. It also uses a voltage sensor (VH) that is built into the inverter to detect the high voltage after it is boosted. Based on the voltage before and after it is boosted, the hybrid vehicle control ECU controls the operation of the boost converter to boost the voltage to the target voltage.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	442	Abnormal voltage execution value	Inverter with converter assembly

MONITOR DESCRIPTION

If the difference between the requested boost converter (inverter with converter assembly) voltage and the actual boost converter voltage exceeds a predetermined value, the hybrid vehicle control ECU determines that there is a malfunction of the execution or monitoring in the boost converter voltage. The hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A94 (INF 442): Discrepancy between commanded and actual
Required sensors / components	Boost converter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Hybrid vehicle control ECU	DTC P0A94 (INF 442) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HV

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	**Hybrid Powertrain Control Module**
P0A1A (all INF codes)	**Generator Control Module**
P0A1B (all INF codes)	**Drive Motor "A" Control Module**
P0A72 (all INF codes)	**Generator Phase V Current**
P0A75 (all INF codes)	**Generator Phase W Current**
P0A60 (all INF codes)	**Drive Motor "A" Phase V Current**
P0A63 (all INF codes)	**Drive Motor "A" Phase W Current**
P0A51-174	**Drive Motor "A" Current Sensor Circuit**

DTC No.	Relevant Diagnosis
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 306, 510, 523, 586, 505, 287, 506, 503, 279, 504, 806, 807, 808	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590, 554, 555, 556, 547, 548, 549	DC/DC Converter Performance
P0A7A-517, 325, 344, 518, 522, 809, 810, 811	Generator Inverter Performance
P0A92 (all INF codes)	Hybrid Generator Performance
P0A90 (all INF codes)	Hybrid Generator Performance
P0AA6 (all INF codes)	Hybrid Battery Voltage System Isolation Fault
P3000 (all INF codes)	HV Battery Malfunction

HINT:
P0A94-442 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → GO TO DTC CHART

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

DTC	P0A94-547	DC / DC Converter Performance

DTC	P0A94-549	DC / DC Converter Performance

DESCRIPTION

For a description of the boost converter, (See page HV-336).
If the boost converter detects a circuit malfunction or overvoltage, it transmits this information to the OVL terminal of the MG ECU via the boost converter overvoltage signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	547	Boost converter overvoltage signal detection (overvoltage due to MG ECU malfunction)	• Wire harness or connector • Inverter with converter assembly • Hybrid vehicle transaxle assembly
P0A94	549	Boost converter overvoltage signal detection (overvoltage due to hybrid vehicle transaxle assembly malfunction)	• Wire harness or connector • Inverter with converter assembly • Hybrid vehicle transaxle assembly

MONITOR DESCRIPTION

If the boost converter (inverter with converter assembly) detects an overvoltage, it transmits a boost converter overvoltage signal to the MG ECU. Upon receiving this signal, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A94 (INF 547/549): OVL detection over voltage
Required sensors / components	Boost converter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Motor generator ECU	DTC P0A94 (INF 547/549) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 523, 586, 505, 287, 506, 806, 807, 808	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590, 554, 555, 556	DC/DC Converter Performance
P0A7A-517, 325, 518, 809, 810, 811	Generator Inverter Performance
P3004-803	High Voltage Power Resource
P0ADB-227	Hybrid Battery Positive Contactor Control Circuit Low
P0ADC-226	Hybrid Battery Positive Contactor Control Circuit High
P0ADF-229	Hybrid Battery Negative Contactor Control Circuit Low

HINT:
P0A94-547 or 549 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → GO TO DTC CHART

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

3	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-159)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4	CHECK MOTOR RESOLVER (See page HV-160)

NG → Go to step 7

OK

5	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-152)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

6	CHECK GENERATOR RESOLVER (See page HV-153)

NG → Go to step 8

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

7	CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) (See page HV-160)

OK → Go to step 9

HV

NG

CONNECT SECURELY

8	CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) (See page HV-153)

OK → Go to step 10

NG

CONNECT SECURELY

9	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-161)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

HV

10	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-154)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A94-548	DC / DC Converter Performance

DESCRIPTION

For a description of the boost converter, (See page HV-336).
If the boost converter detects a circuit malfunction or overvoltage, it transmits this information to the OVL terminal of the MG ECU via the boost converter overvoltage signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	548	Boost converter overvoltage signal detection (overvoltage due to inverter malfunction)	Inverter with converter assembly

MONITOR DESCRIPTION

If the boost converter (inverter with converter assembly) detects an overvoltage, it transmits a boost converter overvoltage signal to the MG ECU. Upon receiving this signal, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A94 (INF 548): OVL detection over voltage
Required sensors / components	Boost converter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

HV

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A94 (INF 548) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 523, 586, 505, 287, 506, 806, 807, 808	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590, 554, 555, 556	DC/DC Converter Performance
P0A7A-517, 325, 518, 809, 810, 811	Generator Inverter Performance
P3004-803	High Voltage Power Resource
P0ADB-227	Hybrid Battery Positive Contactor Control Circuit Low
P0ADC-226	Hybrid Battery Positive Contactor Control Circuit High
P0ADF-229	Hybrid Battery Negative Contactor Control Circuit Low

HINT:
P0A94-548 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

HV

YES → GO TO DTC CHART

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

DTC	P0A94-550	DC / DC Converter Performance

DESCRIPTION

For a description of the boost converter, (See page HV-336).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	550	Boost converter overvoltage (OVL) signal detection (circuit malfunction)	Inverter with converter assembly

MONITOR DESCRIPTION

If the boost converter (inverter with converter assembly) detects a circuit malfunction, it transmits a boost converter overvoltage signal to the MG ECU. Upon receiving this signal, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A94 (INF 550): OVL detection circuit malfunction
Required sensors / components	Boost converter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

HV

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A94 (INF 550) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK ↓

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

DTC	P0A94-553	DC / DC Converter Performance

DESCRIPTION

For a description of the boost converter, (See page HV-336).

DTCNo.	INF Code	DTC Detection Condition	Trouble Area
P0A94	553	Boost converter fail signal detection (boost converter overheating)	• Wire harness or connector • Inverter cooling system • Water pump with motor & bracket assembly • Hybrid vehicle transaxle assembly • Inverter with converter assembly • Fuel level • Engine assembly • Cooling fan system

MONITOR DESCRIPTION

If the boost converter (inverter with converter assembly) overheats, it will transmit a boost converter fail signal to the MG ECU. Upon receiving this signal, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A94 (INF 553): FCV detection over heat
Required sensors / components	Boost converter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

HV

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A94 (INF 553) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 523, 586, 284, 505, 287, 506, 113, 286, 503, 279, 504, 306, 806, 807, 808, 128	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590, 554, 555, 556, 547, 548, 549, 442	DC/DC Converter Performance
P0A7A-322, 517, 325, 518, 122, 324, 344, 809, 810, 811, 130	Generator Inverter Performance
P0A92-521	Hybrid Generator Performance
P0A90-509	Drive Motor "A" Performance
P0AA6-526	Hybrid Battery Voltage System Isolation Fault
P0AA6-613	Hybrid Battery Voltage Isolation Sensor Circuit

HINT:
P0A94-553 may be set due to a malfunction which also causes DTCs in the table above to be set. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → **GO TO DTC CHART**

NO

2	CHECK AMOUNT OF GASOLINE (See page HV-278)

NG → **REFUEL VEHICLE**

HV

OK

3	CHECK ENGINE START (See page HV-278)

OK → Go to step 6

NG

4	INSPECT CRANKSHAFT PULLEY REVOLUTION (P POSITION) (See page HV-278)

OK → Go to step 6

NG

5	INSPECT CRANKSHAFT PULLEY REVOLUTION (N POSITION) (See page HV-279)

NG → REPAIR OR REPLACE ENGINE ASSEMBLY

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

HV

6	CHECK QUANTITY OF HV COOLANT (See page HV-325)

B → ADD COOLANT

C → CHECK FOR COOLANT LEAKS AND ADD COOLANT

A

7	CHECK COOLANT HOSE (See page HV-326)

NG → CORRECT THE PROBLEM

OK

8	CHECK CONNECTOR CONNECTION CONDITION (HV CONTROL ECU CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

9	CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR & BRACKET ASSEMBLY CONNECTOR) (See page HV-326)

NG → CONNECT SECURELY

OK

10	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (WATER PUMP) (See page HV-327)

NG → Go to step 26

OK

11	CHECK CONNECTOR CONNECTION CONDITION (COOLING FAN MOTOR CONNECTOR) (See page HV-327)

NG → CONNECT SECURELY

OK

12	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (COOLING FAN) (See page HV-327)

NG → CHECK COOLING FAN SYSTEM (See page CO-3)

OK

13	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

14	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-152)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

15	CHECK GENERATOR RESOLVER (See page HV-153)

NG → Go to step 22

HV

OK

16	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-159)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

17	CHECK MOTOR RESOLVER (See page HV-160)

NG → Go to step 24

OK

18	CHECK INVERTER WITH CONVERTER ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) (See page HV-165)

NG → TIGHTEN TO SPECIFIED TORQUE

OK

19	CHECK INVERTER WITH CONVERTER ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) (See page HV-164)

NG → TIGHTEN TO SPECIFIED TORQUE

OK

20	CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1) (See page HV-165)

NG → REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

OK

21	CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2) (See page HV-166)

NG → REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

22	CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) (See page HV-153)

NG → CONNECT SECURELY

OK ↓

23	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-154)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

24	CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) (See page HV-160)

NG → CONNECT SECURELY

OK ↓

25	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-161)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

26	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (WATER PUMP) (See page HV-328)

OK → ADD COOLANT

NG ↓

27	CHECK WATER PUMP WITH MOTOR & BRACKET ASSEMBLY (See page HV-329)

NG → Go to step 29

OK

28	CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR & BRACKET ASSEMBLY - HV CONTROL ECU) (See page HV-330)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

29	CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR POWER SOURCE CIRCUIT) (See page HV-330)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE WATER PUMP WITH MOTOR & BRACKET ASSEMBLY

DTC	P0A94-554	DC / DC Converter Performance

DTC	P0A94-556	DC / DC Converter Performance

DESCRIPTION

For a description of the boost converter, (See page HV-336).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	554	Boost converter inverter fail signal detection (overcurrent due to MG ECU malfunction)	• Wire harness or connector • Hybrid vehicle transaxle assembly • Inverter with converter assembly
P0A94	556	Boost converter inverter fail signal detection (overcurrent due to hybrid vehicle transaxle assembly malfunction)	• Wire harness or connector • Hybrid vehicle transaxle assembly • Inverter with converter assembly

MONITOR DESCRIPTION

If excessive amperage flows through the boost converter (inverter with converter assembly) due to an internal short, the boost converter will transmit a boost converter fail signal to the MG ECU. Upon receiving this signal, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A94 (INF 554/556): FCV detection load short circuit
Required sensors / components	Boost converter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A94 (INF 554/556) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**

- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range/Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range/Performance
P0A78-266, 267, 523, 586, 505, 287, 506, 806, 807, 808	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590	DC/DC Converter Performance
P0A7A-517, 325, 518, 809, 810, 811	Generator Inverter Performance

HINT:
P0A94-554 and 556 may be output due to a malfunction which causes the DTCs in the table above to be output. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → **GO TO DTC CHART**

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → **CONNECT SECURELY**

OK

3	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-152)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

4	CHECK GENERATOR RESOLVER (See page HV-153)

NG → Go to step 7

OK ↓

5	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-159)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

6	CHECK MOTOR RESOLVER (See page HV-160)

NG → Go to step 8

OK ↓

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

7	CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) (See page HV-153)

OK → Go to step 9

NG ↓

CONNECT SECURELY

8	CHECK CONNECTOR CONNECTION CONDITION (See page HV-160)

OK → Go to step 10

NG

CONNECT SECURELY

9	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-154)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

10	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-161)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

DTC	P0A94-555	DC / DC Converter Performance

DESCRIPTION

For a description of the boost converter, (See page HV-336).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	555	Boost converter inverter fail signal detection (overcurrent due to inverter assembly malfunction)	Inverter with converter assembly

MONITOR DESCRIPTION

If excessive amperage flows through the boost converter (inverter with converter assembly) due to an internal short, the boost converter will transmit a boost converter fail signal to the MG ECU. Upon receiving this signal, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A94 (INF 555): FCV detection load short circuit
Required sensors / components	Boost converter
Frequency of operation	Continuous
Duration	TOYOTA's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TOYOTA's intellectual property
Other conditions belong to TOYOTA's intellectual property	-

HV

TYPICAL MALFUNCTION THRESHOLDS

TOYOTA's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A94 (INF 555) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range/Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range/Performance
P0A78-266, 267, 523, 586, 505, 287, 506, 806, 807, 808	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590	DC/DC Converter Performance
P0A7A-517, 325, 518, 809, 810, 811	Generator Inverter Performance

HV

HINT:
P0A94-555 may be output due to a malfunction which causes the DTCs in the table above to be output. In this case, first troubleshoot the output DTCs in the table above. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

YES → GO TO DTC CHART

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

DTC	P0A94-557	DC / DC Converter Performance

DESCRIPTION

For a description of the boost converter, (See page HV-336).
If the boost converter detects a circuit malfunction, overheat, or internal short, it transmits this information to the FCV terminal of the MG ECU via the boost converter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	557	Boost converter fail signal detection (circuit malfunction)	• Wire harness or connector • Inverter cooling system • Water pump with motor & bracket assembly • Hybrid vehicle transaxle assembly • Inverter with converter assembly • Fuel level • Engine assembly • Cooling fan system

MONITOR DESCRIPTION

If the boost converter detects a circuit malfunction, it transmits a boost converter fail signal to the MG ECU. Upon receiving this signal, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A94 (INF 557): FCV detection circuit malfunction
Required sensors / components	Boost converter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

HV

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A94 (INF 557) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

NOTICE:
After inspection, be sure to replace the inverter with converter assembly.
HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1D (all INF codes)	Hybrid Powertrain Control Module
P0A1A (all INF codes)	Generator Control Module
P0A1B (all INF codes)	Drive Motor "A" Control Module
P0A72 (all INF codes)	Generator Phase V Current
P0A75 (all INF codes)	Generator Phase W Current
P0A60 (all INF codes)	Drive Motor "A" Phase V Current
P0A63 (all INF codes)	Drive Motor "A" Phase W Current
P0A51-174	Drive Motor "A" Current Sensor Circuit
P0A4B-253	Generator Position Sensor Circuit
P0A4D-255	Generator Position Sensor Circuit Low
P0A4C-513	Generator Position Sensor Circuit Range / Performance
P0A3F-243	Drive Motor "A" Position Sensor Circuit
P0A41-245	Drive Motor "A" Position Sensor Circuit Low
P0A40-500	Drive Motor "A" Position Sensor Circuit Range / Performance
P0A78-266, 267, 523, 586, 284, 505, 287, 506, 113, 286, 503, 279, 504, 306, 806, 807, 808, 128	Drive Motor "A" Inverter Performance
P0A94-585, 587, 589, 590, 553, 554, 555, 556, 172, 547, 548, 549, 442	DC/DC Converter Performance
P0A7A-322, 517, 325, 518, 122, 324, 344, 809, 810, 811, 130	Generator Inverter Performance
P0A92-521	Hybrid Generator Performance
P0A90-509	Drive Motor "A" Performance

HINT:
DTC P0A94-557 may be set due to a malfunction which also causes DTCs in the table above to be set. First troubleshoot the output DTCs in the table above. After troubleshooting all output DTCs, be sure to replace the inverter with converter assembly.

YES > **GO TO DTC CHART**

NO

2	CHECK AMOUNT OF GASOLINE (See page HV-278)

NG > **REFUEL VEHICLE**

HV

OK

3	CHECK ENGINE START (See page HV-278)

OK → Go to step 6

NG

4	INSPECT CRANKSHAFT PULLEY REVOLUTION (P POSITION) (See page HV-278)

OK → Go to step 6

NG

5	INSPECT CRANKSHAFT PULLEY REVOLUTION (N POSITION) (See page HV-279)

NG → REPAIR OR REPLACE ENGINE ASSEMBLY

OK

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

6	CHECK QUANTITY OF HV COOLANT (See page HV-325)

B → ADD COOLANT

C → CHECK FOR COOLANT LEAKS AND ADD COOLANT

A

7	CHECK COOLANT HOSE (See page HV-326)

NG → CORRECT THE PROBLEM

OK

8	CHECK CONNECTOR CONNECTION CONDITION (HYBRID VEHICLE CONTROL ECU CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

9	CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR & BRACKET ASSEMBLY CONNECTOR) (See page HV-326)

NG → CONNECT SECURELY

OK

10	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (WATER PUMP) (See page HV-327)

NG → Go to step 26

OK

11	CHECK CONNECTOR CONNECTION CONDITION (COOLING FAN MOTOR CONNECTOR) (See page HV-327)

NG → CONNECT SECURELY

OK

12	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (COOLING FAN) (See page HV-327)

NG → CHECK COOLING FAN SYSTEM (See page CO-3)

OK

13	CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) (See page HV-79)

NG → CONNECT SECURELY

OK

14	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-152)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

15	CHECK GENERATOR RESOLVER (See page HV-153)

NG → Go to step 22

HV

OK

16	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-159)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

17	CHECK MOTOR RESOLVER (See page HV-160)

NG → Go to step 24

OK

18	CHECK INVERTER WITH CONVERTER ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) (See page HV-165)

NG → TIGHTEN TO SPECIFIED TORQUE

OK

19	CHECK INVERTER WITH CONVERTER ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) (See page HV-164)

NG → TIGHTEN TO SPECIFIED TORQUE

OK

20	CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1) (See page HV-165)

NG → REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

OK

21	CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2) (See page HV-166)

NG → REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

OK

REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

22	CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) (See page HV-153)

NG → CONNECT SECURELY

OK ↓

23	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) (See page HV-154)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

24	CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) (See page HV-160)

NG → CONNECT SECURELY

OK ↓

HV

25	CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) (See page HV-161)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ↓

REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY (See page HX-10)

26	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (WATER PUMP) (See page HV-328)

OK → ADD COOLANT

NG ↓

27	CHECK WATER PUMP WITH MOTOR & BRACKET ASSEMBLY (See page HV-329)

NG → Go to step 29

OK

28	CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR & BRACKET ASSEMBLY - HV CONTROL ECU) (See page HV-330)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

29	CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR POWER SOURCE CIRCUIT) (See page HV-330)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE WATER PUMP WITH MOTOR & BRACKET ASSEMBLY

DTC	P0A94-585	DC / DC Converter Performance

DESCRIPTION

Refer to the description for DTC P0A94-589 (See page HV-373).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	585	Boost converter voltage (VL) sensor performance problem	Inverter with converter assembly

MONITOR DESCRIPTION

The hybrid vehicle control ECU monitors the boost converter voltage sensor signal. If the hybrid vehicle control ECU detects an abnormality in the sensor signal, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A94 (INF 585): Voltage (VL) sensor deviation
Required sensors / components	Boost converter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

HV

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Hybrid vehicle control ECU	DTC P0A94 (INF 585) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Diagnosis
P0A1A, P0A1B	MG ECU malfunction
P0A1D	Hybrid vehicle control ECU malfunction

YES → GO TO DTC CHART

NO → REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

DTC	P0A94-587	DC / DC Converter Performance

DESCRIPTION

For a description for the boost converter, (See page HV-336).
The hybrid vehicle control ECU uses a voltage sensor that is built into the boost converter to detect the high voltage (VL) before it is boosted. The hybrid vehicle control ECU also uses a battery smart unit to detect HV battery voltage (VB).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	587	Voltages from HV battery voltage (VB) sensor and boost converter voltage (VL) sensor deviate	• Inverter with converter assembly • Battery smart unit

MONITOR DESCRIPTION

The hybrid vehicle control ECU monitors the HV battery voltage (VB) and boost converter voltage (VL) sensors. When a large difference occurs between the voltages from the VB and VL sensors, the hybrid vehicle control ECU interprets this as a failure of either of the sensors. The hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A94 (INF 587): Voltage (VB or VL) sensor deviation
Required sensors / components	Boost converter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

HV

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Hybrid vehicle control ECU	DTC P0A94 (INF 587) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1 CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

Output DTC	Proceed to
DTCs P0A94-587 and P0A1F-129 (HV battery voltage circuit malfunction)	A
DTCs P0A94-587 and P0A94-442 (Abnormal voltage execution value)	B
DTCs P0A94-587 and P0A94-585 (Boost converter voltage (VL) sensor performance problem)	C
DTC P0A94-587 only, or DTC P0A94-587 and DTCs other than above	D

A → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC (P0A1F-129)**

B → **REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)**

C → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC (P0A94-585)**

D

HV

2 CLEAR DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Read and record the DTCs and freeze frame data.
(d) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CLEAR CODES.
(e) Clear the DTCs,

NEXT

3 CHECK DTC OUTPUT (HV)

(a) Turn the power switch on (READY) and move the shift lever to the N position. (*1)
(b) Turn the A/C switch to the MAX COOL position. (*2)
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DATA LIST / PWR RESOURCE IB.
(d) Confirm that PWR RESOURCE IB is more than 3 A. (*3)
(e) Leave the vehicle in the condition specified in steps (*2) and (*3) above for 15 seconds. (*4)

NOTICE:
If the low battery charge warning light comes on, move the shift lever to the P position and start the engine to charge the HV battery. After the engine stops, perform steps (*1) through (*5) again.

(f) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(g) Check if DTCs are output. (*5)

Result

DTC No.	Relevant Diagnosis	Proceed to
P0A1F-129	HV battery voltage circuit malfunction	A
P0A94-585	Boost converter voltage (VL) sensor performance problem	B
P3000-388	Discharge inhibition	C
P3004-132	Power Cable Malfunction	D
No DTC is output.	-	E

A → **REPLACE BATTERY SMART UNIT (See page HB-99)**

B → **REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)**

C → **LEAVE VEHICLE IN P POSITION, AND CHARGE HV BATTERY IN IDLE STATUS UNTIL IDLING STOPS (PERFORM STEPS (*1) THROUGH (*5))**

D → **REPLACE BATTERY SMART UNIT (See page HB-99)**

HV

E

4 CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3. (*6)
(b) Perform a road test that repeats full acceleration to 60 km/h and then full braking to a complete stop several times. (*7)
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES. (*8)
(d) Check if DTCs are output. (*9)

Result

DTC No.	Relevant Diagnosis	Proceed to
P0A1F-129	HV battery voltage circuit malfunction	A
P0A94-585	Boost converter voltage (VL) sensor performance problem	B
P3000-388	Discharge inhibition	C
P3004-132	Power Cable Malfunciton	D
No DTC is output.	-	E

A → **REPLACE BATTERY SMART UNIT (See page HB-99)**

B → REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

C → LEAVE VEHICLE IN P POSITION, AND CHARGE HV BATTERY IN IDLE STATUS UNTIL IDLING STOPS (PERFORM STEPS (*6) THROUGH (*9))

D → REPLACE BATTERY SMART UNIT (See page HB-99)

E

5 READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (READY).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DATA LIST / PWR RESOURCE VB, VL, VH.
(d) Read the data list when the shift lever is in the N position (the engine is off) and the vehicle is stationary.

Result

Voltage	Voltage Difference	Result
Difference between HV battery voltage (PWR RESOURCE VB) and pre-boost voltage (VL)	50 V or less	1
Difference between HV battery voltage (PWR RESOURCE VB) and post-boost voltage (VH)	70 V or less	2
Difference between pre-boost voltage (VL) and post-boost voltage (VH)	90 V or less	3

HV

Result

Result	Proceed to
Only 2 is satisfied.	A
Only 3 is satisfied.	B
1, 2, and 3 are all satisfied (normal condition)	C

A → REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)

B → REPLACE BATTERY SMART UNIT (See page HB-99)

C

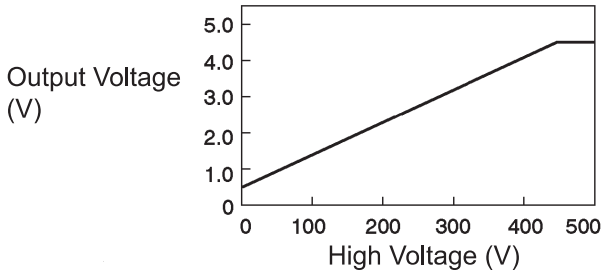
REPLACE BATTERY SMART UNIT (See page HB-99)

DTC	P0A94-589	DC / DC Converter Performance

DTC	P0A94-590	DC / DC Converter Performance

DESCRIPTION

The MG ECU uses a voltage sensor that is built into the boost converter to detect pre-boost high voltage (VL) to allow boost control. The boost converter voltage sensor outputs a voltage that varies between 0 and 5 V in accordance with changes in the high voltage. The higher the high voltage, the higher the output voltage. Conversely, the lower the high voltage, the lower the output voltage. The MG ECU monitors the boost converter voltage sensor signal line and detects a malfunction.



DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	589	Open or short to GND in the boost converter voltage (VL) sensor circuit	Inverter with converter assembly
P0A94	590	Short to +B in the boost converter voltage (VL) sensor circuit	Inverter with converter assembly

HV

MONITOR DESCRIPTION

The MG ECU monitors the boost converter voltage (VL) sensor circuit. If the MG ECU detects an open or short in the VL sensor circuit, the hybrid vehicle control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A94 (INF 589): VL malfunction (Disconnection and GND short) P0A94 (INF 590): VL malfunction (+B short)
Required sensors / components	Boost converter
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	1 driving cycle
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTC is not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

MG ECU	DTC P0A94 (INF 589/590) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	**REPLACE INVERTER WITH CONVERTER ASSEMBLY**

NEXT

COMPLETED

DTC	P0AA1-231	Hybrid Battery Positive Contactor Circuit Stuck Closed

DESCRIPTION

Refer to the description for DTC P0AE6-225 (See page HV-412).

DTCNo.	INF Code	DTC Detection Condition	Trouble Area
P0AA1	231	System main relay B on the HV battery positive side is stuck closed.	• HV relay assembly • Inverter with converter assembly

WIRING DIAGRAM

Refer to the wiring diagram for DTC P0AE6-225 (See page HV-413).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

- Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.
- If P0AA1-231 is output, the vehicle is prevented from starting.

HV

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Part
P0AE2-773, 161	SMRP short
P0ADC-226	SMRB control line
P0A1A-156, 658, 151, 155, P0A1B-511, 164, 163, 512, 193, 786, 788, 659, 661, P0A78-266, 267, 523, 586, P0A94-442, P3004-132	VH sensor circuit
P0A1A-200, 791, 792, 793, P0A1B-192, 168, 794, 795, 796, P0A3F-243, P0A41-245, P0A40-500, P0A4B-253, P0A4C-513, P0A4D-255	MG1 and MG2 rotation speed circuit

YES → GO TO DTC CHART

NO

2	CHECK FREEZE FRAME DATA

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).

(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Read output DTCs.
(e) Read the freeze frame data of P0AA1-231.

Result

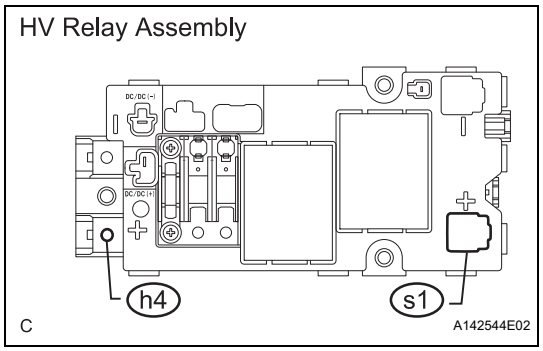
Result	Proceed to
Pre-boost voltage (VL) is less than 60 V.	A
Pre-boost voltage (VL) is 60 V or more.	B

A → **REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)**

B

3 CHECK HV RELAY ASSEMBLY

HV Relay Assembly



CAUTION:
Be sure to wear insulated gloves.

(a) Turn the power switch off and remove the service plug grip (See page HV-1).
NOTICE:
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.
HINT:
For the removal and installation procedures related to inspection of the HV relay assembly, (See page HB-104).

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
h4-1 - s1-1	10 kΩ or more

HINT:
- Leave the HV relay in the vehicle while testing to prevent the movement that occurs during removal from causing a stuck relay to return to normal.
- If the result of reading the freeze frame data is B, the HV relay assembly must be replaced. Measuring resistance can determine that this is either a present or past malfunction.

NG → **REPLACE HV RELAY ASSEMBLY (See page HB-104)**

OK

REPLACE HV RELAY ASSEMBLY (See page HB-104)

HV

DTC	P0AA1-233	Hybrid Battery Positive Contactor Circuit Stuck Closed

DESCRIPTION

Refer to the description for DTC P0AE6-225 (See page HV-412).
This circuit uses the hybrid vehicle control ECU to monitor the system main relays and stops the system if a malfunction is detected in the relays, because it may be impossible to shut off the high-voltage system if any of the relays becomes stuck.

DTCNo.	INF Code	DTC Detection Condition	Trouble Area
P0AA1	233	System main relays B, and G on the HV battery positive and negative sides are stuck closed.	HV relay assembly

WIRING DIAGRAM

Refer to the wiring diagram for DTC P0AE6-225 (See page HV-413).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

- Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.
- If P0AA1-233 is output, the vehicle is prevented from starting.

HV

1	CHECK DTC OUTPUT (HV)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Part
P0AE2-773, 161	SMRP short
P0AE0-228	SMRG control line
P0ADC-226	SMRB control line
P0A1A-156, 658, 151, 155, P0A1B-511, 164, 163, 512, 193, 786, 788, 659, 661, P0A78-266, 267, 523, 586, P0A94-442, P3004-132	VH sensor circuit
P0A1A-200, 791, 792, 793, P0A1B-192, 168, 794, 795, 796, P0A3F-243, P0A41-245, P0A40-500, P0A4B-253, P0A4C-513, P0A4D-255	MG1 and MG2 rotation speed circuit

YES → GO TO DTC CHART

NO

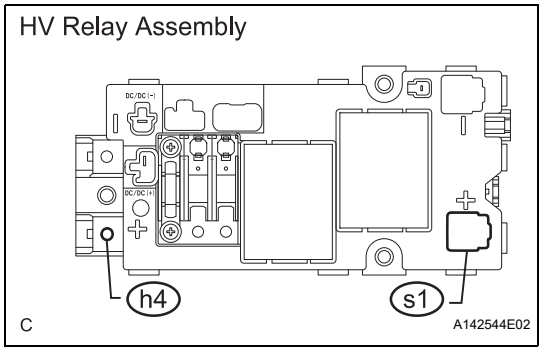
2	CHECK HV RELAY ASSEMBLY (SMRB, SMRG)

CAUTION:
Be sure to wear insulated gloves.

(a) Turn the power switch off and remove the service plug grip (See page HV-1).
NOTICE:
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect the high voltage connector of the HV relay assembly (See page HB-104).

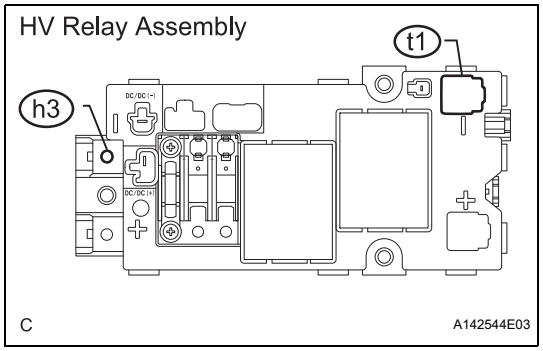
(c) Measure the resistance according to the value(s) in the table below. (SMRB inspection) (*1)
Standard resistance



Tester Connection	Specified Condition
h4-1 - s1-1	10 kΩ or more

HINT:
- Leave the HV relay in the vehicle while testing to prevent the movement that occurs during removal from causing a stuck relay to return to normal.
- Measuring resistance can determine that this is either a present or past malfunction

(d) Measure the resistance according to the value(s) in the table below. (SMRG inspection) (*2)
Standard resistance



Tester Connection	Specified Condition
h3-1 - t1-1	10 kΩ or more

HINT:
- Leave the HV relay in the vehicle while testing to prevent the movement that occurs during removal from causing a stuck relay to return to normal.
- Measuring resistance can determine that this is either a present or past malfunction

HV

Result

Result	Proceed to
There is conduction in either step (*1) or (*2).	A
There is conduction in both steps (*1) and (*2).	B

A → **REPLACE HV RELAY ASSEMBLY (See page HB-104)**

B → **REPLACE HV RELAY ASSEMBLY (See page HB-104)**

DTC	P0AA4-232	Hybrid Battery Negative Contactor Circuit Stuck Closed

DESCRIPTION

Refer to the description for DTC P0AE6-225 (See page HV-412).

DTCNo.	INF Code	DTC Detection Condition	Trouble Area
P0AA4	232	System main relay G on the HV battery negative side is stuck closed.	• HV relay assembly • Inverter with converter assembly

WIRING DIAGRAM

Refer to the wiring diagram for DTC P0AE6-225 (See page HV-413).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

- Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.
- If DTC P0AA4-232 is stored, the vehicle will not turn on.

HV

1	CHECK DTC OUTPUT

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result

DTC No.	Relevant Part
P0AE2-773, 161	SMRP short
P0AE0-228	SMRG control line
P0A1F, P3105	Battery smart unit circuit
P0A1A-156, 658, 151, 155, P0A1B-511, 164, 163, 512, 193, 786, 788, 659, 661 P0A78-266, 267, 523, 586, P0A94-442, P3004-132	VH sensor circuit
P0A1A-200, 791, 792, 793, P0A1B-192, 168, 794, 795, 796, P0A3F-243, P0A41-245, P0A40-500, P0A4B-253, P0A4C-513, P0A4D-255	MG1 and MG2 rotation speed circuit

YES → GO TO DTC CHART

NO

2	CHECK FREEZE FRAME DATA

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Read output DTCs.
(e) Read the freeze frame data of P0AA4-232.

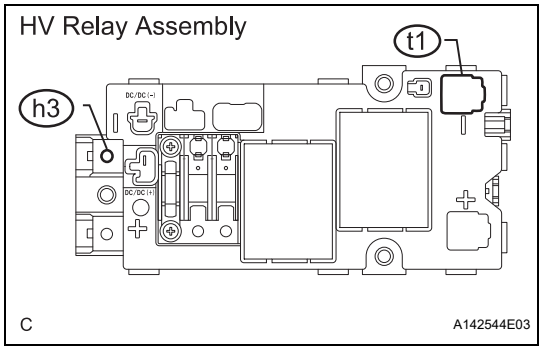
Result

Result	Proceed to
IB BATTERY (Current value of HV battery) is less than 3 A.	A
IB BATTERY (Current value of HV battery) is 3 A or more.	B

A → **REPLACE INVERTER WITH CONVERTER ASSEMBLY (See page HV-558)**

B

3 CHECK HV RELAY ASSEMBLY



CAUTION:
Be sure to wear insulated gloves.

(a) Turn the power switch off and remove the service plug grip (See page HV-1).
NOTICE:
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
h3-1 - t1-1	10 kΩ or more

HINT:
- For the removal and installation procedures related to inspection of the HV relay assembly, (See page HB-104).
- Leave the HV relay in the vehicle while testing to prevent the movement that occurs during removal from causing a stuck relay to return to normal.
- If the result of reading the freeze frame data is B, the HV relay assembly must be replaced. Measuring resistance can determine that this is either a present or past malfunction.

NG → **REPLACE HV RELAY ASSEMBLY (See page HB-104)**

OK

REPLACE HV RELAY ASSEMBLY (See page HB-104)

HV

DTC	P0A82-123	Hybrid Battery Pack Cooling Fan 1

DESCRIPTION

Refer to the circuit description for DTC P0A84-123 (See page HB-35).

DTC No.	DTC Detection Condition	Trouble Area
P0A82-123	The speed of the battery cooling blower assembly is not within the specified range (1 trip detection)	• Battery cooling blower assembly • Battery smart unit • HV battery intake duct • Wire harness or connector

WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A84-123 (See page HB-36).

INSPECTION PROCEDURE

1	CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)

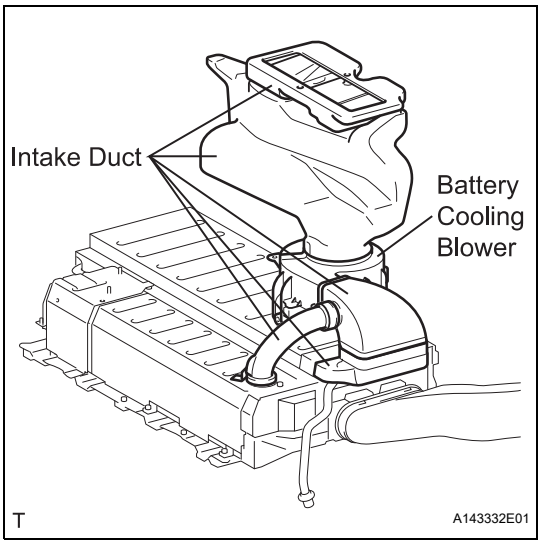
(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

2	CHECK DUCT AND BLOWER

(a) Remove the luggage compartment front trim cover (See page HB-86).
(b) Remove the luggage compartment rear trim cover (See page HB-86).



(c) Check that the intake ducts and battery cooling blower are not disconnected, damaged, or clogged with foreign objects, and that the acoustical materials have not peeled.

OK:

The ducts and blower are not disconnected, damaged, or clogged with foreign objects and the acoustical materials have not peeled.

NG → **CORRECT THE PROBLEM**

OK

3	CHECK HARNESS AND CONNECTOR (BATTERY SMART UNIT - HYBRID VEHICLE CONTROL ECU)

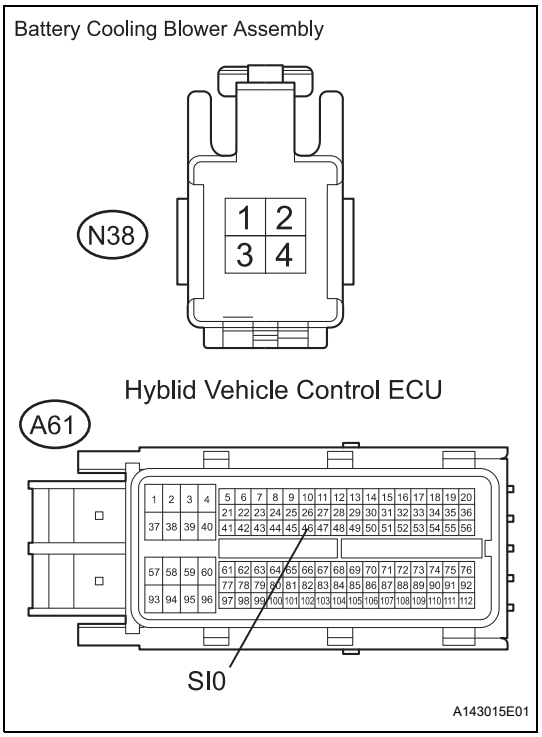
(a) Disconnect the battery cooling blower assembly connector.

(b) Disconnect connector A61 from the hybrid vehicle control ECU.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
N38-3 or SI0 (A61-46) - Body ground	10 kΩ or higher

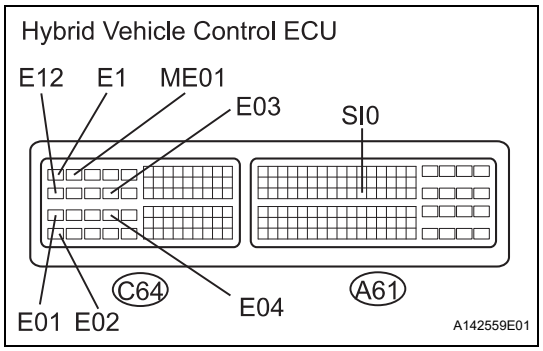


NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	CHECK HYBRID VEHICLE CONTROL ECU (GROUND SHORT CHECK)

(a) Remove the hybrid vehicle control ECU (See page HV-570).



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
SI0 (A61-46) - E02 (C64-65)	10 kΩ or higher
SI0 (A61-46) - ME01 (C64-13)	10 kΩ or higher
SI0 (A61-46) - E03 (C64-25)	10 kΩ or higher
SI0 (A61-46) - E04 (C64-48)	10 kΩ or higher
SI0 (A61-46) - E01 (C64-51)	10 kΩ or higher
SI0 (A61-46) - E1 (C64-14)	10 kΩ or higher
SI0 (A61-46) - E12 (C64-28)	10 kΩ or higher

NG → **REPLACE HYBRID VEHICLE CONTROL ECU**

OK

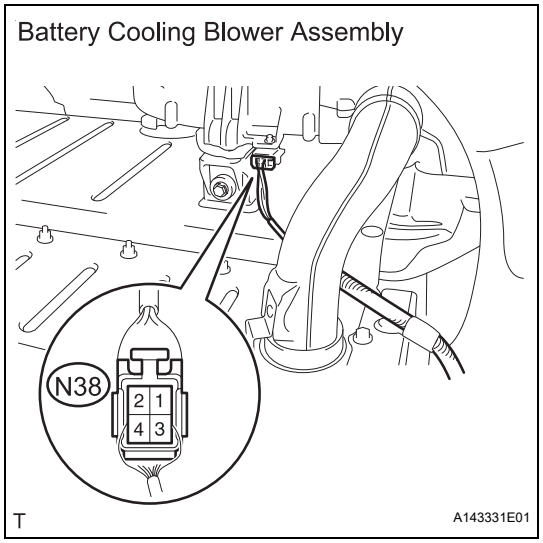
5 READ VALUE ON INTELLIGENT TESTER

(a) Connect the battery cooling blower assembly connector.
(b) Connect connector A61 to the hybrid vehicle control ECU.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the power switch on (IG).
(e) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / ACTIVE TEST / COOLING FAN SPD.
HINT:
Check COOLING FAN MODE1 in the DATA LIST using the intelligent tester. If the COOLING FAN MODE1 is 1 to 6, it is not necessary to perform the ACTIVE TEST.
(f) Select the following menu items: USER DATA / VMF FAN VOLT 1.
(g) Select each air volume mode (1 to 6) in the COOLING FAN SPD active test to operate the battery cooling blower assembly.
(h) While the cooling fan is operating, compare the value in the user data (VMF FAN VOLT 1) with the voltage value that was actually measured at the battery cooling blower assembly connector.

Standard

Tester Connection	Specified Condition
N38-2 - N38-4	There is no difference between the value in the data list (cooling fan voltage) and the voltage value that was actually measured at the battery cooling blower assembly connector.

OK:
Difference of voltage is 1 V or less.



NG → **REPLACE BATTERY SMART UNIT (See page HB-99)**

HB

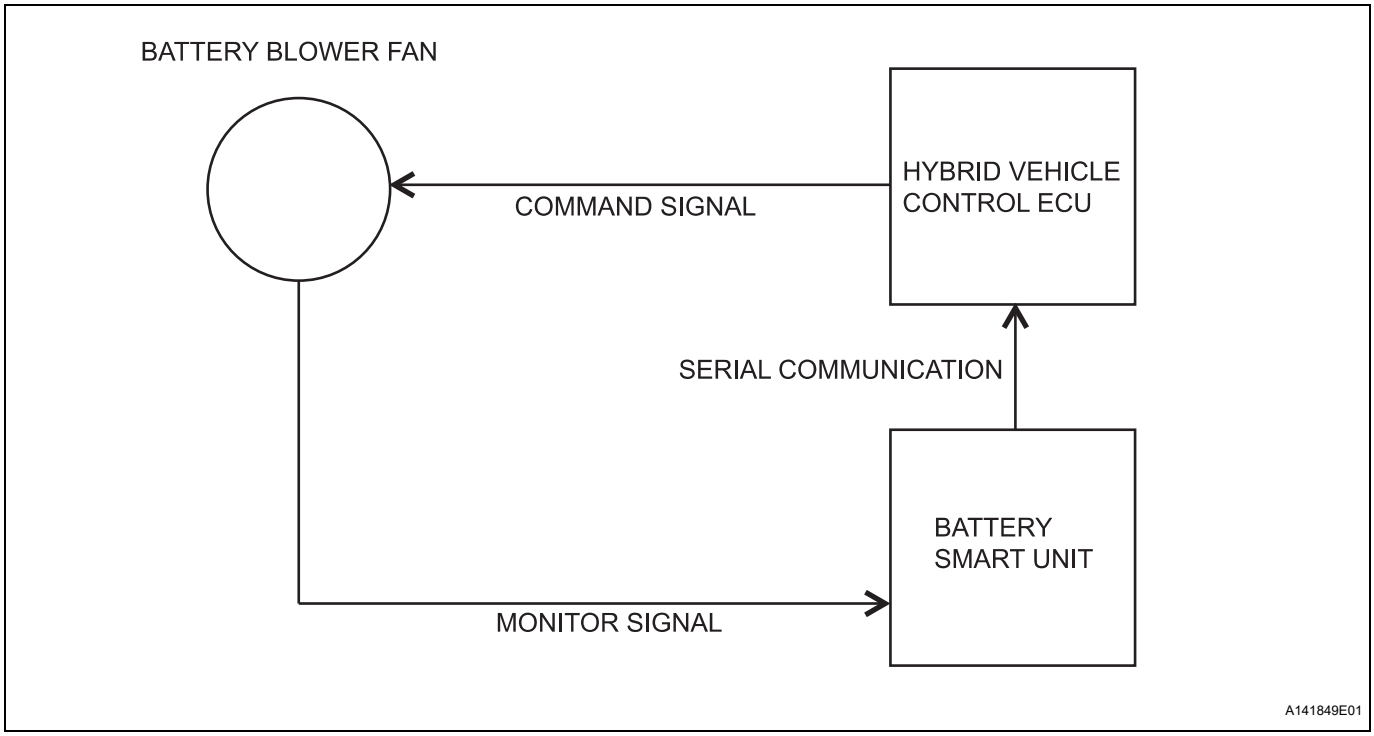
OK

REPLACE BATTERY COOLING BLOWER ASSEMBLY (See page HB-115)

DTC	P0A84-123	Hybrid Battery Pack Cooling Fan 1

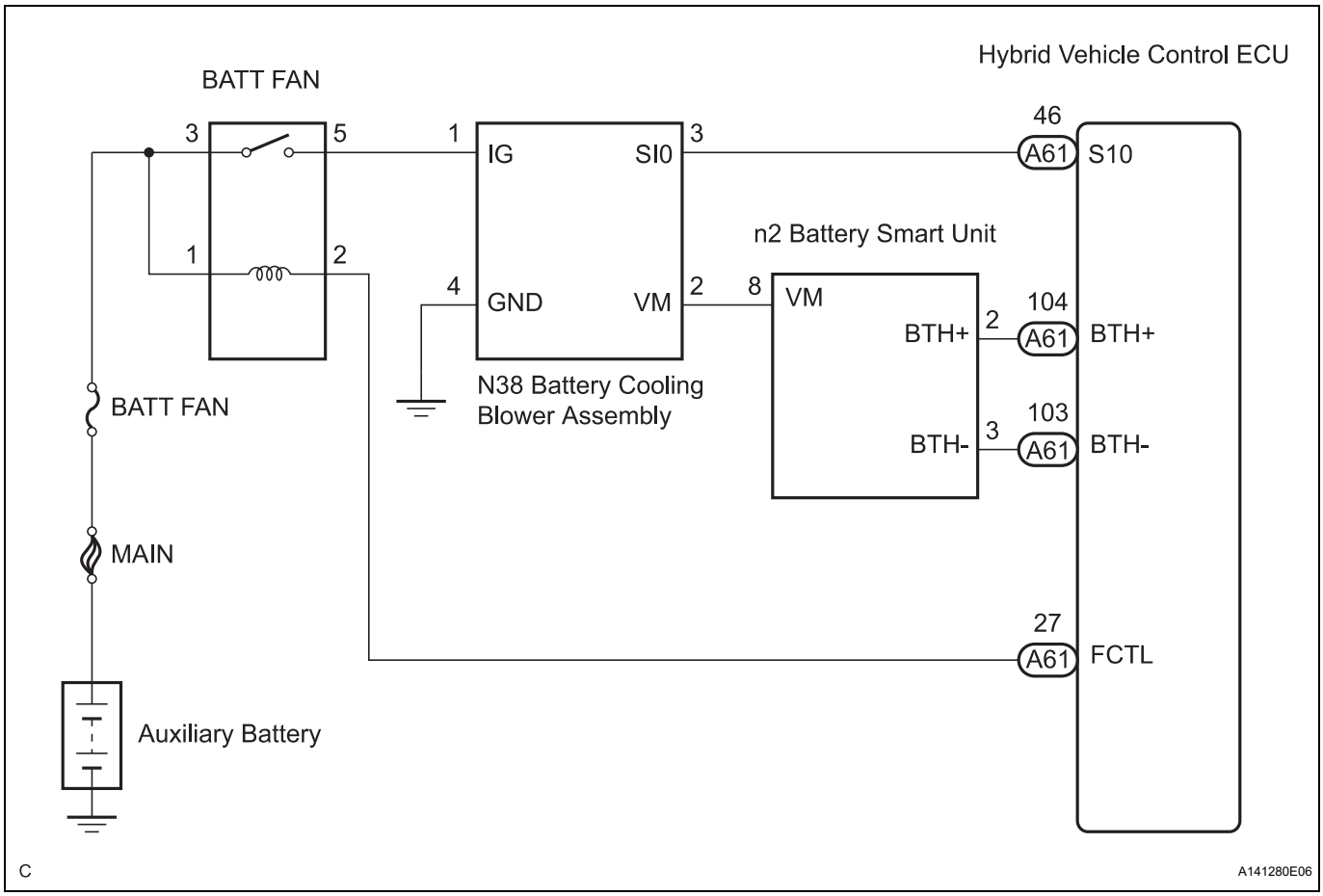
DESCRIPTION

The speed of the battery cooling blower assembly is controlled by the hybrid vehicle control ECU. Battery cooling blower assembly power is supplied when the FCTL terminal of the hybrid vehicle control ECU turns on the battery blower relay. The hybrid vehicle control ECU sends command signals (SI) to the battery cooling blower assembly to get the fan speed corresponding to the HV battery temperature. Information about the voltage applied to the battery cooling blower assembly (VM) is sent to the hybrid vehicle control ECU as a monitor signal using serial communication via the battery smart unit.



DTC No.	DTC Detection Condition	Trouble Area
P0A84-123	When the output voltage of the battery cooling blower assembly (VM) is too low to the target control voltage range (1 trip detection)	• Wire harness or connector • BATT FAN fuse • Battery blower relay • Battery cooling blower assembly • Battery smart unit • Hybrid vehicle control ECU • HV battery

WIRING DIAGRAM



CAUTION:

- **Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

INSPECTION PROCEDURE

1	**CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
Result:
DTC P0A1F-123 is output.
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

YES	**GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

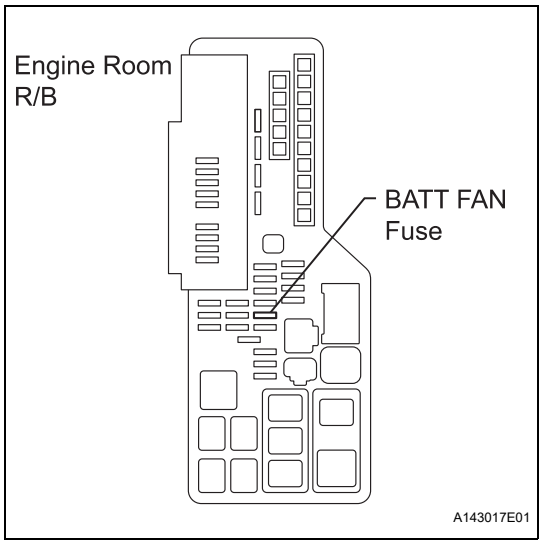
2	PERFORM ACTIVE TEST USING INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / ACTIVE TEST / COOLING FAN SPD.
HINT:
Check COOLING FAN MODE1 in the DATA LIST using the intelligent tester. If the COOLING FAN MODE1 is 1 to 6, it is not necessary to perform the ACTIVE TEST.
(d) Select air volume mode 6 in the COOLING FAN SPD active test to operate the battery cooling blower assembly.
(e) Check that the fan operates and air is sucked into the inlet duct of the package tray trim panel assembly.
HINT:
The cooling fan may not stop even when turning the cooling fan off in the COOLING FAN SPD active test. This is due to HV system control and not a malfunction.
OK:
The fan operates.

OK	Go to step 14

NG

3	CHECK FUSE (BATT FAN)



(a) Measure the resistance of the BATT FAN fuse.
Standard resistance:
Below 1 Ω

OK	Go to step 7

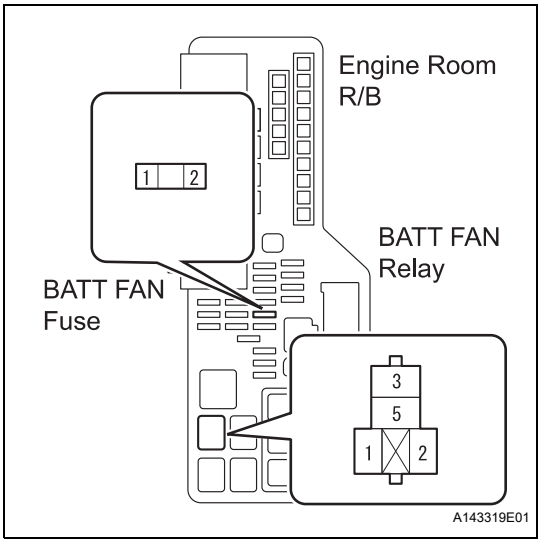
NG

HB

4	REPLACE FUSE (BATT FAN)

NEXT

5	CHECK HARNESS AND CONNECTOR (BATT FAN FUSE - BODY GROUND)



(a) Remove the BATT FAN fuse from the engine room R/B.
(b) Remove the BATT FAN relay from the engine room R/B.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
BATT FAN fuse 2 or BATT FAN relay 3 or 1 - Body ground	10 kΩ or higher

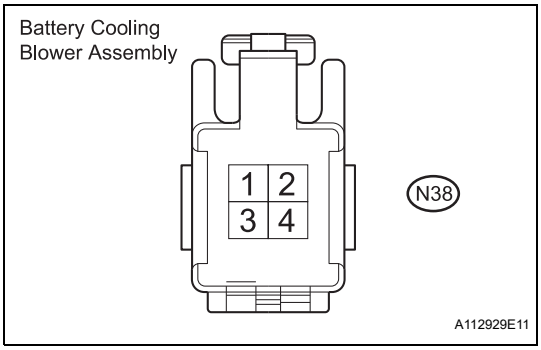
NOTICE:
When taking measurements with an electrical tester, do not apply excessive force to the tester probes to avoid damaging the fuse holder or terminals.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

HB

6	CHECK HARNESS AND CONNECTOR (BATTERY COOLING BLOWER - BODY GROUND)



(a) Remove the front luggage compartment trim cover (See page HB-86).
(b) Disconnect the battery cooling blower assembly connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
N38-1 - Body ground	10 kΩ or higher

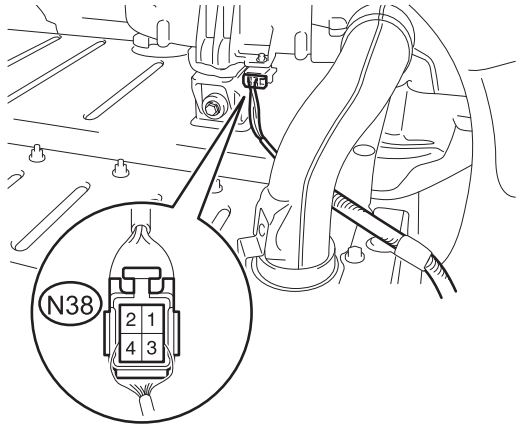
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE BATTERY COOLING BLOWER ASSEMBLY (See page HB-115)

7 CHECK HARNESS AND CONNECTOR (VOLTAGE)

Battery Cooling Blower Assembly



(a) Remove the front luggage compartment trim cover (See page HB-86).
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage

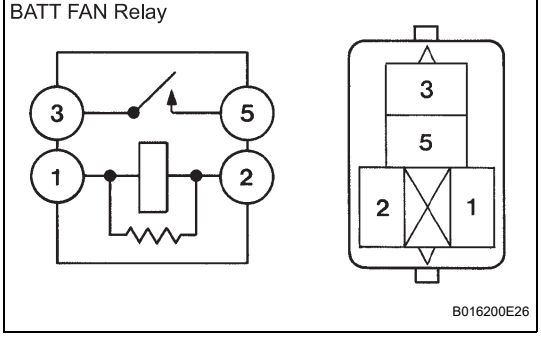
Tester Connection	Specified Condition
1 (+B) - 4 (GND)	9 to 14 V

OK → **Go to step 14**

NG

8 INSPECT RELAY (BATTERY FAN)

BATT FAN Relay



(a) Remove the BATT FAN relay from the engine room R/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

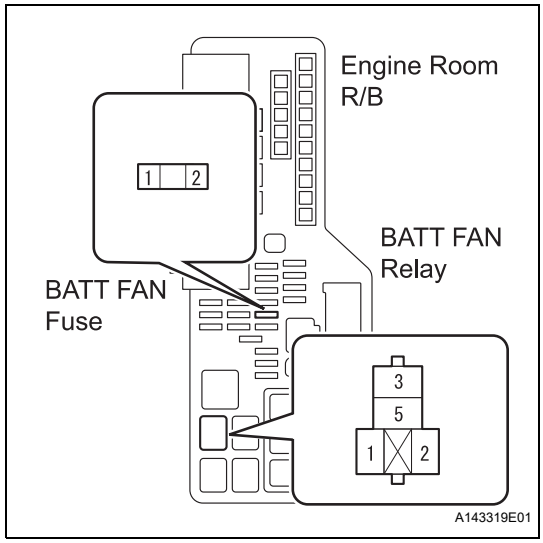
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (Apply battery voltage to terminals 1 and 2)

NG → **REPLACE RELAY (BATTERY BLOWER)**

OK

HB

9	CHECK HARNESS AND CONNECTOR (BATT FAN FUSE - BATT FAN RELAY)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

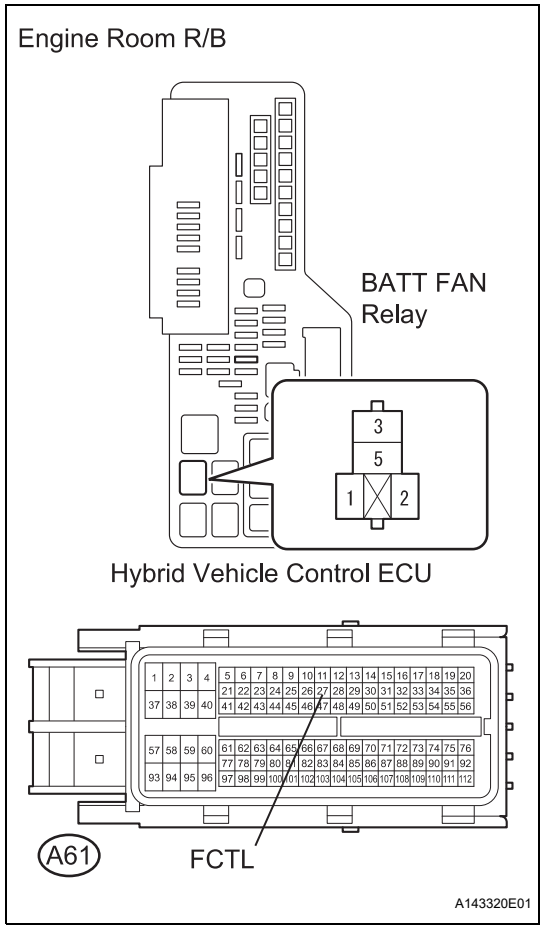
Tester Connection	Specified Condition
BATT FAN fuse 2 - BATT FAN relay 1	Below 1 Ω
BATT FAN fuse 2 - BATT FAN relay 3	Below 1 Ω

NOTICE:
When taking measurements with an electrical tester, do not apply excessive force to the tester probes to avoid damaging the fuse holder or terminals.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

10	CHECK HARNESS AND CONNECTOR (BATT FAN RELAY - HYBRID VEHICLE CONTROL ECU)



(a) Disconnect connector A61 from the hybrid vehicle control ECU.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
2 - FCTL (A61-27)	Below 1 Ω

NOTICE:
When taking measurements with an electrical tester, do not apply excessive force to the tester probes to avoid damaging the fuse holder or terminals.

(c) Turn the power switch on (IG).

(d) Measure the resistance according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
2 or FCTL (A61-27) - Body ground	Below 1 V

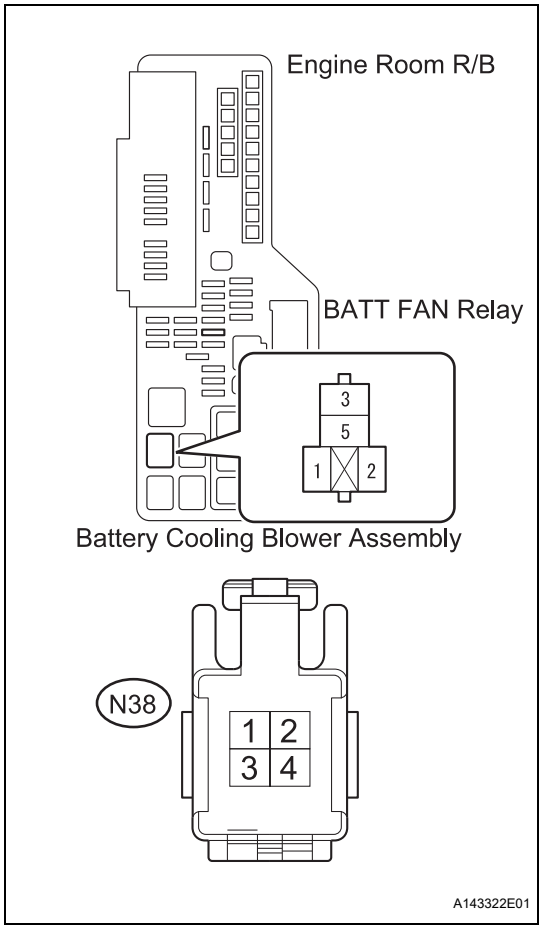
NOTICE:
When taking measurements with an electrical tester, do not apply excessive force to the tester probes to avoid damaging the fuse holder or terminals.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

HB

OK

11	CHECK HARNESS AND CONNECTOR (BATT FAN RELAY - BATTERY COOLING BLOWER)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
5 - N38-1	Below 1 Ω

NOTICE:
When taking measurements with an electrical tester, do not apply excessive force to the tester probes to avoid damaging the fuse holder or terminals.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

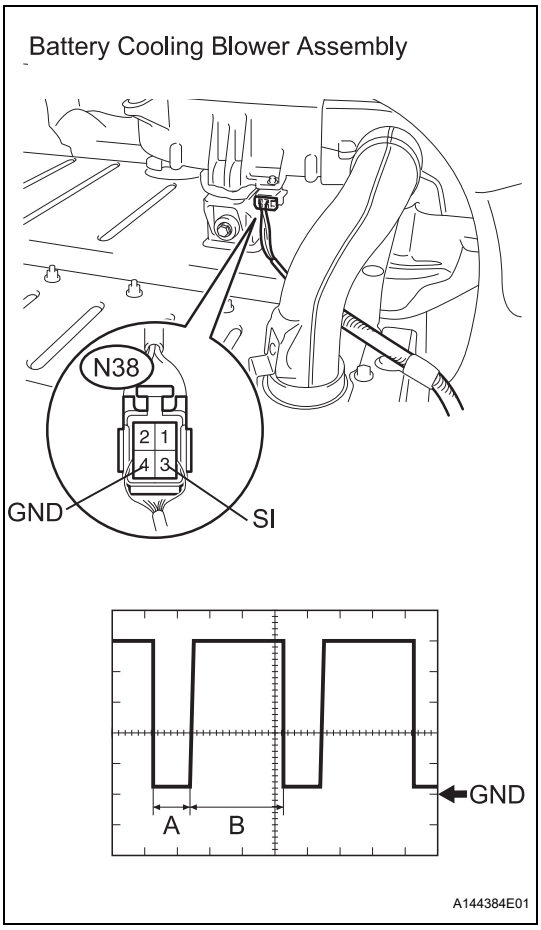
OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

12	CHECK WAVEFORM

(a) Install the BATT FAN fuse to the engine room R/B No. 1.
(b) Connect the battery cooling blower assembly connector.
(c) Connect an oscilloscope between connector terminals 3 (SI) and 4 (GND) of the battery cooling blower assembly.
(d) Connect the intelligent tester to the DLC3.
(e) Turn the power switch on (IG).
(f) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / ACTIVE TEST / COOLING FAN SPD.
(g) Select air volume mode 1 to 6 in the COOLING FAN SPD active test to operate the battery cooling blower assembly.

HB



(h) Measure the waveform.

Item	Contents
Terminal	CH1: N38-3 - N38-4
Equipment Setting	1 V/DIV., 500 μs/DIV.
Condition	Power switch on (IG) or Power switch on (READY)

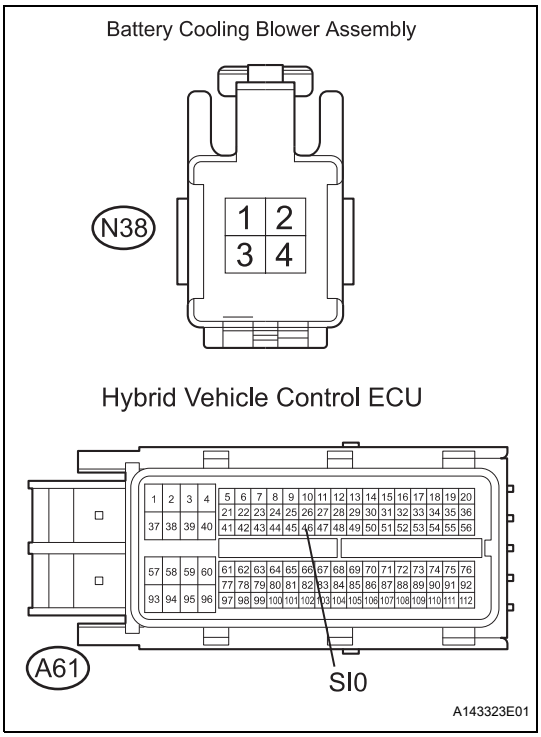
HINT:
- A and B in the DUTY waveform shown in the illustration vary depending on the cooling fan mode.
- The actual duty command value is influenced by variance in fan motors and the change of power supply voltage.

OK → **REPLACE BATTERY COOLING BLOWER ASSEMBLY (See page HB-115)**

NG

HB

13 CHECK HARNESS AND CONNECTOR (BATTERY COOLING BLOWER - HYBRID VEHICLE CONTROL ECU)



(a) Disconnect the battery cooling blower assembly connector.
(b) Disconnect connector A61 from the hybrid vehicle control ECU.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
N38-3 - SI0 (A61-46)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
N38-3 or SI0 (A61-46)- Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

14 CHECK BATTERY COOLING BLOWER ASSEMBLY (VOLTAGE)

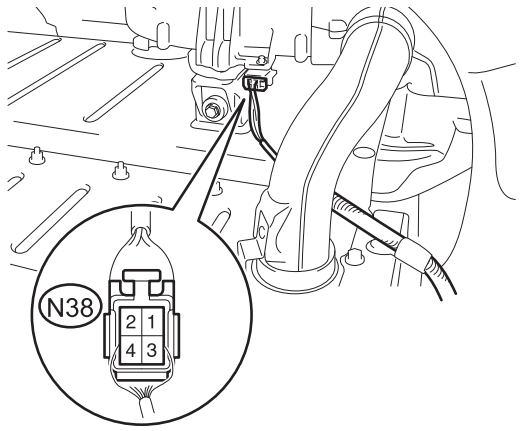
(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / ACTIVE TEST / COOLING FAN SPD.
HINT:
Check COOLING FAN MODE1 in the DATA LIST using the intelligent tester. If the COOLING FAN MODE1 is 1 to 6, it is not necessary to perform the ACTIVE TEST.
(d) Select the following menu items: USER DATA / VMF FAN VOLT 1.
(e) Select each air volume mode (1 to 6) in the COOLING FAN SPD active test to operate the battery cooling blower assembly.
(f) While the cooling fan is operating, compare the value in the user data (VMF FAN VOLT 1) with the voltage value that was actually measured at the battery cooling blower assembly connector.

Standard

Tester Connection	Specified Condition
N38-2 - N38-4	There is no difference between the value in the data list (cooling fan voltage) and the voltage value that was actually measured at the battery cooling blower assembly connector.

OK:
Difference of voltage is 1 V or less.

Battery Cooling Blower Assembly



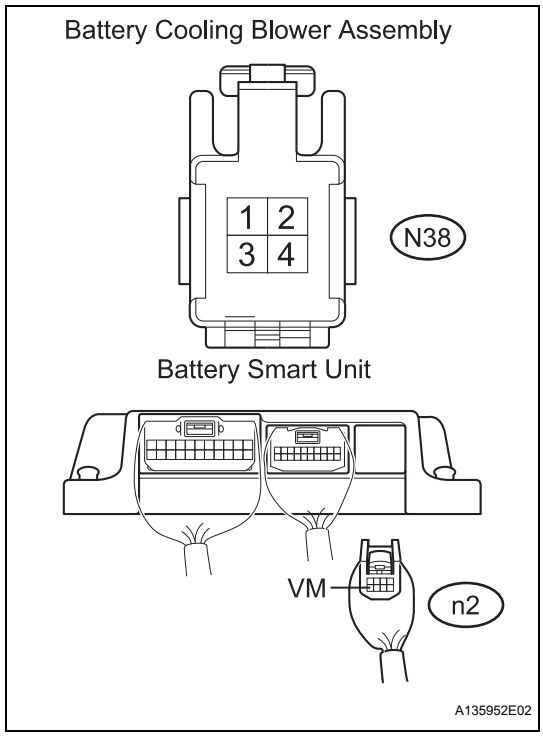
NG → **REPLACE BATTERY COOLING BLOWER ASSEMBLY (See page HB-115)**

OK

15 CHECK HARNESS AND CONNECTOR (BATTERY COOLING BLOWER - BATTERY SMART UNIT)

CAUTION:
Be sure to wear insulated gloves.
(a) Remove the service plug grip (See page HB-86).
(b) Remove the battery smart unit (See page HB-100).
(c) Disconnect connector n2 from the battery smart unit.

HB



(d) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
N38-2 - VM (n2-8)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
N38-2 or VM (n2-8) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE BATTERY SMART UNIT (See page HB-99)

DTC	P0A85-123	Hybrid Battery Pack Cooling Fan 1

DESCRIPTION

Refer to the circuit description for DTC P0A84-123 (See page HB-35).

DTC No.	DTC Detection Condition	Trouble Area
P0A85-123	When the output voltage of the battery cooling blower assembly (VM) is too high to the target control voltage range (1 trip detection)	• Wire harness or connector • Battery cooling blower assembly • Battery smart unit • HV battery

WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A84-123 (See page HB-36).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result:

DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

2	CHECK HARNESS AND CONNECTOR (VOLTAGE)

CAUTION:

Be sure to wear insulated gloves.

(a) Remove the service plug grip (See page HB-86).
(b) Remove the battery smart unit (See page HB-100).
HINT:
Do not disconnect the battery smart unit connectors.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the power switch on (IG).

(e) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / ACTIVE TEST / COOLING FAN SPD.

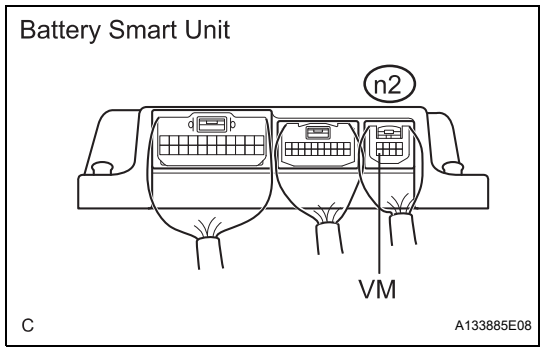
HINT:
Check COOLING FAN MODE1 in the DATA LIST using the intelligent tester. If the COOLING FAN MODE1 is 1 to 6, it is not necessary to perform the ACTIVE TEST.

(f) Select each air volume mode (1 to 6) in the COOLING FAN SPD active test to operate the battery cooling blower assembly.

(g) Measure the voltage according to the value(s) in the table below while the cooling fan is operating.

Standard voltage

Tester Connection	Specified Condition
VM (n2-8) - Body ground	Below 5 V



OK → **Go to step 5**

NG

3 CHECK HARNESS AND CONNECTOR (BATTERY COOLING BLOWER - BATTERY SMART UNIT)

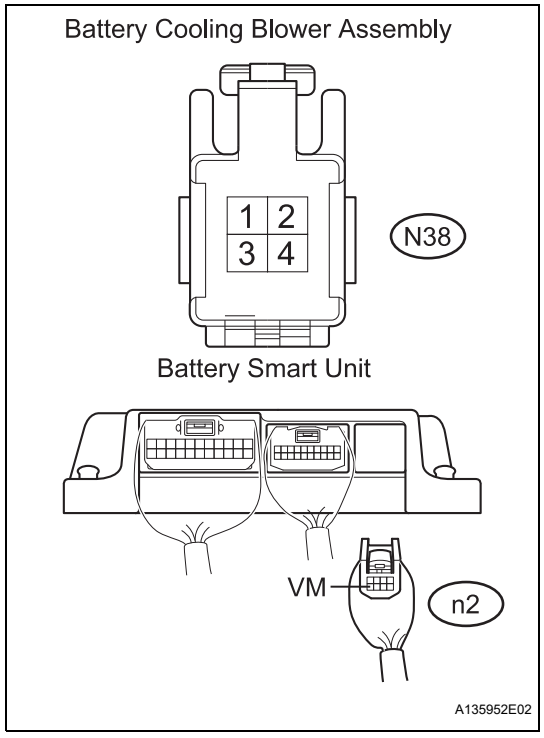
CAUTION:
Be sure to wear insulated gloves.

(a) Disconnect connector n2 from the battery smart unit.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
N38-2 or VM (n2-8) - Other terminal	10 kΩ or higher

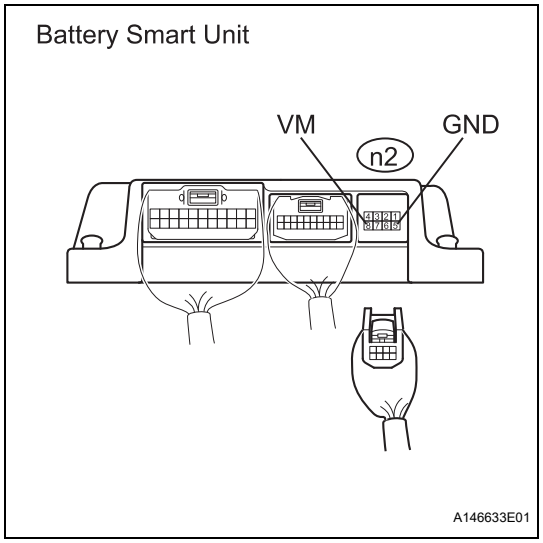


NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

HB

4	CHECK BATTERY SMART UNIT (VOLTAGE)



CAUTION:
Be sure to wear insulated gloves.

(a) Turn the power switch on (IG).
(b) Measure the resistance according to the value(s) in the table below.

Standard voltage

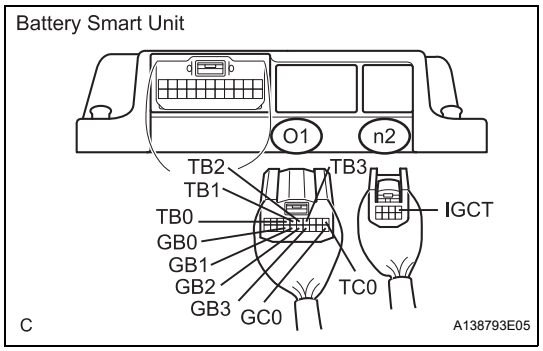
Tester Connection	Specified Condition
VM (n2-8) - GND (n2-5)	Below 5 V

NG → **REPLACE BATTERY SMART UNIT (See page HB-99)**

OK

REPLACE BATTERY COOLING BLOWER ASSEMBLY (See page HB-115)

5	CHECK HV BATTERY (BATTERY TEMPERATURE SENSOR AND INLET AIR TEMPERATURE SENSOR)



CAUTION:
Be sure to wear insulated gloves.

(a) Disconnect connector O1 from the battery smart unit.
(b) Disconnect connector n2 from the battery smart unit.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
TB0 (O1-7) - IGCT (n2-1)	10 kΩ or higher
GB0 (O1-17) - IGCT (n2-1)	10 kΩ or higher
TB1 (O1-6) - IGCT (n2-1)	10 kΩ or higher
GB1 (O1-16) - IGCT (n2-1)	10 kΩ or higher
TB2 (O1-5) - IGCT (n2-1)	10 kΩ or higher
GB2 (O1-15) - IGCT (n2-1)	10 kΩ or higher
TB3 (O1-4) - IGCT (n2-1)	10 kΩ or higher
GB3 (O1-14) - IGCT (n2-1)	10 kΩ or higher
TC0 (O1-1) - IGCT (n2-1)	10 kΩ or higher
GC0 (O1-11) - IGCT (n2-1)	10 kΩ or higher

NG → **REPLACE HV BATTERY (See page HB-81)**

HB

OK

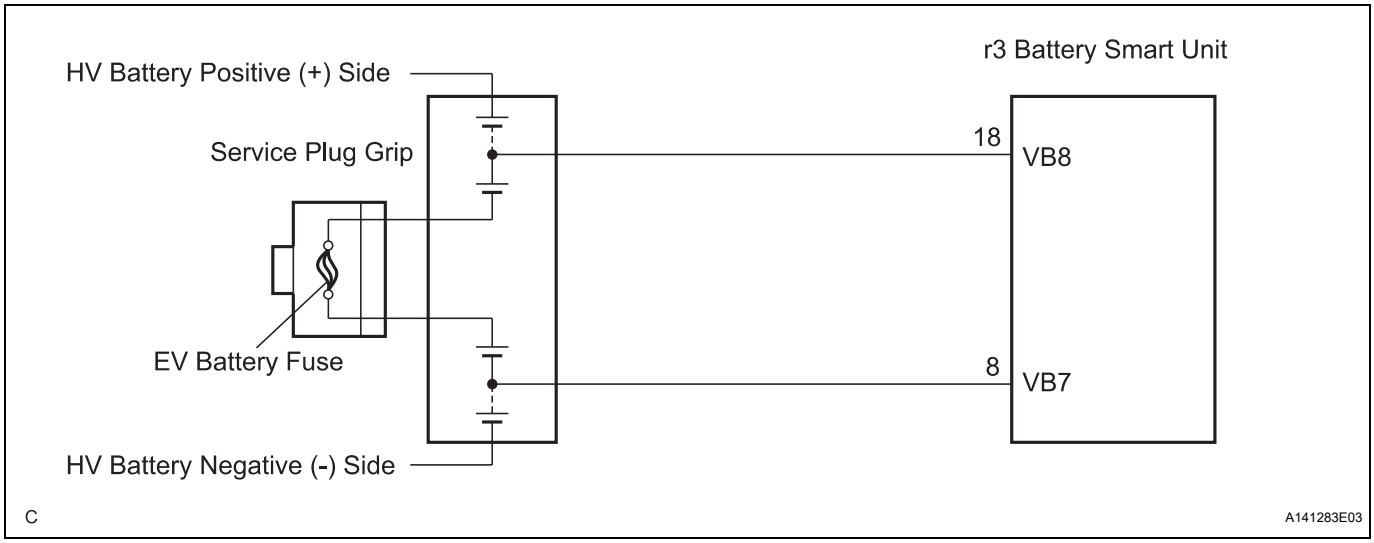
REPLACE BATTERY SMART UNIT (See page HB-99)

DTC	P0A95-123	High Voltage Fuse

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
P0A95-123	Voltage between VBB7 and VBB8 terminals is below the standard despite the interlock switch being engaged (1 trip detection)	• EV battery • Service plug grip • HV battery • Battery smart unit

WIRING DIAGRAM



INSPECTION PROCEDURE

HB

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0A1F-123 is output.

YES → GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC

NO

2	CHECK FOR DTCS (DTCS OTHER THAN P0A95-123)

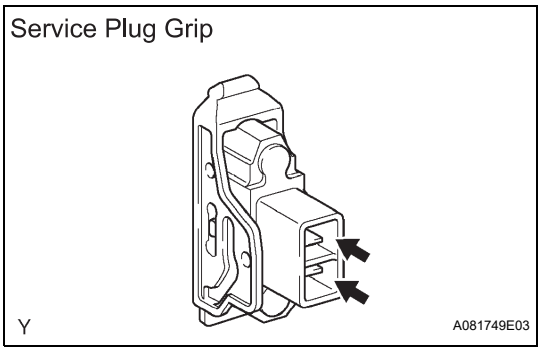
(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTCs other than P0A95-123 are output.

YES → GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC

NO

3	INSPECT SERVICE PLUG GRIP

CAUTION:
Be sure to wear insulated gloves.
(a) Turn the power switch off and remove the service plug grip (See page HB-86).
NOTICE:
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.
(b) Measure the resistance between the terminals of the service plug grip.
Standard resistance:
Below 1 Ω



OK → REPLACE HV BATTERY (See page HB-81)

NG

REPLACE SERVICE PLUG GRIP (See page HB-81)

DTC	P0A9C-123	Hybrid Battery Temperature Sensor "A"

DESCRIPTION

Refer to the circuit description for DTC P0A9D-123. (See page HB-54)

DTC No.	DTC Detection Condition	Trouble Area
P0A9C-123	• When the battery temperature sensor performance is abnormal (1 trip detection/2 trip detection)	• HV battery (Battery temperature sensor) • Battery smart unit

MONITOR DESCRIPTION

If the temperature indicated by the battery temperature sensor is lower than the standard level (open), or is higher than the standard level (short), the battery smart unit interprets this as a sensor malfunction. If the battery smart unit detects that the HV battery temperature is out of its normal range or its value is abnormal, the HV control ECU will illuminates the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A9C (INF 123): Rationality
Required sensors / components	Battery temperature sensor
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	TMC's intellectual property
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

HB

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	DTC P0A9C (INF 123) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)

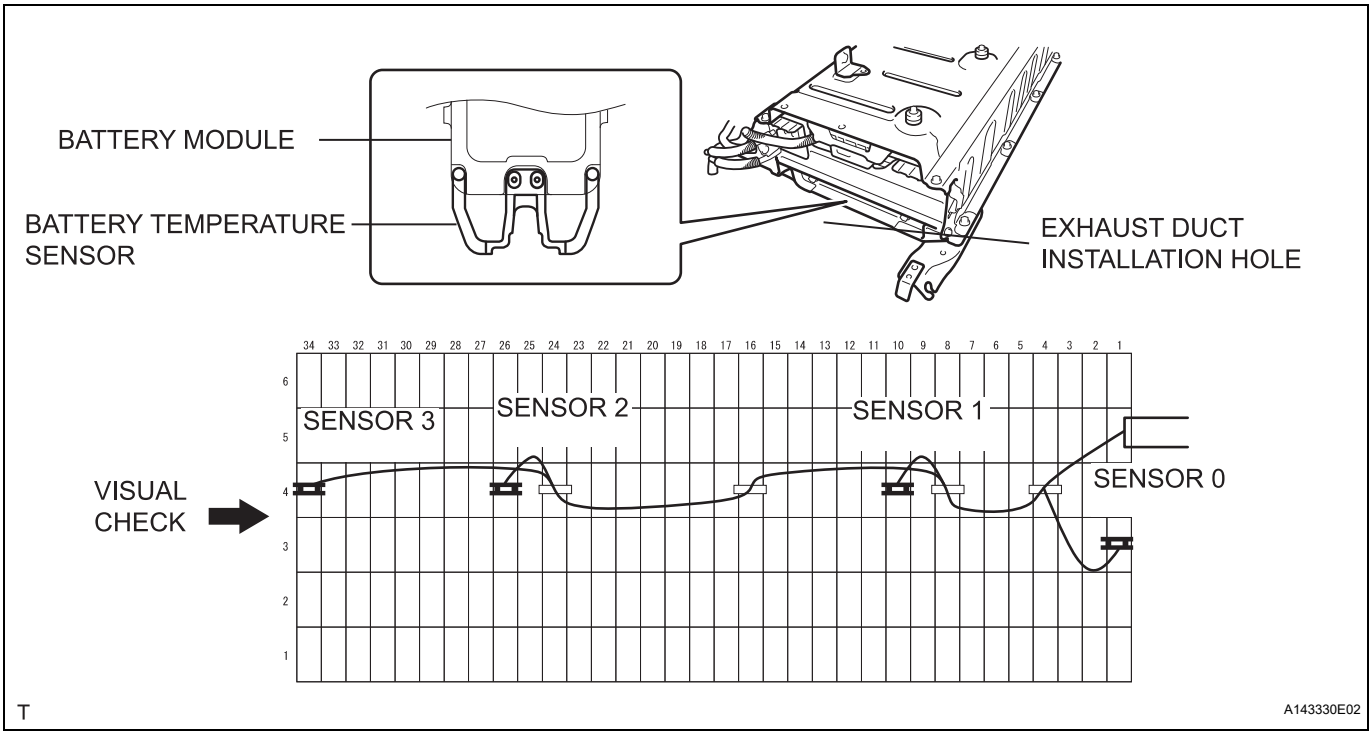
(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

2	CHECK BATTERY TEMPERATURE SENSOR (BATTERY TEMPERATURE SENSOR 0 TO 3)

CAUTION:
Be sure to wear insulated gloves.
(a) Remove the HV battery assembly. (See page HB-86)
(b) Visually check the installation of the battery temperature sensors (0 to 3) through the exhaust duct installation hole.



OK:
The battery temperature sensors (0 to 3) are securely installed.
NOTICE:
Do not poke the battery temperature sensors with a stick or other objects when checking. Doing so may damage the sensors.

NG → REPLACE HV BATTERY (See page HB-81)

OK

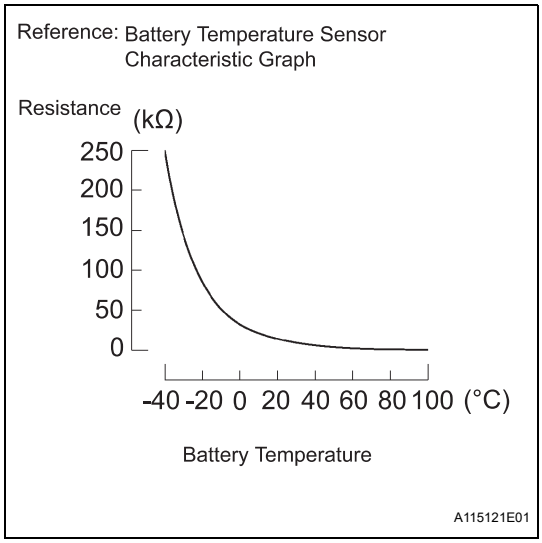
REPLACE BATTERY SMART UNIT (See page HB-99)

DTC	P0A9D-123	Hybrid Battery Temperature Sensor "A" Circuit Low

DTC	P0A9E-123	Hybrid Battery Temperature Sensor "A" Circuit High

DESCRIPTION

The battery temperature sensors are provided at 4 locations on the bottom of the HV battery. The resistance of the thermistor, which is built into each battery temperature sensor, varies in accordance with changes in the HV battery temperature. The lower the battery temperature, the higher the thermistor resistance. Conversely, the higher the temperature, the lower the resistance. The battery smart unit uses the battery temperature sensors to detect the HV battery temperature, and sends the detected values to the hybrid vehicle control ECU. Based on these results, the hybrid vehicle control ECU controls the blower fan. (The blower fan starts when the HV battery temperature rises above a predetermined level.)



HB

DTC No.	DTC Detection Condition	Trouble Area
P0A9D-123 P0A9E-123	When the temperature indicated by the battery temperature sensor is lower than a predetermined limit (open circuit) or is higher than a predetermined limit (short circuit) (1 trip detection)	• HV battery (Battery temperature sensor) • Battery smart unit

HINT:
After confirming that a DTC is output, use the intelligent tester to check "BATT TEMP 1 to 4" in the HV ECU data list.

Displayed Temperature	Malfunction
-45°C or less	Open or +B short circuit
95°C or more	GND short

MONITOR DESCRIPTION

If the temperature indicated by the battery temperature sensor is lower than the standard level (open), or is higher than the standard level (short), the battery smart unit interprets this as a sensor malfunction. If the battery smart unit detects that the HV battery temperature is out of its normal range or its value is abnormal, the HV control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A9D (INF 123): Range check P0A9E (INF 123): Range check
Required sensors / components	Battery temperature sensor
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	TMC's intellectual property
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

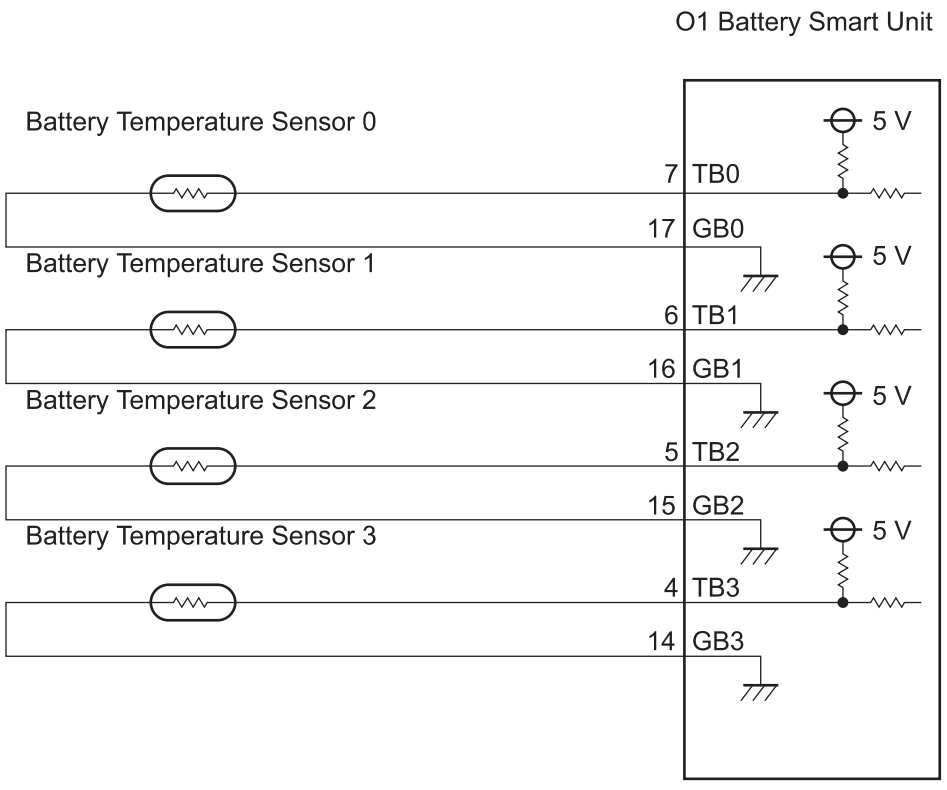
TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	P0A9D (INF 123) / P0A9E (INF 123) is not detected

WIRING DIAGRAM



C

A141281E02

HB

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result:

DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

2	CHECK CONNECTOR CONNECTION CONDITION (BATTERY TEMPERATURE SENSOR)

HB

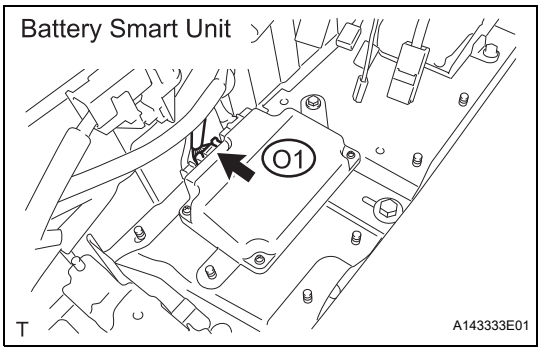
CAUTION:

Be sure to wear insulated gloves.

(a) Remove the service plug grip (See page HB-86).
(b) Remove the HV relay assembly (See page HB-105).
(c) Check the connection of connector O1 of the battery smart unit.

OK:

The connector is connected securely and there are no contact problems.



NG → **CONNECT SECURELY**

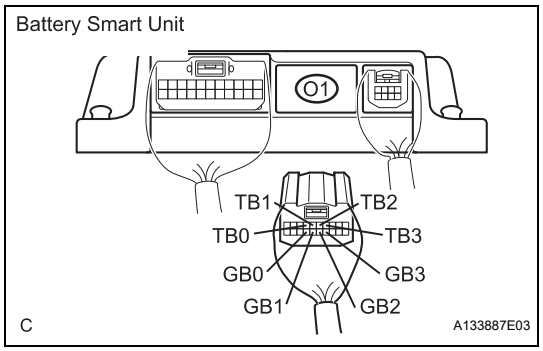
OK

3	CHECK HV BATTERY (BATTERY TEMPERATURE SENSOR)

CAUTION:

Be sure to wear insulated gloves.

(a) Remove the battery smart unit (See page HB-100).
(b) Disconnect connector O1 from the battery smart unit.



(c) For the malfunctioning battery temperature sensor(s) , measure the resistance according to the value(s) in the table below.

Tester Connection	Thermistor No.
TB0 (O1-7) - GB0 (O1 - 17)	0
TB1 (O1-6) - GB1 (O1 - 16)	1
TB2 (O1-5) - GB2 (O1 - 15)	2
TB3 (O1-4) - GB3 (O1 - 14)	3

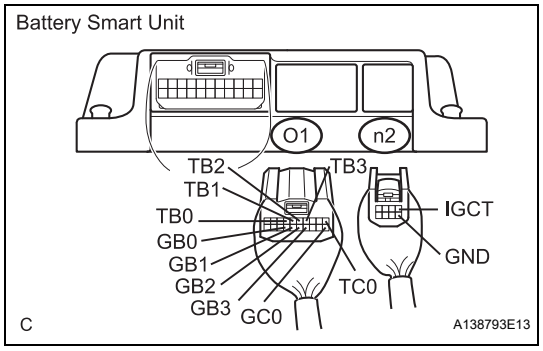
Standard resistance

Thermistor Temperature	Specified Condition
0°C (32°F)	26.7 to 27.9 kΩ
25°C (77°F)	9.9 to 10.1 kΩ
40°C (104°F)	5.7 to 6.0 kΩ

NG → **REPLACE HV BATTERY (See page HB-81)**

OK

4 CHECK HV BATTERY (BATTERY TEMPERATURE SENSOR AND INLET AIR TEMPERATURE SEMSOR)



CAUTION:
Be sure to wear insulated gloves.

(a) Disconnect connector O1 from the battery smart unit.
(b) Disconnect connector n2 from the battery smart unit.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
TB0 (O1-7) - IGCT (n2-1)	10 kΩ or higher
GB0 (O1-17) - IGCT (n2-1)	10 kΩ or higher
TB1 (O1-6) - IGCT (n2-1)	10 kΩ or higher
GB1 (O1-16) - IGCT (n2-1)	10 kΩ or higher
TB2 (O1-5) - IGCT (n2-1)	10 kΩ or higher
GB2 (O1-15) - IGCT (n2-1)	10 kΩ or higher
TB3 (O1-4) - IGCT (n2-1)	10 kΩ or higher
GB3 (O1-14) - IGCT (n2-1)	10 kΩ or higher
TC0 (O1-1) - IGCT (n2-1)	10 kΩ or higher
GC0 (O1-11) - IGCT (n2-1)	10 kΩ or higher
TB0 (O1-7) - GND(n2 - 5)	10 kΩ or higher
TB1 (O1-6) - GND(n2 - 5)	10 kΩ or higher
TB2 (O1-5) - GND(n2 - 5)	10 kΩ or higher
TB3 (O1-4) - GND(n2 - 5)	10 kΩ or higher
TC0 (O1-1) - GND(n2 - 5)	10 kΩ or higher

NG → **REPLACE HV BATTERY (See page HB-81)**

HB

OK

REPLACE BATTERY SMART UNIT (See page HB-99)

DTC	P0AAC-123	Hybrid Battery Pack Air Temperature Sensor "A" Circuit

DESCRIPTION

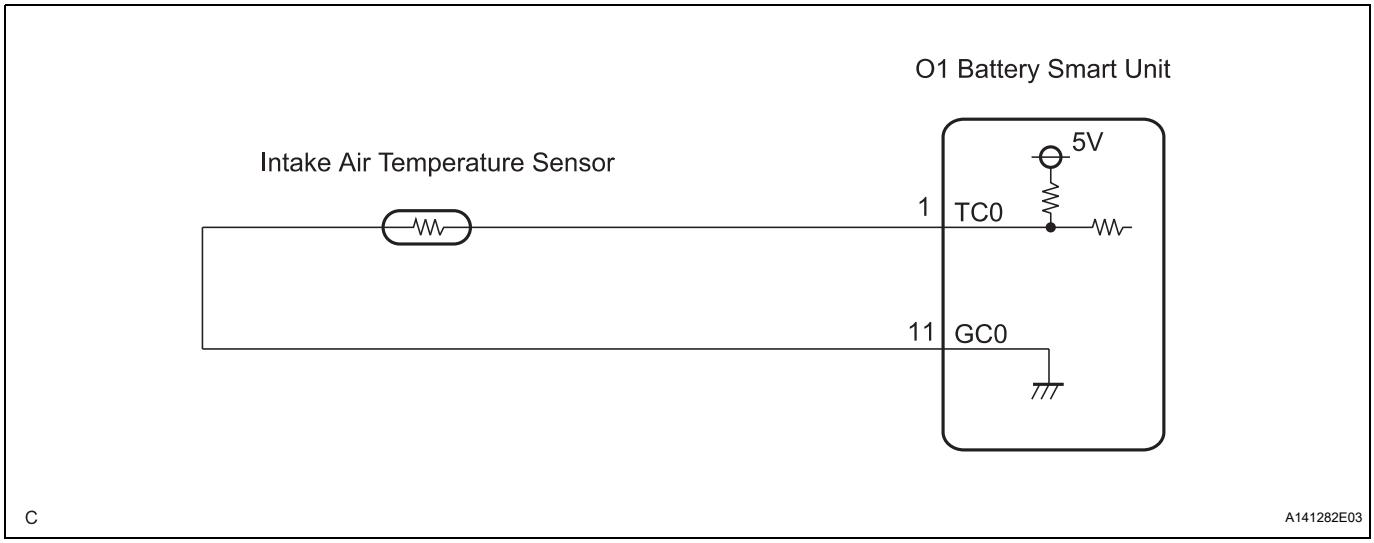
The intake air temperature sensor (battery) is mounted on the HV battery. The resistance of the sensor varies in accordance with changes in the intake air temperature. The characteristics of the intake air temperature sensor are the same as those of the battery temperature sensor. (See page HB-54) The battery smart unit uses signals from the intake air temperature sensor to control the air volume of the battery cooling blower assembly.

DTC No.	DTC Detection Condition	Trouble Area
P0AAC-123	When the temperature indicated by the intake air temperature sensor is lower than a predetermined limit (open circuit) or is higher than a predetermined limit (short circuit)	• HV battery (Intake air temperature sensor) • Battery smart unit

HINT:
After confirming that DTC P0AAC is output, use the intelligent tester to check "BATT INSIDE AIR" in the HV ECU data list.

Displayed Temperature	Malfunction
-45°C or less	Open or +B short circuit
95°C or more	GND short

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

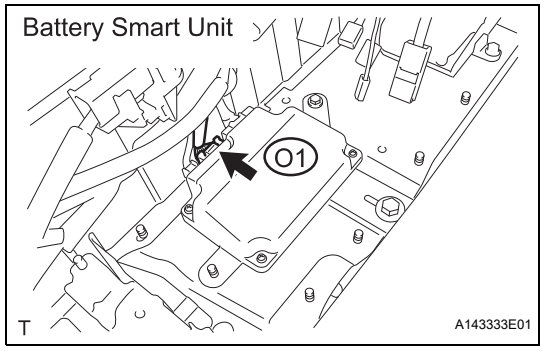
1	CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INTAKE AIR TEMPERATURE SENSOR)

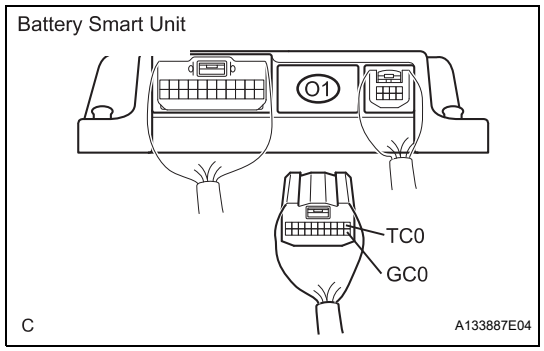


CAUTION:
Be sure to wear insulated gloves.
(a) Remove the service plug grip. (See page HB-86)
(b) Remove the HV relay assembly. (See page HB-105)
(c) Check the connection of connector O1 of the battery smart unit.
OK:
The connector is connected securely and there are no contact problems.
HINT:
The intake air temperature sensor is not available separately. If it requires replacement, replace the HV battery.

NG → **CONNECT SECURELY**

OK

3	CHECK HV BATTERY (INTAKE AIR TEMPERATURE SENSOR)



CAUTION:
Be sure to wear insulated gloves.
(a) Remove the battery smart unit (See page HB-100).
(b) Disconnect connector O1 from the battery smart unit.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

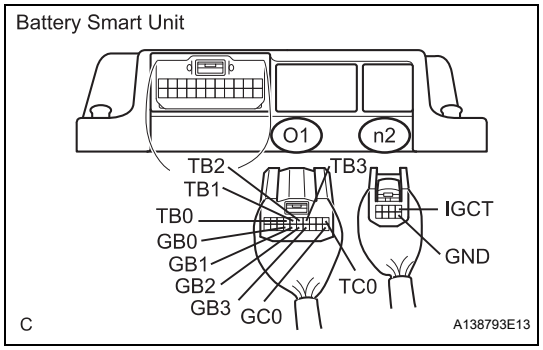
Tester Connection	Specified Condition
TC0 (O1-1) - GC0 (O1-11)	26.7 to 27.9 kΩ at 0°C (32°F)
TC0 (O1-1) - GC0 (O1-11)	9.9 to 10.1 kΩ at 25°C (77°F)
TC0 (O1-1) - GC0 (O1-11)	5.7 to 6.0 kΩ at 40°C (104°F)

NG → **REPLACE HV BATTERY (See page HB-81)**

HB

OK

4	CHECK HV BATTERY (BATTERY TEMPERATURE SENSOR AND INLET AIR TEMPERATURE SENSOR)



CAUTION:
Be sure to wear insulated gloves.

(a) Disconnect connector O1 from the battery smart unit.
(b) Disconnect connector n2 from the battery smart unit.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
TB0 (O1-7) - IGCT (n2-1)	10 kΩ or higher
GB0 (O1-17) - IGCT (n2-1)	10 kΩ or higher
TB1 (O1-6) - IGCT (n2-1)	10 kΩ or higher
GB1 (O1-16) - IGCT (n2-1)	10 kΩ or higher
TB2 (O1-5) - IGCT (n2-1)	10 kΩ or higher
GB2 (O1-15) - IGCT (n2-1)	10 kΩ or higher
TB3 (O1-4) - IGCT (n2-1)	10 kΩ or higher
GB3 (O1-14) - IGCT (n2-1)	10 kΩ or higher
TC0 (O1-1) - IGCT (n2-1)	10 kΩ or higher
GC0 (O1-11) - IGCT (n2-1)	10 kΩ or higher
TB0 (O1-7) - GND(n2 - 5)	10 kΩ or higher
TB1 (O1-6) - GND(n2 - 5)	10 kΩ or higher
TB2 (O1-5) - GND(n2 - 5)	10 kΩ or higher
TB3 (O1-4) - GND(n2 - 5)	10 kΩ or higher
TC0 (O1-1) - GND(n2 - 5)	10 kΩ or higher

NG → REPLACE HV BATTERY (See page HB-81)

OK

REPLACE BATTERY SMART UNIT (See page HB-99)

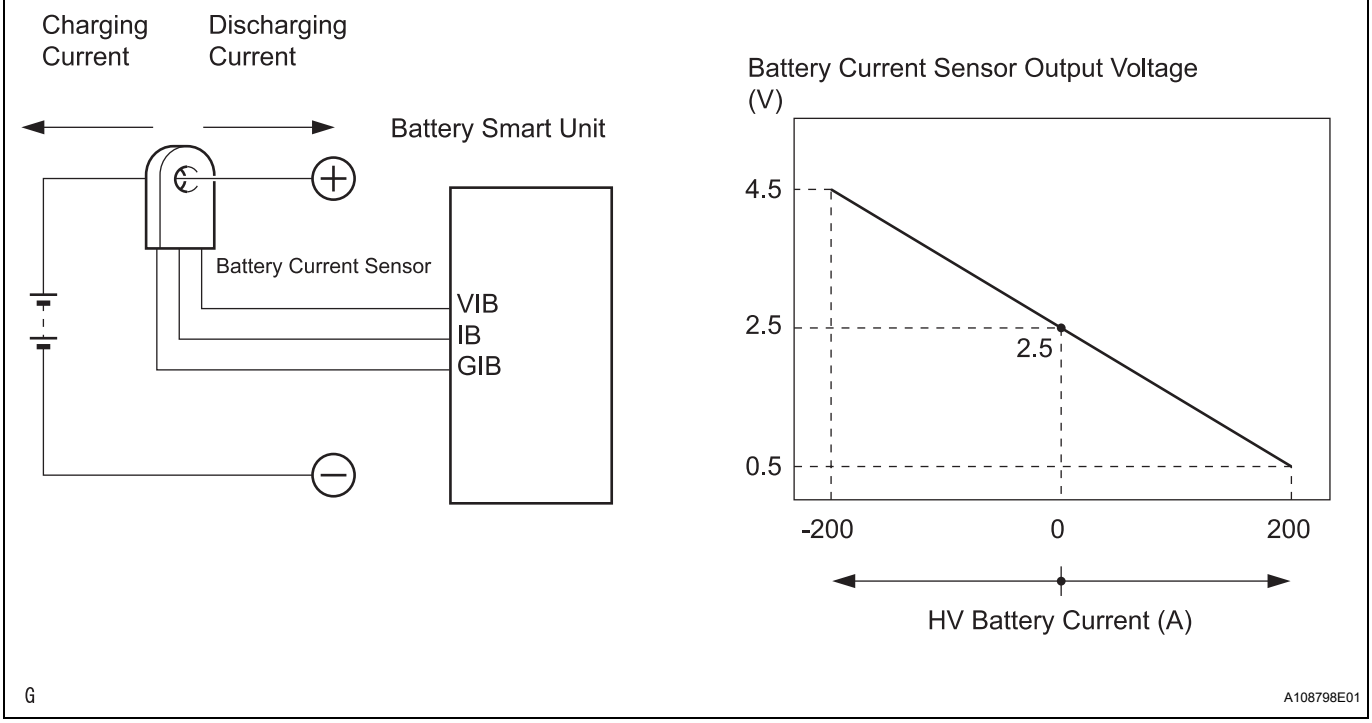
DTC	P0ABF-123	Hybrid Battery Pack Current Sensor Circuit

DTC	P0AC1-123	Hybrid Battery Pack Current Sensor Circuit Low

DTC	P0AC2-123	Hybrid Battery Pack Current Sensor Circuit High

DESCRIPTION

The battery current sensor, which is mounted on the positive cable side of the HV battery, detects the amperage that flows to and from the HV battery. The battery smart unit receives a voltage of between 0 and 5 V that is in proportion to the amperage flowing in the cable. This voltage goes into the IB terminal from the battery current sensor. A battery current sensor output voltage below 2.5 V indicates that the HV battery is being charged, and a voltage above 2.5 V indicates that the HV battery is being discharged. The hybrid vehicle control ECU determines the amount of either charge or discharge amperage that is being received by the HV battery based on the signals that are input to terminal IB of the battery smart unit from the battery smart unit. The hybrid vehicle control ECU also calculates the SOC (state of charge) of the HV battery based on the accumulated amperage.



DTC No.	DTC Detection Condition	Trouble Area
P0ABF-123	When the battery current sensor output is too low or high due to VIB/GIB failure	• HV relay assembly (battery current sensor) • Battery smart unit • Wire harness or connector
P0AC1-123 P0AC2-123	When the battery current sensor output is too low or high due to IB failure	

MONITOR DESCRIPTION

If the battery smart unit detects a malfunction in the battery current sensor, the HV control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0ABF (INF 123): Range check P0AC1 (INF 123): Range check P0AC2 (INF 123): Range check
Required sensors / components	Battery current sensor
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	TMC's intellectual property
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

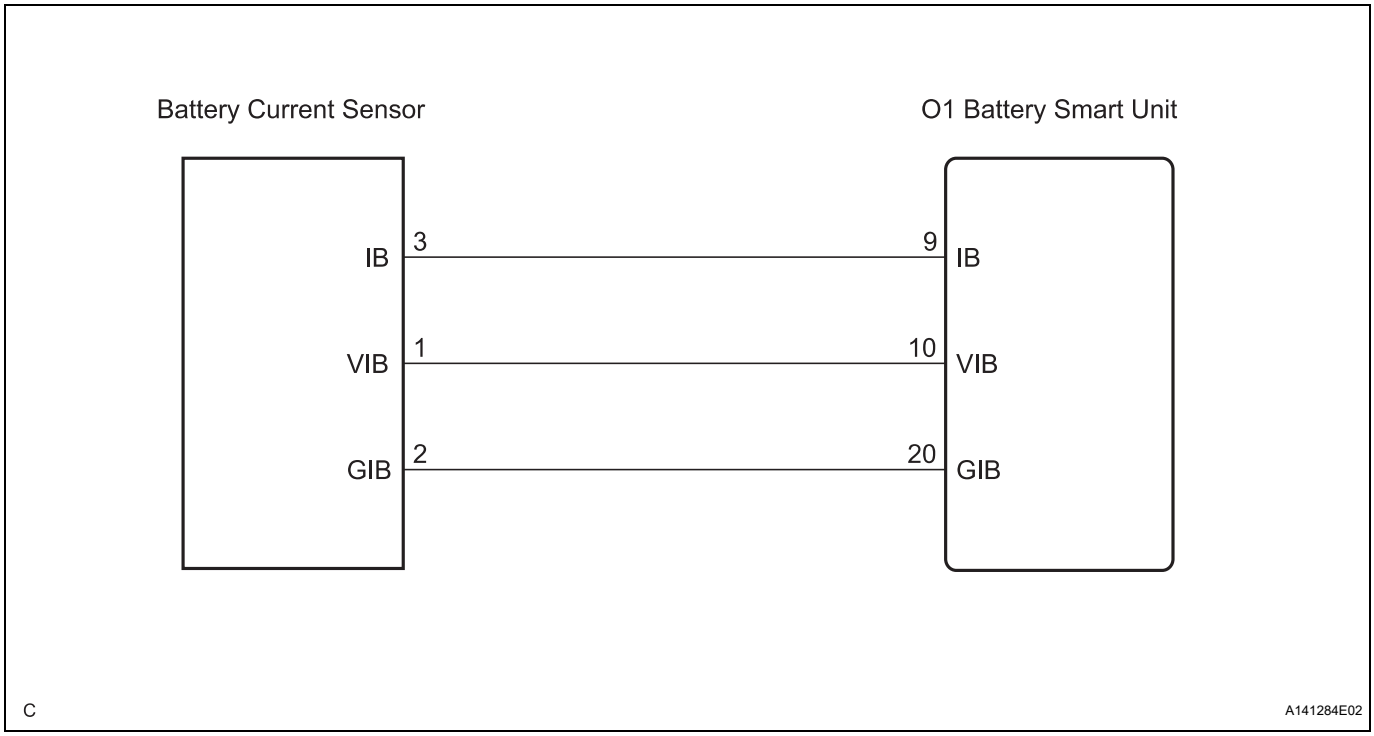
TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	DTC P0ABF (INF 123) / P0AC1 (INF 123) / P0AC2 (INF 123) is not detected

WIRING DIAGRAM



HB

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result:

DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

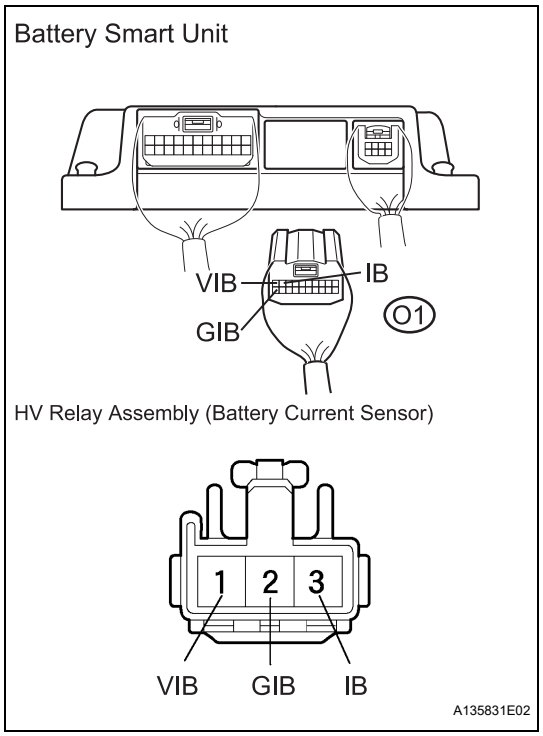
2	CHECK HARNESS AND CONNECTOR (BATTERY ECU - BATTERY CURRENT SENSOR)

HB

CAUTION:

Be sure to wear insulated gloves.

(a) Remove the service plug grip (See page HB-86).
(b) Remove the HV relay assembly (See page HB-105).
(c) Disconnect connector O1 from the battery smart unit.



(d) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
IB (O1-9) - IB (3)	Below 1 Ω
GIB (O1-20) - GIB (2)	Below 1 Ω
VIB (O1-10) - VIB (1)	Below 1 Ω

Standard resistance (Check for short)

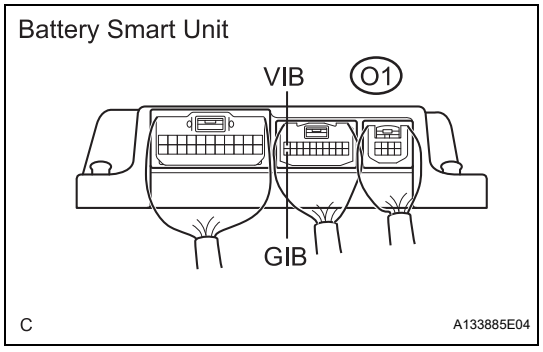
Tester Connection	Specified Condition
IB (O1-9) or IB (3) - Body ground	10 kΩ or higher
GIB (O1-20) or GIB (2) - Body ground	10 kΩ or higher
VIB (O1-10) or VIB (1) - Body ground	10 kΩ or higher

HINT:
The wire harness is not available separately. If it cannot be repaired, replace the HV battery.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 CHECK BATTERY SMART UNIT (VIB VOLTAGE)



CAUTION:
Be sure to wear insulated gloves.

(a) Connect connector O1 to the battery smart unit.
(b) Install the battery carrier. (See page HB-110)
(c) Connect the auxiliary battery positive terminal cable of the frame wire. (See page HB-92)
(d) Turn the power switch on (IG).
(e) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
VIB (O1-10) - GIB (O1-20)	4.6 to 5.4 V

HINT:
If the power switch is turned on (IG) with the service plug grip removed, DTC P0A0D-350 for the interlock switch system will be set.

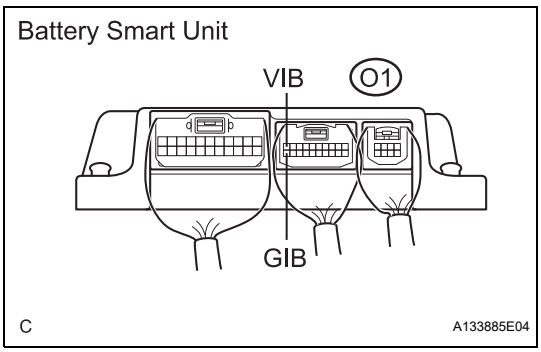
NG → **REPLACE BATTERY SMART UNIT (See page HB-99)**

OK

4 CHECK BATTERY SMART UNIT (IB VOLTAGE)

CAUTION:
Be sure to wear insulated gloves.

HB



(a) Connect the HV relay assembly (battery current sensor) connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
IB (O1-9) - GIB (O1-20)	2.46 to 2.54 V

HINT:
If the power switch is turned on (IG) with the service plug grip removed, DTC P0A0D-350 for the interlock switch system will be set.

NG → **REPLACE HV RELAY ASSEMBLY (See page HB-104)**

OK

REPLACE BATTERY SMART UNIT (See page HB-99)

DTC	P0AC0-123	Hybrid Battery Pack Current Sensor Circuit Range / Performance

DESCRIPTION

Refer to the circuit description for DTC P0ABF-123 (See page HB-62).

DTC No.	DTC Detection Condition	Trouble Area
P0AC0-123	The battery current sensor is output characteristic is abnormal (offset / constant output) (1 trip detection/2 trip detection)	• HV relay assembly (battery current sensor) • Battery smart unit

MONITOR DESCRIPTION

If the battery smart unit detects malfunction in the battery current sensor, the HV control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0AC0 (INF 123): Range check
Required sensors / components	Battery current sensor
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	TMC's intellectual property
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	P0AC0 (INF 123) is not detected

WIRING DIAGRAM

Refer to the wiring diagram for DTC P0ABF-123. (See page HB-63)

INSPECTION PROCEDURE

1	CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

2	**REPLACE HV RELAY ASSEMBLY**

See page HB-104.

NEXT

3	**CLEAR DTC**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CLEAR CODES.
(d) Clear DTCs.
(e) Perform a road test.
HINT:
Turn the power switch off and perform a road test again after the first road test for 2 trip detection.

NEXT

4	**RECONFIRM DTC OUTPUT**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0AC0-123 is output.

YES → **REPLACE BATTERY SMART UNIT (See page HB-99)**

NO

COMPLETED

DTC	P0AFA-123	Hybrid Battery System Voltage Low

DESCRIPTION

Refer to the circuit description for DTC P0A80-123 (See page HB-28).

DTC No.	DTC Detection Condition	Trouble Area
P0AFA-123	Any of the battery block voltages become less than 2.0 V (open). (1 trip detection)	• Battery smart unit • HV battery

MONITOR DESCRIPTION

The battery smart unit monitors a voltage of the battery blocks to detect an open malfunction in internal battery voltage sensor circuits of the battery smart unit and the wire harness between each battery block and battery smart unit. If a voltage at one of the battery blocks is below a standard level or of all the battery blocks is within a specified range, the battery smart unit judges that there is an open in the internal sensor circuit(s) or wire harness. The HV control ECU then illuminates the MIL and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0AFA (INF 123): Range check
Required sensors / components	The wire harness from each battery block to the battery smart unit
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	TMC's intellectual property
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	DTC P0AFA (INF 123) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)

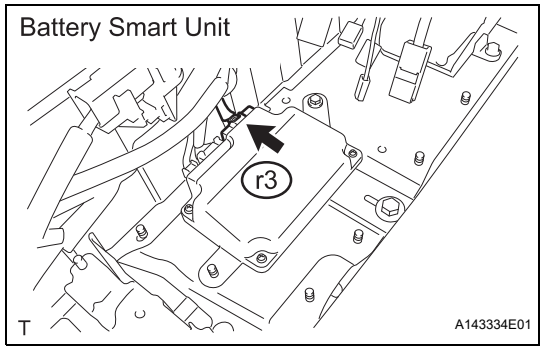
(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

2	CHECK CONNECTOR CONNECTION CONDITION

CAUTION:
Be sure to wear insulated gloves.
(a) Remove the service plug grip (See page HB-86).
(b) Remove the HV relay assembly (See page HB-105).
(c) Check the connection of connector r3 of the battery smart unit.
OK:
The connector is connected securely and there are no contact problems.



NG → **CONNECT SECURELY**

OK

3	REPLACE BATTERY SMART UNIT

See page HB-99.

NEXT

4	CLEAR DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CLEAR CODES.
(d) Clear DTCs.

NEXT

5	RECONFIRM DTC OUTPUT

(a) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(b) Check if DTCs are output.
Result:
DTC P0AFA-123 is output.

YES → **REPLACE HV BATTERY (See page HB-81)**

NO

COMPLETED

DTC	P3011-123	Battery Block 1 Becomes Weak
DTC	P3012-123	Battery Block 2 Becomes Weak
DTC	P3013-123	Battery Block 3 Becomes Weak
DTC	P3014-123	Battery Block 4 Becomes Weak
DTC	P3015-123	Battery Block 5 Becomes Weak
DTC	P3016-123	Battery Block 6 Becomes Weak
DTC	P3017-123	Battery Block 7 Becomes Weak
DTC	P3018-123	Battery Block 8 Becomes Weak
DTC	P3019-123	Battery Block 9 Becomes Weak
DTC	P3020-123	Battery Block 10 Becomes Weak
DTC	P3021-123	Battery Block 11 Becomes Weak
DTC	P3022-123	Battery Block 12 Becomes Weak
DTC	P3023-123	Battery Block 13 Becomes Weak
DTC	P3024-123	Battery Block 14 Becomes Weak
DTC	P3025-123	Battery Block 15 Becomes Weak
DTC	P3026-123	Battery Block 16 Becomes Weak
DTC	P3027-123	Battery Block 17 Becomes Weak

DESCRIPTION

Refer to the circuit description for DTC P0A80-123 (See page HB-28).

DTC No.	DTC Detection Condition	Trouble Area
P3011-123 P3012-123 P3013-123 P3014-123 P3015-123 P3016-123 P3017-123 P3018-123 P3019-123 P3020-123 P3021-123 P3022-123 P3023-123 P3024-123 P3025-123 P3026-123 P3027-123	Presence of a malfunctioning block is determined based on each battery block voltage (1 trip detection).	• HV battery • Battery smart unit

HINT:
- DTCs from P3011-123 to P3027-123 cannot be set unless the vehicle is driven for approximately 10 minutes after clearing the DTCs.

MONITOR DESCRIPTION

If there is an abnormal internal resistance or electromotive voltage in the battery blocks, the battery smart unit determines that a malfunction has occurred. When the malfunction detection condition is satisfied, the HV control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P3011 to P3027 (INF 123): Rationality
Required sensors / components	HV battery
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	TMC's intellectual property
Sequence of operation	None

HB

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	DTC P3011 (INF 123) to P3027 (INF 123) is not detected

INSPECTION PROCEDURE

1	**CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).

(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

2	READ VALUE ON INTELLIGENT TESTER

(a) Ensure the safety of the areas in front and at the back of the vehicle.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (READY).
(d) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DATA LIST / V1 to V17 BATT BLOCK.
(e) Fully warm up the engine and turn the air conditioning off.
(f) Firmly depress the brake pedal with your left foot.
(g) Move the shift lever to the D position.
(h) Record each battery block voltage from the data list (V1 to V17 BATT BLOCK) while fully depressing the accelerator pedal.
(i) Compare the battery block voltages (V1 to V17 BATT BLOCK) between the even and odd number groups in each combination shown in the table below.

HB

Even number group	Odd number group	Battery block voltages to be compared
V1 BATT BLOCK	V2 BATT BLOCK	VB0←→VB1
V3 BATT BLOCK	V4 BATT BLOCK	VB2←→VB3
V5 BATT BLOCK	V6 BATT BLOCK	VB4←→VB5
V7 BATT BLOCK	V8 BATT BLOCK	VB6←→VB7
V9 BATT BLOCK	V10 BATT BLOCK	VB8←→VB9
V11 BATT BLOCK	V12 BATT BLOCK	VB10←→VB11
V13 BATT BLOCK	V14 BATT BLOCK	VB12←→VB13
V15 BATT BLOCK	V16 BATT BLOCK	VB14←→VB15
V17 BATT BLOCK	V16 BATT BLOCK	VB16←→VB15

(j) Check the voltage difference in the all 9 combinations.
OK:
The difference in voltage of all combinations is 0.3 V or more.

YES → **REPLACE BATTERY SMART UNIT (See page HB-99)**

NO

REPLACE HV BATTERY (See page HB-81)

DTC	P3105-123	Battery Observation Communication Circuit Malfunction

DESCRIPTION

The battery smart unit detects the HV battery conditions (voltage, current, and temperature) and the battery cooling fan voltages, and sends the detected information to the hybrid vehicle control ECU via serial communication.

DTC No.	DTC Detection Condition	Trouble Area
P3105-123	Problem with serial communication between the battery smart unit and hybrid vehicle control ECU (1 trip)	• Wire harness or connector • Hybrid vehicle control ECU • Battery smart unit

MONITOR DESCRIPTION

If the battery smart unit detects malfunction in serial communication with hybrid vehicle control ECU, it illuminates the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P3105 (INF 123): Lost Communication With BSU/HCM
Required sensors / components	Battery smart unit
Frequency of operation	Continuity
Duration	TMC's intellectual property
MIL operation	TMC's intellectual property
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

HB

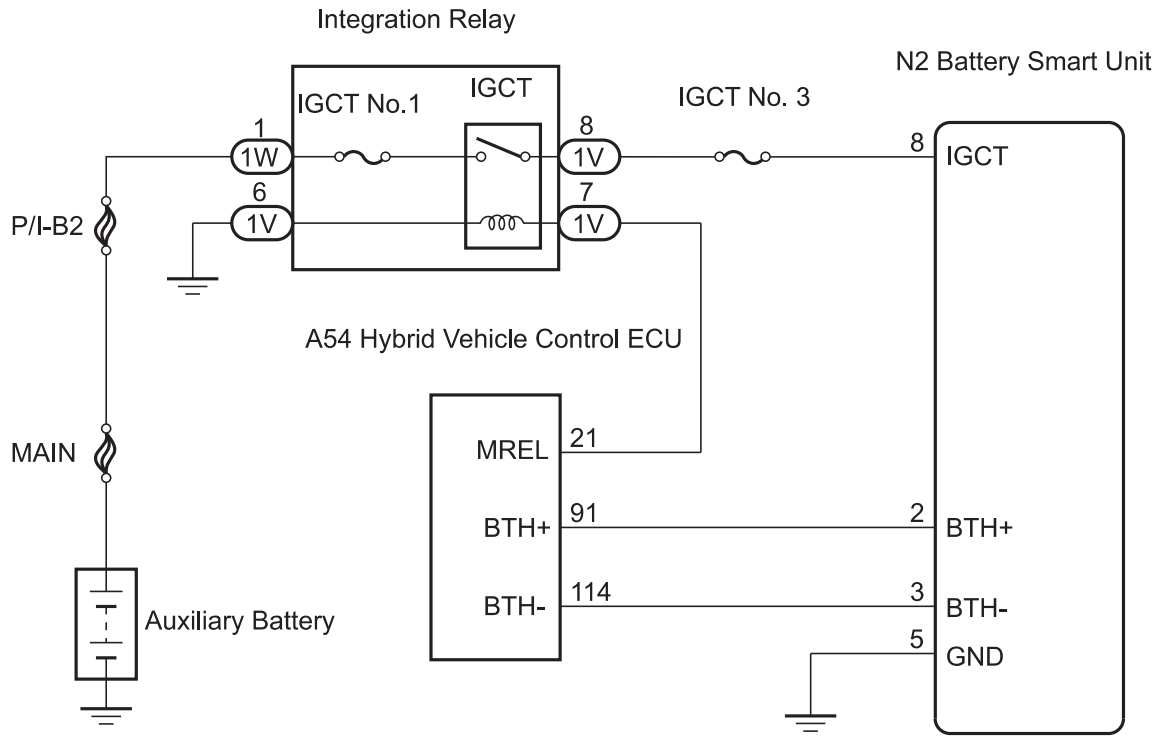
TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	DTC P3105 (INF 123) is not detected

WIRING DIAGRAM



HB

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

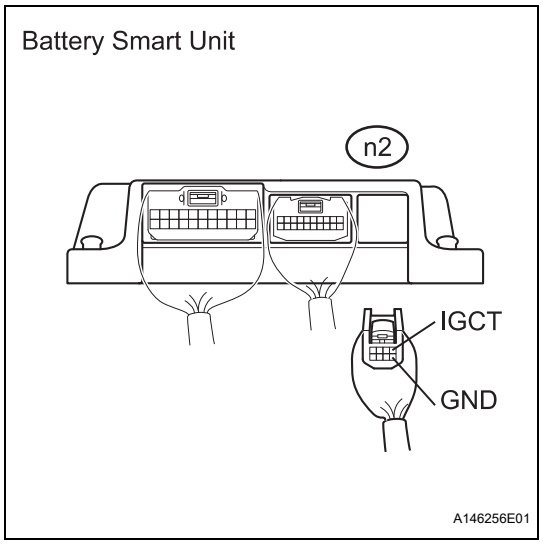
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK HARNESS AND CONNECTOR (VOLTAGE)

CAUTION:

Be sure to wear insulated gloves.

(a) Remove the service plug grip (See page HB-86).
(b) Remove the battery smart unit (See page HB-100).
(c) Disconnect connector n2 from the battery smart unit.
(d) Turn the power switch on (IG).



(e) Measure the voltage according to the value(s) in the table below.

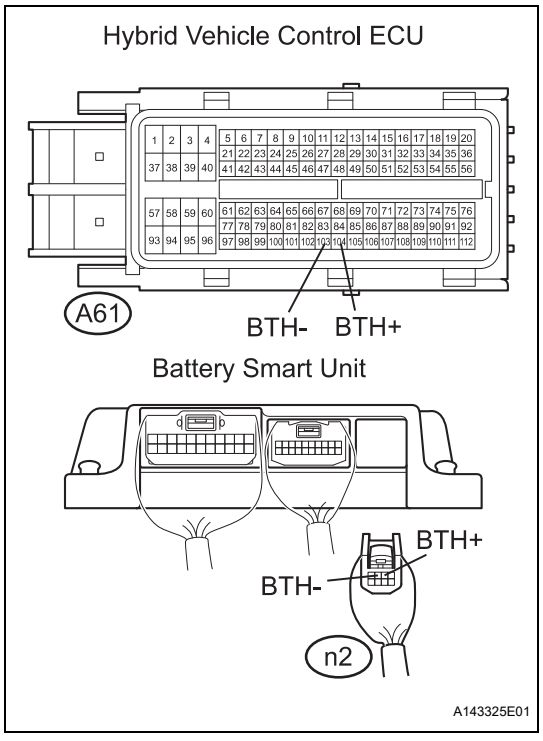
Standard voltage

Tester Connection	Specified Condition
IGCT (n2-1) - GND (n2-5)	11 to 14 V

NG → **Go to step 4**

OK

2 CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - BATTERY SMART UNIT)



CAUTION:
Be sure to wear insulated gloves.

(a) Disconnect connector A61 from the hybrid vehicle control ECU.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
BTH+ (A61-104) - BTH+ (n2-2)	Below 1 Ω
BTH- (A61-103) - BTH- (n2-3)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
BTH+ (A61-104) or BTH+ (n2-2) - Body ground	10 kΩ or higher
BTH- (A61-103) or BTH- (n2-3) - Body ground	10 kΩ or higher

(c) Turn the power switch on (IG).

(d) Measure the resistance according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
BTH+ (A61-104) - Body ground	Below 1 V
BTH- (A61-103) - Body ground	Below 1 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

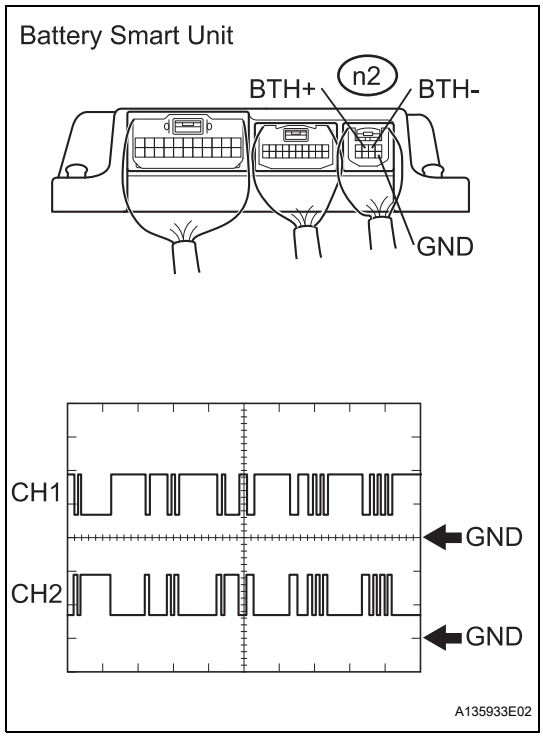
HB

3	CHECK WAVEFORM

CAUTION:
Be sure to wear insulated gloves.

(a) Connect connector A61 from the hybrid vehicle control ECU.
(b) Connect connector n2 to the battery smart unit.
(c) Connect an oscilloscope between the battery smart unit terminals specified in the table below, and measure the waveform.

Item	Contents
Terminal	CH1: BTH+ (n2-2) - GND (n2-5) CH2: BTH- (n2-3) - GND (n2-5)
Equipment Setting	2 V/DIV., 500μs/DIV.
Condition	Power switch on (IG)



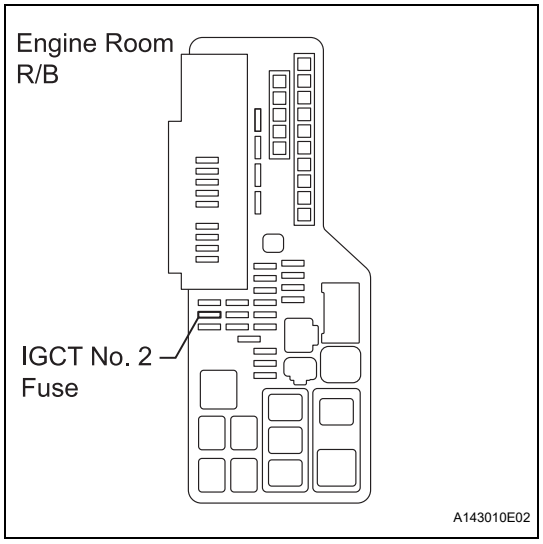
NG → **REPLACE BATTERY SMART UNIT (See page HB-99)**

OK →

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

HB

4	CHECK FUSE



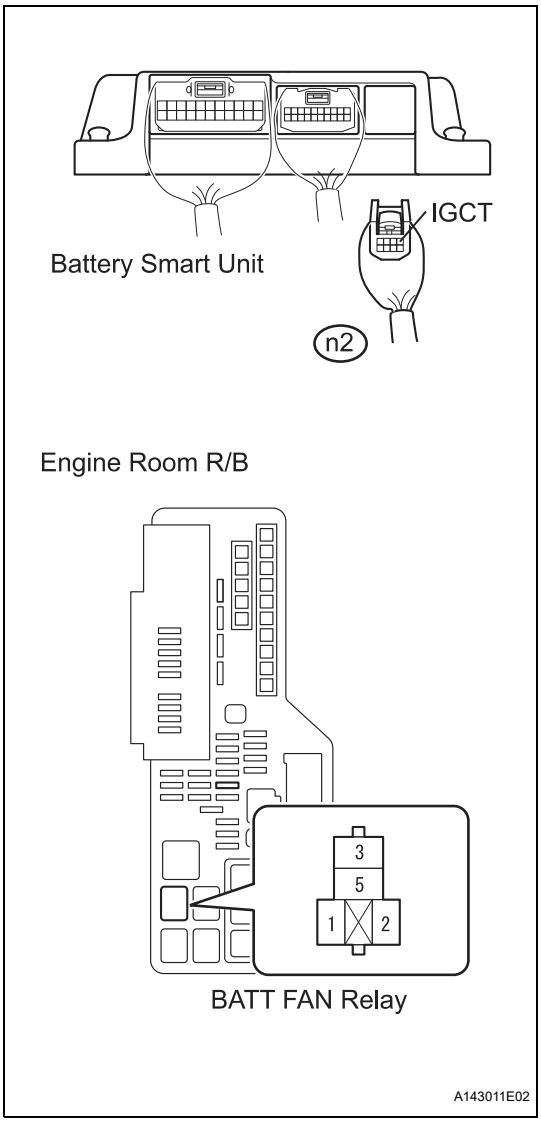
(a) Remove the IGCT No. 2 fuse from the engine room R/B.
(b) Measure the resistance of the IGCT No. 2 fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

5	CHECK HARNESS AND CONNECTOR

CAUTION:
Be sure to wear insulated gloves.
(a) Install the IGCT No. 2 fuse to the engine room R/B No. 1.
(b) Remove the integration relay from the engine room R/B.
(c) Disconnect connector n2 from the battery smart unit.



(d) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
IGCT (n2-1) - 3	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

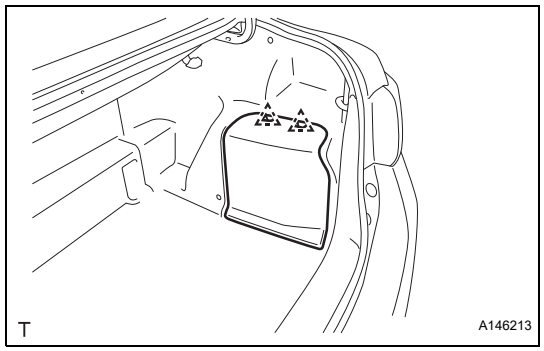
CHECK AND REPAIR POWER SOURCE CIRCUIT

HB

REMOVAL

1. **PRECAUTION**
   See page IN-5

2. **CHECK FOR DTCS**
   (a) Check for DTCs (See page HV-36).
   NOTICE:
   Confirm that P0AA6 (High voltage insulation is unusual) is not output before doing removal or installation work inside the battery. If the DTC is output, perform troubleshooting procedures first.

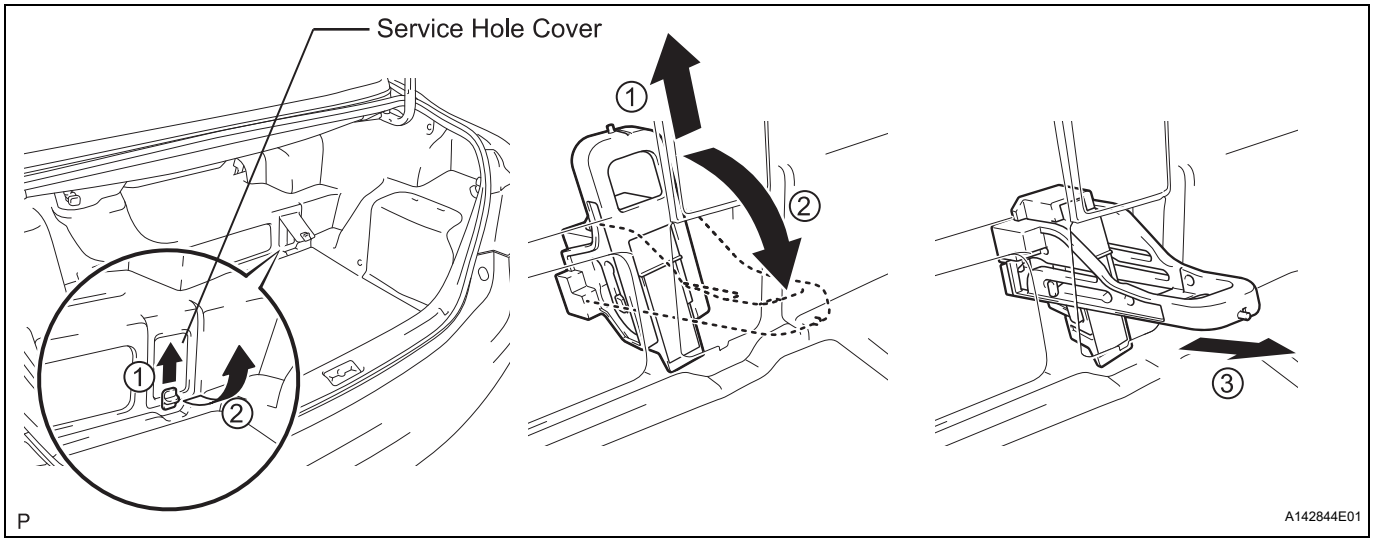


3. **REMOVE LUGGAGE TRIM SERVICE HOLE COVER**
   (a) Release the 2 claws and remove the luggage trim service hole cover.

4. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (See page HV-560)**

5. **REMOVE SERVICE PLUG GRIP**
   CAUTION:
   - **Remove the service plug grip to interrupt a high voltage circuit at the time of the check.**
   - **Keep the removed service plug grip in your pocket to prevent other technicians from accidentally reconnecting it while you are servicing the vehicle.**
   - **All the high voltage wiring connectors are orange colored.**
   - **Be sure to turn the power switch off before removing the service plug grip.**

   (a) Slide the latch upward and open the service hole cover.



(b) Wear insulated gloves. Remove the service plug grip after sliding the lever of the service plug grip.

CAUTION:

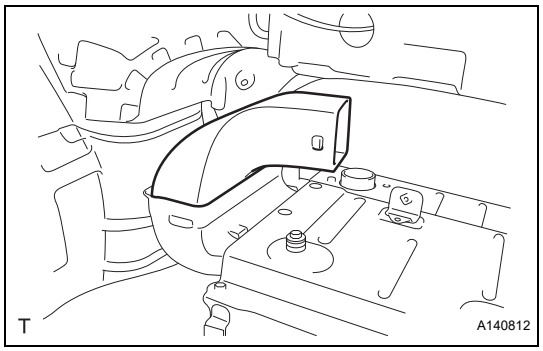
- **Keep the removed service plug grip in your pocket to prevent other technicians from accidentally reconnecting it while you are servicing the vehicle.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

NOTICE:

After removing the service plug grip, do not operate the power switch as it may damage the hybrid vehicle control ECU.

6. **REMOVE NO. 2 ENGINE ROOM SIDE LH COVER (See page HV-560)**
7. **REMOVE CONNECTOR COVER ASSEMBLY (See page HV-560)**
8. **CHECK TERMINAL VOLTAGE (See page HV-561)**
9. **INSTALL CONNECTOR COVER ASSEMBLY (See page HV-566)**
10. **INSTALL NO. 2 ENGINE ROOM SIDE LH COVER (See page HV-568)**
11. **REMOVE LUGGAGE COMPARTMENT FLOOR MAT**
12. **REMOVE SPARE WHEEL COVER CLAMP**
13. **REMOVE SPARE WHEEL COVER ASSEMBLY**
14. **REMOVE NO. 1 LUGGAGE COMPARTMENT TRIM HOOK (See page ED-97)**
15. **REMOVE REAR FLOOR FINISH PLATE (See page ED-97)**
16. **REMOVE LUGGAGE COMPARTMENT REAR TRIM COVER (See page ED-97)**
17. **REMOVE LUGGAGE COMPARTMENT INNER TRIM COVER LH (See page ED-97)**
18. **REMOVE REAR SEAT HEADREST ASSEMBLY**
19. **REMOVE REAR CENTER SEAT HEADREST ASSEMBLY**
20. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-44)**
21. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-44)**
22. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-44)**
23. **REMOVE REAR SIDE SEATBACK ASSEMBLY LH (See page SE-45)**

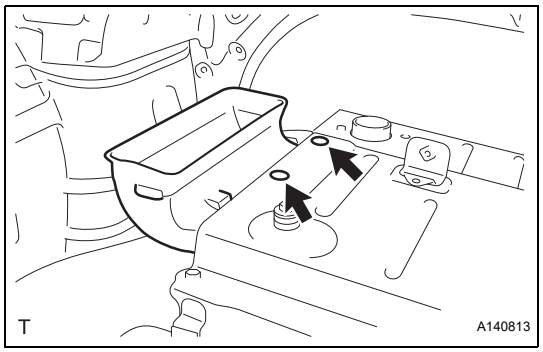
24. REMOVE REAR SIDE SEATBACK ASSEMBLY RH (See page SE-45)
25. REMOVE REAR DOOR SCUFF PLATE LH (See page IR-13)
26. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP LH
27. REMOVE REAR DOOR SCUFF PLATE RH (See page IR-13)
28. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH
29. DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (See page SB-33)
30. REMOVE ROOF SIDE INNER GARNISH LH (See page IR-15)
31. REMOVE ROOF SIDE INNER GARNISH RH (See page IR-15)
32. REMOVE REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-40)
33. REMOVE REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-41)
34. REMOVE REAR SEAT SHOULDER BELT COVER (See page SB-33)
35. REMOVE REAR SEAT SHOULDER BELT HOLE COVER (See page SB-33)
36. REMOVE PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-33)
37. REMOVE FRONT LUGGAGE COMPARTMENT TRIM COVER (See page HB-106)
38. REMOVE ROOM PARTITION BOARD LH (See page HB-119)
39. REMOVE ROOM PARTITION BOARD RH (See page HB-119)
40. REMOVE NO. 1 HV BATTERY INTAKE DUCT (See page HB-119)
41. REMOVE NO. 2 HV BATTERY INTAKE DUCT (See page HB-119)
42. REMOVE BATTERY COOLING BLOWER ASSEMBLY (See page HB-120)
43. REMOVE NO. 5 HV BATTERY INTAKE DUCT (See page HB-106)



44. REMOVE NO. 3 HV BATTERY INTAKE DUCT

(a) Remove the No. 3 HV battery intake duct.

CAUTION:
Wear insulated gloves.



45. REMOVE NO. 4 HV BATTERY INTAKE DUCT

(a) Remove the 2 clips and No. 4 HV battery intake duct.

CAUTION:
Wear insulated gloves.

46. REMOVE NO. 2 HV BATTERY EXHAUST DUCT (See page HB-127)

47. REMOVE WIRE HARNESS CLAMP BRACKET (See page HB-107)

48. REMOVE UPPER BATTERY CARRIER SUB-ASSEMBLY (See page HB-107)

49. DISCONNECT FRAME WIRE (See page HB-107)

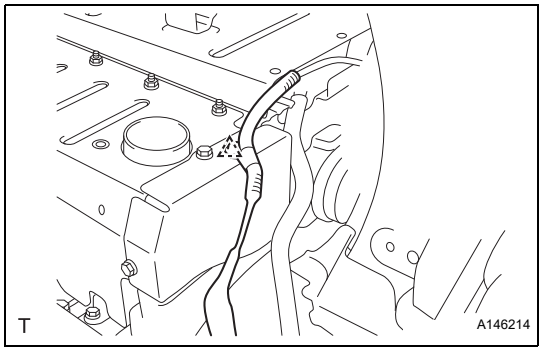
50. INSTALL SPARE WHEEL COVER ASSEMBLY

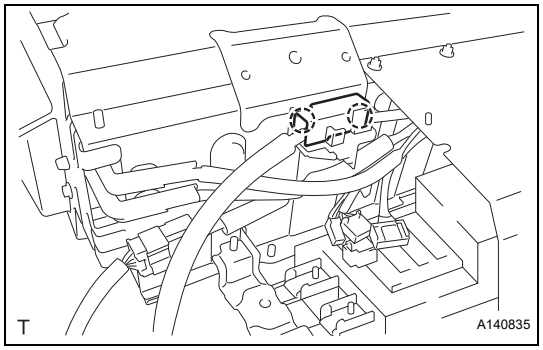
51. INSTALL SPARE WHEEL COVER CLAMP

52. INSTALL LUGGAGE COMPARTMENT FLOOR MAT

53. REMOVE HV BATTERY

(a) Disconnect the wire harness clamp from the No. 1 battery cover.

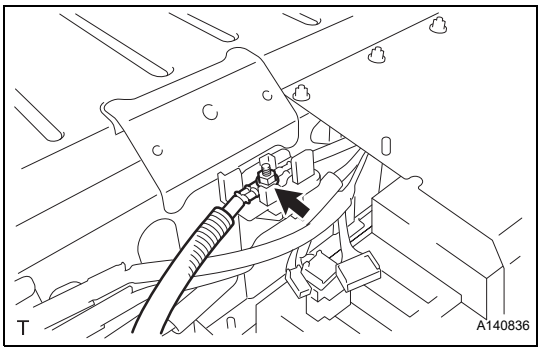




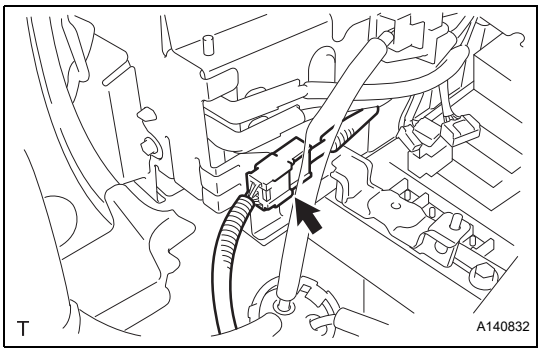
(b) Release the 2 claws and remove the terminal block cover.

CAUTION:
Wear insulated gloves.

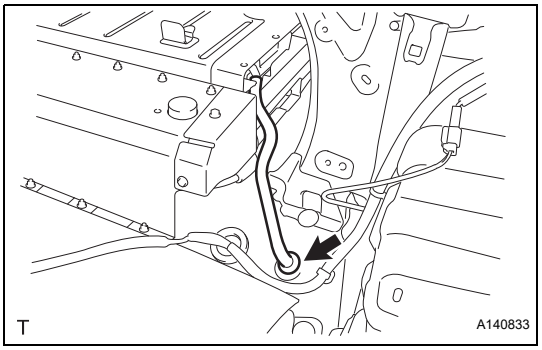
HB



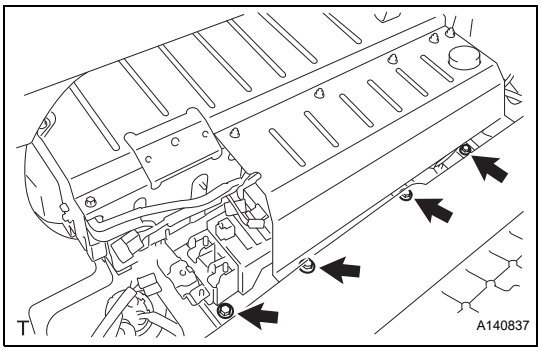
(c) Remove the nut and disconnect the frame wire (AMD cable).
CAUTION:
Wear insulated gloves.



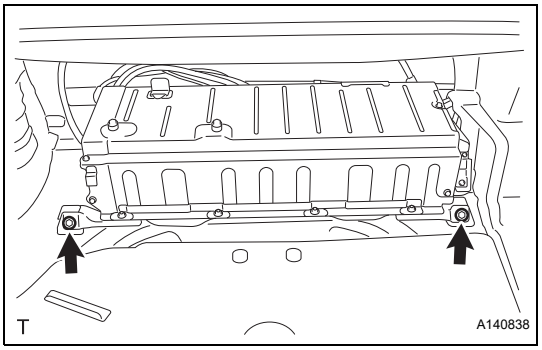
(d) Disconnect the battery pack wire connector.
CAUTION:
Wear insulated gloves.



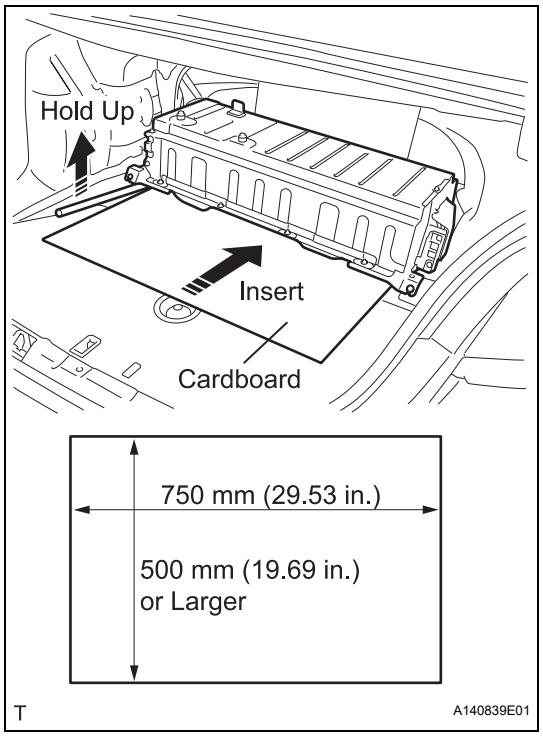
(e) Remove the grommet and battery room ventilation hose.
CAUTION:
Wear insulated gloves.



(f) Remove the 4 bolts from the HV battery.
CAUTION:
Wear insulated gloves.

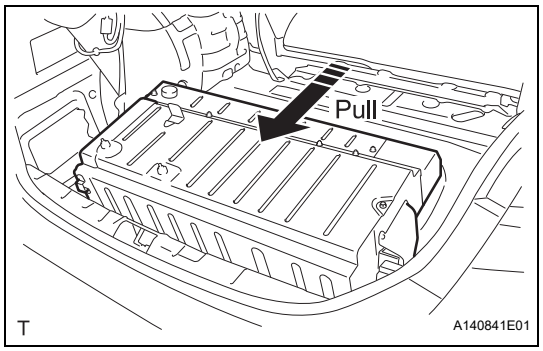


(g) Remove the 2 bolts from the HV battery.

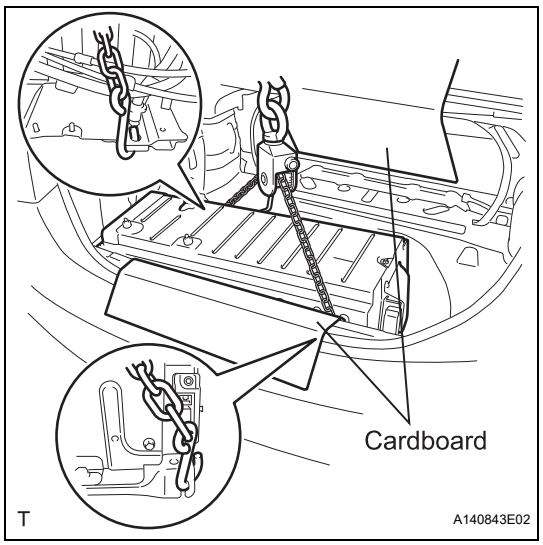


(h) Prepare a piece of cardboard of 750 mm (29.53 in.) X 500 mm (19.69 in.) or larger.

(i) Using an tire lever to hold up the HV battery, insert the cardboard until it cannot be inserted any farther.
CAUTION:
Wear insulated gloves.
NOTICE:
Bind the frame wire with electrical tape to prevent it from getting caught when moving the battery or other parts.



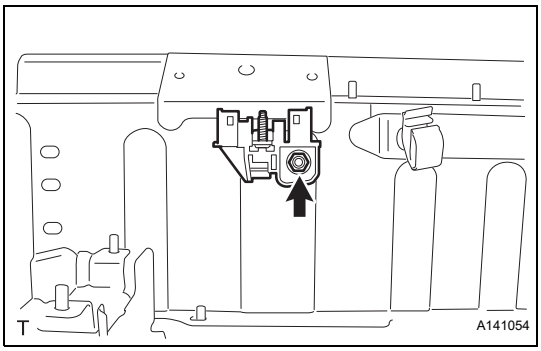
(j) Pull the HV battery together with the cardboard toward the rear of the vehicle.
CAUTION:
Wear insulated gloves.



(k) Using an engine sling device, remove the HV battery while tilting the HV battery 45° at the rear end.
CAUTION:
Wear insulated gloves.
NOTICE:
Use cardboard or other similar material to protect the HV battery and vehicle body from damage.

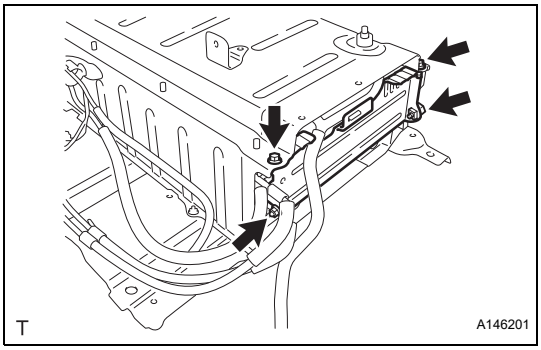
54. **REMOVE NO. 1 BATTERY COVER LID (See page HB-108)**
55. **REMOVE NO. 5 BATTERY CARRIER PANEL (See page HB-108)**
56. **REMOVE NO. 1 HV BATTERY EXHAUST DUCT (See page HB-127)**
57. **REMOVE FILTER NOISE CAPACITOR (See page HB-108)**
58. **REMOVE HV RELAY ASSEMBLY (See page HB-108)**
59. **REMOVE BATTERY SMART UNIT (See page HB-102)**

60. REMOVE HYBRID VEHICLE CONVERTER (See page HB-127)



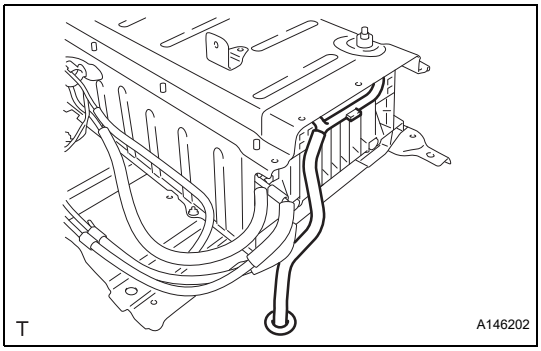
61. REMOVE INVERTER TERMINAL

(a) Remove the nut and inverter terminal from the HV battery.
CAUTION:
Wear insulated gloves.



62. REMOVE BATTERY INSULATOR RUBBER

(a) Remove the 3 bolts, nut and battery carrier bracket.
CAUTION:
Wear insulated gloves.



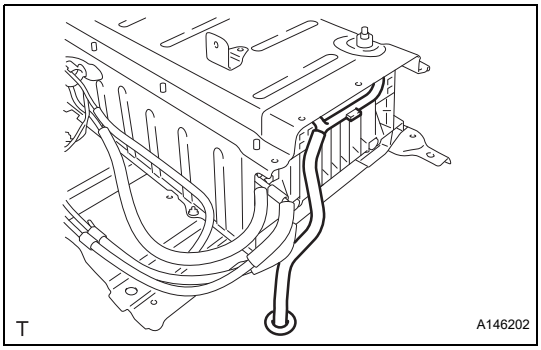
(b) Remove the battery insulator rubber.
CAUTION:
Wear insulated gloves.

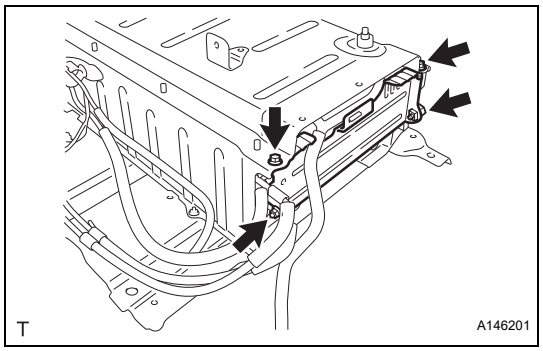
HB

INSTALLATION

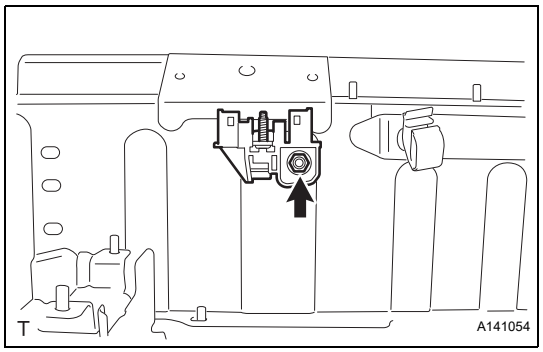
1. INSTALL BATTERY INSULATOR RUBBER

(a) Install the battery insulator rubber.
CAUTION:
Wear insulated gloves.





(b) Install the battery carrier bracket with the 3 bolts and nut.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.



2. INSTALL INVERTER TERMINAL

(a) Install the inverter terminal to the HV battery with the nut.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.

3. INSTALL HYBRID VEHICLE CONVERTER (See page HB-128)

4. INSTALL BATTERY SMART UNIT (See page HB-102)

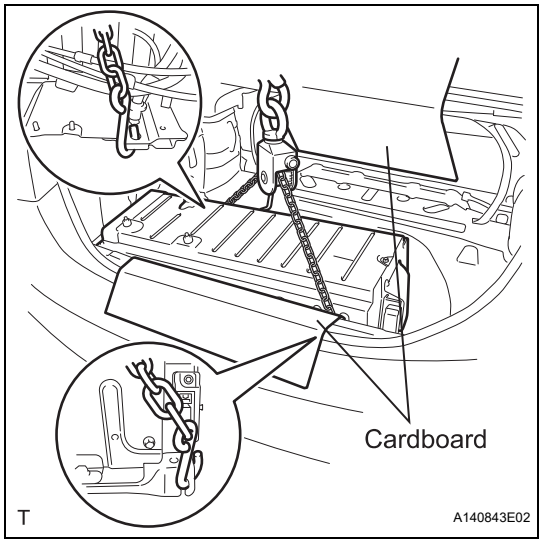
5. INSTALL HV RELAY ASSEMBLY (See page HB-110)

6. INSTALL FILTER NOISE CAPACITOR (See page HB-111)

7. INSTALL NO. 1 HV BATTERY EXHAUST DUCT (See page HB-129)

8. INSTALL NO. 5 BATTERY CARRIER PANEL (See page HB-111)

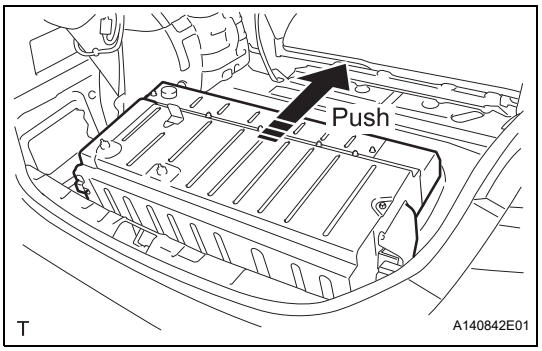
9. INSTALL NO. 1 BATTERY COVER LID (See page HB-111)



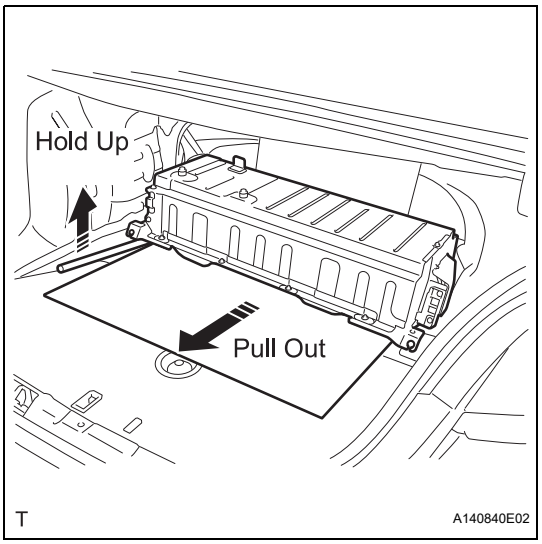
10. INSTALL HV BATTERY

(a) Place a piece of cardboard in the luggage compartment.
CAUTION:
Wear insulated gloves.

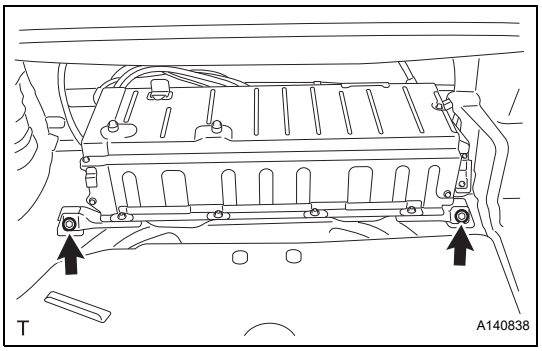
(b) Using an engine sling device, install the HV battery while tilting the HV battery 45° at the rear end.
CAUTION:
Wear insulated gloves.
NOTICE:
Use cardboard or other similar material to protect the HV battery and vehicle body from damage.



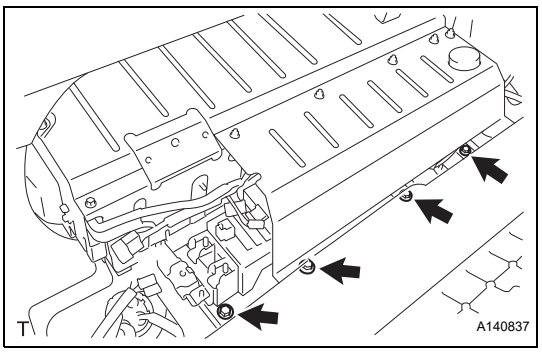
(c) Push the HV battery together with the cardboard toward the front of the vehicle.
CAUTION:
Wear insulated gloves.
NOTICE:
Align the position of the holes for HV battery holding bolts.



(d) Use a tire lever to hold up the HV battery and pull out the cardboard.
CAUTION:
Wear insulated gloves.

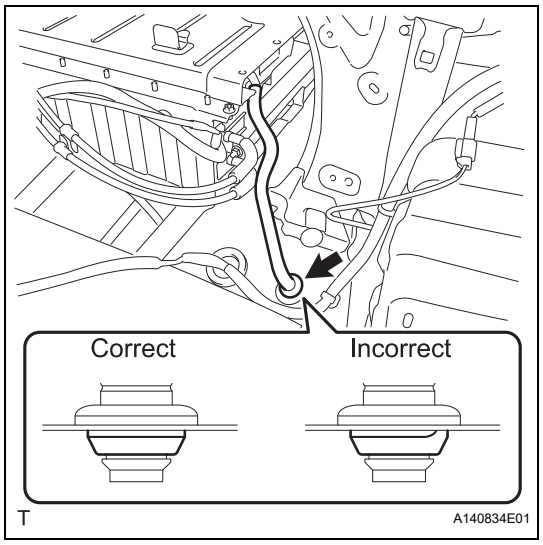


(e) Install the 2 bolts to the HV battery.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)
CAUTION:
Wear insulated gloves.

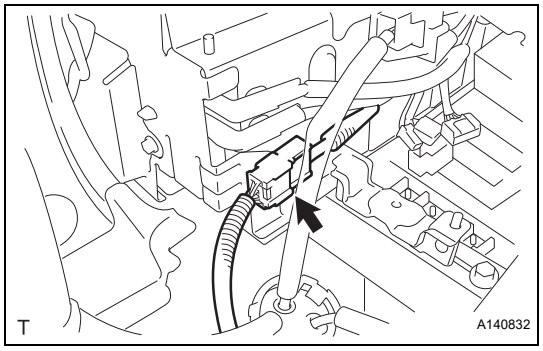


(f) Install the 4 bolts to the HV battery.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)
CAUTION:
Wear insulated gloves.

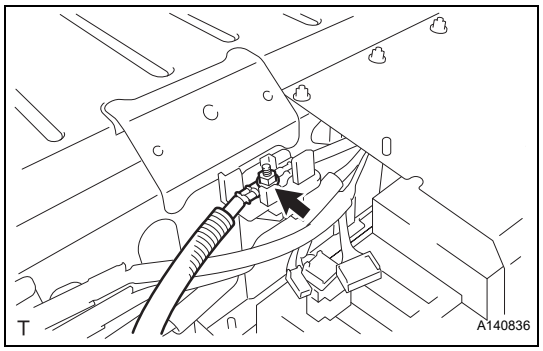
HB



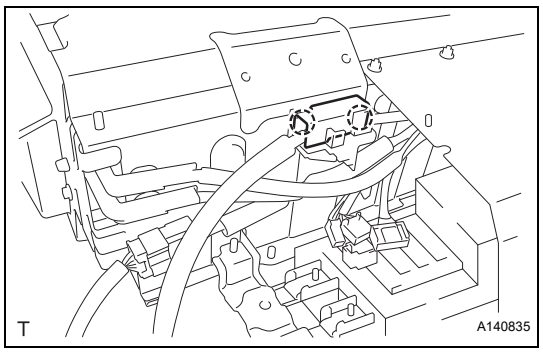
(g) Connect the battery room ventilation hose with the clamp and grommet.
CAUTION:
Wear insulated gloves.
NOTICE:
After installing the grommet, make sure that there is no clearance between the grommet and body.



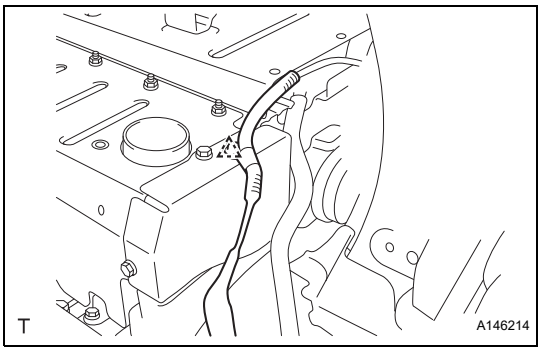
(h) Connect the battery pack wire connector.
CAUTION:
Wear insulated gloves.



(i) Connect the frame wire (AMD cable) with the nut.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
CAUTION:
Wear insulated gloves.

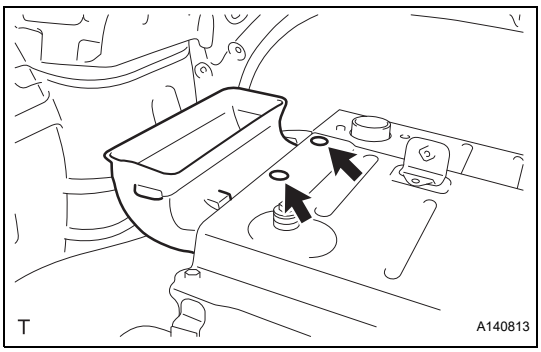


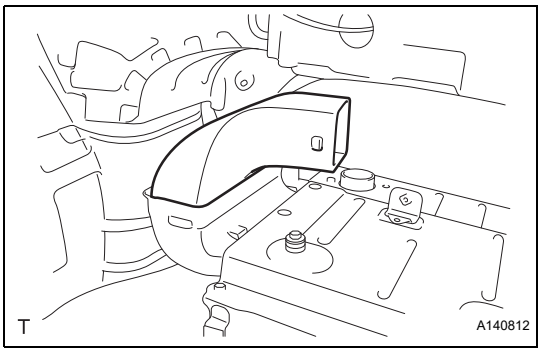
(j) Install the terminal block cover with the 2 claws.
CAUTION:
Wear insulated gloves.



(k) Connect the wire harness clamp to the No. 1 battery cover.

11. **REMOVE LUGGAGE COMPARTMENT FLOOR MAT**
12. **REMOVE SPARE WHEEL COVER CLAMP**
13. **REMOVE SPARE WHEEL COVER ASSEMBLY**
14. **CONNECT FRAME WIRE (See page HB-111)**
15. **INSTALL UPPER BATTERY CARRIER SUB-ASSEMBLY (See page HB-112)**
16. **INSTALL WIRE HARNESS CLAMP BRACKET (See page HB-112)**
17. **INSTALL NO. 2 HV BATTERY EXHAUST DUCT (See page HB-129)**
18. **INSTALL NO. 4 HV BATTERY INTAKE DUCT**
    (a) Install the No. 4 HV battery intake duct with the 2 clips.



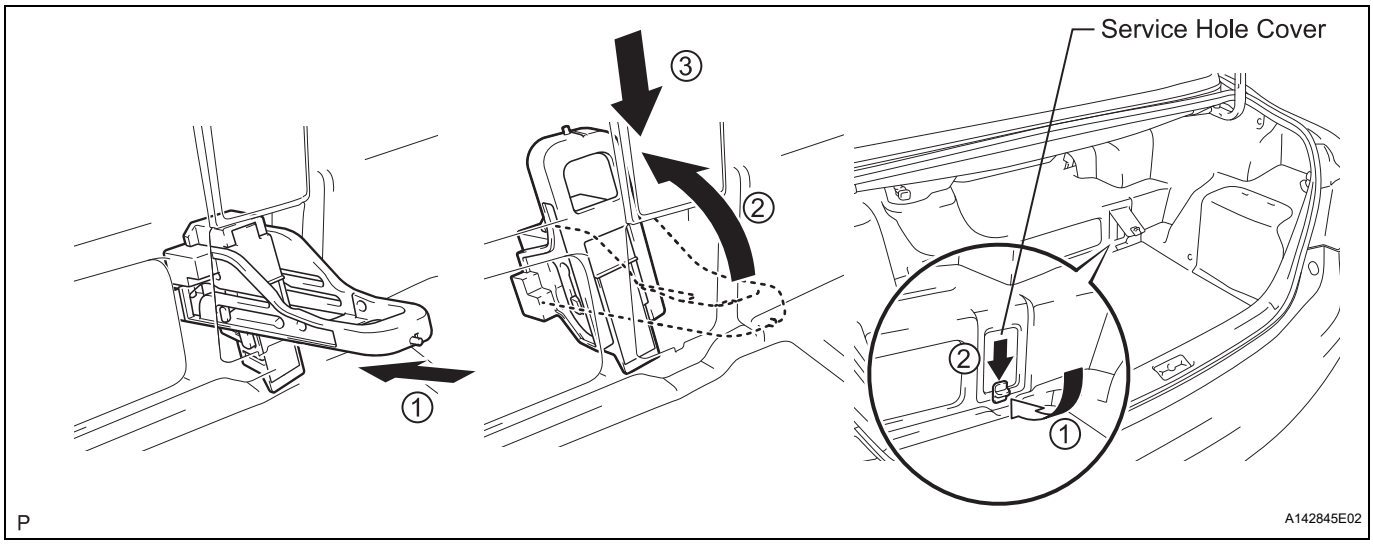


19. **INSTALL NO. 3 HV BATTERY INTAKE DUCT**
    (a) Install the No. 3 HV battery intake duct.
20. **INSTALL NO. 5 HV BATTERY INTAKE DUCT (See page HB-113)**
21. **INSTALL BATTERY COOLING BLOWER ASSEMBLY (See page HB-120)**
22. **INSTALL NO. 2 HV BATTERY INTAKE DUCT (See page HB-121)**
23. **INSTALL NO. 1 HV BATTERY INTAKE DUCT (See page HB-121)**
24. **INSTALL ROOM PARTITION BOARD RH (See page HB-121)**
25. **INSTALL ROOM PARTITION BOARD LH (See page HB-121)**
26. **INSTALL FRONT LUGGAGE COMPARTMENT TRIM COVER (See page HB-113)**
27. **INSTALL PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-34)**
28. **INSTALL REAR SEAT SHOULDER BELT HOLE COVER (See page SB-35)**
29. **INSTALL REAR SEAT SHOULDER BELT COVER (See page SB-35)**

30. INSTALL REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-42)
31. INSTALL REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-42)
32. INSTALL ROOF SIDE INNER GARNISH LH (See page IR-39)
33. INSTALL ROOF SIDE INNER GARNISH RH (See page IR-39)
34. CONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (See page SB-35)
35. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH
36. INSTALL REAR DOOR SCUFF PLATE LH (See page IR-43)
37. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP RH
38. INSTALL REAR DOOR SCUFF PLATE RH (See page IR-43)
39. INSTALL REAR SIDE SEATBACK ASSEMBLY LH (See page SE-54)
40. INSTALL REAR SIDE SEATBACK ASSEMBLY RH
41. INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-54)
42. INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-54)
43. INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-55)
44. INSTALL REAR CENTER SEAT HEADREST ASSEMBLY
45. INSTALL REAR SEAT HEADREST ASSEMBLY
46. INSTALL LUGGAGE COMPARTMENT INNER TRIM COVER LH (See page ED-102)
47. INSTALL LUGGAGE COMPARTMENT REAR TRIM COVER (See page ED-102)
48. INSTALL REAR FLOOR FINISH PLATE (See page ED-103)
49. INSTALL NO. 1 LUGGAGE COMPARTMENT TRIM HOOK (See page ED-103)
50. INSTALL SPARE WHEEL COVER ASSEMBLY
51. INSTALL SPARE WHEEL COVER CLAMP
52. INSTALL LUGGAGE COMPARTMENT FLOOR MAT
53. INSTALL SERVICE PLUG GRIP
    CAUTION:
    Wear insulated gloves.

NOTICE:
Before connecting the service plug grip, make sure that no parts or tools remain in the luggage compartment and the high-voltage terminals and connectors are securely connected.

(a) Wear insulated gloves and insert the service plug grip in the order as shown in the illustration.



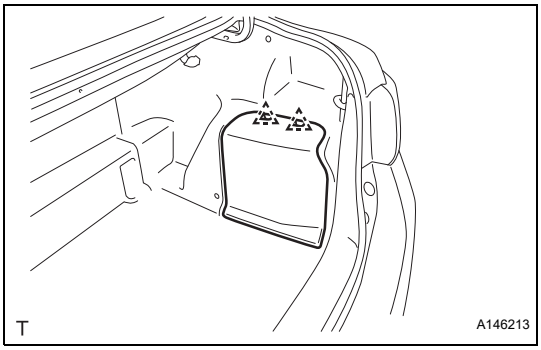
(b) Tilt the service plug grip 90° and slide it down until a click sound is heard.

(c) Install the battery service hole cover.
NOTICE:
Make sure that the battery service hole cover is installed securely.

54. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

55. INSTALL LUGGAGE TRIM SERVICE HOLE COVER

(a) Install the luggage trim service hole cover with the 2 craws.



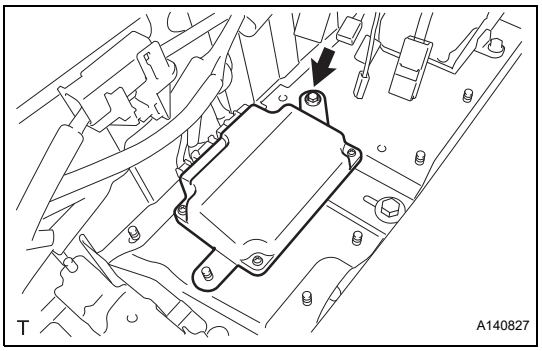
56. PERFORM INITIALIZATION

(a) Perform initialization procedure (See page IN-43).
HINT:
Some vehicle systems require initialization after reconnecting the cable to the negative battery terminal.

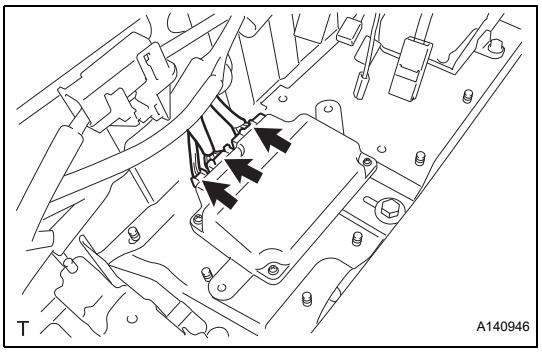
HB

REMOVAL

1. **PRECAUTION**
   See page IN-5
2. **CHECK FOR DTCS (See page HB-86)**
3. **REMOVE LUGGAGE TRIM SERVICE HOLE COVER (See page HB-86)**
4. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (See page HV-560)**
5. **REMOVE SERVICE PLUG GRIP (See page HB-86)**
6. **REMOVE NO. 2 ENGINE ROOM SIDE LH COVER (See page HV-560)**
7. **REMOVE CONNECTOR COVER ASSEMBLY (See page HV-560)**
8. **CHECK TERMINAL VOLTAGE (See page HV-561)**
9. **INSTALL CONNECTOR COVER ASSEMBLY (See page HV-566)**
10. **INSTALL NO. 2 ENGINE ROOM SIDE LH COVER (See page HV-568)**
11. **REMOVE REAR SEAT HEADREST ASSEMBLY**
12. **REMOVE REAR CENTER SEAT HEADREST ASSEMBLY**
13. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-44)**
14. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-44)**
15. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-44)**
16. **REMOVE FRONT LUGGAGE COMPARTMENT TRIM COVER (See page HB-106)**
17. **REMOVE NO. 5 HV BATTERY INTAKE DUCT (See page HB-106)**
18. **REMOVE WIRE HARNESS CLAMP BRACKET (See page HB-107)**
19. **REMOVE UPPER BATTERY CARRIER SUB-ASSEMBLY (See page HB-107)**
20. **DISCONNECT FRAME WIRE (See page HB-107)**
21. **REMOVE NO. 1 BATTERY COVER LID (See page HB-108)**
22. **REMOVE NO. 5 BATTERY CARRIER PANEL (See page HB-108)**
23. **REMOVE FILTER NOISE CAPACITOR (See page HB-108)**
24. **REMOVE HV RELAY ASSEMBLY (See page HB-108)**

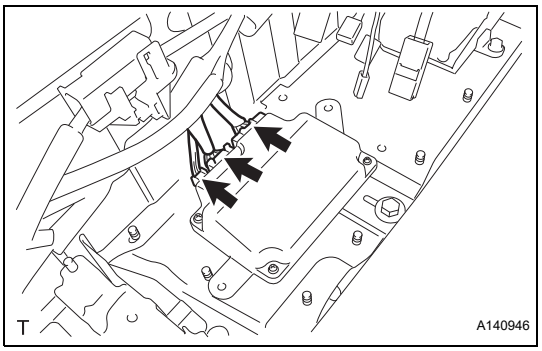


25. **REMOVE BATTERY SMART UNIT**
    (a) Remove the bolt and battery smart unit.
    CAUTION:
    Wear insulated gloves.

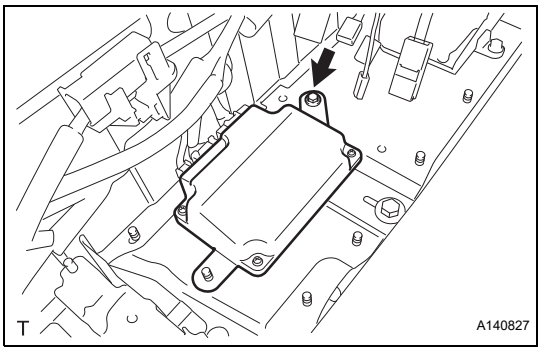


    (b) Disconnect the 3 connectors from the battery smart unit.
    CAUTION:
    Wear insulated gloves.

INSTALLATION



1. **INSTALL BATTERY SMART UNIT**
    (a) Connect the 3 connectors to the battery smart unit.
    CAUTION:
    Wear insulated gloves.



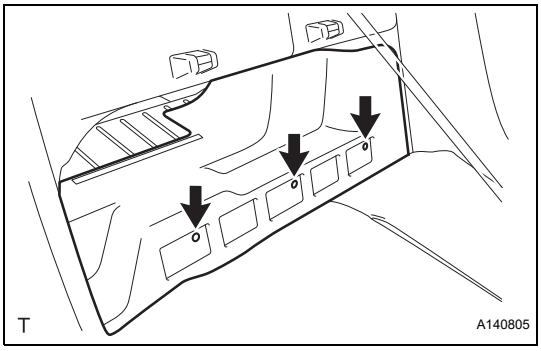
    (b) Install the battery smart unit with the bolt.
    Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
    CAUTION:
    Wear insulated gloves.

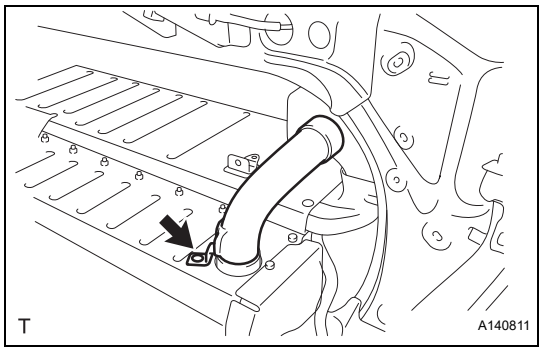
2. **INSTALL HV RELAY ASSEMBLY (See page HB-110)**
3. **INSTALL FILTER NOISE CAPACITOR (See page HB-111)**
4. **INSTALL NO. 5 BATTERY CARRIER PANEL (See page HB-111)**
5. **INSTALL NO. 1 BATTERY COVER LID (See page HB-111)**
6. **CONNECT FRAME WIRE (See page HB-111)**
7. **INSTALL UPPER BATTERY CARRIER SUB-ASSEMBLY (See page HB-112)**
8. **INSTALL WIRE HARNESS CLAMP BRACKET (See page HB-112)**
9. **INSTALL NO. 5 HV BATTERY INTAKE DUCT (See page HB-113)**

10. **INSTALL FRONT LUGGAGE COMPARTMENT TRIM COVER (See page HB-113)**
11. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-54)**
12. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-54)**
13. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-55)**
14. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**
15. **INSTALL REAR SEAT HEADREST ASSEMBLY**
16. **INSTALL SERVICE PLUG GRIP (See page HB-97)**
17. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
18. **INSTALL LUGGAGE TRIM SERVICE HOLE COVER (See page HB-98)**
19. **PERFORM INITIALIZATION**
    (a) Perform the initialization procedure (See page IN-43).
    HINT:
    Some vehicle systems require initialization after reconnecting the cable to the negative battery terminal.

REMOVAL

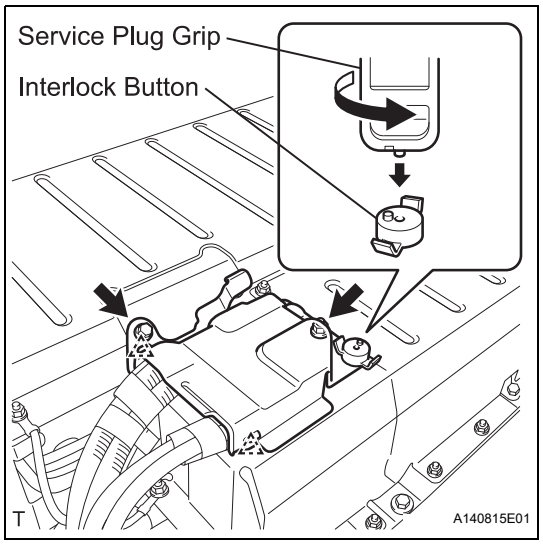
1. **PRECAUTION**
   See page IN-5
2. **CHECK FOR DTCS (See page HB-86)**
3. **REMOVE LUGGAGE TRIM SERVICE HOLE COVER (See page HB-86)**
4. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (See page HV-560)**
5. **REMOVE SERVICE PLUG GRIP (See page HB-86)**
6. **REMOVE NO. 2 ENGINE ROOM SIDE LH COVER (See page HV-560)**
7. **REMOVE CONNECTOR COVER ASSEMBLY (See page HV-560)**
8. **CHECK TERMINAL VOLTAGE (See page HV-561)**
9. **INSTALL CONNECTOR COVER ASSEMBLY (See page HV-566)**
10. **INSTALL NO. 2 ENGINE ROOM SIDE LH COVER (See page HV-568)**
11. **REMOVE REAR SEAT HEADREST ASSEMBLY**
12. **REMOVE REAR CENTER SEAT HEADREST ASSEMBLY**
13. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-44)**
14. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-44)**
15. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-44)**
16. **REMOVE FRONT LUGGAGE COMPARTMENT TRIM COVER**
    (a) Remove the 3 clips and front luggage compartment trim cover.





17. REMOVE NO. 5 HV BATTERY INTAKE DUCT

(a) Remove the clip and No. 5 HV battery intake duct.
CAUTION:
Wear insulated gloves.

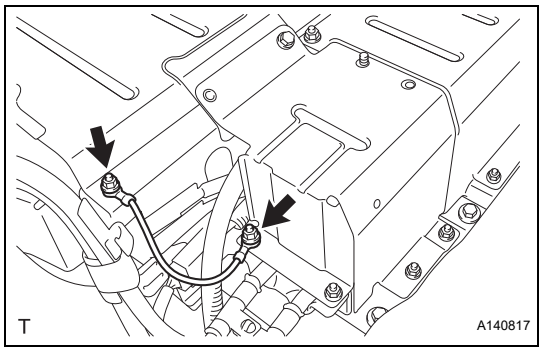


18. REMOVE WIRE HARNESS CLAMP BRACKET

(a) Using the service plug grip, release the interlock button.
CAUTION:
Wear insulated gloves.

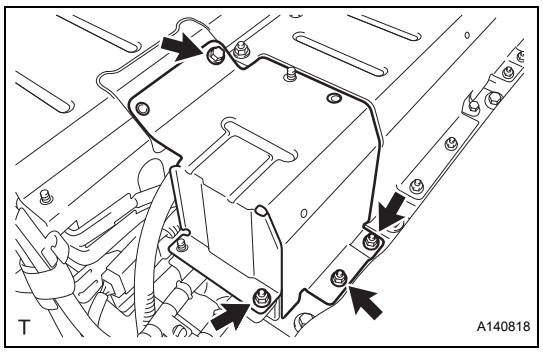
(b) Remove the bolt, nut, and wire harness clamp bracket.
CAUTION:
Wear insulated gloves.

(c) Disconnect the 2 wire harness clamps.
CAUTION:
Wear insulated gloves.



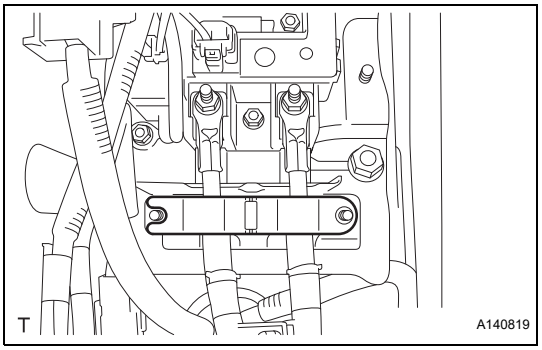
19. REMOVE UPPER BATTERY CARRIER SUB-ASSEMBLY

(a) Remove the 2 nuts and ground cable.
CAUTION:
Wear insulated gloves.



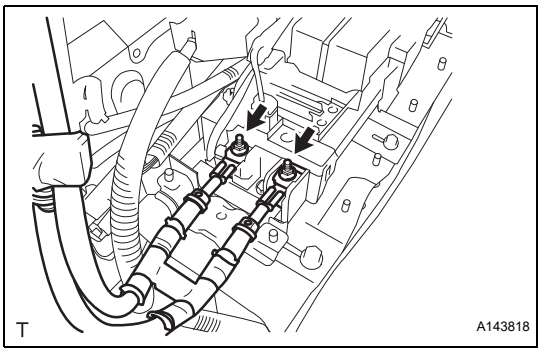
(b) Remove the 3 nuts, bolt, and upper battery carrier sub-assembly.
CAUTION:
Wear insulated gloves.

HB

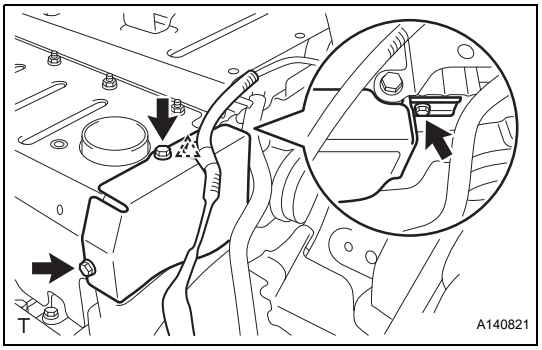


20. DISCONNECT FRAME WIRE

(a) Remove the battery shield contact.
CAUTION:
Wear insulated gloves.

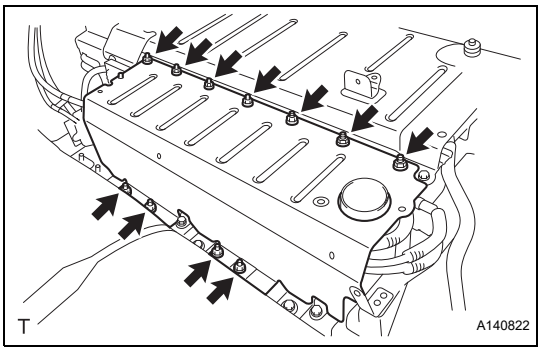


(b) Remove the 2 nuts and disconnect the frame wire (high voltage cable).
CAUTION:
Wear insulated gloves.



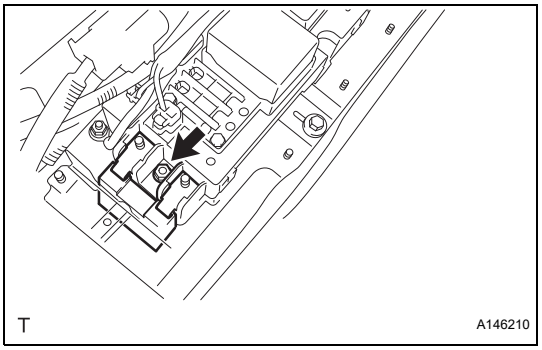
21. REMOVE NO. 1 BATTERY COVER LID

(a) Remove the 3 bolts, clamp, and No. 1 battery cover lid.
CAUTION:
Wear insulated gloves.



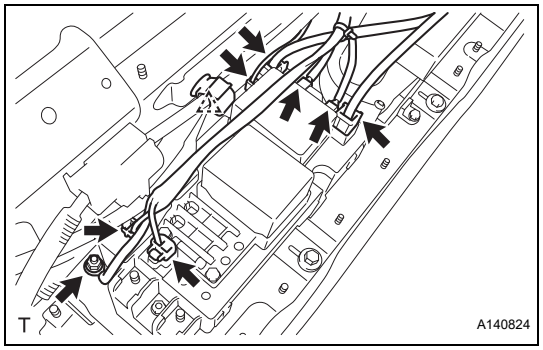
22. REMOVE NO. 5 BATTERY CARRIER PANEL

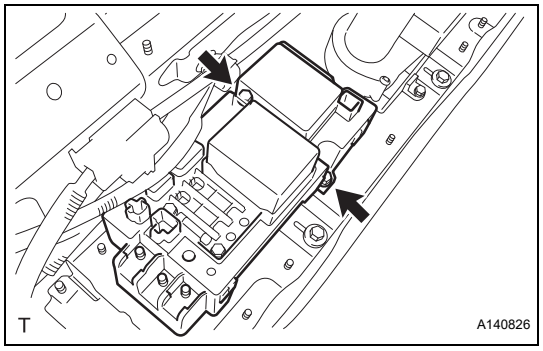
(a) Remove the 11 bolts and No.5 battery carrier panel.
CAUTION:
Wear insulated gloves.



23. REMOVE FILTER NOISE CAPACITOR

(a) Remove the nut and filter noise capacitor.
CAUTION:
Wear insulated gloves.





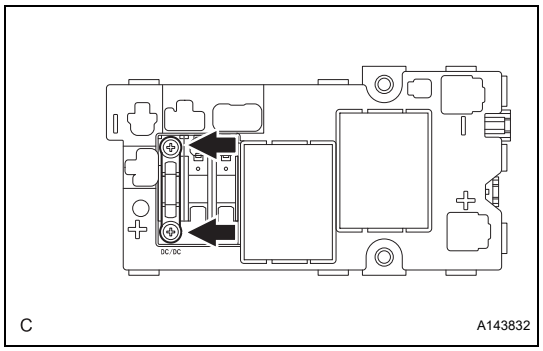
24. REMOVE HV RELAY ASSEMBLY

(a) Remove the nut and disconnect the ground cable.
CAUTION:
Wear insulated gloves.

(b) Disconnect the 7 connectors from the HV relay assembly.
CAUTION:
Wear insulated gloves.

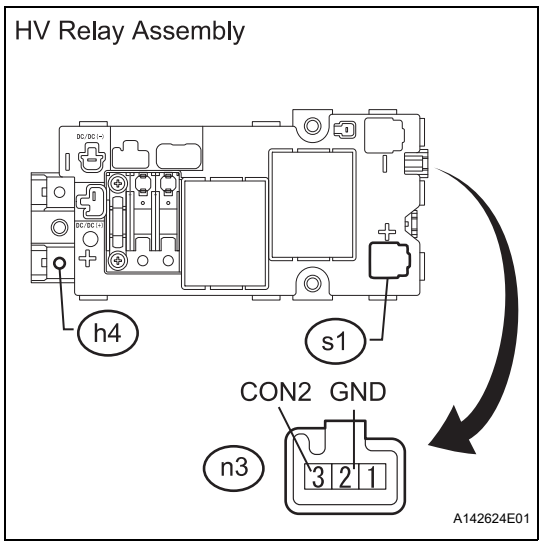
(c) Remove the wire harness clamp.
CAUTION:
Wear insulated gloves.

(d) Remove the 2 bolts and HV relay assembly.
CAUTION:
Wear insulated gloves.



25. REMOVE HIGH VOLTAGE FUSE

(a) Remove the 2 bolts and high voltage fuse.



INSPECTION

1. HV RELAY ASSEMBLY

(a) SMRB inspection

(1) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
h4-1 - s1-1	10 kΩ or more

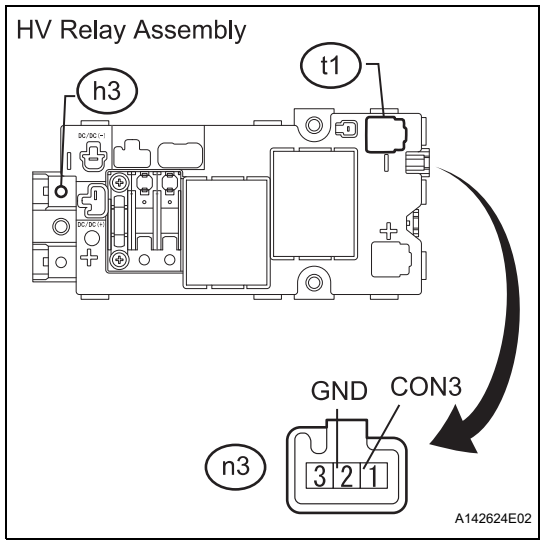
(2) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
h4-1 - s1-1	Below 1 Ω (When battery voltage applied to terminals n3-2 and n3-3)

HB

(3) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
CON2 (n3-3) - GND (n3-2)	18.8 to 32.1 Ω at -35 to 80°C (-31 to 176°F)



(b) SMRG inspection
(1) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
h3-1 - t1-1	10 kΩ or more

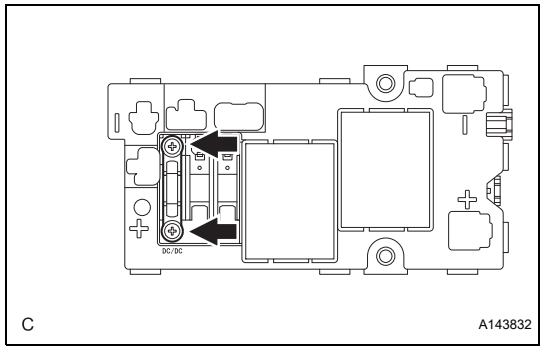
(2) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
h3-1 - t1-1	Below 1 Ω (When battery voltage applied to terminals n3-1 and n3-2)

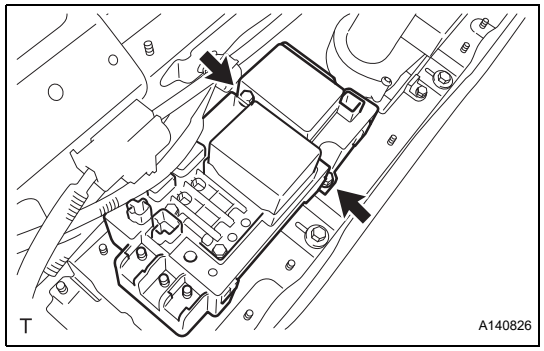
(3) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
CON3 (n3-1) - GND (n3-2)	18.8 to 32.1 Ω at -35 to 80°C (-31 to 176°F)

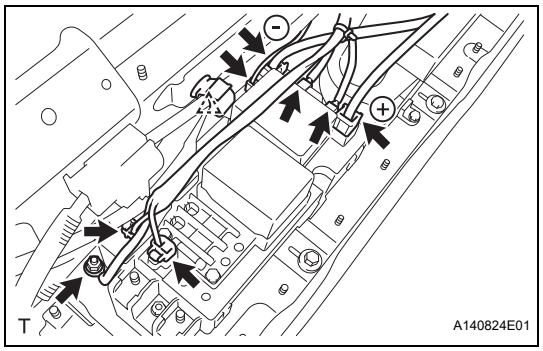
INSTALLATION



1. INSTALL HIGH VOLTAGE FUSE
(a) Install the high voltage fuse with the 2 bolts.
Torque: 4.5 N*m (46 kgf*cm, 40 in.*lbf)
CAUTION:
Wear insulated gloves.
NOTICE:
Be sure to use a torque wrench to tighten the bolts.

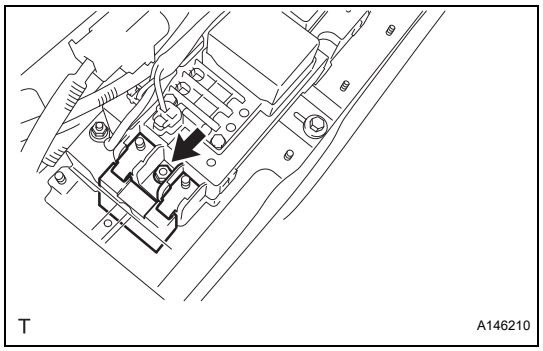


2. INSTALL HV RELAY ASSEMBLY
(a) Install the HV relay assembly with the 2 bolts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.



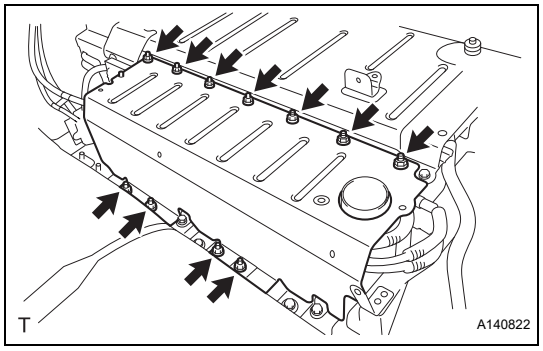
(b) Connect the 7 connectors and clamp to the HV relay assembly.
CAUTION:
Wear insulated gloves.
NOTICE:
- **Connect the wire wrapped with red tape to the terminal indicated by the "+" mark of the HV relay and the wire not wrapped with red tape to the terminal indicated by the "-" mark of the HV battery.**
- **Make sure that the connectors are engaged securely.**

(c) Connect the ground cable with the nut.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)



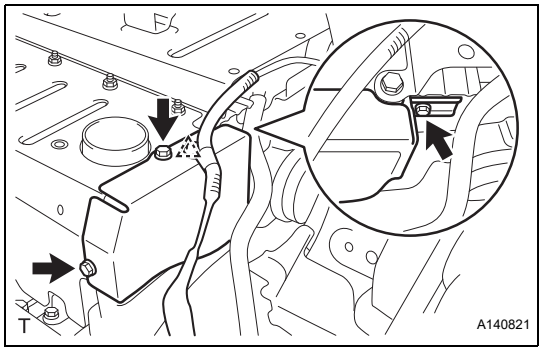
3. INSTALL FILTER NOISE CAPACITOR

(a) Install the filter noise capacitor with the nut.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.



4. INSTALL NO. 5 BATTERY CARRIER PANEL

(a) Install the No. 5 battery carrier panel with the 11 bolts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.

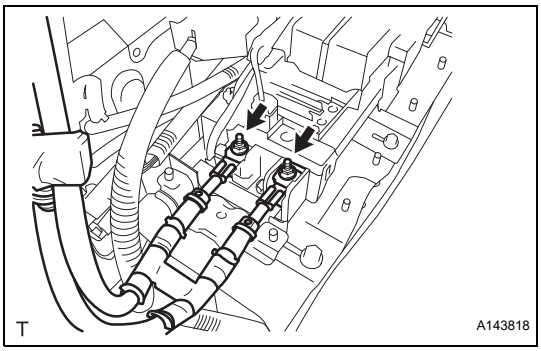


5. INSTALL NO. 1 BATTERY COVER LID

(a) Install the No. 1 battery cover lid with the 3 bolts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.

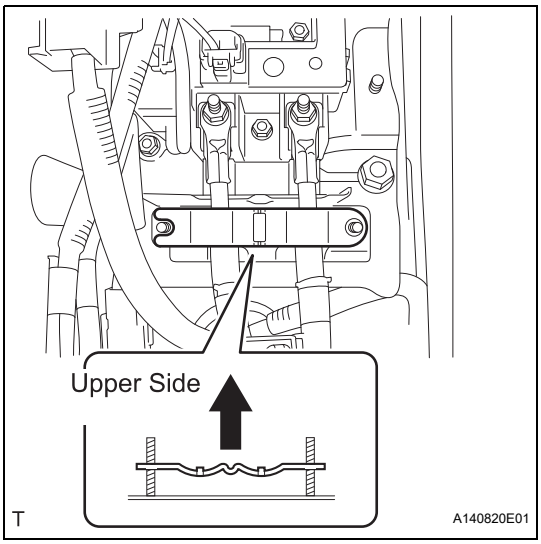
(b) Connect the wire harness clamp to the No. 1 battery cover lid.
CAUTION:
Wear insulated gloves.

HB

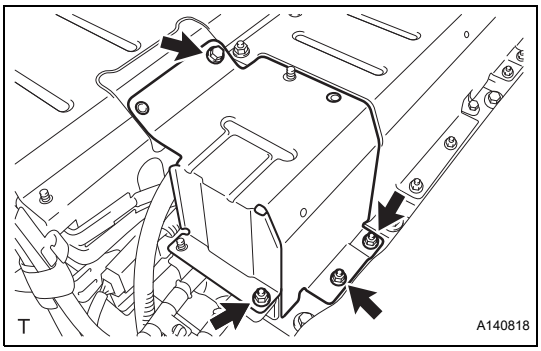


6. CONNECT FRAME WIRE

(a) Connect the frame wire (high voltage cable) with the 2 nuts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
CAUTION:
Wear insulated gloves.

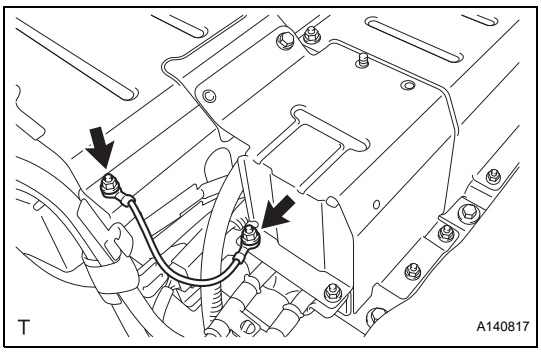


(b) Install the battery shield contact.
CAUTION:
Wear insulated gloves.
NOTICE:
Be sure to install the battery shield contact in the correct direction.



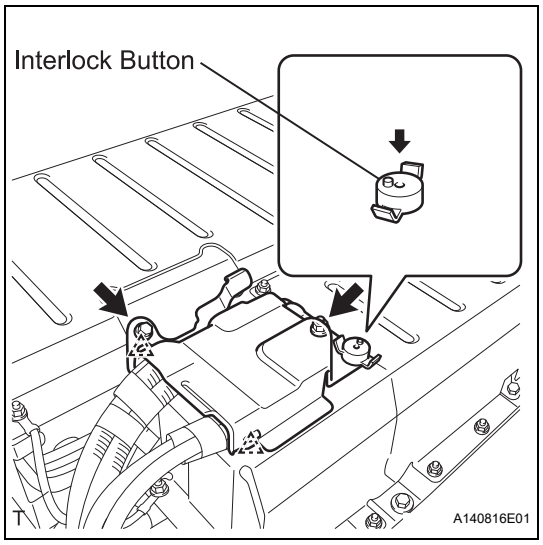
7. INSTALL UPPER BATTERY CARRIER SUB-ASSEMBLY

(a) Install the upper battery carrier sub-assembly with the 3 nuts and bolt.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.

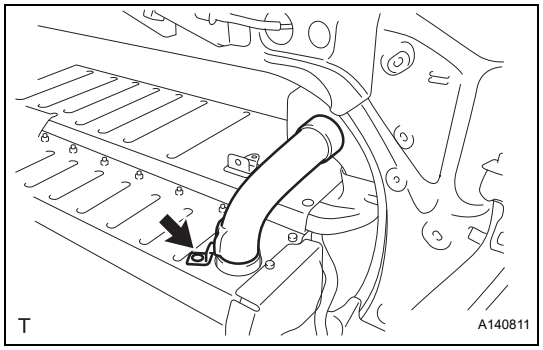


(b) Install the ground cable with the 2 nuts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.

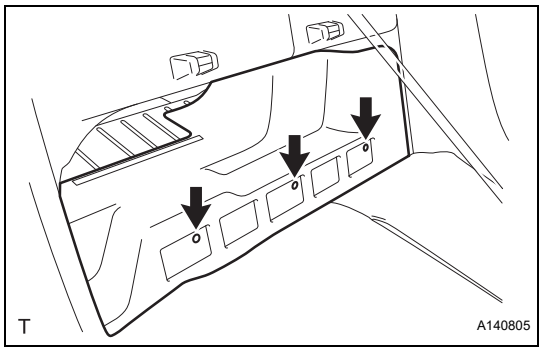
HB



8. **INSTALL WIRE HARNESS CLAMP BRACKET**
   (a) Connect the 2 wire harness clamps.
   CAUTION:
   Wear insulated gloves.
   (b) Install the wire harness clamp bracket with the interlock button.
   CAUTION:
   Wear insulated gloves.
   (c) Press the interlock button.
   CAUTION:
   Wear insulated gloves.
   (d) Secure the wire harness clamp bracket with the bolt and nut.
   Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
   CAUTION:
   Wear insulated gloves.



9. **INSTALL NO. 5 HV BATTERY INTAKE DUCT**
   (a) Install the No. 5 HV battery intake duct with the clamp.
   CAUTION:
   Wear insulated gloves.



10. **INSTALL FRONT LUGGAGE COMPARTMENT TRIM COVER**
    (a) Install the front luggage compartment trim cover with the 3 clips.

11. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-54)**

12. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-54)**

13. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-55)**

14. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**

15. **INSTALL REAR SEAT HEADREST ASSEMBLY**

16. **INSTALL SERVICE PLUG GRIP (See page HB-97)**

17. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

18. **INSTALL LUGGAGE TRIM SERVICE HOLE COVER (See page HB-98)**

19. PERFORM INITIALIZATION

(a) Perform the initialization procedure (See page IN-43).

HINT:

Some vehicle systems require initialization after reconnecting the cable to the negative battery terminal.

REMOVAL

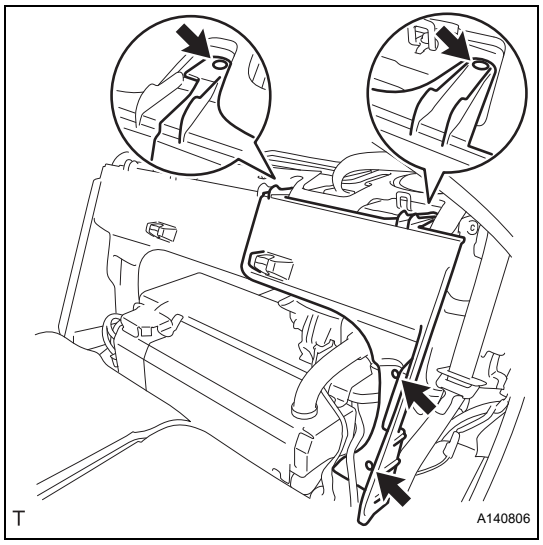
1. REMOVE LUGGAGE COMPARTMENT FLOOR MAT
2. REMOVE SPARE WHEEL COVER CLAMP
3. REMOVE SPARE WHEEL COVER ASSEMBLY
4. REMOVE NO. 1 LUGGAGE COMPARTMENT TRIM HOOK (See page ED-97)
5. REMOVE REAR FLOOR FINISH PLATE (See page ED-97)
6. REMOVE LUGGAGE COMPARTMENT REAR TRIM COVER (See page ED-97)
7. REMOVE LUGGAGE COMPARTMENT INNER TRIM COVER LH (See page ED-97)
8. REMOVE REAR SEAT HEADREST ASSEMBLY
9. REMOVE REAR CENTER SEAT HEADREST ASSEMBLY
10. REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-44)
11. REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-44)
12. REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-44)
13. REMOVE REAR SIDE SEATBACK ASSEMBLY LH (See page SE-45)
14. REMOVE REAR SIDE SEATBACK ASSEMBLY RH (See page SE-45)
15. REMOVE REAR DOOR SCUFF PLATE LH (See page IR-13)
16. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP LH
17. REMOVE REAR DOOR SCUFF PLATE RH (See page IR-13)
18. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH
19. DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (See page SB-33)
20. REMOVE ROOF SIDE INNER GARNISH LH (See page IR-15)
21. REMOVE ROOF SIDE INNER GARNISH RH (See page IR-15)
22. DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-40)
23. DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-41)

24. **REMOVE REAR SEAT SHOULDER BELT COVER (See page SB-33)**

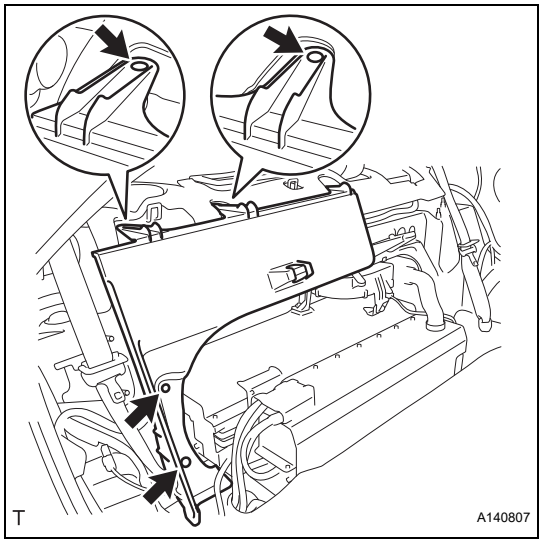
25. **REMOVE REAR SEAT SHOULDER BELT HOLE COVER (See page SB-33)**

26. **REMOVE PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-33)**

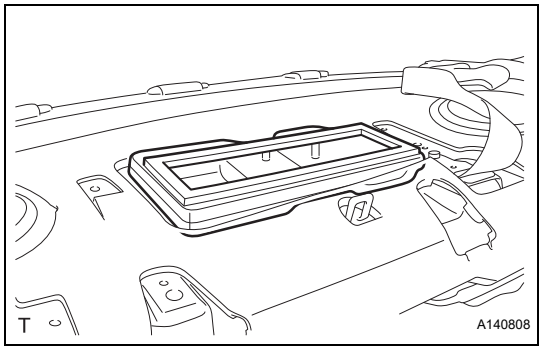
27. **REMOVE FRONT LUGGAGE COMPARTMENT TRIM COVER (See page HB-106)**



28. **REMOVE ROOM PARTITION BOARD LH**
    (a) Remove the 4 clips and room partition board LH.

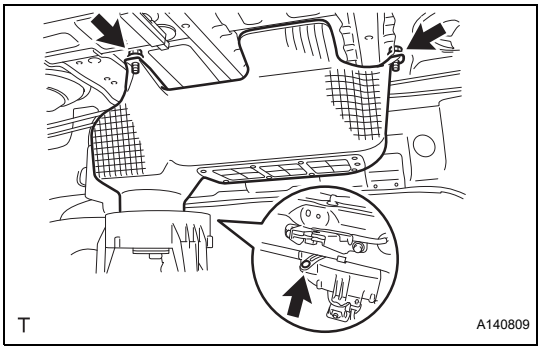


29. **REMOVE ROOM PARTITION BOARD RH**
    (a) Remove the 4 clips and room partition board RH.



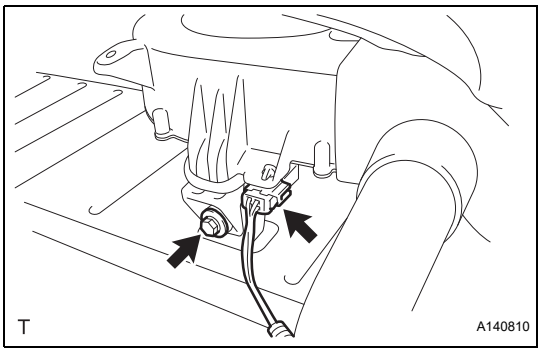
30. **REMOVE NO. 1 HV BATTERY INTAKE DUCT**
    (a) Remove the No. 1 HV battery intake duct.

HB



31. REMOVE NO. 2 HV BATTERY INTAKE DUCT

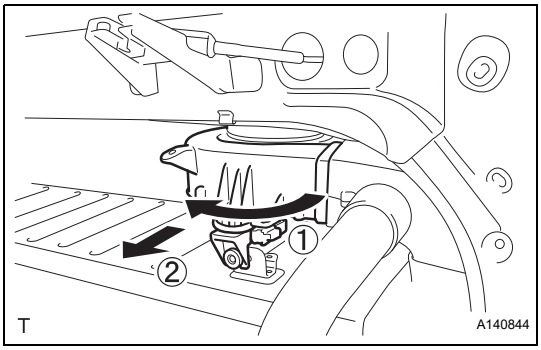
(a) Remove the 2 bolts, clip, and No. 2 HV battery intake duct.



32. REMOVE BATTERY COOLING BLOWER ASSEMBLY

(a) Remove the bolt from the battery cooling blower assembly.

(b) Disconnect the connector from the battery cooling blower assembly.

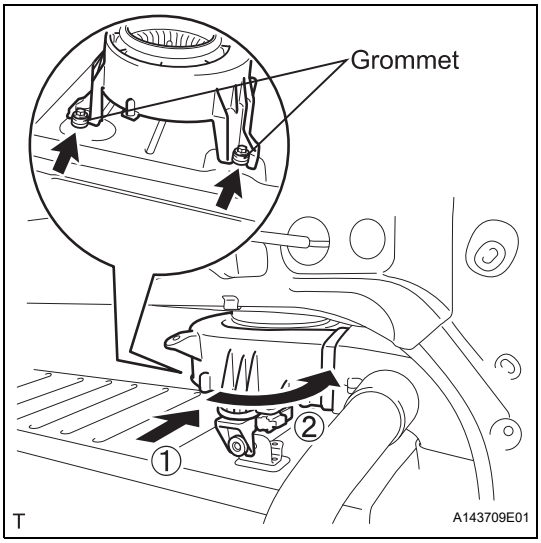


(c) Remove the battery cooling blower assembly shown in the illustration.

NOTICE:

- **Do not touch the fan of the battery cooling blower assembly.**
- **Do not hold the wire harness when lifting the battery cooling blower assembly.**

INSTALLATION

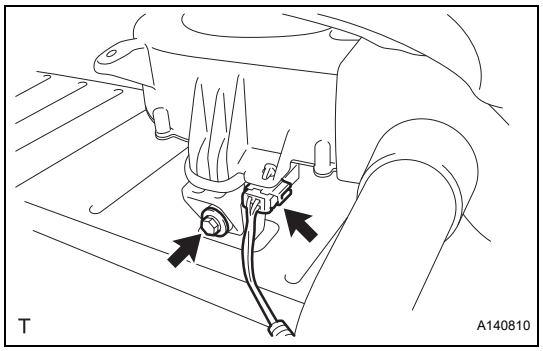


1. INSTALL BATTERY COOLING BLOWER ASSEMBLY

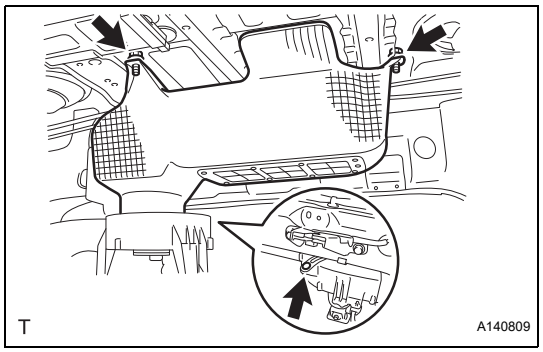
(a) Install the battery cooling blower assembly as shown in the illustration.

NOTICE:

- **Do not touch the fan of the battery cooling blower assembly.**
- **Do not hold the wire harness when lifting the battery cooling blower assembly.**
- **Be sure to engage the cutout on the battery cooling blower assembly to the bushing securely.**

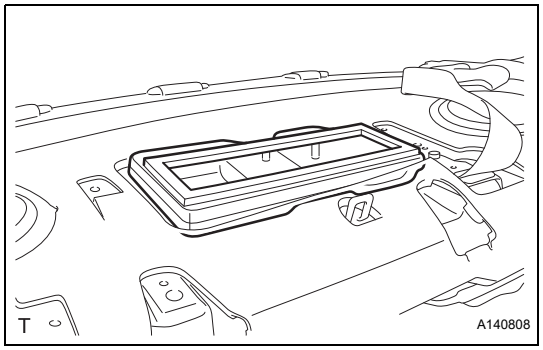


(b) Install the bolt to the battery cooling blower assembly.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)



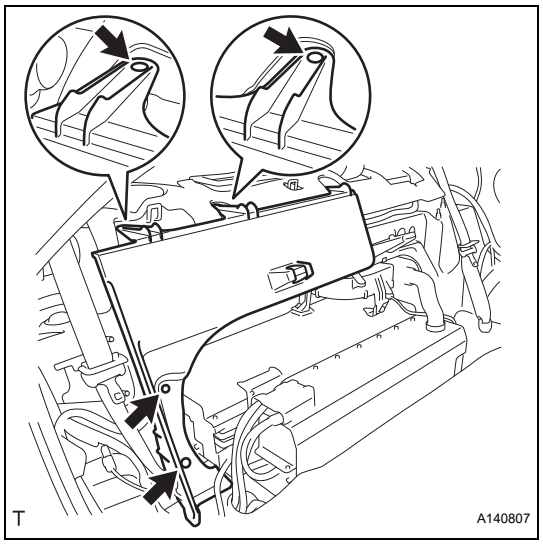
2. INSTALL NO. 2 HV BATTERY INTAKE DUCT

(a) Install the No. 2 HV battery intake duct with the 2 bolts and clip.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)



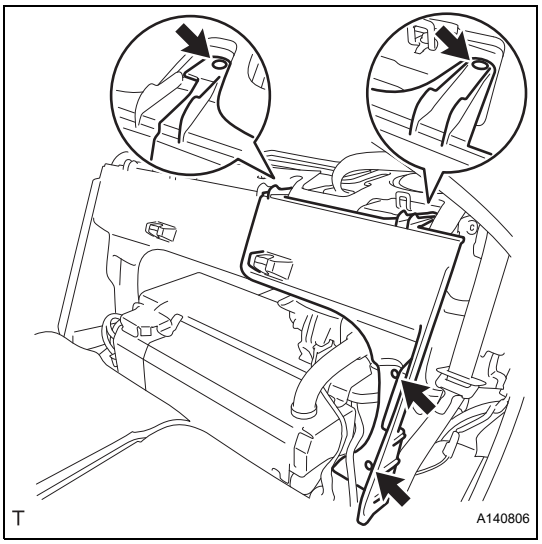
3. INSTALL NO. 1 HV BATTERY INTAKE DUCT

(a) Install the No. 1 HV battery intake duct.



4. INSTALL ROOM PARTITION BOARD RH

(a) Install the room partition board RH with the 4 clips.



5. **INSTALL ROOM PARTITION BOARD LH**
   (a) Install the room partition board LH with the 4 clips.
6. **INSTALL FRONT LUGGAGE COMPARTMENT TRIM COVER (See page HB-113)**
7. **INSTALL PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-34)**
8. **INSTALL REAR SEAT SHOULDER BELT HOLE COVER (See page SB-35)**
9. **INSTALL REAR SEAT SHOULDER BELT COVER (See page SB-35)**
10. **INSTALL REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-42)**
11. **INSTALL REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-42)**
12. **INSTALL ROOF SIDE INNER GARNISH LH (See page IR-39)**
13. **INSTALL ROOF SIDE INNER GARNISH RH (See page IR-39)**
14. **INSTALL REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (See page SB-35)**
15. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH**
16. **INSTALL REAR DOOR SCUFF PLATE LH (See page IR-43)**
17. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP RH**
18. **INSTALL REAR DOOR SCUFF PLATE RH (See page IR-43)**
19. **INSTALL REAR SIDE SEAT BACK ASSEMBLY LH (See page SE-54)**
20. **INSTALL REAR SIDE SEAT BACK ASSEMBLY RH**
21. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-54)**
22. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-54)**
23. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-55)**
24. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**
25. **INSTALL REAR SEAT HEADREST ASSEMBLY**
26. **INSTALL LUGGAGE COMPARTMENT INNER TRIM COVER LH (See page ED-102)**
27. **INSTALL LUGGAGE COMPARTMENT REAR TRIM COVER (See page ED-102)**

28. **INSTALL REAR FLOOR FINISH PLATE (See page ED-103)**
29. **INSTALL NO. 1 LUGGAGE COMPARTMENT TRIM HOOK (See page ED-103)**
30. **INSTALL SPARE WHEEL COVER ASSEMBLY**
31. **INSTALL SPARE WHEEL COVER CLAMP**
32. **INSTALL LUGGAGE COMPARTMENT FLOOR MAT**

REMOVAL

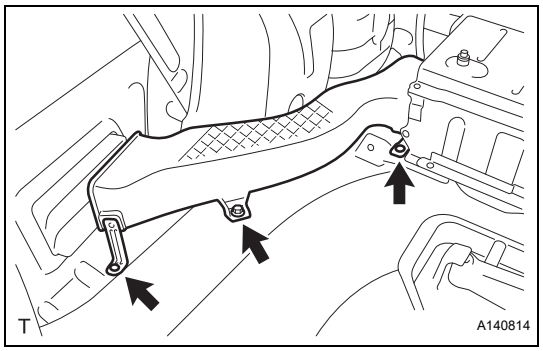
1. **PRECAUTION**
   See page IN-5
2. **CHECK FOR DTCS (See page HB-86)**
3. **REMOVE LUGGAGE TRIM SERVICE HOLE COVER (See page HB-86)**
4. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (See page HV-560)**
5. **REMOVE SERVICE PLUG GRIP (See page HB-86)**
6. **REMOVE NO. 2 ENGINE ROOM SIDE LH COVER (See page HV-560)**
7. **REMOVE CONNECTOR COVER ASSEMBLY (See page HV-560)**
8. **CHECK TERMINAL VOLTAGE (See page HV-561)**
9. **INSTALL CONNECTOR COVER ASSEMBLY (See page HV-566)**
10. **INSTALL NO. 2 ENGINE ROOM SIDE LH COVER (See page HV-568)**
11. **REMOVE LUGGAGE COMPARTMENT FLOOR MAT**
12. **REMOVE SPARE WHEEL COVER CLAMP**
13. **REMOVE SPARE WHEEL COVER ASSEMBLY**
14. **REMOVE NO.1 LUGGAGE COMPARTMENT TRIM HOOK (See page ED-97)**
15. **REMOVE REAR FLOOR FINISH PLATE (See page ED-97)**
16. **REMOVE LUGGAGE COMPARTMENT REAR TRIM COVER (See page ED-97)**
17. **REMOVE LUGGAGE COMPARTMENT INNER TRIM COVER LH (See page ED-97)**
18. **REMOVE REAR SEAT HEADREST ASSEMBLY**
19. **REMOVE REAR CENTER SEAT HEADREST ASSEMBLY**
20. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-44)**
21. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-44)**
22. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-44)**
23. **REMOVE FRONT LUGGAGE COMPARTMENT TRIM COVER (See page HB-106)**
24. **REMOVE NO. 5 HV BATTERY INTAKE DUCT (See page HB-106)**

25. **REMOVE WIRE HARNESS CLAMP BRACKET (See page HB-107)**

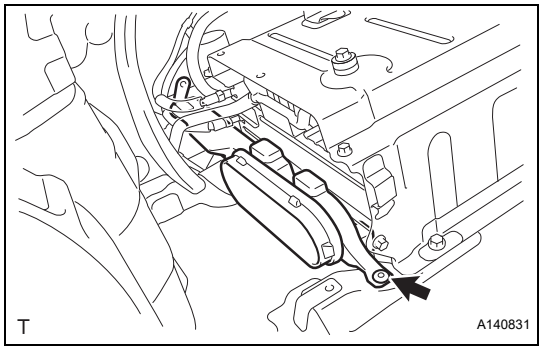
26. **REMOVE UPPER BATTERY CARRIER SUB-ASSEMBLY (See page HB-107)**

27. **REMOVE NO. 1 BATTERY COVER LID (See page HB-108)**

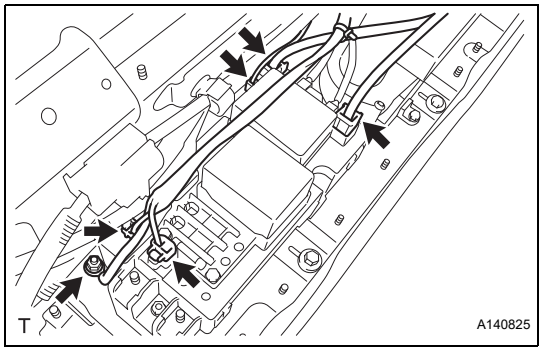
28. **REMOVE NO. 5 BATTERY CARRIER PANEL (See page HB-108)**



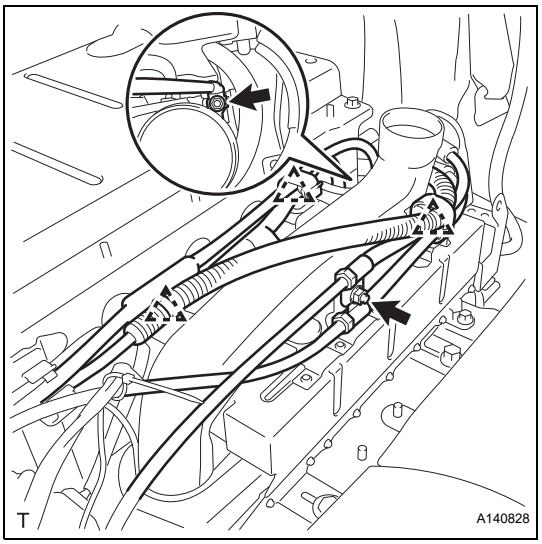
29. **REMOVE NO. 2 HV BATTERY EXHAUST DUCT**
    (a) Remove the 2 clips, nut and No. 2 HV battery exhaust duct.



30. **REMOVE NO. 1 HV BATTERY EXHAUST DUCT**
    (a) Remove the clip and No. 1 HV battery exhaust duct.
    CAUTION:
    Wear insulated gloves.

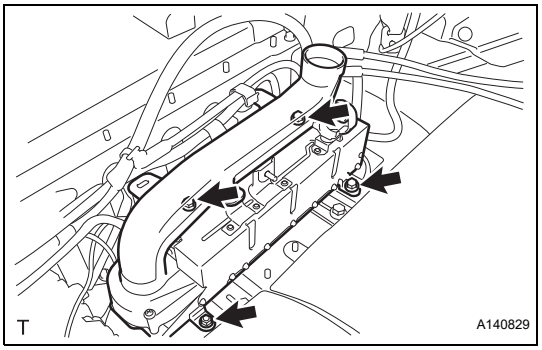


31. **DISCONNECT HV RELAY ASSEMBLY**
    (a) Remove the nut and disconnect the ground cable.
    CAUTION:
    Wear insulated gloves.
    (b) Disconnect the 5 connectors from the HV relay assembly.
    CAUTION:
    Wear insulated gloves.

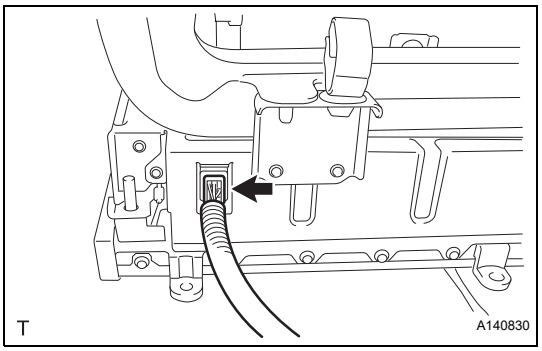


32. REMOVE HYBRID VEHICLE CONVERTER

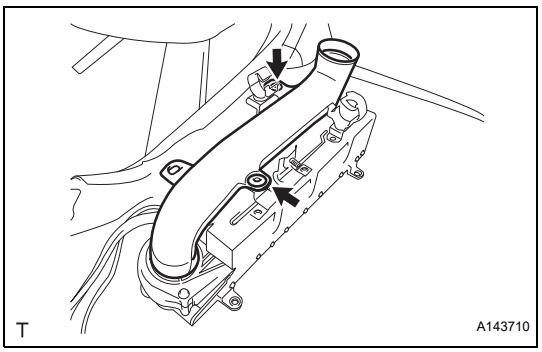
(a) Remove the 2 nuts and 3 clamps and disconnect the wire harness from the hybrid vehicle converter.
CAUTION:
Wear insulated gloves.



(b) Remove the 3 bolts, nut, and hybrid vehicle converter.
CAUTION:
Wear insulated gloves.



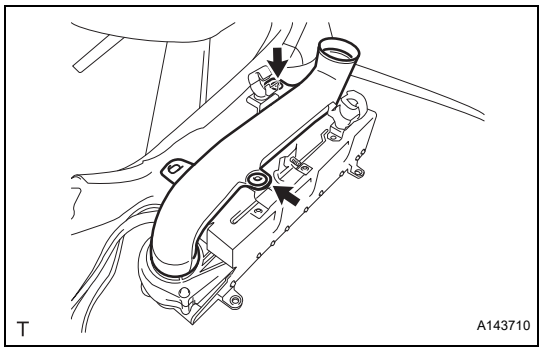
(c) Disconnect the connector from the hybrid vehicle converter.
CAUTION:
Wear insulated gloves.



33. REMOVE VENTILATOR INNER DUCT

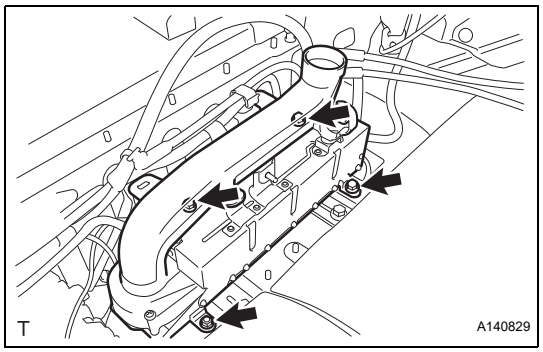
(a) Remove the 2 clips and ventilator inner duct.

INSTALLATION



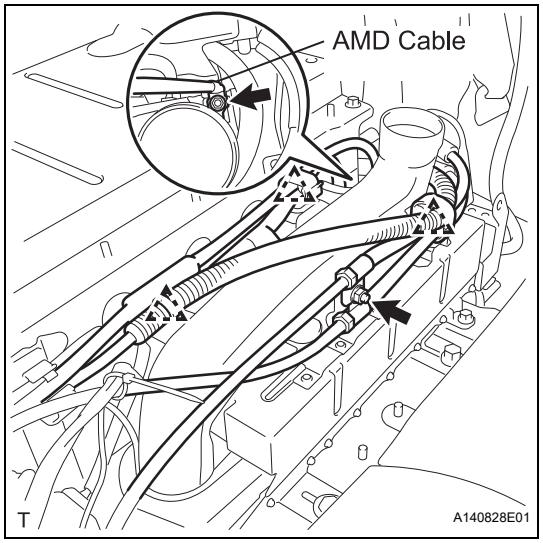
1. INSTALL VENTILATOR INNER DUCT

(a) Install the ventilator inner duct with the 2 clips.



2. INSTALL HYBRID VEHICLE CONVERTER

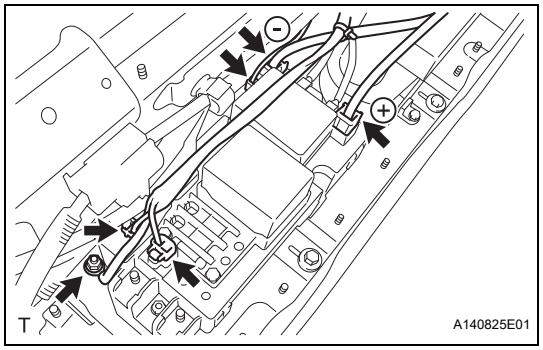
(a) Install the hybrid vehicle converter with the 3 bolts and nut.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.



(b) Connect the wire harness with the 3 clamps.
CAUTION:
Wear insulated gloves.

(c) Connect the AMD cable with the nut.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.

(d) Connect the high voltage cable with the nut.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.

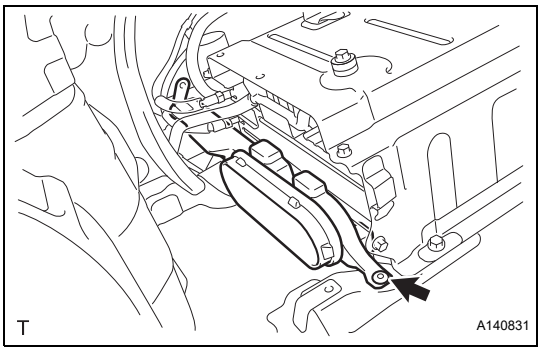


3. CONNECT HV RELAY ASSEMBLY

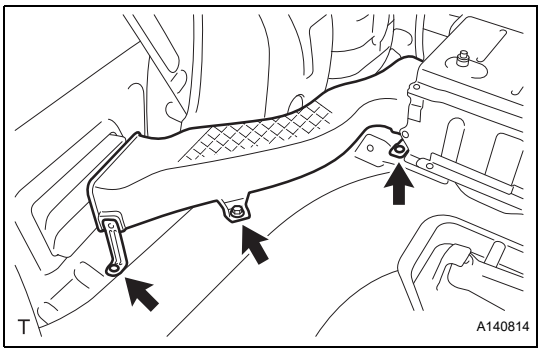
(a) Connect the 5 connectors to the HV relay assembly.
CAUTION:
Wear insulated gloves.
NOTICE:
- **Connect the wire wrapped with red tape to the terminal indicated by the "+" mark of the HV relay and the wire not wrapped with red tape to the terminal indicated by the "-" mark of the HV battery.**
- **Make sure that the connectors are engaged securely.**

(b) Connect the ground cable with the nut.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

HB



4. **INSTALL NO. 1 HV BATTERY EXHAUST DUCT**
   (a) Install the No. 1 battery exhaust duct with the clip.
   CAUTION:
   Wear insulated gloves.



5. **INSTALL NO. 2 HV BATTERY EXHAUST DUCT**
   (a) Install the No. 2 battery exhaust duct with the bolt and 2 clips.
   Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
6. **INSTALL NO. 5 BATTERY CARRIER PANEL (See page HB-111)**
7. **INSTALL NO. 1 BATTERY COVER LID (See page HB-111)**
8. **INSTALL UPPER BATTERY CARRIER SUB-ASSEMBLY (See page HB-112)**
9. **INSTALL WIRE HARNESS CLAMP BRACKET (See page HB-112)**
10. **INSTALL NO. 5 HV BATTERY INTAKE DUCT (See page HB-113)**
11. **INSTALL FRONT LUGGAGE COMPARTMENT TRIM COVER (See page HB-113)**
12. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-54)**
13. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-54)**
14. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-55)**
15. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**
16. **INSTALL REAR SEAT HEADREST ASSEMBLY**
17. **INSTALL LUGGAGE COMPARTMENT INNER TRIM COVER LH (See page ED-102)**
18. **INSTALL LUGGAGE COMPARTMENT REAR TRIM COVER (See page ED-102)**
19. **INSTALL REAR FLOOR FINISH PLATE (See page ED-103)**
20. **INSTALL NO.1 LUGGAGE COMPARTMENT TRIM HOOK (See page ED-103)**
21. **INSTALL SPARE WHEEL COVER ASSEMBLY**
22. **INSTALL SPARE WHEEL COVER CLAMP**

23. **INSTALL LUGGAGE COMPARTMENT FLOOR MAT**
24. **INSTALL SERVICE PLUG GRIP (See page HB-97)**
25. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
26. **INSTALL LUGGAGE TRIM SERVICE HOLE COVER (See page HB-98)**
27. **PERFORM INITIALIZATION**
    (a) Perform the initialization procedure (See page IN-43).
    HINT:
    Some vehicle systems require initialization after reconnecting the cable to the negative battery terminal.

DIAGNOSTIC TROUBLE CODE CHART

HINT:

- If no abnormality is found when the parts are inspected, inspect the tire pressure warning ECU.
- If a trouble code is displayed during the DTC check, inspect the circuit listed for that code. For details of each code, refer to the relevant page listed under respective "DTC Code" in the DTC chart.

TIRE PRESSURE WARNING SYSTEM

DTC Code	Detection Item	Trouble Area	See page
C2111/11	Transmitter ID1 Operation Stop	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-34
C2112/12	Transmitter ID2 Operation Stop	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-34
C2113/13	Transmitter ID3 Operation Stop	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-34
C2114/14	Transmitter ID4 Operation Stop	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-34
C2121/21	No Signal from Transmitter ID1 in Main Mode	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-36
C2122/22	No Signal from Transmitter ID2 in Main Mode	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-36
C2123/23	No Signal from Transmitter ID3 in Main Mode	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-36
C2124/24	No Signal from Transmitter ID4 in Main Mode	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-36
C2141/41	Transmitter ID1 Error	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-43
C2142/42	Transmitter ID2 Error	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-43
C2143/43	Transmitter ID3 Error	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-43
C2144/44	Transmitter ID4 Error	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-43
C2165/65	Abnormal Temperature Inside ID1 Tire	1. Tires 2. Tire pressure warning valve and transmitter 3. Tire pressure warning ECU	TW-46

DTC Code	Detection Item	Trouble Area	See page
C2166/66	Abnormal Temperature Inside ID2 Tire	1. Tires 2. Tire pressure warning valve and transmitter 3. Tire pressure warning ECU	TW-46
C2167/67	Abnormal Temperature Inside ID3 Tire	1. Tires 2. Tire pressure warning valve and transmitter 3. Tire pressure warning ECU	TW-46
C2168/68	Abnormal Temperature Inside ID4 Tire	1. Tires 2. Tire pressure warning valve and transmitter 3. Tire pressure warning ECU	TW-46
C2171/71	Transmitter ID not Registered	Tire pressure warning ECU	TW-49
C2176/76	Receiver Error	1. Tire pressure warning antenna and receiver 2. Wire harness or connector 3. Tire pressure warning ECU	TW-51
C2177/77	Initialization not Completed	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU 3. Tire pressure warning antenna and receiver 4. Tire pressure warning reset switch 5. Wire harness or connector	TW-54
C2181/81	Transmitter ID1 not Received (Test Mode DTC)	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-36
C2182/82	Transmitter ID2 not Received (Test Mode DTC)	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-36
C2183/83	Transmitter ID3 not Received (Test Mode DTC)	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-36
C2184/84	Transmitter ID4 not Received (Test Mode DTC)	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-36
C2191/91	Vehicle Speed Signal Error (Test Mode DTC)	1. Vehicle speed sensor 2. Tire pressure warning ECU 3. Combination meter 4. Wire harness or connector	TW-61

DTC	C2111/11	Transmitter ID1 Operation Stop

DTC	C2112/12	Transmitter ID2 Operation Stop

DTC	C2113/13	Transmitter ID3 Operation Stop

DTC	C2114/14	Transmitter ID4 Operation Stop

DESCRIPTION

The tire pressure warning valve and transmitters that are installed in the tire and wheel assemblies measure the air pressures of the tires. The measured values are transmitted to the tire pressure warning antenna and receiver on the body as radio waves and then sent to the tire pressure warning ECU. The ECU compares the measured air pressure values with the air pressure threshold. When the measured air pressure value is less than this threshold, the warning light in the combination meter comes on. The tire pressure warning ECU stores a DTC when the tire pressure warning valve and transmitter stops transmitting signals. At this time, the signals can be forcibly transmitted by releasing the tire pressure rapidly. The stored DTC is cleared when the signal transmission is resumed.

DTC No.	DTC Detecting Condition	Trouble Area
C2111/11 C2112/12 C2113/13 C2114/14	Tire pressure warning valve and transmitters stop transmitting signals	• Tire pressure warning valve and transmitter • Tire pressure warning ECU

HINT:
It is necessary to perform the procedure to identify the tire pressure warning valve and transmitter that is malfunctioning because it cannot be identified by the output DTC.

INSPECTION PROCEDURE

NOTICE:
It is necessary to perform initialization (See page TW-17) after registration (See page TW-14) of the transmitter IDs into the tire pressure warning ECU after the ECU and/or valve and transmitter has been replaced.

1	PERFORM FORCED TRANSMISSION OF TRANSMITTER ID OF ALL WHEELS

(a) Set the tire pressure to the specified value.

Cold tire inflation pressure

Tire size	Front kPa (kgf/cm^2, psi)	Rear kPa (kgf/cm^2, psi)
P215/60R16 94V	220 (2.2, 32)	220 (2.2, 32)

(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG) and turn the tester on.
(d) Select "TIREPRESS" by following the prompts displayed on the intelligent tester.

TIRE PRESSURE:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
TIREPRESS1	ID1 tire inflation pressure / min.:0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf / cm^2, 92.2 psi)	Actual tire inflation pressure	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
TIREPRESS2	ID2 tire inflation pressure / min.:0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf / cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS3	ID3 tire inflation pressure / min.:0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf / cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS4	ID4 tire inflation pressure / min.:0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf / cm^2, 92.2 psi)	Actual tire inflation pressure	-

(e) Rapidly release the pressures from each wheel by approximately 40 kPa (0.4 kgf / cm^2, 5.8 psi) /30 seconds or more.

(1) Check that each tire pressure data displayed on the intelligent tester screen has changed.

OK:

Each tire pressure data displayed on the intelligent tester screen will change to the value of the tire pressure.

NOTICE:

- **It takes about 1 minute or more to display the updated tire pressure data.**
- **When the "TIREPRESS" data has not changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then rapidly release the tire pressure and recheck it.**

(2) After confirming that all of the tire pressure data displayed on the intelligent tester screen have changed, set the tire pressure to the appropriate specified values.

HINT:

If the tire pressure data displayed on the intelligent tester screen has not changed after rechecking, go to other problem procedure (For malfunctions in transmission or reception function (See page TW-22).

NG → **INSPECT OTHER PROBLEM (MALFUNCTION IN TRANSMISSION OR RECEPTION FUNCTION)**

OK

END

TW

DTC	C2121/21	No Signal from Transmitter ID1 in Main Mode
DTC	C2122/22	No Signal from Transmitter ID2 in Main Mode
DTC	C2123/23	No Signal from Transmitter ID3 in Main Mode
DTC	C2124/24	No Signal from Transmitter ID4 in Main Mode
DTC	C2181/81	Transmitter ID1 not Received (Test Mode DTC)
DTC	C2182/82	Transmitter ID2 not Received (Test Mode DTC)
DTC	C2183/83	Transmitter ID3 not Received (Test Mode DTC)
DTC	C2184/84	Transmitter ID4 not Received (Test Mode DTC)

DESCRIPTION

The tire pressure warning valve and transmitters that are installed in the tire and wheel assemblies measure the air pressure of the tires. The measured values are transmitted to the tire pressure warning antenna and receiver on the body as radio waves and then sent to the tire pressure warning ECU. The ECU compares the measured air pressure values with the air pressure threshold. When the measured air pressure value is less than this threshold, the warning light in the combination meter comes on.
The tire pressure warning valve and transmitters constantly send radio waves to the tire pressure warning antenna and receiver.
Under the following conditions below, the tire pressure warning antenna and receiver is unable to receive the signals from the tire pressure warning valves and transmitters, and a DTC is stored.

- Facilities or devices that use similar radio frequencies are located in the vicinity of the vehicle.
- Devices using similar radio frequencies are used in the vehicle.

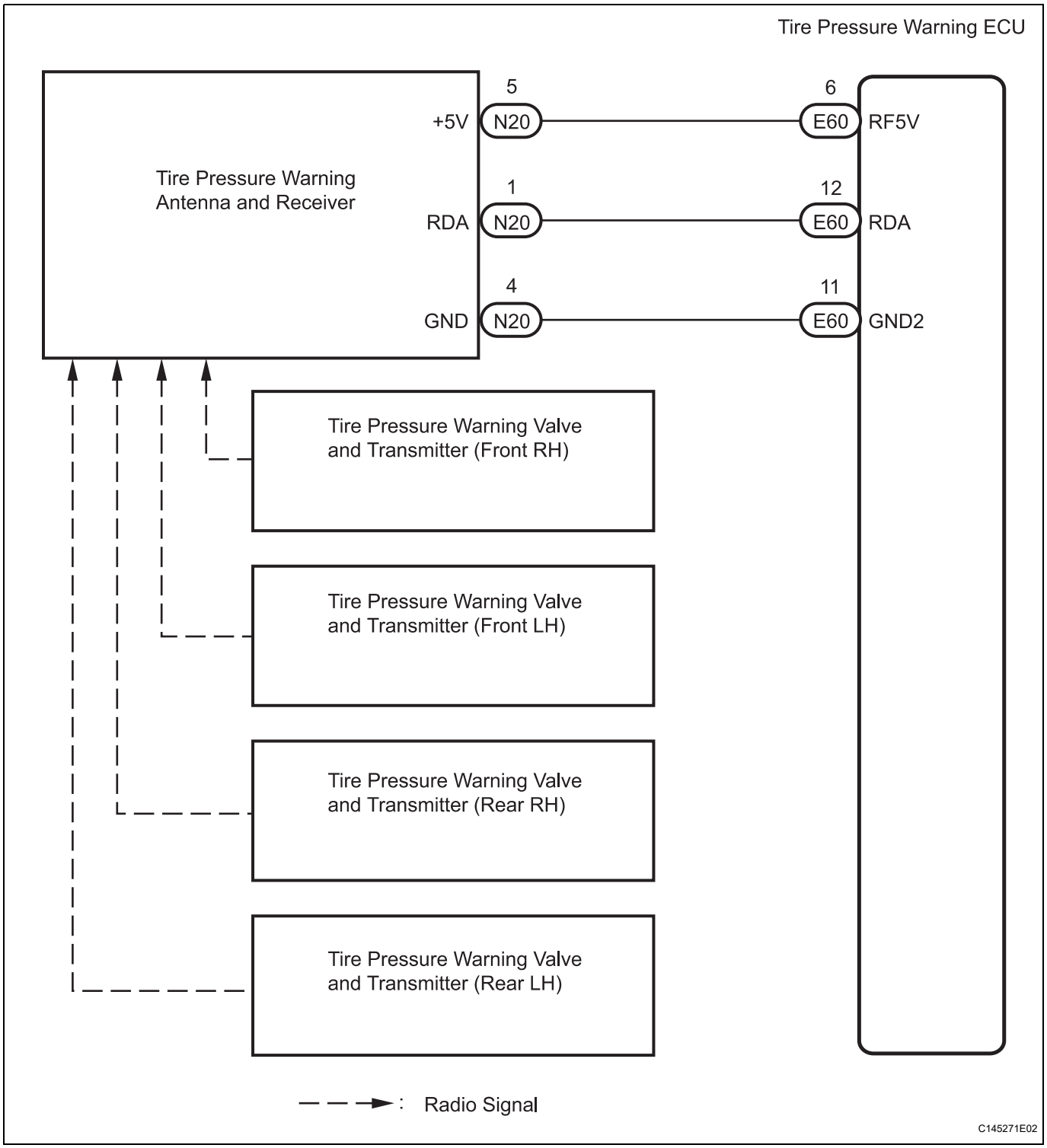
HINT:
When no signals are received for 51 minutes or more, a DTC is output.
DTCs from C2121/21 to C2124/24 can only be cleared by using the tester. DTCs from C2181/81 to C2184/84 can be cleared when the transmitter in the tire pressure warning valve and transmitter sends a forced transmission signal or test mode ends. DTCs from C2181/81 to C2184/84 are output only in test mode.

TW

DTC No.	DTC Detecting Condition	Trouble Area
C2121/21 C2122/22 C2123/23 C2124/24	These DTCs are detected when no signals are received for 51 minutes or more.	• Tire pressure warning valve and transmitter • Tire pressure warning antenna and receiver • Wire harness or connector • Tire pressure warning ECU
C2181/81 C2182/82 C2183/83 C2184/84	Malfunctions in the transmitting/receiving circuit	• Tire pressure warning valve and transmitter • Tire pressure warning antenna and receiver • Wire harness or connector • Tire pressure warning ECU

HINT:
It is necessary to perform the procedure to identify the tire pressure warning valve and transmitter that is malfunctioning because it cannot be identified by the output DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- **When replacing the tire pressure warning ECU, read the IDs stored in the ECU using the intelligent tester and write them down before removal.**
- **It is necessary to perform initialization (See page TW-17) after registration (See page TW-14) of the transmitter IDs into the tire pressure warning ECU after the ECU and/or valve and transmitter has been replaced.**

TW

1	CHECK FREQUENCY RECEIVING CONDITION

(a) Check if the vehicle is not located in areas such as described below:
  (1) Facilities or devices that use similar radio frequencies are located in the vicinity of the vehicle.
  HINT:
  If the vehicle is located in areas described above, the tire pressure warning light may come on only in a particular area.
  (2) Devices using similar radio frequencies are used in the vehicle.
  OK:
  Facilities, or devices that use similar radio frequencies are not located in the vicinity of the vehicle.
  HINT:
  Radio frequency may be interrupted due to surroundings or devices installed by the user.

NG → **CHECK IF ANY DEVICE IS INSTALLED BY USER**

OK

2	IDENTIFY TRANSMITTER CORRESPONDING TO DTC

(a) Set the tire pressure to the appropriate specified values.

Cold tire inflation pressure

Tire size	Front kPa (kgf/cm^2, psi)	Rear kPa (kgf/cm^2, psi)
P215/60R16 94V	220 (2.2, 32)	220 (2.2, 32)

(b) Select "TIREPRESS" by following the prompts displayed on the intelligent tester.

TIRE PRESSURE:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
TIREPRESS1	ID1 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS2	ID2 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS3	ID3 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS4	ID4 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-

(c) Rapidly reduce the tire pressure for each wheel at least 40 kPa (0.41 kg/cm^2, 5.8 psi) within 30 seconds.
(d) Check the DATA LIST.

NOTICE:

- **It takes about 1 minute or more to display the updated tire pressure data.**
- **When no "TIREPRESS" data has changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then rapidly release the tire pressure and recheck it.**
- **Record the transmitter ID of which "TIREPRESS" data corresponds to each tire.**

(e) After confirming that one of the "TIREPRESS" data for one tire (ID1 to ID4) has changed, repeat this procedure one by one. Identify the transmitter that corresponds to the DTC.

Result

Condition	Proceed to
One or more of transmitters abnormal	A
All normal	B
All abnormal	C

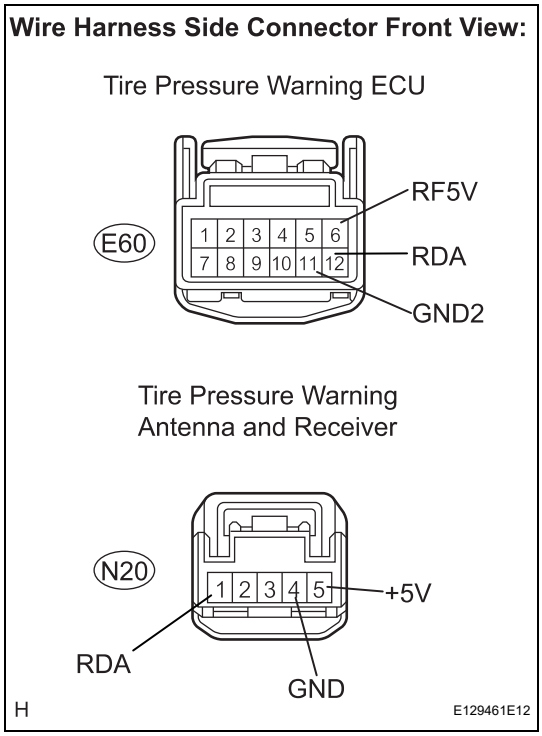
A → **Go to step 4**

B → **END**

C

3 CHECK HARNESS AND CONNECTOR (ECU - RECEIVER)

Wire Harness Side Connector Front View:



(a) Disconnect the E60 ECU connector.
(b) Disconnect the N20 receiver connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E60-12 (RDA) - N20-1 (RDA)	Below 1 Ω
E60-11 (GND2) - N20-4 (GND)	
E60-6 (RF5V) - N20-5 (+5V)	

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

TW

4	INSPECT TIRE PRESSURE WARNING VALVE AND TRANSMITTER

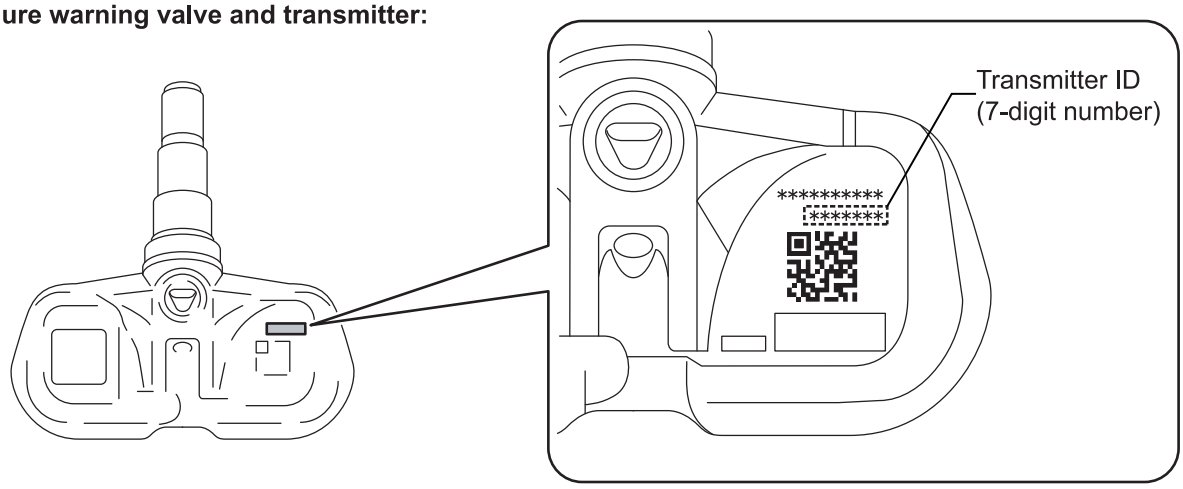
(a) Select REGIT ID CODE by following the prompts displayed on the intelligent tester.

TIRE PRESSURE:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
REGIT ID1 CODE	Registered ID1 code/ min.: 0, max.: FFFFFF*	The ID No. registered in the transmitter ID1 is displayed	*: Displayed only when the ID No. is not registered.
REGIT ID2 CODE	Registered ID2 code/ min.: 0, max.: FFFFFF*	The ID No. registered in the transmitter ID2 is displayed	*: Displayed only when the ID No. is not registered.
REGIT ID3 CODE	Registered ID3 code/ min.: 0, max.: FFFFFF*	The ID No. registered in the transmitter ID3 is displayed	*: Displayed only when the ID No. is not registered.
REGIT ID4 CODE	Registered ID4 code/ min.: 0, max.: FFFFFF*	The ID No. registered in the transmitter ID4 is displayed	*: Displayed only when the ID No. is not registered.

(b) Check the ID number on the identified transmitter by removing it from the tire and wheel.

Tire Pressure warning valve and transmitter:



H E128762E07

(c) Confirm that the ID number on the transmitter and recorded transmitter ID match.

Result

Result	Proceed to
Match	A
Do not match	B

TW

B → **Go to step 6**

A

5	REPLACE TIRE PRESSURE WARNING VALVE AND TRANSMITTER

HINT:
(See page TW-75)

NEXT

6	REGISTRATION OF TRANSMITTER ID

(a) Perform registration (See page TW-14).
(b) Set the tire pressure to the appropriate specified values.

Cold tire inflation pressure

Tire size	Front kPa (kgf/cm^2, psi)	Rear kPa (kgf/cm^2, psi)
P215/60R16 94V	220 (2.2, 32)	220 (2.2, 32)

NEXT

7	PERFORM INITIALIZATION

(a) Perform initialization (See page TW-17).

NEXT

8	READ VALUE OF DATA LIST

(a) Turn the power switch off, and then turn it on (IG).
(b) Select "TIREPRESS" by following the prompts displayed on the intelligent tester.
HINT:
It may take up to 1 minute or more to display the tire pressure data.

Result

Condition	Proceed to
All tire pressure readings are equal to specified values.	A
Tire pressure values are not displayed.	B

A → END

B

9	REPLACE TIRE PRESSURE WARNING ANTENNA AND RECEIVER

(a) Replace the tire pressure warning antenna and receiver (See page TW-72).

NEXT

10	READ VALUE OF DATA LIST

(a) Turn the power switch off, and then turn it on (IG).
(b) Select "TIREPRESS" by following the prompts displayed on the intelligent tester.
HINT:
It may take up to 1 minute or more to display the tire pressure data.

Result

Condition	Proceed to
All tire pressure readings are equal to specified values.	A
Tire pressure values are not displayed.	B

B → **REPLACE TIRE PRESSURE WARNING ECU (See page TW-79)**

A

END

DTC	C2141/41	Transmitter ID1 Error

DTC	C2142/42	Transmitter ID2 Error

DTC	C2143/43	Transmitter ID3 Error

DTC	C2144/44	Transmitter ID4 Error

DESCRIPTION

The tire pressure warning valve and transmitters that are installed in the tire and wheel assemblies measure the air pressure of the tires. The measured values are transmitted to the tire pressure warning antenna and receiver on the body as radio waves and then sent to the tire pressure warning ECU. The ECU compares the measured air pressure values with the air pressure threshold. When the measured air pressure value is less than this threshold, the warning light in the combination meter comes on.
When the internal circuit of the tire pressure warning valve and transmitter is malfunctioning, this DTC is output.

DTC No.	DTC Detecting Condition	Trouble Area
C2141/41 C2142/42 C2143/43 C2144/44	If an "ERROR" signal is received 3 times consecutively, the tire pressure warning valve and transmitter will be judged as defective and a DTC will be output. This will happen in situations where the inflation pressure is outside the range 0 to 637.5 kPa (0 to 6.48 kgf/cm^2, 0 psi to 92.2 psi), the temperature inside the tire is outside the specified range -40 to 120°C (-40 to 248°F), or an error occurs in the tire pressure warning valve and transmitter or the surrounding area.	• Tire pressure warning valve and transmitter • Tire pressure warning ECU

HINT:
It is necessary to perform the procedure to identify the tire pressure warning valve and transmitter that is malfunctioning because it cannot be identified by the output DTC.

INSPECTION PROCEDURE

NOTICE:

- **When replacing the tire pressure warning ECU, read the IDs stored in the ECU using the intelligent tester and write them down before removal.**
- **It is necessary to perform initialization (See page TW-14) after registration (See page TW-17) of the transmitter IDs into the tire pressure warning ECU after the ECU and/or valve and transmitter has been replaced.**

TW

1	IDENTIFY TRANSMITTER CORRESPONDING TO DTC

(a) Set the tire pressure to the specified value.

Cold tire inflation pressure

Tire size	Front kPa (kgf/cm^2, psi)	Rear kPa (kgf/cm^2, psi)
P215/60R16 94V	220 (2.2, 32)	220 (2.2, 32)

(b) Display the "TIREPRESS" data for each wheel using the intelligent tester.

(c) Rapidly reduce the tire pressure for each wheel at least 40 kPa (0.41 kg/cm^2, 5.8 psi) within 30 seconds. If "TIREPRESS" displayed on the tester (ID1 to ID4) does not change, the tire pressure warning valve and transmitter corresponds to the DTC that was detected.
HINT:
- Identify the malfunctioning tire pressure warning valve and transmitter by repeatedly decreasing the tire pressure for each tire.
- Record which "TIREPRESS" data (ID1 to ID4) corresponds to each tire.

TIRE PRESSURE:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
TIREPRESS1	ID1 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS2	ID2 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS3	ID3 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS4	ID4 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-

(d) Check the DATA LIST.

Result

Condition	Detection Condition
One of "TIREPRESS" data (ID1 to ID4) changed.	**Normal**
"TIREPRESS" data did not change.	**Transmitter corresponding to DTC**

NOTICE:
- **When the "TIREPRESS" data has not changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then forcibly transmit the transmitter ID and recheck.**
- **Record the transmitter ID and position of transmitters that are normal.**

(e) When the "TIREPRESS" data (ID1 to ID4) has changed, repeat this procedure to identify the tire pressure warning valve and transmitter that corresponds to a DTC.

(f) When all of the "TIREPRESS" data (ID1 to ID4) have changed, identify the malfunctioning tire pressure warning valve and transmitter using recorded ID numbers and output DTC.

(g) Set the tire pressures to the appropriate specified values.

NEXT

2	REPLACE TIRE PRESSURE WARNING VALVE AND TRANSMITTER

(a) Replace the identified tire pressure warning valve and transmitter with a new one (See page TW-75).
HINT:
- Before installing a new tire pressure warning valve and transmitter, read and write down its transmitter ID.
- The IDs for the tire pressure warning valve and transmitter not to be replaced should be checked using the tester and recorded.

NEXT

3	REGISTRATION OF TRANSMITTER ID

(a) Register the transmitter ID for all wheels (See page TW-14).
(b) Set the tire pressure to the specified value.

Cold tire inflation pressure

Tire size	Front kPa (kgf/cm^2, psi)	Rear kPa (kgf/cm^2, psi)
P215/60R16 94V	220 (2.2, 32)	220 (2.2, 32)

NEXT

4	PERFORM INITIALIZATION

(a) Perform initialization (See page TW-17).

NEXT

5	CHECK FOR DTC

(a) Check for a DTC (See page TW-28).

Result

Condition	Proceed to
Any of the DTCs from C2141/41 to C2144/44 are output.	A
Any of the DTCs from C2141/41 to C2144/44 are not output.	B

B → END

A

REPLACE TIRE PRESSURE WARNING ECU (See page TW-79)

TW

DTC	C2165/65	Abnormal Temperature Inside ID1 Tire

DTC	C2166/66	Abnormal Temperature Inside ID2 Tire

DTC	C2167/67	Abnormal Temperature Inside ID3 Tire

DTC	C2168/68	Abnormal Temperature Inside ID4 Tire

DESCRIPTION

Each tire pressure warning valve and transmitter measures the internal temperature of its tire as well as tire pressure, and transmits the information to the tire pressure warning ECU along with the transmitter ID. If the measured temperature is out of the specified range, the tire pressure warning ECU recognizes it as a malfunction, outputs DTCs, and blinks the tire pressure warning light.

DTC No.	DTC Detecting Condition	Trouble Area
C2165/65 C2166/66 C2167/67 C2168/68	Temperature inside the tire exceeds 119°C (246.2°F) more than once.	• Tires • Tire pressure warning valve and transmitter • Tire pressure warning ECU

HINT:
It is necessary to perform the procedure to identify the tire pressure warning valve and transmitter that is malfunctioning because it cannot be identified by the output DTC.

INSPECTION PROCEDURE

NOTICE:

- **When replacing the tire pressure warning ECU, read the IDs stored in the ECU using the intelligent tester and note them down before removal.**
- **It is necessary to perform initialization (See page TW-17) after registration (See page TW-14) of the transmitter IDs into the tire pressure warning ECU after the ECU and/or valve and transmitter has been replaced.**

1	CHECK TIRES

(a) Check the tire is not flat, and there is no indication of air pressure drop.
OK:
Tire is normal.
HINT:
If a tire is damaged, the tire pressure warning valve and transmitter may also have been damaged at the same time.

NG → **REPLACE TIRE AND TIRE PRESSURE WARNING VALVE AND TRANSMITTER (See page TW-75)**

OK

2	IDENTIFY TRANSMITTER CORRESPONDING TO DTC

(a) Set the tire pressure to the specified value.

TW

Cold tire inflation pressure

Tire size	Front kPa (kgf/cm^2, psi)	Rear kPa (kgf/cm^2, psi)
P215/60R16 94V	220 (2.2, 32)	220 (2.2, 32)

(b) Display the "TIREPRESS" data for each wheel using the intelligent tester.
(c) Rapidly reduce the tire pressure for each wheel at least 40 kPa (0.41 kg/cm^2, 5.8 psi) within 30 seconds.
(d) Check the DATA LIST.

TIRE PRESSURE:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
TIREPRESS1	ID1 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS2	ID2 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS3	ID3 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS4	ID4 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-

Result

Condition	Detection Condition
One of "TIREPRESS" data (ID1 to ID4) changed.	**Normal**
No "TIREPRESS" data changed.	**Transmitter corresponding to DTC**

NOTICE:

- **It takes about 1 minute or more to display the updated data.**
- **When no "TIREPRESS" data has changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then forcibly transmit the transmitter ID and recheck it.**
- **Record the transmitter ID and position in normal condition.**

(e) When the "TIREPRESS" data (ID1 to ID4) has changed, repeat this procedure to identify the tire pressure warning valve and transmitter that corresponds to a DTC.
(f) When all of the "TIREPRESS" data (ID1 to ID4) have changed, identify the malfunctioning tire pressure warning valve and transmitter based on the recorded ID numbers and output DTC.

NEXT

3	REPLACE TIRE PRESSURE WARNING VALVE AND TRANSMITTER

(a) Replace the identified tire pressure warning valve and transmitter with a new one (See page TW-72).

HINT:
- Before installing a new tire pressure warning valve and transmitter, read and write down its transmitter ID.
- The IDs for the tire pressure warning valve and transmitter not to be replaced should be checked using tester and recorded.

NEXT

4	CHECK REGISTRATION OF TRANSMITTER ID

(a) Register the transmitter ID for all wheels (See page TW-14).
(b) Set the tire pressure of all wheels to the specified value.

Cold tire inflation pressure

Tire size	Front kPa (kgf/cm^2, psi)	Rear kPa (kgf/cm^2, psi)
P215/60R16 94V	220 (2.2, 32)	220 (2.2, 32)

NEXT

5	PERFORM INITIALIZATION

(a) Perform initialization (See page TW-17).

NEXT

6	CHECK DTC

(a) Check for a DTC (See page TW-28).

Result

Condition	Proceed to
Any of the DTCs from C2165/65 to C2168/68 are output.	A
Any of the DTCs from C2165/65 to C2168/68 are not output.	B

B → END

A

REPLACE TIRE PRESSURE WARNING ECU (See page TW-79)

DTC	C2171/71	Transmitter ID not Registered

DESCRIPTION

The IDs of each tire pressure warning valve and transmitters are registered to the tire pressure warning ECU.
When the ECU detects that an ID is not the one of the registered IDs, or cannot receive an ID signal, this DTC is output.

DTC No.	DTC Detection Condition	Trouble Area
C2171/71	Transmitter ID code is not registered. (When an ID code is unregistered for 51 minutes or more)	Tire pressure warning ECU

INSPECTION PROCEDURE

NOTICE:

- **When replacing the tire pressure warning ECU, read the IDs stored in the ECU using the intelligent tester and note them down before removal.**
- **It is necessary to perform initialization (See page TW-17) after registration (See page TW-14) of the transmitter IDs into the tire pressure warning ECU after the ECU has been replaced.**

1 CONFIRM REGISTRATION CONDITION (REGISTERED ID CODES)

(a) Connect the intelligent tester to the DLC3 connector.
(b) Turn the power switch ON (IG) and turn the tester on.
(c) Select REGIT ID CODE by following the prompts displayed on the intelligent tester.

OK:

The registered transmitter ID codes are displayed on the intelligent tester screen.

NG → **Go to step 2**

OK

REPLACE TIRE PRESSURE WARNING ECU (See page TW-79)

2 PERFORM REGISTRATION (TRANSMITTER ID)

(a) Register the transmitter IDs for all the wheels (See page TW-14).
(b) Set the tire pressure of all the wheels to the appropriate specified values.

NEXT

3 READ VALUE OF DATA LIST

(a) Check the DATA LIST (See page TW-29).
(b) Select "TIREPRESS" by following the prompts displayed on the intelligent tester.

HINT:
It may take up to 1 minute or more to display the tire pressure data.

Result

Condition	Proceed to
All tire pressure readings are equal to specified values.	A
Tire pressure values are not displayed	B

B → **REPLACE TIRE PRESSURE WARNING ECU (See page TW-79)**

A

END

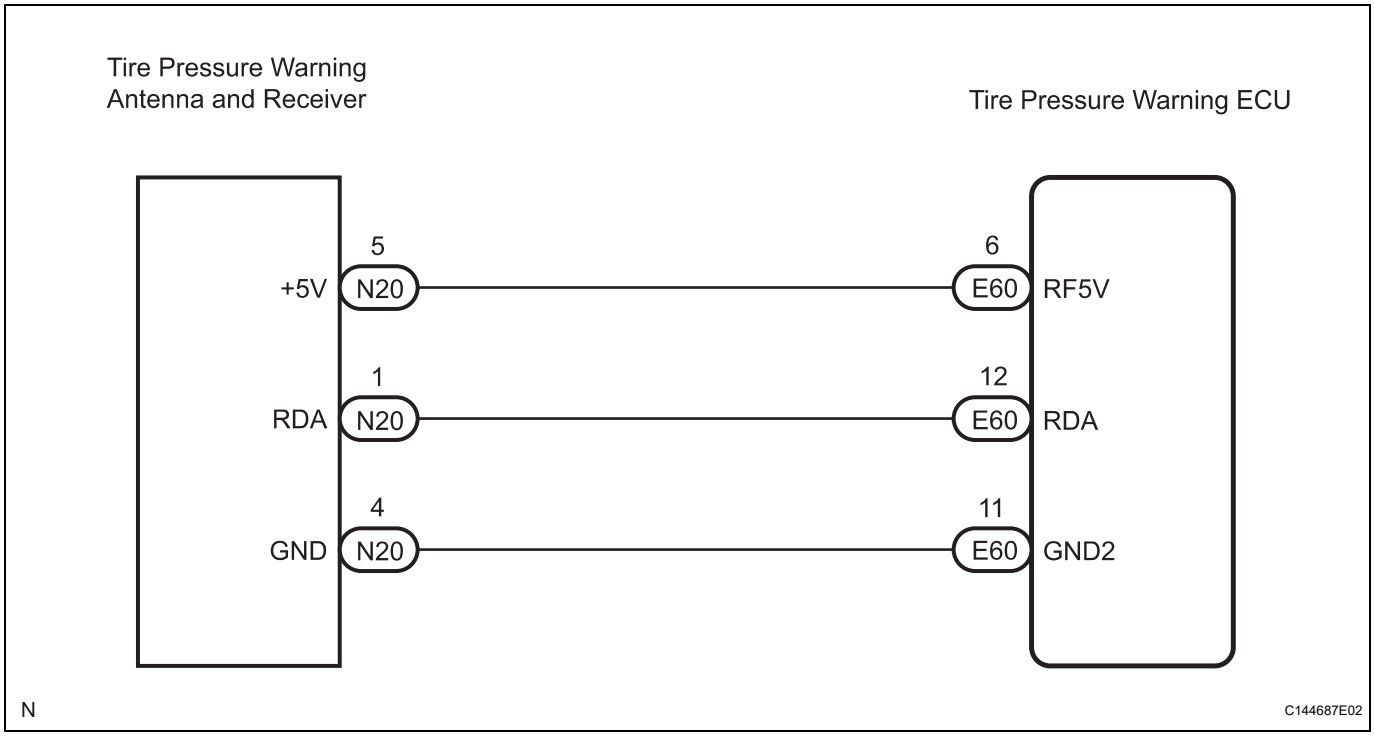
DTC	C2176/76	Receiver Error

DESCRIPTION

The signals are transmitted to the tire pressure warning antenna and receiver on the body as radio waves and then sent to the tire pressure warning ECU.

DTC No.	DTC Detection Condition	Trouble Area
C2176/76	DTC is stored when any of the following is detected: • Malfunction in the tire pressure warning ECU internal circuit. • Terminal RF5V is shorted to ground. • Malfunction in the tire pressure warning antenna and receiver internal circuit.	• Tire pressure warning antenna and receiver • Wire harness or connector • Tire pressure warning ECU

WIRING DIAGRAM



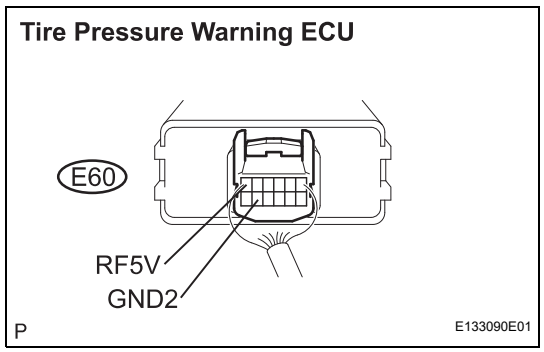
INSPECTION PROCEDURE

NOTICE:

- **When replacing the tire pressure warning ECU, read the IDs stored in the ECU using the intelligent tester and write them down before removal.**
- **It is necessary to perform initialization (See page TW-17) after registration (See page TW-14) of the transmitter IDs into the tire pressure warning ECU after the ECU has been replaced.**

TW

1	CHECK TIRE PRESSURE WARNING ECU



(a) Measure the voltage according to the value(s) in the table below.

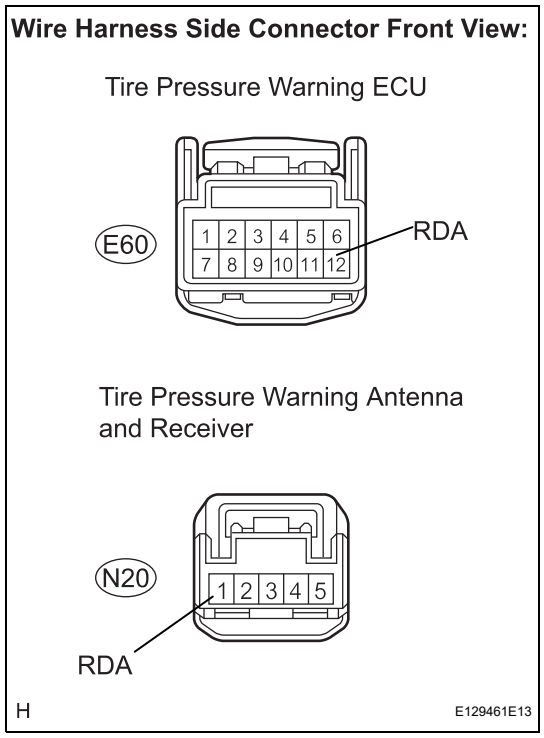
Standard voltage

Tester Connection	Switch Condition	Specified Condition
E60-6 (RF5V) - E60-11 (GND2)	Power switch ON (IG)	4.5 to 5.5 V

NG → Go to step 5

OK

2	CHECK WIRE HARNESS (ECU - RECEIVER)



(a) Disconnect the E60 ECU connector.
(b) Disconnect the N20 receiver connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E60-12 (RDA) - N20-1 (RDA)	Below 1 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3	REPLACE TIRE PRESSURE WARNING ANTENNA AND RECEIVER

(a) Replace the tire pressure warning antenna and receiver (See page TW-72).

NEXT

4	CHECK FOR DTC

(a) Check for DTCs (See page TW-28).

TW

OK:
DTC is not output.
HINT:
- It is necessary to register IDs when replacing the tire pressure warning ECU (See page TW-14).
- Read the IDs in the DATA LIST before removing the tire pressure warning ECU. Register the ID in the new tire pressure warning ECU.

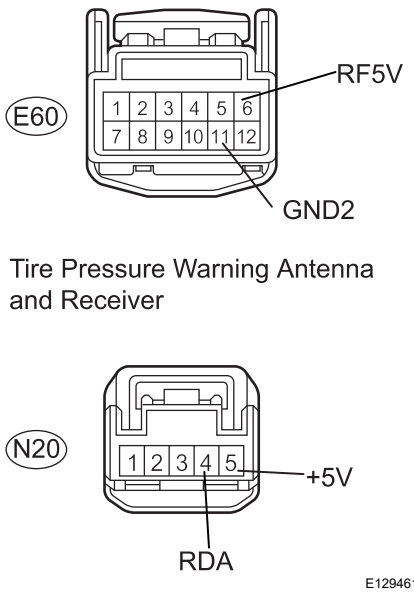
NG → **REPLACE TIRE PRESSURE WARNING ECU (See page TW-79)**

OK

END

5 CHECK HARNESS AND CONNECTOR (ECU - RECEIVER)

Wire Harness Side Connector Front View:



(a) Disconnect the E60 ECU connector.
(b) Disconnect the N20 receiver connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E60-11 (GND2) - N20-4 (GND)	Below 1 Ω
E60-6 (RF5V) - N20-5 (+5V)	

Result

Result	Proceed to
OK	A
OK (When troubleshooting in accordance with PROBLEM SYMPTOMS TABLE)	B
NG	C

A → **REPLACE TIRE PRESSURE WARNING ECU (See page TW-79)**

C → **REPAIR OR REPLACE HARNESS OR CONNECTOR AND REPLACE TIRE PRESSURE WARNING ECU**

B

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page TW-22)

TW

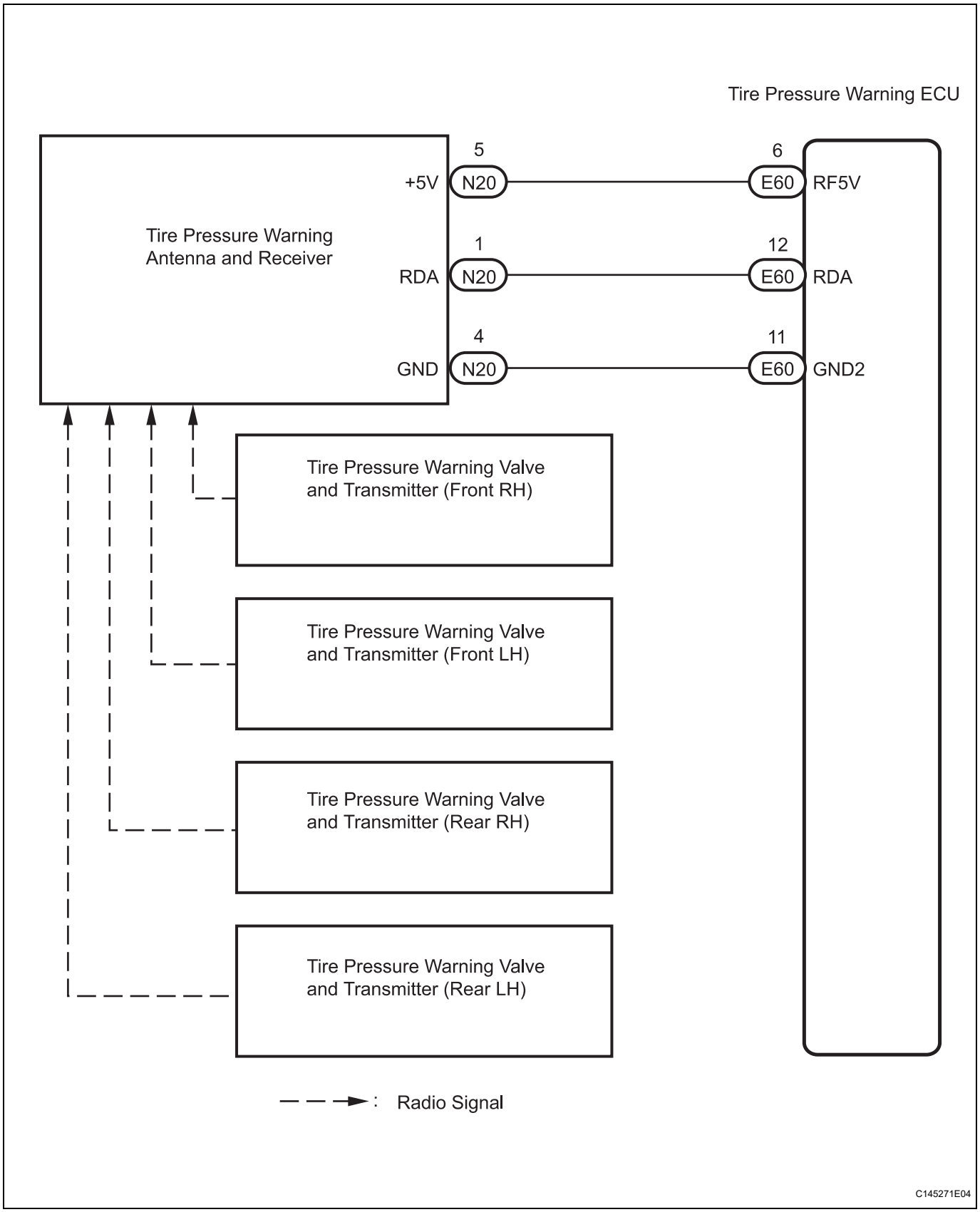
DTC	C2177/77	Initialization not Completed

DESCRIPTION

Initialization is necessary after replacing any of the ECU, tires with different tire pressure, or tire pressure warning valve and transmitter, after rotating the tires or when a new vehicle is delivered.

DTC No.	DTC Detection Condition	Trouble Area
C2177/77	Initialization is not completed after vehicle speed of 5 mph (8 km/h) or more continues for 20 minutes or more (total).	• Tire pressure warning valve and transmitter • Tire pressure warning ECU • Tire pressure warning antenna and receiver • Wire harness or connector

WIRING DIAGRAM



TW

INSPECTION PROCEDURE

NOTICE:

- **When replacing the tire pressure warning ECU, read the IDs stored in the old ECU using the intelligent tester and write them down before removal.**
- **It is necessary to perform initialization (See page TW-17) after registration (See page TW-14) of the transmitter IDs into the tire pressure warning ECU after the ECU and/or valve and transmitter has been replaced.**

1	CHECK FREQUENCY RECEIVING CONDITION

(a) Check if the vehicle is not located in areas such as described below:

(1) Facilities or devices that use similar radio frequencies are located in the vicinity of the vehicle.

HINT:

If the vehicle is located in areas described above, the tire pressure warning light may come on only in a particular area.

(2) Devices using similar radio frequencies are not located in the vicinity of the vehicle.

OK:

Facilities, or devices that use similar radio frequencies are not located in the vicinity of the vehicle.

HINT:

Radio frequency may be interrupted due to surroundings or devices installed by user.

NG → **CHECK IF ANY DEVICE IS INSTALLED BY USER**

OK

2	IDENTIFY TRANSMITTER CORRESPONDING TO DTC

(a) Set the tire pressure to the appropriate specified values.

Cold tire inflation pressure

Tire size	Front kPa (kgf/cm^2, psi	Rear kPa (kgf/cm^2, psi)
P215/60R16 94V	220 (2.2, 32)	220 (2.2, 32)

(b) Select "TIREPRESS" by following the prompts displayed on the intelligent tester.

TIRE PRESSURE:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
TIREPRESS1	ID1 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS2	ID2 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS3	ID3 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
TIREPRESS4	ID4 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-

(c) Rapidly reduce the tire pressure for each wheel at least 40 kPa (0.41 kg/cm^2, 5.8 psi) within 30 seconds.

(d) Check the DATA LIST.

NOTICE:

- **It takes about 1 minute or more to display the updated tire pressure data.**
- **When no "TIREPRESS" data has changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then rapidly release the tire pressure and recheck it.**
- **Record the transmitter ID of which "TIREPRESS" data corresponds to each tire.**

(e) After confirming that one of "TIREPRESS" data for one tire (ID1 to ID4) has changed, repeat this procedure one by one. Identify the transmitter that corresponds to DTC.

Result

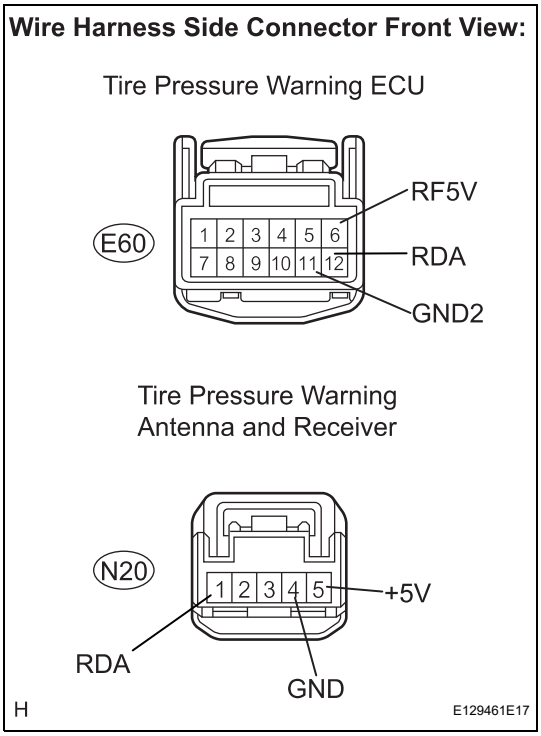
Condition	Proceed to
One or more of transmitters	A
All normal	B
All abnormal	C

A	Go to step 4
B	END

C

3	CHECK HARNESS AND CONNECTOR (ECU - RECEIVER)

Wire Harness Side Connector Front View:



(a) disconnect the E60 ECU connector.
(b) Disconnect the N20 receiver connector.
(c) Measure the resistance according to the value(s) in the table below.

Tester Connection	Specified Condition
E60-12 (RDA) - N20-1 (RDA)	Below 1 Ω
E60-11 (GND2) - N20-4 (GND)	
E60-6 (RF5V) - N20-5 (+5V)	

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

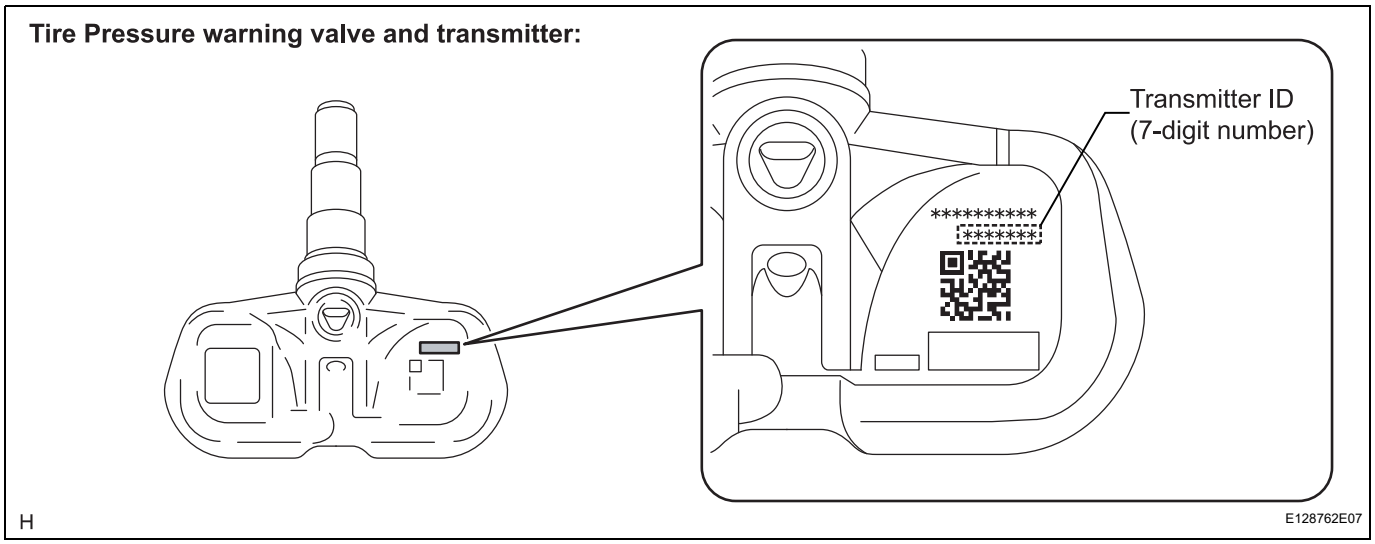
4	INSPECT TIRE PRESSURE WARNING VALVE AND TRANSMITTER

(a) Select REGIT ID CODE by following the prompts displayed on the intelligent tester.

TIRE PRESSURE:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
REGIT ID1 CODE	Registered ID1 code/ min.: 0, max.: FFFFFF*	The ID No. registered in the transmitter ID1 is displayed	*: Displayed only when the ID No. is not registered.
REGIT ID2 CODE	Registered ID2 code/ min.: 0, max.: FFFFFF*	The ID No. registered in the transmitter ID2 is displayed	*: Displayed only when the ID No. is not registered.
REGIT ID3 CODE	Registered ID3 code/ min.: 0, max.: FFFFFF*	The ID No. registered in the transmitter ID3 is displayed	*: Displayed only when the ID No. is not registered.
REGIT ID4 CODE	Registered ID4 code/ min.: 0, max.: FFFFFF*	The ID No. registered in the transmitter ID4 is displayed	*: Displayed only when the ID No. is not registered.

(b) Check the ID number on the identified transmitter by removing it from the tire and wheel.



(c) Confirm that the ID number on the transmitter and recorded transmitter ID match.

Result

Result	Proceed to
Match	A
Do not match	B

B → **Go to step 6**

A

5 REPLACE TIRE PRESSURE WARNING VALVE AND TRANSMITTER

HINT:
(See page TW-75)

NEXT

6 REGISTRATION OF TRANSMITTER ID

(a) Perform registration (See page TW-14).
(b) Set the tire pressure to the appropriate specified values.

Cold tire inflation pressure

Tire size	Front kPa (kgf/cm^2, psi)	Rear kPa (kgf/cm^2, psi)
P215/60R16 94V	220 (2.2, 32)	220 (2.2, 32)

NEXT

7 PERFORM INITIALIZATION

(a) Perform initialization (See page TW-17).

NEXT

TW

8	READ VALUE OF DATA LIST

(a) Turn the power switch off, and then turn it on (IG).
(b) Select "TIREPRESS" by following the prompts displayed on the intelligent tester.
HINT:
It may take up to 1 minute or more to display the tire pressure data.

Result

Condition	Proceed to
All tire pressure readings are equal to specified values.	A
Tire pressure values are not displayed.	B

A → END

B

9	REPLACE TIRE PRESSURE WARNING ANTENNA AND RECEIVER

(a) Replace the tire pressure warning antenna and receiver (See page TW-72).

NEXT

10	READ VALUE OF DATA LIST

(a) Turn the engine switch off, and then turn it on (IG).
(b) Select "TIREPRESS" by following the prompts displayed on the intelligent tester.
HINT:
It may take up to 1 minute or more to display the tire pressure data.

Result

Condition	Proceed to
All tire pressure readings are equal to specified values.	A
Tire pressure values are not displayed	B

B → **REPLACE TIRE PRESSURE WARNING ECU (See page TW-79)**

A

END

DTC	C2191/91	Vehicle Speed Signal Error (Test Mode DTC)

DESCRIPTION

The tire pressure warning ECU receives a speed signal from the combination meter. This DTC is stored upon entering test mode, and cleared when a vehicle speed signal of 12 mph (20 km/h) is detected for 3 seconds or more. This DTC is output only in test mode.

DTC No.	DTC Detecting Condition	Trouble Area
C2191/91	Speed sensor circuit malfunction	• Vehicle speed sensor • Tire pressure warning ECU • Combination meter • Wire harness or connector

WIRING DIAGRAM

INSPECTION PROCEDURE

NOTICE:

- **When replacing the tire pressure warning ECU, read the IDs stored in the ECU using the intelligent tester and write them down before removal.**
- **It is necessary to perform initialization (See page TW-17) after registration (See page TW-14) of the transmitter IDs into the tire pressure warning ECU after the ECU has been replaced.**

1	READ VALUE ON INTELLIGENT TESTER

(a) Connect the intelligent tester to DLC3.
(b) Turn the power switch on (IG), and turn the intelligent tester on.
(c) Select the item below in the Data List, and read the value displayed on the intelligent tester.

HINT:
Enter the following menus: DIAGNOSIS / OBD/MOBD / METER / DATA LIST.

METER

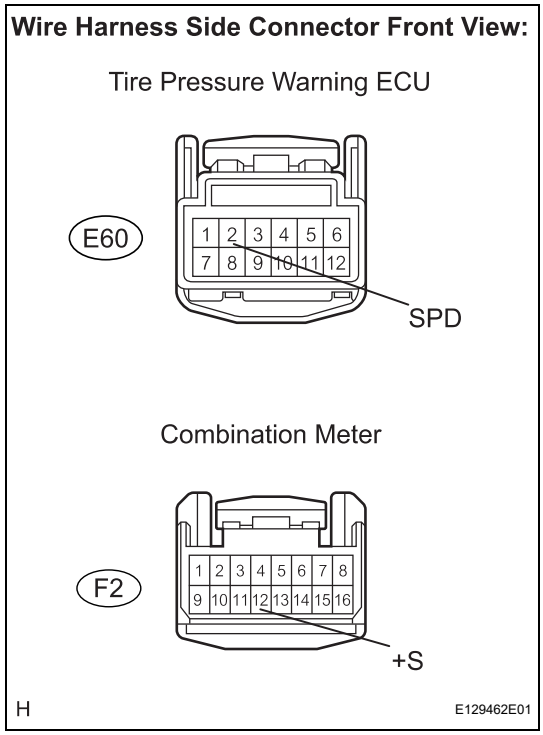
Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
SPEED METER	Vehicle speed/Min.: 0 km/h (0 mph), Max.: 255 km/h (158 mph)	Almost same as actual vehicle speed	-

(d) Check that the values indicated on the tester and on the combination meter are the same.
OK:
Vehicle speed indicated on the intelligent tester indicates the actual speed.

NG → **GO TO METER / GAUGE SYSTEM (See page ME-14)**

OK

2 CHECK HARNESS AND CONNECTOR (ECU - COMBINATION METER)



(a) Disconnect the E60 ECU connector.
(b) Disconnect the F2 meter connector.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
E60-2 (SPD) - F2-12 (+S)	Below 1 Ω
E60-2 (SPD) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE TIRE PRESSURE WARNING ECU (See page TW-79)

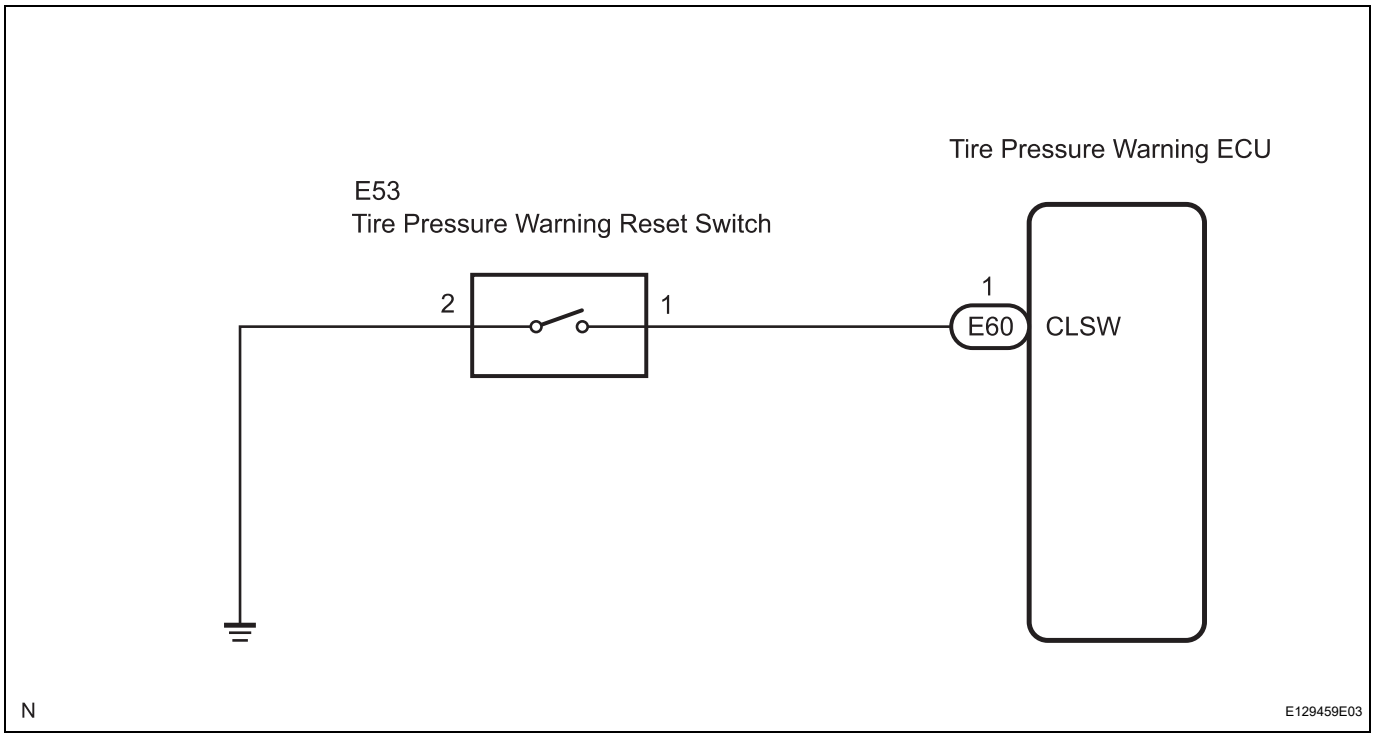
TW

Tire Pressure Warning Reset Switch Circuit

DESCRIPTION

Receiving a signal from the tire pressure warning reset switch, the tire pressure warning ECU and receiver indicates the initialization of the tire pressure warning system.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- **When replacing the tire pressure warning ECU, read the IDs stored in the ECU using the intelligent tester and write them down before removal.**
- **It is necessary to perform initialization (See page TW-17)after registration (See page TW-14) of the transmitter IDs into the tire pressure warning ECU after the ECU have been replaced.**

1	CHECK TIRE PRESSURE WARNING RESET SWITCH FUNCTION

TW

(a) Perform the tire pressure warning reset switch test in TEST MODE PROCEDURE (See page TW-19).

OK:

Reset switch ON:
Tire pressure warning light comes on.
Reset switch OFF:
Tire pressure warning light blinks.

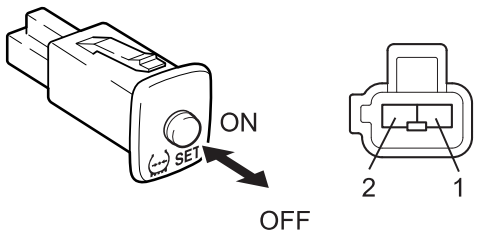
NG → **Go to step 2**

OK

END

2 INSPECT TIRE PRESSURE WARNING RESET SWITCH

Tire Pressure Warning Reset Switch:



(a) Disconnect the tire pressure warning reset switch connector.

(b) Measure the resistance between terminals 1 and 2 of the tire pressure warning reset switch when the tire pressure warning switch is ON and OFF.

Standard resistance

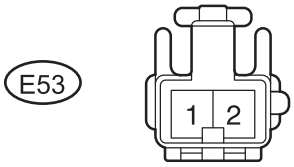
Switch Condition	Specified Condition
ON	Below 1 Ω
OFF	10 kΩ or higher

NG → **REPLACE TIRE PRESSURE WARNING RESET SWITCH (See page TW-82)**

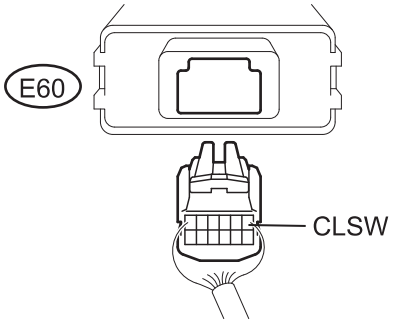
OK

3 CHECK HARNESS AND CONNECTOR (TIRE PRESSURE WARNING RESET SW - TIRE PRESSURE WARNING ECU)

Tire Pressure Warning Reset Switch: (harness side connector)



Tire Pressure Warning ECU:



(a) Disconnect the tire pressure warning reset switch E53 connector and tire pressure warning ECU E60 connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Switch Condition	Specified Condition
E60-1 (CLSW) - E53-1	Below 1 Ω
E60-1 (CLSW) - Body ground	10 kΩ or higher
E53-2 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE TIRE PRESSURE WARNING ECU (See page TW-79)

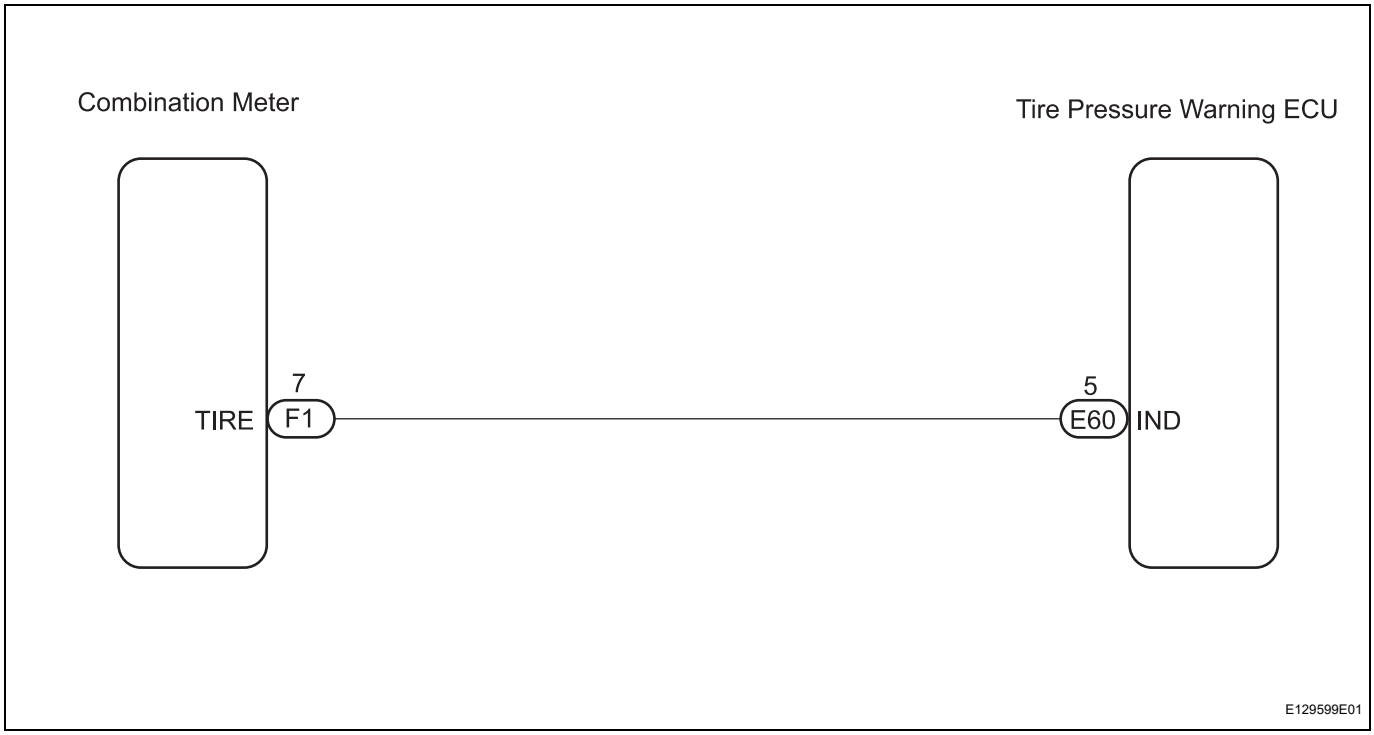
TW

Tire Pressure Warning Light Circuit

DESCRIPTION

If the ECU detects trouble, the tire pressure warning light blinks (comes on after blinking for 1 minute) and tire pressure monitor is cancelled at the same time. At this time, the ECU records a DTC in the memory. Terminals TC and CG of DLC3 to blink the tire pressure warning light and output the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

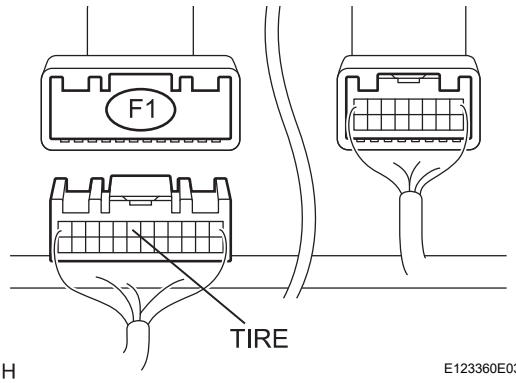
- **When replacing the tire pressure warning ECU, read the IDs stored in the ECU using the intelligent tester and write them down before removal.**
- **It is necessary to perform initialization (See page TW-17)after registration (See page TW-14) of the transmitter IDs into the tire pressure warning ECU after the ECU has been replaced.**

HINT:

This procedure must be performed according to PROBLEM SYMPTOMS TABLE.

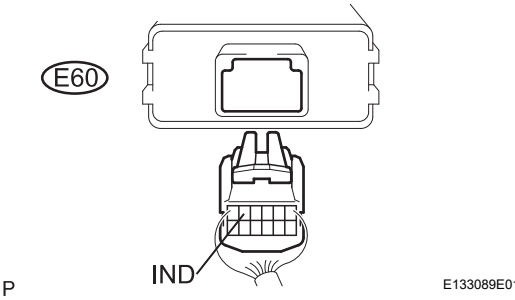
1	CHECK HARNESS AND CONNECTOR (COMBINATION METER - TIRE PRESSURE WARNING ECU)

Combination Meter Assembly Wire Harness View:



(a) Disconnect the F1 combination meter connector.

Tire Pressure Warning ECU



(b) Disconnect the E60 tire pressure warning ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

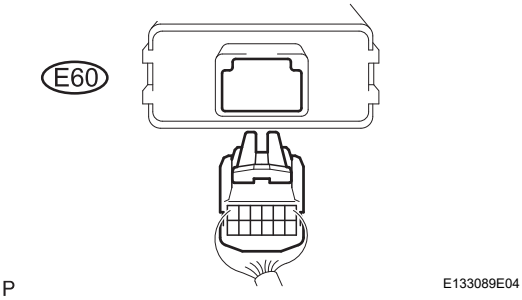
Tester Connection	Specified Condition
F1-7 (TIRE) - E60-5 (IND)	Below 1 Ω
F1-7 (TIRE) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	INSPECT COMBINATION METER

Tire Pressure Warning ECU



(a) Disconnect the connector from the tire pressure warning ECU.

(b) Turn the power switch on (IG), check the condition of the tire pressure warning light illumination.

Result

Condition	Proceed to
Illuminates	A
Does not illuminate	B

B → **REPLACE COMBINATION METER (See page ME-64)**

A

REPLACE TIRE PRESSURE WARNING ECU (See page TW-79)

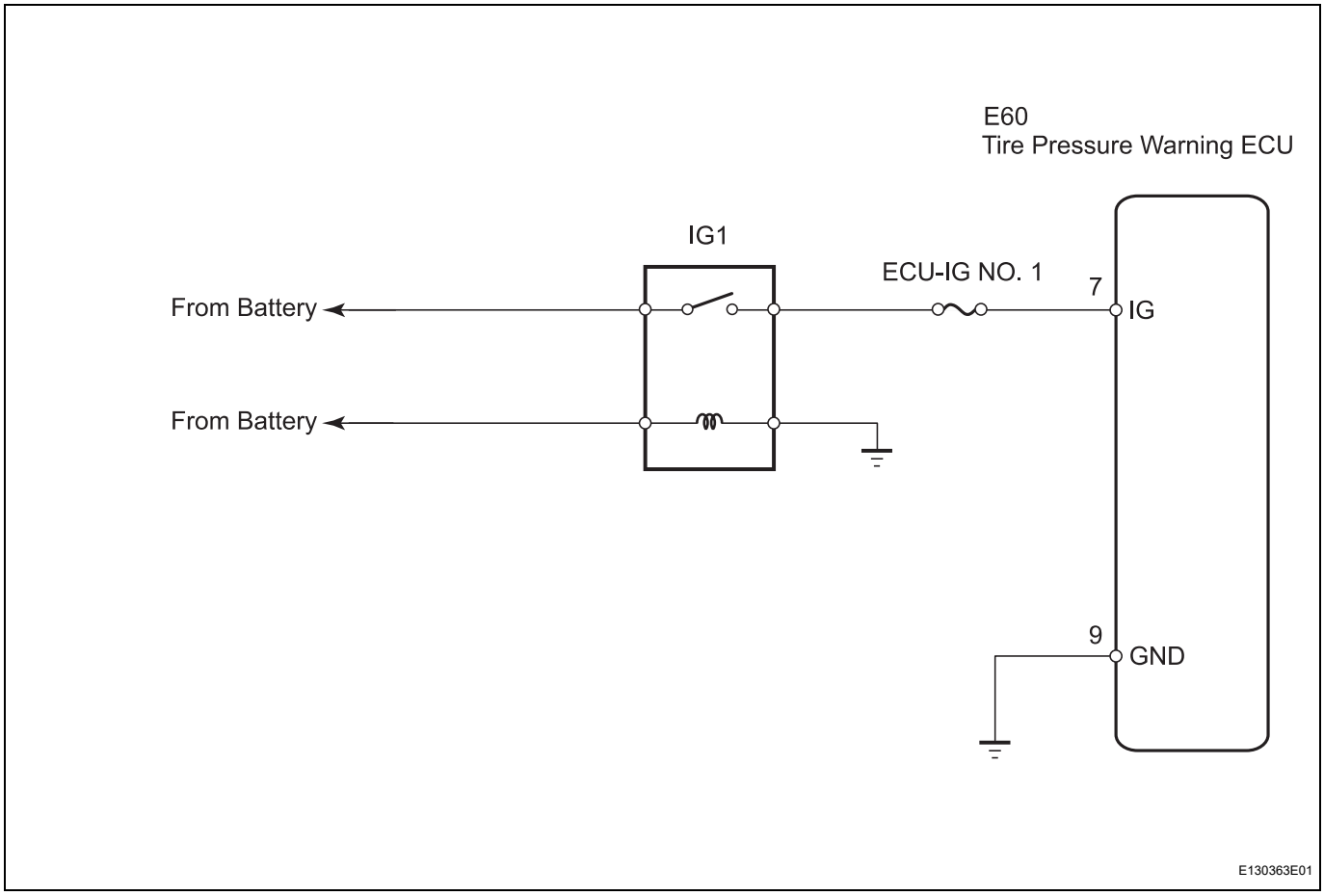
TW

ECU Power Source Circuit

DESCRIPTION

This is the power source for the tire pressure warning ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- **When replacing the tire pressure warning ECU, read the IDs stored in the ECU using the intelligent tester and write the m down before removal.**
- **It is necessary to perform initialization (See page TW-17) after registration (See page TW-14)of the transmitter IDs into the tire pressure warning ECU after the ECU have been replaced.**

TW

1	INSPECT FUSE (ECU-IG NO. 1)

(a) Remove the ECU-IG NO. 1 fuse from the instrument panel junction block.

(b) Measure the resistance of the fuse.

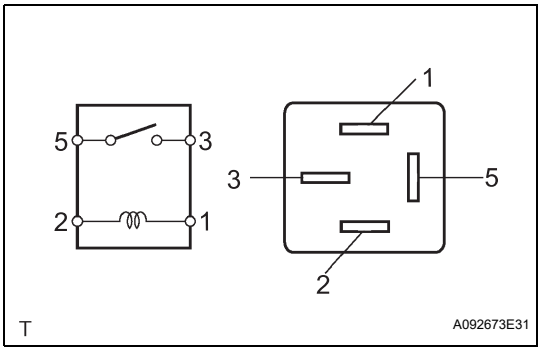
Standard resistance:

Below 1 Ω

NG	REPLACE FUSE

OK

2 INSPECT IG1 RELAY



(a) Remove the IG1 relay from the instrument panel junction block.
(b) Measure the resistance according to the value(s) in the table below.

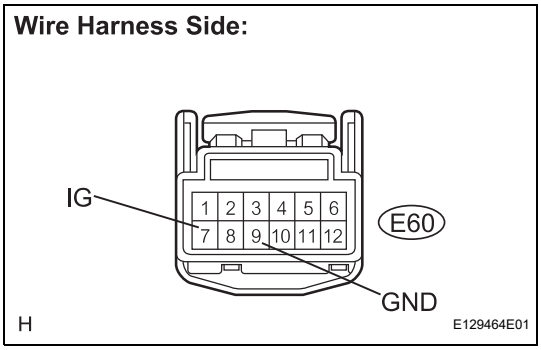
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)

NG → **REPLACE IG1 RELAY**

OK

3 CHECK HARNESS AND CONNECTOR (ECU - BATTERY AND BODY GROUND)



(a) Disconnect the E60 ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Switch Condition	Specified Condition
E60-7 (IG) - Body ground	Power switch on (IG)	10 to 14 V
	Power switch off	Below 1 V

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E60-9 (GND) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

TW

OK

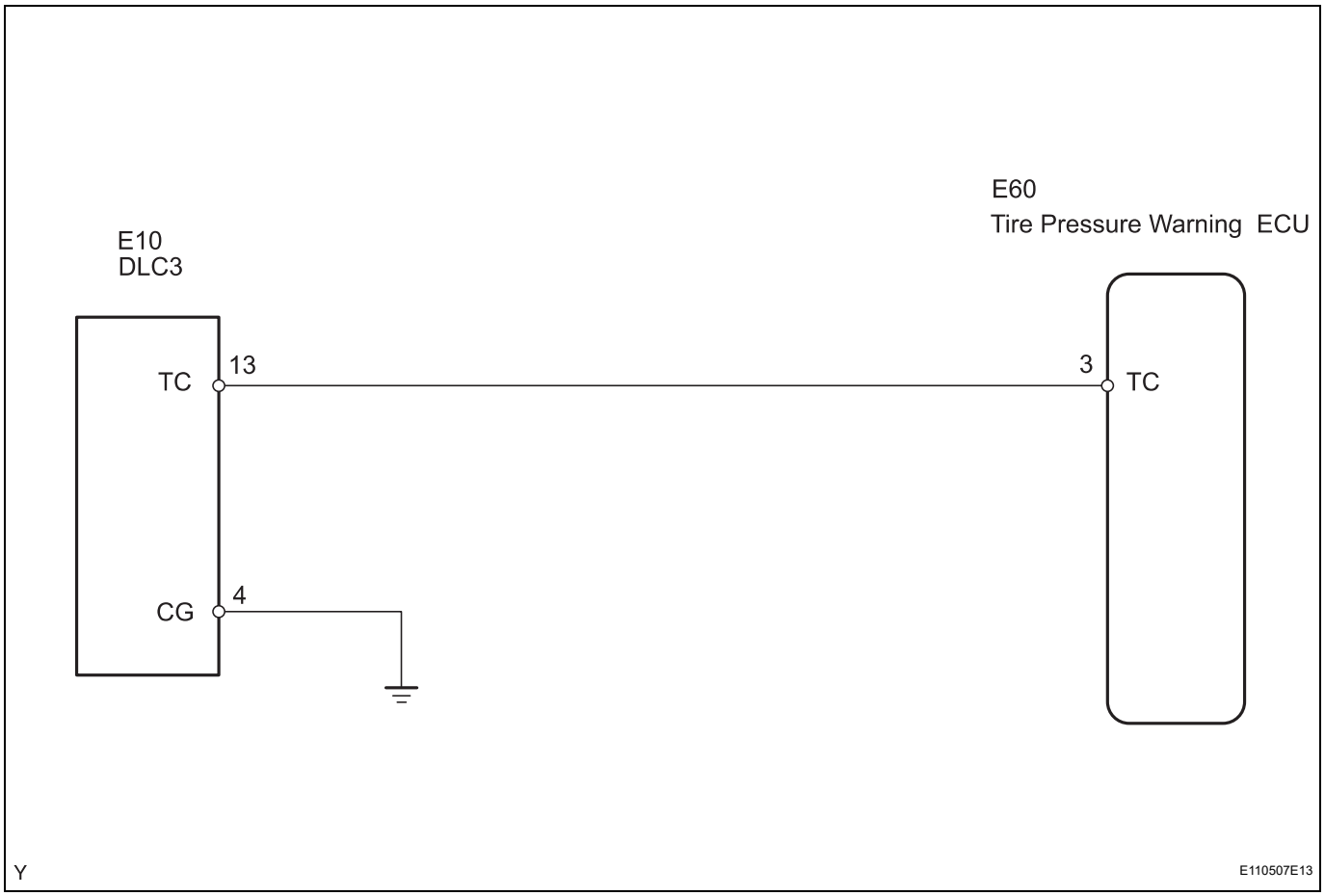
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

TC and CG Terminal Circuit

DESCRIPTION

DTC output mode is set by connecting terminals 13 (TC) and 4 (CG) of the DLC3. The DTCs are indicated by the blinking of the tire pressure warning light.

WIRING DIAGRAM



HINT:
When each warning light blinks continuously, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in an ECU connected to this circuit may have occurred.

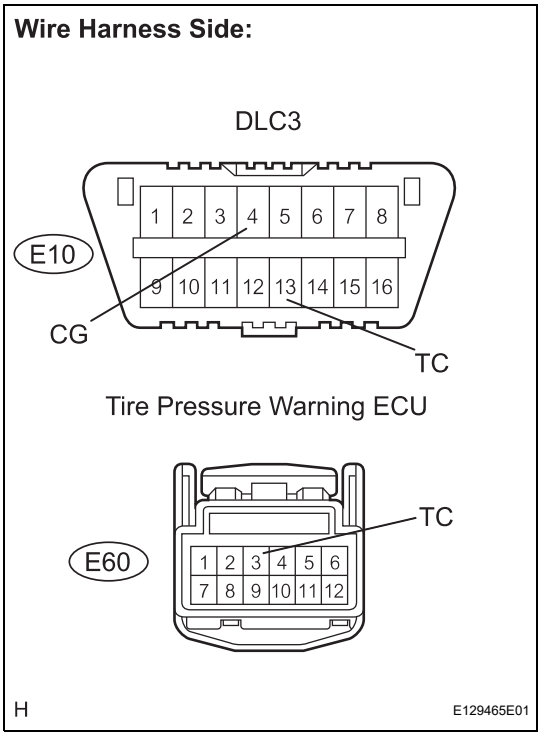
TW

INSPECTION PROCEDURE

NOTICE:

- **When replacing the tire pressure warning ECU, read the IDs stored in the ECU using the intelligent tester and write them down before removal.**
- **It is necessary to perform initialization (See page TW-17) after registration (See page TW-14) of the transmitter IDs into the tire pressure warning ECU after the ECU and/or valve and transmitter has been replaced.**

1	CHECK HARNESS AND CONNECTOR (DLC3 - TIRE PRESSURE WARNING ECU)



(a) Disconnect the E60 ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E60-3 (TC) - E10-13 (TC)	Below 1 Ω
E10-4 (CG) - Body ground	

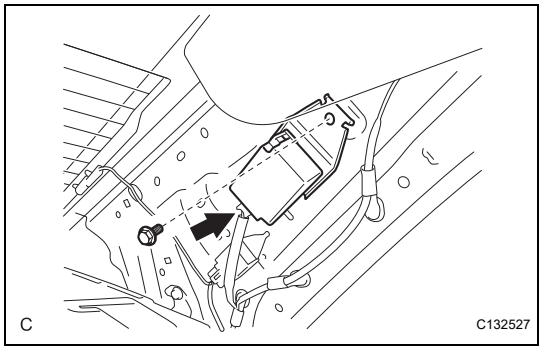
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

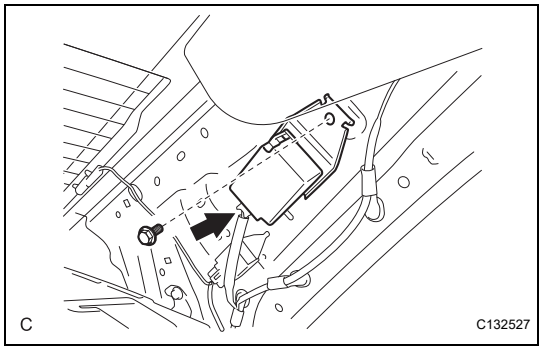
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-44)**
3. **REMOVE REAR SIDE SEAT BACK ASSEMBLY LH (See page SE-45)**
4. **REMOVE INNER ROOF SIDE GARNISH LH (See page IR-15)**
5. **REMOVE TIRE PRESSURE WARNING RECEIVER ASSEMBLY**
   (a) Remove the bolt.
   (b) Disconnect the connector and remove the tire pressure warning receiver assembly.





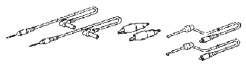
INSTALLATION

1. **INSTALL TIRE PRESSURE WARNING RECEIVER ASSEMBLY**
   (a) Connect the connector to the tire pressure warning receiver assembly.
   (b) Install the tire pressure warning receiver assembly with the bolt.
   Torque: 7.5 N*m (77 kgf*cm, 66 in.*lbf)
2. **INSTALL INNER ROOF SIDE GARNISH LH (See page IR-39)**
3. **INSTALL REAR SIDE SEAT BACK ASSEMBLY LH (See page SE-54)**
4. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-55)**
5. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
6. **PERFORM INITIALIZATION**
   NOTICE:
   Some systems need initialization after reconnecting the cable to the negative battery terminal (See page IN-43).
7. **INSPECT TIRE PRESSURE WARNING SYSTEM**
   HINT:
   (See page TW-19)

TW

2AZ-FXE ENGINE CONTROL SYSTEM

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

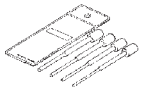
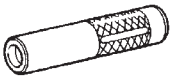
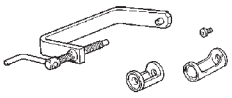
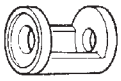
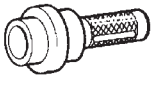
EQUIPMENT

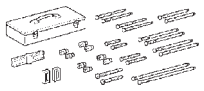
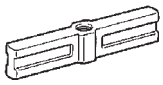
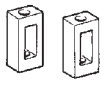
Ohmmeter	
Radiator cap tester	
Service Wire Harness	
Torque wrench	

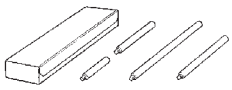
2AZ-FXE ENGINE MECHANICAL

SST

PP

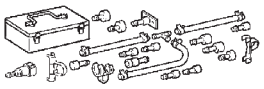
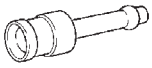
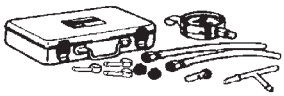
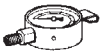
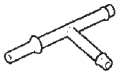
	09032-00100	Oil Pan Seal Cutter	
	09201-10000	Valve Guide Bushing Remover & Replacer Set	
	(09201-01050)	Valve Guide Bushing Remover & Replacer 5	
	09201-41020	Valve Stem Oil Seal Replacer	
	09202-70020	Valve Spring Compressor	
	(09202-00010)	Attachment	
	09213-54015	Crankshaft Pulley Holding Tool	
	(91651-60855)	Bolt	
	09223-15030	Oil Seal & Bearing Replacer	
	09223-22010	Crankshaft Front Oil Seal Replacer	
	09228-06501	Oil Filter Wrench	

	09309-37010	Transmission Bearing Replacer	
	09330-00021	Companion Flange Holding Tool	
	09817-33190	Sensor Socket Wrench	
	09843-18030	Tacho-pulse Pickup Wire No.2	
	09843-18040	Diagnosis Check Wire No. 2	
	09950-40011	Puller B Set	
	(09957-04010)	Attachment	
	09950-50013	Puller C Set	
	(09951-05010)	Hanger 150	
	(09952-05010)	Slide Arm	
	(09953-05020)	Center Bolt 150	
	(09954-05021)	Claw No. 2	

	09950-70010	Handle Set	
	(09951-07100)	Handle 100	

2AZ-FXE FUEL

SST

	09268-21010	Fuel Hose Puller	
	09268-31011	Injection Measuring Tool Set	
	(09268-41110)	Adaptor	
	(09268-41300)	Clamp	
	(09268-41500)	Fuel Tube Connector	
	(90467-13001)	Clip	
	(95336-08070)	Hose	
	09268-45014	EFI Fuel Pressure Gauge	
	(09268-41200)	Gauge	
	(09268-41220)	Hose	
	(09268-41250)	T Joint	

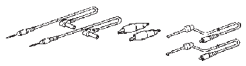
	09842-30080	Wire H EFI Inspection	

2AZ-FXE EMISSION CONTROL

SST

	09224-00010	O2 Sensor Wrench	

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

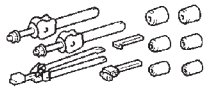
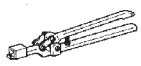
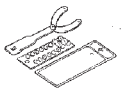
2AZ-FXE EXHAUST

EQUIPMENT

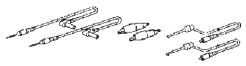
Torque wrench	

2AZ-FXE COOLING

SST

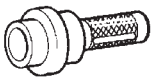
	09230-01010	Radiator Service Tool Set	
	(09231-01010)	Overhaul Handle	
	(09231-01030)	Claw	
	09231-14010	Punch	
	09960-10010	Variable Pin Wrench Set	
	(09962-01000)	Variable Pin Wrench Arm Assembly	
	(09963-00700)	Pin 7	

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

2AZ-FXE LUBRICATION

SST

	09223-22010	Crankshaft Front Oil Seal Replacer	
	09228-06501	Oil Filter Wrench	

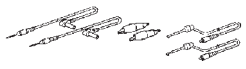
RECOMMENDED TOOLS

	09044-00020	"TORX" Socket E10	
	09200-00010	Engine Adjust Kit	

HINT:
TORX is registered trademark of Textron Inc.

2AZ-FXE IGNITION

RECOMMENDED TOOLS

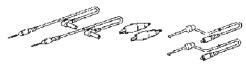
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Spark plug cleaner	
Torque wrench	

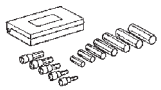
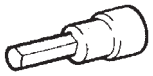
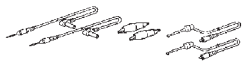
2AZ-FXE STARTING

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

P311 HYBRID VEHICLE CONTROL

RECOMMENDED TOOLS

	09040-00011	Hexagon Wrench Set	
	(09043-20100)	Socket Hexagon Wrench 10	
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

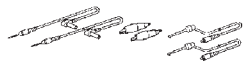
EQUIPMENT

Radiator cap tester	
Torque wrench	
Battery	
Insulated gloves	
Megohmmeter	
Milliohmmeter	

HYBRID BATTERY CONTROL

RECOMMENDED TOOLS

PP

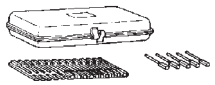
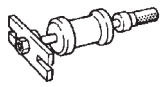
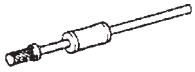
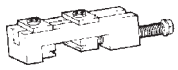
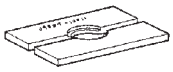
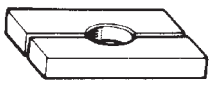
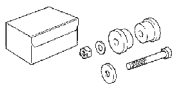
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	
	09090-04020	Engine Sling Device	

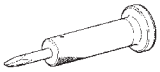
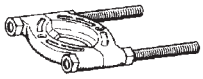
EQUIPMENT

Torque wrench	
Tire lever	
Battery	
Insulated gloves	

DRIVE SHAFT

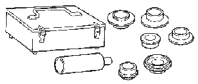
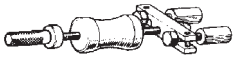
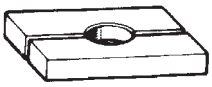
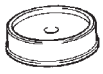
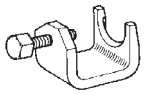
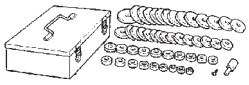
SST

	09240-00020	Wire Gauge Set	
	09520-01010	Drive Shaft Remover Attachment	
	09520-24010	Differential Side Gear Shaft Puller	
	(09520-32040)	Shocker Set	
	09521-24010	Rear Axle Shaft Puller	
	09527-10011	Rear Axle Shaft Bearing Remover	
	09527-30010	Rear Axle Shaft Bearing Remover	
	09608-16042	Front Hub Bearing Adjusting Tool	
	(09608-02021)	Bolt & Nut	
	(09608-02041)	Retainer	
	09628-00011	Ball Joint Puller	

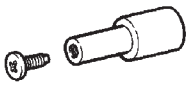
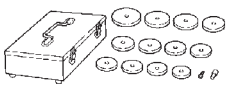
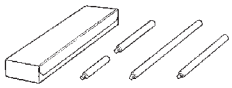
	09726-40010	Lower Control Shaft Bearing Replacer	
	09930-00010	Drive Shaft Nut Chisel	
	09950-00020	Bearing Remover	

AXLE

SST

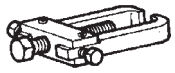
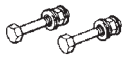
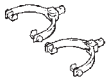
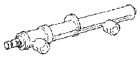
	09316-60011	Transmission & Transfer Bearing Replacer	
	(09316-00011)	Replacer Pipe	
	(09316-00031)	Replacer B	
	09520-00031	Rear Axle Shaft Puller	
	09527-17011	Rear Axle Shaft Bearing Remover	
	09527-20011	Rear Axle Shaft Bearing Remover	
	09555-55010	Differential Drive Pinion Bearing Replacer	
	09608-32010	Steering Knuckle Oil Seal Replacer	
	09628-10011	Ball Joint Puller	
	09950-60010	Replacer Set	
	(09951-00400)	Replacer 40	

PP

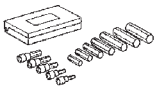
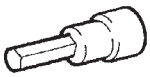
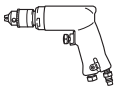
	(09951-00430)	Replacer 43	
	(09951-00600)	Replacer 60	
	(09952-06010)	Adapter	
	09950-60020	Replacer Set No. 2	
	(09951-00810)	Replacer 81	
	09950-70010	Handle Set	
	(09951-07100)	Handle 100	

SUSPENSION

SST

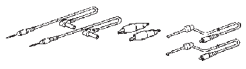
	09628-62011	Boll Joint Puller	
	09727-30021	Coil Spring Compressor	
	(09727-00010)	Bolt Set	
	(09727-00021)	Arm Set	
	(09727-00031)	Compressor	

RECOMMENDED TOOLS

	09011-12301	Socket Wrench 30 mm	
	09040-00011	Hexagon Wrench Set	
	(09043-20050)	Socket Hexagon Wrench 5	
	09050-00032	Air Drill	

TIRE AND WHEEL

RECOMMENDED TOOLS

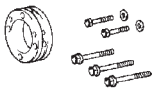
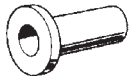
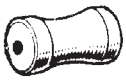
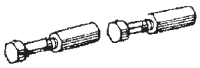
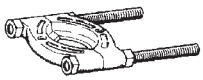
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Tire pressure gauge	
Dial indicator with magnetic base	
Wheel balancer	
Torque wrench	

BRAKE CONTROL

SST

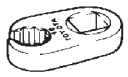
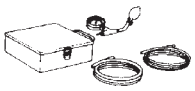
	09023-00101	Union Nut Wrench 10 mm	
	09213-58013	Crankshaft Pulley Holding Tool	
	09309-36010	Transmission Rear Bearing Replacer	
	09520-00031	Rear Axle Shaft Puller	
	(09520-00040)	Shocker	
	(09521-00010)	Rod with Grip	
	09521-00020	Drive Shaft Boot Clamping Tool	
	09709-29018	LSPV Gauge Set	
	09950-00020	Bearing Remover	

EQUIPMENT

Torque wrench	
Gauge	
Pedal effort gauge	

BRAKE

SST

	09023-00101	Union Nut Wrench 10 mm	
	09330-00021	Companion Flange Holding Tool	
	09992-00242	Turbocharger Pressure Gauge	
	09992-00350	Brake Reservoir Pressure Adapter	

EQUIPMENT

Ruler	
Micrometer	
Dial indicator with magnetic base	
Torque wrench	

PARKING BRAKE

SST

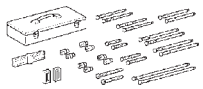
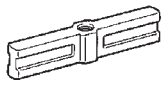
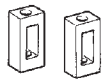
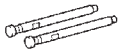
	09023-00101	Union Nut Wrench 10 mm	

EQUIPMENT

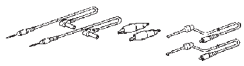
Torque wrench	
Slide calipers	
Brake drum gauge	
Feeler gauge	

STEERING COLUMN

SST

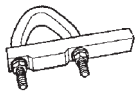
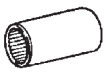
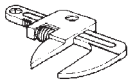
	09950-50013	Puller C Set	
	(09951-05010)	Hanger 150	
	(09952-05010)	Slide Arm	
	(09953-05020)	Center Bolt 150	
	(09954-05031)	Claw No.3	

RECOMMENDED TOOLS

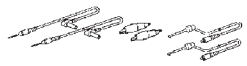
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

POWER STEERING

SST

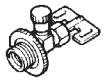
	09612-00012	Rack & Pinion Steering Rack Housing Stand	
	09616-00011	Steering Worm Bearing Adjusting Socket	
	09628-00011	Ball Joint Puller	
	09922-10010	Variable Open Wrench	

RECOMMENDED TOOLS

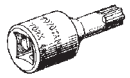
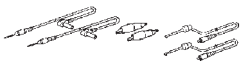
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

AIR CONDITIONING

SST

	07110-58060	Air Conditioner Service Tool Set	
	(07117-58060)	Refrigerant Drain Service Valve	
	(07117-58070)	T-Joint	
	(07117-58080)	Quick Disconnect Adapter	
	(07117-58090)	Quick Disconnect Adapter	
	(07117-78050)	Refrigerant Charging Gauge	
	(07117-88060)	Refrigerant Charging Hose	
	(07117-88070)	Refrigerant Charging Hose	
	(07117-88080)	Refrigerant Charging Hose	

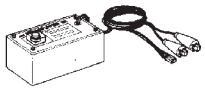
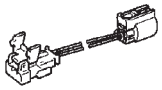
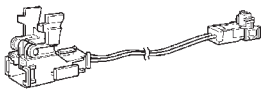
RECOMMENDED TOOLS

	09042-00020	"TORX" Socket T40	
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	
	09904-00010	Expander Set	
	(09904-00050)	No. 4 Claw	

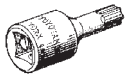
SUPPLEMENTAL RESTRAINT SYSTEM

SST

PP

	09082-00700	SRS Airbag Deployment Tool	
	09082-00750	Airbag Deployment Wire Sub-harness No. 3	
	09082-00770	Airbag Deployment Wire Sub-harness No. 5	
	09082-00780	Airbag Deployment Wire Sub-harness No. 6	
	09082-00802	Airbag Deployment Wire Sub-Harness No. 8	
	(09082-10801)	Wire A	
	(09082-20801)	Wire B	
	(09082-30801)	Wire C	
	09843-18060	SRS Check Wire	

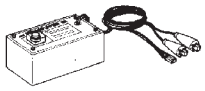
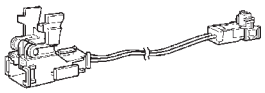
RECOMMENDED TOOLS

	09042-00010	"TORX" Socket T30	

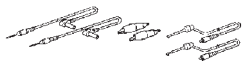
HINT:
"TORX" is a registered trademark of Textron Inc.

SEAT BELT

SST

	09082-00700	SRS Airbag Deployment Tool	
	09082-00770	Airbag Deployment Wire Sub-harness No. 5	

RECOMMENDED TOOLS

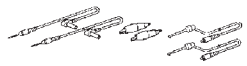
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

ENGINE IMMOBILISER

SST

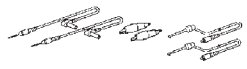
	09843-18040	Diagnosis Check Wire No. 2	

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

CRUISE CONTROL

RECOMMENDED TOOLS

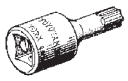
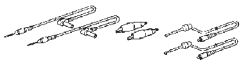
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Torque wrench	

LIGHTING

RECOMMENDED TOOLS

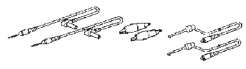
	09042-00010	"TORX" Socket T30	
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Clip remover	
Torque wrench	
Tire pressure gage	
White paper	

WIPER AND WASHER

RECOMMENDED TOOLS

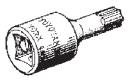
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Protective tape	
Torque wrench	
Wire brush	
MP grease	

DOOR LOCK

RECOMMENDED TOOLS

	09042-00010	Torx Socket T30	
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

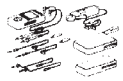
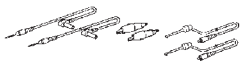
HINT:
TORX is a registered trademark of Textron Inc.

EQUIPMENT

MP grease	
Protective tape	
Torque wrench	

METER

RECOMMENDED TOOLS

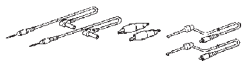
	09082-00050	TOYOTA Electrical Tester Set	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Torque wrench	

AUDIO / VISUAL

RECOMMENDED TOOLS

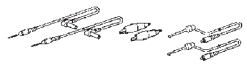
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Torque wrench	
Double-sided tape	
Tape	

NAVIGATION

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

HORN

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Torque wrench	

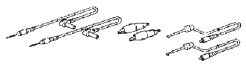
GARAGE DOOR OPENER

RECOMMENDED TOOLS

	09070-20010	Moulding Remover	

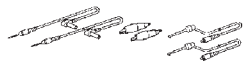
OTHER SYSTEM

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

WINDSHIELD / WINDOWGLASS

RECOMMENDED TOOLS

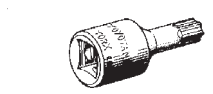
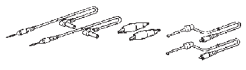
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Torque wrench	
Protective Tape	
Knife	
Suction cup	
Piano wire	
Wooden block or similar object	
Plastic sheet	
Scraper	
Brush or sponge	
Sealer gun	

MIRROR

RECOMMENDED TOOLS

	09042-00030	"TORX" Socket T20	
	09070-20010	Moulding Remover	
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

HINT:
TORX is a registered trademark of Textron Inc.

EQUIPMENT

Torque wrench	
Protective tape	

INSTRUMENT PANEL

RECOMMENDED TOOLS

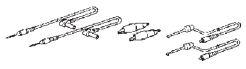
	09070-20010	Moulding Remover	

EQUIPMENT

Torque wrench	
Tape	To avoid surface damage

SEAT

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

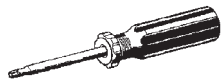
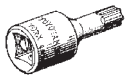
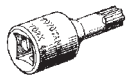
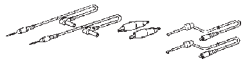
Hog ring	-
Hog ring pliers	-
Tape	To avoid surface damage
Torque wrench	-

ENGINE HOOD / DOOR

SST

	09804-24010	Luggage Compartment Door Torsion Bar Tool	
	09812-00010	Door Hinge Set Bolt Wrench	

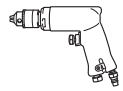
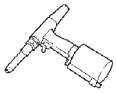
RECOMMENDED TOOLS

	09041-00020	"TORX" Driver T25	
	09042-00010	"TORX" Socket T30	
	09042-00020	"TORX" Socket T40	
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

HINT:
TORX is a registered trademark of Textron Inc.

EXTERIOR

RECOMMENDED TOOLS

	09050-00032	Air Drill	
	09050-20010	Air Riveter	
	(09050-02020)	Nose Piece No.1	
	09070-20010	Moulding Remover	

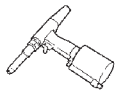
EQUIPMENT

Torque wrench	
Protective tape	To avoid surface damage
Heat light	
Double-sided tape	
Piano wire	
Clip remover	
Wooden block or similar object	For tying both piano wire ends
Drill (Safety equipment: protective goggles, etc.)	
Drill bit	
Hand riveter	
Rivet	
Vacuum cleaner	

INTERIOR

RECOMMENDED TOOLS

PP

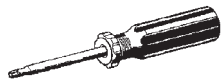
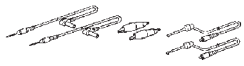
	09050-20010	Air Riveter	
	09070-20010	Moulding Remover	

EQUIPMENT

Clip remover	
Torque wrench	
Protective tape	
Double-sided tape	
Adhesive tape	
Drill (Safety equipment: protective goggles, etc.)	
Hand riveter	
Rivet	

SLIDING ROOF

RECOMMENDED TOOLS

	09041-00020	"TORX" Driver T25	
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

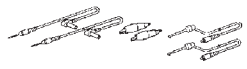
HINT:
"TORX" is a registered trademark of Textron Inc.

EQUIPMENT

Torque wrench	
Protective tape	

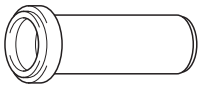
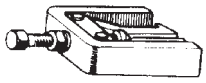
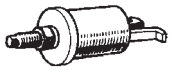
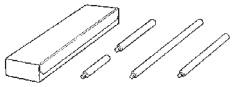
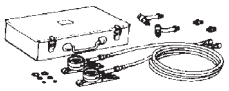
CAN COMMUNICATION

RECOMMENDED TOOLS

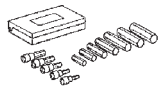
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

P311 HYBRID TRANSMISSION / TRANSAXLE

SST

	09223-15020	Oil Seal & Bearing Replacer	
	09388-40010	Input Oil Seal Replacer	
	09514-35011	Rear Wheel Bearing Puller	
	09612-30012	Steering Worm Bearing Puller	
	09710-30050	Suspension Arm Bushing Replacer	
	09950-70010	Handle Set	
	(09951-07150)	Handle 150	
	09992-00095	Automatic Transmission Oil Pressure Gauge Set	
	(09992-00112)	Adaptor A	
	(09992-00271)	Gauge Assy	

RECOMMENDED TOOLS

	09040-00011	Hexagon Wrench Set	

FREEZE FRAME DATA

1. FREEZE FRAME DATA/INFORMATION

(a) Whenever an ABS DTC is detected, the skid control ECU stores the current vehicle (sensor) state as Freeze Frame Data.

(b) The skid control ECU stores the number of times (maximum: 31) the power switch has been turned from off to on (IG) since the last time the ABS was activated.

(c) For DTCs memorized in the skid control ECU, information (INF) codes that are contained in the Freeze Frame Data can be displayed on the intelligent tester.
HINT:
- However, if the vehicle is stopped or at a low speed (7 km/h (4.3 mph) or less), or if a DTC is detected, the skid control ECU will stop counting the number.
- Freeze Frame Data at the time the ABS operates:
  The skid control ECU stores and updates data whenever the ABS system operates.
  When the ECU stores data at the time a DTC is detected, the data stored during ABS operation is erased.
- Freeze Frame Data at the time a DTC is detected:
  When the skid control ECU stores data at the time a DTC is detected, no updates will be performed until the data is cleared.

2. CHECK FREEZE FRAME DATA AND INFORMATION

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG).

(c) On the tester display, select the Freeze Frame Data.

(d) Read the Freeze Frame Data recorded when the DTC was set.

(e) Read the information.

(1) Select the item that has an information (INF) code from the Freeze Frame Data screen.

BC

Tester Display	Measurement Item	Reference Value
VEHICLE SPD	Vehicle speed reading	Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph)
STOP LAMP SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
#IG ON	Number of operations of power switch on (IG) after storing Freeze Frame Data	0 to 31
MAS CYL PRESS 1	Master cylinder pressure sensor reading	Brake pedal released: 0.3 to 0.9 V
M/C PRESS GRADE	Master cylinder pressure sensor change	Min.: -30 MPa/s, Max.: 225 MPa/s
YAW RATE	Yaw rate sensor reading	Min.: -128 deg/s, Max.: 127 deg/s
STEERING SEN	Steering angle sensor reading	Left turn: Increase Right turn: Decrease
FORWARD&REA G	Forward and backward G	Min.: -25.11 m/s^2, Max.: 24.91 m/s^2
BUZZER	Skid control buzzer signal	Skid control buzzer ON: ON, OFF: OFF
ACCELERATOR %	Accelerator opening angle %	Min.: 0 %, Max.: 128 %

Tester Display	Measurement Item	Reference Value
PARKING BRAKE SW	Parking brake switch signal	Parking brake switch ON: ON, OFF: OFF
FR WHEEL SPD	FR wheel speed	Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph)
FL WHEEL SPD	FL wheel speed	Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph)
RR WHEEL SPD	RR wheel speed	Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph)
RL WHEEL SPD	RL wheel speed	Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph)
LATERAL G	Lateral G	Min.: -25.11 m/s^2, Max.: 24.91 m/s^2
LEVER POSITION	Shift lever position information	FAIL 1st 2nd 3rd 4th 5th 6th/B D/M P, N R
OPERATED SYSTEM	Operated system status	ABS activated: ABS VSC activated: VSC TRAC activated: TRAC BA activated: BA Fail safe mode activated: FAIL No system activated: NON System prohibited: SYS
FREEZE TIME	Elapsed time after freeze trigger	Min.: 0 ms, Max.: 500 ms
TROUBLE CODE	Freeze frame DTC	Displays output DTC
PEDAL STROKE	Stroke sensor reading	Min.: 0 V, Max.: 5 V
PEDAL STROKE 2	Stroke sensor 2 reading	Min.: 0 V, Max.: 5 V
FR W/C SENS	FR wheel cylinder pressure sensor reading	Min.: 0 V, Max.: 5 V
FL W/C SENS	FL wheel cylinder pressure sensor reading	Min.: 0 V, Max.: 5 V
RR W/C SENS	RR wheel cylinder pressure sensor reading	Min.: 0 V, Max.: 5 V
RL W/C SENS	RL wheel cylinder pressure sensor reading	Min.: 0 V, Max.: 5 V
ACC PRESS SENS	Accumulator pressure sensor reading	Min.: 0 V, Max.: 5 V
MAS CYL PRESS 2	Master cylinder pressure sensor reading	Brake pedal released: 0.3 to 0.9 V
MTR VOLTAGE	Motor relay voltage value	Min.: 0 V, Max.: 20 V
SLAFR CUR	Linear solenoid (SLAFR) current	Min.: 0 A, Max.: 1.5 A
SLAFL CUR	Linear solenoid (SLAFL) current	Min.: 0 A, Max.: 1.5 A
SLARR CUR	Linear solenoid (SLARR) current	Min.: 0 A, Max.: 1.5 A
SLARL CUR	Linear solenoid (SLARL) current	Min.: 0 A, Max.: 1.5 A
SLRFR CUR	Linear solenoid (SLRFR) current	Min.: 0 A, Max.: 1.5 A
SLRFL CUR	Linear solenoid (SLRFL) current	Min.: 0 A, Max.: 1.5 A
SLRRR CUR	Linear solenoid (SLRRR) current	Min.: 0 A, Max.: 1.5 A
SLRRL CUR	Linear solenoid (SLRRL) current	Min.: 0 A, Max.: 1.5 A
FR TARGET OIL	FR wheel target oil pressure reading	Min.: 0 MPa, Max.: 20 MPa
FL TARGET OIL	FL wheel target oil pressure reading	Min.: 0 MPa, Max.: 20 MPa
RR TARGET OIL	RR wheel target oil pressure reading	Min.: 0 MPa, Max.: 20 MPa
RL TARGET OIL	RL wheel target oil pressure reading	Min.: 0 MPa, Max.: 20 MPa
DETAILED CODE	Detailed code for Freeze Frame DTC	Displays to output INF code
IG1 VOLTAGE	IG1 voltage value	Min.: 0 V, Max.: 20 V
IG2 VOLTAGE	IG2 voltage value	Min.: 0 V, Max.: 20 V
BS1 VOLTAGE	BS1 voltage value	Min.: 0 V, Max.: 20 V
BS2 VOLTAGE	BS2 voltage value	Min.: 0 V, Max.: 20 V

Tester Display	Measurement Item	Reference Value
VM1 VOLTAGE	VM1 voltage value	Min.: 0 V, Max.: 20 V
VM2 VOLTAGE	VM2 voltage value	Min.: 0 V, Max.: 20 V
+B1 VOLTAGE	+B1 voltage value	Min.: 0 V, Max.: 20 V
+B2 VOLTAGE	+B2 voltage value	Min.: 0 V, Max.: 20 V
ELAPSED TIME	Elapsed time after power switch on (IG)	Min.: 0 second, Max.: 100,661.76 seconds
CAPA MODE	Capacitor mode	Capacitor mode ON: ON, OFF: OFF
SCSS	Stroke simulator solenoid (SCSS) signal	Stroke simulator solenoid (SCSS) ON: ON, OFF: OFF
SMC1	Master cut solenoid (SMC1) signal	Master cut solenoid (SMC1) ON: ON, OFF: OFF
SMC2	Master cut solenoid (SMC2) signal	Master cut solenoid (SMC2) ON: ON, OFF: OFF
ECB* RELAY	ABS main relay signal	ABS main relay ON: ON, OFF: OFF
ECB* RELAY 2	ABS main relay 2 signal	ABS main relay 2 ON: ON, OFF: OFF
ECB* MTR RELAY	ABS motor relay signal	ABS motor relay ON: ON, OFF: OFF
ECB* MTR RELAY 2	ABS motor relay 2 signal	ABS motor relay 2 ON: ON, OFF: OFF
RESERVOIR SW	Brake fluid level warning switch signal	Brake fluid level warning switch ON: ON, OFF: OFF

*: Electronically Controlled Brake

3. CLEAR FREEZE FRAME DATA AND INFORMATION

NOTICE:

Clearing the DTC will also clear the Freeze Frame Data and information (INF) code.

(a) Connect the intelligent tester to the DLC3.

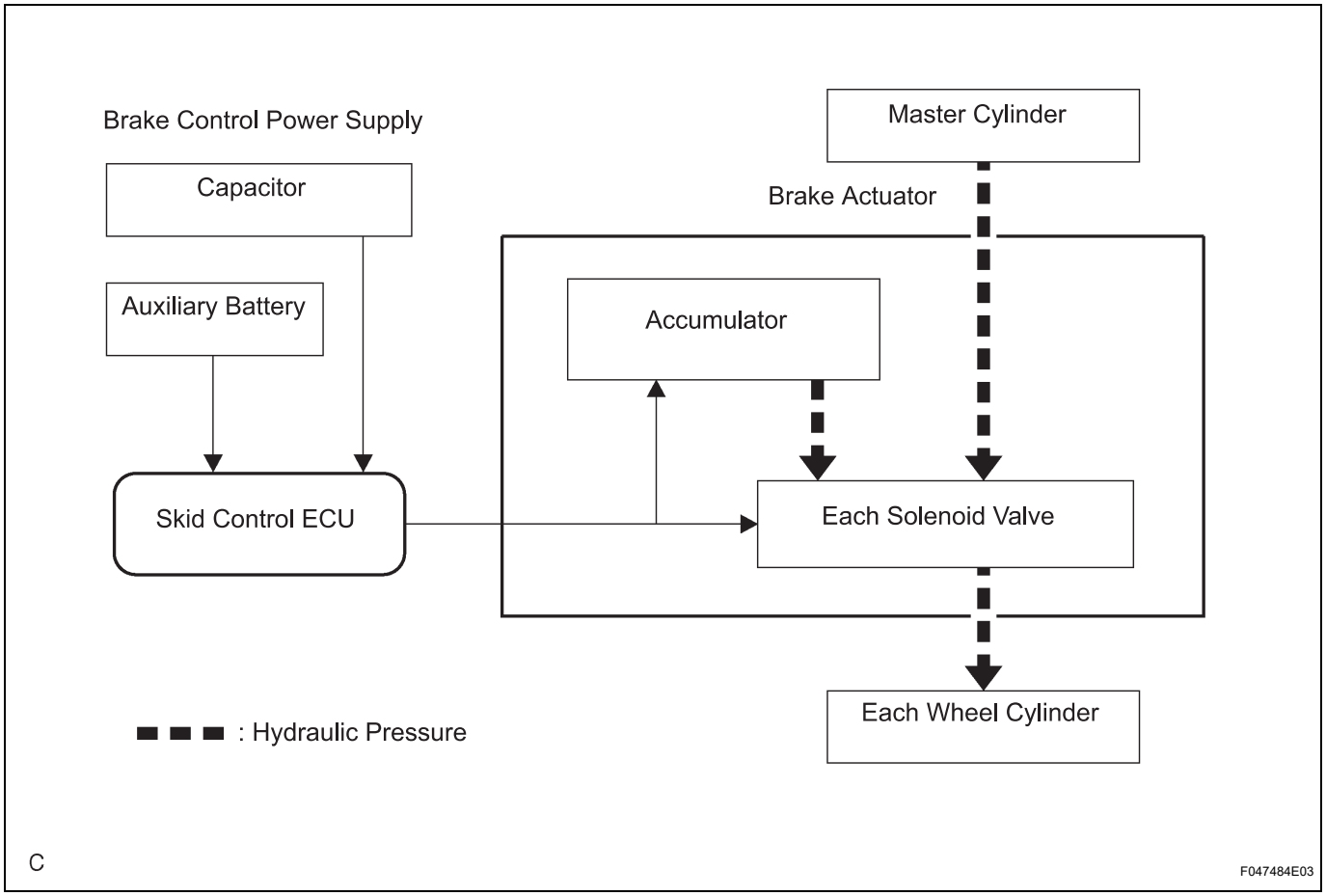
(b) Turn the power switch on (IG).

(c) Clear the DTC and Freeze Frame Data.

HINT:

Refer to the intelligent tester operator's manual for further details.

FAIL-SAFE CHART



1. FAIL-SAFE FUNCTION

(a) If a malfunction occurs in the skid control ECU, sensor signal, or actuator, rest normally operating parts will maintain brake control.

(b) When trouble occurs in the brake control system, the skid control ECU turns the warning light on, displays a DTC corresponding to the malfunctioning systems on the multi information display, and prohibits ABS, BA, and VSC operations.

ABS, EBD and BA system:

Malfunction Area	Control Method
ABS system	ABS, BA, TRAC and VSC control prohibited
BA system	ABS, BA, TRAC and VSC control prohibited
EBD system	ABS, EBD, BA, TRAC and VSC control prohibited

HINT:
A malfunction in either the ABS or BA system will result in an identical operation, with ABS, BA, TRAC and VSC system control prohibited.

TRAC and VSC system:

Malfunction Area	Control Method
Hybrid control system (TRAC and VSC systems)	Before control: Disables control During control: Uses only the brakes to effect control
Brake control system (TRAC and VSC systems)	Before control: Disables control During control: Disables control (by gradually ending control)

HINT:
As for the TRAC and VSC systems, different systems prohibit different controls depending on a malfunctioning part.

(c) The skid control ECU prevents operation of a malfunctioning hydraulic pressure system and continues brake control with the normal hydraulic pressure system.
HINT:
- If control of the Electronically Controlled Brake for any of the 4 wheels is prohibited, that wheel loses brake booster function or braking ability.
- If one of the 4 wheels loses brake booster function, the feeling when depressing the brake pedal changes as the stroke simulator (pedal reactive force generating solenoid) operation will be prohibited.
- If control of the Electronically Controlled Brake for all wheels is prohibited, the 2 front wheels will lose brake booster function.

(d) If the brake control is stopped under such conditions as when trouble occurs with a hydraulic pressure source, the pressure generated in the master cylinder by the driver is applied to the wheel cylinder to ensure braking force.

(e) A power back-up unit is built in as an additional power source to supply stable power to the system.

(f) If the regenerative brake alone does not operate under such conditions as a communication error with the HV control ECU, control is switched so that all braking force is generated with the hydraulic pressure brake.

Malfunction Area	Generated Braking Force
Skid control ECU	Normally operating parts will control brake and generate braking force
Hydraulic pressure controlling parts	Normally operating parts will control brake and generate braking force
Hydraulic pressure source	Braking force generated by the driver

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

With the intelligent tester connected to the DLC3 and the power switch on (IG), the Electronically Controlled Brake, ABS, and VSC Data List can be displayed. Follow the prompts on the tester screen to access the Data List.

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
ECB* MTR RELAY	ABS motor relay / ON or OFF	ON: Motor relay ON OFF: Motor relay OFF	-
IDLE SW	Main idle switch / ON or OFF	ON: Accelerator pedal released OFF: Accelerator pedal depressed	-
STOP LAMP SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
PARKING BRAKE SW	Parking brake switch / ON or OFF	ON: Parking brake applied OFF: Parking brake released	-
LEVER POSITION	Shift lever position information / P/N, R, D/M, 1st-6th/B, FAIL	-	-
FR WHEEL SPD	FR wheel speed sensor reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Similar speed as indicated on speedometer
FL WHEEL SPD	FL wheel speed sensor reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Similar speed as indicated on speedometer
RR WHEEL SPD	RR wheel speed sensor reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Similar speed as indicated on speedometer
RL WHEEL SPD	RL wheel speed sensor reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed	Similar speed as indicated on speedometer
DECELERAT SEN	Acceleration sensor 1 reading / min.: -1.889 G, max.: 1.875 G	Approximately 0+-0.13 G while stationary	Reading changes when vehicle is bounced
DECELERAT SEN 2	Acceleration sensor 2 reading / min.: -1.889 G, max.: 1.875 G	Approximately 0+-0.13 G while stationary	Reading changes when vehicle is bounced
VEHICLE SPD	Maximum wheel speed sensor reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual vehicle speed	Speed indicated on speedometer
YAW RATE SENS 1	Yaw rate sensor 1 / min.: -128 deg/s, max.: 127 deg/s	Min.: -128 deg/s Max.: 127 deg/s	-
YAW RATE SENS 2	Yaw rate sensor 2 / min.: -128 deg/s, max.: 127 deg/s	Min.: -128 deg/s Max.: 127 deg/s	-
ZERO YAW RATE	Memorized zero value / min.: -128 deg/s, max.: 127 deg/s	Min.: -128 deg/s Max.: 127 deg/s	-
ZERO YAW RATE 2	Memorized zero value / min.: -128 deg/s, max.: 127 deg/s	Min.: -128 deg/s Max.: 127 deg/s	-
STEERING SEN	Steering angle sensor / min.: -3,276.8 deg, max.: 3,276.7 deg	Left turn: Increase Right turn: Decrease	-
MAS CYL PRESS 1	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V	Reading increases when brake pedal is depressed
ACCELERATOR %	The difference of a present accelerator / min.: 0%, max.: 128%	-	-
FR SPD OPN	FR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
FL SPD OPN	FL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
RR SPD OPN	RR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RL SPD OPN	RL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
YAW RATE OPN	Yaw rate sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
DECELERAT OPN	Acceleration sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
STEERING OPN	Steering angle sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
M/C OPN	Master cylinder pressure sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
HV COM OPN	HV communication open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
#DTC	Number of DTC / min.: 0, max.: 255	-	-
ABS WARN LAMP	ABS warning light / ON or OFF	ON: Warning light ON OFF: Warning light OFF	-
BRAKE WARN LAMP	BRAKE warning light / ON or OFF	ON: Warning light ON OFF: Warning light OFF	-
SLIP INDI LAMP	SLIP indicator light / ON or OFF	ON: Indicator light ON OFF: Indicator light OFF	-
BUZZER	Skid control buzzer / ON or OFF	ON: Buzzer ON OFF: Buzzer OFF	-
VSC WARN LAMP	VSC warning (master caution indicator light and multi information display) / ON or OFF	ON: Indicator ON OFF: Indicator OFF	-
FR WHEEL ACCEL	FR wheel acceleration / min.: -200.84 m/s^2, max.: 199.27 m/s^2	Min.: -200.84 m/s^2 Max.: 199.27 m/s^2	-
FL WHEEL ACCEL	FL wheel acceleration / min.: -200.84 m/s^2, max.: 199.27 m/s^2	Min.: -200.84 m/s^2 Max.: 199.27 m/s^2	-
RR WHEEL ACCEL	RR wheel acceleration / min.: -200.84 m/s^2, max.: 199.27 m/s^2	Min.: -200.84 m/s^2 Max.: 199.27 m/s^2	-
RL WHEEL ACCEL	RL wheel acceleration / min.: -200.84 m/s^2, max.: 199.27 m/s^2	Min.: -200.84 m/s^2 Max.: 199.27 m/s^2	-
ZERO DECELERAT	Memorized zero value / min.: -25.11 m/s^2, max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
ZERO DECELERAT 2	Memorized zero value / min.: -25.11 m/s^2, max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
ZERO STEERING	Memorized zero value / min.: -3,276.8 deg, max.: 3,276.7 deg	Min.: -3,276.8 deg Max.: 3,276.7 deg	-
LATERAL G	Lateral G / min.: -25.11 m/s^2, max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
FORWARD&REA G	Forward and rearward G / min.: -25.11 m/s^2, max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
YAW RATE VALUE	Yaw rate value / min.: -128 deg/s, max.: 127 deg/s	Min.: -128 deg/s Max.: 127 deg/s	-
STEERING ANGLE	Steering angle value / min.: -3,276.8 deg, max.: 3,276.7 deg	Min.: -3,276.8 deg Max.: 3,276.7 deg	-
TRAC STATUS	TRAC control status / ON or OFF	ON: During the control	-
TRAC BRK STATUS	TRAC brake control status / ON or OFF	ON: During the control	-
FR VSC STATUS	FR wheel VSC control status / ON or OFF	ON: During the control	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
FL VSC STATUS	FL wheel VSC control status / ON or OFF	ON: During the control	-
RR VSC STATUS	RR wheel VSC control status / ON or OFF	ON: During the control	-
RL VSC STATUS	RL wheel VSC control status / ON or OFF	ON: During the control	-
FR ABS STATUS	FR wheel ABS control status / ON or OFF	ON: During the control	-
FL ABS STATUS	FL wheel ABS control status / ON or OFF	ON: During the control	-
RR ABS STATUS	RR wheel ABS control status / ON or OFF	ON: During the control	-
RL ABS STATUS	RL wheel ABS control status / ON or OFF	ON: During the control	-
MAS CYL PRESS 2	Master cylinder pressure sensor 2 reading / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V	Reading increases when brake pedal is depressed
PEDAL STROKE	Stroke sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.7 to 1.3 V	-
PEDAL STROKE 2	Stroke sensor 2 / min.: 0 V, max.: 5 V	When brake pedal is released: 3.7 to 4.3 V	-
ACC PRESS SENS	Accumulator pressure sensor / min.: 0 V, max.: 5 V	Specified value: 3.3 to 4.7 V	-
FR W/C SENS	FR wheel cylinder pressure sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V	-
FL W/C SENS	FL wheel cylinder pressure sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V	-
RR W/C SENS	RR wheel cylinder pressure sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V	-
RL W/C SENS	RL wheel cylinder pressure sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V	-
RESERVOIR SW	Brake fluid level warning switch / ON or OFF	ON: Reservoir level normal OFF: Reservoir level low	-
ECB* WARN LAMP	Brake control warning light / ON or OFF	ON: Warning light ON OFF: Warning light OFF	-
ECB* MTR RELAY 2	ABS motor relay 2 / ON or OFF	ON: Motor relay ON OFF: Motor relay OFF	-
ECB* RELAY	ABS main relay / ON or OFF	ON: Main relay ON OFF: Main relay OFF	-
ECB* RELAY 2	ABS main relay 2 / ON or OFF	ON: Main relay ON OFF: Main relay OFF	-
VOLT M/C SEN	Voltage of master cylinder pressure sensor / min.: -2.5 V, max.: 2.49 V	When brake pedal is released: 0.3 to 0.9 V	-
VOLT M/C SEN 2	Voltage of master cylinder pressure sensor 2 / min.: -2.5 V, max.: 2.49 V	When brake pedal is released: 0.3 to 0.9 V	-
VOLT STROK SEN	Voltage of stroke sensor / min.: -2.5 V, max.: 2.49 V	When brake pedal is released: 0.7 to 1.3 V	-
VOLT STROK SEN 2	Voltage of stroke sensor 2 / min.: -2.5 V, max.: 2.49 V	When brake pedal is released: 3.7 to 4.3 V	-
SLAFR CUR	Linear solenoid (SLAFR) current / min.: 0 A, max.: 3 A	When brake pedal is released: 0 A	-
SLAFL CUR	Linear solenoid (SLAFL) current / min.: 0 A, max.: 3 A	When brake pedal is released: 0 A	-
SLARR CUR	Linear solenoid (SLARR) current / min.: 0 A, max.: 3 A	When brake pedal is released: 0 A	-
SLARL CUR	Linear solenoid (SLARL) current / min.: 0 A, max.: 3 A	When brake pedal is released: 0 A	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
SLRFR CUR	Linear solenoid (SLRFR) current / min.: 0 A, max.: 3 A	When brake pedal is released: 0 A	-
SLRFL CUR	Linear solenoid (SLRFL) current / min.: 0 A, max.: 3 A	When brake pedal is released: 0 A	-
SLRRR CUR	Linear solenoid (SLRRR) current / min.: 0 A, max.: 3 A	When brake pedal is released: 0 A	-
SLRRL CUR	Linear solenoid (SLRRL) current / min.: 0 A, max.: 3 A	When brake pedal is released: 0 A	-
SLC CUR	Linear solenoid (SLC) current / min.: 0 A , max.: 3 A	When brake pedal is released: 0 A	-
M/C2 OPN	Master cylinder pressure sensor 2 open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
STROKE OPN	Stroke sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
STROKE OPN 2	Stroke sensor 2 open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
FR W/C OPN	FR wheel cylinder pressure sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
FL W/C OPN	FL wheel cylinder pressure sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RR W/C OPN	RR wheel cylinder pressure sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RL W/C OPN	RL wheel cylinder pressure sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
ACC OPEN	Accumulator pressure sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
SMC1	Master cut solenoid (SMC1) / ON or OFF	ON: Operate OFF: Not operate	-
SMC2	Master cut solenoid (SMC2) / ON or OFF	ON: Operate OFF: Not operate	-
SCSS	Stroke simulator solenoid (SCSS) / ON or OFF	ON: Operate OFF: Not operate	-
FR RQST TORQ	FR regenerative request torque / min.: 0 N*m, max.: 65,536 N*m	-	-
FR OPERATE TORQ	FR regenerative operation torque / min.: 0 N*m, max.: 65,536 N*m	-	-
RR RQST TORQ	RR regenerative request torque / min.: 0 N*m, max.: 65,536 N*m	-	-
RR OPERATE TORQ	RR regenerative operation torque / min.: 0 N*m, max.: 65,536 N*m	-	-
REGEN COOP	Regenerative cooperation / ON or OFF	ON: Operate OFF: Not operate	-

*: Electronically Controlled Brake

2. ACTIVE TEST

HINT:

Performing the Active Test using the intelligent tester allows the relay, actuator, and other items to operate without removing any parts. Performing the Active Test as the first step in troubleshooting is one of the methods to save labor time.

It is possible to display the Data List during the Active Test.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) On the tester display, select the Active Test.
HINT:
The power switch must be turned on (IG) to proceed to the Active Test using the intelligent tester.

Tester Display	Test Part	Control Range	Diagnostic Note
ABS WARN LAMP	ABS warning light	Warning light ON / OFF	Observe combination meter
VSC WARN LAMP	VSC warning (master caution indicator light and multi information display)	Warning (light and display) ON / OFF	Observe combination meter
SLIP INDI LAMP	SLIP indicator light	Indicator light ON / OFF	Observe combination meter
BRAKE WARN LAMP	BRAKE warning light	Warning light ON / OFF	Observe combination meter
BUZZER	Skid control buzzer	Buzzer ON / OFF	Buzzer can be heard
ECB* WARN LAMP	Brake control warning light	Warning light ON / OFF	Observe combination meter
ECB* MTR RELAY	ABS motor relay	Relay ON / OFF	Operation sound of relay (clicking sound) and motor can be heard
ECB* MTR RELAY 2	ABS motor relay 2	Relay ON / OFF	Operation sound of relay (clicking sound) and motor can be heard
ECB* INVALID	Electronically Controlled Brake control invalid	Control invalid ON / OFF	Electronically Controlled Brake control is blocked (braking with no boost assist)
ZERO DOWN	Accumulator zero down activation	Activation ON / OFF	Brake fluid existing the accumulator makes noise
ACT PATTERN	Actuator air bleeding pattern activation	Activation ON / OFF	When accumulator pressure lowers, pump operation creates sound
POWER SUPPLY 1	Power supply air bleeding pattern activation 1	Activation ON / OFF	When accumulator pressure lowers, pump operation creates sound
POWER SUPPLY 2	Power supply air bleeding pattern activation 2	Activation ON / OFF	When accumulator pressure lowers, pump operation creates sound
SMC1	Master cut solenoid (SMC1)	Solenoid ON / OFF	Operation sound of solenoid (clicking sound) can be heard
SMC2	Master cut solenoid (SMC2)	Solenoid ON / OFF	Operation sound of solenoid (clicking sound) can be heard
ECB* RELAY	ABS main relay	Relay ON / OFF	Operation sound of relay (clicking sound) can be heard
ECB* RELAY 2	ABS main relay 2	Relay ON / OFF	Operation sound of relay (clicking sound) can be heard
SLRRL CLOSE	Linear solenoid (SLRRL) valve	Valve close ON / OFF	-

Tester Display	Test Part	Control Range	Diagnostic Note
SLARL CLOSE	Linear solenoid (SLARL) valve	Valve close ON / OFF	-
SLRRR CLOSE	Linear solenoid (SLRRR) valve	Valve close ON / OFF	-
SLARR CLOSE	Linear solenoid (SLARR) valve	Valve close ON / OFF	-
SLRFL CLOSE	Linear solenoid (SLRFL) valve	Valve close ON / OFF	-
SLAFL CLOSE	Linear solenoid (SLAFL) valve	Valve close ON / OFF	-
SLRFR CLOSE	Linear solenoid (SLRFR) valve	Valve close ON / OFF	-
SLAFR CLOSE	Linear solenoid (SLAFR) valve	Valve close ON / OFF	-

*: Electronically Controlled Brake

DIAGNOSTIC TROUBLE CODE CHART

HINT:

- If a trouble code is displayed during the DTC check, check the circuit indicated by the DTC. For details of each code, turn to the page for the respective DTC Code in the DTC chart.
- Inspect the fuse and relay before investigating the trouble areas as shown in the table below.

DTC chart of ABS:

DTC Code	Detection Item	INF Code	Trouble Area	See page
42	Electronically Controlled Brake System Malfunction	-	Brake control (Electronically Controlled Brake) system	BC-78
C0200/31	Front Speed Sensor RH Circuit	251 252 253 254 255	1. Front speed sensor RH 2. Speed sensor circuit 3. Sensor installation 4. Speed sensor rotor 5. Skid control ECU	BC-80
C0205/32	Front Speed Sensor LH Circuit	264 265 266 267 268	1. Front speed sensor LH 2. Speed sensor circuit 3. Sensor installation 4. Speed sensor rotor 5. Skid control ECU	BC-80
C0210/33	Rear Speed Sensor RH Circuit	277 278 279 280 281	1. Rear speed sensor RH 2. Speed sensor circuit 3. Sensor installation 4. Speed sensor rotor 5. Skid control ECU	BC-89
C0215/34	Rear Speed Sensor LH Circuit	290 291 292 293 294	1. Rear speed sensor LH 2. Speed sensor circuit 3. Sensor installation 4. Speed sensor rotor 5. Skid control ECU	BC-89
C1235/35	Foreign Object is Attached on Tip of Front Speed Sensor RH	302	1. Front speed sensor RH 2. Speed sensor circuit 3. Sensor installation 4. Speed sensor rotor 5. Skid control ECU	BC-112
C1236/36	Foreign Object is Attached on Tip of Front Speed Sensor LH	303	1. Front speed sensor LH 2. Speed sensor circuit 3. Sensor installation 4. Speed sensor rotor 5. Skid control ECU	BC-112
C1238/38	Foreign Object is Attached on Tip of Rear Speed Sensor RH	304	1. Rear speed sensor RH 2. Speed sensor circuit 3. Sensor installation 4. Speed sensor rotor 5. Skid control ECU	BC-112
C1239/39	Foreign Object is Attached on Tip of Rear Speed Sensor LH	305	1. Rear speed sensor LH 2. Speed sensor circuit 3. Sensor installation 4. Speed sensor rotor 5. Skid control ECU	BC-112
C1243/43	Acceleration Sensor Stuck Malfunction	311 312 317	Yaw rate and acceleration sensor	BC-98
C1244/44	Open or Short in Acceleration Sensor Circuit	314	1. Yaw rate and acceleration sensor 2. Sensor installation	BC-98
C1245/45	Acceleration Sensor Output Malfunction	313	1. Yaw rate and acceleration sensor 2. Sensor installation	BC-98

DTC Code	Detection Item	INF Code	Trouble Area	See page
C1336/98	Zero Point Calibration of Acceleration Sensor Undone	-	1. Skid control ECU 2. Yaw rate and acceleration sensor 3. Zero point calibration undone	BC-107
C1381/97	Yaw Rate and / or Acceleration Sensor Power Supply Voltage Malfunction	315	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor power source circuit 3. Skid control ECU	BC-98
U0124/95	Lost Communication with Lateral Acceleration Sensor Module	319	CAN communication system (Skid control ECU to yaw rate and acceleration sensor)	BC-209

1. Drive the vehicle at the speed of 50 km/h (31 mph) and depress the brake pedal strongly for approximately 3 seconds.
2. Repeat the above operation 3 times or more and check that the ABS warning light goes off.
3. Clear the DTC.

HINT:

- In some cases, the intelligent tester cannot be used when the ABS warning light remains on.
- When U0073/94, U0123/62, U0124/95, U0126/63, U0131/67, or U0293/59 is output, inspect and repair the trouble areas indicated by these codes first.

DTC chart of VSC:

DTC Code	Detection Item	INF Code	Trouble Area	See page
43	ABS Control System Malfunction	-	ABS control system	BC-77
45	Electronically Controlled Brake System Malfunction	-	Brake control (Electronically Controlled Brake) system	BC-78
C1210/36	Zero Point Calibration of Yaw Rate Sensor Undone	-	1. Skid control ECU 2. Yaw rate and acceleration sensor 3. Zero point calibration undone	BC-107
C1231/31	Steering Angle Sensor Circuit Malfunction	-	1. Steering angle sensor 2. Steering angle sensor circuit 3. Steering angle sensor power supply 4. Skid control ECU	BC-109
C1234/34	Yaw Rate Sensor Malfunction	333 334 335 337	Yaw rate and acceleration sensor	BC-98
C1290/66	Steering Angle Sensor Zero Point Malfunction	-	1. Yaw rate and acceleration sensor zero point calibration incomplete 2. Poor adjustment of the centered position of the steering wheel 3. Poor adjustment of front wheel alignment	BC-164
C1304/27	EPS Control System Malfunction	376	Electronic power steering system	BC-167

DTC Code	Detection Item	INF Code	Trouble Area	See page
C1310/51	Malfunction in HV system	156	Hybrid control system	BC-163
U0123/62	Lost Communication with Yaw Rate Sensor Module	338	CAN communication system (Skid control ECU to yaw rate and acceleration sensor)	BC-209
U0126/63	Lost Communication with Steering Angle Sensor Module	350	CAN communication system (Skid control ECU to steering angle sensor)	BC-209
U0131/67	Lost Communication with Power Steering Control Module	374 375	CAN communication system (Skid control ECU to power steering (EPS) ECU)	BC-209

DTC chart of Electronically Controlled Brake:

DTC Code	Detection Item	INF Code	Trouble Area	See page
36	ABS Control System Malfunction	-	ABS control system	BC-77
C1202/68	Master Reservoir Level Malfunction	512	1. Fluid leakage 2. Brake fluid level 3. Brake fluid level warning switch 4. Brake fluid level warning switch circuit 5. Skid control ECU	BC-102
C1203/95	ECM Communication Circuit Malfunction	-	HV control ECU	BC-106
C1241/41 (*1)	Low Battery Positive Voltage	81 82 83 84	1. Auxiliary battery 2. ABS NO. 1 relay 3. ABS NO. 1 relay circuit 4. ABS NO. 2 relay 5. ABS NO. 2 relay circuit 6. Brake control power supply (Capacitor) 7. Hybrid control system (Charging circuit) 8. Skid control ECU	BC-121
C1242/42	Open in IG1 / IG2 Power Source Circuit	87 88	1. Auxiliary battery 2. IG1 power source circuit 3. IG2 power source circuit 4. Hybrid control system (Charging circuit) 5. Skid control ECU	BC-121
C1246/46	Master Cylinder Pressure Sensor Malfunction	191 192 194 195 197 198 199 200 201 202 205	1. Brake actuator assembly (Master cylinder pressure sensor) 2. Master cylinder pressure sensor circuit 3. Master cylinder pressure sensor power supply 4. Brake actuator assembly 5. Skid control ECU	BC-128
C1247/47	Stroke Sensor Malfunction	171 172 173 174 175 176 177 179 180	1. Brake pedal stroke sensor 2. Brake pedal stroke sensor circuit 3. Brake pedal stroke sensor power supply 4. Sensor installation 5. Skid control ECU	BC-136

DTC Code	Detection Item	INF Code	Trouble Area	See page
C1249/49	Open in Stop Light Switch Circuit	520	1. STOP fuse 2. Stop light switch 3. Stop light switch circuit 4. Skid control ECU	BC-141
C1252/52	Brake Booster Pump Motor on Time Abnormally Long	130	1. ABS MTR1 relay 2. ABS MTR1 relay circuit 3. ABS MTR2 relay 4. ABS MTR2 relay circuit 5. Brake actuator assembly (Accumulator pressure sensor circuit)	BC-150
C1253/53	Hydro Booster Pump Motor Relay Malfunction	132 133 134 136 137 138 140	1. ABS MTR1 fuse 2. ABS MTR2 fuse 3. ABS MTR1 relay 4. ABS MTR1 relay circuit 5. ABS MTR2 relay 6. ABS MTR2 relay circuit 7. Brake actuator assembly (Pump motor) 8. Pump motor circuit	BC-150
C1256/57	Accumulator Low Pressure	141 143	1. Accumulator pressure 2. Brake actuator assembly (Accumulator pressure sensor) 3. Brake actuator assembly (Pump motor)	BC-160
C1259/58	HV System Regenerative Malfunction	150	Hybrid control system	BC-163
C1300	Skid Control ECU Malfunction	-	Skid control ECU	BC-166
C1311/11	Open in Main Relay 1 Circuit	1	1. ABS NO. 1 relay 2. ABS NO. 1 relay circuit 3. Skid control ECU	BC-168
C1312/12	Short in Main Relay 1 Circuit	3	1. ABS NO. 1 relay 2. ABS NO. 1 relay circuit 3. Skid control ECU	BC-168
C1313/13	Open in Main Relay 2 Circuit	4	1. ABS NO. 2 relay 2. ABS NO. 2 relay circuit 3. Skid control ECU	BC-168
C1314/14	Short in Main Relay 2 Circuit	6	1. ABS NO. 2 relay 2. ABS NO. 2 relay circuit 3. Skid control ECU	BC-168
C1315/31	SMC1 Changeover Solenoid Malfunction	61 62 63 64	1. Brake actuator assembly (SMC1) 2. SMC1 circuit 3. Skid control ECU	BC-173
C1316/32	SMC2 Changeover Solenoid Malfunction	66 67 68 69	1. Brake actuator assembly (SMC2) 2. SMC2 circuit 3. Skid control ECU	BC-173
C1319/35	SCSS Changeover Solenoid Malfunction	71 72 73 74	1. Brake master stroke simulator 2. Brake master stroke simulator circuit 3. Skid control ECU	BC-182
C1341/62	Front Hydraulic System RH Malfunction	551 552 553 554 555	1. Fluid leakage 2. Disc rotor 3. Brake actuator assembly	BC-185

DTC Code	Detection Item	INF Code	Trouble Area	See page
C1342/63	Front Hydraulic System LH Malfunction	561 562 563 564 565	1. Fluid leakage 2. Disc rotor 3. Brake actuator assembly	BC-185
C1343/64	Rear Hydraulic System RH Malfunction	571 572 573 574 575	1. Fluid leakage 2. Disc rotor 3. Brake actuator assembly	BC-185
C1344/65	Rear Hydraulic System LH Malfunction	581 582 583 584 585	1. Fluid leakage 2. Disc rotor 3. Brake actuator assembly	BC-185
C1345/66	Linear Solenoid Valve Offset Learning Undone	-	1. Initialization of linear solenoid valve and calibration undone 2. Skid control ECU	BC-190
C1352/21	Front Increasing Pressure Solenoid RH Malfunction	11 12 13 14	1. Brake actuator assembly (SLAFR) 2. SLAFR circuit 3. Skid control ECU	BC-173
C1353/23	Front Increasing Pressure Solenoid LH Malfunction	21 22 23 24	1. Brake actuator assembly (SLAFL) 2. SLAFL circuit 3. Skid control ECU	BC-173
C1354/25	Rear Increasing Pressure Solenoid RH Malfunction	31 32 33 34	1. Brake actuator assembly (SLARR) 2. SLARR circuit 3. Skid control ECU	BC-173
C1355/27	Rear Increasing Pressure Solenoid LH Malfunction	41 42 43 44	1. Brake actuator assembly (SLARL) 2. SLARL circuit 3. Skid control ECU	BC-173
C1356/22	Front Decreasing Pressure Solenoid RH Malfunction	16 17 18 19	1. Brake actuator assembly (SLRFR) 2. SLRFR circuit 3. Skid control ECU	BC-173
C1357/24	Front Decreasing Pressure Solenoid LH Malfunction	26 27 28 29	1. Brake actuator assembly (SLRFL) 2. SLRFL circuit 3. Skid control ECU	BC-173
C1358/26	Rear Decreasing Pressure Solenoid RH Malfunction	36 37 38 39	1. Brake actuator assembly (SLRRR) 2. SLRRR circuit 3. Skid control ECU	BC-173
C1359/28	Rear Decreasing Pressure Solenoid LH Malfunction	46 47 48 49	1. Brake actuator assembly (SLRRL) 2. SLRRL circuit 3. Skid control ECU	BC-173

DTC Code	Detection Item	INF Code	Trouble Area	See page
C1364/61	Wheel Cylinder Pressure Sensor Malfunction	221 222 224 225 227 228 230 231 233 234 236 237 239 240 242 243	1. Brake actuator assembly (Wheel cylinder pressure sensor) 2. Wheel cylinder pressure sensor circuit 3. Wheel cylinder pressure sensor power supply 4. Brake actuator assembly 5. Skid control ECU	BC-128
C1365/54	Accumulator Pressure Sensor Malfunction	211 212 214 215 216	1. Brake actuator assembly (Accumulator pressure sensor) 2. Accumulator pressure sensor circuit 3. Accumulator pressure sensor power supply 4. Brake actuator assembly 5. Skid control ECU	BC-192
C1368/67	Linear Solenoid Valve Offset Malfunction	-	1. Initialization of linear solenoid valve and calibration undone 2. Skid control ECU	BC-190
C1377/43	Capacitor Malfunction	101 102 103 105 106 107 108 109 110	1. ABS MAIN NO. 1 fuse 2. ABS MAIN NO. 2 fuse 3. ABS MAIN NO. 3 fuse 4. Apply high voltage 5. Brake control power supply (Capacitor) 6. Brake control power supply circuit	BC-196
C1378/44	Capacitor Communication Malfunction	112	1. Brake control power supply (Capacitor) 2. Brake control power supply circuit	BC-202
C1391/69	Accumulator Leak Malfunction	591	1. Fluid leakage 2. Brake actuator assembly	BC-207
C1392/48	Stroke Sensor Zero Point Calibration Undone	-	1. Brake pedal stroke sensor zero point calibration undone (Initialization of linear solenoid valve and calibration undone) 2. Skid control ECU	BC-136
U0073/94	Control Module Communication Bus OFF	360	CAN communication system	BC-209
U0293/59	Communication Error from HV ECU	152 153 154	CAN communication system (Skid control ECU to HV control ECU)	BC-209

(*1): These codes are displayed to indicate the ABS and Electronically Controlled Brake DTCs.

Test Mode DTC of ABS:

DTC Code	Detection Item	INF Code	Trouble Area	See page
C1271/71	Low Output Signal of Front Speed Sensor RH (Test Mode DTC)	-	1. Front speed sensor RH 2. Sensor installation 3. Speed sensor rotor	BC-80
C1272/72	Low Output Signal of Front Speed Sensor LH (Test Mode DTC)	-	1. Front speed sensor LH 2. Sensor installation 3. Speed sensor rotor	BC-80
C1273/73	Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)	-	1. Rear speed sensor RH 2. Sensor installation 3. Speed sensor rotor	BC-89
C1274/74	Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)	-	1. Rear speed sensor LH 2. Sensor installation 3. Speed sensor rotor	BC-89
C1275/75	Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)	-	Speed sensor rotor	BC-112
C1276/76	Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)	-	Speed sensor rotor	BC-112
C1277/77	Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)	-	Speed sensor rotor	BC-112
C1278/78	Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)	-	Speed sensor rotor	BC-112
C1279/79	Acceleration Sensor Output Voltage Malfunction (Test Mode DTC)	-	1. Yaw rate and acceleration sensor 2. Sensor installation	BC-98
C1281/81	Master Cylinder Pressure Sensor Output Malfunction (Test Mode DTC)	-	1. Stop light switch 2. Master cylinder pressure sensor	BC-128

Test Mode DTC of VSC:

DTC Code	Detection Item	INF Code	Trouble Area	See page
C0371/71	Yaw Rate Sensor (Test Mode DTC)	-	Yaw rate and acceleration sensor	BC-98

Test Mode DTC of Electronically Controlled Brake:

DTC Code	Detection Item	INF Code	Trouble Area	See page
C1346/71	Stroke Sensor Zero Point Learning Malfunction (Test Mode DTC)	-	Brake pedal stroke sensor	BC-136

DTC	36	ABS Control System Malfunction

DTC	43	ABS Control System Malfunction

DESCRIPTION

This DTC is output when the VSC and/or Electronically Controlled Brake system detects a malfunction in the ABS control system.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
36	-	Malfunction in the ABS control system.	ABS control system
43	-	Malfunction in the ABS control system.	ABS control system

INSPECTION PROCEDURE

NOTICE:

When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	CHECK ABS CONTROL SYSTEM

(a) Clear the DTC (See page BC-57).
(b) Turn the power switch on (IG).
(c) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTC (ABS control system DTC) is not output	A
DTC (ABS control system DTC) is output	B

B → REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See page BC-69)

A

2	RECONFIRM DTC

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (IG).
(d) Check if the same DTC is recorded (See page BC-57).

BC

Result

Condition	Proceed to
DTCs (36 and/or 43) are not output	A
DTCs (36 and/or 43) are output	B

B → REPLACE SKID CONTROL ECU

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

DTC	42	Electronically Controlled Brake System Malfunction

DTC	45	Electronically Controlled Brake System Malfunction

DESCRIPTION

This DTC is output when the ABS and/or VSC system detects a malfunction in the brake control (Electronically Controlled Brake) system.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
42	-	Malfunction in the brake control (Electronically Controlled Brake) system.	Brake control (Electronically Controlled Brake) system
45	-	Malfunction in the brake control (Electronically Controlled Brake) system.	Brake control (Electronically Controlled Brake) system

INSPECTION PROCEDURE

NOTICE:

When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	CHECK BRAKE CONTROL (ELECTRONICALLY CONTROLLED BRAKE) SYSTEM

(a) Clear the DTC (See page BC-57).
(b) Turn the power switch on (IG).
(c) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTC (Brake control (Electronically Controlled Brake) system DTC) is not output	A
DTC (Brake control (Electronically Controlled Brake) system DTC) is output	B

B → REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See page BC-69)

A

2	RECONFIRM DTC

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (IG).
(d) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTCs (42 and/or 45) are not output	A
DTCs (42 and/or 45) are output	B

B → REPLACE SKID CONTROL ECU

BC

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

DTC	C0200/31	Front Speed Sensor RH Circuit

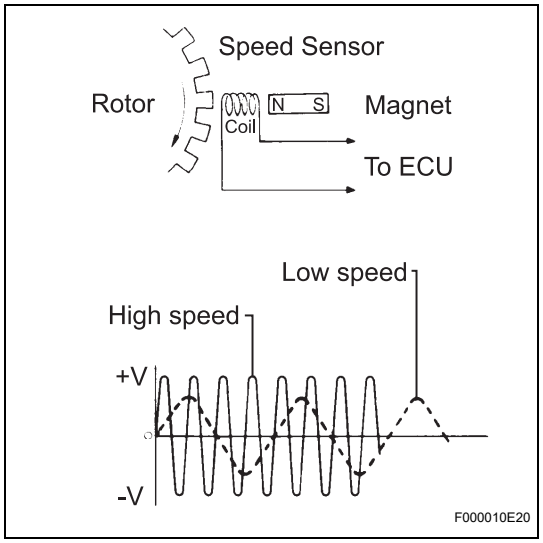
DTC	C0205/32	Front Speed Sensor LH Circuit

DTC	C1271/71	Low Output Signal of Front Speed Sensor RH (Test Mode DTC)

DTC	C1272/72	Low Output Signal of Front Speed Sensor LH (Test Mode DTC)

DESCRIPTION

The speed sensors detect wheel speed and transmit the signals to the ECU. These signals are used for control of the ABS control system. Each of the front and rear rotors has 48 serrations.
When the rotors rotate, the magnetic field generated by the permanent magnet in the speed sensor induces an AC voltage.
Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.
DTCs C1271/71 and C1272/72 can be deleted when the speed sensor sends a wheel speed signal or the Test Mode ends. DTCs C1271/71 and C1272/72 are output only in the Test Mode.

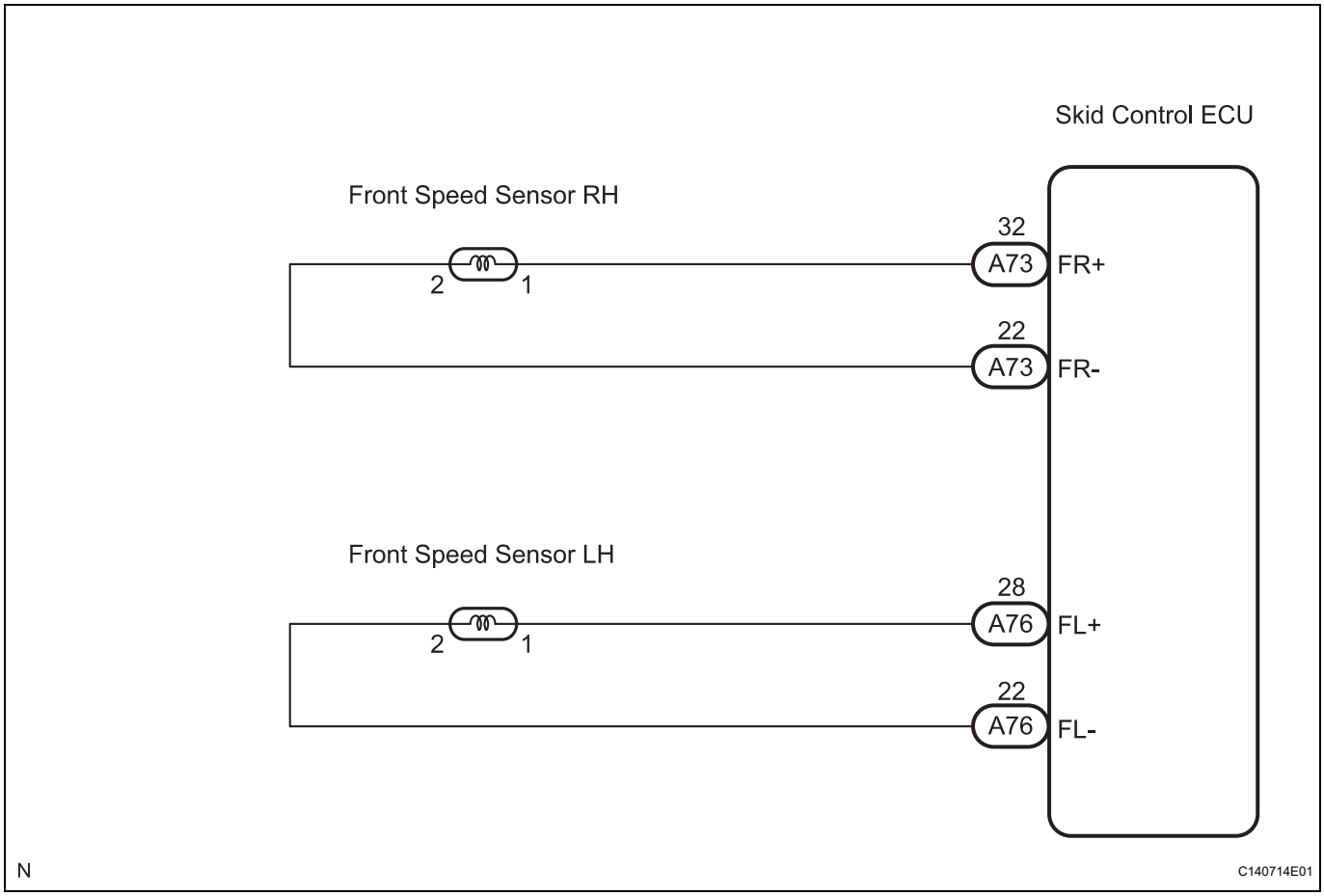


DTC Code	INF Code	DTC Detection Condition	Trouble Area
C0200/31	251	At a vehicle speed of 10 km/h (6 mph) or more, an open or short in the sensor signal circuit of the abnormal wheel continues for 1 second or more.	• Front speed sensor RH • Speed sensor circuit • Sensor installation • Speed sensor rotor • Skid control ECU
↑	252	More than 1 wheel is abnormal.	↑
↑	253	Speed sensor signal circuit is open for 0.5 seconds or more.	↑
↑	254	Momentary interruption of sensor signal from the abnormal wheel occurs 7 times or more.	↑
↑	255	Frequency of 2.7 kHz or higher is input.	• Front speed sensor RH • Speed sensor circuit • Speed sensor rotor • Skid control ECU

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C0205/32	264	At a vehicle speed of 10 km/h (6 mph) or more, an open or short in the sensor signal circuit of the abnormal wheel continues for 1 second or more.	• Front speed sensor LH • Speed sensor circuit • Sensor installation • Speed sensor rotor • Skid control ECU
↑	265	More than 1 wheel is abnormal.	↑
↑	266	Speed sensor signal circuit is open for 0.5 seconds or more.	↑
↑	267	Momentary interruption of sensor signal from the abnormal wheel occurs 7 times or more.	↑
↑	268	Frequency of 2.7 kHz or higher is input.	• Front speed sensor LH • Speed sensor circuit • Speed sensor rotor • Skid control ECU
C1271/71 C1272/72	-	Detected only during Test Mode.	• Front speed sensor RH/LH • Sensor installation • Speed sensor rotor

HINT:
- DTCs C0200/31 and C1271/71 are for the front speed sensor RH.
- DTCs C0205/32 and C1272/72 are for the front speed sensor LH.
- The BRAKE warning light comes on when speed sensor malfunctions are detected in two or more wheels.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1 CHECK HARNESS AND CONNECTOR (MOMENTARY INTERRUPTION)

(a) Using the intelligent tester, check for any momentary interruption in the wire harness and connector corresponding to a DTC (See page BC-23).

ABS / VSC:

Tester Display	Measurement Item/Range	Normal Condition
FR SPD OPN	FR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal
FL SPD OPN	FL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal

Result

Condition	Proceed to
There are no momentary interruptions	**A**
There are momentary interruptions	**B**
There is a constant open circuit	**C**

HINT:

Perform the above inspection before removing the sensor and connector.

B → **Go to step 11**

C → **Go to step 5**

A

2 READ VALUE OF INTELLIGENT TESTER (FRONT SPEED SENSOR)

(a) Turn the power switch off.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (READY).
(d) Select the Data List mode on the intelligent tester.

ABS / VSC:

Tester Display	Measurement Item/Range	Normal Condition
FR WHEEL SPD	FR wheel speed sensor reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed
FL WHEEL SPD	FL wheel speed sensor reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed

(e) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.

OK:

The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.

BC

NG → Go to step 5

OK

3	PERFORM TEST MODE (SIGNAL CHECK)

(a) Perform sensor check in the Test Mode procedure (See page BC-35).
OK:
All Test Mode DTCs are erased.

NG → Go to step 5

OK

4	RECONFIRM DTC

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (READY).
(d) Drive the vehicle at the speed of 32 km/h (20 mph) or more for at least 60 seconds.
(e) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTCs (C0200/31 and/or C0205/32) are not output	A
DTCs (C0200/31 and/or C0205/32) are output	B

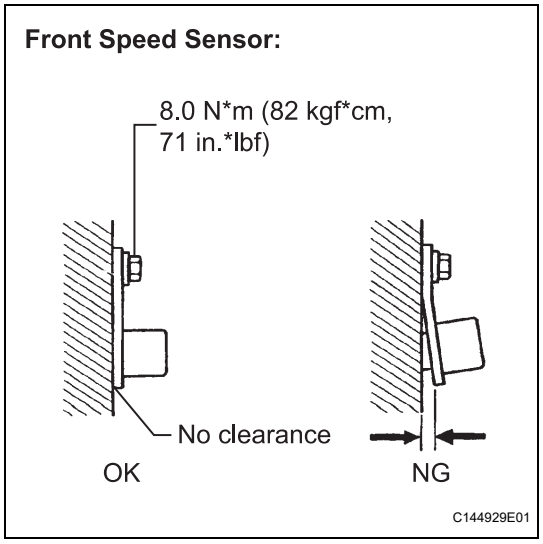
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-46).

B → Go to step 7

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

5	CHECK FRONT SPEED SENSOR INSTALLATION



(a) Turn the power switch off.
(b) Check the speed sensor installation.
OK:
There is no clearance between the sensor and the front steering knuckle.
The installation bolt is tightened properly.
Torque:
8.0 N*m (82 kgf*cm, 71 in.*lbf)

NG → **INSTALL FRONT SPEED SENSOR CORRECTLY**

OK

6	CHECK FRONT SPEED SENSOR TIP

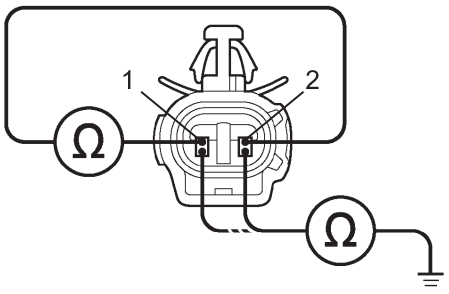
(a) Remove the front speed sensor (See page BC-272).
(b) Check the speed sensor tip.
OK:
No scratches or foreign matter on the sensor tip.
NOTICE:
Check the speed sensor signal after cleaning or replacement (See page BC-35).

NG → **CLEAN OR REPLACE FRONT SPEED SENSOR**

OK

7	INSPECT FRONT SPEED SENSOR

Front Speed Sensor:



C136017E03

(a) Turn the power switch off.
(b) Install the front speed sensor.
(c) Disconnect the front speed sensor connector.
(d) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

Tester Connection	Condition	Specified Condition
1 (FR+) - 2 (FR-)	Always	1.4 to 1.8 kΩ or at 20°C (68°F)
1 (FR+) - Body ground	Always	10 kΩ or higher
2 (FR-) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
1 (FL+) - 2 (FL-)	Always	1.4 to 1.8 kΩ or at 20°C (68°F)
1 (FL+) - Body ground	Always	10 kΩ or higher
2 (FL-) - Body ground	Always	10 kΩ or higher

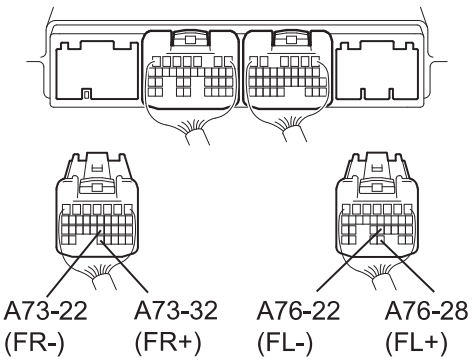
NOTICE:
Check the speed sensor signal after replacement (See page BC-35).

NG → **REPLACE FRONT SPEED SENSOR**

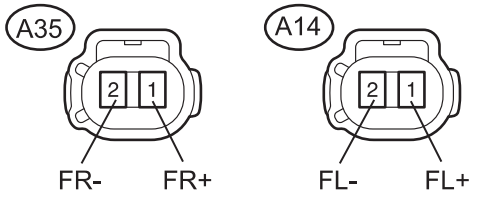
OK

8	CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - FRONT SPEED SENSOR)

Skid Control ECU Wire Harness View:



Front Speed Sensor Harness Side Connector Front View:



C140715E01

(a) Disconnect the skid control ECU connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

Tester Connection	Condition	Specified Condition
A73-32 (FR+) - A35-1 (FR+)	Always	Below 1 Ω
A73-32 (FR+) - Body ground	Always	10 kΩ or higher
A73-22 (FR-) - A35-2 (FR-)	Always	Below 1 Ω
A73-22 (FR-) - Body ground	Always	10 kΩ or higher

LH

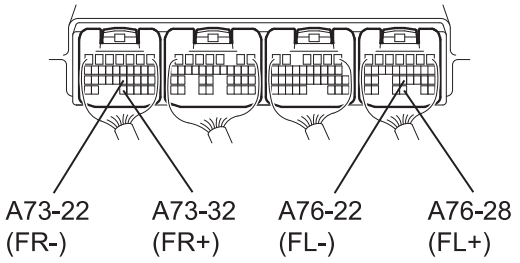
Tester Connection	Condition	Specified Condition
A76-28 (FL+) - A14-1 (FL+)	Always	Below 1 Ω
A76-28 (FL+) - Body ground	Always	10 kΩ or higher
A76-22 (FL-) - A14-2 (FL-)	Always	Below 1 Ω
A76-22 (FL-) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

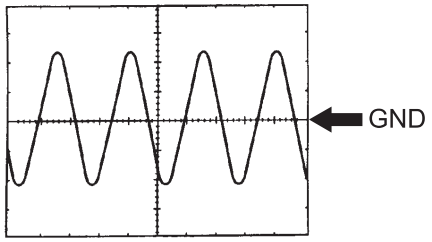
OK

9	CHECK SPEED SENSOR AND SPEED SENSOR ROTOR SERRATIONS

Skid Control ECU Wire Harness View:



Normal Signal Waveform:



C140716E01

(a) Reconnect the skid control ECU connectors and the front speed sensor connector.
(b) Connect the oscilloscope to the front speed sensor terminal of the skid control ECU.
(c) Check that a waveform is output when the tires are rotated.

OK:

The same waveform is output from all the 4 wheels and there is no noise or interference in the waveform.

HINT:

- As the vehicle speed (wheel revolution speed) increases, a cycle of the waveform narrows and the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to speed sensor rotor's scratches, looseness or foreign matter attached to it.

NOTICE:

Check the speed sensor signal after cleaning or replacement (See page BC-35).

NG → **CLEAN OR REPLACE SPEED SENSOR OR SPEED SENSOR ROTOR**

OK

10	RECONFIRM DTC

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (READY).
(d) Drive the vehicle at the speed of 32 km/h (20 mph) or more for at least 60 seconds.
(e) Check if the same DTC is recorded (See page BC-57).

BC

Result

Condition	Proceed to
DTCs (C0200/31 and/or C0205/32) are not output	A
DTCs (C0200/31 and/or C0205/32) are output	B

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-46).

B → **REPLACE SKID CONTROL ECU**

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

11	REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU - FRONT SPEED SENSOR)

(a) Turn the power switch off.
(b) Repair or replace the harness or connector.
(c) Check for any momentary interruption between the skid control ECU and front speed sensor (See page BC-23).
(d) Check that there is no momentary interruption.

NEXT

12	RECONFIRM DTC

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (READY).
(d) Drive the vehicle at the speed of 32 km/h (20 mph) or more for at least 60 seconds.
(e) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTCs (C0200/31 and/or C0205/32) are not output	A
DTCs (C0200/31 and/or C0205/32) are output	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-46).

B → **Go to step 2**

A

END

BC

DTC	C0210/33	Rear Speed Sensor RH Circuit

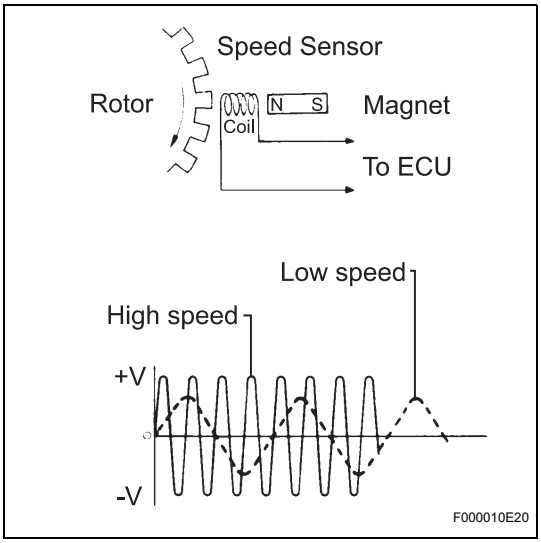
DTC	C0215/34	Rear Speed Sensor LH Circuit

DTC	C1273/73	Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)

DTC	C1274/74	Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)

DESCRIPTION

The speed sensors detect wheel speed and transmit the signals to the ECU. These signals are used for control of the ABS control system. Each of the front and rear rotors has 48 serrations.
When the rotors rotate, the magnetic field generated by the permanent magnet in the speed sensor induces an AC voltage.
Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.
DTCs C1273/73 and C1274/74 can be deleted when the speed sensor sends a wheel speed signal or the Test Mode ends. DTCs C1273/73 and C1274/74 are output only in the Test Mode.

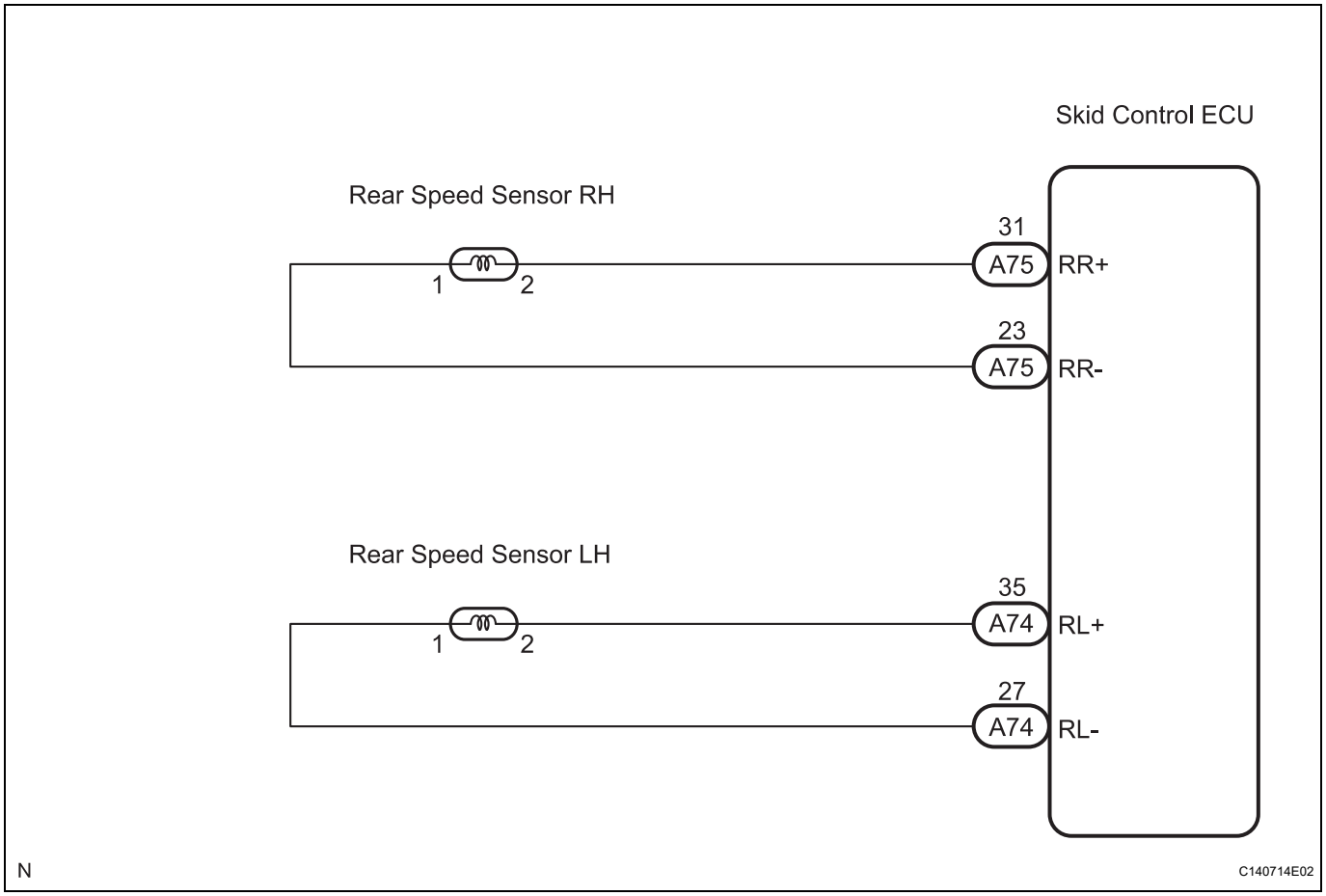


DTC Code	INF Code	DTC Detection Condition	Trouble Area
C0210/33	277	At a vehicle speed of 10 km/h (6 mph) or more, an open or short in the sensor signal circuit of the abnormal wheel continues for 1 second or more.	• Rear speed sensor RH • Speed sensor circuit • Sensor installation • Speed sensor rotor • Skid control ECU
↑	278	More than 1 wheel is abnormal.	↑
↑	279	Speed sensor signal circuit is open for 0.5 seconds or more.	↑
↑	280	Momentary interruption of sensor signal from the abnormal wheel occurs 7 times or more.	↑
↑	281	Frequency of 2.7 kHz or higher is input.	• Rear speed sensor RH • Speed sensor circuit • Speed sensor rotor • Skid control ECU

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C0215/34	290	At a vehicle speed of 10 km/h (6 mph) or more, an open or short in the sensor signal circuit of the abnormal wheel continues for 1 second or more.	• Rear speed sensor LH • Speed sensor circuit • Sensor installation • Speed sensor rotor • Skid control ECU
↑	291	More than 1 wheel is abnormal.	↑
↑	292	Speed sensor signal circuit is open for 0.5 seconds or more.	↑
↑	293	Momentary interruption of sensor signal from the abnormal wheel occurs 7 times or more.	↑
↑	294	Frequency of 2.7 kHz or higher is input.	• Rear speed sensor LH • Speed sensor circuit • Speed sensor rotor • Skid control ECU
C1273/73 C1274/74	-	Detected only during Test Mode.	• Rear speed sensor RH/LH • Sensor installation • Speed sensor rotor

HINT:
- DTCs C0210/33 and C1273/73 are for the rear speed sensor RH.
- DTCs C0215/34 and C1274/74 are for the rear speed sensor LH.
- The BRAKE warning light comes on when speed sensor malfunctions are detected in two or more wheels.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1 CHECK HARNESS AND CONNECTOR (MOMENTARY INTERRUPTION)

(a) Using the intelligent tester, check for any momentary interruption in the wire harness and connector corresponding to a DTC (See page BC-23).

ABS / VSC:

Tester Display	Measurement Item/Range	Normal Condition
RR SPD OPN	RR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal
RL SPD OPN	RL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal

Result

Condition	Proceed to
There are no momentary interruptions	**A**
There are momentary interruptions	**B**
There is a constant open circuit	**C**

HINT:

Perform the above inspection before removing the sensor and connector.

B → **Go to step 11**

C → **Go to step 5**

A

2 READ VALUE OF INTELLIGENT TESTER (REAR SPEED SENSOR)

(a) Turn the power switch off.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (READY).
(d) Select the Data List mode on the intelligent tester.

ABS / VSC:

BC

Tester Display	Measurement Item/Range	Normal Condition
RR WHEEL SPD	RR wheel speed sensor reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed
RL WHEEL SPD	RL wheel speed sensor reading / min.: 0 km/h (0 mph), max.: 326 km/h (202 mph)	Actual wheel speed

(e) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.

OK:

The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.

NG → Go to step 5

OK

3	PERFORM TEST MODE (SIGNAL CHECK)

(a) Perform sensor check in the Test Mode procedure (See page BC-35).
OK:
All Test Mode DTCs are erased.

NG → Go to step 5

OK

4	RECONFIRM DTC

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (READY).
(d) Drive the vehicle at the speed of 32 km/h (20 mph) or more for at least 60 seconds.
(e) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTCs (C0210/33 and/or C0215/34) are not output	A
DTCs (C0210/33 and/or C0215/34) are output	B

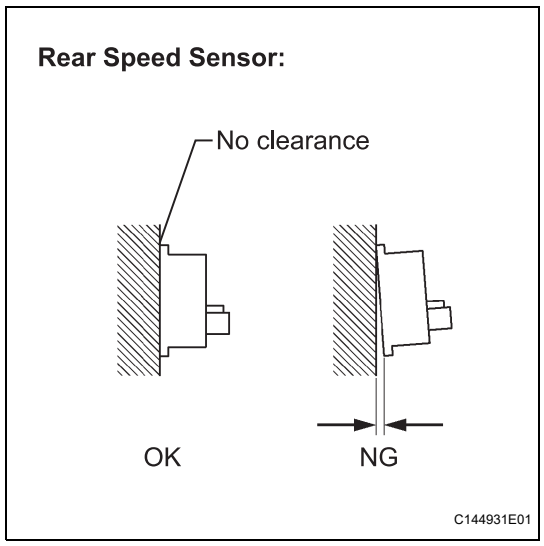
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-46).

B → Go to step 6

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

5 CHECK REAR SPEED SENSOR INSTALLATION

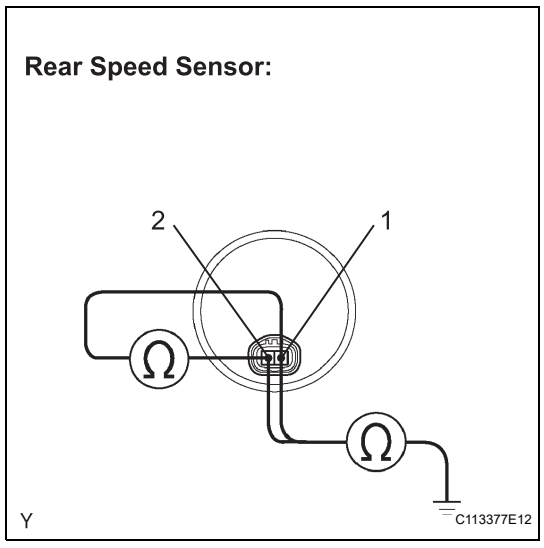


(a) Turn the power switch off.
(b) Check the speed sensor installation.
OK:
There is no clearance between the sensor and rear axle carrier.

NG → **INSTALL REAR SPEED SENSOR CORRECTLY**

OK

6 INSPECT REAR SPEED SENSOR



(a) Turn the power switch off.
(b) Disconnect the rear speed sensor connector.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance:
RH

Tester Connection	Condition	Specified Condition
2 (RR+) - 1 (RR-)	Always	Below 1.45 kΩ at 20°C (68°F)
2 (RR+) - Body ground	Always	10 kΩ or higher
1 (RR-) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
2 (RL+) - 1 (RL-)	Always	Below 1.45 kΩ at 20°C (68°F)
2 (RL+) - Body ground	Always	10 kΩ or higher
1 (RL-) - Body ground	Always	10 kΩ or higher

NOTICE:
Check the speed sensor signal after replacement (See page BC-35).

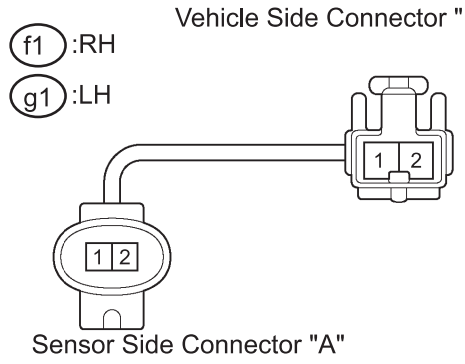
NG → **REPLACE REAR SPEED SENSOR**

OK

BC

7	CHECK HARNESS AND CONNECTOR (SKID CONTROL SENSOR WIRE)

Skid Control Sensor Wire:



C136026E01

(a) Disconnect the skid control sensor wire.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

Tester Connection	Condition	Specified Condition
f1 ("A"-1) - f1 ("B"-2)	Always	Below 1 Ω
f1 ("A"-1) - f1 ("B"-1)	Always	10 kΩ or higher
f1 ("A"-1) - Body ground	Always	10 kΩ or higher
f1 ("A"-2) - f1 ("B"-1)	Always	Below 1 Ω
f1 ("A"-2) - f1 ("B"-2)	Always	10 kΩ or higher
f1 ("A"-2) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
g1 ("A"-1) - g1 ("B"-2)	Always	Below 1 Ω
g1 ("A"-1) - g1 ("B"-1)	Always	10 kΩ or higher
g1 ("A"-1) - Body ground	Always	10 kΩ or higher
g1 ("A"-2) - g1 ("B"-1)	Always	Below 1 Ω
g1 ("A"-2) - g1 ("B"-2)	Always	10 kΩ or higher
g1 ("A"-2) - Body ground	Always	10 kΩ or higher

NOTICE:
Check the speed sensor signal after replacement (See page BC-35).

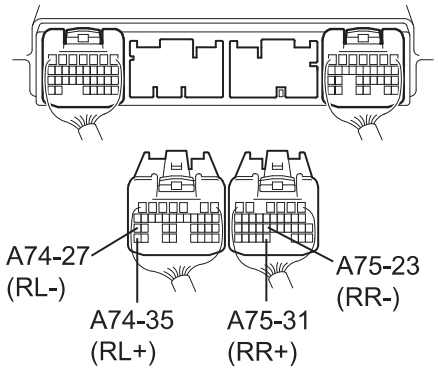
NG → **REPLACE SKID CONTROL SENSOR WIRE**

OK

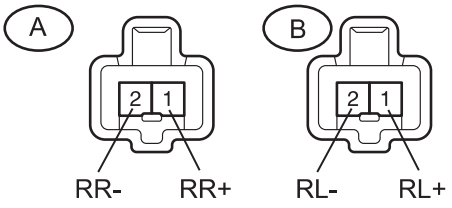
BC

8	CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - REAR SPEED SENSOR)

Skid Control ECU Wire Harness View:



Rear Speed Sensor Harness Side Connector Front View:



N C140717E01

(a) Disconnect the skid control ECU connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

Tester Connection	Condition	Specified Condition
A75-31 (RR+) - A-1 (RR+)	Always	Below 1 Ω
A75-31 (RR+) - Body ground	Always	10 kΩ or higher
A75-23 (RR-) - A-2 (RR-)	Always	Below 1 Ω
A75-23 (RR-) - Body ground	Always	10 kΩ or higher

LH

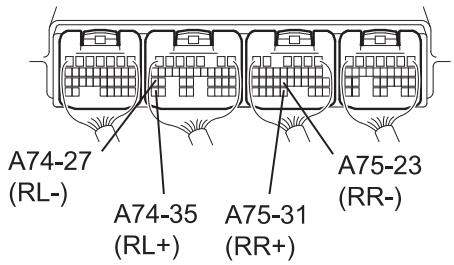
Tester Connection	Condition	Specified Condition
A74-35 (RL+) - B-1 (RL+)	Always	Below 1 Ω
A74-35 (RL+) - Body ground	Always	10 kΩ or higher
A74-27 (RL-) - B-2 (RL-)	Always	Below 1 Ω
A74-27 (RL-) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

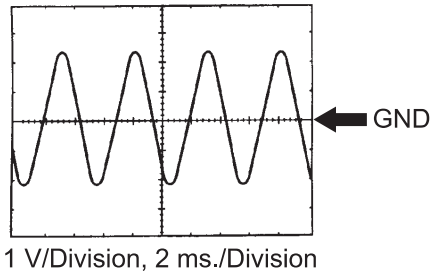
OK

9	CHECK SPEED SENSOR AND SPEED SENSOR ROTOR SERRATIONS

Skid Control ECU Wire Harness View:



Normal Signal Waveform:



C140716E02

(a) Reconnect the skid control sensor wire.
(b) Reconnect the skid control ECU connectors and the rear speed sensor connector.
(c) Connect the oscilloscope to the rear speed sensor terminal of the skid control ECU.
(d) Check that a waveform is output when the tires are rotated.

OK:

The same waveform is output from all the 4 wheels and there is no noise or interference in the waveform.

HINT:

- As the vehicle speed (wheel revolution speed) increases, a cycle of the waveform narrows and the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to speed sensor rotor's scratches, looseness or foreign matter attached to it.

NOTICE:

Check the speed sensor signal after cleaning or replacement (See page BC-35).

NG → **CLEAN OR REPLACE SPEED SENSOR OR SPEED SENSOR ROTOR**

OK

10	RECONFIRM DTC

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (READY).
(d) Drive the vehicle at the speed of 32 km/h (20 mph) or more for at least 60 seconds.
(e) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTCs (C0210/33 and/or C0215/34) are not output	A
DTCs (C0210/33 and/or C0215/34) are output	B

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-46).

B → **REPLACE SKID CONTROL ECU**

BC

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

11 **REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU - REAR SPEED SENSOR)**

(a) Turn the power switch off.
(b) Repair or replace the harness or connector.
(c) Check for any momentary interruption between the skid control ECU and rear speed sensor (See page BC-23).
(d) Check that there is no momentary interruption.

NEXT

12 **RECONFIRM DTC**

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (READY).
(d) Drive the vehicle at the speed of 32 km/h (20 mph) or more for at least 60 seconds.
(e) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTCs (C0210/33 and/or C0215/34) are not output	A
DTCs (C0210/33 and/or C0215/34) are output	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-46).

B → **Go to step 2**

A

END

DTC	**C0371/71**	**Yaw Rate Sensor (Test Mode DTC)**
DTC	**C1234/34**	**Yaw Rate Sensor Malfunction**
DTC	**C1243/43**	**Acceleration Sensor Stuck Malfunction**
DTC	**C1244/44**	**Open or Short in Acceleration Sensor Circuit**
DTC	**C1245/45**	**Acceleration Sensor Output Malfunction**
DTC	**C1279/79**	**Acceleration Sensor Output Voltage Malfunction (Test Mode DTC)**
DTC	**C1381/97**	**Yaw Rate and / or Acceleration Sensor Power Supply Voltage Malfunction**

DESCRIPTION

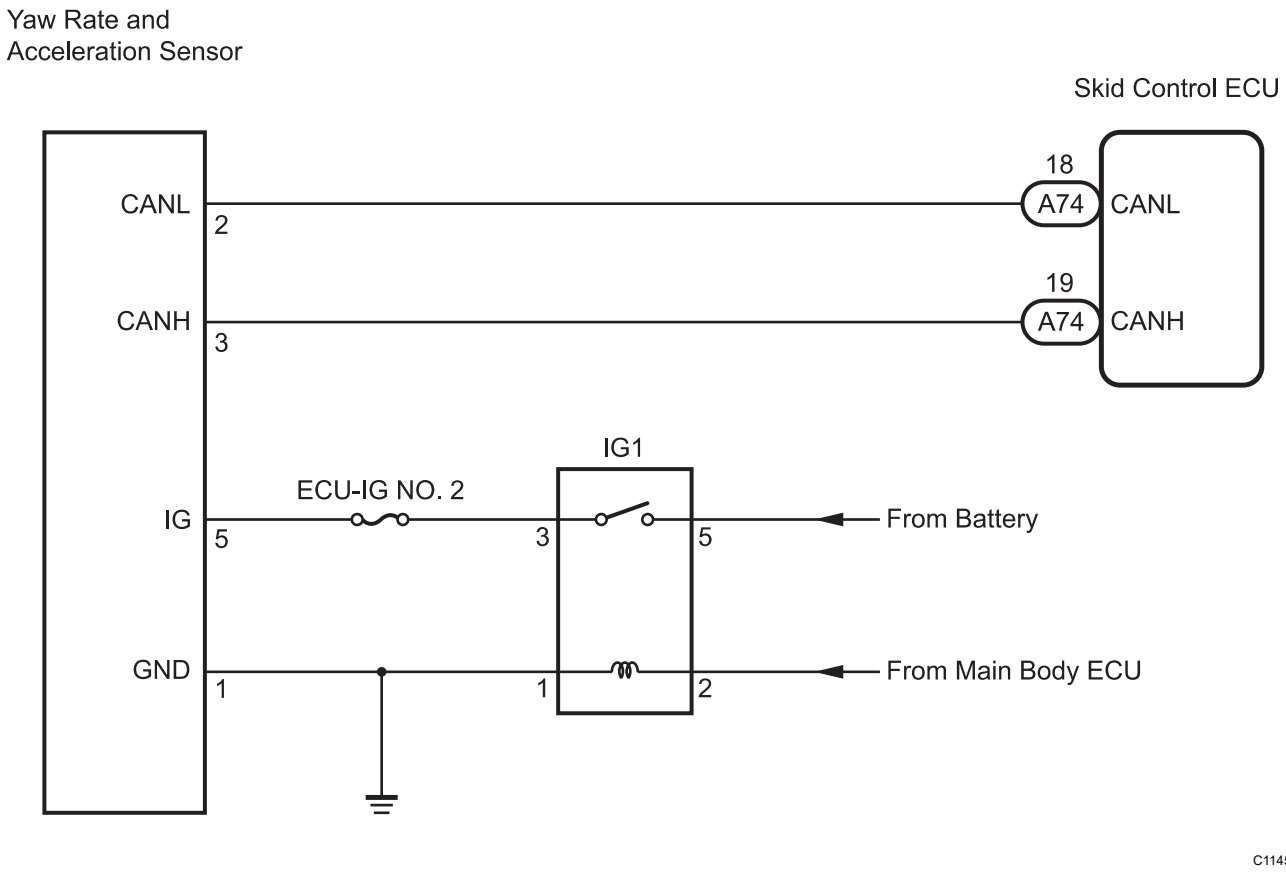
The skid control ECU receives signals from the yaw rate and acceleration sensor through the CAN communication system.
The yaw rate sensor has a built in acceleration sensor and detects the vehicle's condition using 2 circuits (GL1, GL2).
If there is trouble in the bus lines between the yaw rate and acceleration sensor and the CAN communication system, DTCs U0123/62 (malfunction in CAN communication with the yaw rate sensor) and U0124/95 (malfunction in CAN communication with the acceleration sensor) are output.
These DTCs are also output when calibration has not been completed.
DTCs C0371/71 and C1279/79 can be deleted when the yaw rate and acceleration sensor sends a yaw rate and/or acceleration signal or the Test Mode ends. DTCs C0371/71 and C1279/79 are output only in the Test Mode.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1234/34	333 334 335 337	Malfunction signal that is detected in sensor self check is received when communication with the sensors is valid.	Yaw rate and acceleration sensor
C1243/43	311 312 317	Sensor sticking can be seen 16 times or more in a series at a speed between 30 km/h (18 mph) and 0 km/h (0 mph).	Yaw rate and acceleration sensor
C1244/44	314	Difference between GL1 and GL2 is not less than 0.4 G for at least 60 seconds after the difference is 0.6 G or more when the vehicle speed is 0 km/h (0 mph). Malfunction signal from acceleration sensor is received.	• Yaw rate and acceleration sensor • Sensor installation
C1245/45	313	Difference between the G value calculated from deceleration sensor value and vehicle speed exceeds 0.35 G for at least 60 seconds when vehicle speed is 30 km/h (18 mph).	• Yaw rate and acceleration sensor • Sensor installation
C1381/97	315	Power source voltage is not within specified range when communication between skid control ECU and sensor is valid.	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor power source circuit • Skid control ECU
C0371/71	-	Detected only during Test Mode.	Yaw rate and acceleration sensor

BC

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1279/79	-	Detected only during Test Mode.	• Yaw rate and acceleration sensor • Sensor installation

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

When replacing the yaw rate and acceleration sensor, perform zero point calibration (See page BC-29).

HINT:

When U0123/62 or U0124/95 is output together with C1234/34, C1243/43, C1244/44, C1245/45, or C1381/97, inspect and repair the trouble areas indicated by U0123/62 or U0124/95 first.

BC

1	CHECK DTC

(a) Clear the DTC (See page BC-57).
(b) Turn the power switch off.
(c) At a speed of 30 km/h (18 mph) or more, drive the vehicle, turn the steering wheel, and decelerate the vehicle (depress the brake pedal).
(d) Turn the power switch on (IG) again and check that no CAN communication system DTC is output.

(e) Check if DTCs indicating that zero point calibration of the yaw rate sensor is undone (C1210/36) or indicating that zero point calibration of the acceleration sensor is undone (C1336/98) are output.

Result

Condition	Proceed to
DTCs (C1210/36, C1336/98, and/or CAN communication system DTC) are not output	A
CAN communication system DTC is output	B
DTCs (C1210/36 and/or C1336/98) are output	C

B → **INSPECT CAN COMMUNICATION SYSTEM**

C → **REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See page BC-69)**

A

2 CHECK YAW RATE AND ACCELERATION SENSOR INSTALLATION

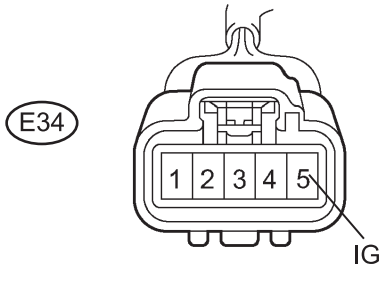
(a) Turn the power switch off.
(b) Check that the yaw rate and acceleration sensor has been installed properly (See page BC-283).
OK:
The sensor is tightened to the specified torque.
The sensor is not tilted.

NG → **INSTALL YAW RATE AND ACCELERATION SENSOR CORRECTLY**

OK

3 INSPECT YAW RATE AND ACCELERATION SENSOR (IG TERMINAL)

Yaw Rate and Acceleration Sensor Harness Side Connector Front View:



(a) Disconnect the yaw rate and acceleration sensor connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
E34-5 (IG) - Body ground	Power switch on (IG)	10 to 14 V

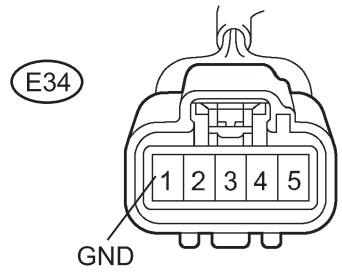
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG CIRCUIT)**

OK

BC

4	INSPECT YAW RATE AND ACCELERATION SENSOR (GND TERMINAL)

Yaw Rate and Acceleration Sensor Harness Side Connector Front View:



(a) Turn the power switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E34-1 (GND) - Body ground	Always	Below 1 Ω

NOTICE:
Check the yaw rate and acceleration sensor signal after replacement (See page BC-35).
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-46).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

REPLACE YAW RATE AND ACCELERATION SENSOR

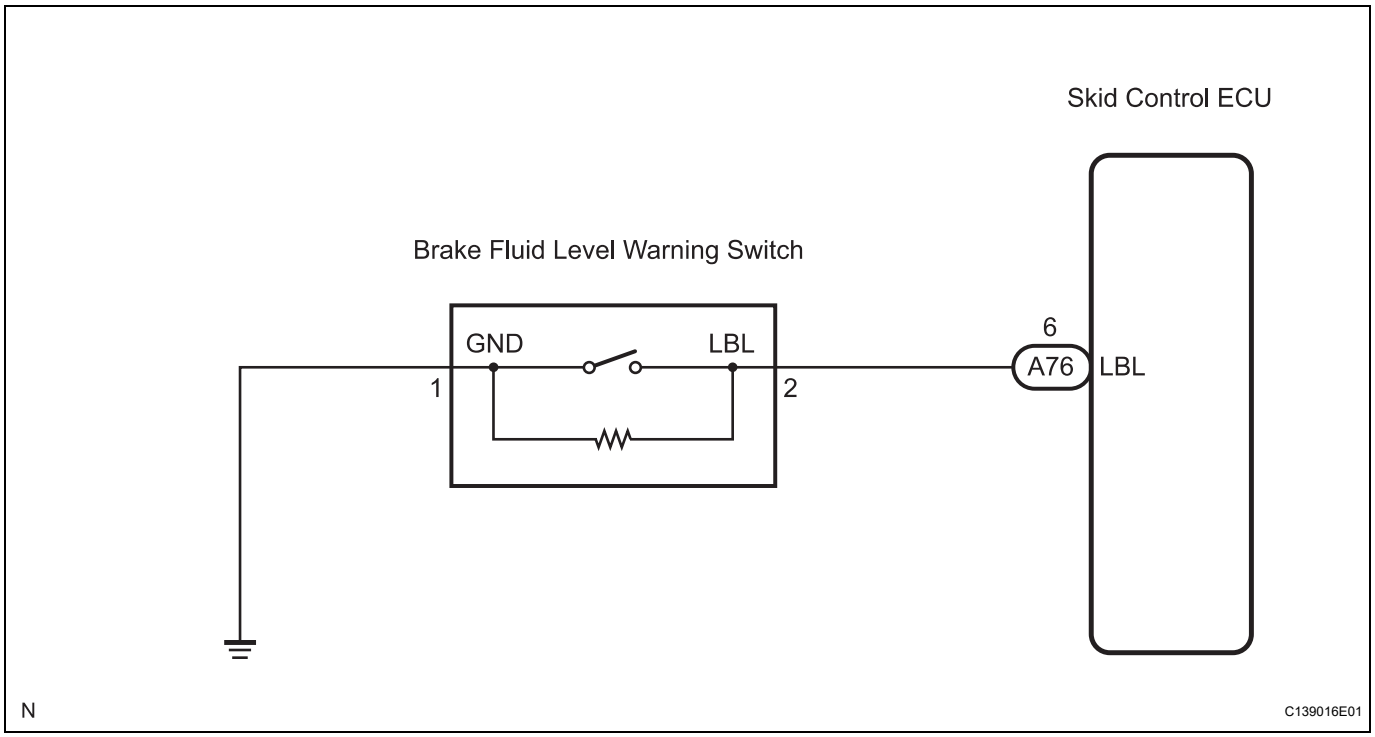
DTC	C1202/68	Master Reservoir Level Malfunction

DESCRIPTION

When a fluid level drop in the master cylinder reservoir is detected, the signal is input to the skid control ECU.
When the DTC for the fluid level drop is memorized, the warning is canceled and the DTC is not stored if the fluid level returns to normal.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1202/68	-	When either of the following is detected: 1. Pump motor operates for specified period when reservoir level drops. 2. Brake operation signal is input when the reservoir level is abnormal and the power switch is on (IG).	• Fluid leakage • Brake fluid level • Brake fluid level warning switch • Brake fluid level warning switch circuit • Skid control ECU
↑	512	An open in the switch signal circuit continues for 2 seconds or more.	• Brake fluid level warning switch • Brake fluid level warning switch circuit • Skid control ECU

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:
When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).
HINT:
When releasing the parking brake, set the chocks to hold the vehicle for safety.

1	CHECK BRAKE FLUID LEVEL IN RESERVOIR

(a) Check that the brake fluid level is sufficient.

HINT:
- If the fluid level drops, check for a fluid leak, and repair if found.
- If no leak exists, add and adjust fluid and then check that the trouble code is not output again.

OK:

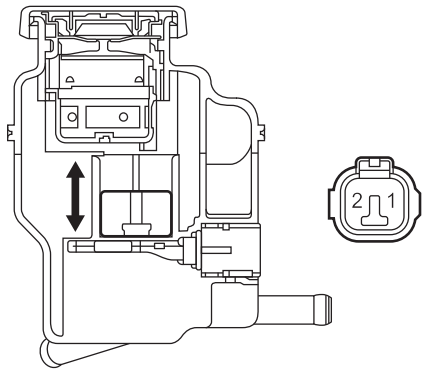
Brake fluid level is proper.

NG → **CHECK AND REPAIR BRAKE FLUID LEAKAGE OR ADD FLUID**

OK

2	INSPECT BRAKE FLUID LEVEL WARNING SWITCH

Brake Fluid Level Warning Switch:



(a) Remove the reservoir tank cap.
(b) Disconnect the brake fluid level warning switch connector.
(c) Measure the resistance according to the value(s) in the table below.

HINT:
A float is located inside the reservoir. Its position can be changed by increasing or decreasing the level of brake fluid.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Float up (Switch OFF)	1.9 to 2.1 kΩ
1 - 2	Float down (Switch ON)	Below 1 Ω

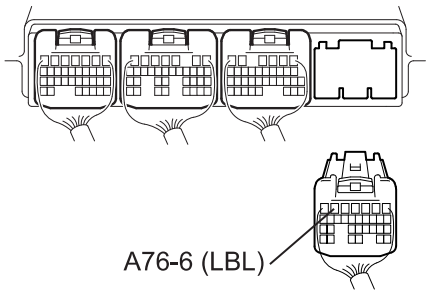
HINT:
If there is no problem after finishing the above check, adjust the brake fluid level to the MAX level.

NG → **REPLACE BRAKE MASTER CYLINDER RESERVOIR ASSEMBLY (BRAKE FLUID LEVEL WARNING SWITCH)**

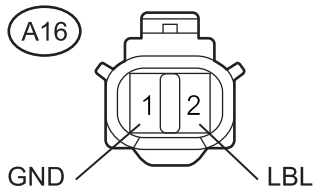
OK

3	CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - BRAKE FLUID LEVEL WARNING SWITCH)

Skid Control ECU Wire Harness View:



Brake Fluid Level Warning Switch Harness Side Connector Front View:



C140718E01

(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

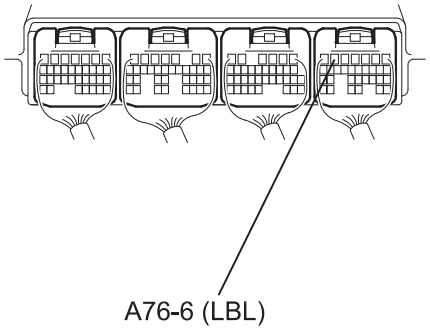
Tester Connection	Condition	Specified Condition
A76-6 (LBL) - A16-2 (LBL)	Always	Below 1 Ω
A76-6 (LBL) - Body ground	Always	10 kΩ or higher
A16-1 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	INSPECT SKID CONTROL ECU (SWITCH INPUT)

Skid Control ECU Wire Harness View:



P

C135838E02

(a) Reconnect the skid control ECU connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A76-6 (LBL) - Body ground	Power switch on (IG)	8 to 14 V

NG → **REPLACE SKID CONTROL ECU**

BC

OK

5	RECONFIRM DTC

(a) Turn the power switch off.
(b) Reconnect the brake fluid level warning switch connector.
(c) Clear the DTC (See page BC-57).
(d) Turn the power switch on (IG).
(e) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTC (C1202/68) is not output	A
DTC (C1202/68) is output	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-46).

B → REPLACE SKID CONTROL ECU

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

DTC	C1203/95	ECM Communication Circuit Malfunction

DESCRIPTION

The circuit is used to send TRAC and VSC control information from the skid control ECU to the HV control ECU, and hybrid control information from the HV control ECU to the skid control ECU through the CAN communication system.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1203/95	-	When any of the following is detected: 1. No stored information for destination. 2. No stored information whether VSC is in operation or not. 3. Destination information from HV control ECU does not match with stored value.	HV control ECU

INSPECTION PROCEDURE

1 CHECK PART NUMBER (SKID CONTROL ECU AND HV CONTROL ECU)

(a) Check that the proper skid control ECU and HV control ECU are installed.
OK:
Proper ECUs are installed.

NG → **REPLACE ECUS WITH PROPER ONES**

OK ↓

2 RECONFIRM DTC

(a) Clear the DTC (See page BC-57).
(b) Turn the power switch on (IG).
(c) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTC (C1203/95) is not output	A
DTC (C1203/95) is output	B

B → **REPLACE HV CONTROL ECU**

A ↓

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

BC

DTC	C1210/36	Zero Point Calibration of Yaw Rate Sensor Undone

DTC	C1336/98	Zero Point Calibration of Acceleration Sensor Undone

DESCRIPTION

The skid control ECU receives signals from the yaw rate and acceleration sensor through the CAN communication system.
The yaw rate sensor has the built in acceleration sensor and detects the vehicle's condition using 2 circuits (GL1, GL2).
If there is trouble in the bus lines between the yaw rate and acceleration sensor and the CAN communication system, the DTCs U0123/62 (yaw rate sensor communication trouble) and U0124/95 (acceleration sensor communication trouble) are output.
The DTCs are also output when the calibration has not been completed.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1210/36	-	Yaw rate sensor zero point calibration is unfinished.	• Skid control ECU • Yaw rate and acceleration sensor • Zero point calibration undone (Perform zero point calibration and check DTC. If DTC is not output again, the sensor is normal)
C1336/98	-	When either of the following is detected: 1. Vehicle speed increases with unfinished zero point calibration. 2. Zero point calculation is not within specified range when zero point calibration is finished.	• Skid control ECU • Yaw rate and acceleration sensor • Zero point calibration undone (Perform zero point calibration and check DTC. If DTC is not output again, the sensor is normal)

INSPECTION PROCEDURE

NOTICE:
When replacing the skid control ECU, perform initialization of the linear solenoid valve and calibration (See page BC-25).
HINT:
When U0123/62, U0124/95 or U0126/63 is output along with C1210/36 or C1336/98, inspect and repair trouble areas indicated by U0123/62, U0124/95 or U0126/63 first.

1	PERFORM ZERO POINT CALIBRATION OF YAW RATE AND ACCELERATION SENSOR

(a) Perform zero point calibration of the yaw rate and acceleration sensor (See page BC-29).

BC

NEXT

2	RECONFIRM DTC

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (IG).
(d) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTCs (C1210/36 and/or C1336/98) are output	A

Condition	Proceed to
DTCs (C1210/36 and/or C1336/98) are not output	B

HINT:
- The DTCs are recorded because zero point calibration has not been completed.
- End the procedure as the same DTCs are not recorded after completion of zero point calibration.

B → **END**

A

3	CHECK YAW RATE AND ACCELERATION SENSOR INSTALLATION

(a) Turn the power switch off.
(b) Check that the yaw rate and acceleration sensor has been installed properly (See page BC-283).
OK:
The sensor should be tightened to the specified torque.
The sensor should not be tilted.

NG → **INSTALL YAW RATE AND ACCELERATION SENSOR CORRECTLY**

OK

REPLACE SKID CONTROL ECU

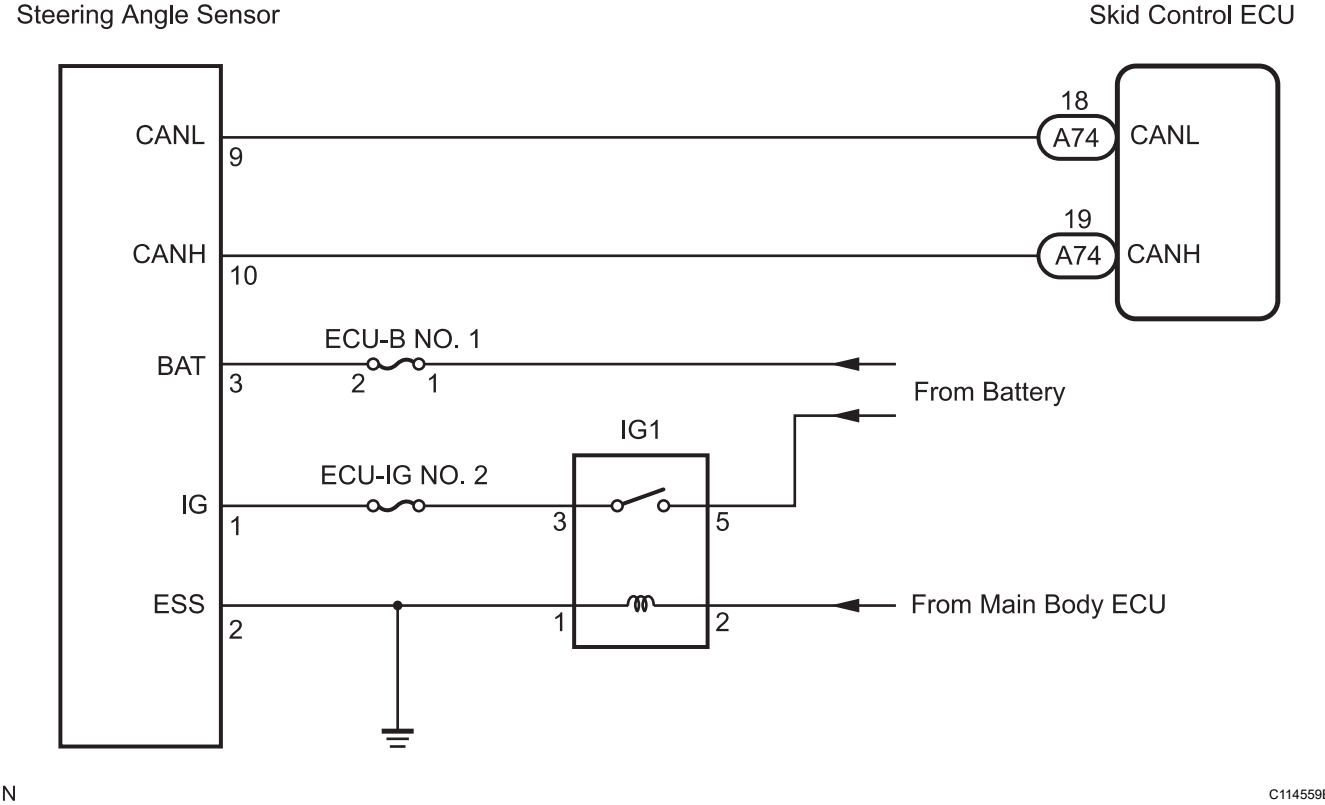
DTC	C1231/31	Steering Angle Sensor Circuit Malfunction

DESCRIPTION

The skid control ECU inputs the steering angle sensor signal through the CAN communication. When a malfunction occurs in the communication line with the steering angle sensor, DTC U0126/63 (malfunction in communication with steering angle sensor) is output.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1231/31	-	When either of the following is detected: 1. Steering angle sensor malfunction signal is received when data transmission is valid (internal malfunction is detected in sensor self check). 2. A signal of +B open in steering angle sensor is received when communication with sensor is valid.	• Steering angle sensor • Steering angle sensor circuit • Steering angle sensor power supply • Skid control ECU

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

HINT:

- When U0126/63 is output together with C1231/31, inspect and repair the trouble areas indicated by U0126/63 first.
- When the speed sensor or the yaw rate sensor has trouble, DTCs for the steering angle sensor may be output even when the steering angle sensor is normal. When DTCs for the speed sensor or yaw rate sensor are output together with other DTCs for the steering angle sensor, inspect and repair the speed sensor and yaw rate sensor first, and then inspect and repair the steering angle sensor.

1	CHECK DTC

(a) Clear the DTC (See page BC-57).
(b) Turn the power switch off.
(c) Turn the power switch on (IG) again and check that no CAN communication system DTC is output.
(d) Drive the vehicle and turn the steering wheel to the right and left at the speed of 35 km/h (22 mph) and check that no speed sensor and yaw rate sensor DTCs are output.

Result

Condition	Proceed to
No CAN communication system DTC and the speed sensor or yaw rate sensor DTC are output	A
CAN communication system DTC is output	B
Speed sensor or yaw rate sensor DTC is output	C

HINT:
- If there is a malfunction in the speed sensor or the yaw rate sensor, an abnormal value may be output although the steering angle sensor is normal.
- If the speed sensor and the yaw rate sensor DTCs are output simultaneously, repair the sensors and inspect the steering angle sensor.

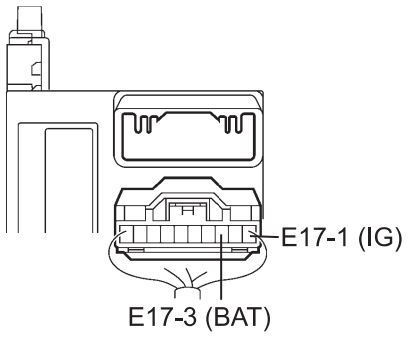
B → **INSPECT CAN COMMUNICATION SYSTEM**

C → **REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See page BC-69)**

A

2	INSPECT STEERING ANGLE SENSOR (POWER SOURCE TERMINAL)

Steering Angle Sensor Wire Harness View:



(a) Turn the power switch off.
(b) Remove the steering wheel and the column cover lower.
(c) Disconnect the steering angle sensor connector.
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E17-1 (IG) - Body ground	Power switch on (IG)	10 to 14 V
E17-3 (BAT) - Body ground	Always	10 to 14 V

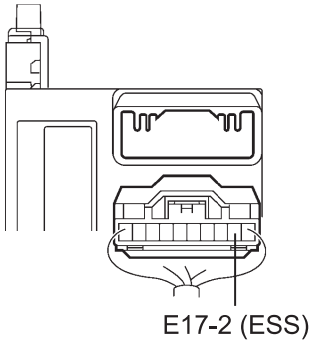
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)**

OK

BC

3	INSPECT STEERING ANGLE SENSOR (GROUND TERMINAL)

Steering Angle Sensor Wire Harness View:



G030156E21

(a) Turn the power switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E17-2 (ESS) - Body ground	Always	Below 1 Ω

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-46).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GROUND CIRCUIT)**

OK

REPLACE STEERING ANGLE SENSOR

DTC	**C1235/35**	**Foreign Object is Attached on Tip of Front Speed Sensor RH**
DTC	**C1236/36**	**Foreign Object is Attached on Tip of Front Speed Sensor LH**
DTC	**C1238/38**	**Foreign Object is Attached on Tip of Rear Speed Sensor RH**
DTC	**C1239/39**	**Foreign Object is Attached on Tip of Rear Speed Sensor LH**
DTC	**C1275/75**	**Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)**
DTC	**C1276/76**	**Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)**
DTC	**C1277/77**	**Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)**
DTC	**C1278/78**	**Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)**

DESCRIPTION

The speed sensors detect wheel speed and transmit the signals to the ECU. These signals are used for control of the ABS control system. Each of the front and rear rotors has 48 serrations.

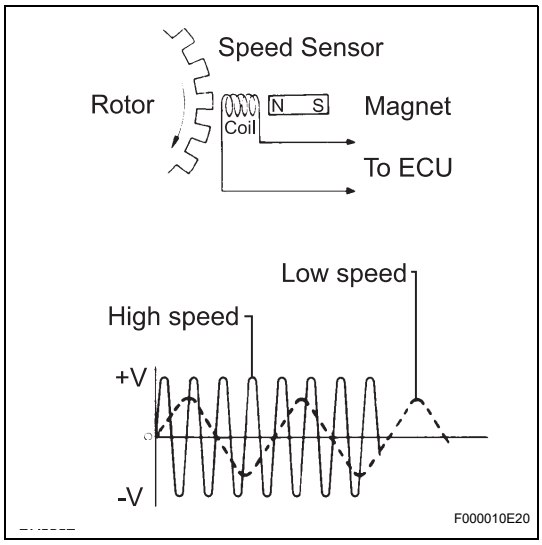
When the rotors rotate, the magnetic field generated by the permanent magnet in the speed sensor induces an AC voltage.

Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.

When foreign matter adheres to the speed sensor tip or speed sensor rotor, or the rotor teeth are chipped, these DTCs are output. An abnormal waveform input from the sensor determines these conditions.

These DTCs may be detected when a malfunction occurs in the connector terminals or wire harness of the speed sensor circuit.

DTCs C1275/75 to C1278/78 can be deleted when the speed sensor sends a wheel speed signal or the Test Mode ends. DTCs from C1275/75 to C1278/78 are output only in the Test Mode.

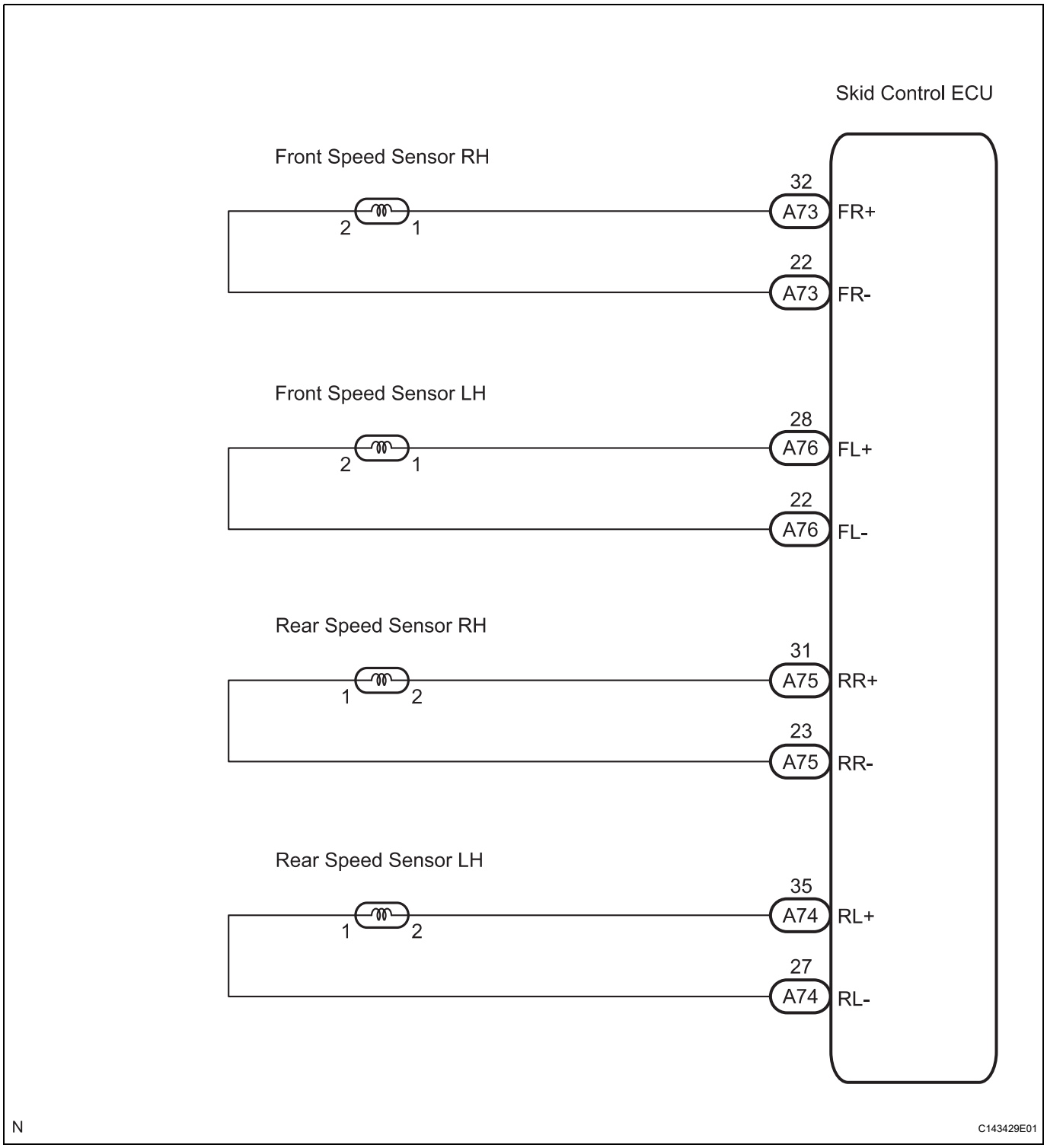


DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1235/35	302	Pulse waveform of speed sensor signal is abnormal for at least 5 seconds when vehicle speed is 20 km/h (12 mph) or more.	• Front speed sensor RH • Speed sensor circuit • Sensor installation • Speed sensor rotor • Skid control ECU
C1236/36	303	Pulse waveform of speed sensor signal is abnormal for at least 5 seconds when vehicle speed is 20 km/h (12 mph) or more.	• Front speed sensor LH • Speed sensor circuit • Sensor installation • Speed sensor rotor • Skid control ECU
C1238/38	304	Pulse waveform of speed sensor signal is abnormal for at least 5 seconds when vehicle speed is 20 km/h (12 mph) or more.	• Rear speed sensor RH • Speed sensor circuit • Sensor installation • Speed sensor rotor • Skid control ECU
C1239/39	305	Pulse waveform of speed sensor signal is abnormal for at least 5 seconds when vehicle speed is 20 km/h (12 mph) or more.	• Rear speed sensor LH • Speed sensor circuit • Sensor installation • Speed sensor rotor • Skid control ECU
C1275/75 C1276/76 C1277/77 C1278/78	-	Detected only during Test Mode.	Speed sensor rotor

HINT:

- DTCs C1235/35 and C1275/75 are for the front speed sensor RH.
- DTCs C1236/36 and C1276/76 are for the front speed sensor LH.
- DTCs C1238/38 and C1277/77 are for the rear speed sensor RH.
- DTCs C1239/39 and C1278/78 are for the rear speed sensor LH.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

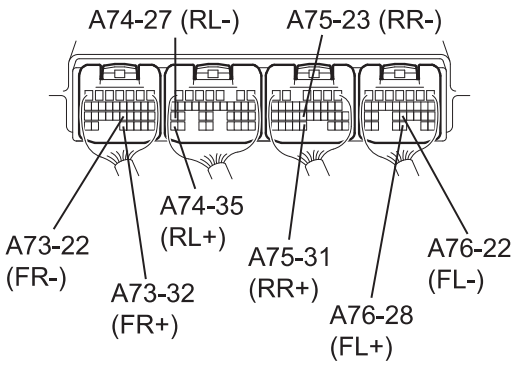
When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

HINT:

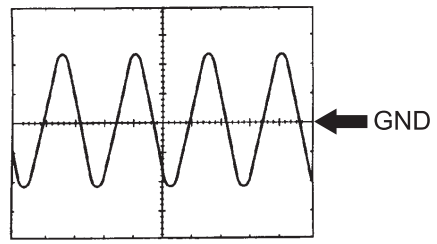
When C0200/31, C0205/32, C0210/33, or C0215/34 is output together with C1235/35, C1236/36, C1238/38, or C1239/39, inspect and repair the trouble areas indicated by C0200/31, C0205/32, C0210/33, or C0215/34 first.

1	CHECK SPEED SENSOR AND SPEED SENSOR ROTOR SERRATIONS

Skid Control ECU Wire Harness View:



Normal Signal Waveform:



C140716E03

(a) Connect the oscilloscope to each speed sensor terminal of the skid control ECU.
(b) Check that a waveform is output when the tires are rotated (by the sensor circuit).
OK:
The same waveform is output from all the 4 wheels and there is no noise or interference in the waveform.
(c) Check that the waveform does not change while jiggling a connector or a wire harness.
OK:
The waveform does not change.
HINT:
- As the vehicle speed (wheel revolution speed) increases, a cycle of the waveform narrows and the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to speed sensor rotor's scratches, looseness or foreign matter attached to it.

NG → **Go to step 3**

OK

2	RECONFIRM DTC

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (READY).
(d) Drive the vehicle at the speed of 20 km/h (12 mph) or more for at least 60 seconds.
(e) Check if the same DTC is recorded (See page BC-57).

BC

Result

Condition	Proceed to
DTCs (C1235/35, C1236/36, C1238/38 and/or C1239/39) are not output	A
DTCs (C1235/35, C1236/36, C1238/38 and/or C1239/39) are output	B

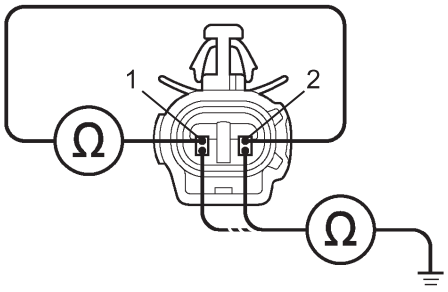
B → **REPLACE SKID CONTROL ECU**

A

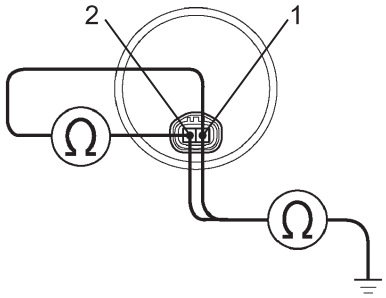
CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

3 INSPECT EACH SPEED SENSOR

Front Speed Sensor:



Rear Speed Sensor:



C136027E04

(a) Turn the power switch off.
(b) Disconnect each speed sensor connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

Tester Connection	Condition	Specified Condition
1 (FR+) - 2 (FR-)	Always	1.4 to 1.8 kΩ at 20°C (68°F)
1 (FR+) - Body ground	Always	10 kΩ or higher
2 (FR-) - Body ground	Always	10 kΩ or higher
2 (RR+) - 1 (RR-)	Always	Below 1.45 kΩ at 20°C (68°F)
2 (RR+) - Body ground	Always	10 kΩ or higher
1 (RR-) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
1 (FL+) - 2 (FL-)	Always	1.4 to 1.8 kΩ at 20°C (68°F)
1 (FL+) - Body ground	Always	10 kΩ or higher
2 (FL-) - Body ground	Always	10 kΩ or higher
2 (RL+) - 1 (RL-)	Always	Below 1.45 kΩ at 20°C (68°F)
2 (RL+) - Body ground	Always	10 kΩ or higher
1 (RL-) - Body ground	Always	10 kΩ or higher

Result

Result	Proceed to
OK (for rear)	A
OK (for front)	B
NG	C

B → Go to step 5

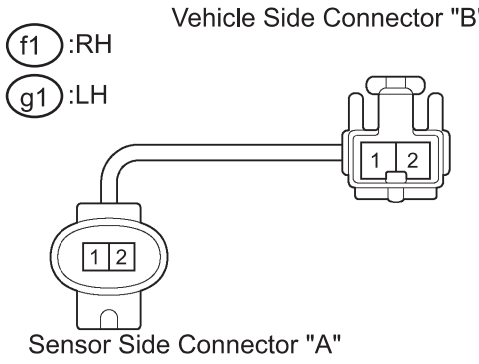
C → REPLACE EACH SPEED SENSOR

A

BC

4	CHECK HARNESS AND CONNECTOR (SKID CONTROL SENSOR WIRE)

Skid Control Sensor Wire:



(a) Disconnect the skid control sensor wire.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

Tester Connection	Condition	Specified Condition
f1 ("A"-1) - f1 ("B"-2)	Always	Below 1 Ω
f1 ("A"-1) - f1 ("B"-1)	Always	10 kΩ or higher
f1 ("A"-1) - Body ground	Always	10 kΩ or higher
f1 ("A"-2) - f1 ("B"-1)	Always	Below 1 Ω
f1 ("A"-2) - f1 ("B"-2)	Always	10 kΩ or higher
f1 ("A"-2) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
g1 ("A"-1) - g1 ("B"-2)	Always	Below 1 Ω
g1 ("A"-1) - g1 ("B"-1)	Always	10 kΩ or higher
g1 ("A"-1) - Body ground	Always	10 kΩ or higher
g1 ("A"-2) - g1 ("B"-1)	Always	Below 1 Ω
g1 ("A"-2) - g1 ("B"-2)	Always	10 kΩ or higher
g1 ("A"-2) - Body ground	Always	10 kΩ or higher

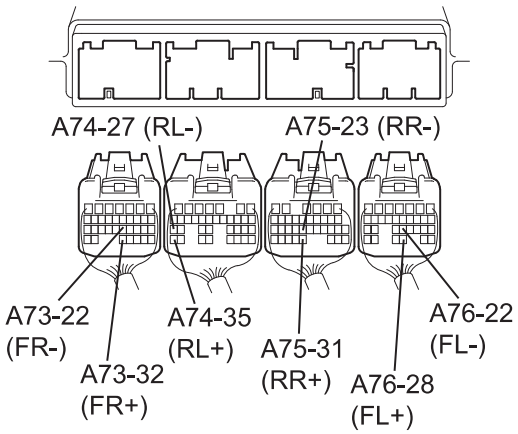
NOTICE:
Check the speed sensor signal after replacement (See page BC-35).

NG → **REPLACE SKID CONTROL SENSOR WIRE**

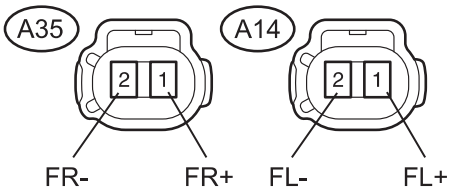
OK

5 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - EACH SPEED SENSOR)

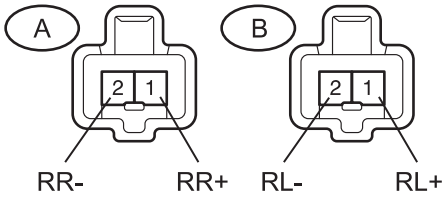
Skid Control ECU Wire Harness View:



Front Speed Sensor Harness Side Connector Front View:



Rear Speed Sensor Harness Side Connector Front View:



C140719E01

(a) Disconnect the skid control ECU connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

Tester Connection	Condition	Specified Condition
A73-32 (FR+) - A35-1 (FR+)	Always	Below 1 Ω
A73-32 (FR+) - Body ground	Always	10 kΩ or higher
A73-22 (FR-) - A35-2 (FR-)	Always	Below 1 Ω
A73-22 (FR-) - Body ground	Always	10 kΩ or higher
A75-31 (RR+) - A-1 (RR+)	Always	Below 1 Ω
A75-31 (RR+) - Body ground	Always	10 kΩ or higher
A75-23 (RR-) - A-2 (RR-)	Always	Below 1 Ω
A75-23 (RR-) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
A76-28 (FL+) - A14-1 (FL+)	Always	Below 1 Ω
A76-28 (FL+) - Body ground	Always	10 kΩ or higher
A76-22 (FL-) - A14-2 (FL-)	Always	Below 1 Ω
A76-22 (FL-) - Body ground	Always	10 kΩ or higher
A74-35 (RL+) - B-1 (RL+)	Always	Below 1 Ω
A74-35 (RL+) - Body ground	Always	10 kΩ or higher
A74-27 (RL-) - B-2 (RL-)	Always	Below 1 Ω
A74-27 (RL-) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 RECONFIRM DTC

(a) Reconnect the skid control sensor wire.
(b) Reconnect the skid control ECU connectors and the speed sensor connector.
(c) Clear the DTC (See page BC-57).
(d) Turn the power switch on (READY).
(e) Drive the vehicle at the speed of 20 km/h (12 mph) or more for at least 60 seconds.

BC

(f) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTCs (C1235/35, C1236/36, C1238/38 and/or C1239/39) are output (for front)	A
DTCs (C1235/35, C1236/36, C1238/38 and/or C1239/39) are output (for rear)	B
DTCs (C1235/35, C1236/36, C1238/38 and/or C1239/39) are not output	C

B → **Go to step 8**

C → **CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)**

A

7	CHECK FRONT SPEED SENSOR TIP

(a) Turn the power switch off.
(b) Remove the front speed sensor (See page BC-272).
(c) Check the speed sensor tip.
OK:
No scratches or foreign matter on the sensor tip.
NOTICE:
Check the speed sensor signal after cleaning or replacement (See page BC-35).

NG → **CLEAN OR REPLACE FRONT SPEED SENSOR**

OK

8	CHECK EACH SPEED SENSOR ROTOR

(a) Turn the power switch off.
(b) Remove each speed sensor rotor (See page DS-5 for front, or AH-15 for rear).
(c) Check the speed sensor rotor.
OK:
No scratches, missing teeth or foreign matter on the rotors.
NOTICE:
Check the speed sensor signal after cleaning or replacement (See page BC-35).

NG → **CLEAN OR REPLACE EACH SPEED SENSOR ROTOR**

OK

9	RECONFIRM DTC

(a) Install the front speed sensor and the speed sensor rotor.
(b) Clear the DTC (See page BC-57).

(c) Turn the power switch on (READY).
(d) Drive the vehicle at the speed of 20 km/h (12 mph) or more for at least 60 seconds.
(e) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTCs (C1235/35, C1236/36, C1238/38 and/or C1239/39) are not output	A
DTCs (C1235/35, C1236/36, C1238/38 and/or C1239/39) are output	B

B → **REPLACE SKID CONTROL ECU**

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

DTC	C1241/41	Low Battery Positive Voltage

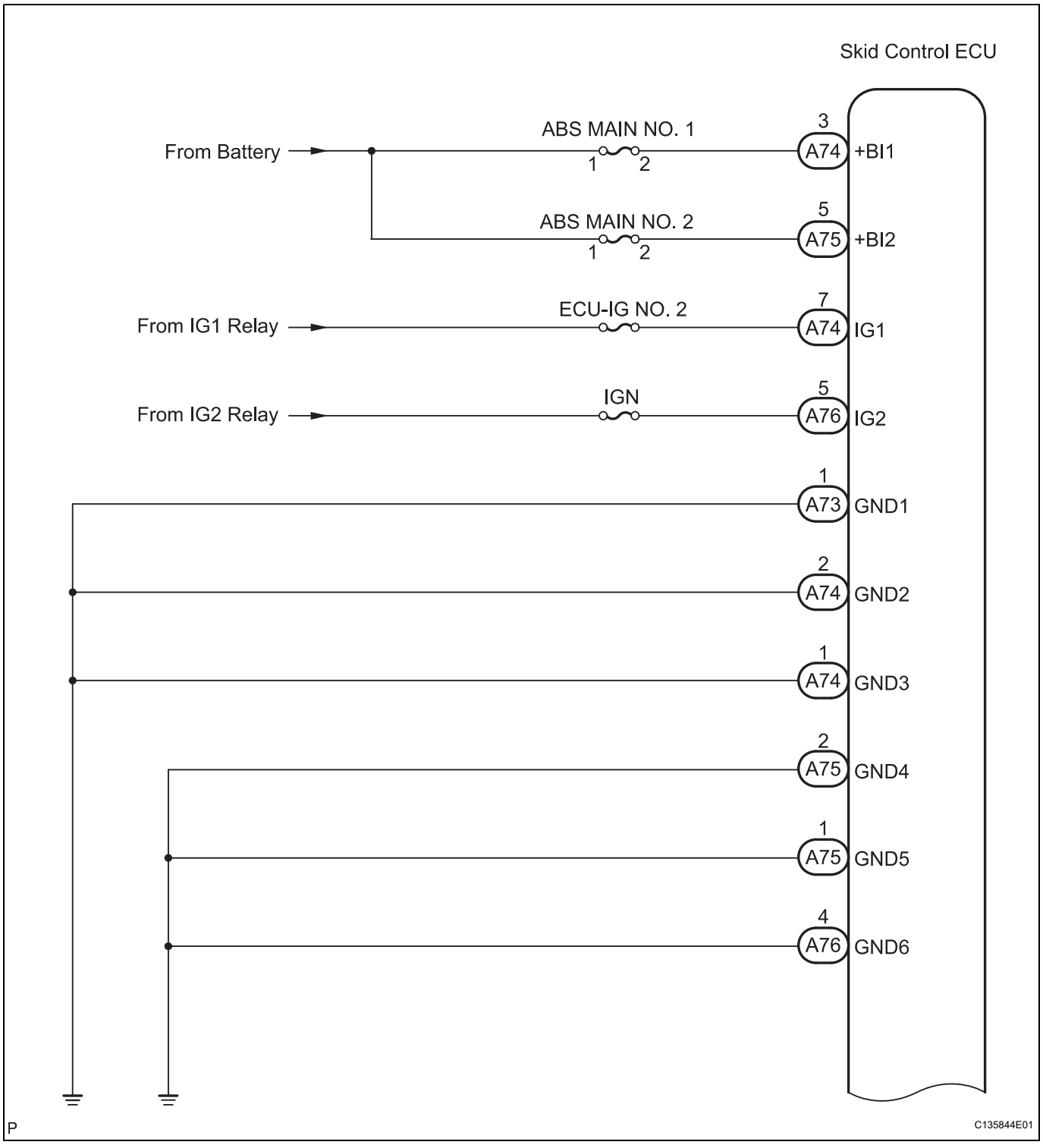
DTC	C1242/42	Open in IG1 / IG2 Power Source Circuit

DESCRIPTION

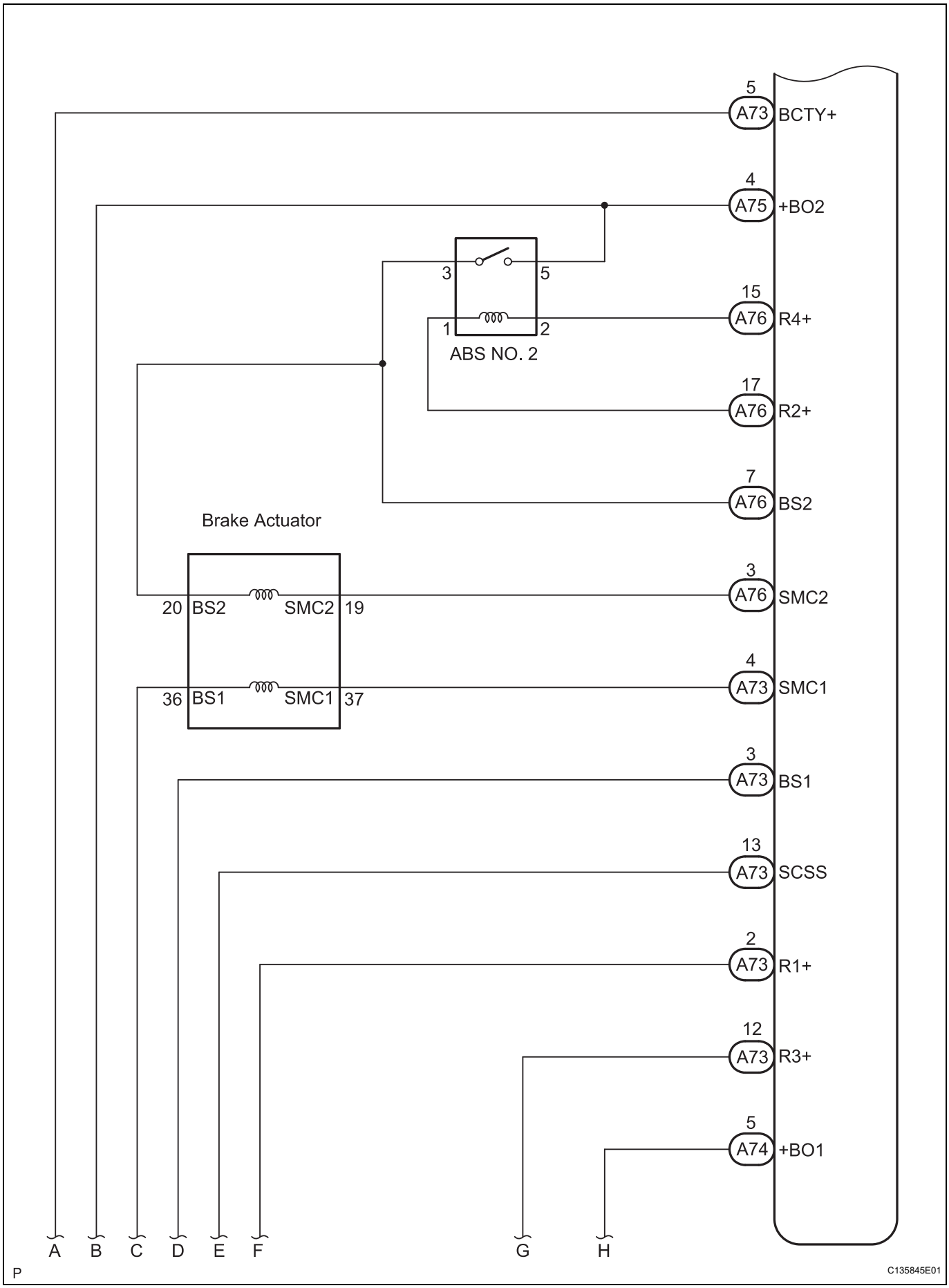
These codes are memorized when the power source voltage for the skid control ECU drops or the voltage for the main relay 1 and main relay 2 operation drops.
Codes may be memorized when the voltage of the auxiliary battery temporarily drops.
When the power source voltage is too high, the skid control ECU stops functioning and outputs no DTCs, and the ABS and BRAKE warning lights remain on.
HINT:
DTC C1256/57 (accumulator low voltage malfunction) may be memorized if the power source voltage drops.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1241/41	81	System 1 is under the following conditions when the power switch is on (IG): • Linear solenoid cannot receive enough current (brake is applied). • BS voltage is less than 8.9 V for at least 3 seconds (brake is not applied). • 12 V power source voltage inside ECU is less than 8.5 V when main relay is opened or VCM voltage is less than 4.7 V or 5 V or more for at least 0.05 seconds.	• Auxiliary battery • ABS NO. 1 relay • ABS NO. 1 relay circuit • Brake control power supply (Capacitor) • Hybrid control system (Charging circuit) • Skid control ECU
↑	82	System 2 is under the following conditions when the power switch is on (IG): • Linear solenoid cannot receive enough current (brake is applied). • BS voltage is less than 8.9 V for at least 3 seconds (brake is not applied). • 12 V power source voltage inside ECU is less than 8.5 V when main relay is opened or VCM voltage is less than 4.7 V or 5.3 V or more for at least 0.05 seconds.	• Auxiliary battery • ABS NO. 2 relay • ABS NO. 2 relay circuit • Brake control power supply (Capacitor) • Hybrid control system (Charging circuit) • Skid control ECU
↑	83	Capacitor mode signal is received from brake control power supply for 3 seconds or more when the power switch is on (IG).	• Auxiliary battery • Brake control power supply (Capacitor) • Hybrid control system (Charging circuit)
↑	84	ABS is requested to operate when the power source voltage of the main relay system is dropping.	• ABS NO. 1 relay • ABS NO. 1 relay circuit • ABS NO. 2 relay • ABS NO. 2 relay circuit • Brake control power supply (Capacitor) • Hybrid control system (Charging circuit) • Skid control ECU
C1242/42	87	The power supply voltage is not applied to the IG1 terminal, power supply voltage is applied to the IG2 terminal, and +BI1 terminal voltage is 9.5 V or more for 4 seconds or more.	• Auxiliary battery • IG1 power source circuit • Hybrid control system (Charging circuit) • Skid control ECU
↑	88	The power supply voltage is applied to the IG1 terminal, power supply voltage is not applied to the IG2 terminal, and +BI1 terminal voltage is 9.5 V or more for 4 seconds or more.	• Auxiliary battery • IG2 power source circuit • Hybrid control system (Charging circuit) • Skid control ECU

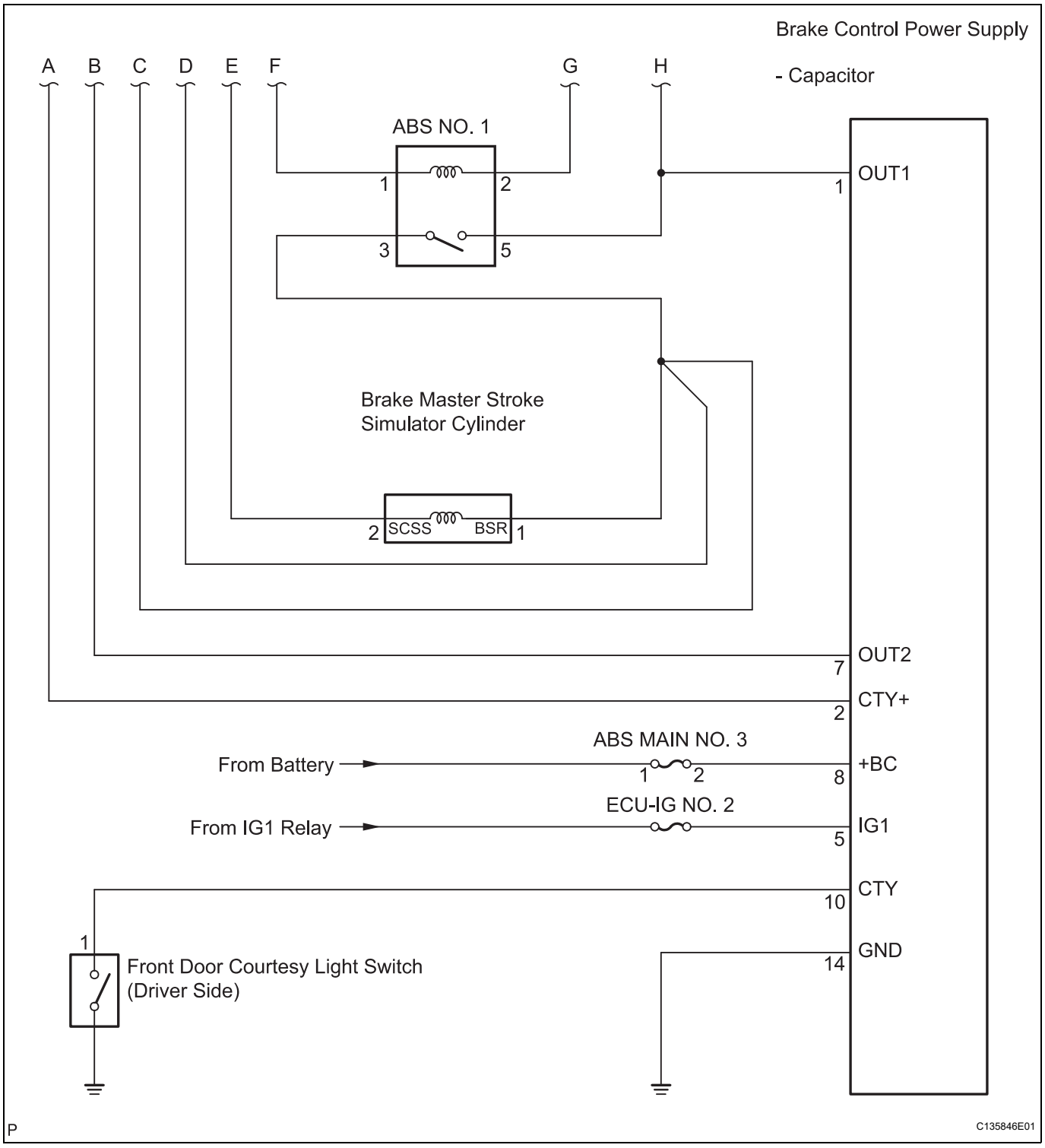
WIRING DIAGRAM



BC


5
A73
BCTY+
4
A75
+BO2
3
5
1
2
ABS NO. 2
15
A76
R4+
17
A76
R2+
7
A76
BS2
Brake Actuator
20
BS2
SMC2
19
3
A76
SMC2
36
BS1
SMC1
37
4
A73
SMC1
3
A73
BS1
13
A73
SCSS
2
A73
R1+
12
A73
R3+
5
A74
+BO1
A
B
C
D
E
F
G
H
P
C135845E01

BC



INSPECTION PROCEDURE

NOTICE:

When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	CHECK HYBRID CONTROL SYSTEM

(a) Check if the hybrid control system DTC is output (See page HV-36).

BC

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → **INSPECT HYBRID CONTROL SYSTEM**

A

2 CHECK AUXILIARY BATTERY

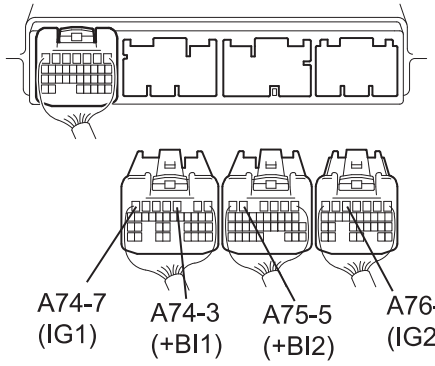
(a) Check the auxiliary battery voltage.
Standard voltage:
11 to 14 V

NG → **CHARGE OR REPLACE AUXILIARY BATTERY**

OK

3 INSPECT SKID CONTROL ECU (IG AND +BI TERMINAL)

Skid Control ECU Wire Harness View:



(a) Disconnect the skid control ECU connectors.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
A74-7 (IG1) - Body ground	Power switch on (IG)	10 to 14 V
A76-5 (IG2) - Body ground	Power switch on (IG)	10 to 14 V
A74-3 (+BI1) - Body ground	Always	10 to 14 V
A75-5 (+BI2) - Body ground	Always	10 to 14 V

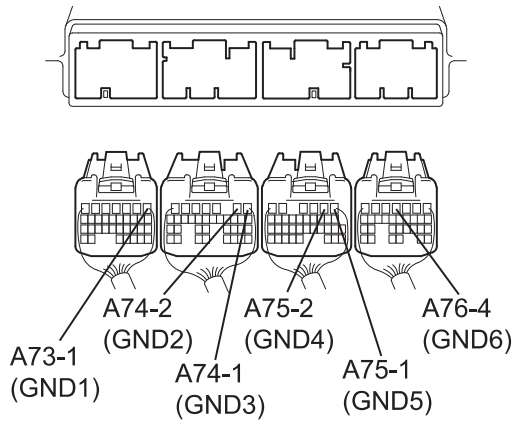
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG OR +BI CIRCUIT)**

OK

BC

4 INSPECT SKID CONTROL ECU (GND TERMINAL)

Skid Control ECU Wire Harness View:



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

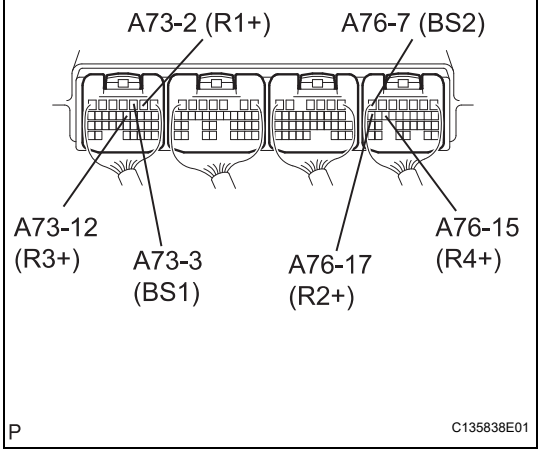
Tester Connection	Condition	Specified Condition
A73-1 (GND1) - Body ground	Always	Below 1 Ω
A74-2 (GND2) - Body ground	Always	Below 1 Ω
A74-1 (GND3) - Body ground	Always	Below 1 Ω
A75-2 (GND4) - Body ground	Always	Below 1 Ω
A75-1 (GND5) - Body ground	Always	Below 1 Ω
A76-4 (GND6) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

5 INSPECT SKID CONTROL ECU (RELAY TERMINAL)

Skid Control ECU Wire Harness View:



(a) Reconnect the skid control ECU connectors.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A73-2 (R1+) - Body ground	Power switch on (IG)	9.1 to 13.6 V
A76-17 (R2+) - Body ground	Power switch on (IG)	9.1 to 13.6 V
A73-12 (R3+) - Body ground	Power switch on (IG)	Below 1 V
A76-15 (R4+) - Body ground	Power switch on (IG)	Below 1 V
A73-3 (BS1) - Body ground	Power switch on (IG)	8.8 to 14 V
A76-7 (BS2) - Body ground	Power switch on (IG)	8.8 to 14 V

BC

Result

Result	Proceed to
OK	A
NG (R1+ and/or R2+)	B
NG (R3+, R4+, BS1 and/or BS2)	C

B → **REPLACE SKID CONTROL ECU**

C → **REPAIR OR REPLACE HARNESS OR CONNECTOR (RELAY CIRCUIT)**

A

6	RECONFIRM DTC

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (IG).
(d) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTCs (C1241/41 and/or C1242/42) are not output	A
DTCs (C1241/41 and/or C1242/42) are output	B

B → REPLACE SKID CONTROL ECU

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

DTC	C1246/46	Master Cylinder Pressure Sensor Malfunction

DTC	C1281/81	Master Cylinder Pressure Sensor Output Malfunction (Test Mode DTC)

DTC	C1364/61	Wheel Cylinder Pressure Sensor Malfunction

DESCRIPTION

The master cylinder pressure sensor and the wheel cylinder pressure sensor are built into the brake actuator, and measure the master cylinder pressure and the wheel cylinder pressure sent to the skid control ECU.

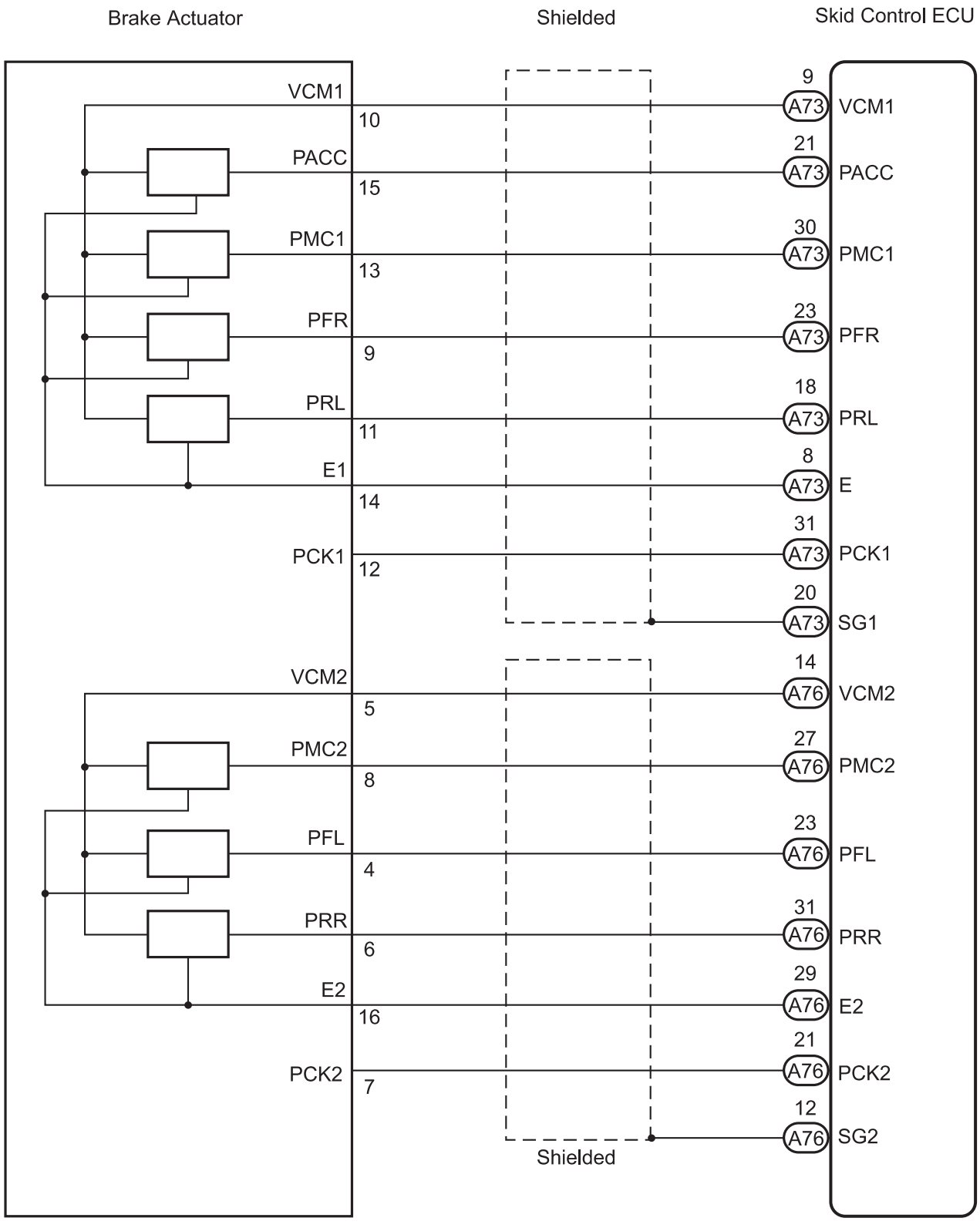
DTC C1281/81 can be deleted when the master cylinder pressure sensor sends a master cylinder pressure signal or the Test Mode ends. DTC C1281/81 is output only in the Test Mode.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1246/46	191	Sensor power source 1 (VCM1) voltage is less than 4.7 V or 5.3 V or more for at least 0.05 seconds.	• Brake actuator assembly (Master cylinder pressure sensor) • Master cylinder pressure sensor circuit • Master cylinder pressure sensor power supply • Brake actuator assembly • Skid control ECU
↑	192	Ratio of M/C pressure sensor output voltage 1 (PMC1) to sensor power source 1 (VCM1) is less than 5% or 90.5% or more for at least 0.05 seconds.	• Brake actuator assembly (Master cylinder pressure sensor) • Master cylinder pressure sensor circuit • Brake actuator assembly • Skid control ECU
↑	194	Sensor power source 2 (VCM2) voltage is less than 4.7 V or 5.3 V or more for at least 0.05 seconds.	• Brake actuator assembly (Master cylinder pressure sensor) • Master cylinder pressure sensor circuit • Master cylinder pressure sensor power supply • Brake actuator assembly • Skid control ECU
↑	195	Ratio of M/C pressure sensor output voltage 2 (PMC2) to sensor power source 2 (VCM2) is less than 5% or 90.5% or more for at least 0.05 seconds.	• Brake actuator assembly (Master cylinder pressure sensor) • Master cylinder pressure sensor circuit • Brake actuator assembly • Skid control ECU
↑	197	M/C pressure sensor output voltage 1 (PMC1) is abnormal.	• Brake actuator assembly • Skid control ECU
↑	198	M/C pressure sensor output voltage 2 (PMC2) is abnormal.	↑
↑	199	M/C pressure sensor output 1 (PMC1) is not approx. 0 Mpa when not braking.	• Brake actuator assembly (Master cylinder pressure sensor) • Master cylinder pressure sensor circuit • Brake actuator assembly • Skid control ECU
↑	200	M/C pressure sensor output 2 (PMC2) is not approx. 0 Mpa when not braking.	↑
↑	201	PMC1 and PMC2 voltages are different when braking.	↑
↑	202	M/C pressure sensor 1 data (PMC1) is invalid.	• Master cylinder pressure sensor power supply • Brake actuator assembly • Skid control ECU

DTC Code	INF Code	DTC Detection Condition	Trouble Area
↑	205	M/C pressure sensor 2 data (PMC2) is invalid.	↑
C1364/61	221	Sensor power source 1 (VCM1) voltage is less than 4.7 V or 5.3 V or more for at least 0.05 seconds.	• Wheel cylinder pressure sensor power supply • Brake actuator assembly • Skid control ECU
↑	222	Ratio of FR right sensor output voltage (PFR) to sensor power source 1 (VCM1) is less than 5% or 90.5% or more for at least 0.05 seconds.	• Brake actuator assembly (Wheel cylinder pressure sensor) • Wheel cylinder pressure sensor circuit • Brake actuator assembly • Skid control ECU
↑	224	When any of the following is detected: 1. FR right sensor output (PFR) is not approx. 0 Mpa when not braking. 2. FR right sensor (PFR) zero point malfunction. 3. Open or short in FR right sensor (PFR) circuit.	↑
↑	225	Ratio of FR right sensor output voltage (PFR) to sensor power source 1 (VCM1) is less than 90.5% for at least 0.1 second when self diagnosis signal is output.	↑
↑	227	Sensor power source 2 (VCM2) voltage is less than 4.7 V or 5.3 V or more for at least 0.05 seconds.	• Wheel cylinder pressure sensor power supply • Brake actuator assembly • Skid control ECU
↑	228	Ratio of FR left sensor output voltage (PFL) to sensor power source 2 (VCM2) is less than 5% or 90.5% or more for at least 0.05 seconds.	• Brake actuator assembly (Wheel cylinder pressure sensor) • Wheel cylinder pressure sensor circuit • Brake actuator assembly • Skid control ECU
↑	230	When any of the following is detected: 1. FR left sensor output (PFL) is not approx. 0 Mpa when not braking. 2. FR left sensor (PFL) zero point malfunction. 3. Open or short in FR left sensor (PFR) circuit.	↑
↑	231	Ratio of FR left sensor output voltage (PFL) to sensor power source 2 (VCM2) is less than 90.5% for at least 0.1 second when self diagnosis signal is output.	↑
↑	233	Sensor power source 2 (VCM2) voltage is less than 4.7 V or 5.3 V or more for at least 0.05 seconds.	• Wheel cylinder pressure sensor power supply • Brake actuator assembly • Skid control ECU
↑	234	Ratio of RR right sensor output voltage (PRR) to sensor power source 2 (VCM2) is less than 5% or 90.5% or more for at least 0.05 seconds.	• Brake actuator assembly (Wheel cylinder pressure sensor) • Wheel cylinder pressure sensor circuit • Brake actuator assembly • Skid control ECU
↑	236	When any of the following is detected: 1. RR right sensor output (PRR) is not approx. 0 Mpa when not braking. 2. RR right sensor (PRR) zero point malfunction. 3. Open or short in RR right sensor (PRR) circuit.	↑
↑	237	Ratio of RR right sensor output voltage (PRR) to sensor power source 2 (VCM2) is less than 90.5% for at least 0.1 second when self diagnosis signal is output.	↑
↑	239	Sensor power source 1 (VCM1) voltage is less than 4.7 V or 5.3 V or more for at least 0.05 seconds.	• Wheel cylinder pressure sensor power supply • Brake actuator assembly • Skid control ECU

DTC Code	INF Code	DTC Detection Condition	Trouble Area
↑	240	Ratio of RR left sensor output voltage (PRL) to sensor power source 1 (VCM1) is less than 5% or 90.5% or more for at least 0.05 seconds.	• Brake actuator assembly (Wheel cylinder pressure sensor) • Wheel cylinder pressure sensor circuit • Brake actuator assembly • Skid control ECU
↑	242	When any of the following is detected: 1. RR left sensor output (PRL) is not approx. 0 Mpa when not braking. 2. RR left sensor (PRL) zero point malfunction. 3. Open or short in RR left sensor (PRL) circuit.	↑
↑	243	Ratio of RR left sensor output voltage (PRL) to sensor power source 1 (VCM1) is less than 90.5% for at least 0.1 second when self diagnosis signal is output.	↑
C1281/81	-	Detected only during Test Mode.	• Stop light switch • Master cylinder pressure sensor

WIRING DIAGRAM



BC

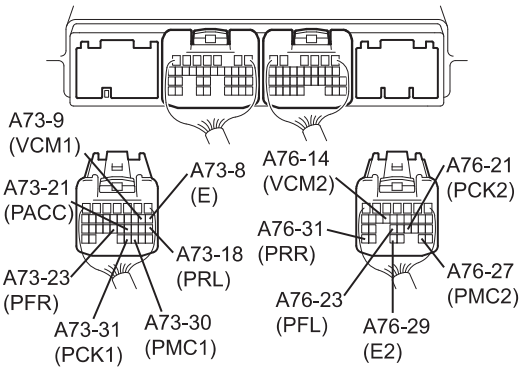
INSPECTION PROCEDURE

NOTICE:

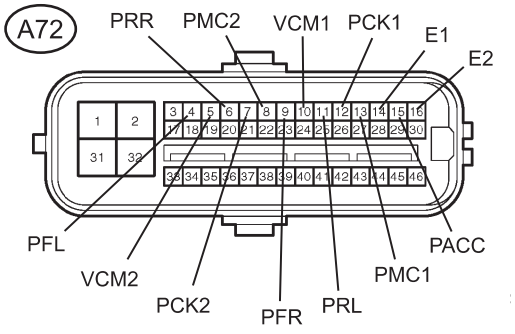
When replacing the skid control ECU or brake actuator assembly, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - BRAKE ACTUATOR)

Skid Control ECU Wire Harness View:



Brake Actuator Harness Side Connector Front View:



C141361E01

(a) Disconnect the skid control ECU connectors and the brake actuator connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A73-8 (E) - A72-14 (E1)	Always	Below 1 Ω
A73-8 (E) - Body ground	Always	10 kΩ or higher
A73-9 (VCM1) - A72-10 (VCM1)	Always	Below 1 Ω
A73-9 (VCM1) - Body ground	Always	10 kΩ or higher
A73-18 (PRL) - A72-11 (PRL)	Always	Below 1 Ω
A73-18 (PRL) - Body ground	Always	10 kΩ or higher
A73-21 (PACC) - A72-15 (PACC)	Always	Below 1 Ω
A73-21 (PACC) - Body ground	Always	10 kΩ or higher
A73-23 (PFR) - A72-9 (PFR)	Always	Below 1 Ω
A73-23 (PFR) - Body ground	Always	10 kΩ or higher
A73-30 (PMC1) - A72-13 (PMC1)	Always	Below 1 Ω
A73-30 (PMC1) - Body ground	Always	10 kΩ or higher
A73-31 (PCK1) - A72-12 (PCK1)	Always	Below 1 Ω
A73-31 (PCK1) - Body ground	Always	10 kΩ or higher
A76-14 (VCM2) - A72-5 (VCM2)	Always	Below 1 Ω
A76-14 (VCM2) - Body ground	Always	10 kΩ or higher
A76-21 (PCK2) - A72-7 (PCK2)	Always	Below 1 Ω
A76-21 (PCK2) - Body ground	Always	10 kΩ or higher
A76-23 (PFL) - A72-4 (PFL)	Always	Below 1 Ω
A76-23 (PFL) - Body ground	Always	10 kΩ or higher
A76-27 (PMC2) - A72-8 (PMC2)	Always	Below 1 Ω
A76-27 (PMC2) - Body ground	Always	10 kΩ or higher
A76-29 (E2) - A72-16 (E2)	Always	Below 1 Ω
A76-29 (E2) - Body ground	Always	10 kΩ or higher
A76-31 (PRR) - A72-6 (PRR)	Always	Below 1 Ω
A76-31 (PRR) - Body ground	Always	10 kΩ or higher

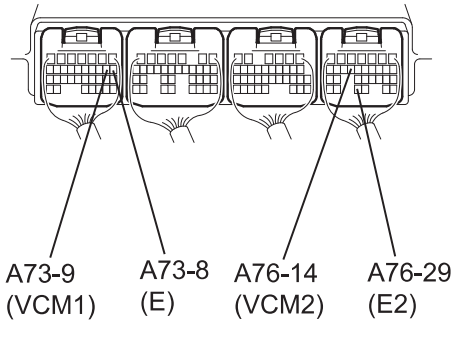
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

BC

2 INSPECT SKID CONTROL ECU (SENSOR INPUT)

Skid Control ECU Wire Harness View:



(a) Reconnect the skid control ECU connectors.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A73-9 (VCM1) - Body ground	Power switch on (IG)	4.75 to 5.25 V
A76-14 (VCM2) - Body ground	Power switch on (IG)	4.75 to 5.25 V

(d) Turn the power switch off.
(e) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A73-8 (E) - Body ground	Always	Below 1 Ω
A76-29 (E2) - Body ground	Always	Below 1 Ω

NG → **REPLACE SKID CONTROL ECU**

OK

3 READ VALUE OF INTELLIGENT TESTER (MASTER CYLINDER PRESSURE SENSOR)

(a) Reconnect the brake actuator connector.
(b) Connect the pedal effort gauge (See page BC-259).
(c) Connect the intelligent tester to the DLC3.
(d) Turn the power switch on (IG).
(e) Select the Data List mode on the intelligent tester.

ABS / VSC:

Tester Display	Measurement Item/Range	Normal Condition
MAS CYL PRESS 1	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V
MAS CYL PRESS 2	Master cylinder pressure sensor 2 reading / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V

BC

(f) Check the output value of the master cylinder pressure sensor at each fluid pressure.
HINT:
- Check the value while Electronically Controlled Brake control is being prohibited without servo assistance.
- The brake control warning light is on while Electronically Controlled Brake control is being prohibited.

Standard voltage

Brake Effort N (kgf, lbf)	MAS CYL PRESS 1 (Data List Display)	MAS CYL PRESS 2 (Data List Display)
200 (20.4, 45)	0.9 to 1.2 V	0.9 to 1.2 V
500 (51, 112)	2.05 to 2.35 V	2.05 to 2.35 V

NG → REPLACE BRAKE ACTUATOR ASSEMBLY

OK

4 READ VALUE OF INTELLIGENT TESTER (WHEEL CYLINDER PRESSURE SENSOR)

(a) Turn the power switch off.
(b) Install the hydro LSPV gauge (SST) and bleed air (See page BC-259).
SST 09709-29018
(c) Turn the power switch on (IG).
(d) Select the Data List mode on the intelligent tester.

ABS / VSC:

Tester Display	Measurement Item/Range	Normal Condition
FR W/C SENS	FR wheel cylinder pressure sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V
FL W/C SENS	FL wheel cylinder pressure sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V
RR W/C SENS	RR wheel cylinder pressure sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V
RL W/C SENS	RL wheel cylinder pressure sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V

(e) Check the output value of the wheel cylinder pressure sensor at each fluid pressure during the Electronically Controlled Brake control.
Standard voltage:
Front wheel cylinder pressure sensor

Hydraulic Pressure MPa (kgf/cm^2, psi)	FR W/C SENS (Data List Display)	FL W/C SENS (Data List Display)
2.6 (26.5, 376.9)	0.85 to 1.15 V	0.85 to 1.15 V
6.3 (64.3, 914.5)	1.6 to 1.9 V	1.6 to 1.9 V
8.1 (82.6, 1,174.8)	1.95 to 2.25 V	1.95 to 2.25 V
8.2 (83.6, 1,189.0)	2.0 to 2.3 V	2.0 to 2.3 V

Rear wheel cylinder pressure sensor

Hydraulic Pressure MPa (kgf/cm^2, psi)	RR W/C SENS (Data List Display)	RL W/C SENS (Data List Display)
2.6 (26.5, 376.9)	0.85 to 1.15 V	0.85 to 1.15 V
5.0 (51.0, 725.4)	1.35 to 1.65 V	1.35 to 1.65 V

NG → REPLACE BRAKE ACTUATOR ASSEMBLY

OK

5 RECONFIRM DTC

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Perform the road and braking test.
(d) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTCs (C1246/46 and/or C1364/61) are not output	A
DTCs (C1246/46 and/or C1364/61) are output	B

B → **REPLACE SKID CONTROL ECU**

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

DTC	C1247/47	Stroke Sensor Malfunction

DTC	C1346/71	Stroke Sensor Zero Point Learning Malfunction (Test Mode DTC)

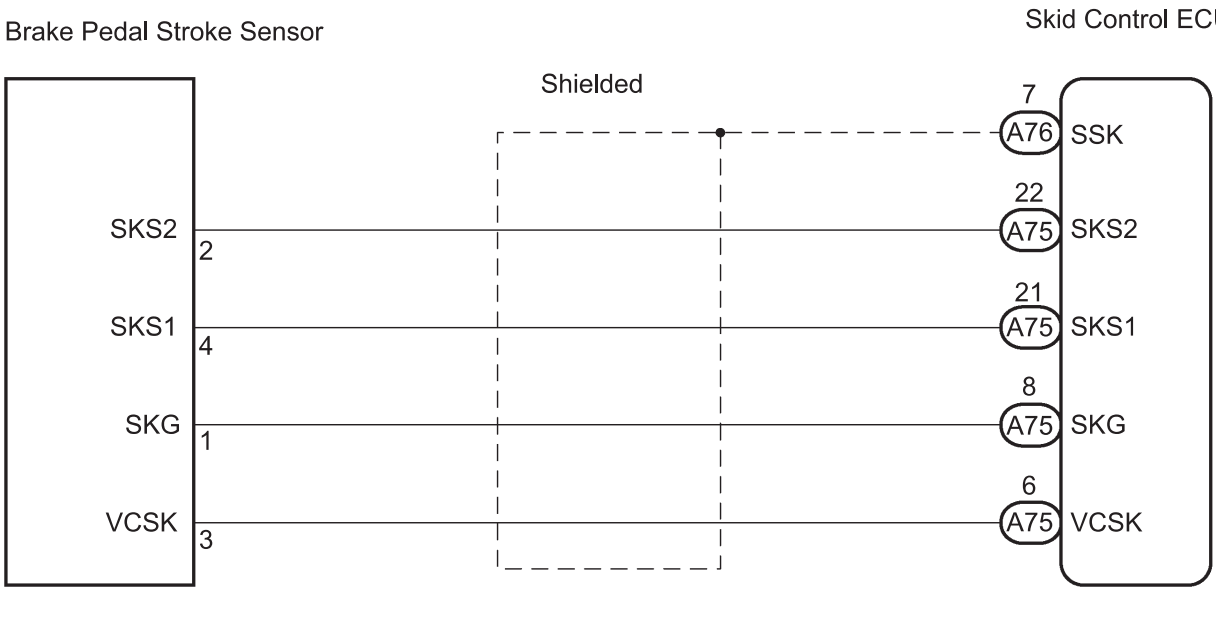
DTC	C1392/48	Stroke Sensor Zero Point Calibration Undone

DESCRIPTION

The stroke sensor inputs the pedal stroke into the skid control ECU.
DTC C1346/71 can be deleted when the brake pedal stroke sensor sends a stroke sensor signal or the Test Mode ends. DTC C1346/71 is output only in the Test Mode.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1247/47	171	Sensor power source voltage (VCSK) is 3.6 V or less or 4.95 V or more for at least 1.2 seconds.	• Brake pedal stroke sensor • Brake pedal stroke sensor power supply • Skid control ECU
↑	172	Ratio of sensor output voltage 1 (SKS1) to sensor power source voltage (VCSK) is less than 3 % or 97 % or more for at least 1.2 seconds.	• Brake pedal stroke sensor • Brake pedal stroke sensor circuit
↑	173	Ratio of sensor output voltage 2 (SKS2) to sensor power source voltage (VCSK) is less than 3 % or 97 % or more for at least 1.2 seconds.	↑
↑	174	Sensor output 1 (SKS1) calculation value becomes 20 mm or more for at least 1.2 seconds at an interval of 0.006 seconds (changes due to interference).	↑
↑	175	Sensor output 2 (SKS2) calculation value becomes 20 mm or more for at least 1.2 seconds at an interval of 0.006 seconds (changes due to interference).	↑
↑	176	Zero point stored value (ratio to power source voltage) of sensor output 1 (SKS1) is 0.46 or more or 0.03 or less.	• Brake pedal stroke sensor • Brake pedal stroke sensor circuit • Sensor installation
↑	177	Zero point stored value (ratio to power source voltage) of sensor output 2 (SKS2) is 0.46 or more or 0.03 or less.	↑
↑	179	When either of the following is detected: 1. Sum of SKS1/VCSK and SKS2/VCSK is 1.155 or more or 0.845 or less for at least 1 second. 2. Difference between sensor output 1 (SKS1) and sensor output 2 (SKS2) is excessively large for at least 0.2 seconds.	• Brake pedal stroke sensor • Brake pedal stroke sensor circuit
↑	180	• Difference between zero point output value and stored value is 0.5 or more for at least 0.05 seconds. • Short between SKS1 and SKS2 output line.	• Brake pedal stroke sensor • Brake pedal stroke sensor circuit • Skid control ECU
C1392/48	-	Zero point calibration of stroke sensor is unfinished.	• Brake pedal stroke sensor zero point calibration undone (Initialization of linear solenoid valve and calibration undone) • Skid control ECU
C1346/71	-	Detected only during Test Mode.	Brake pedal stroke sensor

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

When replacing the skid control ECU or brake pedal stroke sensor, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	CHECK BRAKE PEDAL

(a) Check that the brake pedal and the brake pedal stroke sensor are properly installed and that the pedal can be operated normally.

(b) Check the brake pedal height (See page BR-18).

OK:

The brake pedal is securely installed.

The pedal height is within the specified range.

NG → **ADJUST BRAKE PEDAL**

OK

2	READ VALUE OF INTELLIGENT TESTER (BRAKE PEDAL STROKE SENSOR)

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG).

(c) Select the Data List mode on the intelligent tester.

ABS / VSC:

Tester Display	Measurement Item/Range	Normal Condition
PEDAL STROKE	Stroke sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.7 to 1.3 V
PEDAL STROKE 2	Stroke sensor 2 / min.: 0 V, max.: 5 V	When brake pedal is released: 3.7 to 4.3 V

(d) Read the pedal stroke sensor voltage value on the intelligent tester screen.
OK:
The normal condition value is displayed on the intelligent tester.

NG → **ADJUST BRAKE PEDAL STROKE SENSOR**

OK

3	PERFORM INITIALIZATION OF LINEAR SOLENOID VALVE AND CALIBRATION

(a) Perform initialization of the linear solenoid valve and calibration (See page BC-25).

NEXT

4	RECONFIRM DTC

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Perform the road and braking test.
(d) Check if the same DTC is recorded (See page BC-57).

Result

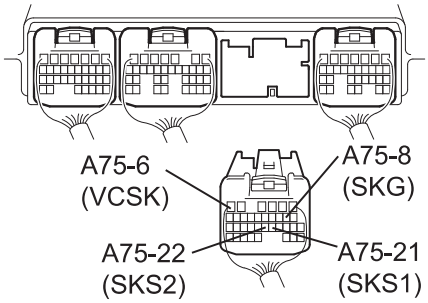
Condition	Proceed to
DTCs (C1247/47 and/or C1392/48) are output	A
DTCs (C1247/47 and/or C1392/48) are not output	B

B → **END**

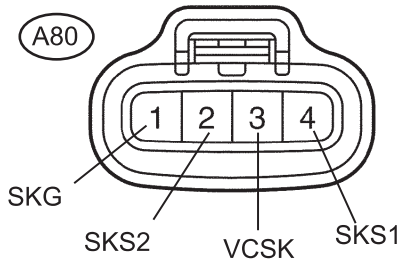
A

5	CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - BRAKE PEDAL STROKE SENSOR)

Skid Control ECU Wire Harness View:



Brake Pedal Stroke Sensor Harness Side Connector Front View:



C141362E01

(a) Turn the power switch off.
(b) Disconnect the skid control ECU connector and the brake pedal stroke sensor connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

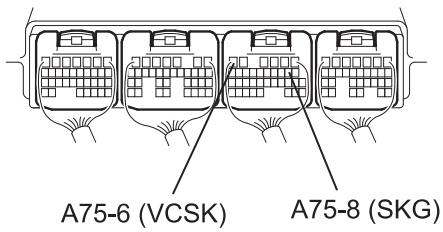
Tester Connection	Condition	Specified Condition
A75-6 (VCSK) - A80-3 (VCSK)	Always	Below 1 Ω
A75-6 (VCSK) - Body ground	Always	10 kΩ or higher
A75-8 (SKG) - A80-1 (SKG)	Always	Below 1 Ω
A75-8 (SKG) - Body ground	Always	10 kΩ or higher
A75-21 (SKS1) - A80-4 (SKS1)	Always	Below 1 Ω
A75-21 (SKS1) - Body ground	Always	10 kΩ or higher
A75-22 (SKS2) - A80-2 (SKS2)	Always	Below 1 Ω
A75-22 (SKS2) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6	INSPECT SKID CONTROL ECU (SENSOR INPUT)

Skid Control ECU Wire Harness View:



P

C135838E04

(a) Reconnect the skid control ECU connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A75-6 (VCSK) - Body ground	Power switch on (IG)	3.75 to 4.95 V

(d) Turn the power switch off.
(e) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A75-8 (SKG) - Body ground	Always	Below 1 Ω

BC

NG → REPLACE SKID CONTROL ECU

OK

7 READ VALUE OF INTELLIGENT TESTER (BRAKE PEDAL STROKE SENSOR)

(a) Reconnect the brake pedal stroke sensor connector.
(b) Connect the pedal effort gauge.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the power switch on (IG).
(e) Select the Data List mode on the intelligent tester.

ABS / VSC:

Tester Display	Measurement Item/Range	Normal Condition
PEDAL STROKE	Stroke sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.7 to 1.3 V
PEDAL STROKE 2	Stroke sensor 2 / min.: 0 V, max.: 5 V	When brake pedal is released: 3.7 to 4.3 V

(f) When depressing the brake pedal with the amount of force listed in the table below, check that the output value displayed on the intelligent tester is normal.
HINT:
The brake pedal must be depressed gradually.

Standard voltage

Brake Effort N (kgf, lbf)	PEDAL STROKE (Data List Display)	PEDAL STROKE 2 (Data List Display)
50 (5.1, 11)	1.4 to 1.8 V	3.2 to 3.6 V
100 (10.2, 22)	1.55 to 1.95 V	3.05 to 3.45 V
150 (15.3, 34)	1.65 to 2.05 V	2.95 to 3.35 V
200 (20.4, 45)	1.7 to 2.1 V	2.9 to 3.3 V

NG → REPLACE BRAKE PEDAL STROKE SENSOR

OK

8 RECONFIRM DTC

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Perform the road and braking test.
(d) Check if the same DTC is recorded (See page BC-57).

BC

Result

Condition	Proceed to
DTCs (C1247/47 and/or C1392/48) are not output	A
DTCs (C1247/47 and/or C1392/48) are output	B

B → REPLACE SKID CONTROL ECU

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

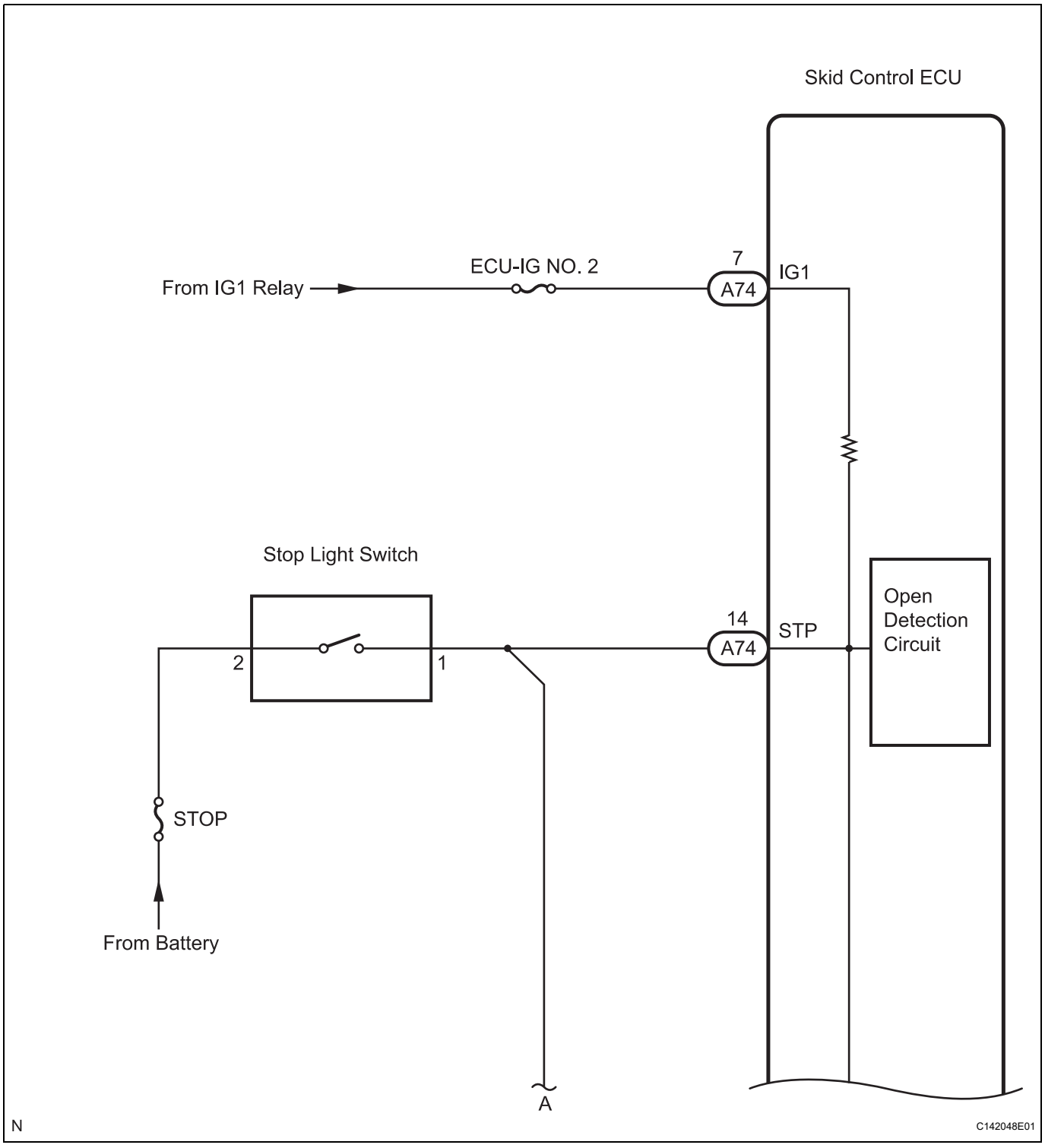
DTC	C1249/49	Open in Stop Light Switch Circuit

DESCRIPTION

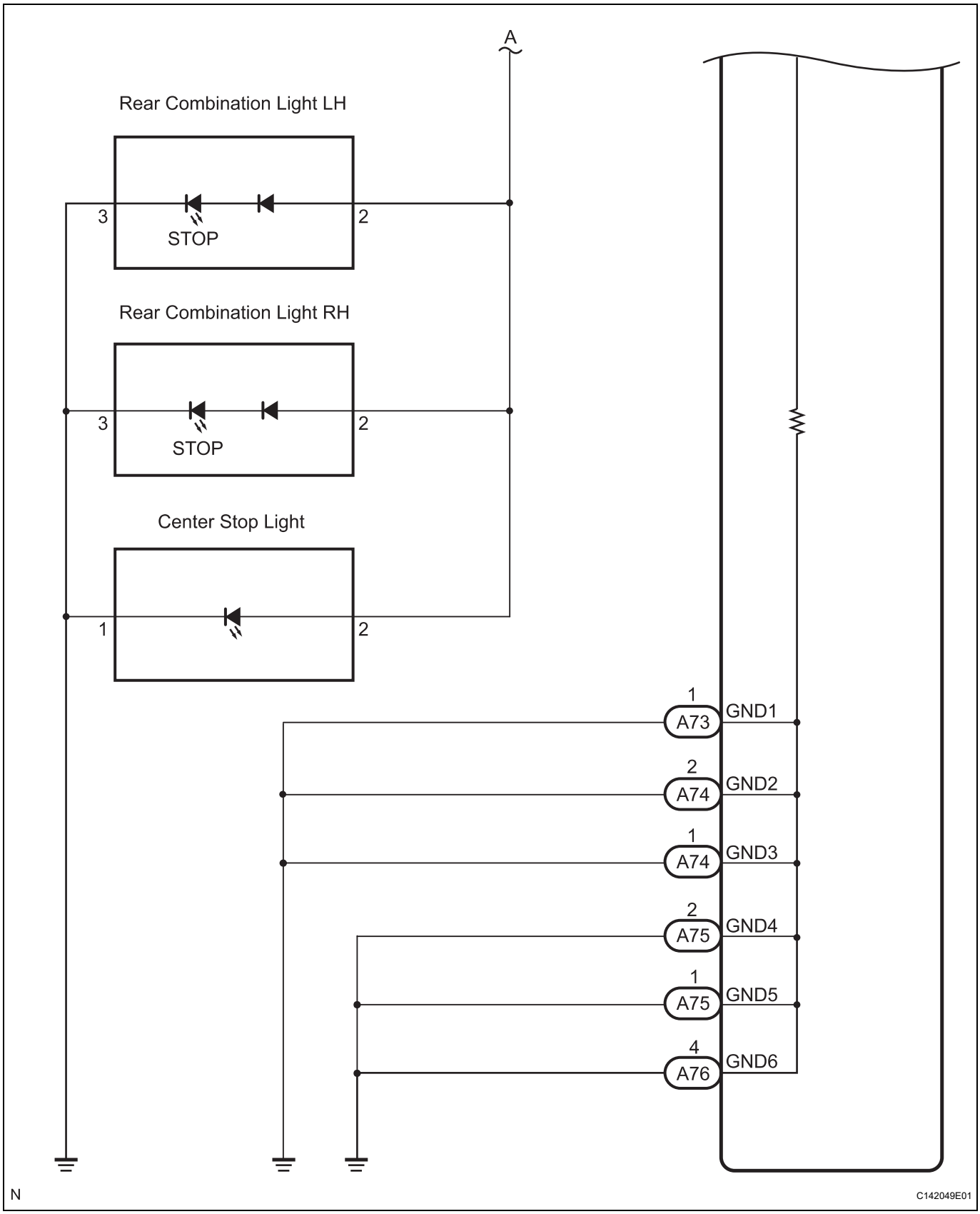
The skid control ECU inputs the stop light switch signal and the condition of brake operation.
The skid control ECU has an open detection circuit, which outputs this DTC when detecting an open in the stop light input line while the stop light switch is OFF.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1249/49	520	When IG1 terminal voltage is 9.5 to 17.2 V, an open circuit of the stop light switch continues for 10 seconds or more.	• STOP fuse • Stop light switch • Stop light switch circuit • Skid control ECU

WIRING DIAGRAM



BC

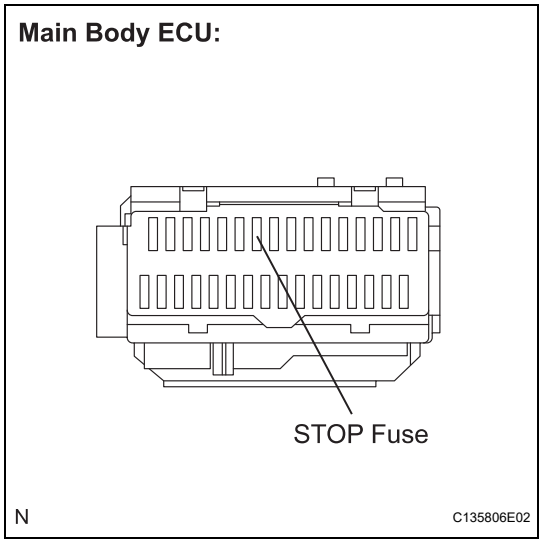


INSPECTION PROCEDURE

NOTICE:

When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	INSPECT STOP FUSE



(a) Remove the STOP fuse from the main body ECU.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
STOP (10 A) fuse	Always	Below 1 Ω

NG → **REPLACE STOP FUSE**

OK

2	CHECK STOP LIGHT OPERATION

(a) Install the STOP fuse.
(b) Check that the stop light comes on when the brake pedal is depressed, and goes off when the brake pedal is released.

OK

Condition	Illumination Condition
Brake pedal depressed	ON
Brake pedal released	OFF

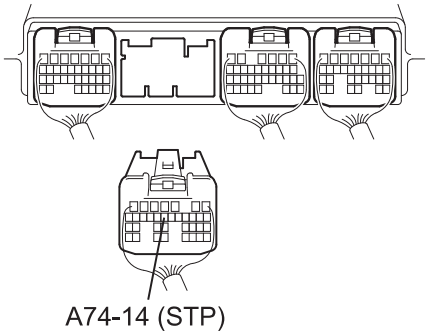
NG → **Go to step 7**

OK

BC

3	INSPECT SKID CONTROL ECU (STP TERMINAL)

Skid Control ECU Wire Harness View:



(a) Disconnect the skid control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

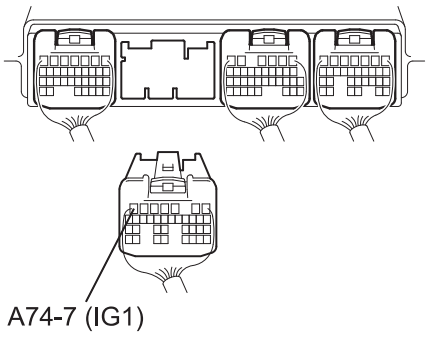
Tester Connection	Condition	Specified Condition
A74-14 (STP) - Body ground	Stop light switch ON (Brake pedal depressed)	8 to 14 V
A74-14 (STP) - Body ground	Stop light switch OFF (Brake pedal released)	Below 1.5 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (STP CIRCUIT)**

OK

4	INSPECT SKID CONTROL ECU (IG1 TERMINAL)

Skid Control ECU Wire Harness View:



(a) Turn the power switch on (IG).
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A74-7 (IG1) - Body ground	Power switch on (IG)	10 to 14 V

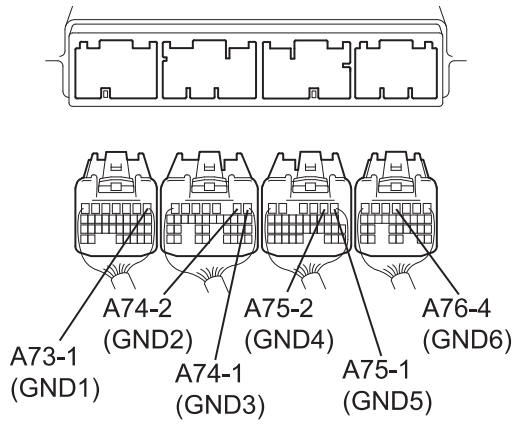
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

OK

BC

5 INSPECT SKID CONTROL ECU (GND TERMINAL)

Skid Control ECU Wire Harness View:



(a) Turn the power switch off.
(b) Disconnect the skid control ECU connectors.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A73-1 (GND1) - Body ground	Always	Below 1 Ω
A74-2 (GND2) - Body ground	Always	Below 1 Ω
A74-1 (GND3) - Body ground	Always	Below 1 Ω
A75-2 (GND4) - Body ground	Always	Below 1 Ω
A75-1 (GND5) - Body ground	Always	Below 1 Ω
A76-4 (GND6) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

6 RECONFIRM DTC

(a) Reconnect the skid control ECU connectors.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (READY).
(d) Depress the brake pedal several times to test the stop light circuit.
(e) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTC (C1249/49) is not output	A
DTC (C1249/49) is output	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-46).

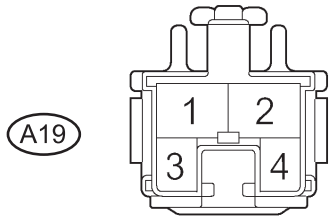
B → **REPLACE SKID CONTROL ECU**

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

7	INSPECT STOP LIGHT SWITCH (POWER SOURCE TERMINAL)

Stop Light Switch Harness Side Connector Front View:



C142000E02

(a) Disconnect the stop light switch connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

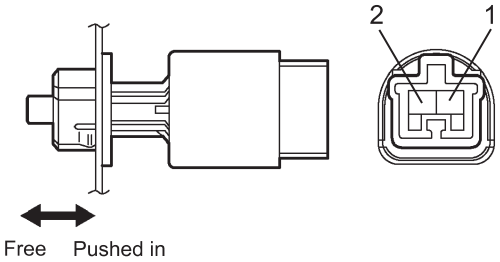
Tester Connection	Condition	Specified Condition
A19-2 - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)**

OK

8	INSPECT STOP LIGHT SWITCH

Stop Light Switch:



C124796E03

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Switch pin free	Below 1 Ω
1 - 2	Switch pin pushed in	10 kΩ or higher

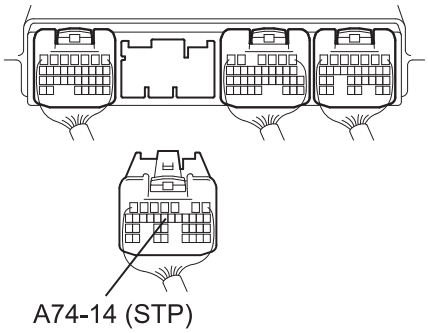
NG → **REPLACE STOP LIGHT SWITCH**

OK

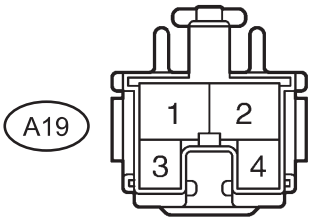
BC

9	CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - STOP LIGHT SWITCH)

Skid Control ECU Wire Harness View:



Stop Light Switch Harness Side Connector Front View:



C141363E01

(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A74-14 (STP) - A19-1	Always	Below 1 Ω
A74-14 (STP) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

10	RECONFIRM DTC

(a) Reconnect the skid control ECU connector and the stop light switch connector.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (READY).
(d) Depress the brake pedal several times to test the stop light circuit.
(e) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTC (C1249/49) is not output	A
DTC (C1249/49) is output	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-46).

B → **REPLACE SKID CONTROL ECU**

BC

A

INSPECT LIGHTING SYSTEM (STOP LIGHT CIRCUIT)

DTC	C1252/52	Brake Booster Pump Motor on Time Abnormally Long

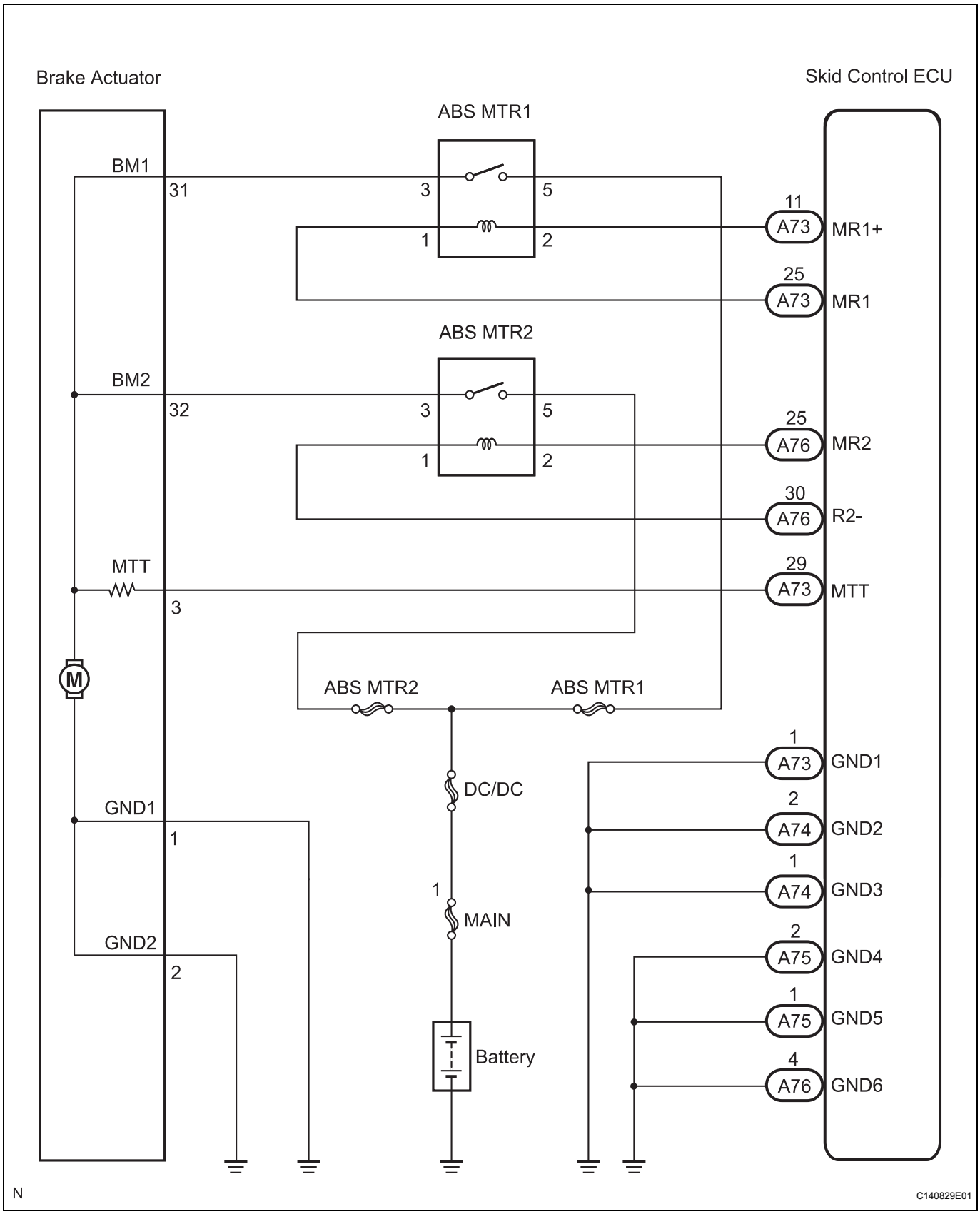
DTC	C1253/53	Hydro Booster Pump Motor Relay Malfunction

DESCRIPTION

The skid control ECU detects decreases in the accumulator pressure according to the data from the accumulator pressure sensor, and then starts and stops the pump motor by operating the motor relay. The skid control ECU usually drives the motor relay 1 for Electronically Controlled Brake control, and the motor relay 2 for ABS control. If either of them is malfunctioning, the other will substitute.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1252/52	130	Motor relay is on for at least 5 minutes.	• ABS MTR1 relay • ABS MTR1 relay circuit • ABS MTR2 relay • ABS MTR2 relay circuit • Brake actuator assembly (Accumulator pressure sensor circuit)
C1253/53	132	Motor relay 1 coil is energized for at least 1 second when linear solenoid power source voltage 1 (BS1) is 9.5 V or more and motor relay 1 is off.	• ABS MTR1 fuse • ABS MTR1 relay • ABS MTR1 relay circuit
↑	133	Motor relay 1 coil is not energized for at least 1 second when linear solenoid power source voltage 1 (BS1) is 9.5 V or more and motor relay 1 is on.	↑
↑	134	MTT input is 3.5 V or less for at least 1 second when linear solenoid power source voltage 1 (BS1) is 9.5 V or more and motor relay 1 is on.	• ABS MTR1 fuse • ABS MTR1 relay • ABS MTR1 relay circuit • Brake actuator assembly (Pump motor) • Pump motor circuit
↑	136	Motor relay 2 coil is energized for at least 1 second when linear solenoid power source voltage 2 (BS2) is 9.5 V or more and motor relay 2 is off.	• ABS MTR2 fuse • ABS MTR2 relay • ABS MTR2 relay circuit
↑	137	Motor relay 2 coil is not energized for at least 1 second when linear solenoid power source voltage 2 (BS2) is 9.5 V or more and motor relay 2 is on.	↑
↑	138	MTT input is 3.5 V or less for at least 1 second when linear solenoid power source voltage 2 (BS2) is 9.5 V or more and motor relay 2 is on.	• ABS MTR2 fuse • ABS MTR2 relay • ABS MTR2 relay circuit • Brake actuator assembly (Pump motor) • Pump motor circuit
↑	140	MTT input is 3.5 V or more for at least 2 seconds when motor relay 1 and 2 are off.	• ABS MTR1 relay • ABS MTR2 relay • Brake actuator assembly (Pump motor) • Pump motor circuit

WIRING DIAGRAM



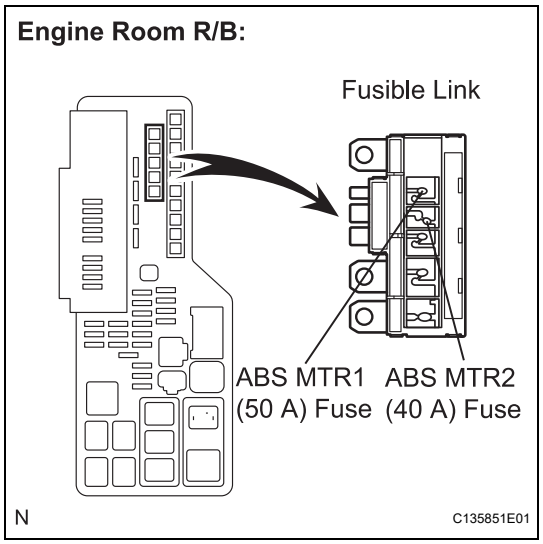
BC

INSPECTION PROCEDURE

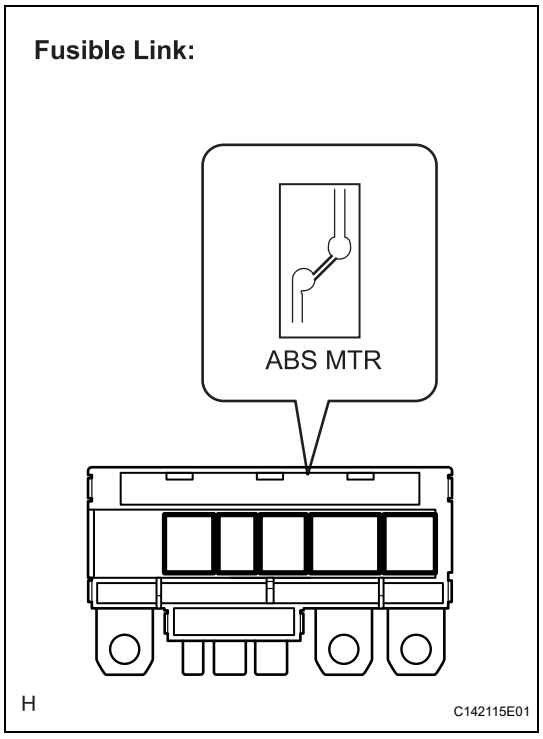
NOTICE:

When replacing the skid control ECU or brake actuator assembly, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	INSPECT ABS MTR FUSE



(a) Remove the fusible link from the engine room R/B.

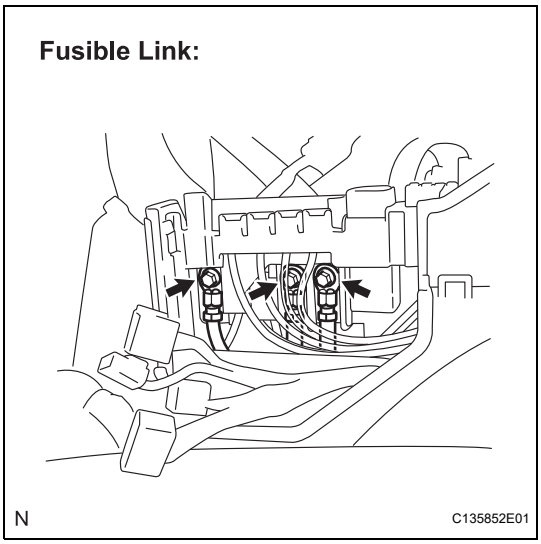


(b) Check if the fusible link is melted.

OK:

The fusible link is melted.

BC



(c) Install the fusible link to the engine room R/B with the bolt.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

NG → **REPLACE FUSIBLE LINK (ABS MTR FUSE)**

OK

2 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (ABS MOTOR RELAY)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the Active Test mode on the intelligent tester.

ABS / VSC:

Tester Display	Test Part	Control Range	Diagnostic Note
ECB* MTR RELAY	ABS motor relay	Relay ON / OFF	Operation sound of relay (clicking sound) and motor can be heard
ECB* MTR RELAY 2	ABS motor relay 2	Relay ON / OFF	Operation sound of relay (clicking sound) and motor can be heard

*: Electronically Controlled Brake

(d) Check the operation sound of the ABS motor relay and motor when operating it with the intelligent tester.

OK:

The operation sound of the ABS motor relay and motor should be heard.

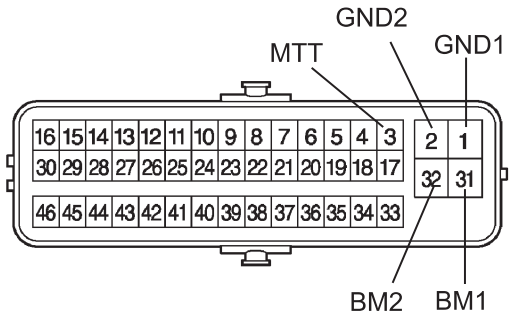
NG → **Go to step 7**

OK

BC

3 INSPECT BRAKE ACTUATOR ASSEMBLY

Brake Actuator:



C126561E04

(a) Turn the power switch off.
(b) Disconnect the brake actuator connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

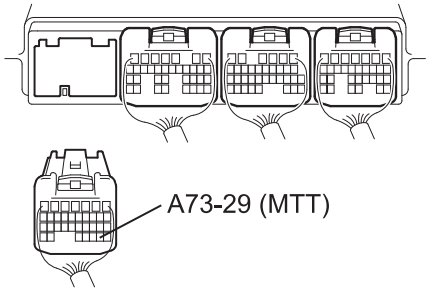
Tester Connection	Condition	Specified Condition
31 (BM1) - 1 (GND1)	Always	Below 10 Ω
32 (BM2) - 1 (GND1)	Always	Below 10 Ω
31 (BM1) - 32 (BM2)	Always	Below 1 Ω
1 (GND1) - 2 (GND2)	Always	Below 1 Ω
31 (BM1) - 3 (MTT)	Always	950 to 1,050 Ω
32 (BM2) - 3 (MTT)	Always	950 to 1,050 Ω

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY**

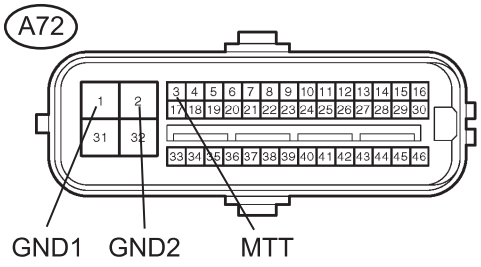
OK

4 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - BRAKE ACTUATOR)

Skid Control ECU Wire Harness View:



Brake Actuator Harness Side Connector Front View:



C141364E05

(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A73-29 (MTT) - A72-3 (MTT)	Always	Below 1 Ω
A73-29 (MTT) - Body ground	Always	10 kΩ or higher
A72-1 (GND1) - Body ground	Always	Below 1 Ω
A72-2 (GND2) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

BC

5	READ VALUE OF INTELLIGENT TESTER (ACCUMULATOR PRESSURE SENSOR)

(a) Reconnect the skid control ECU connector and the brake actuator connector.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Select the Data List mode on the intelligent tester.

ABS / VSC:

Tester Display	Measurement Item/Range	Normal Condition
ACC PRESS SENS	Accumulator pressure sensor / min.: 0 V, max.: 5 V	Specified value: 3.3 to 4.7 V

(e) Depress the brake pedal 4 or 5 times to operate the pump motor, and check the output value on the intelligent tester with the motor stopped (not braking).
OK:
Accumulator pressure sensor voltage does not drop.

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY**

OK

6	RECONFIRM DTC

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (IG).
(d) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTCs (C1252/52 and/or C1253/53) are not output	A
DTCs (C1252/52 and/or C1253/53) are output	B

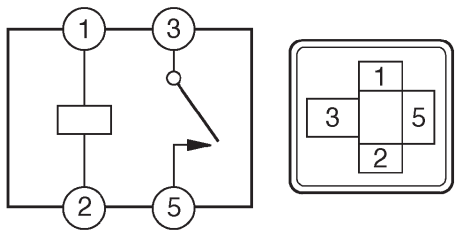
B → **REPLACE SKID CONTROL ECU**

A

BC **CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)**

7 INSPECT ABS MOTOR RELAY (ABS MTR1, 2 RELAY)

ABS MTR1, 2 Relay:



C144829E01

(a) Turn the power switch off.
(b) Remove the ABS MTR1 relay and the ABS MTR2 relay.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

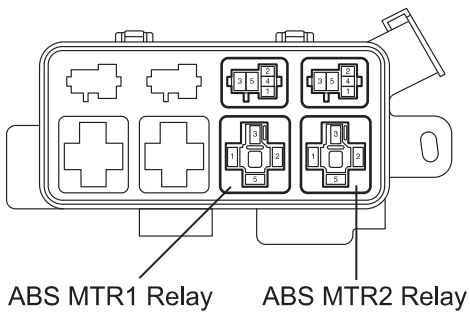
Tester Connection	Condition	Specified Condition
3 - 5	Always	10 kΩ or higher
3 - 5	Apply B+ between terminals 1 and 2	Below 1 Ω

NG → **REPLACE ABS MOTOR RELAY (ABS MTR1, 2 RELAY)**

OK

8 INSPECT ENGINE ROOM NO. 3 RELAY BLOCK (POWER SOURCE TERMINAL)

Engine Room No. 3 R/B:



N

C135850E01

(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
ABS MTR1 relay terminal 5 - Body ground	Always	10 to 14 V
ABS MTR2 relay terminal 5 - Body ground	Always	10 to 14 V

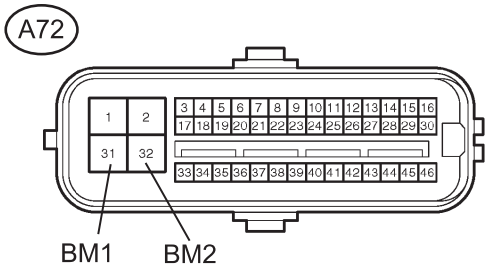
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)**

OK

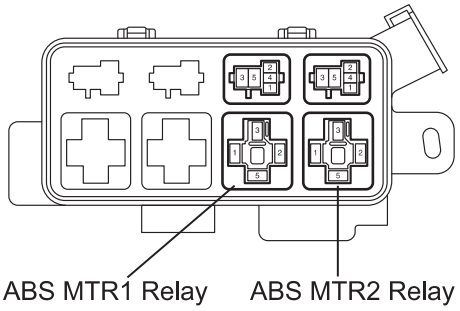
BC

9	CHECK HARNESS AND CONNECTOR (BRAKE ACTUATOR - ENGINE ROOM NO. 3 RELAY BLOCK)

Brake Actuator Harness Side Connector Front View:



Engine Room No. 3 R/B:



N C141365E01

(a) Disconnect the brake actuator connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

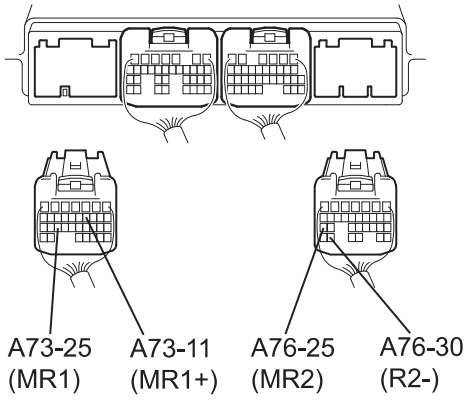
Tester Connection	Condition	Specified Condition
A72-31 (BM1) - ABS MTR1 relay terminal 3	Always	Below 1 Ω
A72-31 (BM1) - Body ground	Always	10 kΩ or higher
A72-32 (BM2) - ABS MTR2 relay terminal 3	Always	Below 1 Ω
A72-32 (BM2) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

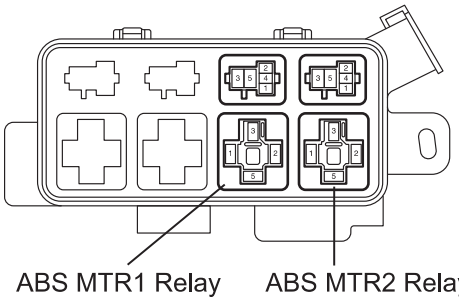
OK

10 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - ENGINE ROOM NO. 3 RELAY BLOCK)

Skid Control ECU Wire Harness View:



Engine Room No. 3 R/B:



N

C142645E01

(a) Disconnect the skid control ECU connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A73-11 (MR1+) - ABS MTR1 relay terminal 2	Always	Below 1 Ω
A73-11 (MR1+) - Body ground	Always	10 kΩ or higher
A73-25 (MR1) - ABS MTR1 relay terminal 1	Always	Below 1 Ω
A73-25 (MR1) - Body ground	Always	10 kΩ or higher
A76-25 (MR2) - ABS MTR2 relay terminal 2	Always	Below 1 Ω
A76-25 (MR2) - Body ground	Always	10 kΩ or higher
A76-30 (R2-) - ABS MTR2 relay terminal 1	Always	Below 1 Ω
A76-30 (R2-) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

11 RECONFIRM DTC

(a) Clear the DTC (See page BC-57).
(b) Turn the power switch on (IG).
(c) Check if the same DTC is recorded (See page BC-57).
HINT:
Reinstall the relays, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTCs (C1252/52 and/or C1253/53) are not output	A
DTCs (C1252/52 and/or C1253/53) are output	B

BC

B → **REPLACE SKID CONTROL ECU**

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

DTC	C1256/57	Accumulator Low Pressure

DESCRIPTION

The accumulator pressure sensor is built into the actuator and detects the accumulator pressure. The skid control ECU turns on the brake control warning light and sounds the skid control buzzer if it senses a decrease in the accumulator pressure.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1256/57	141	When either of the following is detected: 1. Braking operation is input when accumulator pressure is less than 12.45 MPa and vehicle speed is input (detected value changes if accumulator pressure is low after system start). 2. Accumulator pressure is less than 14.62 MPa for 120 seconds (changes according to power source voltage) after system start (stores the DTC after the conditions are met, and drives buzzer).	• Accumulator pressure • Brake actuator assembly (Accumulator pressure sensor) • Brake actuator assembly (Pump motor)
↑	143	When any of the following is detected: 1. Any of the wheel cylinder pressure sensor value is lower than the target value for at least 0.5 seconds when accumulator pressure is less than 14.62 MPa and vehicle speed is input. 2. Accumulator pressure changes little when accumulator pressure is less than 14.62 MPa for at least 1 second without braking (pump motor is operating). 3. Accumulator pressure is less than 14.62 MPa for at least 0.5 seconds when motor relay is malfunctioning.	↑

WIRING DIAGRAM

Refer to DTCs C1252/52 and C1253/53 (See page BC-151).

INSPECTION PROCEDURE

NOTICE:

When replacing the skid control ECU or brake actuator assembly, perform initialization of linear solenoid valve and calibration (See page BC-25).

HINT:

When C1241/41, C1252/52 or C1253/53 is output together with C1256/57, inspect and repair the trouble areas indicated by C1241/41, C1252/52 or C1253/53 first.

1	BRAKE PROBLEM CHECK

(a) Ask the customer if frequent braking is performed when the brake control warning light comes on.

OK

Condition	Proceed to
Frequent braking is performed	**A**
Frequent braking is not performed	**B**

HINT:

This DTC is output even if the accumulator pressure drops only temporarily due to frequent braking.

B → END

A

2 READ VALUE OF INTELLIGENT TESTER (ACCUMULATOR PRESSURE SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the Data List mode on the intelligent tester.

ABS / VSC:

Tester Display	Measurement Item/Range	Normal Condition
ACC PRESS SENS	Accumulator pressure sensor / min.: 0 V, max.: 5 V	Specified value: 3.3 to 4.7 V

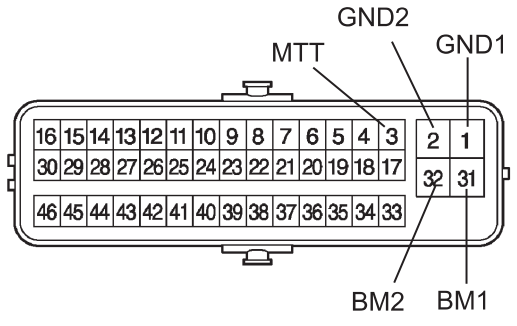
(d) Depress the brake pedal 4 or 5 times to operate the pump motor, and check the output value on the intelligent tester with the motor stopped (not braking).
OK:
Accumulator pressure sensor's output voltage does not drop.

OK → **Go to step 4**

NG

3 INSPECT BRAKE ACTUATOR ASSEMBLY

Brake Actuator:



(a) Turn the power switch off.
(b) Disconnect the brake actuator connector.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
31 (BM1) - 1 (GND1)	Always	Below 10 Ω
32 (BM2) - 1 (GND1)	Always	Below 10 Ω
31 (BM1) - 32 (BM2)	Always	Below 1 Ω
1 (GND1) - 2 (GND2)	Always	Below 1 Ω
31 (BM1) - 3 (MTT)	Always	950 to 1,050 Ω
32 (BM2) - 3 (MTT)	Always	950 to 1,050 Ω

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY**

OK

4 RECONFIRM DTC

(a) Reconnect the brake actuator connector.
(b) Clear the DTC (See page BC-57).
(c) Perform the road and braking test.
(d) Check if the same DTC is recorded (See page BC-57).

BC

Result

Condition	Proceed to
DTC (C1256/57) is not output	A
DTC (C1256/57) is output	B

B → **REPLACE SKID CONTROL ECU**

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

DTC	C1259/58	HV System Regenerative Malfunction

DTC	C1310/51	Malfunction in HV system

DESCRIPTION

The skid control ECU communicates with the HV control ECU and controls braking force according to the motor's regenerative force.
The skid control ECU sends enhanced VSC signal to the HV control ECU and inputs operating signal from the HV control ECU.
The skid control ECU uses CAN communication for communication with the HV control ECU. If a communication malfunction is memorized, the skid control ECU prohibits enhanced VSC operation and a part of Electronically Controlled Brake control by fail safe function.
C1259/58 is stored if the power switch on (IG) with the HV battery service plug disconnected.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1259/58	150	The regeneration malfunction signal is input for at least 0.02 seconds when IG2 terminal voltage is 9.5 V or more for at least 2 seconds and communication with HV control ECU is valid.	Hybrid control system
C1310/51	156	The traction control prohibition signal is received for at least 0.07 seconds when IG2 terminal voltage is 10.5 V or more for at least 1.5 seconds and communication with HV control ECU is valid.	Hybrid control system

HINT:
This DTC is output from the skid control ECU when the HV control ECU sends a malfunction signal to the skid control ECU.

INSPECTION PROCEDURE

1	CHECK HYBRID CONTROL SYSTEM

(a) Check if the hybrid control system DTC is output (See page HV-36).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

BC

B → INSPECT HYBRID CONTROL SYSTEM

A

REPLACE HV CONTROL ECU

DTC	C1290/66	Steering Angle Sensor Zero Point Malfunction

DESCRIPTION

The skid control ECU acquires steering angle sensor zero point every time the power switch is turned on (IG) and the vehicle is driven at 35 km/h (22 mph) or more for approximately 5 seconds. The ECU also stores the previous zero point.
If front wheel alignment or steering wheel position is adjusted without disconnecting the negative battery terminal, or if yaw rate and acceleration sensor zero point is not acquired after the adjustments have been completed, the skid control ECU detects the difference between the previous zero point and newly acquired zero point and outputs this DTC to indicate a poor adjustment.
Warning of the steering angle sensor zero point malfunction will be cancelled by turning the power switch off.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1290/66	-	The steering angle sensor zero point calibration position vastly differs from the recorded value	• Yaw rate and acceleration sensor zero point calibration incomplete • Poor adjustment of the centered position of the steering wheel • Poor adjustment of front wheel alignment

INSPECTION PROCEDURE

NOTICE:
When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	PERFORM ZERO POINT CALIBRATION OF YAW RATE AND ACCELERATION SENSOR

(a) Perform zero point calibration of the yaw rate and acceleration sensor (See page BC-29).
HINT:
- When the stored zero point of the yaw rate and acceleration sensor is erased, steering angle sensor zero point will also be erased.
- If the zero point and output value of the yaw rate and acceleration sensor and the output value of the speed sensors are not normal, steering angle sensor zero point cannot be acquired normally even if the vehicle is driven straight ahead at 35 km/h (22 mph) or more.

NEXT

BC

2	CHECK STEERING ANGLE SENSOR ZERO POINT CALIBRATION

(a) Drive the vehicle straight ahead at 35 km/h (22 mph) or more for at least 5 seconds.
(b) Check that the centered position of the steering wheel is correctly set, while driving straight ahead.
HINT:
If front wheel alignment and steering position are adjusted as a result of abnormal centered position of the steering wheel, acquire yaw rate and acceleration sensor zero point again after the adjustments are completed.

OK:
The centered position of the steering wheel is correctly set.

NG → **ADJUST FRONT WHEEL ALIGNMENT OR STEERING POSITION**

OK

3	RECONFIRM DTC

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (READY).
(d) Drive the vehicle and turn the steering wheel to the right and left at the speed of 35 km/h (22 mph) or more.
(e) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTC (C1290/66) is not output	A
DTC (C1290/66) is output	B

B → **REPLACE SKID CONTROL ECU**

A

END

DTC	C1300	Skid Control ECU Malfunction

DESCRIPTION

The skid control ECU outputs this DTC if malfunctions are found in the circuit inside the computer by self diagnosis.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1300	-	Malfunction in the skid control ECU.	Skid control ECU

INSPECTION PROCEDURE

NOTICE:

When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	REPLACE SKID CONTROL ECU

(a) Replace the skid control ECU (See page BC-289).

NEXT

END

DTC	C1304/27	EPS Control System Malfunction

DESCRIPTION

The skid control ECU communicates with the power steering (EPS) ECU via CAN communication.
If a malfunction in the electronic power steering (EPS) system is detected, cooperative control of the steering is prohibited by the fail safe function.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1304/27	376	The EPS system fail signal continues to be output for 5 seconds or more.	Electronic power steering system

INSPECTION PROCEDURE

1	CHECK ELECTRONIC POWER STEERING SYSTEM

(a) Check if the electronic power steering system DTC is output (See page PS-17).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT ELECTRONIC POWER STEERING SYSTEM

A

REPLACE POWER STEERING ECU

DTC	C1311/11	Open in Main Relay 1 Circuit

DTC	C1312/12	Short in Main Relay 1 Circuit

DTC	C1313/13	Open in Main Relay 2 Circuit

DTC	C1314/14	Short in Main Relay 2 Circuit

DESCRIPTION

The main relay 1 supplies power to the changeover solenoid and the linear solenoid.
The main relay remains ON for approximately 2 minutes after the power switch is turned off and the input of brake operation signals stops, and supplies power to the system to keep it ready to operate.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1311/11	1	When either of the following is detected: 1. Relay contact is off (BS1 terminal is less than 3.5 V) for at least 0.2 seconds when R1+ terminal voltage is 9.5 V or more and main relay 1 is on. 2. R1+ terminal voltage is less than 9.5 V and main relay 1 cannot be on for at least 0.2 seconds when main relay 1 is turned on (BS1 terminal is 3.5 V or more).	• ABS NO. 1 relay • ABS NO. 1 relay circuit • Skid control ECU
C1312/12	3	Relay contact is on for at least 4 seconds when main relay 1 is off.	↑
C1313/13	4	When either of the following is detected: 1. Relay contact is off (BS2 terminal is less than 3.5 V) for at least 0.2 seconds when R2+ terminal voltage is 9.5 V or more and main relay 2 is on. 2. R2+ terminal voltage is less than 9.5 V and main relay 2 cannot be on for at least 2 seconds when main relay 2 is turned on (BS2 terminal is 3.5 V or more).	• ABS NO. 2 relay • ABS NO. 2 relay circuit • Skid control ECU
C1314/14	6	Relay contact is on for at least 4 seconds when main relay 2 is off.	↑

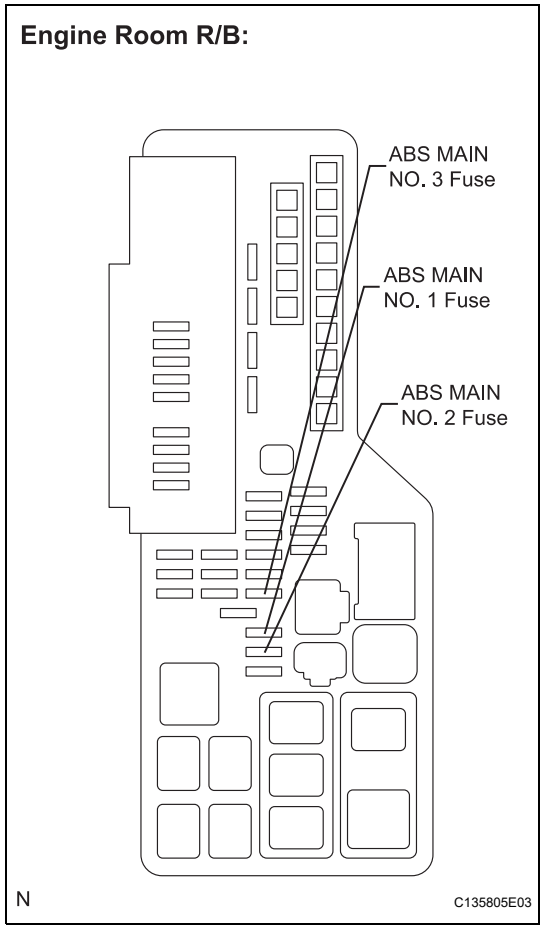
WIRING DIAGRAM

Refer to DTCs C1241/41 and C1242/42 (See page BC-122).

INSPECTION PROCEDURE

NOTICE:
When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	INSPECT ABS MAIN FUSE



(a) Remove the ABS MAIN NO. 1, ABS MAIN NO. 2 and ABS MAIN NO. 3 fuses from the engine room R/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
ABS MAIN NO. 1 (10 A) fuse	Always	Below 1 Ω
ABS MAIN NO. 2 (10 A) fuse	Always	Below 1 Ω
ABS MAIN NO. 3 (10 A) fuse	Always	Below 1 Ω

NG → REPLACE ABS MAIN FUSE

OK

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (ABS MAIN RELAY)

(a) Install the ABS MAIN NO. 1, ABS MAIN NO. 2 and ABS MAIN NO. 3 fuses.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Select the Active Test mode on the intelligent tester.

BC

ABS / VSC:

Tester Display	Test Part	Control Range	Diagnostic Note
ECB* RELAY	ABS main relay	Relay ON / OFF	Operating sound of relay (clicking sound) can be heard
ECB* RELAY 2	ABS main relay 2	Relay ON / OFF	Operating sound of relay (clicking sound) can be heard

*: Electronically Controlled Brake

(e) Check the operating sound of the ABS main relay when operating it with the intelligent tester.

OK:

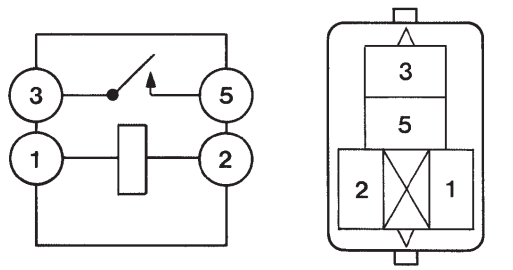
The operating sound of the ABS main relay should be heard.

OK → Go to step 6

NG

3 INSPECT ABS MAIN RELAY (ABS NO. 1, 2 RELAY)

ABS NO. 1, 2 Relay:



C143433E01

(a) Turn the power switch off.
(b) Remove the ABS NO. 1 relay and ABS NO. 2 relay.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

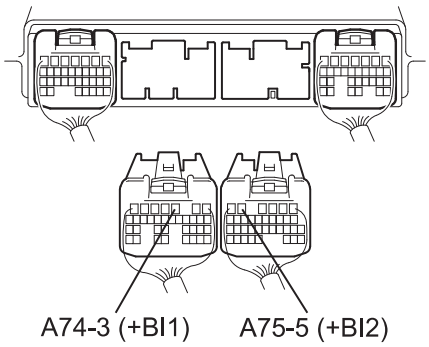
Tester Connection	Condition	Specified Condition
3 - 5	Always	10 kΩ or higher
3 - 5	Apply B+ between terminals 1 and 2	Below 1 Ω

NG → REPLACE ABS MAIN RELAY (ABS NO. 1, 2 RELAY)

OK

4 INSPECT SKID CONTROL ECU (+BI TERMINAL)

Skid Control ECU Wire Harness View:



P

C135832E01

(a) Install the ABS NO. 1 relay and ABS NO. 2 relay.
(b) Disconnect the skid control ECU connectors.
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A74-3 (+BI1) - Body ground	Always	10 to 14 V
A75-5 (+BI2) - Body ground	Always	10 to 14 V

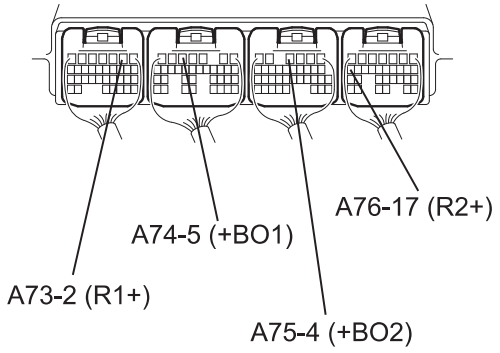
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (+BI CIRCUIT)

OK

BC

5 INSPECT SKID CONTROL ECU (RELAY TERMINAL)

Skid Control ECU Wire Harness View:



(a) Reconnect the skid control ECU connectors.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

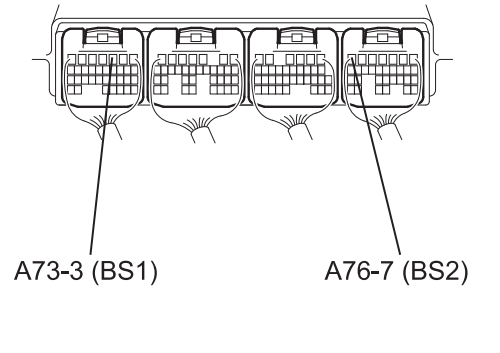
Tester Connection	Condition	Specified Condition
A73-2 (R1+) - Body ground	Power switch on (IG)	9.1 to 13.6 V
A76-17 (R2+) - Body ground	Power switch on (IG)	9.1 to 13.6 V
A74-5 (+BO1) - Body ground	Power switch on (IG)	8.8 to 14 V
A75-4 (+BO2) - Body ground	Power switch on (IG)	8.8 to 14 V

NG → **REPLACE SKID CONTROL ECU**

OK

6 INSPECT SKID CONTROL ECU (BS TERMINAL)

Skid Control ECU Wire Harness View:



(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A73-3 (BS1) - Body ground	Power switch on (IG)	8.8 to 14 V
A76-7 (BS2) - Body ground	Power switch on (IG)	8.8 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (BS CIRCUIT)**

OK

7 RECONFIRM DTC

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (IG).
(d) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTCs (C1311/11, C1312/12, C1313/13 and/or C1314/14) are not output	A
DTCs (C1311/11, C1312/12, C1313/13 and/or C1314/14) are output	B

BC

B → **REPLACE SKID CONTROL ECU**

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

DTC	C1315/31	SMC1 Changeover Solenoid Malfunction
DTC	C1316/32	SMC2 Changeover Solenoid Malfunction
DTC	C1352/21	Front Increasing Pressure Solenoid RH Malfunction
DTC	C1353/23	Front Increasing Pressure Solenoid LH Malfunction
DTC	C1354/25	Rear Increasing Pressure Solenoid RH Malfunction
DTC	C1355/27	Rear Increasing Pressure Solenoid LH Malfunction
DTC	C1356/22	Front Decreasing Pressure Solenoid RH Malfunction
DTC	C1357/24	Front Decreasing Pressure Solenoid LH Malfunction
DTC	C1358/26	Rear Decreasing Pressure Solenoid RH Malfunction
DTC	C1359/28	Rear Decreasing Pressure Solenoid LH Malfunction

DESCRIPTION

Each solenoid adjusts pressure which affects each wheel cylinder according to signals from the skid control ECU and controls the vehicle.

The master cut solenoid (SMC1/2) is closed and blocks the master cylinder pressure from the Electronically Controlled Brake control pressure when the system is normal. The master cut solenoid is open and sends the master cylinder fluid pressure to the non-assisted brake wheel cylinders during the fail safe due to a system malfunction.

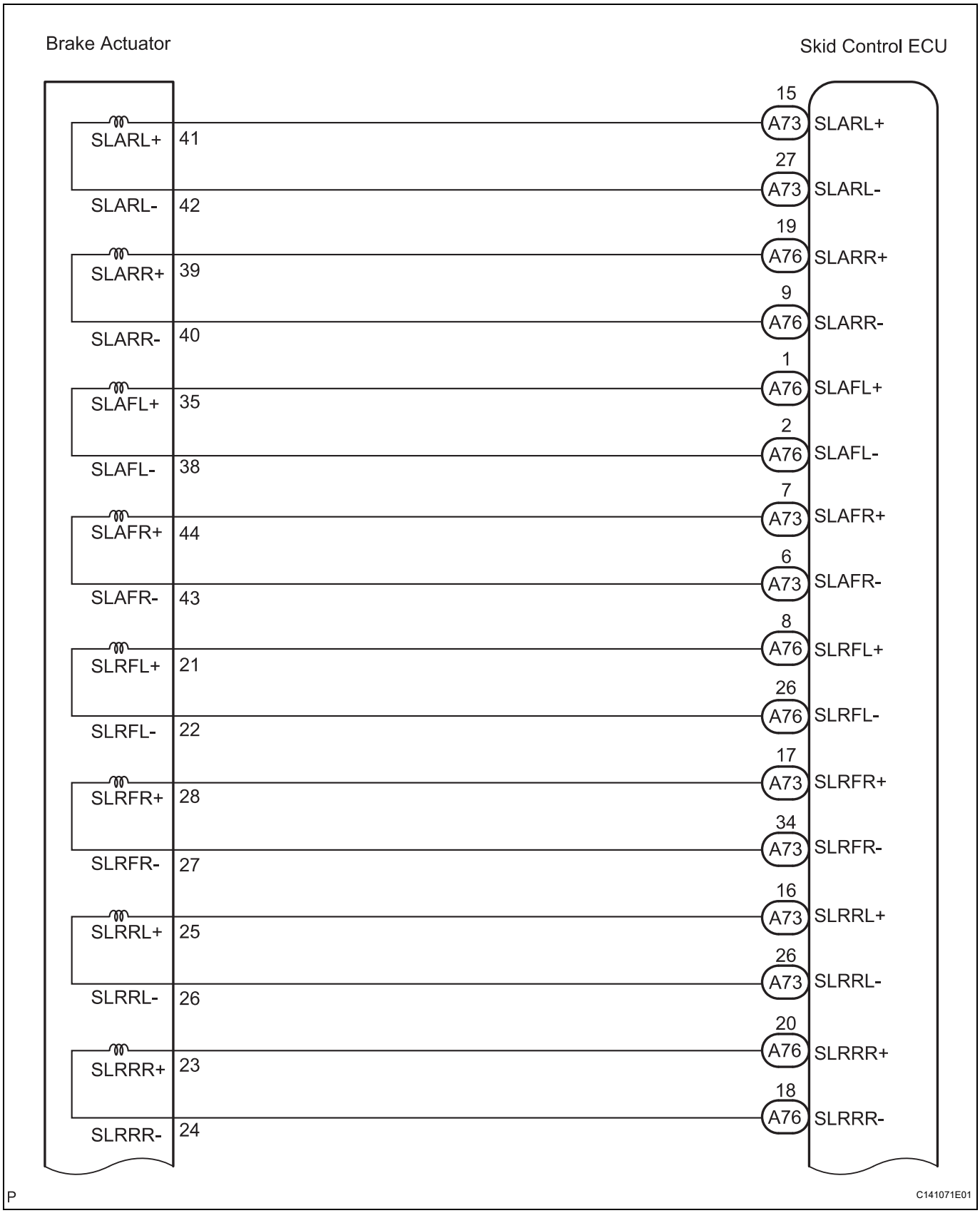
BC

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1315/31	61	When either of the following is detected: 1. SMC1 drive circuit is malfunctioning for 0.05 seconds or more. 2. Short to +B in SMC1.	• Brake actuator assembly (SMC1) • SMC1 circuit • Skid control ECU
↑	62	Current leaks for 0.05 seconds or more when SMC1 is off.	↑
↑	63	Open circuit in SMC1 continues for 0.05 seconds or more.	↑
↑	64	Overcurrent in SMC1 continues for 0.05 seconds or more.	↑

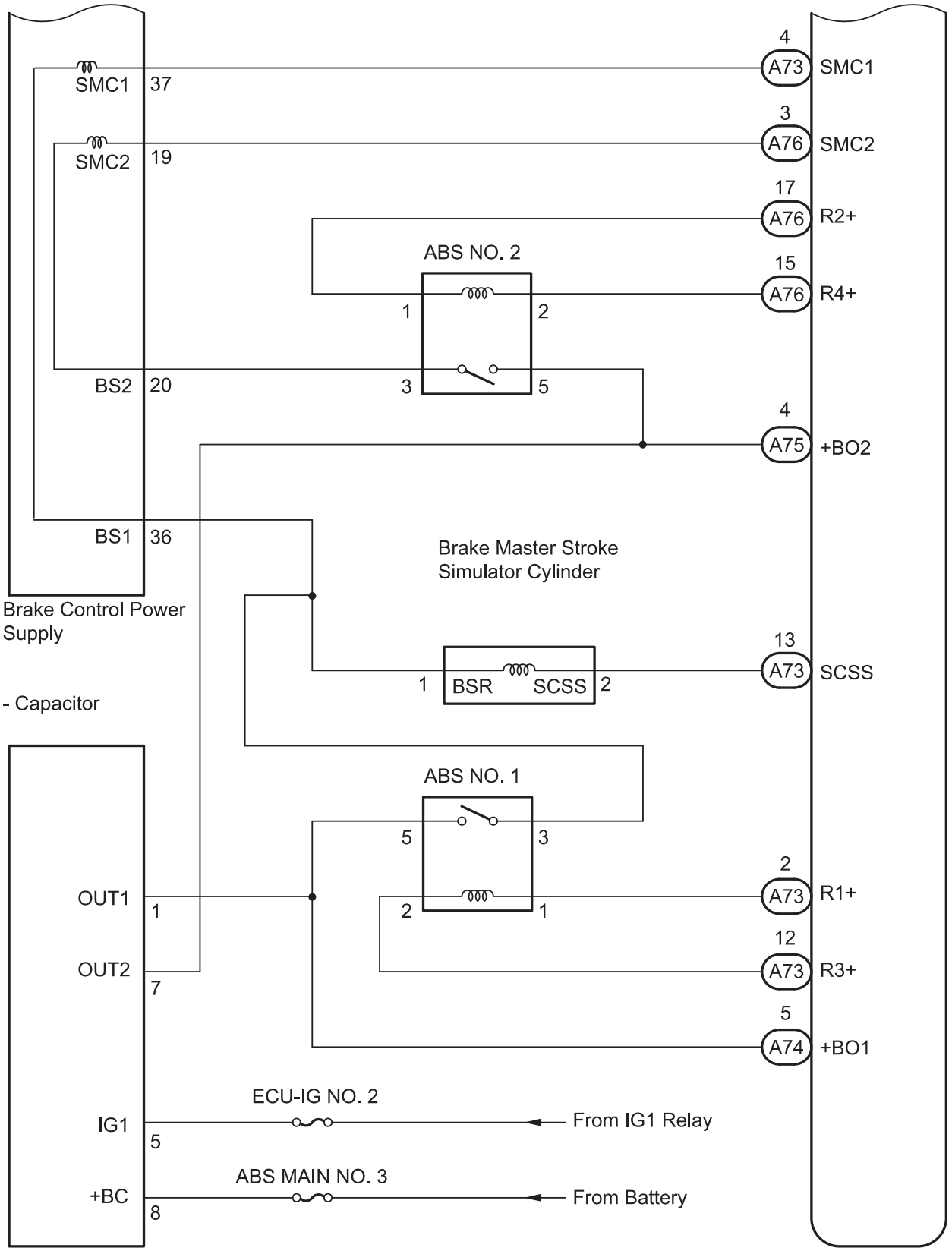
DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1316/32	66	When either of the following is detected: 1. SMC2 drive circuit is malfunctioning for 0.05 seconds or more. 2. Short to +B in SMC2.	• Brake actuator assembly (SMC2) • SMC2 circuit • Skid control ECU
↑	67	Current leaks for 0.05 seconds or more when SMC2 is off.	↑
↑	68	Open circuit in SMC2 continues for 0.05 seconds or more.	↑
↑	69	Overcurrent in SMC2 continues for 0.05 seconds or more.	↑
C1352/21	11	Open circuit in SLAFR continues for 0.05 seconds or more when SLAFR is off.	• Brake actuator assembly (SLAFR) • SLAFR circuit • Skid control ECU
↑	12	Open circuit in SLAFR continues for 0.05 seconds or more when SLAFR is on.	↑
↑	13	Short to +B or voltage leak in SLAFR continues for 0.05 seconds or more.	↑
↑	14	Overcurrent in SLAFR continues for 0.05 seconds or more.	↑
C1353/23	21	Open circuit in SLAFL continues for 0.05 seconds or more when SLAFL is off.	• Brake actuator assembly (SLAFL) • SLAFL circuit • Skid control ECU
↑	22	Open circuit in SLAFL continues for 0.05 seconds or more when SLAFL is on.	↑
↑	23	Short to +B or voltage leak in SLAFL continues for 0.05 seconds or more.	↑
↑	24	Overcurrent in SLAFL continues for 0.05 seconds or more.	↑
C1354/25	31	Open circuit in SLARR continues for 0.05 seconds or more when SLARR is off.	• Brake actuator assembly (SLARR) • SLARR circuit • Skid control ECU
↑	32	Open circuit in SLARR continues for 0.05 seconds or more when SLARR is on.	↑
↑	33	Short to +B or voltage leak in SLARR continues for 0.05 seconds or more.	↑
↑	34	Overcurrent in SLARR continues for 0.05 seconds or more.	↑
C1355/27	41	Open circuit in SLARL continues for 0.05 seconds or more when SLARL is off.	• Brake actuator assembly (SLARL) • SLARL circuit • Skid control ECU
↑	42	Open circuit in SLARL continues for 0.05 seconds or more when SLARL is on.	↑
↑	43	Short to +B or voltage leak in SLARL continues for 0.05 seconds or more.	↑
↑	44	Overcurrent in SLARL continues for 0.05 seconds or more.	↑
C1356/22	16	Open circuit in SLRFR continues for 0.05 seconds or more when SLRFR is off.	• Brake actuator assembly (SLRFR) • SLRFR circuit • Skid control ECU
↑	17	Open circuit in SLRFR continues for 0.05 seconds or more when SLRFR is on.	↑
↑	18	Short to +B or voltage leak in SLRFR continues for 0.05 seconds or more.	↑
↑	19	Overcurrent in SLRFR continues for 0.05 seconds or more.	↑
C1357/24	26	Open circuit in SLRFL continues for 0.05 seconds or more when SLRFL is off.	• Brake actuator assembly (SLRFL) • SLRFL circuit • Skid control ECU

DTC Code	INF Code	DTC Detection Condition	Trouble Area
↑	27	Open circuit in SLRFL continues for 0.05 seconds or more when SLRFL is on.	↑
↑	28	Short to +B or voltage leak in SLRFL continues for 0.05 seconds or more.	↑
↑	29	Overcurrent in SLRFL continues for 0.05 seconds or more.	↑
C1358/26	36	Open circuit in SLRRR continues for 0.05 seconds or more when SLRRR is off.	• Brake actuator assembly (SLRRR) • SLRRR circuit • Skid control ECU
↑	37	Open circuit in SLRRR continues for 0.05 seconds or more when SLRRR is on.	↑
↑	38	Short to +B or voltage leak in SLRRR continues for 0.05 seconds or more.	↑
↑	39	Overcurrent in SLRRR continues for 0.05 seconds or more.	↑
C1359/29	46	Open circuit in SLRRL continues for 0.05 seconds or more when SLRRL is off.	• Brake actuator assembly (SLRRL) • SLRRL circuit • Skid control ECU
↑	47	Open circuit in SLRRL continues for 0.05 seconds or more when SLRRL is on.	↑
↑	48	Short to +B or voltage leak in SLRRL continues for 0.05 seconds or more.	↑
↑	49	Overcurrent in SLRRL continues for 0.05 seconds or more.	↑

WIRING DIAGRAM



BC



BC

P

C141072E02

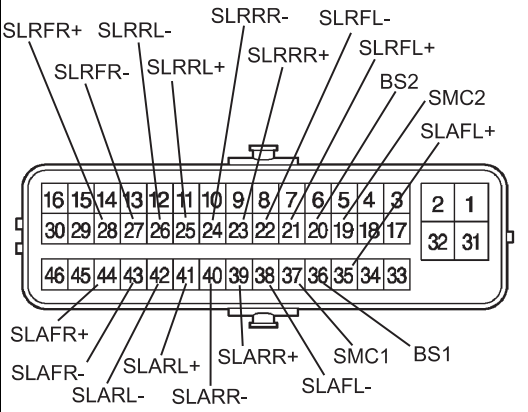
INSPECTION PROCEDURE

NOTICE:

When replacing the skid control ECU or brake actuator assembly, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	INSPECT BRAKE ACTUATOR ASSEMBLY

Brake Actuator:



(a) Disconnect the brake actuator connector.

(b) Measure the resistance according to the value(s) in the table below.

HINT:

Check the brake actuator assembly when it is cooled down.

Standard resistance

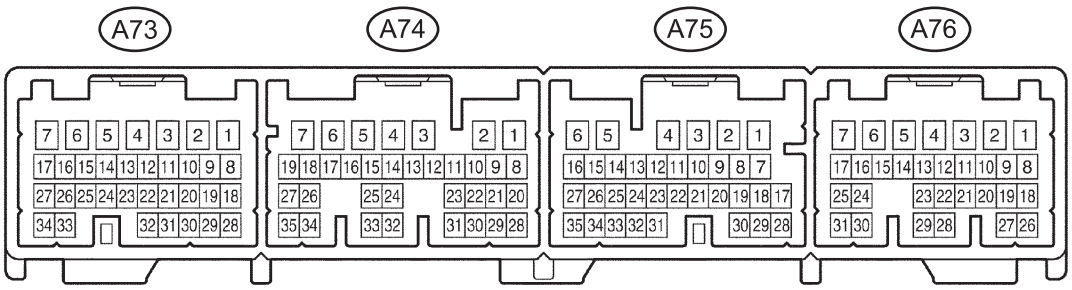
Tester Connection	Condition	Specified Condition
37 (SMC1) - 36 (BS1)	Always	15.3 to 17.3 Ω
37 (SMC1) - Body ground	Always	10 kΩ or higher
19 (SMC2) - 20 (BS2)	Always	15.3 to 17.3 Ω
19 (SMC2) - Body ground	Always	10 kΩ or higher
44 (SLAFR+) - 43 (SLAFR-)	Always	3.6 to 4.2 Ω
44 (SLAFR+) - Body ground	Always	10 kΩ or higher
35 (SLAFL+) - 38 (SLAFL-)	Always	3.6 to 4.2 Ω
35 (SLAFL+) - Body ground	Always	10 kΩ or higher
39 (SLARR+) - 40 (SLARR-)	Always	3.6 to 4.2 Ω
39 (SLARR+) - Body ground	Always	10 kΩ or higher
41 (SLARL+) - 42 (SLARL-)	Always	3.6 to 4.2 Ω
41 (SLARL+) - Body ground	Always	10 kΩ or higher
28 (SLRFR+) - 27 (SLRFR-)	Always	3.6 to 4.2 Ω
28 (SLRFR+) - Body ground	Always	10 kΩ or higher
21 (SLRFL+) - 22 (SLRFL-)	Always	3.6 to 4.2 Ω
21 (SLRFL+) - Body ground	Always	10 kΩ or higher
23 (SLRRR+) - 24 (SLRRR-)	Always	4.4 to 5.0 Ω
23 (SLRRR+) - Body ground	Always	10 kΩ or higher
25 (SLRRL+) - 26 (SLRRL-)	Always	4.4 to 5.0 Ω
25 (SLRRL+) - Body ground	Always	10 kΩ or higher

NG → REPLACE BRAKE ACTUATOR ASSEMBLY

OK

2	INSPECT SKID CONTROL ECU

Skid Control ECU:



C138589E03

(a) Turn the power switch on (IG).
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A73-4 (SMC1) - Body ground	Brake pedal released	10 to 14 V
A76-3 (SMC2) - Body ground	Brake pedal released	10 to 14 V
A73-7 (SLAFR+) - Body ground	Brake pedal released	Pulse generation (see waveform 1) (See page BC-48)
A73-6 (SLAFR-) - Body ground	Brake pedal released	Pulse generation (see waveform 1) (See page BC-48)
A76-1 (SLAFL+) - Body ground	Brake pedal released	Pulse generation (see waveform 1) (See page BC-48)
A76-2 (SLAFL-) - Body ground	Brake pedal released	Pulse generation (see waveform 1) (See page BC-48)
A76-19 (SLARR+) - Body ground	Brake pedal released	Pulse generation (see waveform 1) (See page BC-48)
A76-9 (SLARR-) - Body ground	Brake pedal released	Pulse generation (see waveform 1) (See page BC-48)
A73-15 (SLARL+) - Body ground	Brake pedal released	Pulse generation (see waveform 1) (See page BC-48)
A73-27 (SLARL-) - Body ground	Brake pedal released	Pulse generation (see waveform 1) (See page BC-48)
A73-17 (SLRFR+) - Body ground	Brake pedal released	Below 1.5 V
A73-34 (SLRFR-) - Body ground	Brake pedal released	Below 1.5 V
A76-8 (SLRFL+) - Body ground	Brake pedal released	Below 1.5 V
A76-26 (SLRFL-) - Body ground	Brake pedal released	Below 1.5 V
A76-20 (SLRRR+) - Body ground	Brake pedal released	Below 1.5 V
A76-18 (SLRRR-) - Body ground	Brake pedal released	Below 1.5 V
A73-16 (SLRRL+) - Body ground	Brake pedal released	Below 1.5 V
A73-26 (SLRRL-) - Body ground	Brake pedal released	Below 1.5 V

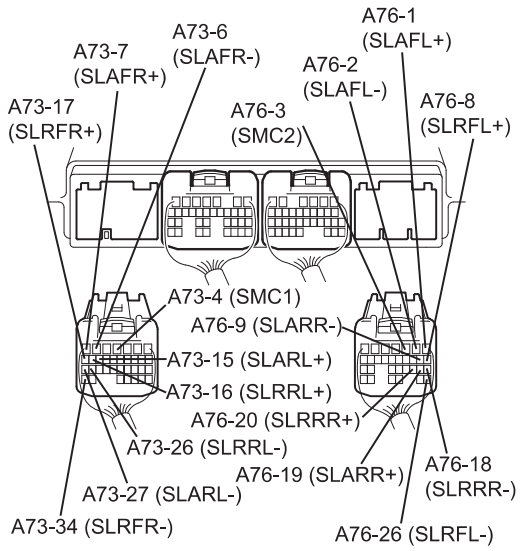
NG → REPLACE SKID CONTROL ECU

BC

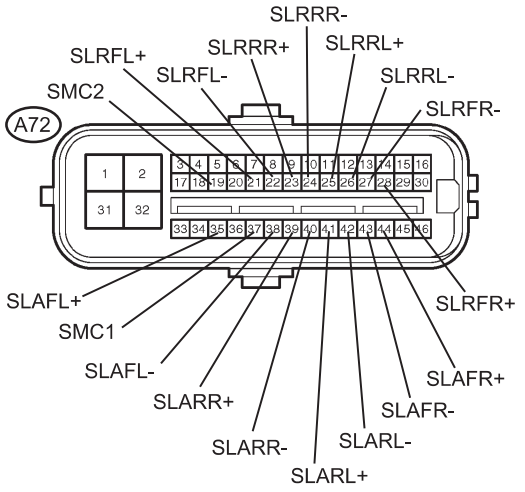
OK

3 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - BRAKE ACTUATOR)

Skid Control ECU Wire Harness View:



Brake Actuator Harness Side Connector Front View:



C141366E02

(a) Turn the power switch off.
(b) Disconnect the skid control ECU connectors.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A73-4 (SMC1) - A72-37 (SMC1)	Always	Below 1 Ω
A73-4 (SMC1) - Body ground	Always	10 kΩ or higher
A76-3 (SMC2) - A72-19 (SMC2)	Always	Below 1 Ω
A76-3 (SMC2) - Body ground	Always	10 kΩ or higher
A73-7 (SLAFR+) - A72-44 (SLAFR+)	Always	Below 1 Ω
A73-7 (SLAFR+) - Body ground	Always	10 kΩ or higher
A73-6 (SLAFR-) - A72-43 (SLAFR-)	Always	Below 1 Ω
A73-6 (SLAFR-) - Body ground	Always	10 kΩ or higher
A76-1 (SLAFL+) - A72-35 (SLAFL+)	Always	Below 1 Ω
A76-1 (SLAFL+) - Body ground	Always	10 kΩ or higher
A76-2 (SLAFL-) - A72-38 (SLAFL-)	Always	Below 1 Ω
A76-2 (SLAFL-) - Body ground	Always	10 kΩ or higher
A76-19 (SLARR+) - A72-39 (SLARR+)	Always	Below 1 Ω
A76-19 (SLARR+) - Body ground	Always	10 kΩ or higher
A76-9 (SLARR-) - A72-40 (SLARR-)	Always	Below 1 Ω
A76-9 (SLARR-) - Body ground	Always	10 kΩ or higher
A73-15 (SLARL+) - A72-41 (SLARL+)	Always	Below 1 Ω
A73-15 (SLARL+) - Body ground	Always	10 kΩ or higher
A73-27 (SLARL-) - A72-42 (SLARL-)	Always	Below 1 Ω
A73-27 (SLARL-) - Body ground	Always	10 kΩ or higher
A73-17 (SLRFR+) - A72-28 (SLRFR+)	Always	Below 1 Ω
A73-17 (SLRFR+) - Body ground	Always	10 kΩ or higher
A73-34 (SLRFR-) - A72-27 (SLRFR-)	Always	Below 1 Ω
A73-34 (SLRFR-) - Body ground	Always	10 kΩ or higher
A76-8 (SLRFL+) - A72-21 (SLRFL+)	Always	Below 1 Ω
A76-8 (SLRFL+) - Body ground	Always	10 kΩ or higher
A76-26 (SLRFL-) - A72-22 (SLRFL-)	Always	Below 1 Ω
A76-26 (SLRFL-) - Body ground	Always	10 kΩ or higher
A76-20 (SLRRR+) - A72-23 (SLRRR+)	Always	Below 1 Ω
A76-20 (SLRRR+) - Body ground	Always	10 kΩ or higher

BC

Tester Connection	Condition	Specified Condition
A76-18 (SLRRR-) - A72-24 (SLRRR-)	Always	Below 1 Ω
A76-18 (SLRRR-) - Body ground	Always	10 kΩ or higher
A73-16 (SLRRL+) - A72-25 (SLRRL+)	Always	Below 1 Ω
A73-16 (SLRRL+) - Body ground	Always	10 kΩ or higher
A73-26 (SLRRL-) - A72-26 (SLRRL-)	Always	Below 1 Ω
A73-26 (SLRRL-) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 RECONFIRM DTC

(a) Reconnect the skid control ECU connectors and the brake actuator connector.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (READY).
(d) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTCs (C1315/31, C1316/32, C1352/21, C1353/23, C1354/25, C1355/27, C1356/22, C1357/24, C1358/26 and/or C1359/28) are not output	A
DTCs (C1315/31, C1316/32, C1352/21, C1353/23, C1354/25, C1355/27, C1356/22, C1357/24, C1358/26 and/or C1359/28) are output	B

B → **REPLACE SKID CONTROL ECU**

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

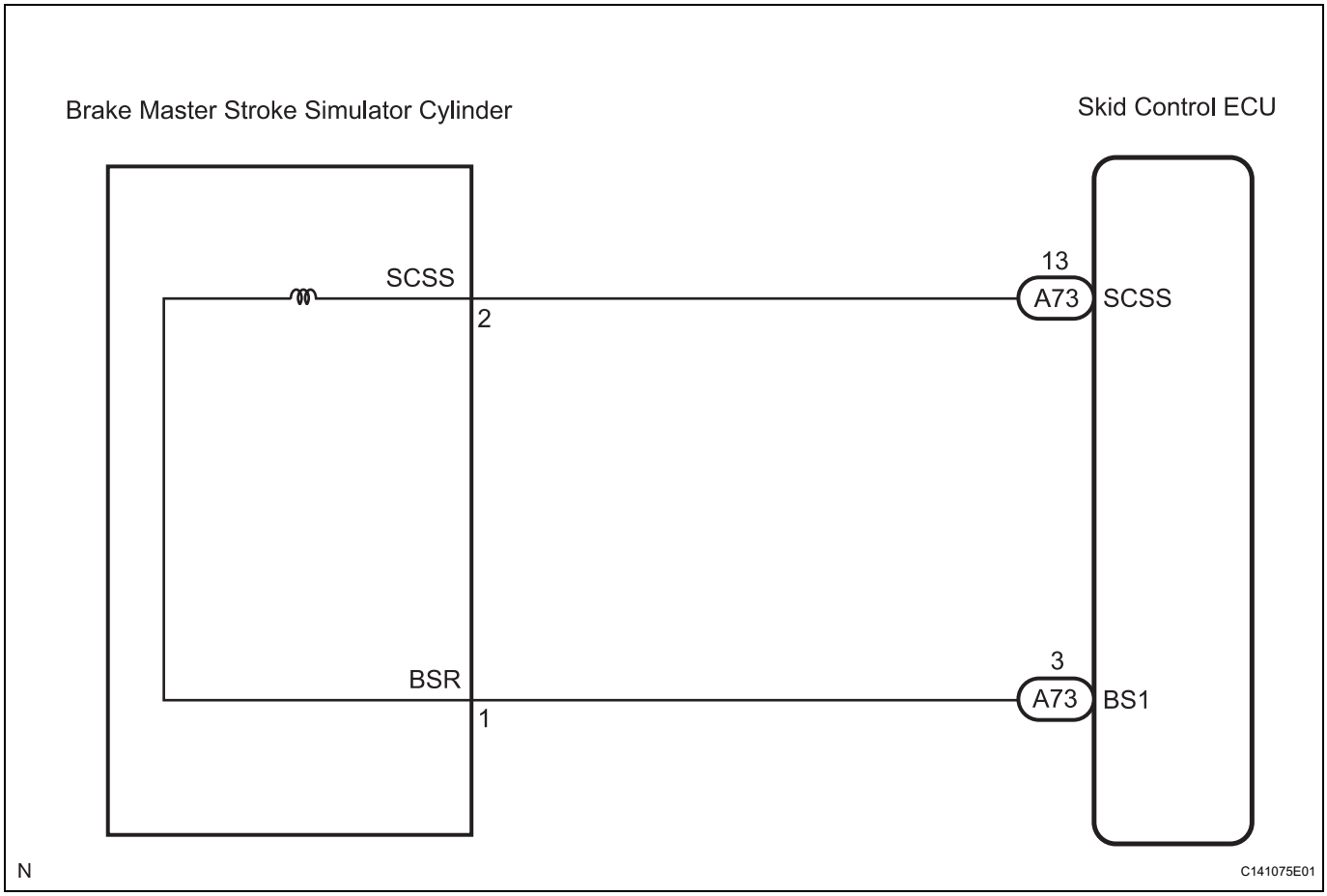
DTC	C1319/35	SCSS Changeover Solenoid Malfunction

DESCRIPTION

The stroke simulator solenoid (SCSS) generates pedal reactive effort during Electronically Controlled Brake control. If one or more of the front wheels loses brake booster function, the simulator operation is prohibited.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1319/35	71	When either of the following is detected: 1. SCSS drive circuit is malfunctioning for 0.05 seconds or more. 2. Short to +B in SCSS.	• Brake master stroke simulator • Brake master stroke simulator circuit • Skid control ECU
↑	72	Current leaks for 0.05 seconds or more when SCSS is off.	↑
↑	73	Open circuit in SCSS continues for 0.05 seconds or more.	↑
↑	74	Overcurrent in SCSS continues for 0.05 seconds or more.	↑

WIRING DIAGRAM



INSPECTION PROCEDURE

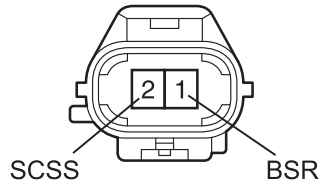
NOTICE:

When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

BC

1	INSPECT BRAKE MASTER STROKE SIMULATOR CYLINDER ASSEMBLY

Brake Master Stroke Simulator Cylinder:



(a) Disconnect the brake master stroke simulator cylinder connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

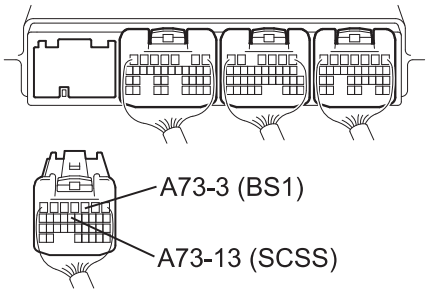
Tester Connection	Condition	Specified Condition
1 (BSR) - 2 (SCSS)	Always	21.45 to 23.15 Ω
1 (BSR) - Body ground	Always	10 kΩ or higher

NG → **REPLACE BRAKE MASTER STROKE SIMULATOR CYLINDER ASSEMBLY**

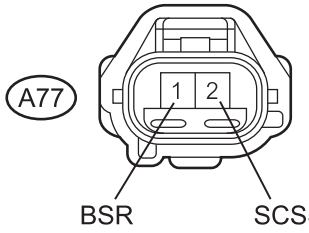
OK

2	CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - BRAKE MASTER STROKE SIMULATOR CYLINDER)

Skid Control ECU Wire Harness View:



Brake Master Stroke Simulator Cylinder Harness Side Connector Front View:



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A73-13 (SCSS) - A77-2 (SCSS)	Always	Below 1 Ω
A73-13 (SCSS) - Body ground	Always	10 kΩ or higher
A73-3 (BS1) - A77-1 (BSR)	Always	Below 1 Ω
A73-3 (BS1) - Body ground	Always	10 kΩ or higher

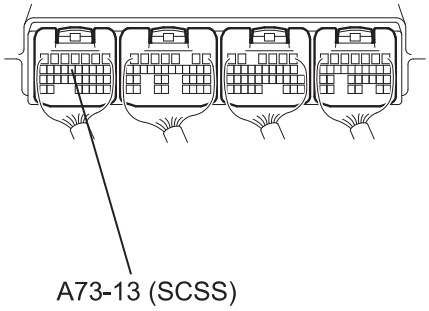
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

BC

3	INSPECT SKID CONTROL ECU (SOLENOID INPUT)

Skid Control ECU Wire Harness View:



(a) Reconnect the skid control ECU connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A73-13 (SCSS) - Body ground	Brake pedal depressed (Stroke simulator ON)	Below 1.5 V
A73-13 (SCSS) - Body ground	Brake pedal released (Stroke simulator OFF)	10 to 14 V

NG → REPLACE SKID CONTROL ECU

OK

4	RECONFIRM DTC

(a) Turn the power switch off.
(b) Reconnect the brake master stroke simulator cylinder connector.
(c) Clear the DTC (See page BC-57).
(d) Turn the power switch on (READY).
(e) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTC (C1319/35) is not output	A
DTC (C1319/35) is output	B

B → REPLACE SKID CONTROL ECU

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

DTC	C1341/62	Front Hydraulic System RH Malfunction

DTC	C1342/63	Front Hydraulic System LH Malfunction

DTC	C1343/64	Rear Hydraulic System RH Malfunction

DTC	C1344/65	Rear Hydraulic System LH Malfunction

DESCRIPTION

The skid control ECU controls braking force according to the hybrid control system regenerative braking force and inputs the fluid pressure necessary for operating each wheel cylinder according to the wheel cylinder pressure sensor.
DTCs may be stored if brake fluid leaks, the wheel cylinder vibrates due to uneven wear of the brake disc rotor, or foreign matter enters the solenoid valve.
DTCs may be stored if the line pressure drops during air bleeding.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1341/62	551 552	Hydraulic pressure control on FR wheel has deteriorated.	• Fluid leakage • Brake actuator assembly
↑	553	There is a malfunction, such as leakage in the pressure increase control valve of FR wheel.	• Fluid leakage • Disc rotor • Brake actuator assembly
↑	554 555	There is a malfunction, such as leakage in the pressure decrease control valve of FR wheel.	↑
C1342/63	561 562	Hydraulic pressure control on FL wheel has deteriorated.	• Fluid leakage • Brake actuator assembly
↑	563	There is a malfunction, such as leakage in pressure increase control valve of FL wheel.	• Fluid leakage • Disc rotor • Brake actuator assembly
↑	564 565	There is a malfunction, such as leakage in pressure decrease control valve of FL wheel.	↑
C1343/64	571 572	Hydraulic pressure control on RR wheel has deteriorated.	• Fluid leakage • Brake actuator assembly
↑	573	There is a malfunction, such as leakage in pressure increase control valve of RR wheel.	• Fluid leakage • Disc rotor • Brake actuator assembly
↑	574 575	There is a malfunction, such as leakage in pressure decrease control valve of RR wheel.	↑
C1344/65	581 582	Hydraulic pressure control on RL wheel has deteriorated.	• Fluid leakage • Brake actuator assembly
↑	583	There is a malfunction, such as leakage in pressure increase control valve of RL wheel.	• Fluid leakage • Disc rotor • Brake actuator assembly
↑	584 585	There is a malfunction, such as leakage in pressure decrease control valve of RL wheel.	↑

BC

WIRING DIAGRAM

Refer to DTCs C1246/46, C1281/81 and C1364/61 (See page BC-131).

INSPECTION PROCEDURE

NOTICE:
When replacing the brake actuator assembly, perform initialization of linear solenoid valve and calibration (See page BC-25).

HINT:
When C1364/61 is output together with C1341/62, C1342/63, C1343/64 or C1344/65, inspect and repair the trouble areas indicated by C1364/61 first.

1	CHECK FOR BRAKE FLUID LEAKS

(a) Check that there is no fluid leakage in the brake line between the brake actuator and the wheel cylinder which is the cause of DTCs.
(b) Check that the brake is not dragging.
OK:
There is no fluid leakage or dragging.

NG → **REPAIR OR REPLACE APPLICABLE PART**

OK

2	PERFORM AIR BLEEDING

(a) Bleed the air from the front and rear brake systems (See page BR-5).

NEXT

3	RECONFIRM DTC

(a) Clear the DTC (See page BC-57).
(b) Repeat the braking test under malfunction conditions recreated based on the Freeze Frame Data or customer problem analysis.
(c) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTCs (C1341/62, C1342/63, C1343/64 and/or C1344/65) are output	A
DTCs (C1341/62, C1342/63, C1343/64 and/or C1344/65) are not output	B

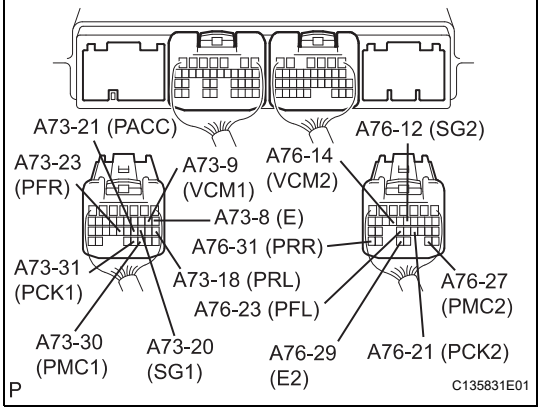
HINT:
DTC may be stored if foreign matter or air enters the solenoid valve.

B → **END**

A

4 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - BODY GROUND)

Skid Control ECU Wire Harness View:



(a) Turn the power switch off.
(b) Disconnect the skid control ECU connectors and the brake actuator connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
A73-8 (E) - Body ground	Always	10 kΩ or higher
A73-9 (VCM1) - Body ground	Always	10 kΩ or higher
A73-18 (PRL) - Body ground	Always	10 kΩ or higher
A73-20 (SG1) - Body ground	Always	10 kΩ or higher
A73-21 (PACC) - Body ground	Always	10 kΩ or higher
A73-23 (PFR) - Body ground	Always	10 kΩ or higher
A73-30 (PMC1) - Body ground	Always	10 kΩ or higher
A73-31 (PCK1) - Body ground	Always	10 kΩ or higher
A76-12 (SG2) - Body ground	Always	10 kΩ or higher
A76-14 (VCM2) - Body ground	Always	10 kΩ or higher
A76-21 (PCK2) - Body ground	Always	10 kΩ or higher
A76-23 (PFL) - Body ground	Always	10 kΩ or higher
A76-27 (PMC2) - Body ground	Always	10 kΩ or higher
A76-29 (E2) - Body ground	Always	10 kΩ or higher
A76-31 (PRR) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 READ VALUE OF INTELLIGENT TESTER (WHEEL CYLINDER PRESSURE SENSOR)

(a) Reconnect the skid control ECU connectors and the brake actuator connector.
(b) Connect the pedal effort gauge (See page BC-259).
(c) Install the hydro LSPV gauge (SST) and bleed air (See page BC-259).

SST 09709-29018

(d) Connect the intelligent tester to the DLC3.
(e) Turn the power switch on (IG).
(f) Select the Data List mode on the intelligent tester.

ABS / VSC:

Tester Display	Measurement Item/Range	Normal Condition
FR W/C SENS	FR wheel cylinder pressure sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V
FL W/C SENS	FL wheel cylinder pressure sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V
RR W/C SENS	RR wheel cylinder pressure sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V
RL W/C SENS	RL wheel cylinder pressure sensor / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V

(g) Check the output value of the wheel cylinder pressure at each fluid pressure during the Electronically Controlled Brake control.
Standard voltage:
Front wheel cylinder pressure sensor

Hydraulic Pressure MPa (kgf/cm^2, psi)	FR W/C SENS (Data List Display)	FL W/C SENS (Data List Display)
2.6 (26.5, 376.9)	0.85 to 1.15 V	0.85 to 1.15 V
6.3 (64.3, 914.5)	1.6 to 1.9 V	1.6 to 1.9 V
8.1 (82.6, 1174.8)	1.95 to 2.25 V	1.95 to 2.25 V
8.2 (83.6, 1189.0)	2.0 to 2.3 V	2.0 to 2.3 V

Rear wheel cylinder pressure sensor

Hydraulic Pressure MPa (kgf/cm^2, psi)	RR W/C SENS (Data List Display)	RL W/C SENS (Data List Display)
2.6 (26.5, 376.9)	0.85 to 1.15 V	0.85 to 1.15 V
5.0 (51.0, 725.4)	1.35 to 1.65 V	1.35 to 1.65 V

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY**

OK

6 CHECK BRAKE DISC

(a) Turn the power switch off.
(b) Disconnect the brake pedal stroke sensor connector.
(c) Carry out the running and braking test according to Freeze Frame Data or customer problem analysis. Check the brake line pressure vibration caused due to uneven wear of the disc according to brake pedal vibration.
OK:
Brake pedal does not vibrate during braking.
HINT:
- The brake pedal does not kick back due to wheel cylinder piston vibration during Electronically Controlled Brake control.
- If the brake pedal stroke sensor connector is disconnected, the fail safe function will prohibit Electronically Controlled Brake control.
- The Active Test does not prohibit Electronically Controlled Brake control when the vehicle is running, so disconnect the stroke sensor connector and carry out inspection.
- Disc wear can be checked by measuring the disc thickness.

NG → **REPLACE BRAKE DISC**

OK

BC

7	RECONFIRM DTC

(a) Reconnect the brake pedal stroke sensor connector.
(b) Clear the DTC (See page BC-57).
(c) Repeat the braking test under malfunction conditions recreated based on the Freeze Frame Data or customer problem analysis.
(d) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTCs (C1341/62, C1342/63, C1343/64 and/or C1344/65) are not output	A
DTCs (C1341/62, C1342/63, C1343/64 and/or C1344/65) are output	B

B → REPLACE BRAKE ACTUATOR ASSEMBLY

A → CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

DTC	C1345/66	Linear Solenoid Valve Offset Learning Undone

DTC	C1368/67	Linear Solenoid Valve Offset Malfunction

DESCRIPTION

The skid control ECU stores and corrects the difference in each individual part such as the stroke sensor, actuator solenoids, and stroke simulator solenoid. Perform initialization of linear solenoid valve and calibration if these parts are replaced.
The skid control ECU receives shift position P signals from the HV control ECU through CAN communication system.
The DTCs are cancelled when the result of linear valve offset learning is normal.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1345/66	-	Value of initialization of linear solenoid valve and calibration for the FR, FL, RR, and RL wheels is not stored.	• Initialization of linear solenoid valve and calibration undone • Skid control ECU
C1368/67	-	Value of initialization of linear solenoid valve and calibration is not within the brake actuator's standard value.	• Initialization of linear solenoid valve and calibration undone • Skid control ECU

INSPECTION PROCEDURE

NOTICE:
When replacing the brake actuator assembly, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	CHECK DTC

(a) Clear the DTC (See page BC-57).
(b) Turn the power switch off.
(c) Turn the power switch on (IG).
(d) Check that the DTCs (Electronically Controlled Brake and hybrid control system) are recorded.

Result

Condition	Proceed to
DTCs (except C1345/66, C1368/67 and/or hybrid control system DTC) are not output	A
Hybrid control system DTC is output	B
DTCs (except C1345/66 and/or C1368/67) are output	C

B → INSPECT HYBRID CONTROL SYSTEM

C → REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See page BC-69)

A

2	PERFORM INITIALIZATION OF LINEAR SOLENOID VALVE AND CALIBRATION

(a) Perform initialization of the linear solenoid valve and calibration (See page BC-25).

BC

NEXT

3	RECONFIRM DTC

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (IG).
(d) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTCs (C1345/66 and/or C1368/67) are not output	A
DTCs (C1345/66 and/or C1368/67) are output	B

B → REPLACE SKID CONTROL ECU

A

END

DTC	C1365/54	Accumulator Pressure Sensor Malfunction

DESCRIPTION

The accumulator pressure sensor is built into the brake actuator.
The skid control ECU detects the accumulator pressure from the data sent from the accumulator pressure sensor, and then runs and stops the pump motor by operating the motor relay.
DTCs may be output if the accumulator pressure drops due to frequent braking (this is not a malfunction).

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1365/54	211	Sensor power 1 (VCM1) voltage is 4.7 V or less or 5.3 V or more for at least 0.05 seconds.	• Brake actuator assembly (Accumulator pressure sensor) • Accumulator pressure sensor circuit • Accumulator pressure sensor power supply • Brake actuator assembly • Skid control ECU
↑	212	Ratio of accumulator pressure sensor output voltage (PACC) to sensor power 1 (VCM1) voltage is 5% or less or 90.5% or more for at least 0.05 seconds.	↑
↑	214	Total wheel cylinder pressure sensor exceeds 18 MPa after depressing brake pedal, but accumulator pressure sensor output voltage (PACC) changes less than 0.5 MPa for at least 0.5 seconds.	↑
↑	215	Ratio of accumulator pressure sensor output voltage (PACC) to sensor power 1 (VCM1) voltage is 90.5% or less for at least 0.1 second during self diagnosis.	↑
↑	216	Voltage difference is 0.3 V or more before and after changing the pull up resistance in sensor signal input circuit (loose contact).	↑

WIRING DIAGRAM

Refer to DTCs C1246/46, C1281/81 and C1364/61 (See page BC-131).

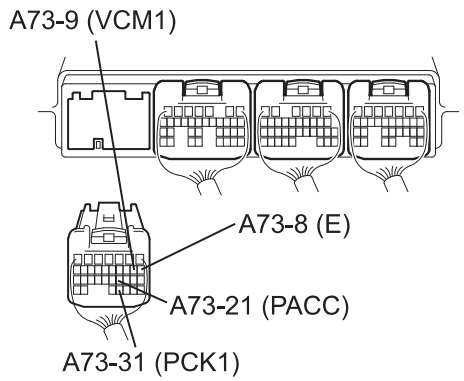
INSPECTION PROCEDURE

NOTICE:

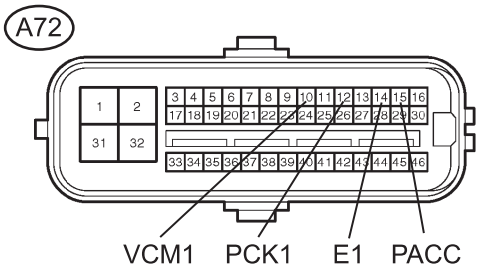
When replacing the skid control ECU or brake actuator assembly, perform initialization of linear solenoid valve and calibration (See page BC-25).

1 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - BRAKE ACTUATOR)

Skid Control ECU Wire Harness View:



Brake Actuator Harness Side Connector Front View:



C141364E04

(a) Disconnect the skid control ECU connector and the brake actuator connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

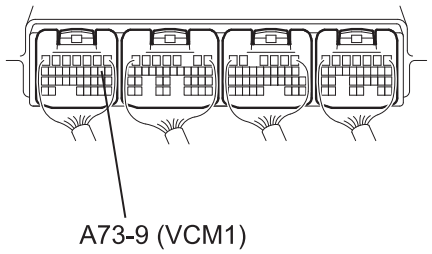
Tester Connection	Condition	Specified Condition
A73-8 (E) - A72-14 (E1)	Always	Below 1 Ω
A73-8 (E) - Body ground	Always	10 kΩ or higher
A73-9 (VCM1) - A72-10 (VCM1)	Always	Below 1 Ω
A73-9 (VCM1) - Body ground	Always	10 kΩ or higher
A73-21 (PACC) - A72-15 (PACC)	Always	Below 1 Ω
A73-21 (PACC) - Body ground	Always	10 kΩ or higher
A73-31 (PCK1) - A72-12 (PCK1)	Always	Below 1 Ω
A73-31 (PCK1) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 INSPECT SKID CONTROL ECU (SENSOR INPUT)

Skid Control ECU Wire Harness View:



P

C135838E09

(a) Reconnect the skid control ECU connector and the brake actuator connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A73-9 (VCM1) - Body ground	Power switch on (IG)	4.75 to 5.25 V

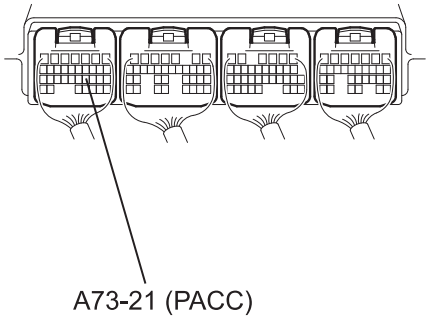
NG → **REPLACE SKID CONTROL ECU**

OK

BC

3 INSPECT SKID CONTROL ECU (SENSOR OUTPUT)

Skid Control ECU Wire Harness View:



(a) Depress the brake pedal to operate the pump motor, and then check that the pump motor stops.
(b) Measure the voltage according to the value(s) in the table below.

NOTICE:
Do not depress the brake pedal until the pump motor stops and the voltage check is finished in order to keep the accumulator pressure.

Standard voltage

Tester Connection	Condition	Specified Condition
A73-21 (PACC) - Body ground	Power switch on (IG)	3.3 to 4.7 V

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY**

OK

4 READ VALUE OF INTELLIGENT TESTER (ACCUMULATOR PRESSURE SENSOR)

(a) Turn the power switch off.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Select the Data List mode on the intelligent tester.

ABS / VSC:

Tester Display	Measurement Item/Range	Normal Condition
ACC PRESS SENS	Accumulator pressure sensor / min.: 0 V, max.: 5 V	Specified value: 3.3 to 4.7 V

(e) Depress the brake pedal 4 or 5 times to operate the pump motor, and check the output value on the intelligent tester with the motor stopped (no braking).

OK:
Accumulator pressure sensor voltage does not drop.

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY**

OK

5 RECONFIRM DTC

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Perform the road and braking test.
(d) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTC (C1365/54) is not output	A
DTC (C1365/54) is output	B

BC

B → **REPLACE SKID CONTROL ECU**

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

DTC C1377/43 Capacitor Malfunction

DESCRIPTION

The brake control power supply (capacitor) is used as auxiliary power for brake control when battery voltage is low.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1377/43	101	Brake control power supply is deteriorated (indicates a need to replace).	Brake control power supply (Capacitor)
↑	102	Self discharge (current leak) is excessive (internal malfunction).	↑
↑	103	Overvoltage (16.4 V or more) continues to be applied from the auxiliary battery to the capacitor voltage input (+BC) for 10 seconds or more.	Apply high voltage
↑	105	Circuit inside the power back up unit (charge) is malfunctioning.	Brake control power supply (Capacitor)
↑	106	Circuit inside the power back up unit (back up output circuit) is malfunctioning.	↑
↑	107	Malfunction in the forced discharge circuit.	↑
↑	108	Circuit inside the power back up unit (voltage monitor circuit) is malfunctioning.	↑
↑	109	Open circuit between auxiliary battery (12 V) and capacitor power input (+BC terminal).	• ABS MAIN NO. 3 fuse • Brake control power supply circuit
↑	110	When either of the following is detected: 1. Open or short circuit between auxiliary battery (12 V) and capacitor output 1 (OUT1). 2. Open or short circuit between auxiliary battery (12 V) and capacitor output 2 (OUT2).	• ABS MAIN NO. 1 fuse • ABS MAIN NO. 2 fuse • Brake control power supply circuit

WIRING DIAGRAM

Refer to DTCs C1241/41 and C1242/42 (See page BC-122).

INSPECTION PROCEDURE

NOTICE:

When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1 CHECK FREEZE FRAME DATA

(a) Check the INF code from the Freeze Frame Data memorized when the DTC (C1377/43) is stored (See page BC-59).

Result

Condition	Proceed to
INF codes (109 and/or 110) are output	A
INF codes (101, 102, 105, 106, 107 and/or 108) are output	B
INF code (103) is output	C

B → REPLACE BRAKE CONTROL POWER SUPPLY (CAPACITOR)

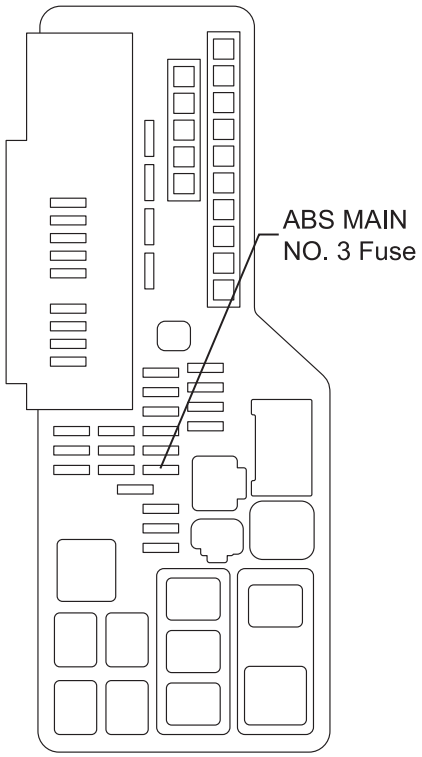
C → Go to step 9

BC

A

2	INSPECT ABS MAIN NO. 3 FUSE

Engine Room R/B:



(a) Remove the ABS MAIN NO. 3 fuse from the engine room R/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

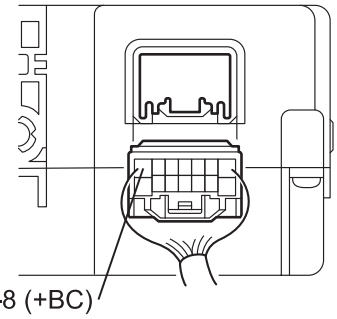
Tester Connection	Condition	Specified Condition
ABS MAIN NO. 3 (10 A) fuse	Always	Below 1 Ω

NG → REPLACE ABS MAIN NO. 3 FUSE

OK

3	INSPECT BRAKE CONTROL POWER SUPPLY (+BC TERMINAL)

Brake Control Power Supply Wire Harness View:



(a) Install the ABS MAIN NO. 3 fuse.
(b) Disconnect the brake control power supply connector.
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
O23-8 (+BC) - Body ground	Always	10 to 14 V

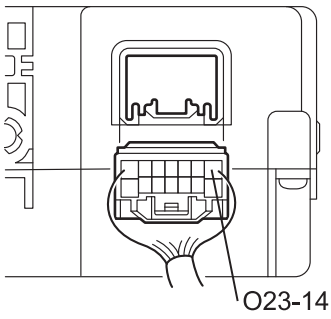
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (+BC CIRCUIT)

BC

OK

4 INSPECT BRAKE CONTROL POWER SUPPLY (GND TERMINAL)

Brake Control Power Supply Wire Harness View:



N C140720E02

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

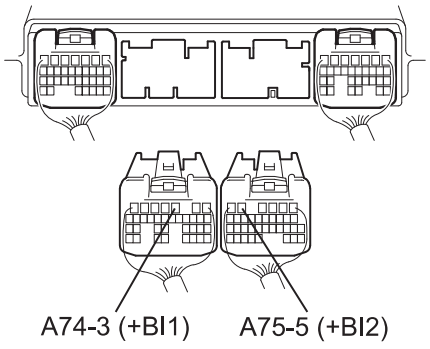
Tester Connection	Condition	Specified Condition
O23-14 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

5 INSPECT SKID CONTROL ECU (+BI TERMINAL)

Skid Control ECU Wire Harness View:



P C135832E01

(a) Disconnect the skid control ECU connectors.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A74-3 (+BI1) - Body ground	Always	10 to 14 V
A75-5 (+BI2) - Body ground	Always	10 to 14 V

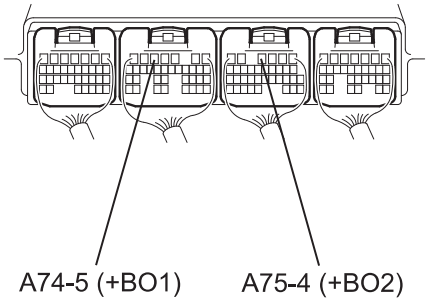
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (+BI CIRCUIT)**

OK

BC

6 INSPECT SKID CONTROL ECU (RELAY INPUT)

Skid Control ECU Wire Harness View:



(a) Reconnect the skid control ECU connectors.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

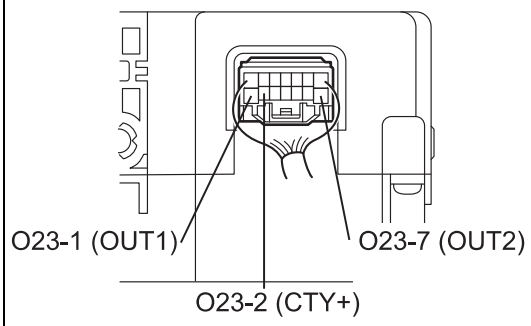
Tester Connection	Condition	Specified Condition
A74-5 (+BO1) - Body ground	Power switch on (IG)	8.8 to 14 V
A75-4 (+BO2) - Body ground	Power switch on (IG)	8.8 to 14 V

NG → **REPLACE SKID CONTROL ECU**

OK

7 INSPECT BRAKE CONTROL POWER SUPPLY (OUT AND CTY+ TERMINAL)

Brake Control Power Supply Wire Harness View:



(a) Reconnect the brake control power supply connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

HINT:
Perform inspection while the brake is not operated.

Standard voltage

Tester Connection	Condition	Specified Condition
O23-1 (OUT1) - Body ground	Power switch on (IG)	10 to 14 V
O23-2 (CTY+) - Body ground	Power switch on (IG)	10 to 14 V (*1)
O23-7 (OUT2) - Body ground	Power switch on (IG)	10 to 14 V

(*1): For 5 seconds after the driver's door is opened.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (OUT OR CTY+ CIRCUIT)**

OK

8 RECONFIRM DTC

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (IG).
(d) Check if the same DTC is recorded (See page BC-57).

BC

Result

Condition	Proceed to
DTC (C1377/43) is not output	A
DTC (C1377/43) is output	B

B → REPLACE SKID CONTROL ECU

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

9 CHECK AUXILIARY BATTERY

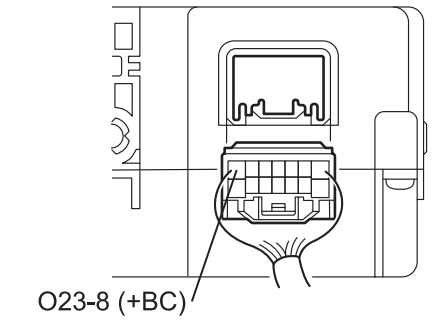
(a) Check the auxiliary battery voltage.
Standard voltage:
11 to 14 V

NG → **CHARGE OR REPLACE AUXILIARY BATTERY**

OK

10 INSPECT BRAKE CONTROL POWER SUPPLY (+BC TERMINAL)

Brake Control Power Supply Wire Harness View:



(a) Disconnect the brake control power supply connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
O23-8 (+BC) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (+BC CIRCUIT)**

OK

11 RECONFIRM DTC

(a) Clear the DTC (See page BC-57).
(b) Turn the power switch on (IG).
(c) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTC (C1377/43) is not output	A

BC

Condition	Proceed to
DTC (C1377/43) is output	B

B → **REPLACE BRAKE CONTROL POWER SUPPLY (CAPACITOR)**

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

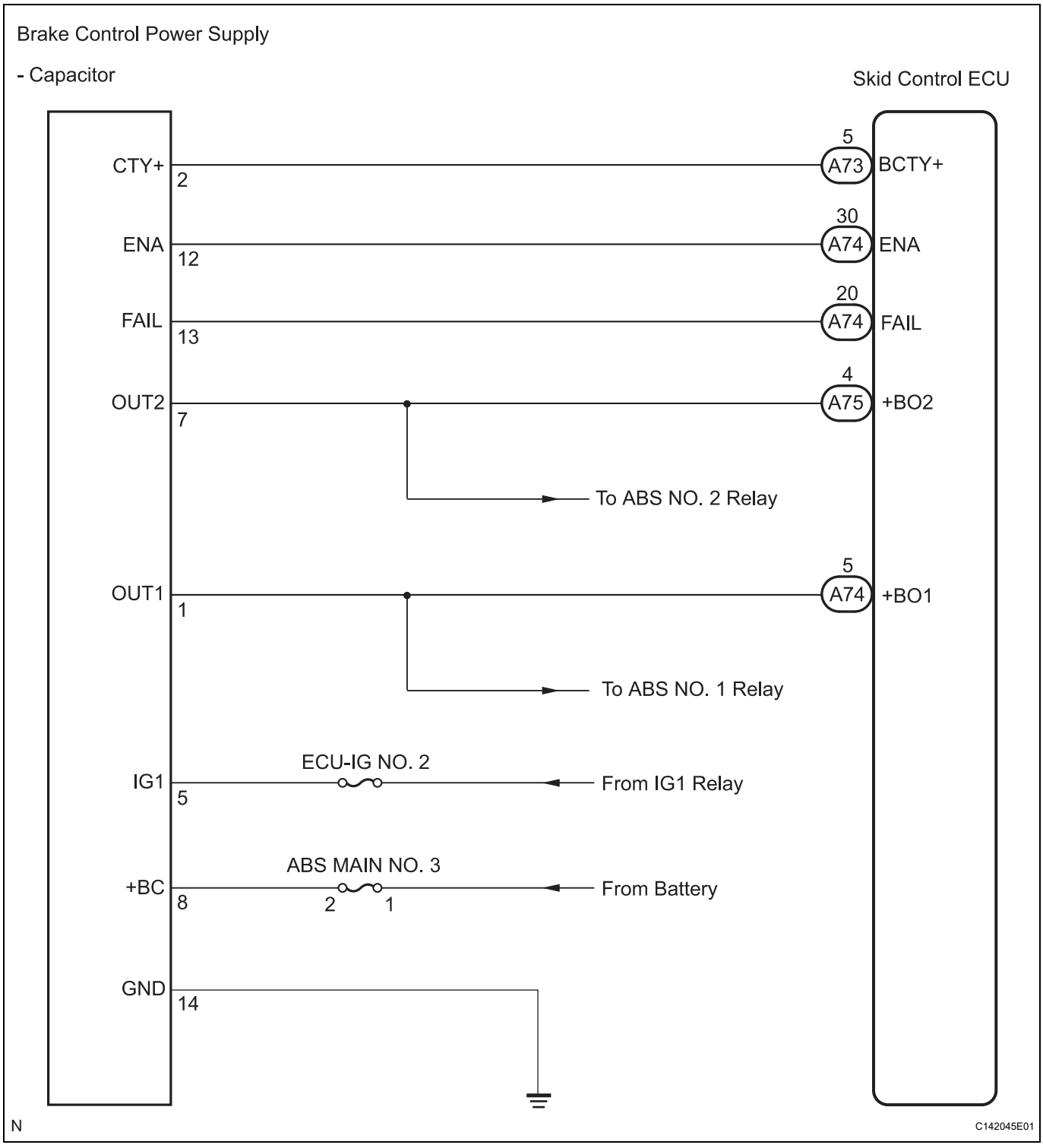
DTC	C1378/44	Capacitor Communication Malfunction

DESCRIPTION

The brake control power supply (capacitor) provides auxiliary power for brake control when an auxiliary battery (12 V) voltage drops.
The FAIL and ENA lines are placed between the skid control ECU and the brake control power supply. Signals indicating that the brake control power supply is in auxiliary mode are sent to the skid control ECU through the FAIL line.
Charge permit prohibition signals are sent to the brake control power supply through the ENA line.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1378/44	112	When either of the following is detected: 1. Open or short in FAIL line. 2. Malfunction inside the power back up unit.	• Brake control power supply (Capacitor) • Brake control power supply circuit

WIRING DIAGRAM



BC

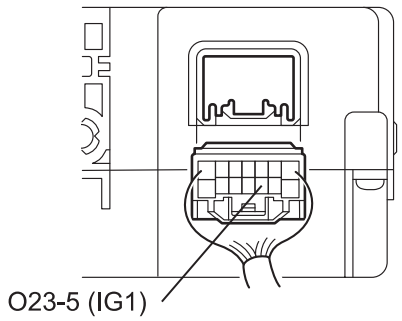
INSPECTION PROCEDURE

NOTICE:

When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1 INSPECT BRAKE CONTROL POWER SUPPLY (IG1 TERMINAL)

Brake Control Power Supply Wire Harness View:



(a) Disconnect the brake control power supply connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

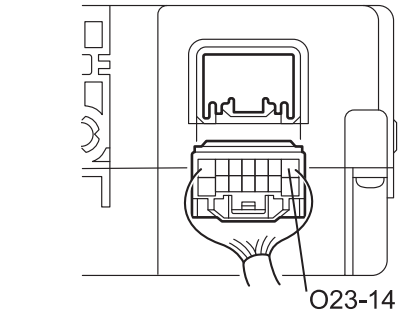
Tester Connection	Condition	Specified Condition
O23-5 (IG1) - Body ground	Power switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

OK

2 INSPECT BRAKE CONTROL POWER SUPPLY (GND TERMINAL)

Brake Control Power Supply Wire Harness View:



(a) Turn the power switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
O23-14 (GND) - Body ground	Always	Below 1 Ω

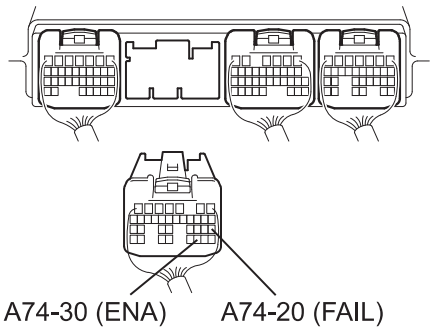
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

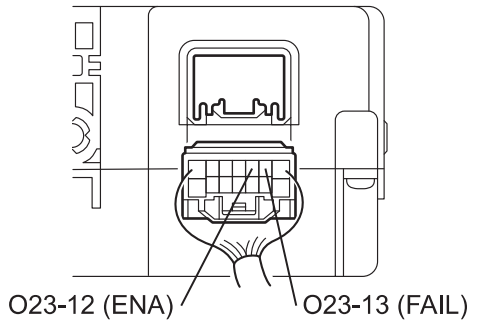
BC

3	CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - BRAKE CONTROL POWER SUPPLY)

Skid Control ECU Wire Harness View:



Brake Control Power Supply Wire Harness View:



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A74-30 (ENA) - O23-12 (ENA)	Always	Below 1 Ω
A74-30 (ENA) - Body ground	Always	10 kΩ or higher
A74-20 (FAIL) - O23-13 (FAIL)	Always	Below 1 Ω
A74-20 (FAIL) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	RECONFIRM DTC

(a) Reconnect the skid control ECU connector and the brake control power supply connector.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (IG).
(d) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTC (C1378/44) is output	A
DTC (C1378/44) is not output	B

B → CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

A

5 CHECK FREEZE FRAME DATA

(a) Check the INF code from the Freeze Frame Data memorized when the DTC (C1378/44) is stored (See page BC-59).

Result

Condition	Proceed to
INF code (112) is not output	A
INF code (112) is output	B

B → REPLACE BRAKE CONTROL POWER SUPPLY (CAPACITOR)

A

REPLACE SKID CONTROL ECU

DTC C1391/69 Accumulator Leak Malfunction

DESCRIPTION

The DTC is stored if a brake fluid, internal or other leak is detected due to improper sealing in the actuator. Internal leakage is suspected if the pump motor operates frequently without braking.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
C1391/69	591	Accumulator performance is deteriorated (improper sealing inside the actuator, gas pressure drop inside the accumulator, leak in each pressure boosting valve).	• Fluid leakage • Brake actuator assembly

INSPECTION PROCEDURE

NOTICE:

When replacing the skid control ECU or brake actuator assembly, perform initialization of linear solenoid valve and calibration (See page BC-25).

1 CHECK FOR BRAKE FLUID LEAKS

(a) Check that there is no fluid leakage in the brake line between the brake actuator and the wheel cylinder which is the cause of DTCs.

(b) Check that the brake is not dragging.

OK:

There is no fluid leakage or dragging.

NG → **REPAIR OR REPLACE APPLICABLE PART**

OK

2 READ VALUE OF INTELLIGENT TESTER (ACCUMULATOR PRESSURE SENSOR)

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG).

(c) Select the Data List mode on the intelligent tester.

ABS / VSC:

Tester Display	Measurement Item/Range	Normal Condition
ACC PRESS SENS	Accumulator pressure sensor / min.: 0 V, max.: 5 V	Specified value: 3.3 to 4.7 V

(d) Wait a few minutes without operating the brake pedal.

(e) Check that the output value of the accumulator pressure sensor does not decrease and that the pump motor is not activated due to a decrease in accumulator pressure.

OK:

Accumulator pressure does not decrease and the pump motor is not activated due to a decrease in accumulator pressure.

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY**

OK

BC

3	RECONFIRM DTC

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (IG).
(d) Check if the same DTC is recorded (See page BC-57).

Result

Condition	Proceed to
DTC (C1391/69) is not output	A
DTC (C1391/69) is output	B

B → REPLACE SKID CONTROL ECU

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

DTC	U0073/94	Control Module Communication Bus OFF

DTC	U0123/62	Lost Communication with Yaw Rate Sensor Module

DTC	U0124/95	Lost Communication with Lateral Acceleration Sensor Module

DTC	U0126/63	Lost Communication with Steering Angle Sensor Module

DTC	U0131/67	Lost Communication with Power Steering Control Module

DTC	U0293/59	Communication Error from HV ECU

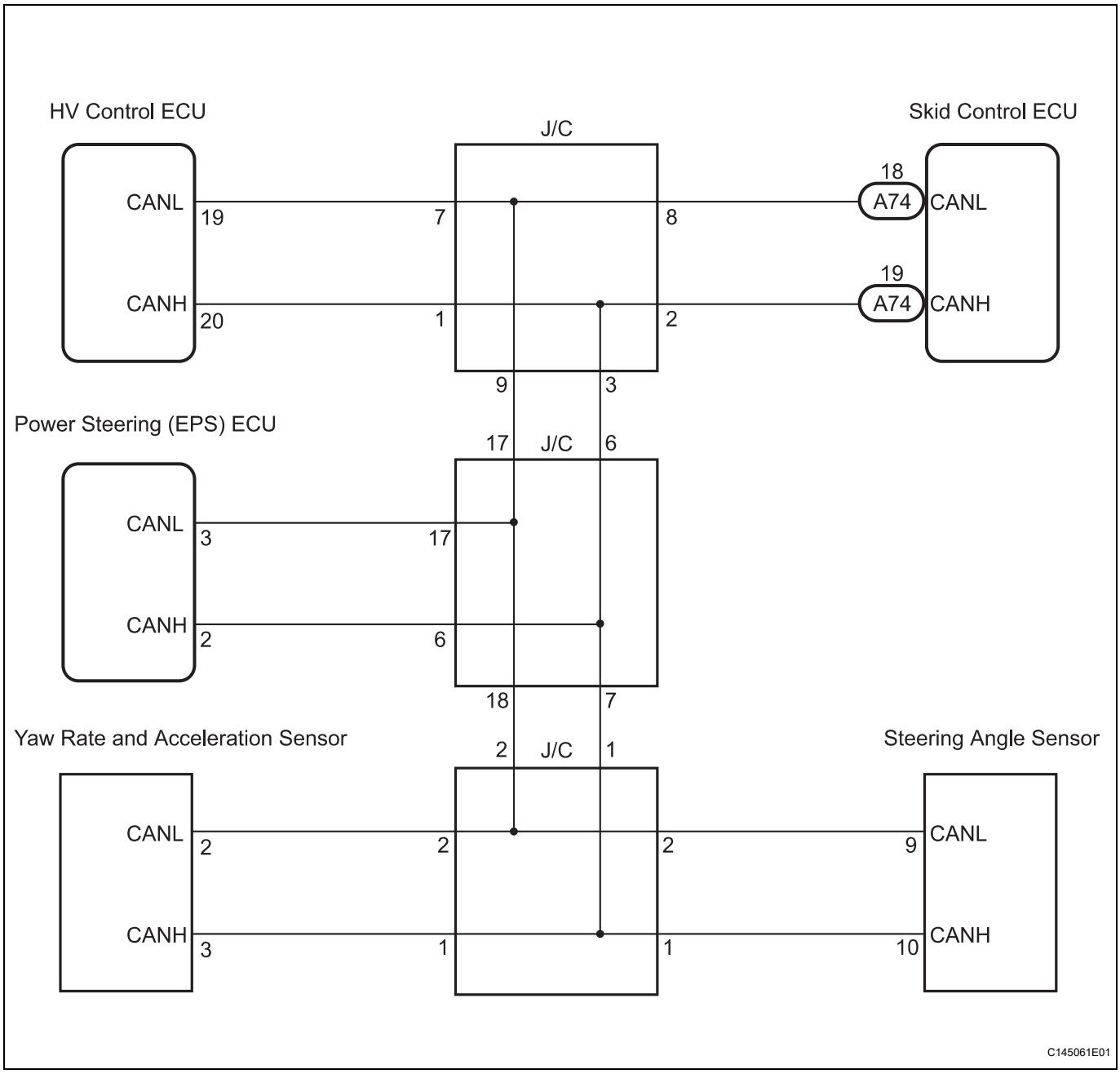
DESCRIPTION

The skid control ECU receives the signals from the HV control ECU, power steering (EPS) ECU, steering angle sensor, and yaw rate and acceleration sensor via the CAN communication system.

DTC Code	INF Code	DTC Detection Condition	Trouble Area
U0073/94	360	When either of the following is detected: 1. After the output of data from the skid control ECU is completed, the sending continues for 5 seconds or more. 2. The condition that bus OFF state occurs once or more within 100 ms occurs 10 times in succession. (Sent signals cannot be received.)	CAN communication system
U0123/62	338	When either of the following is detected: 1. With the IG1 terminal voltage 10 V or more, data from the yaw rate sensor cannot be received for 1 second or more. 2. With the IG1 terminal voltage 10 V or more, the following occurs 10 times in succession. • The condition that data from the yaw rate sensor cannot be received occurs once or more within 5 seconds.	CAN communication system (Skid control ECU to yaw rate and acceleration sensor)
U0124/95	319	When either of the following is detected: 1. With the IG1 terminal voltage 9.5 V or more, data from the deceleration sensor cannot be received for 1 second or more. 2. With the IG1 terminal voltage 9.5 V or more, the following occurs 10 times in succession. • The condition that data from the deceleration sensor cannot be received occurs once or more within 5 seconds.	CAN communication system (Skid control ECU to yaw rate and acceleration sensor)
U0126/63	350	When either of the following is detected: 1. With the IG1 terminal voltage 10 V or more, data from the steering sensor cannot be received for 1 second or more. 2. With the IG1 terminal voltage 10 V or more, the following occurs 10 times in succession. • The condition that data from the steering angle sensor cannot be received occurs once or more within 5 seconds.	CAN communication system (Skid control ECU to steering angle sensor)

DTC Code	INF Code	DTC Detection Condition	Trouble Area
U0131/67	374 375	When either of the following is detected: 1. With the IG1 terminal voltage 10 V or more, data from the EPS ECU cannot be received for 1 second or more. 2. With the IG1 terminal voltage 10 V or more, the following occurs 10 times in succession within 60 seconds. • The condition that data from the EPS ECU cannot be received occurs once or more within 5 seconds.	CAN communication system (Skid control ECU to power steering (EPS) ECU)
U0293/59	152	With the IG2 terminal voltage at 9.5 V or more for 2 seconds or more, communication with the HV control ECU remains invalid for 2 seconds or more.	CAN communication system (Skid control ECU to HV control ECU)
↑	153	With the G2 terminal voltage at 9.5 V or more for 2 seconds or more, communication with the HV control ECU that occurs once or more within 5 seconds changes from being valid communication to being invalid communication 10 times or more within 1 minute.	↑
↑	154	With the IG2 terminal voltage at 9.5 V or more for 2 seconds or more, abnormal regenerative braking torque value or braking request torque value is received for 2 seconds or more.	↑

WIRING DIAGRAM



BC INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (MOMENTARY INTERRUPTION)

(a) Using the intelligent tester, check for any momentary interruption in the wire harness and connector corresponding to a DTC (See page BC-23).

ABS / VSC:

Tester Display	Measurement Item/Range	Normal Condition
HV COM OPN	HV communication open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal
STEERING OPN	Steering sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal

Tester Display	Measurement Item/Range	Normal Condition
YAW RATE OPN	Yaw rate sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal

Result

Condition	Proceed to
There is a constant open circuit	A
There are no momentary interruptions	B
There are momentary interruptions	C

HINT:
Perform the above inspection before removing the sensor and connector.

B → Go to step 3

C → Go to step 4

A

2 CHECK IF EACH SENSOR AND ECU CONNECTOR IS SECURELY CONNECTED

(a) Turn the power switch off.
(b) Check if each sensor and ECU connector is securely connected.
OK:
The connector should be securely connected.

NG → **CONNECT CONNECTOR TO EACH SENSOR OR ECU CORRECTLY**

OK

3 RECONFIRM DTC

(a) Turn the power switch off.
(b) Record the output DTCs (for ABS, VSC, Electronically Controlled Brake, and CAN communication).
HINT:
If the CAN communication system DTC and the relevant sensor DTCs are output simultaneously, troubleshoot the relevant sensor DTCs (for ABS, VSC and Electronically Controlled Brake) after the CAN communication system returns to normal.

BC

Result

Condition	Proceed to
DTC (CAN communication system DTC) is output	A
DTC (ABS, VSC and/or Electronically Controlled Brake DTC) is output	B
DTC is not output	C

B → **REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See page BC-69)**

C → CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)

A

INSPECT CAN COMMUNICATION SYSTEM

4 REPAIR OR REPLACE HARNESS OR CONNECTOR

(a) Turn the power switch off.
(b) Repair or replace the harness or connector.
(c) Check for any momentary interruption between the skid control ECU and each sensor or ECU (See page BC-23).
(d) Check that there is no momentary interruption.

NEXT

5 RECONFIRM DTC

(a) Turn the power switch off.
(b) Clear the DTC (See page BC-57).
(c) Turn the power switch on (READY).
(d) Drive the vehicle and turn the steering wheel to the right and left at a speed of 15 km/h (9 mph) or more.
(e) Check that no CAN communication system DTC is output.
(f) If ABS, VSC and Electronically Controlled Brake DTCs are output, record them.

Result

Condition	Proceed to
DTC output for the CAN communication system	A
No DTC is output (ABS, VSC and/or Electronically Controlled Brake DTC is output)	B
No DTC is output (No ABS, VSC and/or Electronically Controlled Brake DTC is output)	C

HINT:
The CAN communication system must be normal when repairing each sensor DTC (for ABS, VSC and Electronically Controlled Brake).

B → REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See page BC-69)

C → END

A

INSPECT CAN COMMUNICATION SYSTEM

ABS Warning Light Remains ON

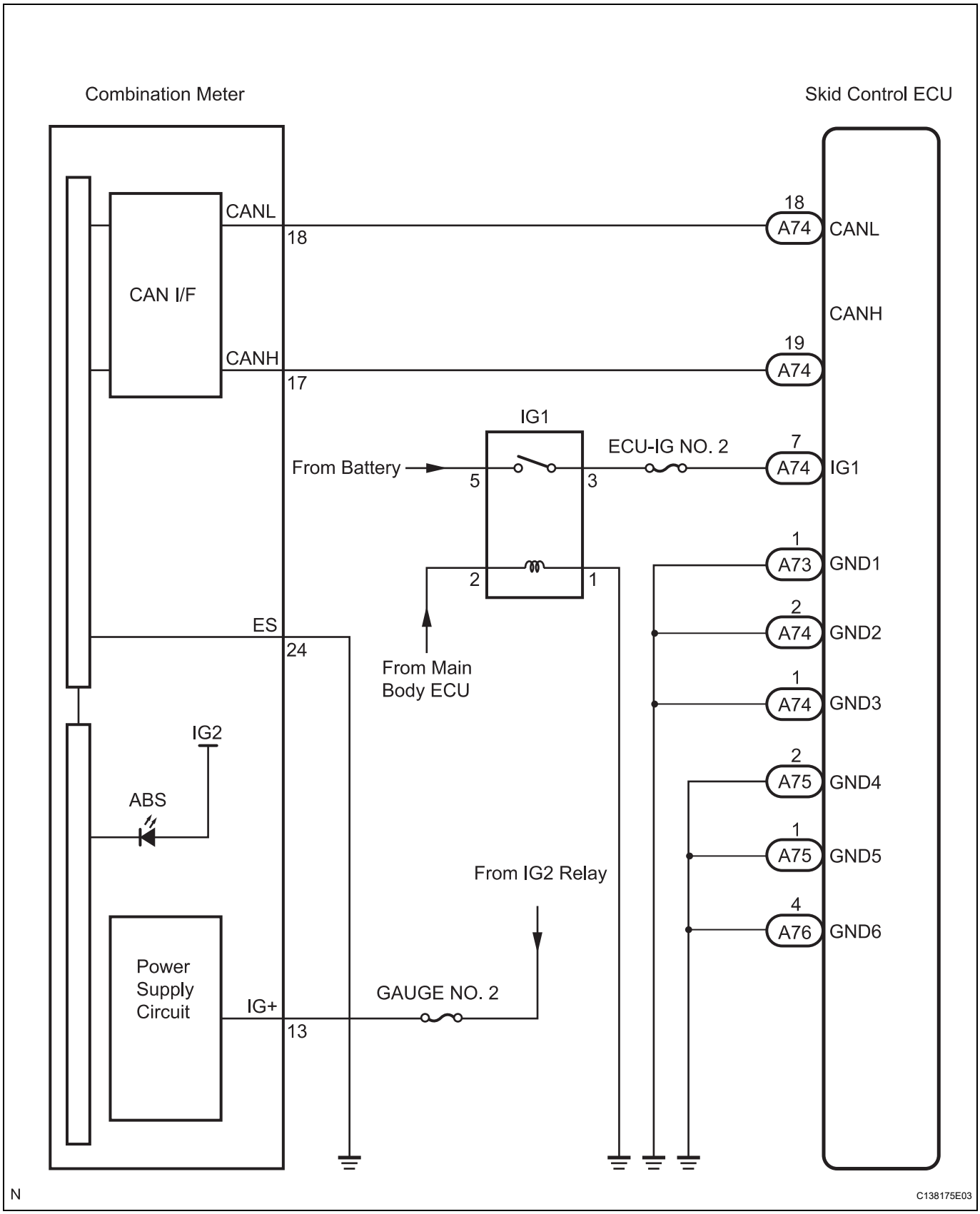
DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.
If any of the following is detected, the ABS warning light remains on.

- The skid control ECU connectors are disconnected from the skid control ECU.
- There is a malfunction in the skid control ECU internal circuit.
- There is an open in the harness between the combination meter and the skid control ECU.

HINT:
In some cases, the intelligent tester cannot be used when the skid control ECU is abnormal.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-22).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM**

A

2	CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

(a) Check if the skid control ECU connector is securely connected.

OK:

The connector should be securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

3	CHECK AUXILIARY BATTERY

(a) Check the auxiliary battery voltage.

Standard voltage:

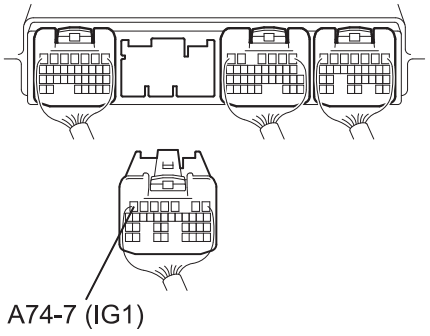
11 to 14 V

NG → **CHARGE OR REPLACE AUXILIARY BATTERY**

OK

4 INSPECT SKID CONTROL ECU (IG1 TERMINAL)

Skid Control ECU Wire Harness View:



(a) Disconnect the skid control ECU connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

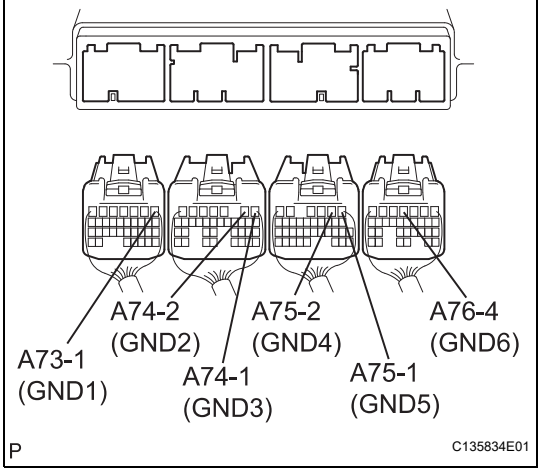
Tester Connection	Condition	Specified Condition
A74-7 (IG1) - Body ground	Power switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

OK

5 INSPECT SKID CONTROL ECU (GND TERMINAL)

Skid Control ECU Wire Harness View:



(a) Turn the power switch off.
(b) Disconnect the skid control ECU connectors.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A73-1 (GND1) - Body ground	Always	Below 1 Ω
A74-2 (GND2) - Body ground	Always	Below 1 Ω
A74-1 (GND3) - Body ground	Always	Below 1 Ω
A75-2 (GND4) - Body ground	Always	Below 1 Ω
A75-1 (GND5) - Body ground	Always	Below 1 Ω
A76-4 (GND6) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

6 INSPECT COMBINATION METER ASSEMBLY

(a) Reconnect the skid control ECU connectors.
(b) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-30).

BC

OK:

The ABS warning light turns on or off in accordance with the intelligent tester.

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-46).

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

REPLACE SKID CONTROL ECU

ABS Warning Light does not Come ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

WIRING DIAGRAM

Refer to ABS Warning Light Remains ON (See page BC-215).

INSPECTION PROCEDURE

NOTICE:

When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-22).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT CAN COMMUNICATION SYSTEM

A

2	CHECK ABS WARNING LIGHT

(a) Disconnect the skid control ECU connector.
(b) Turn the power switch on (IG).
(c) Check that the ABS warning light comes on.

OK:

The ABS warning light comes on.

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-46).

OK → REPLACE SKID CONTROL ECU

NG

3	INSPECT COMBINATION METER ASSEMBLY

(a) Turn the power switch off.
(b) Reconnect the skid control ECU connector.
(c) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-30).

OK:

The ABS warning light turns on or off in accordance with the intelligent tester.

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-46).

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

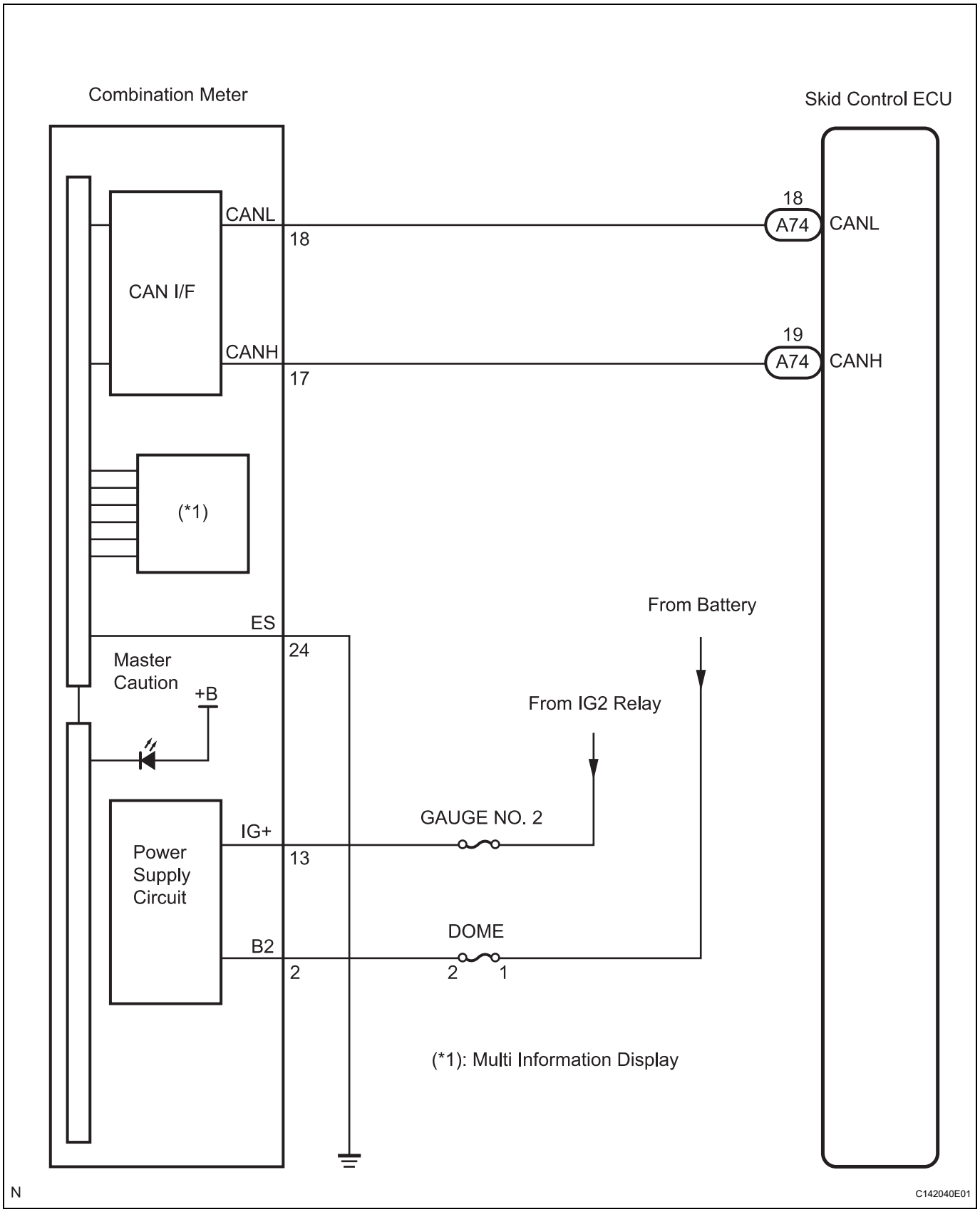
REPLACE SKID CONTROL ECU

VSC Warning Light Remains ON

DESCRIPTION

The skid control ECU communicates with the combination meter via CAN communication.
If the ECU stores a DTC, the master caution indicator light will come on and the DTC will be displayed on the multi information display in the combination meter.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-22).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT CAN COMMUNICATION SYSTEM

A

2	CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

(a) Check if the skid control ECU connector is securely connected.

OK:

The connector should be securely connected.

NG → CONNECT CONNECTOR TO ECU CORRECTLY

OK

3	CHECK AUXILIARY BATTERY

(a) Check the auxiliary battery voltage.

Standard voltage:

11 to 14 V

NG → CHARGE OR REPLACE AUXILIARY BATTERY

OK

4	INSPECT COMBINATION METER ASSEMBLY

(a) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-30).

OK:

The VSC warning (master caution indicator light and multi information display) turns on or off in accordance with the intelligent tester.

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-46).

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

REPLACE SKID CONTROL ECU

VSC Warning Light does not Come ON

DESCRIPTION

The skid control ECU communicates with the combination meter via CAN communication.
If the ECU stores a DTC, the master caution indicator light will come on and the DTC will be displayed on the multi information display in the combination meter.

WIRING DIAGRAM

Refer to VSC Warning Light Remains ON (See page BC-222).

INSPECTION PROCEDURE

NOTICE:
When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-22).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT CAN COMMUNICATION SYSTEM

A

2	CHECK VSC WARNING LIGHT

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (READY).
(c) Select "VSC WARN LAMP" in the Active Test and operate the VSC warning (master caution indicator light and multi information display) using the intelligent tester.

ABS / VSC:

Tester Display	Test Part	Control Range	Diagnostic Note
VSC WARN LAMP	VSC warning (master caution indicator light and multi information display)	Warning (light and display) ON / OFF	Observe combination meter

(d) Check that "ON" and "OFF" of the VSC warning (master caution indicator light and multi information display) are indicated on the combination meter when using the intelligent tester.

OK:

The VSC warning (master caution indicator light and multi information display) turns on or off in accordance with the intelligent tester.

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-46).

OK → **REPLACE SKID CONTROL ECU**

NG

3	INSPECT COMBINATION METER ASSEMBLY

(a) Turn the power switch off.
(b) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-30).
OK:
The VSC warning (master caution indicator light and multi information display) turns on or off in accordance with the intelligent tester.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-46).

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

REPLACE SKID CONTROL ECU

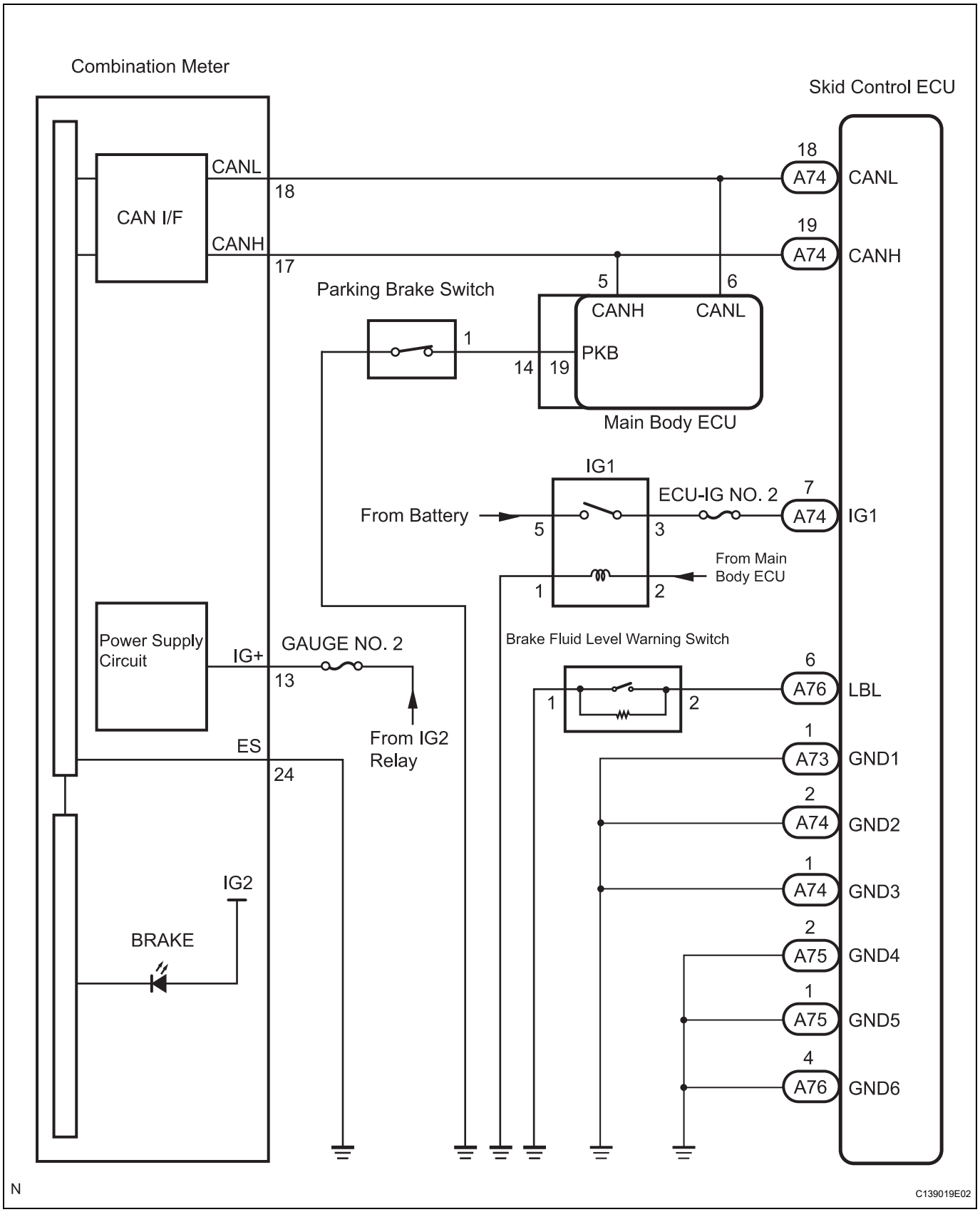
Brake Warning Light Remains ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.
If any of the following is detected, the BRAKE warning light remains on:

- The skid control ECU connector is disconnected from the skid control ECU.
- The brake fluid level is insufficient.
- The parking brake is applied.
- EBD operation is not possible.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	CHECK DTC

(a) Check if the ABS, VSC and/or Electronically Controlled Brake DTC is output (See page BC-57).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → **REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See page BC-69)**

A

2	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-22).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM**

A

3	CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

(a) Check if the skid control ECU connector is securely connected.

OK:

The connector should be securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

4	CHECK AUXILIARY BATTERY

(a) Check the auxiliary battery voltage.

Standard voltage:

11 to 14 V

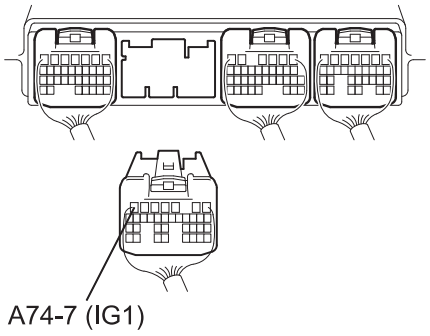
BC

NG → CHARGE OR REPLACE AUXILIARY BATTERY

OK

5 INSPECT SKID CONTROL ECU (IG1 TERMINAL)

Skid Control ECU Wire Harness View:



(a) Disconnect the skid control ECU connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

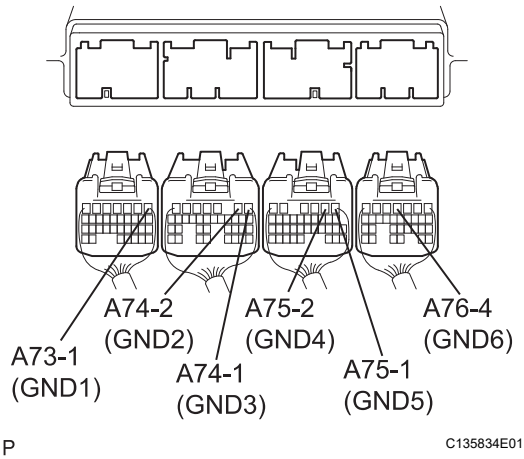
Tester Connection	Condition	Specified Condition
A74-7 (IG1) - Body ground	Power switch on (IG)	10 to 14 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)

OK

6 INSPECT SKID CONTROL ECU (GND TERMINAL)

Skid Control ECU Wire Harness View:



(a) Turn the power switch off.
(b) Disconnect the skid control ECU connectors.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A73-1 (GND1) - Body ground	Always	Below 1 Ω
A74-2 (GND2) - Body ground	Always	Below 1 Ω
A74-1 (GND3) - Body ground	Always	Below 1 Ω
A75-2 (GND4) - Body ground	Always	Below 1 Ω
A75-1 (GND5) - Body ground	Always	Below 1 Ω
A76-4 (GND6) - Body ground	Always	Below 1 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

OK

BC

7	READ VALUE OF INTELLIGENT TESTER (PARKING BRAKE SWITCH)

(a) Reconnect the skid control ECU connectors.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Select the Data List mode on the intelligent tester.

ABS / VSC:

Tester Display	Measurement Item/Range	Normal Condition
PARKING BRAKE SW	Parking brake switch / ON or OFF	ON: Parking brake applied OFF: Parking brake released

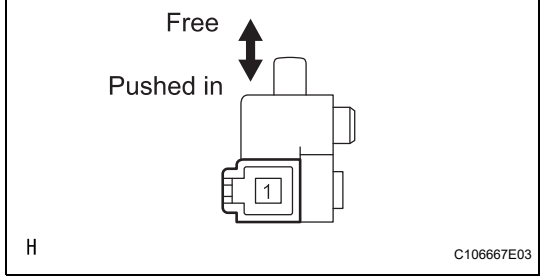
(e) Using the intelligent tester, check the input of switch operation when the parking brake pedal is operated.
OK:
When the parking brake is operated, the display changes as shown above.

OK → **Go to step 10**

NG

8	INSPECT PARKING BRAKE SWITCH

Parking Brake Switch:



(a) Turn the power switch off.
(b) Disconnect the parking brake switch connector.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
1 - Body ground	Parking brake switch ON (Switch pin free)	Below 1 Ω
1 - Body ground	Parking brake switch OFF (Switch pin pushed in)	10 kΩ or higher

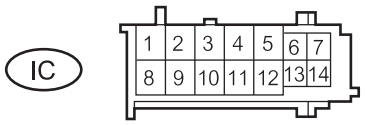
NG → **REPLACE PARKING BRAKE SWITCH**

OK

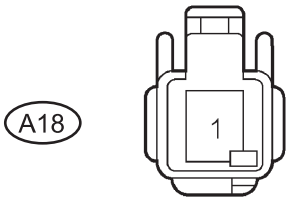
BC

9	CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - PARKING BRAKE SWITCH)

Main Body ECU Harness Side Connector Front View:



Parking Brake Switch Harness Side Connector Front View:



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(a) Disconnect the main body ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
IC-14 (PKB) - A18-1	Always	Below 1 Ω
IC-14 (PKB) - Body ground	Always	10 kΩ or higher

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-46).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE SKID CONTROL ECU

10	INSPECT COMBINATION METER ASSEMBLY

(a) Turn the power switch off.
(b) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-30).

OK:

The BRAKE warning light turns on or off in accordance with the intelligent tester.

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-46).

NG → **REPLACE COMBINATION METER ASSEMBLY**

BC

OK

REPLACE SKID CONTROL ECU

Brake Warning Light does not Come ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

WIRING DIAGRAM

Refer to Brake Warning Light Remains ON (See page BC-228).

INSPECTION PROCEDURE

NOTICE:

When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-22).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT CAN COMMUNICATION SYSTEM

A

2	CHECK BRAKE WARNING LIGHT

(a) Disconnect the skid control ECU connector.
(b) Turn the power switch on (IG).
(c) Check that the BRAKE warning light comes on.

OK:

The BRAKE warning light comes on.

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-46).

OK → REPLACE SKID CONTROL ECU

NG

3	INSPECT COMBINATION METER ASSEMBLY

(a) Turn the power switch off.
(b) Reconnect the skid control ECU connector.
(c) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-30).

OK:

The BRAKE warning light turns on or off in accordance with the intelligent tester.

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-46).

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK ↓

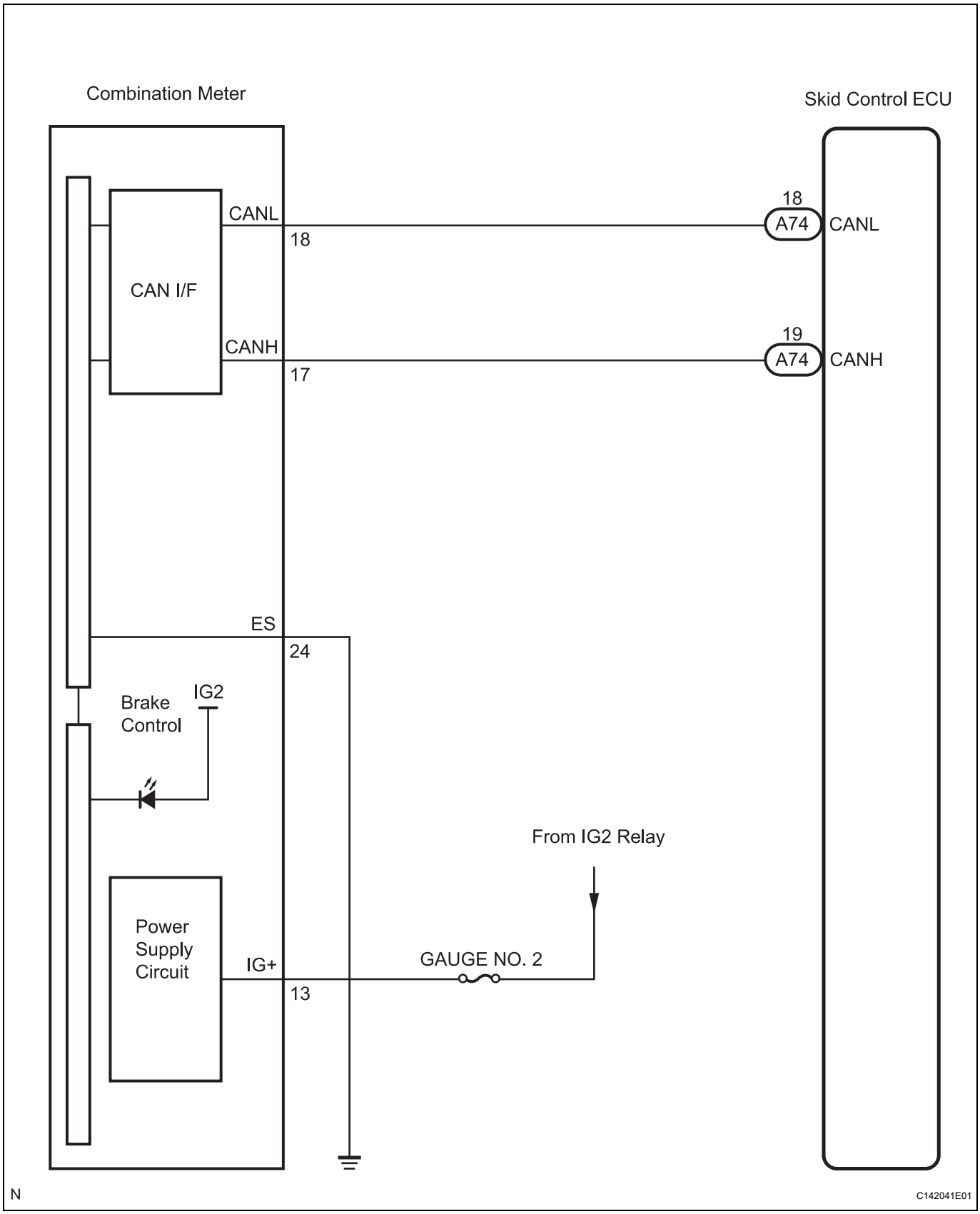
REPLACE SKID CONTROL ECU

Brake Control Warning Light Remains ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.
If the ECU stores a DTC, the brake control warning light comes on in the combination meter.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-22).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT CAN COMMUNICATION SYSTEM

A

2	CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

(a) Check if the skid control ECU connector is securely connected.

OK:

The connector should be securely connected.

NG → CONNECT CONNECTOR TO ECU CORRECTLY

OK

3	CHECK AUXILIARY BATTERY

(a) Check the auxiliary battery voltage.

Standard voltage:

11 to 14 V

NG → CHARGE OR REPLACE AUXILIARY BATTERY

OK

4	INSPECT COMBINATION METER ASSEMBLY

(a) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-30).

OK:

The brake control warning light turns on or off in accordance with the intelligent tester.

BC

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table refer back to the table and proceed to the next step before replacing the part (See page BC-46).

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

REPLACE SKID CONTROL ECU

Brake Control Warning Light does not Come ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.
If the ECU stores a DTC, the brake control warning light comes on in the combination meter.

WIRING DIAGRAM

Refer to Brake Control Warning Light Remains ON (See page BC-237).

INSPECTION PROCEDURE

NOTICE:
When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-22).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT CAN COMMUNICATION SYSTEM

A

2	CHECK BRAKE CONTROL WARNING LIGHT

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (READY).
(c) Select "ECB* WARN LAMP" in the Active Test and operate the brake control warning light using the intelligent tester.

ABS / VSC:

Tester Display	Test Part	Control Range	Diagnostic Note
ECB* WARN LAMP	Brake control warning light	Warning light ON / OFF	Observe combination meter

*: Electronically Controlled Brake

(d) Check that "ON" and "OFF" of the brake control warning light are indicated on the combination meter when using the intelligent tester.

OK:

The brake control warning light turns on or off in accordance with the intelligent tester.

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-46).

OK → REPLACE SKID CONTROL ECU

BC

NG

3	INSPECT COMBINATION METER ASSEMBLY

(a) Turn the power switch off.
(b) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-30).
OK:
The brake control warning light turns on or off in accordance with the intelligent tester.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-46).

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

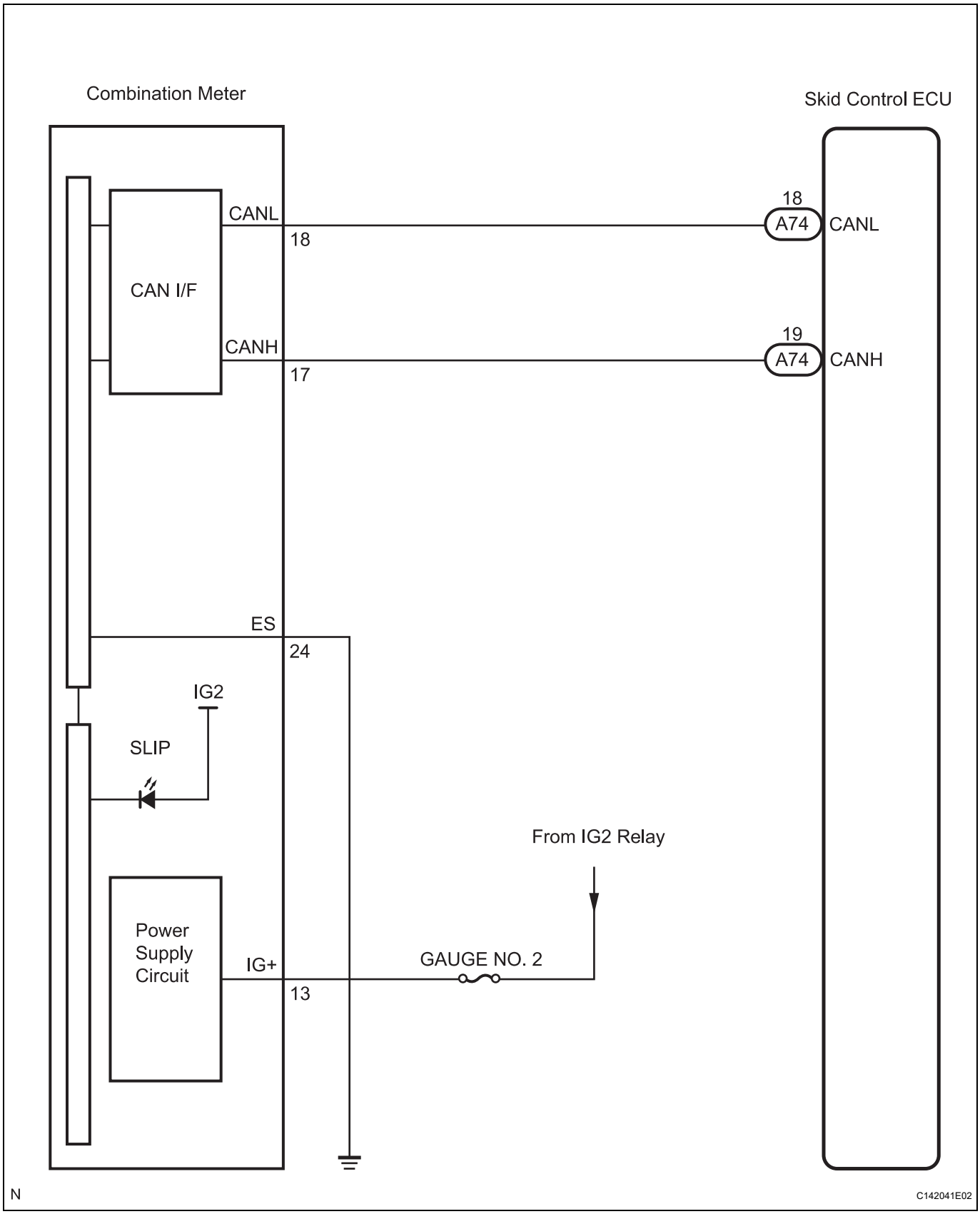
REPLACE SKID CONTROL ECU

Slip Indicator Light Remains ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.
The SLIP indicator blinks during VSC and/or TRAC operation.
When the system fails, the SLIP indicator comes on to warn the driver (See page BC-54).

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:
When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-22).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT CAN COMMUNICATION SYSTEM

A

2	CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

(a) Check if the skid control ECU connector is securely connected.
OK:
The connector should be securely connected.

NG → CONNECT CONNECTOR TO ECU CORRECTLY

OK

3	CHECK AUXILIARY BATTERY

(a) Check the auxiliary battery voltage.
Standard voltage:
11 to 14 V

NG → CHARGE OR REPLACE AUXILIARY BATTERY

OK

4	INSPECT COMBINATION METER ASSEMBLY

(a) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-30).
OK:
The SLIP indicator light turns on or off in accordance with the intelligent tester.

BC

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-46).

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

REPLACE SKID CONTROL ECU

Slip Indicator Light does not Come ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.
The SLIP indicator blinks during VSC and/or TRAC operation.
When the system fails, the SLIP indicator comes on to warn the driver (See page BC-54).

WIRING DIAGRAM

Refer to Slip Indicator Light Remains ON (See page BC-243).

INSPECTION PROCEDURE

NOTICE:
When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1 CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-22).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM**

A

2 CHECK SLIP INDICATOR LIGHT

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (READY).
(c) Select "SLIP INDI LAMP" in the Active Test and operate the SLIP indicator light using the intelligent tester.

ABS / VSC:

Tester Display	Test Part	Control Range	Diagnostic Note
SLIP INDI LAMP	SLIP indicator light	Indicator light ON / OFF	Observe combination meter

(d) Check that "ON" and "OFF" of the SLIP indicator light are indicated on the combination meter when using the intelligent tester.
OK:
The SLIP indicator light turns on or off in accordance with the intelligent tester.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-46).

OK → **REPLACE SKID CONTROL ECU**

BC

NG

3	INSPECT COMBINATION METER ASSEMBLY

(a) Turn the power switch off.
(b) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-30).
OK:
The SLIP indicator light turns on or off in accordance with the intelligent tester.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-46).

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

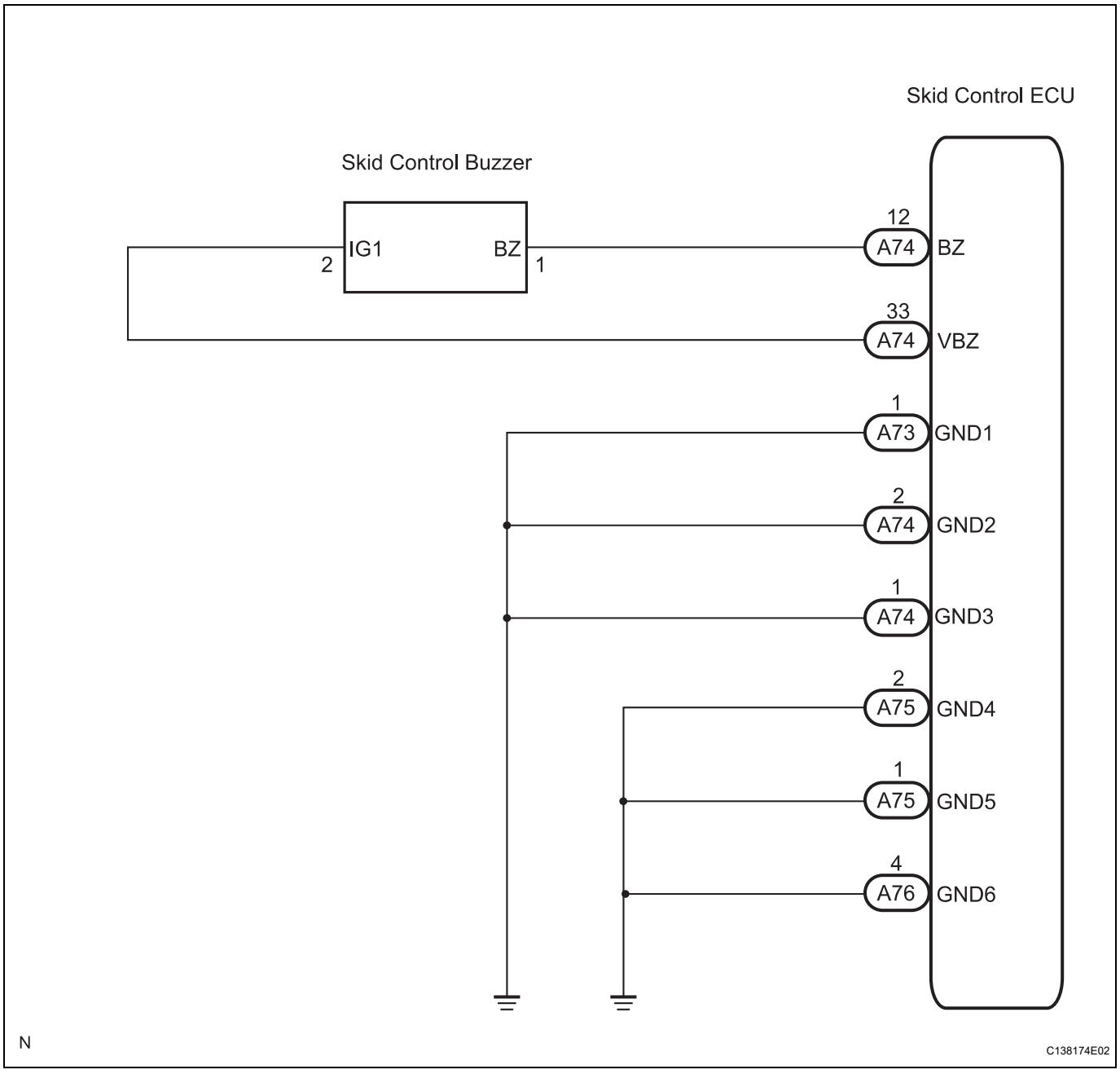
REPLACE SKID CONTROL ECU

Skid Control Buzzer Circuit

DESCRIPTION

The skid control buzzer sounds while the accumulator pressure is abnormally low or when an abnormality causing low fluid pressure occurs, and then the VSC is activated.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

BC

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (SKID CONTROL BUZZER)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (READY).
(c) Select the Active Test mode on the intelligent tester.

ABS / VSC:

Tester Display	Test Part	Control Range	Diagnostic Note
BUZZER	Skid control buzzer	Buzzer ON / OFF	Buzzer can be heard

(d) Check that the buzzer sounds/stops when turning the skid control buzzer on/off by using the intelligent tester.

Result

Condition	Proceed to
Buzzer does not sound or sounds constantly	**A**
Buzzer sounds/stops	**B**

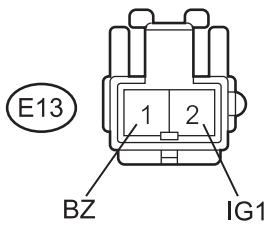
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-46).

B → **END**

A

2	INSPECT SKID CONTROL BUZZER (POWER SOURCE TERMINAL)

Skid Control Buzzer Harness Side Connector Front View:



H

C143346E01

(a) Turn the power switch off.
(b) Disconnect the skid control buzzer connector.
(c) Turn the power switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E13-2 - Body ground	**Power switch on (IG)**	**10 to 14 V**

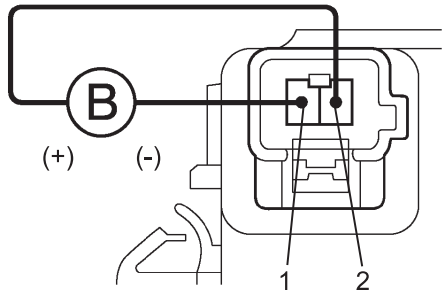
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)**

OK

BC

3 INSPECT SKID CONTROL BUZZER

Skid Control Buzzer:



C125130E01

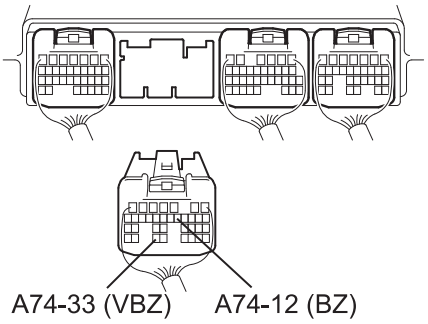
(a) Apply battery negative voltage to terminal 1, and battery positive voltage to terminal 2 of the skid control buzzer, and then check that the buzzer sounds.
OK:
The skid control buzzer sounds.

NG → **REPLACE SKID CONTROL BUZZER**

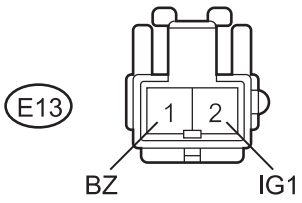
OK

4 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - SKID CONTROL BUZZER)

Skid Control ECU Wire Harness View:



Skid Control Buzzer Harness Side Connector Front View:



H

C140729E01

(a) Turn the power switch off.
(b) Disconnect the skid control ECU connector.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
A74-12 (BZ) - E13-1 (BZ)	Always	Below 1 Ω
A74-12 (BZ) - Body ground	Always	10 kΩ or higher
A74-33 (VBZ) - E13-2 (IG1)	Always	Below 1 Ω
A74-33 (VBZ) - Body ground	Always	10 kΩ or higher

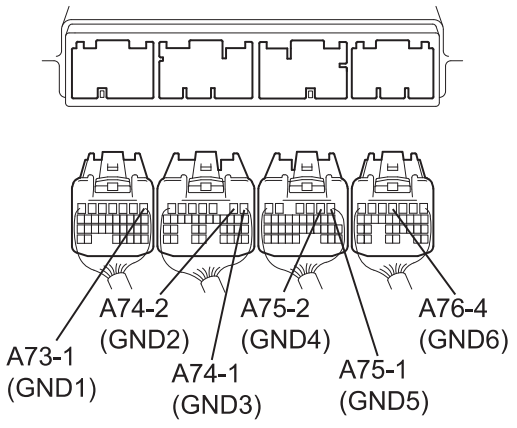
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

BC

5	INSPECT SKID CONTROL ECU (GND TERMINAL)

Skid Control ECU Wire Harness View:



(a) Disconnect the skid control ECU connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A73-1 (GND1) - Body ground	Always	Below 1 Ω
A74-2 (GND2) - Body ground	Always	Below 1 Ω
A74-1 (GND3) - Body ground	Always	Below 1 Ω
A75-2 (GND4) - Body ground	Always	Below 1 Ω
A75-1 (GND5) - Body ground	Always	Below 1 Ω
A76-4 (GND6) - Body ground	Always	Below 1 Ω

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-46).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

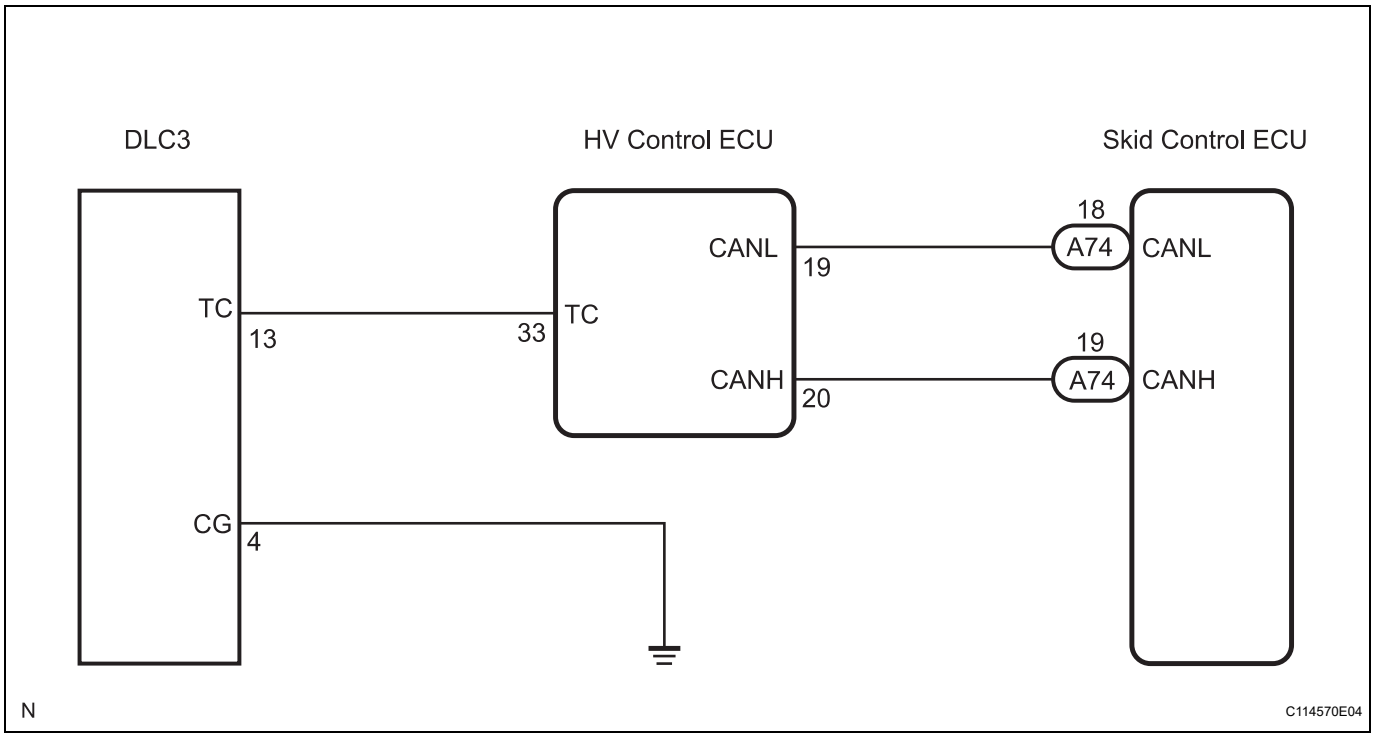
REPLACE SKID CONTROL ECU

TC and CG Terminal Circuit

DESCRIPTION

Connecting terminals TC and CG of the DLC3 causes the ECU to display the DTC by blinking the ABS warning light.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-22).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

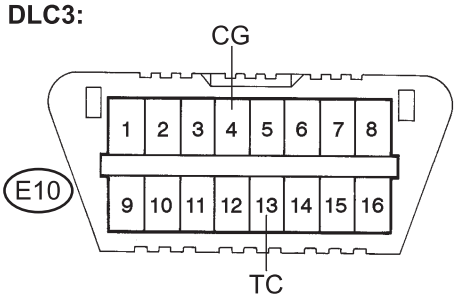
B → INSPECT CAN COMMUNICATION SYSTEM

A

BC

2	INSPECT DLC3

DLC3:



(a) Turn the power switch on (IG).
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

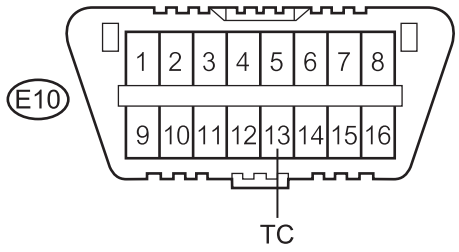
Tester Connection	Condition	Specified Condition
E10-13 (TC) - E10-4 (CG)	Power switch on (IG)	10 to 14 V

OK → Go to step 5

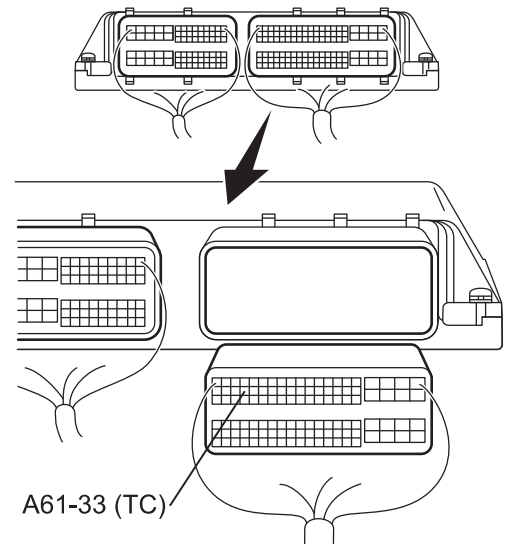
NG

3	CHECK HARNESS AND CONNECTOR (TC of DLC3 - HV CONTROL ECU)

DLC3:



HV Control ECU Wire Harness View:



(a) Turn the power switch off.
(b) Disconnect the HV control ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

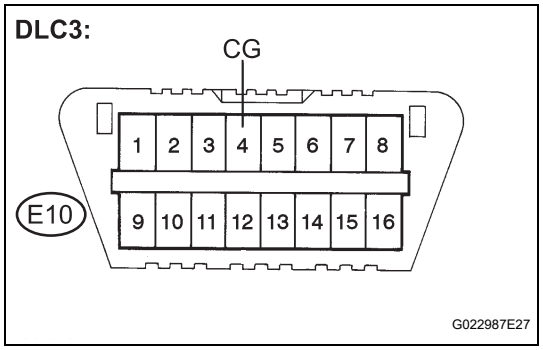
Tester Connection	Condition	Specified Condition
E10-13 (TC) - A61-33 (TC)	Always	Below 1 Ω
E10-13 (TC) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

BC

4 CHECK HARNESS AND CONNECTOR (CG of DLC3 - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

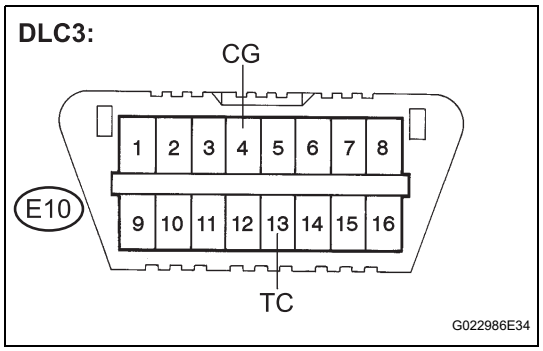
Standard resistance

Tester Connection	Condition	Specified Condition
E10-4 (CG) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 CHECK HV CONTROL ECU (TC of DLC3 INPUT)



(a) Turn the power switch off.
(b) Reconnect the HV control ECU connector.
(c) Using the SST, connect terminals TC and CG of the DLC3.
(d) Turn the power switch on (IG).
(e) Check that the check engine warning light is blinking.

Result

Condition	Proceed to
Check engine warning light is blinking	A
Check engine warning light is not blinking	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-46).

B → **REPAIR OR REPLACE WIRE HARNESS OR HV CONTROL ECU (TC of HV CONTROL ECU CIRCUIT)**

A

REPLACE SKID CONTROL ECU

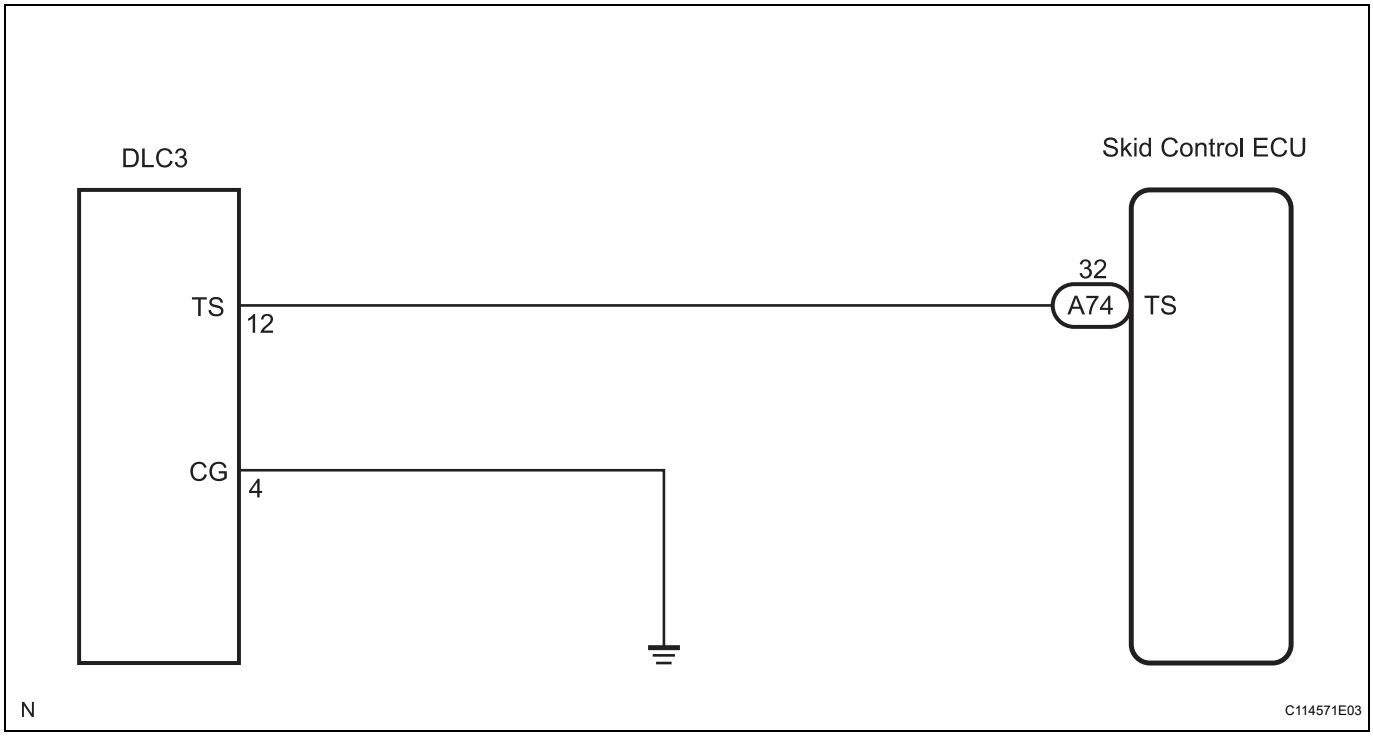
BC

TS and CG Terminal Circuit

DESCRIPTION

In the Test Mode (signal check), a malfunction of the speed sensor that cannot be detected when the vehicle is stopped can be detected while driving.
Transition to the sensor check mode can be performed by connecting terminals TS and CG of the DLC3 and turning the power switch from off to on (IG).

WIRING DIAGRAM

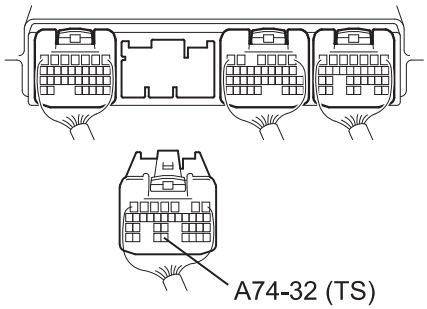


INSPECTION PROCEDURE

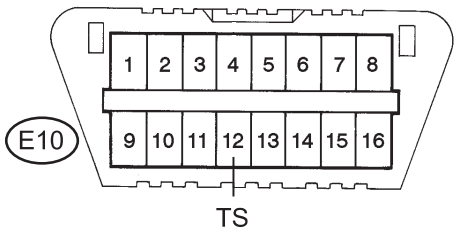
NOTICE:
When replacing the skid control ECU, perform initialization of linear solenoid valve and calibration (See page BC-25).

1	CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - TS of DLC3)

Skid Control ECU Wire Harness View:



DLC3:



C140730E01

(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

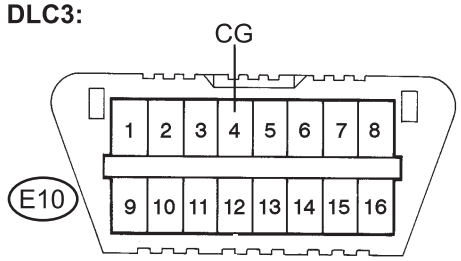
Tester Connection	Condition	Specified Condition
A74-32 (TS) - E10-12 (TS)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	CHECK HARNESS AND CONNECTOR (CG of DLC3 - BODY GROUND)

DLC3:



G022987E27

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E10-4 (CG) - Body ground	Always	Below 1 Ω

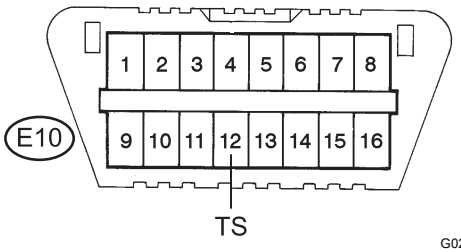
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

BC

3	CHECK HARNESS AND CONNECTOR (TS of DLC3 - BODY GROUND)

DLC3:



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E10-12 (TS) - Body ground	Always	10 kΩ or higher

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-46).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE SKID CONTROL ECU

ON-VEHICLE INSPECTION

1. INSPECT BRAKE ACTUATOR ASSEMBLY OPERATION

(a) Pre-check preparation

(1) Move the shift lever to the P position. Apply the parking brake and connect the intelligent tester to the DLC3.

(2) Turn the power switch on (IG).

(3) Turn on the intelligent tester. Select "MAS CYL PRS 1", "MAS CYL PRS 2", "FR PRESS SENS", "FL PRESS SENS", "RR PRESS SENS" and "RL PRESS SENS".

(b) Check the FR system solenoids (SLA**, SLR**, SMC1, SMC2).

(1) Select "SLAFR CLASE". → Enter and check the output voltage.

NOTICE:

Do not depress the brake pedal.

HINT:

- It takes approximately 35 seconds to complete the check.
- If incorrect, troubleshoot the brake system. (See page BC-46)

Standard voltage

Sensor	10 to 20 sec. after check start (V)	35 sec. or more after check start (V)
MAS CYL PRS 1	0.3 to 0.7	0.3 to 0.7
MAS CYL PRS 2	0.3 to 0.7	0.3 to 0.7
FR PRESS SENS	2.5 to 4.5	0.3 to 0.7
FL PRESS SENS	0.3 to 0.7	0.3 to 0.7
RR PRESS SENS	0.3 to 0.7	0.3 to 0.7
RL PRESS SENS	0.3 to 0.7	0.3 to 0.7

(c) Check the FL system solenoids (SLA**, SLR**, SMC1, SMC2).

(1) Select "SLAFL CLOSE". → Enter and check the output voltage.

NOTICE:

Do not depress the brake pedal.

HINT:

- It takes approximately 35 seconds to complete the check.
- If incorrect, troubleshoot the brake system. (See page BC-46)

BC

Standard voltage

Sensor	10 to 20 sec. after check start (V)	35 sec. or more after check start (V)
MAS CYL PRS 1	0.3 to 0.7	0.3 to 0.7
MAS CYL PRS 2	0.3 to 0.7	0.3 to 0.7
FR PRESS SENS	0.3 to 0.7	0.3 to 0.7
FL PRESS SENS	2.5 to 4.5	0.3 to 0.7
RR PRESS SENS	0.3 to 0.7	0.3 to 0.7
RL PRESS SENS	0.3 to 0.7	0.3 to 0.7

(d) Check the RR system solenoids (SLA**, SLR**, SMC1, SMC2).
(1) Select "SLARR CLOSE". → Enter and check the output voltage.
NOTICE:
Do not depress the brake pedal.
HINT:
- It takes approximately 35 seconds to complete the check.
- If incorrect, troubleshoot the brake system. (See page BC-46)

Standard voltage

Sensor	10 to 20 sec. after check start (V)	35 sec. or more after check start (V)
MAS CYL PRS 1	0.3 to 0.7	0.3 to 0.7
MAS CYL PRS 2	0.3 to 0.7	0.3 to 0.7
FR PRESS SENS	0.3 to 0.7	0.3 to 0.7
FL PRESS SENS	0.3 to 0.7	0.3 to 0.7
RR PRESS SENS	2.5 to 4.5	0.3 to 0.7
RL PRESS SENS	0.3 to 0.7	0.3 to 0.7

(e) Check the RL system solenoids (SLA**, SLR**, SMC1, SMC2).
(1) Select "SLAFL CLOSE". → Enter and check the output voltage.
NOTICE:
Do not depress the brake pedal.
HINT:
- It takes approximately 35 seconds to complete the check.
- If incorrect, troubleshoot the brake system. (See page BC-46)

Standard voltage

Sensor	10 to 20 sec. after check start (V)	35 sec. or more after check start (V)
MAS CYL PRS 1	0.3 to 0.7	0.3 to 0.7
MAS CYL PRS 2	0.3 to 0.7	0.3 to 0.7
FR PRESS SENS	0.3 to 0.7	0.3 to 0.7
FL PRESS SENS	0.3 to 0.7	0.3 to 0.7
RR PRESS SENS	0.3 to 0.7	0.3 to 0.7
RL PRESS SENS	2.5 to 4.5	0.3 to 0.7

(f) Check SMC1 and SMC2.
(1) Select "ELECTRONICALLY CONTROLLED BRAKE SYSTEM INVALID" on the intelligent tester menu screen to prohibit the brake control.
(2) Check that the brake control warning light comes on.
(3) Check the output voltage by depressing the brake pedal.
Standard voltage:
Difference in the output voltage between "MAS CYL PRS 1" and "FR PRESS SENS" is less than 0.4 V.

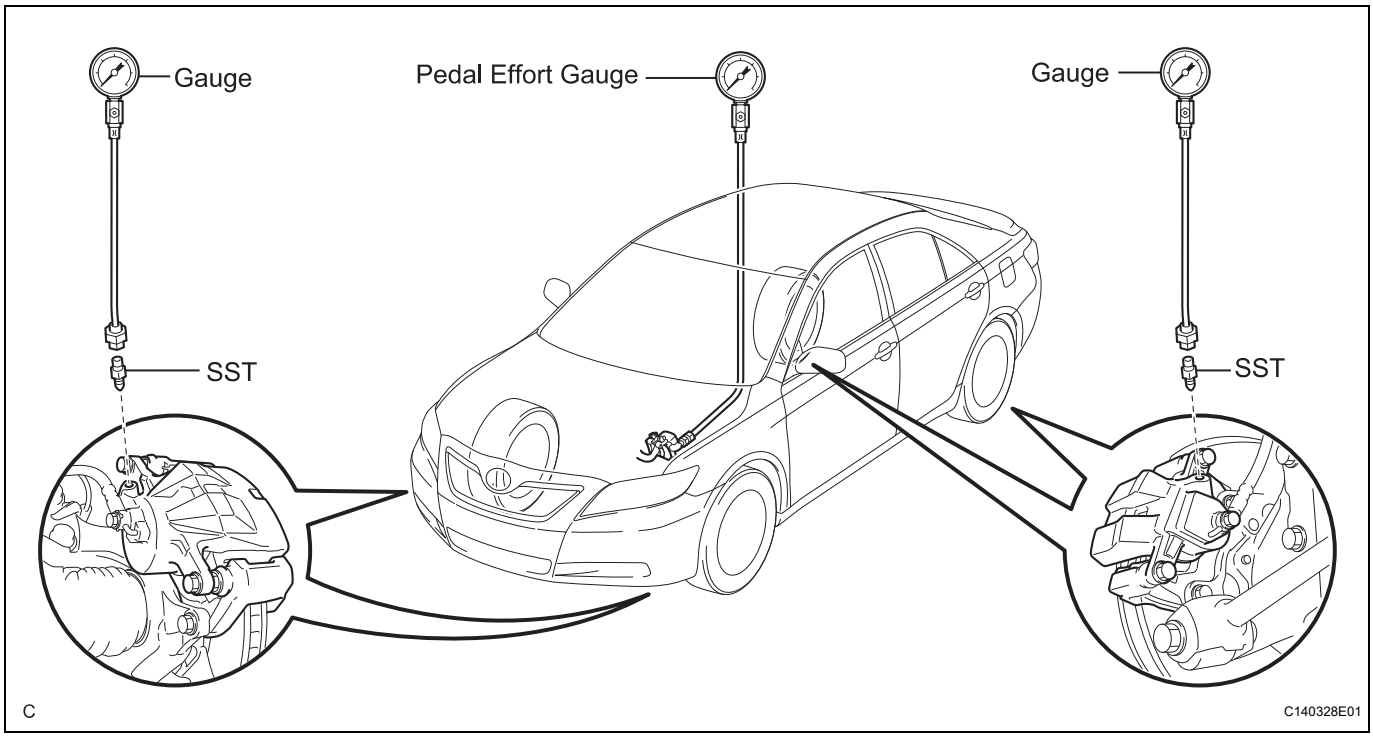
Standard Voltage:
Difference in the output voltage between "MAS CYL PRS 2" and "FL PRESS SENS" is less than 0.4 V.

(4) Press the return key on the intelligent tester and cancel brake control prohibition (ELECTRONICALLY CONTROLLED BRAKE SYSTEM INVALID).

2. INSPECT PRESSURE SENSOR OPERATION

(a) Check the battery voltage.
Standard voltage:
10 to 14 V (when the engine is not running and the power switch is off)

(b) Connect the LSPV pressure gauge (SST) and pedal effort gauge.
(1) Install the hydro LSPV gauge (SST) and brake pedal effort gauge.
SST 09709-29018



(2) Bleed the air from the hydro booster pressure gauge.
(3) Move the shift lever to the P position. Connect the intelligent tester to the DLC3 with the parking brake applied.
(4) Turn the power switch on (IG).
(5) Clear the DTCs.

(c) Check the wheel cylinder pressure sensor and master pressure sensor.
(1) Turn on the intelligent tester. Select "MAS CYL PRS 1", "MAS CYL PRS 2", "FR PRESS SENS", "FL PRESS SENS", "RR PRESS SENS", and "RL PRES SENS".

(2) Check the brake pedal effort gauge, hydro booster pressure gauge reading, and output pressure voltage. If incorrect, troubleshoot the brake system. (See page BC-46)

Standard voltage

Brake effort {N (kgf, lbf)}	MAS CYL PRS 1 (V)	MAS CYL PRS 2 (V)
200 (20.4, 45)	0.85 to 1.15	0.85 to 1.15
500 (51, 112)	1.85 to 2.15	1.85 to 2.15

Standard voltage

Brake effort {N (kgf, lbf)}	Front right wheel hydraulic pressure {MPa (kgf/cm^2, psi)}	FR PRESS SENS (V)
50 (5.1, 11)	2.4 (24.5, 348)	0.85 to 1.15
100 (10.2, 22)	5.0 (51.0, 725)	1.35 to 1.65
150 (15.3, 34)	5.0 (51.0, 725)	1.35 to 1.65
200 (20.4, 45)	5.1 (52.0, 740)	1.4 to 1.7

Standard voltage

Brake effort {N (kgf, lbf)}	Front left wheel hydraulic pressure {MPa (kgf/cm^2, psi)}	FL PRESS SENS (V)
50 (5.1, 11)	2.4 (24.5, 348)	0.85 to 1.15
100 (10.2, 22)	5.0 (51.0, 725)	1.35 to 1.65
150 (15.3, 34)	5.0 (51.0, 725)	1.35 to 1.65
200 (20.4, 45)	5.1 (52.0, 740)	1.4 to 1.7

Standard voltage

Brake effort {N (kgf, lbf)}	Rear right wheel hydraulic pressure {MPa (kgf/cm^2, psi)}	RR PRESS SENS (V)
50 (5.1, 11)	2.4 (24.5, 348)	0.85 to 1.15
100 (10.2, 22)	5.0 (51.0, 725)	1.35 to 1.65
150 (15.3, 34)	5.0 (51.0, 725)	1.35 to 1.65
200 (20.4, 45)	5.0 (51.0, 725)	1.35 to 1.65

Standard voltage

Brake effort {N (kgf, lbf)}	Rear left wheel hydraulic pressure {MPa (kgf/cm^2, psi)}	RL PRESS SENS (V)
50 (5.1, 11)	2.4 (24.5, 348)	0.85 to 1.15
100 (10.2, 22)	5.0 (51.0, 725)	1.35 to 1.65
150 (15.3, 34)	5.0 (51.0, 725)	1.35 to 1.65
200 (20.4, 45)	5.0 (51.0, 725)	1.35 to 1.65

(d) Check the accumulator (ACC) pressure sensor.

(1) Move the shift lever to the P position. Apply the parking brake and connect the intelligent tester to the DLC3.

(2) Turn the power switch on (IG).

(3) Turn on the intelligent tester. Select the accumulator (ACC) pressure sensor 1 (ACC PRESS SENS) in the data list.

(4) Temporarily operate the pump motor by depressing the brake pedal 4 or 5 times.
(5) After confirming that the pump motor stops, check the pressure output voltage.
Standard voltage:
2.6 to 3.8 V
If incorrect, troubleshoot the brake system.
(See page BC-46)

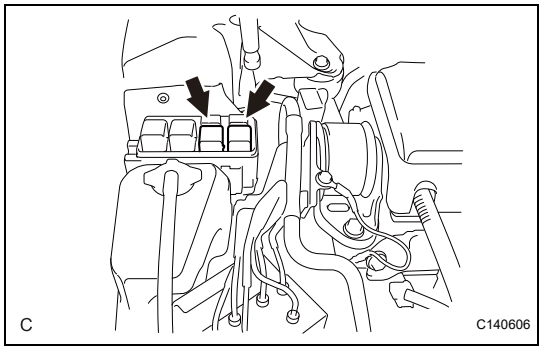
REMOVAL

NOTICE:
If brake fluid spills on any painted surface, wash or otherwise remove it completely.

1. **PERFORM ACCUMULATOR PRESSURE ZERO DOWN (See page BR-12)**

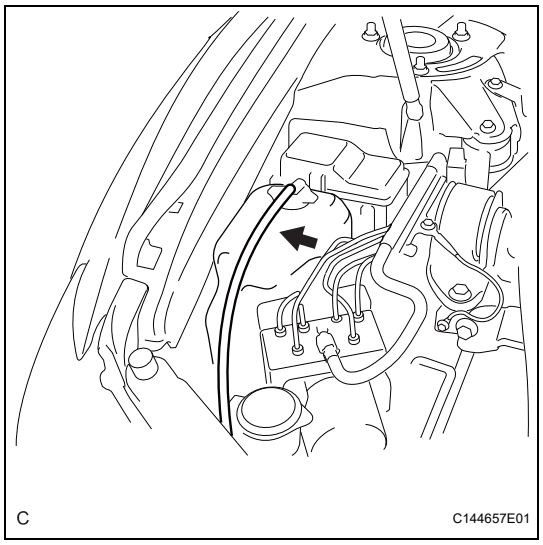
2. **DISCONNECT CABLE FROM BATTERY NEGATIVE TERMINAL**

3. **REMOVE ABS MOTOR RELAY**

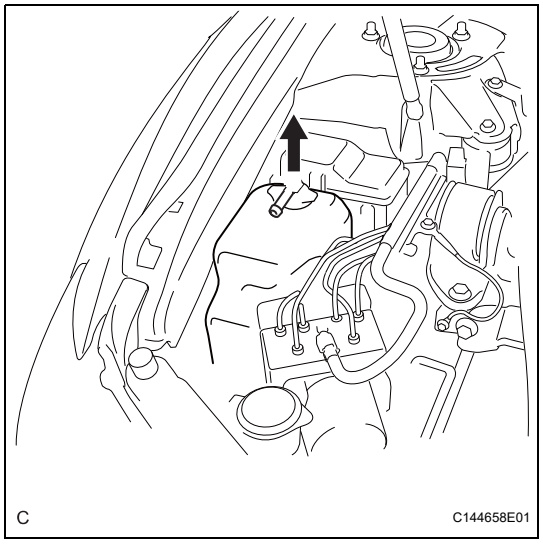


(a) In order to prohibit brake control, remove the 2 ABS motor relays with the power switch off.
NOTICE:
If the pump motor operates while air remains inside the brake actuator hose, the air will enter the actuator, resulting in difficulty in bleeding the brakes.

4. **REMOVE RADIATOR RESERVE TANK ASSEMBLY**

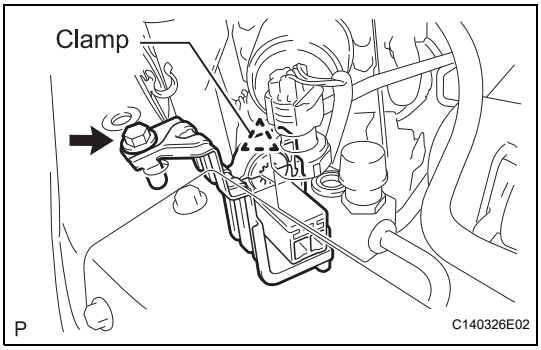


(a) Remove the radiator reservoir hose.



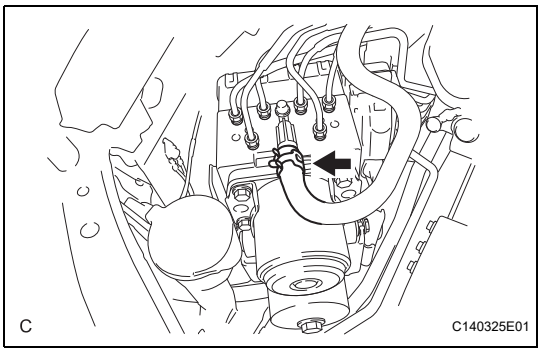
(b) Remove the radiator reserve tank assembly.

BC



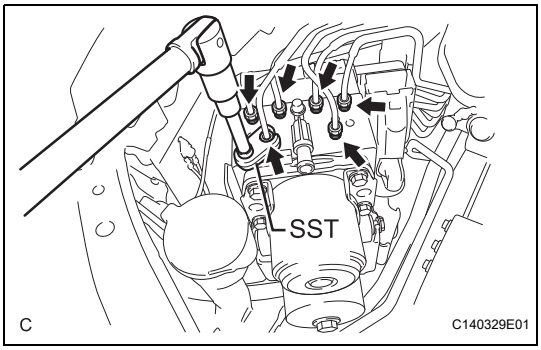
5. REMOVE COOLER BRACKET

(a) Remove the bolt, clamp and the cooler bracket.

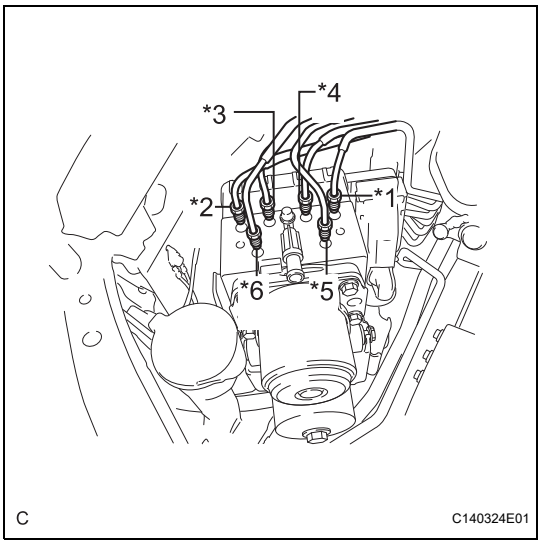


6. REMOVE BRAKE ACTUATOR WITH NO. 1 BRAKE ACTUATOR BRACKET

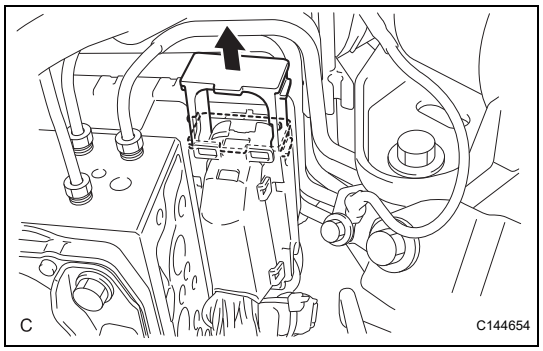
(a) Move the clip and disconnect the brake actuator hose from the brake actuator with No. 1 brake actuator bracket.



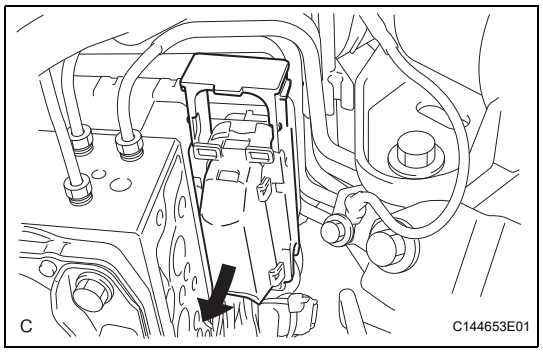
(b) Using SST, disconnect the 6 brake lines from the brake actuator with No. 1 brake actuator bracket.
SST 09023-00101



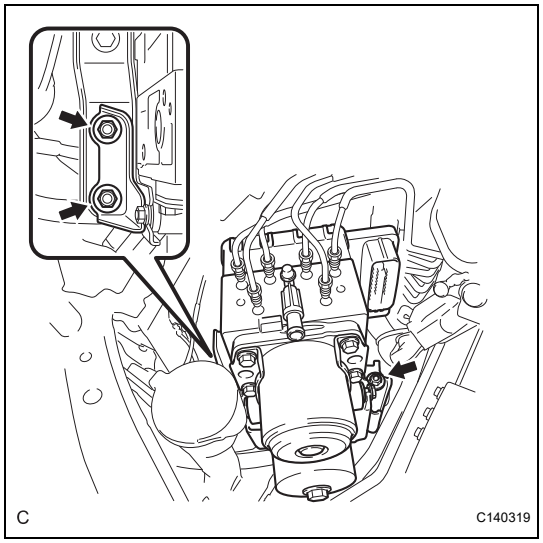
(c) Use tags or make a memo to identify the places to reconnect.
HINT:
- *1: To Front Wheel Cylinder RH
- *2: To Front Wheel Cylinder LH
- *3: To Rear Wheel Cylinder RH
- *4: To Rear Wheel Cylinder LH
- *5: From Master Cylinder
- *6: From Stroke Simulator Cylinder



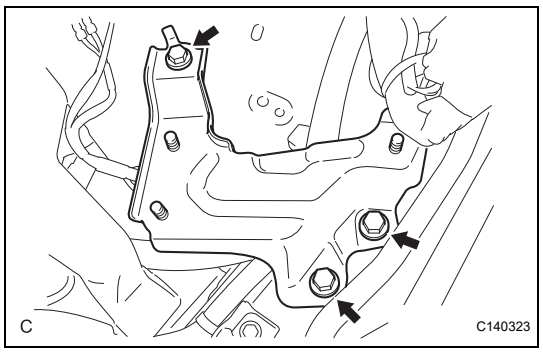
(d) Release the lock lever.



(e) Disconnect the actuator connector.



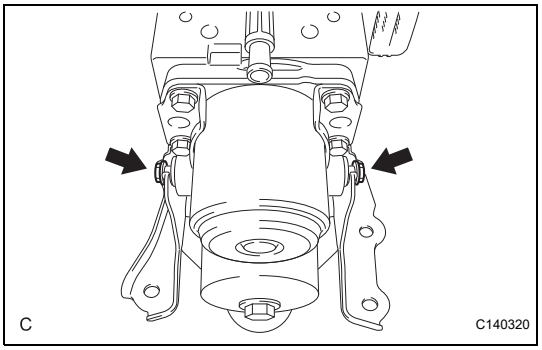
(f) Remove the 3 nuts and brake actuator with No. 1 brake actuator bracket.
NOTICE:
Do not damage the brake lines.



7. REMOVE BRAKE ACTUATOR BRACKET ASSEMBLY

(a) Remove the 3 bolts and brake actuator bracket assembly.

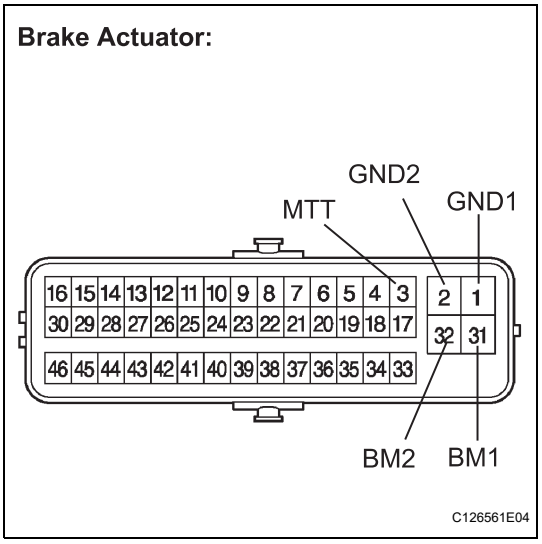
BC



DISASSEMBLY

1. REMOVE NO. 1 BRAKE ACTUATOR BRACKET

(a) Remove the 2 nuts and brake actuator assembly from the No. 1 brake actuator bracket.



INSPECTION

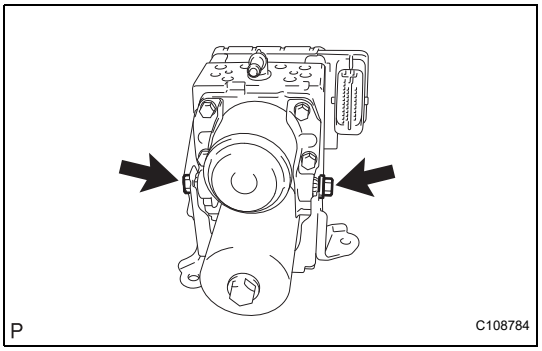
1. INSPECT BRAKE ACTUATOR ASSEMBLY

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
31 (BM1) - 1 (GND1)	Always	Below 10 Ω
32 (BM2) - 1 (GND1)	Always	Below 10 Ω
31 (BM1) - 32 (BM2)	Always	Below 1 Ω
1 (GND1) - 2 (GND2)	Always	Below 1 Ω
31 (BM1) - 3 (MTT)	Always	950 to 1,050 Ω
32 (BM2) - 3 (MTT)	Always	950 to 1,050 Ω

If the value is not as specified, replace the brake actuator assembly.



REASSEMBLY

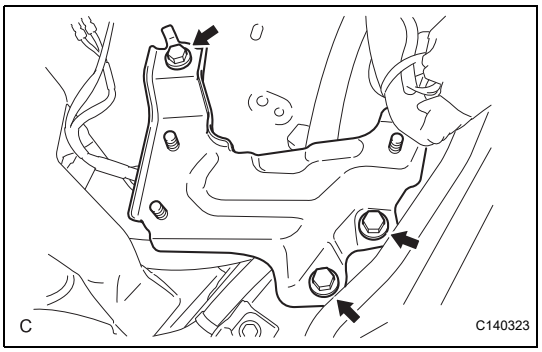
1. INSTALL NO. 1 BRAKE ACTUATOR BRACKET

(a) Install the brake actuator assembly to the No. 1 brake actuator bracket with the 2 nuts.

Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

NOTICE:

Do not remove the hole plug before connecting the brake line because a new brake actuator assembly is filled with brake fluid.

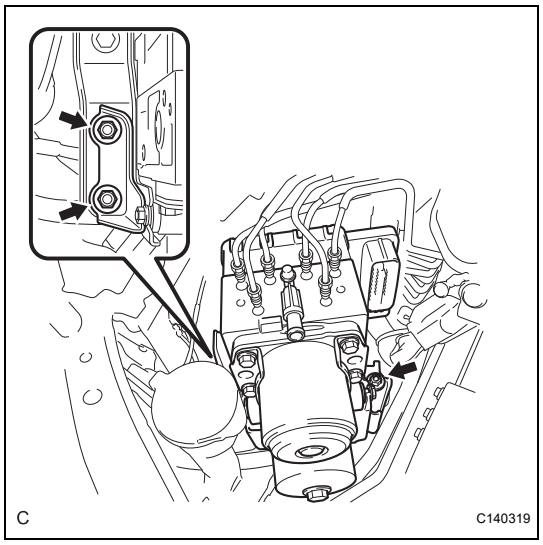


INSTALLATION

1. INSTALL BRAKE ACTUATOR BRACKET ASSEMBLY

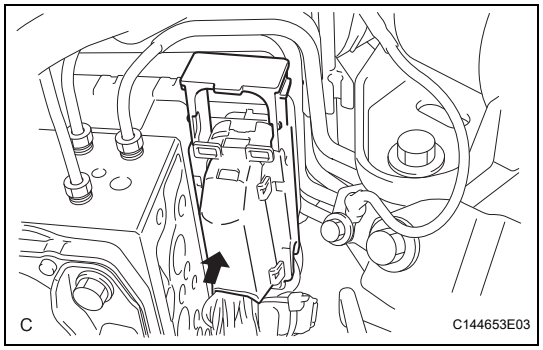
(a) Install the brake actuator bracket assembly with the 3 bolts.

Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)

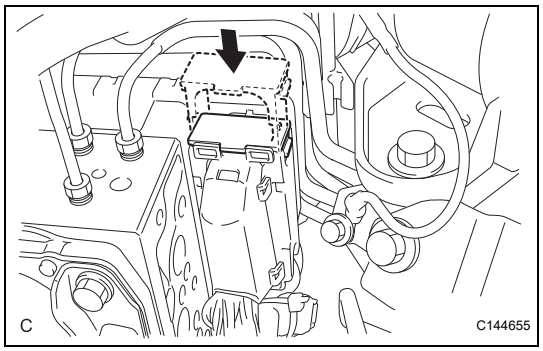


2. INSTALL BRAKE ACTUATOR WITH NO. 1 BRAKE ACTUATOR BRACKET

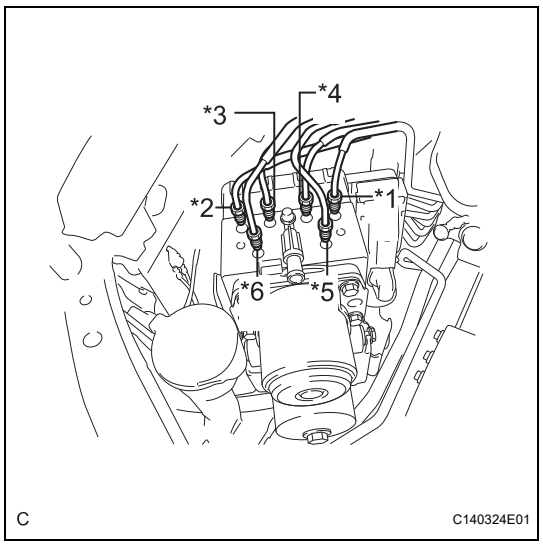
(a) Install the brake actuator with No. 1 brake actuator bracket to the body with the 3 nuts.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)
NOTICE:
Do not damage the brake lines.



(b) Connect the brake actuator connector.

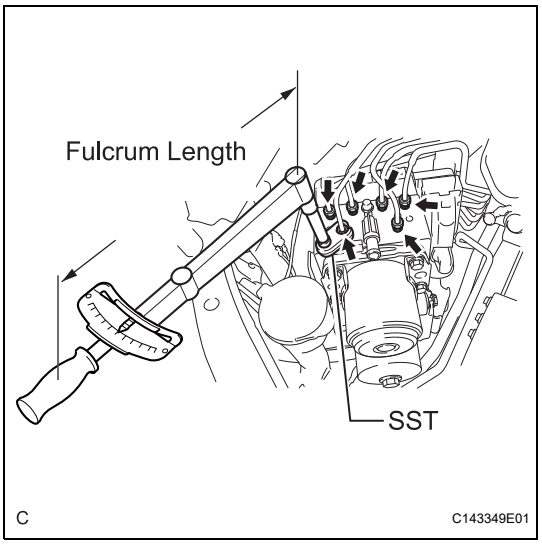


(c) Lock the lock lever.
NOTICE:
Make sure that the connector is locked securely.

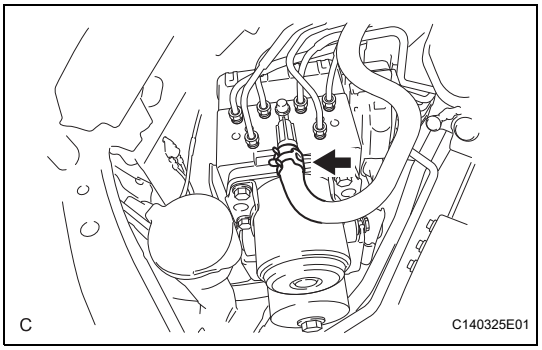


(d) Temporarily tighten each brake line to the correct positions of the brake actuator with No. 1 brake actuator bracket as shown in the illustration.
HINT:
- *1: To Front Wheel Cylinder RH
- *2: To Front Wheel Cylinder LH
- *3: To Rear Wheel Cylinder RH
- *4: To Rear Wheel Cylinder LH
- *5: From Master Cylinder
- *6: From Stroke Simulator Cylinder

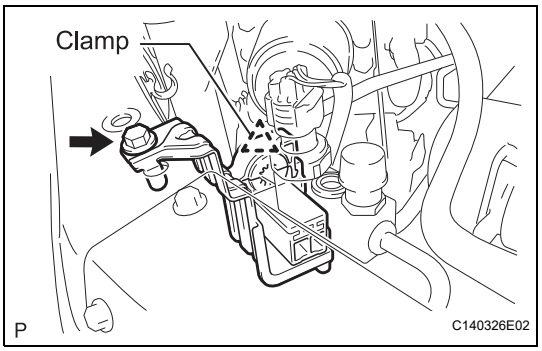
BC



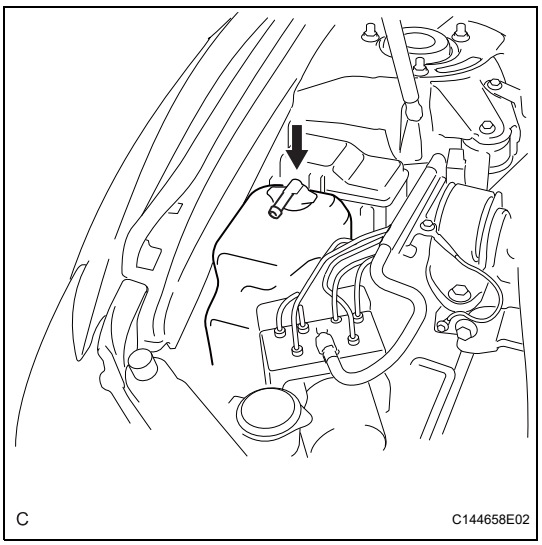
(e) Using SST, fully tighten each brake line.
SST 09023-00101
Torque: without SST
15 N*m (155 kgf*cm, 11 ft.*lbf)
with SST
14 N*m (143 kgf*cm, 10 ft.*lbf)
NOTICE:
- **Use a torque wrench with a fulcrum length of 250 mm (9.84 in.).**
- **This torque value is effective when SST is parallel to a torque wrench.**



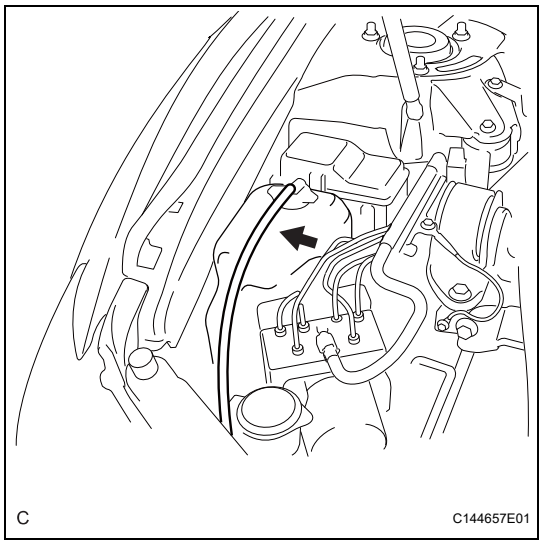
(f) Connect the brake actuator hose to the brake actuator and move the clip.



3. INSTALL COOLER BRACKET
(a) Install the cooler bracket with the bolt and clamp.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)



4. INSTALL RADIATOR RESERVE TANK ASSEMBLY
(a) Install the radiator reserve tank assembly.



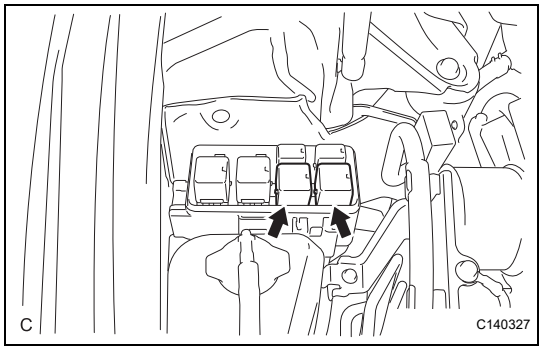
(b) Install the radiator reservoir hose.

5. **FILL RESERVOIR WITH BRAKE FLUID (See page BR-7)**

6. **BLEED BRAKE ACTUATOR HOSE (See page BR-8)**

7. **BLEED FRONT BRAKE SYSTEM (See page BR-10)**

8. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**



9. **INSTALL ABS MOTOR RELAY**
(a) Install the 2 ABS motor relays.

10. **CLEAR DTC FOR BRAKE CONTROL SYSTEM**
HINT:
Refer the procedures up to "ELECTRONICALLY CONTROLLED BRAKE SYSTEM". (See page BC-57)

11. **BLEED REAR BRAKE SYSTEM (See page BR-11)**

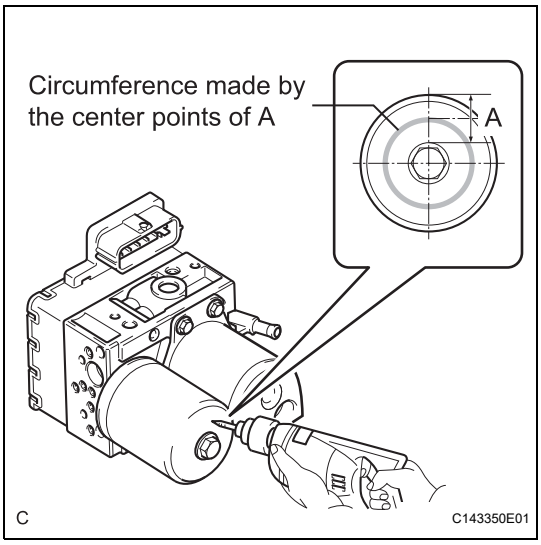
12. **PERFORM ACCUMULATOR PRESSURE ZERO DOWN (See page BR-12)**

13. **CHECK BRAKE FLUID LEVEL IN RESERVOIR (See page BR-13)**

14. **PERFORM LINEAR VALVE OFFSET LEARNING**
HINT:
Refer the procedures up to "ELECTRONICALLY CONTROLLED BRAKE SYSTEM". (See page BC-25)

15. **INSPECT FOR BRAKE FLUID LEAK**

16. **PERFORM INITIALIZATION**
NOTICE:
Some systems need initialization after reconnecting the cable to the negative battery terminal. (See page IN-43)



DISPOSAL

1. DISPOSE OF BRAKE ACTUATOR ASSEMBLY

(a) Using a drill, slowly make a hole on the circumference made by the center points of A and discharge the gas.

CAUTION:

Be sure to wear protective glasses to protect the eyes from fragments that may become airborne due to high pressure.

HINT:

- The hole may be drilled up to approximately 5 to 10 mm (0.20 to 0.39 in.) away from the circumference made by the center point of A without problem.
- The gas is nitrogen, which is colorless, odorless, and harmless.

INSPECTION

1. INSPECT FRONT SPEED SENSOR

(a) Inspect the front speed sensor. If any of the following occurs, replace the front speed sensor with a new one:
- The surface of the front speed sensor is cracked, dented, or chipped off.
- The connector or wire harness is scratched, cracked, or damaged.
- The front speed sensor has been dropped.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

LH

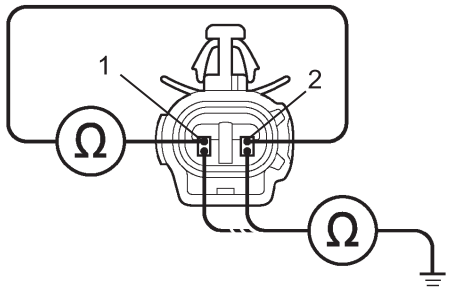
Tester Connection	Condition	Specified Condition
1 (FL+) - 2 (FL-)	Always	1.4 to 1.8 kΩ or at 20°C (68°F)
1 (FL+) - Body ground	Always	10 kΩ or higher
2 (FL-) - Body ground	Always	10 kΩ or higher

RH

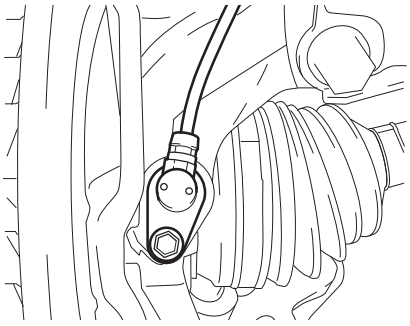
Tester Connection	Condition	Specified Condition
1 (FR+) - 2 (FR-)	Always	1.4 to 1.8 kΩ or at 20°C (68°F)
1 (FR+) - Body ground	Always	10 kΩ or higher
2 (FR-) - Body ground	Always	10 kΩ or higher

If the value is not as specified, replace the front speed sensor.

Front Speed Sensor:



C136017E01



C132782

INSTALLATION

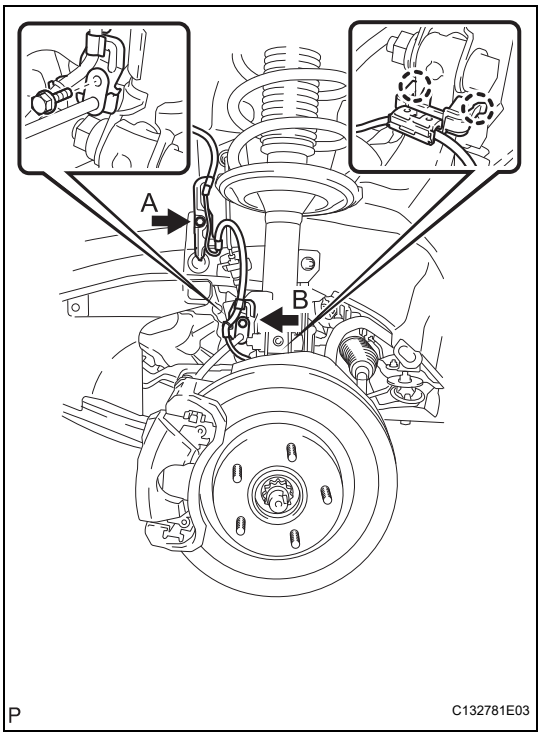
1. INSTALL FRONT SPEED SENSOR

(a) Install the front speed sensor with the bolt.

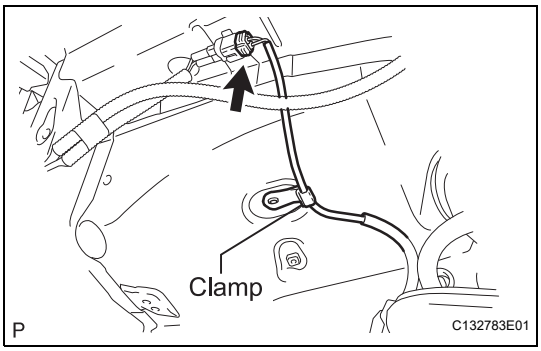
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

NOTICE:
- **Prevent foreign matter from attaching to the sensor tip.**
- **Clean the installation hole and the surface for the speed sensor every time the speed sensor is removed.**

BC



(b) Install the front speed sensor with the 2 bolts and engage the 2 claws.
Torque: Bolt A
5.0 N*m (51 kgf*cm, 44 in.*lbf)
Bolt B
19 N*m (194 kgf*cm, 14 ft.*lbf)
NOTICE:
Do not twist the wire harness for the front speed sensor when installing the speed sensor.



(c) Connect the front speed sensor connector and clamp.

2. **INSTALL FRONT FENDER LINER (See page ED-36)**
3. **INSTALL FRONT WHEEL OPENING EXTENSION PAD (See page ED-37)**
4. **INSTALL FRONT WHEEL**
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
5. **CHECK SPEED SENSOR SIGNAL**
HINT:
Refer the procedures up to "ELECTRONICALLY CONTROLLED BRAKE SYSTEM". (See page BC-35)

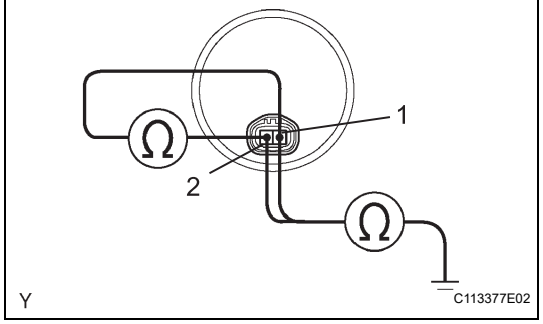
INSPECTION

1. INSPECT SKID CONTROL SENSOR

(a) Inspect the skid control sensor. If any of the following occurs, replace the skid control sensor with a new one:
- The surface of the skid control sensor is cracked, dented, or chipped off.
- The connector is scratched, cracked, or damaged.
- The skid control sensor has been dropped.

(b) Measure the resistance according to the value(s) in the table below.

Rear Speed Sensor:



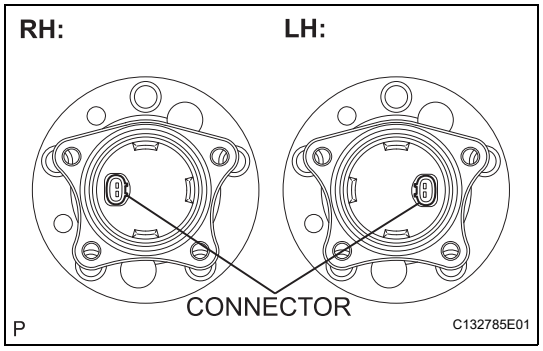
Standard resistance
LH

Tester Connection	Condition	Tester Connection
2 (RL+) - 1 (RL-)	Always	Below 1.45 kΩ at 20°C (68°F)
2 (RL+) - Body ground	Always	10 kΩ or higher
1 (RL-) - Body ground	Always	10 kΩ or higher

Standard resistance
RH

Tester Connection	Condition	Tester Connection
2 (RR+) - 1 (RR-)	Always	Below 1.45 kΩ at 20°C (68°F)
2 (RR+) - Body ground	Always	10 kΩ or higher
1 (RR-) - Body ground	Always	10 kΩ or higher

If the value is not as specified, replace the skid control sensor.



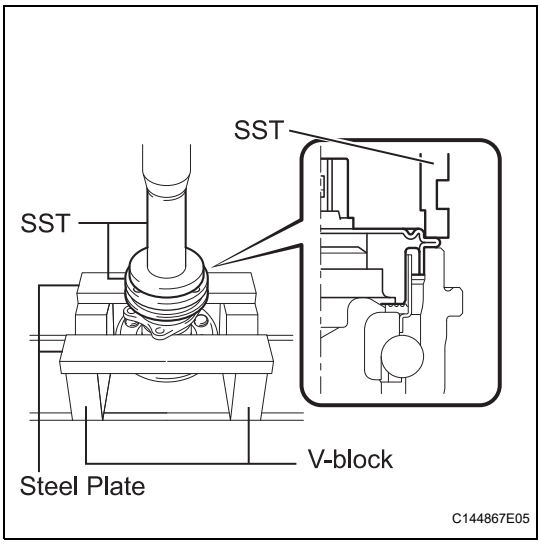
INSTALLATION

1. INSTALL SKID CONTROL SENSOR

(a) Clean the contact surface between the axle hub and a new skid control sensor.

NOTICE:
Prevent foreign matter from attaching to the sensor rotor.

(b) Place the skid control sensor on the axle hub so that the connector is positioned as shown in the illustration.



(c) Using SST, a press, 2 V-blocks, and 2 steel plates, install the skid control sensor to the axle hub.
SST 09309-36010, 09213-58013
NOTICE:
- **Keep the sensor away from magnets.**
- **Do not use a hammer on the skid control sensor.**
- **Check that there is no foreign matter such as iron chips on the detecting portion of the skid control sensor.**
- **Slowly press the skid control sensor straight.**

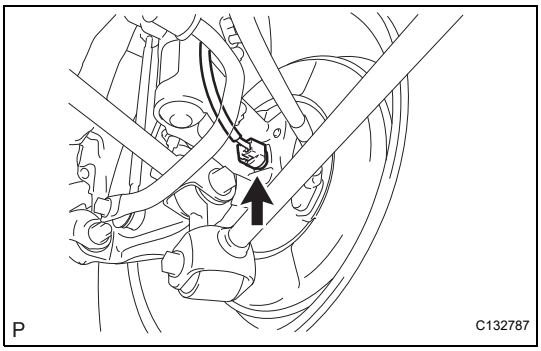
2. **INSTALL REAR AXLE HUB AND BEARING ASSEMBLY WITH SKID CONTROL SENSOR (See page AH-16)**

3. **INSPECT REAR AXLE HUB BEARING LOOSENESS (See page AH-15)**

4. **INSPECT REAR AXLE HUB RUNOUT (See page AH-15)**

5. **INSTALL REAR DISC (See page BR-64)**

6. **INSTALL REAR DISC BRAKE CALIPER ASSEMBLY (See page PB-40)**



7. **CONNECT SKID CONTROL SENSOR WIRE**
(a) Connect the connector to the skid control sensor.

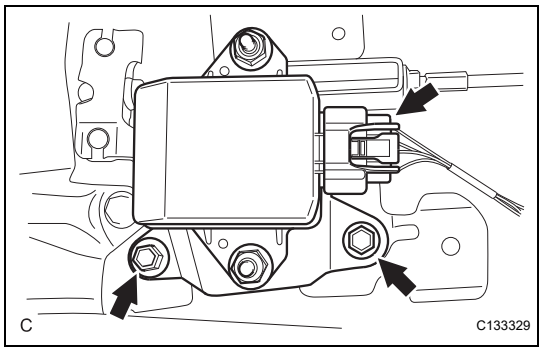
8. **INSTALL REAR WHEEL**
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

9. **INSPECT AND ADJUST REAR WHEEL ALIGNMENT**
HINT:
Refer the procedures up to "REAR WHEEL ALIGNMENT". (See page SP-11)

10. **CHECK SPEED SENSOR SIGNAL**
HINT:
Refer the procedures up to "ELECTRONICALLY CONTROLLED BRAKE SYSTEM". (See page BC-35)

REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
2. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-14)
3. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-14)
4. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-14)
5. REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-15)
6. REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-13)
7. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-14)
8. REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-15)
9. REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-15)
10. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-11)
11. REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-13)
12. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-14)
13. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-15)
14. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-16)
15. REMOVE CONSOLE BOX POCKET (See page IP-17)
16. REMOVE CONSOLE BOX CARPET (See page IP-17)
17. REMOVE CONSOLE BOX ASSEMBLY (See page IP-17)
18. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (See page IP-18)
19. REMOVE NO. 1 CONSOLE BOX INSERT FRONT (See page IP-18)
20. REMOVE NO. 1 CONSOLE BOX DUCT (See page AC-188)



21. REMOVE YAW RATE AND ACCELERATION SENSOR

(a) Disconnect the yaw rate and acceleration sensor connector.

(b) Remove the 2 bolts and yaw rate and acceleration sensor.

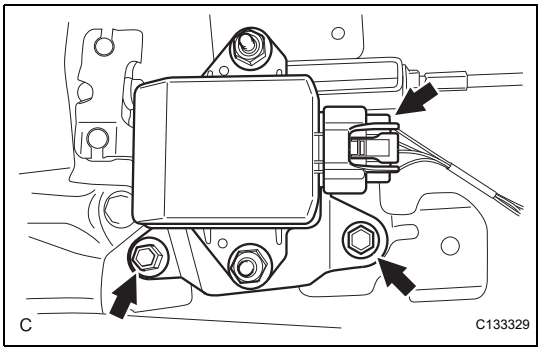
NOTICE:

Do not remove the yaw rate and acceleration sensor from the bracket.

INSPECTION

1. **INSPECT YAW RATE AND ACCELERATION SENSOR**
   (a) Inspect the yaw rate and acceleration sensor. If any of the following occurs, replace the yaw rate and acceleration sensor with a new one:
   - The surface of the yaw rate and acceleration sensor is cracked, dented, or chipped off.
   - The connector is scratched, cracked, or damaged.
   - The yaw rate and acceleration sensor has been dropped.

INSTALLATION

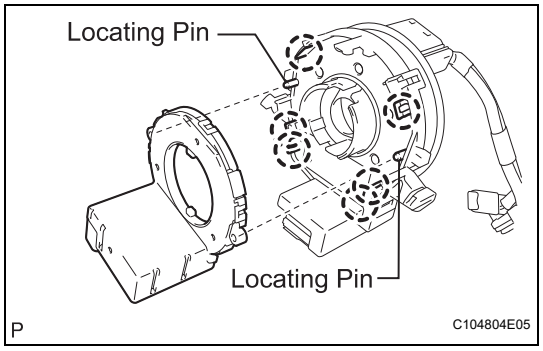


1. **INSTALL YAW RATE AND ACCELERATION SENSOR**
   (a) Install the yaw rate and acceleration sensor with the 2 bolts.
   Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)
   NOTICE:
   - **Do not damage the yaw rate and acceleration sensor.**
   - **Make sure that the yaw rate and acceleration sensor is installed securely.**
   (b) Connect the yaw rate and acceleration sensor connector.
2. **INSTALL NO. 1 CONSOLE BOX DUCT (See page AC-204)**
3. **INSTALL NO. 1 CONSOLE BOX INSERT FRONT (See page IP-29)**
4. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (See page IP-30)**
5. **INSTALL CONSOLE BOX ASSEMBLY (See page IP-30)**
6. **INSTALL CONSOLE BOX CARPET (See page IP-30)**
7. **INSTALL CONSOLE BOX POCKET (See page IP-30)**
8. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-31)**
9. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-31)**
10. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-33)**
11. **INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-33)**
12. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-35)**
13. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-42)**
14. **INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-41)**

15. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-41)**
16. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-41)**
17. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-31)**
18. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-32)**
19. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-32)**
20. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-32)**
21. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
22. **PERFORM YAW RATE SENSOR ZERO POINT CALIBRATION**
    HINT:
    Refer the procedures up to "ELECTRONICALLY CONTROLLED BRAKE SYSTEM". (See page BC-29)
23. **INSPECT SENSOR SIGNAL**
    HINT:
    Refer the procedures up to "ELECTRONICALLY CONTROLLED BRAKE SYSTEM". (See page BC-35)
24. **PERFORM INITIALIZATION**
    NOTICE:
    Some systems need initialization after reconnecting the cable to the negative battery terminal. (See page IN-43)

INSPECTION

1. **INSPECT STEERING ANGLE SENSOR**
   (a) Inspect the steering angle sensor. If any of the following occurs, replace the steering angle sensor with a new one:
   - The surface of the steering angle sensor is cracked, dented, or chipped off.
   - The connector is scratched, cracked, or damaged.
   - The steering angle sensor has been dropped.



INSTALLATION

1. **INSTALL STEERING ANGLE SENSOR**
   (a) Align the locating pins, engage the claws, and install the steering angle sensor to the spiral cable.
2. **INSTALL SPIRAL CABLE SUB-ASSEMBLY WITH STEERING ANGLE SENSOR (See page RS-359)**
3. **INSTALL STEERING COLUMN COVER (See page SR-41)**
4. **ADJUST SPIRAL CABLE (See page RS-360)**
5. **INSTALL STEERING WHEEL ASSEMBLY (See page SR-42)**
6. **INSPECT STEERING WHEEL CENTER POINT**
7. **INSTALL STEERING PAD (See page RS-346)**
8. **INSTALL NO. 2 LOWER STEERING WHEEL COVER (See page RS-347)**
9. **INSTALL NO. 3 LOWER STEERING WHEEL COVER (See page RS-347)**
10. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
11. **INSPECT STEERING PAD (See page RS-347)**
12. **INSPECT SRS WARNING LIGHT (See page SR-42)**
13. **PERFORM INITIALIZATION**
    NOTICE:
    Some systems need initialization after reconnecting the cable to the negative battery terminal. (See page IN-43)

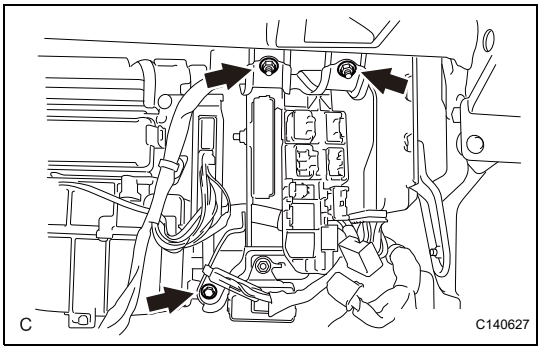
REMOVAL

1. **PRECAUTION**
   NOTICE:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).

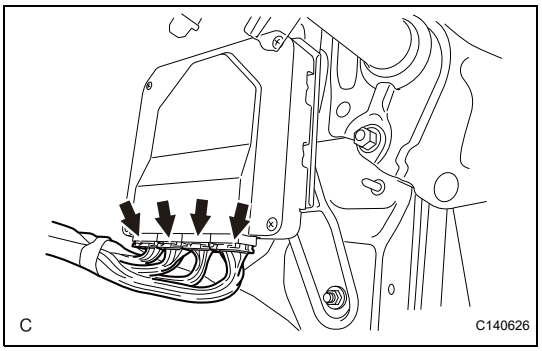
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.

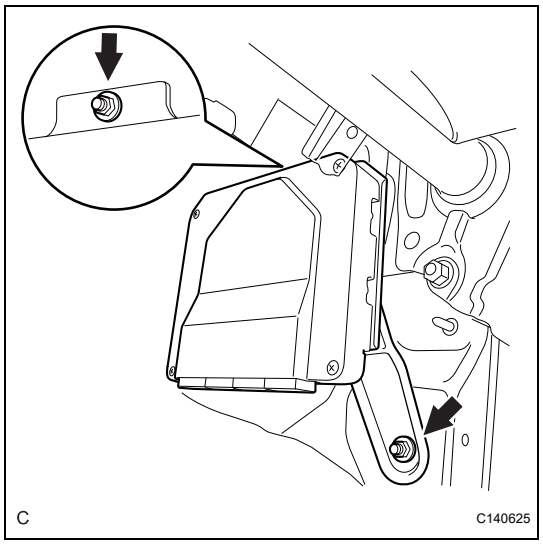
3. **REMOVE INSTRUMENT PANEL SAFETY PAD ASSEMBLY**
   HINT:
   Refer the procedures up to "REMOVE INSTRUMENT PANEL SAFETY PAD". (See page IP-11)

4. **SEPARATE WIRING HARNESS CLAMP BRACKET**
   (a) Disconnect the wiring harness clamp and connectors.
   (b) Remove the 2 nuts and the bolt, and separate the wiring harness clamp bracket.



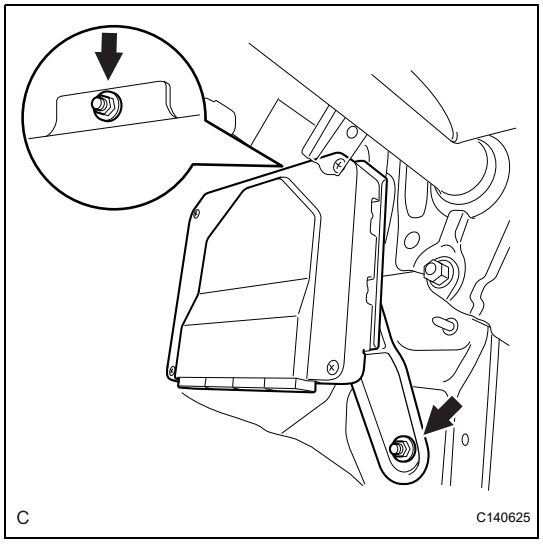
5. **REMOVE SKID CONTROL ECU**
   (a) Disconnect the 4 skid control ECU connectors.





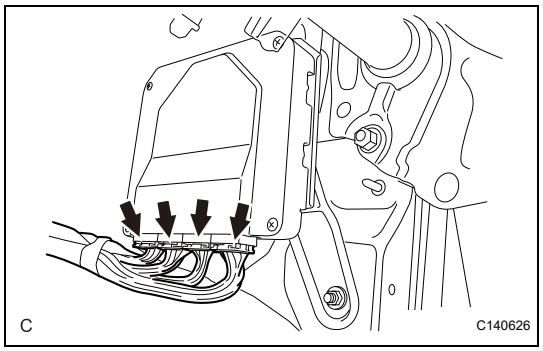
(b) Remove the 2 nuts and skid control ECU.

INSTALLATION

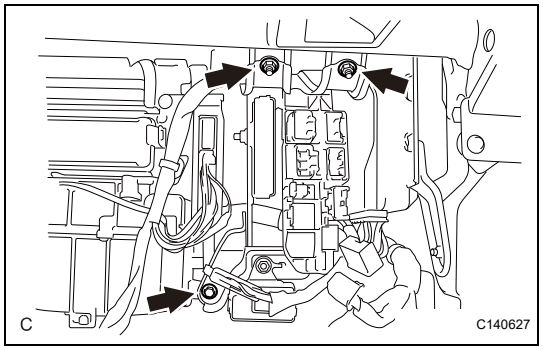


1. INSTALL SKID CONTROL ECU

(a) Install the skid control ECU with the 2 nuts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)



(b) Connect the 4 skid control ECU connectors.



2. INSTALL WIRING HARNESS CLAMP BRACKET

(a) Install the wiring harness clamp bracket with the 2 nuts and the bolt.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

(b) Connect the wiring harness clamp and connectors.

3. INSTALL INSTRUMENT PANEL SAFETY PAD ASSEMBLY

HINT:
Refer the procedures up to "INSTALL INSTRUMENT PANEL SAFETY PAD". (See page IP-25)

4. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

5. **CLEAR DTC FOR BRAKE CONTROL SYSTEM**
   HINT:
   Refer the procedures up to "ELECTRONICALLY CONTROLLED BRAKE SYSTEM". (See page BC-57)

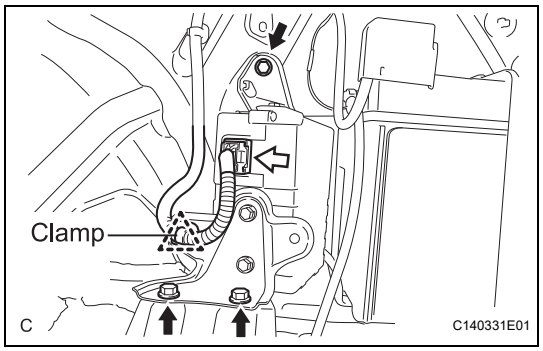
6. **PERFORM LINEAR VALVE OFFSET LEARNING**
   HINT:
   Refer the procedures up to "ELECTRONICALLY CONTROLLED BRAKE SYSTEM". (See page BC-25)

7. **PERFORM YAW RATE SENSOR ZERO POINT CALIBRATION**
   HINT:
   Refer the procedures up to "ELECTRONICALLY CONTROLLED BRAKE SYSTEM". (See page BC-29)

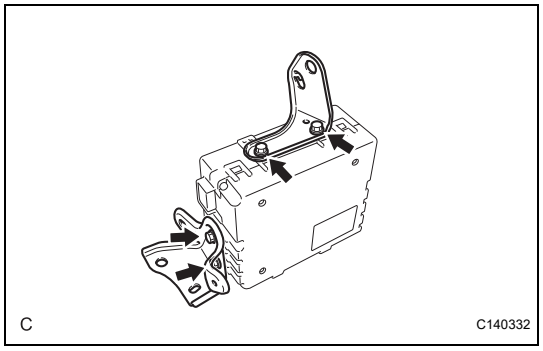
8. **PERFORM INITIALIZATION**
   NOTICE:
   Some systems need initialization after reconnecting the cable to the negative battery terminal. (See page IN-43)

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE LUGGAGE COMPARTMENT TRIM HOOK NO.1 (See page ED-97)**
3. **REMOVE REAR FLOOR FINISH PLATE (See page ED-97)**
4. **REMOVE LUGGAGE COMPARTMENT REAR TRIM COVER (See page ED-97)**
5. **REMOVE LUGGAGE TRIM SERVICE HOLE COVER**
6. **REMOVE LUGGAGE COMPARTMENT INNER TRIM COVER RH (See page ED-98)**
7. **REMOVE BRAKE CONTROL POWER SUPPLY WITH BRACKET**
   (a) Disconnect the brake control power supply connector and separate the clamp.
   (b) Remove the 3 bolts and brake control power supply with bracket.



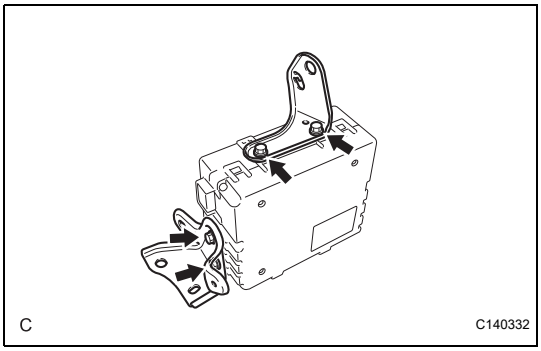
8. **REMOVE BRAKE CONTROL POWER SUPPLY ASSEMBLY**
   (a) Remove the 2 bolts and No. 1 brake control power supply bracket.
   (b) Remove the 2 bolts and No. 2 brake control power supply bracket.



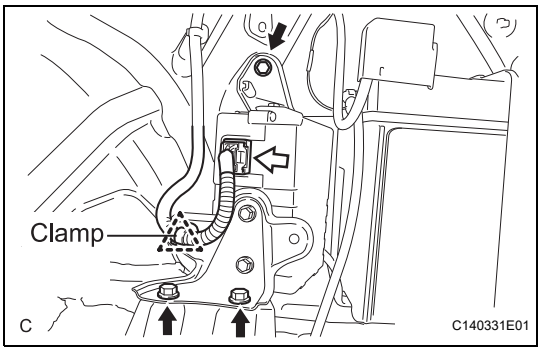
INSPECTION

1. **INSPECT BRAKE CONTROL POWER SUPPLY**
   (a) Inspect the brake control power supply assembly. If any of the following occurs, replace the brake control power supply assembly with a new one:
   - The surface of the brake control power supply assembly is cracked, dented, or chipped off.
   - The connector is scratched, cracked, or damaged.
   - The brake control power supply assembly has been dropped.

INSTALLATION



1. **INSTALL BRAKE CONTROL POWER SUPPLY ASSEMBLY**
   (a) Install the No. 2 brake control power supply bracket with the 2 bolts.
   Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
   (b) Install the No. 2 brake control power supply bracket with the 2 bolts.
   Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)



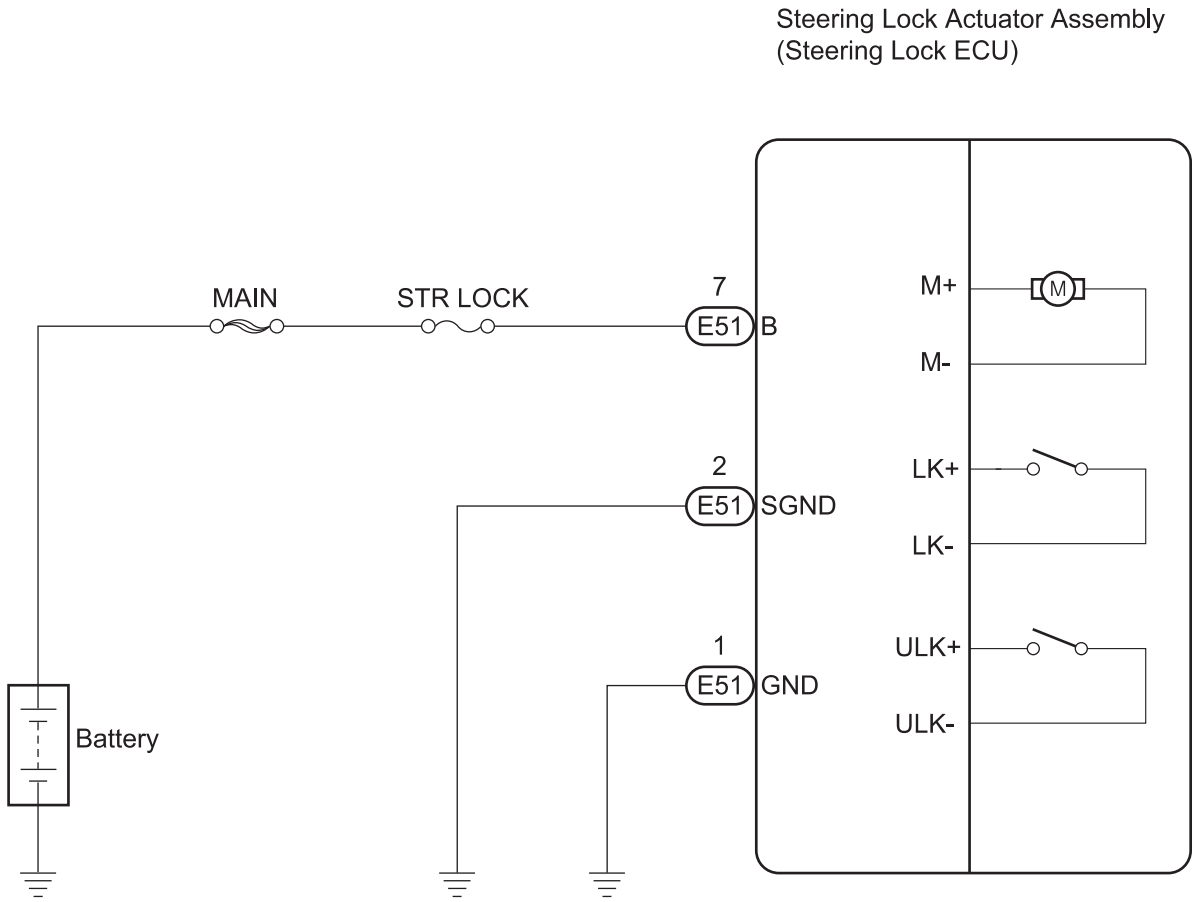
2. **INSTALL BRAKE CONTROL POWER SUPPLY WITH BRACKET**
   (a) Install the brake control power supply with bracket with the 3 bolts.
   Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
   (b) Connect the brake control power supply connector and install the clamp.
3. **INSTALL LUGGAGE COMPARTMENT INNER TRIM COVER RH (See page ED-102)**
4. **INSTALL LUGGAGE TRIM SERVICE HOLE COVER**
5. **INSTALL LUGGAGE COMPARTMENT REAR TRIM COVER (See page ED-102)**
6. **INSTALL REAR FLOOR FINISH PLATE (See page ED-103)**
7. **INSTALL LUGGAGE COMPARTMENT TRIM HOOK NO.1 (See page ED-103)**
8. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
9. **CLEAR DTC FOR BRAKE CONTROL SYSTEM**
   HINT:
   Refer the procedures up to "ELECTRONICALLY CONTROLLED BRAKE SYSTEM". (See page BC-57)
10. **PERFORM INITIALIZATION**
    NOTICE:
    Some systems need initialization after reconnecting the cable to the negative battery terminal. (See page IN-43)

Power Source Circuit

DESCRIPTION

This circuit supplies voltage from the battery to terminal B of the steering lock ECU. This circuit is used as power source for the steering lock CPU, motor, communication, and peripheral circuits.

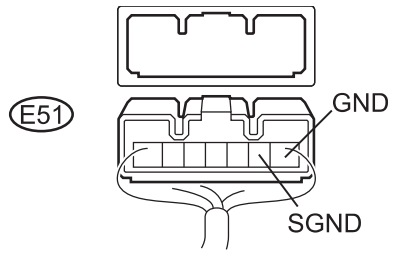
WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK HARNESS AND CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - BODY GROUND)

Steering Lock Actuator Assembly:



(a) Disconnect the E51 connector from the steering lock actuator assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

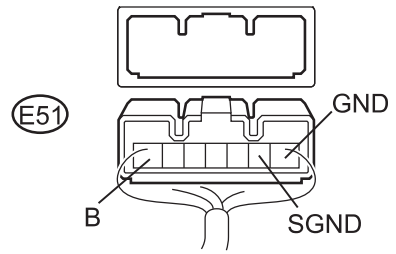
Tester Connection	Condition	Specified Condition
E51-1 (GND) - Body ground	Always	Below 1 Ω
E51-2 (SGND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 CHECK HARNESS AND CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - BATTERY)

Steering Lock Actuator Assembly:



(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E51-7 (B) - E51-1 (GND)	Always	10 to 14 V
E51-7 (B) - E51-2 (SGND)	Always	10 to 14 V

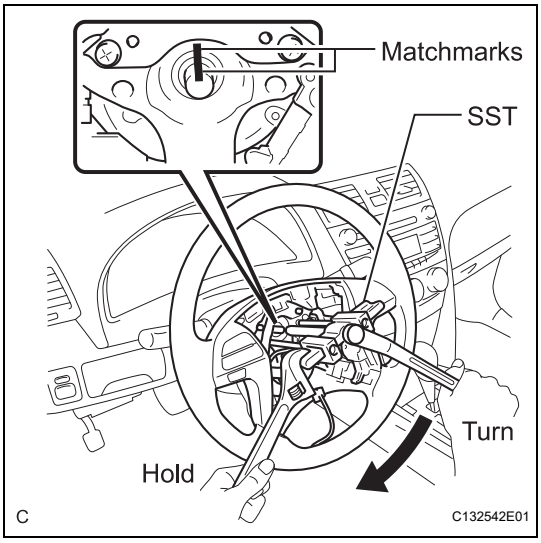
OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

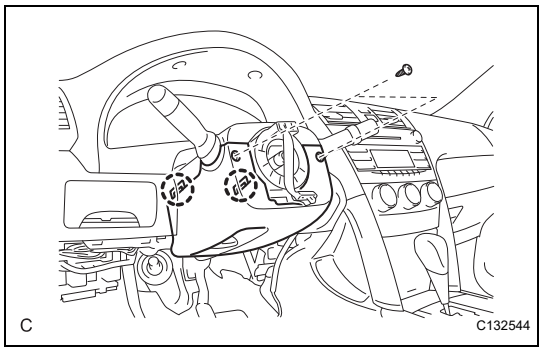
REPAIR OR REPLACE HARNESS OR CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - BATTERY)

REMOVAL

1. **PRECAUTION**
   HINT:
   (See page SR-1)
2. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
3. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
4. **REMOVE FRONT WHEEL LH**
5. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-13)**
6. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-14)**
7. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-11)**
8. **REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY (See page RS-363)**
9. **REMOVE NO. 3 LOWER STEERING WHEEL COVER (See page RS-345)**
10. **REMOVE NO. 2 LOWER STEERING WHEEL COVER (See page RS-345)**
11. **REMOVE STEERING PAD (See page RS-345)**
12. **REMOVE STEERING WHEEL ASSEMBLY**
    (a) Remove the steering wheel assembly set nut.
    (b) Put matchmarks on the steering wheel assembly and the steering main shaft.
    (c) Disconnect the connectors from the spiral cable sub-assembly.
    (d) Using SST, remove the steering wheel assembly.
    SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05031)



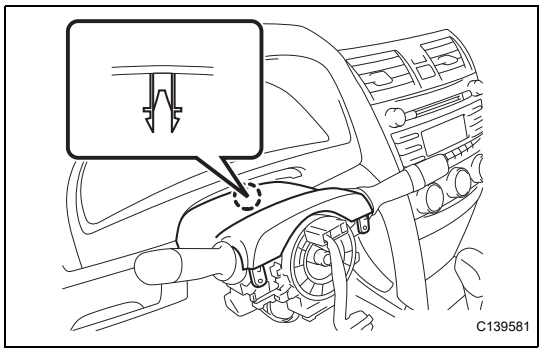
SR



13. REMOVE STEERING COLUMN COVER

(a) Remove the 2 screws.

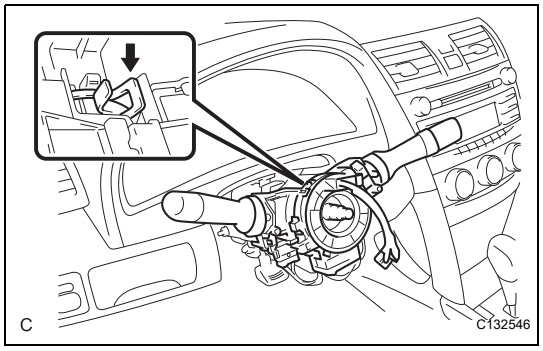
(b) Disengage the 2 claws to remove the lower steering column cover.



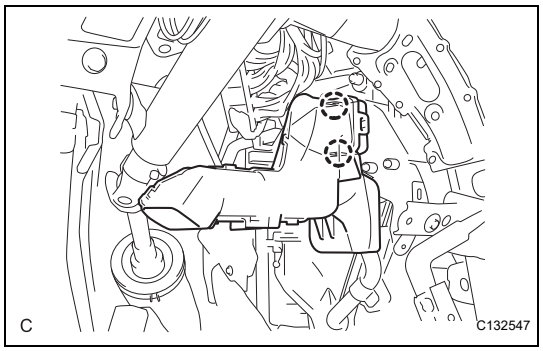
(c) Disengage the claw to remove the upper steering column cover.

14. REMOVE TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY

(a) Disconnect the connectors from the turn signal switch assembly with spiral cable sub-assembly.

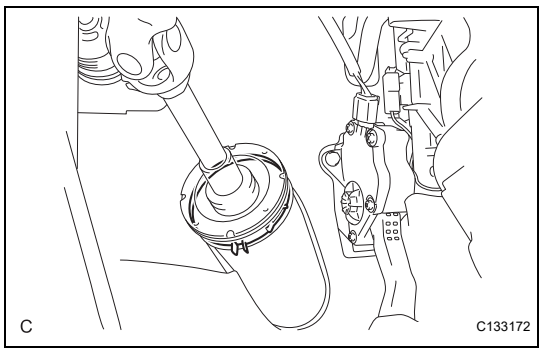


(b) Using pliers, grip the claws of the clip and remove the turn signal switch assembly with spiral cable sub-assembly.



15. REMOVE NO. 1 AIR DUCT SUB-ASSEMBLY

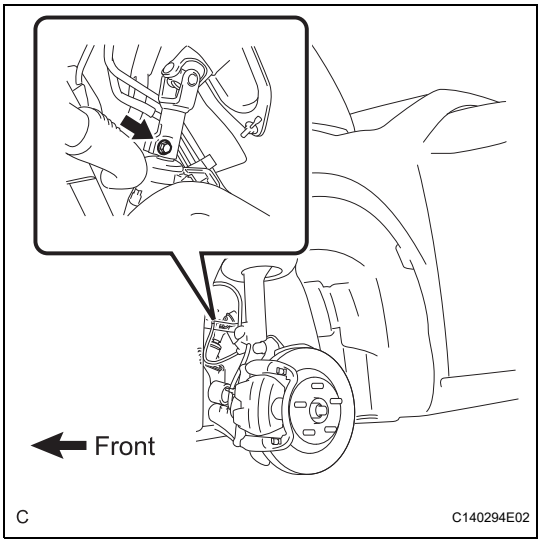
(a) Disengage the 2 claws and remove the No. 1 air duct sub-assembly.



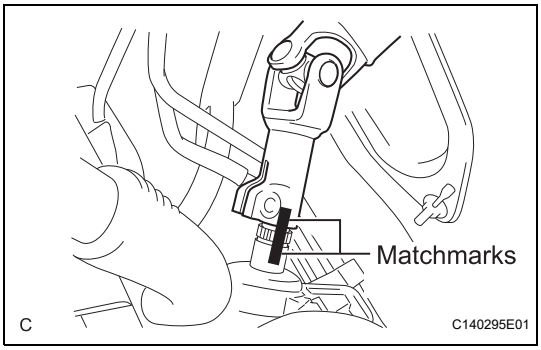
16. SEPARATE STEERING INTERMEDIATE SHAFT ASSEMBLY

(a) Remove the clamp from the steering column hole shield.

SR



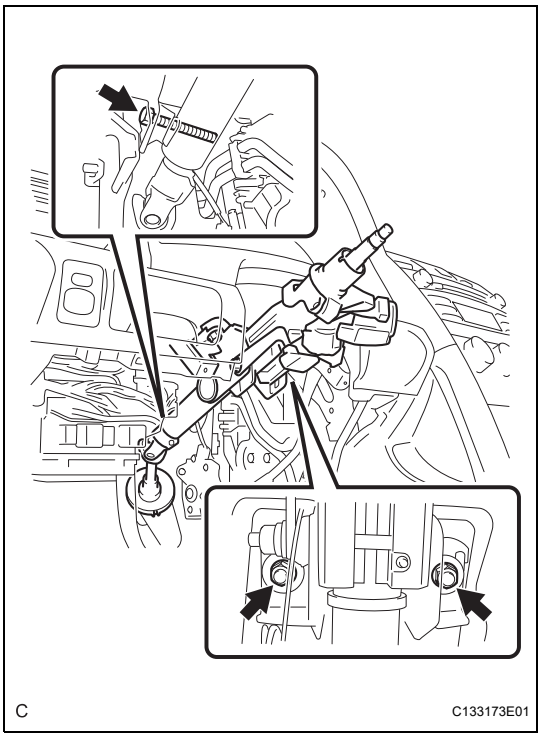
(b) Remove the bolt and slide the steering intermediate shaft assembly.
NOTICE:
Do not separate the steering intermediate shaft assembly from the power steering link assembly.



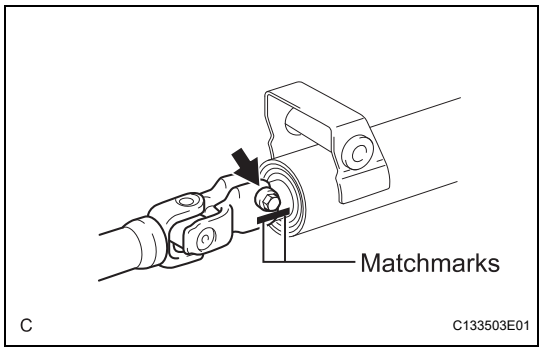
(c) Put matchmarks on the steering intermediate shaft assembly and the power steering link assembly.
(d) Separate the steering intermediate shaft assembly from the power steering link assembly.

17. REMOVE STEERING COLUMN ASSEMBLY

(a) Disconnect the connectors and wire harness clamps from the steering column assembly.



(b) Remove the bolt, 2 nuts, and the steering column assembly.



18. REMOVE STEERING INTERMEDIATE SHAFT ASSEMBLY

(a) Put matchmarks on the steering intermediate shaft assembly and the steering column assembly.

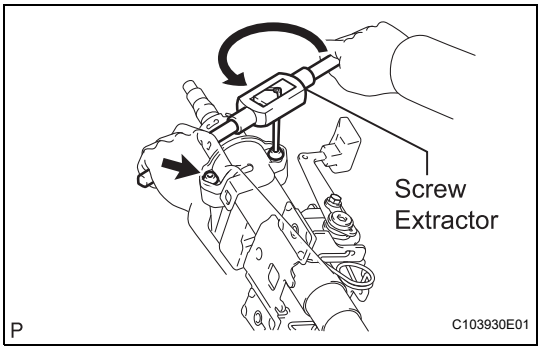
(b) Remove the bolt and the steering intermediate shaft assembly from the steering column assembly.

DISASSEMBLY

NOTICE:
When using a vise, do not overtighten it.

1. REMOVE STEERING LOCK ACTUATOR ASSEMBLY

(a) Secure the steering column assembly in a vise.
(b) Using a center punch, mark the center of the 2 tapered-head bolts.
(c) Using a 3 to 4 mm (0.12 to 0.16 in.) drill, drill a hole in the 2 tapered-head bolts.
(d) Using a screw extractor, remove the 2 tapered-head bolts, and then remove the steering lock actuator assembly and the steering lock bracket from the steering column assembly.

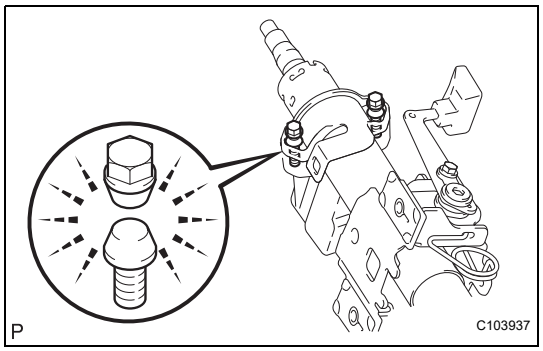


REASSEMBLY

1. INSTALL STEERING LOCK ACTUATOR ASSEMBLY

(a) Temporarily install the steering lock actuator assembly and the steering lock bracket with 2 new tapered-head bolts.

(b) Tighten the 2 tapered-head bolts until the bolt heads break off.

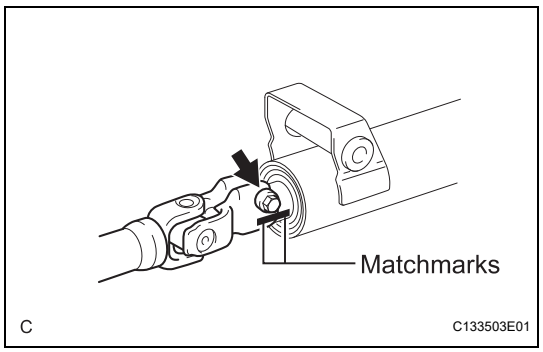


INSTALLATION

1. INSTALL STEERING INTERMEDIATE SHAFT ASSEMBLY

(a) Align the matchmarks on the steering intermediate shaft assembly and the steering column assembly.

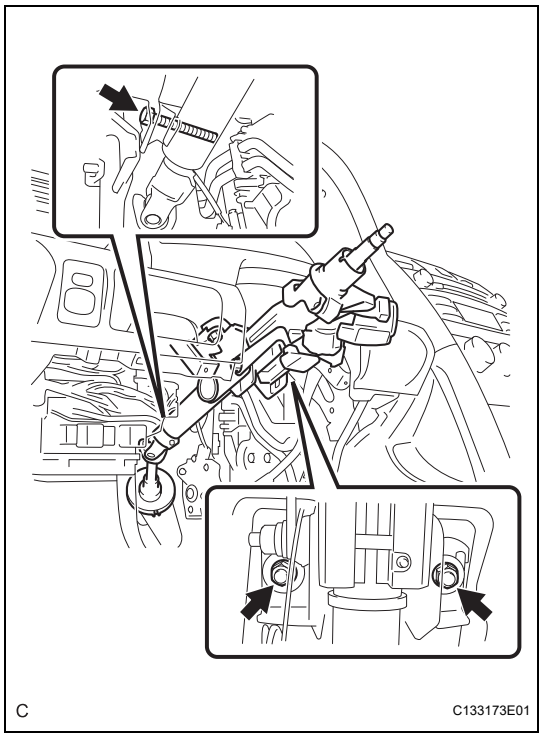
(b) Install the bolt.
Torque: 35 N*m (360 kgf*cm, 26 ft.*lbf)

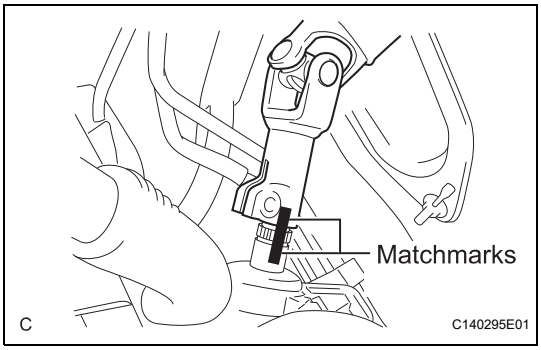


2. INSTALL STEERING COLUMN ASSEMBLY

(a) Install the steering column assembly with the bolt and 2 nuts.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

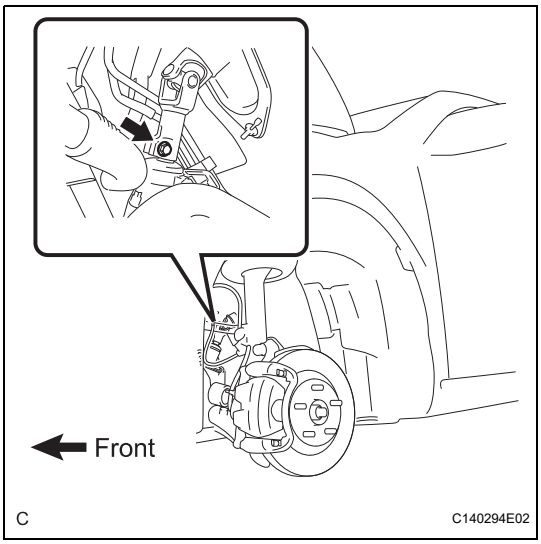
(b) Connect the connectors and wire harness clamps to the steering column assembly.



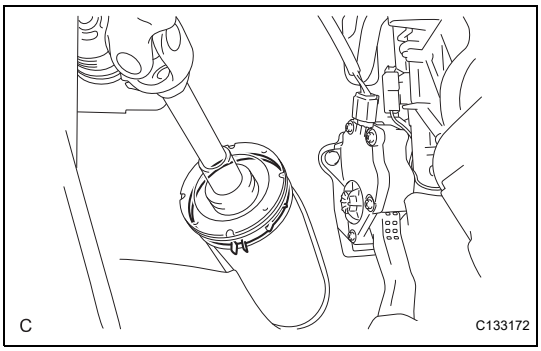


3. CONNECT STEERING INTERMEDIATE SHAFT ASSEMBLY

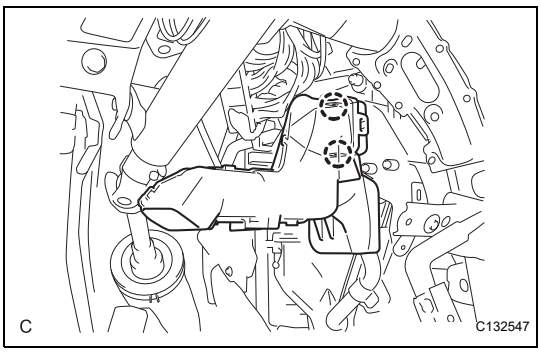
(a) Align the matchmarks on the steering intermediate shaft assembly and the power steering link assembly.



(b) Install the bolt.
Torque: 35 N*m (360 kgf*cm, 26 ft.*lbf)



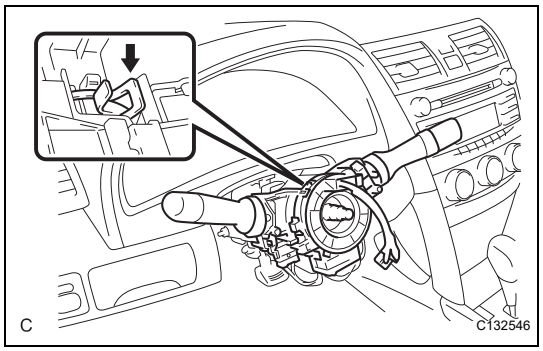
(c) Install the clamp to the steering column hole shield.



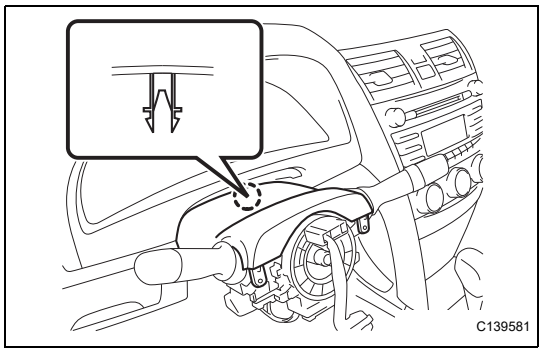
4. INSTALL NO. 1 AIR DUCT SUB-ASSEMBLY

(a) Engage the 2 claws to install the No. 1 air duct sub-assembly.

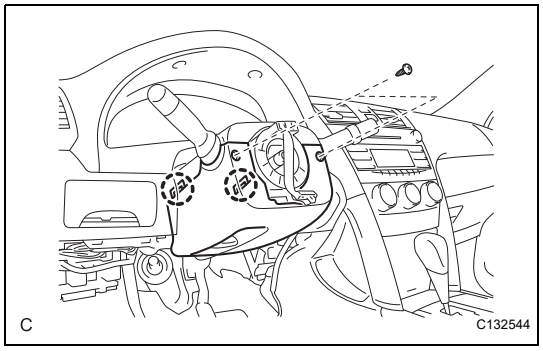
5. PLACE FRONT WHEELS FACING STRAIGHT AHEAD



6. **INSTALL TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY**
   (a) Install the turn signal switch assembly with spiral cable sub-assembly to the steering column assembly with the clamp.
   (b) Connect the connectors to the turn signal switch assembly with spiral cable sub-assembly.

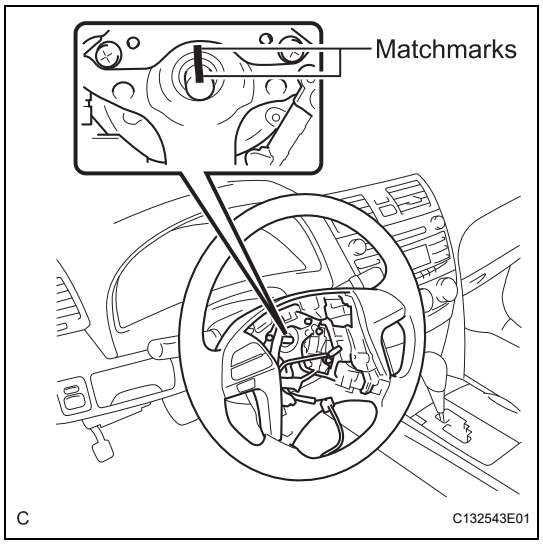


7. **INSTALL STEERING COLUMN COVER**
   (a) Engage the claw to install the upper steering column cover.



   (b) Engage the 2 claws to install the lower steering column cover.
   (c) Install the 2 screws.
   Torque: 2.0 N*m (20 kgf*cm, 1.5 in.*lbf)

8. **ADJUST SPIRAL CABLE SUB-ASSEMBLY (See page RS-360)**



9. **INSTALL STEERING WHEEL ASSEMBLY**
   (a) Align the matchmarks on the steering wheel assembly and steering main shaft.
   (b) Install the steering wheel assembly set nut.
   Torque: 50 N*m (510 kgf*cm, 37 ft.*lbf)
   (c) Connect the connectors to the spiral cable sub-assembly.

10. **INSPECT STEERING WHEEL CENTER POINT**
11. **INSTALL STEERING PAD (See page RS-346)**
12. **INSTALL NO. 3 LOWER STEERING WHEEL COVER (See page RS-347)**
13. **INSTALL NO. 2 LOWER STEERING WHEEL COVER (See page RS-347)**
14. **INSPECT STEERING PAD (See page RS-347)**
15. **INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY (See page RS-363)**
16. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-35)**

17. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-41)**

18. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-41)**

19. **INSTALL FRONT WHEEL LH**
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

20. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

21. **INSPECT SRS WARNING LIGHT**
HINT:
(See page RS-33)

22. **PERFORM INITIALIZATION**
NOTICE:
Some systems need initialization after reconnecting the cable to the negative battery terminal. (See page IN-43).

DTC	C1515	Torque Sensor Zero Point Adjustment Undone

DTC	C1525	Rotation Angle Sensor Initialization Undone

DESCRIPTION

These DTCs do not indicate a malfunction. The power steering ECU assembly outputs these DTCs when it determines that rotation angle sensor value initialization and torque sensor zero point calibration have not been performed. When IG terminal voltage is 9 V or less, rotation angle sensor initialization and torque sensor zero point calibration cannot be performed.

DTC No.	DTC Detection Condition	Procedure
C1515	This DTC is detected when torque sensor zero point calibration has not been performed.	There is no malfunction if this DTC is not output again after performing zero point calibration.
C1525	This DTC is detected when rotation angle sensor value initialization has not been performed.	There is no malfunction if this DTC is not output again after performing rotation angle sensor value initialization.

INSPECTION PROCEDURE

1	INITIALIZE ROTATION ANGLE SENSOR AND CALIBRATE TORQUE SENSOR ZERO POINT

(a) Initialize the rotation angle sensor and calibrate the torque sensor zero point (See page PS-13).

NEXT

2	RECONFIRM DTC

(a) Check for DTCs (See page PS-17).

Result

Result	Proceed to
DTCs are still output after performing rotation angle sensor value initialization and steering zero point calibration 3 times.	**A**
DTCs are still output after performing rotation angle sensor value initialization and steering zero point calibration once or twice.	**B**
Normal system code is output.	**C**

HINT:
Replace the power steering ECU assembly if DTCs are still output after performing rotation angle sensor value initialization and steering zero point calibration 3 times.

B	Go to step 1
C	END

PS

A

3	REPLACE POWER STEERING ECU ASSEMBLY

(a) Replace the power steering ECU assembly (See page PS-68).

NEXT

4	INITIALIZE ROTATION ANGLE SENSOR AND CALIBRATE TORQUE SENSOR ZERO POINT

(a) Initialize the rotation angle sensor value and calibrate the torque sensor zero point (See page PS-13).

NEXT

5	RECONFIRM DTC

(a) Check for DTCs (See page PS-17).
Result

Result	Proceed to
DTCs are still output after performing rotation angle sensor value initialization and steering zero point calibration 3 times.	A
DTCs are still output after performing rotation angle sensor value initialization and steering zero point calibration once or twice.	B
Normal system code is output.	C

HINT:
Replace the power steering link assembly if DTCs are still output after performing rotation angle sensor value initialization and steering zero point calibration 3 times.
NOTICE:
If replacing the power steering link assembly, clear the rotation angle sensor calibration value, initialize the rotation angle sensor value, and calibrate the torque sensor zero point (See page PS-13).

B	Go to step 4
C	END

A

REPLACE POWER STEERING LINK ASSEMBLY (See page PS-58)

DTC	C1516	Torque Sensor Zero Point Adjustment Incomplete

DTC	C1526	Rotation Angle Sensor Initialization Incomplete

DESCRIPTION

These DTCs do not indicate a malfunction. The power steering ECU assembly outputs these DTCs when it determines that rotation angle sensor value initialization and torque sensor zero point calibration are incomplete.

DTC No.	DTC Detection Condition	Procedure
C1516	Steering zero point calibration is incomplete due to the steering wheel being touched during calibration.	There is no malfunction if this DTC is not output again after clearing the DTCs and torque sensor calibration value, and performing zero point calibration.
C1526	Rotation angle sensor value initialization is incomplete due to the steering wheel being touched during calibration.	There is no malfunction if this DTC is not output again after clearing the DTCs and torque sensor calibration value, and performing rotation angle sensor value initialization.

INSPECTION PROCEDURE

1	CLEAR DTC

(a) Clear the DTCs (See page PS-17).

NEXT

2	INITIALIZE ROTATION ANGLE SENSOR AND CALIBRATE TORQUE SENSOR ZERO POINT

(a) Initialize the rotation angle sensor and calibrate the torque sensor zero point (See page PS-13).

NEXT

3	RECONFIRM DTC

(a) Check for DTCs (See page PS-17).
Result

Result	Proceed to
DTCs are still output after performing rotation angle sensor value initialization and steering zero point calibration 3 times.	**A**
DTCs are still output after performing rotation angle sensor value initialization and steering zero point calibration once or twice.	**B**
Normal system code is output.	**C**

HINT:
Replace the power steering ECU assembly if DTCs are still output after performing rotation angle sensor value initialization and steering zero point calibration 3 times.

PS

B	Go to step 2
C	END

A

4	REPLACE POWER STEERING ECU ASSEMBLY

(a) Replace the power steering ECU assembly (See page PS-68).

NEXT

5	CLEAR DTC

(a) Clear the DTCs (See page PS-17).

NEXT

6	INITIALIZE ROTATION ANGLE SENSOR AND CALIBRATE TORQUE SENSOR ZERO POINT

(a) Initialize the rotation angle sensor value and calibrate the torque sensor zero point (See page PS-13).

NEXT

7	RECONFIRM DTC

(a) Check for DTCs (See page PS-17).
Result

Result	Proceed to
DTCs are still output after performing rotation angle sensor value initialization and steering zero point calibration 3 times.	A
DTCs are still output after performing rotation angle sensor value initialization and steering zero point calibration once or twice.	B
Normal system code is output.	C

HINT:
Replace the power steering link assembly if DTCs are still output after performing rotation angle sensor value initialization and steering zero point calibration 3 times.
NOTICE:
If replacing the power steering link assembly, clear the rotation angle sensor calibration value, initialize the rotation angle sensor value, and calibrate the torque sensor zero point (See page PS-13).

B	Go to step 6
C	END

PS

A

REPLACE POWER STEERING LINK ASSEMBLY (See page PS-58)

DTC	C1521	Motor Circuit Malfunction
DTC	C1522	Motor Circuit Malfunction
DTC	C1531	ECU Malfunction
DTC	C1532	ECU Malfunction
DTC	C1533	ECU Malfunction
DTC	C1534	ECU Malfunction
DTC	C1554	Power Supply Relay Failure
DTC	C1555	Motor Relay Welding Failure

DESCRIPTION

If the power steering ECU assembly detects these DTCs, it will shut off the motor current sensor, power source relay, motor relay circuit (built into the power steering ECU assembly) and stop power assistance. However, power assistance will continue if DTC C1533 or C1534 is output.

DTC No.	DTC Detection Item	Trouble Area
C1521	Motor overcurrent	Power steering ECU assembly
C1522	Motor current sensor malfunction	Power steering ECU assembly
C1531	ECU internal malfunction (CPU malfunction) is detected	Power steering ECU assembly
C1532	ECU internal malfunction (Peripheral circuit malfunction) is detected	Power steering ECU assembly
C1533	ECU internal malfunction (Substrate temp sensor malfunction) is detected	Power steering ECU assembly
C1534	ECU internal malfunction (EEPROM error) is detected	Power steering ECU assembly
C1554	Power source relay malfunction is detected.	Power steering ECU assembly
C1555	Motor relay malfunction is detected.	Power steering ECU assembly

INSPECTION PROCEDURE

1	RECONFIRM DTC

(a) Check for DTCs (See page PS-17).

OK:

DTCs are not output.

NOTICE:

If replacing the power steering ECU assembly, initialize the rotation angle sensor value and calibrate the torque sensor zero point (See page PS-13).

NG	REPLACE POWER STEERING ECU ASSEMBLY (See page PS-68)

OK

USE SIMULATION METHOD TO CHECK

DTC	C1523	Motor Circuit Malfunction

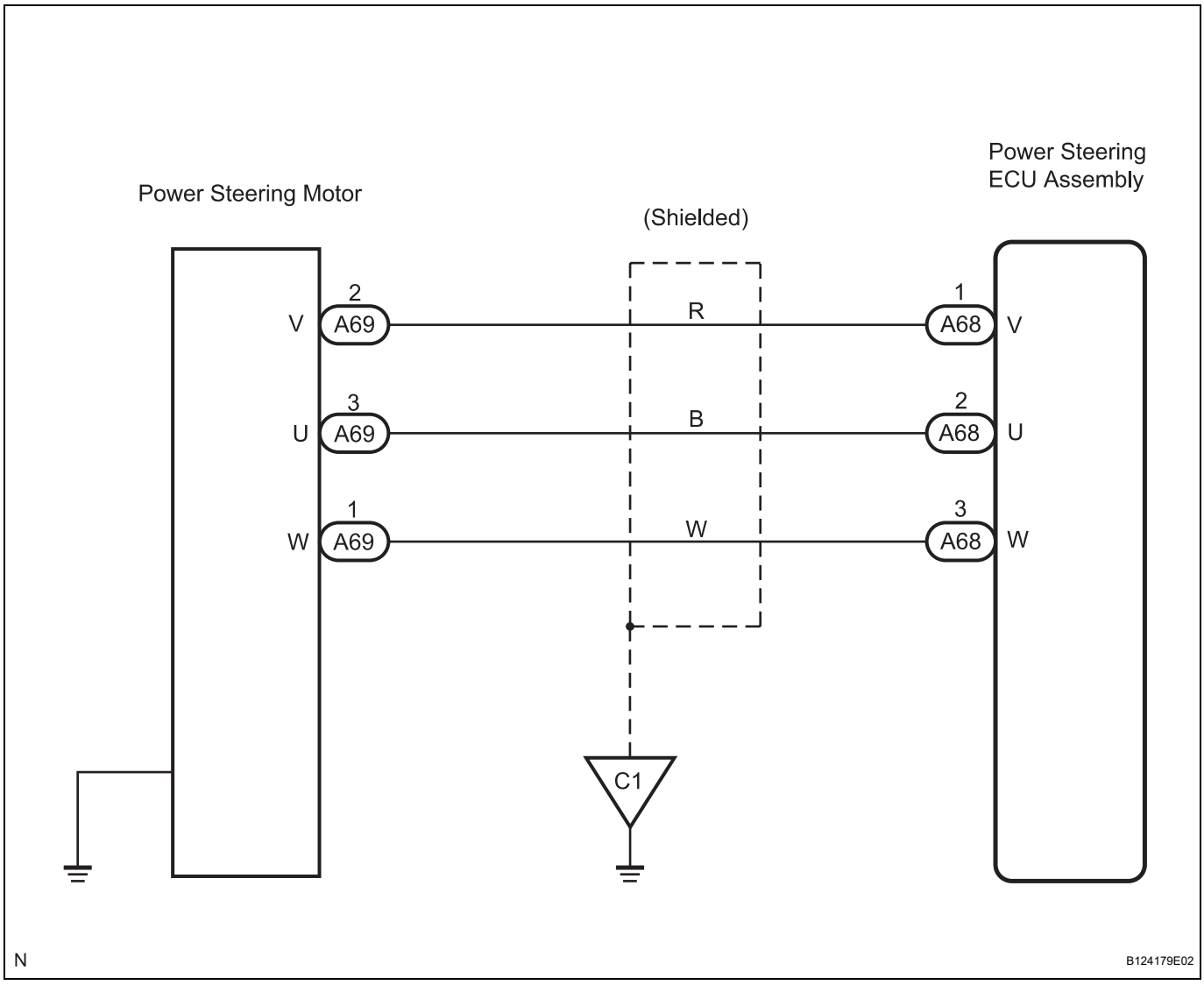
DTC	C1524	Motor Circuit Malfunction

DESCRIPTION

The power steering ECU assembly supplies current to the power steering motor through this circuit.

DTC No.	DTC Detection Item	Trouble Area
C1523	Excessively large current deviation	• Wire harness • Power steering motor (built into power steering link assembly) • Power steering ECU assembly
C1524	Voltage error between motor terminals	• Wire harness • Power steering motor (built into power steering link assembly) • Power steering ECU assembly

WIRING DIAGRAM



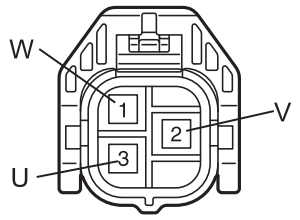
PS

INSPECTION PROCEDURE

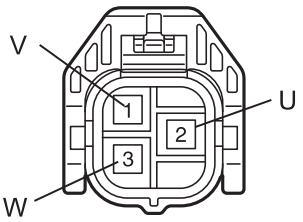
1 CHECK HARNESS AND CONNECTOR (POWER STEERING ECU ASSEMBLY - POWER STEERING MOTOR)

Wire Harness Side Connector Front View:

A69 Power Steering Motor



A68
Power Steering ECU Assembly



C116653E03

(a) Disconnect the A68 connector from the power steering ECU assembly.
(b) Disconnect the A69 connector from the power steering motor.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

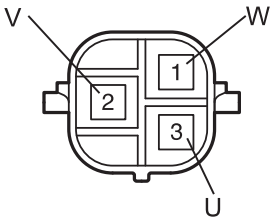
Tester Connection	Condition	Specified Condition
A68-1 (V) - A69-2 (V)	Always	Below 1 Ω
A68-2 (U) - A69-3 (U)	Always	Below 1 Ω
A68-3 (W) - A69-1 (W)	Always	Below 1 Ω
A68-1 (V) - Body ground	Always	10 kΩ or higher
A68-2 (U) - Body ground	Always	10 kΩ or higher
A68-3 (W) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 INSPECT POWER STEERING LINK ASSEMBLY (POWER STEERING MOTOR)

Power Steering Motor:



P

C116649E01

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A69-3 (U) - A69-2 (V)	Always	Below 1 Ω
A69-2 (V) - A69-1 (W)	Always	Below 1 Ω
A69-1 (W) - A69-3 (U)	Always	Below 1 Ω
A69-3 (U) - Motor body	Always	10 kΩ or higher
A69-2 (V) - Motor body	Always	10 kΩ or higher
A69-1 (W) - Motor body	Always	10 kΩ or higher

NOTICE:

- **If replacing the power steering link assembly, clear the rotation angle sensor calibration value, initialize the rotation angle sensor, and calibrate the torque sensor zero point (See page PS-13).**
- **If replacing the power steering ECU assembly, initialize the rotation angle sensor value and calibrate the torque sensor zero point (See page PS-13).**

PS

NG → REPLACE POWER STEERING LINK ASSEMBLY (See page PS-58)

OK

REPLACE POWER STEERING ECU ASSEMBLY (See page PS-68)

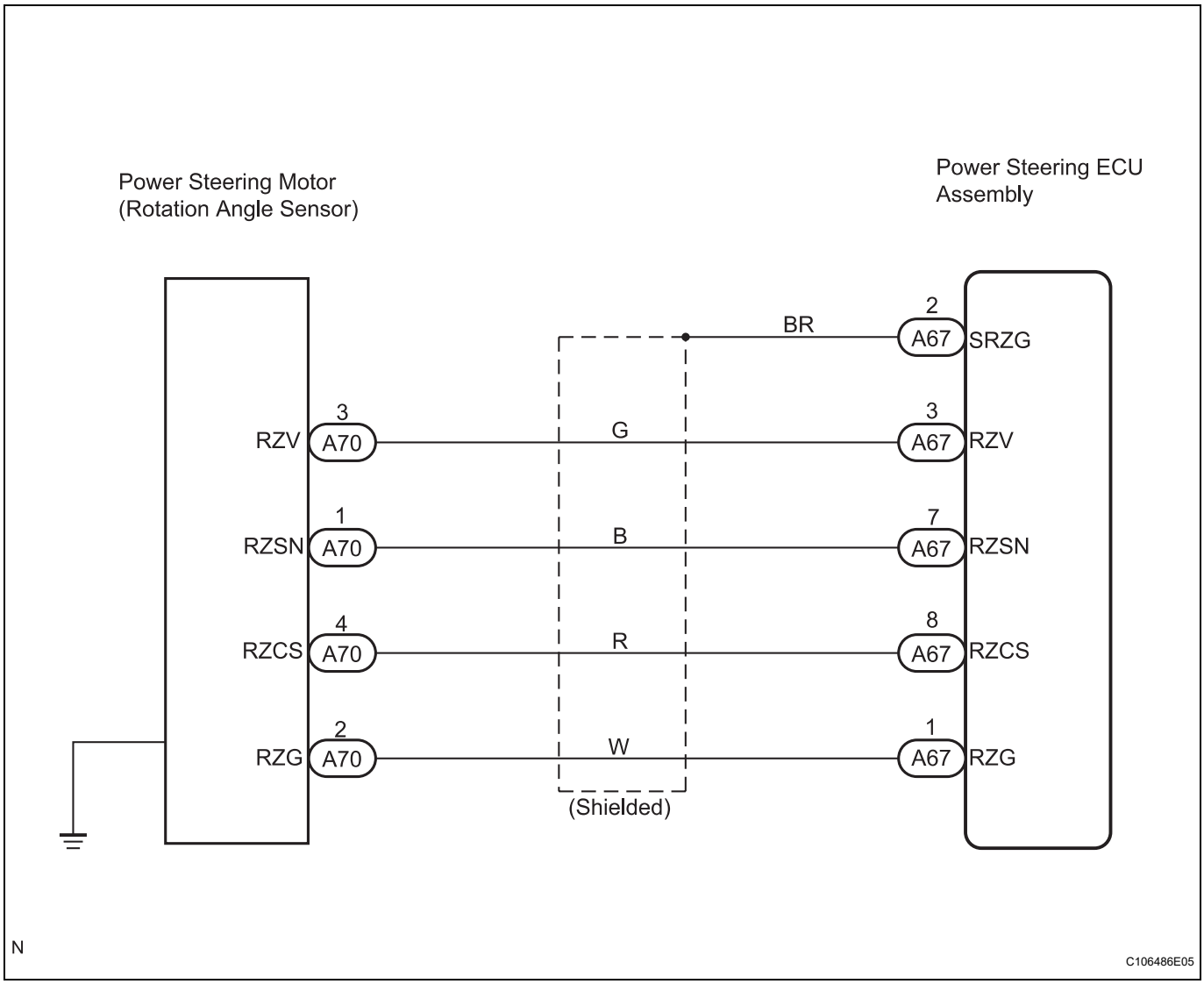
DTC	C1528	Motor Rotation Angle Sensor Malfunction

DESCRIPTION

The motor rotation angle sensor detects the motor rotation angle and sends this information to the power steering ECU assembly.

DTC No.	DTC Detection Item	Trouble Area
C1528	Motor rotation angle sensor malfunction (e.g. An open, short to ground, or short to B+ in the rotation angle sensor circuit)	• Motor rotation angle sensor (built into power steering link assembly) • Wire harness • Power steering earth wire • Power steering ECU assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK POWER STEERING EARTH WIRE (POWER STEERING LINK ASSEMBLY - BODY GROUND)

(a) Check the installation condition of the power steering earth wire connected to the power steering link assembly.

OK:

The power steering earth wire is securely installed to the power steering link assembly and body ground.

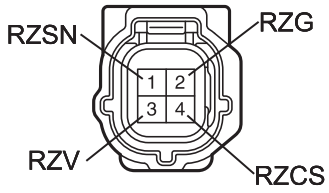
NG → **REINSTALL POWER STEERING EARTH WIRE**

OK

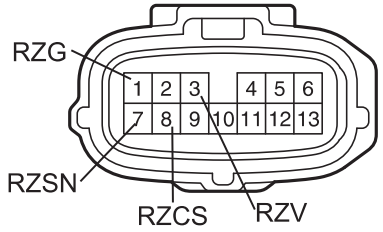
2	CHECK HARNESS AND CONNECTOR (POWER STEERING ECU ASSEMBLY - MOTOR ROTATION ANGLE SENSOR)

Wire Harness Side Connector Front View:

A70
Motor Rotation Angle Sensor



A67
Power Steering ECU Assembly



C116654E03

(a) Disconnect the A70 connector from the power steering link assembly.

(b) Disconnect the A67 connector from the power steering ECU.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection (Symbols)	Condition	Specified condition
A70-1 (RZSN) - A67-7 (RZSN)	Always	Below 1 Ω
A70-2 (RZG) - A67-1 (RZG)	Always	Below 1 Ω
A70-3 (RZV) - A67-3 (RZV)	Always	Below 1 Ω
A70-4 (RZCS) - A67-8 (RZCS)	Always	Below 1 Ω
A70-1 (RZSN) - Body ground	Always	10 kΩ or higher
A70-2 (RZG) - Body ground	Always	10 kΩ or higher
A70-3 (RZV) - Body ground	Always	10 kΩ or higher
A70-4 (RZCS) - Body ground	Always	10 kΩ or higher

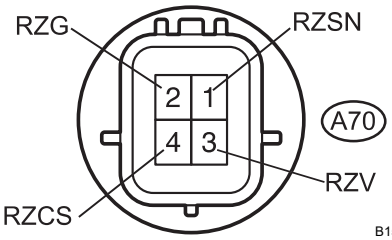
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PS

3	INSPECT POWER STEERING LINK ASSEMBLY (MOTOR ROTATION ANGLE SENSOR)

Motor Rotation Angle Sensor:



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection (Symbols)	Condition	Specified condition
A70-1 (RZSN) - A70-2 (RZG)	Always	50 to 140 Ω
A70-3 (RZV) - A70-2 (RZG)	Always	50 to 140 Ω
A70-4 (RZCS) - A70-2 (RZG)	Always	15 to 45 Ω

NOTICE:
If replacing the power steering link assembly, clear the rotation angle sensor calibration value, initialize the rotation angle sensor value, and calibrate the torque sensor zero point (See page PS-13).

NG → **REPLACE POWER STEERING LINK ASSEMBLY (See page PS-58)**

OK

4	REPLACE POWER STEERING ECU ASSEMBLY

(a) Replace the power steering ECU assembly (See page PS-68).

NEXT

5	INITIALIZE ROTATION ANGLE SENSOR AND CALIBRATE TORQUE SENSOR ZERO POINT

(a) Initialize the rotation angle sensor value and calibrate the torque sensor zero point (See page PS-13).

NEXT

6	RECONFIRM DTC

(a) Check for DTCs (See page PS-17).

Result

DTC Condition	Proceed to
DTC is not output	A
DTC C1528 is output	B

NOTICE:
If replacing the power steering link assembly, clear the rotation angle sensor calibration value, initialize the rotation angle sensor value, and calibrate the torque sensor zero point (See page PS-13).

B → REPLACE POWER STEERING LINK ASSEMBLY (See page PS-58)

A

END

DTC	C1541	Vehicle Speed Signal Malfunction

DESCRIPTION

The power steering ECU assembly receives vehicle speed signals from the skid control ECU via CAN communication. The ECU provides appropriate assisting force in accordance with the vehicle speed, based on the signals.
If the ECU detects this DTC, it adjusts the amount of power assistance for driving at a speed of 100 km/h (62 mph) and continues the system control.

DTC No.	DTC Detection Condition	Trouble Area
C1541	This DTC is detected when vehicle speed signals via CAN communication are cut off for 3 seconds or more.	• Speed sensor circuit • Skid control ECU • CAN communication system • Power steering ECU assembly

INSPECTION PROCEDURE

1	CHECK DTC OUTPUT (CAN COMMUNICATION SYSTEM)

(a) Check if DTC U0073 or U0129 is output.
Result

DTC Condition	Proceed to
DTC is not output	A
DTC U0073 or U0129 is output	B

HINT:
- DTC U0073 indicates a CAN communication malfunction in the electronic power steering system.
- DTC U0129 indicates a skid control ECU communication malfunction in the electronic power steering system.

B → **GO TO CAN COMMUNICATION SYSTEM (See page CA-7)**

A

2	CHECK DTC OUTPUT (BREAK CONTROL SYSTEM)

(a) Check for DTCs of the ABS system.
Result

DTC Condition	Proceed to
DTC is not output	A
DTC C0200, C0205, C0210, C0215, C1235, C1236, C1238, or C1239 is output	B

NOTICE:
If replacing the power steering ECU assembly, initialize the rotation angle sensor value and calibrate the torque sensor zero point (See page PS-13).

PS

B → GO TO BRAKE CONTROL SYSTEM (SPEED SENSOR CIRCUIT) (See page BC-21)

A

REPLACE POWER STEERING ECU ASSEMBLY (See page PS-68)

DTC	C1551	IG Power Supply Voltage Malfunction

DESCRIPTION

If the power steering ECU assembly determines that there is a malfunction in the IG circuit inside the ECU, it outputs this DTC. This DTC is not output when there is an open circuit in the wire harness connected to terminal IG or a battery voltage drops.

DTC No.	DTC Detection Condition	Trouble Area
C1551	IG power source circuit malfunction inside ECU	Power steering ECU assembly

INSPECTION PROCEDURE

1	REPLACE POWER STEERING ECU ASSEMBLY

(a) Replace the power steering ECU assembly (See page PS-68).

NOTICE:

If replacing the power steering ECU assembly, initialize the rotation angle sensor value and calibrate the torque sensor zero point (See page PS-13).

NEXT

END

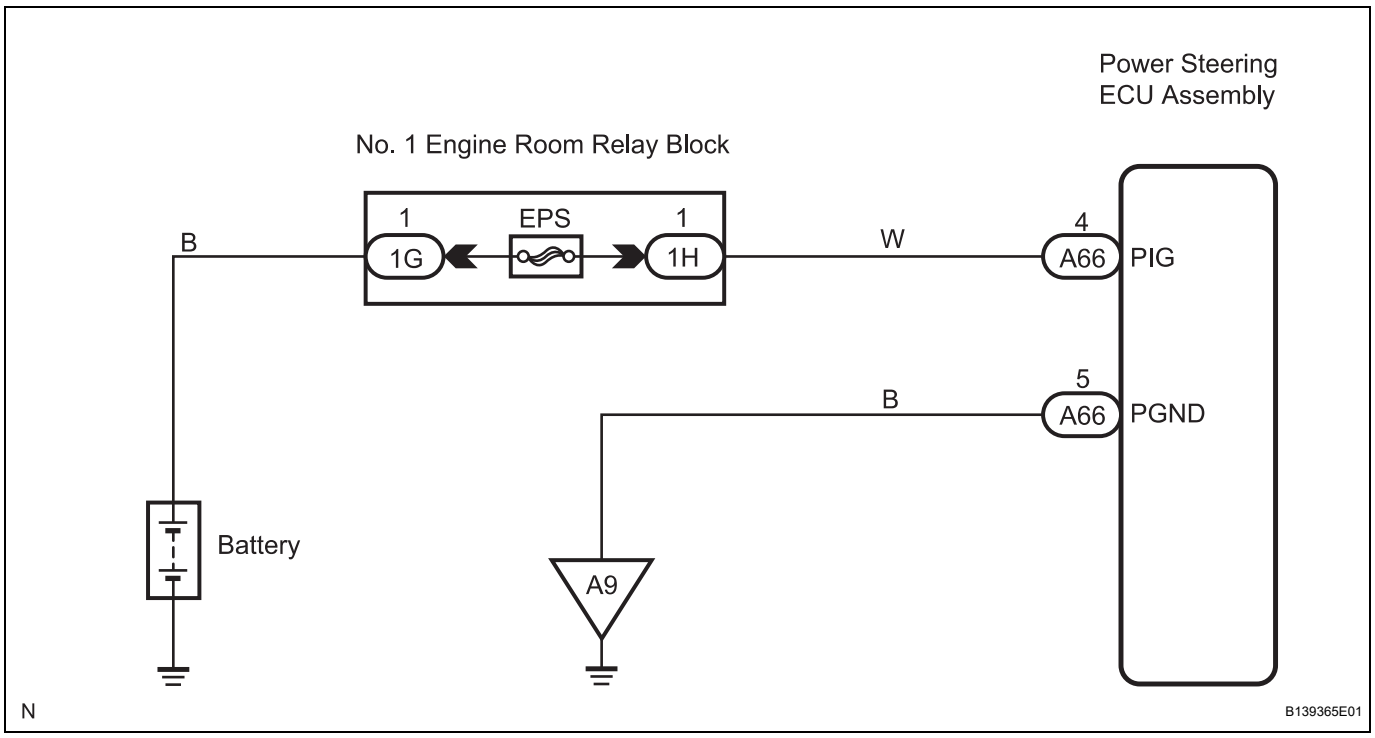
DTC	C1552	PIG Power Supply Voltage Malfunction

DESCRIPTION

This circuit supplies power to drive the power steering motor.

DTC No.	DTC Detection Condition	Trouble Area
C1552	This DTC is detected when power source voltage drops or remains high.	• EPS fuse • Wire harness • Power steering ECU assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT FUSE (EPS FUSE)

(a) Remove the EPS fuse from the engine room relay block.
(b) Check resistance of the EPS fuses.
OK:
Below 1 Ω

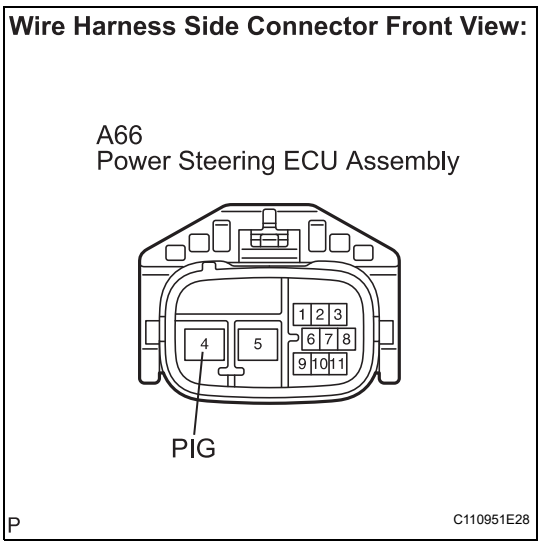
NG → **REPLACE FUSE**

OK

PS

2	CHECK HARNESS AND CONNECTOR (POWER STEERING ECU ASSEMBLY - BATTERY)

Wire Harness Side Connector Front View:



(a) Disconnect the A66 connector from the power steering ECU assembly.

(b) Measure the voltage according value(s) in the table below.

Standard voltage

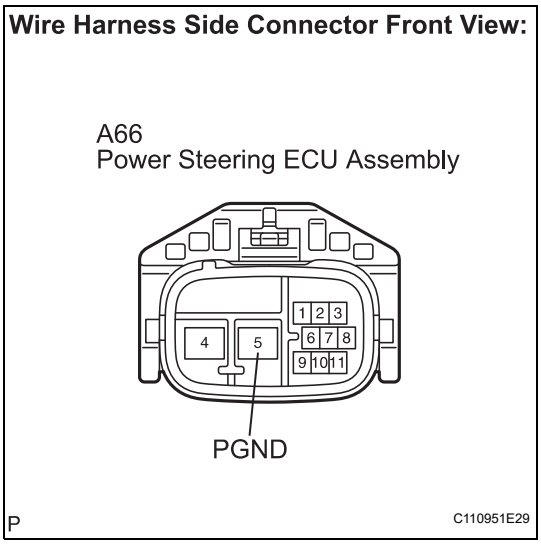
Tester Connection	Condition	Specified Condition
A66-4 (PIG) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK HARNESS AND CONNECTOR (POWER STEERING ECU ASSEMBLY - BODY GROUND)

Wire Harness Side Connector Front View:



(a) Measure the resistance according value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A66-5 (PGND) - Body ground	Always	Below 1 Ω

NOTICE:
If replacing the power steering ECU assembly, initialize the rotation angle sensor value and calibrate the torque sensor zero point (See page PS-13).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE POWER STEERING ECU ASSEMBLY (See page PS-68)

DTC	C1581	Assist Map Number Un-Writing

DESCRIPTION

The power steering ECU assembly outputs this DTC when it determines that the assist map is not written in the ECU.
HINT:
The assist map is data written in the power steering ECU assembly to control the degree of assistance. The assist map is selected based on the vehicle's specified communication data (designation and grade package information).

DTC No.	DTC Detection Item	Trouble Area
C1581	Assist map is not written in the power steering ECU assembly.	• Hybrid vehicle control ECU • Main body ECU (Instrument panel J/B) • Power steering ECU assembly

INSPECTION PROCEDURE

1 PERFORM ASSIST MAP WRITING

(a) Turn the power switch on (IG), and wait for 30 seconds or more.
HINT:
The assist map is automatically written when approximately 30 seconds have elapsed after the power switch is turned on (IG). DTC C1581 will be cleared after the assist map is written.
(b) Check for DTCs.
OK:
DTC C1581 is not output.

NG → **Go to step 2**

OK

END

2 CHECK CAN COMMUNICATION SYSTEM

(a) Using the intelligent tester, check for DTCs and confirm that there are no problems in the CAN communication system.
OK:
DTCs are not output.

NG → **GO TO CAN COMMUNICATION SYSTEM (See page CA-7)**

OK

3	CHECK HYBRID VEHICLE CONTROL ECU

(a) Check if the correct hybrid vehicle control ECU for the engine type and drivetrain of the vehicle is installed.
OK:
The correct hybrid vehicle control ECU is installed.

NG → **REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-570)**

OK

4	CHECK MAIN BODY ECU (INSTRUMENT PANEL J/B)

(a) Check if the correct main body ECU (instrument panel J/B) for the model and grade of the vehicle is installed.
OK:
The correct main body ECU (instrument panel J/B).
NOTICE:
If replacing the power steering ECU assembly, initialize the rotation angle sensor value and calibrate the torque sensor zero point (See page PS-13).

NG → **REPLACE MAIN BODY ECU (INSTRUMENT PANEL J/B)**

OK

REPLACE POWER STEERING ECU ASSEMBLY (See page PS-68)

DTC	U0073	Control Module Communication Bus OFF

DTC	U0100	Lost Communication with ECM/PCM "A"

DTC	U0129	Lost Communication with Skid Control ECU

DTC	U0293	Lost Communication with HV ECU

DESCRIPTION

The power steering ECU assembly receives signals from the hybrid vehicle control ECU, skid control ECU and steering control ECU via CAN communication.

DTC No.	DTC Detection Item	Inspection Area
U0073	CAN communication error (CAN bus is off)	CAN communication system
U0100	Hybrid vehicle control ECU communication error	• CAN communication system • Hybrid vehicle control ECU
U0129	Skid control ECU communication error	• CAN communication system • Skid control ECU
U0293	Hybrid vehicle control ECU communication error	• CAN communication system • Hybrid vehicle control ECU

HINT:

- When two or more DTCs starting with "U" are output simultaneously, inspect the connectors and wire harness of each ECU.
- If the power steering ECU assembly detects DTC U0129 only, it adjusts the amount of power assistance for driving at a speed of 100 km/h (62 mph) and continues system control.

INSPECTION PROCEDURE

Refer to the U0073 (CAN communication system) (See page CA-64).
Refer to the U0100 (CAN communication system) (See page CA-40).
Refer to the U0129 (CAN communication system) (See page CA-42).
Refer to the U0293 (CAN communication system) (See page CA-40).

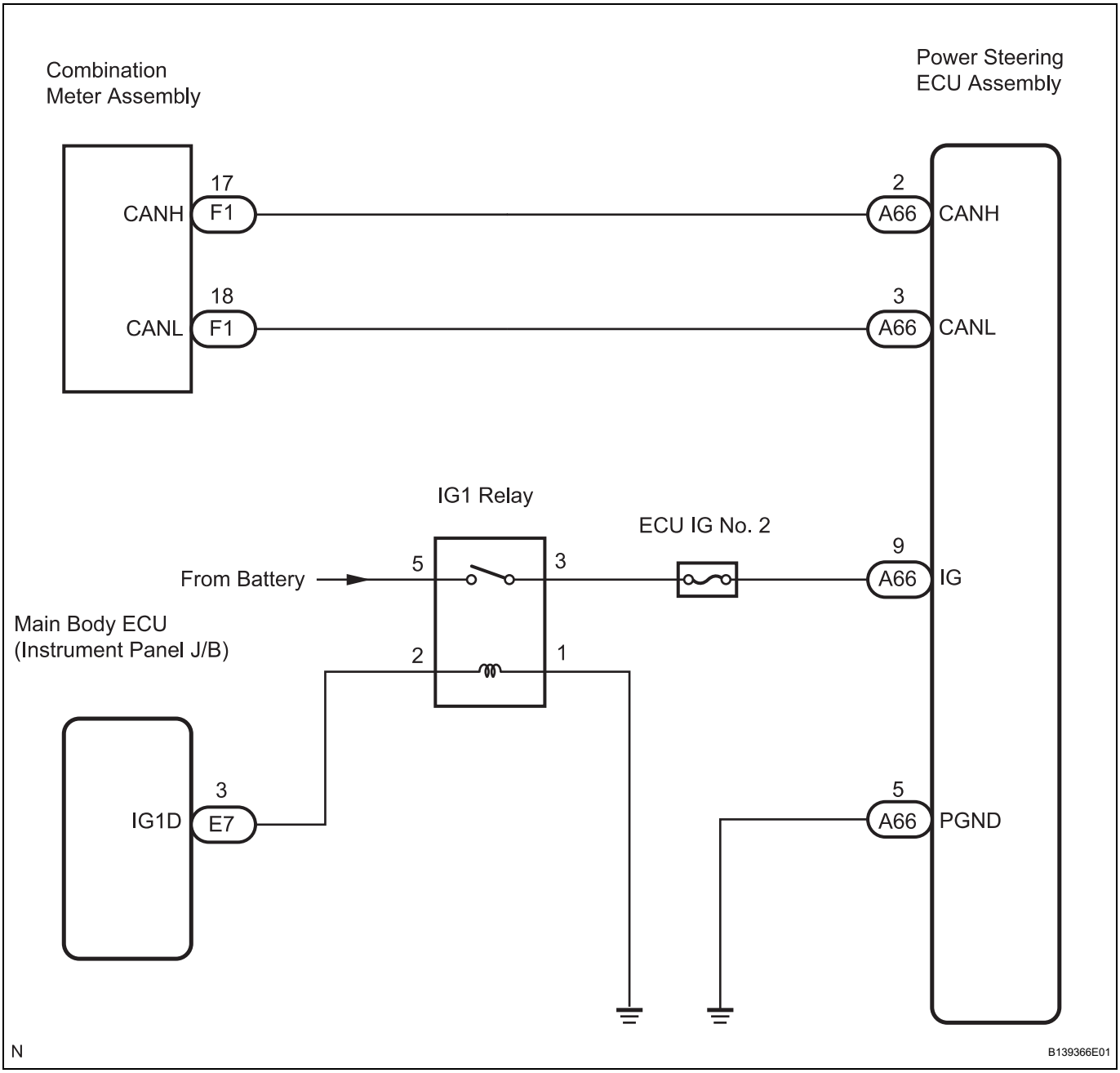
PS Warning Light Remains ON

DESCRIPTION

The power steering ECU is connected to the combination meter via CAN communication. If any of the following are detected, the PS warning light remains on.

- The power steering ECU connectors are disconnected from the power steering ECU.
- There is a malfunction in the power steering ECU internal circuit.
- There is an open in the harness between the combination meter and power steering ECU assembly.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR

(a) Check the indication of the PS warning light while wiggling the power steering ECU assembly connector and wire harness up and down, and right and left.
OK:
PS warning light indication does not change.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	INSPECT CAN COMMUNICATION SYSTEM

(a) Using the intelligent tester, check for DTCs and confirm that there are no problems in the CAN communication system.
OK:
DTCs are not output.

NG → **GO TO CAN COMMUNICATION SYSTEM (See page CA-7)**

OK

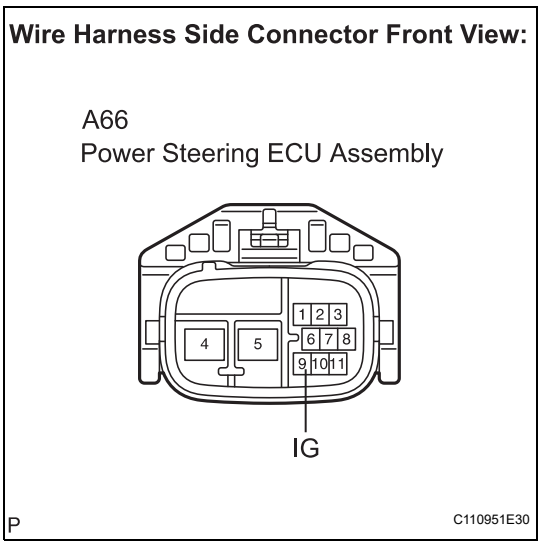
3	INSPECT FUSE

(a) Remove the ECU-IG LH fuse from the instrument panel J/B.
(b) Check the resistance of the ECU-IG LH fuse.
OK:
Below 1 Ω

NG → **REPLACE FUSE**

OK

4	INSPECT POWER STEERING ECU ASSEMBLY



(a) Disconnect the A66 connector from the power steering ECU assembly.
(b) Measure the voltage according to the value(s) in the table below.

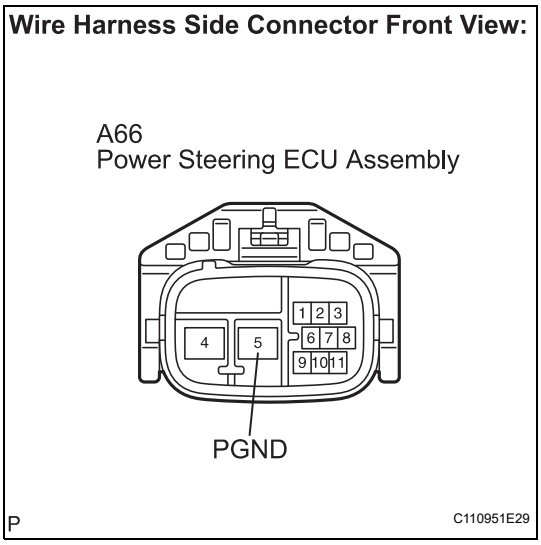
Standard voltage

Tester Connection	Condition	Specified Condition
A66-9 (IG) - Body ground	Power switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5	CHECK HARNESS AND CONNECTOR (POWER STEERING ECU ASSEMBLY - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

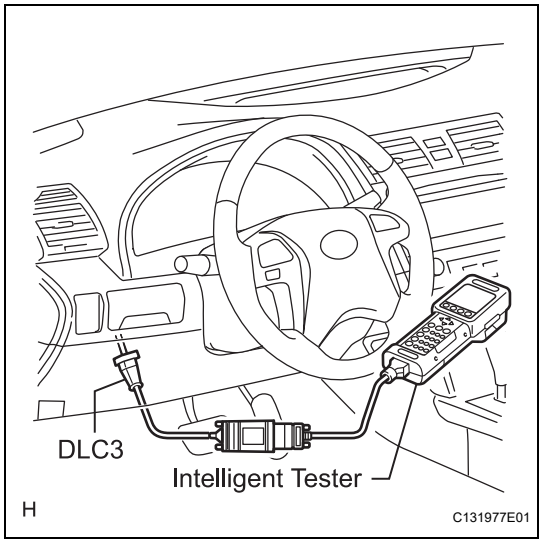
Standard resistance

Tester Connection	Condition	Specified Condition
A66-5 (PGND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6	INSPECT COMBINATION METER ASSEMBLY



(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the power switch on (IG).
(c) Perform the ACTIVE TEST according to the display on the tester.

METER:

Tester Display	Test Part	Control Range	Diagnostic Note
EPS INDIC	PS indicator light OFF/ON	OFF / ON	-

OK:
The PS warning light comes on or goes off according to the tester operation.
NOTICE:
If replacing the power steering ECU assembly, initialize the rotation angle sensor value and calibrate the torque sensor zero point (See page PS-13).

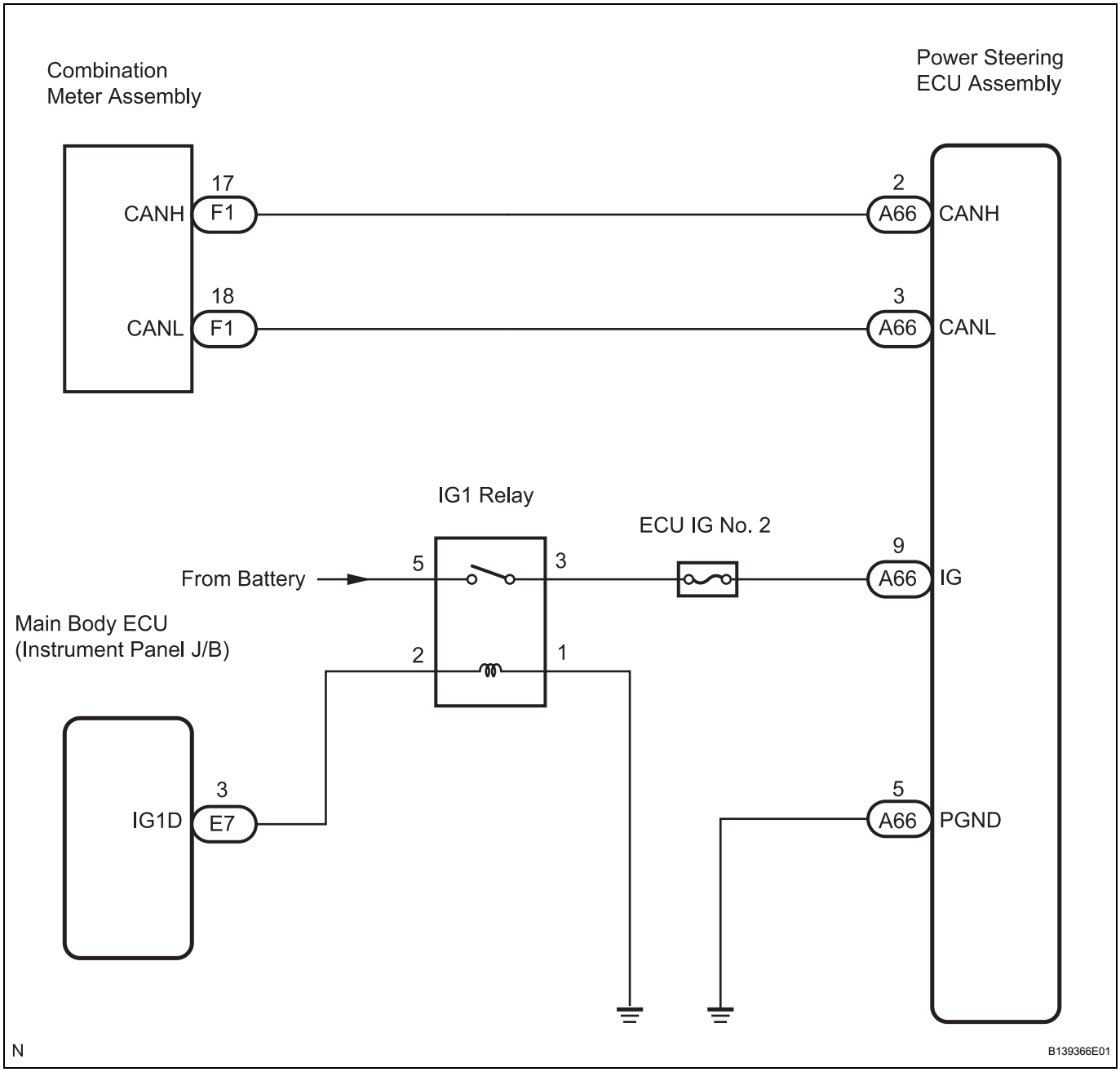
NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-64)**

OK

REPLACE POWER STEERING ECU ASSEMBLY (See page PS-68)

PS Warning Light does not Come ON

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT CAN COMMUNICATION SYSTEM

(a) Using the intelligent tester, check for DTCs and confirm that there are no problems in the CAN communication system.

OK:

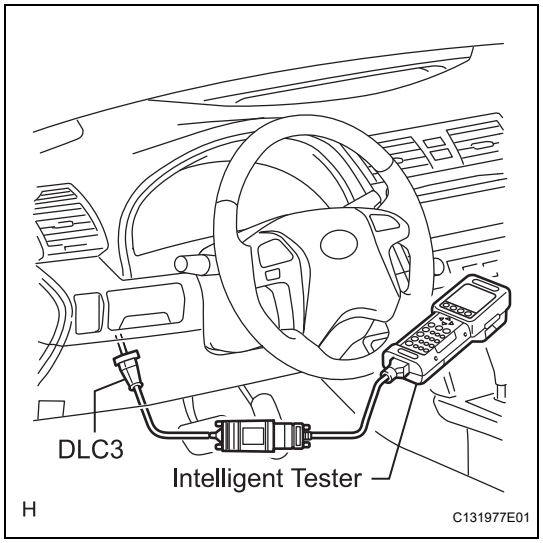
DTCs are not output.

PS

NG → **GO TO CAN COMMUNICATION SYSTEM (See page CA-7)**

OK

2	INSPECT COMBINATION METER ASSEMBLY



(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the power switch on (IG).
(c) Perform the ACTIVE TEST according to the display on the tester.

COMBINATION METER:

Tester Display	Test Part	Control Range	Diagnostic Note
EPS INDIC	PS indicator light OFF/ON	ON / OFF	-

OK:
The PS warning light comes on or goes off according to the tester operation.
NOTICE:
If replacing the power steering ECU assembly, initialize the rotation angle sensor value and calibrate the torque sensor zero point (See page PS-13).

NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-64)**

OK

REPLACE POWER STEERING ECU ASSEMBLY (See page PS-68)

REMOVAL

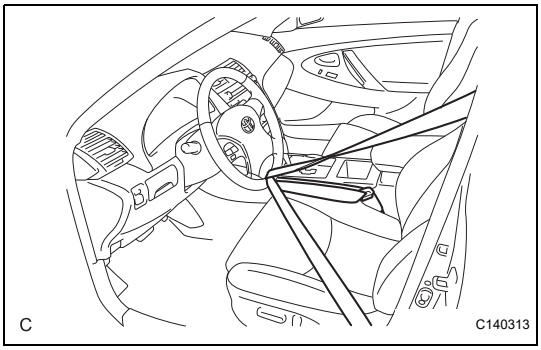
1. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

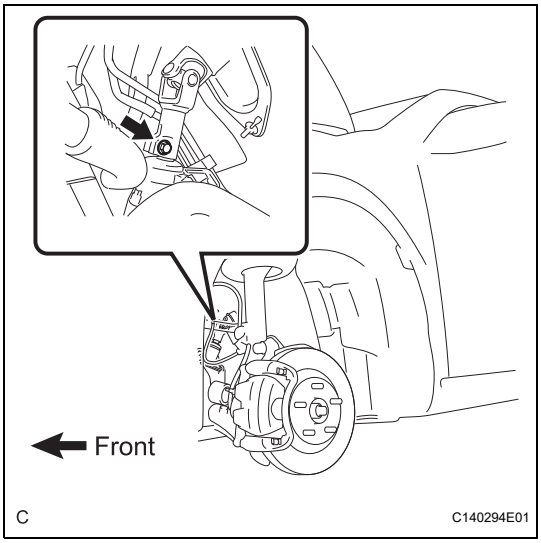
3. REMOVE FRONT WHEELS

4. SEPARATE STEERING INTERMEDIATE SHAFT ASSEMBLY

(a) Secure the steering wheel with the seat belt in order to prevent rotation.
HINT:
This operation is useful to prevent damage to the spiral cable.

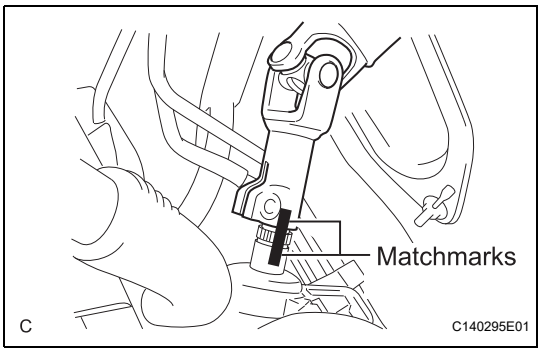


(b) Remove the bolt and slide the steering intermediate shaft assembly.
NOTICE:
Do not separate the steering intermediate shaft assembly from the power steering link assembly.



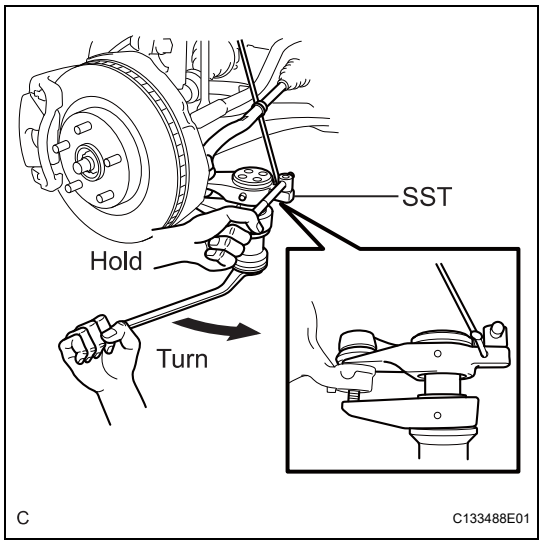
(c) Put matchmarks on the steering intermediate shaft assembly and the power steering link assembly.

(d) Separate the steering intermediate shaft assembly from the power steering link assembly.



5. SEPARATE TIE ROD ASSEMBLY LH

(a) Remove the cotter pin and the nut.



(b) Using SST, separate the tie rod assembly LH from the steering knuckle.
SST 09628-00011
NOTICE:
- **Hang SST with a string, etc. to prevent it from falling.**
- **Do not damage the front disc brake dust cover.**
- **Do not damage the ball joint dust cover.**
- **Do not damage the steering knuckle.**

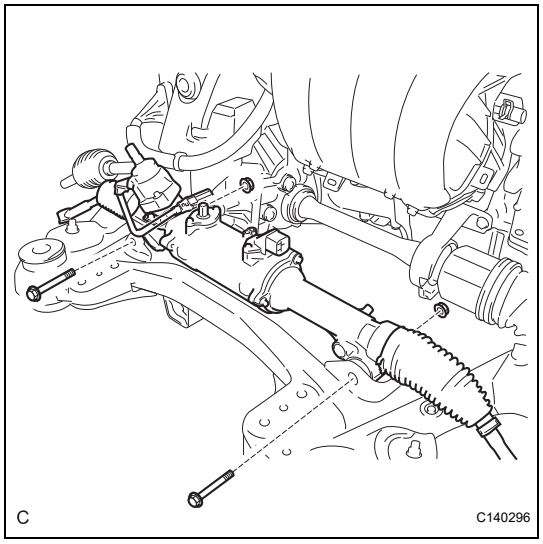
6. SEPARATE TIE ROD ASSEMBLY RH
SST 09628-00011
HINT:
Perform the same procedure as for the LH side.

7. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE
HINT:
Refer to the instructions for REMOVAL of the ENGINE ASSEMBLY (See page EM-89).

8. REMOVE NO. 1 FRONT STABILIZER BRACKET LH (See page SP-28)

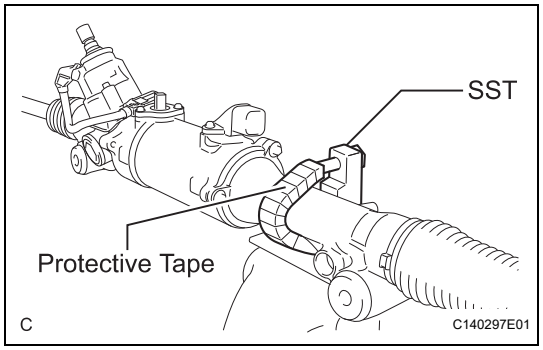
9. REMOVE NO. 1 FRONT STABILIZER BRACKET RH (See page SP-29)

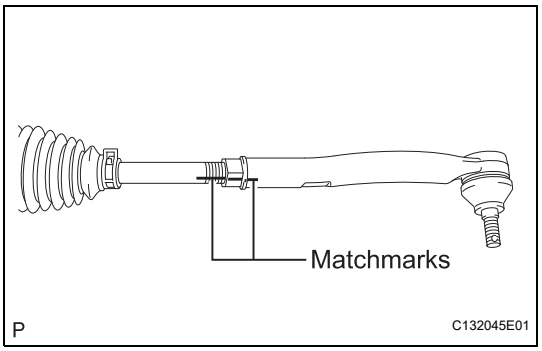
10. REMOVE POWER STEERING LINK ASSEMBLY
(a) Remove the 2 bolts, 2 nuts, and the power steering link assembly from the front frame assembly.
NOTICE:
Because the nut has its own stopper, do not turn the nut. Loosen the bolt with the nut fixed.

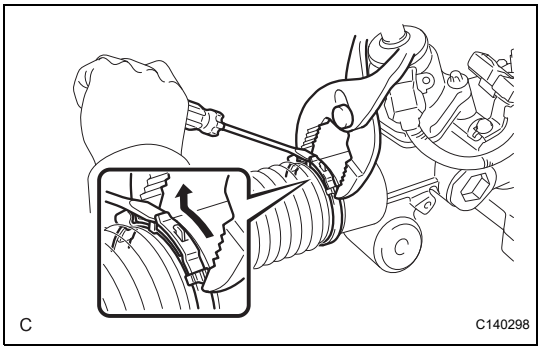


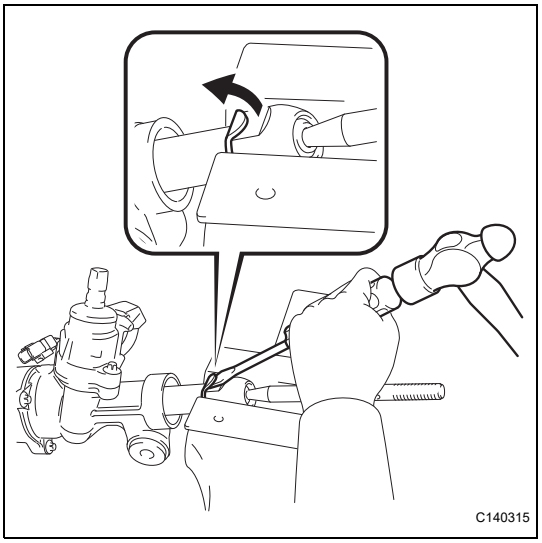
DISASSEMBLY

1. SECURE POWER STEERING LINK ASSEMBLY
(a) Using SST, secure the power steering link assembly.
SST 09612-00012
HINT:
Tape the SST before use.









2. REMOVE TIE ROD ASSEMBLY LH

(a) Put matchmarks on the tie rod assembly LH and the steering rack end sub-assembly.

(b) Loosen the lock nut, and remove the tie rod assembly LH and the lock nut.

3. REMOVE TIE ROD ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

4. REMOVE STEERING RACK BOOT CLIP

(a) Using pliers, remove the 2 steering rack boot clips.

5. REMOVE NO. 2 STEERING RACK BOOT CLAMP

(a) Using pliers and a screwdriver, remove the No. 2 steering rack boot clamp as shown in the illustration.

NOTICE:

Be careful not to damage the steering rack boot.

6. REMOVE NO. 1 STEERING RACK BOOT CLAMP

HINT:

Perform the same procedure as for the No. 2 steering rack boot clamp.

7. REMOVE NO. 2 STEERING RACK BOOT

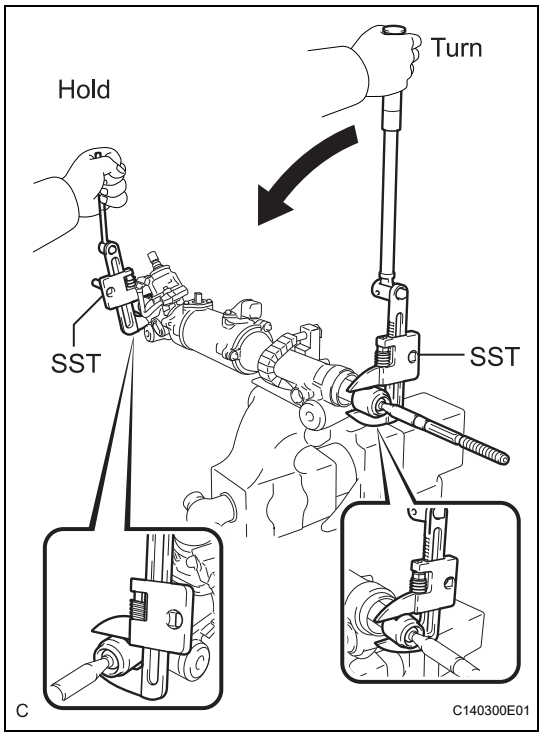
8. REMOVE NO. 1 STEERING RACK BOOT

9. REMOVE STEERING RACK END SUB-ASSEMBLY

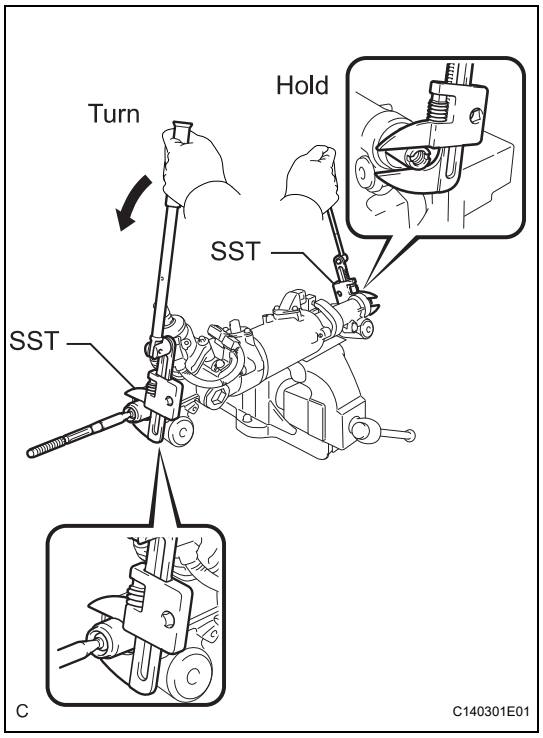
(a) Using a screwdriver and a hammer, unstake the RH and LH claw washers.

NOTICE:

Avoid any impact to the steering rack.



(b) Using SST, remove the steering rack end sub-assembly (RH side) and the claw washer.
SST 09922-10010
NOTICE:
Use SST 09922-10010 as shown in the illustration.



(c) Using SST, remove the steering rack end sub-assembly (LH side) and the claw washer.
SST 09922-10010
NOTICE:
Use SST 09922-10010 as shown in the illustration.
HINT:
Using SST, hold the rack and remove the steering rack end sub-assembly.

INSPECTION

1. INSPECT TIE ROD ASSEMBLY LH

(a) Secure the tie rod assembly LH in a vise.

(b) Install the nut to the stud bolt.

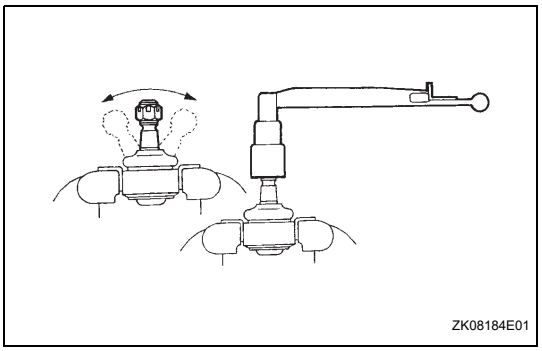
(c) Flip the ball joint back and forth 5 times or more.

(d) Using a torque wrench, turn the nut continuously at a rate of 3 to 5 seconds per turn and take the torque reading on the 5th turn.

Torque: Turning torque

0.98 to 3.92 N*m (10 to 40 kgf*cm, 8.7 to 34.7 in.*lbf)

If the turning torque is not within the specified range, replace the tie rod assembly LH.



2. INSPECT TIE ROD ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

3. INSPECT TOTAL PRELOAD

(a) Temporarily install the left and right steering rack ends to prevent steering rack over stroke.

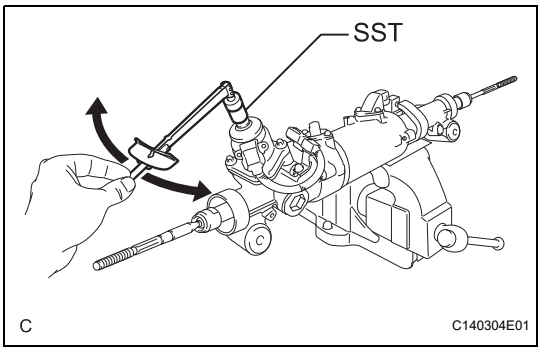
(b) Using SST and a torque wrench, inspect total preload.

SST 09616-00011

Torque: Preload (turning)

1.0 to 2.0 N*m (10 to 20 kgf*cm, 8.9 to 17.7 in.*lbf)

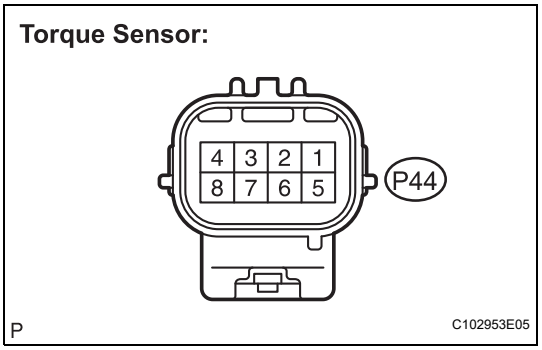
If the turning torque is not as specified, replace the power steering link assembly.



4. INSPECT POWER STEERING LINK ASSEMBLY (TORQUE SENSOR)

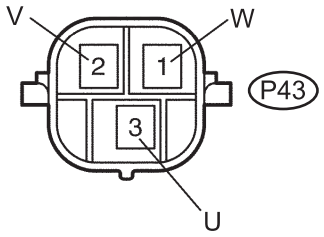
(a) Measure the resistance according to the value(s) in the table below.

Resistance



Tester connection (Symbols)	Condition	Specified condition
P44-1 (INCS) - P44-7 (TQG2)	Always	90 to 170 Ω
P44-2 (INSN) - P44-7 (TQG2)	Always	300 to 430 Ω
P44-4 (TRQV) - P44-8 (TQG1)	Always	4 to 14 Ω
P44-5 (OUCS) - P44-7 (TQG2)	Always	90 to 170 Ω
P44-6 (OUSN) - P44-7 (TQG2)	Always	300 to 430 Ω

Power Steering Motor:



P C110602E02

5. INSPECT POWER STEERING LINK ASSEMBLY (POWER STEERING MOTOR)

(a) Measure the resistance according to the value(s) in the table below.

Resistance

Tester connection (Symbols)	Condition	Specified condition
P43-3 (U) - P43-2 (V)	Always	Below 1 Ω
P43-2 (V) - P43-1 (W)	Always	Below 1 Ω
P43-1 (W) - P43-3 (U)	Always	Below 1 Ω

REASSEMBLY

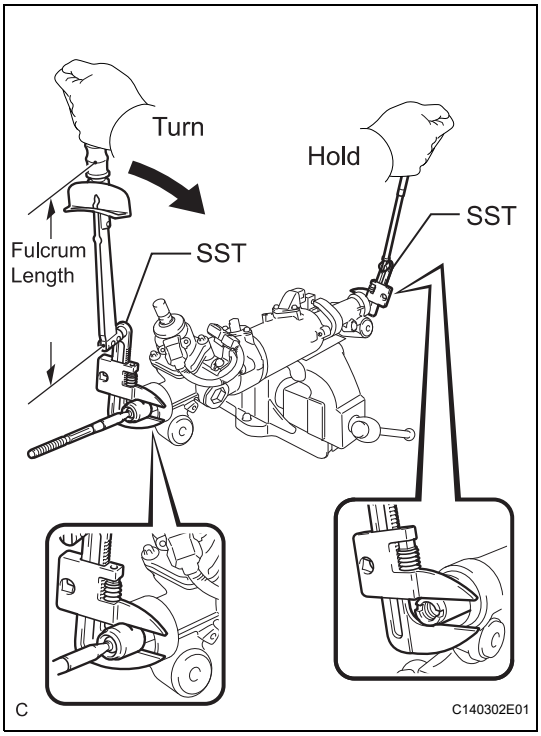
NOTICE:
When installing, coat the parts indicated by arrows with silicone grease (See page PS-56).

1. INSTALL STEERING RACK END SUB-ASSEMBLY

(a) Install 2 new claw washers.
HINT:
Align the claws of the claw washer with the steering rack grooves.

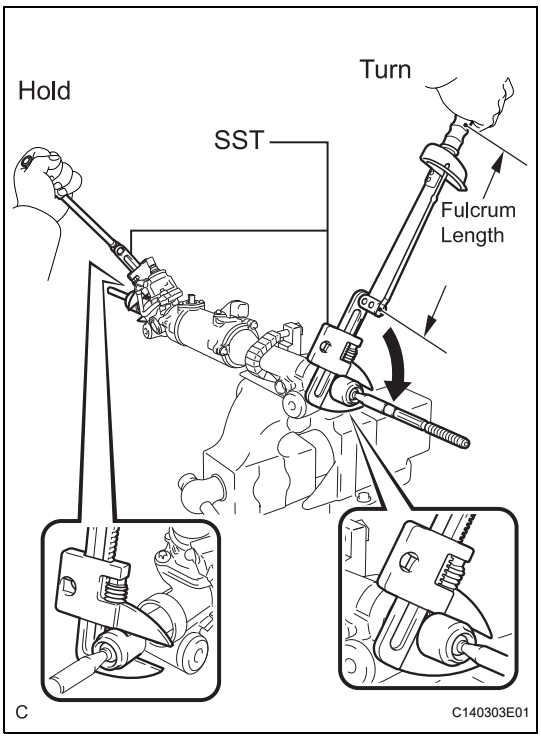
(b) Using SST, install the steering rack end sub-assembly (LH side).
SST 09922-10010
Torque: Without SST
103 N*m (1,050 kgf*cm, 76 ft.*lbf)
With SST
74 N*m (755 kgf*cm, 55 ft.*lbf)
NOTICE:
- **Use SST 09922-10010 as shown in the illustration.**
- **Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).**
- **This torque value is effective when SST is parallel to the torque wrench.**

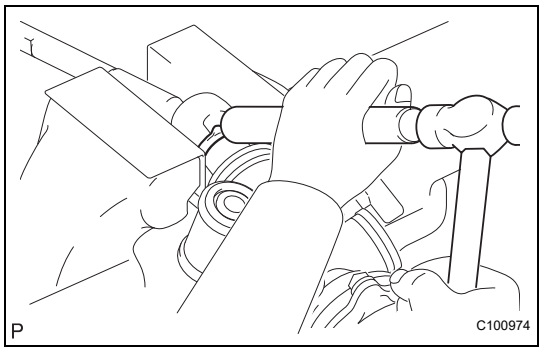
HINT:
Using SST, hold the steering rack and install the steering rack end sub-assembly.



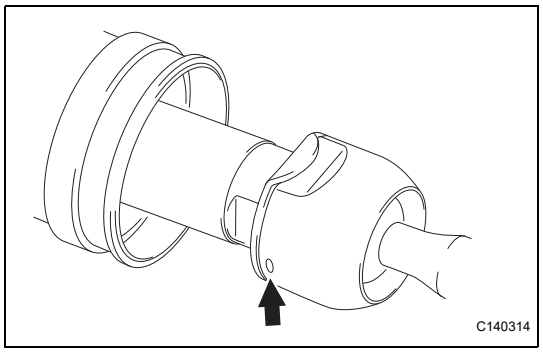
(c) Using SST, install the steering rack end sub-assembly (RH side).
SST 09922-10010
Torque: Without SST
103 N*m (1,050 kgf*cm, 76 ft.*lbf)
With SST
74 N*m (755 kgf*cm, 55 ft.*lbf)
NOTICE:
- **Use SST 09922-10010 as shown in the illustration.**
- **Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).**
- **This torque value is effective when SST is parallel to the torque wrench.**

HINT:
Using SST, hold the steering rack and install the steering rack end sub-assembly.

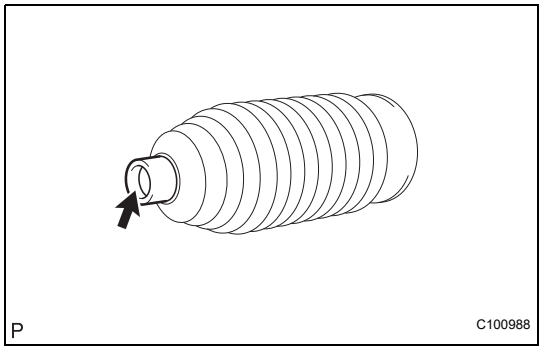




(d) Using a brass bar and a hammer, stake the 2 claw washers.
NOTICE:
Avoid any impact to the steering rack.

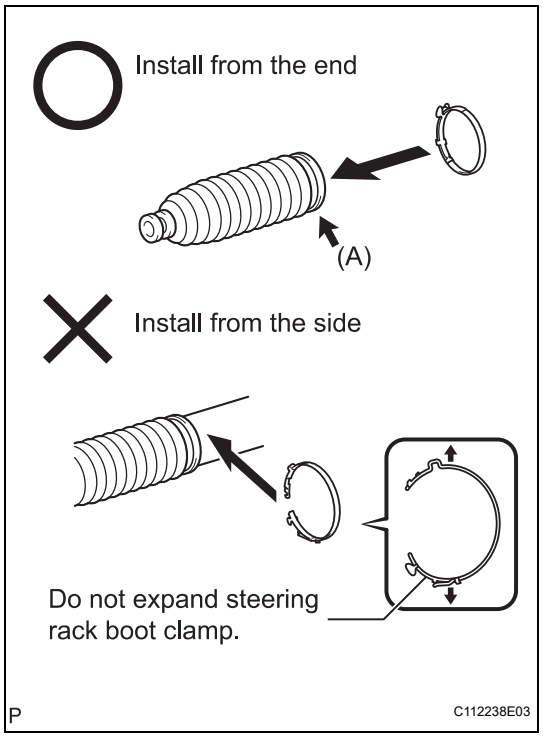


(e) Ensure that the holes of the rack ends are not clogged with grease.
HINT:
If the hole is clogged, the pressure inside the boot will change after it is assembled and the steering wheel is turned.



2. INSTALL NO. 2 STEERING RACK BOOT

(a) Apply silicone grease to the inside of the small opening of the No. 2 steering rack boot.



(b) Temporarily install a new No. 2 steering rack boot clamp to the large opening of the No. 2 steering rack boot at the position shown by arrow (A).
NOTICE:
- **Use a new No. 2 steering rack boot clamp.**
- **Do not expand the No. 2 steering rack boot clamp more than necessary for installation.**
- **Do not deform the No. 2 steering rack boot clamp.**
- **Tightening force of the No. 1 steering rack boot clamp becomes uneven if it is installed after being expanded as shown in the illustration. As a result, rust is caused by water entering from the clearance between the boot and rack housing, causing a malfunction.**
- **Use only the supply parts which are applicable to the vehicle to secure the boot.**

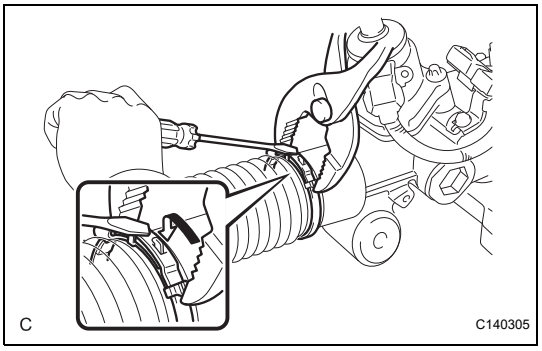
HINT:
After disengaging the claw of a new No. 2 steering rack boot clamp, temporarily install it from the end without expanding the clamp diameter more than necessary.

(c) Install the No. 2 rack boot to the groove on the rack housing.

NOTICE:
- **Be careful not to damage or twist the boot.**
- **Do not damage the No. 2 steering rack boot.**
- **Ensure that the No. 2 steering rack boot clamp is installed before installing the No. 2 steering rack boot to the rack housing.**

3. INSTALL NO. 1 STEERING RACK BOOT

HINT:
Perform the same procedure as for the No. 2 steering rack boot.



4. INSTALL NO. 2 STEERING RACK BOOT CLAMP

(a) Using pliers and a screwdriver, install the No. 2 steering rack boot clamp.

NOTICE:
- **Be careful not to damage the No. 2 steering rack boot.**
- **Do not twist the No. 2 steering rack boot.**

5. INSTALL NO. 1 STEERING RACK BOOT CLAMP

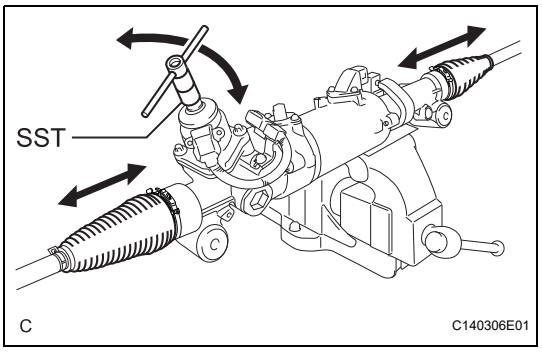
HINT:
Perform the same procedure as for the No. 2 steering rack boot clamp.

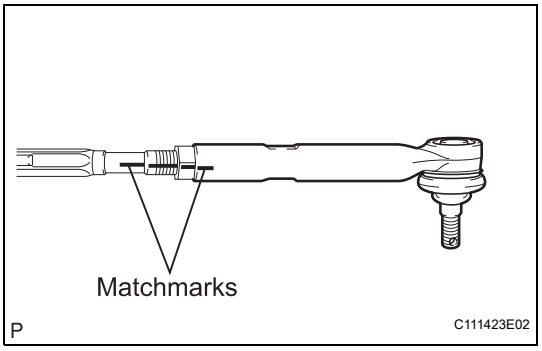
6. INSTALL STEERING RACK BOOT CLIP

(a) Using pliers, install the 2 boot clips.

(b) Using SST, turn the pinion and check that the rack boots expand and contract smoothly.

SST 09616-00011





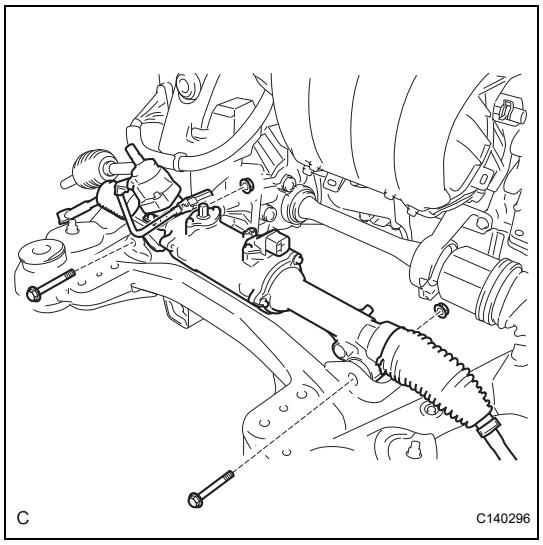
7. INSTALL TIE ROD ASSEMBLY LH

(a) Install the lock nut and the tie rod assembly LH to the steering rack end sub-assembly until the matchmarks are aligned.

HINT:
After adjusting toe-in, tighten the lock nut.

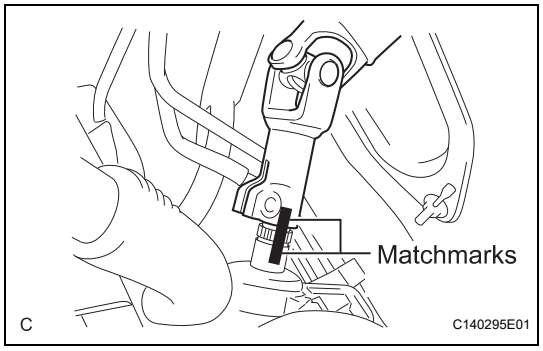
8. INSTALL TIE ROD ASSEMBLY RH

HINT:
Perform the same procedure as for the LH side.

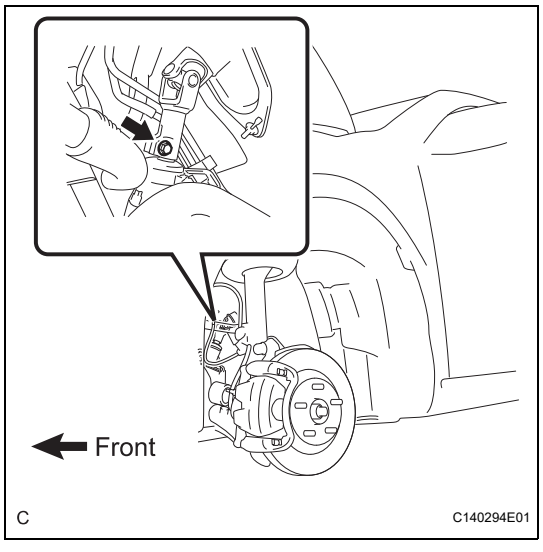


INSTALLATION

1. **INSTALL POWER STEERING LINK ASSEMBLY**
   (a) Install the power steering link assembly with the 2 bolts and 2 nuts.
   Torque: 70 N*m (714 kgf*cm, 52 ft.*lbf)
   NOTICE:
   Because the nut has its own stopper, do not turn the nut. Tighten the bolt with the nut fixed.
2. **INSTALL FRONT STABILIZER BAR (See page SP-30)**
3. **INSTALL ENGINE ASSEMBLY WITH TRANSAXLE**
   HINT:
   Refer to the instructions for INSTALLATION of the ENGINE ASSEMBLY (See page EM-102).
4. **CONNECT TIE ROD ASSEMBLY LH**
   (a) Connect the tie rod assembly LH to the steering knuckle with the nut.
   Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)
   (b) Install a new cotter pin.
   NOTICE:
   Further tighten the nut up to 60° if the holes for the cotter pin are not aligned.
5. **CONNECT TIE ROD ASSEMBLY RH**
   HINT:
   Perform the same procedure as for the LH side.
6. **CONNECT STEERING INTERMEDIATE SHAFT ASSEMBLY**
   (a) Align the matchmarks on the steering intermediate shaft assembly and the power steering link assembly.

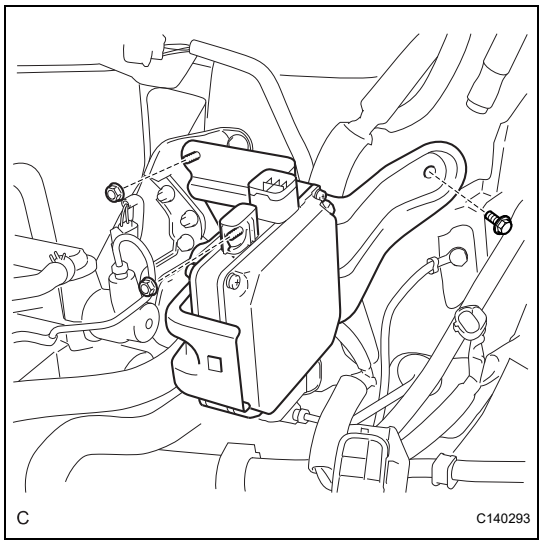


   (b) Install the bolt.
   Torque: 35 N*m (360 kgf*cm, 26 ft.*lbf)
7. **INSTALL FRONT WHEELS**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
8. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
9. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
10. **INSPECT AND ADJUST FRONT WHEEL ALIGNMENT**
    HINT:
    (See page SP-4)



11. **PERFORM INITIALIZATION**
NOTICE:
Some systems need initialization after reconnecting the cable to the negative battery terminal (See page IN-43).

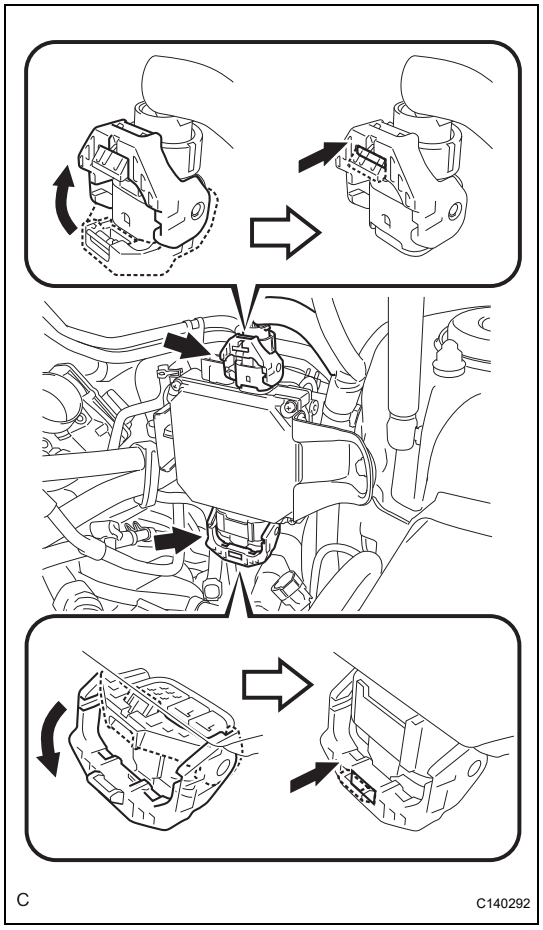
12. **INITIALIZE ROTATION ANGLE SENSOR AND CALIBRATE TORQUE SENSOR ZERO POINT**
HINT:
(See page PS-13)



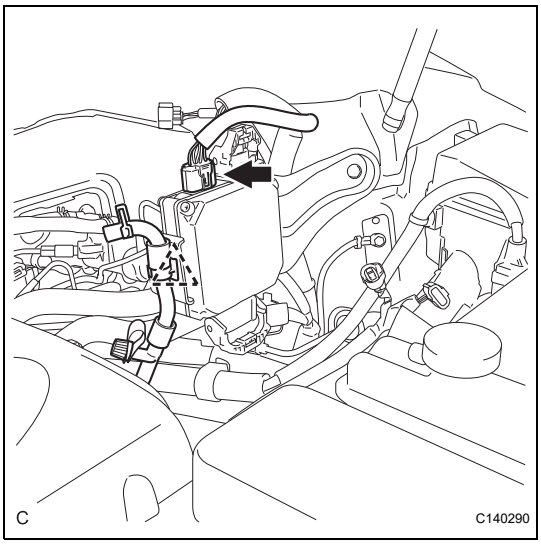
INSTALLATION

1. INSTALL POWER STEERING ECU ASSEMBLY

(a) Install the power steering ECU assembly with the bolt and 2 nus.
Torque: 8.5 N*m (87 kgf*cm, 75 in.*lbf)



(b) Connect the 2 power steering ECU assembly connectors and securely lock the connectors as shown in the illustration.



(c) Connect the connector and install the hose clamp to the power steering ECU assembly.

2. **INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-405)**
3. **INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-13)**
4. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-14)**
5. **INSTALL FRONT FENDER TO COWL SIDE SEAL RH (See page WW-14)**
6. **INSTALL FRONT FENDER TO COWL SIDE SEAL LH (See page WW-14)**
7. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-14)**
8. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-15)**
9. **INSTALL BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY (See page BR-33)**
10. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-113)**
11. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-398)**
12. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-113)**
13. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
14. **PERFORM INITIALIZATION**
    NOTICE:
    Some systems need initialization after reconnecting the cable to the negative battery terminal (See page IN-43).
15. **INITIALIZE ROTATION ANGLE SENSOR AND CALIBRATE TORQUE SENSOR ZERO POINT**
    HINT:
    (See page PS-13)

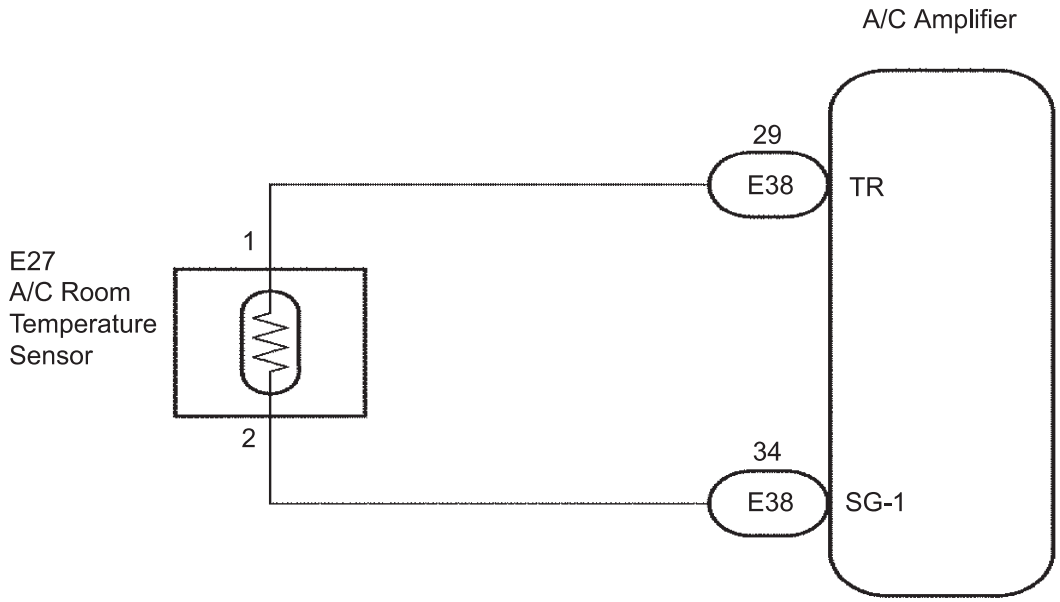
DTC	B1411/11	Room Temperature Sensor Circuit

DESCRIPTION

This sensor detects the cabin temperature that is used as the basis for temperature control and sends a signal to the A/C amplifier.

DTC No.	DTC Detection Condition	Trouble Area
B1411/11	Room temperature sensor circuit (Open or short)	• A/C room temperature sensor • Harness or connector between A/C room temperature sensor and A/C amplifier • A/C amplifier

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.

(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

DATA LIST / AIR CONDITIONER:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
ROOM TEMP (Room temperature sensor)	Room temperature sensor / Min.: -6.5°C (20.3°F), Max.: 57.25°C (135.05°F)	Actual cabin temperature is displayed	-

OK:

The display is as specified in the normal condition column.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

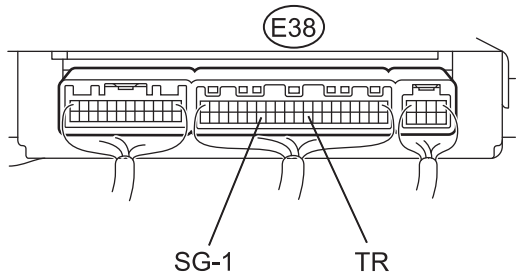
B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

2 INSPECT AIR CONDITIONING AMPLIFIER

Air Conditioning Amplifier Connector Wire Harness View:



(a) Remove the A/C amplifier with the connectors still connected.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
E38-29 (TR) - E38-34 (SG-1)	Power switch on (IG) at 25°C (77°F)	1.35 to 1.75 V
E38-29 (TR) - E38-34 (SG-1)	Power switch on (IG) at 40°C (104°F)	0.9 to 1.2 V

HINT:

As the temperature increases, the voltage decreases.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

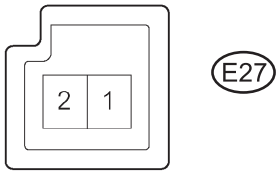
C → REPLACE AIR CONDITIONING AMPLIFIER

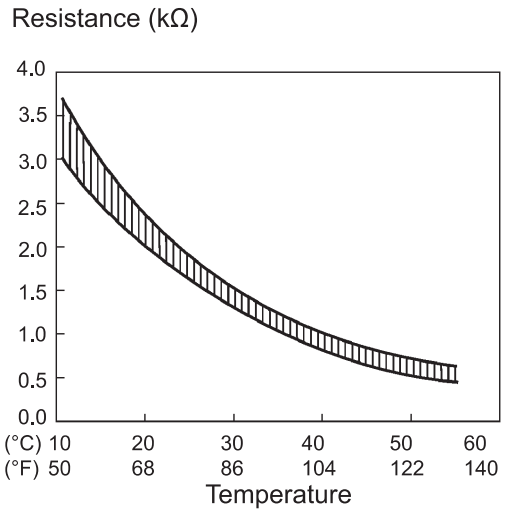
AC

A

3 INSPECT A/C ROOM TEMPERATURE SENSOR

A/C Room Temperature Sensor Connector Front View:





(a) Remove the A/C room temperature sensor.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E27-1 - E27-2	10°C (50°F)	3.00 to 3.73 kΩ
E27-1 - E27-2	15°C (59°F)	2.45 to 2.88 kΩ
E27-1 - E27-2	20°C (68°F)	1.95 to 2.30 kΩ
E27-1 - E27-2	25°C (77°F)	1.60 to 1.80 kΩ
E27-1 - E27-2	30°C (86°F)	1.28 to 1.47 kΩ
E27-1 - E27-2	35°C (95°F)	1.00 to 1.22 kΩ
E27-1 - E27-2	40°C (104°F)	0.80 to 1.00 kΩ
E27-1 - E27-2	45°C (113°F)	0.65 to 0.85 kΩ
E27-1 - E27-2	50°C (122°F)	0.50 to 0.70 kΩ
E27-1 - E27-2	55°C (131°F)	0.44 to 0.60 kΩ
E27-1 - E27-2	60°C (140°F)	0.36 to 0.50 kΩ

NOTICE:
- **Hold the sensor only by its connector. Touching the sensor may change the resistance value.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

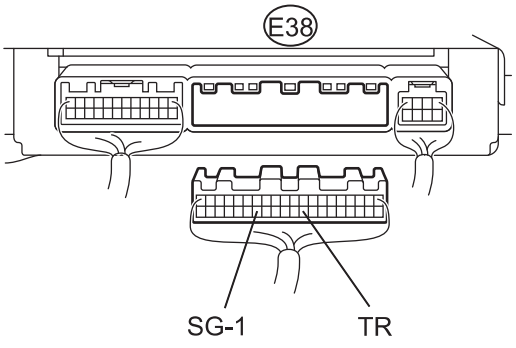
HINT:
As the temperature increases, the resistance decreases (see the graph).

NG → **REPLACE A/C ROOM TEMPERATURE SENSOR**

OK

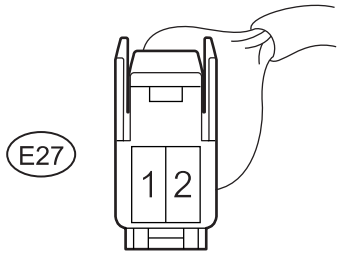
4	CHECK HARNESS AND CONNECTOR (A/C ROOM TEMPERATURE SENSOR - AIR CONDITIONING AMPLIFIER)

A/C Amplifier Connector Wire Harness View:



(a) Disconnect the connector from the A/C amplifier.

A/C Room Temperature Sensor Connector Front View:



(b) Disconnect the connector from the A/C room temperature sensor.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E38-29 (TR) - E27-1	Always	Below 1 Ω
E38-34 (SG-1) - E27-2	Always	Below 1 Ω
E38-29 (TR) - Body ground	Always	10 kΩ or higher
E38-34 (SG-1) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER

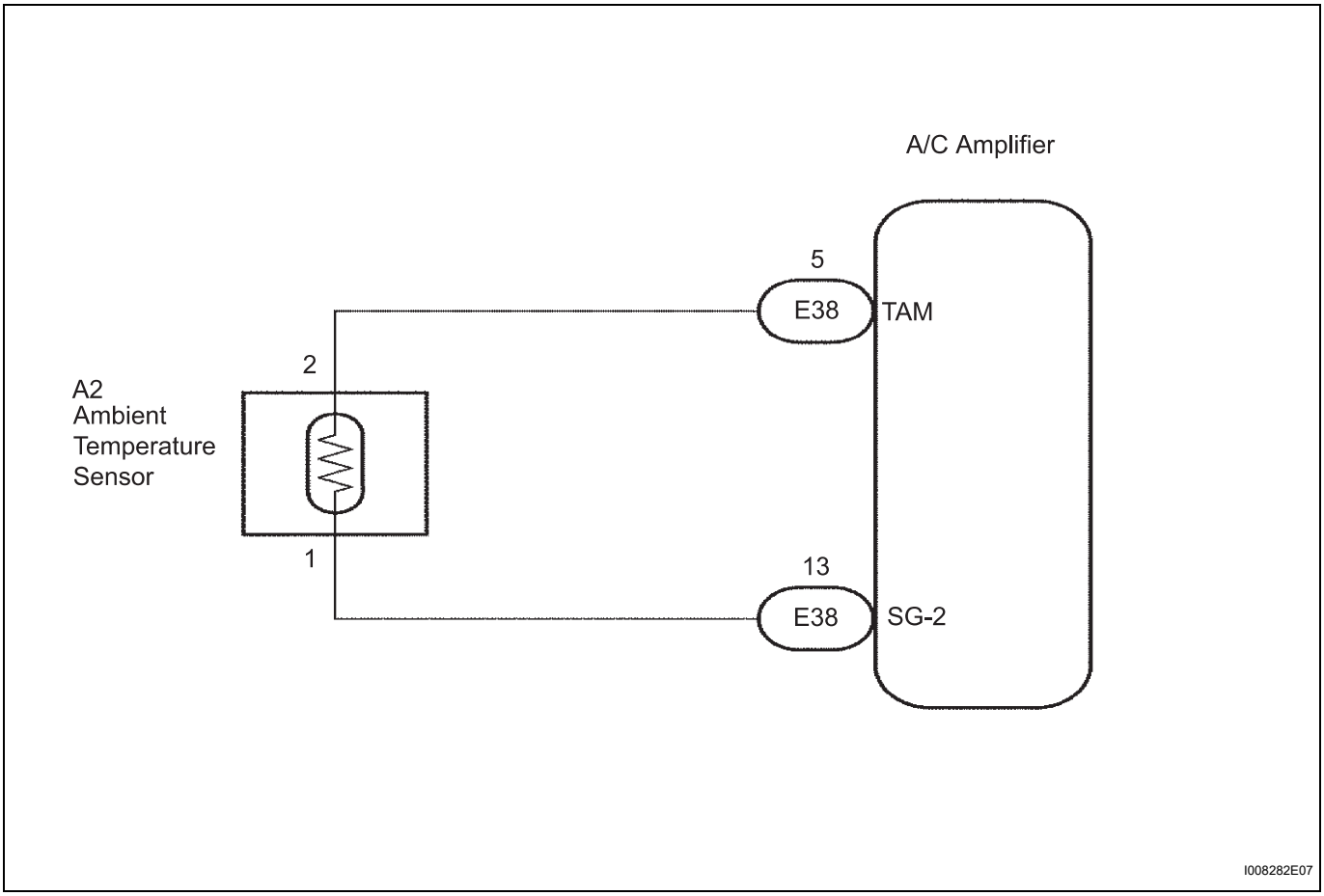
DTC	B1412/12	Ambient Temperature Sensor Circuit

DESCRIPTION

The ambient temperature sensor is installed in front of the condenser to detect the ambient temperature which is used to control the air conditioner "AUTO" mode. This sensor is connected to the A/C amplifier and detects fluctuations in the ambient temperature. This data is used for controlling the cabin temperature. The sensor sends a signal to the A/C amplifier. The resistance of the ambient temperature sensor changes in accordance with the ambient temperature. As the temperature decreases, the resistance increases. As the temperature increases, the resistance decreases.
The A/C amplifier applies voltage (5 V) to the ambient temperature sensor and reads voltage changes as the resistance of the ambient temperature sensor changes.

DTC No.	DTC Detection Condition	Trouble Area
B1412/12	Open or short in ambient temperature sensor circuit	• Ambient temperature sensor • Harness or connector between ambient temperature sensor and A/C amplifier • A/C amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

AC

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

DATA LIST / AIR CONDITIONER:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
AMBI TEMP SENS (Ambient temperature sensor)	Ambient temperature sensor / Min: -23.3°C (-9.94°F), Max: 65.95°C (150.71°F)	Actual ambient temperature is displayed	Open in circuit: -23.3°C (-9.94°F) Short in circuit: 65.95°C (150.71°F)

OK:
The display is as specified in the normal condition column.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

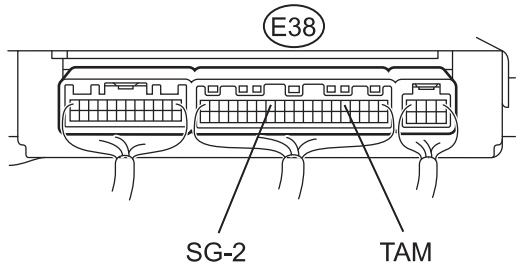
B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

2 INSPECT AIR CONDITIONING AMPLIFIER

Air Conditioning Amplifier Connector Wire Harness View:



(a) Remove the A/C amplifier with the connectors still connected.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
E38-5 (TAM) - E38-13 (SG-2)	Power switch on (IG) at 25°C (77°F)	1.35 to 1.75 V
E38-5 (TAM) - E38-13 (SG-2)	Power switch on (IG) at 40°C (104°F)	0.9 to 1.2 V

HINT:
As the temperature increases, the voltage decreases.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

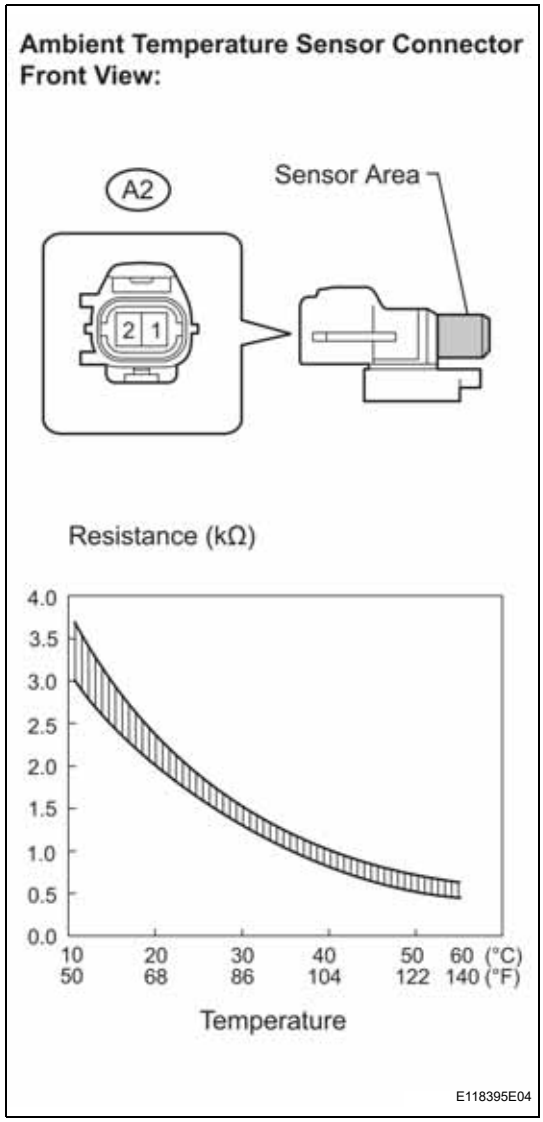
B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

AC

A

3	INSPECT AMBIENT TEMPERATURE SENSOR



(a) Remove the ambient temperature sensor.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A2-1 - A2-2	10°C (50°F)	3.00 to 3.73 kΩ
A2-1 - A2-2	15°C (59°F)	2.45 to 2.88 kΩ
A2-1 - A2-2	20°C (68°F)	1.95 to 2.30 kΩ
A2-1 - A2-2	25°C (77°F)	1.60 to 1.80 kΩ
A2-1 - A2-2	30°C (86°F)	1.28 to 1.47 kΩ
A2-1 - A2-2	35°C (95°F)	1.00 to 1.22 kΩ
A2-1 - A2-2	40°C (104°F)	0.80 to 1.00 kΩ
A2-1 - A2-2	45°C (113°F)	0.65 to 0.85 kΩ
A2-1 - A2-2	50°C (122°F)	0.50 to 0.70 kΩ
A2-1 - A2-2	55°C (131°F)	0.44 to 0.60 kΩ
A2-1 - A2-2	60°C (140°F)	0.36 to 0.50 kΩ

NOTICE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

HINT:

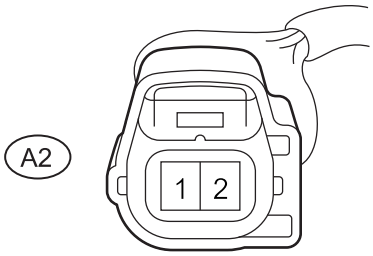
As the temperature increases, the resistance decreases (see the graph).

NG → **REPLACE AMBIENT TEMPERATURE SENSOR**

OK

4	CHECK HARNESS AND CONNECTOR (AMBIENT TEMPERATURE SENSOR - A/C AMPLIFIER)

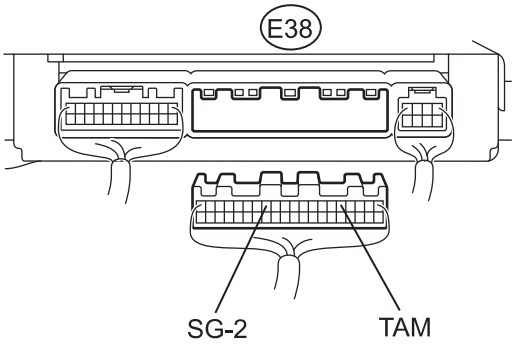
Ambient Temperature Sensor Connector Front View:



H E124473E02

(a) Disconnect the ambient temperature sensor connector.

Air Conditioning Amplifier Connector Wire Harness View:



H E124470E03

(b) Disconnect the A/C amplifier connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
A2-2 - E38-5 (TAM)	Always	Below 1 Ω
A2-1 - E38-13 (SG-2)	Always	Below 1 Ω
E38-5 (TAM) - Body ground	Always	10 kΩ or higher
E38-13 (SG-2) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER

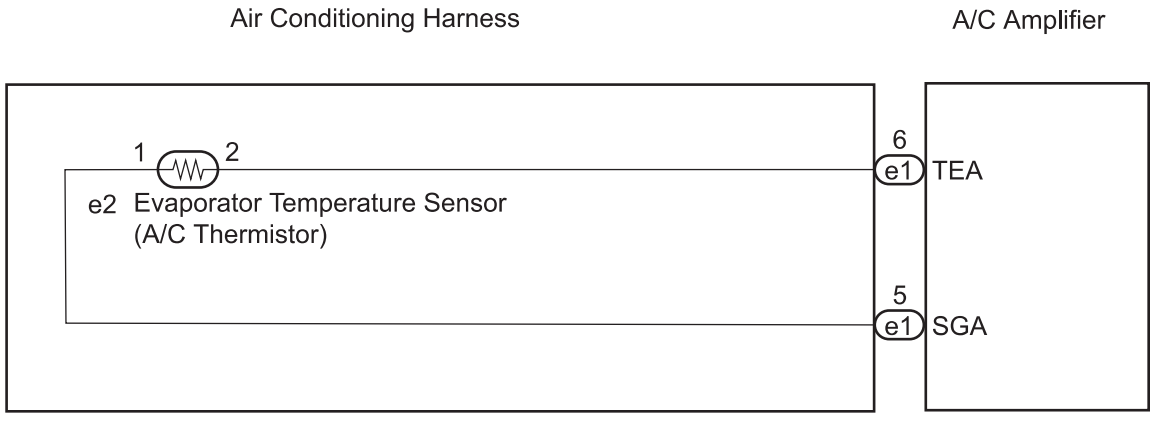
DTC	B1413/13	Evaporator Temperature Sensor Circuit

DESCRIPTION

The evaporator temperature sensor (A/C thermistor) is installed on the evaporator in the air conditioning unit. It detects the temperature of the cooled air that has passed through the evaporator and its signal is used to control the air conditioning. It sends a signal to the A/C amplifier. The resistance of the evaporator temperature sensor (A/C thermistor) changes in accordance with the temperature of the cooled air that has passed through the evaporator. As the temperature decreases, the resistance increases. As the temperature increases, the resistance decreases.
The A/C amplifier applies voltage (5 V) to the evaporator temperature sensor (A/C thermistor) and reads voltage changes as the resistance of the evaporator temperature sensor (A/C thermistor) changes. This sensor is used to prevent the evaporator from freezing.

DTC No.	DTC Detection Condition	Trouble Area
B1413/13	Open or short in evaporator temperature sensor circuit	• Evaporator temperature sensor • Air conditioning harness • A/C amplifier

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.

AC

(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

DATA LIST / AIR CONDITIONER:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
EVAP FIN TEMP (Evaporator fin thermistor)	Evaporator fin thermistor / Min.: -29.7°C (-21.46°F), Max.: 59.55°C (139.19°F)	Actual evaporator temperature is displayed	Open in circuit: -29.7°C (-21.46°F) Short in circuit: 59.55°C (139.19°F)

OK:

The display is as specified in the normal condition column.

Result

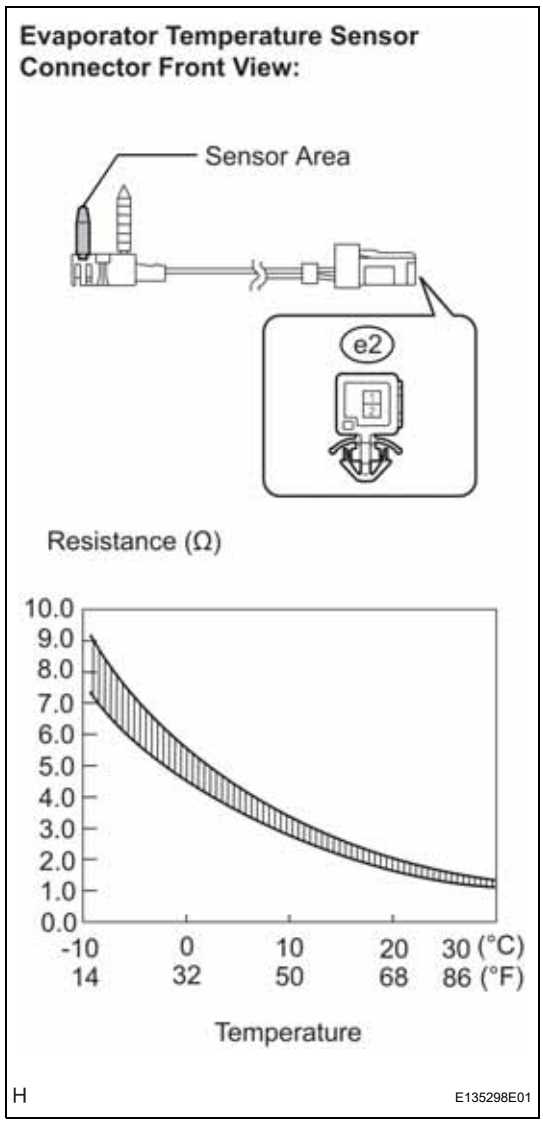
Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

2	INSPECT EVAPORATOR TEMPERATURE SENSOR



(a) Disconnect the connector from the evaporator temperature sensor.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
e2-1 - e2-2	-10°C (14°F)	7.30 to 9.10 kΩ
e2-1 - e2-2	-5°C (23°F)	5.65 to 6.95 kΩ
e2-1 - e2-2	0°C (32°F)	4.40 to 5.35 kΩ
e2-1 - e2-2	5°C (41°F)	3.40 to 4.15 kΩ
e2-1 - e2-2	10°C (50°F)	2.70 to 3.25 kΩ
e2-1 - e2-2	15°C (59°F)	2.14 to 2.58 kΩ
e2-1 - e2-2	20°C (68°F)	1.71 to 2.05 kΩ
e2-1 - e2-2	25°C (77°F)	1.38 to 1.64 kΩ
e2-1 - e2-2	30°C (86°F)	1.11 to 1.32 kΩ

NOTICE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

HINT:

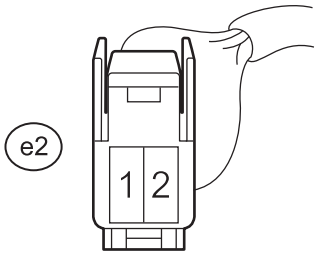
As the temperature increases, the resistance decreases (see the graph).

NG → **REPLACE EVAPORATOR TEMPERATURE SENSOR**

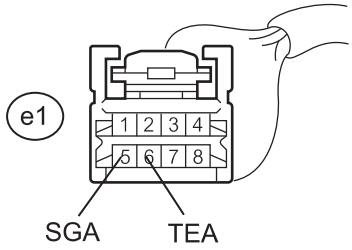
OK

3	INSPECT AIR CONDITIONING HARNESS

Evaporator Temperature Sensor Connector Front View:



Air Conditioning Amplifier Connector Front View:



E135297E01

(a) Remove the air conditioning harness.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
e1-6 (TEA) - e2-2	Always	Below 1 Ω
e1-5 (SGA) - e2-1	Always	Below 1 Ω
e1-6 (TEA) - Body ground	Always	10 kΩ or higher
e1-5 (SGA) - Body ground	Always	10 kΩ or higher

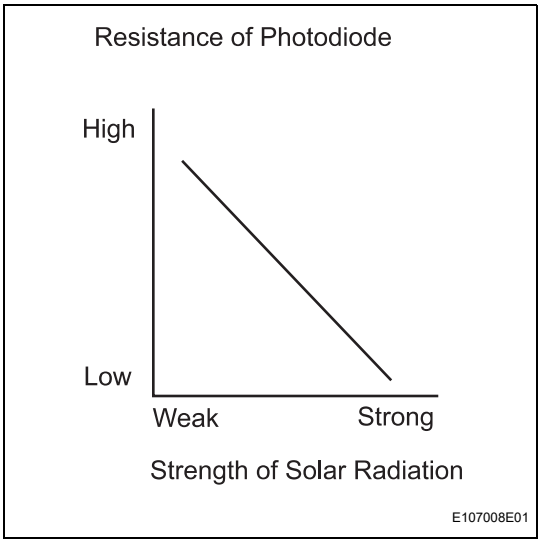
NG → REPLACE AIR CONDITIONING HARNESS

OK

REPLACE AIR CONDITIONING AMPLIFIER

DTC	B1421/21	Solar Sensor Circuit (Passenger Side)

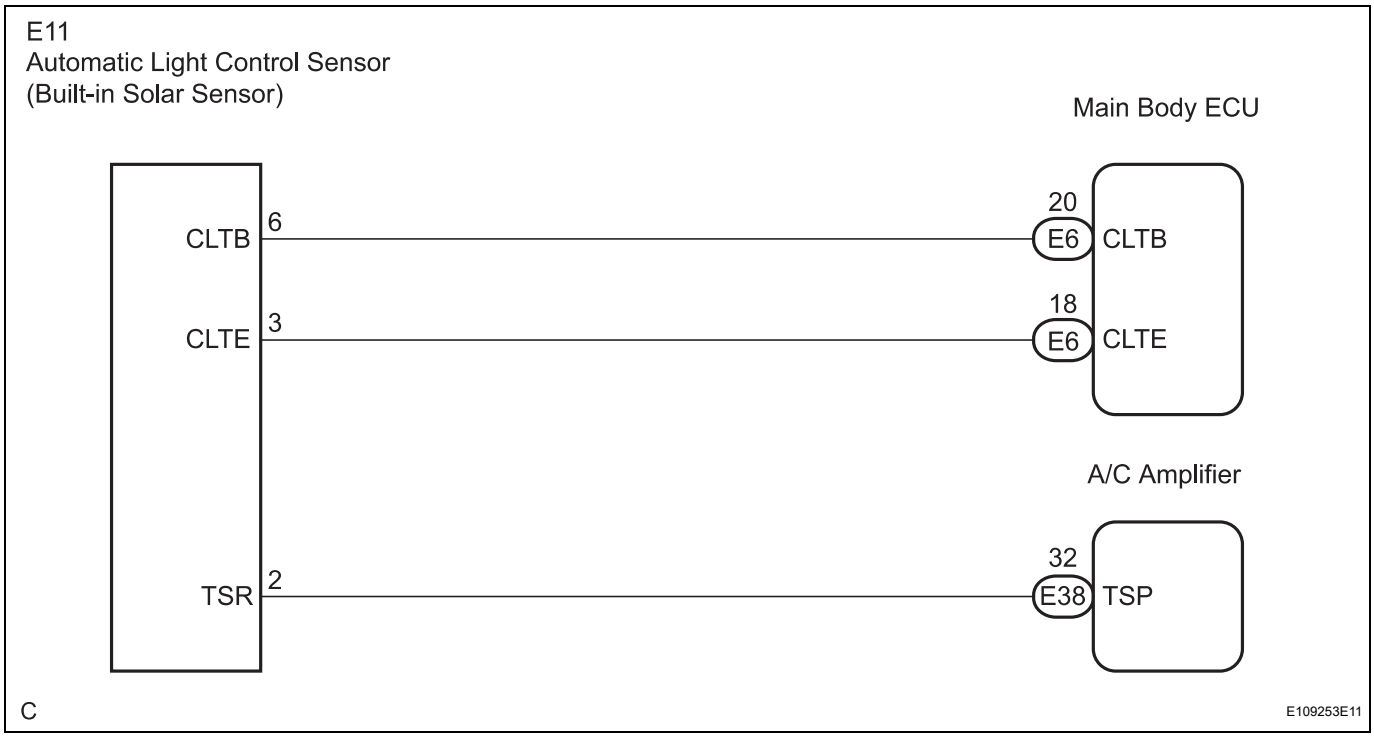
DESCRIPTION



The solar sensor, which is installed on the upper side of the instrument panel, detects sunlight and controls the air conditioning in AUTO mode. The output voltage from the solar sensor varies according to the amount of sunlight. When the sunlight increases, the output voltage increases. As the sunlight decreases, the output voltage decreases. The A/C amplifier detects voltage output from the solar sensor.

DTC No.	DTC Detection Condition	Trouble Area
B1421/21	Open or short in passenger side solar sensor circuit	• Solar sensor • Harness or connector between solar sensor and A/C amplifier • Harness or connector between solar sensor and main body ECU • A/C amplifier • Main body ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTC B1244 is output at the same time, troubleshoot DTC B1244 first (See page LI-23).
- If the check is performed in a dark place, DTC B1421/21 or B1424/24 (solar sensor circuit abnormal) may be output even though the system is normal.

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Expose the sensing portion of the solar sensor to light.
HINT:
Use an incandescent light for inspection.
(d) Select the item below in the DATA LIST, and read the display on the intelligent tester.

DATA LIST / AIR CONDITIONER:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
SOLAR SENS-P (Solar sensor (P side))	Passenger side solar sensor / Min.: 0, Max.: 255	Passenger side solar sensor value increases as brightness increases	-

OK:

The display is as specified in the normal condition column.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

AC

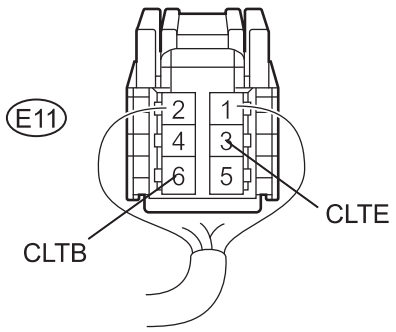
B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

2 CHECK HARNESS AND CONNECTOR (SOLAR SENSOR)

A/C Solar Sensor Connector Wire Harness View:



H E124476E02

(a) Disconnect the solar sensor connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

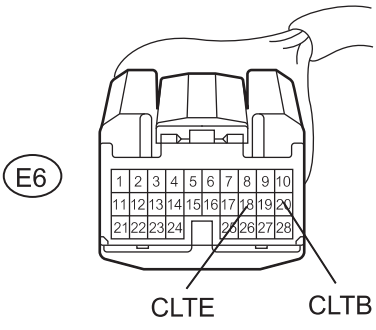
Tester Connection (Symbols)	Condition	Specified Condition
E11-6 (CLTB) - E11-3 (CLTE)	Power switch off	Below 1 V
E11-6 (CLTB) - E11-3 (CLTE)	Power switch on (IG)	10 to 14 V

OK → Go to step 4

NG

3 CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - SOLAR SENSOR)

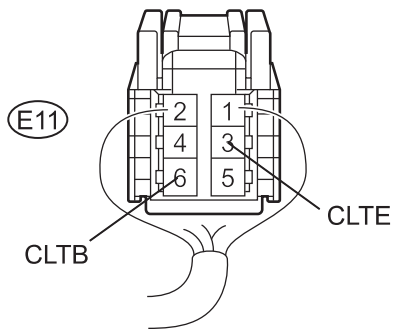
Main Body ECU Connector Front View:



H E124475E02

(a) Disconnect the main body ECU connector.

A/C Solar Sensor Connector Wire Harness View:



H E124476E02

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E6-20 (CLTB) - E11-6 (CLTB)	Always	Below 1 Ω
E6-18 (CLTE) - E11-3 (CLTE)	Always	Below 1 Ω
E6-20 (CLTB) - Body ground	Always	10 kΩ or higher
E6-18 (CLTE) - Body ground	Always	10 kΩ or higher

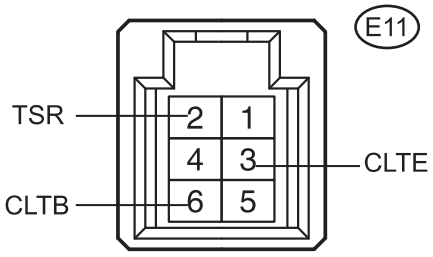
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MAIN BODY ECU

4 CHECK SOLAR SENSOR

Solar Sensor Connector Front View:



P E109215E12

(a) Remove the solar sensor with its connector still connected.

(b) Connect the positive (+) lead from the battery to terminal 6 (CLTB), and the negative (-) lead to terminal 3 (CLTE) of the solar sensor.

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
E11-2 (TSR) - E11-3 (CLTE)	Sensor is subjected to electric light	0.8 to 4.3 V
E11-2 (TSR) - E11-3 (CLTE)	Sensor is covered with a cloth	Below 0.8 V

NOTICE:

- **The connection procedure for using a digital tester such as a TOYOTA electrical tester is shown above. When using an analog tester, connect the negative (-) lead to terminal 6, and the positive (+) lead to terminal 3 of the solar sensor.**
- **While using the battery during inspection, do not bring the positive and negative tester probes too close to each other as a short circuit may occur.**

HINT:

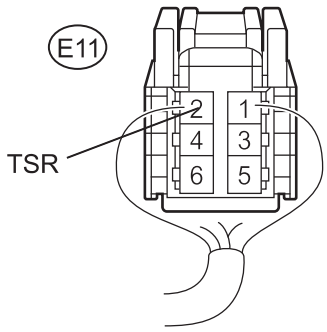
- Use an incandescent light for inspection. Bring it within about 30 cm (11.8 in.) of the solar sensor.
- As the inspection light is moved away from the sensor, the voltage increases.

NG → REPLACE SOLAR SENSOR

OK

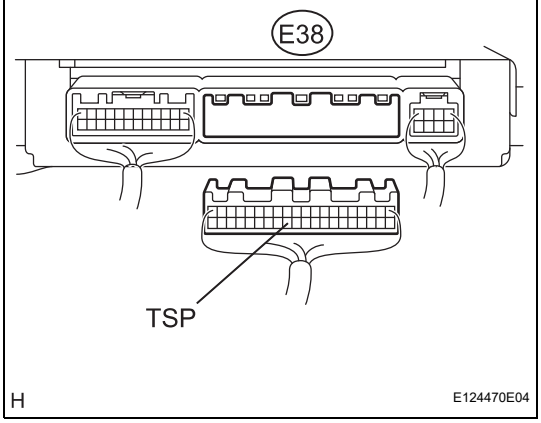
5 CHECK HARNESS AND CONNECTOR (SOLAR SENSOR - A/C AMPLIFIER)

A/C Solar Sensor Connector Wire Harness View:



(a) Disconnect the solar sensor connector.

Air Conditioning Amplifier Connector Wire Harness View:



(b) Disconnect the A/C amplifier connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E38-32 (TSP) - E11-2 (TSR)	Always	Below 1 Ω
E38-32 (TSP) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE AIR CONDITIONING AMPLIFIER

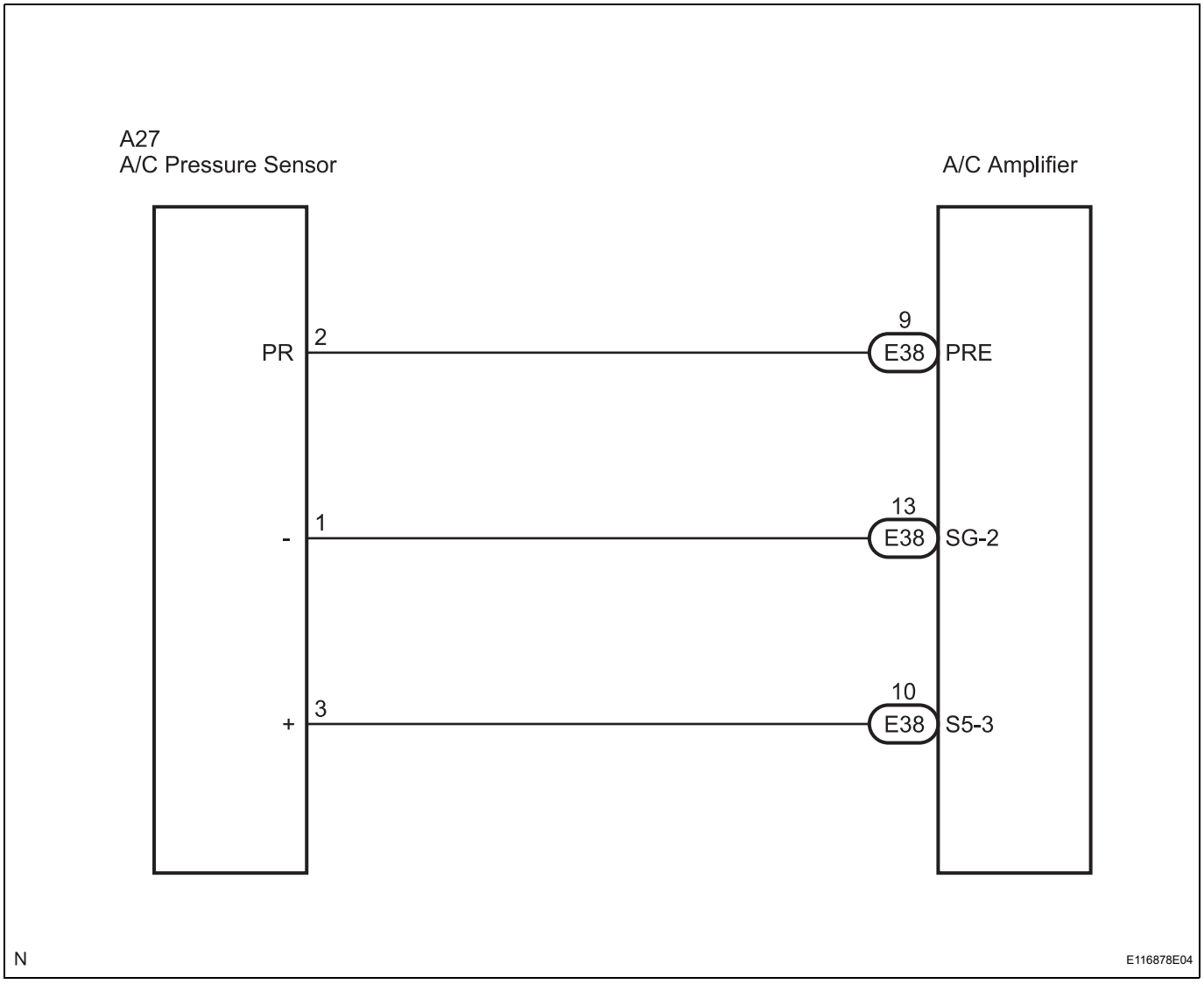
DTC	B1423/23	Pressure Sensor Circuit

DESCRIPTION

This DTC is output when refrigerant pressure is extremely low (0.19 MPa (2.0 kgf/cm^2, 28 psi) or less) or extremely high (3.14 MPa (32.0 kgf/cm^2, 455 psi) or more). The A/C pressure sensor, which is installed on the pipe of the high pressure side to detect refrigerant pressure, outputs a refrigerant pressure signal to the A/C amplifier. The A/C amplifier converts this signal to pressure according to the sensor characteristics to control the compressor.
HINT:
Be sure to check the refrigerant volume first when this DTC is output because this DTC can also be output if there is no refrigerant in the system.

DTC No.	DTC Detection Condition	Trouble Area
B1423/23	Open or short in pressure switch circuit	• A/C pressure sensor • Harness or connector between A/C pressure sensor and A/C amplifier • Refrigerant pipe line • A/C amplifier

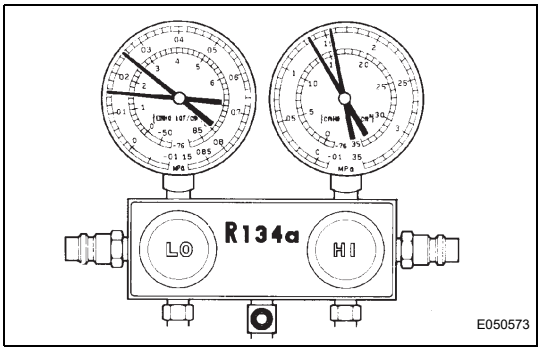
WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	CHECK REFRIGERANT PRESSURE



(a) Install the manifold gauge set (See page AC-165).
(b) Read the manifold gauge pressure when the following conditions are established.
  (1) Prepare the vehicle according to the chart below.

Item	Condition
Vehicle Doors	All fully open
Engine speed	1,500 rpm
Temperature Setting	MAX COLD
Blower Speed	HI
A/C switch	ON
R/F Switch	RECIRCULATION (30 to 35°C (86 to 95°F))

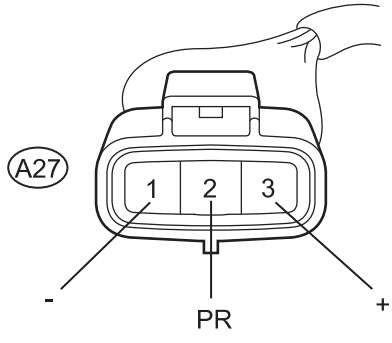
Standard pressure:
Low pressure side:
0.15 to 0.25 MPa (1.5 to 2.5 kgf/cm^2, 21.3 to 35.6 psi)
High pressure side:
1.37 to 1.57 MPa (14 to 16 kgf/cm^2, 199 to 228 psi)

NG → **CHARGE REFRIGERANT**

OK

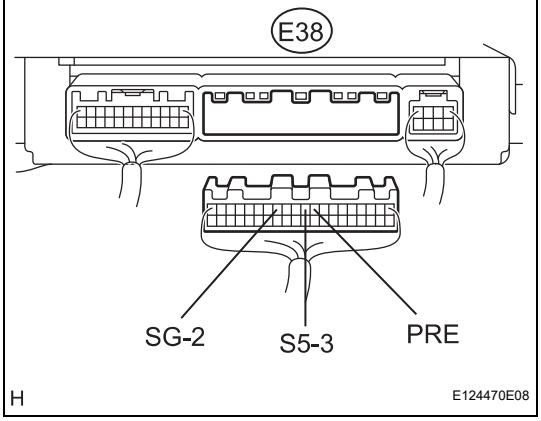
2	CHECK HARNESS AND CONNECTOR (A/C PRESSURE SENSOR - A/C AMPLIFIER)

A/C Pressure Sensor Connector Front View:



(a) Disconnect the A/C pressure sensor connector.

Air Conditioning Amplifier Connector Wire Harness View:



(b) Disconnect the A/C amplifier connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

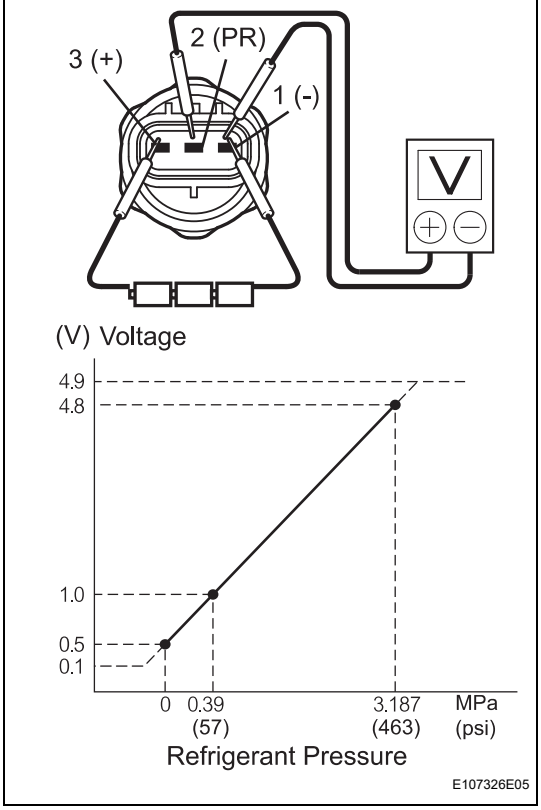
Tester Connection (Symbols)	Condition	Specified Condition
A27-2 (PR) - E38-9 (PRE)	Always	Below 1 Ω
A27-3 (+) - E38-10 (S5-3)	Always	Below 1 Ω
A27-1 (-) - E38-13 (SG-2)	Always	Below 1 Ω
E38-9 (PRE) - Body ground	Always	10 kΩ or higher
E38-10 (S5-3) - Body ground	Always	10 kΩ or higher
E38-13 (SG-2) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 INSPECT A/C PRESSURE SENSOR

A/C Pressure Sensor Connector Front View:



(a) Install the manifold gauge set (See page AC-165).
(b) Connect the three 1.5 V dry cell batteries' positive (+) lead to terminal 3, and the negative (-) lead to terminal 1. Then connect the voltmeter's positive (+) lead to terminal 2, and the negative (-) lead to terminal 1. Measure the voltage.

OK:

The voltage changes according to refrigerant pressure, as shown in the graph.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the DTC)	B
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	C

B → **REPLACE AIR CONDITIONING AMPLIFIER**

C → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

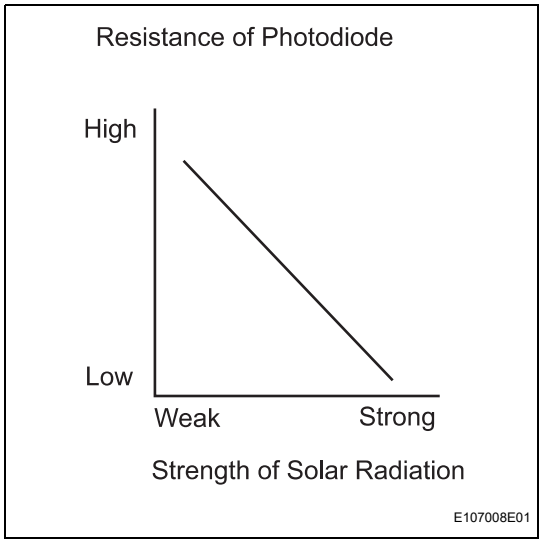
AC

A

REPLACE A/C PRESSURE SENSOR

DTC	B1424/24	Solar Sensor Circuit (Driver Side)

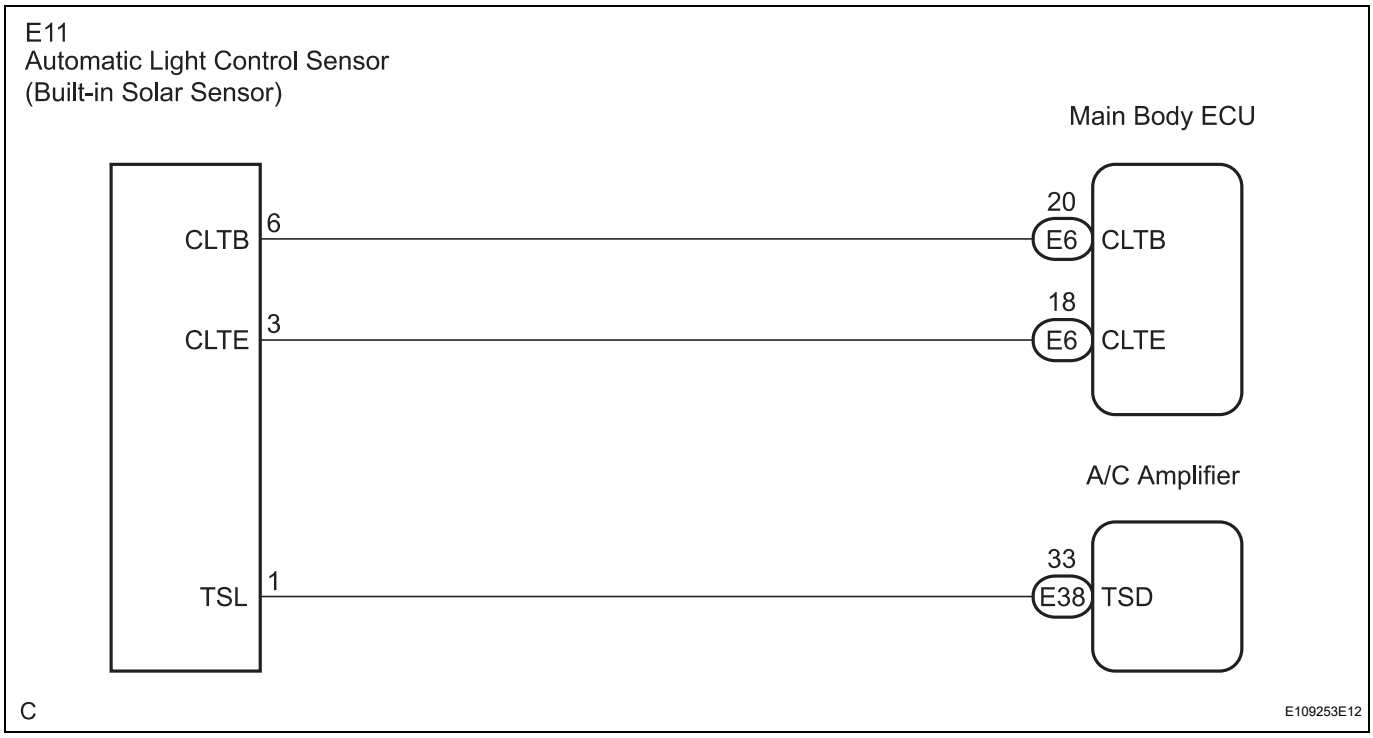
DESCRIPTION



The solar sensor, which is installed on the upper side of the instrument panel, detects sunlight and controls the air conditioning in AUTO mode. The output voltage from the solar sensor varies according to the amount of sunlight. When the sunlight increases, the output voltage increases. As the sunlight decreases, the output voltage decreases. The A/C amplifier detects output voltage from the solar sensor.

DTC No.	DTC Detection Condition	Trouble Area
B1424/24	Open or short in driver side solar sensor circuit	• Solar sensor • Harness or connector between solar sensor and A/C amplifier • Harness or connector between solar sensor and main body ECU • A/C amplifier • Main body ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTC B1244 is output at the same time, troubleshoot DTC B1244 first (See page LI-23).
- If the check is performed in a dark place, DTC B1421/21 or B1424/24 (solar sensor circuit abnormal) may be output even though the system is normal.

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Expose the sensing portion of the solar sensor to light.
HINT:
Use an incandescent light for inspection.
(d) Select the item below in the DATA LIST, and read the display on the intelligent tester.

DATA LIST / AIR CONDITIONER:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
SOLAR SENS-D (Solar sensor (D side))	Driver side solar sensor / Min.: 0, Max.: 255	Driver side solar sensor value increases as brightness increases	-

OK:
The display is as specified in the normal condition column.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

AC

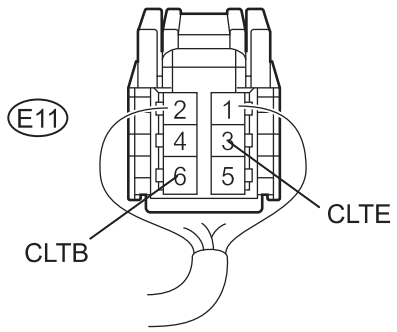
B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

2 CHECK HARNESS AND CONNECTOR (SOLAR SENSOR)

A/C Solar Sensor Connector Wire Harness View:



H E124476E02

(a) Disconnect the solar sensor connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

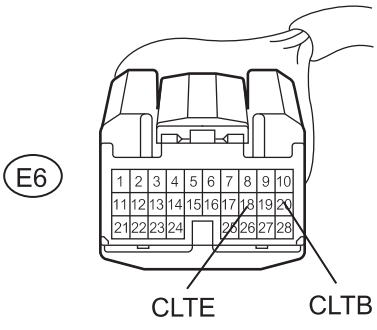
Tester Connection (Symbols)	Condition	Specified Condition
E11-6 (CLTB) - E11-3 (CLTE)	Power switch on (IG)	10 to 14 V
E11-6 (CLTB) - E11-3 (CLTE)	Power switch off	Below 1 V

OK → Go to step 4

NG

3 CHECK HARNESS AND CONNECTOR (SOLAR SENSOR - MAIN BODY ECU)

Main Body ECU Connector Front View:

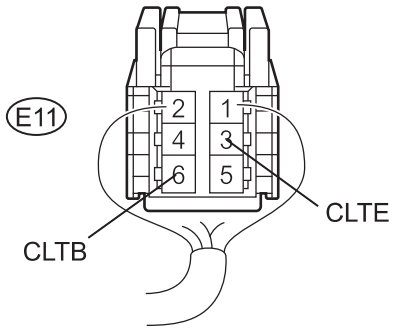


H E124475E02

(a) Disconnect the main body ECU connector.

AC

A/C Solar Sensor Connector Wire Harness View:



H E124476E02

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E6-20 (CLTB) - E11-6 (CLTB)	Always	Below 1 Ω
E6-18 (CLTE) - E11-3 (CLTE)	Always	Below 1 Ω
E6-20 (CLTB) - Body ground	Always	10 kΩ or higher
E6-18 (CLTE) - Body ground	Always	10 kΩ or higher

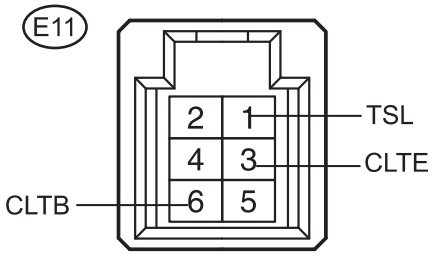
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MAIN BODY ECU

4 CHECK SOLAR SENSOR

Solar Sensor Connector Front View:



P E109215E15

(a) Remove the solar sensor with its connector still connected.

(b) Connect the positive (+) lead from the battery to terminal 6 (CLTB), and the negative (-) lead to terminal 3 (CLTE) of the solar sensor.

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
E11-1 (TSL) - E11-3 (CLTE)	Sensor is subjected to electric light	0.8 to 4.3 V
E11-1 (TSL) - E11-3 (CLTE)	Sensor is covered with a cloth	Below 0.8 V

NOTICE:

- **The connection procedure for using a digital tester such as a TOYOTA electrical tester is shown above. When using an analog tester, connect the negative (-) lead to terminal 6, and the positive (+) lead to terminal 3 of the solar sensor.**
- **While using the battery during inspection, do not bring the positive and negative tester probes too close to each other as a short circuit may occur.**

HINT:

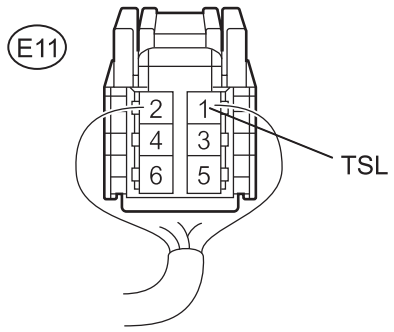
- Use an incandescent light for inspection. Bring it within about 30 cm (11.8 in.) of the solar sensor.
- As the inspection light is moved away from the sensor, the voltage increases.

NG → REPLACE SOLAR SENSOR

OK

5 CHECK HARNESS AND CONNECTOR (SOLAR SENSOR - A/C AMPLIFIER)

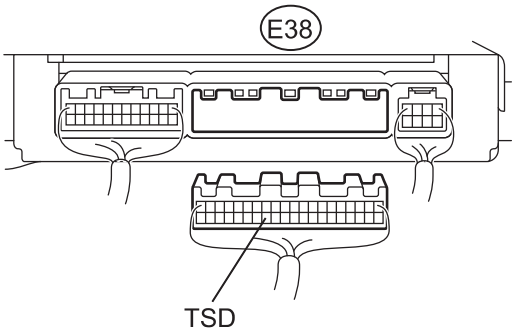
A/C Solar Sensor Connector Wire Harness View:



H E124476E04

(a) Disconnect the solar sensor connector.

Air Conditioning Amplifier Connector Wire Harness View:



H E124470E09

(b) Disconnect the A/C amplifier connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E38-33 (TSD) - E11-1 (TSL)	Always	Below 1 Ω
E38-33 (TSD) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE AIR CONDITIONING AMPLIFIER

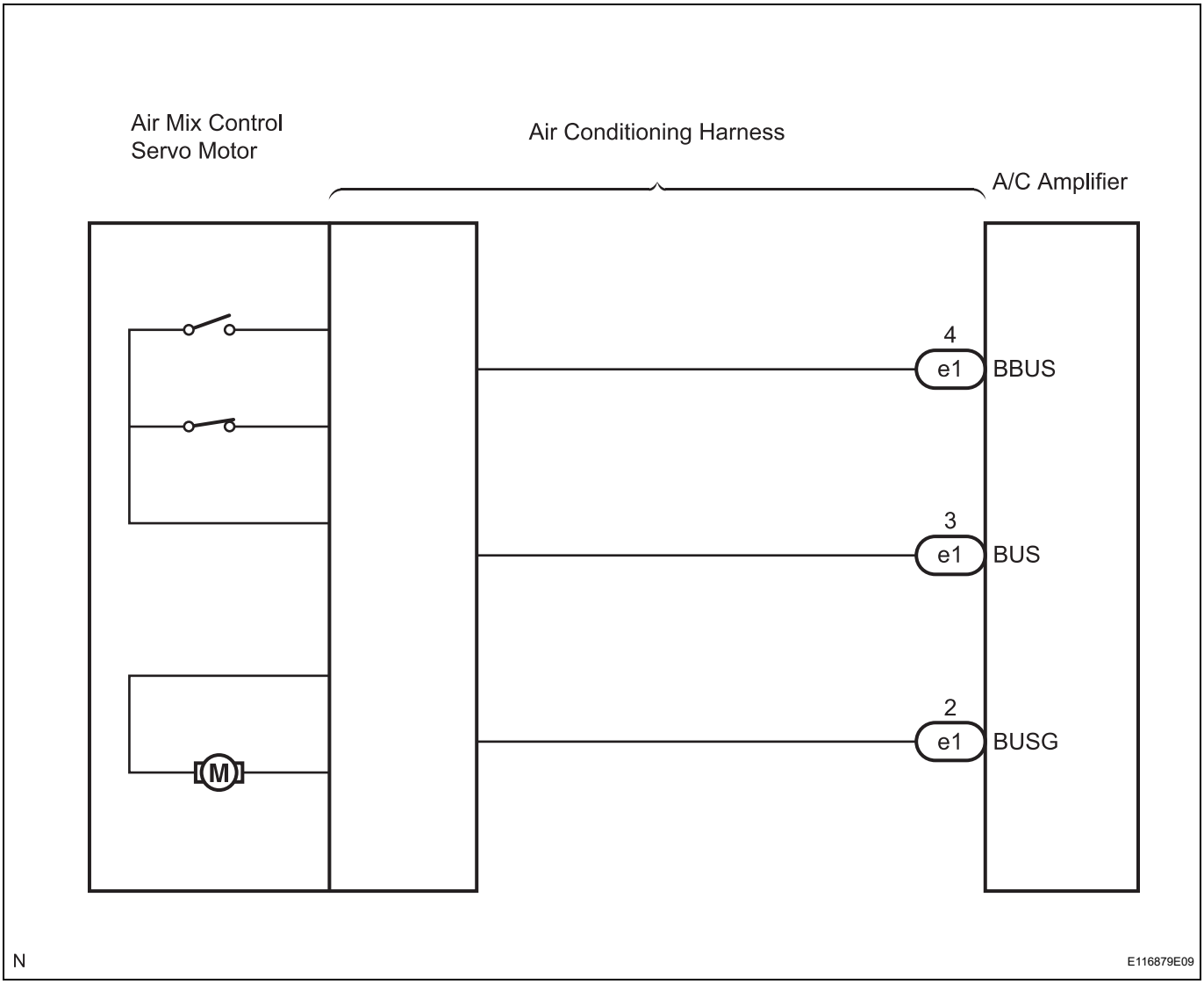
DTC	B1441/41	Air Mix Damper Control Servo Motor Circuit (Passenger Side)

DESCRIPTION

The air mix damper servo sends pulse signals to inform the air conditioning amplifier of the damper position. The air conditioning amplifier activates the motor (normal, reverse) based on the signals to move the air mix damper (passenger seat) to any position, which adjusts the amount of air passing the heater core after passing the evaporator to control the blowing temperature.
HINT:
Confirm that no mechanical problem is present because this diagnostic code can be output when either a damper link or damper is mechanically locked.

DTC No.	DTC Detection Condition	Trouble Area
B1441/41	Air mix damper position sensor value does not change even if air conditioning amplifier operates air mix control servo motor	• Air mix control servo motor • Air conditioning harness • A/C amplifier

WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Operate the front passenger side temperature adjustment switch.
(d) Select the item below in the DATA LIST, and read the display on the intelligent tester.

DATA LIST / AIR CONDITIONER:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
AIR MIX PULSE-P (Air mix servomotor target pulse (P side))	Passenger side air mix servo motor target pulse / Min.: 0, Max.: 255	MAX. COLD: 105 (pulse) MAX. HOT: 7 (pulse)	-

OK:
The display is as specified in the normal condition column.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

2	REPLACE AIR MIX CONTROL SERVO MOTOR

(a) Replace the air mix control servo motor.
HINT:
Since the servo motor cannot be inspected while it is removed from the vehicle, replace the servo motor with a normal one and check that the condition returns to normal.
(b) Check for DTCs.
Result

Result	Proceed to
DTC B1441/41 is output	A
DTC B1441/41 is not output	B

B → END

AC

A

REPLACE AIR CONDITIONING HARNESS

DTC	B1442/42	Air Inlet Damper Control Servo Motor Circuit

DESCRIPTION

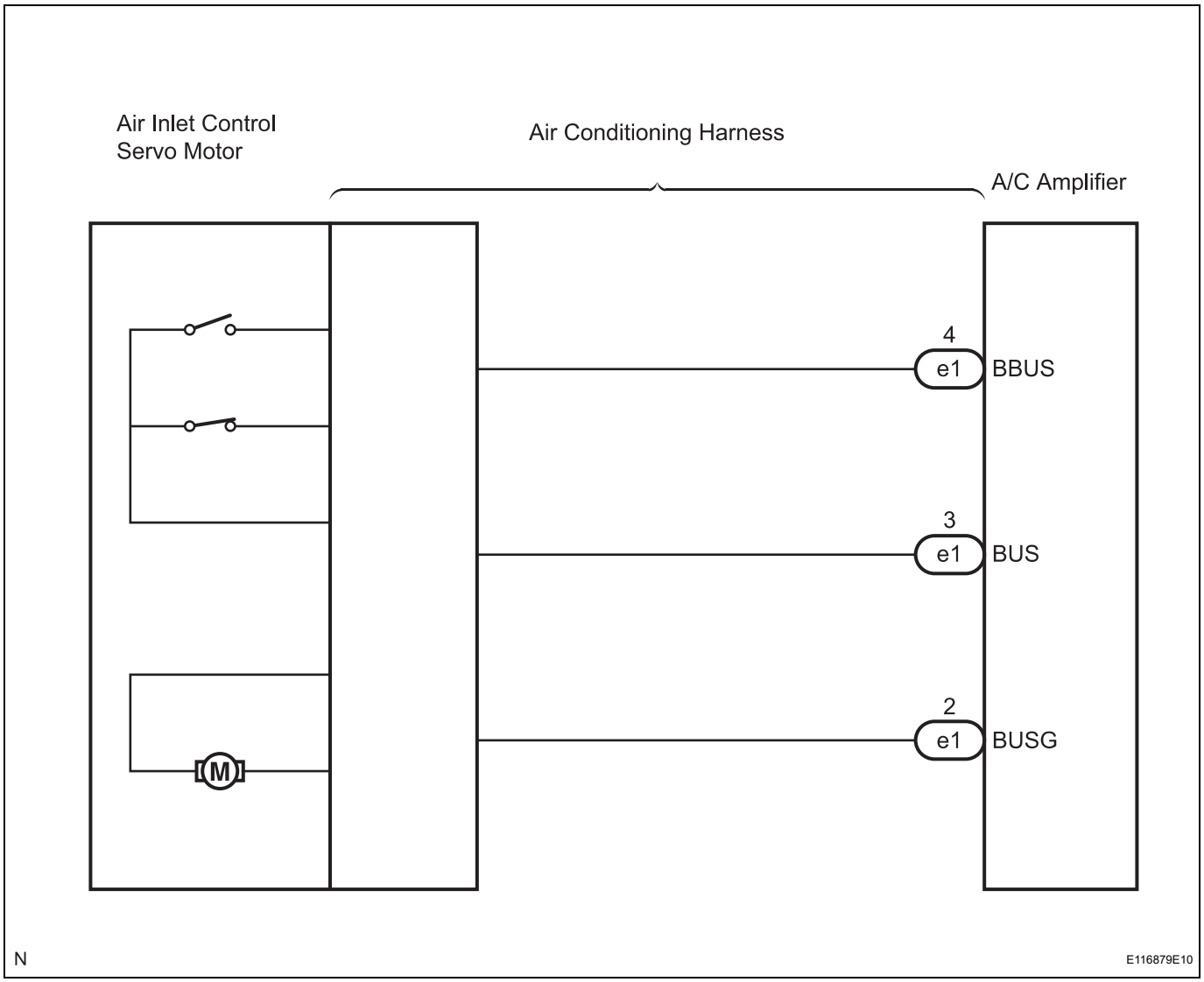
The damper servo (air inlet control) sends pulse signals to inform the air conditioning amplifier of the damper position. The air conditioning amplifier activates the motor (normal, reverse) based on the signals to move the air inlet damper to any position, which controls the intake air settings (FRESH, FRESH/ RECIRCULATION, and RECIRCULATION).

HINT:

Confirm that no mechanical problem is present because this diagnostic code can be output when either a damper link or damper is mechanically locked.

DTC No.	DTC Detection Condition	Trouble Area
B1442/42	Air inlet damper position sensor value does not change even if air conditioning amplifier operates air inlet control servo motor	• Air inlet control servo motor • Air conditioning harness • A/C amplifier

WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Operate the R/F (Recirculation/Fresh) switch.
(d) Select the item below in the DATA LIST, and read the display on the intelligent tester.

DATA LIST / AIR CONDITIONER:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
A/I DAMP PLS (Air inlet damper target pulse)	Air inlet damper target pulse / Min.: 0, Max.: 255	RECIRCULATION: 7 (pulse) FRESH: 28 (pulse)	-

OK:
The display is as specified in the normal condition column.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

2	REPLACE AIR INLET CONTROL SERVO MOTOR

(a) Replace the air inlet control servo motor.
HINT:
Since the servo motor cannot be inspected while it is removed from the vehicle, replace the servo motor with a normal one and check that the condition returns to normal.
(b) Check for DTCs.
Result

Result	Proceed to
DTC B1442/42 is output	A
DTC B1442/42 is not output	B

B → **END**

A

REPLACE AIR CONDITIONING HARNESS

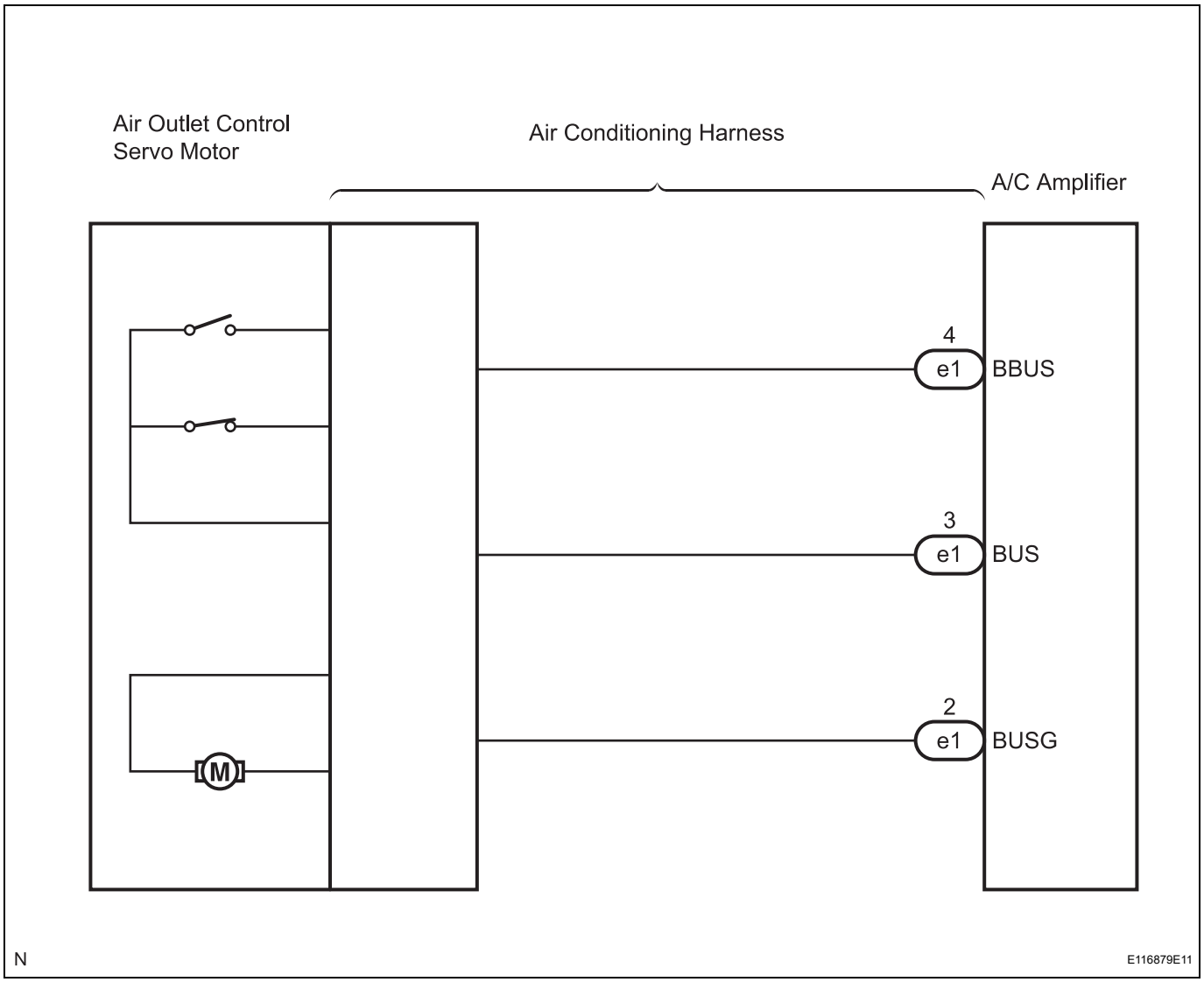
DTC	B1443/43	Air Outlet Damper Control Servo Motor Circuit

DESCRIPTION

The mode damper servo sends pulse signals to inform the air conditioning amplifier of the damper position. The air conditioning amplifier activates the motor (normal, reverse) based on the signals to move the air outlet damper to any position, which controls the air outlet switching.
HINT:
Confirm that no mechanical problem is present because this diagnostic code can be output when either a damper link or damper is mechanically locked.

DTC No.	DTC Detection Condition	Trouble Area
B1443/43	Air outlet damper position sensor value does not change even if air conditioning amplifier operates air outlet control servo motor	• Air outlet control servo motor • Air conditioning harness • A/C amplifier

WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Operate the MODE switch.
(d) Select the item below in the DATA LIST, and read the display on the intelligent tester.

DATA LIST / AIR CONDITIONER:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
AIR OUT PULSE-D (Air outlet servomotor target pulse (D side))	Driver side air outlet servo motor target pulse / Min.: 0, Max.: 255	FACE: 8 (pulse) B/L: 30 to 38 (pulse) FOOT: 50 to 74 (pulse) FOOT/DEF: 80 (pulse) DEF: 97 (pulse)	-

OK:
The display is as specified in the normal condition column.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

2	REPLACE AIR OUTLET CONTROL SERVO MOTOR

(a) Replace the air outlet control servo motor.
HINT:
Since the servo motor cannot be inspected while it is removed from the vehicle, replace the servo motor with a normal one and check that the condition returns to normal.
(b) Check for DTCs.
Result

Result	Proceed to
DTC B1443/43 is output	A
DTC B1443/43 is not output	B

B → **END**

A

REPLACE AIR CONDITIONING HARNESS

DTC	B1446/46	Air Mix Damper Control Servo Motor Circuit (Driver Side)

DESCRIPTION

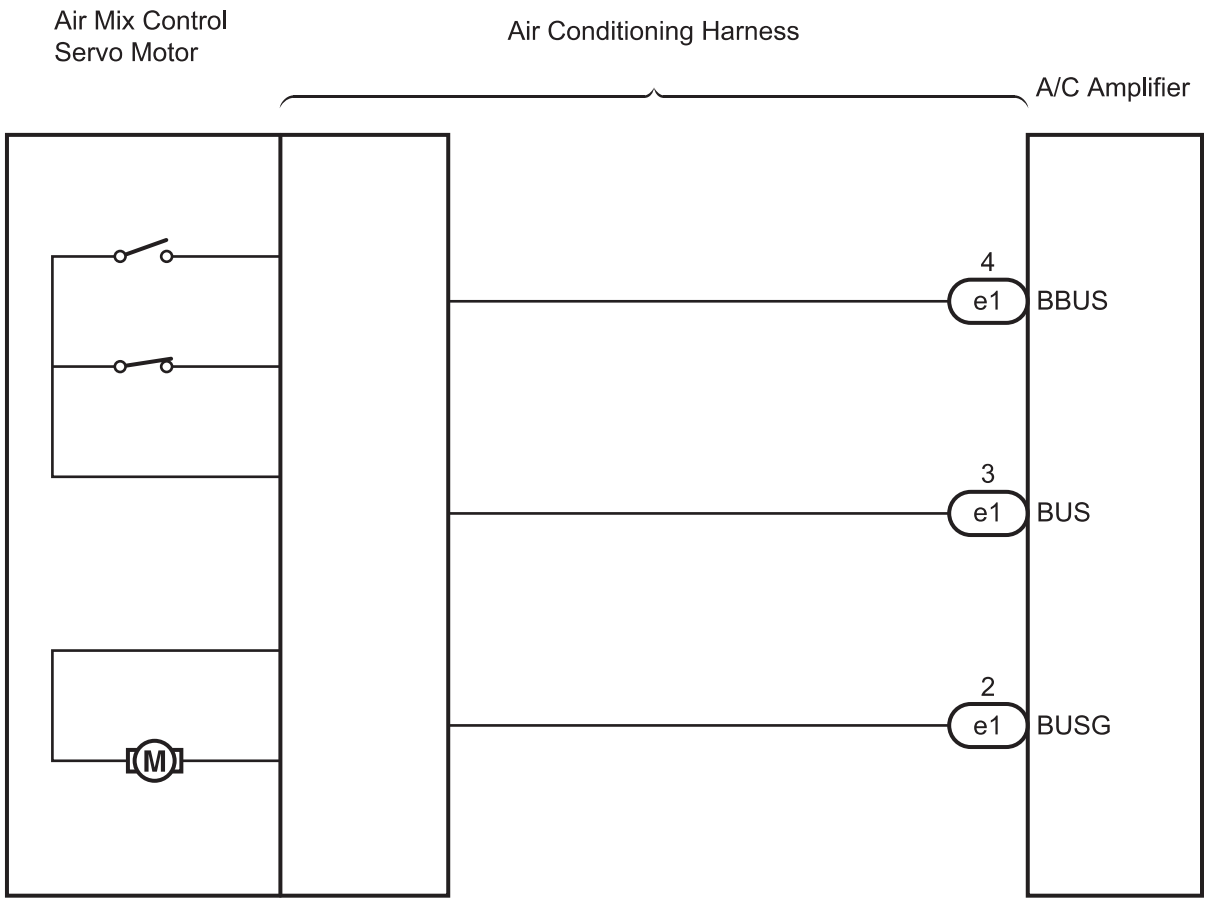
The air mix damper servo sends pulse signals to inform the air conditioning amplifier of the damper position. The air conditioning amplifier activates the motor (normal, reverse) based on the signals to move the air mix damper (driver seat) to any position. As a result, the amount of air passing through the heater core after passing through the evaporator is adjusted, and the temperature of the air blowing toward the driver seat side is controlled.

HINT:

Confirm that no mechanical problem is present because this diagnostic code can be output when either a damper link or damper is mechanically locked.

DTC No.	DTC Detection Condition	Trouble Area
B1446/46	Air mix damper position sensor value does not change even if air conditioning amplifier operates air mix control servo motor	• Air mix control servo motor • Air conditioning harness • A/C amplifier

WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Operate the driver side temperature adjustment switch.
(d) Select the item below in the DATA LIST, and read the display on the intelligent tester.

DATA LIST / AIR CONDITIONER:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
AIR MIX PULSE-D (Air mix servomotor target pulse (D side))	Driver side air mix servo motor target pulse / Min.: 0, Max.: 255	MAX COLD: 5 (pulse) MAX HOT: 103 (pulse)	-

OK:
The display is as specified in the normal condition column.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

2	REPLACE AIR MIX CONTROL SERVO MOTOR

(a) Replace the air mix control servo motor.
HINT:
Since the servo motor cannot be inspected while it is removed from the vehicle, replace the servo motor with a normal one and check that the condition returns to normal.
(b) Check for DTCs.
Result

Result	Proceed to
DTC B1446/46 is output	A
DTC B1446/46 is not output	B

B → END

A

REPLACE AIR CONDITIONING HARNESS

AC

DTC	B1471/71	A/C Inverter High Voltage Power Resource System Malfunction

DESCRIPTION

The A/C inverter assembly monitors power voltage from the main battery in the circuit. It stops compressor control and outputs the DTC when the monitored voltage is outside the specified range. The output DTC is memorized as previous trouble. Compressor control may not resume unless the power switch is turned off.

CAUTION:

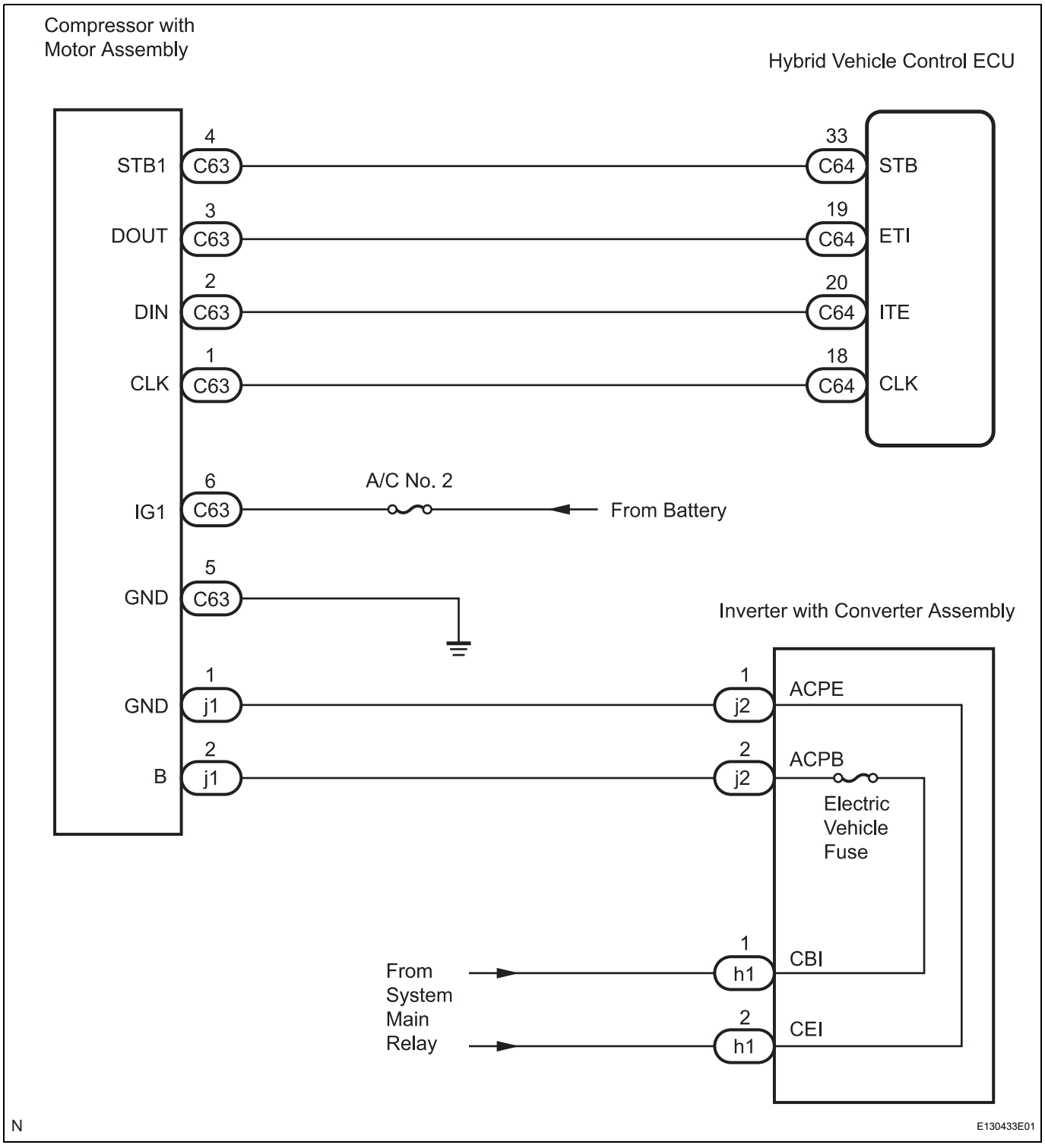
- **Wear electrically insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors. Be sure to carry the removed service plug grip because other workers may install it by mistake.**
- **Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.**

NOTICE:

The hybrid control system and air conditioning system output DTCs separately. Inspect DTCs following the flow chart for the hybrid control system first if any DTCs from those systems are output simultaneously.

DTC No.	DTC Detection Condition	Trouble Area
B1471/71	• Open or short in A/C inverter high voltage power resource system. • The boost pressure system is broken or malfunctioning.	• Harness or connector between compressor with motor assembly and inverter with converter assembly • Compressor with motor assembly • Hybrid control system • Inverter with converter assembly • CAN communication system

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Wear electrically insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors. Be sure to carry the removed service plug grip because other workers may install it by mistake.**
- **Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.**

1	CHECK CAN COMMUNICATION SYSTEM

(a) Use the intelligent tester to check if the CAN Communication System is functioning normally.
Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → **GO TO CAN COMMUNICATION SYSTEM (See page CA-7)**

A

2	CHECK DIAGNOSTIC TROUBLE CODE (HYBRID CONTROL SYSTEM)

(a) Check if DTCs for the hybrid control system are output using the intelligent tester.
OK:
Hybrid control system DTCs are not output.

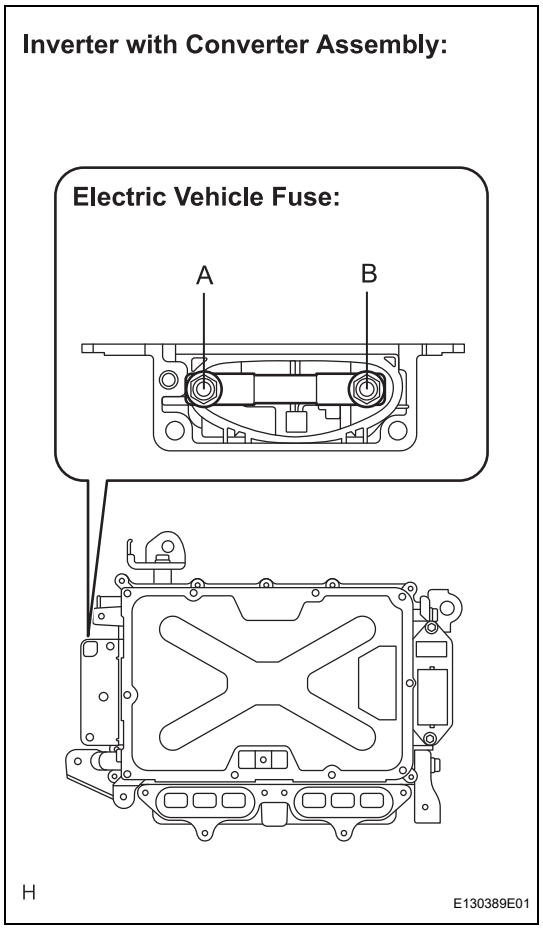
NG → **GO TO HYBRID CONTROL SYSTEM (See page HV-15)**

OK

3	INSPECT ELECTRIC VEHICLE FUSE

(a) Turn the power switch off.
(b) Remove the service plug grip.
CAUTION:
- **Be sure to wear insulated gloves.**
- **Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.**

NOTICE:
Do not start the engine with the service plug grip removed because it may cause a malfunction.
(c) Remove the connector cover assembly.
CAUTION:
Be sure to wear insulated gloves.
NOTICE:
Be sure to prevent foreign objects or water from entering the inverter with converter assembly.



(d) Check that bolts A and B are tightened securely.
(e) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Item (Tester Connection)	Condition	Specified Condition
ELECTRIC VEHICLE fuse (A - B)	Always	Below 1 Ω

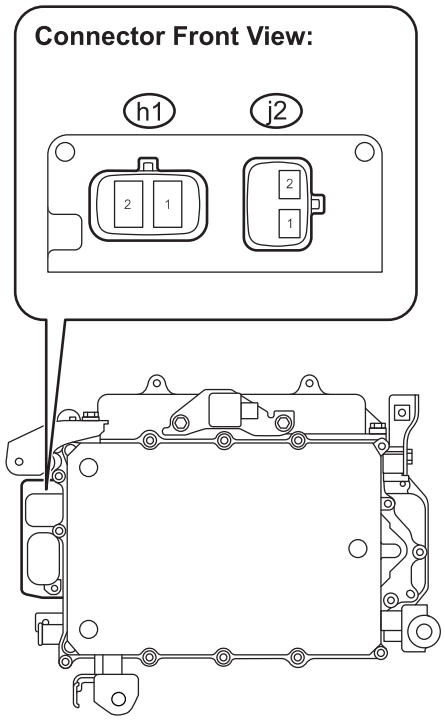
NG → REPLACE ELECTRIC VEHICLE FUSE

OK

4	INSPECT INVERTER WITH CONVERTER ASSEMBLY

CAUTION:
- **Be sure to wear insulated gloves.**
- **Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.**

Inverter with Converter Assembly:



(a) Disconnect the connector from the inverter with converter assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

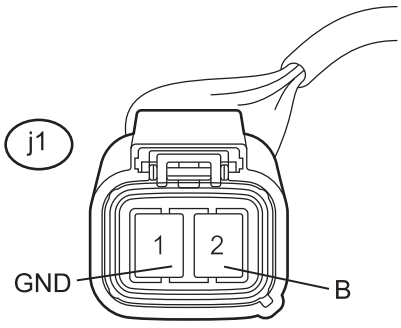
Tester Connection (Symbols)	Condition	Specified Condition
j2-1 (ACPE) - h1-2 (CEI)	Always	Below 1 Ω
j2-2 (ACPB) - h1-1 (CBI)	Always	Below 1 Ω

NG → **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

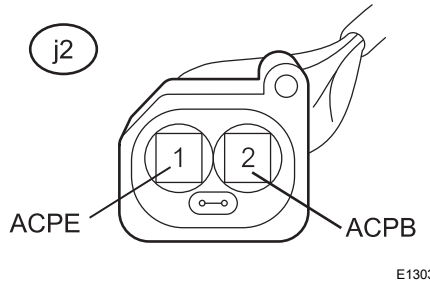
OK

5	INSPECT ENGINE WIRE NO. 4

Compressor with Motor Assembly Connector Front View:



Inverter with Converter Assembly Connector Front View:



H

E130379E01

(a) Disconnect the connector from engine wire No. 4.
CAUTION:
Be sure to wear insulated gloves.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
j1-1 (GND) - j2-1 (ACPE)	Always	Below 1 Ω
j1-2 (B) - j2-2 (ACPB)	Always	Below 1 Ω
j1-1 (GND) - j1-2 (B)	Always	10 kΩ or higher

NG → **REPLACE ENGINE WIRE NO. 4**

OK

REPLACE COMPRESSOR WITH MOTOR ASSEMBLY

DTC	B1472/72	A/C Inverter High Voltage Output System Malfunction

DESCRIPTION

The inverter in the compressor with motor assembly outputs high-voltage to operate the motor. If there is an open or short in the output circuit, the ECU will stop compressor operation and output the DTC. The output DTC will be memorized as a past DTC. The compressor operation remains stopped until both the past and present DTCs are cleared.

CAUTION:

- **Wear electrically insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors. Be sure to carry the removed service plug grip because other workers may install it by mistake.**
- **Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.**

DTC No.	DTC Detection Condition	Trouble Area
B1472/72	Open or short in A/C inverter high voltage output system.	• Compressor with motor assembly • CAN communication system

INSPECTION PROCEDURE

CAUTION:

- **Wear electrically insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors. Be sure to carry the removed service plug grip because other workers may install it by mistake.**
- **Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.**

1	CHECK CAN COMMUNICATION SYSTEM

(a) Use the intelligent tester to check if the CAN Communication System is functioning normally.

Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → **GO TO CAN COMMUNICATION SYSTEM (See page CA-7)**

A

REPLACE COMPRESSOR WITH MOTOR ASSEMBLY

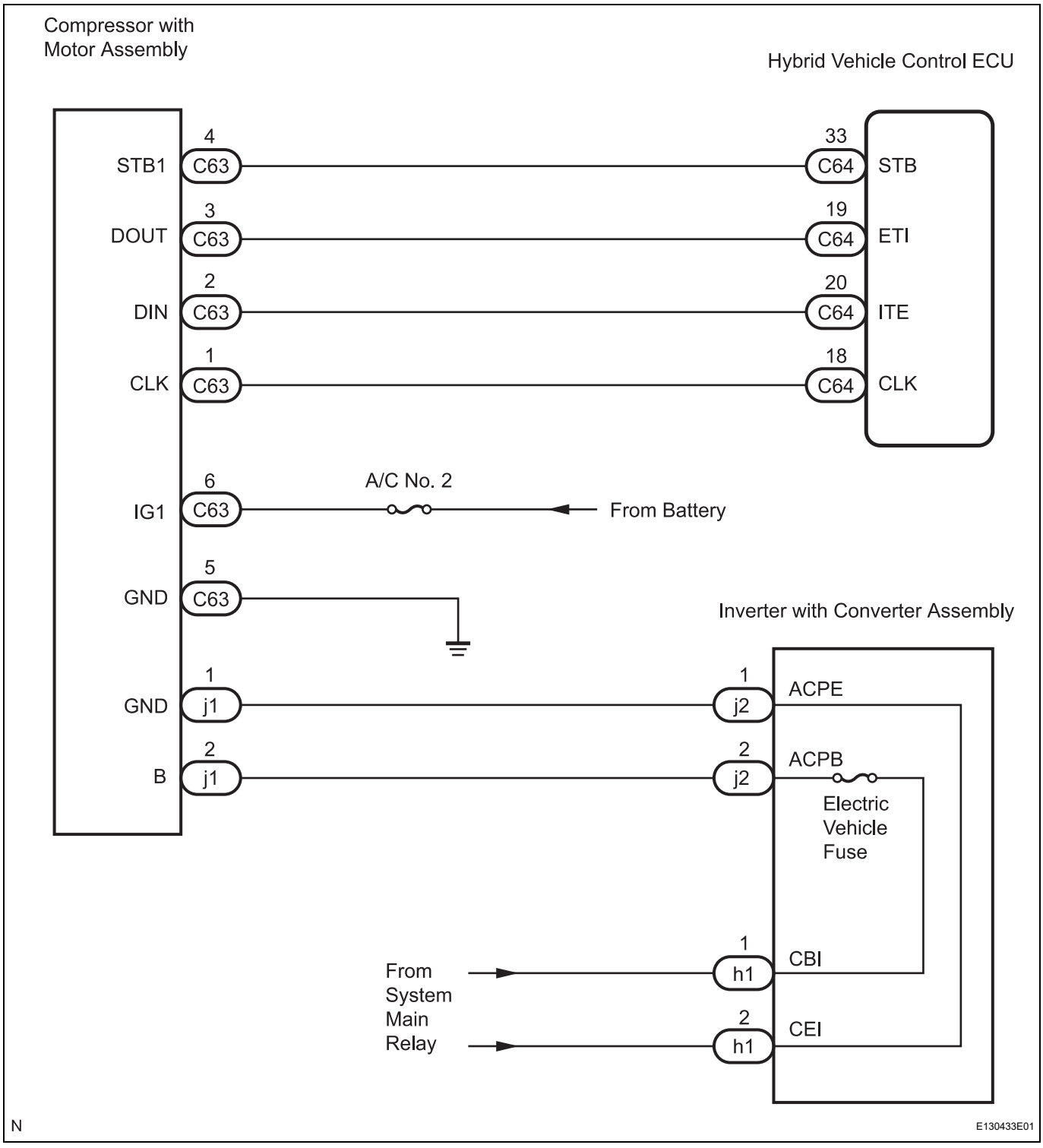
DTC	B1473/73	A/C Inverter Start-up Signal System Malfunction

DESCRIPTION

The inverter activation signal is sent to the compressor with motor assembly from the hybrid vehicle control ECU. Compressor control is stopped and the DTC is output if there is an open or short in the signal circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1473/73	Open or short in A/C inverter start-up signal system.	• Harness or connector between hybrid vehicle control ECU and compressor with motor assembly • Compressor with motor assembly • Hybrid control system • CAN communication system

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**CHECK CAN COMMUNICATION SYSTEM**

(a) Use the intelligent tester to check if the CAN Communication System is functioning normally.

Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → GO TO CAN COMMUNICATION SYSTEM (See page CA-7)

A

2 CHECK DIAGNOSTIC TROUBLE CODE

(a) Check if DTCs for the air conditioning system and the hybrid control system are output using the intelligent tester.

Result

Result	Proceed to
Only DTC B1473 is output	A
DTCs B1473 and P3108 are output simultaneously (B1498 is not output)	
DTCs B1473 and B1498 are output simultaneously (P3108 is not output)	B
DTCs B1473, B1498 and P3108 are output simultaneously	
DTCs other than P3108 are output for hybrid control system	C

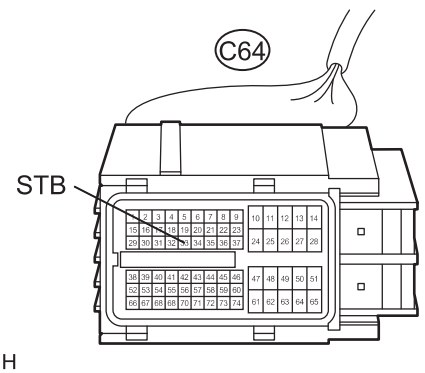
B → GO TO DTC B1498/98 (See page AC-112)

C → GO TO HYBRID CONTROL SYSTEM (See page HV-15)

A

3 CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - COMPRESSOR WITH MOTOR ASSEMBLY)

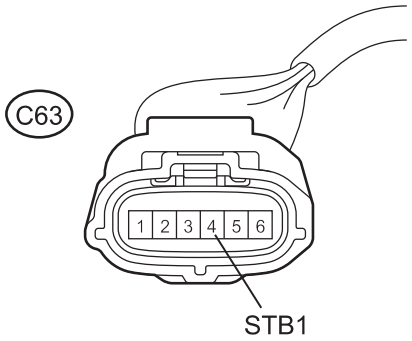
Hybrid Vehicle Control ECU Connector Front View:



(a) Disconnect the connector from the hybrid vehicle control ECU.

AC

Compressor with Motor Assembly Connector Front View:



(b) Disconnect the connector from the compressor with motor assembly.
CAUTION:
Do not disconnect the connector on the high-voltage side.

(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

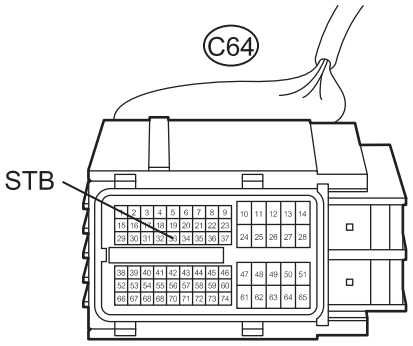
Tester Connection (Symbols)	Condition	Specified Condition
C64-33 (STB) - C63-4 (STB1)	Always	Below 1 Ω
C64-33 (STB) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 INSPECT COMPRESSOR WITH MOTOR ASSEMBLY

Hybrid Vehicle Control ECU Connector Front View:



(a) Reconnect the connector to the compressor with motor assembly.

(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
C64-33 (STB) - Body ground	Power switch on (IG)	10 to 14 V
C64-33 (STB) - Body ground	Power switch off	Below 1 V

NG → **REPLACE COMPRESSOR WITH MOTOR ASSEMBLY**

OK

REPLACE HYBRID VEHICLE CONTROL ECU

DTC	B1474/74	A/C Inverter Malfunction

DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
B1474/74	A/C inverter malfunction	• Compressor with motor assembly • CAN communication system

INSPECTION PROCEDURE

CAUTION:

- **Wear electrically insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors. Be sure to carry the removed service plug grip because other workers may install it by mistake.**
- **Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.**

1	CHECK CAN COMMUNICATION SYSTEM

(a) Use the intelligent tester to check if the CAN Communication System is functioning normally.

Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → **GO TO CAN COMMUNICATION SYSTEM (See page CA-7)**

A →

REPLACE COMPRESSOR WITH MOTOR ASSEMBLY

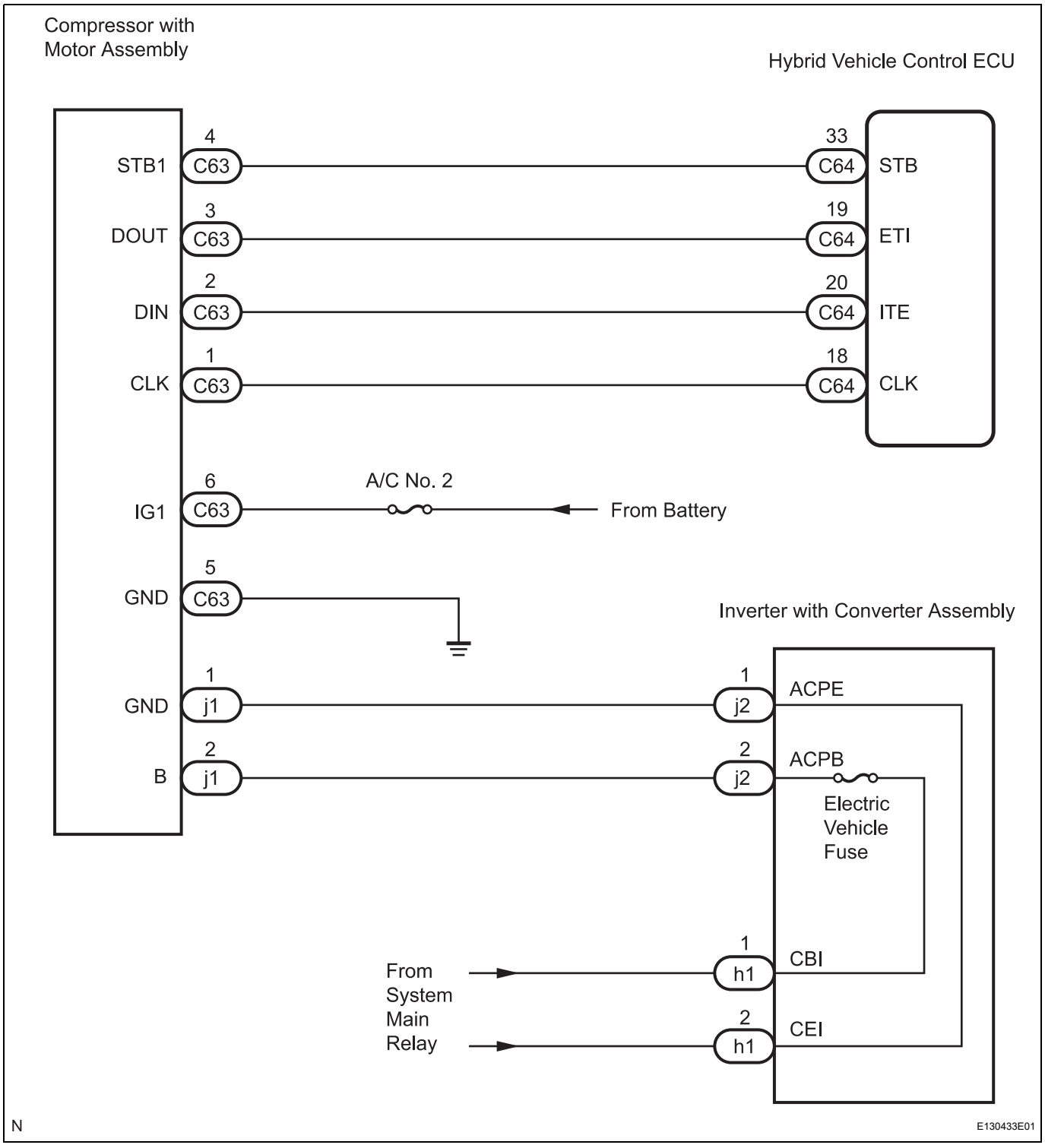
DTC	B1475/75	A/C Inverter Cooling / Heating System Malfunction

DESCRIPTION

The temperature sensor of the compressor with motor assembly detects inverter temperature.
If the temperature exceeds the maximum, the compressor with motor assembly stops compressor operation, and this DTC will be output.

DTC No.	DTC Detection Condition	Trouble Area
B1475/75	Cooling water temperature in the inverter is outside the specified range (temperature is too high), or there is an open or short to ground in the temperature sensor circuit.	• Cooling fan system • Refrigerant volume • Compressor with motor assembly • CAN communication system

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**CHECK CAN COMMUNICATION SYSTEM**

(a) Use the intelligent tester to check if the CAN Communication System is functioning normally.

AC

Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → **GO TO CAN COMMUNICATION SYSTEM (See page CA-7)**

A

2 PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Select the item below in the ACTIVE TEST and then check that the fan operates.

ACTIVE TEST / AIR CONDITIONER:

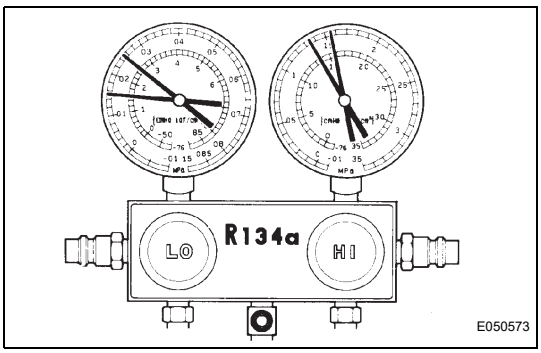
Tester Display	Test Part	Control Range
ELECTRICAL FAN (Electrical fan)	Electrical fan/OFF, ON	-

OK:
Electrical fan operates smoothly.

NG → **GO TO COOLING FAN SYSTEM (See page CO-3)**

OK

3 CHECK REFRIGERANT PRESSURE



(a) Install the manifold gauge set (See page AC-165).
(b) Read the manifold gauge pressure when the following conditions are established.
(1) Prepare the vehicle according to the chart below.

Item	Condition
Vehicle Doors	All fully open
Engine speed	1,500 rpm
Temperature Setting	MAX COLD
Blower Speed	HI
A/C switch	ON
R/F Switch	RECIRCULATION (30 to 35°C (86 to 95°F))

Standard pressure:
Low pressure side:
0.15 to 0.25 MPa (1.5 to 2.5 kgf/cm^2, 21.3 to 35.6 psi)
High pressure side:
1.37 to 1.57 MPa (14 to 16 kgf/cm^2, 199 to 228 psi)

NG → CHARGE REFRIGERANT

OK

4	READ OUTPUT DTC (DTC B1475/75)

(a) Clear the DTCs (See page AC-39).
(b) Prepare the vehicle according to the table below.

Item	Condition
Engine speed	Engine idling
Blower speed	HI
A/C switch	ON
Temperature setting	MAX. COLD

(c) Check for DTCs (See page AC-39).

Result

Result	Proceed to
DTC B1475/75 is not output (normal)	A
DTC B1475/75 is output	B

NOTICE:
If the engine keeps idling when ambient temperature is high, the compressor may automatically stop to protect the inverter circuit, and DTC B1475/75 may be stored.

B → REPLACE COMPRESSOR WITH MOTOR ASSEMBLY

A

SYSTEM IS OK

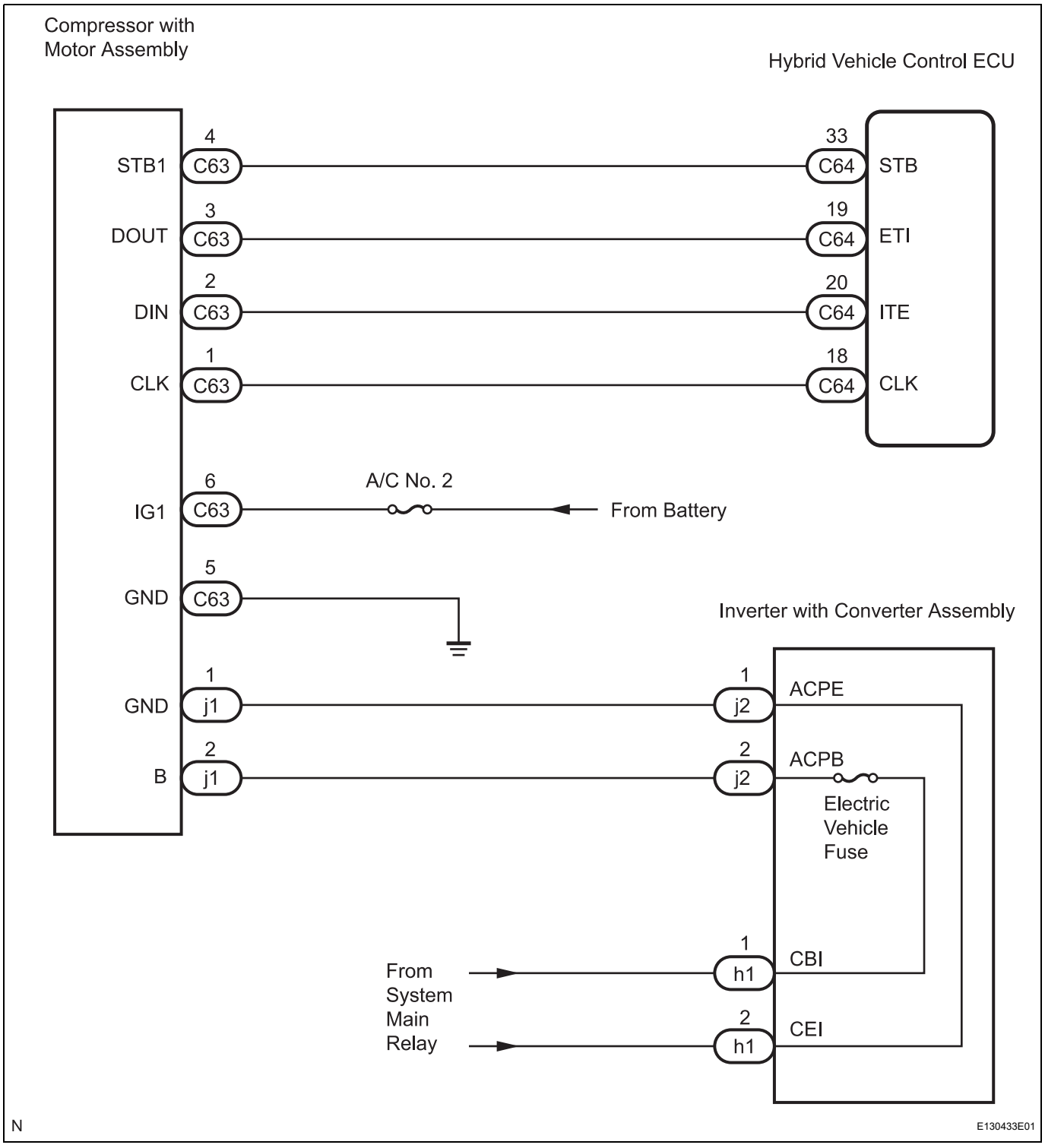
DTC	B1476/76	A/C Inverter Load System Malfunction

DESCRIPTION

The compressor with motor assembly stops compressor control and outputs this DTC if the rotation load is too large or too small while controlling motor rotation in the compressor with motor assembly.
Possible causes are refrigerant gas leakage, overcharged refrigerant gas, insufficient cooling because of a condenser fan circuit malfunction, or compressor lock.

DTC No.	DTC Detection Condition	Trouble Area
B1476/76	Motor's rotation load while the compressor is operating is too large or too small.	• Refrigerant volume • Compressor with motor assembly • Cooling fan system • CAN communication system

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**CHECK CAN COMMUNICATION SYSTEM**

(a) Use the intelligent tester to check if the CAN Communication System is functioning normally.

AC

Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → **GO TO CAN COMMUNICATION SYSTEM (See page CA-7)**

A

2 PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Select the item below in the ACTIVE TEST and then check that the fan operates.

ACTIVE TEST / AIR CONDITIONER:

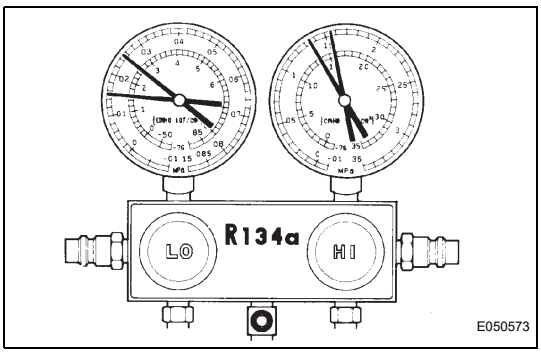
Tester Display	Test Part	Control Range
ELECTRICAL FAN (Electrical fan)	Electrical fan/OFF, ON	-

OK:
Electrical fan operates smoothly.

NG → **GO TO COOLING FAN SYSTEM (See page CO-3)**

OK

3 CHECK REFRIGERANT PRESSURE



(a) Install the manifold gauge set (See page AC-165).
(b) Read the manifold gauge pressure when the following conditions are established.
(1) Prepare the vehicle according to the chart below.

Item	Condition
Vehicle Doors	All fully open
Engine speed	1,500 rpm
Temperature Setting	MAX COLD
Blower Speed	HI
A/C switch	ON
R/F Switch	RECIRCULATION (30 to 35°C (86 to 95°F))

Standard pressure:
Low pressure side:
0.15 to 0.25 MPa (1.5 to 2.5 kgf/cm^2, 21.3 to 35.6 psi)
High pressure side:
1.37 to 1.57 MPa (14 to 16 kgf/cm^2, 199 to 228 psi)

NG → **CHARGE REFRIGERANT**

OK

REPLACE COMPRESSOR WITH MOTOR ASSEMBLY

DTC	B1477/77	A/C Inverter Low Voltage Power Resource System Malfunction

DESCRIPTION

The compressor with motor assembly monitors the controlling power voltage in the circuit. It stops the compressor circuit and outputs the DTC when the monitored voltage is outside the specified range. The output DTC is memorized as previous trouble. The compressor control may not resume unless the power switch is turned off.

CAUTION:

- **Wear electrically insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors. Be sure to carry the removed service plug grip because other workers may install it by mistake.**
- **Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.**

DTC No.	DTC Detection Condition	Trouble Area
B1477/77	An open or short to ground in the inverter's controlling power voltage circuit.	• Compressor with motor assembly • CAN communication system

INSPECTION PROCEDURE

CAUTION:

- **Wear electrically insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors. Be sure to carry the removed service plug grip because other workers may install it by mistake.**
- **Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.**

1	CHECK CAN COMMUNICATION SYSTEM

(a) Use the intelligent tester to check if the CAN Communication System is functioning normally.

Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → **GO TO CAN COMMUNICATION SYSTEM (See page CA-7)**

A → **REPLACE COMPRESSOR WITH MOTOR ASSEMBLY**

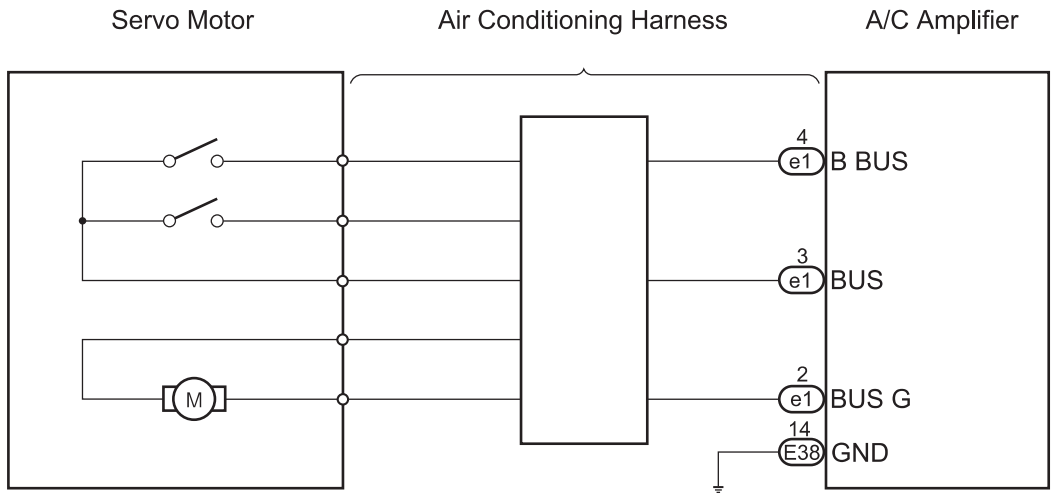
DTC	B1497/97	BUS IC Communication Malfunction

DESCRIPTION

The air conditioning harness connects the air conditioning amplifier and each servo motor. The air conditioning amplifier supplies power and sends operation instructions to each servo motor through the air conditioning harness. Each servo motor sends the damper position information to the air conditioning amplifier.

DTC No.	DTC Detection Condition	Trouble Area
B1497/97	Communication line error or open	• Air conditioning harness • A/C amplifier

WIRING DIAGRAM



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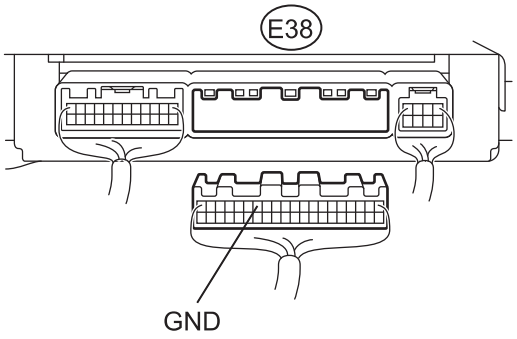
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR

(a) Remove the A/C amplifier.

Air Conditioning Amplifier Connector Wire Harness View:



(b) Disconnect the connector from the A/C amplifier.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

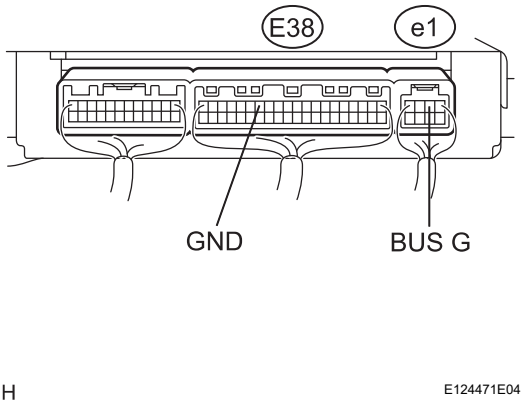
Tester Connection (Symbols)	Condition	Specified Condition
E38-14 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 INSPECT AIR CONDITIONING AMPLIFIER

Air Conditioning Amplifier Connector Wire Harness View:



(a) Reconnect the connector to the A/C amplifier.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

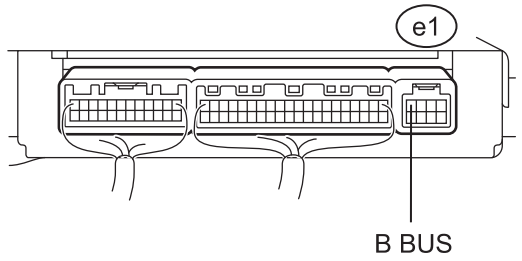
Tester Connection (Symbols)	Condition	Specified Condition
e1-2 (BUS G) - E38-14 (GND)	Always	Below 1 Ω

NG → **REPLACE AIR CONDITIONING AMPLIFIER**

OK

3	INSPECT AIR CONDITIONING AMPLIFIER

Air Conditioning Amplifier Connector Wire Harness View:



H E124471E10

(a) Disconnect the connector (e1) from the A/C amplifier.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
e1-4 (B BUS) - Body ground	Power switch off	Below 1 V
e1-4 (B BUS) - Body ground	Power switch on (IG)	10 to 14 V

NG → REPLACE AIR CONDITIONING AMPLIFIER

OK

4	REPLACE AIR CONDITIONING HARNESS

(a) Replace the air conditioning harness.
HINT:
Since the air conditioning harness cannot be inspected while it is removed from the vehicle, replace the air conditioning harness with a normal one and check that the condition returns to normal.
(b) Check for DTCs.

Result

Result	Proceed to
DTC B1497/97 is output.	A
DTC B1497/97 is not output.	B

B → END

A

REPLACE AIR CONDITIONING AMPLIFIER

DTC	B1498/98	Communication Malfunction (A/C Inverter Local)

DESCRIPTION

The hybrid vehicle control ECU and compressor with motor assembly transmit information to one another via a communication line. Compressor control is stopped and the DTC is output if communication information is cut off or abnormal information occurs.

The DTC is also detected if high-voltage power supplied from the inverter with converter assembly to the compressor control circuit is shut off.

The output DTC is memorized as previous trouble.

CAUTION:

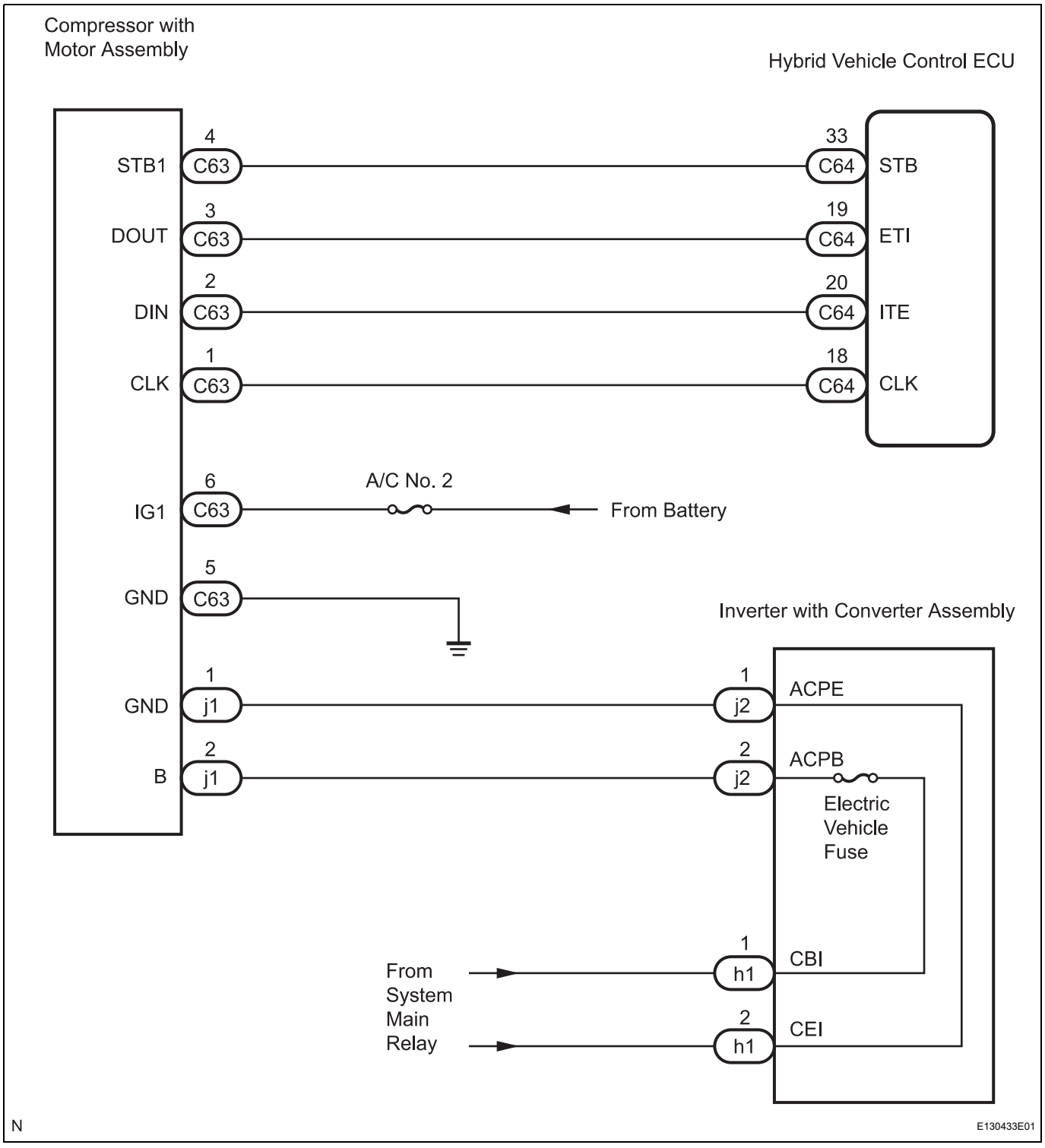
- **Wear electrically insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors. Be sure to carry the removed service plug grip because other workers may install it by mistake.**
- **Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.**

NOTICE:

Depending on the timing of the power supply to the 12 V power supply circuit and high-voltage circuit when the power switch is turned on (READY), an abnormal information signal may be output, causing this DTC to be stored. If the output DTC is a code that was memorized in the past, check the fuses and wire harnesses. If there is no malfunction, erase the DTC.

DTC No.	DTC Detection Condition	Trouble Area
B1498/98	• Communication line error or open between the hybrid vehicle control ECU and the compressor with motor assembly. • High-voltage power source is shut off.	• Harness or connector between hybrid vehicle control ECU, compressor with motor assembly, and body ground • Hybrid vehicle control ECU • Compressor with motor assembly • Inverter with converter assembly • Engine wire No. 4 • Electric vehicle fuse • CAN communication system • Hybrid control system

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Wear electrically insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors. Be sure to carry the removed service plug grip because other workers may install it by mistake.**
- **Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.**

NOTICE:
Depending on the timing of the power supply to the 12 V power supply circuit and high-voltage circuit when the power switch is turned on (READY), an abnormal information signal may be output, causing this DTC to be stored. If the output DTC is a code that was memorized in the past, check the fuses and wire harnesses. If there is no malfunction, erase the DTC.

1 CHECK CAN COMMUNICATION SYSTEM

(a) Use the intelligent tester to check if the CAN Communication System is functioning normally.
Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → **GO TO CAN COMMUNICATION SYSTEM (See page CA-7)**

A

2 CHECK DIAGNOSTIC TROUBLE CODE

(a) Check if DTCs for the hybrid control system are output using the intelligent tester.

Result

Result	Proceed to
DTC is not output	A
Only DTC P3108 is output	A
DTCs other than P3108 are output	B

B → **GO TO HYBRID CONTROL SYSTEM (See page HV-15)**

A

3 INSPECT FUSE (A/C NO. 2)

(a) Remove the A/C No. 2 fuse from the instrument panel J/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

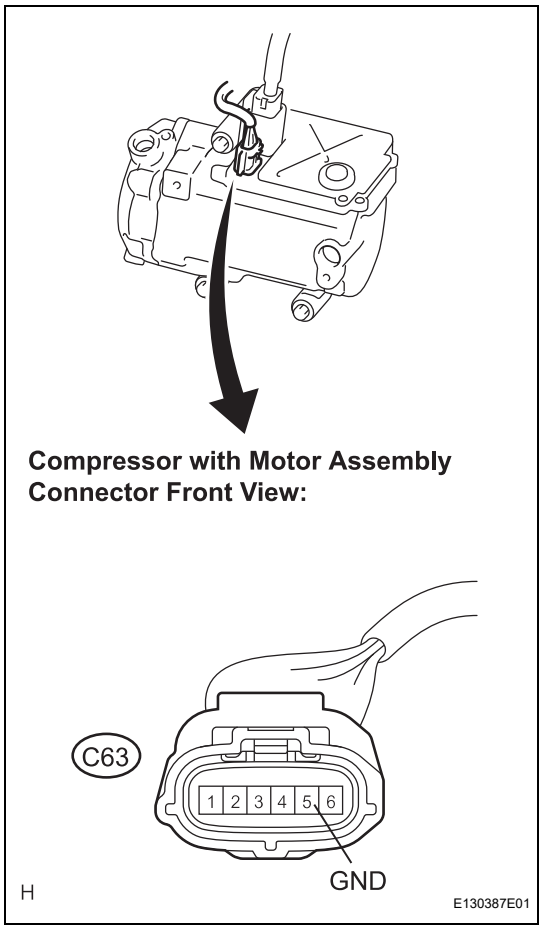
Tester Item	Condition	Specified condition
A/C No. 2 fuse	Always	Below 1 Ω

NG → **REPLACE FUSE (A/C NO. 2)**

OK

AC

4	CHECK HARNESS AND CONNECTOR (COMPRESSOR WITH MOTOR ASSEMBLY - BODY GROUND)



(a) Disconnect the connector from the compressor with motor assembly.
CAUTION:
Do not disconnect the connector on the high-voltage side.

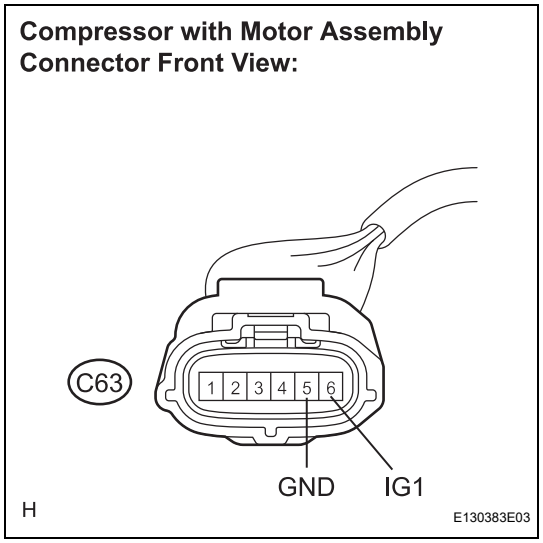
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
C63-5 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5	CHECK HARNESS AND CONNECTOR (IG1 - GND)



(a) Turn the power switch on (IG).

(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
C63-6 (IG1) - C63-5 (GND)	Power switch on (IG)	10 to 14 V
C63-6 (IG1) - C63-5 (GND)	Power switch off	Below 1 V

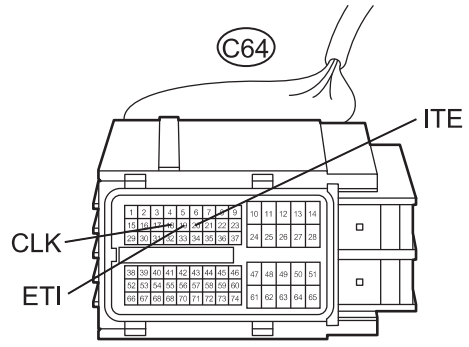
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

AC

OK

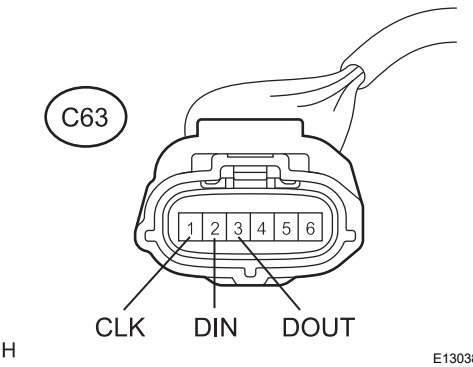
6	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - COMPRESSOR WITH MOTOR ASSEMBLY)

Hybrid Vehicle Control ECU Connector Front View:



(a) Disconnect the connector from the hybrid vehicle control ECU.

Compressor with Motor Assembly Connector Front View:



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
C63-1 (CLK) - C64-18 (CLK)	Always	Below 1 Ω
C63-2 (DIN) - C64-20 (ITE)	Always	Below 1 Ω
C63-3 (DOUT) - C64-19 (ETI)	Always	Below 1 Ω
C63-1 (CLK) - Body ground	Always	10 kΩ or higher
C63-2 (DIN) - Body ground	Always	10 kΩ or higher
C63-3 (DOUT) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

7	INSPECT ELECTRIC VEHICLE FUSE

(a) Turn the power switch off.

(b) Remove the service plug grip.

CAUTION:

- **Be sure to wear insulated gloves.**
- **Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.**

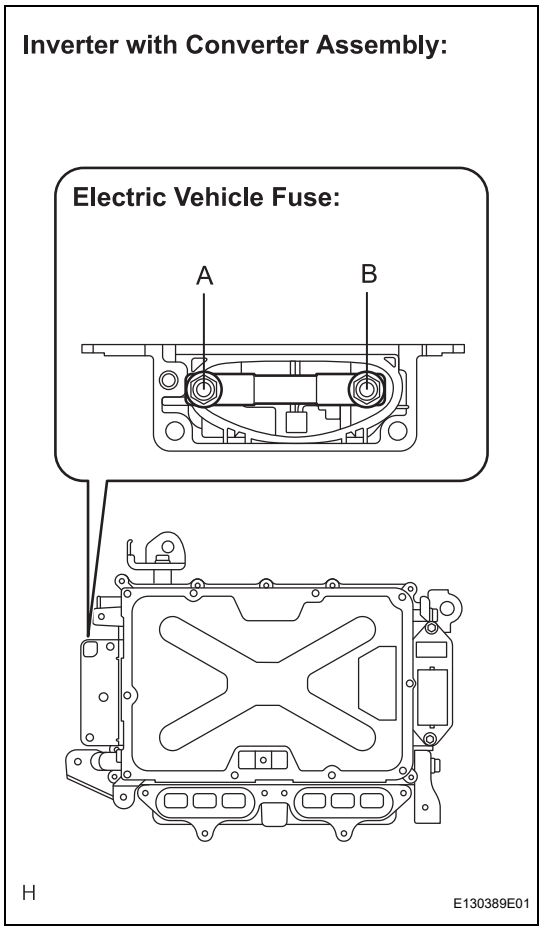
NOTICE:

Do not start the engine with the service plug grip removed because it may cause a malfunction.

(c) Remove the connector cover assembly.

CAUTION:
Be sure to wear insulated gloves.
NOTICE:
Be sure to prevent foreign objects or water from entering the inverter with converter assembly.

(d) Check that bolts A and B are tightened securely.
(e) Measure the resistance according to the value(s) in the table below.



Standard resistance

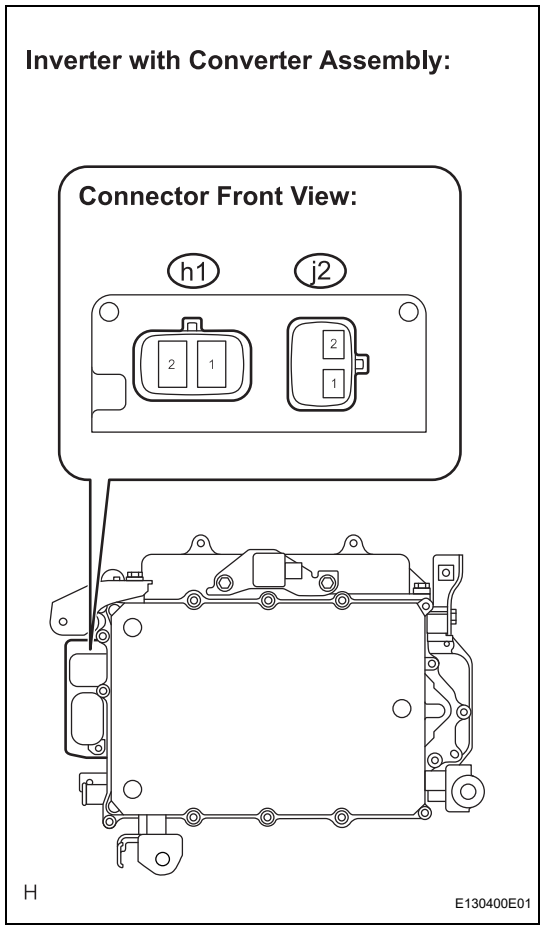
Tester Item (Tester Connection)	Condition	Specified Condition
ELECTRIC VEHICLE fuse (A - B)	Always	Below 1 Ω

NG → **REPLACE ELECTRIC VEHICLE FUSE**

OK

8	INSPECT INVERTER WITH CONVERTER ASSEMBLY

CAUTION:
- **Be sure to wear insulated gloves.**
- **Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.**



(a) Disconnect the connector from the inverter with converter assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

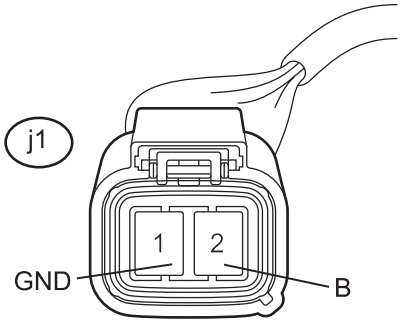
Tester Connection (Symbols)	Condition	Specified Condition
j2-1 (ACPE) - h1-2 (CEI)	Always	Below 1 Ω
j2-2 (ACPB) - h1-1 (CBI)	Always	Below 1 Ω

NG → **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

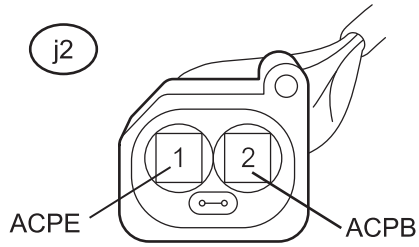
OK →

9	INSPECT ENGINE WIRE NO. 4

Compressor with Motor Assembly Connector Front View:



Inverter with Converter Assembly Connector Front View:



H

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(a) Disconnect the connector from engine wire No. 4.
CAUTION:
Be sure to wear insulated gloves.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

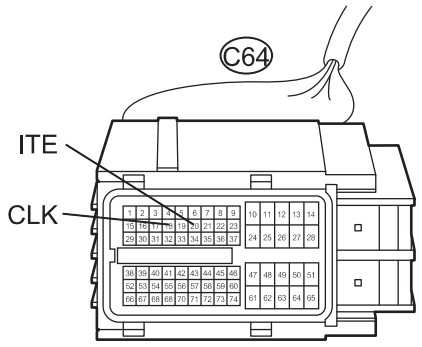
Tester Connection (Symbols)	Condition	Specified Condition
j1-1 (GND) - j2-1 (ACPE)	Always	Below 1 Ω
j1-2 (B) - j2-2 (ACPB)	Always	Below 1 Ω
j1-1 (GND) - j1-2 (B)	Always	10 kΩ or higher

NG → **REPLACE ENGINE WIRE NO. 4**

OK

10	INSPECT COMPRESSOR WITH MOTOR ASSEMBLY

Hybrid Vehicle Control ECU Connector Front View:



H

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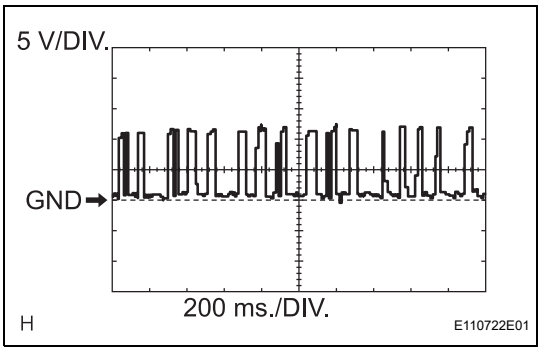
(a) Reconnect the compressor with motor assembly.
(b) Turn the power switch on (IG).

AC



(c) Measure the waveform according to the following tables.

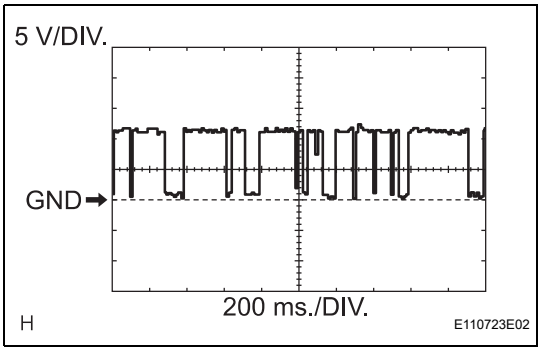
(1) CLK - Body ground

Standard

Tester Connection (Symbols)	Condition	Specified Condition
C64-18 (CLK) - Body ground	Power switch on (IG)	Pulse generation

Item	Contents
Tool Setting	5 V/DIV., 200 ms./DIV.
Vehicle Condition	Power switch on (IG)

HINT:
Waveform cycle varies with the communication contents.



(2) ITE - Body ground

Standard

Tester Connection (Symbols)	Condition	Specified Condition
C64-20 (ITE) - Body ground	Power switch on (IG)	Pulse generation

Item	Contents
Tool Setting	5 V/DIV., 200 ms./DIV.
Vehicle Condition	Power switch on (IG)

HINT:
Waveform cycle varies with the communication contents.

NG → **REPLACE COMPRESSOR WITH MOTOR ASSEMBLY**

OK

REPLACE HYBRID VEHICLE CONTROL ECU

DTC	B1499/99	Multiplex Communication Circuit

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
B1499/99	Open in CAN communication circuit	CAN communication system

INSPECTION PROCEDURE

1	GO TO CAN COMMUNICATION SYSTEM

(a) Refer to the CAN communication system (See page CA-7).

NEXT

END

DTC	P0AA6-611	Hybrid Battery Voltage System Isolation Fault

DESCRIPTION

The DTC is output if there is insulation trouble with the high-voltage circuits in the air conditioning system. Possible causes are poor insulation in the compressor with motor assembly, or mixing of any oil other than ND-OIL 11 in the refrigerant cycle.

The motor driven with high-voltage is built into the electrical compressor and is cooled directly with refrigerant. Compressor oil (ND-OIL 11) with high insulation performance is used because a leakage of electrical power may occur if regular compressor oil (ND-OIL 8) is used.

NOTICE:

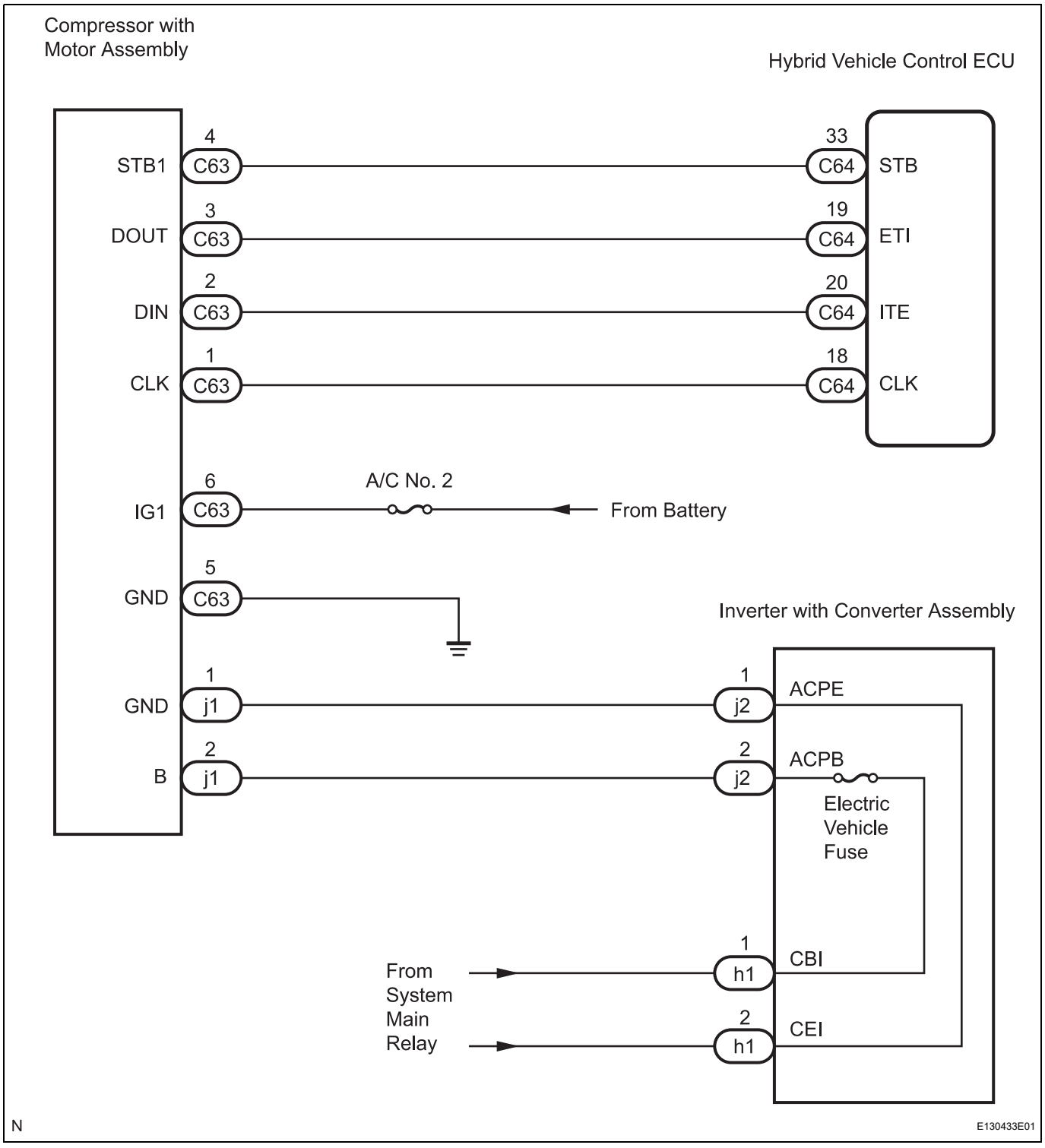
- **Electrical insulation performance may decrease significantly if even a small amount of oil other than ND-OIL 11 is used (or enters) in the refrigerant cycle, causing the DTC to be output.**
- **If other oil is accidentally used and a DTC is output, collect the oil in the refrigerant cycle into the compressor and replace it with ND-OIL 11 to increase the ND-OIL 11 ratio amount.**
- **Replace the main components (evaporator, condenser, and compressor) if a large amount of oil other than ND-OIL 11 enters the system. Failing to do so may cause electrical insulation performance to remain low, causing the DTC to be output.**

CAUTION:

- **Wear insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors.**
- **Be sure to carry the removed service plug grip because other workers may install it by mistake.**
- **Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.**

DTC No.	DTC Detection Condition	Trouble Area
P0AA6-611	High voltage system insulation malfunction	• Compressor oil • Refrigerant pipe line • Compressor with motor assembly • CAN communication system

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Wear insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors.**
- **Be sure to carry the removed service plug grip because other workers may install it by mistake.**
- **Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.**

HINT:
If it can be confirmed that any compressor oil other than ND-OIL 11 has been used in the vehicle, replace the air conditioning cycle.

1	CHECK CAN COMMUNICATION SYSTEM

(a) Use the intelligent tester to check if the CAN Communication System is functioning normally.
Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → **GO TO CAN COMMUNICATION SYSTEM (See page CA-7)**

A

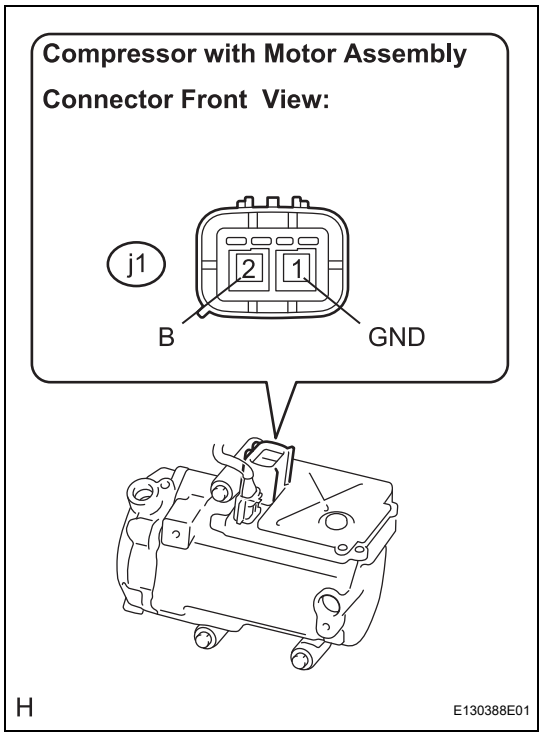
2	INSPECT COMPRESSOR WITH MOTOR ASSEMBLY

(a) Clear the DTCs (See page AC-39).
(b) Turn the power switch on (IG).
(c) Prepare the vehicle according to the table below for 3 minutes.

Item	Condition
Blower speed	HI
Temperature setting	MAX COLD
A/C	ON

(d) Turn the power switch off.
(e) Remove the service plug grip.
CAUTION:
- **Because the compressor has a high-voltage circuit, wear insulated gloves and pull out the service plug grip to cut off the high-voltage circuit before inspection.**
- **Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.**

NOTICE:
Do not start the engine with the service plug grip removed because it may cause a malfunction.



(f) Disconnect the connector (j1) from the compressor with motor assembly.

(g) Using a megohmmeter, measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
j1-1 (GND) - Body ground	Always	2 MΩ or higher
j1-2 (B) - Body ground	Always	2 MΩ or higher

NG → **REPLACE COMPRESSOR WITH MOTOR ASSEMBLY**

OK

3	INSPECT AIR CONDITIONING CYCLE

(a) Reconnect the connector (j1) to the compressor with motor assembly.

(b) Install the service plug grip.

(c) Turn the power switch on (IG).

(d) Set the A/C setting temperature to 25°C (77°F) and the blower switch LO and then operate the compressor for 10 minutes to circulate the refrigerant cycle with refrigerant and collect as much compressor oil as possible.

(e) Turn the power switch off.

(f) Using a spot cooler or other tools, cool down the compressor with motor assembly for 30 minutes, or leave the vehicle overnight before inspection.

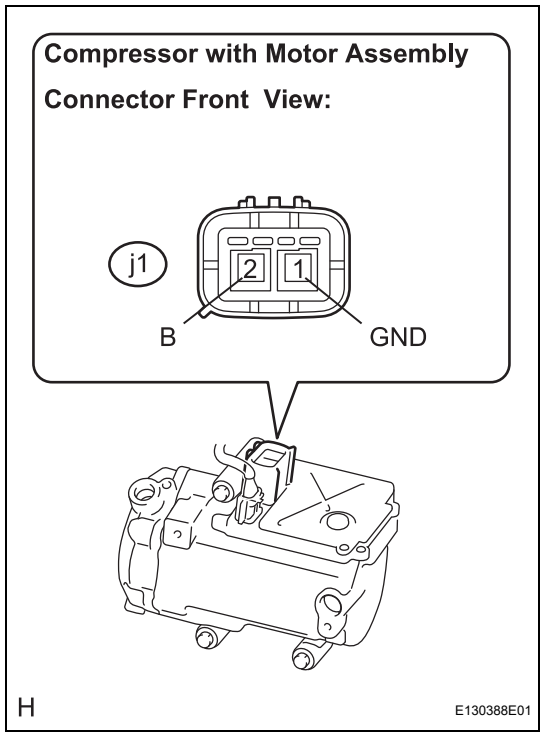
NOTICE:

Do not operate the compressor before inspection.

(g) Remove the service plug grip.

NOTICE:

Do not start the engine with the service plug grip removed because it may cause a malfunction.



(h) Disconnect the connector (j1) from the compressor with motor assembly.

(i) Using a megohmmeter, measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
j1-1 (GND) - Body ground	Always	3 MΩ or higher
j1-2 (B) - Body ground	Always	3 MΩ or higher

NOTICE:
If the results are out of the specified range, replace the compressor without operating.

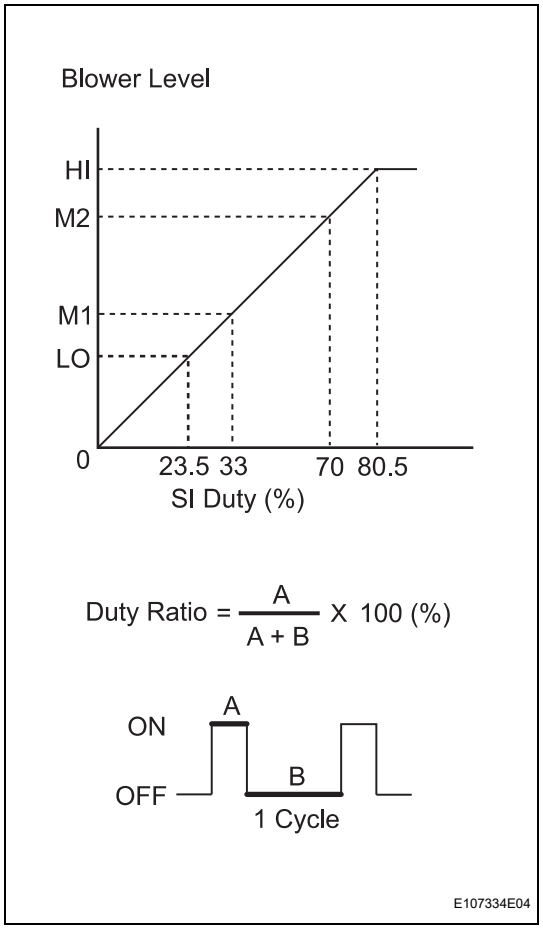
NG → **REPLACE AIR CONDITIONING CYCLE**

OK

REPLACE COMPRESSOR WITH MOTOR ASSEMBLY

Blower Motor Circuit

DESCRIPTION



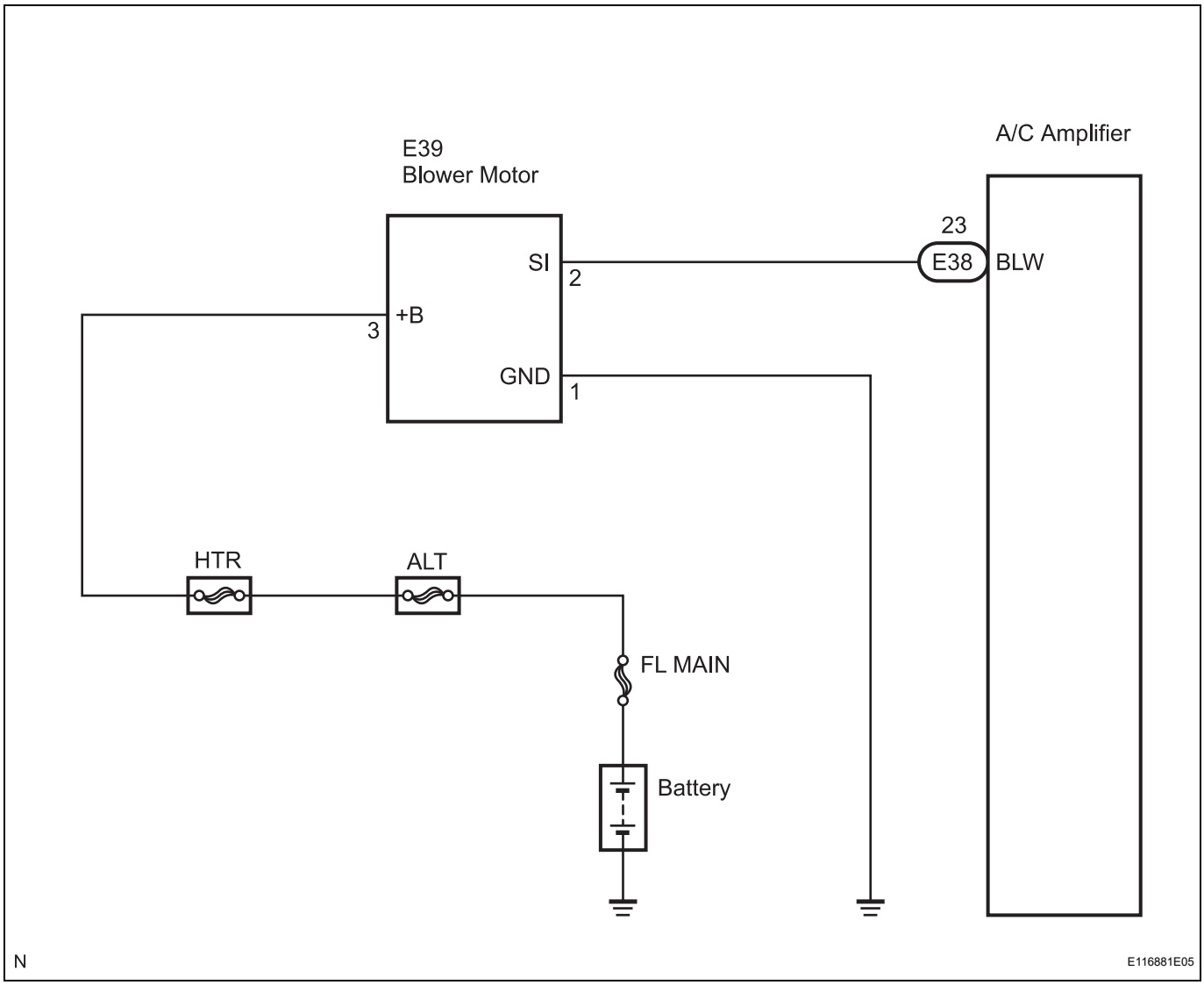
The blower motor is operated by signals from the A/C amplifier. The blower motor speed is controlled using various duty ratios.

Duty Ratio:

The duty ratio is the ratio of the blower motor ON time (A) to the total of the blower motor ON and OFF time (A + B).

The blower motor controller controls the blower motor speed.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Select the item below in the ACTIVE TEST and then check that the blower motor operates.

ACTIVE TEST / AIR CONDITIONER:

Tester Display	Test Parts	Control Range
BLOWER MOTOR (Blower motor)	Blower motor / Min.: Level 01, Max.: Level 31	-

Result

Result	Proceed to
OK	A
NG (blower motor does not operate)	B

AC

Result	Proceed to
NG (blower motor operates but does not change speed)	C

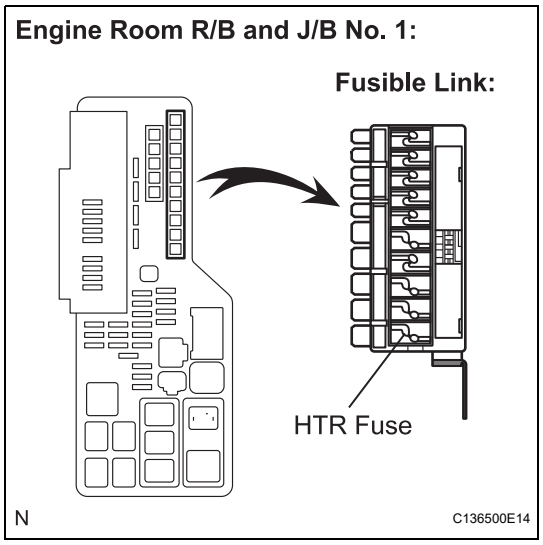
B → Go to step 2

C → Go to step 6

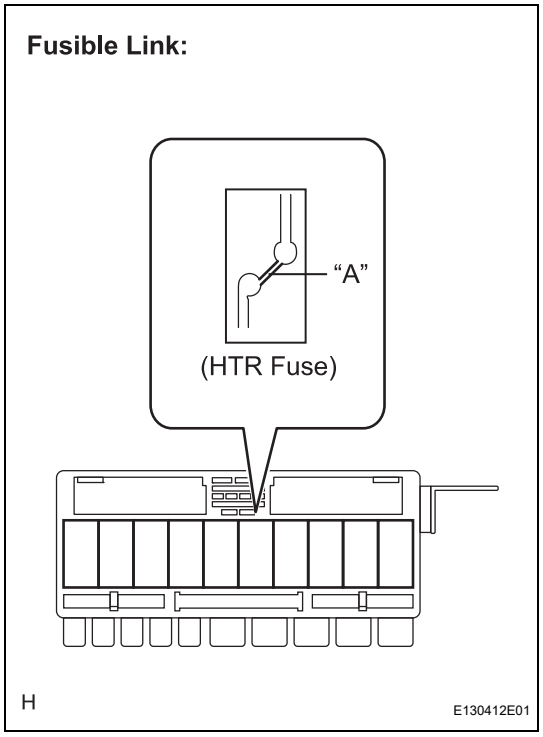
A

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2 INSPECT FUSIBLE LINK (HTR)



(a) Remove the fusible link from the engine room relay block and junction block No. 1.



(b) Check if the fusible link is melted.
OK:
The point indicated by "A" is not melted.

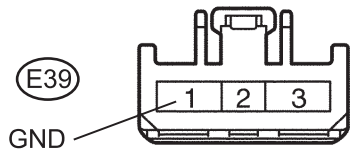
(c) Install the fusible link to the engine room relay block and junction block No. 1 with the nut.

NG → **REPLACE FUSIBLE LINK (HTR)**

OK

3 CHECK HARNESS AND CONNECTOR (BLOWER MOTOR - BODY GROUND)

Blower Motor Connector Front View:



I041124E15

(a) Disconnect the blower motor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

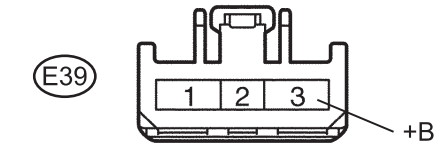
Tester Connection (Symbols)	Condition	Specified Condition
E39-1 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 CHECK HARNESS AND CONNECTOR (BLOWER MOTOR - BATTERY)

Blower Motor Connector Front View:



I041124E16

(a) Disconnect the blower motor connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

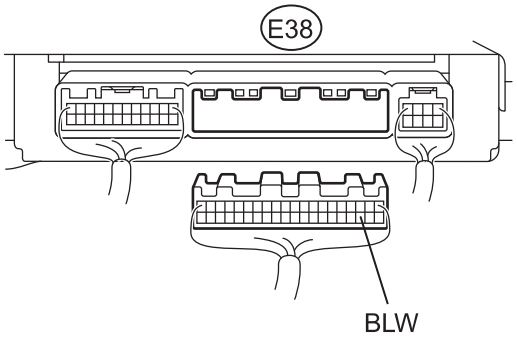
Tester Connection (Symbols)	Condition	Specified Condition
E39-3 (+B) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 CHECK HARNESS AND CONNECTOR (A/C AMPLIFIER - BLOWER MOTOR)

Air Conditioning Amplifier Connector Wire Harness View:



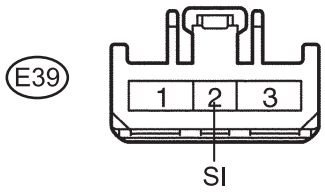
H

E124470E12

(a) Disconnect the A/C amplifier connector.

AC

Blower Motor Connector Front View:



I041124E17

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

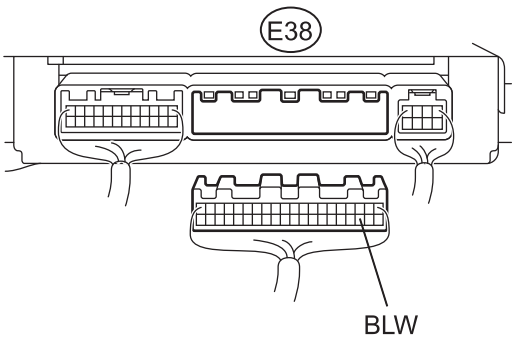
Tester Connection (Symbols)	Condition	Specified Condition
E39-2 (SI) - E38-23 (BLW)	Always	Below 1 Ω
E39-2 (SI) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 INSPECT BLOWER MOTOR

Air Conditioning Amplifier Connector Wire Harness View:



H

E124470E12

(a) Reconnect the connector to the blower motor.

(b) Measure the voltage on the A/C amplifier connector side according to the value(s) in the table below.

Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
E38-23 (BLW) - Body ground	Power switch on (IG)	4.5 to 5.5 V

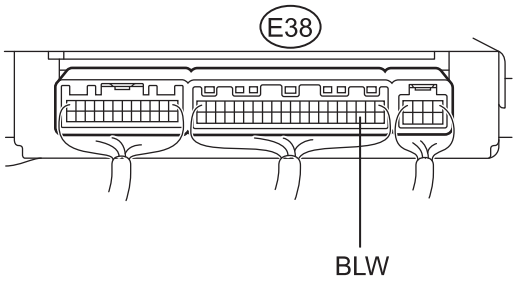
NG → **REPLACE BLOWER MOTOR**

OK

7 INSPECT AIR CONDITIONING AMPLIFIER

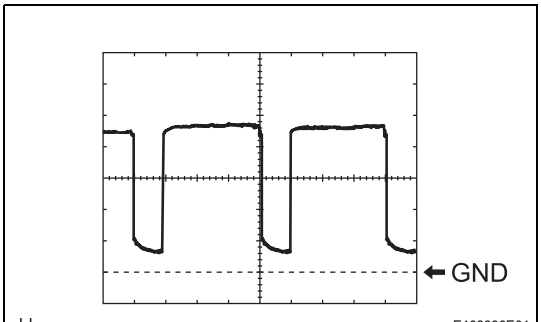
(a) Remove the A/C amplifier.

Air Conditioning Amplifier Connector Wire Harness View:



H E124471E06

(b) Reconnect the connector to the A/C amplifier.



H E103396E01

(c) Turn the power switch on (IG).
(d) Turn the blower switch ON.
(e) Measure the waveform between terminal E38-23 (BLW) of the A/C amplifier and body ground.
OK:
Waveform is as shown in the illustration.
HINT:
Waveform varies with the blower level.

Item	Contents
Tool setting	1 V/DIV., 500 μs/DIV.
Vehicle condition	Power switch on (IG) Blower switch: ON

NG → **REPLACE AIR CONDITIONING AMPLIFIER**

OK

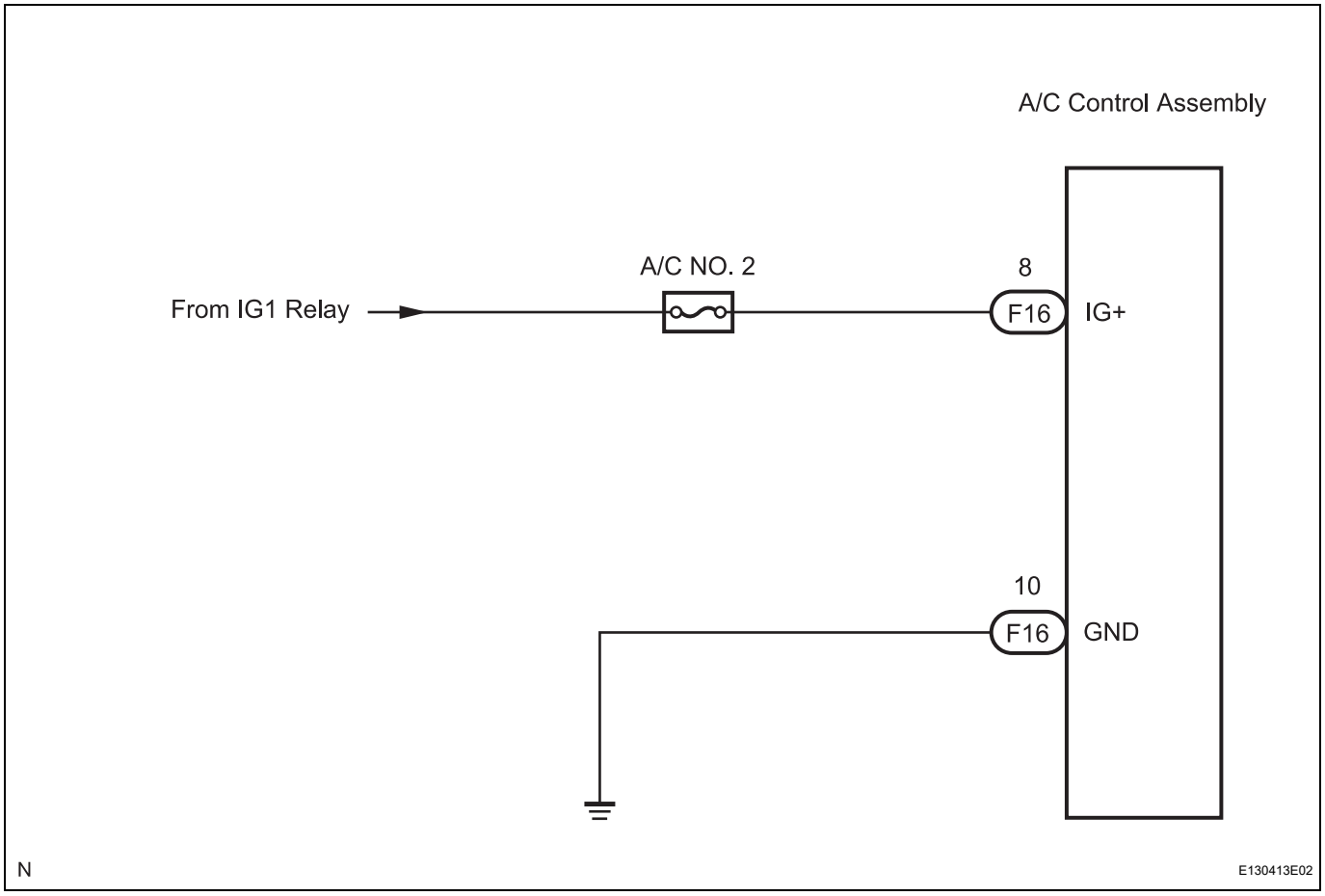
REPLACE BLOWER MOTOR

Heater Control Panel Power Source Circuit

DESCRIPTION

Battery voltage is supplied to the heater control panel (A/C control assembly) through the A/C No. 2 fuse.

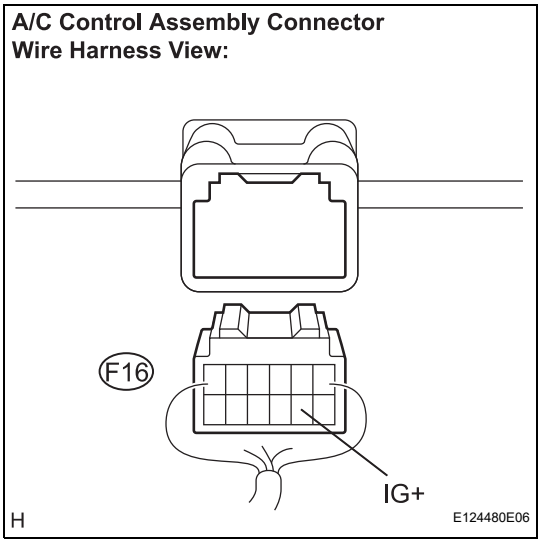
WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK HARNESS AND CONNECTOR (IG+, B - BODY GROUND)

A/C Control Assembly Connector
Wire Harness View:



(a) Disconnect the connector from the heater control panel.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

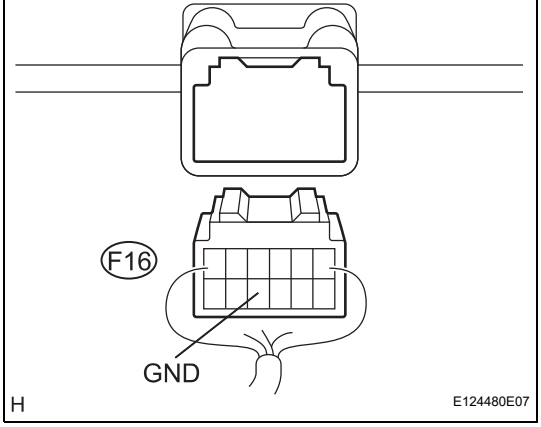
Tester Connection (Symbols)	Condition	Specified Condition
F16-8 (IG+) - Body ground	Power switch on (IG)	10 to 14 V
F16-8 (IG+) - Body ground	Power switch off	Below 1 V

NG → **GO TO SMART KEY SYSTEM (See page ST-10)**

OK

2 CHECK HARNESS AND CONNECTOR (GND - BODY GROUND)

A/C Control Assembly Connector
Wire Harness View:



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
F16-10 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

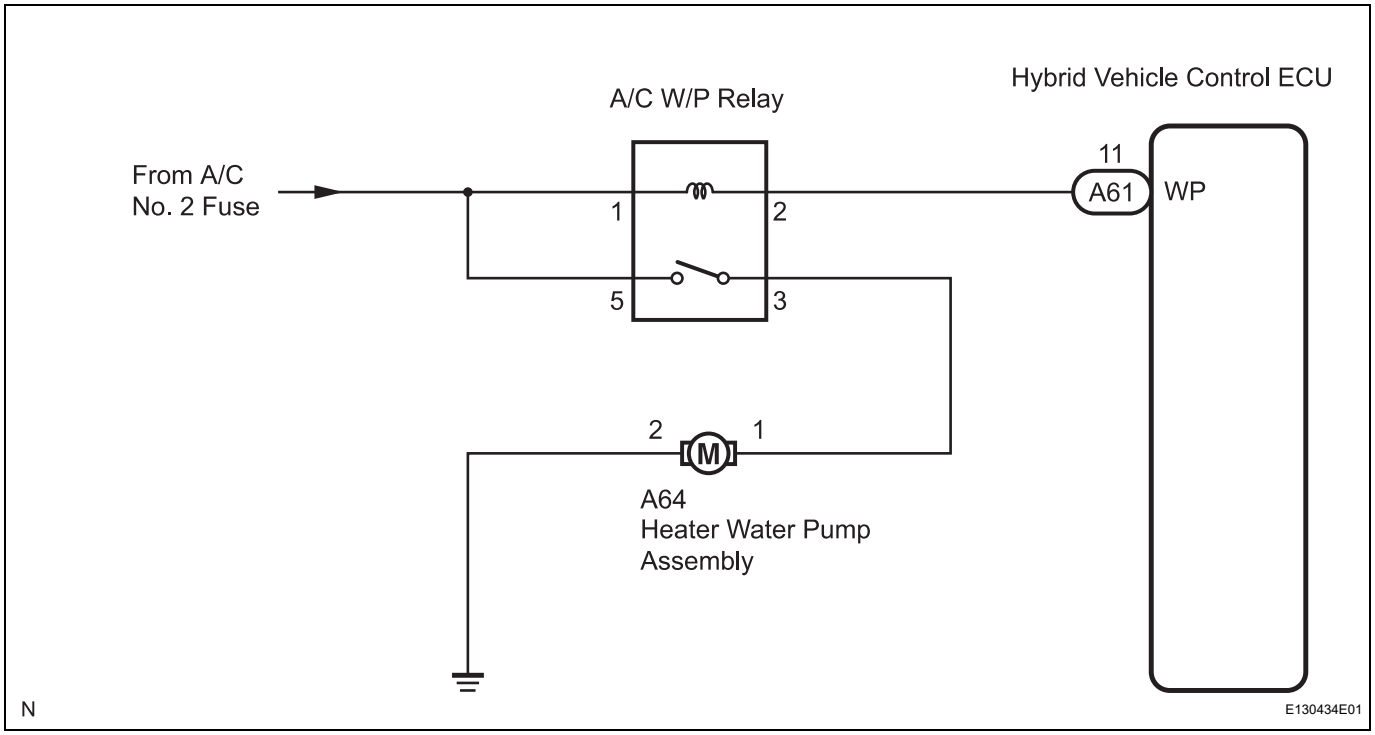
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Heater Water Pump Circuit

DESCRIPTION

The heater water pump assembly sends engine coolant to the heater core assembly while the engine is stopped to prevent heater effectiveness from becoming low. Directed by the A/C amplifier, the hybrid vehicle control ECU operates the water pump relay and drives the heater water pump assembly.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK CAN COMMUNICATION SYSTEM

(a) Use the intelligent tester to check if the CAN Communication System is functioning normally.
Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → **GO TO CAN COMMUNICATION SYSTEM (See page CA-7)**

A

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Select the item below in the ACTIVE TEST and check that the relay operates.

ACTIVE TEST / AIR CONDITIONER:

Tester Display	Test Part	Control Range
WATER PUMP (Water pump)	Activate the water pump/OFF, ON	-

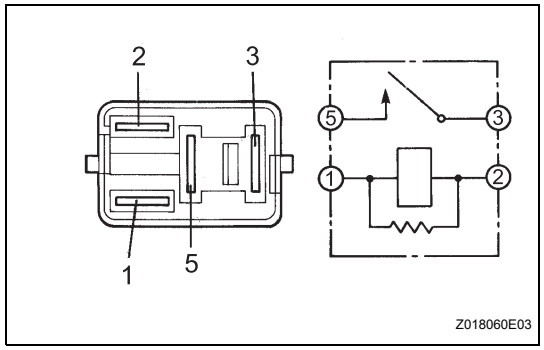
OK:
Heater water pump operates smoothly.

NG → **Go to step 3**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

3 INSPECT RELAY (A/C W/P)



(a) Remove the A/C W/P relay from the engine room relay block and junction block No. 1.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

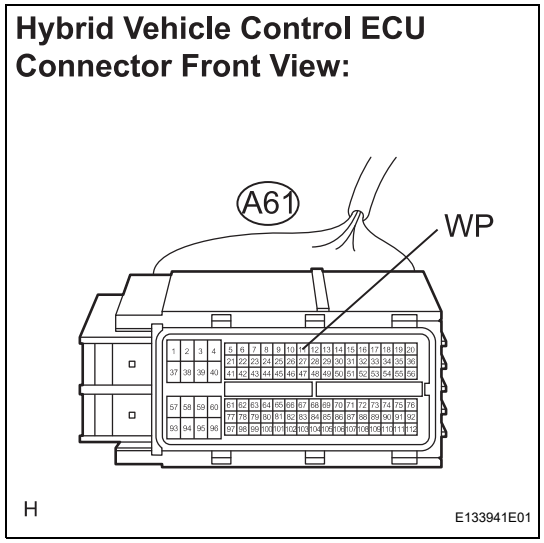
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY (A/C W/P)**

OK

4 CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - BATTERY)

Hybrid Vehicle Control ECU Connector Front View:



(a) Disconnect the connector from the hybrid vehicle control ECU.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

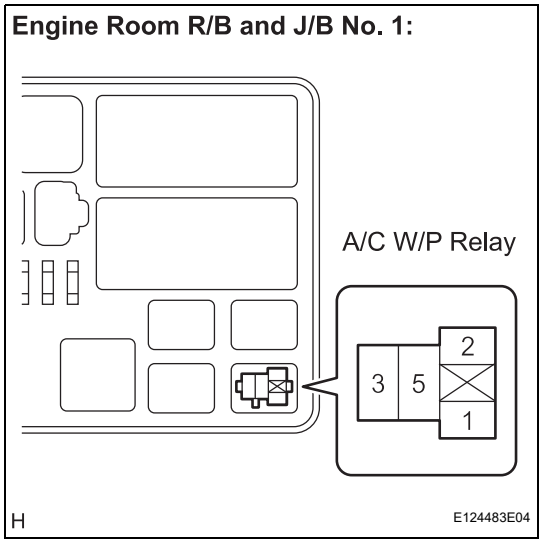
Tester Connection (Symbols)	Condition	Specified Condition
A61-11 (WP) - Body ground	Power switch off	Below 1 V
A61-11 (WP) - Body ground	Power switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

AC

OK

5	CHECK HARNESS AND CONNECTOR (BATTERY - ENGINE ROOM R/B AND J/B NO. 1)



(a) Remove the A/C W/P relay from the engine room relay block and junction block No. 1.
(b) Measure the voltage according to the value(s) in the table below.

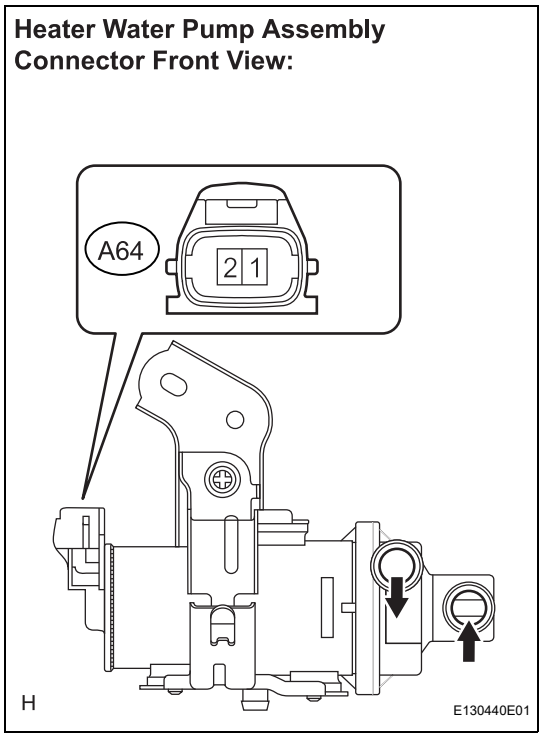
Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
Relay block A/C W/P relay terminal 5 - Body ground	Power switch on (IG)	10 to 14 V
Relay block A/C W/P relay terminal 5 - Body ground	Power switch off	Below 1 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6	INSPECT HEATER WATER PUMP ASSEMBLY



(a) Disconnect the connector from the heater water pump assembly.
(b) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2.

OK:

Heater water pump operates smoothly.

NOTICE:

Complete this inspection within 10 seconds if there is no water in the heater water pump assembly.

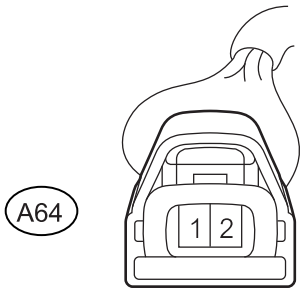
NG → **REPLACE HEATER WATER PUMP ASSEMBLY**

OK

AC

7	CHECK HARNESS AND CONNECTOR (HEATER WATER PUMP ASSEMBLY - BODY GROUND)

Heater Water Pump Assembly Connector Front View:



H

E130435E01

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

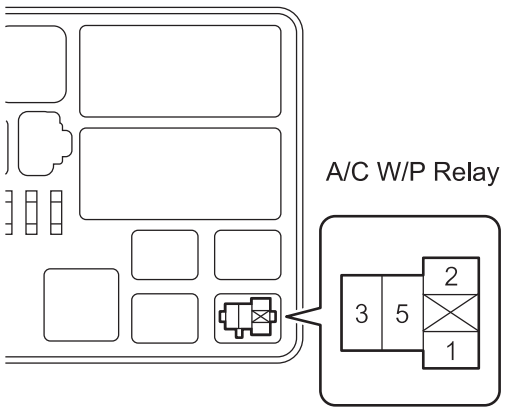
Tester Connection	Condition	Specified Condition
A64-2 - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

8	CHECK HARNESS AND CONNECTOR (HEATER WATER PUMP ASSEMBLY - ENGINE ROOM R/B AND J/B NO. 1)

Engine Room R/B and J/B No. 1:

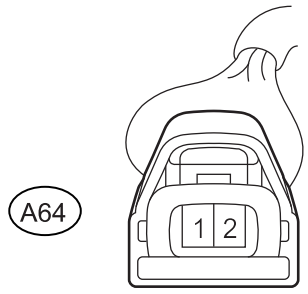


H

E124483E04

(a) Remove the A/C W/P relay from the engine room relay block and junction block No. 1.

Heater Water Pump Assembly Connector Front View:



H

E130435E01

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A64-1 - Relay block A/C W/P relay terminal 3	Always	Below 1 Ω
A64-1 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

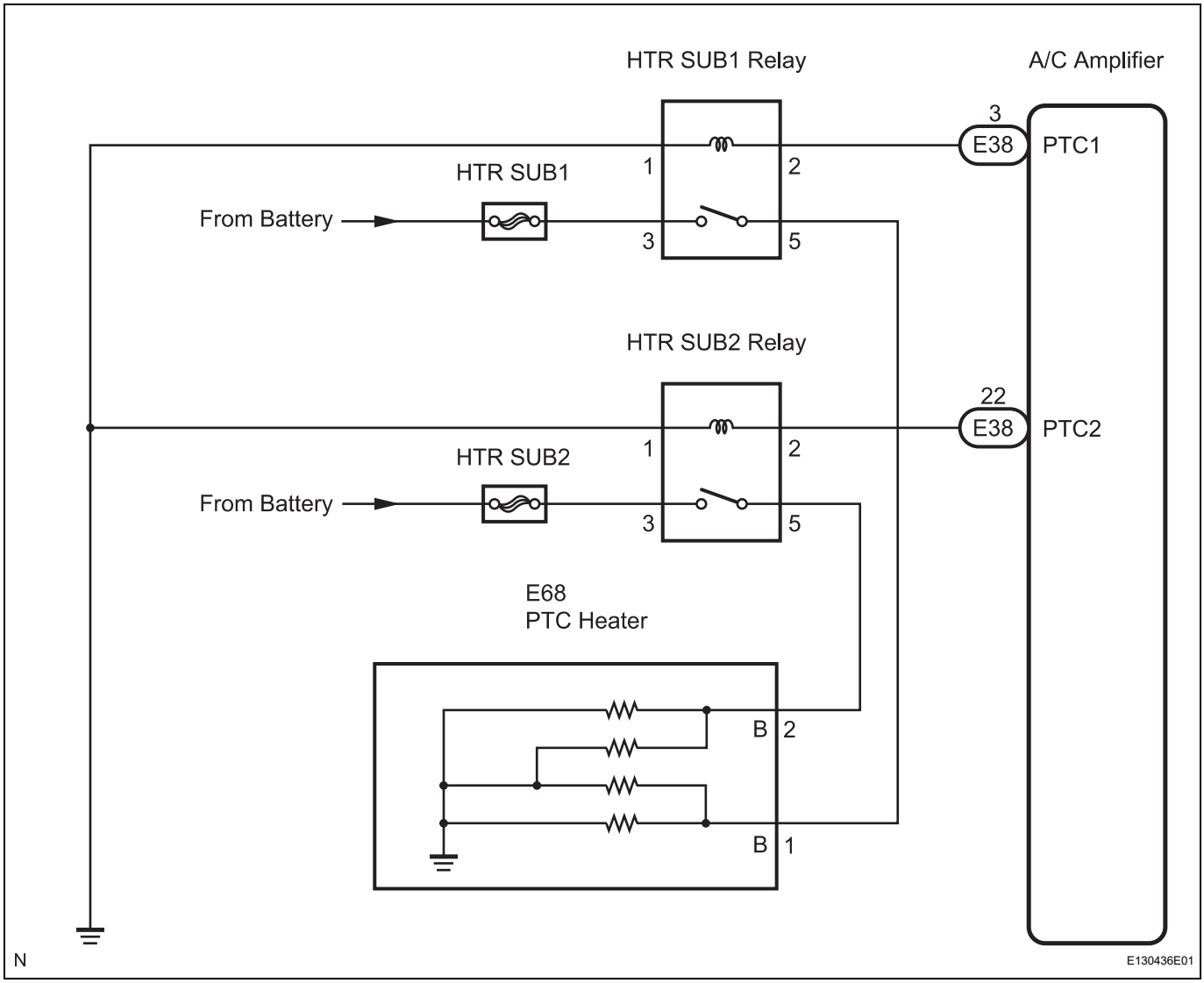
REPLACE HYBRID VEHICLE CONTROL ECU

PTC Heater Circuit

DESCRIPTION

The PTC heater is installed in the radiator in the heater unit and operates when cooling water temperature is low and normal heater effectiveness is insufficient.
The air conditioning amplifier switches the circuit in the PTC relay and operates the PTC heater when the operating conditions (cooling water temperature is below 55°C (131°F), setting temperature is MAX. HOT, air outlet damper position is FOOT or FOOT/DEF, and blower switch is not OFF) are met.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**PERFORM ACTIVE TEST BY INTELLIGENT TESTER**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.

AC

(c) Select the item below in the ACTIVE TEST and then check that the relay operates.

ACTIVE TEST / AIR CONDITIONER:

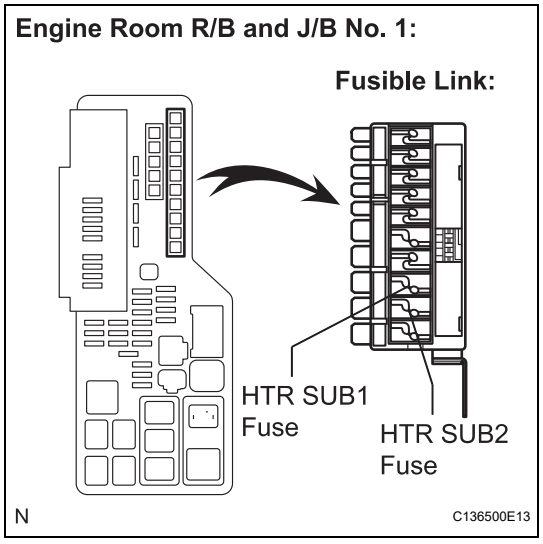
Tester Display	Test Part	Control Range
HEATER1 (Electric heater1)	Electric heater1/ON, OFF	-
HEATER2 (Electric heater2)	Electric heater2/ON, OFF	-

NG → **Go to step 2**

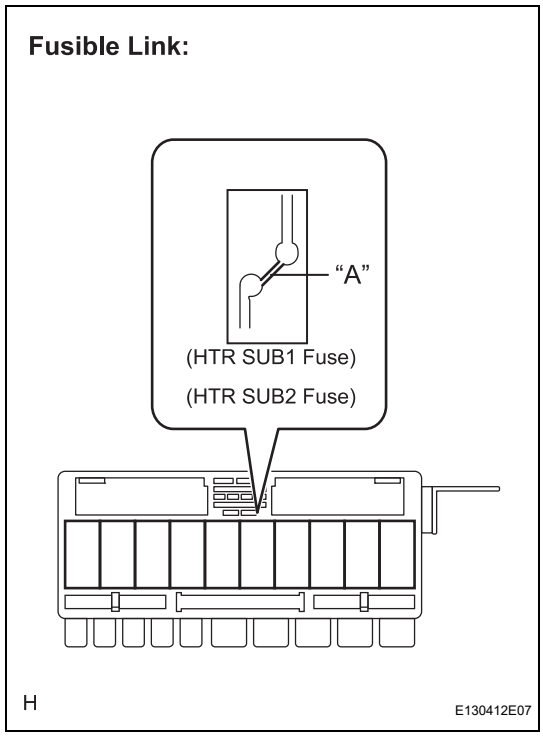
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2 INSPECT FUSIBLE LINK (HTR SUB1, HTR SUB2)



(a) Remove the fusible link from the engine room relay block and junction block No. 1.



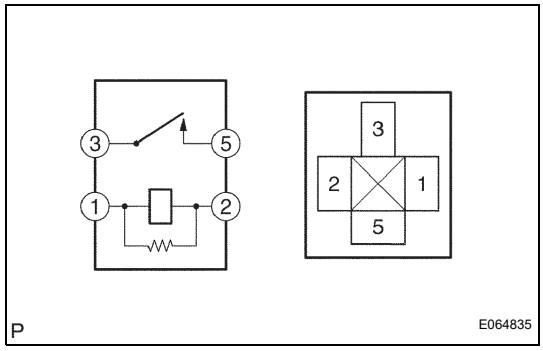
(b) Check if the fusible link is melted.
OK:
The point indicated by "A" is not melted.

(c) Install the fusible link to the engine room relay block and junction block No. 1 with the nut.

NG → **REPLACE FUSIBLE LINK (HTR SUB1, HTR SUB2)**

OK

3 INSPECT PTC HEATER RELAY



(a) Remove the PTC heater relay from the engine room relay block No. 3.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)

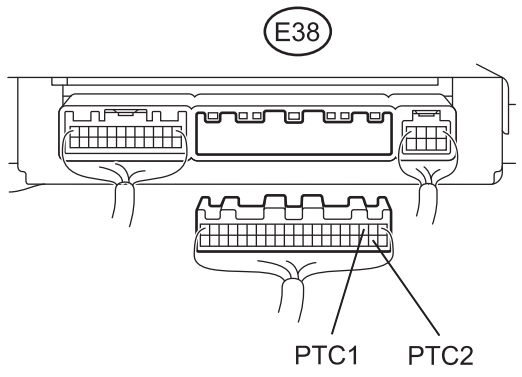
(c) Install the PTC heater relay to the engine room relay block No. 3.

NG → **REPLACE PTC HEATER RELAY**

OK

4	CHECK HARNESS AND CONNECTOR (AIR CONDITIONING AMPLIFIER - BODY GROUND)

A/C Amplifier Connector Wire Harness View:



(a) Disconnect the connector from the A/C amplifier.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

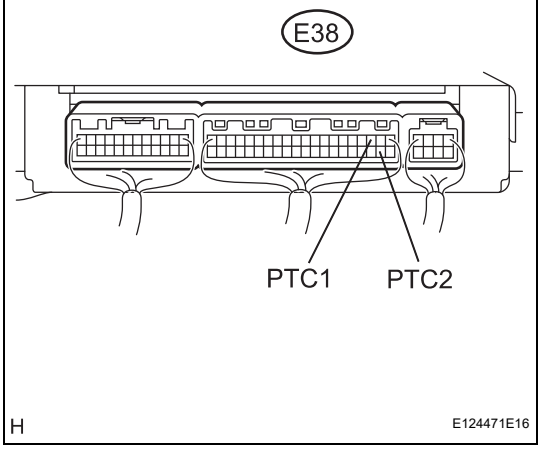
Tester Connection (Symbols)	Condition	Specified Condition
E38-3 (PTC1) - Body ground	Always	Below 1 Ω
E38-22 (PTC2) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5	INSPECT AIR CONDITIONING AMPLIFIER (PTC1, PTC2)

A/C Amplifier Connector Wire Harness View:



(a) Reconnect the connector to the A/C amplifier.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
E38-3 (PTC1) - Body ground	Power switch on (IG) Temperature setting: MAX. HOT MODE switch: FOOT Engine coolant temperature: 55°C (131°F) or lower Blower switch: OFF	10 to 14 V
E38-3 (PTC1) - Body ground	Power switch on (IG) Temperature setting: MAX. HOT MODE switch: FOOT Engine coolant temperature: 55°C (131°F) or lower Blower switch: ON	Below 1 V
E38-22 (PTC2) - Body ground	Power switch on (IG) Temperature setting: MAX. HOT MODE switch: FOOT Engine coolant temperature: 55°C (131°F) or lower Blower switch: OFF	10 to 14 V

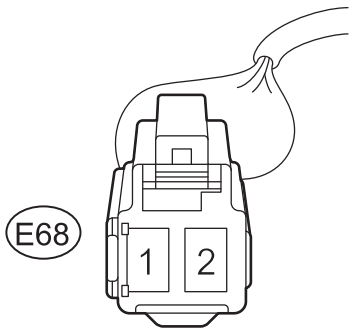
Tester Connection (Symbols)	Condition	Specified Condition
E38-22 (PTC2) - Body ground	Power switch on (IG) Temperature setting: MAX. HOT MODE switch: FOOT Engine coolant temperature: 55°C (131°F) or lower Blower switch: ON	Below 1 V

NG → REPLACE AIR CONDITIONING AMPLIFIER

OK

6 CHECK HARNESS AND CONNECTOR (BATTERY - PTC HEATER)

PTC Heater Connector Front View:



(a) Disconnect the connector from the PTC heater.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
E68-1 - Body ground	Power switch on (IG) Temperature setting: MAX. HOT MODE switch: FOOT Engine coolant temperature: 55°C (131°F) or lower Blower switch: OFF	Below 1 V
E68-1 - Body ground	Power switch on (IG) Temperature setting: MAX. HOT MODE switch: FOOT Engine coolant temperature: 55°C (131°F) or lower Blower switch: ON	10 to 14 V
E68-2 - Body ground	Power switch on (IG) Temperature setting: MAX. HOT MODE switch: FOOT Engine coolant temperature: 55°C (131°F) or lower Blower switch: OFF	Below 1 V
E68-2 - Body ground	Power switch on (IG) Temperature setting: MAX. HOT MODE switch: FOOT Engine coolant temperature: 55°C (131°F) or lower Blower switch: ON	10 to 14 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

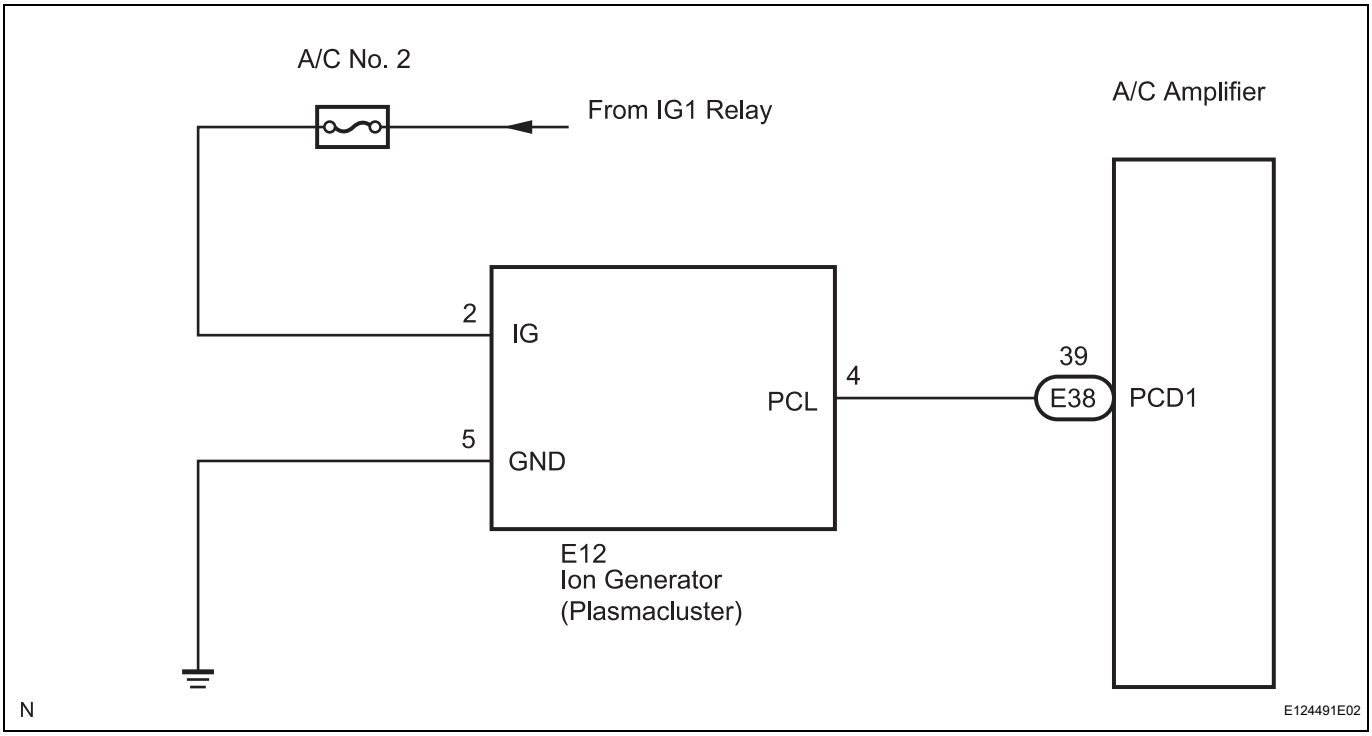
REPLACE PTC HEATER

Plasmacluster Circuit

DESCRIPTION

The plasmacluster operates in conjunction with blower switch operation.

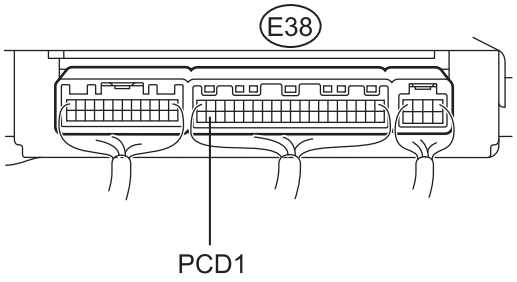
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT AIR CONDITIONING AMPLIFIER

Air Conditioning Amplifier Connector Wire Harness View:



(a) Remove the A/C amplifier with the connectors still connected.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
E38-39 (PCD1) - Body ground	Power switch on (IG) Blower switch: OFF	10 to 14 V
E38-39 (PCD1) - Body ground	Power switch on (IG) Blower switch: ON	Below 1 V

NG	Go to step 2

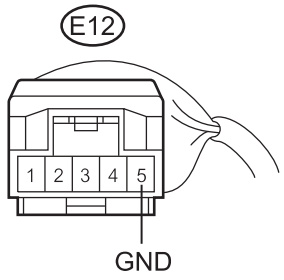
AC

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2 CHECK HARNESS AND CONNECTOR (ION GENERATOR - BODY GROUND)

Ion Generator Connector Front View:



H E116928E03

(a) Disconnect the connector from the ion generator.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

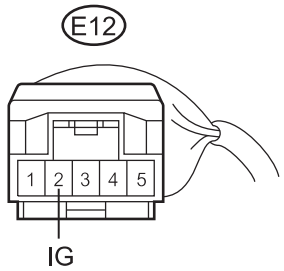
Tester Connection (Symbols)	Condition	Specified Condition
E12-5 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 CHECK HARNESS AND CONNECTOR (ION GENERATOR - BATTERY)

Ion Generator Connector Front View:



H E116928E04

(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

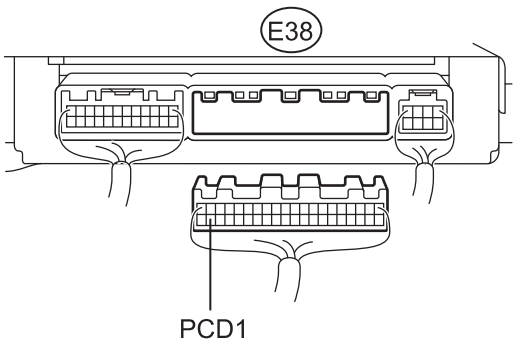
Tester Connection (Symbols)	Condition	Specified Condition
E12-2 (IG) - Body ground	Power switch off	Below 1 V
E12-2 (IG) - Body ground	Power switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

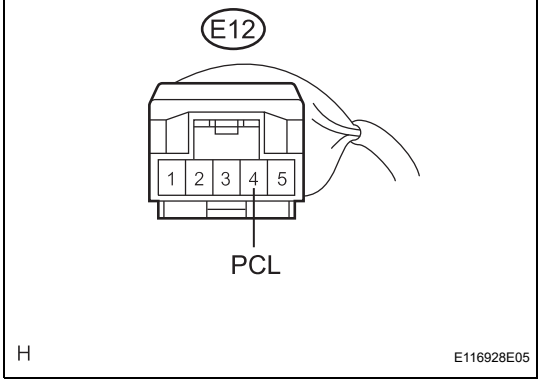
4	CHECK HARNESS AND CONNECTOR (ION GENERATOR - A/C AMPLIFIER)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Disconnect the connector from the A/C amplifier.

Ion Generator Connector Front View:



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E12-4 (PCL) - E38-39 (PCD1)	Always	Below 1 Ω
E12-4 (PCL) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ION GENERATOR

Steering Pad Switch Circuit

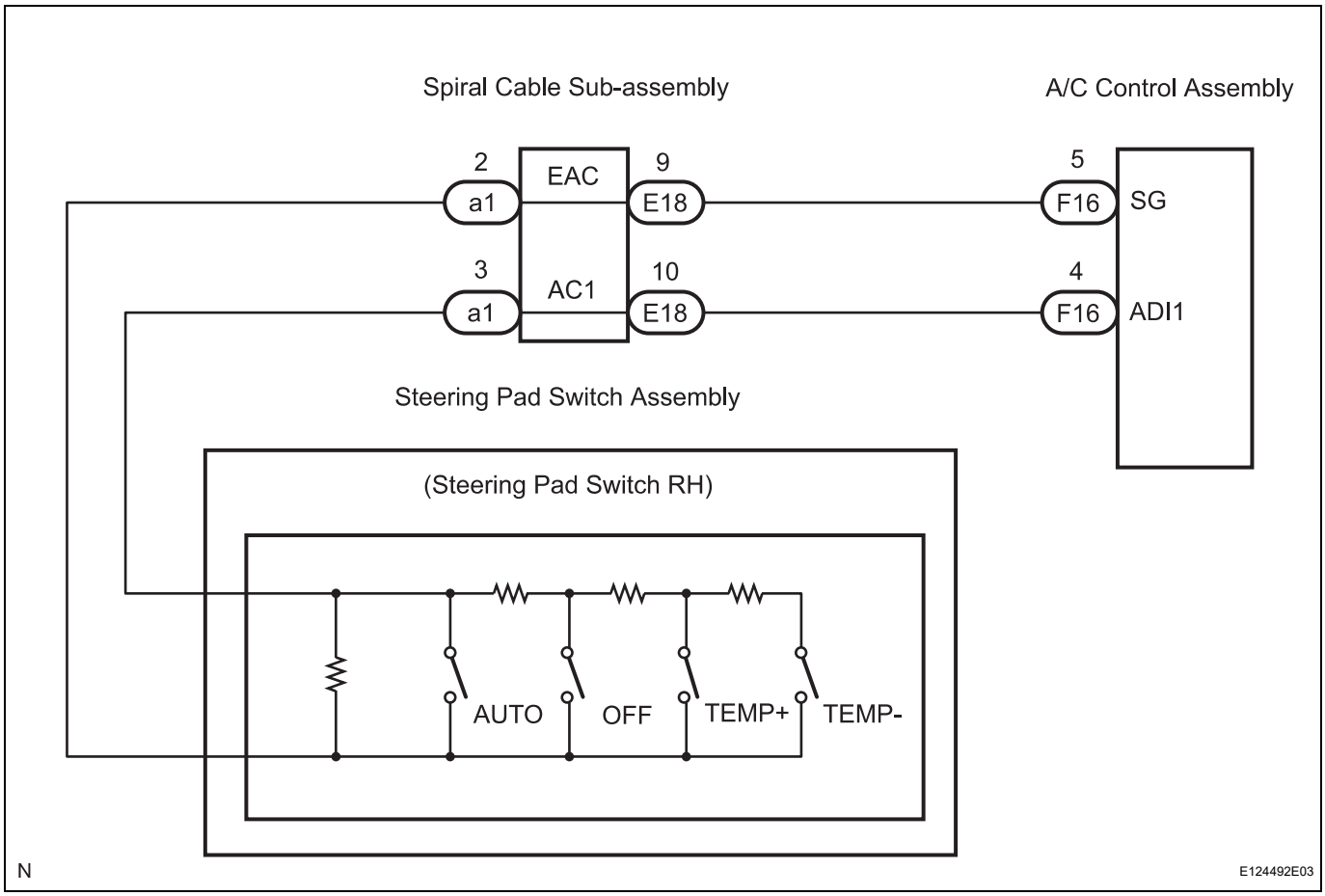
DESCRIPTION

AUTO, OFF, TEMP UP (+), and TEMP DOWN (-) switches are located on the steering pad switch. The resistance of the steering pad switch changes in accordance with switch operation. The A/C control assembly outputs voltage to the steering pad switch and reads voltage changes due to the resistance changes that result from switch operation.

HINT:

If there is an open in the circuit, the A/C system cannot be operated by the steering pad switch assembly. If there is a short in the circuit, the resulting condition is the same as if the switch were continuously depressed. Therefore, the A/C control assembly cannot be operated by the steering pad switch assembly, and the A/C control assembly will not be able to function correctly.

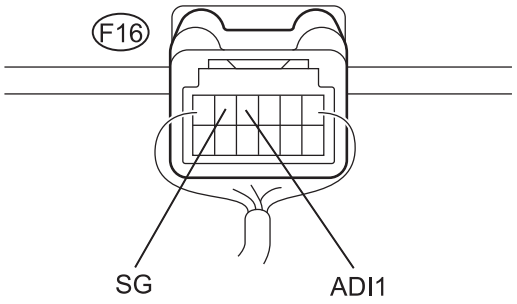
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT AIR CONDITIONING CONTROL ASSEMBLY

A/C Control Assembly Connector Wire Harness View:



H E124479E03

(a) Remove the A/C control assembly with the connectors still connected.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
F16-4 (ADI1) - F16-5 (SG)	AUTO switch: ON	Below 2.5 Ω
F16-4 (ADI1) - F16-5 (SG)	OFF switch: ON	Approx. 329 Ω
F16-4 (ADI1) - F16-5 (SG)	TEMP+ switch: ON	Approx. 1,000 Ω
F16-4 (ADI1) - F16-5 (SG)	TEMP- switch: ON	Approx. 3,110 Ω

NG → Go to step 2

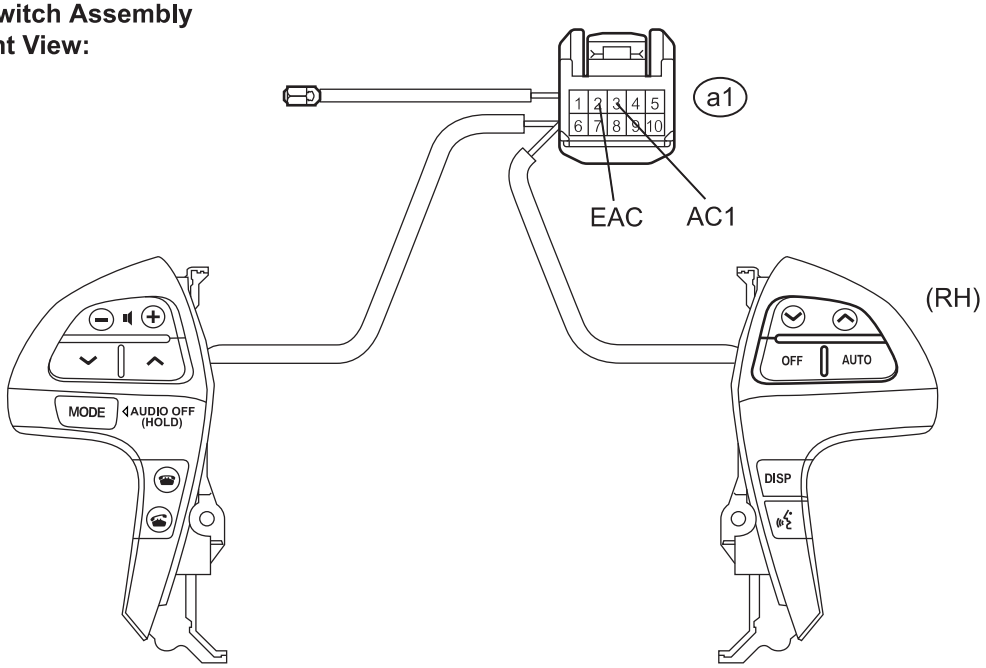
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2	INSPECT STEERING PAD SWITCH ASSEMBLY

(a) Remove the steering pad switch assembly.
(b) Disconnect the connector from the steering pad switch assembly.

Steering Pad Switch Assembly Connector Front View:



H

E124484E01

(c) Measure the resistance according to the value(s) in the table below.

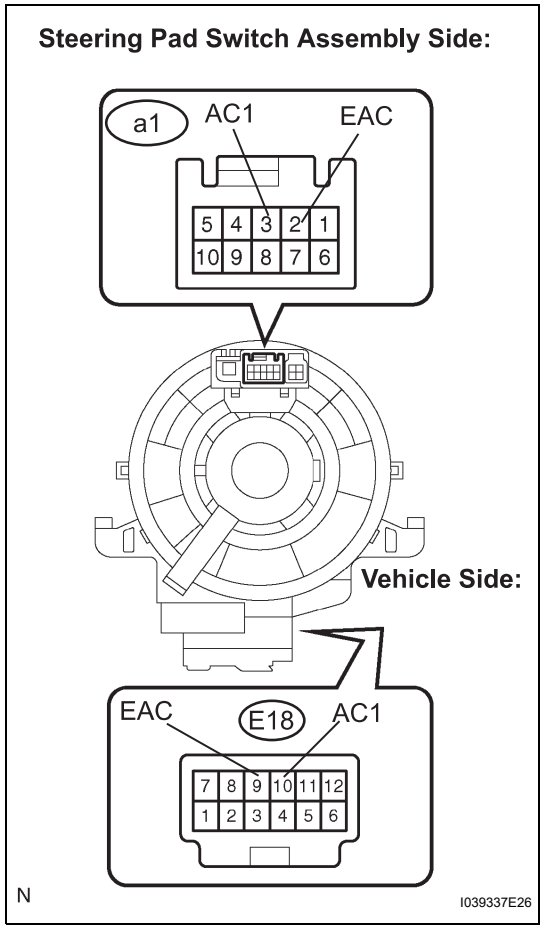
Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
a1-3 (AC1) - a1-2 (EAC)	AUTO switch: ON	Below 2.5 Ω
a1-3 (AC1) - a1-2 (EAC)	OFF switch: ON	Approx. 329 Ω
a1-3 (AC1) - a1-2 (EAC)	TEMP+ switch: ON	Approx. 1,000 Ω
a1-3 (AC1) - a1-2 (EAC)	TEMP- switch: ON	Approx. 3,110 Ω

NG → **REPLACE STEERING PAD SWITCH ASSEMBLY**

OK

3	INSPECT SPIRAL CABLE SUB-ASSEMBLY



(a) Disconnect the connector from the spiral cable sub-assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

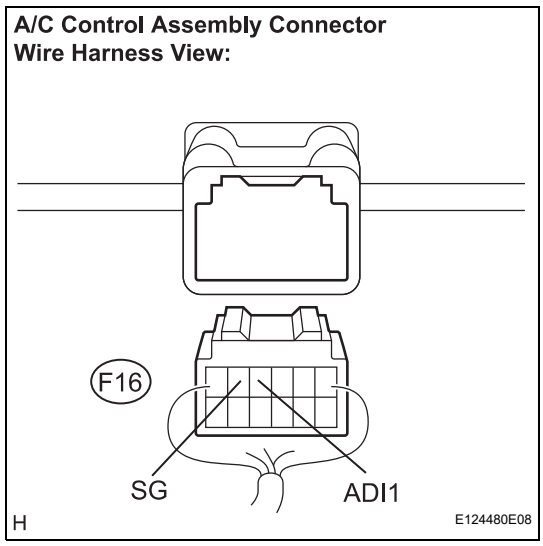
Tester Connection (Symbols)	Condition	Specified Condition
E18-10 (AC1) - a1-3 (AC1)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
E18-9 (EAC) - a1-2 (EAC)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	

HINT:
The spiral cable makes a maximum of approximately 5 rotations.

NG → REPLACE SPIRAL CABLE SUB-ASSEMBLY

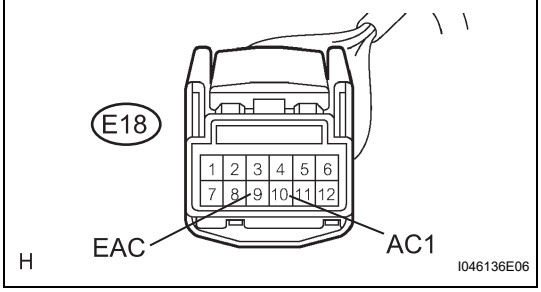
OK

4	CHECK HARNESS AND CONNECTOR (A/C CONTROL ASSEMBLY - SPIRAL CABLE SUB-ASSEMBLY)



(a) Disconnect the connector from the A/C control assembly.

Spiral Cable Sub-assembly Connector Front View:



(b) Disconnect the connector from the spiral cable sub-assembly.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
F16-4 (ADI1) - E18-10 (AC1)	Always	Below 1 Ω
F16-5 (SG) - E18-9 (EAC)	Always	Below 1 Ω
F16-4 (ADI1) - E18-10 (AC1)	Always	10 kΩ or higher
F16-5 (SG) - E18-9 (EAC)	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

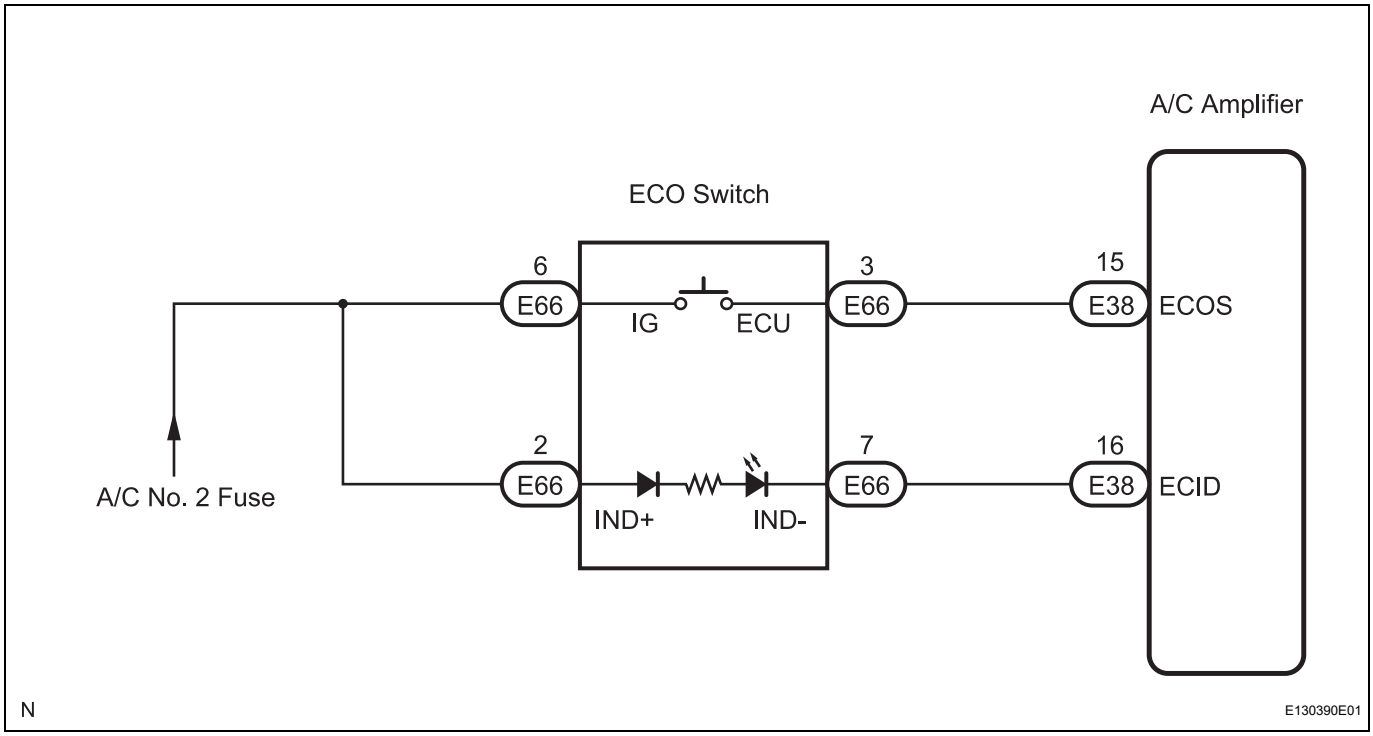
REPLACE AIR CONDITIONING CONTROL ASSEMBLY

ECO Switch Circuit

DESCRIPTION

The ECO switch is installed on the instrument panel on the driver's seat side. When the ECO switch is turned on, the A/C amplifier receives an ECO switch ON signal and controls the air conditioning to enhance fuel efficiency.
When the heater is on, the engine ON request coolant temperature will be set to a lower level. Thus, the length of time that the engine operates to generate the heat necessary to operate the heater will be limited. When the engine coolant temperature drops, the amount of air flow of the blower motor will also decrease. If FOOT/DEF or DEF is selected, or if the temperature is set to MAX HOT, the fuel efficiency control due to the ECO switch operation will be canceled.
When the air conditioning is used to cool the vehicle, the power consumption of the compressor will be limited. Initially, the air conditioning will operate normally until the cabin temperature stabilizes. After the cabin temperature stabilizes, the power consumption of the compressor will be limited while stabilizing the cabin temperature. If the temperature is set to MAX COOL, the fuel efficiency control due to the ECO switch operation will be canceled.

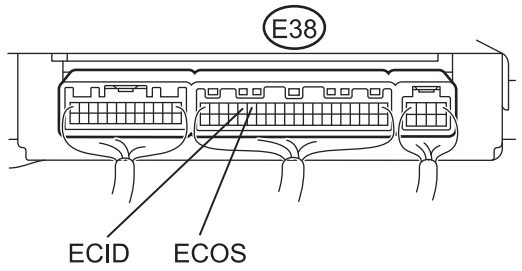
WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT AIR CONDITIONING AMPLIFIER

Air Conditioning Amplifier Connector Wire Harness View:



H E124471E14

(a) Remove the A/C amplifier with the connectors still connected.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
E38-15 (ECOS) - Body ground	Power switch on (IG) ECO switch: OFF (when switch is not pressed)	Below 1 V
E38-15 (ECOS) - Body ground	Power switch on (IG) ECO switch: ON (when switch is pressed)	10 to 14 V
E38-16 (ECID) - Body ground	Power switch on (IG) ECO switch: OFF	10 to 14 V
E38-16 (ECID) - Body ground	Power switch on (IG) ECO switch: ON	Below 1 V

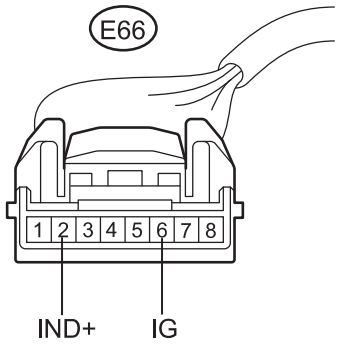
NG → Go to step 2

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2 CHECK HARNESS AND CONNECTOR (ECO SWITCH - BATTERY)

ECO Switch Wire Harness Connector Front View:



H E130392E01

(a) Disconnect the connector from the ECO switch.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

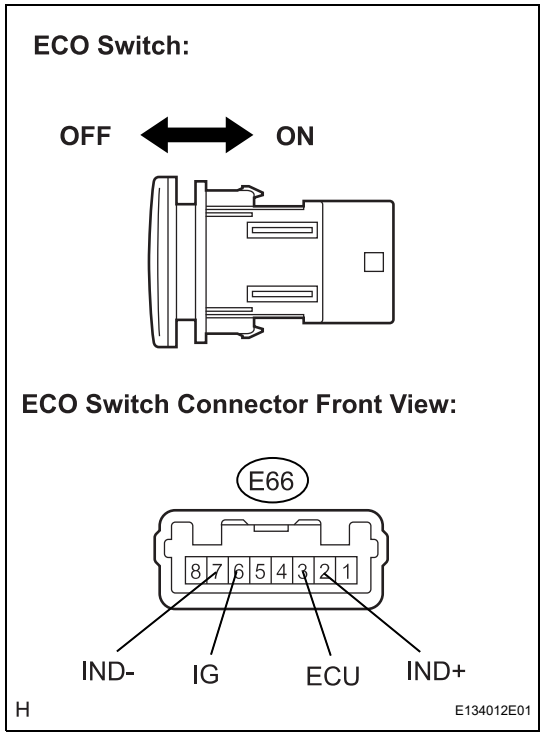
Tester Connection (Symbols)	Condition	Specified Condition
E66-6 (IG) - Body ground	Power switch off	Below 1 V
E66-6 (IG) - Body ground	Power switch on (IG)	10 to 14 V
E66-2 (IND+) - Body ground	Power switch off	Below 1 V
E66-2 (IND+) - Body ground	Power switch on (IG)	10 to 14 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

AC

3 INSPECT ECO SWITCH



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E66-6 (IG) - E66-3 (ECU)	ECO switch: OFF (when switch is not pressed)	10 kΩ or higher
E66-6 (IG) - E66-3 (ECU)	ECO switch: ON (when switch is pressed)	Below 1 Ω

(b) Connect the positive (+) lead from the battery to terminal 2 (IND+), and the negative (-) lead to terminal 7 (IND-). Check that the indicator light comes on.

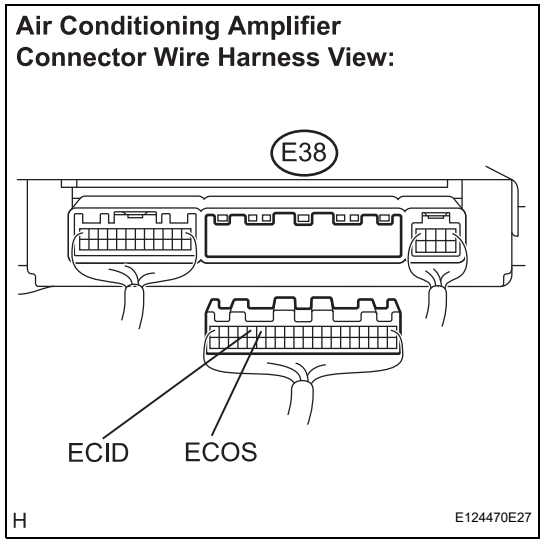
OK:

Indicator light comes on.

NG → **REPLACE ECO SWITCH**

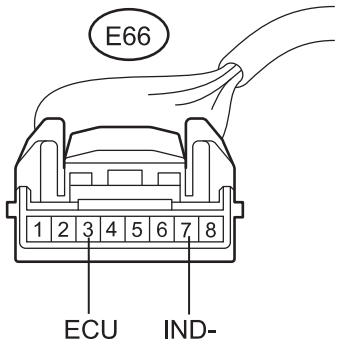
OK

4 CHECK HARNESS AND CONNECTOR (ECO SWITCH - A/C AMPLIFIER)



(a) Disconnect the connector from the A/C amplifier.

ECO Switch Wire Harness Connector Front View:



H

E130392E03

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E38-15 (ECOS) - E66-3 (ECU)	Always	Below 1 Ω
E38-15 (ECOS) - Body ground	Always	10 kΩ or higher
E38-16 (ECID) - E66-7 (IND-)	Always	Below 1 Ω
E38-16 (ECID) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

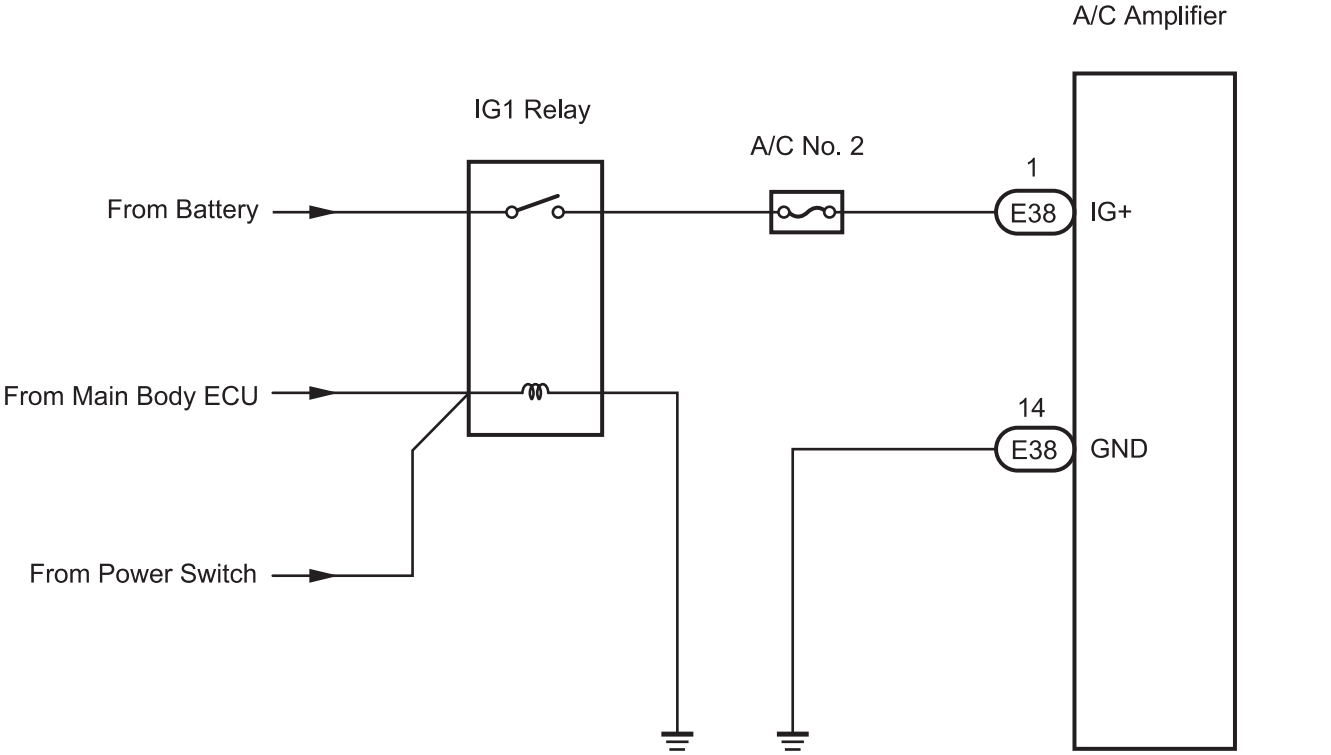
REPLACE AIR CONDITIONING AMPLIFIER

IG Power Source Circuit

DESCRIPTION

The main power source is supplied to the A/C amplifier when the power switch is turned on (IG).
The power source is used for operating the A/C amplifier and servo motor, etc.

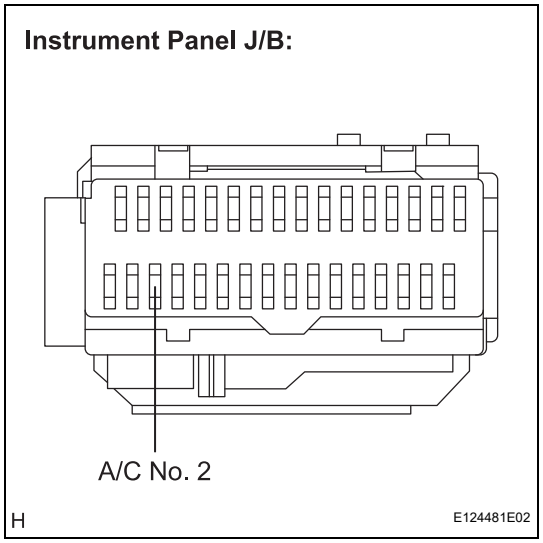
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Start the engine before inspection. Check the IG1 relay or battery if the engine does not start.

1 INSPECT FUSE (A/C NO. 2)



(a) Remove the A/C No. 2 fuse from the instrument panel J/B.
(b) Measure the resistance according to the value(s) in the table below.

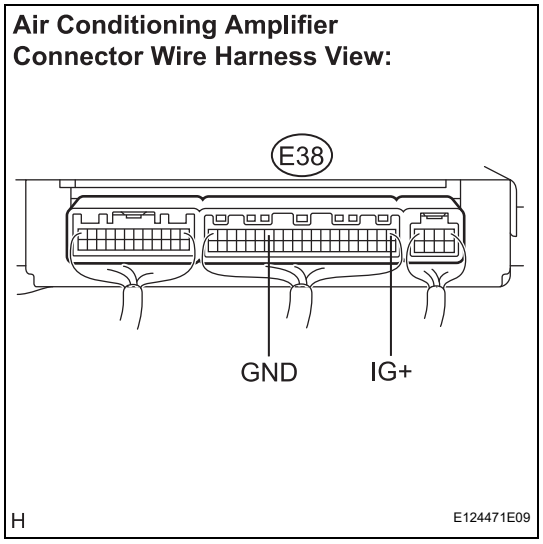
Standard resistance

Tester Item	Condition	Specified Condition
A/C No. 2 fuse	Always	Below 1 Ω

NG → **REPLACE FUSE (A/C NO. 2)**

OK

2 INSPECT AIR CONDITIONING AMPLIFIER (IG+ - GND)



(a) Remove the A/C amplifier with its connectors still connected.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
E38-1 (IG+) - E38-14 (GND)	Power switch on (IG)	10 to 14 V

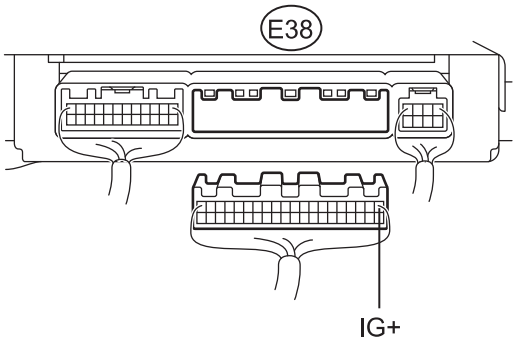
NG → **Go to step 3**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

3	CHECK WIRE HARNESS (AIR CONDITIONING AMPLIFIER - BATTERY)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Disconnect the A/C amplifier connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

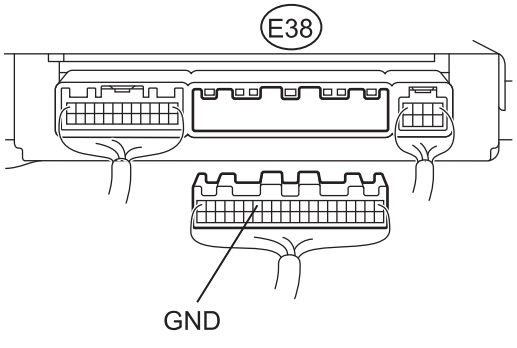
Tester Connection (Symbols)	Condition	Specified Condition
E38-1 (IG+) - Body ground	Power switch off	Below 1 V
	Power switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	CHECK WIRE HARNESS (AIR CONDITIONING AMPLIFIER - BODY GROUND)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Disconnect the A/C amplifier connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E38-14 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

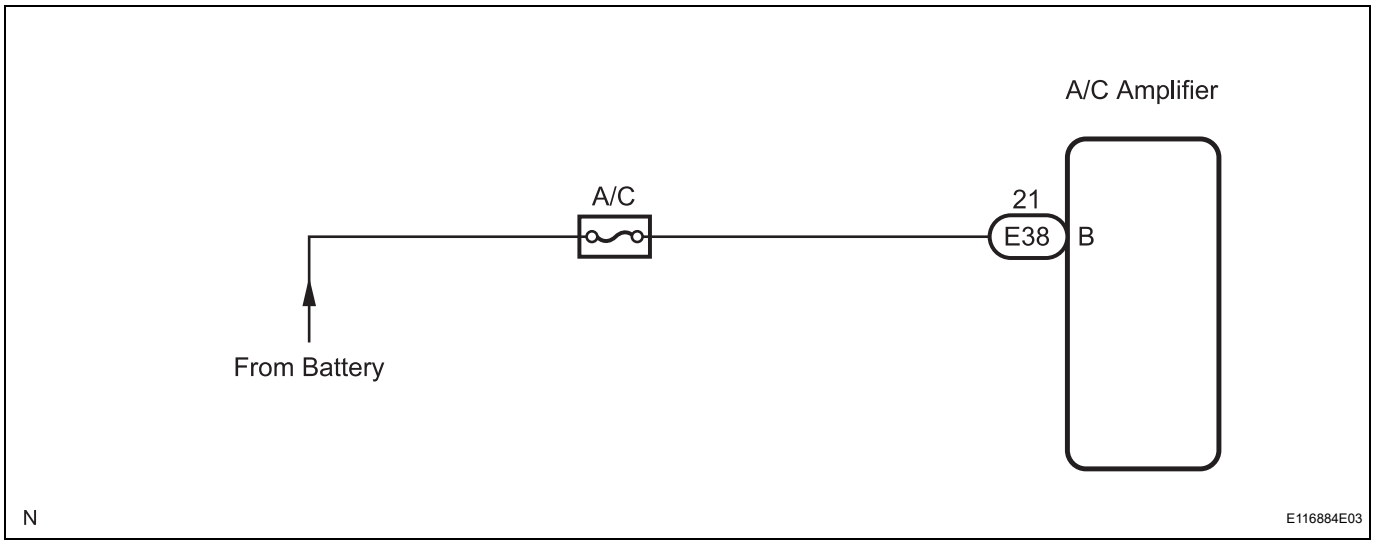
REPLACE AIR CONDITIONING AMPLIFIER

Back-up Power Source Circuit

DESCRIPTION

The back-up power source circuit for the A/C amplifier is shown below. Power is supplied even when turning the power switch off and is used for diagnostic trouble code memory, etc.

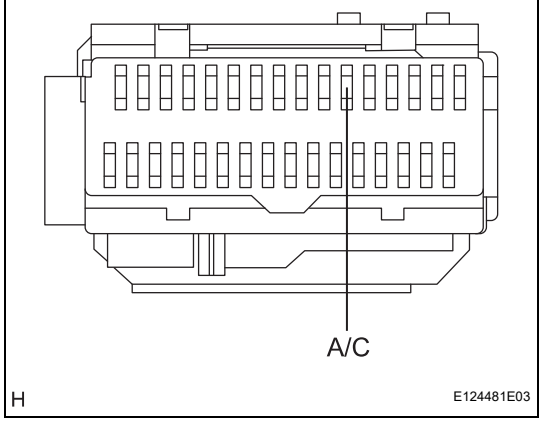
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT FUSE (A/C)

Instrument Panel J/B:



(a) Remove the A/C fuse from the instrument panel J/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Item	Condition	Specified Condition
A/C fuse	Always	Below 1 Ω

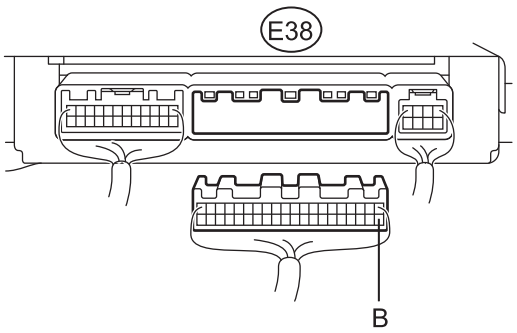
NG → **REPLACE FUSE (A/C)**

OK

AC

2	INSPECT AIR CONDITIONING AMPLIFIER (AIR CONDITIONING AMPLIFIER - BODY GROUND)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Disconnect the A/C amplifier connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
E38-21 (B) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

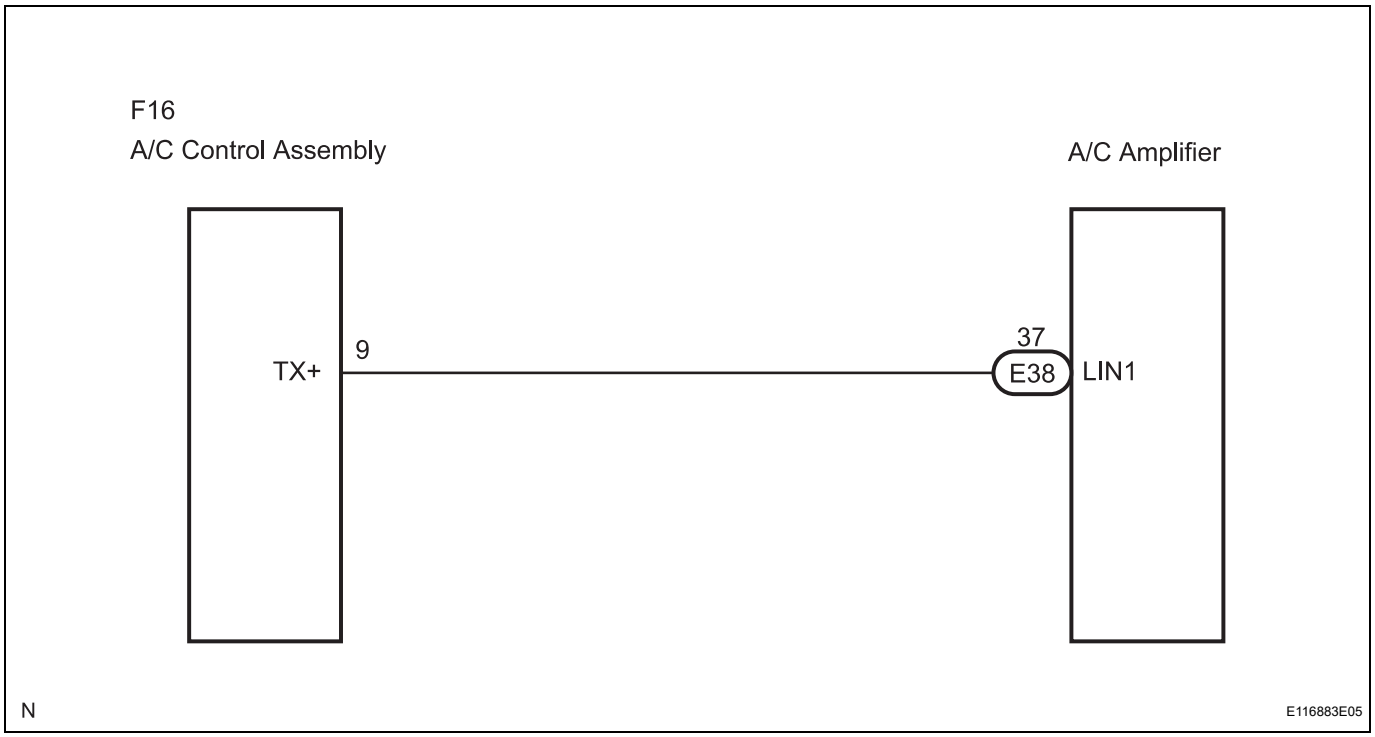
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

LIN Communication Circuit

DESCRIPTION

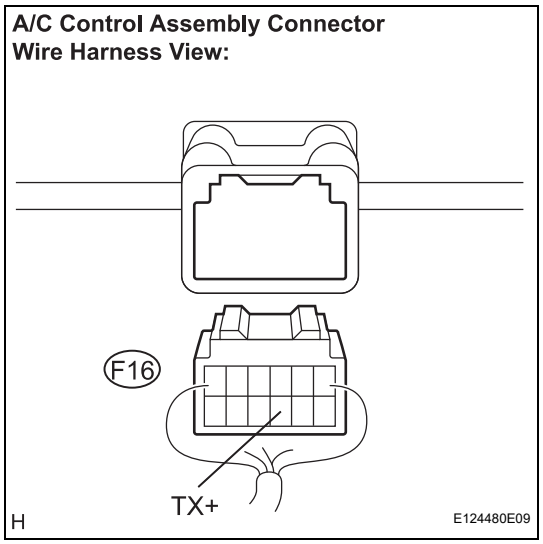
The operation signal of a switch etc. is exchanged between terminal TX+ of the A/C control assembly and terminal LIN1 of the A/C amplifier.

WIRING DIAGRAM



INSPECTION PROCEDURE

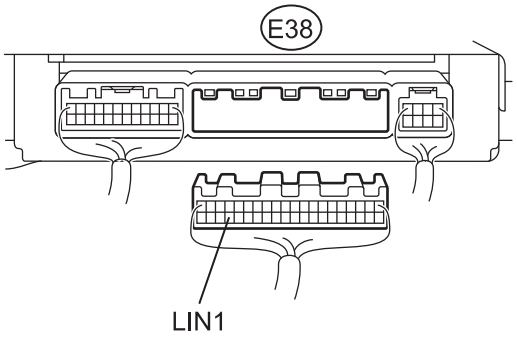
1	CHECK HARNESS AND CONNECTOR (A/C CONTROL ASSEMBLY - AIR CONDITIONING AMPLIFIER)



(a) Disconnect the connector from the A/C control assembly.

AC

Air Conditioning Amplifier Connector Wire Harness View:



H E124470E17

(b) Disconnect the connector from the A/C amplifier.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E38-37 (LIN1) - F16-9 (TX+)	Always	Below 1 Ω
E38-37 (LIN1) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

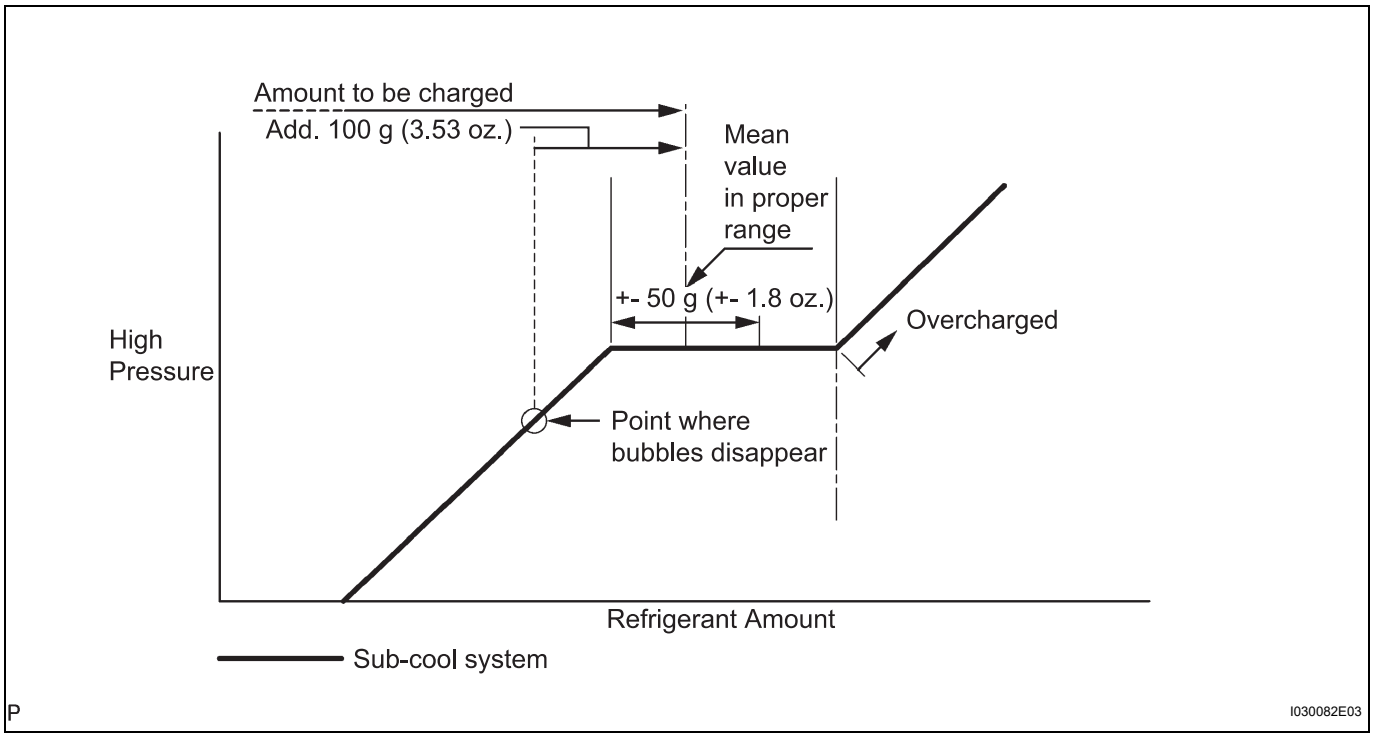
REPLACEMENT

1. RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM

(a) Turn the A/C switch on.
(b) Operate the A/C with the setting temperature at 25°C (77°F) and the blower level at LO for 10 minutes to circulate the refrigerant. This causes most of the compressor oil from the various components of the A/C system to collect in the A/C compressor.
(c) Turn the power switch off.
(d) Recover the refrigerant from the A/C system using a refrigerant recovery unit.

2. CHARGE WITH REFRIGERANT

(a) Perform vacuum purging using a vacuum pump.
(b) Charge with refrigerant HFC-134a (R134a).



Standard:
480 to 580 g (16.9 to 20.5 oz.)
SST 07110-58060 (07117-58060, 07117-58070, 07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080)
NOTICE:

- **Do not turn the A/C on before charging with refrigerant. Doing so will cause the compressor to work without refrigerant, resulting in overheating of the cooler compressor.**

- **Approximately 100 g (3.53 oz.) of refrigerant may need to be charged after bubbles disappear.**
  The refrigerant amount should be checked by quantity, not with the sight glass.
- **Avoid using the gauge manifold set that had been used for vehicles with conventional compressor oil (ND-OIL11 or equivalent) as much as possible. This will cause compressor oil remaining in the manifold to enter the vehicle, resulting in insulation performance deterioration. A gauge manifold set that had been used 3 times or less can be reused if an appropriate one is not available.**

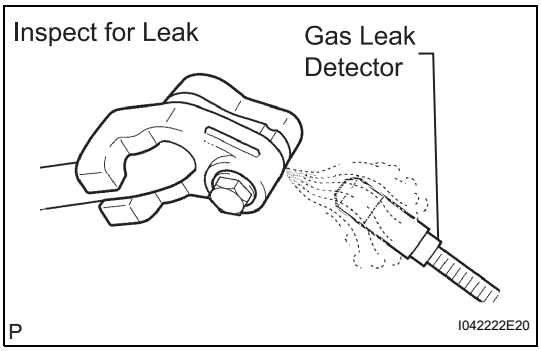
HINT:
Ensure that sufficient refrigerant is available to recharge the system when using a refrigerant recovery unit. Refrigerant recovery units are not always able to recover 100% of the refrigerant from an A/C system.

3. WARM UP COMPRESSOR

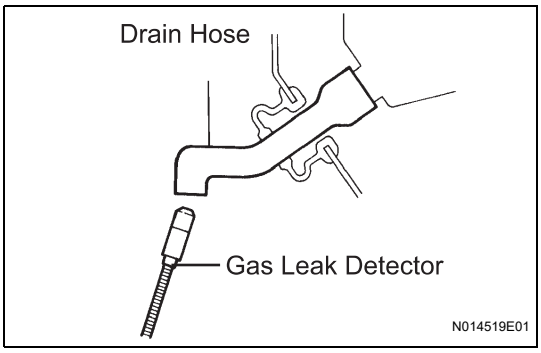
(a) Keep the A/C switch on for at least 2 minutes to warm up the compressor.
NOTICE:
Be sure to warm up the compressor when turning the A/C on after removing and installing the cooler refrigerant lines (including the compressor), to prevent damage to the compressor.

4. INSPECT FOR REFRIGERANT LEAK

(a) After recharging with refrigerant gas, inspect for a refrigerant leak using a halogen leak detector.
(b) Carry out the test under the following conditions:
- Power switch OFF
- Secure good ventilation (the gas leak detector may react to volatile gases which are not refrigerant, such as evaporated gasoline and exhaust gas).
- Repeat the test 2 or 3 times.
- Make sure that there is some refrigerant remaining in the refrigeration system.
  When the compressor is off: approx. 392 to 588 kPa (4 to 6 kgf/cm^2, 57 to 85 psi)



(c) Using a gas leak detector, inspect for a leak from the refrigerant lines.



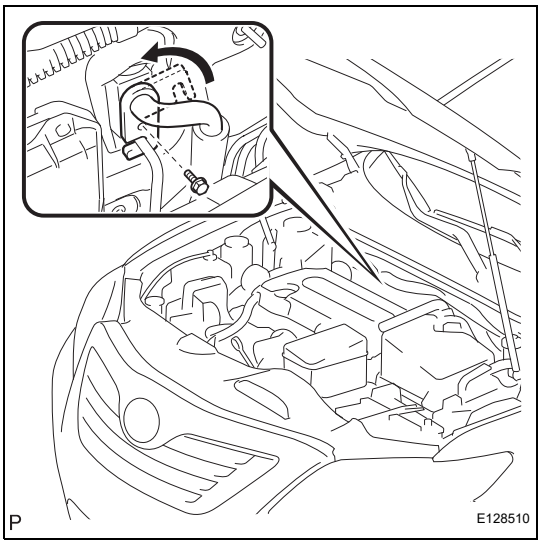
(d) Bring the gas leak detector close to the drain hose with the detector's power off, and then turn the detector on.
HINT:
- After the blower motor has stopped, let the cooling unit stand for more than 15 minutes.
- Bring the gas leak detector sensor under the drain hose.
- When bringing the gas leak detector close to the drain hose, make sure that the gas leak detector does not react to volatile gases.
  If it is not possible to avoid interference form volatile gases, the vehicle should be lifted up to allow testing.

(e) If a gas leak is not detected from the drain hose, remove the blower motor control from the cooling unit. Insert the gas leak detector sensor into the unit and perform the test.

(f) Disconnect the pressure switch connector and leave it for approximately 20 minutes. Bring the gas leak detector close to the pressure switch and perform the test.

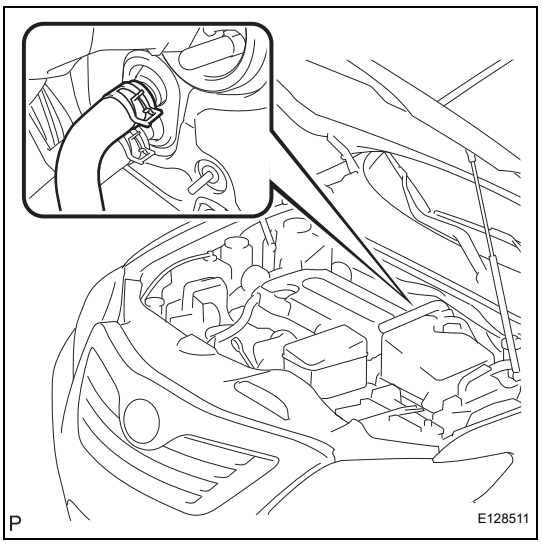
REMOVAL

1. **RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM**
   (a) Start up the engine.
   (b) Turn the A/C switch on.
   (c) Operate the cooler compressor at an engine speed of approximately 1,000 rpm for 5 to 6 minutes to circulate the refrigerant. This causes most of the compressor oil from the various components of the A/C system to collect in the A/C compressor.
   (d) Stop the engine.
   (e) Recover the refrigerant from the A/C system using a refrigerant recovery unit.
2. **ALIGN FRONT WHEELS FACING STRAIGHT AHEAD**
3. **DISCONNECT NEGATIVE BATTERY TERMINAL**
   NOTICE:
   Wait for 90 seconds after disconnecting the terminal to prevent the airbag from deploying (See page RS-1).
4. **SEPARATE BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY (See page BR-27)**
5. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-9)**
6. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-9)**
7. **REMOVE FRONT FENDER TO COWL SIDE SEAL LH (See page WW-9)**
8. **REMOVE FRONT FENDER TO COWL SIDE SEAL RH (See page WW-9)**
9. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-10)**
10. **REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-10)**
11. **REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-403)**



12. **DISCONNECT SUCTION PIPE SUB-ASSEMBLY**
    (a) Remove the bolt, and slide the hook connector.
    (b) Disconnect the suction pipe sub-assembly.
    (c) Remove the O-ring from the suction hose sub-assembly.
    NOTICE:
    Seal the openings of the disconnected parts using vinyl tape to prevent entry of moisture and foreign matter.

13. **DISCONNECT AIR CONDITIONER TUBE AND ACCESSORY**
    (a) Disconnect the air conditioner tube and accessory.
    (b) Remove the O-ring from the air conditioner tube and accessory.
    NOTICE:
    Seal the openings of the disconnected parts using vinyl tape to prevent entry of moisture and foreign matter.



14. **DISCONNECT HEATER OUTLET WATER HOSE**
    (a) Using pliers, grip the claws of the clip and slide the clip to disconnect the heater outlet water hose.
    NOTICE:
    - **Do not apply excessive force to the heater outlet water hose.**
    - **Prepare a drain pan or cloth in case the coolant leaks.**

15. **DISCONNECT HEATER INLET WATER HOSE**
    HINT:
    Disconnection procedure for the heater inlet water hose is the same as that for the heater outlet water hose.

16. **REMOVE LOWER NO. 3 STEERING WHEEL COVER (See page RS-345)**

17. **REMOVE LOWER NO. 2 STEERING WHEEL COVER (See page RS-345)**

18. **REMOVE STEERING PAD (See page RS-345)**

19. **REMOVE STEERING WHEEL ASSEMBLY (See page SR-36)**

20. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-13)**

21. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-14)**

22. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-11)**

23. **REMOVE STEERING COLUMN COVER (See page IP-12)**

24. **REMOVE TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY (See page SR-37)**

25. **REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-12)**

26. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-12)
27. REMOVE INSTRUMENT CLUSTER FINISH PANEL (See page IP-13)
28. REMOVE COMBINATION METER ASSEMBLY (See page IP-13)
29. REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-15)
30. REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-15)
31. REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-13)
32. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-14)
33. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-14)
34. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-14)
35. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-14)
36. REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-15)
37. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-15)
38. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-16)
39. REMOVE INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-16)
40. REMOVE RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-136)
41. REMOVE NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/ Navigation System) (See page NS-193)
42. REMOVE CONSOLE BOX POCKET (See page IP-17)
43. REMOVE CONSOLE BOX CARPET (See page IP-17)
44. REMOVE CONSOLE BOX ASSEMBLY (See page IP-17)
45. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (See page IP-18)
46. REMOVE NO. 1 CONSOLE BOX INSERT FRONT (See page IP-18)
47. REMOVE FRONT PILLAR GARNISH LH (See page IR-16)

48. **REMOVE INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY (See page IP-18)**

49. **REMOVE INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY (See page IP-19)**

50. **REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-146)**

51. **REMOVE FRONT PILLAR GARNISH RH (See page IR-16)**

52. **REMOVE INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY (See page IP-19)**

53. **REMOVE INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY (See page IP-19)**

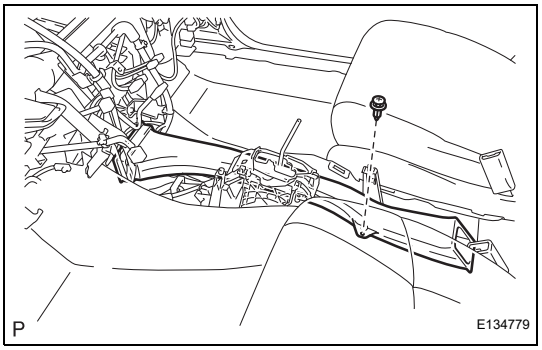
54. **REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side) (See page IP-19)**

55. **REMOVE NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-20)**

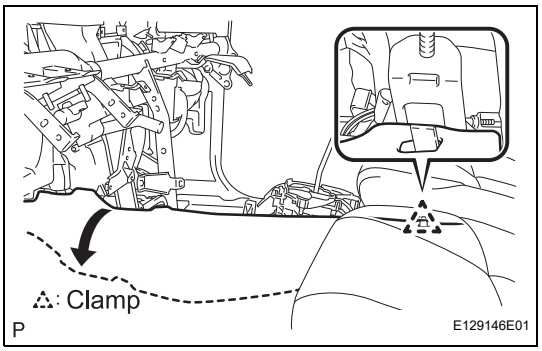
56. **DISCONNECT INSTRUMENT PANEL WIRE ASSEMBLY**

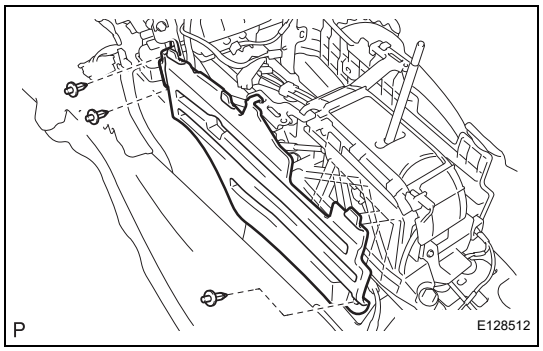
57. **REMOVE INSTRUMENT PANEL SAFETY PAD ASSEMBLY (See page IP-20)**

58. **REMOVE NO. 1 CONSOLE BOX DUCT**
    (a) Remove the clip and No. 1 console box duct.

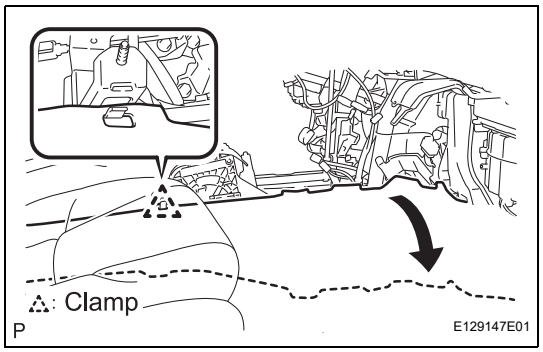


59. **REMOVE FLOOR CARPET BRACKET LH**
    (a) Release the clamp.
    (b) Turn back the floor carpet.



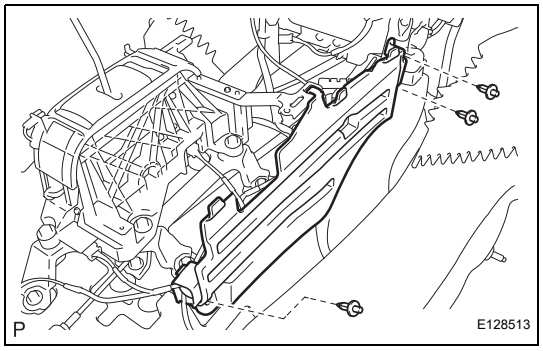


(c) Remove the 3 clips.
(d) Remove the floor carpet bracket LH.

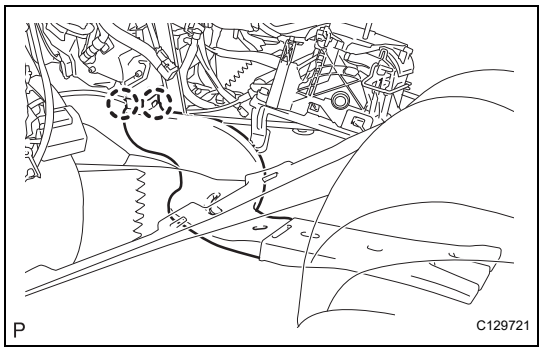


60. REMOVE FLOOR CARPET BRACKET RH

(a) Release the clamp.
(b) Turn back the floor carpet.

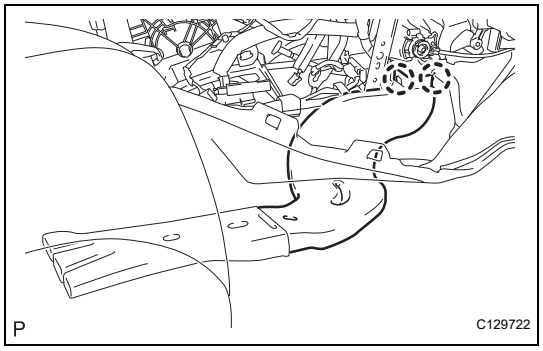


(c) Remove the 3 clips.
(d) Remove the floor carpet bracket RH.



61. REMOVE REAR NO. 2 AIR DUCT

(a) Release the 2 claws and remove the rear No. 2 air duct.



62. REMOVE REAR NO. 1 AIR DUCT

(a) Release the 2 claws and remove the rear No. 1 air duct.

63. REMOVE NO. 1 AIR DUCT SUB-ASSEMBLY (See page SR-37)

64. SEPARATE STEERING INTERMEDIATE SHAFT ASSEMBLY (See page SR-37)

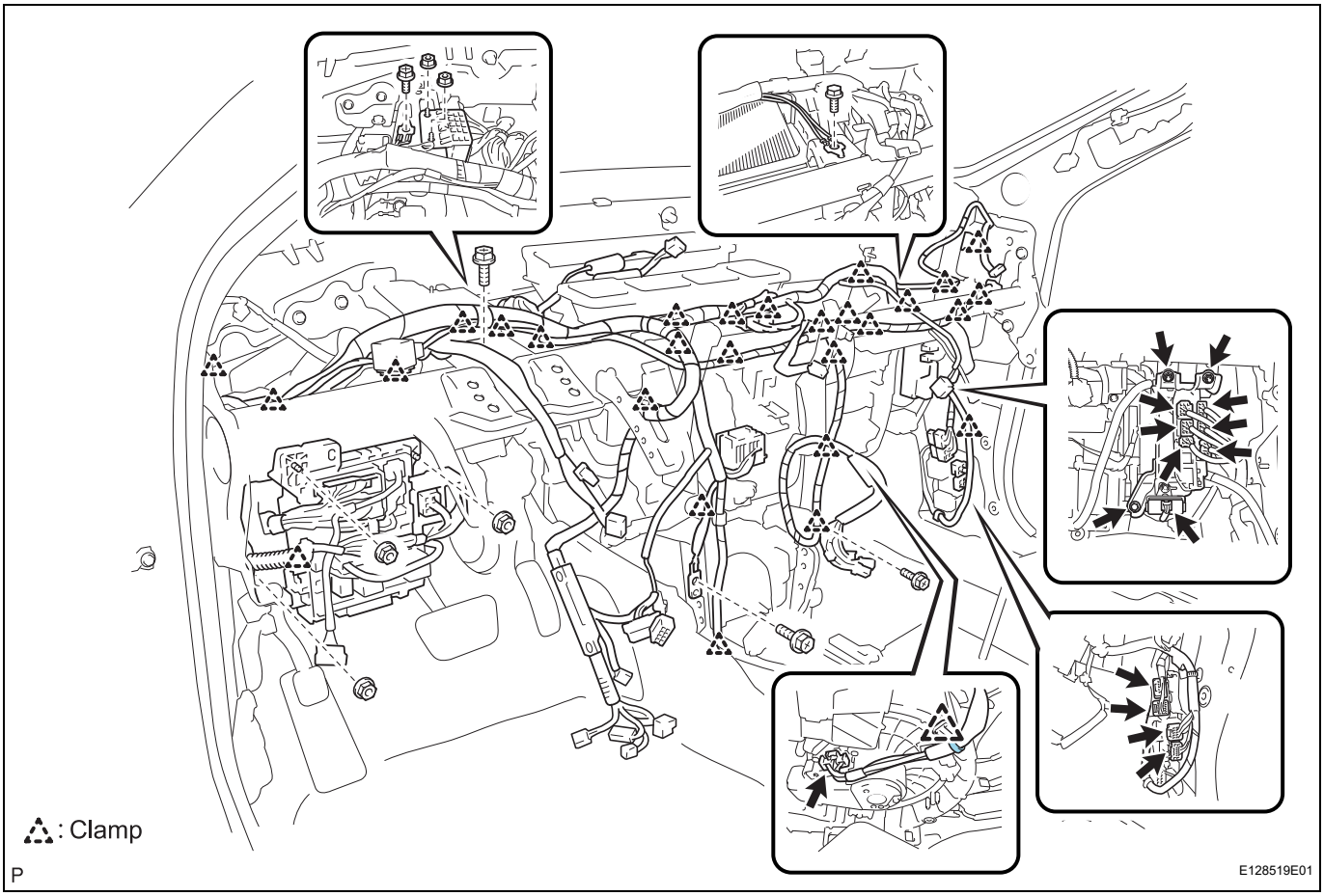
65. REMOVE STEERING COLUMN ASSEMBLY (See page SR-38)

66. REMOVE AIR CONDITIONING AMPLIFIER ASSEMBLY (See page AC-269)

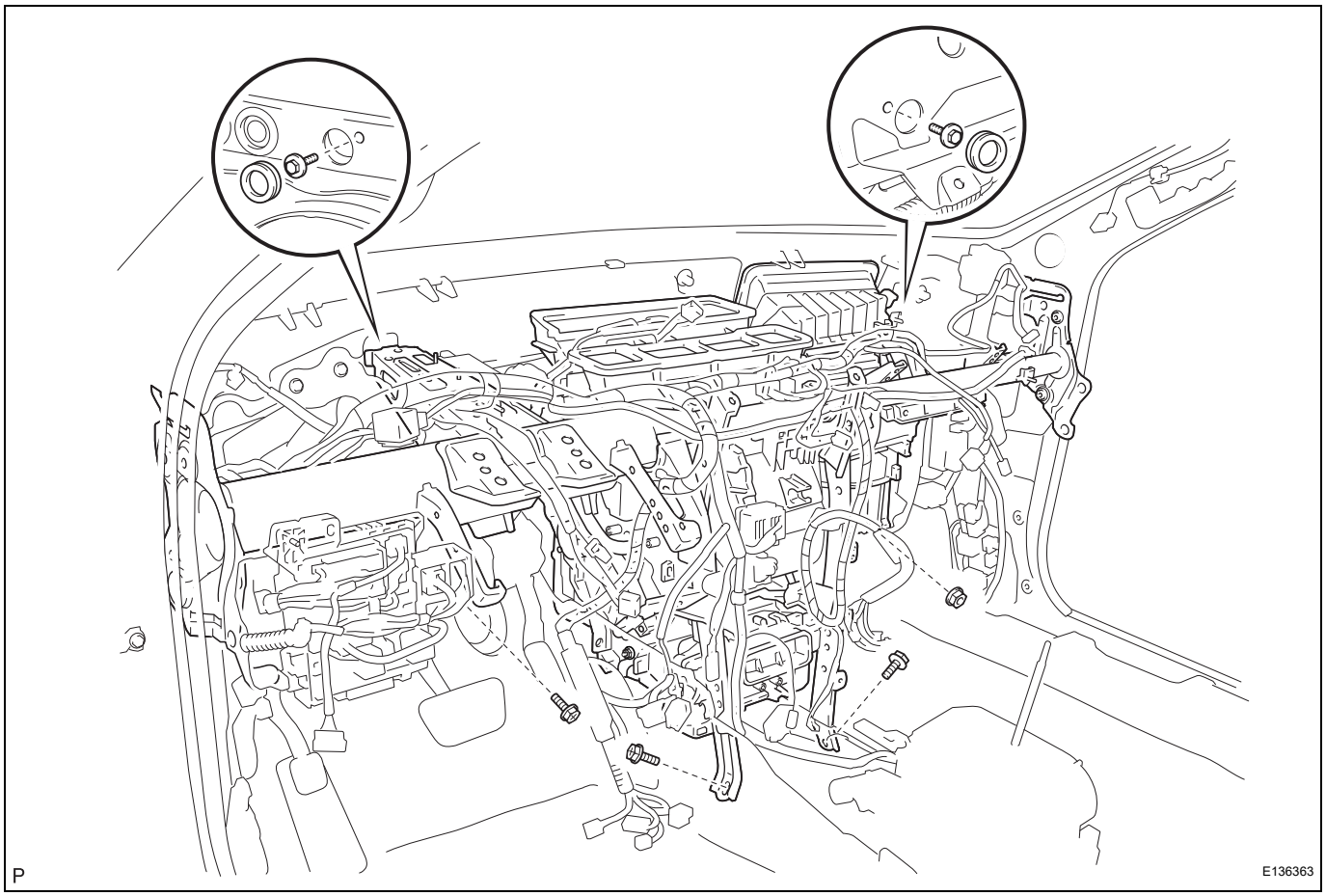
67. REMOVE INSTRUMENT PANEL REINFORCEMENT ASSEMBLY

(a) Remove the 28 clamps, disconnect the 11 connectors, and then disconnect the wire harness.

(b) Remove the 6 nuts, 7 bolts, and junction block.

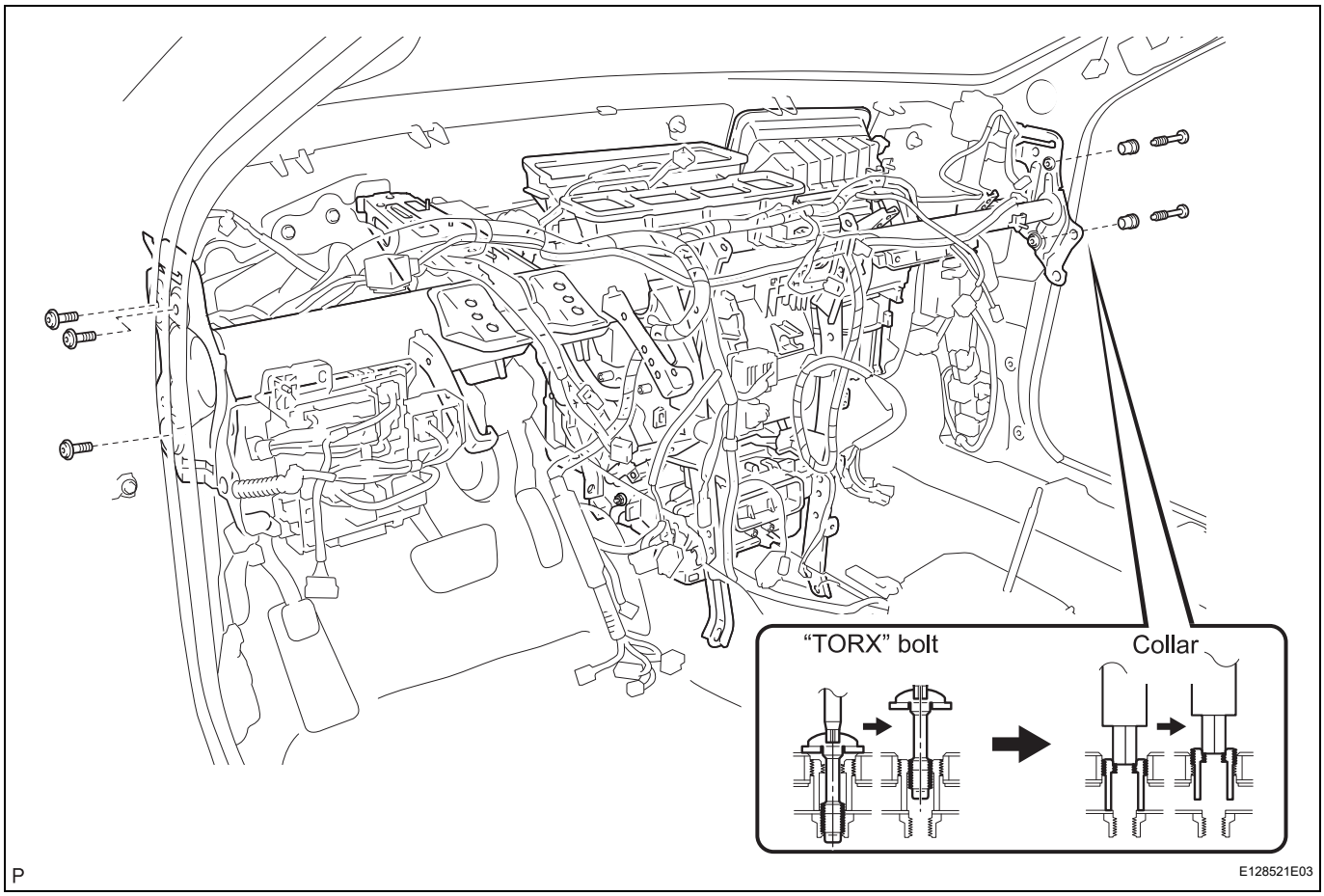


(c) Remove the 2 caps and 2 bolts from the engine compartment side.



(d) Remove the 3 bolts and nut.

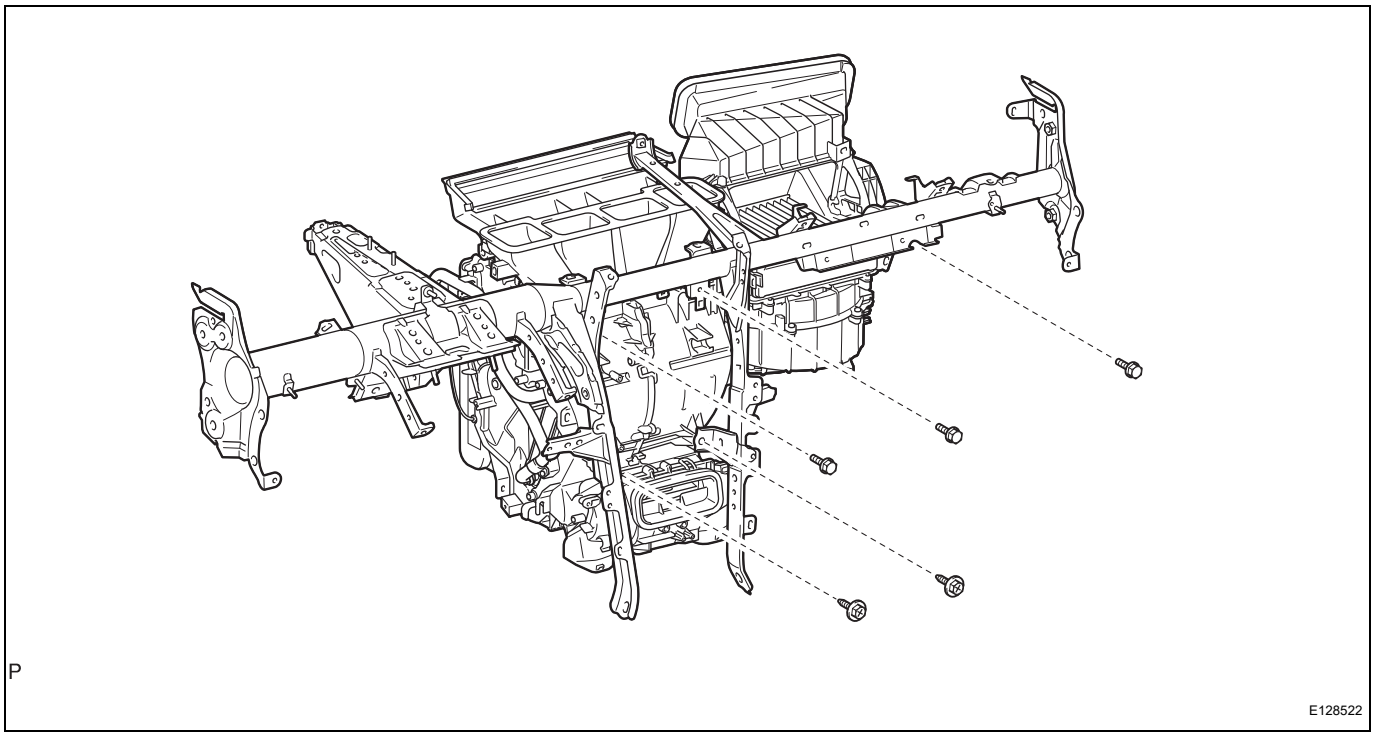
(e) Using a "TORX" socket wrench (T40), remove the 5 "TORX" bolts.

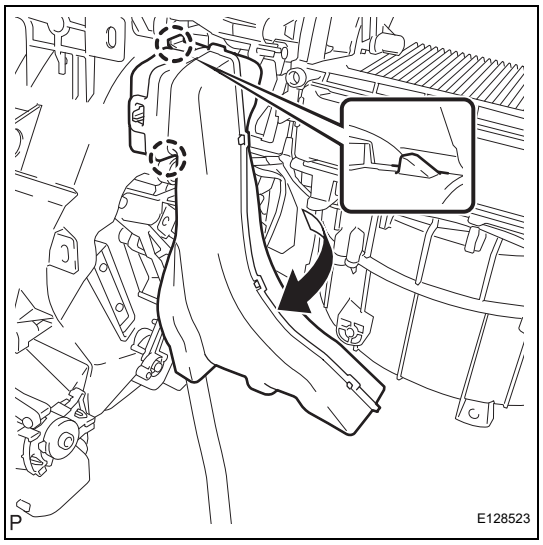


HINT:
The "TORX" bolts on the passenger side can be removed with the collars for adjustment.

(f) Using a 12 mm hexagon wrench, remove the 2 collars and instrument panel reinforcement assembly with the air conditioning unit assembly.

(g) Remove the 3 bolts, 2 screws, and instrument panel reinforcement assembly.





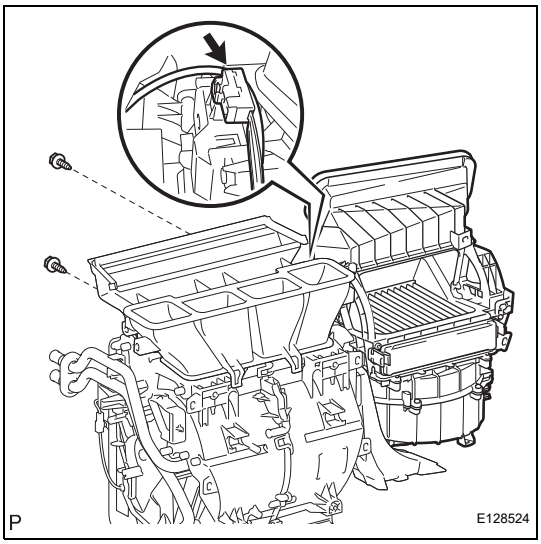
DISASSEMBLY

1. REMOVE NO. 2 AIR DUCT SUB-ASSEMBLY

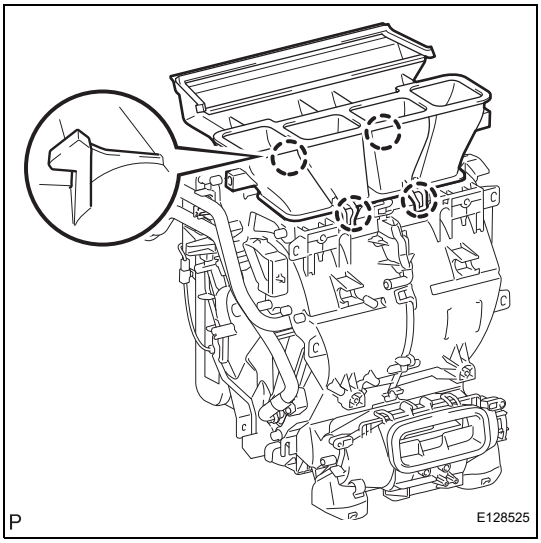
(a) Release the 2 claws and remove the No. 2 air duct sub-assembly as shown in the illustration.

2. REMOVE BLOWER ASSEMBLY

(a) Disconnect the connector.

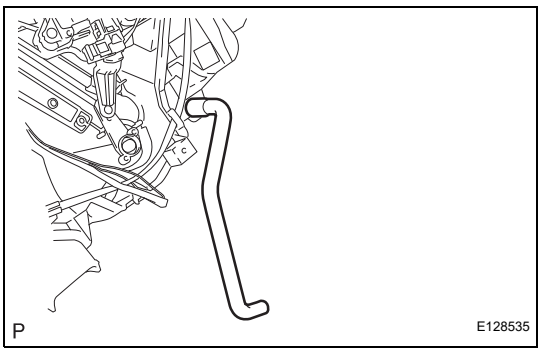


(b) Remove the 2 screws and blower assembly.



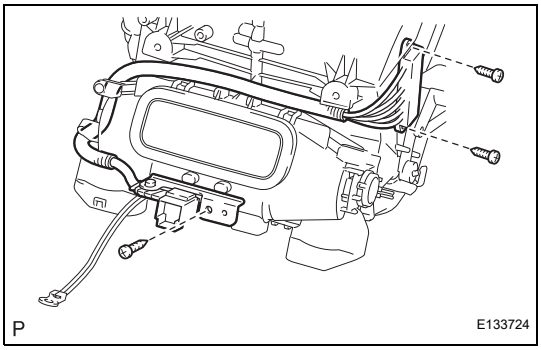
3. REMOVE NO. 6 HEATER TO REGISTER DUCT ASSEMBLY

(a) Release the 4 claws and remove the No. 6 heater to register duct assembly.



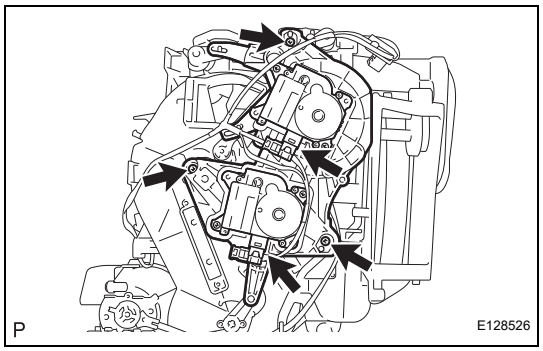
4. REMOVE DRAIN COOLER HOSE

(a) Remove the drain cooler hose from the air conditioning radiator assembly.



5. REMOVE QUICK HEATER ASSEMBLY

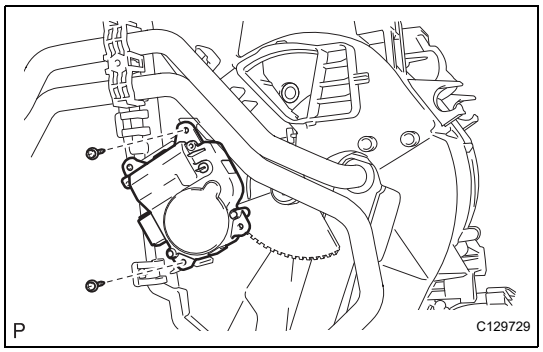
(a) Remove the 3 screws and quick heater assembly.



6. REMOVE AIR OUTLET CONTROL SERVO MOTOR

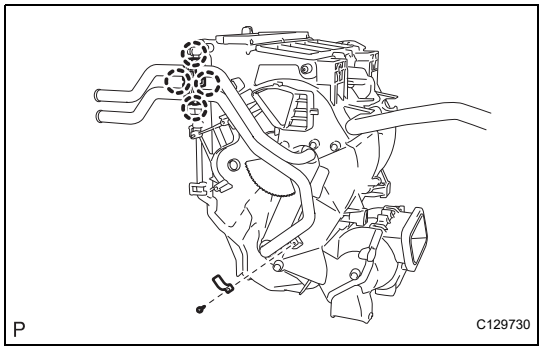
(a) Disconnect the 2 connectors and remove the air conditioner harness.

(b) Remove the 3 screws and then remove the air outlet control servo motor.



7. REMOVE AIR MIX CONTROL SERVO MOTOR

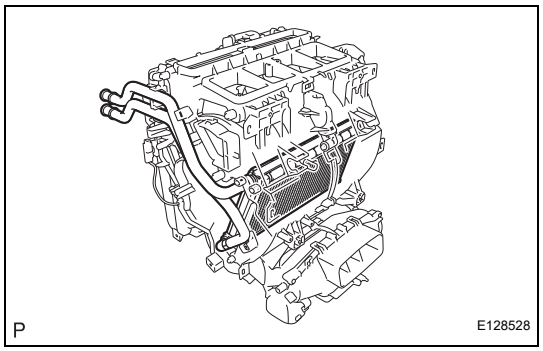
(a) Remove the 2 screws and air mix control servo motor.



8. REMOVE HEATER RADIATOR UNIT SUB-ASSEMBLY

(a) Remove the screw and clamp.

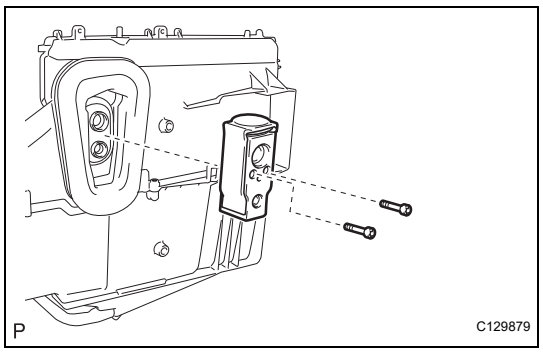
(b) Release the 4 claws and remove the clamp.



(c) Remove the heater radiator unit sub-assembly from the air conditioning radiator assembly.

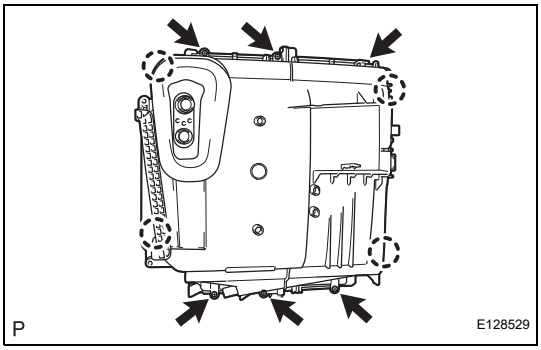
NOTICE:

Prepare a drain pan or cloth in case the coolant water leaks.



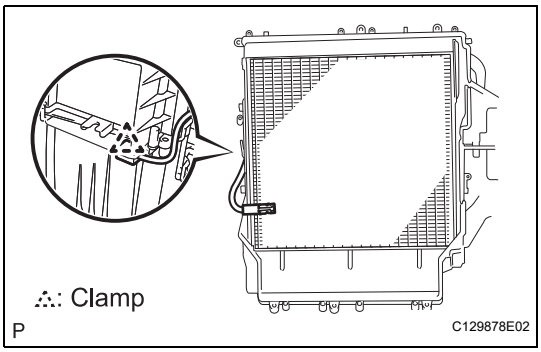
9. REMOVE COOLER EXPANSION VALVE

(a) Using a 4 mm hexagon wrench, remove the 2 hexagon bolts and cooler expansion valve.

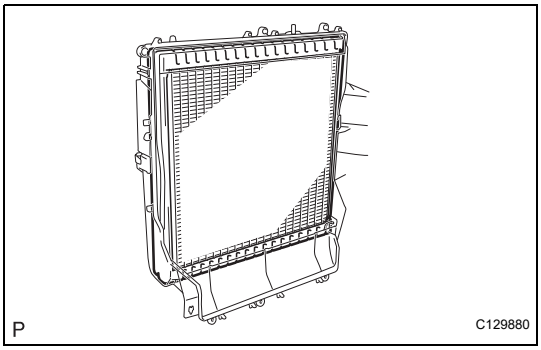


10. REMOVE NO. 1 COOLER EVAPORATOR SUB-ASSEMBLY

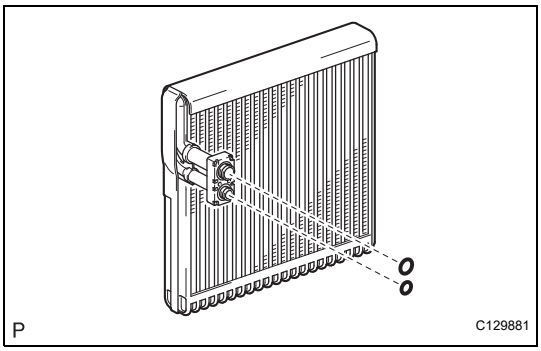
(a) Remove the 6 screws, release the 4 claws, and remove the plate cover.



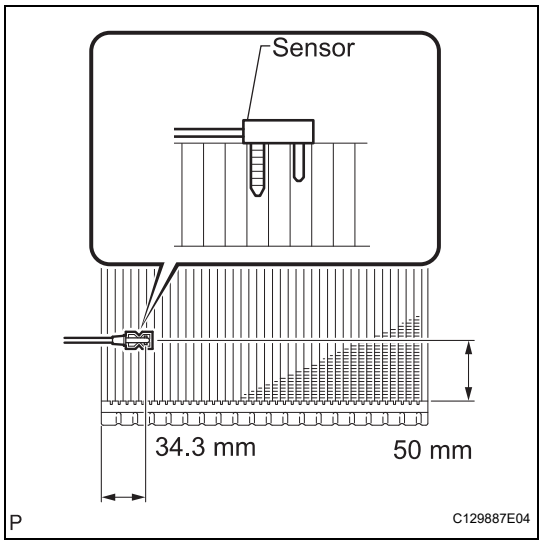
(b) Remove the clamp and No. 1 cooler thermistor.



(c) Remove the No. 1 cooler evaporator sub-assembly.



(d) Remove the 2 O-rings from the No. 1 cooler evaporator sub-assembly.

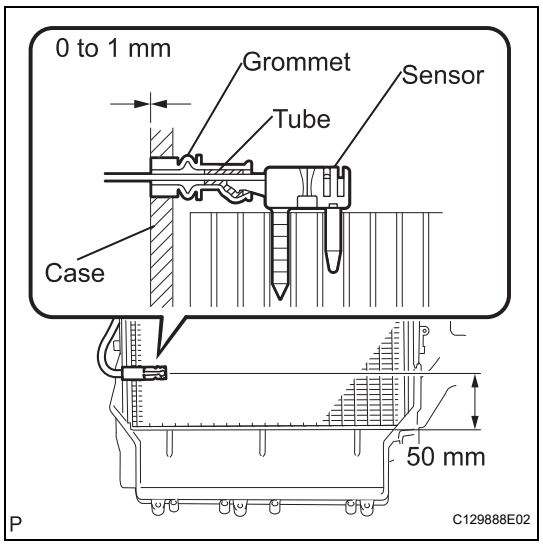


REASSEMBLY

1. INSTALL NO. 1 COOLER THERMISTOR

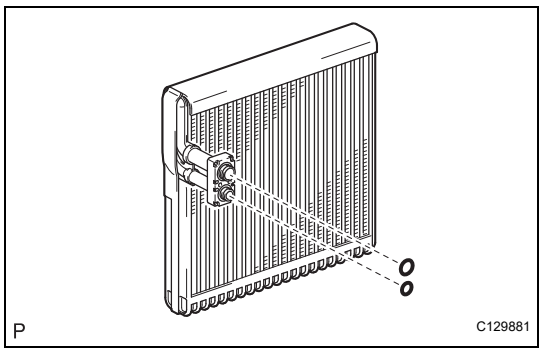
(a) If using a new evaporator:

(1) Install the No. 1 cooler thermistor to the evaporator as shown in the illustration.



(b) If reusing the evaporator:

(1) Install the No. 1 cooler thermistor to the evaporator as shown in the illustration.

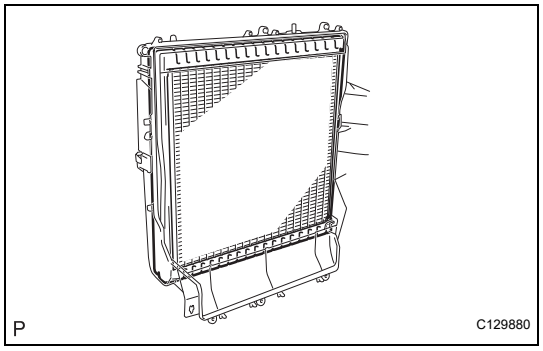


2. INSTALL NO. 1 COOLER EVAPORATOR SUB-ASSEMBLY

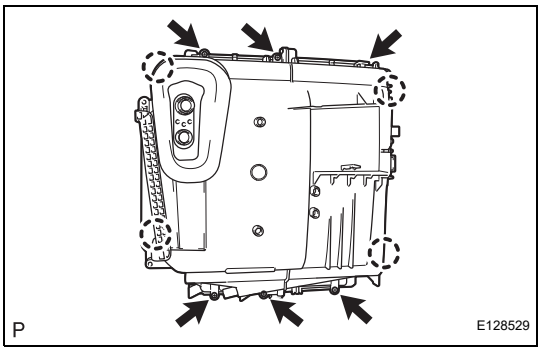
(a) Sufficiently apply compressor oil to 2 new O-rings and the fitting surfaces. Install the 2 O-rings to the No. 1 cooler evaporator sub-assembly.

Compressor oil:

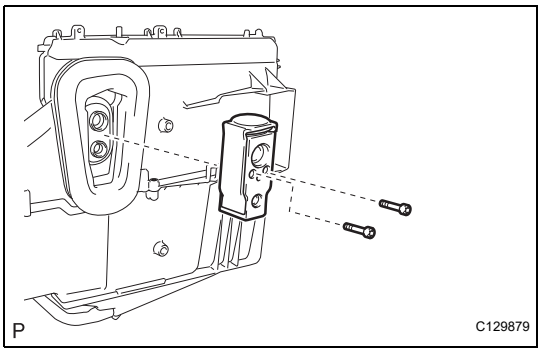
ND-OIL 11 or equivalent



(b) Install the No. 1 cooler evaporator sub-assembly.

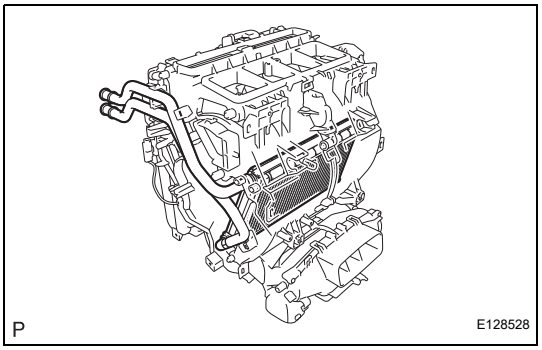


(c) Engage the 4 claws and install the plate cover with the 6 screws.



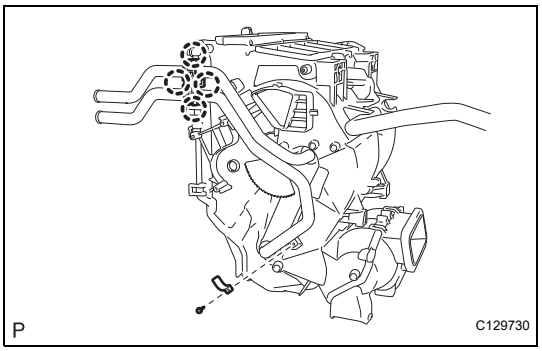
3. INSTALL COOLER EXPANSION VALVE

(a) Using a 4 mm hexagon wrench, install the cooler expansion valve with the 2 hexagon bolts.
Torque: 3.5 N*m (35 kgf*cm, 30 in.*lbf)

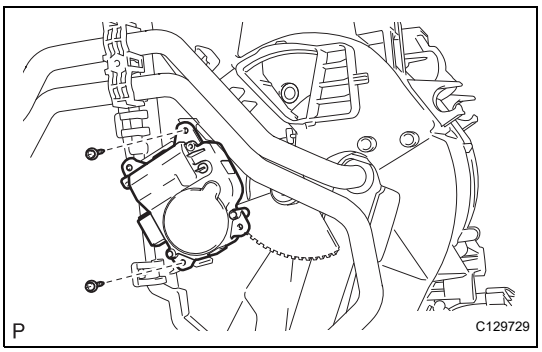


4. INSTALL HEATER RADIATOR UNIT SUB-ASSEMBLY

(a) Install the heater radiator unit sub-assembly to the air conditioning radiator assembly.

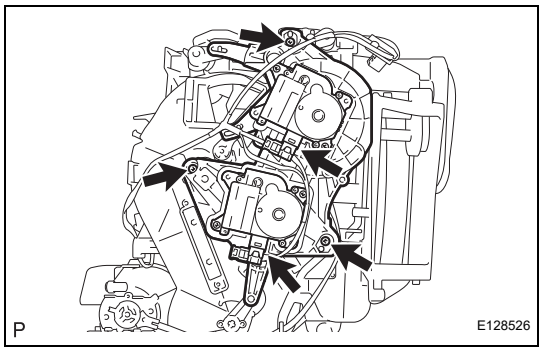


(b) Install the clamp with the screw.
(c) Engage the 4 claws and install the heater clamp.



5. INSTALL AIR MIX DAMPER CONTROL MOTOR

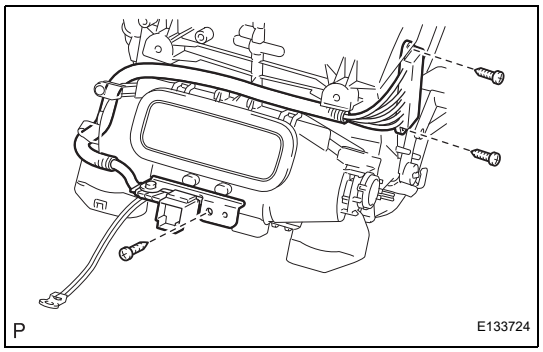
(a) Install the air mix damper control motor with the 2 screws.



6. INSTALL AIR OUTLET CONTROL SERVO MOTOR

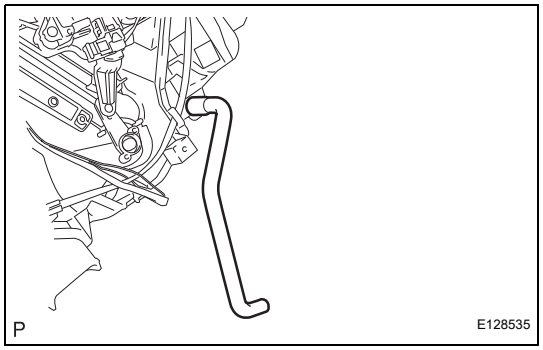
(a) Install the air outlet control servo motor with the 3 screws.

(b) Connect the 2 connectors and install the air conditioner harness.



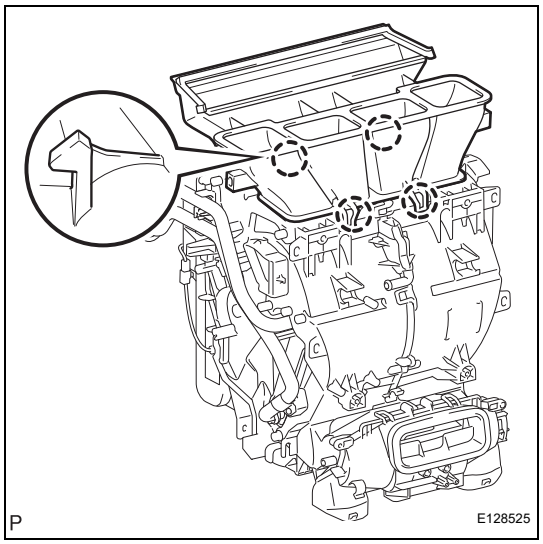
7. INSTALL QUICK HEATER ASSEMBLY

(a) Install the quick heater assembly with the 3 screws.



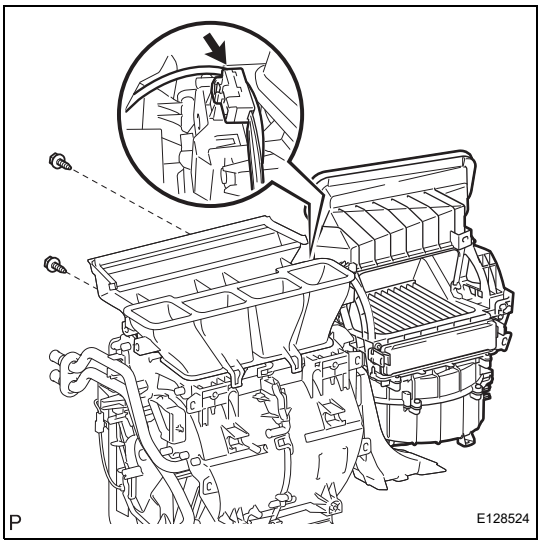
8. INSTALL DRAIN COOLER HOSE

(a) Install the drain cooler hose to the air conditioning radiator assembly.



9. INSTALL NO. 6 HEATER TO REGISTER DUCT ASSEMBLY

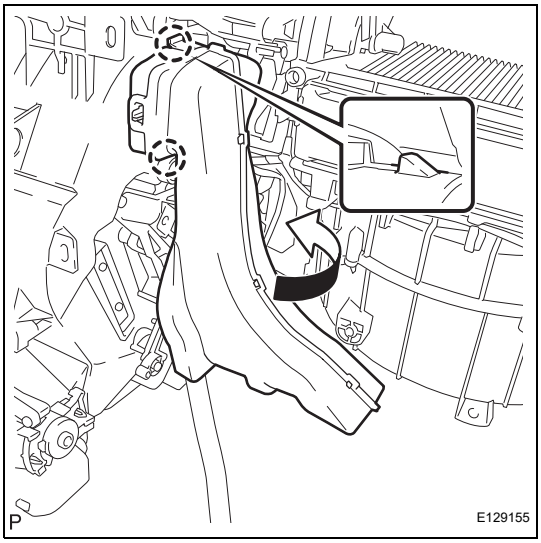
(a) Engage the 4 claws to install the No. 6 heater to register duct assembly.



10. INSTALL BLOWER ASSEMBLY

(a) Install the blower assembly with the 2 screws.

(b) Connect the connector.



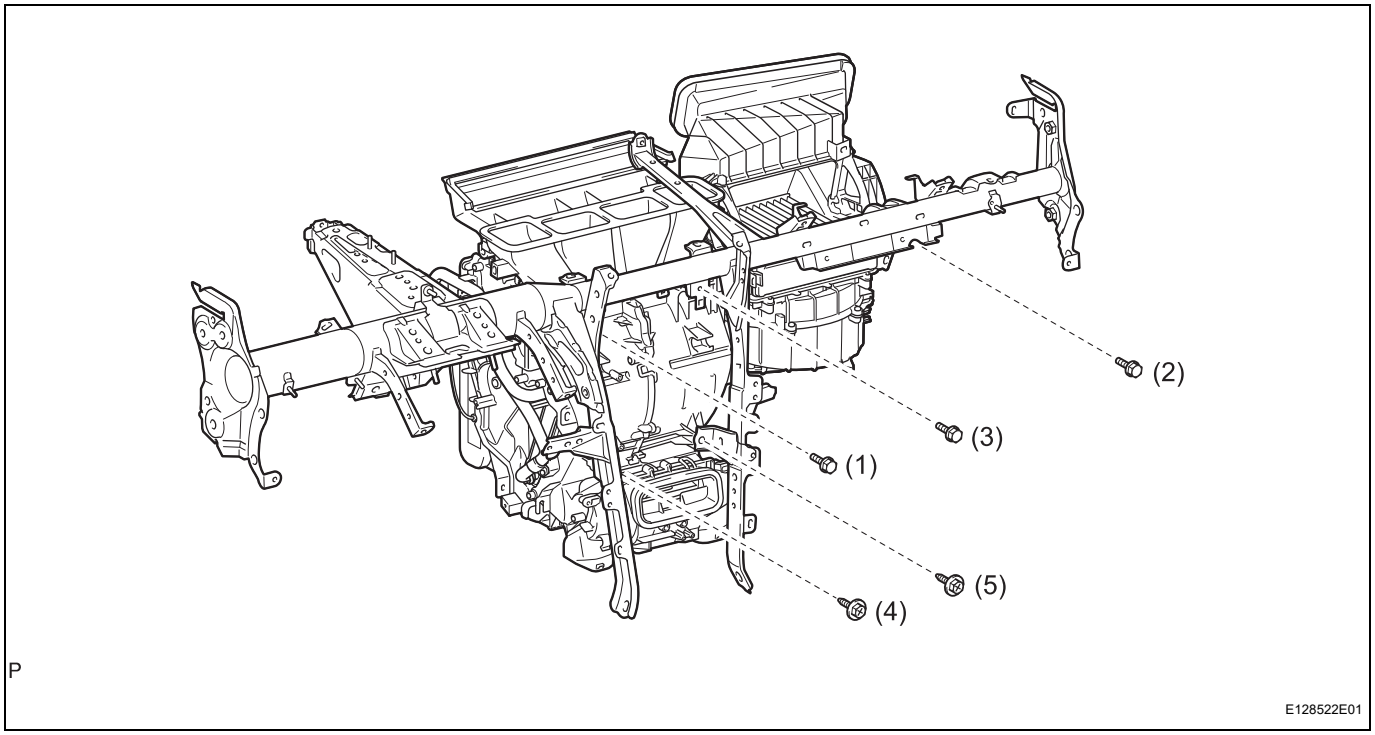
11. INSTALL NO. 2 AIR DUCT SUB-ASSEMBLY

(a) Engage the 2 claws to install the No. 2 air duct sub-assembly.

INSTALLATION

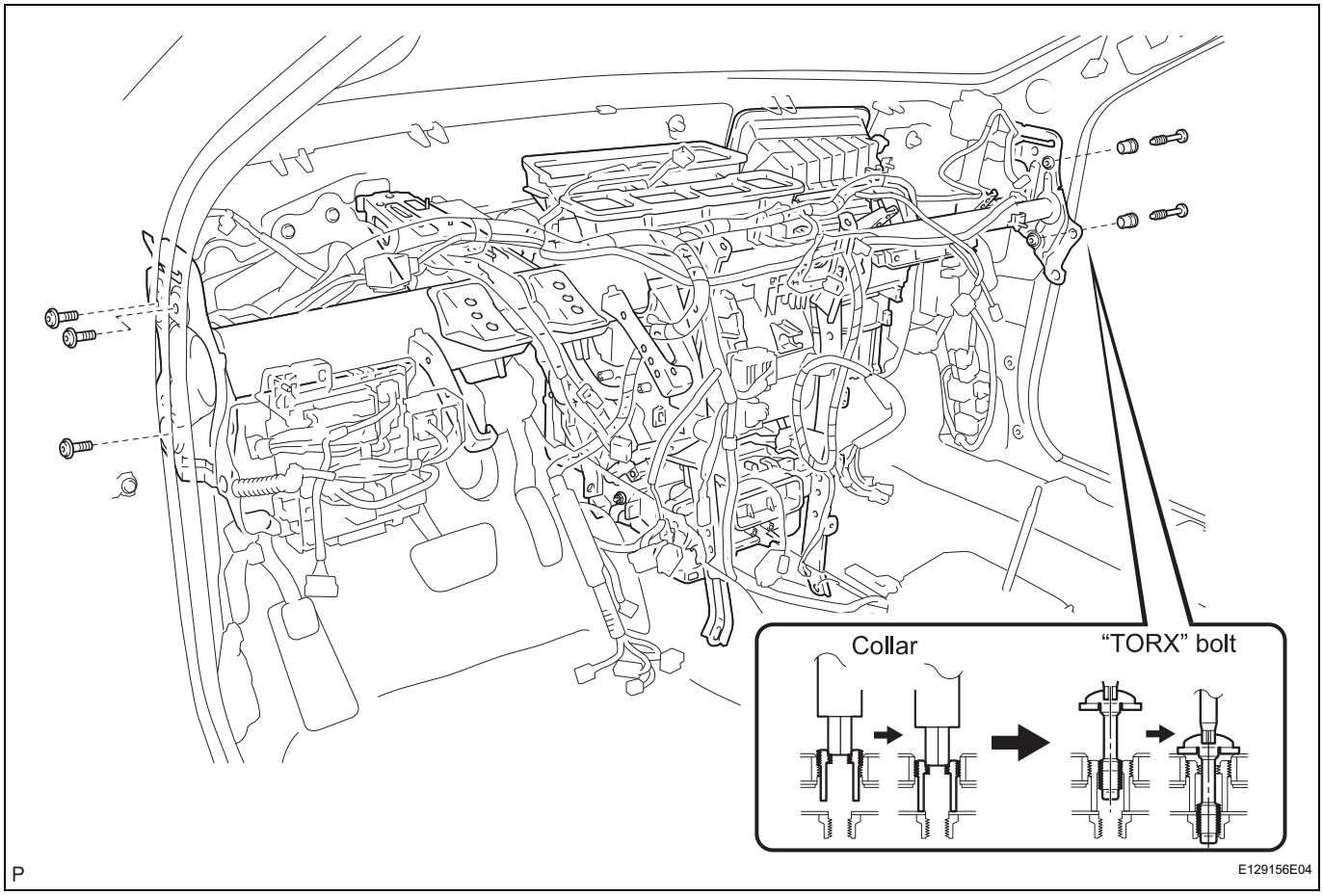
1. INSTALL INSTRUMENT PANEL REINFORCEMENT ASSEMBLY

(a) Install the air conditioning unit assembly to the instrument panel reinforcement assembly with the 2 screws and 3 bolts.



Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)
NOTICE:
Tighten the bolts and screws in the order shown in the illustration to install the air conditioning unit assembly.

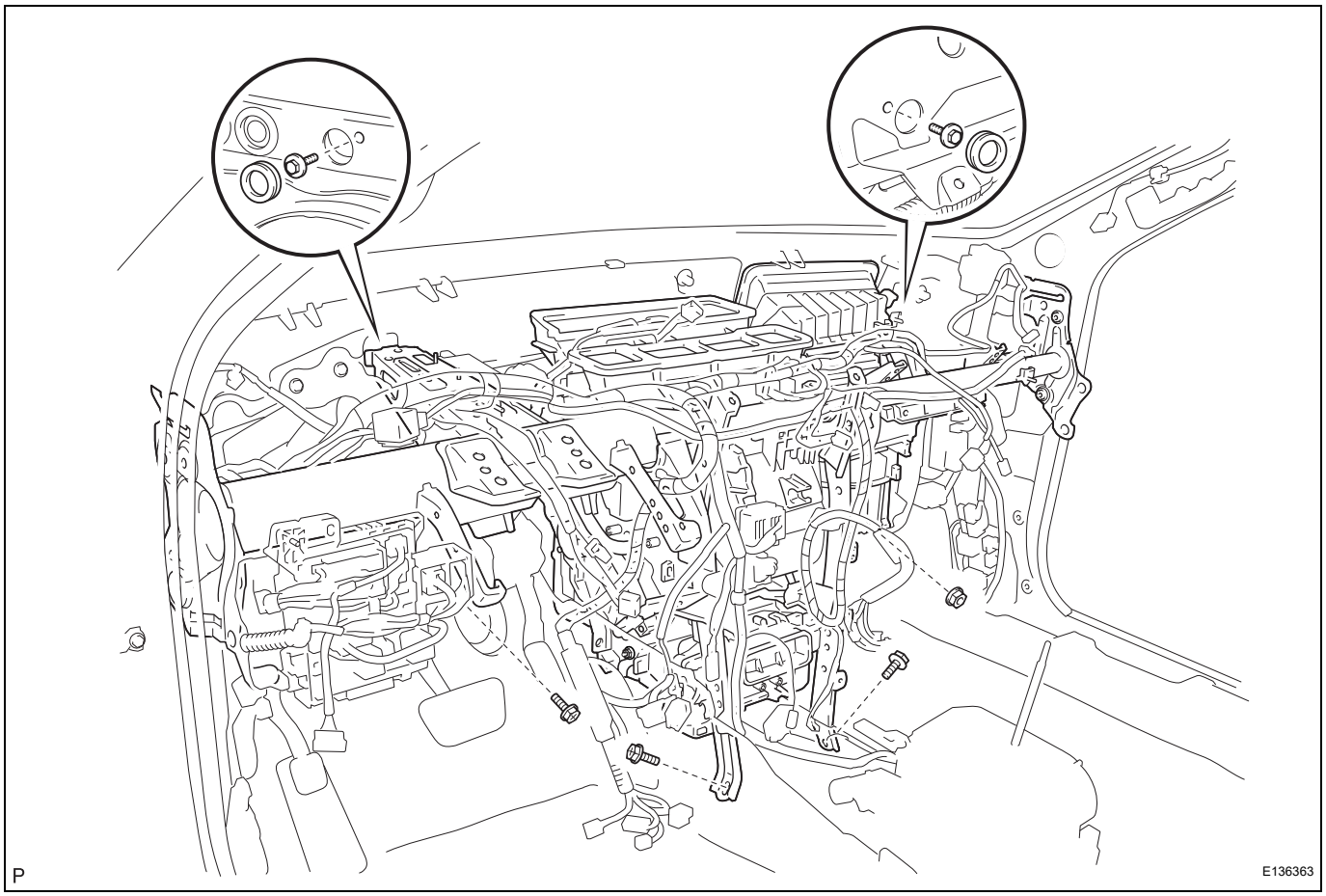
(b) Driver seat:
(1) Using a "TORX" socket wrench (T40), install the instrument panel reinforcement assembly with the 3 "TORX" bolts.



Torque: 17 N*m (173 kgf*cm, 13 ft.*lbf)

(c) Passenger seat:
(1) Using a 12 mm hexagon wrench, adjust the position of the 2 collars.
Torque: 6.0 N*m (61 kgf*cm, 53 in.*lbf)
(2) Using a "TORX" socket wrench (T40), install the instrument panel reinforcement assembly with the 2 "TORX" bolts.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)

(d) Install the instrument panel reinforcement assembly with the 3 bolts and nut.

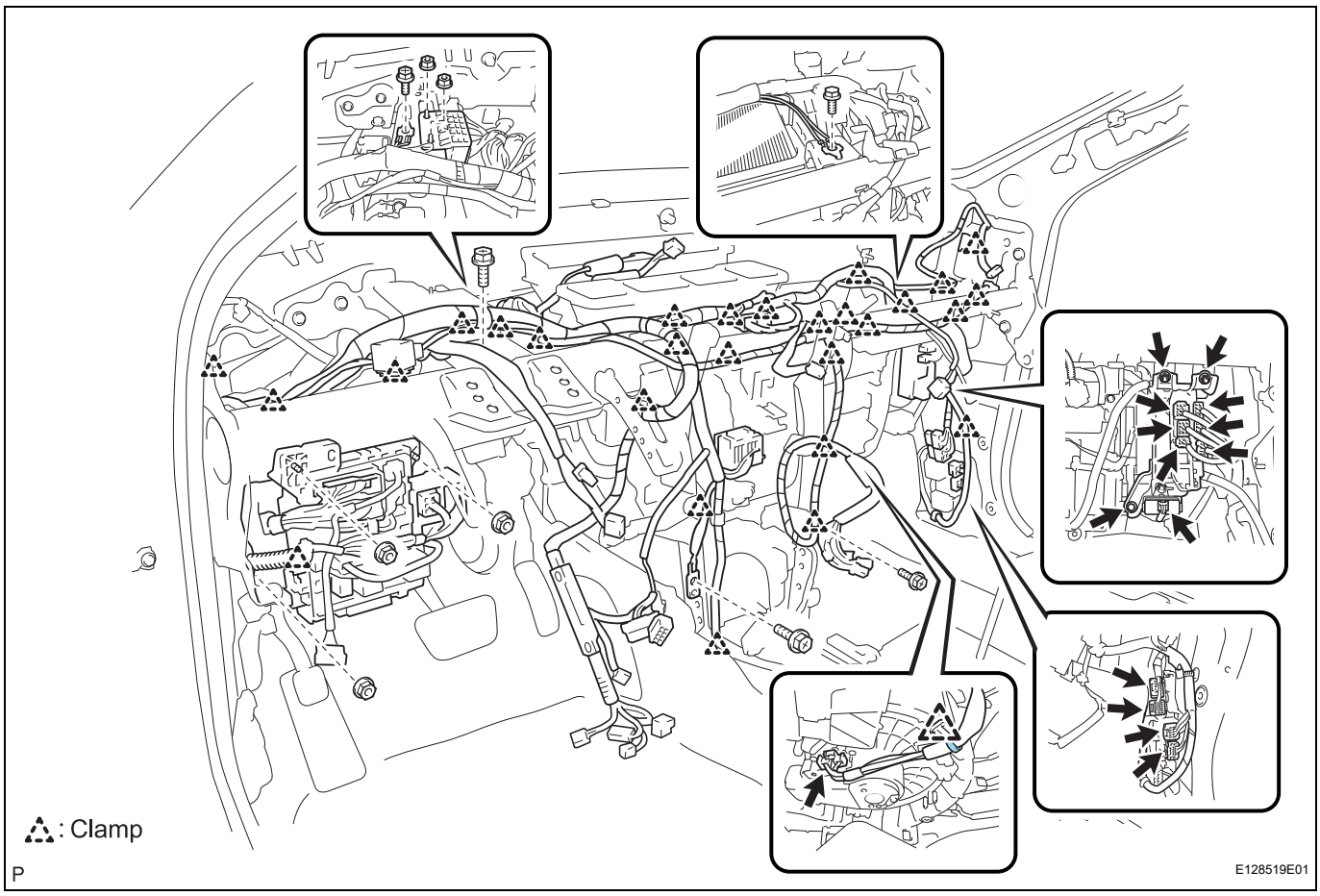


Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf) (NUT)

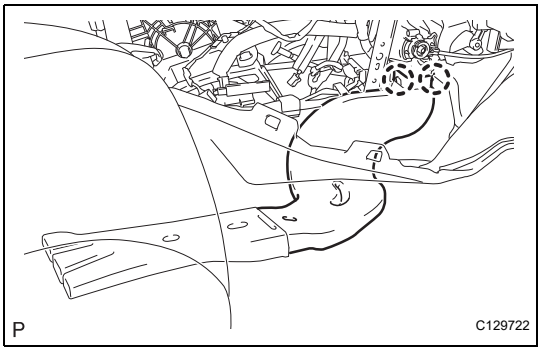
(e) Install the 2 bolts and 2 caps.

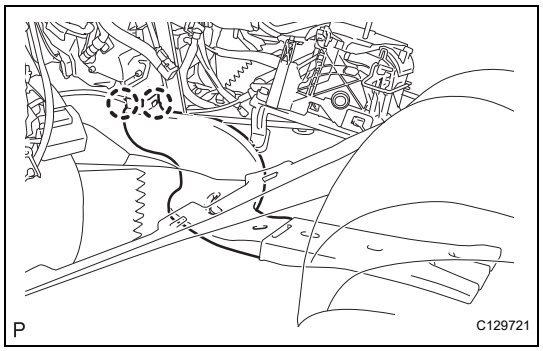
(f) Connect the connectors and clamps.

(g) Install the 6 nuts and 7 bolts.

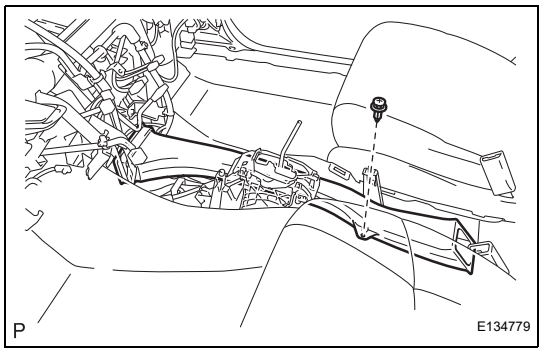


2. **INSTALL AIR CONDITIONING AMPLIFIER ASSEMBLY (See page AC-269)**
3. **INSTALL STEERING COLUMN ASSEMBLY (See page SR-40)**
4. **CONNECT STEERING INTERMEDIATE SHAFT ASSEMBLY (See page SR-40)**
5. **INSTALL NO. 1 AIR DUCT SUB-ASSEMBLY (See page SR-41)**
6. **INSTALL REAR NO. 1 AIR DUCT**
   (a) Engage the 2 claws to install the rear No. 1 air duct.





7. **INSTALL REAR NO. 2 AIR DUCT**
   (a) Engage the 2 claws to install the rear No. 2 air duct.
8. **INSTALL FLOOR CARPET BRACKET RH**
9. **INSTALL FLOOR CARPET BRACKET LH**



10. **INSTALL NO. 1 CONSOLE BOX DUCT**
    (a) Install the No. 1 console box duct with the clip.
11. **INSTALL INSTRUMENT PANEL SAFETY PAD ASSEMBLY (See page IP-25)**
12. **CONNECT INSTRUMENT PANEL WIRE ASSEMBLY**
13. **INSTALL NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-28)**
14. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-146)**
15. **INSTALL INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY (See page IP-28)**
16. **INSTALL INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY (See page IP-28)**
17. **INSTALL FRONT PILLAR GARNISH LH (See page IR-38)**
18. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side) (See page IP-28)**
19. **INSTALL INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY (See page IP-29)**
20. **INSTALL INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY (See page IP-29)**
21. **INSTALL FRONT PILLAR GARNISH RH (See page IR-39)**
22. **INSTALL NO. 1 CONSOLE BOX INSERT FRONT (See page IP-29)**
23. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (See page IP-30)**
24. **INSTALL CONSOLE BOX ASSEMBLY (See page IP-30)**
25. **INSTALL CONSOLE BOX CARPET (See page IP-30)**
26. **INSTALL CONSOLE BOX POCKET (See page IP-30)**
27. **INSTALL RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-137)**

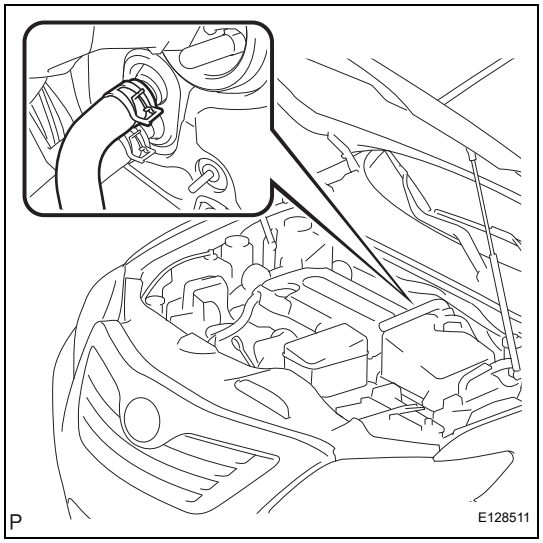
28. INSTALL NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/ Navigation System) (See page NS-194)
29. INSTALL INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-31)
30. INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-31)
31. INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-31)
32. INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-31)
33. INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-32)
34. INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-32)
35. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-32)
36. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-33)
37. INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-33)
38. INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-42)
39. INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-42)
40. INSTALL COMBINATION METER ASSEMBLY (See page IP-33)
41. INSTALL INSTRUMENT CLUSTER FINISH PANEL (See page IP-34)
42. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-34)
43. INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-34)
44. INSTALL TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY
45. ADJUST SPIRAL CABLE SUB-ASSEMBLY (See page RS-360)
46. INSTALL STEERING COLUMN COVER (See page IP-35)
47. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-35)
48. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-41)
49. INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-41)

50. **INSTALL STEERING WHEEL ASSEMBLY (See page SR-42)**

51. **INSTALL STEERING PAD (See page RS-346)**

52. **INSTALL LOWER NO. 3 STEERING WHEEL COVER (See page RS-347)**

53. **INSTALL LOWER NO. 2 STEERING WHEEL COVER (See page RS-347)**

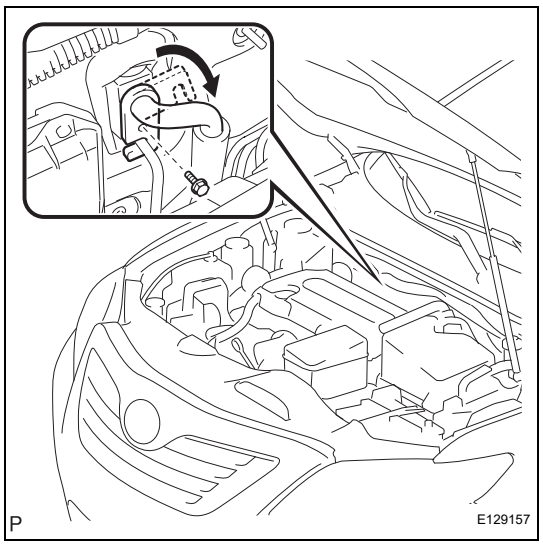


54. **INSTALL HEATER INLET WATER HOSE**
    (a) Install the water hose and attach the clip.

55. **INSTALL HEATER OUTLET WATER HOSE**
    (a) Use the same procedures described for the heater inlet water hose.

56. **INSTALL AIR CONDITIONER TUBE AND ACCESSORY**
    (a) Remove the attached vinyl tape from the tube.
    (b) Sufficiently apply compressor oil to a new O-ring and fitting surface of the air conditioner tube and accessory.
    Compressor oil:
    ND-OIL 11 or equivalent
    (c) Install the O-ring on the air conditioner tube and accessory.
    (d) Install the air conditioner tube and accessory.

57. **INSTALL SUCTION HOSE SUB-ASSEMBLY**
    (a) Remove the attached vinyl tape from the hose.
    (b) Sufficiently apply compressor oil to a new O-ring and the fitting surface of the suction hose sub-assembly.
    Compressor oil:
    ND-OIL 11 or equivalent
    (c) Install the O-ring on the suction hose sub-assembly.



    (d) Move the hook connector in the direction indicated by the arrow in the illustration.
    (e) Insert the pipe joint into the fitting hole securely and tighten the bolt.
    Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)

58. **INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-405)**

59. **INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-13)**

60. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-14)**

61. **INSTALL FRONT FENDER TO COWL SIDE SEAL LH (See page WW-14)**

62. **INSTALL FRONT FENDER TO COWL SIDE SEAL RH (See page WW-14)**

63. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-14)**

64. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-15)**
65. **INSTALL BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY (See page BR-33)**
66. **CONNECT NEGATIVE BATTERY TERMINAL**
67. **INSPECT STEERING PAD (See page RS-347)**
68. **INSPECT SRS WARNING LIGHT**
    (See page RS-33)
69. **PERFORM INITIALIZATION**
    NOTICE:
    Some systems need initialization after reconnecting the negative battery terminal (See page IN-43).
70. **ADD ENGINE COOLANT (See page CO-5)**
71. **INSPECT FOR COOLANT LEAK**
72. **CHARGE WITH REFRIGERANT (See page AC-169)**
73. **WARM UP COMPRESSOR (See page AC-171)**
74. **INSPECT FOR REFRIGERANT LEAK (See page AC-171)**

REMOVAL

1. RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM (See page AC-169)
2. ALIGN FRONT WHEELS FACING STRAIGHT AHEAD
3. DISCONNECT NEGATIVE BATTERY TERMINAL
   NOTICE:
   Wait for 90 seconds after disconnecting the terminal to prevent the airbag from deploying (See page RS-1).
4. SEPARATE BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY (See page BR-27)
5. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-9)
6. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-9)
7. REMOVE FRONT FENDER TO COWL SIDE SEAL LH (See page WW-9)
8. REMOVE FRONT FENDER TO COWL SIDE SEAL RH (See page WW-9)
9. REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-10)
10. REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-10)
11. REMOVE COWL TOP OUTER FRONT PANEL SUB-ASSEMBLY (See page ES-403)
12. DISCONNECT SUCTION PIPE SUB-ASSEMBLY (See page AC-186)
13. DISCONNECT AIR CONDITIONER TUBE AND ACCESSORY (See page AC-186)
14. DISCONNECT HEATER OUTLET WATER HOSE (See page AC-186)
15. DISCONNECT HEATER INLET WATER HOSE (See page AC-186)
16. REMOVE LOWER NO. 3 STEERING WHEEL COVER (See page RS-345)
17. REMOVE LOWER NO. 2 STEERING WHEEL COVER (See page RS-345)
18. REMOVE STEERING PAD (See page RS-345)
19. REMOVE STEERING WHEEL ASSEMBLY (See page SR-36)
20. REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-13)
21. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-14)

22. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-11)
23. REMOVE STEERING COLUMN COVER (See page IP-12)
24. REMOVE TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY (See page SR-37)
25. REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-12)
26. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-12)
27. REMOVE INSTRUMENT CLUSTER FINISH PANEL (See page IP-13)
28. REMOVE COMBINATION METER ASSEMBLY (See page IP-13)
29. REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-15)
30. REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-15)
31. REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-13)
32. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-14)
33. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-14)
34. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-14)
35. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-14)
36. REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-15)
37. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-15)
38. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-16)
39. REMOVE INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-16)
40. REMOVE RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-136)
41. REMOVE NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (See page NS-193)
42. REMOVE CONSOLE BOX POCKET (See page IP-17)
43. REMOVE CONSOLE BOX CARPET (See page IP-17)

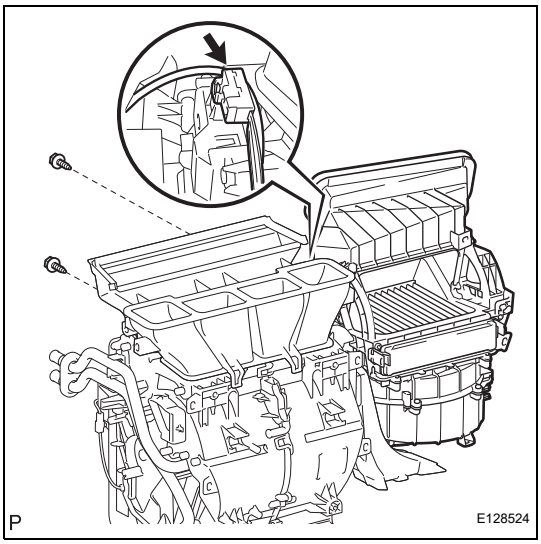
44. REMOVE CONSOLE BOX ASSEMBLY (See page IP-17)
45. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (See page IP-18)
46. REMOVE NO. 1 CONSOLE BOX INSERT FRONT (See page IP-18)
47. REMOVE FRONT PILLAR GARNISH LH (See page IR-16)
48. REMOVE INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY (See page IP-18)
49. REMOVE INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY (See page IP-19)
50. REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-146)
51. REMOVE FRONT PILLAR GARNISH RH (See page IR-16)
52. REMOVE INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY (See page IP-19)
53. REMOVE INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY (See page IP-19)
54. REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side) (See page IP-19)
55. REMOVE NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-20)
56. DISCONNECT INSTRUMENT PANEL WIRE ASSEMBLY
57. REMOVE INSTRUMENT PANEL SAFETY PAD ASSEMBLY (See page IP-20)
58. REMOVE NO. 1 CONSOLE BOX DUCT (See page AC-188)
59. REMOVE FLOOR CARPET BRACKET LH (See page AC-188)
60. REMOVE FLOOR CARPET BRACKET RH (See page AC-189)
61. REMOVE REAR NO. 2 AIR DUCT (See page AC-189)
62. REMOVE REAR NO. 1 AIR DUCT (See page AC-189)
63. REMOVE NO. 1 AIR DUCT SUB-ASSEMBLY (See page SR-37)
64. SEPARATE STEERING INTERMEDIATE SHAFT ASSEMBLY (See page SR-37)
65. REMOVE STEERING COLUMN ASSEMBLY (See page SR-38)
66. REMOVE AIR CONDITIONING AMPLIFIER ASSEMBLY (See page AC-269)

67. REMOVE INSTRUMENT PANEL REINFORCEMENT ASSEMBLY (See page AC-190)

68. REMOVE BLOWER ASSEMBLY

(a) Disconnect the connector.

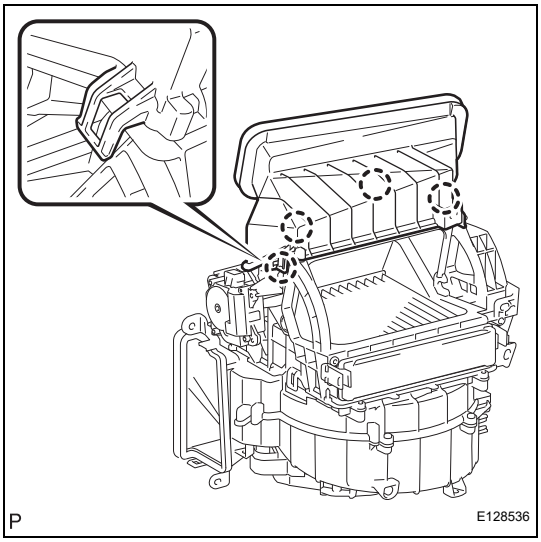
(b) Remove the 2 screws and blower assembly.



DISASSEMBLY

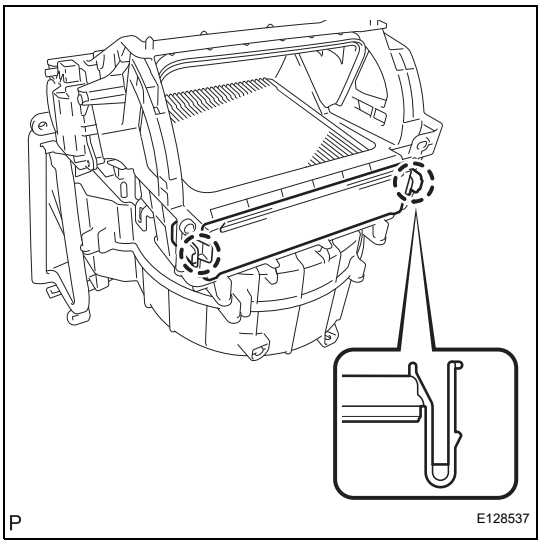
1. REMOVE AIR DUCT SUB-ASSEMBLY

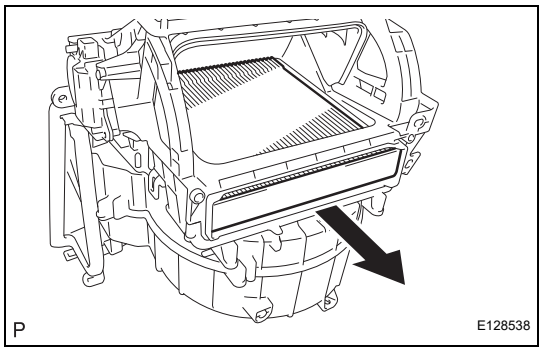
(a) Release the 4 claws and remove the air duct sub-assembly.



2. REMOVE AIR FILTER COVER PLATE

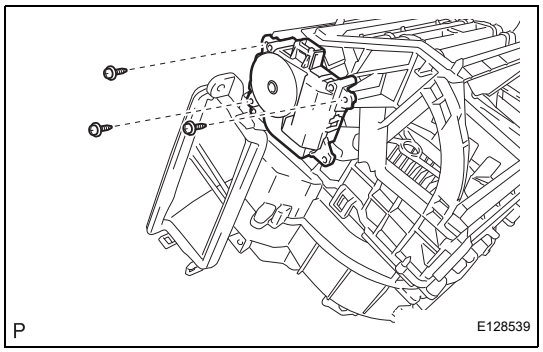
(a) Release the 2 claws and remove the air filter cover plate.





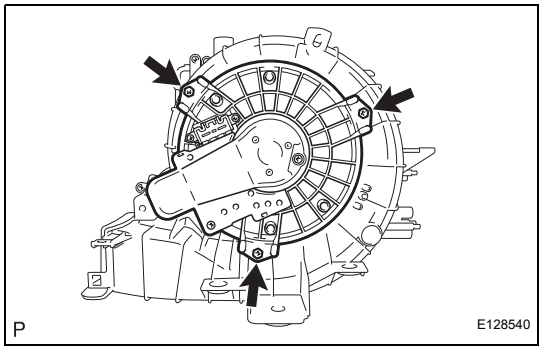
3. REMOVE CLEAN AIR FILTER

(a) Remove the clean air filter as shown in the illustration.



4. REMOVE AIR INLET SERVO MOTOR

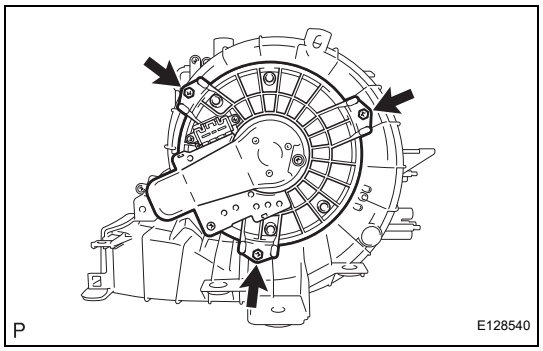
(a) Remove the 3 screws and air inlet servo motor.



5. REMOVE BLOWER WITH FAN MOTOR SUB-ASSEMBLY

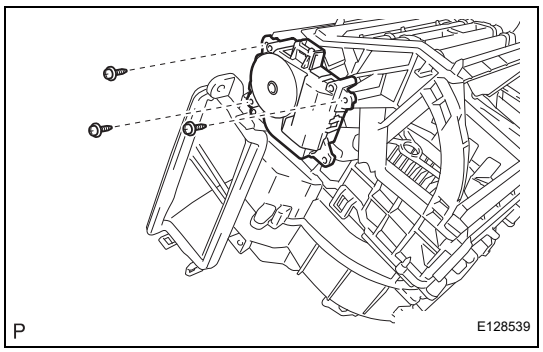
(a) Remove the 3 screws and blower with fan motor sub-assembly.

REASSEMBLY



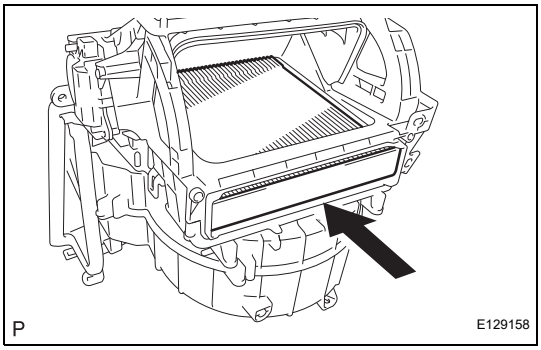
1. INSTALL BLOWER WITH FAN MOTOR SUB-ASSEMBLY

(a) Install the blower with fan motor sub-assembly with the 3 screws.



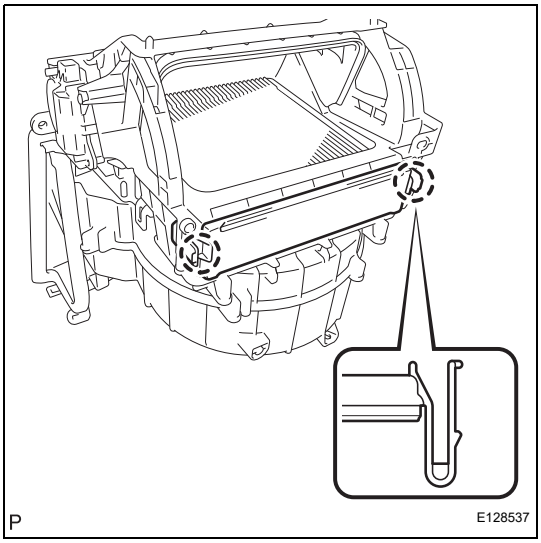
2. INSTALL AIR INLET SERVO MOTOR

(a) Install the air inlet servo motor with the 3 screws.



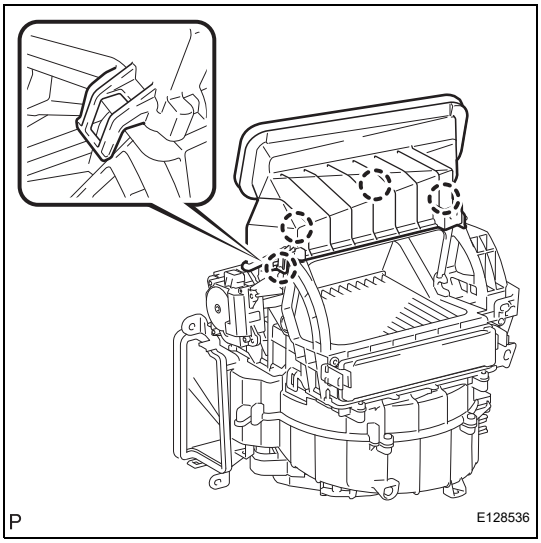
3. INSTALL CLEAN AIR FILTER

(a) Install the clean air filter as shown in the illustration.



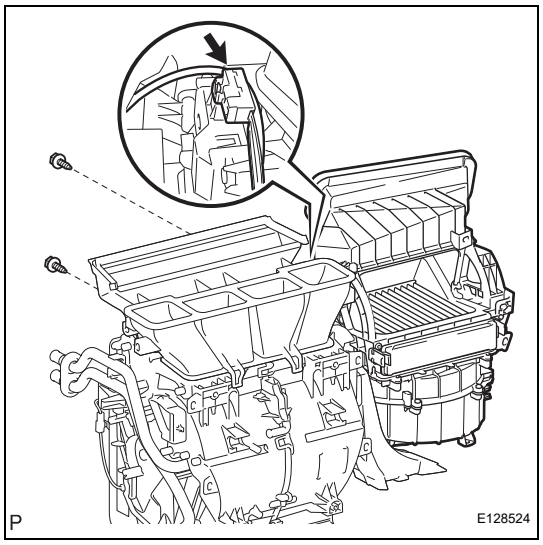
4. INSTALL AIR FILTER COVER PLATE

(a) Engage the 2 claws to install the air filter cover plate.



5. INSTALL AIR DUCT SUB-ASSEMBLY

(a) Engage the 4 claws to install the air duct sub-assembly.



INSTALLATION

1. **INSTALL BLOWER ASSEMBLY**
   (a) Install the blower assembly with the 2 screws.
   (b) Connect the connector.
2. **INSTALL INSTRUMENT PANEL REINFORCEMENT ASSEMBLY (See page AC-200)**
3. **INSTALL AIR CONDITIONING AMPLIFIER ASSEMBLY (See page AC-269)**
4. **INSTALL STEERING COLUMN ASSEMBLY (See page SR-40)**
5. **CONNECT STEERING INTERMEDIATE SHAFT ASSEMBLY (See page SR-40)**
6. **INSTALL NO. 1 AIR DUCT (See page SR-41)**
7. **INSTALL REAR NO. 1 AIR DUCT (See page AC-203)**
8. **INSTALL REAR NO. 2 AIR DUCT (See page AC-204)**
9. **INSTALL FLOOR CARPET BRACKET RH**
10. **INSTALL FLOOR CARPET BRACKET LH**
11. **INSTALL NO. 1 CONSOLE BOX DUCT (See page AC-204)**
12. **INSTALL INSTRUMENT PANEL SAFETY PAD ASSEMBLY (See page IP-25)**
13. **CONNECT INSTRUMENT PANEL WIRE ASSEMBLY**
14. **INSTALL NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-28)**
15. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-146)**
16. **INSTALL INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY (See page IP-28)**
17. **INSTALL INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY (See page IP-28)**
18. **INSTALL FRONT PILLAR GARNISH LH (See page IR-38)**
19. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side) (See page IP-28)**
20. **INSTALL INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY (See page IP-28)**
21. **INSTALL INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY (See page IP-29)**
22. **INSTALL FRONT PILLAR GARNISH RH (See page IR-39)**
23. **INSTALL NO. 1 CONSOLE BOX INSERT FRONT (See page IP-29)**

24. INSTALL NO. 2 CONSOLE BOX INSERT FRONT (See page IP-30)
25. INSTALL CONSOLE BOX ASSEMBLY (See page IP-30)
26. INSTALL CONSOLE BOX CARPET (See page IP-30)
27. INSTALL CONSOLE BOX POCKET (See page IP-30)
28. INSTALL RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-137)
29. INSTALL NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/ Navigation System) (See page NS-194)
30. INSTALL INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-31)
31. INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-31)
32. INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-31)
33. INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-31)
34. INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-32)
35. INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-32)
36. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-32)
37. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-33)
38. INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-33)
39. INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-42)
40. INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-42)
41. INSTALL COMBINATION METER ASSEMBLY (See page IP-33)
42. INSTALL INSTRUMENT CLUSTER FINISH PANEL (See page IP-34)
43. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-34)
44. INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-34)
45. INSTALL TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY

46. ADJUST SPIRAL CABLE SUB-ASSEMBLY (See page RS-360)
47. INSTALL STEERING COLUMN COVER (See page IP-35)
48. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-35)
49. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-41)
50. INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-41)
51. INSTALL STEERING WHEEL ASSEMBLY (See page SR-42)
52. INSTALL STEERING PAD (See page RS-346)
53. INSTALL LOWER NO. 3 STEERING WHEEL COVER (See page RS-347)
54. INSTALL LOWER NO. 2 STEERING WHEEL COVER (See page RS-347)
55. INSTALL HEATER INLET WATER HOSE (See page AC-206)
56. INSTALL HEATER OUTLET WATER HOSE (See page AC-206)
57. INSTALL AIR CONDITIONER TUBE AND ACCESSORY (See page AC-206)
58. INSTALL SUCTION HOSE SUB-ASSEMBLY (See page AC-206)
59. INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-405)
60. INSTALL WINDSHIELD WIPER MOTOR AND LINK (See page WW-13)
61. INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-14)
62. INSTALL FRONT FENDER TO COWL SIDE SEAL LH (See page WW-14)
63. INSTALL FRONT FENDER TO COWL SIDE SEAL RH (See page WW-14)
64. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-14)
65. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-15)
66. INSTALL BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY (See page BR-33)
67. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL
68. INSPECT STEERING PAD (See page RS-347)

69. **INSPECT SRS WARNING LIGHT**
(See page RS-33)

70. **PERFORM INITIALIZATION**
NOTICE:
Some systems need initialization after reconnecting the negative battery terminal (See page IN-43).

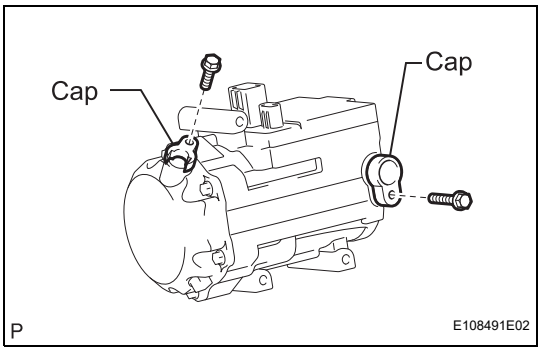
71. **ADD ENGINE COOLANT (See page CO-5)**

72. **INSPECT FOR COOLANT LEAK**

73. **CHARGE WITH REFRIGERANT (See page AC-169)**

74. **WARM UP COMPRESSOR (See page AC-169)**

75. **INSPECT FOR REFRIGERANT LEAK (See page AC-171)**



INSTALLATION

1. ADJUST COMPRESSOR OIL

(a) When replacing the electric inverter compressor with a new one, gradually discharge the inert gas (helium) from the cap, and drain the following amount of oil from the new electric inverter compressor before installation.

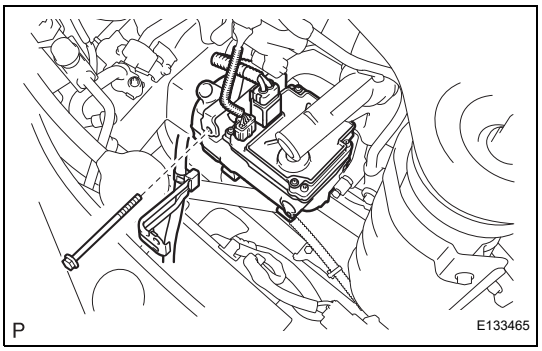
Standard:

(Oil capacity inside the new electric inverter compressor: 120 to 135 cc (4.1 to 4.6 fl.oz.)) - (Remaining oil amount in the removed electric inverter compressor) = (Oil amount to be removed from the new compressor when replacing)

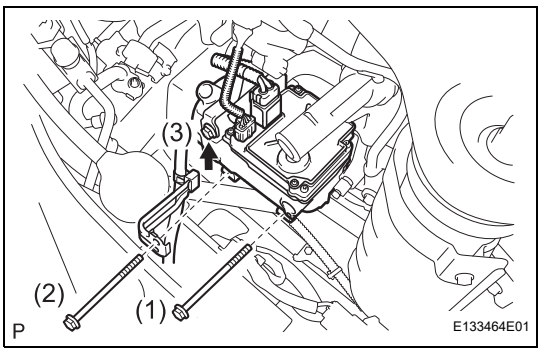
NOTICE:

- **When checking the compressor oil level, observe the precautions on the cooler removal/installation.**
- **If a new electric inverter compressor is installed without removing some oil, due to the oil remaining in the pipes of the vehicle, the oil amount will be too large. This prevents heat exchange in the refrigerant cycle and causes refrigerant failure.**
- **If the volume of oil remaining in the removed electric inverter compressor is too small, inspect for an oil leak.**
- **Be sure to use ND-OIL 11 or equivalent for compressor oil.**

2. INSTALL ELECTRIC INVERTER COMPRESSOR



(a) Temporarily install the electric inverter compressor with the bolt.

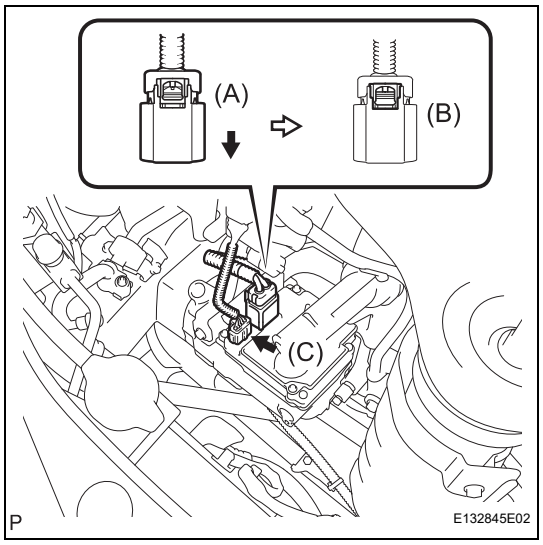


(b) Install the electric inverter compressor with the 3 bolts.

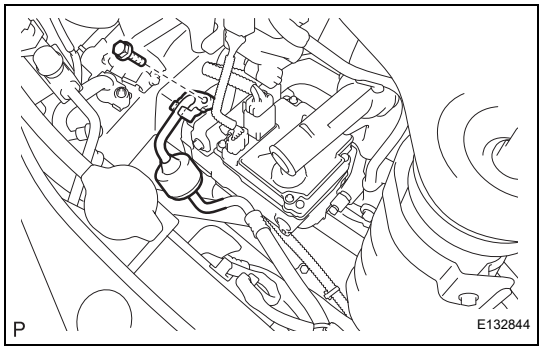
CAUTION:

Tighten the bolts in the order indicated in the illustration.

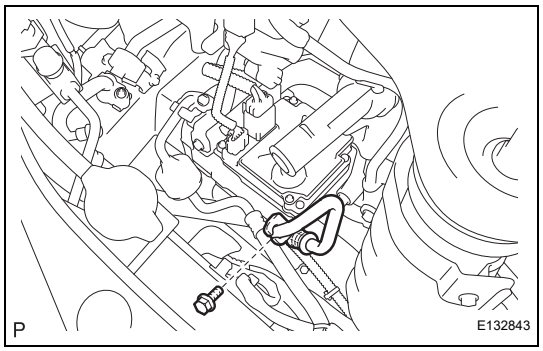
Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)



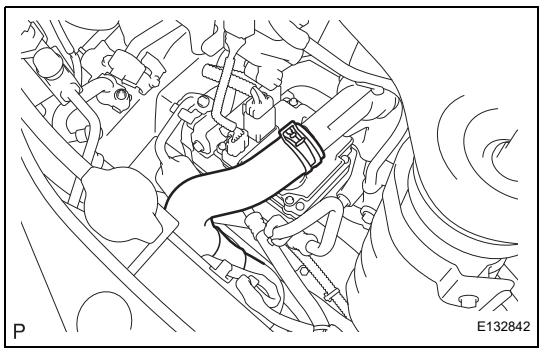
(c) Connect the connector (A).
NOTICE:
Wear insulated gloves when performing this procedure.
(d) Lock the green-colored lock (B).
NOTICE:
Wear insulated gloves when performing this procedure.
(e) Connect the connector (C).



3. INSTALL NO. 1 COOLER REFRIGERANT DISCHARGE HOSE
(a) Remove the attached vinyl tape from the hose.
(b) Apply sufficient compressor oil to a new O-ring and the fitting surface of the electric inverter compressor.
Compressor oil:
ND-OIL 11 or equivalent
(c) Install the O-ring onto the No. 1 cooler refrigerant discharge hose.
(d) Install the No. 1 cooler refrigerant discharge hose onto the electric inverter compressor with the bolt.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)



4. INSTALL NO. 1 COOLER REFRIGERANT SUCTION HOSE
(a) Remove the attached vinyl tape from the hose.
(b) Apply sufficient compressor oil to a new O-ring and the fitting surface of the electric inverter compressor.
Compressor oil:
ND-OIL 11 or equivalent
(c) Install the O-ring onto the No. 1 cooler refrigerant suction hose.
(d) Install the No. 1 cooler refrigerant suction hose onto the electric inverter compressor with the bolt.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)



5. INSTALL RADIATOR HOSE OUTLET
(a) Install the radiator hose outlet and attach the clip.

6. INSTALL SERVICE PLUG GRIP (See page HB-97)

7. CONNECT NEGATIVE BATTERY TERMINAL

8. ADD ENGINE COOLANT (See page CO-5)

9. INSPECT FOR COOLANT LEAK

10. CHARGE WITH REFRIGERANT (See page AC-169)

11. WARM UP COMPRESSOR (See page AC-171)

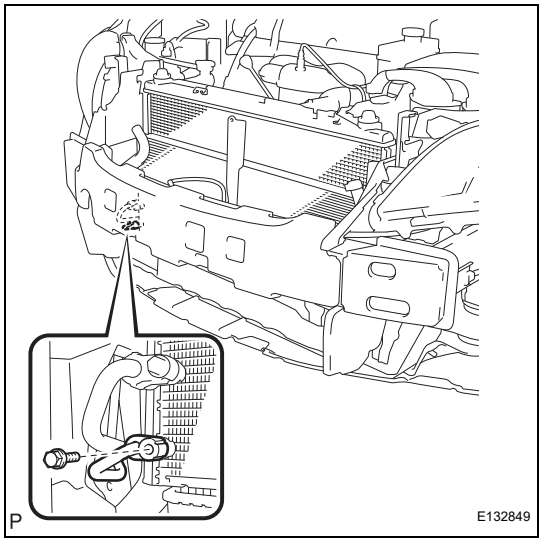
12. INSPECT FOR REFRIGERANT LEAK (See page AC-171)

13. PERFORM INITIALIZATION

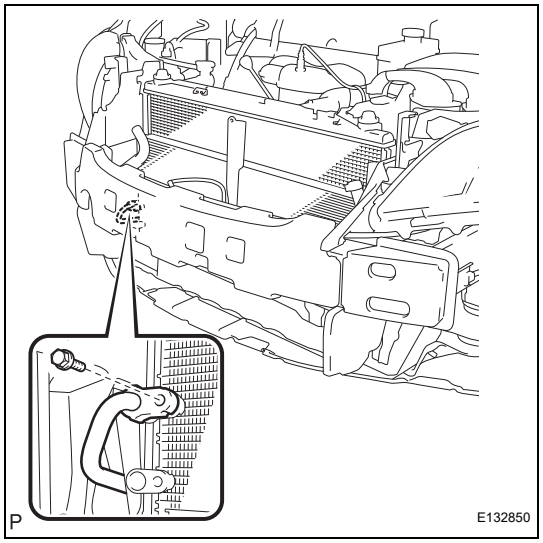
(a) Perform initialization procedure (See page IN-43).
HINT:
Some vehicle systems require initialization after reconnecting the cable to the negative battery terminal.

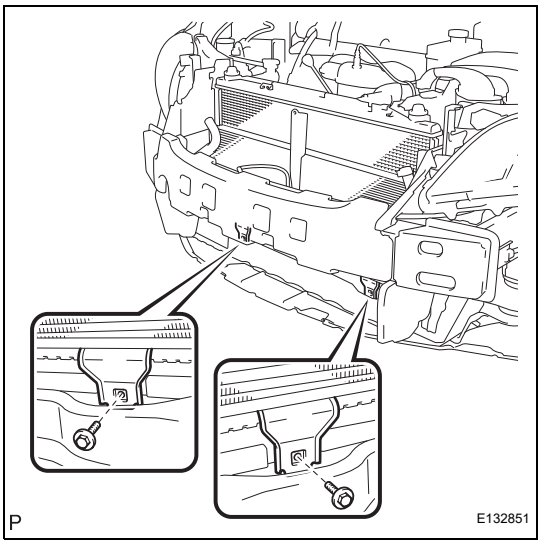
REMOVAL

1. **RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM (See page AC-169)**
2. **DRAIN COOLANT (for Inverter) (See page HV-556)**
3. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-90)**
4. **REMOVE FRONT BUMPER ASSEMBLY (See page ET-3)**
5. **REMOVE FRONT BUMPER ENERGY ABSORBER (See page ET-6)**
6. **REMOVE RADIATOR SUPPORT UPPER (See page CO-23)**
7. **REMOVE RADIATOR ASSEMBLY (See page HV-577)**
8. **DISCONNECT LIQUID TUBE SUB-ASSEMBLY**
   (a) Remove the bolt and disconnect the liquid tube sub-assembly from the condenser.
   (b) Remove the O-ring from the liquid tube sub-assembly.
   NOTICE:
   Seal the openings of the disconnected parts using vinyl tape to prevent entry of moisture and foreign matter.



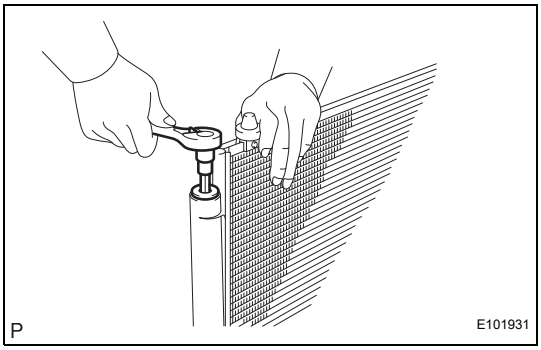
9. **DISCONNECT COOLER REFRIGERANT DISCHARGE PIPE**
   (a) Remove the bolt and disconnect the cooler refrigerant discharge pipe from the condenser.
   (b) Remove the O-ring from the cooler refrigerant discharge pipe.
   NOTICE:
   Seal the openings of the disconnected parts using vinyl tape to prevent entry of moisture and foreign matter.





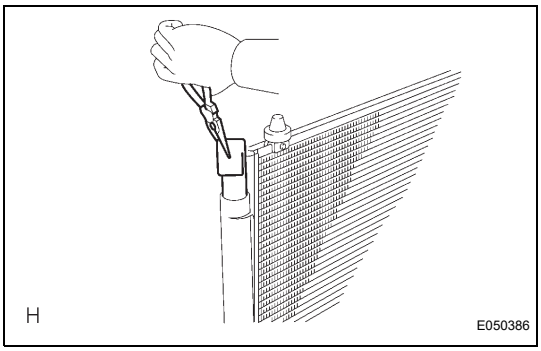
10. REMOVE COOLER CONDENSER ASSEMBLY

(a) Remove the 2 bolts and condenser.



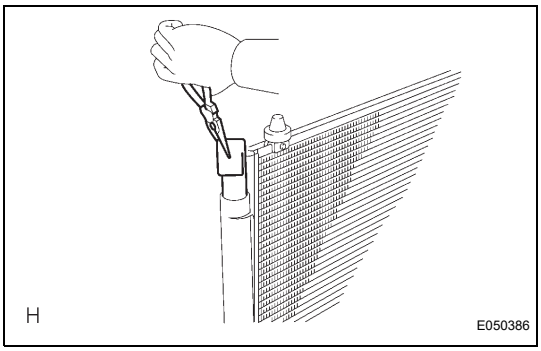
11. REMOVE COOLER DRYER

(a) Using a 14 mm straight hexagon wrench, remove the cap from the modulator.



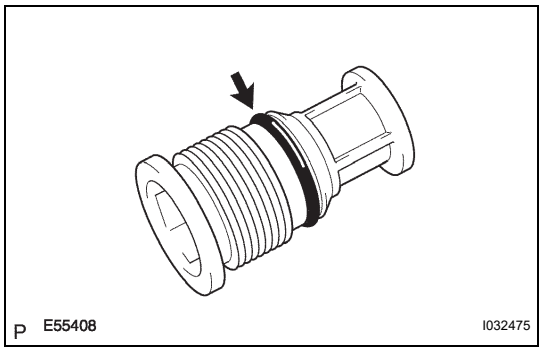
(b) Using pliers, remove the cooler dryer.

INSTALLATION

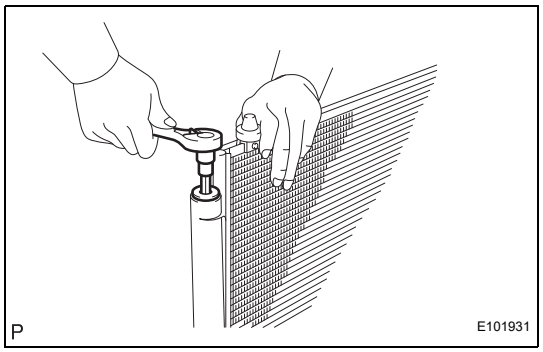


1. INSTALL COOLER DRYER

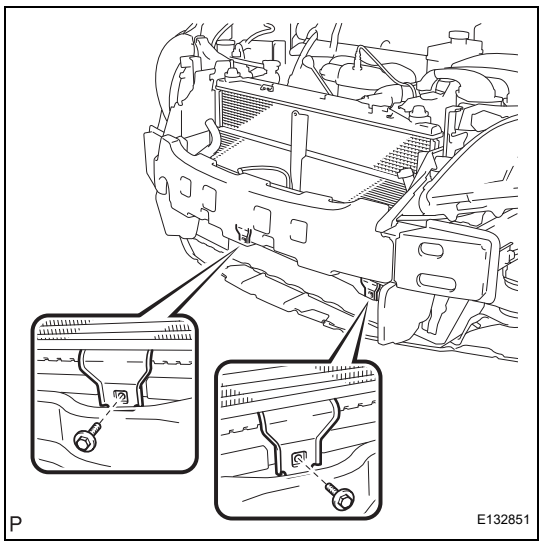
(a) Using pliers, install the cooler dryer to the modulator.



(b) Apply sufficient compressor oil to an O-ring and cap fitting surface.
Compressor oil:
ND-OIL 11 or equivalent

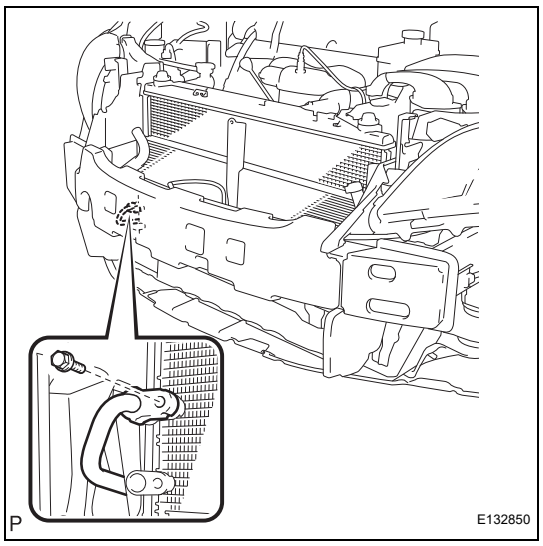


(c) Using a 14 mm straight hexagon wrench, install the cap to the cooler condenser core.
Torque: 2.9 N*m (30 kgf*cm, 26 in.*lbf)



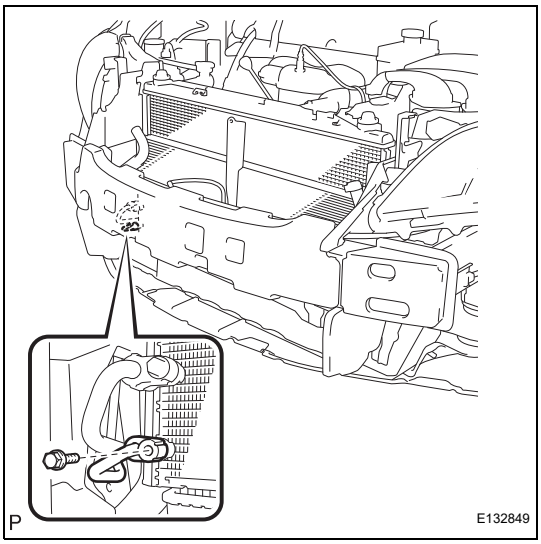
2. INSTALL COOLER CONDENSER ASSEMBLY

(a) Install the cooler condenser assembly with the 2 bolts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
HINT:
If the condenser is replaced with a new one, add compressor oil to the new condenser.
Capacity:
40 cc (1.4 fl. oz.)
Compressor oil:
ND-OIL 11 or equivalent



3. INSTALL COOLER REFRIGERANT DISCHARGE PIPE

(a) Remove the attached vinyl tape from the pipe and the connecting part of the cooler condenser assembly.
(b) Sufficiently apply compressor oil to a new O-ring and the fitting surface of the pipe joint.
Compressor oil:
ND-OIL 11 or equivalent
(c) Install the O-ring on the cooler refrigerant discharge pipe.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)



4. **INSTALL LIQUID TUBE SUB-ASSEMBLY**
   (a) Remove the attached vinyl tape from the tube and the connecting part of the cooler condenser assembly.
   (b) Sufficiently apply compressor oil to a new O-ring and the fitting surface of the tube joint.
   Compressor oil:
   ND-OIL 11 or equivalent
   (c) Install the O-ring on the liquid tube sub-assembly.
   (d) Install the liquid tube sub-assembly on the cooler condenser assembly with the bolt.
   Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)
5. **INSTALL RADIATOR ASSEMBLY (See page HV-577)**
6. **INSTALL RADIATOR SUPPORT UPPER (See page CO-29)**
7. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-113)**
8. **ADD COOLANT (for Inverter) (See page HV-556)**
9. **INSPECT FOR COOLANT LEAK (for Inverter) (See page HV-555)**
10. **CHARGE WITH REFRIGERANT (See page AC-169)**
11. **WARM UP ENGINE (See page AC-171)**
12. **INSPECT FOR REFRIGERANT LEAK (See page AC-171)**
13. **INSTALL FRONT BUMPER ENERGY ABSORBER (See page ET-7)**
14. **INSTALL FRONT BUMPER ASSEMBLY (See page ET-9)**

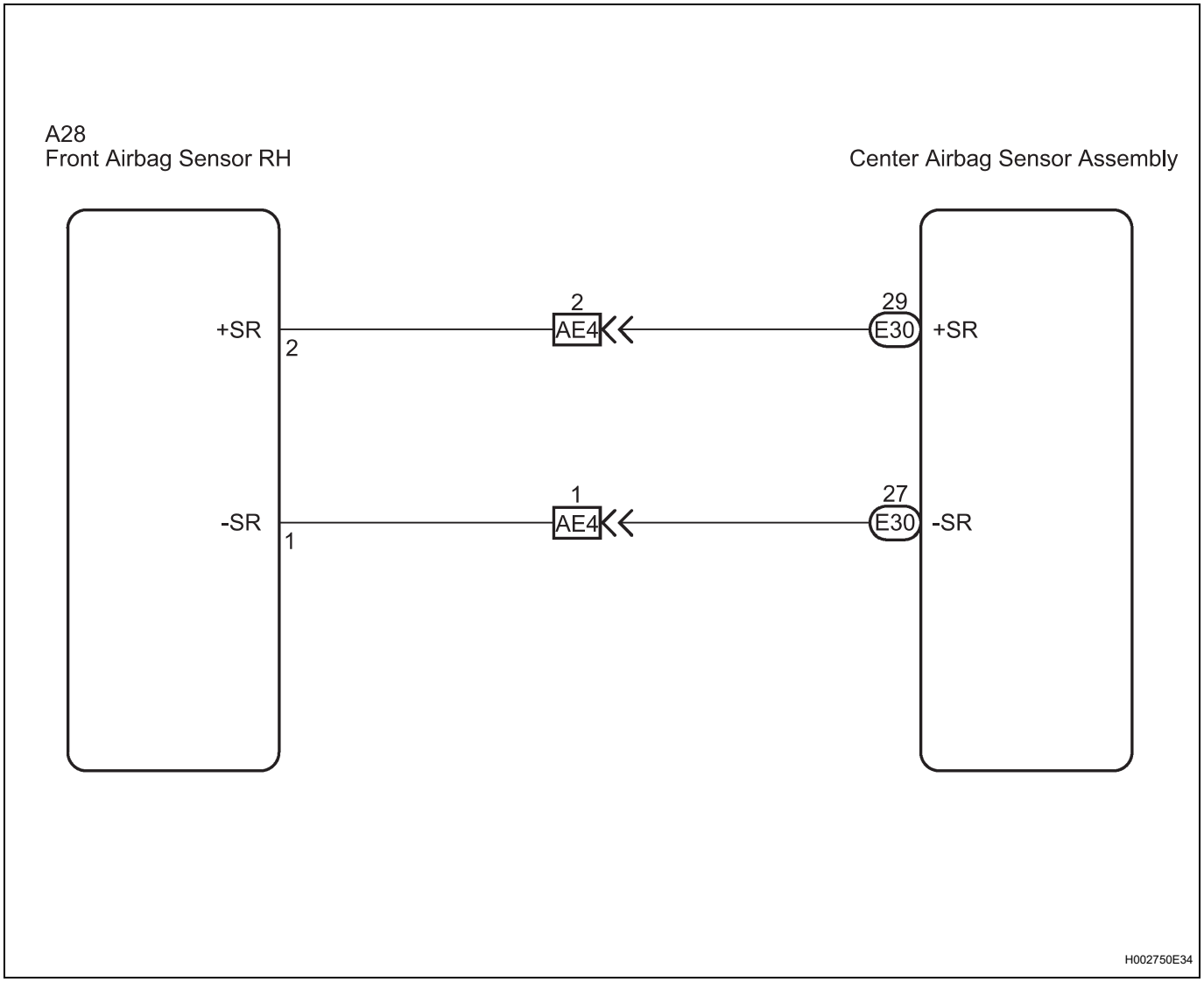
DTC	B1610/13	Front Airbag Sensor RH Malfunction

DESCRIPTION

The front airbag sensor RH consists of the diagnostic circuit, the frontal deceleration sensor, etc.
If the center airbag sensor assembly receives signals from the frontal deceleration sensor, it determines whether the SRS should be activated.
DTC B1610/13 is recorded when a malfunction is detected in the front airbag sensor RH.

DTC No.	DTC Detection Condition	Trouble Area
B1610/13	• Front airbag sensor RH malfunction • Center airbag sensor assembly malfunction	• Front airbag sensor RH • Center airbag sensor assembly

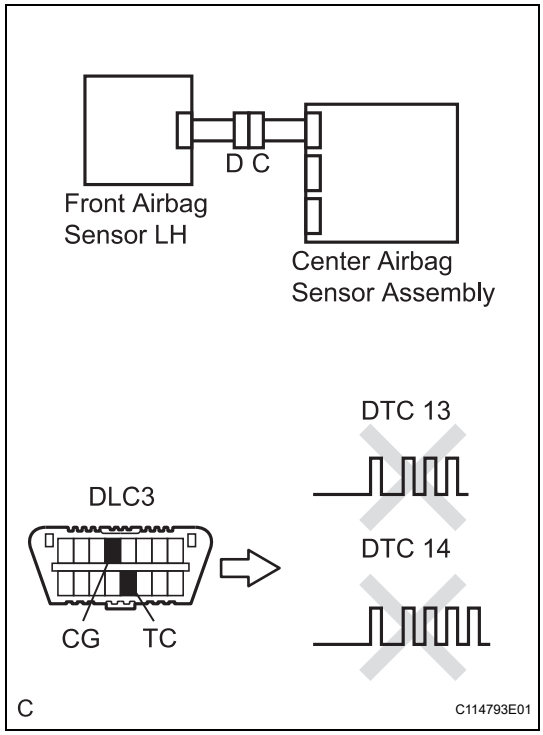
WIRING DIAGRAM



RS

INSPECTION PROCEDURE

1	CHECK FRONT AIRBAG SENSOR RH



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Interchange the front airbag sensor LH with RH and connect the connectors to them.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the power switch on (IG), and wait for at least 60 seconds.
(f) Clear the DTCs stored in the memory (See page RS-41).
(g) Turn the power switch off.
(h) Turn the power switch on (IG), and wait for at least 60 seconds.
(i) Check the DTCs (See page RS-41).

Result

Result	Proceed to
DTC B1610/13 is output.	A
DTC B1615/14 is output.	B
DTC B1610/13 and B1615/14 are not output.	C

HINT:
Codes other than DTC B1610/13 and B1615/14 may be output at this time, but they are not related to this check.

A → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

B → **REPLACE FRONT AIRBAG SENSOR RH (See page RS-428)**

C

USE SIMULATION METHOD TO CHECK (See page RS-33)

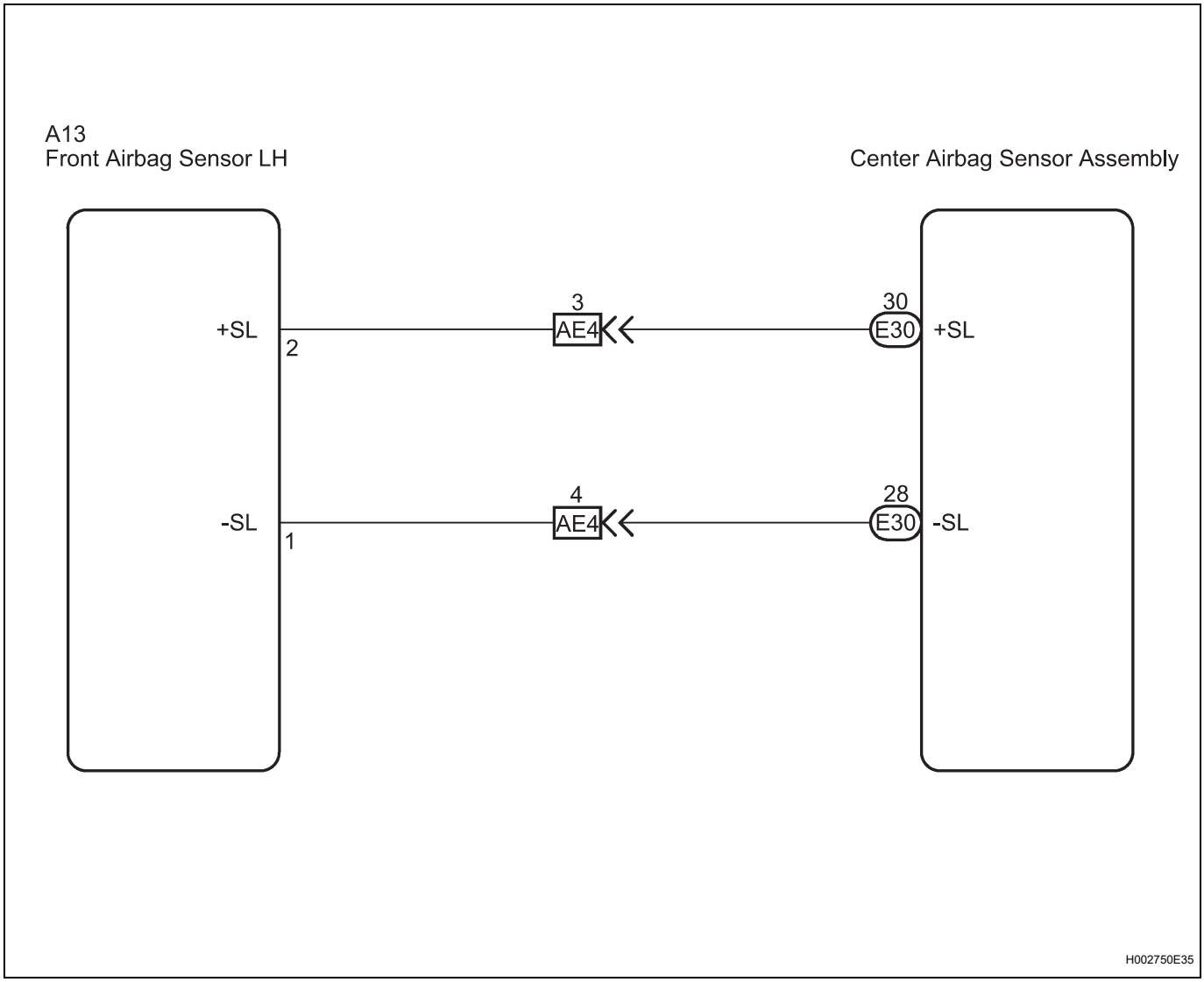
DTC	B1615/14	Front Airbag Sensor LH Malfunction

DESCRIPTION

The front airbag sensor LH consists of the diagnostic circuit and the frontal deceleration sensor, etc.
If the center airbag sensor assembly receives signals from the frontal deceleration sensor, it determines whether the SRS should be activated.
DTC B1615/14 is recorded when a malfunction is detected in the front airbag sensor LH.

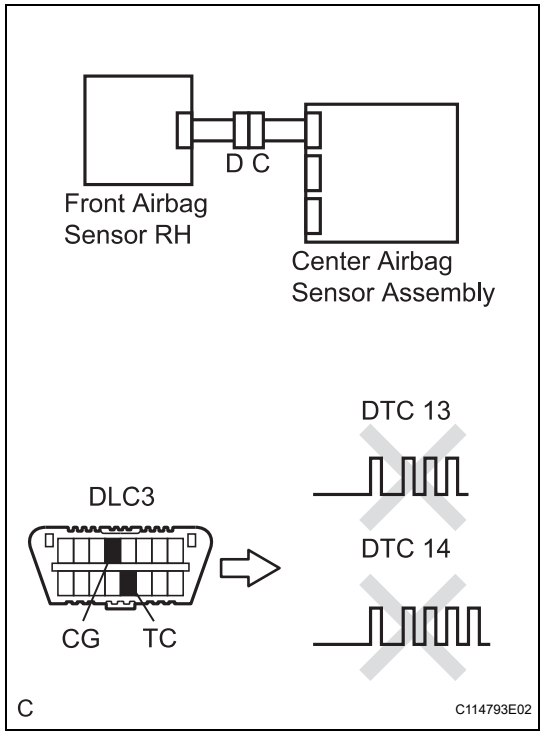
DTC No.	DTC Detection Condition	Trouble Area
B1615/14	• Front airbag sensor LH malfunction • Center airbag sensor assembly malfunction	• Front airbag sensor LH • Center airbag sensor assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FRONT AIRBAG SENSOR LH



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Interchange the front airbag sensor RH with LH and connect the connectors to them.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the power switch on (IG), and wait for at least 60 seconds.
(f) Clear the DTCs stored in the memory (See page RS-41).
(g) Turn the power switch off.
(h) Turn the power switch on (IG), and wait for at least 60 seconds.
(i) Check the DTCs (See page RS-41).

Result

Result	Proceed to
DTC B1615/14 is output.	A
DTC B1610/13 is output.	B
DTC B1610/13 and B1615/14 are not output.	C

HINT:
Codes other than DTC B1610/13 and B1615/14 may be output at this time, but they are not related to this check.

A → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

B → **REPLACE FRONT AIRBAG SENSOR LH (See page RS-428)**

C

USE SIMULATION METHOD TO CHECK (See page RS-33)

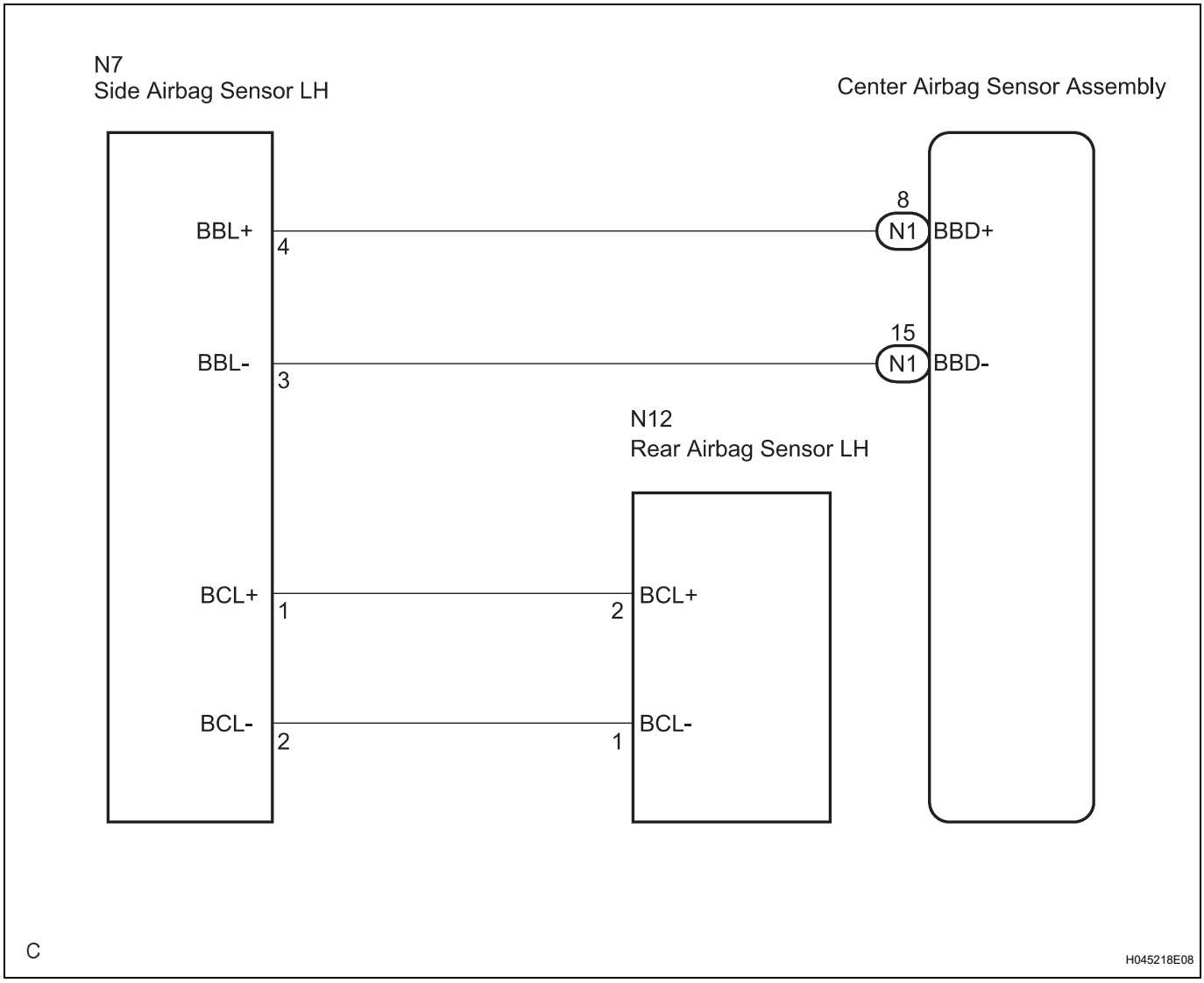
DTC	B1620/21	Driver Side - Side Airbag Sensor Malfunction

DESCRIPTION

The side airbag sensor LH consists of the safing sensor, the diagnostic circuit, the lateral deceleration sensor, etc.
If the center airbag sensor assembly receives signals from the lateral deceleration sensor, it determines whether the SRS should be activated.
DTC B1620/21 is recorded when a malfunction is detected in the side airbag sensor LH.

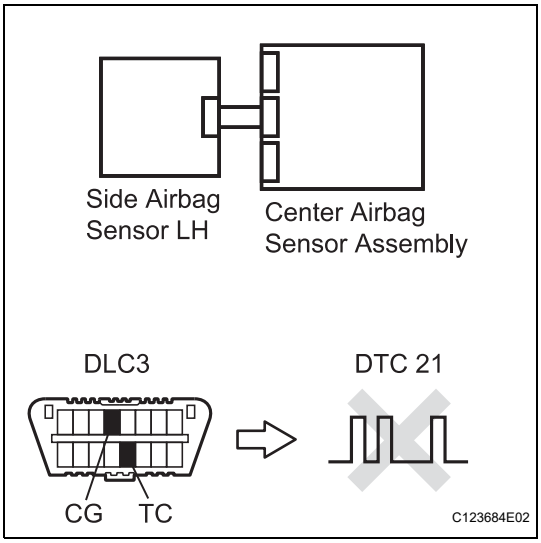
DTC No.	DTC Detection Condition	Trouble Area
B1620/21	• Side airbag sensor LH malfunction • Center airbag sensor assembly malfunction	• Side airbag sensor LH • Center airbag sensor assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the power switch on (IG), and wait for at least 60 seconds.
(b) Clear the DTCs stored in the memory (See page RS-41).
(c) Turn the power switch off.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Check the DTCs (See page RS-41).
OK:
DTC B1620/21 is not output.
HINT:
Codes other than DTC B1620/21 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-33)**

NG

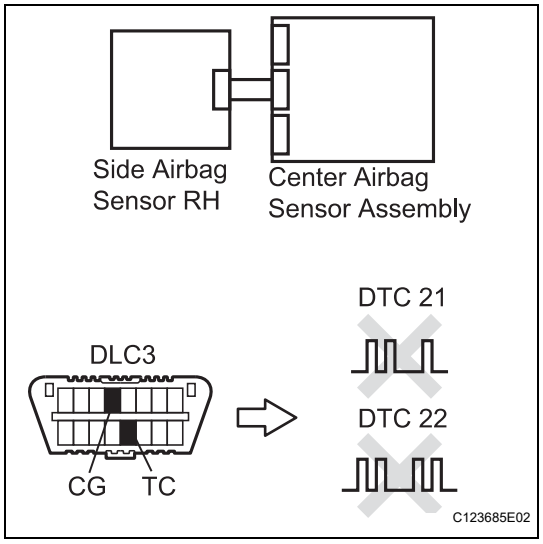
2	CONFIRM PART NUMBER OF SIDE AIRBAG SENSOR

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the part number of the side airbag sensor LH is equal to the number of the other side.
OK:
Those numbers are the same.

NG → **Go to step 4**

OK

3 CHECK SIDE AIRBAG SENSOR LH



(a) Interchange the side airbag sensor RH with LH and connect the connectors to them.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

Result

Result	Proceed to
DTC B1620/21 is output.	A
DTC B1625/22 is output.	B
DTC B1620/21 and B1625/22 are not output.	C

HINT:
Codes other than DTC B1620/21 and B1625/22 may be output at this time, but they are not related to this check.

(h) Turn the power switch off.
(i) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(j) Return the side airbag sensor RH and LH to their original positions and connect the connectors to them.

A	**Go to step 5**
B	**REPLACE SIDE AIRBAG SENSOR LH (See page RS-431)**

C

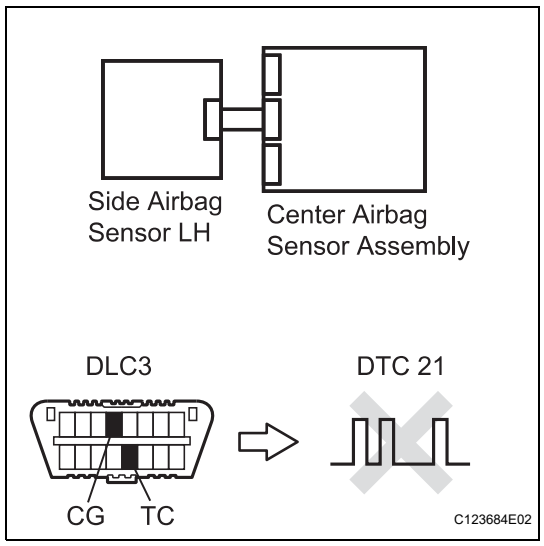
USE SIMULATION METHOD TO CHECK (See page RS-33)

4 REPLACE SIDE AIRBAG SENSOR LH

(a) Replace the side airbag sensor LH (See page RS-431).
HINT:
Perform inspection using parts from a normal vehicle if possible.

NEXT

5	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG), and wait for at least 60 seconds.
(c) Clear the DTCs stored in the memory (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG), and wait for at least 60 seconds.
(f) Check the DTCs (See page RS-41).

OK:

DTC B1620/21 is not output.

HINT:

Codes other than DTC B1620/21 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENOR ASSEMBLY (See page RS-423)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

DTC	B1622/81	Lost Communication with Driver Side - Side Airbag Sensor Assembly
DTC	B1623/81	Driver Side - Side Airbag Sensor Assembly Initialization Incomplete
DTC	B1632/81	Lost Communication with Driver Side Rear Airbag Sensor
DTC	B1633/81	Driver Side Rear Airbag Sensor Initialization Incomplete
DTC	B1642/81	Lost Communication with Driver Side Satellite Sensor Bus
DTC	B1643/81	Driver Side Satellite Sensor Bus Initialization Incomplete

DESCRIPTION

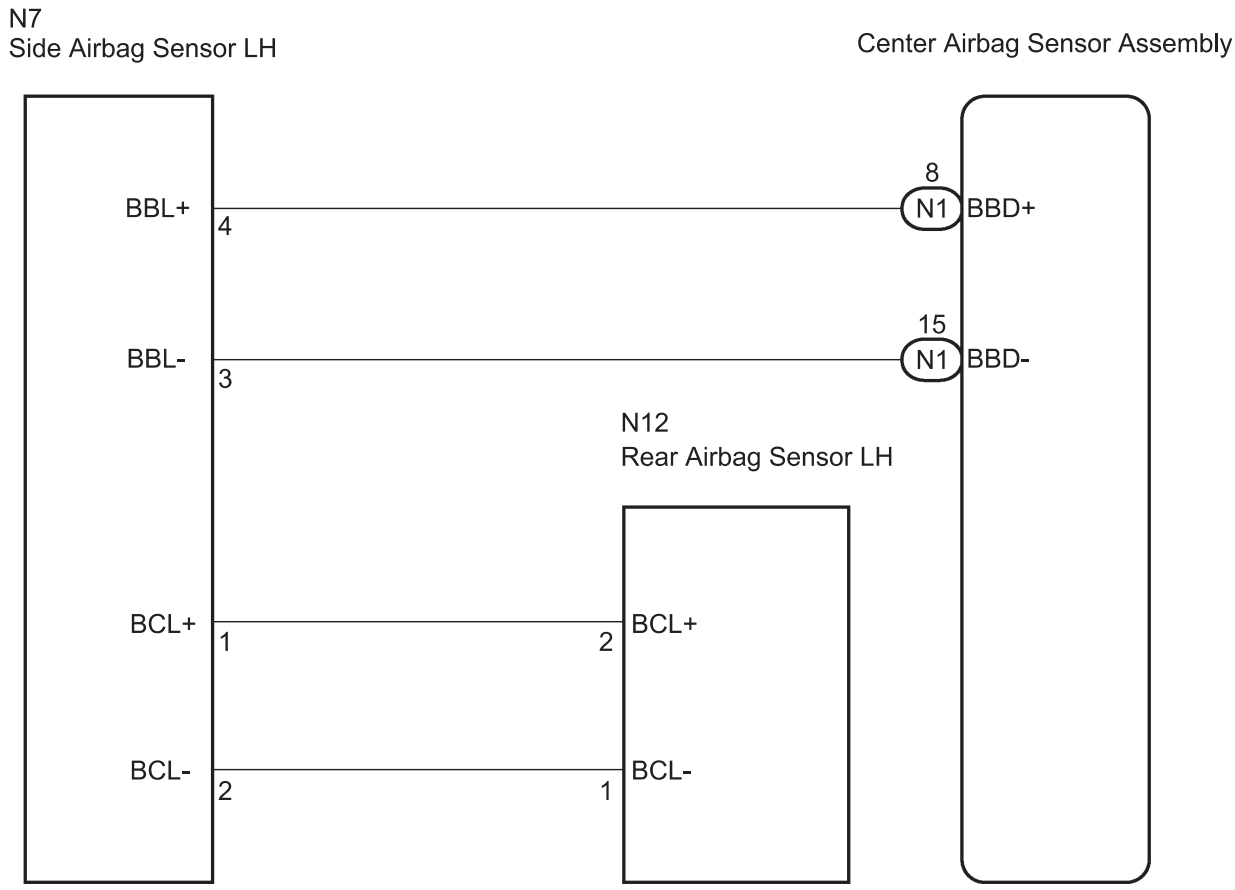
The circuit for the side collision sensor LH (to determine deployment of the front seat side airbag assembly LH and curtain shield airbag assembly LH) is composed of the center airbag sensor assembly, side airbag sensor LH, and rear airbag sensor LH.

The side airbag sensor LH and rear airbag sensor LH detect impacts to the vehicle and send signals to the center airbag sensor assembly to determine if the airbag should be deployed.

DTC B1622/81, B1623/81, B1632/81, B1633/81, B1642/81, or B1643/81 is recorded when a malfunction is detected in the circuit for the side collision sensor LH (to determine deployment of the front seat side airbag assembly LH and curtain shield airbag assembly LH).

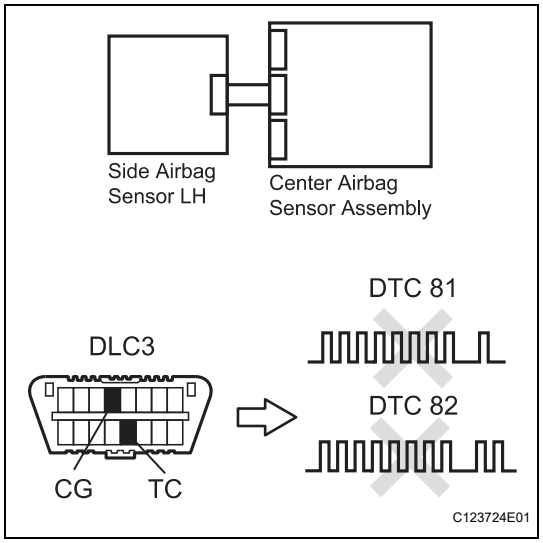
DTC No.	DTC Detecting Condition	Trouble Area
1622/81 1623/81 1632/81 1633/81 1642/81 1643/81	• The center airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the circuit for the side collision sensor LH (to determine deployment of the front seat side airbag assembly LH and curtain shield airbag assembly LH) for 2 seconds. • Side airbag sensor LH malfunction • Rear airbag sensor LH malfunction • Center airbag sensor assembly malfunction	• Floor wire • Side airbag sensor LH • Rear airbag sensor LH • Center airbag sensor assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK PRESENT DTC



(a) Turn the power switch on (IG), and wait for at least 60 seconds.
(b) Turn the power switch off.
HINT:
If a communication error occurs, DTCs for both the LH and RH sides will be stored simultaneously. To identify the malfunctioning area, turn the power switch off and then on (IG) again.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Check the present DTCs (See page RS-41).
Result

Result	Proceed to
Present DTC B1623, B1633, B1643, or 81 is output.	A
Present DTC B1628, B1638, B1648, or 82 is output.	B
Present DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 are not output.	C

HINT:
- DTCs indicating communication errors will be changed to DTCs indicating errors in initialization by turning the power switch off and then on (IG) again.
- Codes other than present DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 may be output at this time, but they are not related to this check.

B → **REPAIR CIRCUITS INDICATED BY OUTPUT DTCS**

C → **USE SIMULATION METHOD TO CHECK (See page RS-33)**

A

2 CHECK PAST DTC

(a) Check the past DTCs (See page RS-41).
Result

Result	Proceed to
• Past DTC B1632, B1642, or 81 is output. • Past DTC B1622, B1632, B1642, or 81 is not output.	A
Past DTC B1622 is output.	B

HINT:
Codes other than past DTC B1622, B1632, B1642, or 81 may be output at this time, but they are not related to this check.

B → Go to step 20

A

3	CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and the side airbag sensor LH.
OK:
The connectors are properly connected.

NG → CONNECT CONNECTORS PROPERLY

OK

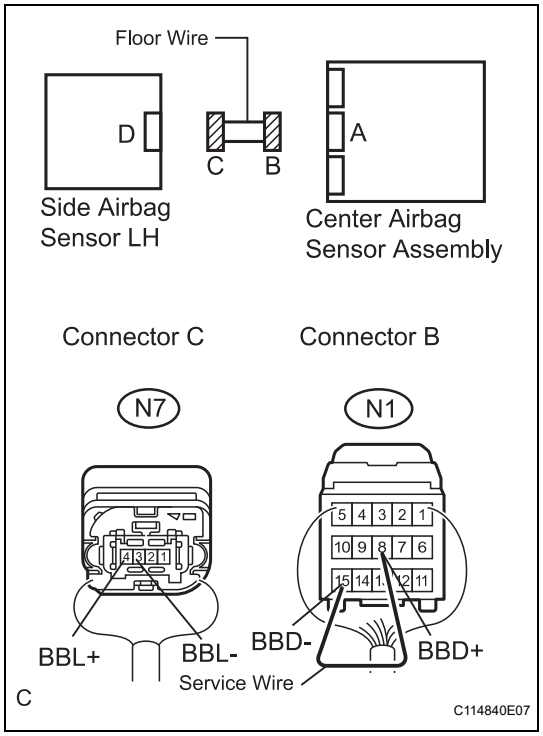
4	CHECK CONNECTORS

(a) Disconnect the connectors from the center airbag sensor assembly and side airbag sensor LH.
(b) Check that the connectors (on the center airbag sensor assembly side and side airbag sensor LH side) are not damaged.
OK:
The connectors are not deformed or damaged.

NG → REPAIR OR REPLACE FLOOR WIRE

OK

5 CHECK FLOOR WIRE (OPEN)



(a) Using a service wire, connect terminals 8 (BBD+) and 15 (BBD-) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.

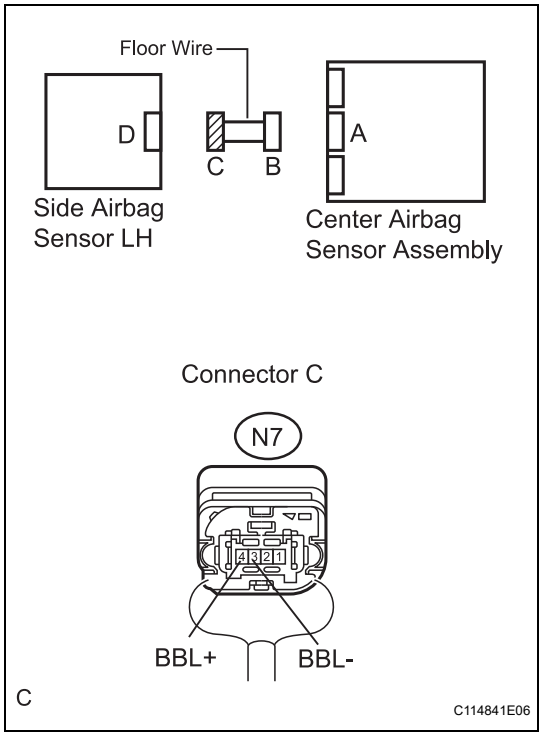
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester connection	Condition	Specified condition
N7-4 (BBL+) - N7-3 (BBL-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

6 CHECK FLOOR WIRE (SHORT)



(a) Disconnect the service wire from connector B.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

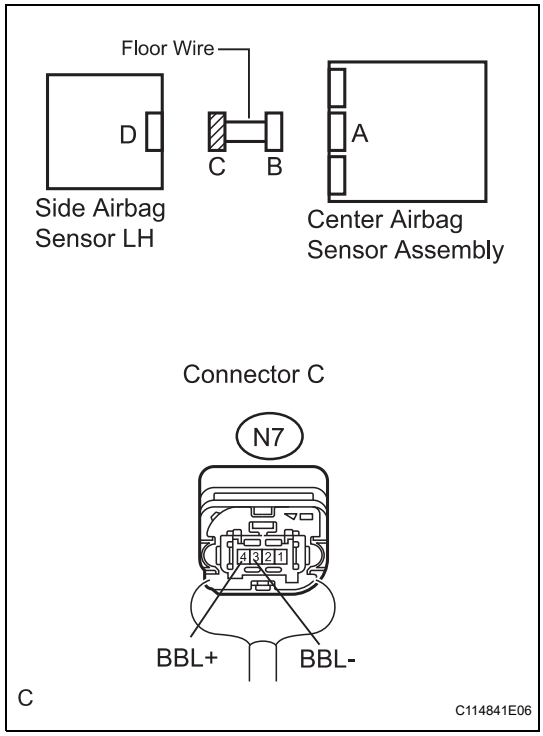
Tester connection	Condition	Specified condition
N7-4 (BBL+) - N7-3 (BBL-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

7 CHECK FLOOR WIRE (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

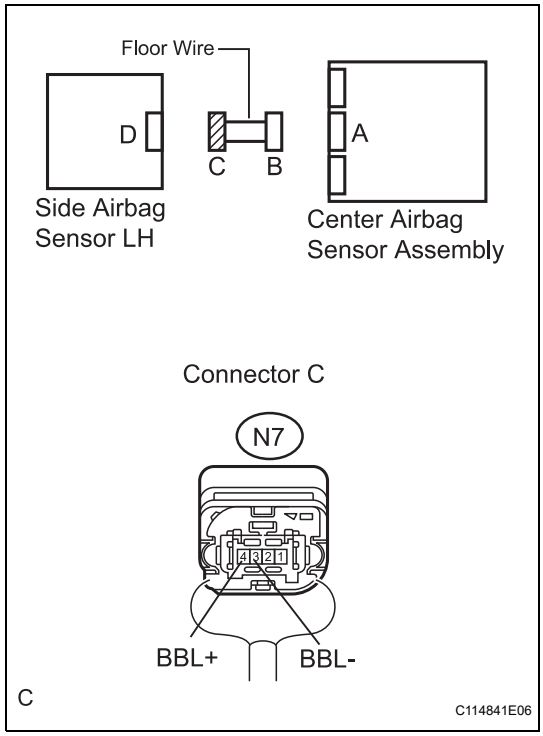
Standard voltage

Tester connection	Condition	Specified condition
N7-4 (BBL+) - Body ground	Power switch on (IG)	Below 1 V
N7-3 (BBL-) - Body ground	Power switch on (IG)	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE

OK

8 CHECK FLOOR WIRE (SHORT TO GROUND)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
N7-4 (BBL+) - Body ground	Always	1 MΩ or higher
N7-3 (BBL-) - Body ground	Always	1 MΩ or higher

NG → REPAIR OR REPLACE FLOOR WIRE

OK

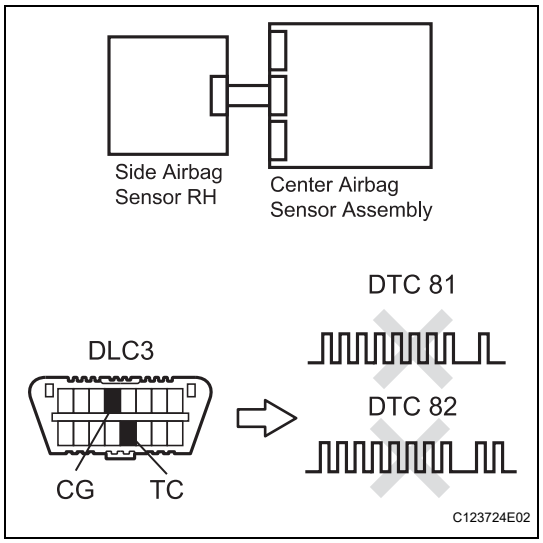
9	CONFIRM PART NUMBER OF SIDE AIRBAG SENSOR

(a) Check that the part number of the side airbag sensor LH is equal to the number of the other side.
OK:
Those numbers are the same.
(b) Connect the connectors to the center airbag sensor assembly and the side airbag sensor LH.

NG → **Go to step 11**

OK

10	CHECK SIDE AIRBAG SENSOR LH



(a) Interchange the side airbag sensor RH with LH and connect the connectors to them.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).
Result

Result	Proceed to
DTC B1623, B1633, B1643, or 81 is output.	A
DTC B1628, B1638, B1648, or 82 is output.	B
DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 are not output.	C

HINT:
Codes other than DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 may be output at this time, but they are not related to this check.
(h) Turn the power switch off.
(i) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(j) Return the side airbag sensor RH and LH to their original positions and connect the connectors to them.

B → **REPLACE SIDE AIRBAG SENSOR LH (See page RS-431)**

C → **USE SIMULATION METHOD TO CHECK (See page RS-33)**

A

11	CHECK CONNECTION OF CONNECTOR

(a) Check that the connector is properly connected to the rear airbag sensor LH.
OK:
The connector is properly connected.

NG → **CONNECT CONNECTOR PROPERLY**

OK

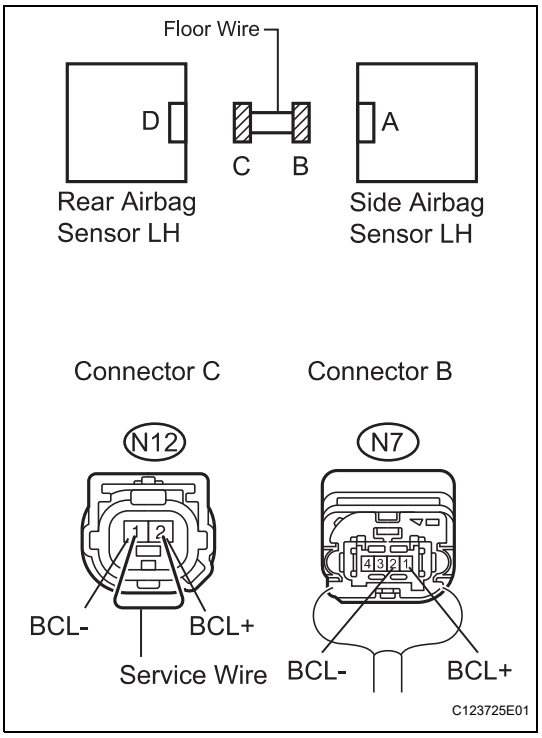
12	CHECK CONNECTOR

(a) Disconnect the connector from the rear airbag sensor LH.
(b) Check that the connector (on the rear airbag sensor LH side) is not damaged.
OK:
The connector is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

13	CHECK FLOOR WIRE (OPEN)



(a) Disconnect the connector from the side airbag sensor LH.
(b) Using a service wire, connect terminals 2 (BCL+) and 1 (BCL-) of connector C.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

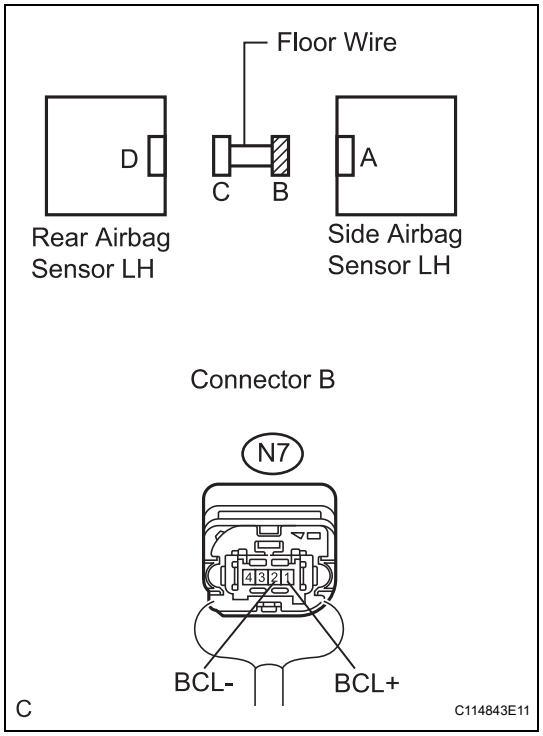
Tester connection	Condition	Specified condition
N7-1 (BCL+) - N7-2 (BCL-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

14 CHECK FLOOR WIRE (SHORT)



(a) Disconnect the service wire from connector C.
(b) Measure the resistance according to the value(s) in the table below.

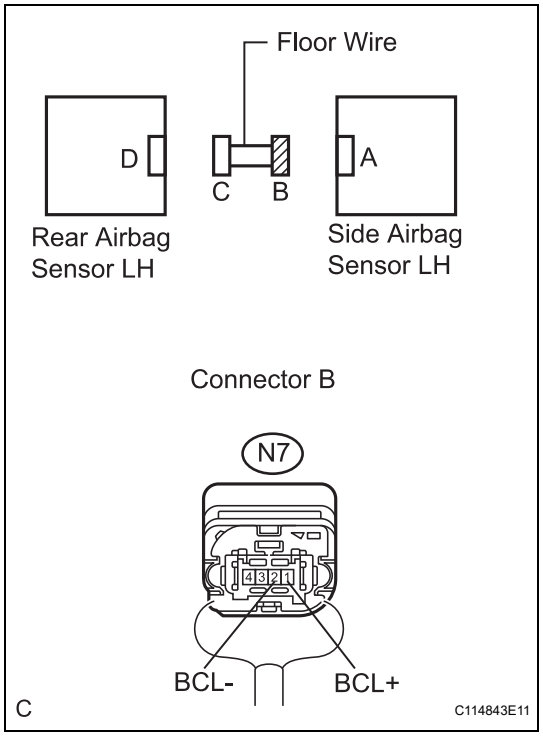
Standard resistance

Tester connection	Condition	Specified condition
N7-1 (BCL+) - N7-2 (BCL-)	Always	1 MΩ or higher

NG → REPAIR OR REPLACE FLOOR WIRE

OK

15 CHECK FLOOR WIRE (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

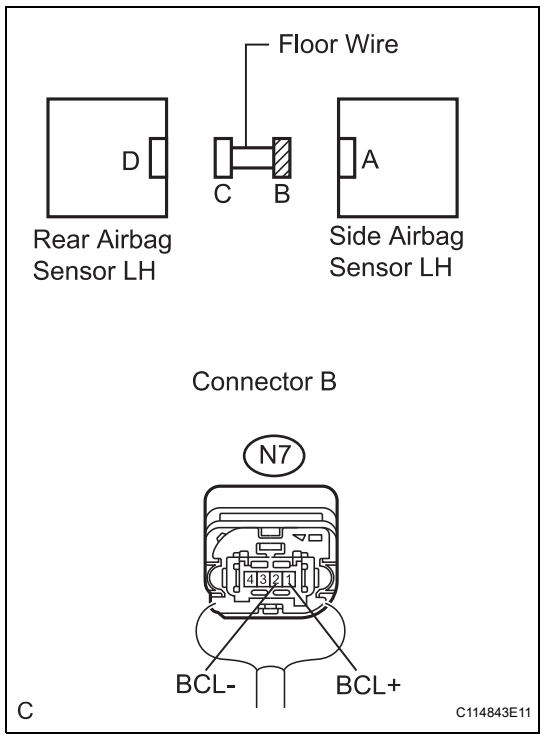
Standard voltage

Tester connection	Condition	Specified condition
N7-1 (BCL+) - Body ground	Power switch on (IG)	Below 1 V
N7-2 (BCL-) - Body ground	Power switch on (IG)	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE

OK

16	CHECK FLOOR WIRE (SHORT TO GROUND)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
N7-1 (BCL+) - Body ground	Always	1 MΩ or higher
N7-2 (BCL-) - Body ground	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

17	CONFIRM PART NUMBER OF REAR AIRBAG SENSOR

(a) Check that the part number of the rear airbag sensor LH is equal to the number of the other side.

OK:

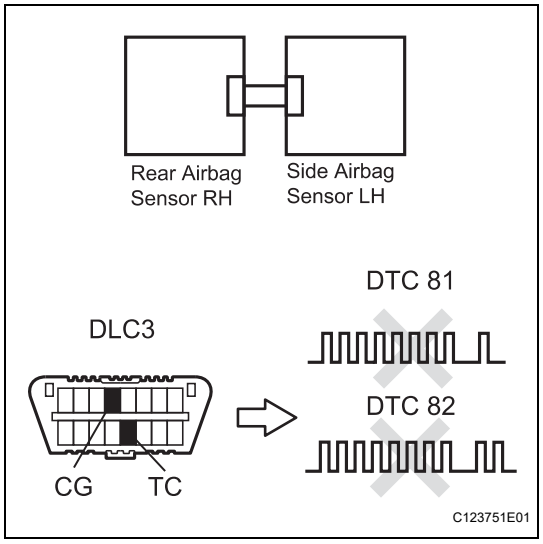
Those numbers are the same.

(b) Connect the connectors to the side airbag sensor LH and the rear airbag sensor LH.

NG → **Go to step 19**

OK

18 CHECK REAR AIRBAG SENSOR LH



(a) Interchange the rear airbag sensor RH with LH and connect the connectors to them.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

Result

Result	Proceed to
DTC B1623, B1633, B1643, or 81 is output.	A
DTC B1628, B1638, B1648, or 82 is output.	B
DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 are not output.	C

HINT:
Codes other than DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 may be output at this time, but they are not related to this check.

(h) Turn the power switch off.
(i) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(j) Return the rear airbag sensor RH and LH to their original positions and connect the connectors to them.

B → **REPLACE REAR AIRBAG SENSOR LH (See page RS-435)**

C → **USE SIMULATION METHOD TO CHECK (See page RS-33)**

A

19 CHECK CENTER AIRBAG SENSOR ASSEMBLY

(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG), and wait for at least 60 seconds.
(c) Clear the DTCs stored in the memory (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG), and wait for at least 60 seconds.
(f) Check the DTCs (See page RS-41).

OK:

DTC B1623, B1633, B1643, or 81 is not output.

HINT:
Codes other than DTC B1623, B1633, B1643, or 81 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

20	CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and the side airbag sensor LH.
OK:
The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY**

OK

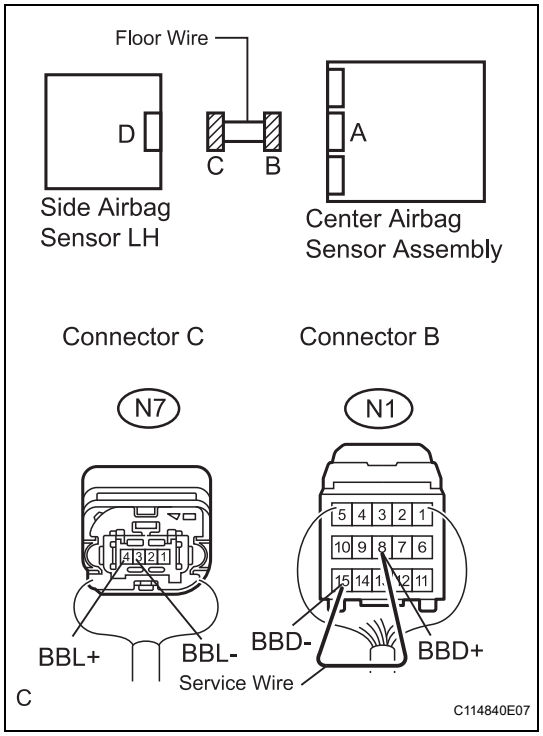
21	CHECK CONNECTORS

(a) Disconnect the connectors from the center airbag sensor assembly and side airbag sensor LH.
(b) Check that the connectors (on the center airbag sensor assembly side and side airbag sensor LH side) are not damaged.
OK:
The connectors are not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

22 CHECK FLOOR WIRE (OPEN)



(a) Using a service wire, connect terminals 8 (BBD+) and 15 (BBD-) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.

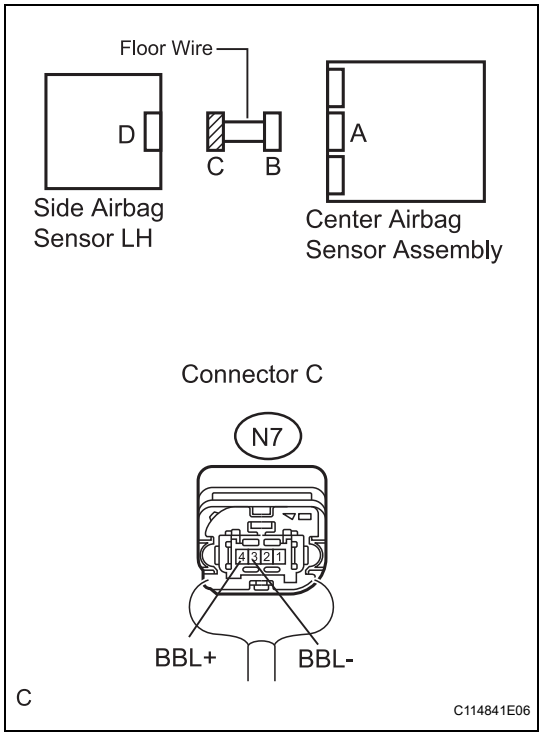
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester connection	Condition	Specified condition
N7-4 (BBL+) - N7-3 (BBL-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

23 CHECK FLOOR WIRE (SHORT)



(a) Disconnect the service wire from connector B.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

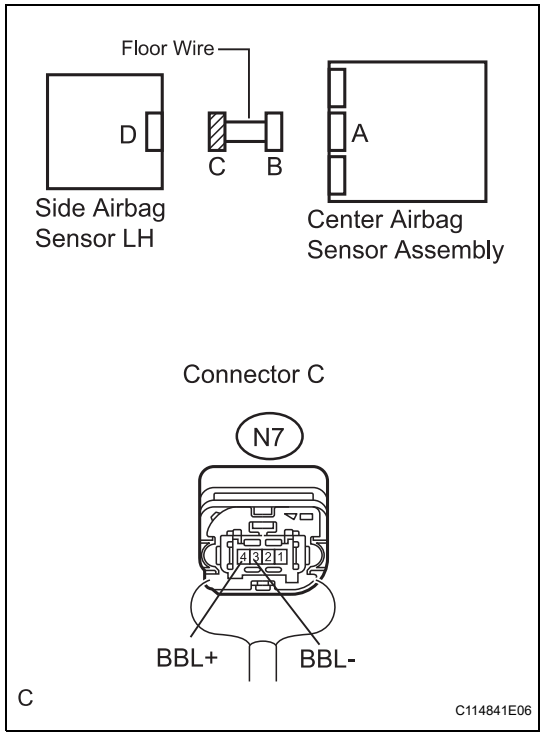
Tester connection	Condition	Specified condition
N7-4 (BBL+) - N7-3 (BBL-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

24 CHECK FLOOR WIRE (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

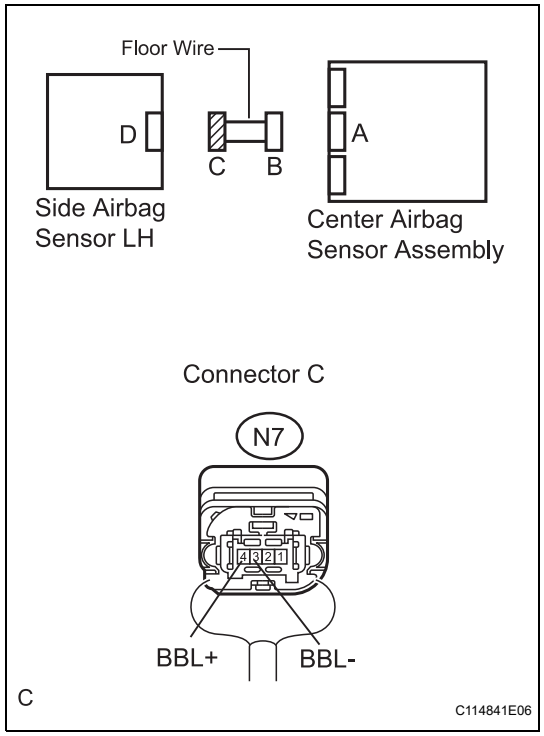
Standard voltage

Tester connection	Condition	Specified condition
N7-4 (BBL+) - Body ground	Power switch on (IG)	Below 1 V
N7-3 (BBL-) - Body ground	Power switch on (IG)	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE

OK

25 CHECK FLOOR WIRE (SHORT TO GROUND)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
N7-4 (BBL+) - Body ground	Always	1 MΩ or higher
N7-3 (BBL-) - Body ground	Always	1 MΩ or higher

NG → REPAIR OR REPLACE FLOOR WIRE

OK

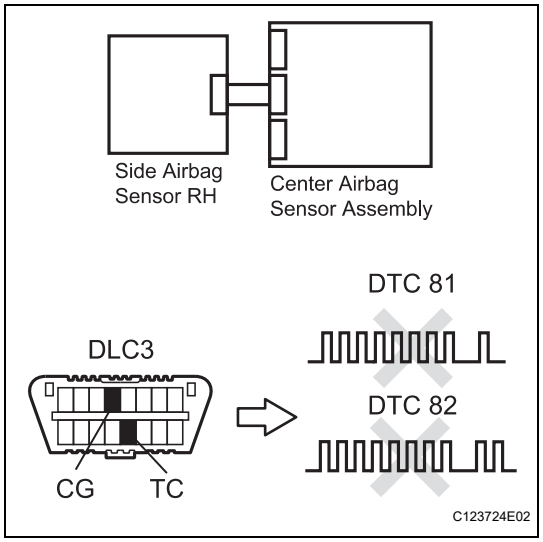
26	CONFIRM PART NUMBER OF SIDE AIRBAG SENSOR

(a) Check that the part number of the side airbag sensor LH is equal to the number of the other side.
OK:
Those numbers are the same.
(b) Connect the connectors to the center airbag sensor assembly and the side airbag sensor LH.

NG → **Go to step 28**

OK

27	CHECK SIDE AIRBAG SENSOR LH



(a) Interchange the side airbag sensor RH with LH and connect the connectors to them.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).
Result

Result	Proceed to
DTC B1623, B1633, B1643, or 81 is output.	A
DTC B1628, B1638, B1648, or 82 is output.	B
DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 are not output.	C

HINT:
Codes other than DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 may be output at this time, but they are not related to this check.
(h) Turn the power switch off.
(i) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(j) Return the side airbag sensor RH and LH to their original positions and connect the connectors to them.

B → **REPLACE SIDE AIRBAG SENSOR LH (See page RS-431)**

C → **USE SIMULATION METHOD TO CHECK (See page RS-33)**

A

28	CHECK CENTER AIRBAG SENSOR ASSEMBLY

(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG), and wait for at least 60 seconds.
(c) Clear the DTCs stored in the memory (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG), and wait for at least 60 seconds.
(f) Check the DTCs (See page RS-41).
OK:
DTC B1623, B1633, B1643, or 81 is not output.
HINT:
Codes other than DTC B1623, B1633, B1643, or 81 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

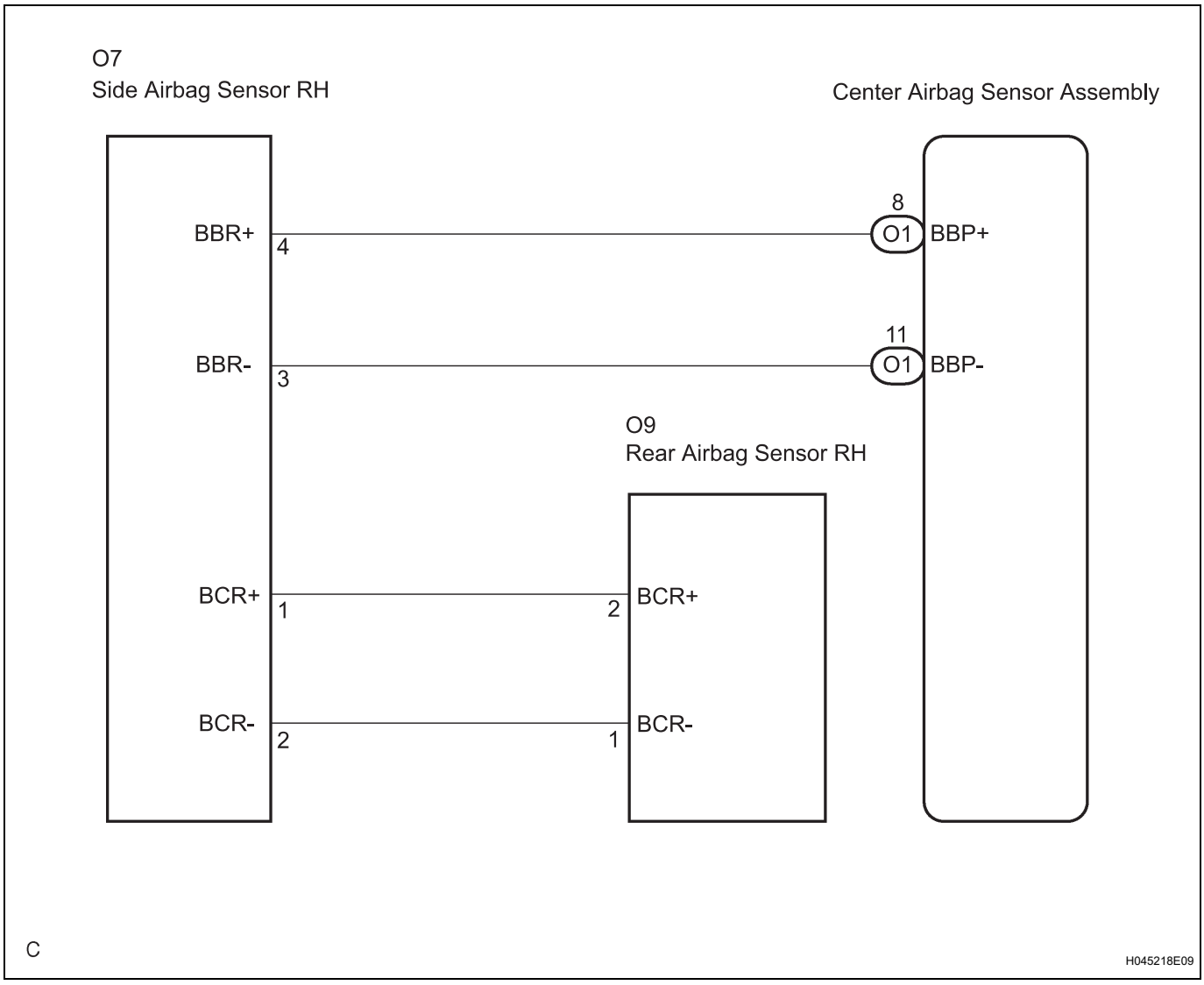
DTC	B1625/22	Front Passenger Side - Side Airbag Sensor Malfunction

DESCRIPTION

The side airbag sensor RH consists of the safing sensor, the diagnostic circuit, the lateral deceleration sensor, etc.
If the center airbag sensor assembly receives signals from the lateral deceleration sensor, it determines whether the SRS should be activated.
DTC B1625/22 is recorded when a malfunction is detected in the side airbag sensor RH.

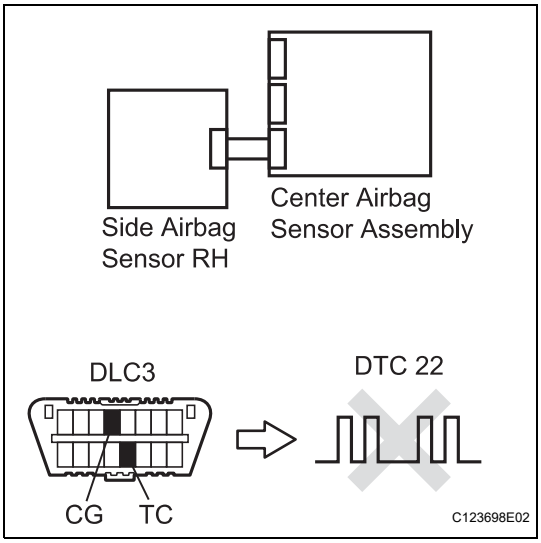
DTC No.	DTC Detection Condition	Trouble Area
B1625/22	• Side airbag sensor RH malfunction • Center airbag sensor assembly malfunction	• Side airbag sensor RH • Center airbag sensor assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the power switch on (IG), and wait for at least 60 seconds.
(b) Clear the DTCs stored in the memory (See page RS-41).
(c) Turn the power switch off.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Check the DTCs (See page RS-41).

OK:

DTC B1625/22 is not output.

HINT:

Codes other than DTC B1625/22 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-33)**

NG

2	CONFIRM PART NUMBER OF SIDE AIRBAG SENSOR

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the part number of the side airbag sensor RH is equal to the number of the other side.

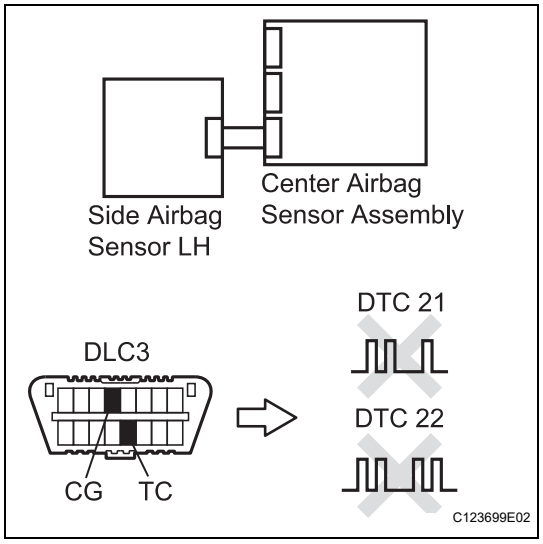
OK:

Those numbers are the same.

NG → **Go to step 4**

OK

3 CHECK SIDE AIRBAG SENSOR RH



(a) Connect the connectors to the center airbag sensor assembly.
(b) Interchange the side airbag sensor LH with RH and connect the connectors to them.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in the memory (See page RS-41).
(f) Turn the power switch off.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (See page RS-41).

Result

Result	Proceed to
DTC B1625/22 is output.	A
DTC B1620/21 is output.	B
DTC B1620/21 and B1625/22 are not output.	C

HINT:
Codes other than DTC B1620/21 and B1625/22 may be output at this time, but they are not related to this check.

(i) Turn the power switch off.
(j) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(k) Return the side airbag sensor LH and RH to their original positions and connect the connectors to them.

A	Go to step 5
B	REPLACE SIDE AIRBAG SENSOR RH (See page RS-431)

C

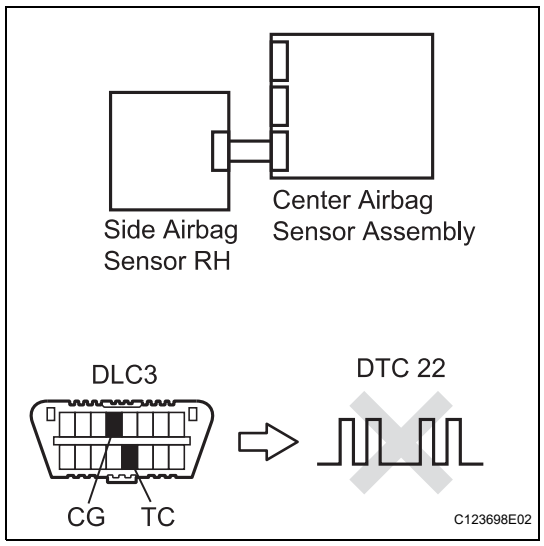
USE SIMULATION METHOD TO CHECK (See page RS-33)

4 REPLACE SIDE AIRBAG SENSOR RH

(a) Replace the side airbag sensor RH (See page RS-431).
HINT:
Perform inspection using parts from a normal vehicle if possible.

NEXT

5	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG), and wait for at least 60 seconds.
(c) Clear the DTCs stored in the memory (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG), and wait for at least 60 seconds.
(f) Check the DTCs (See page RS-41).

OK:

DTC B1625/22 is not output.

HINT:

Codes other than DTC B1625/22 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

DTC	B1627/82	Lost Communication with Front Passenger Side - Side Airbag Sensor Assembly

DTC	B1628/82	Front Passenger Side - Side Airbag Sensor Assembly Initialization Incomplete

DTC	B1637/82	Lost Communication with Passenger Side Rear Airbag Sensor

DTC	B1638/82	Passenger Side Rear Airbag Sensor Initialization Incomplete

DTC	B1647/82	Lost Communication with Front Passenger Side Satellite Sensor Bus

DTC	B1648/82	Front Passenger Side Satellite Sensor Bus Initialization Incomplete

DESCRIPTION

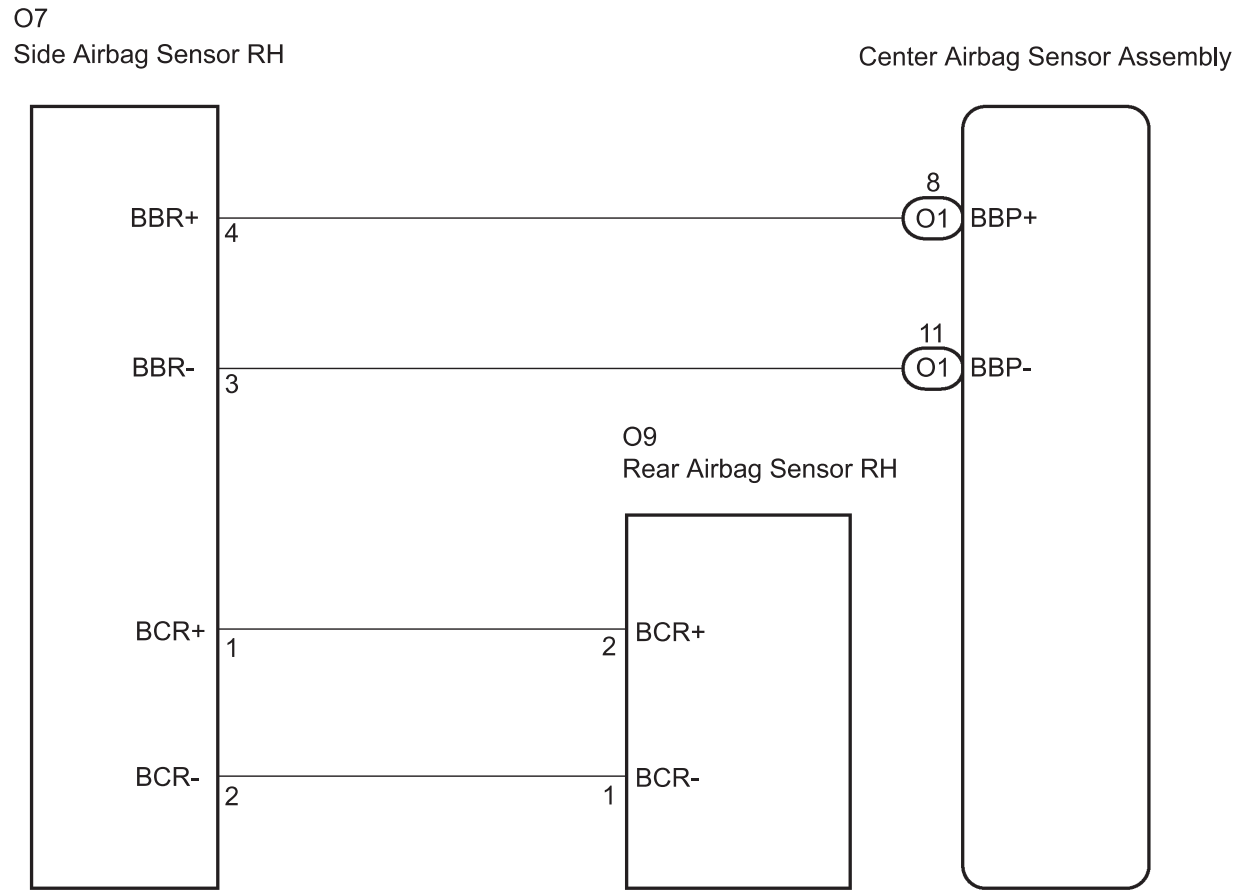
The circuit for the side collision sensor RH (to determine deployment of the front seat side airbag assembly RH and curtain shield airbag assembly RH) is composed of the center airbag sensor assembly, side airbag sensor RH, and rear airbag sensor RH.

The side airbag sensor RH and rear airbag sensor RH detect impacts to the vehicle and send signals to the center airbag sensor assembly to determine if the airbag should be deployed.

DTC B1627/82, B1628/82, B1637/82, B1638/82, B1647/82, or B1648/82 is recorded when a malfunction is detected in the circuit for the side collision sensor RH (to determine deployment of the front seat side airbag assembly RH and curtain shield airbag assembly RH).

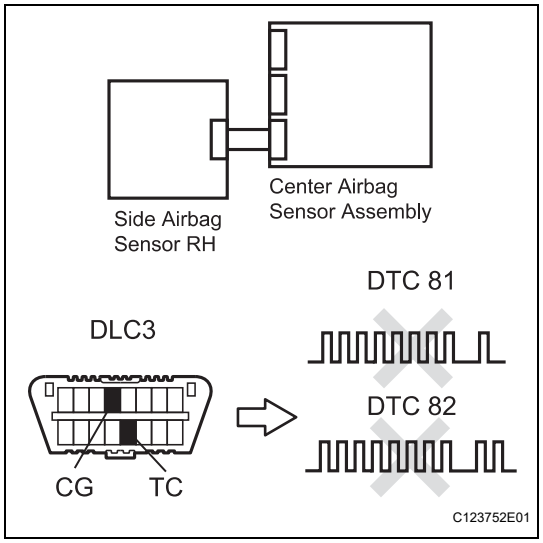
DTC No.	DTC Detecting Condition	Trouble Area
B1627/82 B1628/82 B1637/82 B1638/82 B1647/82 B1648/82	• The center airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the circuit for the side collision sensor RH (to determine deployment of the front seat side airbag assembly RH and curtain shield airbag assembly RH) for 2 seconds. • Side airbag sensor RH malfunction • Rear airbag sensor RH malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Side airbag sensor RH • Rear airbag sensor RH • Center airbag sensor assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the power switch on (IG), and wait for at least 60 seconds.
(b) Turn the power switch off.
HINT:
If a communication error occurs, DTCs for both the LH and RH sides will be stored simultaneously. To identify the malfunctioning area, turn the power switch off and then on (IG) again.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Check the present DTCs (See page RS-41).
Result

Result	Proceed to
Present DTC B1628, B1638, B1648, or 82 is output.	A
Present DTC B1623, B1633 B1643, or 81 is output.	B
Present DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 are not output.	C

HINT:
- DTCs indicating communication errors will be changed to DTCs indicating errors in initialization by turning the power switch off and then on (IG) again.
- Codes other than present DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 may be output at this time, but they are not related to this check.

B → **REPAIR CIRCUITS INDICATED BY OUTPUT DTCS**

C → **USE SIMULATION METHOD TO CHECK (See page RS-33)**

A

2	CHECK PAST DTC

(a) Check the past DTCs (See page RS-41).
Result

Result	Proceed to
• Past DTC B1637, B1647, or 82 is output. • Past DTC B1627, B1637, B1647, or 82 is not output.	A
Past DTC B1627 is output.	B

HINT:
Codes other than past DTC B1627, B1637, B1647, or 82 may be output at this time, but they are not related to this check.

B → Go to step 20

A

3	CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and the side airbag sensor RH.
OK:
The connectors are properly connected.

NG → CONNECT CONNECTORS PROPERLY

OK

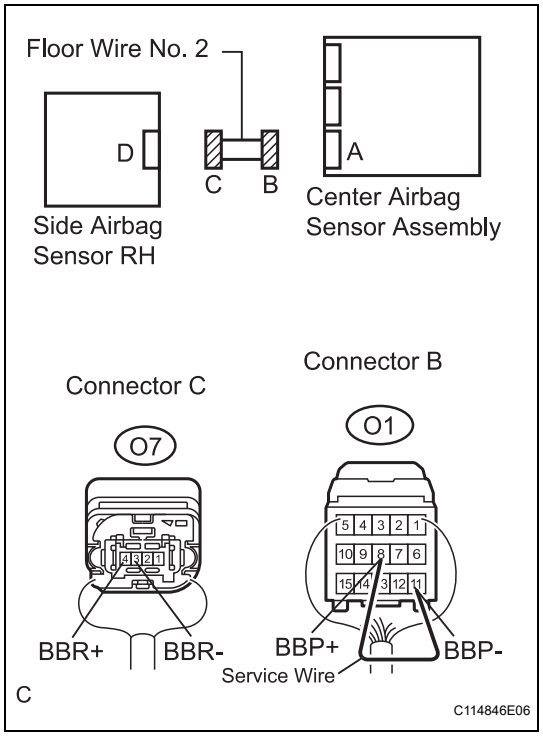
4	CHECK CONNECTORS

(a) Disconnect the connectors from the center airbag sensor assembly and side airbag sensor RH.
(b) Check that the connectors (on the center airbag sensor assembly side and side airbag sensor RH side) are not damaged.
OK:
The connectors are not deformed or damaged.

NG → REPAIR OR REPLACE FLOOR WIRE NO. 2

OK

5 CHECK FLOOR WIRE NO. 2 (OPEN)



(a) Using a service wire, connect terminals 8 (BBP+) and 11 (BBP-) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.

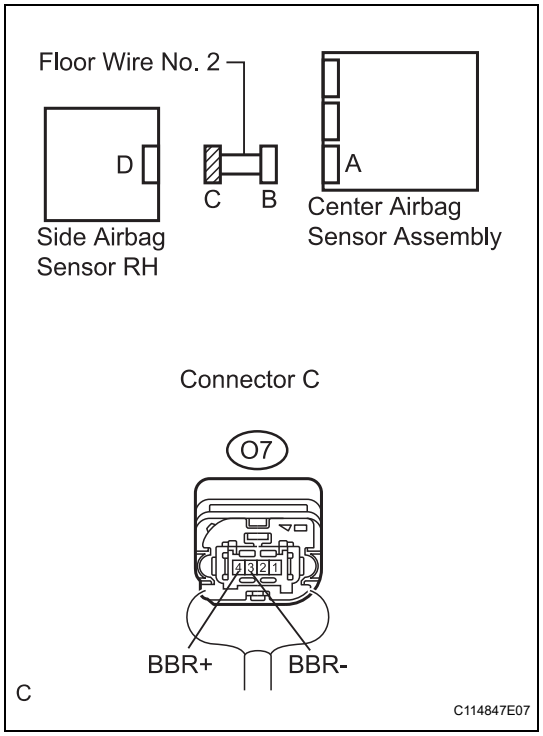
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester connection	Condition	Specified condition
O7-4 (BBR+) - O7-3 (BBR-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

6 CHECK FLOOR WIRE NO. 2 (SHORT)



(a) Disconnect the service wire from connector B.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

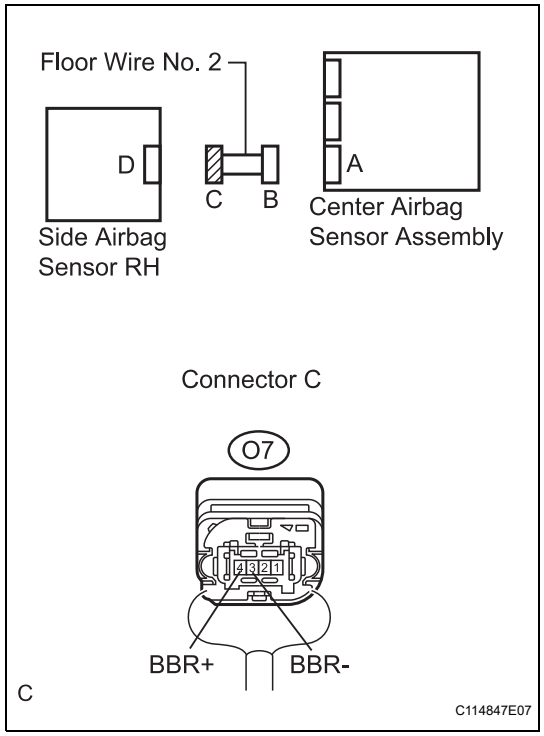
Tester connection	Condition	Specified condition
O7-4 (BBR+) - O7-3 (BBR-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

RS

7 CHECK FLOOR WIRE NO. 2 (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

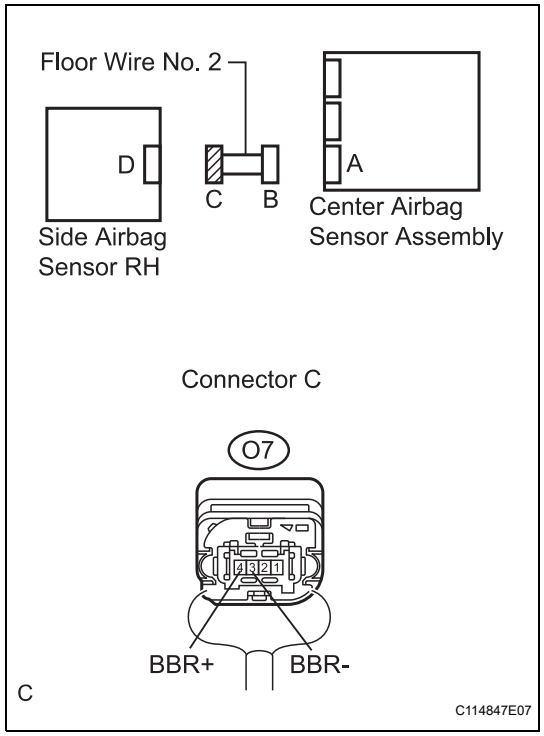
Standard voltage

Tester connection	Condition	Specified condition
O7-4 (BBR+) - Body ground	Power switch on (IG)	Below 1 V
O7-3 (BBR-) - Body ground	Power switch on (IG)	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE NO. 2

OK

8 CHECK FLOOR WIRE NO. 2 (SHORT TO GROUND)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
O7-4 (BBR+) - Body ground	Always	1 MΩ or higher
O7-3 (BBR-) - Body ground	Always	1 MΩ or higher

NG → REPAIR OR REPLACE FLOOR WIRE NO. 2

OK

RS

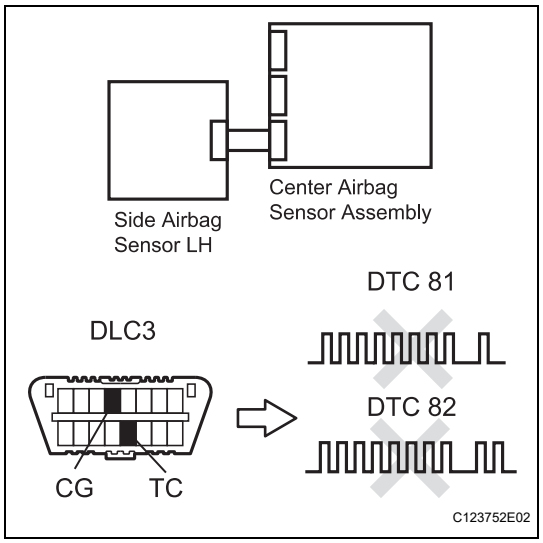
9	CONFIRM PART NUMBER OF SIDE AIRBAG SENSOR

(a) Check that the part number of the side airbag sensor RH is equal to the number of the other side.
OK:
Those numbers are the same.
(b) Connect the connectors to the center airbag sensor assembly and the side airbag sensor RH.

NG → **Go to step 11**

OK

10	CHECK SIDE AIRBAG SENSOR RH



(a) Interchange the side airbag sensor LH with RH and connect the connectors to them.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).
Result

Result	Proceed to
DTC B1628, B1638, B1648, or 82 is output.	A
DTC B1623, B1633, B1643, or 81 is output.	B
DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 are not output.	C

HINT:
Codes other than DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 may be output at this time, but they are not related to this check.
(h) Turn the power switch off.
(i) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(j) Return the side airbag sensor LH and RH to their original positions and connect the connectors to them.

B → **REPLACE SIDE AIRBAG SENSOR RH (See page RS-431)**

C → **USE SIMULATION METHOD TO CHECK (See page RS-33)**

A

11	CHECK CONNECTION OF CONNECTOR

(a) Check that the connector is properly connected to the rear airbag sensor RH.
OK:
The connector is properly connected.

NG → **CONNECT CONNECTOR PROPERLY**

OK

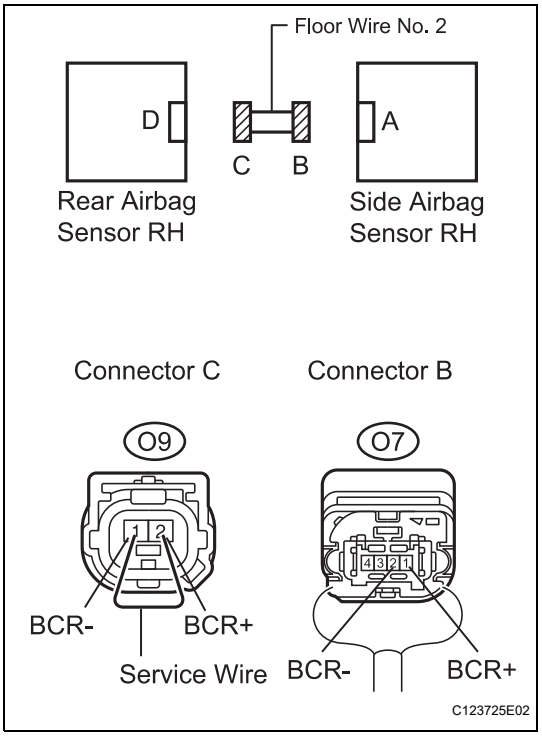
12	CHECK CONNECTOR

(a) Disconnect the connectors from the rear airbag sensor RH.
(b) Check that the connector (on the rear airbag sensor RH side) is not damaged.
OK:
The connector is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

13	CHECK FLOOR WIRE NO. 2 (OPEN)



(a) Disconnect the connectors from the side airbag sensor RH.
(b) Using a service wire, connect terminals 2 (BCR+) and 1 (BCR-) of connector C.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

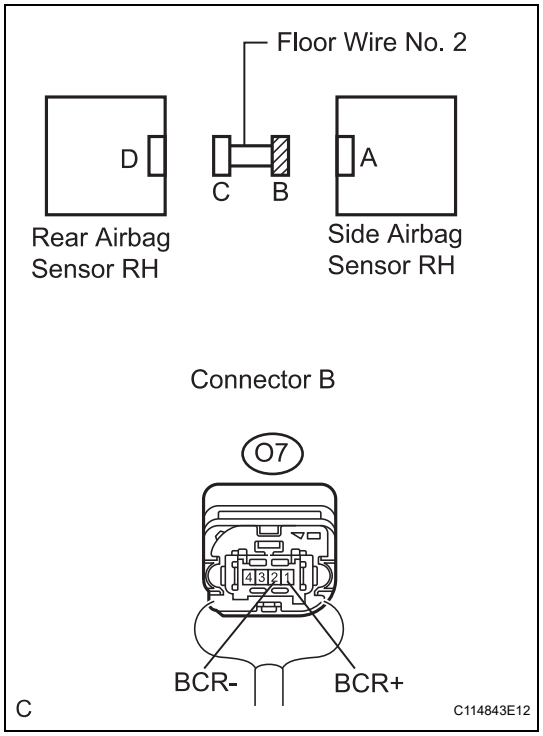
Tester connection	Condition	Specified condition
O7-2 (BCR-) - O7-1 (BCR+)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

RS

14 CHECK FLOOR WIRE NO. 2 (SHORT)



(a) Disconnect the service wire from connector C.
(b) Measure the resistance according to the value(s) in the table below.

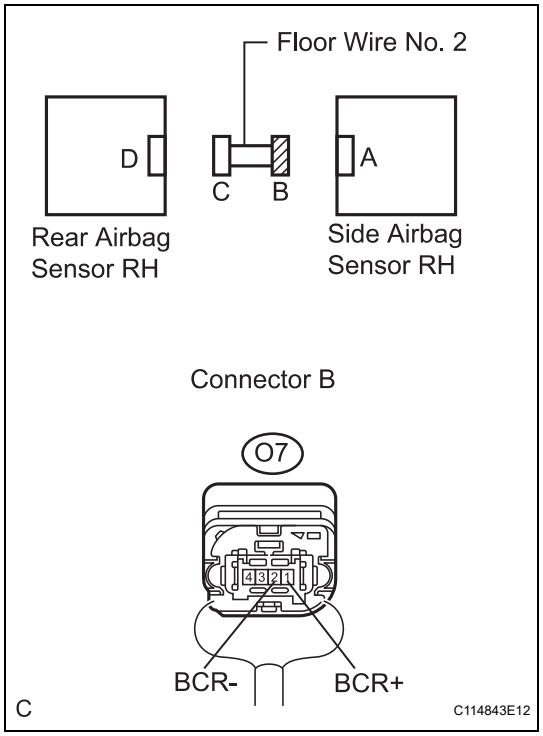
Standard resistance

Tester connection	Condition	Specified condition
O7-1 (BCR+) - O7-2 (BCR-)	Always	1 MΩ or higher

NG → REPAIR OR REPLACE FLOOR WIRE NO. 2

OK

15 CHECK FLOOR WIRE NO. 2 (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

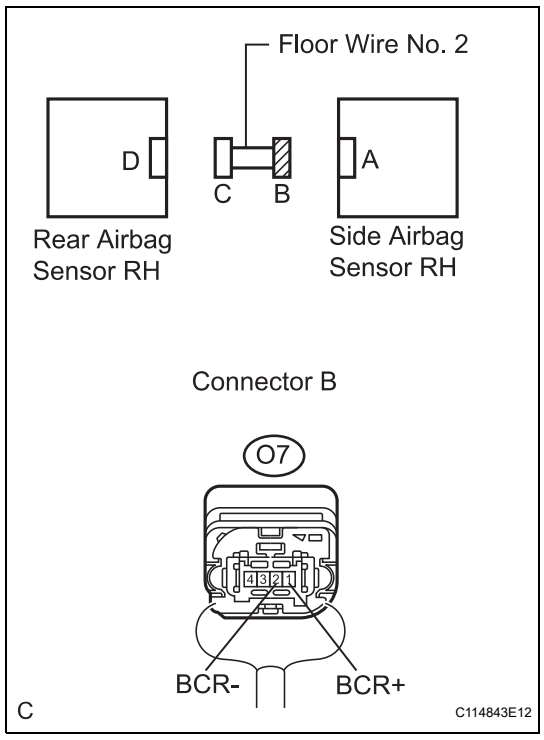
Standard voltage

Tester connection	Condition	Specified condition
O7-1 (BCR+) - Body ground	Power switch on (IG)	Below 1 V
O7-2 (BCR-) - Body ground	Power switch on (IG)	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE NO. 2

OK

16	CHECK FLOOR WIRE NO. 2 (SHORT TO GROUND)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
O7-1 (BCR+) - Body ground	Always	1 MΩ or higher
O7-2 (BCR-) - Body ground	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

17	CONFIRM PART NUMBER OF REAR AIRBAG SENSOR

(a) Check that the part number of the rear airbag sensor RH is equal to the number of the other side.

OK:

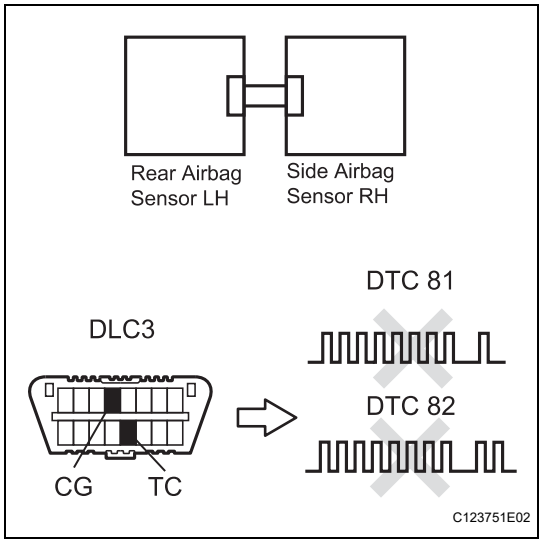
Those numbers are the same.

(b) Connect the connectors to the side airbag sensor RH and the rear airbag sensor RH.

NG → **Go to step 19**

OK

18 CHECK REAR AIRBAG SENSOR RH



(a) Interchange the rear airbag sensor LH with RH and connect the connectors to them.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

Result

Result	Proceed to
DTC B1628, B1638, B1648, or 82 is output.	A
DTC B1623, B1633, B1643, or 81 is output.	B
DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 are not output.	C

HINT:
Codes other than DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 may be output at this time, but they are not related to this check.

(h) Turn the power switch off.
(i) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(j) Return the rear airbag sensor LH and RH to their original positions and connect the connectors to them.

B → **REPLACE REAR AIRBAG SENSOR RH (See page RS-435)**

C → **USE SIMULATION METHOD TO CHECK (See page RS-33)**

A

19 CHECK CENTER AIRBAG SENSOR ASSEMBLY

(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG), and wait for at least 60 seconds.
(c) Clear the DTCs stored in the memory (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG), and wait for at least 60 seconds.
(f) Check the DTCs (See page RS-41).

OK:

DTC B1628, B1638, B1648, or 82 is not output.

HINT:
Codes other than DTC B1628, B1638, B1648, or 82 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

20	CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and the side airbag sensor RH.
OK:
The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY**

OK

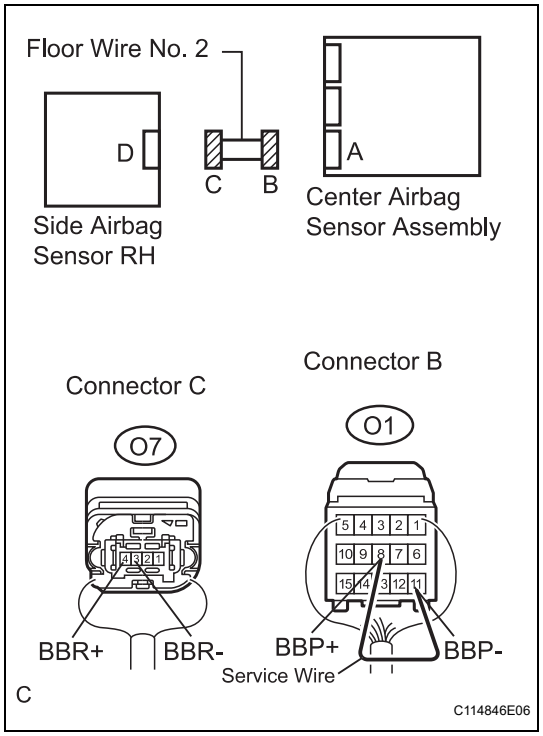
21	CHECK CONNECTORS

(a) Disconnect the connectors from the center airbag sensor assembly and side airbag sensor RH.
(b) Check that the connectors (on the center airbag sensor assembly side and side airbag sensor RH side) are not damaged.
OK:
The connectors are not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

22 CHECK FLOOR WIRE NO. 2 (OPEN)



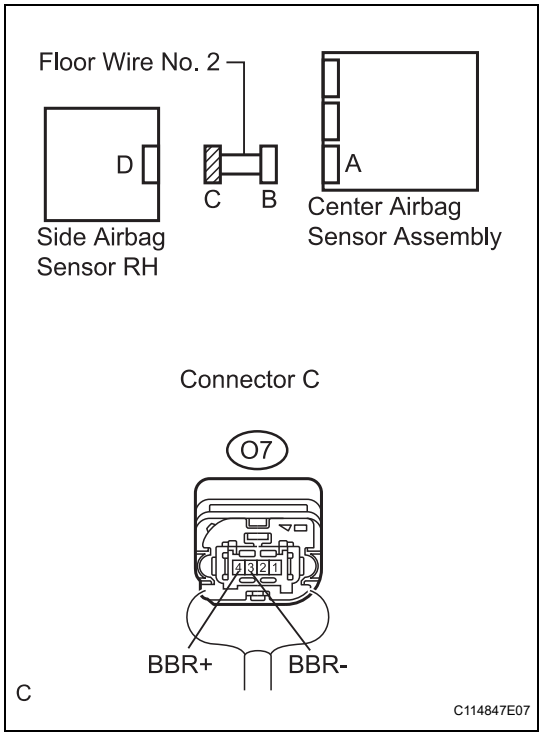
(a) Using a service wire, connect terminals 8 (BBP+) and 11 (BBP-) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester connection	Condition	Specified condition
O7-4 (BBR+) - O7-3 (BBR-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

23 CHECK FLOOR WIRE NO. 2 (SHORT)



(a) Disconnect the service wire from connector B.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

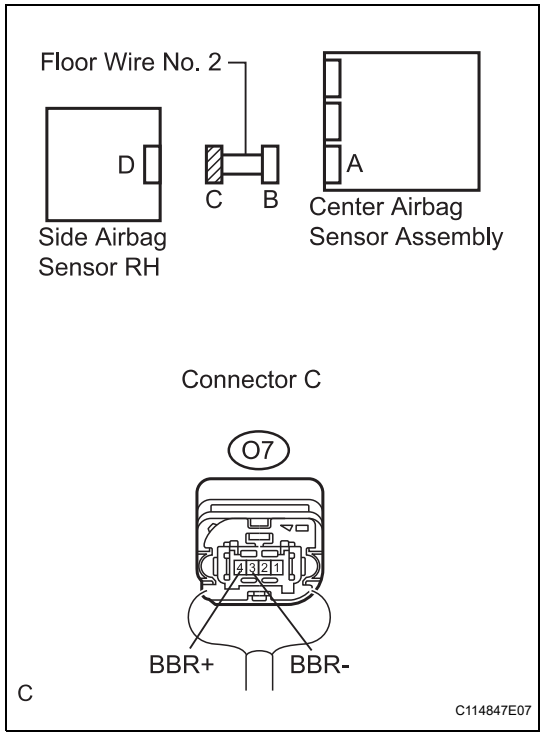
Tester connection	Condition	Specified condition
O7-4 (BBR+) - O7-3 (BBR-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

RS

24 CHECK FLOOR WIRE NO. 2 (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

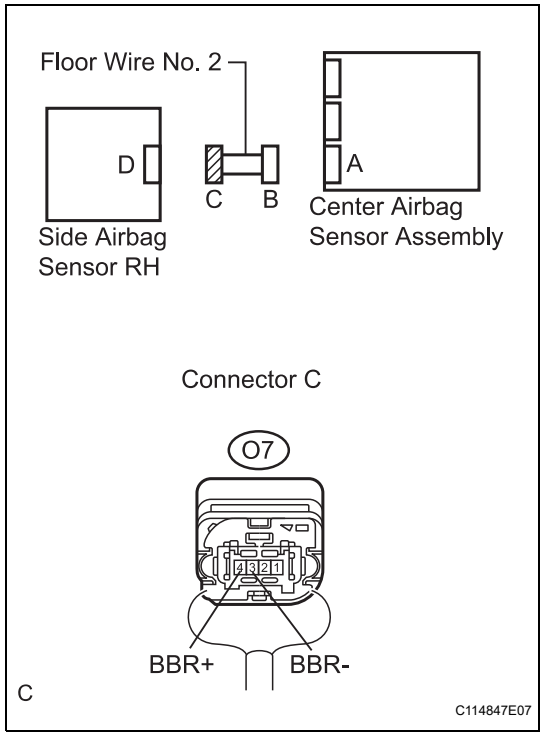
Standard voltage

Tester connection	Condition	Specified condition
O7-4 (BBR+) - Body ground	Power switch on (IG)	Below 1 V
O7-3 (BBR-) - Body ground	Power switch on (IG)	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE NO. 2

OK

25 CHECK FLOOR WIRE NO. 2 (SHORT TO GROUND)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
O7-4 (BBR+) - Body ground	Always	1 MΩ or higher
O7-3 (BBR-) - Body ground	Always	1 MΩ or higher

NG → REPAIR OR REPLACE FLOOR WIRE NO. 2

OK

RS

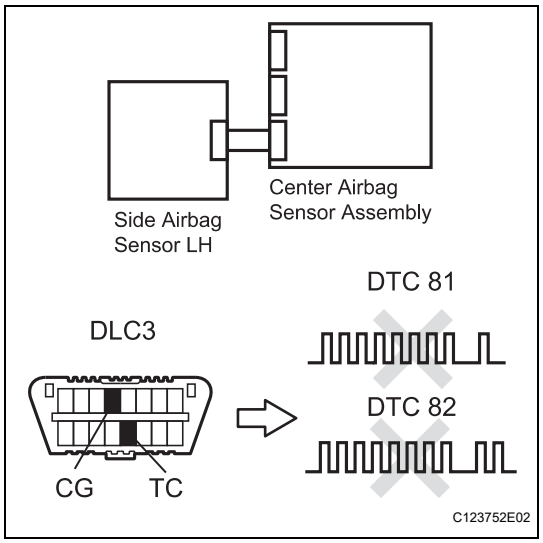
26	CONFIRM PART NUMBER OF SIDE AIRBAG SENSOR

(a) Check that the part number of the side airbag sensor RH is equal to the number of the other side.
OK:
Those numbers are the same.
(b) Connect the connectors to the center airbag sensor assembly and the side airbag sensor RH.

NG → **Go to step 28**

OK

27	CHECK SIDE AIRBAG SENSOR RH



(a) Interchange the side airbag sensor LH with RH and connect the connectors to them.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).
Result

Result	Proceed to
DTC B1628, B1638, B1648, or 82 is output.	A
DTC B1623, B1633, B1643, or 81 is output.	B
DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 are not output.	C

HINT:
Codes other than DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 may be output at this time, but they are not related to this check.
(h) Turn the power switch off.
(i) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(j) Return the side airbag sensor LH and RH to their original positions and connect the connectors to them.

B → **REPLACE SIDE AIRBAG SENSOR RH (See page RS-431)**

C → **USE SIMULATION METHOD TO CHECK (See page RS-33)**

A

28	CHECK CENTER AIRBAG SENSOR ASSEMBLY

(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG), and wait for at least 60 seconds.
(c) Clear the DTCs stored in the memory (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG), and wait for at least 60 seconds.
(f) Check the DTCs (See page RS-41).
OK:
DTC B1628, B1638, B1648, or 82 is not output.
HINT:
Codes other than DTC B1628, B1638, B1648, or 82 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

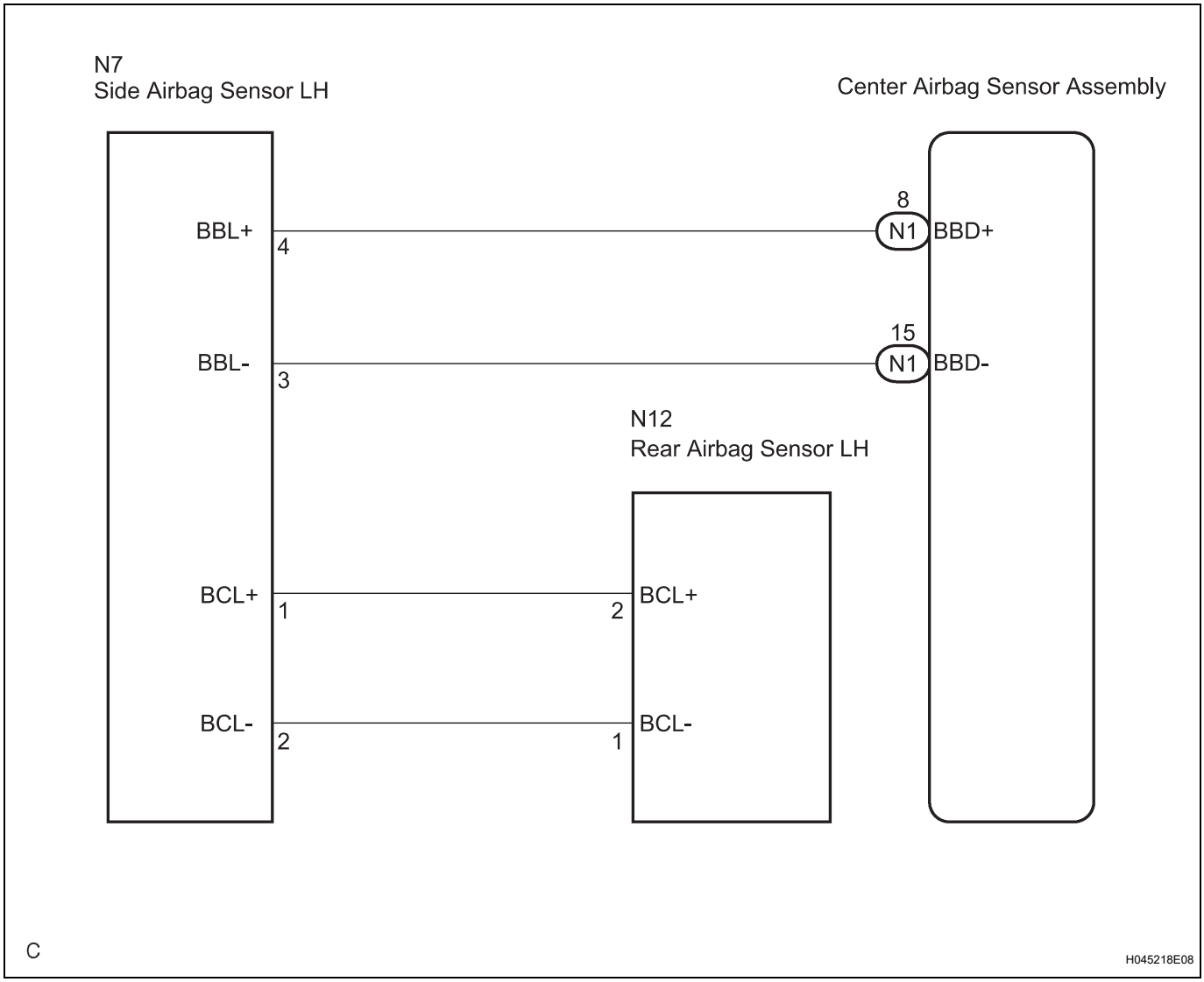
DTC	B1630/23	Driver Side Rear Airbag Sensor Malfunction

DESCRIPTION

The rear airbag sensor LH consists of the safing sensor, the diagnostic circuit, the lateral deceleration sensor, etc.
If the center airbag sensor assembly receives signals from the lateral deceleration sensor, it determines whether the SRS should be activated.
DTC B1630/23 is recorded when a malfunction is detected in the rear airbag sensor LH.

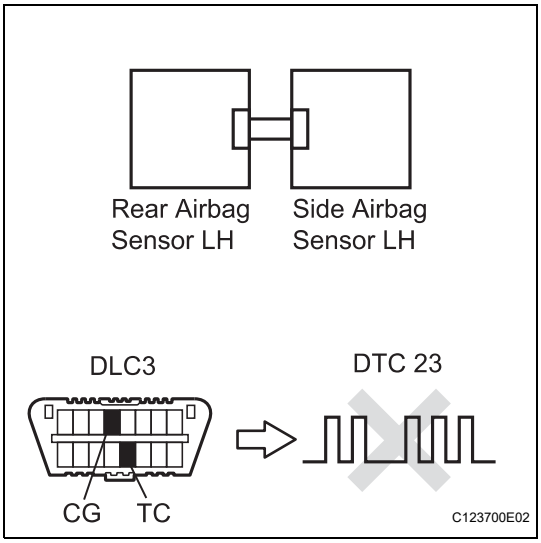
DTC No.	DTC Detection Condition	Trouble Area
B1630/23	• Rear airbag sensor LH malfunction • Center airbag sensor assembly malfunction	• Rear airbag sensor LH • Center airbag sensor assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the power switch on (IG), and wait for at least 60 seconds.
(b) Clear the DTCs stored in the memory (See page RS-41).
(c) Turn the power switch off.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Check the DTCs (See page RS-41).

OK:

DTC B1630/23 is not output.

HINT:

Codes other than DTC B1630/23 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-33)**

NG

2	CONFIRM PART NUMBER OF REAR AIRBAG SENSOR

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the part number of the rear airbag sensor LH is equal to the number of the other side.

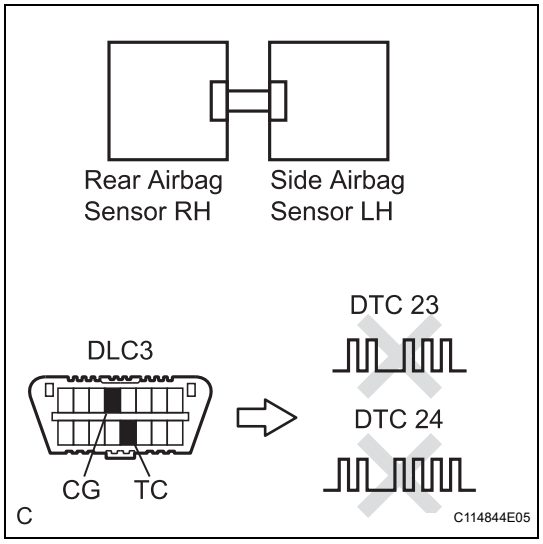
OK:

Those numbers are the same.

NG → **Go to step 4**

OK

3 CHECK REAR AIRBAG SENSOR LH



(a) Interchange the rear airbag sensor RH with LH and connect the connectors to them.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

Result

Result	Proceed to
DTC B1630/23 is output.	A
DTC B1635/24 is output.	B
DTC B1630/23 and B1635/24 are not output.	C

HINT:
Codes other than DTC B1630/23 and B1635/24 may be output at this time, but they are not related to this check.

(h) Turn the power switch off.
(i) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(j) Return the rear airbag sensor RH and LH to their original positions and connect the connectors to them.

A	**Go to step 5**
B	**REPLACE REAR AIRBAG SENSOR LH (See page RS-435)**

C

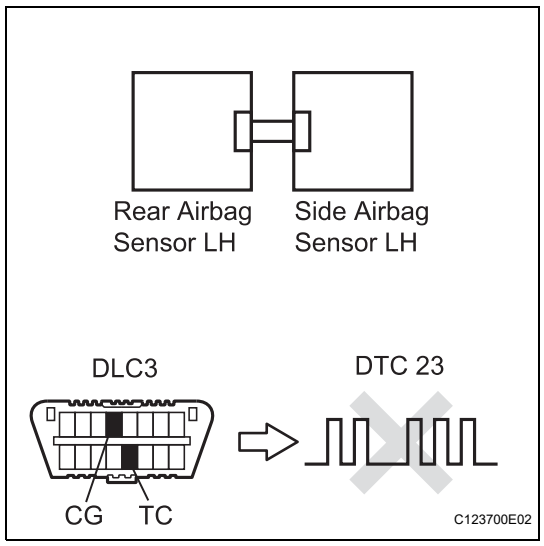
USE SIMULATION METHOD TO CHECK (See page RS-33)

4 REPLACE REAR AIRBAG SENSOR LH

(a) Replace the rear airbag sensor LH (See page RS-435).
HINT:
Perform inspection using parts from a normal vehicle if possible.

NEXT

5	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG), and wait for at least 60 seconds.
(c) Clear the DTCs stored in the memory (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG), and wait for at least 60 seconds.
(f) Check the DTCs (See page RS-41).

OK:

DTC B1630/23 is not output.

HINT:

Codes other than DTC B1630/23 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

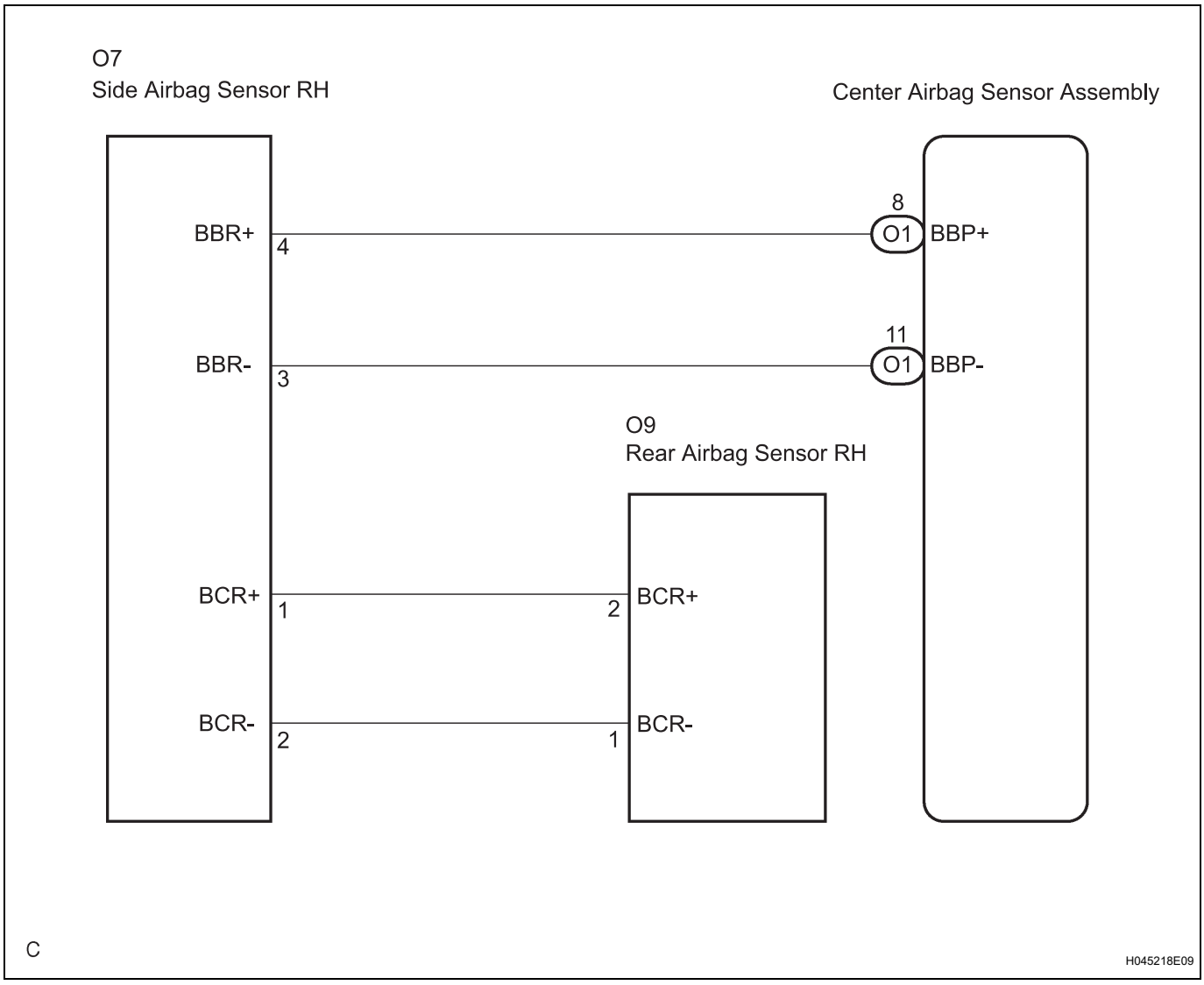
DTC	B1635/24	Front Passenger Side Rear Airbag Sensor Malfunction

DESCRIPTION

The rear airbag sensor RH consists of the safing sensor, the diagnostic circuit, the lateral deceleration sensor, etc.
If the center airbag sensor assembly receives signals from the lateral deceleration sensor, it determines whether the SRS should be activated.
DTC B1635/24 is recorded when a malfunction is detected in the rear airbag sensor RH.

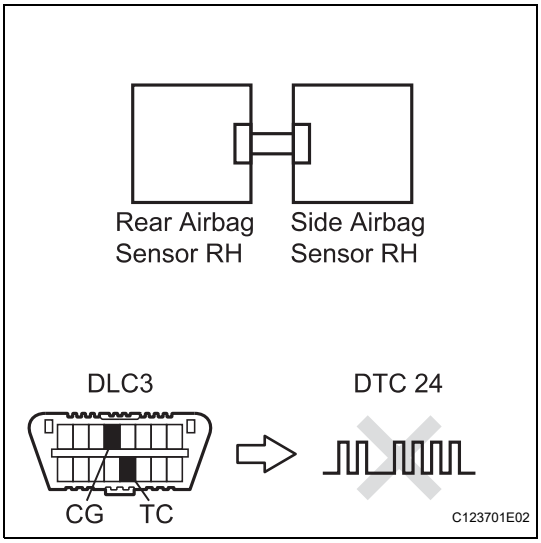
DTC No.	DTC Detection Condition	Trouble Area
B1635/24	• Rear airbag sensor RH malfunction • Center airbag sensor assembly malfunction	• Rear airbag sensor RH • Center airbag sensor assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the power switch on (IG), and wait for at least 60 seconds.
(b) Clear the DTCs stored in the memory (See page RS-41).
(c) Turn the power switch off.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Check the DTCs (See page RS-41).

OK:

DTC B1635/24 is not output.

HINT:

Codes other than DTC B1635/24 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-33)**

NG

2	CONFIRM PART NUMBER OF REAR AIRBAG SENSOR

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the part number of the rear airbag sensor RH is equal to the number of the other side.

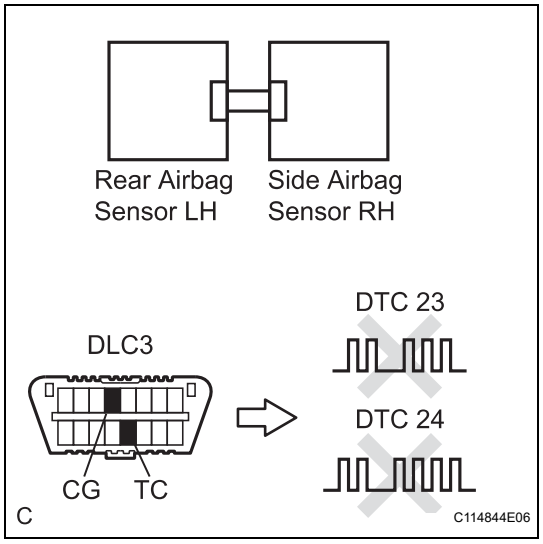
OK:

Those numbers are the same.

NG → **Go to step 4**

OK

3 CHECK REAR AIRBAG SENSOR RH



(a) Interchange the rear airbag sensor LH with RH and connect the connectors to them.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

Result

Result	Proceed to
DTC B1635/24 is output.	A
DTC B1630/23 is output.	B
DTC B1630/23 and B1635/24 are not output.	C

HINT:
Codes other than DTC B1630/23 and B1635/24 may be output at this time, but they are not related to this check.

(h) Turn the power switch off.
(i) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(j) Return the rear airbag sensor LH and RH to their original positions and connect the connectors to them.

A → **Go to step 5**

B → **REPLACE REAR AIRBAG SENSOR RH (See page RS-435)**

C

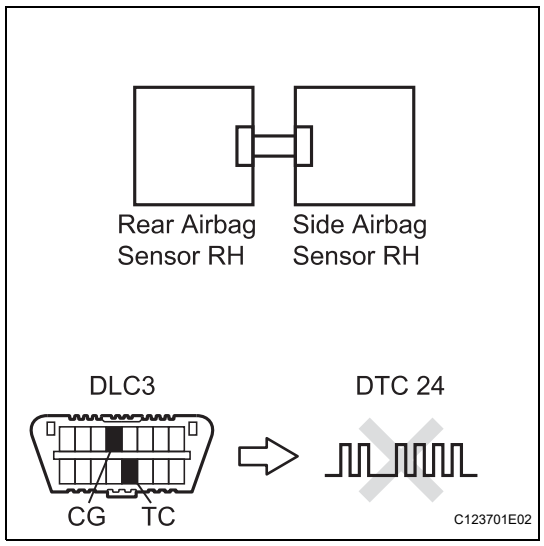
USE SIMULATION METHOD TO CHECK (See page RS-33)

4 REPLACE REAR AIRBAG SENSOR RH

(a) Replace the rear airbag sensor RH (See page RS-435).
HINT:
Perform inspection using parts from a normal vehicle if possible.

NEXT

5	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG), and wait for at least 60 seconds.
(c) Clear the DTCs stored in the memory (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG), and wait for at least 60 seconds.
(f) Check the DTCs (See page RS-41).

OK:

DTC B1635/24 is not output.

HINT:

Codes other than DTC B1635/24 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

DTC	B1650/32	Occupant Classification System Malfunction

DESCRIPTION

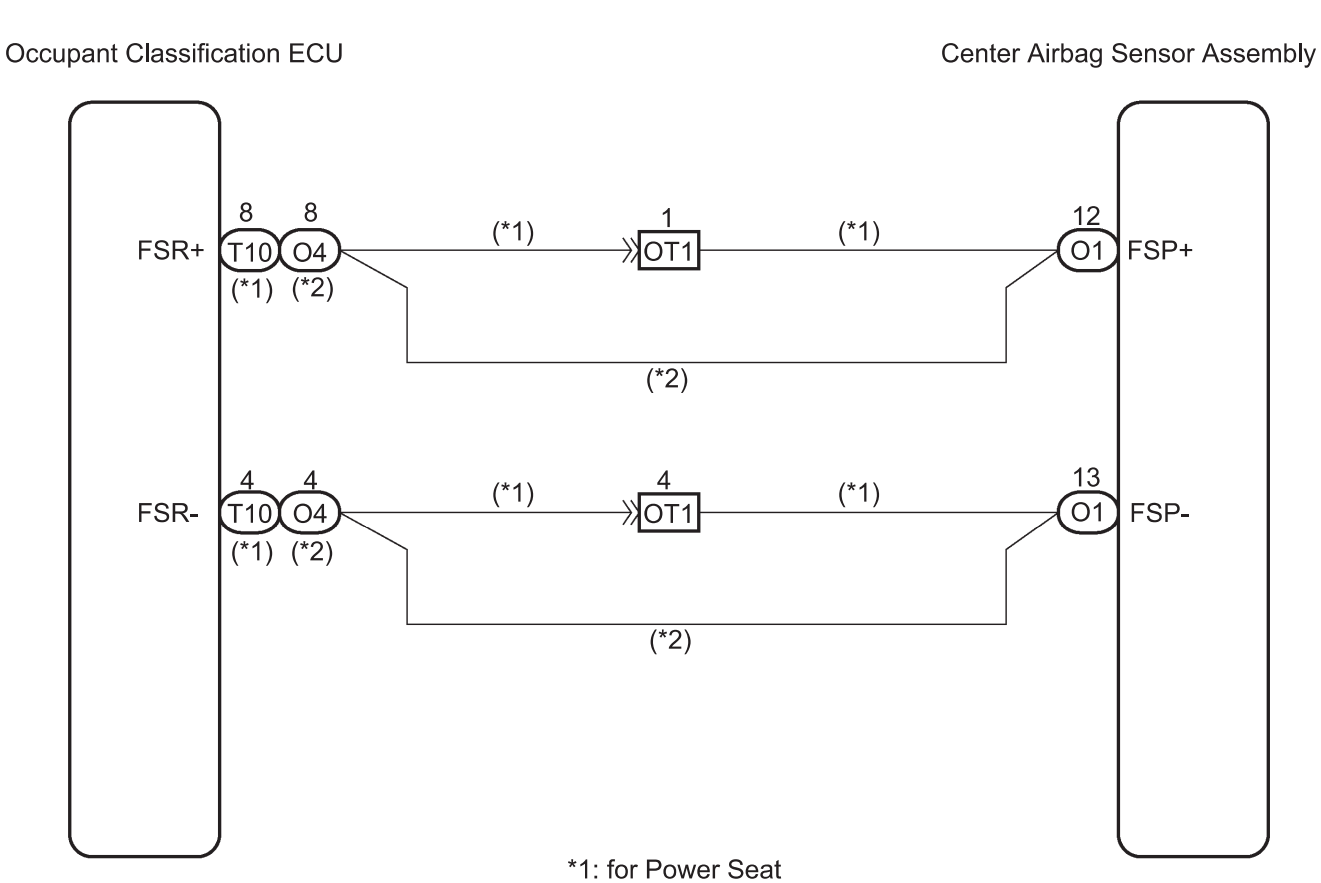
The occupant classification system circuit consists of the center airbag sensor assembly and the occupant classification system.

If the center airbag sensor assembly receives signals from the occupant classification ECU, it determines whether the front passenger airbag assembly, the front seat side airbag assembly RH and front seat outer belt assembly should be operated.

DTC B1650/32 is recorded when a malfunction is detected in the occupant classification system circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1650/32	• Occupant classification system malfunction • The center airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the occupant classification system circuit for 2 seconds. • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Occupant classification system • Front seat wire RH (for Power Seat) • Center airbag sensor assembly

WIRING DIAGRAM



RS

INSPECTION PROCEDURE

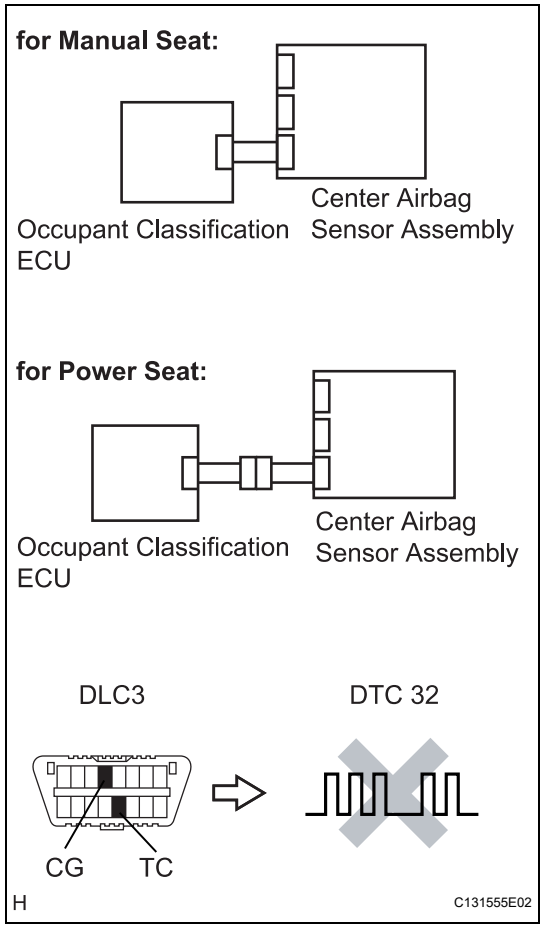
1	CHECK DTC (OCCUPANT CLASSIFICATION ECU)

(a) Turn the power switch on (IG), and wait for at least 10 seconds.
(b) Using the intelligent tester, check the DTCs of the occupant classification ECU (See page RS-248).
OK:
DTC is not output.

NG → **GO TO OCCUPANT CLASSIFICATION SYSTEM (See page RS-250)**

OK

2	CHECK DTC (CENTER AIRBAG SENSOR ASSEMBLY)



(a) Turn the power switch on (IG), and wait for at least 60 seconds.
(b) Clear the DTCs stored in the memory (See page RS-41).
(c) Turn the power switch off.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Check the DTCs (See page RS-41).
OK:
DTC B1650/32 is not output.
HINT:
Codes other than DTC B1650/32 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-33)**

NG

3	CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

RS

(c) Check that the connectors are properly connected to the center airbag sensor assembly and the occupant classification ECU.
OK:
The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY**

OK

4 CHECK CONNECTORS

(a) Disconnect the connectors from the center airbag sensor assembly and the occupant classification ECU.
(b) Check that the connectors (on the center airbag sensor assembly side and occupant classification ECU side) are not damaged.
OK:
The connectors are not deformed or damaged.

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

5 CHECK VEHICLE TYPE

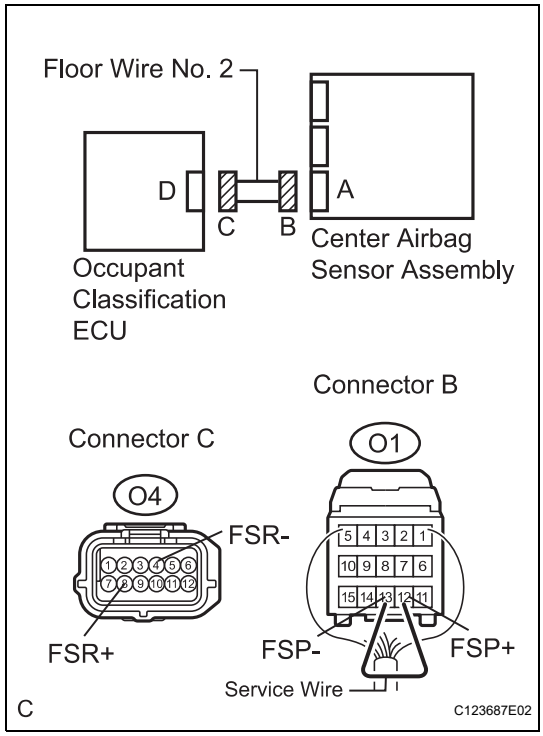
(a) Check the front passenger side seat type.
Result

Result	Proceed to
for Manual seat	A
for Power seat	B

B → **Go to step 10**

A

6	CHECK FLOOR WIRE NO. 2 (OPEN)



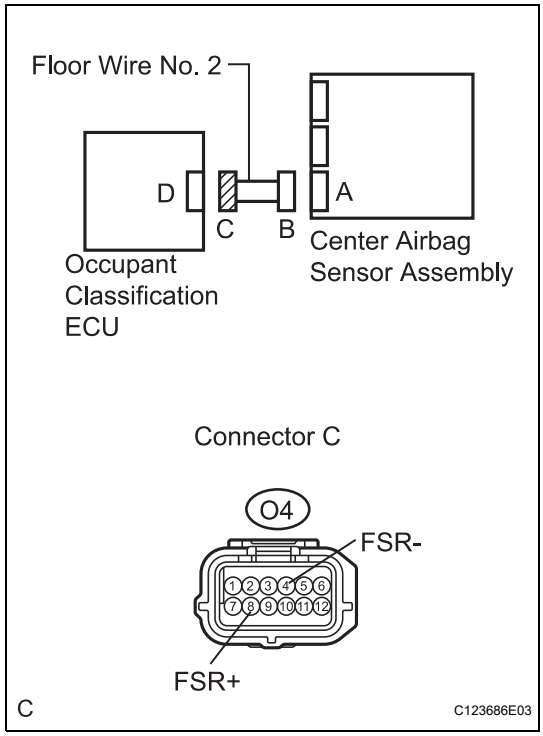
(a) Using a service wire, connect terminals 12 (FSP+) and 13 (FSP-) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Terminal Connection	Condition	Specified Condition
O4-8 (FSR+) - O4-4 (FSR-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

7	CHECK FLOOR WIRE NO. 2 (SHORT)



(a) Disconnect the service wire from connector B.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

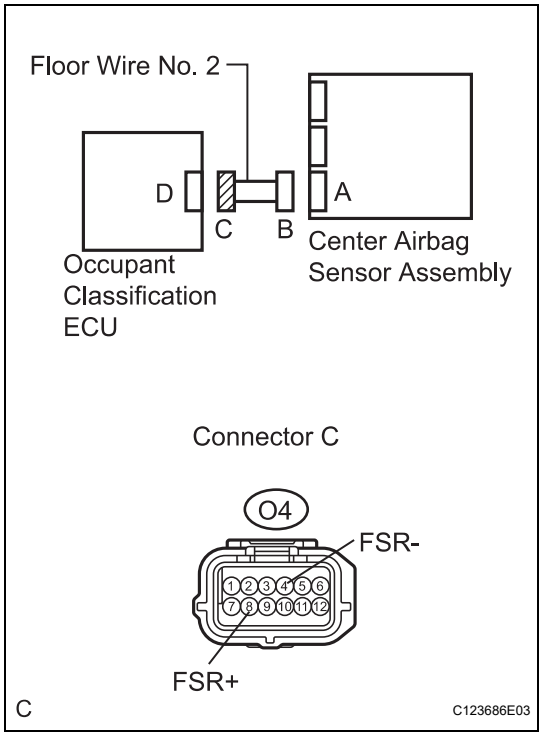
Terminal Connection	Condition	Specified Condition
O4-8 (FSR+) - O4-4 (FSR-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

RS

8 CHECK FLOOR WIRE NO. 2 (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

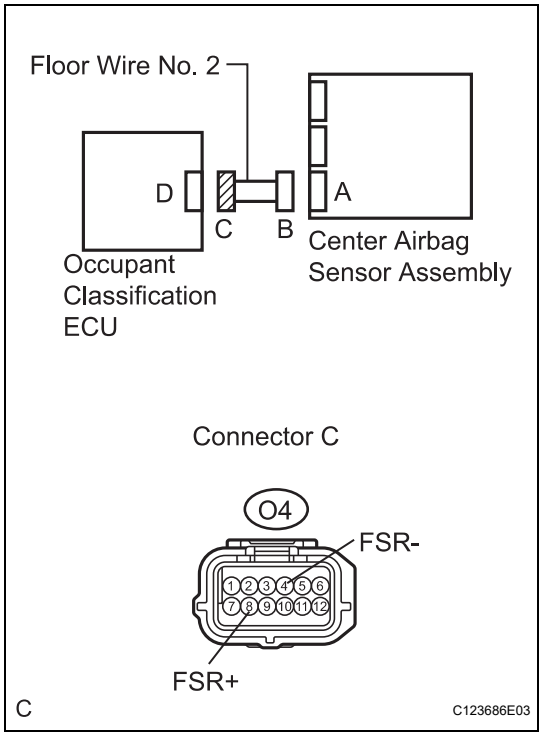
Standard voltage

Tester Connection	Condition	Specified Condition
O4-8 (FSR+) - Body ground	Power switch ON	Below 1 V
O4-4 (FSR-) - Body ground	Power switch ON	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE NO. 2

OK

9 CHECK FLOOR WIRE NO. 2 (SHORT TO GROUND)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
O4-8 (FSR+) - Body ground	Always	1 MΩ or higher
O4-4 (FSR-) - Body ground	Always	1 MΩ or higher

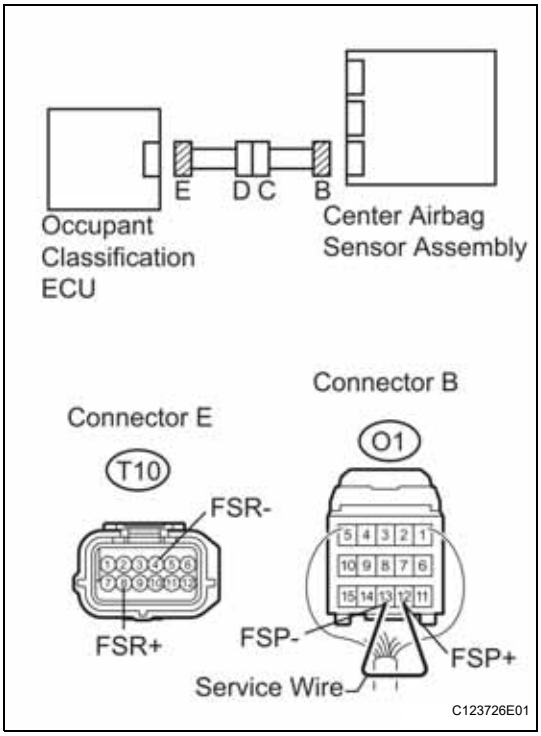
HINT:
After replacing the center airbag sensor assembly, check for DTCs of the center airbag sensor assembly. If the DTC B1650/32 is detected, replace the occupant classification ECU (See page RS-445) and perform "zero point calibration" and "sensitivity check" of the occupant classification system (See page RS-239).

NG → REPAIR OR REPLACE FLOOR WIRE NO. 2

OK

REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)

10 CHECK OCCUPANT CLASSIFICATION SYSTEM CIRCUIT (OPEN)



(a) Using a service wire, connect terminals 12 (FSP+) and 13 (FSP-) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminal of the connector when connecting.

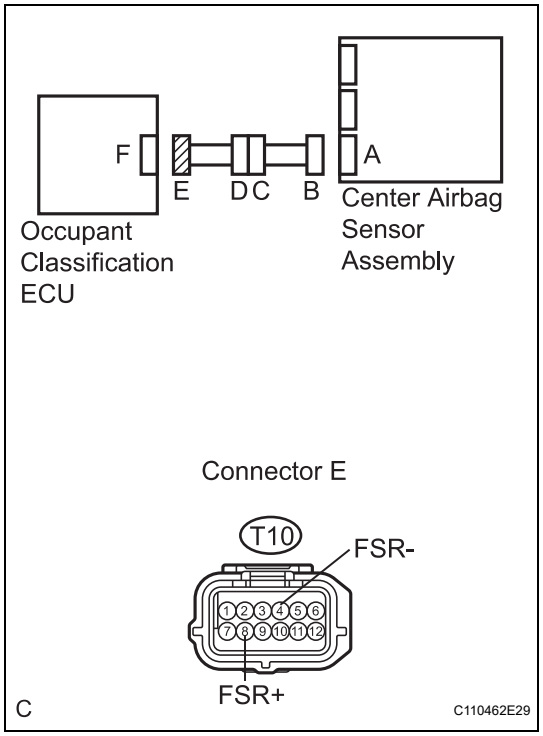
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
T10-8 (FSR+) - T10-4 (FSR-)	Always	Below 1 Ω

NG → **Go to step 14**

OK

11 CHECK OCCUPANT CLASSIFICATION SYSTEM CIRCUIT (SHORT)



(a) Disconnect the service wire from connector B.
(b) Measure the resistance according to the value(s) in the table below.

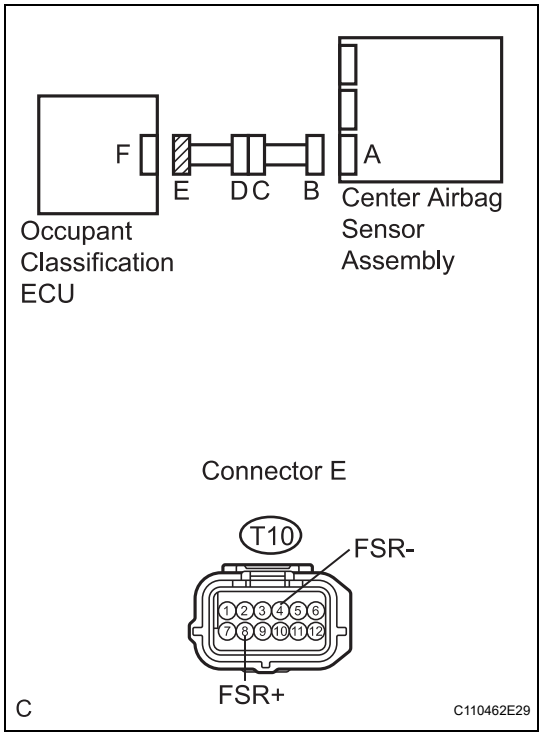
Standard resistance

Tester Connection	Condition	Specified Condition
T10-8 (FSR+) - T10-4 (FSR-)	Always	1 MΩ or higher

NG → **Go to step 15**

OK

12 CHECK OCCUPANT CLASSIFICATION SYSTEM CIRCUIT (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

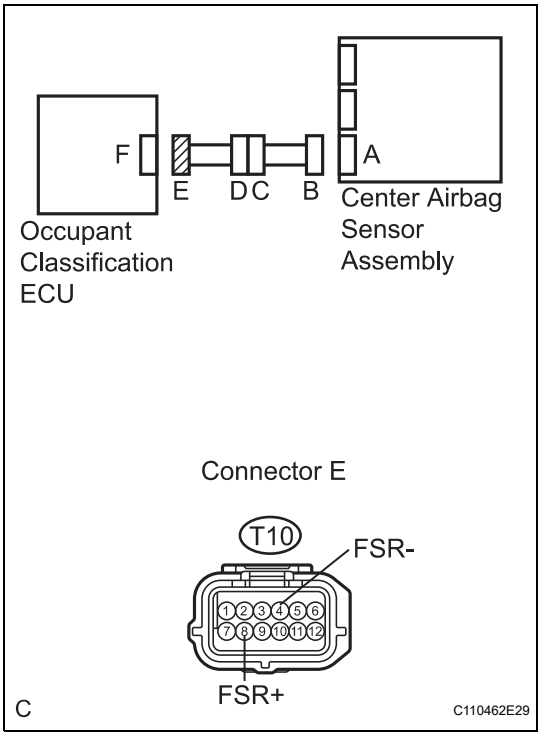
Tester Connection	Condition	Specified Condition
T10-8 (FSR+) - Body ground	Power switch on (IG)	Below 1 V
T10-4 (FSR-) - Body ground	Power switch on (IG)	Below 1 V

NG → **Go to step 16**

OK

RS

13	CHECK OCCUPANT CLASSIFICATION SYSTEM CIRCUIT (SHORT TO GROUND)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
T10-8 (FSR+) - Body ground	Always	1 MΩ or higher
T10-4 (FSR-) - Body ground	Always	1 MΩ or higher

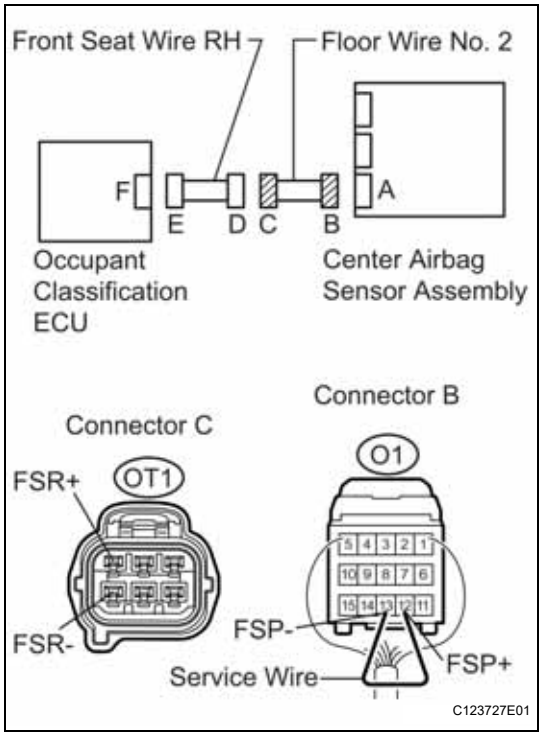
HINT:
After replacing the center airbag sensor assembly, check for DTCs of the center airbag sensor assembly. If the DTC B1650/32 is detected, replace the occupant classification ECU (See page RS-445) and perform "zero point calibration" and "sensitivity check" of the occupant classification system (See page RS-239).

NG → **Go to step 17**

OK

REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)

14	CHECK FLOOR WIRE NO. 2 (OPEN)



(a) Disconnect the front seat wire RH connector from the floor wire No. 2.
HINT:
The service wire has already been inserted into connector B.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

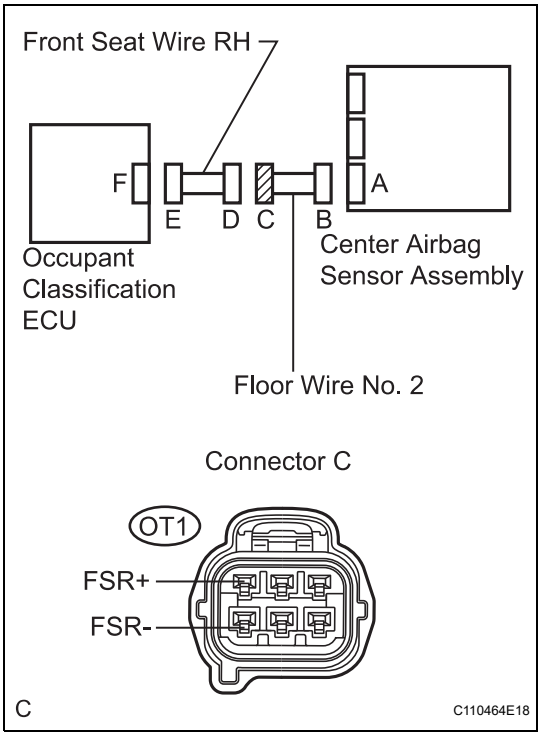
Tester Connection	Condition	Specified Condition
OT1-1 (FSR+) - OT1-4 (FSR-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

REPAIR OR REPLACE FRONT SEAT WIRE RH

15	CHECK FLOOR WIRE NO. 2 (SHORT)



(a) Disconnect the front seat wire RH connector from the floor wire No. 2.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

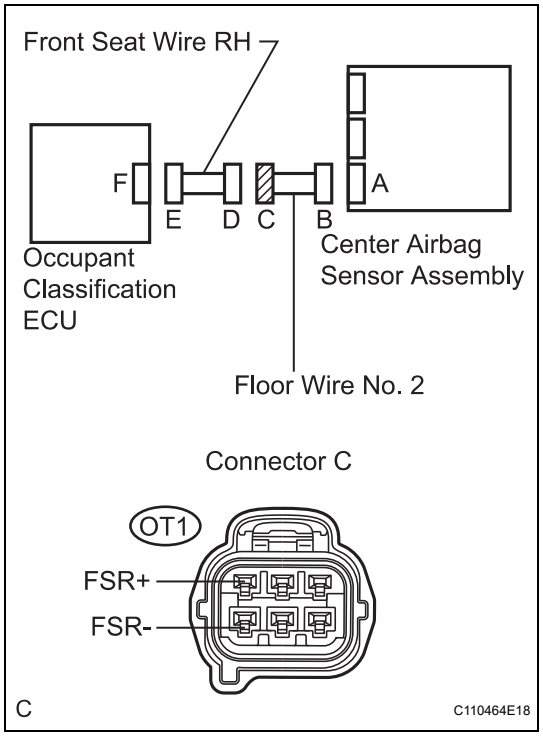
Tester Connection	Condition	Specified Condition
OT1-1 (FSR+) - OT1-4 (FSR-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

REPAIR OR REPLACE FRONT SEAT WIRE RH

16	CHECK FLOOR WIRE NO. 2 (SHORT TO B+)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the front seat wire RH connector from the floor wire No. 2.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the power switch on (IG).
(f) Measure the voltage according to the value(s) in the table below.

Standard voltage

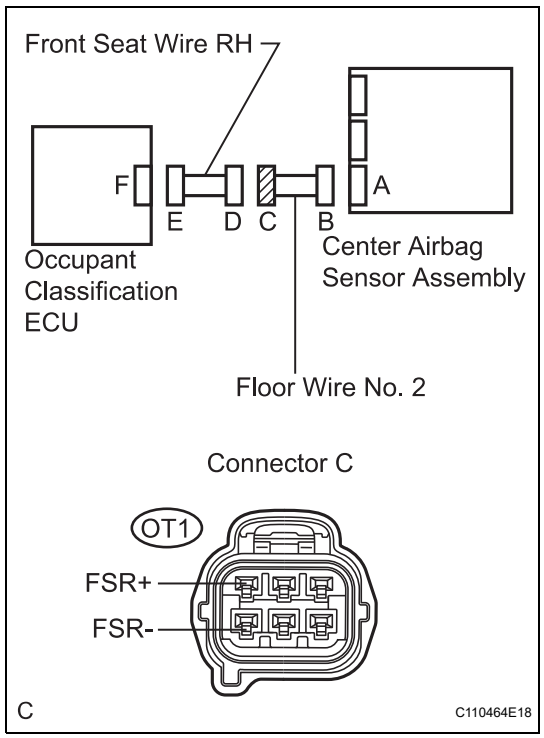
Tester Connection	Condition	Specified Condition
OT1-1 (FSR+) - Body ground	Power switch on (IG)	Below 1 V
OT1-4 (FSR-) - Body ground	Power switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

REPAIR OR REPLACE FRONT SEAT WIRE RH

17	CHECK FLOOR WIRE NO. 2 (SHORT TO GROUND)



(a) Disconnect the front seat wire RH connector from the floor wire No. 2.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
OT1-1 (FSR+) - Body ground	Always	1 MΩ or higher
OT1-4 (FSR-) - Body ground	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

REPAIR OR REPLACE FRONT SEAT WIRE RH

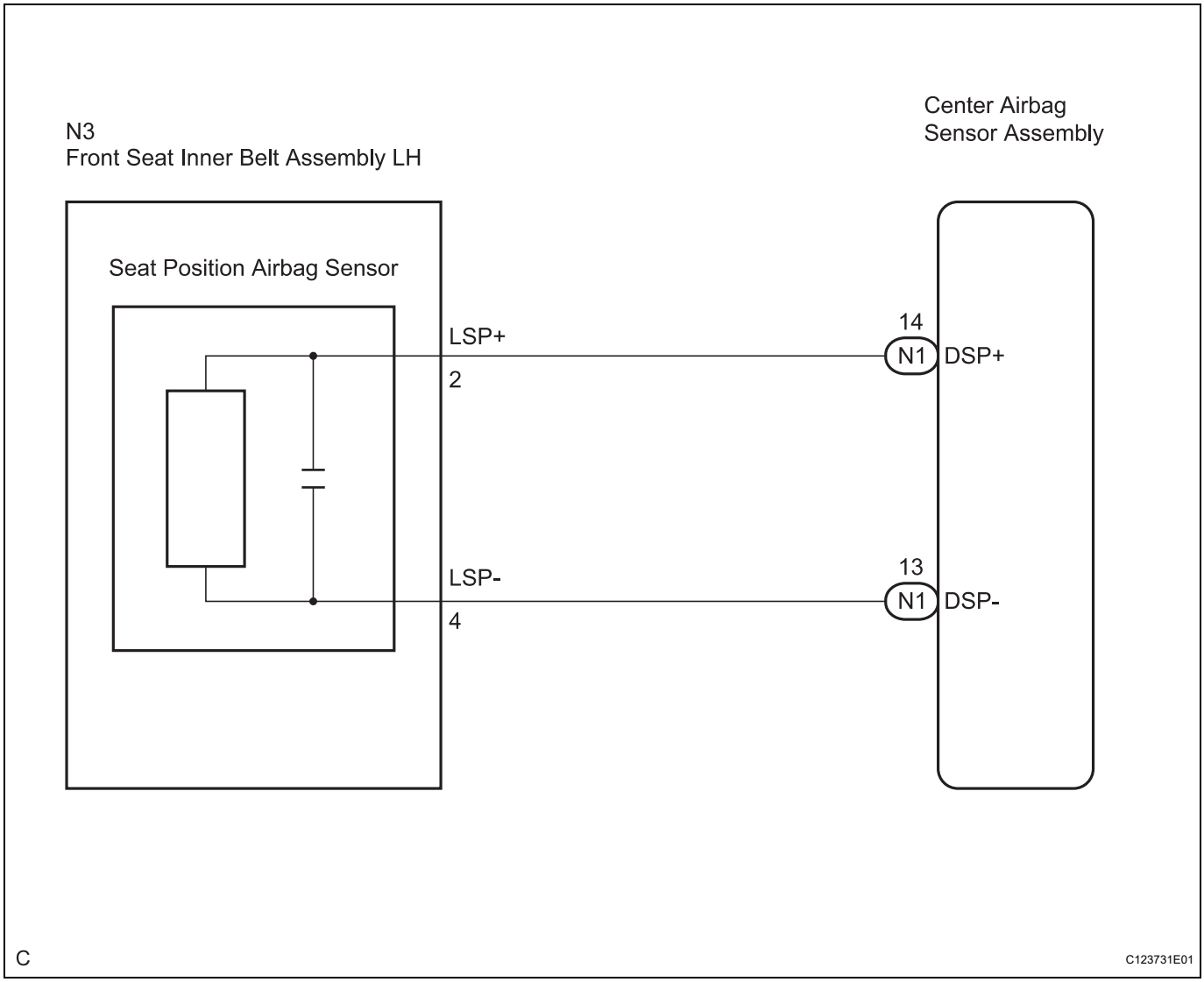
DTC	B1653/35	Seat Position Airbag Sensor Circuit Malfunction

DESCRIPTION

The seat position airbag sensor circuit consists of the center airbag sensor assembly and the seat position airbag sensor.
DTC B1653/35 is recorded when a malfunction is detected in the seat position airbag sensor circuit.

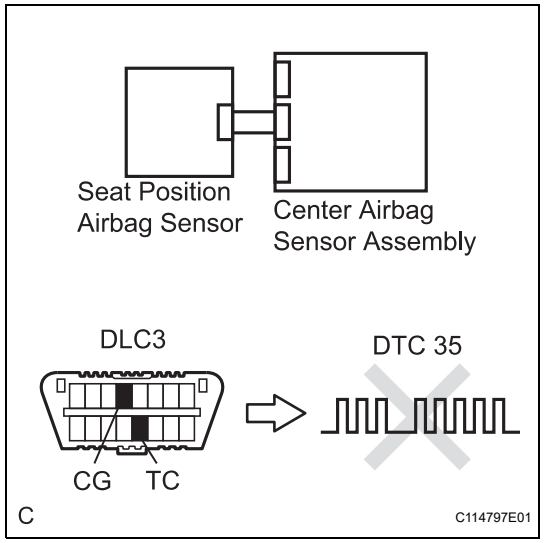
DTC No.	DTC Detecting Condition	Trouble Area
B1653/35	• The center airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the seat position airbag sensor circuit for 2 seconds. • Seat position airbag sensor malfunction • Center airbag sensor assembly malfunction	• Floor wire • Seat position airbag sensor • Center airbag sensor assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the power switch on (IG), and wait for at least 60 seconds.
(b) Clear the DTCs stored in the memory (See page RS-41).
(c) Turn the power switch off.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Check the DTCs (See page RS-41).
OK:
DTC B1653/35 is not output.
HINT:
Codes other than DTC B1653/35 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-33)**

NG

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and the seat position airbag sensor.
OK:
The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY, THEN GO TO STEP 1**

OK

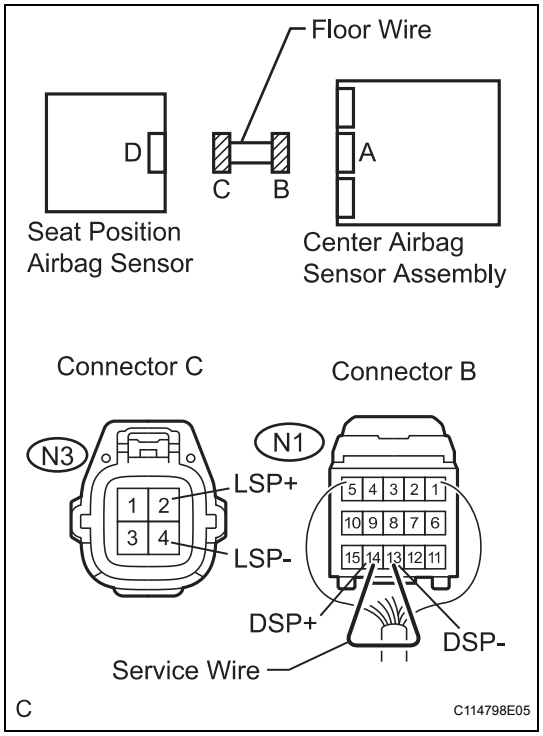
3	CHECK CONNECTORS

(a) Disconnect the connectors from the center airbag sensor assembly and the seat position airbag sensor.
(b) Check that the connectors (on the center airbag sensor assembly side and seat position airbag sensor side) are not damaged.
OK:
The connectors are not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

4 CHECK FLOOR WIRE (OPEN)



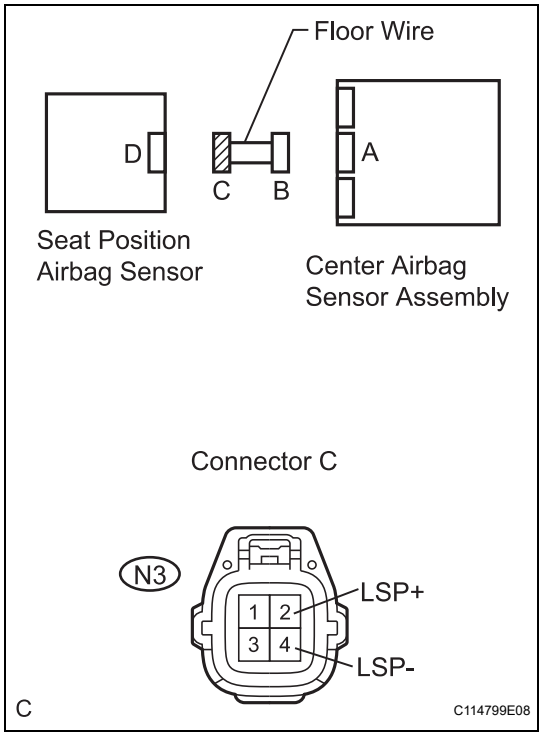
(a) Using a service wire, connect terminals 14 (DSP+) and 13 (DSP-) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
N3-2 (LSP+) - N3-4 (LSP-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

5 CHECK FLOOR WIRE (SHORT)



(a) Disconnect the service wire from connector B.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

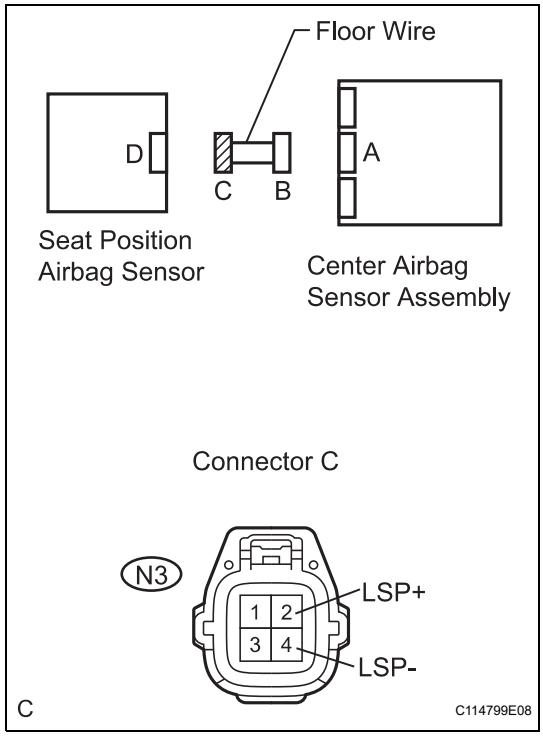
Tester Connection	Condition	Specified Condition
N3-2 (LSP+) - N3-4 (LSP-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

6 CHECK FLOOR WIRE (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

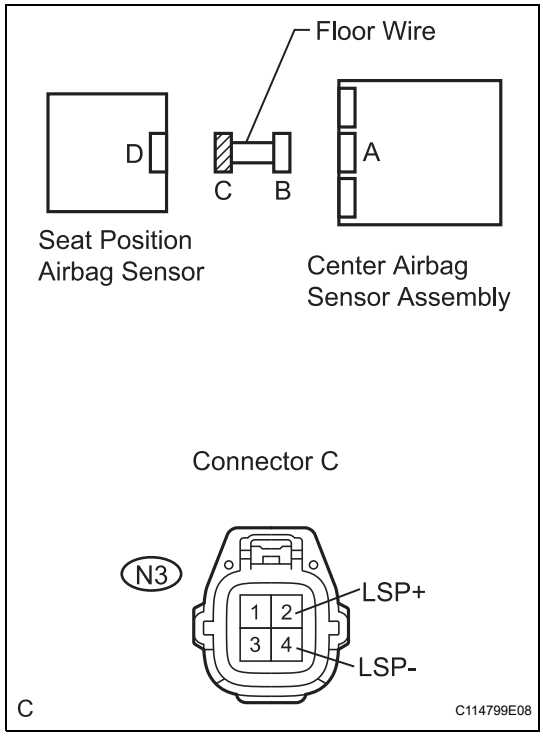
Standard voltage

Tester Connection	Condition	Specified Condition
N3-2 (LSP+) - Body ground	Power switch on (IG)	Below 1 V
N3-4 (LSP-) - Body ground	Power switch on (IG)	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE

OK

7 CHECK FLOOR WIRE (SHORT TO GROUND)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

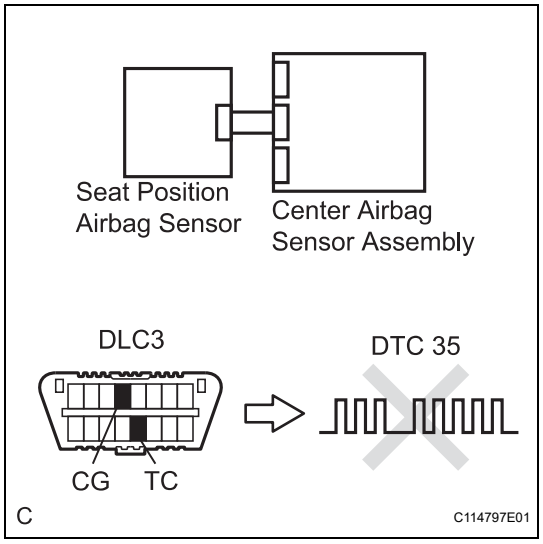
Standard resistance

Tester Connection	Condition	Specified Condition
N3-2 (LSP+) - Body ground	Always	1 MΩ or higher
N3-4 (LSP-) - Body ground	Always	1 MΩ or higher

NG → REPAIR OR REPLACE FLOOR WIRE

OK

8	CHECK SEAT POSITION AIRBAG SENSOR



(a) Connect the connectors to the center airbag sensor assembly and the seat position airbag sensor.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1653/35 is not output.

HINT:

Codes other than DTC B1653/35 may be output at this time, but they are not related to this check.

OK	USE SIMULATION METHOD TO CHECK (See page RS-33)

NG

9	REPLACE SEAT POSITION AIRBAG SENSOR

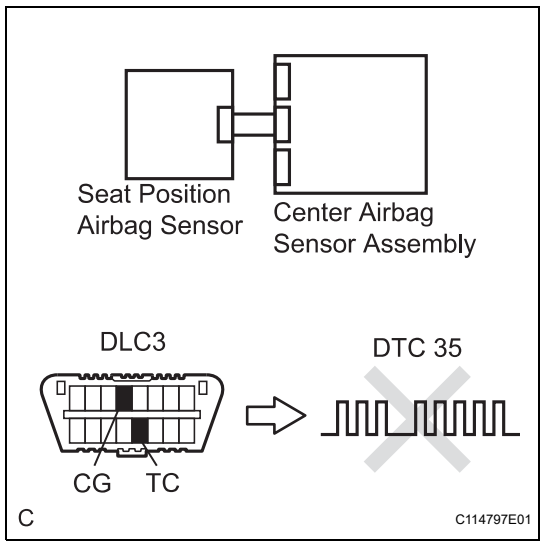
(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the seat position airbag sensor (See page RS-439).

HINT:

Perform inspection using parts from a normal vehicle if possible.

NEXT

10	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG), and wait for at least 60 seconds.
(c) Clear the DTCs stored in the memory (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG), and wait for at least 60 seconds.
(f) Check the DTCs (See page RS-41).

OK:

DTC B1653/35 is not output.

HINT:

Codes other than DTC B1653/35 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

END

DTC	B1655/37	Driver Side Seat Belt Buckle Switch Circuit Malfunction

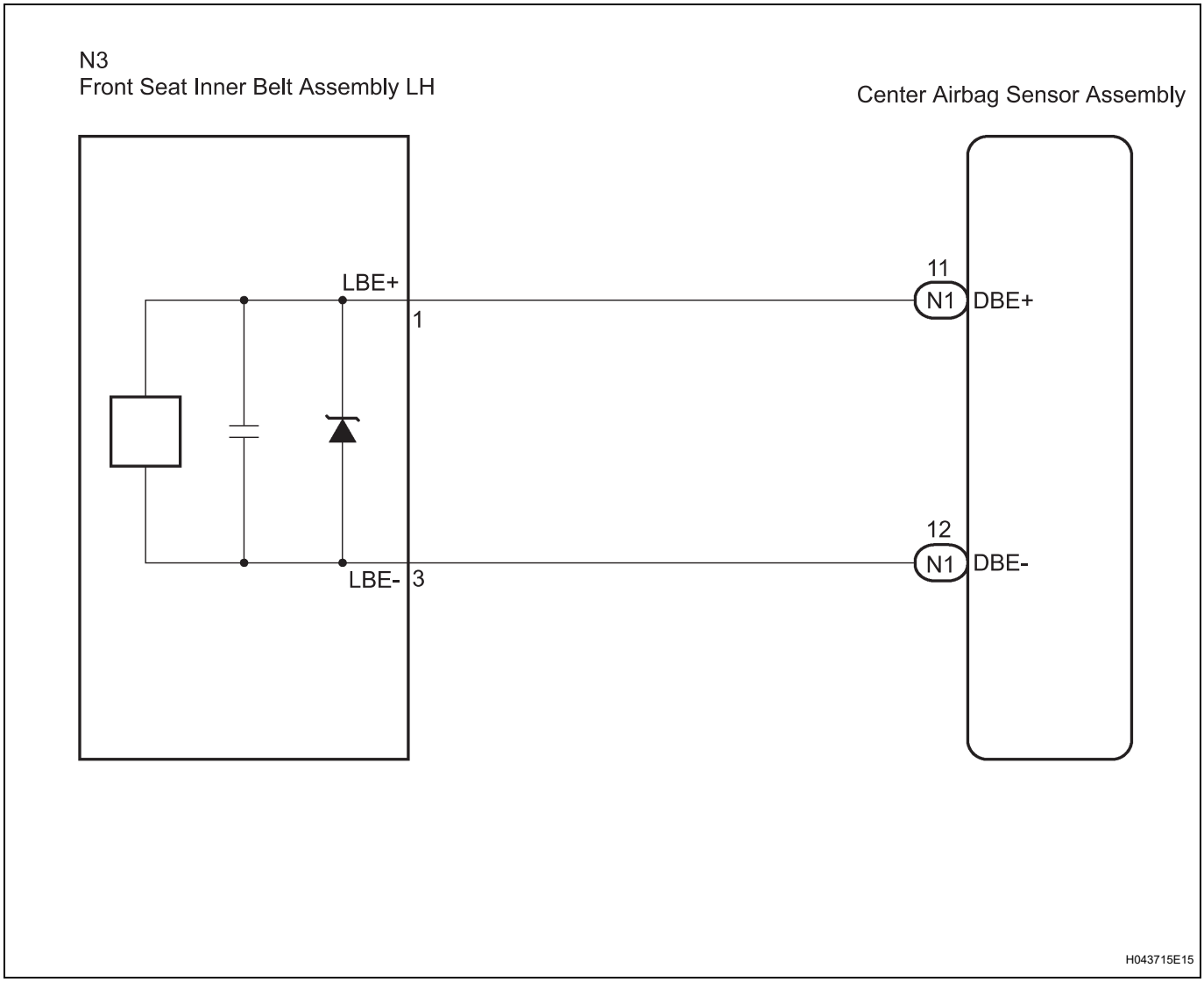
DESCRIPTION

The driver side seat belt buckle switch circuit consists of the center airbag sensor assembly and the front seat inner belt assembly LH.

DTC B1655/37 is recorded when a malfunction is detected in the driver side seat belt buckle switch circuit.

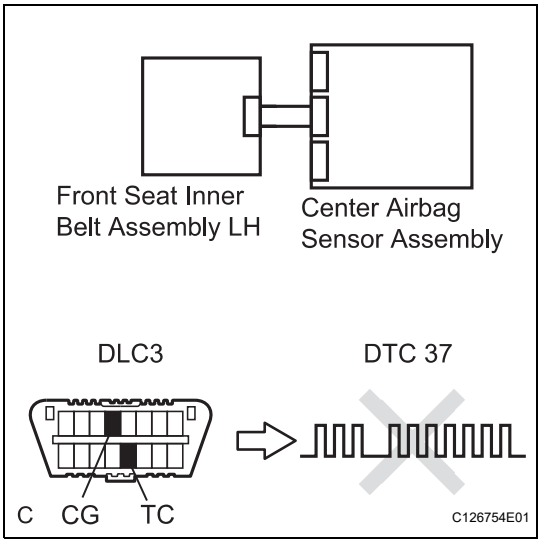
DTC No.	DTC Detection Condition	Trouble Area
B1655/37	• The center airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the driver side seat belt buckle switch circuit for 2 seconds. • Front seat inner belt assembly LH malfunction • Center airbag sensor assembly malfunction	• Floor wire • Front seat inner belt assembly LH (Driver side seat belt buckle switch) • Center airbag sensor assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the power switch on (IG), and wait for at least 60 seconds.
(b) Clear the DTCs stored in the memory (See page RS-41).
(c) Turn the power switch off.
(d) Turn the power switch on (IG), and wait for at least 60 seconds.
(e) Check the DTCs (See page RS-44).

OK:

DTC B1655/37 is not output.

HINT:

Codes other than DTC B1655/37 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-33)**

NG

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and front seat inner belt assembly LH.

OK:

The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY, THEN GO TO STEP 1**

OK

3	CHECK CONNECTORS

(a) Disconnect the connectors from the center airbag sensor assembly and the front seat inner belt assembly LH.
(b) Check that the connectors (on the center airbag sensor assembly side and front seat inner belt assembly LH side) are not damaged.

OK:

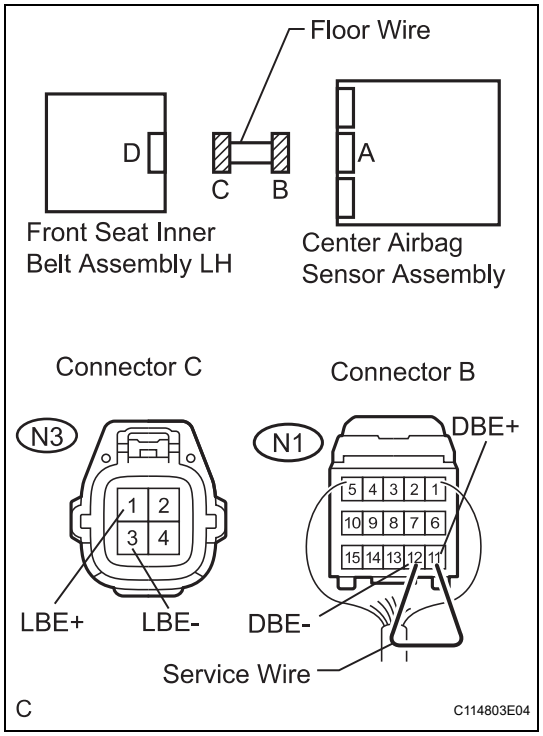
The connectors are not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

4 CHECK FLOOR WIRE (OPEN)



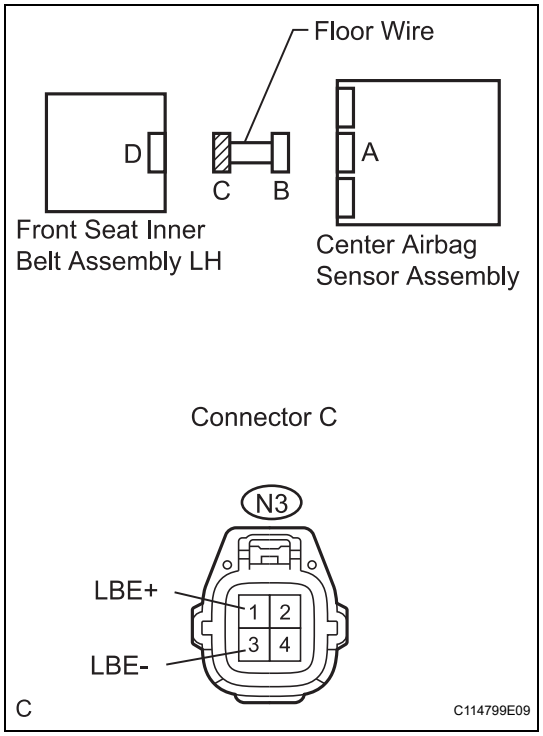
(a) Using a service wire, connect terminals 11 (DBE+) and 12 (DBE-) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
N3-1 (LBE+) - N3-3 (LBE-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

5 CHECK FLOOR WIRE (SHORT)



(a) Disconnect the service wire from connector B.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

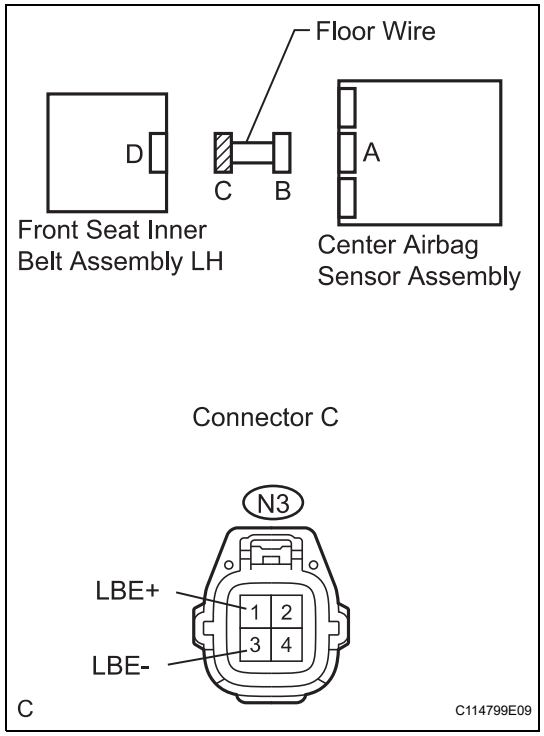
Tester Connection	Condition	Specified Condition
N3-1 (LBE+) - N3-3 (LBE-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

6 CHECK FLOOR WIRE (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

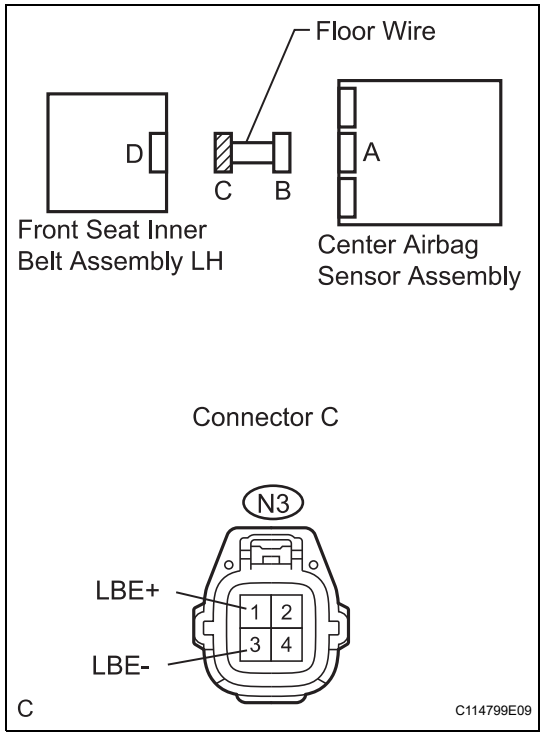
Standard voltage

Tester Connection	Condition	Specified Condition
N3-1 (LBE+) - Body ground	Power switch on (IG)	Below 1 V
N3-3 (LBE-) - Body ground	Power switch on (IG)	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE

OK

7 CHECK FLOOR WIRE (SHORT TO GROUND)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

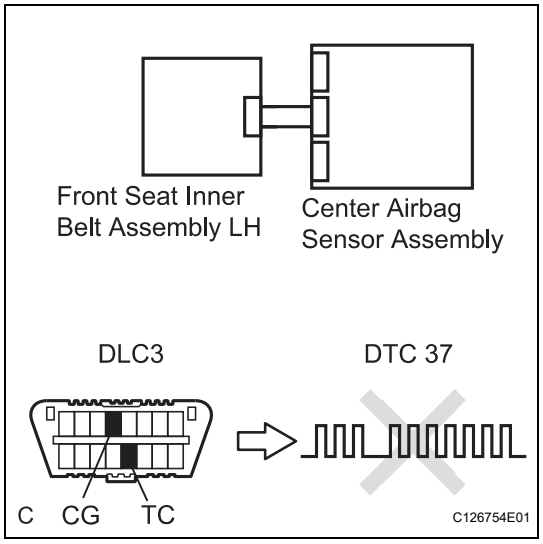
Standard resistance

Tester Connection	Condition	Specified Condition
N3-1 (LBE+) - Body ground	Always	1 MΩ or higher
N3-3 (LBE-) - Body ground	Always	1 MΩ or higher

NG → REPAIR OR REPLACE FLOOR WIRE

OK

8	CHECK FRONT SEAT INNER BELT ASSEMBLY LH



(a) Connect the connector to the center airbag sensor assembly and the front seat inner belt assembly LH.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).
OK:
DTC B1655/37 is not output.
HINT:
Codes other than DTC B1655/37 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-33)**

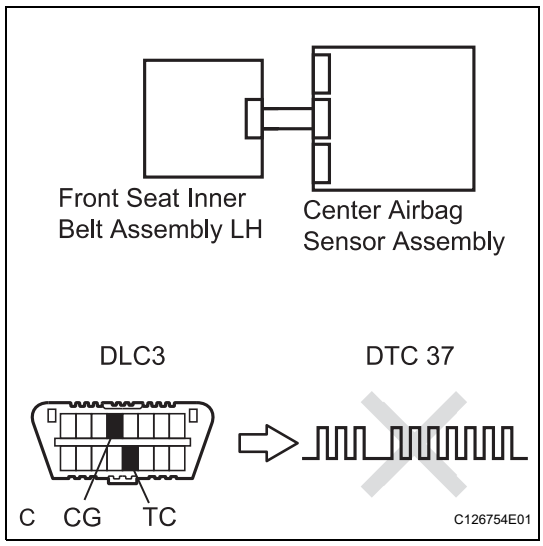
NG

9	REPLACE FRONT SEAT INNER BELT ASSEMBLY LH

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the front seat inner belt assembly LH (See page SB-16).
HINT:
Perform inspection using parts from a normal vehicle if possible.

NEXT

10	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG), and wait for at least 60 seconds.
(c) Clear the DTCs stored in the memory (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG), and wait for at least 60 seconds.
(f) Check the DTCs (See page RS-41).

OK:

DTC B1655/37 is not output.

HINT:

Codes other than DTC B1655/37 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

END

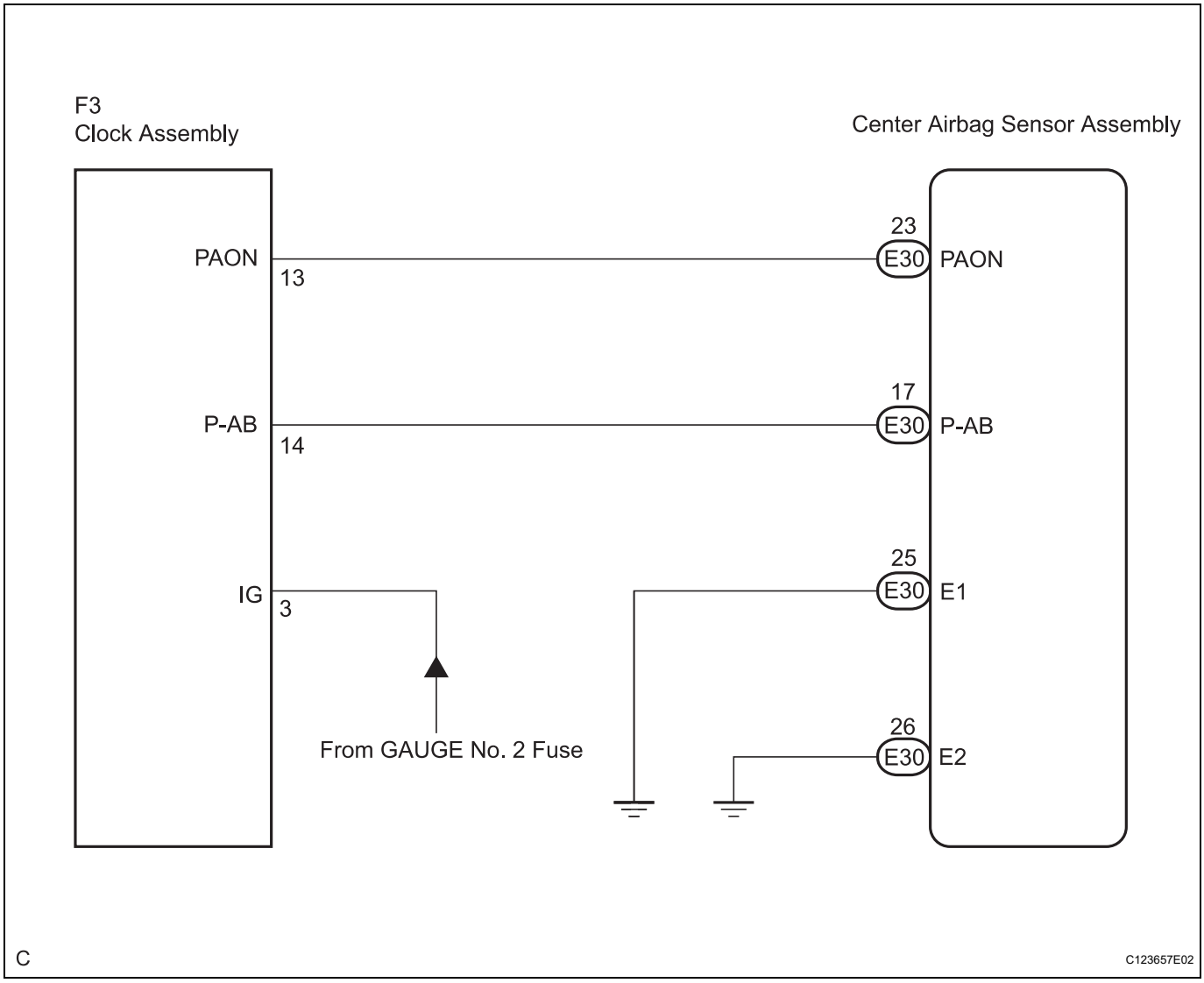
DTC	B1660/43	Passenger Airbag ON / OFF Indicator Circuit Malfunction

DESCRIPTION

The passenger airbag ON/OFF indicator circuit consists of the center airbag sensor assembly and the clock assembly.
The passenger airbag ON/OFF indicator indicates the operation condition of the front passenger airbag assembly and the front seat side airbag assembly RH.
DTC B1660/43 is recorded when a malfunction is detected in the passenger airbag ON/OFF indicator circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1660/43	• The center airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the passenger airbag ON/OFF indicator circuit for 2 seconds. • Clock assembly malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Instrument panel wire No. 2 • Clock assembly (Passenger airbag ON/OFF indicator) • Center airbag sensor assembly

WIRING DIAGRAM

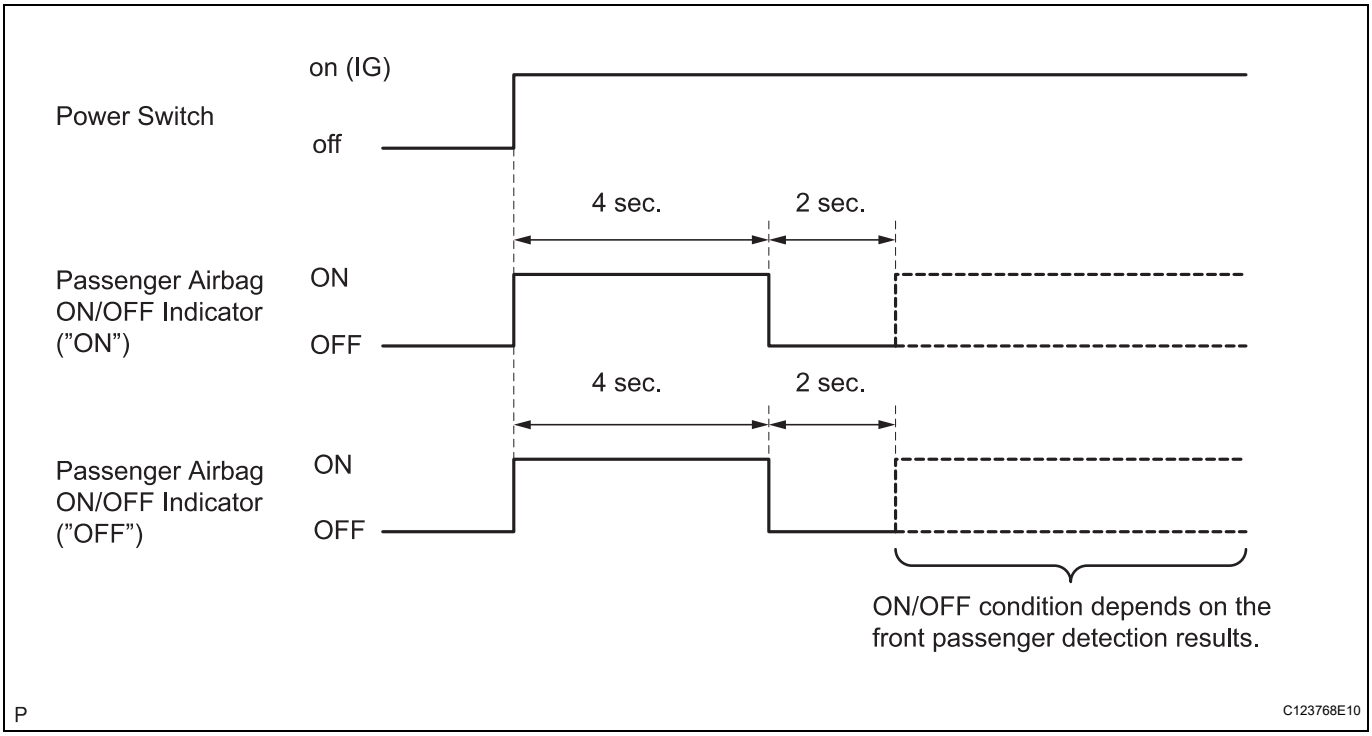


RS

INSPECTION PROCEDURE

1	CHECK PASSENGER AIRBAG ON/OFF INDICATOR CONDITION

(a) Turn the power switch on (IG).
(b) Check the passenger airbag ON/OFF indicator operation.
HINT:
Refer to the normal condition of the passenger airbag ON/OFF indicator (See page RS-33).



Result

ON/OFF Indicator Illumination	Proceed to
Always ON	A
OFF	B

B → **Go to step 10**

A

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and the clock assembly.
OK:
The connectors are properly connected.

RS

NG → CONNECT CONNECTORS PROPERLY, THEN GO TO STEP 1

OK

3	CHECK CONNECTORS

(a) Disconnect the connectors from the center airbag sensor assembly and the clock assembly.
(b) Check that the connectors (on the center airbag sensor assembly side and clock assembly side) are not damaged.
OK:
The connectors are not deformed or damaged.

NG → REPAIR OR REPLACE WIRE HARNESS

OK

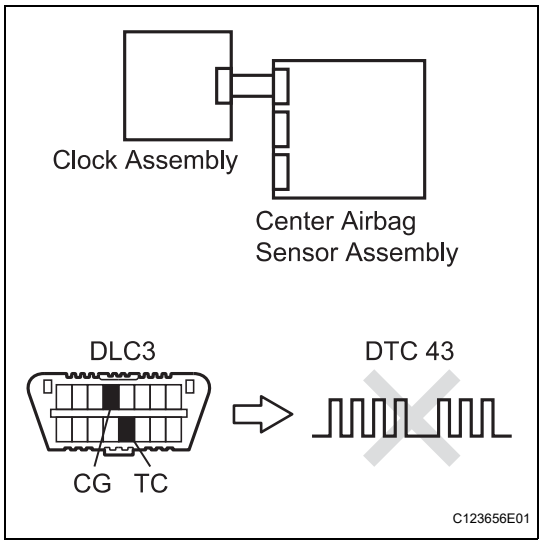
4	CHECK PASSENGER AIRBAG ON/OFF INDICATOR

(a) Connect the connector to the clock assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG).
(d) Check the passenger airbag ON/OFF indicator operation.
OK:
The passenger airbag ON/OFF indicator does not come on.

NG → Go to step 6

OK

5	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check for DTCs (See page RS-41).
OK:
DTC B1660/43 is not output.
HINT:
Codes other than DTC B1660/43 may be output at this time, but they are not related to this check.

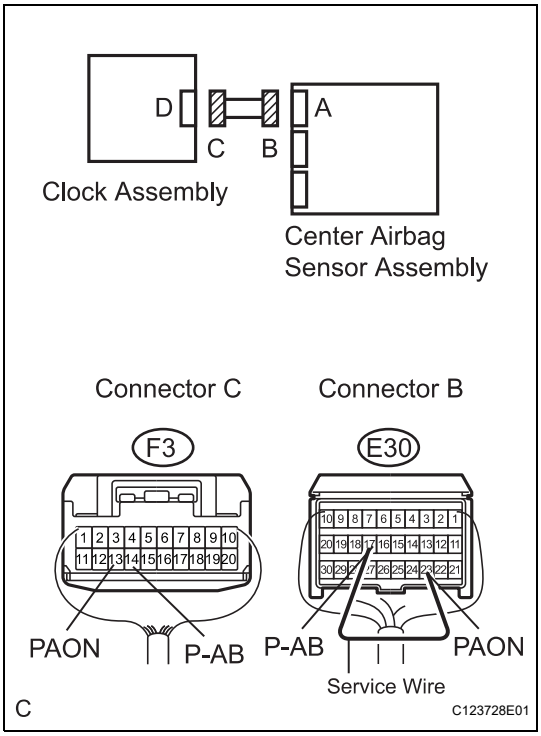
RS

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

6 CHECK PASSENGER AIRBAG ON/OFF INDICATOR CIRCUIT (OPEN)



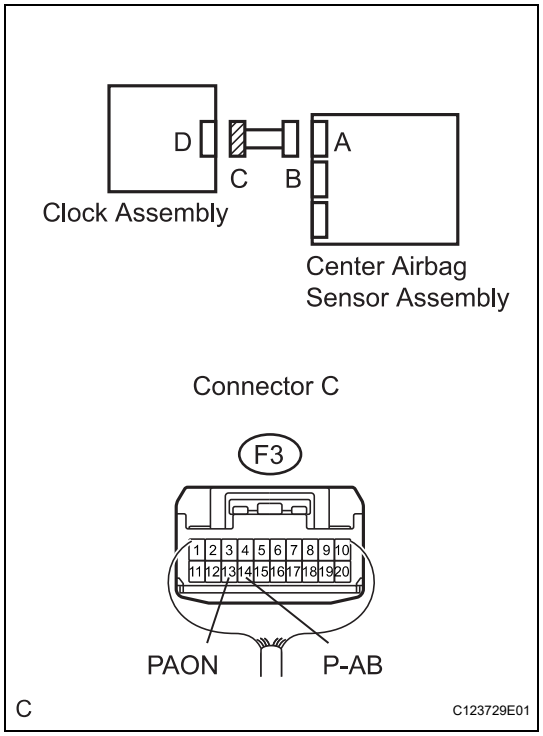
(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the clock assembly.
(d) Using a service wire, connect terminals 23 (PAON) and 17 (P-AB) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(e) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
F3-13 (PAON) - F3-14 (P-AB)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

7 CHECK PASSENGER AIRBAG ON/OFF INDICATOR CIRCUIT (SHORT)



(a) Disconnect the service wire from connector B.
(b) Measure the resistance according to the value(s) in the table below.

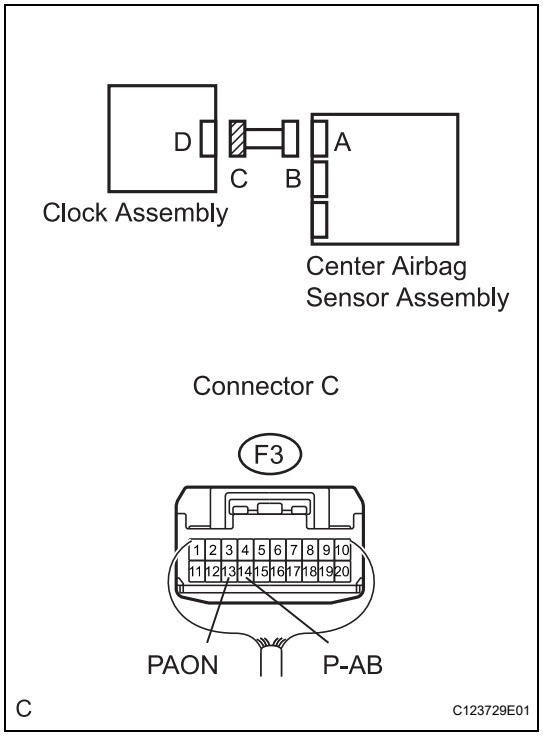
Standard resistance

Tester Connection	Condition	Specified Condition
F3-13 (PAON) - F3-14 (P-AB)	Always	1 MΩ or higher

NG → REPAIR OR REPLACE WIRE HARNESS

OK

8 CHECK PASSENGER AIRBAG ON/OFF INDICATOR CIRCUIT (SHORT TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

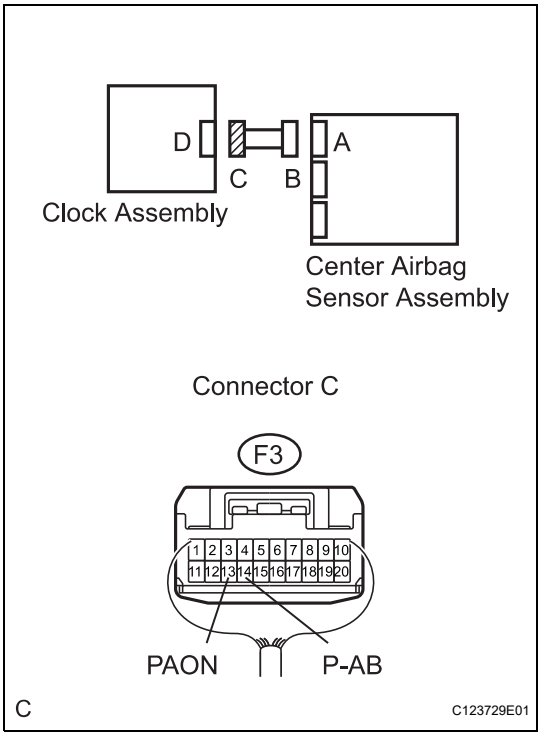
Tester Connection	Condition	Specified Condition
F3-13 (PAON) - Body ground	Always	1 MΩ or higher
F3-14 (P-AB) - Body ground	Always	1 MΩ or higher

NG → REPAIR OR REPLACE WIRE HARNESS

OK

RS

9	CHECK PASSENGER AIRBAG ON/OFF INDICATOR CIRCUIT (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
F3-13 (PAON) - Body ground	Power switch on (IG)	Below 1 V
F3-14 (P-AB) - Body ground	Power switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

REPLACE CLOCK ASSEMBLY (See page OT-5)

10	CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and the clock assembly.

OK:

The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY**

OK

11	CHECK CONNECTORS

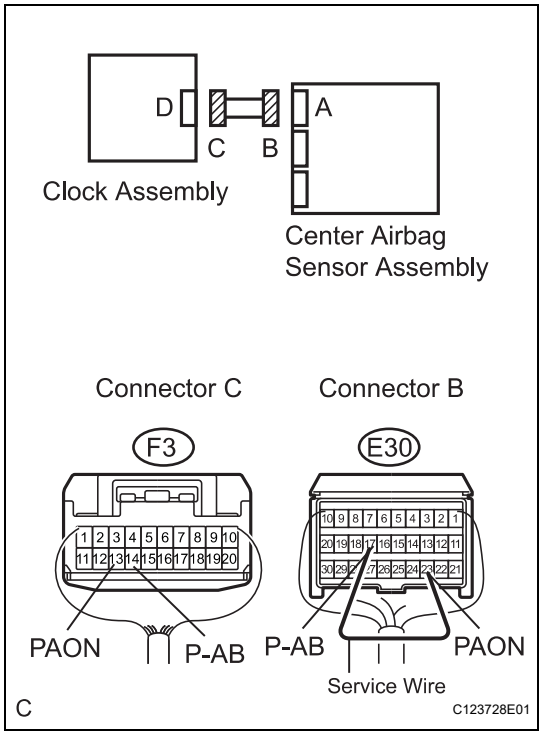
(a) Disconnect the connectors from the center airbag sensor assembly and the clock assembly.
(b) Check that the connectors (on the center airbag sensor assembly side and clock assembly side) are not damaged.

OK:
The connectors are not deformed or damaged.

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

12 CHECK PASSENGER AIRBAG ON/OFF INDICATOR CIRCUIT (OPEN)



(a) Using a service wire, connect terminals 23 (PAON) and 17 (P-AB) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.

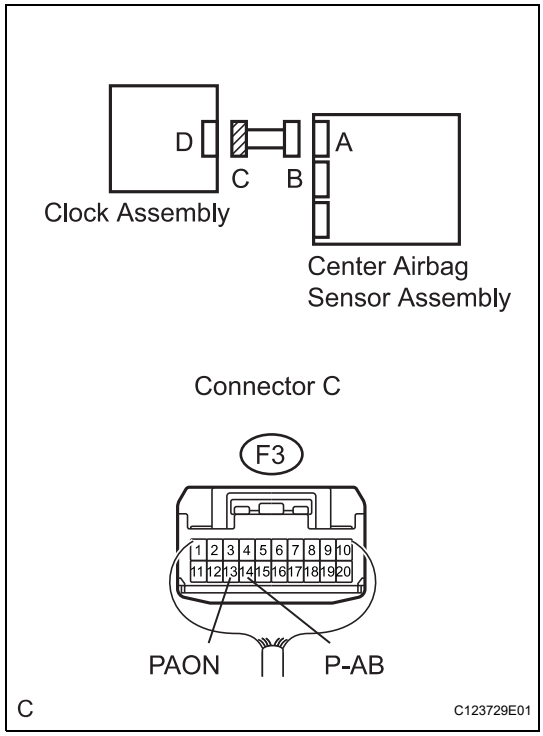
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
F3-13 (PAON) - F3-14 (P-AB)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

13 CHECK PASSENGER AIRBAG ON/OFF INDICATOR CIRCUIT (SHORT)



(a) Disconnect the service wire from connector B.
(b) Measure the resistance according to the value(s) in the table below.

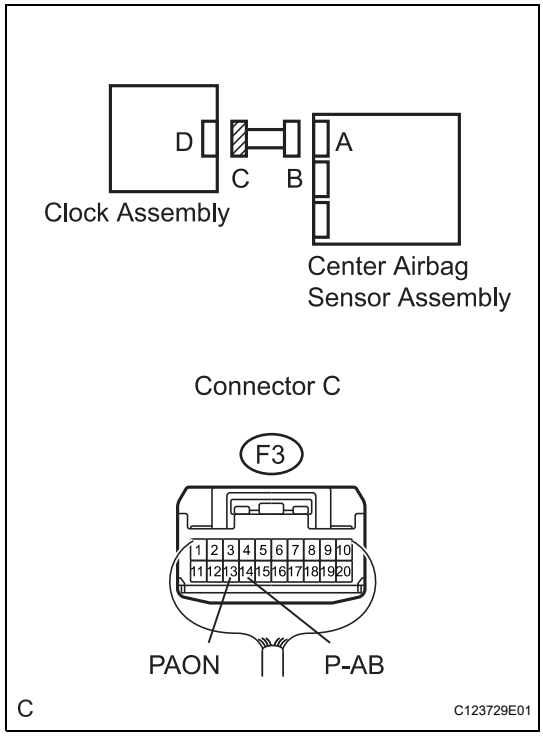
Standard resistance

Tester Connection	Condition	Specified Condition
F3-13 (PAON) - F3-14 (P-AB)	Always	1 MΩ or higher

NG → REPAIR OR REPLACE WIRE HARNESS

OK

14 CHECK PASSENGER AIRBAG ON/OFF INDICATOR CIRCUIT (SHORT TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

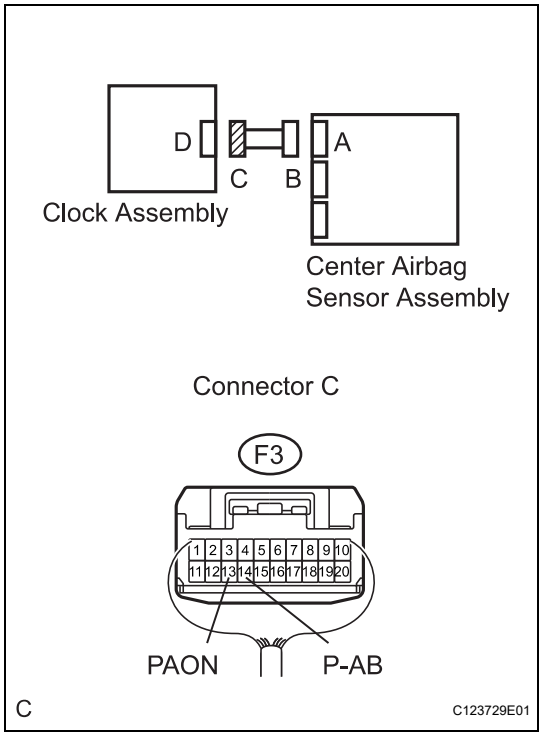
Tester Connection	Condition	Specified Condition
F3-13 (PAON) - Body ground	Always	1 MΩ or higher
F3-14 (P-AB) - Body ground	Always	1 MΩ or higher

NG → REPAIR OR REPLACE WIRE HARNESS

OK

RS

15 CHECK PASSENGER AIRBAG ON/OFF INDICATOR CIRCUIT (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

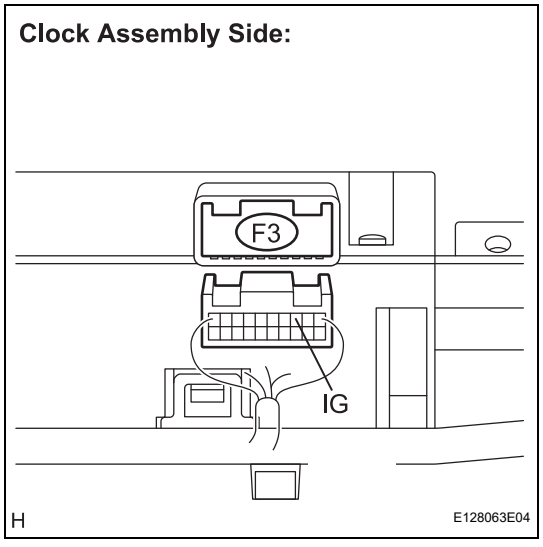
Standard voltage

Tester Connection	Condition	Specified Condition
F3-13 (PAON) - Body ground	Power switch on (IG)	Below 1 V
F3-14 (P-AB) - Body ground	Power switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

16 CHECK CLOCK ASSEMBLY (SOURCE VOLTAGE)



(a) Connect the connectors to the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

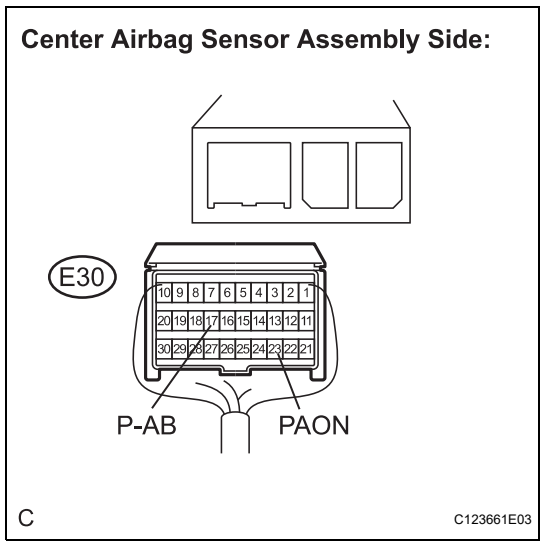
Standard voltage

Tester Connection	Condition	Specified Condition
F3-3 (IG) -Body ground	Power switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE WIRE HARNESS (CLOCK ASSEMBLY - BATTERY) OR BATTERY**

OK

17 CHECK PASSENGER AIRBAG ON / OFF INDICATOR



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the clock assembly.
(d) Disconnect the connectors from the center airbag sensor assembly.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG).
(g) Check the indicator according to the conditions in the table below.

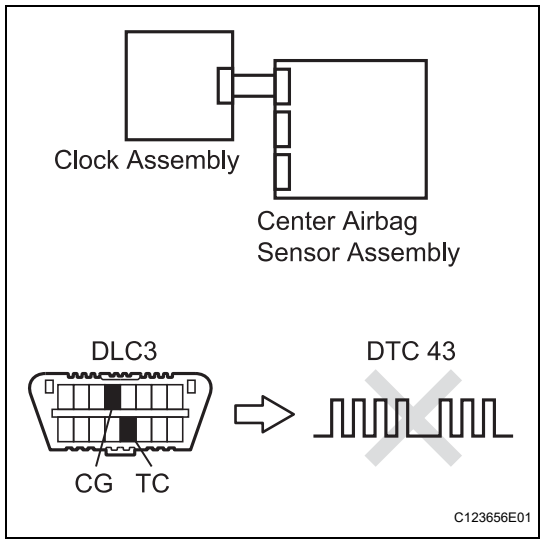
Result

Tester Connection	Condition	Passenger airbag ON/ OFF indicator
E30-23 (PAON) - Body ground	Power switch on (IG)	"ON" comes on
E30-17 (P-AB) - Body ground	Power switch on (IG)	"OFF" comes on

NG → **REPLACE CLOCK ASSEMBLY (See page OT-5)**

OK

18 CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connectors to the center airbag sensor assembly.
(d) Connect the negative (-) terminal cable to the battery and wait for at least 2 seconds.
(e) Turn the power switch on (IG), and wait for at least 60 seconds.
(f) Clear the DTCs stored in the memory (See page RS-41).
(g) Turn the power switch off.
(h) Turn the power switch on (IG), and wait for at least 60 seconds.
(i) Check for DTCs (See page RS-41).

OK:

DTC B1660/43 is not output.

HINT:

Codes other than DTC B1660/43 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

DTC	B1800/51	Short in Driver Side Squib Circuit

DTC	B1801/51	Open in Driver Side Squib Circuit

DTC	B1802/51	Short to GND in Driver Side Squib Circuit

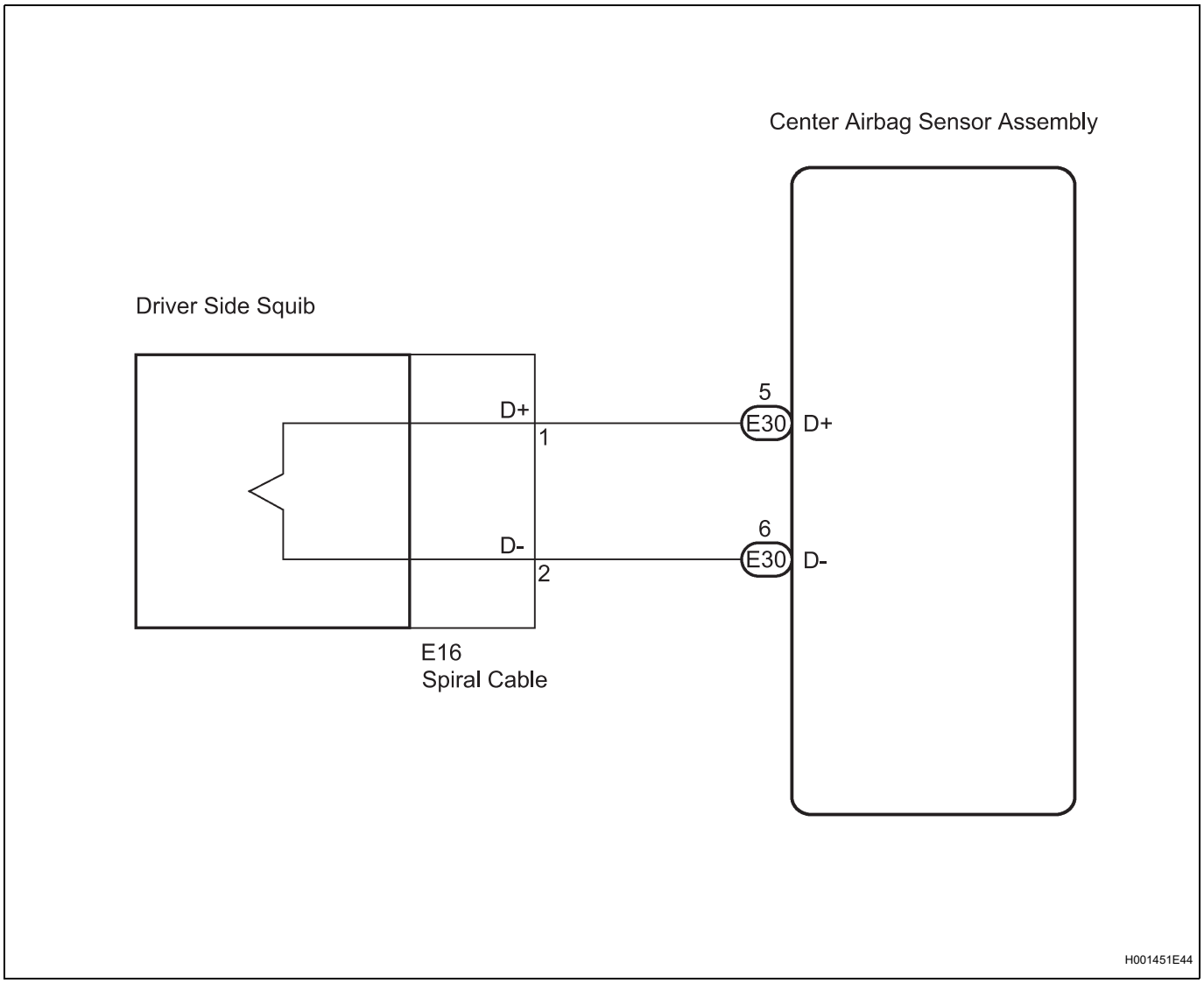
DTC	B1803/51	Short to B+ in Driver Side Squib Circuit

DESCRIPTION

The driver side squib circuit consists of the center airbag sensor assembly, the spiral cable and the steering pad.
The circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the driver side squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1800/51	• The center airbag sensor assembly receives a line short circuit signal 5 times in the driver side squib circuit during primary check. • Driver side squib malfunction • Spiral cable malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Spiral cable • Steering pad (Driver side squib) • Center airbag sensor assembly
B1801/51	• The center airbag sensor assembly receives an open circuit signal in the driver side squib circuit for 2 seconds. • Driver side squib malfunction • Spiral cable malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Spiral cable • Steering pad (Driver side squib) • Center airbag sensor assembly
B1802/51	• The center airbag sensor assembly receives a short circuit to ground signal in the driver side squib circuit for 0.5 seconds. • Driver side squib malfunction • Spiral cable malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Spiral cable • Steering pad (Driver side squib) • Center airbag sensor assembly
B1803/51	• The center airbag sensor assembly receives a short circuit to B+ signal in the driver side squib circuit for 0.5 seconds. • Driver side squib malfunction • Spiral cable malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Spiral cable • Steering pad (Driver side squib) • Center airbag sensor assembly

WIRING DIAGRAM

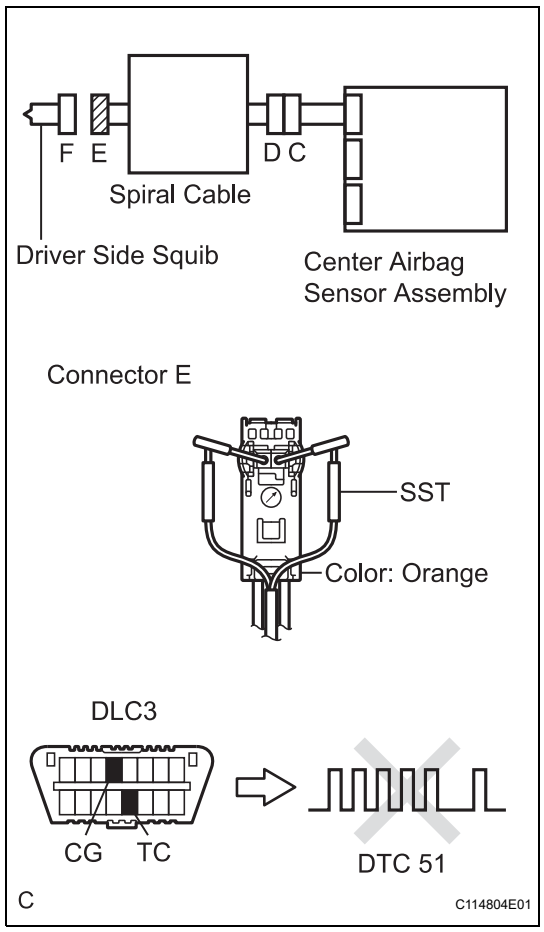


INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting the "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting the "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

1	CHECK STEERING PAD (DRIVER SIDE SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the steering pad.
(d) Connect the white wire side of SST (resistance 2.1 Ω) to connector E (orange connector).

CAUTION:
Never connect the tester to the steering pad (driver side squib) for measurement, as this may lead to a serious injury due to airbag deployment.

NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

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(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).

OK:
DTC B1800, B1801, B1802, B1803, or 51 is not output.

HINT:
Codes other than DTC B1800, B1801, B1802, B1803, and 51 may be output at this time, but they are not related to this check.

OK → **REPLACE STEERING PAD (See page RS-344)**

NG

2	CHECK CONNECTOR

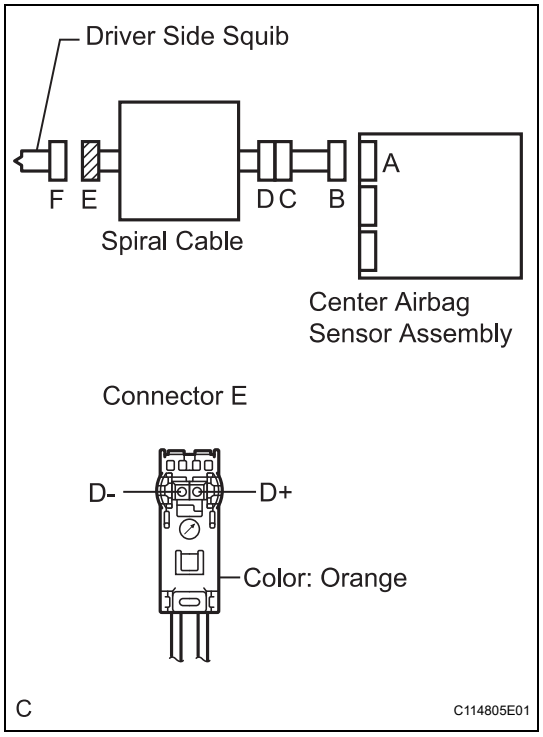
(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector E.
(d) Check that the spiral cable connectors (on the steering pad side) are not damaged.

OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → REPLACE SPIRAL CABLE (See page RS-357)

OK

3 CHECK DRIVER SIDE SQUIB CIRCUIT



(a) Disconnect the connectors from the center airbag sensor assembly.

(b) Check for a short to B+ in the circuit.
 (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
 (2) Turn the power switch on (IG).
 (3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
D+ - Body ground	Power switch on (IG)	Below 1 V
D- - Body ground	Power switch on (IG)	Below 1 V

(c) Check for an open in the circuit.
 (1) Turn the power switch off.
 (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
 (3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
D+ - D-	Always	Below 1 Ω

(d) Check for a short to ground in the circuit.
 (1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
D+ - Body ground	Always	1 MΩ or higher
D- - Body ground	Always	1 MΩ or higher

(e) Check for a short in the circuit.
 (1) Release the activation prevention mechanism built into connector B (See page RS-33).
 (2) Measure the resistance according to the value(s) in the table below.

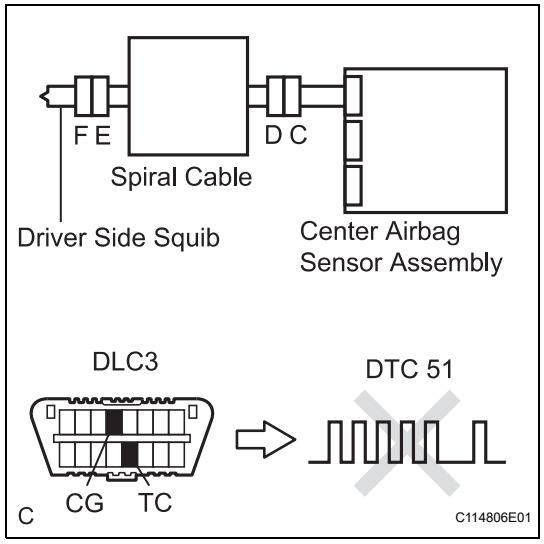
Standard resistance

Tester Connection	Condition	Specified Condition
D+ - D-	Always	1 MΩ or higher

NG → Go to step 5

OK

4 CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the steering pad and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1800, B1801, B1802, B1803, or 51 is not output.

HINT:

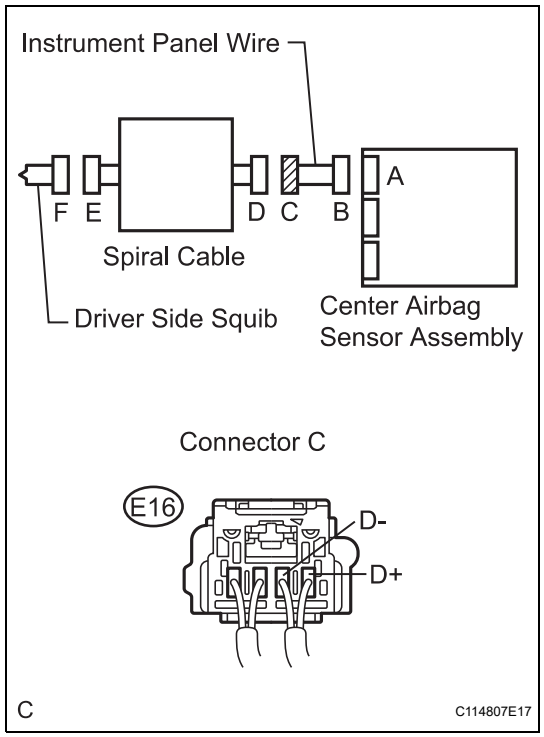
Codes other than DTC B1800, B1801, B1802, B1803, and 51 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

5 CHECK INSTRUMENT PANEL WIRE



(a) Restore the released activation prevention mechanism of connector B to the original condition.
(b) Disconnect the instrument panel wire connector from the spiral cable.
(c) Check for a short to B+ in the circuit.
  (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (2) Turn the power switch on (IG).
  (3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E16-1 (D+) - Body ground	Power switch on (IG)	Below 1 V
E16-2 (D-) - Body ground	Power switch on (IG)	Below 1 V

(d) Check for an open in the circuit.
  (1) Turn the power switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

RS

(3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E16-1 (D+) - E16-2 (D-)	Always	Below 1 Ω

(e) Check for a short to ground in the circuit.

(1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E16-1 (D+) - Body ground	Always	1 MΩ or higher
E16-2 (D-) - Body ground	Always	1 MΩ or higher

(f) Check for a short in the circuit.

(1) Release the activation prevention mechanism built into connector B (See page RS-33).

(2) Measure the resistance according to the value(s) in the table below.

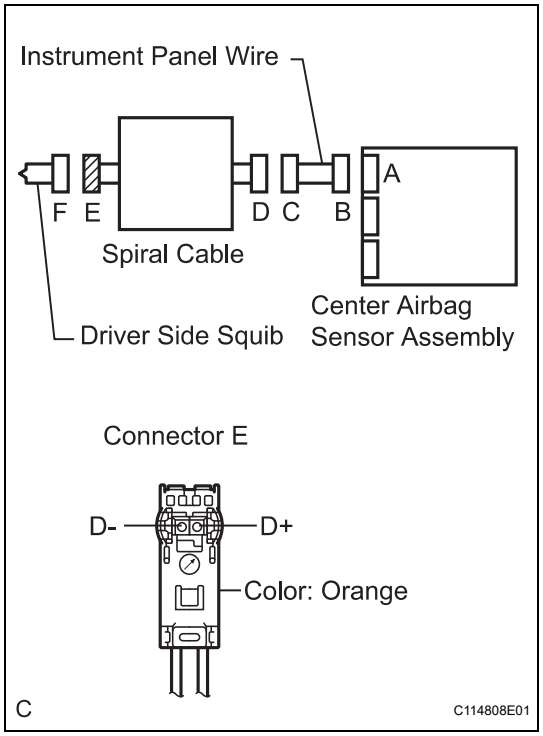
Standard resistance

Tester Connection	Condition	Specified Condition
E16-1 (D+) - E16-2 (D-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

6 CHECK SPIRAL CABLE



(a) Check for a short to B+ in the circuit.

(1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(2) Turn the power switch on (IG).

(3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
D+ - Body ground	Power switch on (IG)	Below 1 V
D- - Body ground	Power switch on (IG)	Below 1 V

(b) Check for an open in the circuit.

(1) Turn the power switch off.

(2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

(3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
D+ - D-	Always	Below 1 Ω

(c) Check for a short to ground in the circuit.

RS

(1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
D+ - Body ground	Always	1 MΩ or higher
D- - Body ground	Always	1 MΩ or higher

(d) Check for a short in the circuit.

(1) Release the activation prevention mechanism built into connector D (See page RS-33).

(2) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
D+ - D-	Always	1 MΩ or higher

NG → **REPLACE SPIRAL CABLE (See page RS-357)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

DTC	B1805/52	Short in Front Passenger Side Squib Circuit

DTC	B1806/52	Open in Front Passenger Side Squib Circuit

DTC	B1807/52	Short to GND in Front Passenger Side Squib Circuit

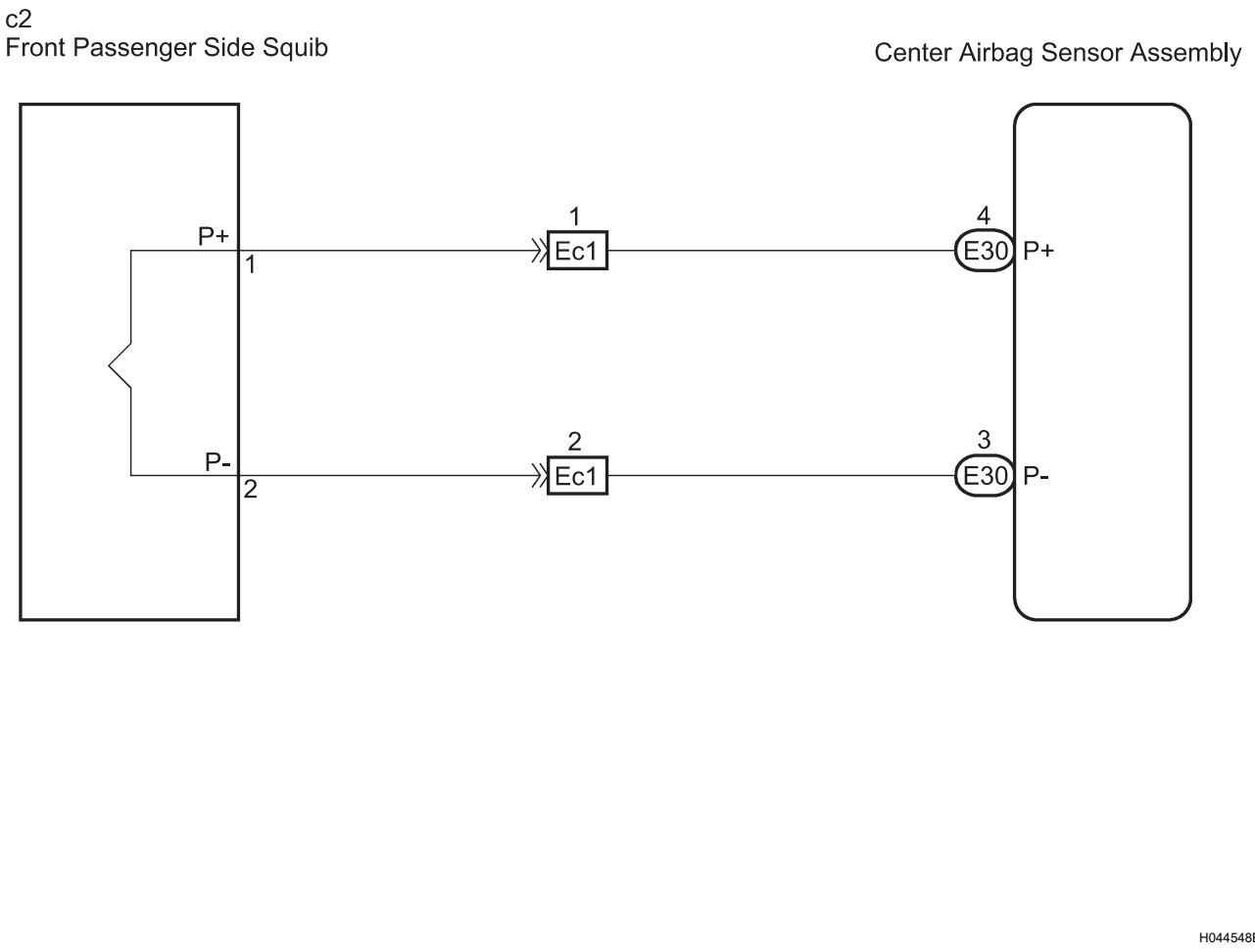
DTC	B1808/52	Short to B+ in Front Passenger Side Squib Circuit

DESCRIPTION

The front passenger side squib circuit consists of the center airbag sensor assembly and the front passenger airbag assembly.
The circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the front passenger side squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1805/52	• The center airbag sensor assembly receives a line short circuit signal 5 times in the front passenger side squib circuit during primary check. • Front passenger side squib malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Instrument panel wire assembly • Front passenger airbag assembly (Front passenger side squib) • Center airbag sensor assembly
B1806/52	• The center airbag sensor assembly receives an open circuit signal in the front passenger side squib circuit for 2 seconds. • Front passenger side squib malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Instrument panel wire assembly • Front passenger airbag assembly (Front passenger side squib) • Center airbag sensor assembly
B1807/52	• The center airbag sensor assembly receives a short circuit to ground signal in the front passenger side squib circuit for 0.5 seconds. • Front passenger side squib malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Instrument panel wire assembly • Front passenger airbag assembly (Front passenger side squib) • Center airbag sensor assembly
B1808/52	• The center airbag sensor assembly receives a short circuit to B+ signal in the front passenger side squib circuit for 0.5 seconds. • Front passenger side squib malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Instrument panel wire assembly • Front passenger airbag assembly (Front passenger side squib) • Center airbag sensor assembly

WIRING DIAGRAM

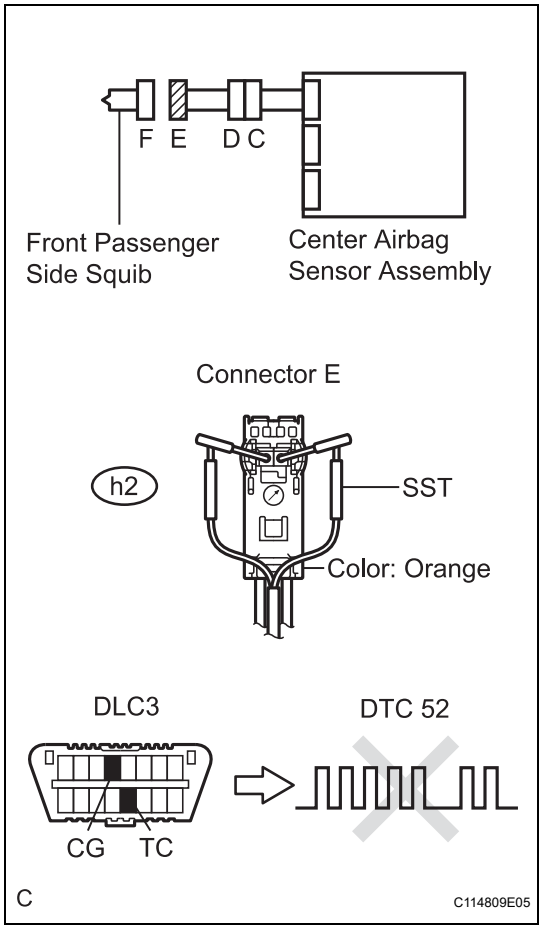


INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

1	CHECK FRONT PASSENGER AIRBAG ASSEMBLY (FRONT PASSENGER SIDE SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the front passenger airbag assembly.
(d) Connect the white wire side of SST (resistance 2.1 Ω) to connector E (orange connector).

CAUTION:
Never connect the tester to the front passenger airbag assembly (front passenger side squib) for measurement, as this may lead to a serious injury due to airbag deployment.

NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

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(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).

OK:
DTC B1805, B1806, B1807, B1808, or 52 is not output.

HINT:
Codes other than DTC B1805, B1806, B1807, B1808, and 52 may be output at this time, but they are not related to this check.

OK → **REPLACE FRONT PASSENGER AIRBAG ASSEMBLY (See page RS-379)**

NG

2	CHECK CONNECTOR

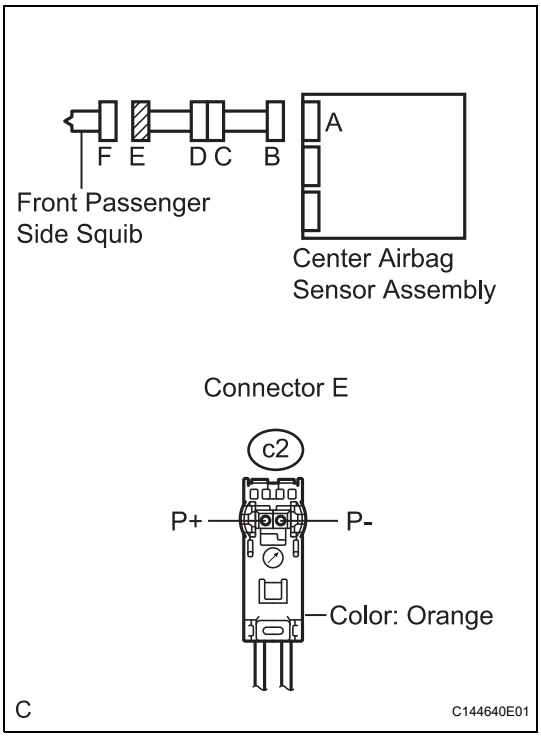
(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector E.
(d) Check that the instrument panel wire assembly connectors (on the front passenger airbag assembly side) are not damaged.

OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE ASSEMBLY**

OK

3 CHECK FRONT PASSENGER SIDE SQUIB CIRCUIT



(a) Disconnect the connectors from the center airbag sensor assembly.
(b) Check for a short to B+ in the circuit.
  (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (2) Turn the power switch on (IG).
  (3) Measure the voltage according to the value(s) in the table below.
  Standard voltage

Tester Connection	Condition	Specified Condition
c2-1 (P+) - Body ground	Power switch on (IG)	Below 1 V
c2-2 (P-) - Body ground	Power switch on (IG)	Below 1 V

(c) Check for an open in the circuit.
  (1) Turn the power switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
  (3) Measure the resistance according to the value(s) in the table below.
  Standard resistance

Tester Connection	Condition	Specified Condition
c2-1 (P+) - c2-2 (P-)	Always	Below 1 Ω

(d) Check for a short to ground in the circuit.
  (1) Measure the resistance according to the value(s) in the table below.
  Standard resistance

Tester Connection	Condition	Specified Condition
c2-1 (P+) - Body ground	Always	1 MΩ or higher
c2-2 (P-) - Body ground	Always	1 MΩ or higher

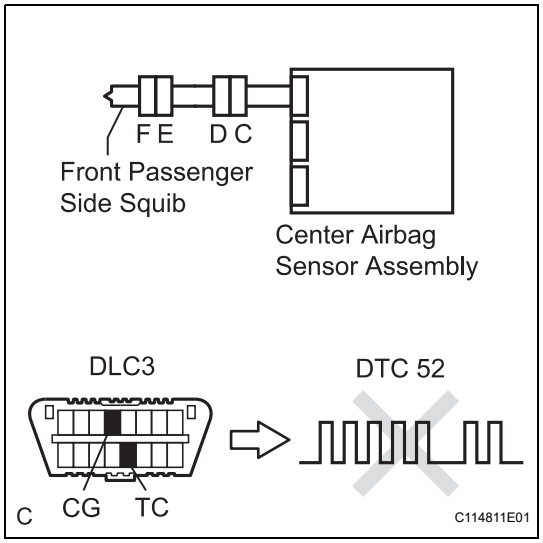
(e) Check for a short in the circuit.
  (1) Release the activation prevention mechanism built into connector B (See page RS-33).
  (2) Measure the resistance according to the value(s) in the table below.
  Standard resistance

Tester Connection	Condition	Specified Condition
c2-1 (P+) - c2-2 (P-)	Always	1 MΩ or higher

NG → **Go to step 5**

OK

4	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the front passenger airbag assembly and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1805, B1806, B1807, B1808, or 52 is not output.

HINT:

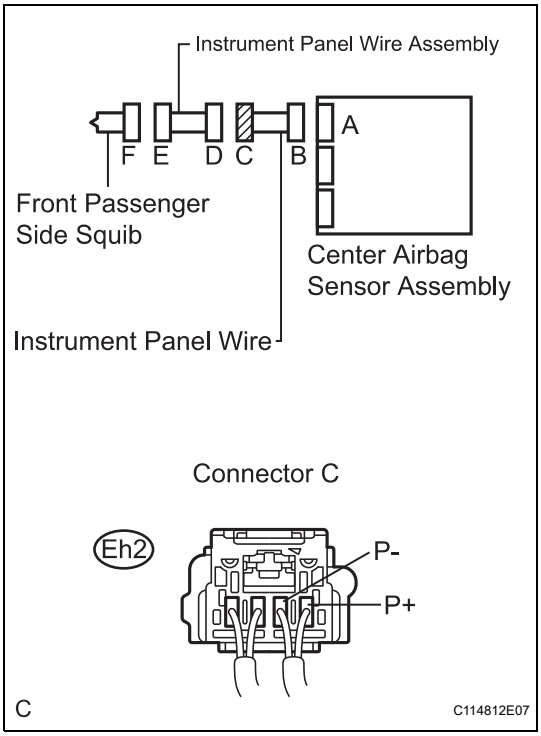
Codes other than DTC B1805, B1806, B1807, B1808, and 52 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

5 CHECK INSTRUMENT PANEL WIRE



(a) Restore the released activation prevention mechanism of connector B to the original condition.

(b) Disconnect the instrument panel wire connector from the instrument panel wire assembly.

(c) Check for a short to B+ in the circuit.

(1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(2) Turn the power switch on (IG).

(3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
Ec1-1 (P+) - Body ground	Power switch on (IG)	Below 1 V
Ec1-2 (P-) - Body ground	Power switch on (IG)	Below 1 V

(d) Check for an open in the circuit.

(1) Turn the power switch off.

(2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

(3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
Ec1-1 (P+) - Ec1-2 (P-)	Always	Below 1 Ω

(e) Check for a short to ground in the circuit.

(1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
Ec1-1 (P+) - Body ground	Always	1 MΩ or higher
Ec1-2 (P-) - Body ground	Always	1 MΩ or higher

(f) Check for a short in the circuit.

(1) Release the activation prevention mechanism built into connector B (See page RS-33).

(2) Measure the resistance according to the value(s) in the table below.

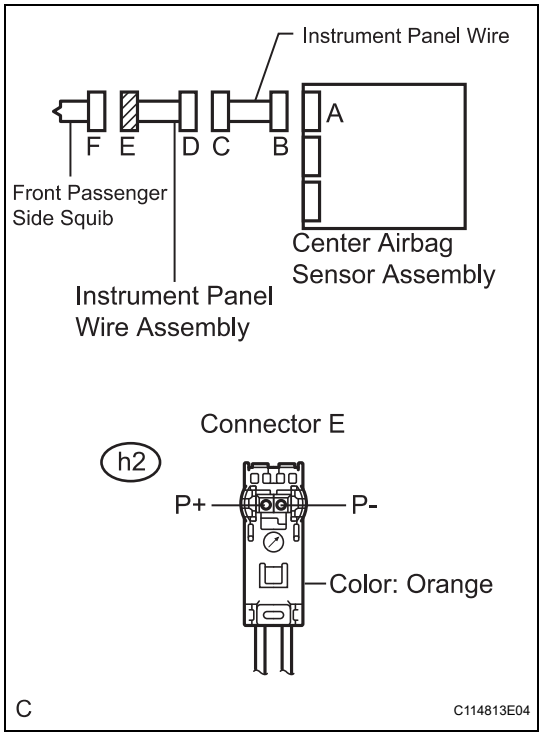
Standard resistance

Tester Connection	Condition	Specified Condition
Ec1-1 (P+) - Ec1-2 (P-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

6 CHECK INSTRUMENT PANEL WIRE ASSEMBLY



(a) Check for a short to B+ in the circuit.
  (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (2) Turn the power switch on (IG).
  (3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
c2-1 (P+) - Body ground	Power switch on (IG)	Below 1 V
c2-2 (P-) - Body ground	Power switch on (IG)	Below 1 V

(b) Check for a open in the circuit.
  (1) Turn the power switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
  (3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
c2-1 (P+) - c2-2 (P-)	Always	Below 1 Ω

(c) Check for a short to ground in the circuit.
  (1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
c2-1 (P+) - Body ground	Always	1 MΩ or higher
c2-2 (P-) - Body ground	Always	1 MΩ or higher

(d) Check for a short in the circuit.
  (1) Release the activation prevention mechanism built into connector D (See page RS-33).
  (2) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
c2-1 (P+) - c2-2 (P-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE ASSEMBLY**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

DTC	B1810/53	Short in Driver Side Squib 2nd Step Circuit

DTC	B1811/53	Open in Driver Side Squib 2nd Step Circuit

DTC	B1812/53	Short to GND in Driver Side Squib 2nd Step Circuit

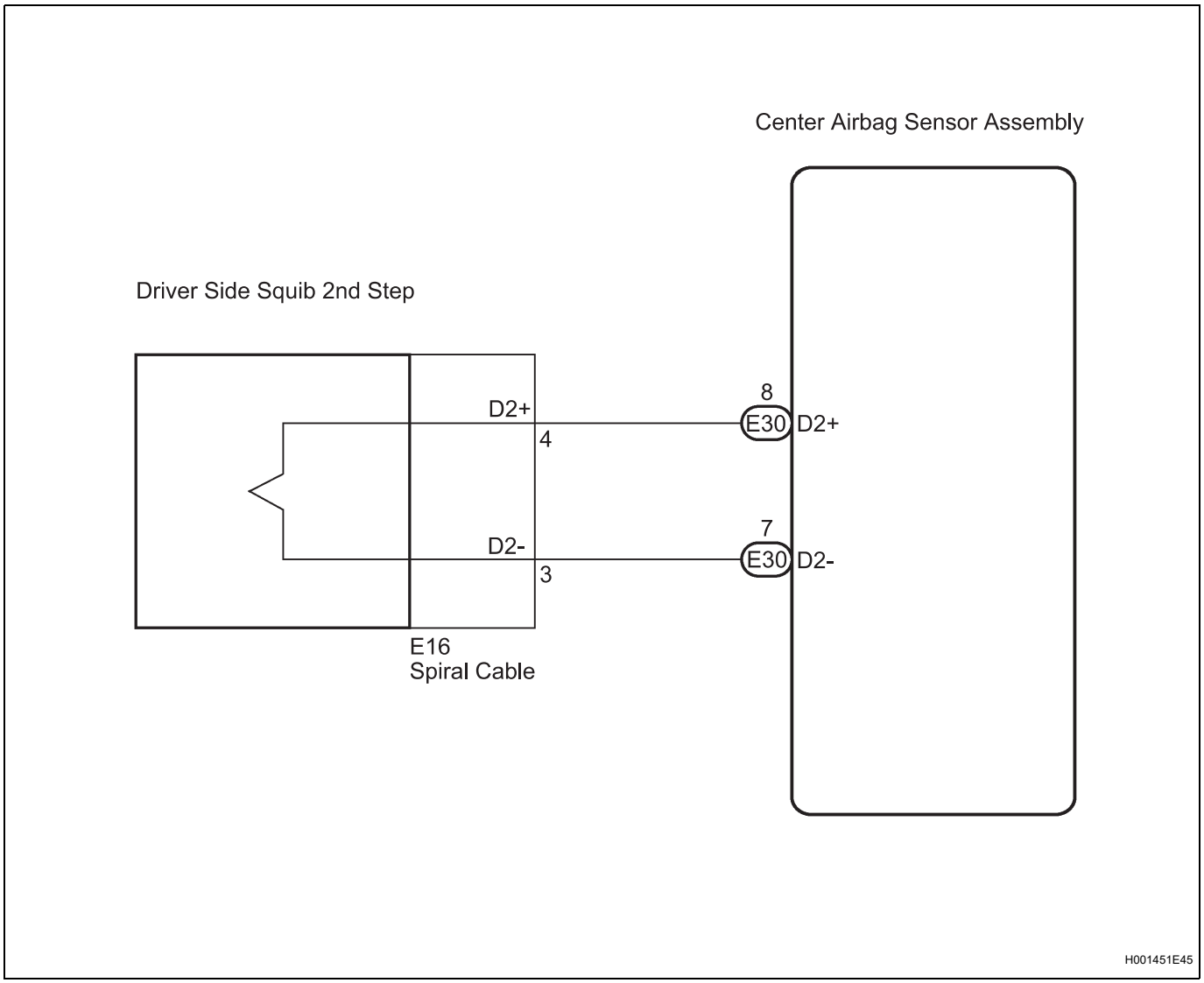
DTC	B1813/53	Short to B+ in Driver Side Squib 2nd Step Circuit

DESCRIPTION

The driver side squib 2nd step circuit consists of the center airbag sensor assembly, the spiral cable, and the steering pad.
The circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the driver side squib 2nd step circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1810/53	• The center airbag sensor assembly receives a line short circuit signal 5 times in the driver side squib 2nd step circuit during primary check. • Driver side squib 2nd step malfunction • Spiral cable malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Spiral cable • Steering pad (Driver side squib 2nd step) • Center airbag sensor assembly
B1811/53	• The center airbag sensor assembly receives an open circuit signal in the driver side squib 2nd step circuit for 2 seconds. • Driver side squib 2nd step malfunction • Spiral cable malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Spiral cable • Steering pad (Driver side squib 2nd step) • Center airbag sensor assembly
B1812/53	• The center airbag sensor assembly receives a short circuit to ground signal in the driver side 2nd step circuit for 0.5 seconds. • Driver side squib 2nd step malfunction • Spiral cable malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Spiral cable • Steering pad (Driver side squib 2nd step) • Center airbag sensor assembly
B1813/53	• The center airbag sensor assembly receives a short circuit to B+ signal in the driver side squib 2nd step circuit for 0.5 seconds. • Driver side squib 2nd step malfunction • Spiral cable malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Spiral cable • Steering pad (Driver side squib 2nd step) • Center airbag sensor assembly

WIRING DIAGRAM

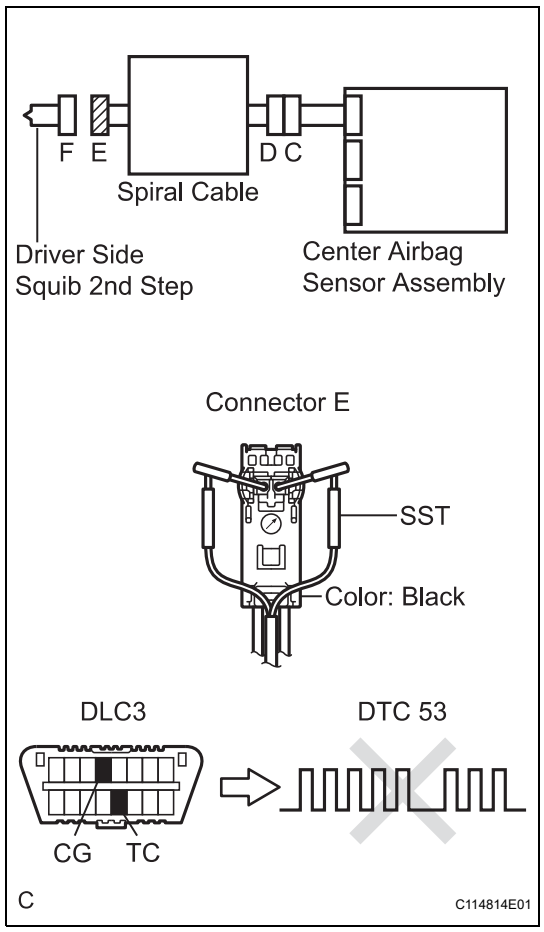


INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

1	CHECK STEERING PAD (DRIVER SIDE SQUIB 2ND STEP)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the steering pad.
(d) Connect the white wire side of SST (resistance 2.1 Ω) to connector E (black connector).

CAUTION:
Never connect the tester to the steering pad (driver side squib 2nd step) for measurement, as this may lead to a serious injury due to airbag deployment.

NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

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(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).

OK:
DTC B1810, B1811, B1812, B1813, or 53 is not output.

HINT:
Codes other than DTC B1810, B1811, B1812, B1813, and 53 may be output at this time, but they are not related to this check.

OK → **REPLACE STEERING PAD (See page RS-344)**

NG

2	CHECK CONNECTOR

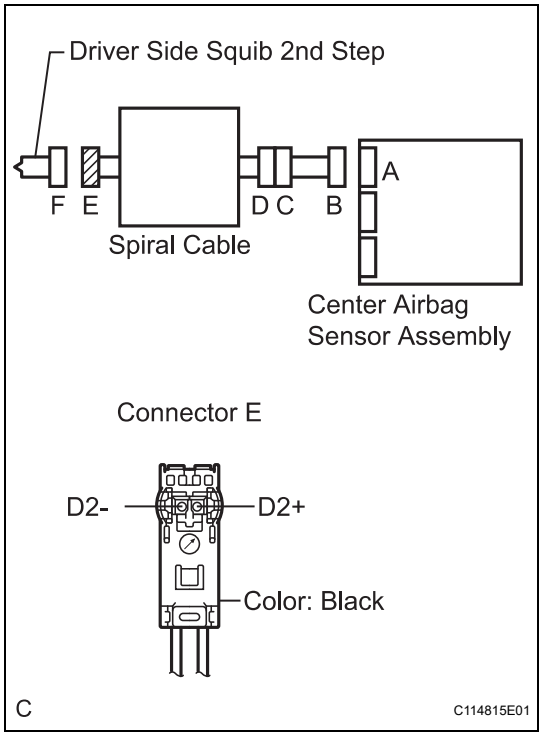
(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector E.
(d) Check that the spiral cable connectors (on the steering pad side) are not damaged.

OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → REPLACE SPIRAL CABLE (See page RS-357)

OK

3 CHECK DRIVER SIDE SQUIB 2ND STEP CIRCUIT



(a) Disconnect the connectors from the center airbag sensor assembly.

(b) Check for a short to B+ in the circuit.
  (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (2) Turn the power switch on (IG).
  (3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
D2+ - Body ground	Power switch on (IG)	Below 1 V
D2- - Body ground	Power switch on (IG)	Below 1 V

(c) Check for an open in the circuit.
  (1) Turn the power switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
  (3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
D2+ - D2-	Always	Below 1 Ω

(d) Check for a short to ground in the circuit.
  (1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
D2+ - Body ground	Always	1 MΩ or higher
D2- - Body ground	Always	1 MΩ or higher

(e) Check for a short in the circuit.
  (1) Release the activation prevention mechanism built into connector B (See page RS-33).
  (2) Measure the resistance according to the value(s) in the table below.

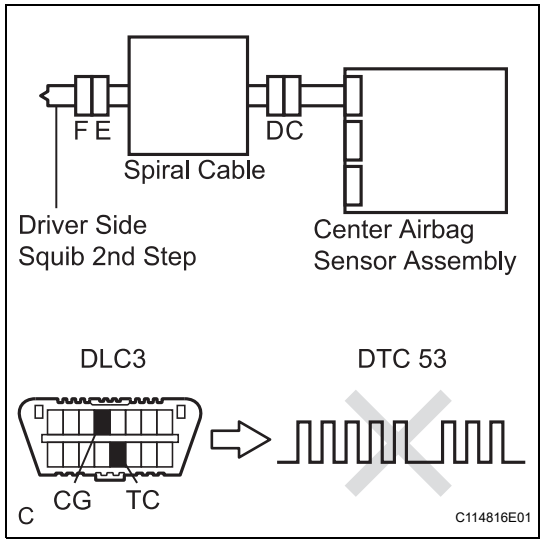
Standard resistance

Tester Connection	Condition	Specified Condition
D2+ - D2-	Always	1 MΩ or higher

NG → Go to step 5

OK

4 CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the steering pad and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1810, B1811, B1812, B1813, or 53 is not output.

HINT:

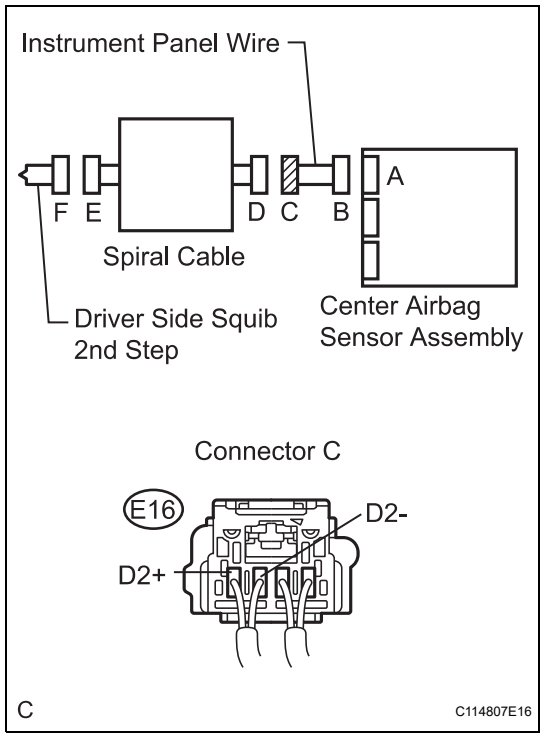
Codes other than DTC B1810, B1811, B1812, B1813, and 53 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

5 CHECK INSTRUMENT PANEL WIRE



(a) Check for a short to B+ in the circuit.
  (1) Restore the released activation prevention mechanism of connector B to the original condition.
  (2) Disconnect the instrument panel wire connector from the spiral cable.
  (3) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (4) Turn the power switch on (IG).
  (5) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E16-4 (D2+) - Body ground	Power switch on (IG)	Below 1 V
E16-3 (D2-) - Body ground	Power switch on (IG)	Below 1 V

(b) Check for an open in the circuit.
  (1) Turn the power switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

RS

(3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E16-4 (D2+) - E16-3 (D2-)	Always	Below 1 Ω

(c) Check for a short to ground in the circuit.

(1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E16-4 (D2+) - Body ground	Always	1 MΩ or higher
E16-3 (D2-) - Body ground	Always	1 MΩ or higher

(d) Check for a short in the circuit.

(1) Release the activation prevention mechanism built into connector B (See page RS-33).

(2) Measure the resistance according to the value(s) in the table below.

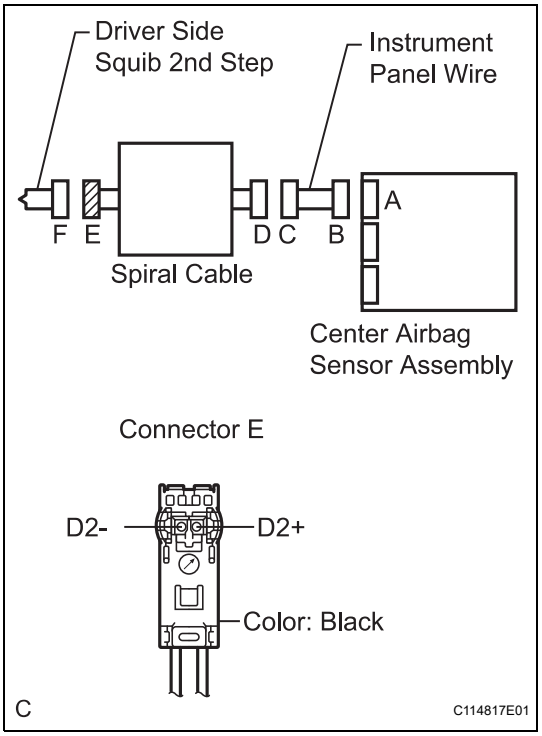
Standard resistance

Tester Connection	Condition	Specified Condition
E16-4 (D2+) - E16-3 (D2-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE ASSEMBLY**

OK

6	CHECK SPIRAL CABLE



(a) Check for a short to B+ in the circuit.
  (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (2) Turn the power switch on (IG).
  (3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
D2+ - Body ground	Power switch on (IG)	Below 1 V
D2- - Body ground	Power switch on (IG)	Below 1 V

(b) Check for an open in the circuit.
  (1) Turn the power switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
  (3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
D2+ - D2-	Always	Below 1 Ω

(c) Check for a short to ground in the circuit.
  (1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
D2+ - Body ground	Always	1 MΩ or higher
D2- - Body ground	Always	1 MΩ or higher

(d) Check for a short in the circuit.
  (1) Release the activation prevention mechanism built into connector D (See page RS-33).
  (2) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
D2+ - D2-	Always	1 MΩ or higher

NG → **REPLACE SPIRAL CABLE (See page RS-357)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

DTC	B1815/54	Short in Front Passenger Side Squib 2nd Step Circuit

DTC	B1816/54	Open in Front Passenger Side Squib 2nd Step Circuit

DTC	B1817/54	Short to GND in Front Passenger Side Squib 2nd Step Circuit

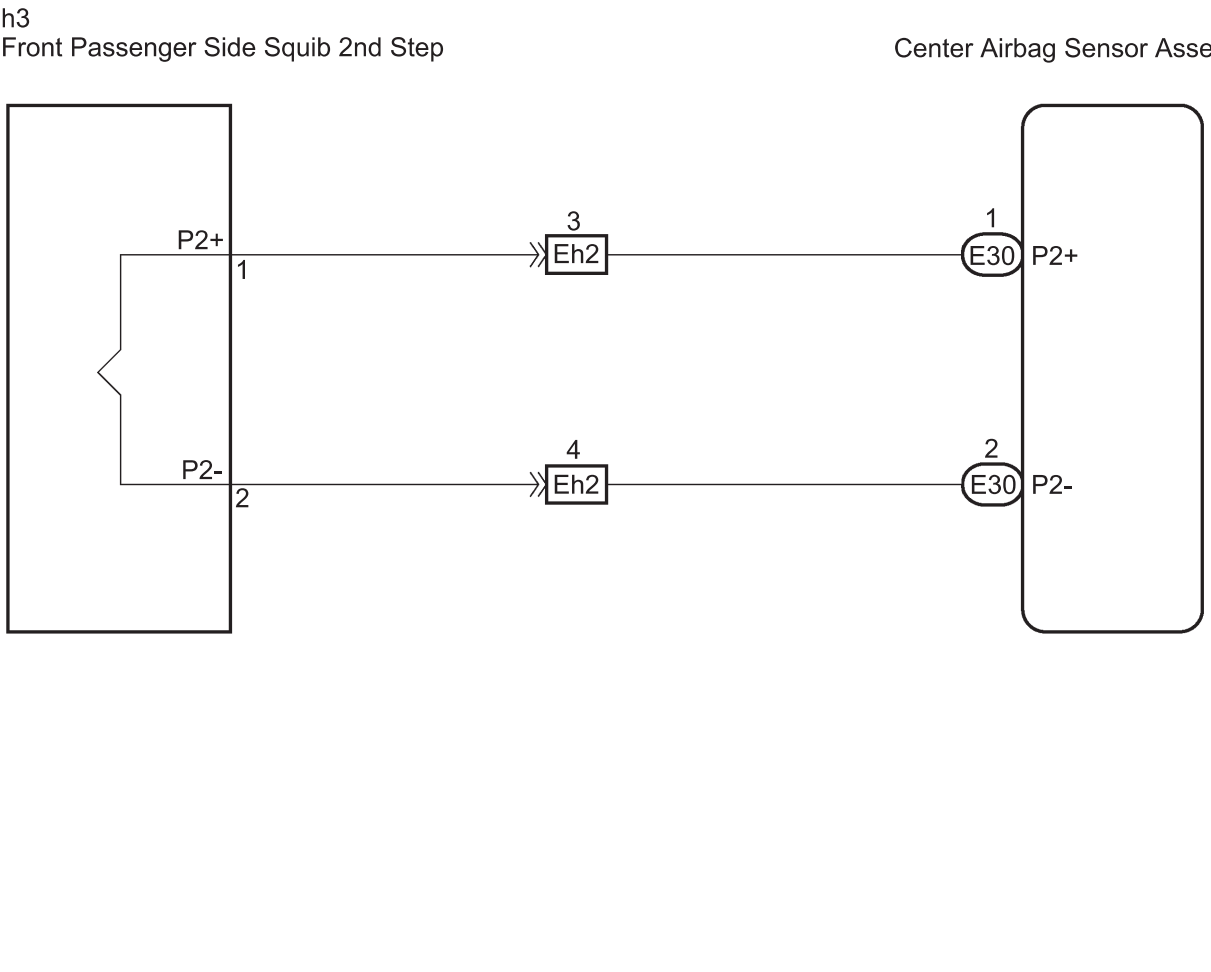
DTC	B1818/54	Short to B+ in Front Passenger Side Squib 2nd Step Circuit

DESCRIPTION

The front passenger side squib 2nd step circuit consists of the center airbag sensor assembly and the front passenger airbag assembly.
The circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the front passenger side squib 2nd step circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1815/54	• The center airbag sensor assembly receives a line short circuit signal 5 times in the front passenger side squib 2nd step circuit during primary check. • Front passenger side squib 2nd step malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Instrument panel wire assembly • Front passenger airbag assembly (Front passenger side squib 2nd step) • Center airbag sensor assembly
B1816/54	• The center airbag sensor assembly receives an open circuit signal in the front passenger side squib 2nd step circuit for 2 seconds. • Front passenger side squib 2nd step malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Instrument panel wire assembly • Front passenger airbag assembly (Front passenger side squib 2nd step) • Center airbag sensor assembly
B1817/54	• The center airbag sensor assembly receives a short circuit to ground signal in the front passenger side squib 2nd step circuit for 0.5 seconds. • Front passenger side squib 2nd step malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Instrument panel wire assembly • Front passenger airbag assembly (Front passenger side squib 2nd step) • Center airbag sensor assembly
B1818/54	• The center airbag sensor assembly receives a short circuit to B+ signal in the front passenger side squib 2nd step circuit for 0.5 seconds. • Front passenger side squib 2nd step malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Instrument panel wire assembly • Front passenger airbag assembly (Front passenger side squib 2nd step) • Center airbag sensor assembly

WIRING DIAGRAM

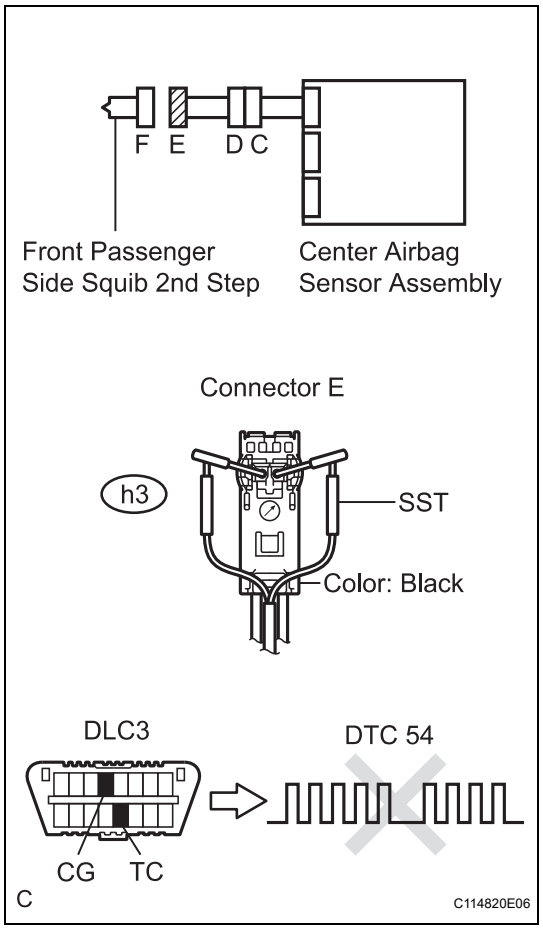


INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

1	CHECK FRONT PASSENGER AIRBAG ASSEMBLY (FRONT PASSENGER SIDE SQUIB 2ND STEP)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the front passenger airbag assembly.
(d) Connect the white wire side of SST (resistance 2.1 Ω) to connector E (black connector).
CAUTION:
Never connect the tester to the front passenger airbag assembly (front passenger side squib 2nd step) for measurement, as this may lead to a serious injury due to airbag deployment.
NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

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(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).
OK:
DTC B1815, B1816, B1817, B1818, or 54 is not output.
HINT:
Codes other than DTC B1815, B1816, B1817, B1818, and 54 may be output at this time, but they are not related to this check.

OK → **REPLACE FRONT PASSENGER AIRBAG ASSEMBLY (See page RS-379)**

NG

2	CHECK CONNECTOR

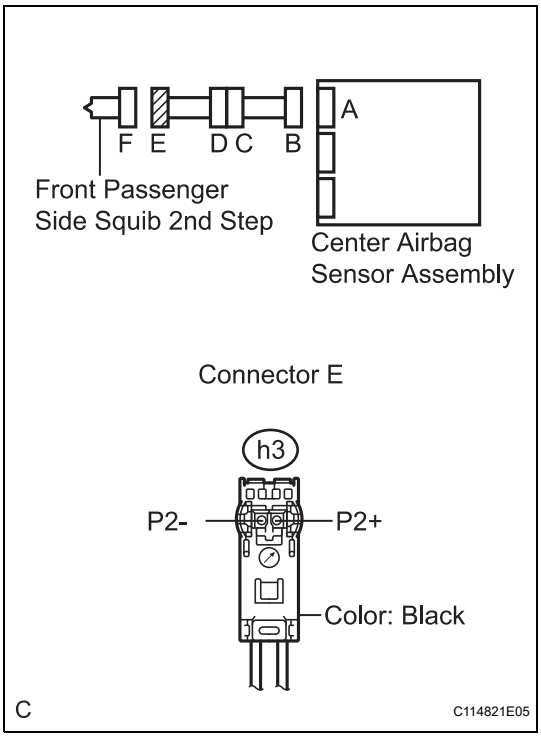
(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector E.
(d) Check that the instrument panel wire assembly connectors (on the front passenger airbag assembly side) are not damaged.

OK:
The lock button is not disengaged, or the claw of the lock is not damaged or deformed.

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE ASSEMBLY**

OK

3	CHECK FRONT PASSENGER SIDE SQUIB 2ND STEP CIRCUIT



(a) Disconnect the connectors from the center airbag sensor assembly.
(b) Check for a short to B+ in the circuit.
  (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (2) Turn the power switch on (IG).
  (3) Measure the voltage according to the value(s) in the table below.
  Standard voltage

Tester Connection	Condition	Specified Condition
c1-1 (P2+) - Body ground	Power switch on (IG)	Below 1 V
c1-2 (P2-) - Body ground	Power switch on (IG)	Below 1 V

(c) Check for an open in the circuit.
  (1) Turn the power switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
  (3) Measure the resistance according to the value(s) in the table below.
  Standard resistance

Tester Connection	Condition	Specified Condition
c1-1 (P2+) - c1-2 (P2-)	Always	Below 1 Ω

(d) Check for a short to ground in the circuit.
  (1) Measure the resistance according to the value(s) in the table below.
  Standard resistance

Tester Connection	Condition	Specified Condition
c1-1 (P2+) - Body ground	Always	1 MΩ or higher
c1-2 (P2-) - Body ground	Always	1 MΩ or higher

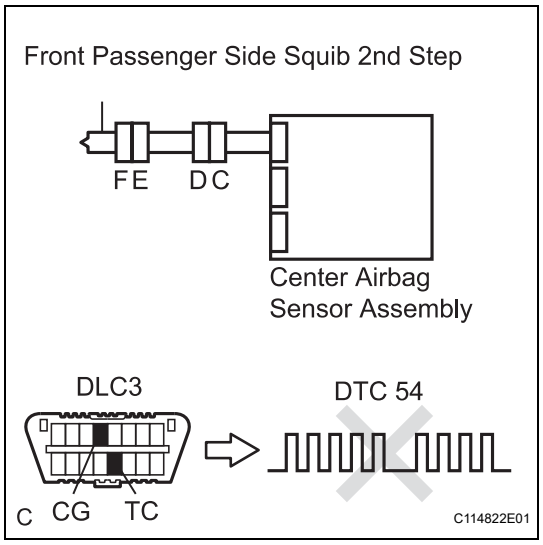
(e) Check for a short in the circuit.
  (1) Release the activation prevention mechanism built into connector B (See page RS-33).
  (2) Measure the resistance according to the value(s) in the table below.
  Standard resistance

Tester Connection	Condition	Specified Condition
c1-1 (P2+) - c1-2 (P2-)	Always	1 MΩ or higher

NG → Go to step 5

OK

4	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the front passenger airbag assembly and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1815, B1816, B1817, B1818, or 54 is not output.

HINT:

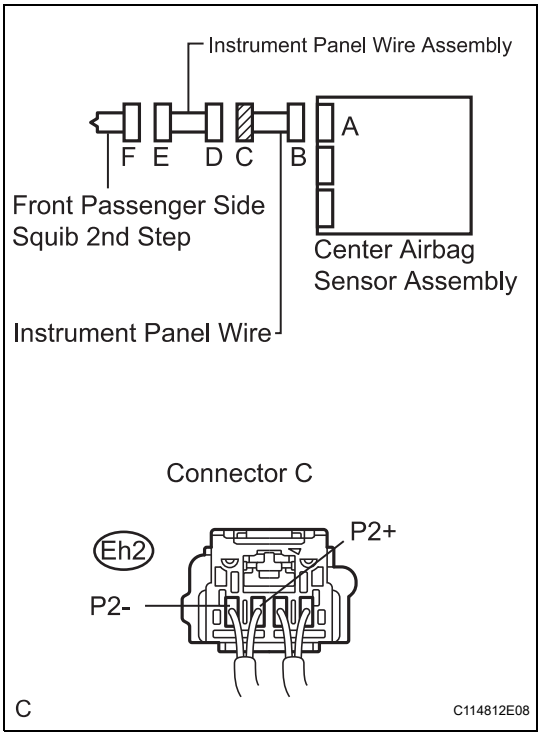
Codes other than DTC B1815, B1816, B1817, B1818, and 54 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

5 CHECK INSTRUMENT PANEL WIRE



(a) Check for a short to B+ in the circuit.
  (1) Restore the released activation prevention mechanism of connector B to the original condition.
  (2) Disconnect the instrument panel wire connector from the instrument panel wire assembly.
  (3) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (4) Turn the power switch on (IG).
  (5) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester connection	Condition	Specified condition
Ec1-3 (P2+) - Body ground	Power switch on (IG)	Below 1 V
Ec1-4 (P2-) - Body ground	Power switch on (IG)	Below 1 V

(b) Check for an open in the circuit.
  (1) Turn the power switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
  (3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
Ec1-3 (P2+) - Ec1-4 (P2-)	Always	Below 1 Ω

(c) Check for a short to ground in the circuit.
  (1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
Ec1-3 (P2+) - Body ground	Always	1 MΩ or higher
Ec1-4 (P2-) - Body ground	Always	1 MΩ or higher

(d) Check for a short in the circuit.
  (1) Release the activation prevention mechanism built into connector B (See page RS-33).
  (2) Measure the resistance according to the value(s) in the table below.

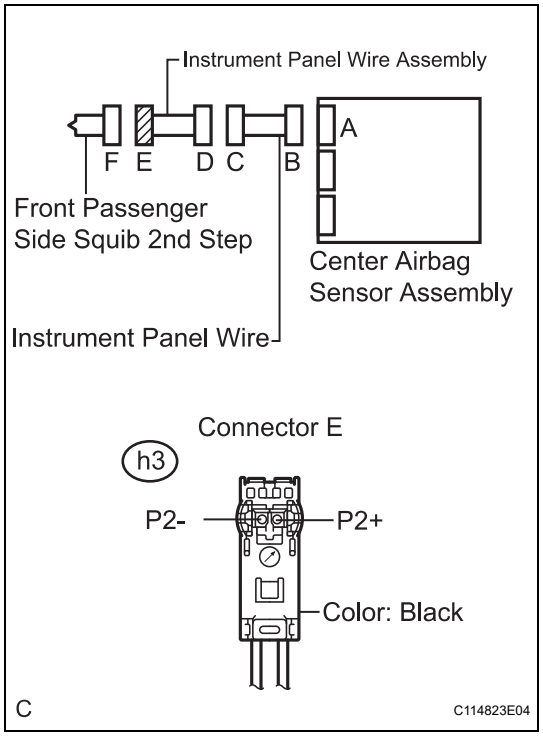
Standard resistance

Tester Connection	Condition	Specified Condition
Ec1-3 (P2+) - Ec1-4 (P2-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

6 CHECK INSTRUMENT PANEL WIRE ASSEMBLY



(a) Check for a short to B+ in the circuit.
  (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (2) Turn the power switch on (IG).
  (3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
c1-1 (P2+) - Body ground	Power switch on (IG)	Below 1 V
c1-2 (P2-) - Body ground	Power switch on (IG)	Below 1 V

(b) Check for an open in the circuit.
  (1) Turn the power switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
  (3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
c1-1 (P2+) - c1-2 (P2-)	Always	Below 1 Ω

(c) Check for a short to ground in the circuit.
  (1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
c1-1 (P2+) - Body ground	Always	1 MΩ or higher
c1-2 (P2-) - Body ground	Always	1 MΩ or higher

(d) Check for a short in the circuit.
  (1) Release the activation prevention mechanism built into connector D (See page RS-33).
  (2) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
c1-1 (P2+) - c1-2 (P2-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE ASSEMBLY**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

DTC	B1820/55	Short in Front Driver Side - Side Squib Circuit

DTC	B1821/55	Open in Front Driver Side - Side Squib Circuit

DTC	B1822/55	Short to GND in Front Driver Side - Side Squib Circuit

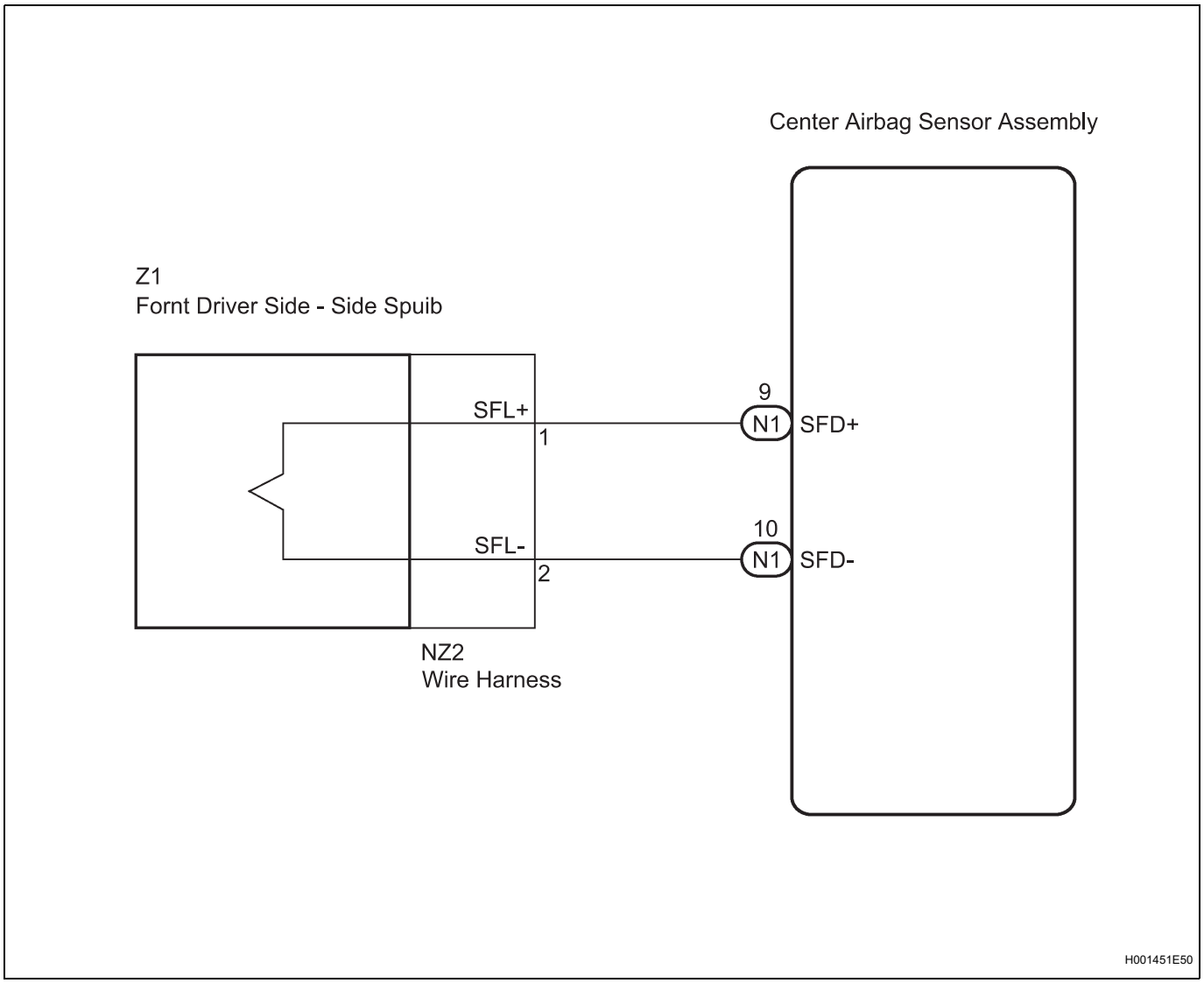
DTC	B1823/55	Short to B+ in Front Driver Side - Side Squib Circuit

DESCRIPTION

The front driver side - side squib circuit consists of the center airbag sensor assembly and the front seat side airbag assembly LH.
This circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the front driver side - side squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1820/55	• The center airbag sensor assembly receives a line short circuit signal 5 times in the front driver side - side squib circuit during primary check. • Front driver side - side squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Front seat side airbag assembly LH (Front driver side - side squib) • Center airbag sensor assembly
B1821/55	• The center airbag sensor assembly receives an open circuit signal in the front driver side - side squib circuit for 2 seconds. • Front driver side - side squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Front seat side airbag assembly LH (Front driver side - side squib) • Center airbag sensor assembly
B1822/55	• The center airbag sensor assembly receives a short circuit to ground signal in the front driver side - side squib circuit for 0.5 seconds. • Front driver side - side squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Front seat side airbag assembly LH (Front driver side - side squib) • Center airbag sensor assembly
B1823/55	• The center airbag sensor assembly receives a short circuit to B+ signal in the front driver side - side squib circuit for 0.5 seconds. • Front driver side - side squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Front seat side airbag assembly LH (Front driver side - side squib) • Center airbag sensor assembly

WIRING DIAGRAM

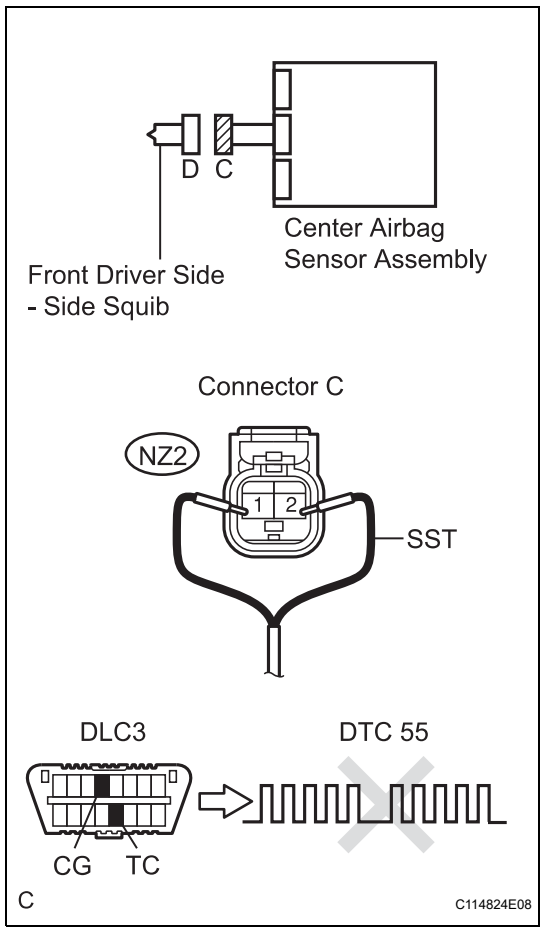


INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

1	CHECK FRONT SEAT SIDE AIRBAG ASSEMBLY LH (FRONT DRIVER SIDE - SIDE SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the front seat side airbag assembly LH.
(d) Connect the black wire side of SST (resistance 2.1 Ω) to connector C.

CAUTION:
Never connect the tester to the front seat side airbag assembly LH (front driver side - side squib) for measurement, as this may lead to a serious injury due to airbag deployment.

NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

SST 09843-18060

(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).

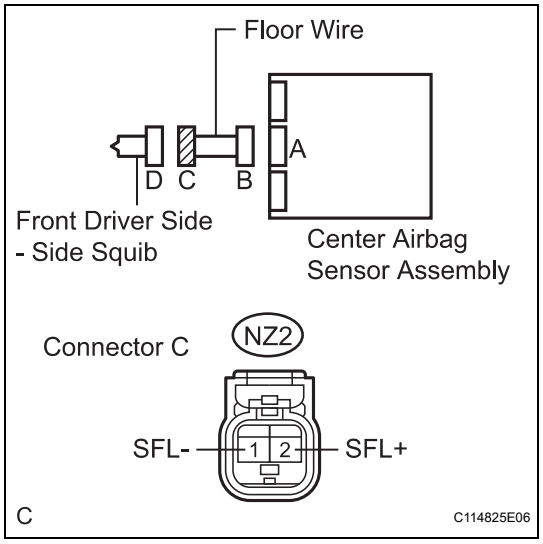
OK:
DTC B1820, B1821, B1822, B1823, or 55 is not output.

HINT:
Codes other than DTC B1820, B1821, B1822, B1823, and 55 may be output at this time, but they are not related to this check.

OK → **REPLACE FRONT SEAT ASSEMBLY LH**

NG

2 CHECK FLOOR WIRE (FRONT DRIVER SIDE - SIDE SQUIB CIRCUIT)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector C.
(d) Disconnect the connectors from the center airbag sensor assembly.
(e) Check for a short to B+ in the circuit.
  (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (2) Turn the power switch on (IG).
  (3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
NZ2-2 (SFL+) - Body ground	Power switch on (IG)	Below 1 V
NZ2-1 (SFL-) - Body ground	Power switch on (IG)	Below 1 V

(f) Check for an open in the circuit.
  (1) Turn the power switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
  (3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
NZ2-2 (SFL+) - NZ2-1 (SFL-)	Always	Below 1 Ω

(g) Check for a short to ground in the circuit.
  (1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
NZ2-2 (SFL+) - Body ground	Always	1 MΩ or higher
NZ2-1 (SFL-) - Body ground	Always	1 MΩ or higher

(h) Check for a short in the circuit.
  (1) Release the activation prevention mechanism built into connector B (See page RS-33).
  (2) Measure the resistance according to the value(s) in the table below.

Standard resistance

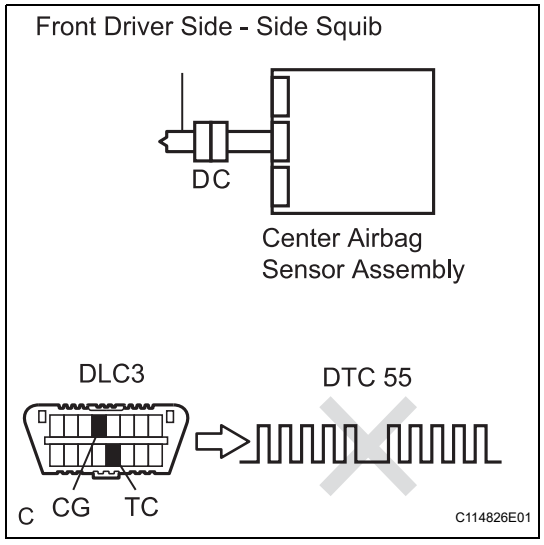
Tester Connection	Condition	Specified Condition
NZ2-2 (SFL+) - NZ2-1 (SFL-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

RS

OK

3	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the front seat side airbag assembly LH and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1820, B1821, B1822, B1823, or 55 is not output.

HINT:

Codes other than DTC B1820, B1821, B1822, B1823, and 55 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

DTC	B1825/56	Short in Front Passenger Side - Side Squib Circuit

DTC	B1826/56	Open in Front Passenger Side - Side Squib Circuit

DTC	B1827/56	Short to GND in Front Passenger Side - Side Squib Circuit

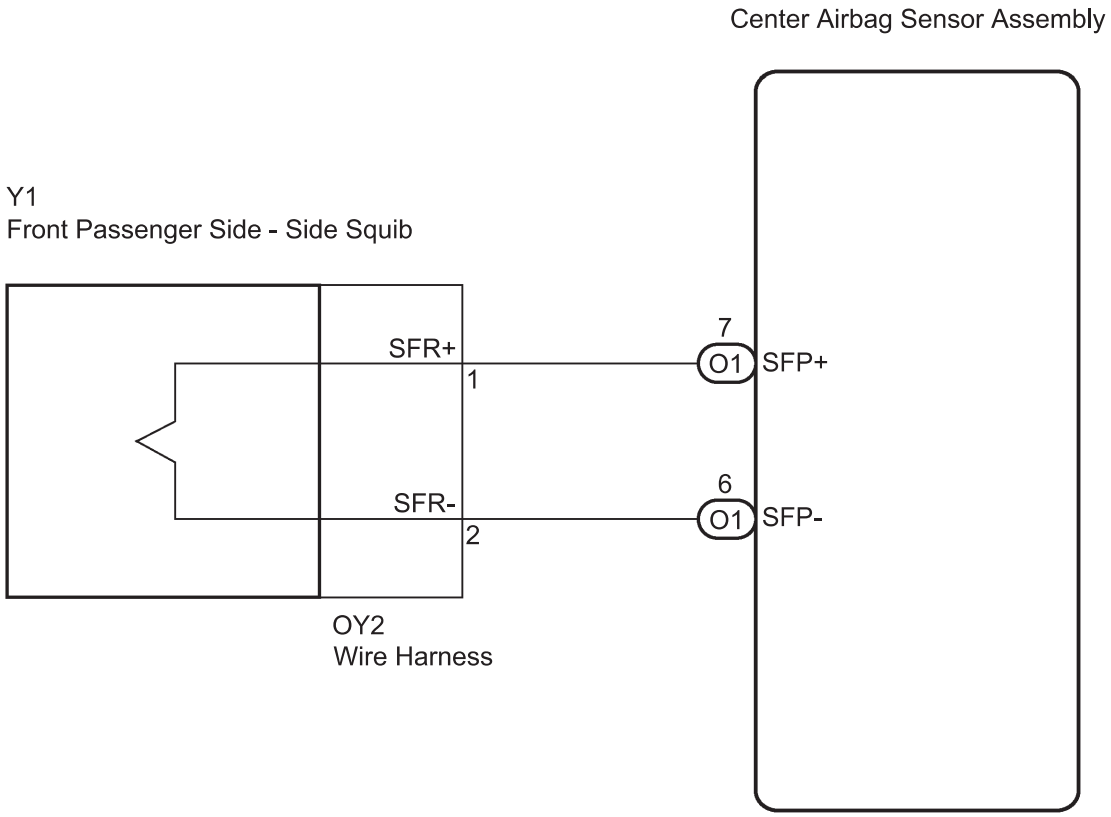
DTC	B1828/56	Short to B+ in Front Passenger Side - Side Squib Circuit

DESCRIPTION

The front passenger side - side squib circuit consists of the center airbag sensor assembly and the front seat side airbag assembly RH.
The circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the front passenger side - side squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1825/56	• The center airbag sensor assembly receives a line short circuit signal 5 times in the front passenger side - side squib circuit during primary check. • Front passenger side - side squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Front seat side airbag assembly RH (Front passenger side - side squib) • Center airbag sensor assembly
B1826/56	• The center airbag sensor assembly receives an open circuit signal in the front passenger side - side squib circuit for 2 seconds. • Front passenger side - side squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Front seat side airbag assembly RH (Front passenger side - side squib) • Center airbag sensor assembly
B1827/56	• The center airbag sensor assembly receives a short circuit to ground signal in the front passenger side - side squib circuit for 0.5 seconds. • Front passenger side - side squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Front seat side airbag assembly RH (Front passenger side - side squib) • Center airbag sensor assembly
B1828/56	• The center airbag sensor assembly receives a short circuit to B+ signal in the front passenger side - side squib circuit for 0.5 seconds. • Front passenger side - side squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Front seat side airbag assembly RH (Front passenger side - side squib) • Center airbag sensor assembly

WIRING DIAGRAM

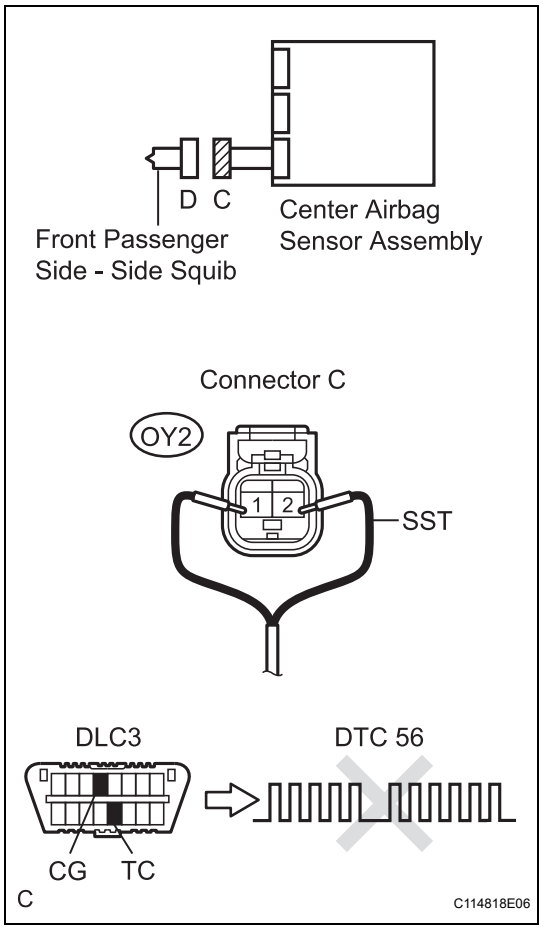


INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

1	CHECK FRONT SEAT SIDE AIRBAG ASSEMBLY RH (FRONT PASSENGER SIDE - SIDE SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the front seat side airbag assembly RH.
(d) Connect the black wire side of SST (resistance 2.1 Ω) to connector C.

CAUTION:
Never connect the tester to the front seat side airbag assembly RH (front passenger side - side squib) for measurement, as this may lead to a serious injury due to airbag deployment.

NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

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(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).

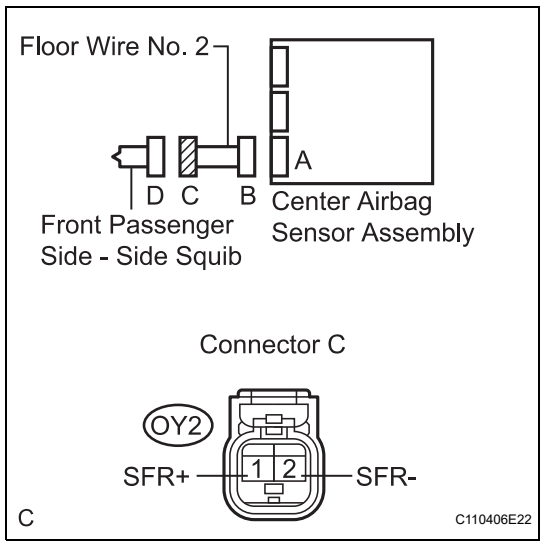
OK:
DTC B1825, B1826, B1827, B1828, or 56 is not output.

HINT:
Codes other than DTC B1825, B1826, B1827, B1828, and 56 may be output at this time, but they are not related to this check.

OK → **REPLACE FRONT SEAT ASSEMBLY RH**

NG

2	CHECK FLOOR WIRE NO. 2 (FRONT PASSENGER SIDE - SIDE SQUIB CIRCUIT)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector C.
(d) Disconnect the connectors from the center airbag sensor assembly.
(e) Check for a short to B+ in the circuit.
  (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (2) Turn the power switch on (IG).
  (3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester connection	Condition	Specified condition
OY2-2 (SFR+) - Body ground	Power switch on (IG)	Below 1 V
OY2-1 (SFR-) - Body ground	Power switch on (IG)	Below 1 V

(f) Check for an open in the circuit.
  (1) Turn the power switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
  (3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
OY2-2 (SFR+) - OY2-1 (SFR-)	Always	Below 1 Ω

(g) Check for a short to ground in the circuit.
  (1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
OY2-2 (SFR+) - Body ground	Always	1 MΩ or higher
OY2-1 (SFR-) - Body ground	Always	1 MΩ or higher

(h) Check for a short in the circuit.
  (1) Release the activation prevention mechanism built into connector B (See page RS-33).
  (2) Measure the resistance according to the value(s) in the table below.

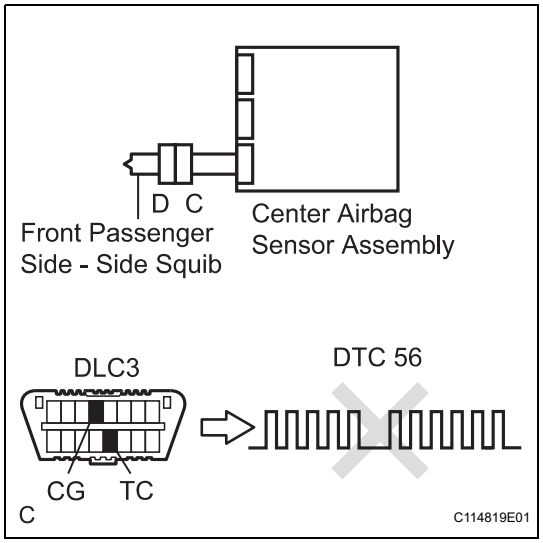
Standard resistance

Tester Connection	Condition	Specified Condition
OY2-2 (SFR+) - OY2-1 (SFR-)	Always	1 MΩ or higher

NG	REPAIR OR REPLACE FLOOR WIRE NO. 2

OK

3	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the front seat side airbag assembly RH and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1825, B1826, B1827, B1828, or 56 is not output.

HINT:

Codes other than DTC B1825, B1826, B1827, B1828, and 56 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

DTC	B1830/57	Short in Driver Side Curtain Shield Squib Circuit

DTC	B1831/57	Open in Driver Side Curtain Shield Squib Circuit

DTC	B1832/57	Short to GND in Driver Side Curtain Shield Squib Circuit

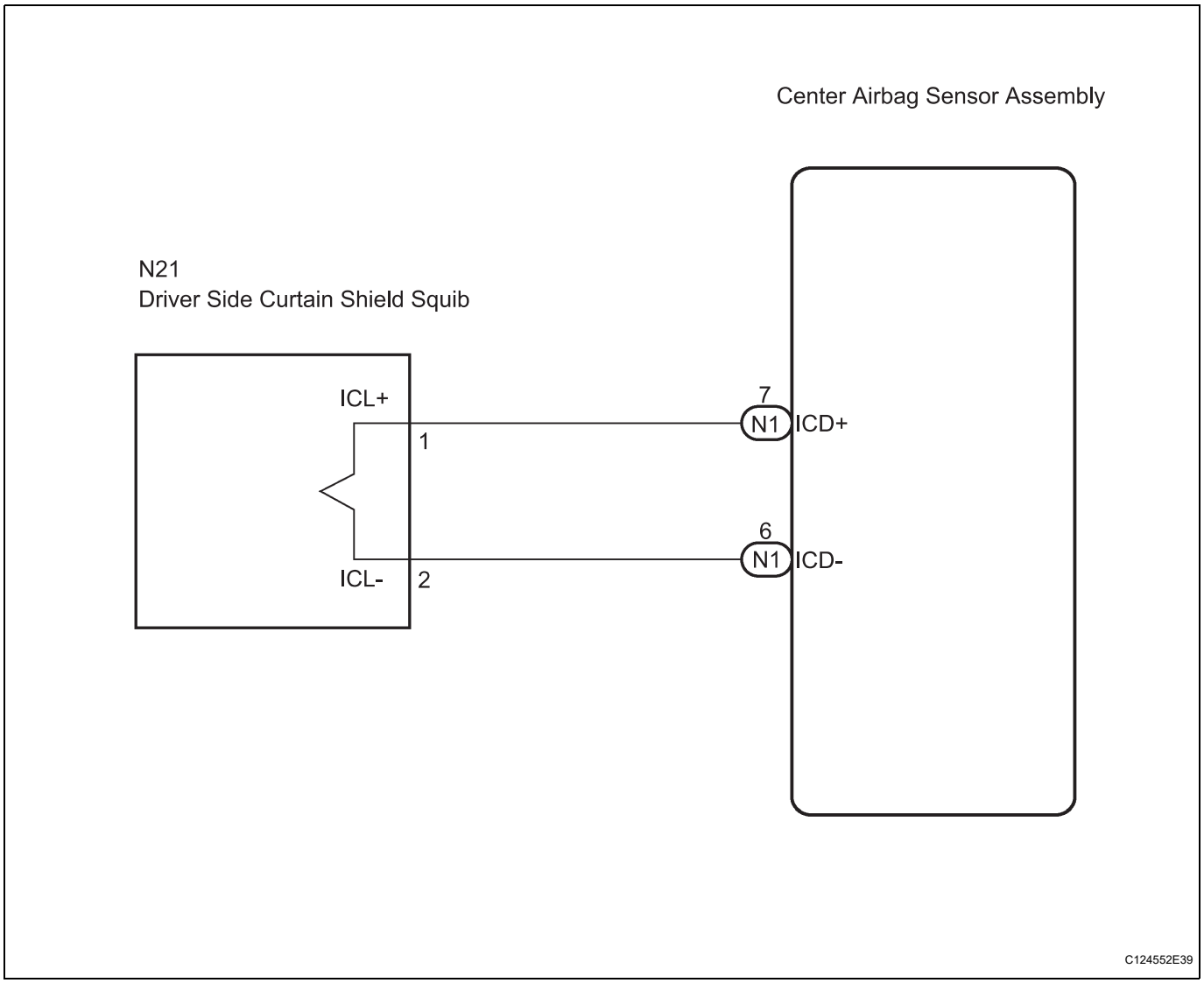
DTC	B1833/57	Short to B+ in Driver Side Curtain Shield Squib Circuit

DESCRIPTION

The driver side curtain shield squib circuit consists of the center airbag sensor assembly and the curtain shield airbag assembly LH.
The circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the driver side curtain shield squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1830/57	• The center airbag sensor assembly receives a line short circuit signal 5 times in the driver side curtain shield squib circuit during primary check. • Driver side curtain shield squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Curtain shield airbag assembly LH (Driver side curtain shield squib) • Center airbag sensor assembly
B1831/57	• The center airbag sensor assembly receives an open circuit signal in the driver side curtain shield squib circuit for 2 seconds. • Driver side curtain shield squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Curtain shield airbag assembly LH (Driver side curtain shield squib) • Center airbag sensor assembly
B1832/57	• The center airbag sensor assembly receives a short circuit to ground signal in the driver side curtain shield squib circuit for 0.5 seconds. • Driver side curtain shield squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Curtain shield airbag assembly LH (Driver side curtain shield squib) • Center airbag sensor assembly
B1833/57	• The center airbag sensor assembly receives a short circuit to B+ signal in the driver side curtain shield squib circuit for 0.5 seconds. • Driver side curtain shield squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Curtain shield airbag assembly LH (Driver side curtain shield squib) • Center airbag sensor assembly

WIRING DIAGRAM

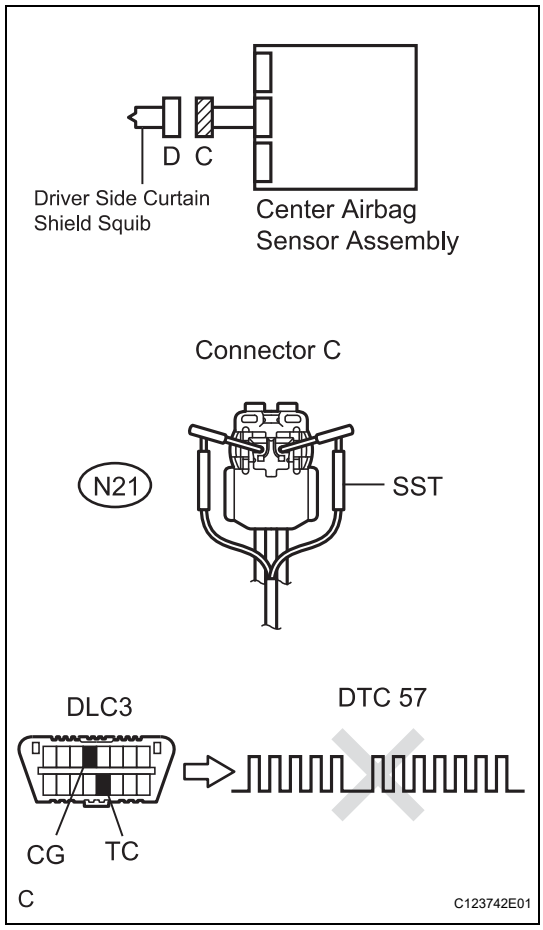


INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

1	CHECK CURTAIN SHIELD AIRBAG ASSEMBLY LH (DRIVER SIDE CURTAIN SHIELD SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the curtain shield airbag assembly LH.
(d) Connect the white wire side of SST (resistance 2.1 Ω) to connector C.
CAUTION:
Never connect the tester to the curtain shield airbag assembly LH (driver side curtain shield squib) for measurement, as this may lead to a serious injury due to airbag deployment.
NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

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(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).
OK:
DTC B1830, B1831, B1832, B1833, or 57 is not output.
HINT:
Codes other than DTC B1830, B1831, B1832, B1833, and 57 may be output at this time, but they are not related to this check.

OK → **REPLACE CURTAIN SHIELD AIRBAG ASSEMBLY LH (See page RS-401)**

NG

2	CHECK CONNECTOR

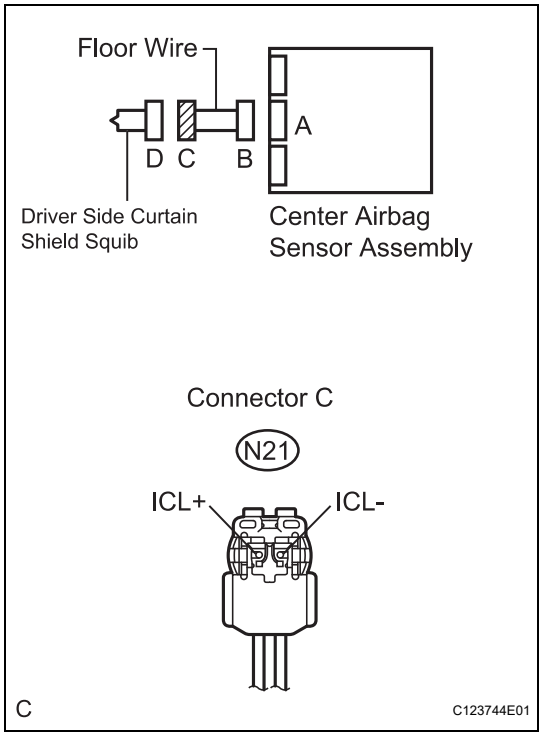
(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector C.
(d) Check that the floor wire connector (on the curtain shield airbag assembly LH side) is not damaged.

OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

3 CHECK FLOOR WIRE (DRIVER SIDE CURTAIN SHIELD SQUIB CIRCUIT)



(a) Disconnect the connectors from the center airbag sensor assembly.
(b) Check for a short to B+ in the circuit.
  (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (2) Turn the power switch on (IG).
  (3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
N21-1 (ICL+) - Body ground	Power switch on (IG)	Below 1 V
N21-2 (ICL-) - Body ground	Power switch on (IG)	Below 1 V

(c) Check for an open in the circuit.
  (1) Turn the power switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
  (3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
N21-1 (ICL+) - N21-2 (ICL-)	Always	Below 1 Ω

(d) Check for a short to ground in the circuit.
  (1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
N21-1 (ICL+) - Body ground	Always	1 MΩ or higher
N21-2 (ICL-) - Body ground	Always	1 MΩ or higher

(e) Check for a short in the circuit.
  (1) Release the activation prevention mechanism built into connector B (See page RS-33).
  (2) Measure the resistance according to the value(s) in the table below.

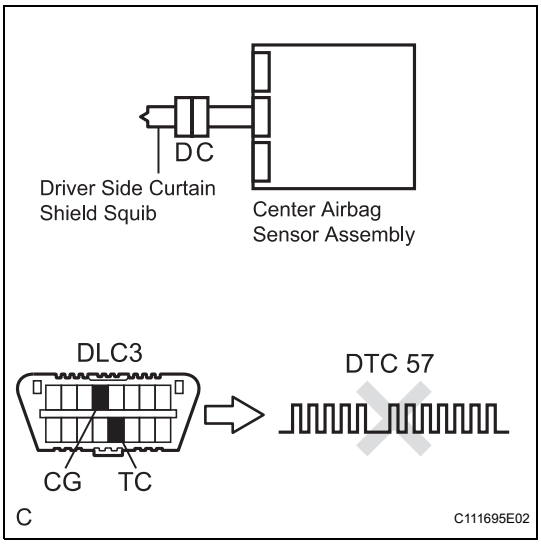
Standard resistance

Tester Connection	Condition	Specified Condition
N21-1 (ICL+) - N21-2 (ICL-)	Always	1 MΩ or higher

NG → REPAIR OR REPLACE FLOOR WIRE

OK

4	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the curtain shield airbag assembly LH and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1830, B1831, B1832, B1833, or 57 is not output.

HINT:

Codes other than DTC B1830, B1831, B1832, B1833, and 57 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

DTC	B1835/58	Short in Front Passenger Side Curtain Shield Squib Circuit

DTC	B1836/58	Open in Front Passenger Side Curtain Shield Squib Circuit

DTC	B1837/58	Short to GND in Front Passenger Side Curtain Shield Squib Circuit

DTC	B1838/58	Short to B+ in Front Passenger Side Curtain Shield Squib Circuit

DESCRIPTION

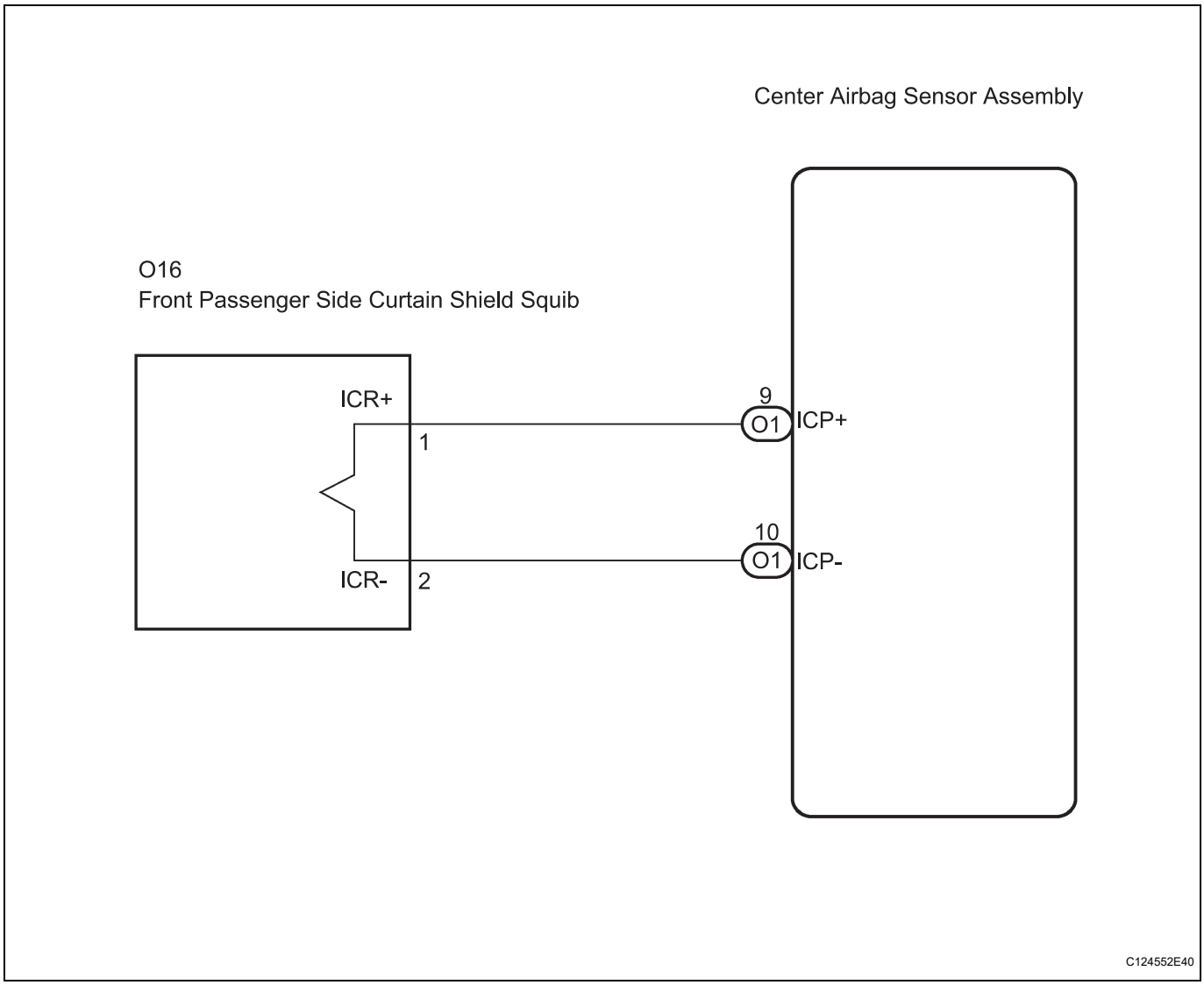
The front passenger side curtain shield squib circuit consists of the center airbag sensor assembly and the curtain shield airbag assembly RH.

The circuit instructs the SRS to deploy when deployment conditions are met.

These DTCs are recorded when a malfunction is detected in the front passenger side curtain shield squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1835/58	• The center airbag sensor assembly receives a line short circuit signal 5 times in the front passenger side curtain shield squib circuit during primary check. • Front passenger side curtain shield squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Curtain shield airbag assembly RH (Front passenger side curtain shield squib) • Center airbag sensor assembly
B1836/58	• The center airbag sensor assembly receives an open circuit signal in the front passenger side curtain shield squib circuit for 2 seconds. • Front passenger side curtain shield squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Curtain shield airbag assembly RH (Front passenger side curtain shield squib) • Center airbag sensor assembly
B1837/58	• The center airbag sensor assembly receives a short circuit to ground signal in the front passenger side curtain shield squib circuit for 0.5 seconds. • Front passenger side curtain shield squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Curtain shield airbag assembly RH (Front passenger side curtain shield squib) • Center airbag sensor assembly
B1838/58	• The center airbag sensor assembly receives a short circuit to B+ signal in the front passenger side curtain shield squib circuit for 0.5 seconds. • Front passenger side curtain shield squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Curtain shield airbag assembly RH (Front passenger side curtain shield squib) • Center airbag sensor assembly

WIRING DIAGRAM

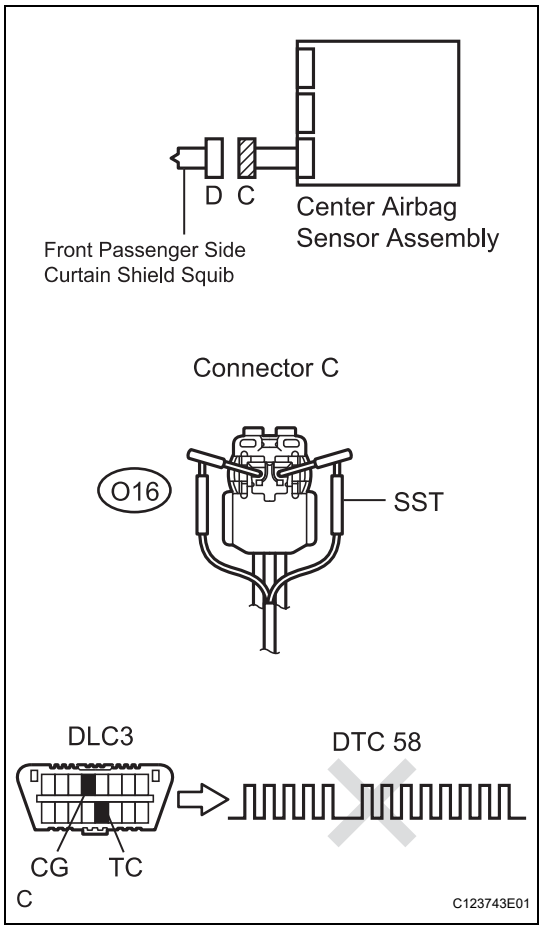


INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

1	CHECK CURTAIN SHIELD AIRBAG ASSEMBLY RH (FRONT PASSENGER SIDE CURTAIN SHIELD SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the curtain shield airbag assembly RH.
(d) Connect the white wire side of SST (resistance 2.1 Ω) to connector C.

CAUTION:
Never connect the tester to the curtain shield airbag assembly RH (front passenger side curtain shield squib) for measurement, as this may lead to a serious injury due to airbag deployment.

NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

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(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).

OK:
DTC B1835, B1836, B1837, B1838, or 58 is not output.

HINT:
Codes other than DTC B1835, B1836, B1837, B1838, and 58 may be output at this time, but they are not related to this check.

OK → **REPLACE CURTAIN SHIELD AIRBAG ASSEMBLY RH (See page RS-401)**

NG

2	CHECK CONNECTOR

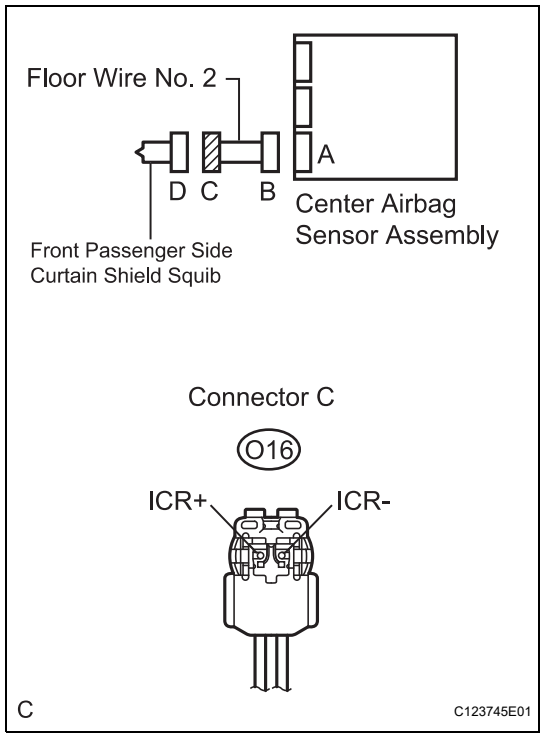
(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector C.
(d) Check that the floor wire No. 2 connectors (on the curtain shield airbag assembly RH side) are not damaged.

OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

3	CHECK FLOOR WIRE NO. 2 (FRONT PASSENGER SIDE CURTAIN SHIELD SQUIB CIRCUIT)



(a) Disconnect the connectors from the center airbag sensor assembly.
(b) Check for a short to B+ in the circuit.
  (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (2) Turn the power switch on (IG).
  (3) Measure the voltage according to the value(s) in the table below.
  Standard voltage

Tester Connection	Condition	Specified Condition
O16-1 (ICR+) - Body ground	Power switch on (IG)	Below 1 V
O16-2 (ICR-) - Body ground	Power switch on (IG)	Below 1 V

(c) Check for an open in the circuit.
  (1) Turn the power switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
  (3) Measure the resistance according to the value(s) in the table below.
  Standard resistance

Tester Connection	Condition	Specified Condition
O16-1 (ICR+) - O16-2 (ICR-)	Always	Below 1 Ω

(d) Check for a short to ground in the circuit.
  (1) Measure the resistance according to the value(s) in the table below.
  Standard resistance

Tester Connection	Condition	Specified Condition
O16-1 (ICR+) - Body ground	Always	1 MΩ or higher
O16-2 (ICR-) - Body ground	Always	1 MΩ or higher

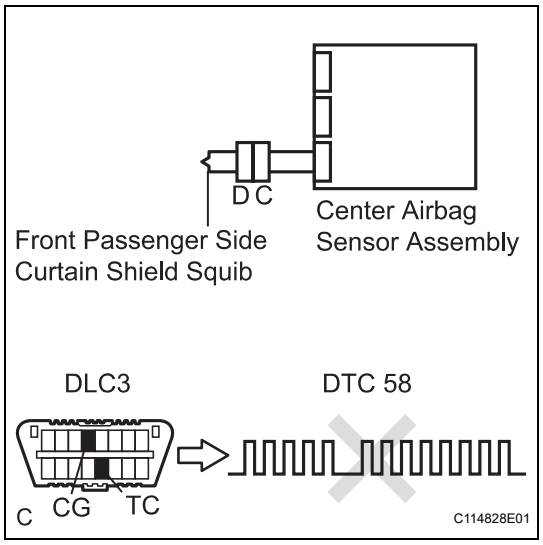
(e) Check for a short in the circuit.
  (1) Release the activation prevention mechanism built into connector B (See page RS-33).
  (2) Measure the resistance according to the value(s) in the table below.
  Standard resistance

Tester Connection	Condition	Specified Condition
O16-1 (ICR+) - O16-2 (ICR-)	Always	1 MΩ or higher

NG → REPAIR OR REPLACE FLOOR WIRE NO. 2

OK

4	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the curtain shield airbag assembly RH and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1835, B1836, B1837, B1838, or 58 is not output.

HINT:

Codes other than DTC B1835, B1836, B1837, B1838, and 58 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

DTC	B1860/64	Short in Driver Side Knee Airbag Squib Circuit

DTC	B1861/64	Open in Driver Side Knee Airbag Squib Circuit

DTC	B1862/64	Short to GND in Driver Side Knee Airbag Squib Circuit

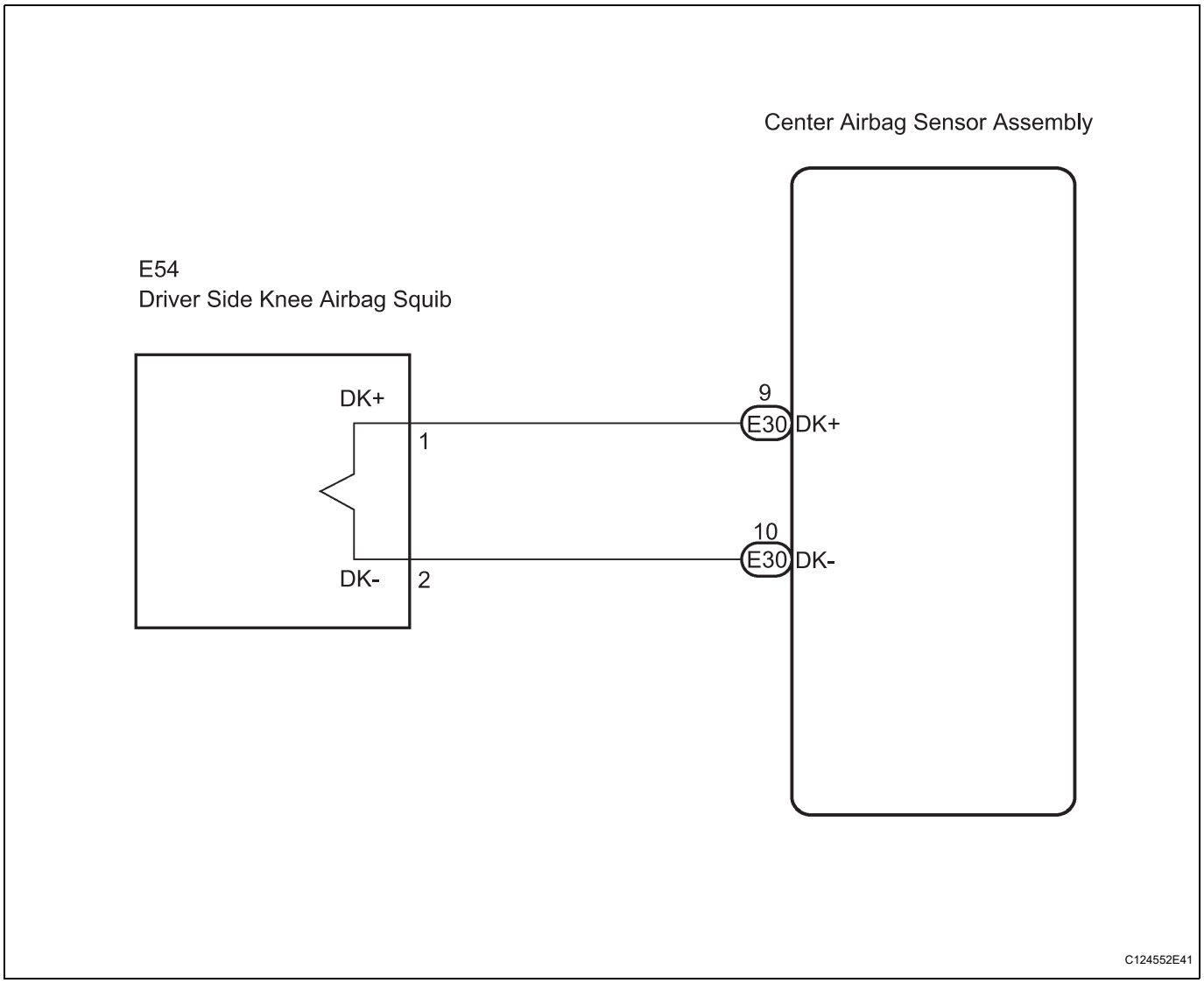
DTC	B1863/64	Short to B+ in Driver Side Knee Airbag Squib Circuit

DESCRIPTION

The driver side knee airbag squib circuit consists of the center airbag sensor assembly and the driver side knee airbag assembly.
This circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the driver side knee airbag squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1860/64	• The center airbag sensor assembly receives a line short circuit signal 5 times in the driver side knee airbag squib circuit during primary check. • Driver side knee airbag squib malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Driver side knee airbag assembly (Driver side knee airbag squib) • Center airbag sensor assembly
B1861/64	• The center airbag sensor assembly receives an open circuit signal in the driver side knee airbag squib circuit for 2 seconds. • Driver side knee airbag squib malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Driver side knee airbag assembly (Driver side knee airbag squib) • Center airbag sensor assembly
B1862/64	• The center airbag sensor assembly receives a short circuit to ground signal in the driver side knee airbag squib circuit for 0.5 seconds. • Driver side knee airbag squib malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Driver side knee airbag assembly (Driver side knee airbag squib) • Center airbag sensor assembly
B1863/64	• The center airbag sensor assembly receives a short circuit to B+ signal in the driver side knee airbag squib circuit for 0.5 seconds. • Driver side knee airbag squib malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Driver side knee airbag assembly (Driver side knee airbag squib) • Center airbag sensor assembly

WIRING DIAGRAM

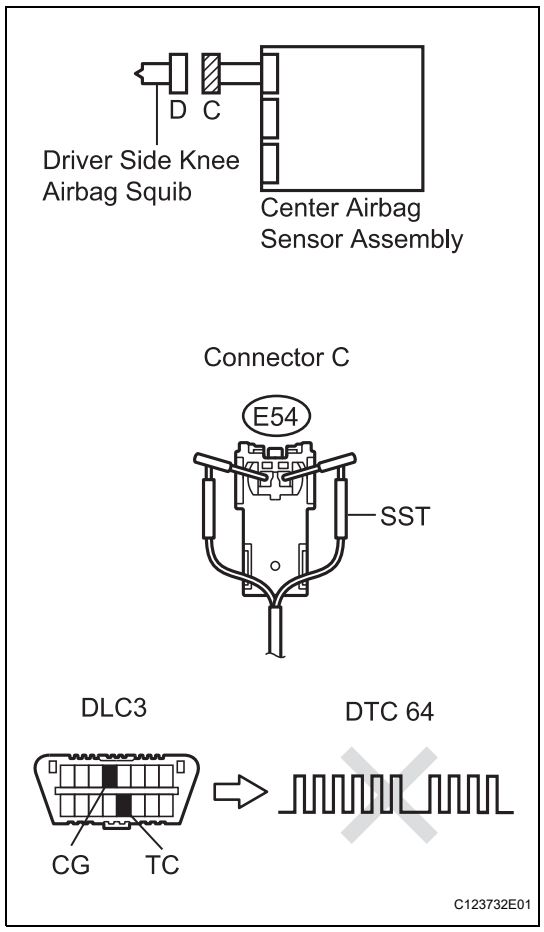


INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

1	CHECK DRIVER SIDE KNEE AIRBAG ASSEMBLY (DRIVER SIDE KNEE AIRBAG SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the driver side knee airbag assembly.
(d) Connect the white wire side of SST (resistance 2.1 Ω) to connector C.

CAUTION:
Never connect the tester to the driver side knee airbag assembly (driver side knee airbag squib) for measurement, as this may lead to a serious injury due to airbag deployment.

NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

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(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).

OK:
DTC B1860, B1861, B1862, B1863, or 64 is not output.

HINT:
Codes other than DTC B1860, B1861, B1862, B1863, and 64 may be output at this time, but they are not related to this check.

OK → **REPLACE DRIVER SIDE KNEE AIRBAG ASSEMBLY (See page RS-362)**

NG

2	CHECK CONNECTOR

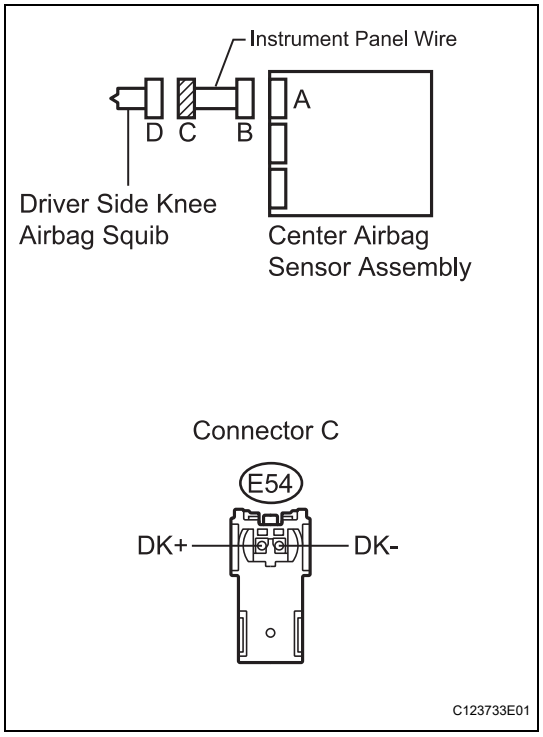
(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector C.
(d) Check that the instrument panel wire connector (on the driver side knee airbag assembly side) is not damaged.

OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → REPAIR OR REPLACE INSTRUMENT PANEL WIRE

OK

3 CHECK INSTRUMENT PANEL WIRE (DRIVER SIDE KNEE AIRBAG SQUIB CIRCUIT)



(a) Disconnect the connectors from the center airbag sensor assembly.

(b) Check for a short to B+ in the circuit.
  (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (2) Turn the power switch on (IG).
  (3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E54-1 (DK+) - Body ground	Power switch on (IG)	Below 1 V
E54-2 (DK-) - Body ground	Power switch on (IG)	Below 1 V

(c) Check for an open in the circuit.
  (1) Turn the power switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
  (3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E54-1 (DK+) - E54-2 (DK-)	Always	Below 1 Ω

(d) Check for a short to ground in the circuit.
  (1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E54-1 (DK+) - Body ground	Always	1 MΩ or higher
E54-2 (DK-) - Body ground	Always	1 MΩ or higher

(e) Check for a short in the circuit.
  (1) Release the activation prevention mechanism built into connector B (See page RS-33).
  (2) Measure the resistance according to the value(s) in the table below.

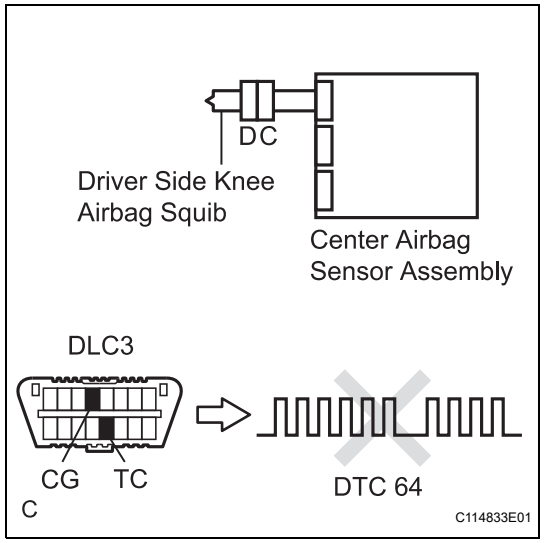
Standard resistance

Tester Connection	Condition	Specified Condition
E54-1 (DK+) - E54-2 (DK-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

4	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the driver side knee airbag assembly and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the stored DTCs in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1860, B1861, B1862, B1863, or 64 is not output.

HINT:

Codes other than DTC B1860, B1861, B1862, B1863, and 64 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

DTC	B1900/73	Short in Front Driver Side Pretensioner Squib Circuit

DTC	B1901/73	Open in Front Driver Side Pretensioner Squib Circuit

DTC	B1902/73	Short to GND in Front Driver Side Pretensioner Squib Circuit

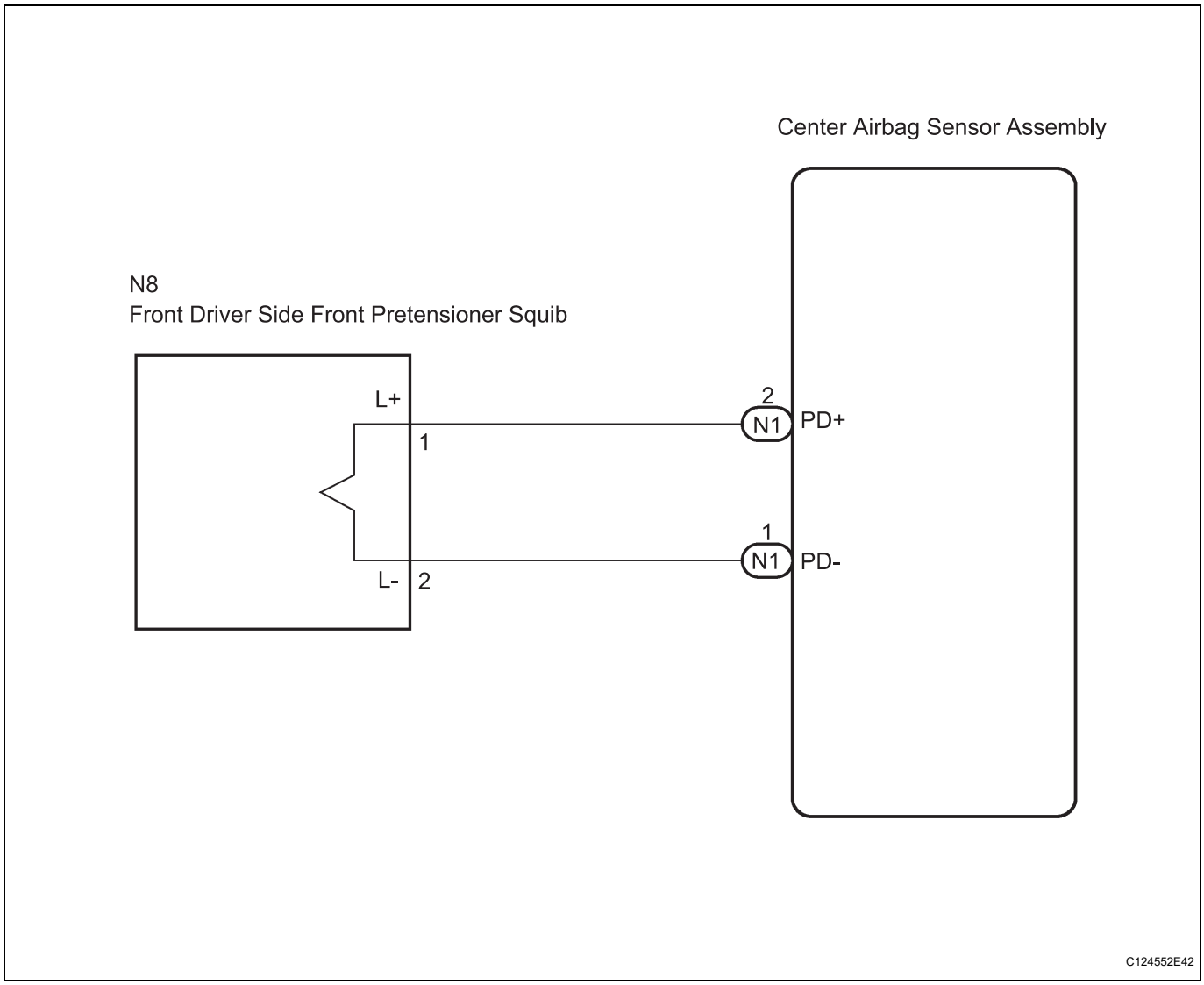
DTC	B1903/73	Short to B+ in Front Driver Side Pretensioner Squib Circuit

DESCRIPTION

The front driver side front pretensioner squib circuit consists of the center airbag sensor assembly and the front seat outer belt assembly LH.
This circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the front driver side pretensioner squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1900/73	• The center airbag sensor assembly receives a line short circuit signal 5 times in the front driver side pretensioner squib circuit during primary check. • Front driver side pretensioner squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Front seat outer belt assembly LH (Front driver side pretensioner squib) • Center airbag sensor assembly
B1901/73	• The center airbag sensor assembly receives an open circuit signal in the front driver side pretensioner squib circuit for 2 seconds. • Front driver side pretensioner squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Front seat outer belt assembly LH (Front driver side pretensioner squib) • Center airbag sensor assembly
B1902/73	• The center airbag sensor assembly receives a short circuit to ground signal in the front driver side pretensioner squib circuit for 0.5 seconds. • Front driver side pretensioner squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Front seat outer belt assembly LH (Front driver side pretensioner squib) • Center airbag sensor assembly
B1903/73	• The center airbag sensor assembly receives a short circuit to B+ signal in the front driver side pretensioner squib circuit for 0.5 seconds. • Front driver side pretensioner squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Front seat outer belt assembly LH (Front driver side pretensioner squib) • Center airbag sensor assembly

WIRING DIAGRAM

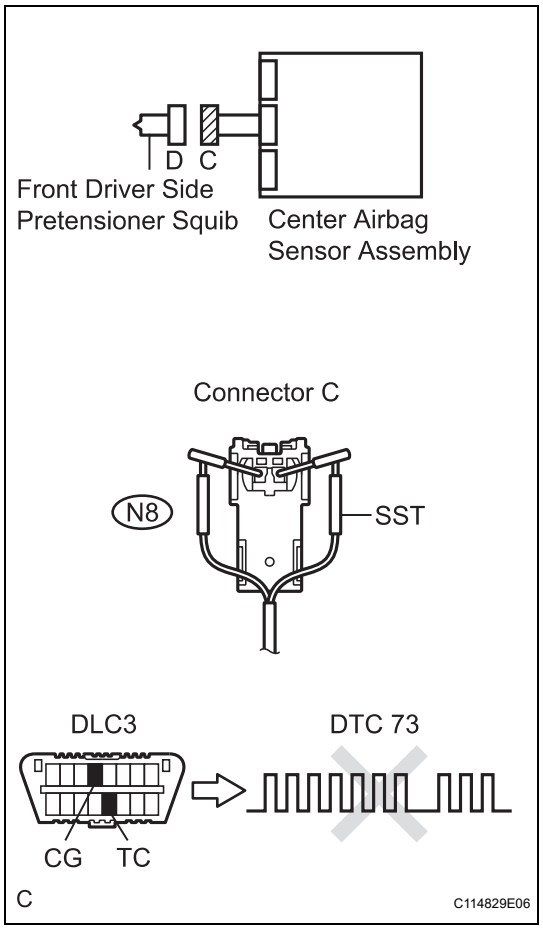


INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

1	CHECK FRONT SEAT OUTER BELT ASSEMBLY LH (FRONT DRIVER SIDE PRETENSIONER SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the front seat outer belt assembly LH.
(d) Connect the white wire side of SST (resistance 2.1 Ω) to connector C.
CAUTION:
Never connect the tester to the front seat outer belt assembly LH (front driver side pretensioner squib) for measurement, as this may lead to a serious injury due to airbag deployment.
NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

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(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).
OK:
DTC B1900, B1901, B1902, B1903, or 73 is not output.
HINT:
Codes other than DTC B1900, B1901, B1902, B1903, and 73 may be output at this time, but they are not related to this check.

OK → **REPLACE FRONT SEAT OUTER BELT ASSEMBLY LH (See page SB-21)**

NG

2	CHECK CONNECTOR

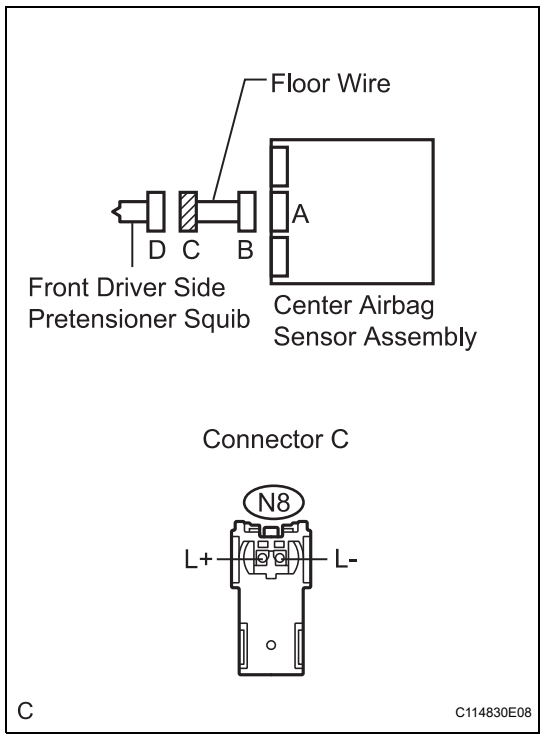
(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector C.
(d) Check that the floor wire connector (on the front seat outer belt assembly LH side) is not damaged.

OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

3	CHECK FLOOR WIRE (FRONT DRIVER SIDE PRETENSIONER SQUIB CIRCUIT)



(a) Disconnect the connectors from the center airbag sensor assembly.
(b) Check for a short to B+ in the circuit.
  (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (2) Turn the power switch on (IG).
  (3) Measure the voltage according to the value(s) in the table below.
  Standard voltage

Tester connection	Condition	Specified condition
N8-1 (L+) - Body ground	Power switch on (IG)	Below 1 V
N8-2 (L-) - Body ground	Power switch on (IG)	Below 1 V

(c) Check for an open in the circuit.
  (1) Turn the power switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
  (3) Measure the resistance according to the value(s) in the table below.
  Standard resistance

Tester Connection	Condition	Specified Condition
N8-1 (L+) - N8-2 (L-)	Always	Below 1 Ω

(d) Check for a short to ground in the circuit.
  (1) Measure the resistance according to the value(s) in the table below.
  Standard resistance

Tester Connection	Condition	Specified Condition
N8-1 (L+) - Body ground	Always	1 MΩ or higher
N8-2 (L-) - Body ground	Always	1 MΩ or higher

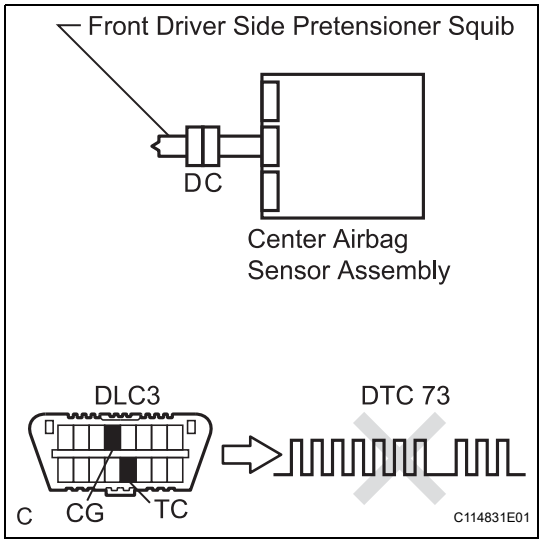
(e) Check for a short in the circuit.
  (1) Release the activation prevention mechanism built into connector B (See page RS-33).
  (2) Measure the resistance according to the value(s) in the table below.
  Standard resistance

Tester Connection	Condition	Specified Condition
N8-1 (L+) - N8-2 (L-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

4	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the front seat outer belt assembly LH and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1900, B1901, B1902, B1903, or 73 is not output.

HINT:

Codes other than DTC B1900, B1901, B1902, B1903, or 73 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-33)

DTC	B1905/74	Short in Front Passenger Side Pretensioner Squib Circuit

DTC	B1906/74	Open in Front Passenger Side Pretensioner Squib Circuit

DTC	B1907/74	Short to GND in Front Passenger Side Pretensioner Squib Circuit

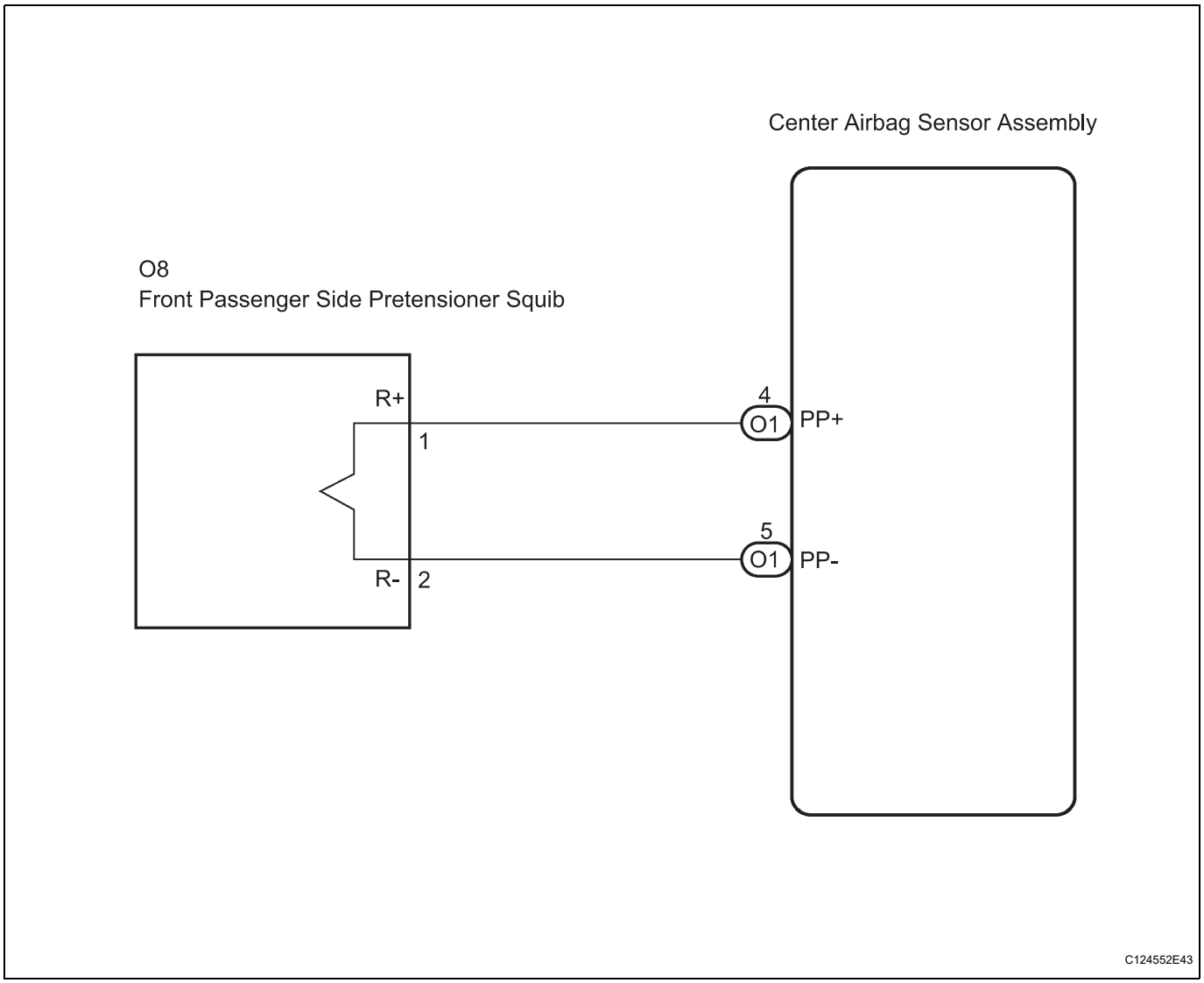
DTC	B1908/74	Short to B+ in Front Passenger Side Pretensioner Squib Circuit

DESCRIPTION

The front passenger side front pretensioner squib circuit consists of the center airbag sensor assembly and the front seat outer belt assembly RH.
This circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the front passenger side front pretensioner squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1905/74	• The center airbag sensor assembly receives a line short circuit signal 5 times in the front passenger side front pretensioner squib circuit during primary check. • Front passenger side front pretensioner squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Front seat outer belt assembly RH (Front passenger side pretensioner squib) • Center airbag sensor assembly
B1906/74	• The center airbag sensor assembly receives an open circuit signal in the front passenger side front pretensioner squib circuit for 2 seconds. • Front passenger side front pretensioner squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Front seat outer belt assembly RH (Front passenger side pretensioner squib) • Center airbag sensor assembly
B1907/74	• The center airbag sensor assembly receives a short circuit to ground signal in the front passenger side front pretensioner squib circuit for 0.5 seconds. • Front passenger side front pretensioner squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Front seat outer belt assembly RH (Front passenger side pretensioner squib) • Center airbag sensor assembly
B1908/74	• The center airbag sensor assembly receives a short circuit to B+ signal in the front passenger side front pretensioner squib circuit for 0.5 seconds. • Front passenger side front pretensioner squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Front seat outer belt assembly RH (Front passenger side pretensioner squib) • Center airbag sensor assembly

WIRING DIAGRAM

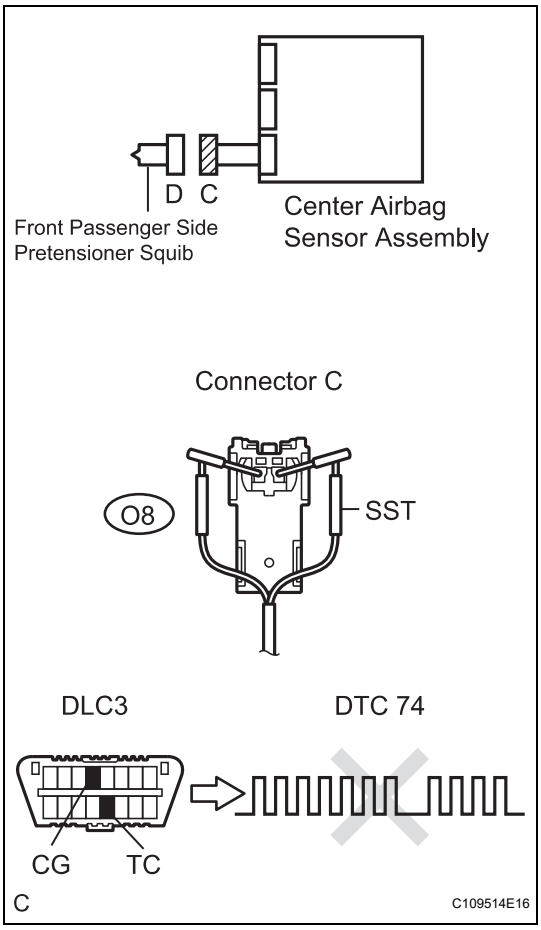


INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

1	CHECK FRONT SEAT OUTER BELT ASSEMBLY RH (FRONT PASSENGER SIDE PRETENSIONER SQUIB)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the front seat outer belt assembly RH.
(d) Connect the white wire side of SST (resistance 2.1 Ω) to connector C.
CAUTION:
Never connect the tester to the front seat outer belt assembly RH (front passenger side pretensioner squib) for measurement, as this may lead to a serious injury due to airbag deployment.
NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

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(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the power switch off.
(i) Turn the power switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).
OK:
DTC B1905, B1906, B1907, B1908, or 74 is not output.
HINT:
Codes other than DTC B1905, B1906, B1907, B1908, and 74 may be output at this time, but they are not related to this check.

OK → **REPLACE FRONT SEAT OUTER BELT ASSEMBLY RH (See page SB-21)**

NG

2	CHECK CONNECTOR

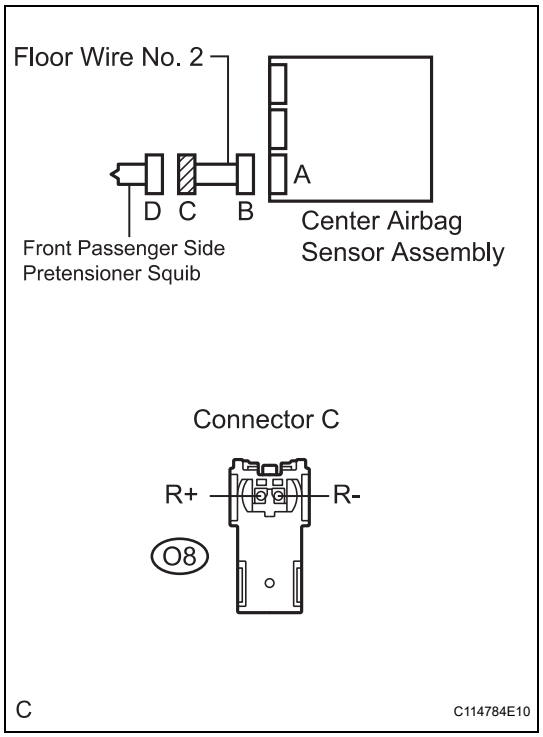
(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector C.
(d) Check that the floor wire No. 2 connector (on the front seat outer belt assembly RH side) is not damaged.

OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

3	CHECK FLOOR WIRE NO. 2 (FRONT PASSENGER SIDE PRETENSIONER SQUIB CIRCUIT)



(a) Disconnect the connectors from the center airbag sensor assembly.
(b) Check for a short to B+ in the circuit.
 (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
 (2) Turn the power switch on (IG).
 (3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
O8-1 (R+) - Body ground	Power switch on (IG)	Below 1 V
O8-2 (R-) - Body ground	Power switch on (IG)	Below 1 V

(c) Check for an open in the circuit.
 (1) Turn the power switch off.
 (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
 (3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
O8-1 (R+) - O8-2 (R-)	Always	Below 1 Ω

(d) Check for a short to ground in the circuit.
 (1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
O8-1 (R+) - Body ground	Always	1 MΩ or higher
O8-2 (R-) - Body ground	Always	1 MΩ or higher

(e) Check for a short in the circuit.
 (1) Release the activation prevention mechanism built into connector B (See page RS-33).
 (2) Measure the resistance according to the value(s) in the table below.

Standard resistance

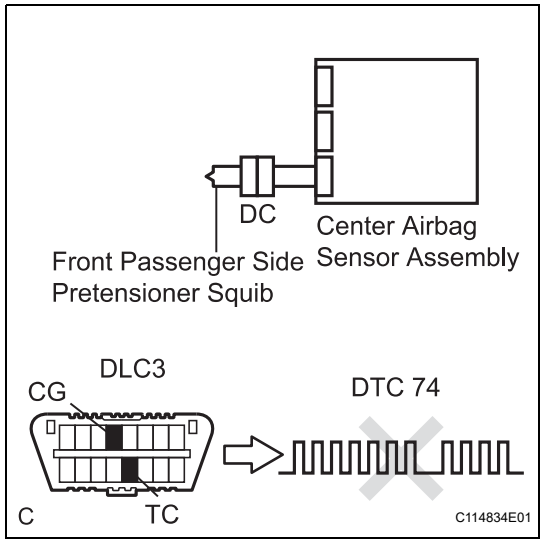
Tester Connection	Condition	Specified Condition
O8-1 (R+) - O8-2 (R-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

RS

OK

4	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the front seat outer belt assembly RH and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the power switch off.
(f) Turn the power switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1905, B1906, B1907, B1908, or 74 is not output.

HINT:

Codes other than DTC B1905, B1906, B1907, B1908, and 74 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

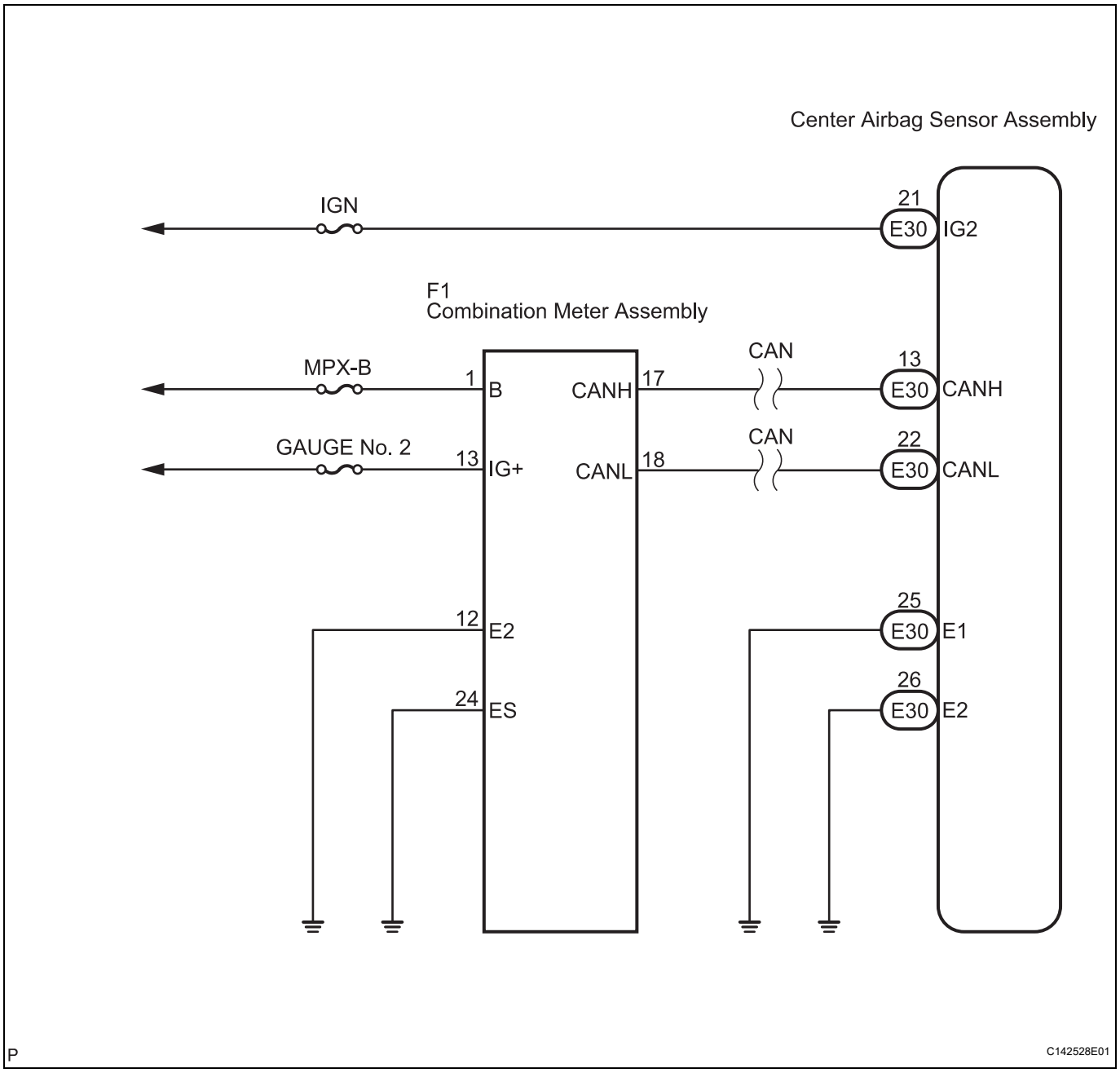
USE SIMULATION METHOD TO CHECK (See page RS-33)

SRS Warning Light Remains ON

DESCRIPTION

The SRS warning light is located on the combination meter assembly.
When the SRS is normal, the SRS warning light comes on for approximately 6 seconds after the power switch is turned from off to on (IG), and then goes off automatically.
If there is a malfunction in the SRS, the SRS warning light comes on to inform the driver of a problem.
When terminals TC and CG of the DLC3 are connected, the DTC is displayed by blinking of the SRS warning light.
The SRS is equipped with a voltage-increase circuit (DC-DC converter) in the center airbag sensor assembly in case the source voltage drops.
When the battery voltage drops, the voltage-increase circuit (DC-DC converter) functions to increase the voltage of the SRS to normal voltage.
A malfunction in this circuit is not recorded in the center airbag sensor assembly. The SRS warning light automatically goes off when the source voltage returns to normal.
The signal to illuminate the SRS warning light is transmitted from the center airbag sensor assembly to the combination meter assembly through the CAN communication system.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication DTC is output (See page CA-22).

Result

Condition	Proceed To
DTC is not output	A
DTC is output	B

RS

B → REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

A

2 CHECK BATTERY

(a) Measure the voltage of the battery.
Standard voltage:
11 to 14 V

NG → CHECK AND REPLACE BATTERY OR CHARGING SYSTEM

OK

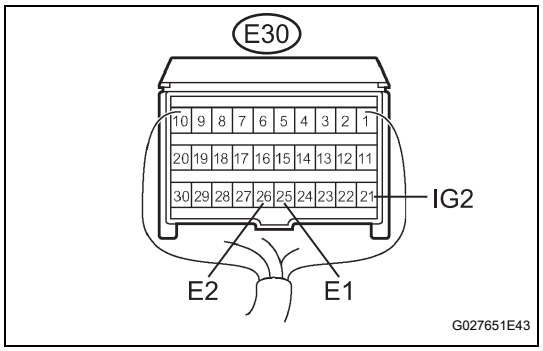
3 CHECK CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and combination meter assembly.
OK:
The connectors are properly connected.

NG → CONNECT CONNECTORS PROPERLY

OK

4 CHECK WIRE HARNESS (CENTER AIRBAG SENSOR ASSEMBLY - BODY GROUND)



(a) Disconnect the connectors from the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the power switch on (IG).
(d) Operate all components of the electrical system (defogger, wipers, headlight, heater blower, etc.).
(e) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
E30-21 (IG2) - Body ground	Power switch on (IG)	10 to 14 V

(f) Turn the power switch off.
(g) Measure the resistance according to the value(s) in the table below.

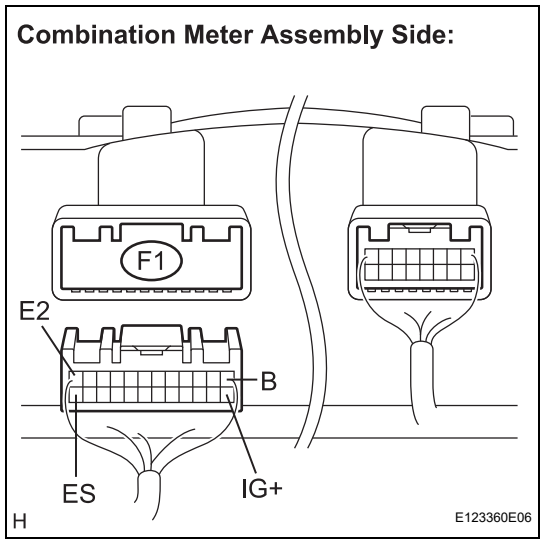
Standard resistance

Tester Connection	Condition	Specified Condition
E30-25 (E1) - Body ground	Always	Below 1 Ω
E30-26 (E2) - Body ground	Always	Below 1 Ω

NG → REPAIR OR REPLACE WIRE HARNESS

OK

5 CHECK WIRE HARNESS (COMBINATION METER ASSEMBLY - BODY GROUND)



(a) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(b) Disconnect the F1 connector from the combination meter assembly.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the power switch on (IG).
(e) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
F1-1 (B) - Body ground	Always	10 to 14 V
F1-13 (IG+) - Body ground	Power switch on (IG)	10 to 14 V

(f) Turn the power switch off.
(g) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
F1-12 (E2) - Body ground	Always	Below 1 Ω
F1-24 (ES) - Body ground	Always	Below 1 Ω

NG → REPAIR OR REPLACE WIRE HARNESS

OK

6 CHECK SRS WARNING LIGHT

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the combination meter assembly.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the power switch on (IG).
(f) Check the SRS warning light condition.

OK:

After the primary check period, SRS warning light goes off for approximately 10 seconds, and remains on.

HINT:

The primary check period shows approximately 6 seconds after the power switch is turned on (IG).

NG → **GO TO METER / GAUGE SYSTEM (See page ME-14)**

OK

REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)

SRS Warning Light does not Come ON

DESCRIPTION

See page RS-222.

WIRING DIAGRAM

See page RS-223.

INSPECTION PROCEDURE

1	CHECK BATTERY

(a) Measure the voltage of the battery.
Standard voltage:
11 to 14 V

NG → **CHECK AND REPLACE BATTERY OR CHARGING SYSTEM**

OK

2	CHECK CONNECTOR

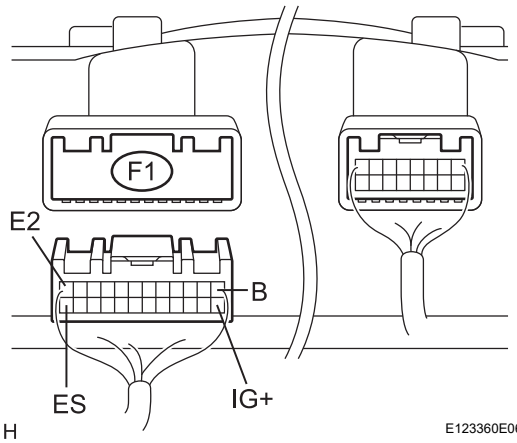
(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connector is properly connected to the combination meter assembly.
OK:
The connector is properly connected.

NG → **CONNECT CONNECTOR PROPERLY**

OK

3	CHECK WIRE HARNESS (COMBINATION METER ASSEMBLY - BODY GROUND)

Combination Meter Assembly Side:



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the F1 connector from the combination meter assembly.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the power switch on (IG).
(f) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
F1-1 (B) - Body ground	Always	10 to 14 V
F1-13 (IG+) - Body ground	Power switch on (IG)	10 to 14 V

(g) Turn the power switch off.
(h) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
F1-12 (E2) - Body ground	Always	Below 1 Ω
F1-24 (ES) - Body ground	Always	Below 1 Ω

NG → REPAIR OR REPLACE WIRE HARNESS

OK

4	CHECK SRS WARNING LIGHT

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the combination meter assembly.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the power switch on (IG).
(f) Check the SRS warning light condition.

OK:

After the primary check period, SRS warning light goes off for approximately 10 seconds, and remains on.

HINT:
The primary check period is approximately 6 seconds after the power switch is turned on (IG).

NG → GO TO METER / GAUGE SYSTEM (See page ME-14)

OK

REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)

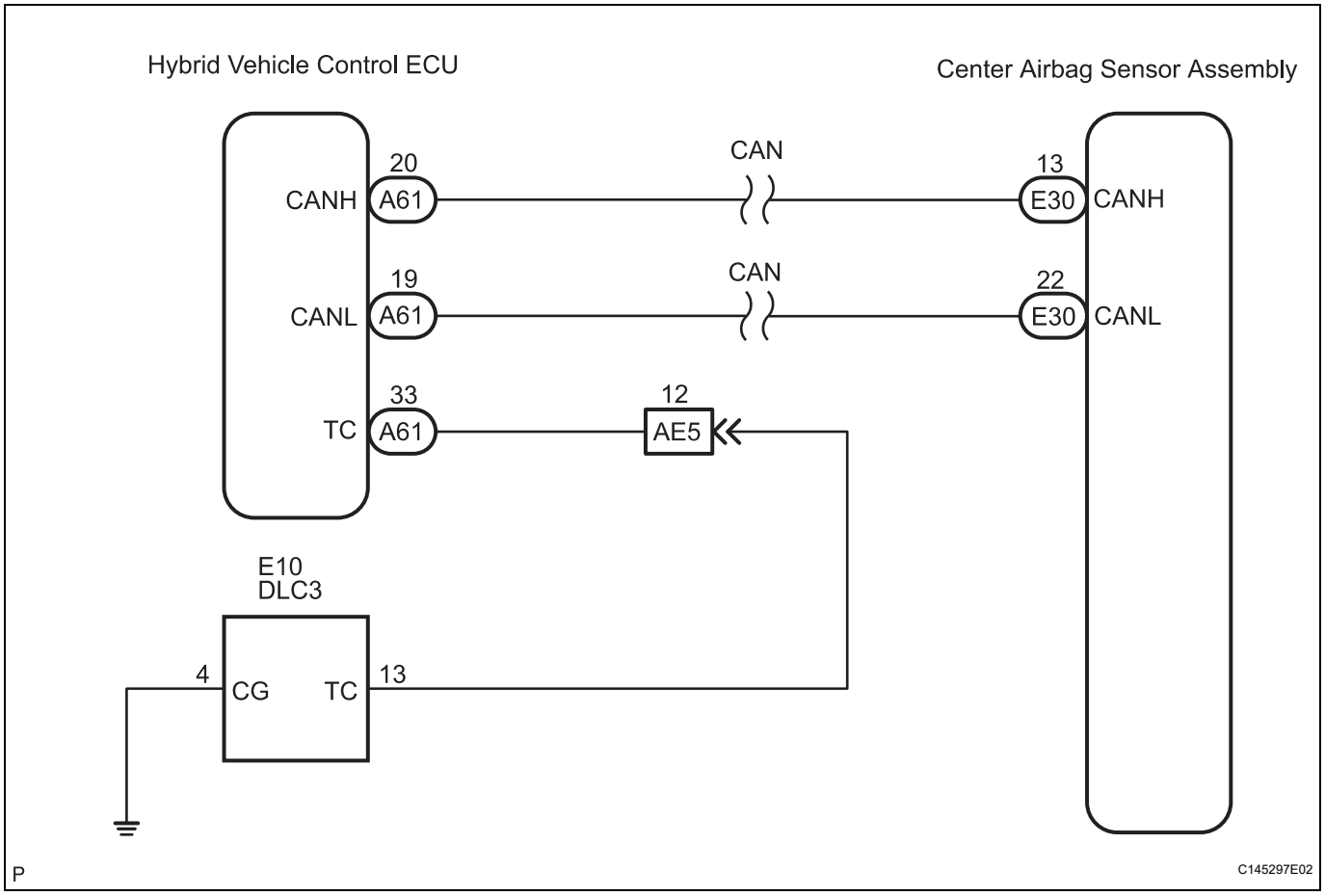
Diagnosis Circuit

DESCRIPTION

DTC output mode is set by connecting terminals TC and CG of the DLC3.
DTCs are displayed by blinking of the SRS warning light.
HINT:

- When each warning light stays blinking, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in each ECU is suspected.
- A DTC output mode signal is transmitted through CAN communication system to each ECU including the center airbag sensor assembly. Thus when all systems do not enter DTC output mode, there may be an hybrid vehicle control ECU malfunction.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page CA-22).

Result

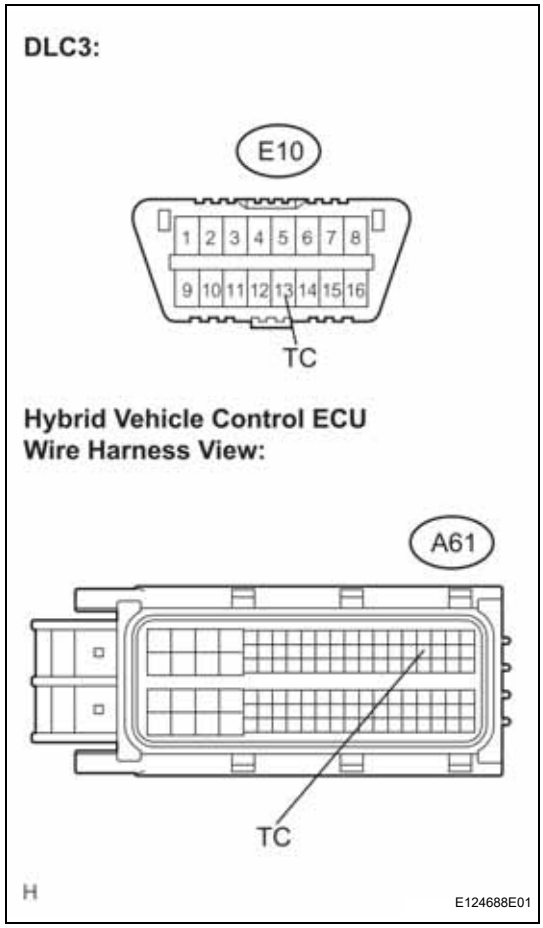
Condition	Proceed to
DTC is not output	A
DTC is output	B

RS

B → REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

A

2 CHECK WIRE HARNESS (DLC3 - HYBRID VEHICLE CONTROL ECU)



(a) Turn the power switch off.
(b) Disconnect the connector from the hybrid vehicle control ECU.
(c) Measure the resistance according to the value(s) in the table below.

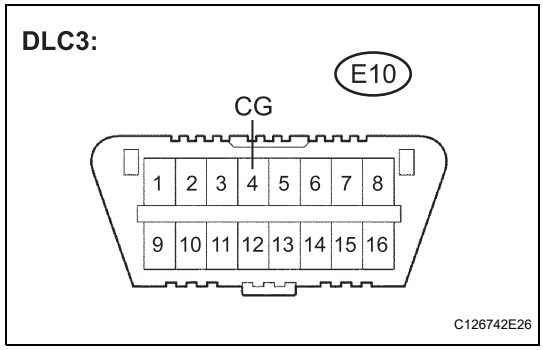
Standard resistance

Tester Connection	Condition	Specified Condition
E10-13 (TC) - A61-33 (TC)	Always	Below 1 Ω

NG → REPAIR OR REPLACE WIRE HARNESS (TC OF DLC3 - TC OF HYBRID VEHICLE CONTROL ECU)

OK

3 CHECK WIRE HARNESS (CG OF DLC3 - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

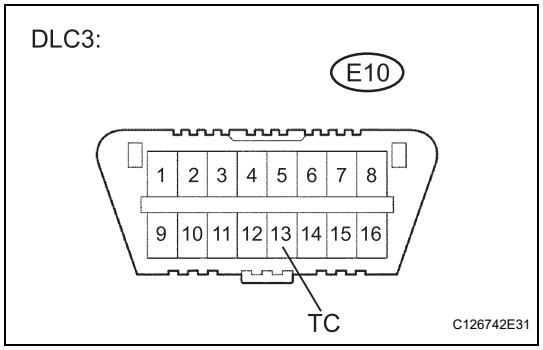
Tester Connection	Condition	Specified Condition
E10-4 (CG) - Body ground	Always	Below 1 Ω

NG → REPAIR OR REPLACE WIRE HARNESS (CG OF DLC3 - BODY GROUND)

RS

OK

4	CHECK WIRE HARNESS (TC OF DLC3 - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

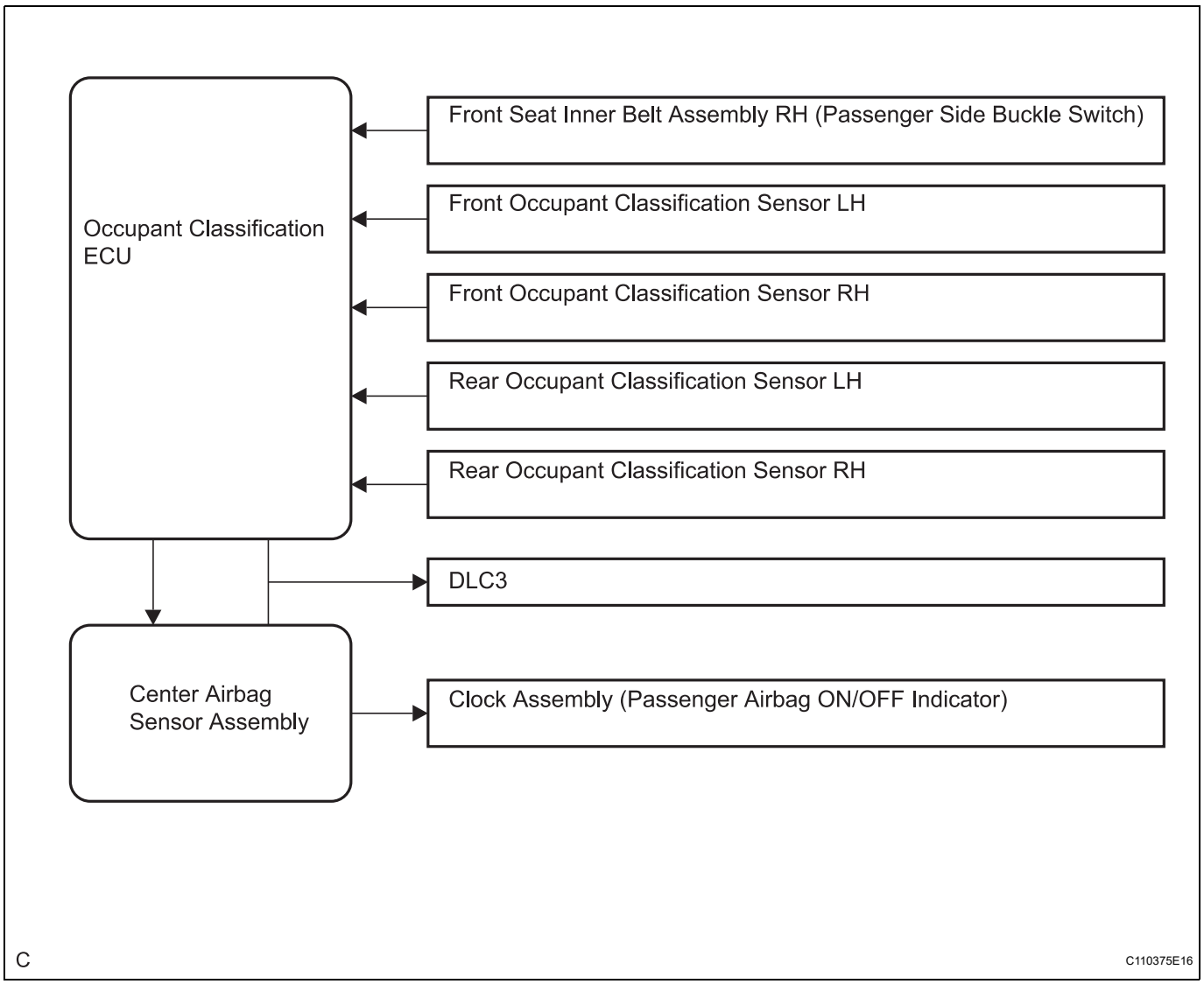
Tester Connection	Condition	Specified Condition
E10-13 (TC) - Body ground	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE WIRE HARNESS OR EACH ECU**

OK

REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

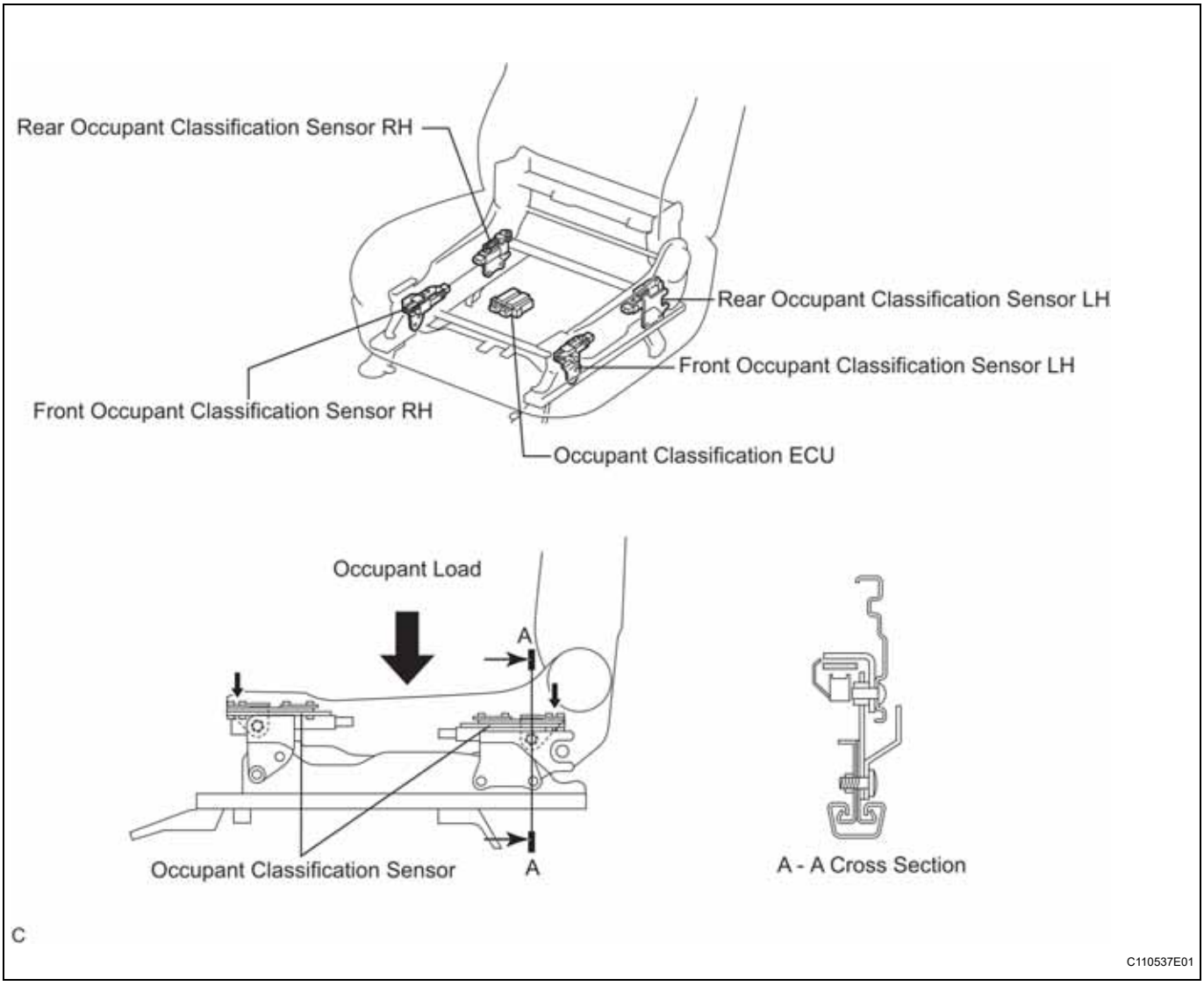
1. DESCRIPTION OF OCCUPANT CLASSIFICATION SYSTEM

(a) GENERAL DESCRIPTION.

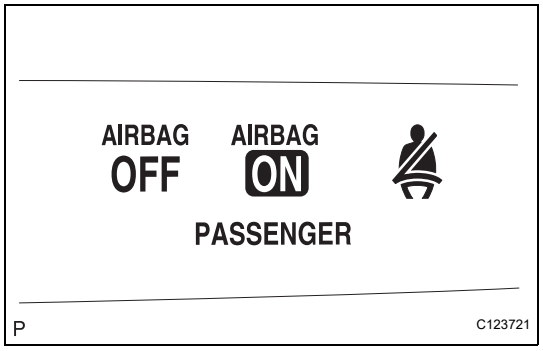
(1) In the occupant classification system, the occupant classification ECU calculates the weight of the occupant based on a signal from the occupant classification sensors. This system recognizes the occupant as a child if it detects a weight of less than 36 kg (79.37 lb), and disables the front passenger airbag and front passenger side-side airbag.

(2) This system is mainly comprised of 4 occupant classification sensors that detect the load on the front passenger seat. The occupant classification ECU controls the system, and the passenger airbag ON/OFF indicator indicates the ON/OFF condition of the front passenger airbag and front passenger side-side airbag.

(b) OCCUPANT CLASSIFICATION SENSOR.



(1) The occupant classification sensors are installed on 4 brackets connecting the seat rail and seat frame. Accordingly, when load is applied to the front passenger seat by an occupant sitting in it, the occupant classification sensors register a distortion.



(c) DESCRIPTION FOR PASSENGER AIRBAG ON/OFF INDICATOR.

(1) The passenger airbag ON/OFF indicator is installed on the clock assembly. This indicator informs the driver whether the occupant classification ECU puts the front passenger airbag assembly into an active state or inactive state.

(2) If a malfunction occurs in the occupant classification system, "OFF" indication of the passenger airbag ON/OFF indicator and the SRS warning light come on.

HOW TO PROCEED WITH TROUBLESHOOTING

The intelligent tester can be used in steps 4, 6, 8, and 9.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

(a) Confirm problem symptoms (See page IN-72).

NEXT

3	PASSENGER AIRBAG ON/OFF INDICATOR CHECK

NEXT

4	DTCS CHECK (Present and Past DTCs)

(a) Check for DTCs.
Result

Result	Proceed to
DTC is output.	A
DTC is not output.	B

B → GO TO PROBLEM SYMPTOMS TABLE

A

5	DTCS CHART

NEXT

6	CIRCUIT INSPECTION

NEXT

7	REPAIR

NEXT

8	CLEAR DTCS (Present and Past DTCs)

(a) Clear DTCs.

NEXT

9	DTCS CHECK (Present and Past DTCs)

(a) Check for DTCs.
Result

Result	Proceed to
DTC is not output.	A
DTC is output.	B

B → Go to step 5

A

10	SYMPTOM SIMULATION

(a) Check the passenger airbag ON/OFF indicator condition.
Result

Result	Proceed to
Passenger airbag ON/OFF indicator operates normally.	A
Passenger airbag ON/OFF indicator ("OFF") and SRS warning light come on.	B

B → Go to step 5

A

11	CONFIRMATION TEST

NEXT

END

INITIALIZATION

1. ZERO POINT CALIBRATION

NOTICE:

Make sure that the front passenger seat is not occupied before performing the operation:

HINT:

Perform zero point calibration and sensitivity check if any of the following conditions occur.

- The occupant classification ECU is replaced.
- Accessories (seatback tray and seat cover, etc.) are installed.
- The front passenger seat is removed from the vehicle.
- The passenger airbag ON/OFF indicator ("OFF") comes on when the front passenger seat is not occupied.
- The vehicle is brought to the workshop for repair due to an accident or a collision.

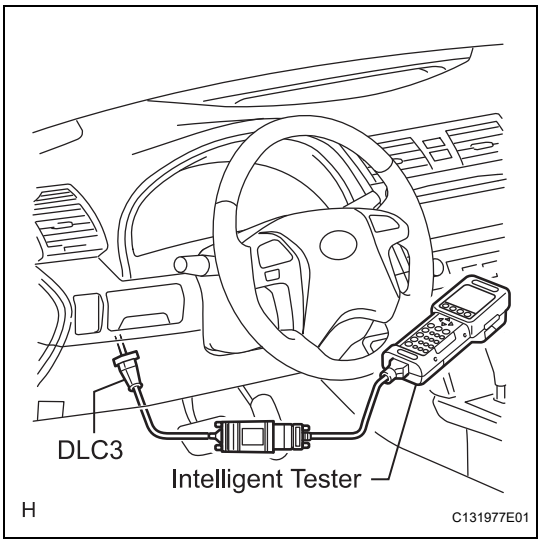
(a) Zero point calibration and sensitivity check procedures.

HINT:

Make sure that zero point calibration has finished normally, and then perform the sensitivity check.

(1) Adjust the seat position according to the table below.

Adjustment Component	Position
Slide Direction	Rearmost position
Reclining Angle	Upright position
Headrest Height	Lowest position
Lifter Height	Lowest position



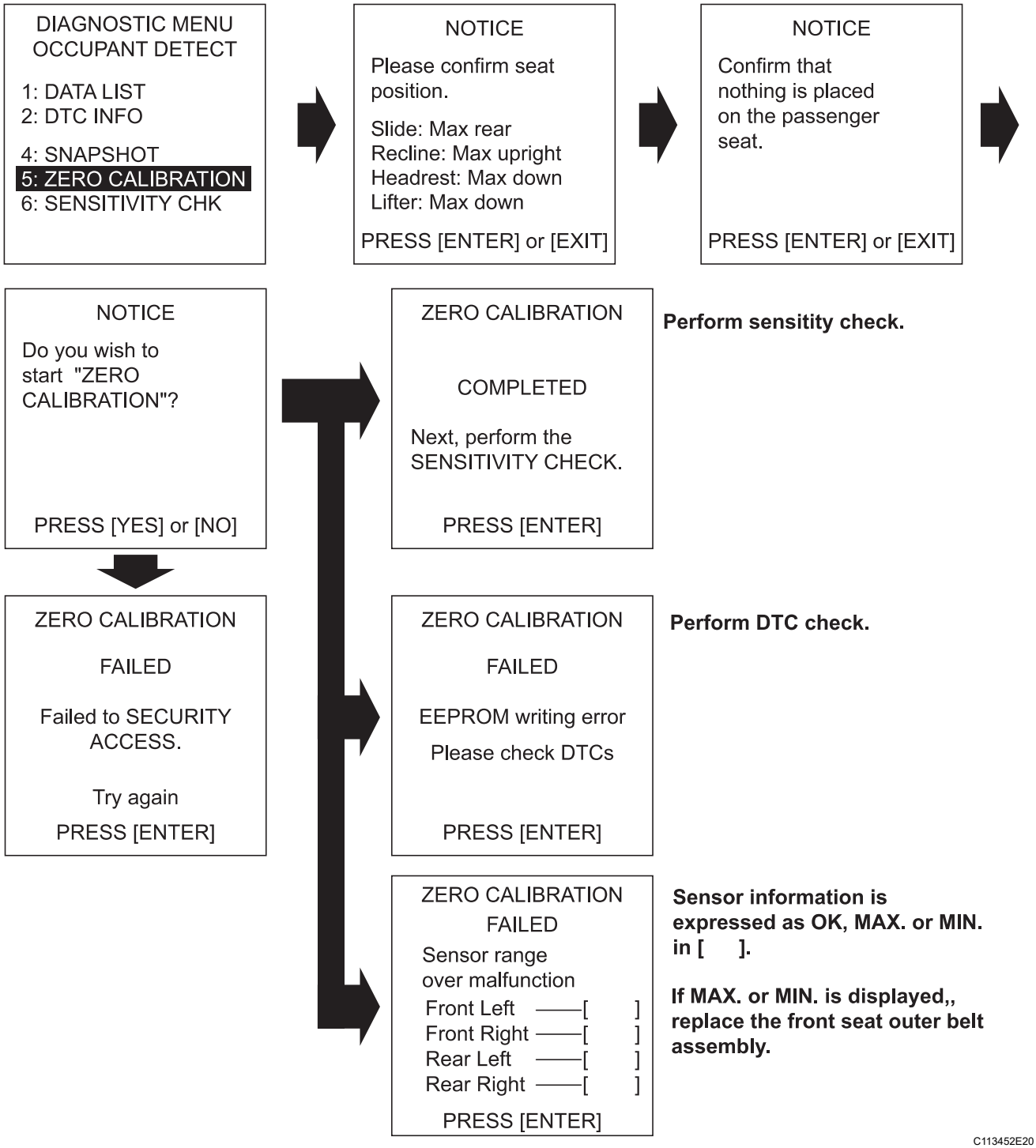
(2) Connect the intelligent tester to the DLC3.

(3) Turn the power switch on (IG).

(4) Perform the zero point calibration by following the prompts on the tester screen.

ZERO POINT CALIBRATION PROCEDURE

"1: DIAGNOSIS" - "1: OBD/MOBD" - "MODEL YEAR" - "MODEL SELECTION" - "CAMRY" - Select the option parts" - "9: OCCUPANT DETECT"
Refer to the following screen flow.



HINT:
Refer to the intelligent tester operator's manual for further details.

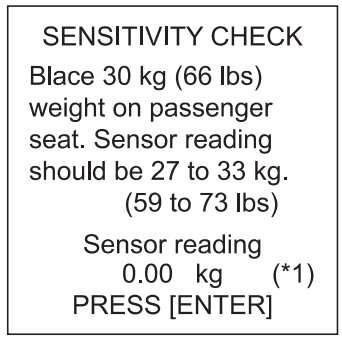
RS

OK:
"COMPLETE" is displayed.

(5) Perform the sensitivity check by following the prompts on the tester screen.
(6) Confirm that the beginning sensor reading within standard value.
Standard value:
-3.2 to 3.2 kg (-7 to 7 lb)
(7) Place a 30 kg (66.14 lb) weight (eg. a 30 kg (66.14 lb) of lead mass) onto the front passenger seat.
(8) Confirm that the sensitivity is within the standard value.

SENSITIVITY CHECK PROCEDURE

"1: DIAGNOSIS" - "1: OBD/MOBD" - "MODEL YEAR" - "MODEL SELECTION = CAMRY" - Select the option parts - "9: OCCUPANT DETECT" - Refer to the following screen flow.



*1: kg = lb

Unit can be changed based on unit conversion setting.

[System Selection Screen]

"1: DIAGNOSIS" - "9: SETUP" - "4: UNIT CONVERSION" - "WEIGHT" (kg = lbs)

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Standard value:
27 to 33 kg (59.52 to 72.75 lb)

HINT:

- When performing the sensitivity check, use a solid metal weight (the check result may not appear properly if the weight made from liquid is used).

- When the sensitivity deviates from the standard value, retighten the bolts of the front passenger seat without deforming the seat rail. After performing this procedure, if the sensitivity is not within the standard value, replace the front seat assembly RH.
- When zero point calibration has not finished normally, replace the front seat assembly RH.

PROBLEM SYMPTOMS TABLE

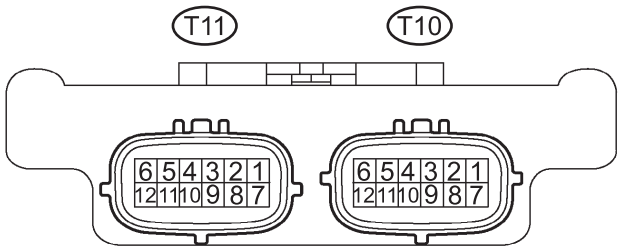
HINT:
Proceed to the troubleshooting for each circuit in the table below.

OCCUPANT CLASSIFICATION SYSTEM:

Symptom	Suspected area	See page
The front passenger seat condition differs from the indication by the passenger airbag ON/OFF indicator (DTC is not output).	Trouble in Passenger Airbag ON/OFF Indicator	RS-339

TERMINALS OF ECU

1. OCCUPANT CLASSIFICATION ECU (for Power seat)



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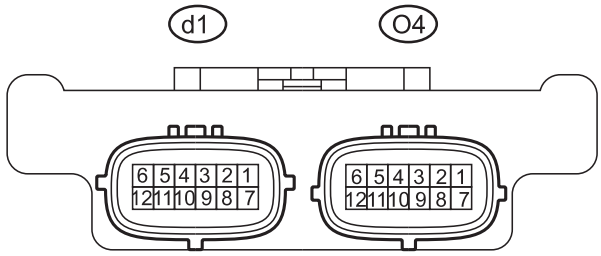
Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specification
T10-1 (+B) - T10-3 (GND)	W - W-B	Battery	Always	10 to 14 V
T10-2 (DIA) - T10-3 (GND)	GR - W-B	Diagnosis (DLC3)	Power switch on (IG)	Pulse generation
T10-3 (GND) - Body ground	W-B - Body ground	Ground	Always	Below 1 V
T10-4 (FSR-) - T10-3 (GND)	Y - W-B	Center airbag sensor assembly communication line (-)	Always	Below 1 V
T10-5 (BGND) - T10-3 (GND)	GR - W-B	Passenger side buckle switch ground line	Always	Below 1 V
T10-7 (IG) - T10-3 (GND)	BR - W-B	Power source (ECU-B Fuse)	Power switch on (IG)	10 to 14 V
T10-8 (FSR+) - T10-4 (FSR-)	L - Y	Center airbag sensor assembly communication line	Power switch on (IG)	Pulse generation
T10-9 (BSW) - T10-5 (BGND)	B - GR	Passenger side buckle switch line	Always	Below 1 V
T11-1 (SGD1) - T10-3 (GND)	G - W-B	Front occupant classification sensor LH ground line	Always	Below 1 V
T11-2 (SGD2) - T10-3 (GND)	O - W-B	Front occupant classification sensor RH ground line	Always	Below 1 V
T11-3 (SGD3) - T10-3 (GND)	W - W-B	Rear occupant classification sensor LH ground line	Always	Below 1 V
T11-4 (SGD4) - T10-3 (GND)	BR - W-B	Rear occupant classification sensor RH ground line	Always	Below 1 V
T11-5 (SVC3) - T11-3 (SGD3)	GR - W	Rear occupant classification sensor LH power supply line	Power switch on (IG), a load is applied to rear occupant classification sensor LH	4.5 to 5.1 V
T11-6 (SVC4) - T11-4 (SGD4)	V - BR	Rear occupant classification sensor RH power supply line	Power switch on (IG), a load is applied to rear occupant classification sensor RH	4.5 to 5.1 V
T11-7 (SIG1) - T11-1 (SGD1)	P - G	Front occupant classification sensor LH signal line	Power switch on (IG), a load is applied to front occupant classification sensor LH	0.2 to 4.9 V
T11-8 (SIG2) - T11-2 (SGD2)	L - O	Front occupant classification sensor RH signal line	Power switch on (IG), a load is applied to front occupant classification sensor RH	0.2 to 4.9 V

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specification
T11-9 (SIG3) - T11-3 (SGD3)	Y - W	Rear occupant classification sensor LH signal line	Power switch on (IG), a load is applied to rear occupant classification sensor LH	0.2 to 4.9 V
T11-10 (SIG4) - T11-4 (SGD4)	B - BR	Rear occupant classification sensor RH signal line	Power switch on (IG), a load is applied to rear occupant classification sensor RH	0.2 to 4.9 V
T11-11 (SVC1) - T11-1 (SGD1)	R - G	Front occupant classification sensor LH power supply line	Power switch on (IG), a load is applied to front occupant classification sensor LH	4.5 to 5.1 V
T11-12 (SVC2) - T11-2 (SGD2)	W - O	Front occupant classification sensor RH power supply line	Power switch on (IG), a load is applied to front occupant classification sensor RH	4.5 to 5.1 V

2. OCCUPANT CLASSIFICATION ECU (for Manual seat)



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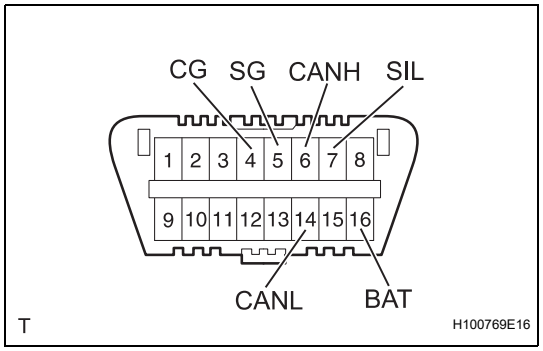
Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specification
O4-1 (+B) - O4-3 (GND)	LG - W-B	Battery	Always	10 to 14 V
O4-2 (DIA) - O4-3 (GND)	O - W-B	Diagnosis (DLC3)	Power switch on (IG)	Pulse generation
O4-3 (GND) - Body ground	W-B - Body ground	Ground	Always	Below 1 V
O4-4 (FSR-) - O4-3 (GND)	B - W	Center airbag sensor assembly communication line (-)	Always	Below 1 V
O4-5 (BGND) - O4-3 (GND)	GR - W-B	Passenger side buckle switch ground line	Always	Below 1 V
O4-7 (IG) - O4-3 (GND)	BR - W-B	Power source (ECU-B Fuse)	Power switch on (IG)	10 to 14 V
O4-8 (FSR+) - O4-4 (FSR-)	W - B	Center airbag sensor assembly communication line	Power switch on (IG)	Pulse generation
O4-9 (BSW) - O4-5 (BGND)	P - GR	Passenger side buckle switch line	Always	Below 1 V
d1-1 (SGD1) - O4-3 (GND)	G - W-B	Front occupant classification sensor LH ground line	Always	Below 1 V
d1-2 (SGD2) - O4-3 (GND)	O - W-B	Front occupant classification sensor RH ground line	Always	Below 1 V
d1-3 (SGD3) - O4-3 (GND)	W - W-B	Rear occupant classification sensor LH ground line	Always	Below 1 V
d1-4 (SGD4) - O4-3 (GND)	BR - W-B	Rear occupant classification sensor RH ground line	Always	Below 1 V

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specification
d1-5 (SVC3) - d1-3 (SGD3)	GR - W	Rear occupant classification sensor LH power supply line	Power switch on (IG), a load is applied to rear occupant classification sensor LH	4.5 to 5.1 V
d1-6 (SVC4) - d1-4 (SGD4)	V - BR	Rear occupant classification sensor RH power supply line	Power switch on (IG), a load is applied to rear occupant classification sensor RH	4.5 to 5.1 V
d1-7 (SIG1) - d1-1 (SGD1)	SB - G	Front occupant classification sensor LH signal line	Power switch on (IG), a load is applied to front occupant classification sensor LH	0.2 to 4.9 V
d1-8 (SIG2) - d1-2 (SGD2)	L - O	Front occupant classification sensor RH signal line	Power switch on (IG), a load is applied to front occupant classification sensor RH	0.2 to 4.9 V
d1-9 (SIG3) - d1-3 (SGD3)	Y - W	Rear occupant classification sensor LH signal line	Power switch on (IG), a load is applied to rear occupant classification sensor LH	0.2 to 4.9 V
d1-10 (SIG4) - d1-4 (SGD4)	R - BR	Rear occupant classification sensor RH signal line	Power switch on (IG), a load is applied to rear occupant classification sensor RH	0.2 to 4.9 V
d1-11 (SVC1) - d1-1 (SGD1)	R - G	Front occupant classification sensor LH power supply line	Power switch on (IG), a load is applied to front occupant classification sensor LH	4.5 to 5.1 V
d1-12 (SVC2) - d1-2 (SGD2)	W - O	Front occupant classification sensor RH power supply line	Power switch on (IG), a load is applied to front occupant classification sensor RH	4.5 to 5.1 V



DIAGNOSIS SYSTEM

1. CHECK DLC3

(a) The ECU uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

Symbols (Terminal No.)	Terminal Description	Condition	Pulse condition
SIL (7) - SG (5)	Bus "+" Line	During transmission	Pulse generation
CG (4) - Body ground	Chassis Ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Power switch off (*)	54 to 69 Ω
CANH (6) - BAT (16)	HIGH-level CAN bus line	Power switch off (*)	6 kΩ or higher
CANH (6) - CG (4)	HIGH-level CAN bus line	Power switch off (*)	200 Ω or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Power switch off (*)	6 kΩ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Power switch off (*)	200 Ω or higher

NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches, or the door.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

If the display shows a communication error message when connecting the cable of the intelligent tester to the DLC3, turning the power switch on (IG) and operating the intelligent tester, there is a problem on the vehicle side or tester side.

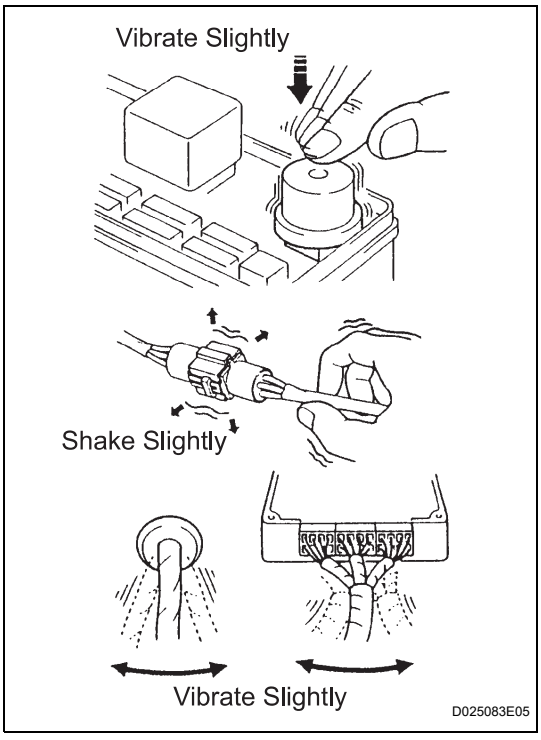
- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

2. SYMPTOM SIMULATION

HINT:

The most difficult case in troubleshooting is when no symptoms occur. In such cases, a thorough customer problem analysis must be carried out. Then the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be simulated. No matter how experienced or skilled a technician may be, if he proceeds to troubleshoot without confirming the problem symptoms, he will likely overlook something important and make a wrong guess at some points in the repair operation.

This leads to a standstill in troubleshooting.



(a) Vibration method: When vibration seems to be the major cause.

HINT:

Perform the simulation method only during the primary check period (for approximately 6 seconds after the power switch is turned on (IG)).

(1) Slightly vibrate the part of the sensor considered to be the problem cause with your fingers and check whether the malfunction occurs.

HINT:

Shaking the relays too strongly may result in open relays.

(2) Slightly shake the connector vertically and horizontally.

(3) Slightly shake the wire harness vertically and horizontally.

The connector joint and fulcrum of the vibration are the major areas to be checked thoroughly.

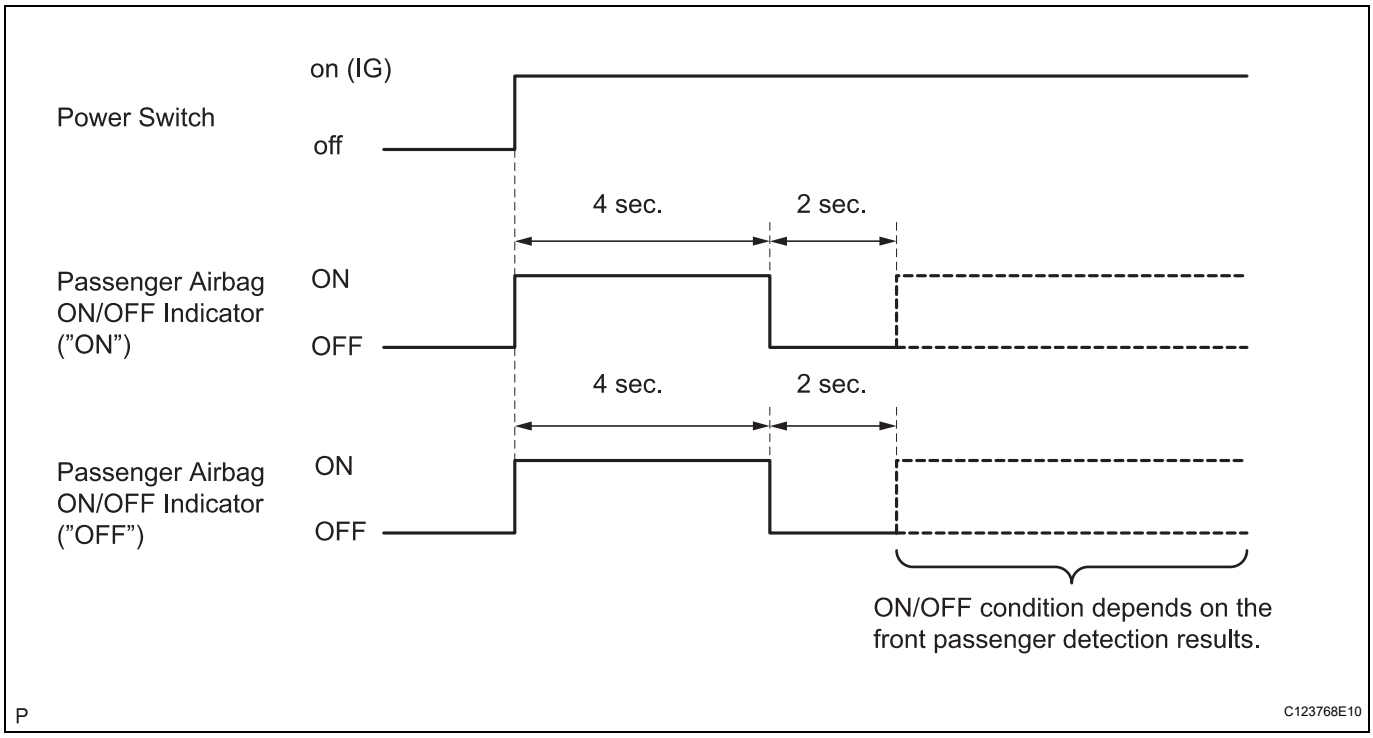
(b) Simulation method for DTC B1794:
Turn the power switch from the off to on (IG), hold it for 10 seconds, and back to off again 50 times in a row.
HINT:
DTC B1794 is output if the occupant classification ECU receives the power switch off-on (IG)-off signal 50 times in a row when a malfunction occurs in the power circuit for the occupant classification system.

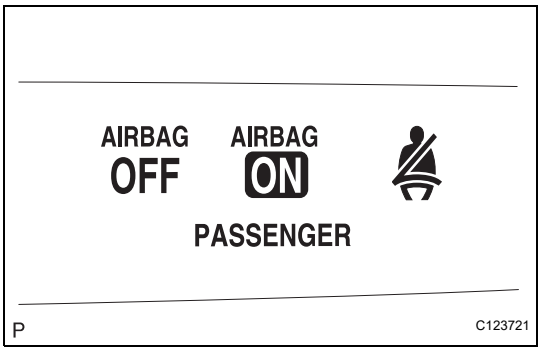
3. FUNCTION OF PASSENGER AIRBAG ON/OFF INDICATOR

(a) Initial check.
(1) Turn the power switch on (IG).
(2) The passenger airbag ON/OFF indicator ("ON" and "OFF") comes on for approximately 4 seconds, then goes off for approximately 2 seconds.
(3) Approximately 6 seconds after the power switch is turned to on (IG), the passenger airbag ON/OFF indicator will show ON or OFF depending on the conditions listed below.

Condition	ON Indicator	OFF Indicator
Vacant	OFF	OFF
Adult is seated. (Above 36 kg (79.37 lb))	ON	OFF
Child is seated. (Less than 36 kg (79.37 lb))	OFF	ON
Child restraint system is set. (*)	OFF	ON
Front passenger occupant classification system failure	OFF	ON

*: Child restraint system less than 7 kg (15.43 lb) and passenger side buckle switch is ON, then 7 to 36 kg (15.43 to 79.37 lb) is set.
HINT:
- The passenger airbag ON/OFF indicator is based on the timing chart below in order to check the indicator light circuit.
- When the occupant classification system has trouble, both the SRS warning light and the passenger airbag ON/OFF indicator ("OFF") come on. In this case, check the DTCs in "AIRBAG SYSTEM" first.





4. CHECK PASSENGER AIRBAG ON/OFF INDICATOR

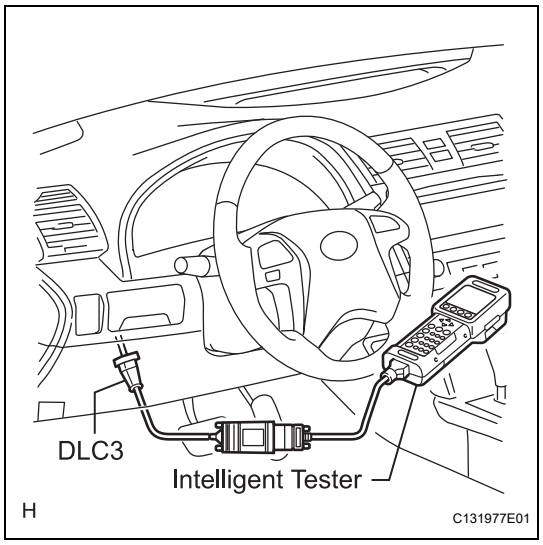
(a) Turn the power switch on (IG).

(b) Check that the passenger airbag ON/OFF indicator ("ON" and "OFF") come on for approximately 4 seconds, then goes off for approximately 2 seconds.
HINT:
Refer to the table in step 3 regarding the passenger airbag ON/OFF indicator when the power switch is turned on (IG) and approximately 6 seconds pass.

DTC CHECK / CLEAR

1. DTC CHECK

HINT:
When DTC B1650/32 is detected as a result of troubleshooting for "AIRBAG SYSTEM", perform troubleshooting for the occupant classification system.

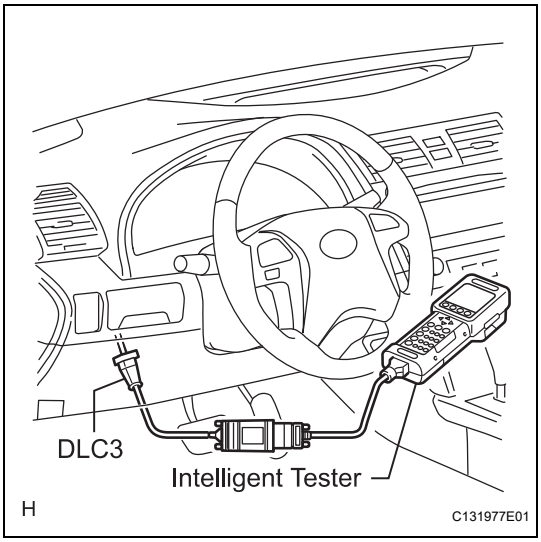


(a) Check for DTCs.
  (1) Connect the intelligent tester to the DLC3.
  (2) Turn the power switch on (IG).
  (3) Check the DTCs by following the prompts on the tester screen.
    HINT:
    Refer to the intelligent tester operator's manual for further details.

(b) Clear DTCs.
  (1) Connect the intelligent tester to the DLC3.
  (2) Turn the power switch on (IG).
  (3) Clear the DTCs by following the prompts on the tester screen.
    HINT:
    Refer to the intelligent tester operator's manual for further details.

DATA LIST / ACTIVE TEST

HINT:
By accessing the DATA LIST displayed on the intelligent tester, you can perform such functions as reading the values of switches and sensors without removing any parts. Reading the DATA LIST is the first step in troubleshooting is one method to save labor time.



1. DATA LIST FOR OCCUPANT CLASSIFICATION ECU

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the tester ON.
(d) Enter the following menus: DIAGNOSIS / OBD/ MOBD / OCCUPANT DETECT / DATA LIST.
(e) Check the values by referring to: the table below.

DATA LIST:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
IG SW	Power switch condition/ ON: Power switch on (IG) OFF: Power switch off	ON/OFF	-
P BUCKLE SW	Passenger side buckle switch/ SET: The seat belt is fastened UNSET: The seat belt is not fastened NG: Data is not determined	SET/UNSET	-
PASSENGER CLASS	Passenger classification/ AM50: Adult (more than 54 kg (119.05 lb)) is seated AF05: Adult (36 to 54 kg (79.37 to 119.05 lb)) is seated CHILD: Child (less than 36 kg (79.37 lb)) is seated CRS: Child restraint system (less than 7 kg (15.43 lb)) and passenger side buckle switch is ON, then 7 to 36 kg (15.43 to 79.37 lb) is set OFF: Vacant	AM50/AF05/CHILD/CRS/OFF	-
SENS RANGE INF	Sensor range information/ OK: The value of a sensor is within the range NG: The value of a sensor is over the range	OK	-
FL SENS RANGE	Front left sensor range information/ OK: Sensor range is -17 to 27 kg (-37.48 to 59.52 lb) Min.: Less than -17 kg (-37.48 lb) Max.: More than 27 kg (59.52 lb)	OK	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
FR SENS RANGE	Front right sensor range information/ OK: Sensor range is -17 to 27 kg (-37.48 to 59.52 lb) Min.: Less than -17 kg (-37.48 lb) Max.: More than 27 kg (59.52 lb)	OK	-
RL SENS RANGE	Rear left sensor range information/ OK: Sensor range is -17 to 37 kg (-37.48 to 81.57 lb) Min.: Less than -17 kg (-37.48 lb) Max.: More than 37 kg (81.57 lb)	OK	-
RR SENS RANGE	Rear right sensor range information/ OK: Sensor range is -17 to 37 kg (-37.48 to 81.57 lb) Min.: Less than -17 kg (-37.48 lb) Max.: More than 37 kg (81.57 lb)	OK	-
FL SENS VOL	Front left sensor voltage/ Min.: 0 V Max.: 19.8 V	0 to 4.7 V	-
FR SENS VOL	Front right sensor voltage/ Min.: 0 V Max.: 19.8 V	0 to 4.7 V	-
RL SENS VOL	Rear left sensor voltage/ Min.: 0 V Max.: 19.8 V	0 to 4.7 V	-
RR SENS VOL	Rear right sensor voltage/ Min.: 0 V Max.: 19.8 V	0 to 4.7 V	-
FL SENS WEIGHT	Front left sensor weight information/ Min.: -17 kg (-37.48 lb) Max.: 27 kg (59.52 lb)	-17 to 27 kg (-37.48 to 59.52 lb)	-
FR SENS WEIGHT	Front right sensor weight information/ Min.: -17 kg (-37.48 lb) Max.: 27 kg (59.52 lb)	-17 to 27 kg (-37.48 to 59.52 lb)	-
RL SENS WEIGHT	Rear left sensor weight information/ Min.: -17 kg (-37.48 lb) Max.: 37 kg (81.57 lb)	-17 to 37 kg (-37.48 to 81.57 lb)	-
RR SENS WEIGHT	Rear right sensor weight information/ Min.: -17 kg (-37.48 lb) Max.: 37 kg (81.57 lb)	-17 to 37 kg (-37.48 to 81.57 lb)	-
TOTAL WEIGHT	Total weight information/ Min.: -68 kg (-149.91 lb) Max.: 128 kg (282.19 lb)	-68 to 128 kg (-149.91 to 282.19 lb)	-
#PRESENT CODES	Number of present DTC recorded/ Min.: 0, Max.: 255	0	-
#PAST CODES	Number of past DTC recorded/ Min.: 0, Max.: 255	0	-

DIAGNOSTIC TROUBLE CODE CHART

If a trouble code is displayed during the DTC check, check the circuit listed for the code in the table below (Proceed to the page listed for that circuit).

OCCUPANT CLASSIFICATION SYSTEM:

DTC Code	Detection Item	Trouble Area	Passenger Airbag ON/ OFF Indicator (OFF Indicator)	See page
B1771	Passenger Side Buckle Switch Circuit Malfunction	1. Front seat inner belt assembly RH (Passenger side buckle switch) 2. Occupant classification ECU 3. Floor wire No. 2 4. Front seat wire RH (for Power seat)	ON	RS-253
B1780	Front Occupant Classification Sensor LH Circuit Malfunction	1. Front seat assembly RH (Front occupant classification sensor LH) 2. Occupant classification ECU 3. Front seat wire RH	ON	RS-261
B1781	Front Occupant Classification Sensor RH Circuit Malfunction	1. Front seat assembly RH (Front occupant classification sensor RH) 2. Occupant classification ECU 3. Front seat wire RH	ON	RS-269
B1782	Rear Occupant Classification Sensor LH Circuit Malfunction	1. Front seat assembly RH (Rear occupant classification sensor LH) 2. Occupant classification ECU 3. Front seat wire RH	ON	RS-277
B1783	Rear Occupant Classification Sensor RH Circuit Malfunction	1. Front seat assembly RH (Rear occupant classification sensor RH) 2. Occupant classification ECU 3. Front seat wire RH	ON	RS-285
B1785	Front Occupant Classification Sensor LH Collision Detection	1. Front seat assembly RH (Front occupant classification sensor LH) 2. Occupant classification ECU	ON	RS-293
B1786	Front Occupant Classification Sensor RH Collision Detection	1. Front seat assembly RH (Front occupant classification sensor RH) 2. Occupant classification ECU	ON	RS-297
B1787	Rear Occupant Classification Sensor LH Collision Detection	1. Front seat assembly RH (Rear occupant classification sensor LH) 2. Occupant classification ECU	ON	RS-301
B1788	Rear Occupant Classification Sensor RH Collision Detection	1. Front seat assembly RH (Rear occupant classification sensor RH) 2. Occupant classification ECU	ON	RS-305

DTC Code	Detection Item	Trouble Area	Passenger Airbag ON/ OFF Indicator (OFF Indicator)	See page
B1790	Center Airbag Sensor Assembly Communication Circuit Malfunction	1. Occupant classification ECU 2. Center airbag sensor assembly 3. Floor wire No. 2 4. Front seat wire RH (for Power seat)	ON	RS-309
B1793	Occupant Classification Sensor Power Supply Circuit Malfunction	1. Front seat assembly RH (Occupant classification sensors) 2. Front seat wire RH 3. Occupant classification ECU	ON	RS-323
B1794	Open in Occupant Classification ECU Battery Positive Line	1. Battery 2. ECU-B fuse 3. Floor wire No. 2 4. Front seat wire RH (for Power seat) 5. Occupant classification ECU	ON	RS-330
B1795	Occupant Classification ECU Malfunction	1. Occupant classification ECU 2. Floor wire No. 2 3. Front seat wire RH (for Power seat) 4. Front seat inner belt assembly RH (Passenger side buckle switch)	ON	RS-334
B1796	Sleep Operation Failure of Occupant Classification ECU	Occupant classification ECU	ON	RS-337

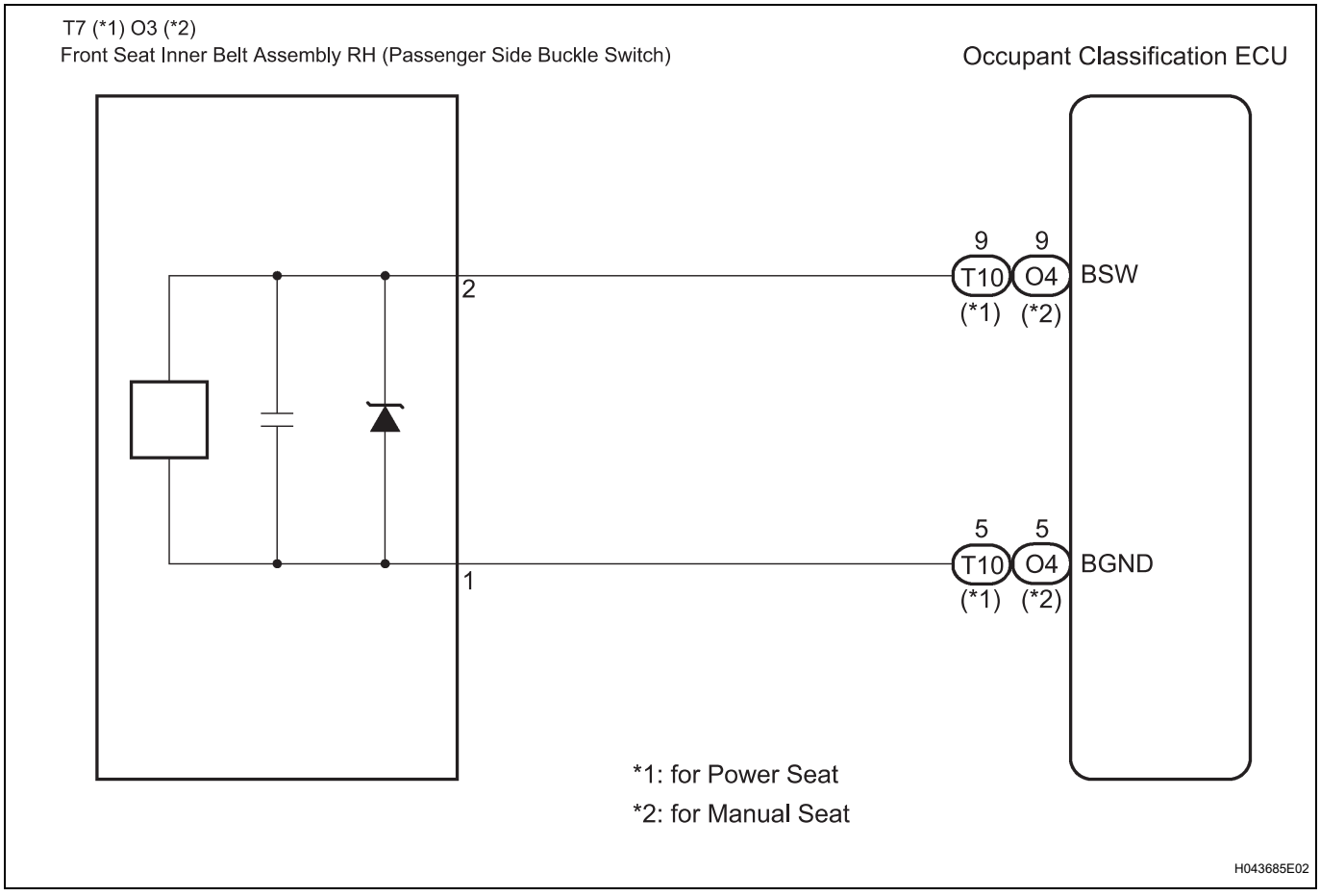
DTC	B1771	Passenger Side Buckle Switch Circuit Malfunction

DESCRIPTION

The passenger side buckle switch circuit consists of the occupant classification ECU and the front seat inner belt assembly RH.
DTC B1771 is recorded when a malfunction is detected in the passenger side buckle switch circuit.
Troubleshoot DTC B1771 first when the DTC B1771 and B1795 are output simultaneously.

DTC No.	DTC Detecting Condition	Trouble Area
B1771	• The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the passenger side buckle switch circuit for 2 seconds. • Passenger side buckle switch malfunction • Occupant classification ECU malfunction	• Front seat inner belt assembly RH (Passenger side buckle switch) • Occupant classification ECU • Floor wire No. 2 • Front seat wire RH (for Power seat)

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front passenger seat installation bolts to see the under surface of seat cushion.
- In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

RS

1	CHECK DTC

(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Check the DTCs (See page RS-248).

OK:

DTC B1771 is not output.

HINT:

Codes other than DTC B1771 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-245)**

NG

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Check that the connectors are properly connected to the occupant classification ECU and the front seat inner belt assembly RH.

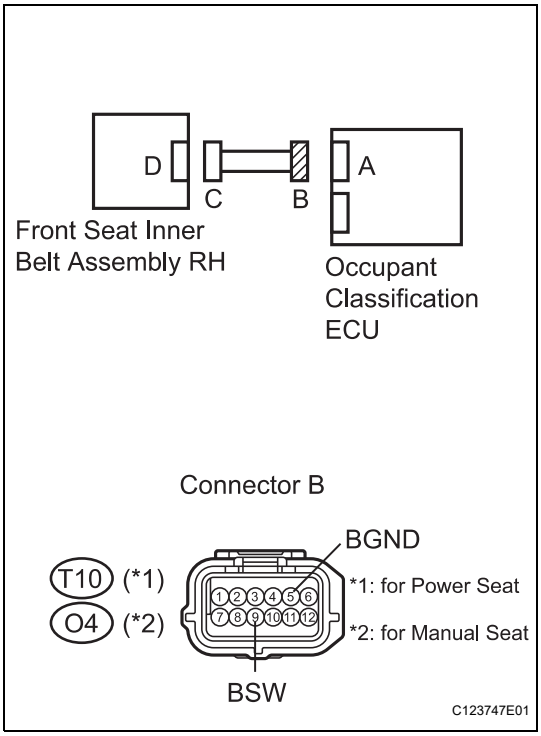
OK:

The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY, THEN GO TO STEP 1**

OK

3	CHECK WIRE HARNESS (SHORT TO B+)



(a) Disconnect the connectors from the occupant classification ECU and the front seat inner belt assembly RH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the power switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage:

for Power seat

Tester connection	Condition	Specified condition
T10-9 (BSW) - Body ground	Power switch on (IG)	Below 1 V
T10-5 (BGND) - Body ground	Power switch on (IG)	Below 1 V

for Manual seat

Tester connection	Condition	Specified condition
O4-9 (BSW) - Body ground)	Power switch on (IG)	Below 1 V
O4-5 (BGND) - Body ground	Power switch on (IG)	Below 1 V

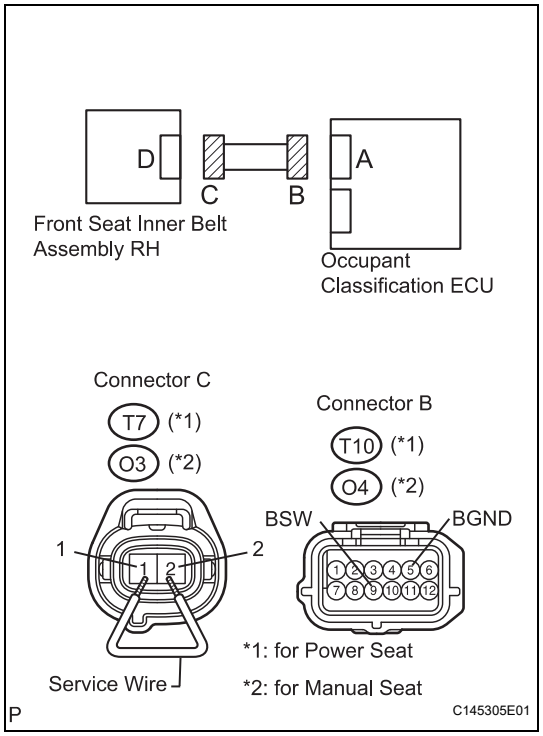
Result

Result	Proceed to
NG (for Power seat)	A
NG (for Manual seat)	B
OK	C

A	REPAIR OR REPLACE FRONT SEAT WIRE RH
B	REPAIR OR REPLACE FLOOR WIRE NO. 2

C

4	CHECK WIRE HARNESS (OPEN)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Using a service wire, connect terminals 2 and 1 of connector C.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(d) Measure the resistance according to the value(s) in the table below.
Standard resistance:
for Power seat

Tester connection	Condition	Specified condition
T10-9 (BSW) - T10-5 (BGND)	Always	Below 1 Ω

for Manual seat

Tester connection	Condition	Specified condition
O4-9 (BSW) - O4-5 (BGND)	Always	Below 1 Ω

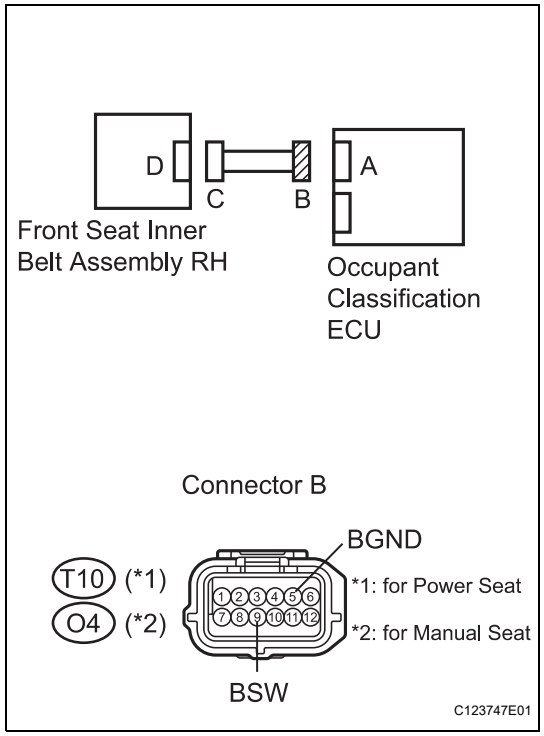
Result

Result	Proceed to
NG (for Power seat)	A
NG (for Manual seat)	B
OK	C

A	REPAIR OR REPLACE FRONT SEAT WIRE RH
B	REPAIR OR REPLACE FLOOR WIRE NO. 2

C

5	CHECK WIRE HARNESS (SHORT)



(a) Disconnect the service wire from connector C.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T10-9 (BSW) - T10-5 (BGND)	Always	1 MΩ or Higher

for Manual seat

Tester connection	Condition	Specified condition
O4-9 (BSW) - O4-5 (BGND)	Always	1 MΩ or Higher

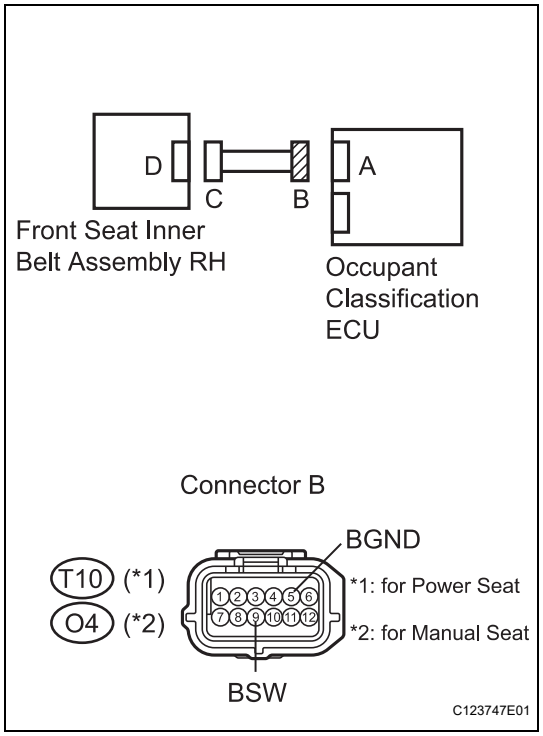
Result

Result	Proceed to
NG (for Power seat)	A
NG (for Manual seat)	B
OK	C

A	REPAIR OR REPLACE FRONT SEAT WIRE RH
B	REPAIR OR REPLACE FLOOR WIRE NO. 2

C

6 CHECK WIRE HARNESS (SHORT TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T10-9 (BSW) - Body ground	Always	1 MΩ or Higher
T10-5 (BGND) - Body ground	Always	1 MΩ or Higher

for Manual seat

Tester connection	Condition	Specified condition
O4-9 (BSW) - Body ground	Always	1 MΩ or Higher
O4-5 (BGND) - Body ground	Always	1 MΩ or Higher

Result

Result	Proceed to
NG (for Power seat)	A
NG (for Manual seat)	B
OK	C

A → REPAIR OR REPLACE FRONT SEAT WIRE RH

B → REPAIR OR REPLACE FLOOR WIRE NO. 2

C

7 CHECK DTC

(a) Connect the connectors to the occupant classification ECU and the front seat inner belt assembly RH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the power switch on (IG).
(d) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(e) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(f) Turn the power switch off.
(g) Turn the power switch on (IG).
(h) Check the DTCs (See page RS-248).

OK:

DTC B1771 is not output.

HINT:

Codes other than DTC B1771 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-245)**

NG

8	REPLACE FRONT SEAT INNER BELT ASSEMBLY RH

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the front seat inner belt assembly RH (See page SB-16).
HINT:
Perform the inspection using parts from a normal vehicle if possible.
(d) Connect the negative (-) terminal cable to the battery.
(e) Turn the power switch on (IG).
(f) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(g) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(h) Turn the power switch off.
(i) Turn the power switch on (IG).
(j) Check the DTCs (See page RS-248).
OK:
DTC B1771 is not output.
HINT:
Codes other than DTC B1771 may be output at this time, but they are not related to this check.

OK → **END**

NG

9	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-445).

NEXT

10	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NEXT

11	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

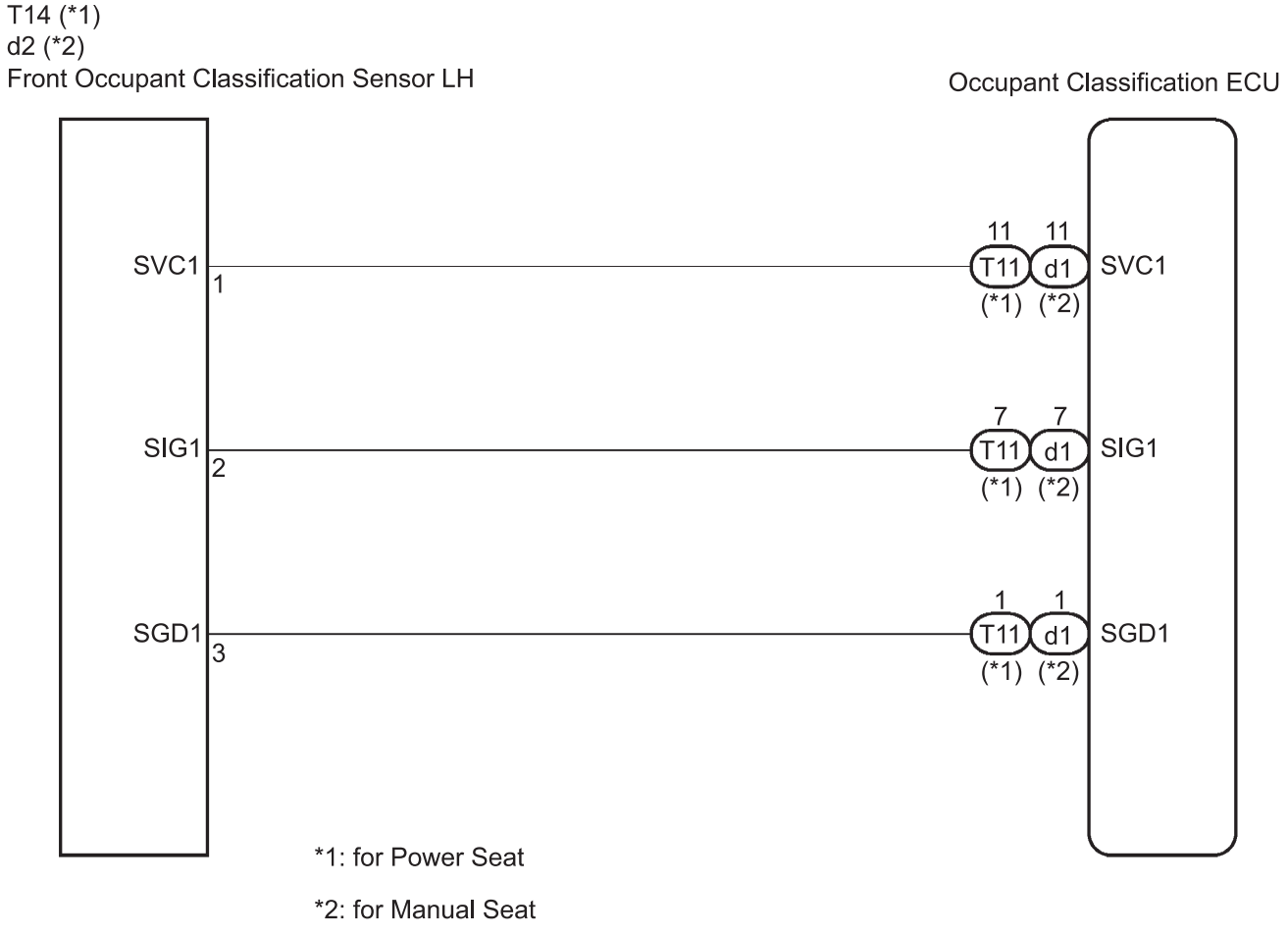
DTC	B1780	Front Occupant Classification Sensor LH Circuit Malfunction

DESCRIPTION

The front occupant classification sensor LH circuit consists of the occupant classification ECU and the front occupant classification sensor LH.
DTC B1780 is recorded when a malfunction is detected in the front occupant classification sensor LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1780	• The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the front occupant classification sensor LH circuit for 2 seconds. • Front occupant classification sensor LH malfunction • Occupant classification ECU malfunction	• Front seat assembly RH (Front occupant classification sensor LH) • Front seat wire RH • Occupant classification ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front passenger seat installation bolts to see the under surface of seat cushion.
- In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	CHECK DTC

(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Check the DTCs (See page RS-248).

OK:

DTC B1780 is not output.

HINT:

Codes other than DTC B1780 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-245)**

NG

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Check that the connectors are properly connected to the occupant classification ECU and the front occupant classification sensor LH.

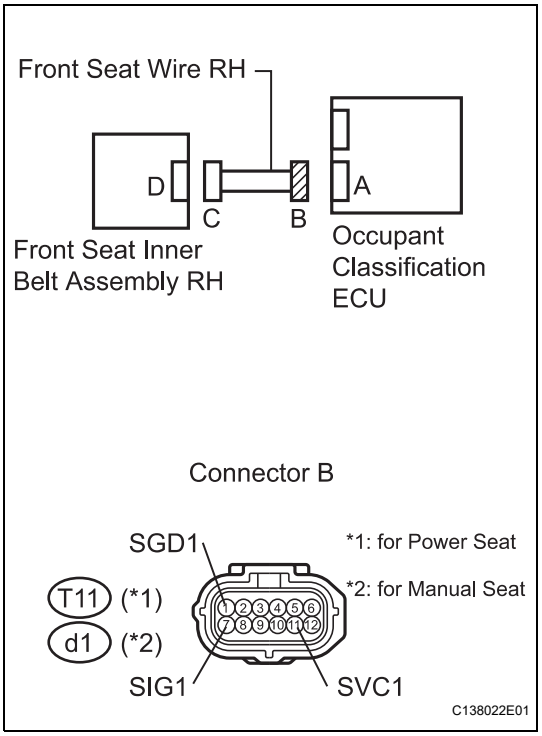
OK:

The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY, THEN GO TO STEP 1**

OK

3	CHECK FRONT SEAT WIRE RH (SHORT TO B+)



(a) Disconnect the connectors from the occupant classification ECU and the front occupant classification sensor LH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the power switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage:

for Power seat

Tester connection	Condition	Specified condition
T11-1 (SGD1) - Body ground	Power switch on (IG)	Below 1 V
T11-7 (SIG1) - Body ground	Power switch on (IG)	Below 1 V
T11-11 (SVC1) - Body ground	Power switch on (IG)	Below 1 V

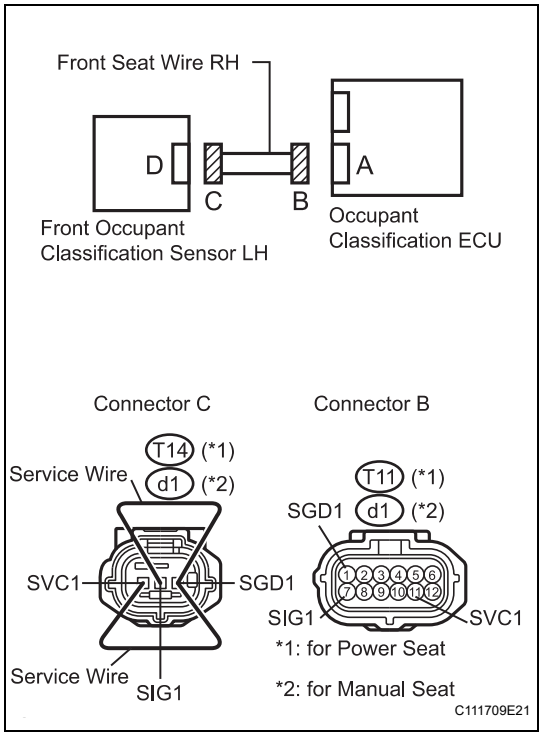
for Manual seat

Tester connection	Condition	Specified condition
d1-1 (SGD1) - Body ground	Power switch on (IG)	Below 1 V
d1-7 (SIG1) - Body ground	Power switch on (IG)	Below 1 V
d1-11 (SVC1) - Body ground	Power switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

4	CHECK FRONT SEAT WIRE RH (OPEN)



(a) Turn the power switch off.

(b) Disconnect the negative (-) terminal cable from the battery.

(c) Using a service wire, connect terminals 1 (SVC1) and 3 (SGD1), and connect terminals 2 (SIG1) and 3 (SGD1) of connector C.

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(d) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-7 (SIG1) - T11-1 (SGD1)	Always	Below 1 Ω
T11-11 (SVC1) - T11-1 (SGD1)	Always	Below 1 Ω

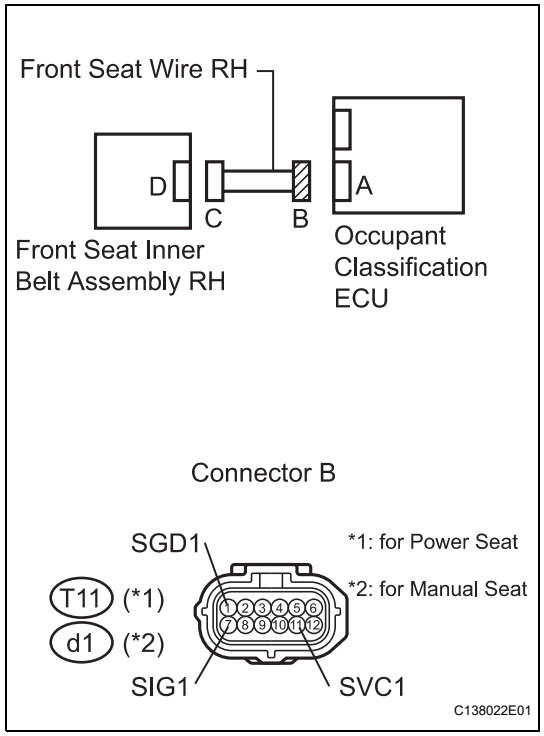
for Manual seat

Tester connection	Condition	Specified condition
d1-7 (SIG1) - d1-1 (SGD1)	Always	Below 1 Ω
d1-11 (SVC1) - d1-1 (SGD1)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

5 CHECK FRONT SEAT WIRE RH (SHORT)



(a) Disconnect the service wire from connector C.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-7 (SIG1) - T11-1 (SGD1)	Always	1 MΩ or Higher
T11-11 (SVC1) - T11-1 (SGD1)	Always	1 MΩ or Higher
T11-7 (SIG1) - T11-11 (SVC1)	Always	1 MΩ or Higher

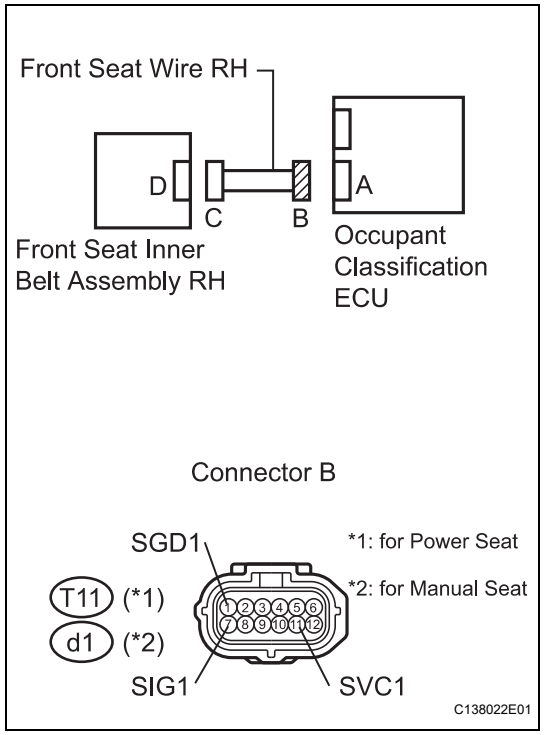
for Manual seat

Tester connection	Condition	Specified condition
d1-7 (SIG1) - d1-1 (SGD1)	Always	1 MΩ or Higher
d1-11 (SVC1) - d1-1 (SGD1)	Always	1 MΩ or Higher
d1-7 (SIG1) - d1-11 (SVC1)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

6 CHECK FRONT SEAT WIRE RH (SHORT TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-1 (SGD1) - Body ground	Always	1 MΩ or Higher
T11-7 (SIG1) - Body ground	Always	1 MΩ or Higher
T11-11 (SVC1) - Body ground	Always	1 MΩ or Higher

for Manual seat

Tester connection	Condition	Specified condition
d1-1 (SGD1) - Body ground	Always	1 MΩ or Higher
d1-7 (SIG1) - Body ground	Always	1 MΩ or Higher
d1-11 (SVC1) - Body ground	Always	1 MΩ or Higher

RS

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

7	CHECK DTC

(a) Connect the connectors to the occupant classification ECU and the front occupant classification sensor LH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the power switch on (IG).
(d) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(e) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(f) Turn the power switch off.
(g) Turn the power switch on (IG).
(h) Check the DTCs (See page RS-248).
OK:
DTC B1780 is not output.
HINT:
Codes other than DTC B1780 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-245)**

NG

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-445).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

9	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NG → **Go to step 12**

OK

10	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 12**

OK

11	CHECK DTC

(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Check the DTCs (See page RS-248).
OK:
DTC B1780 is not output.
HINT:
Codes other than DTC B1780 may be output at this time, but they are not related to this check.

OK → **END**

NG

12	REPLACE FRONT SEAT ASSEMBLY RH

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the front seat assembly RH (See page SE-29 for power seat or SE-16 for manual seat).

NEXT

13	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NEXT

14	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

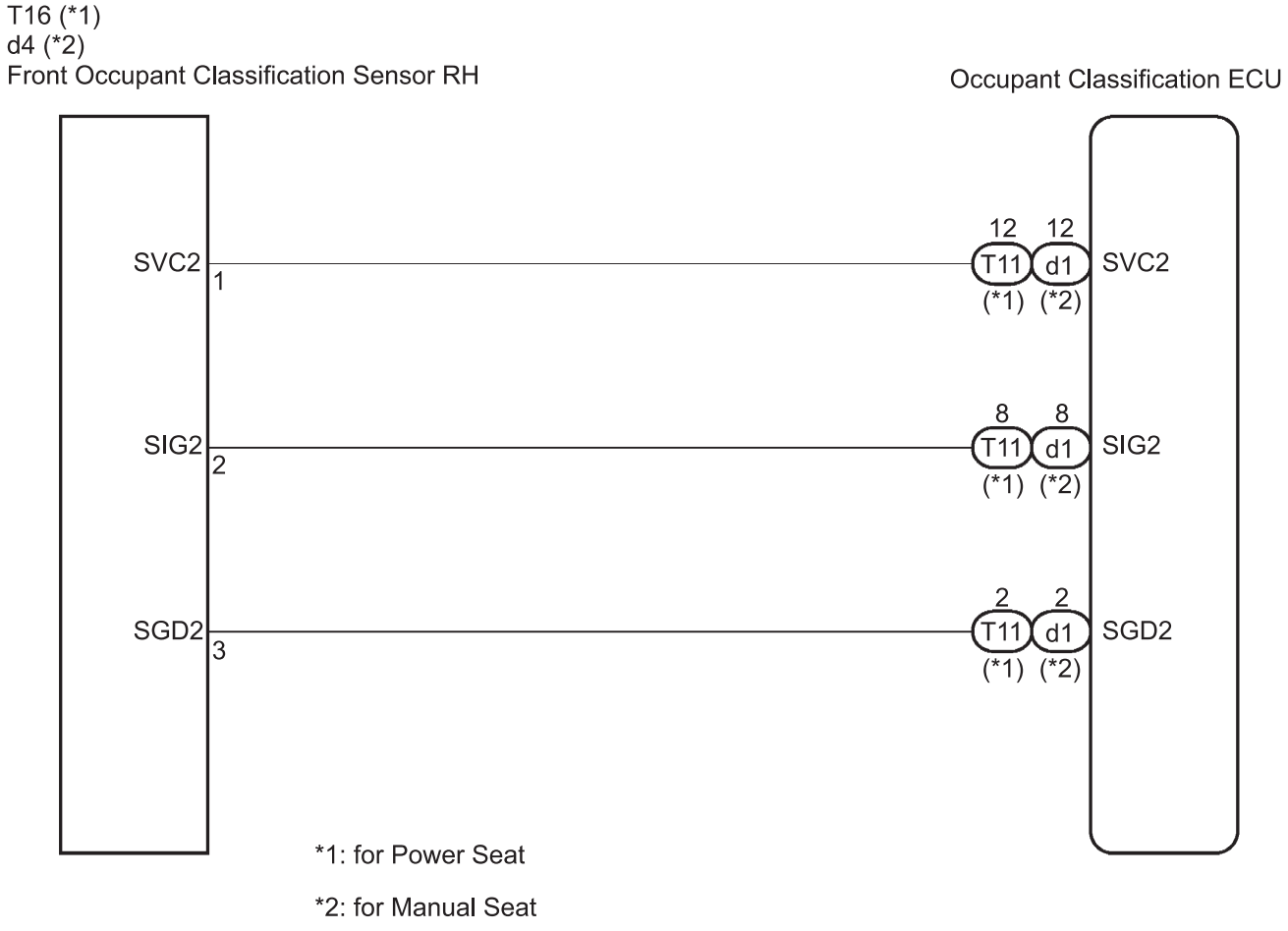
DTC	B1781	Front Occupant Classification Sensor RH Circuit Malfunction

DESCRIPTION

The front occupant classification sensor RH circuit consists of the occupant classification ECU and the front occupant classification sensor RH.
DTC B1781 is recorded when a malfunction is detected in the front occupant classification sensor RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1781	• The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the front occupant classification sensor RH circuit for 2 seconds. • Front occupant classification sensor RH malfunction • Occupant classification ECU malfunction	• Front seat assembly RH (Front occupant classification sensor RH) • Front seat wire RH • Occupant classification ECU

WIRING DIAGRAM



C

H045935E08

INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front passenger seat installation bolts to see the under surface of seat cushion.
- In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	CHECK DTC

(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Check the DTCs (See page RS-41).

OK:

DTC B1781 is not output.

HINT:

Codes other than DTC B1781 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-245)**

NG

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Check that the connectors are properly connected to the occupant classification ECU and the front occupant classification sensor RH.

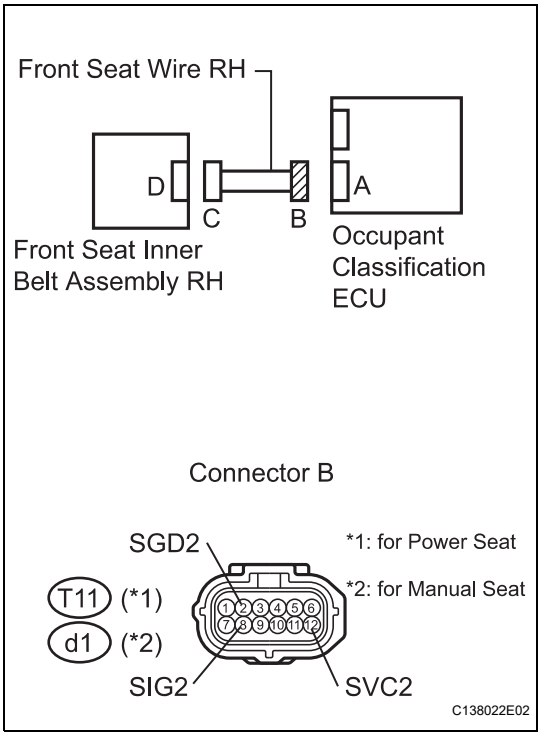
OK:

The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY, THEN GO TO STEP 1**

OK

3	CHECK FRONT SEAT WIRE RH (SHORT TO B+)



(a) Disconnect the connectors from the occupant classification ECU and the front occupant classification sensor RH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the power switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage:

for Power seat

Tester connection	Condition	Specified condition
T11-2 (SGD2) - Body ground	Power switch on (IG)	Below 1 V
T11-8 (SIG2) - Body ground	Power switch on (IG)	Below 1 V
T11-12 (SVC2) - Body ground	Power switch on (IG)	Below 1 V

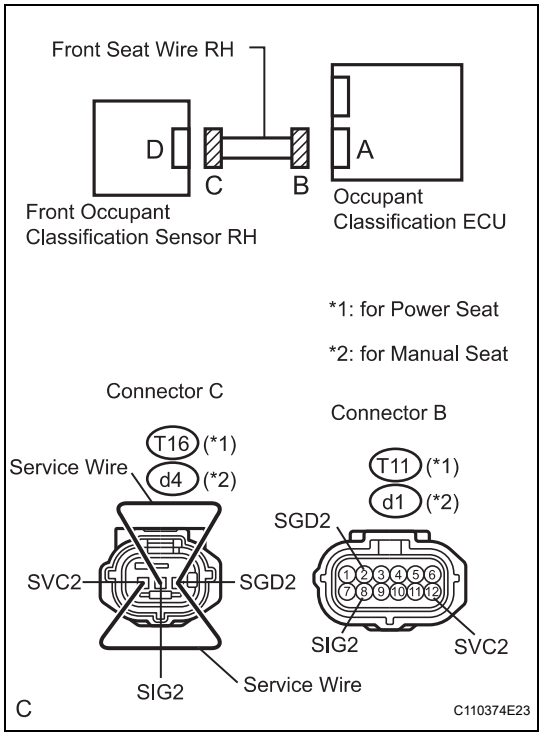
for Manual seat

Tester connection	Condition	Specified condition
d1-2 (SGD2) - Body ground	Power switch on (IG)	Below 1 V
d1-8 (SIG2) - Body ground	Power switch on (IG)	Below 1 V
d1-12 (SVC2) - Body ground	Power switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

4	CHECK FRONT SEAT WIRE RH (OPEN)



(a) Turn the power switch off.

(b) Disconnect the negative (-) terminal cable from the battery.

(c) Using a service wire, connect terminals 1 (SVC2) and 3 (SGD2), and connect terminals 2 (SIG2) and 3 (SGD2) of connector C.

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(d) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-8 (SIG2) - T11-2 (SGD2)	Always	Below 1 Ω
T11-12 (SVC2) - T11-2 (SGD2)	Always	Below 1 Ω

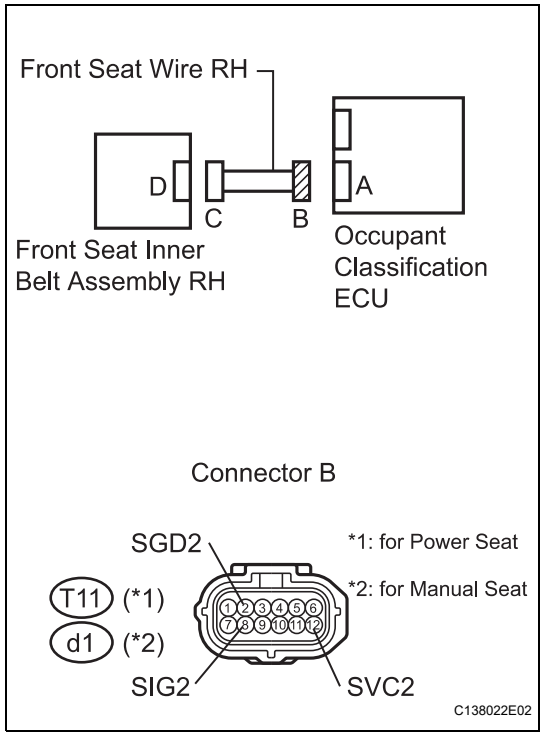
for Manual seat

Tester connection	Condition	Specified condition
d1-8 (SIG2) - d1-2 (SGD2)	Always	Below 1 Ω
d1-12 (SVC2) - d1-2 (SGD2)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

5 CHECK FRONT SEAT WIRE RH (SHORT)



(a) Disconnect the service wire from connector C.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-8 (SIG2) - T11-2 (SGD2)	Always	1 MΩ or Higher
T11-12 (SVC2) - T11-2 (SGD2)	Always	1 MΩ or Higher
T11-8 (SIG2) - T11-12 (SVC2)	Always	1 MΩ or Higher

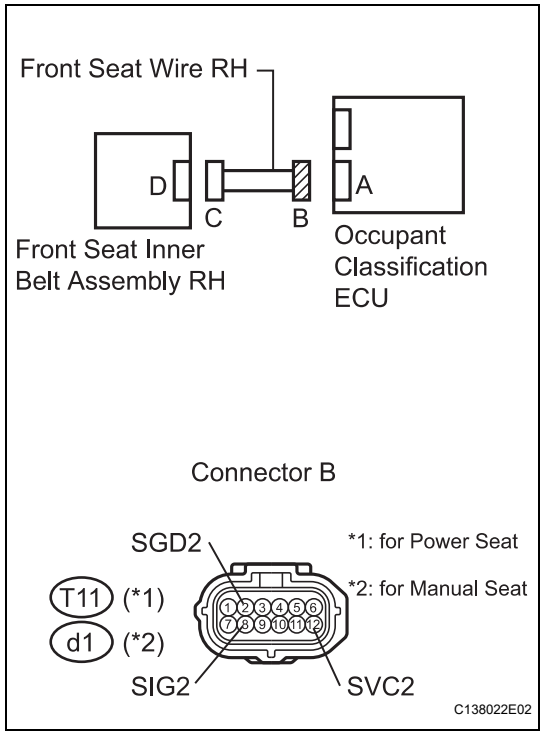
for Manual seat

Tester connection	Condition	Specified condition
d1-8 (SIG2) - d1-2 (SGD2)	Always	1 MΩ or Higher
d1-12 (SVC2) - d1-2 (SGD2)	Always	1 MΩ or Higher
d1-8 (SIG2) - d1-12 (SVC2)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

6 CHECK FRONT SEAT WIRE RH (SHORT TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-2 (SGD2) - Body ground	Always	1 MΩ or Higher
T11-8 (SIG2) - Body ground	Always	1 MΩ or Higher
T11-12 (SVC2) - Body ground	Always	1 MΩ or Higher

for Manual seat

Tester connection	Condition	Specified condition
d1-2 (SGD2) - Body ground	Always	1 MΩ or Higher
d1-8 (SIG2) - Body ground	Always	1 MΩ or Higher
d1-12 (SVC2) - Body ground	Always	1 MΩ or Higher

RS

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

7	CHECK DTC

(a) Connect the connectors to the occupant classification ECU and the front occupant classification sensor RH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the power switch on (IG).
(d) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(e) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(f) Turn the power switch off.
(g) Turn the power switch on (IG).
(h) Check the DTCs (See page RS-248).
OK:
DTC B1781 is not output.
HINT:
Codes other than DTC B1781 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-245)**

NG

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-445).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

9	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NG → **Go to step 12**

OK

10	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 12**

OK

11	CHECK DTC

(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Check the DTCs (See page RS-248).
OK:
DTC B1781 is not output.
HINT:
Codes other than DTC B1781 may be output at this time, but they are not related to this check.

OK → **END**

NG

12	REPLACE FRONT SEAT ASSEMBLY RH

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the front seat assembly RH (See page SE-29 for power seat or SE-16 for manual seat).

NEXT

13	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NEXT

14	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

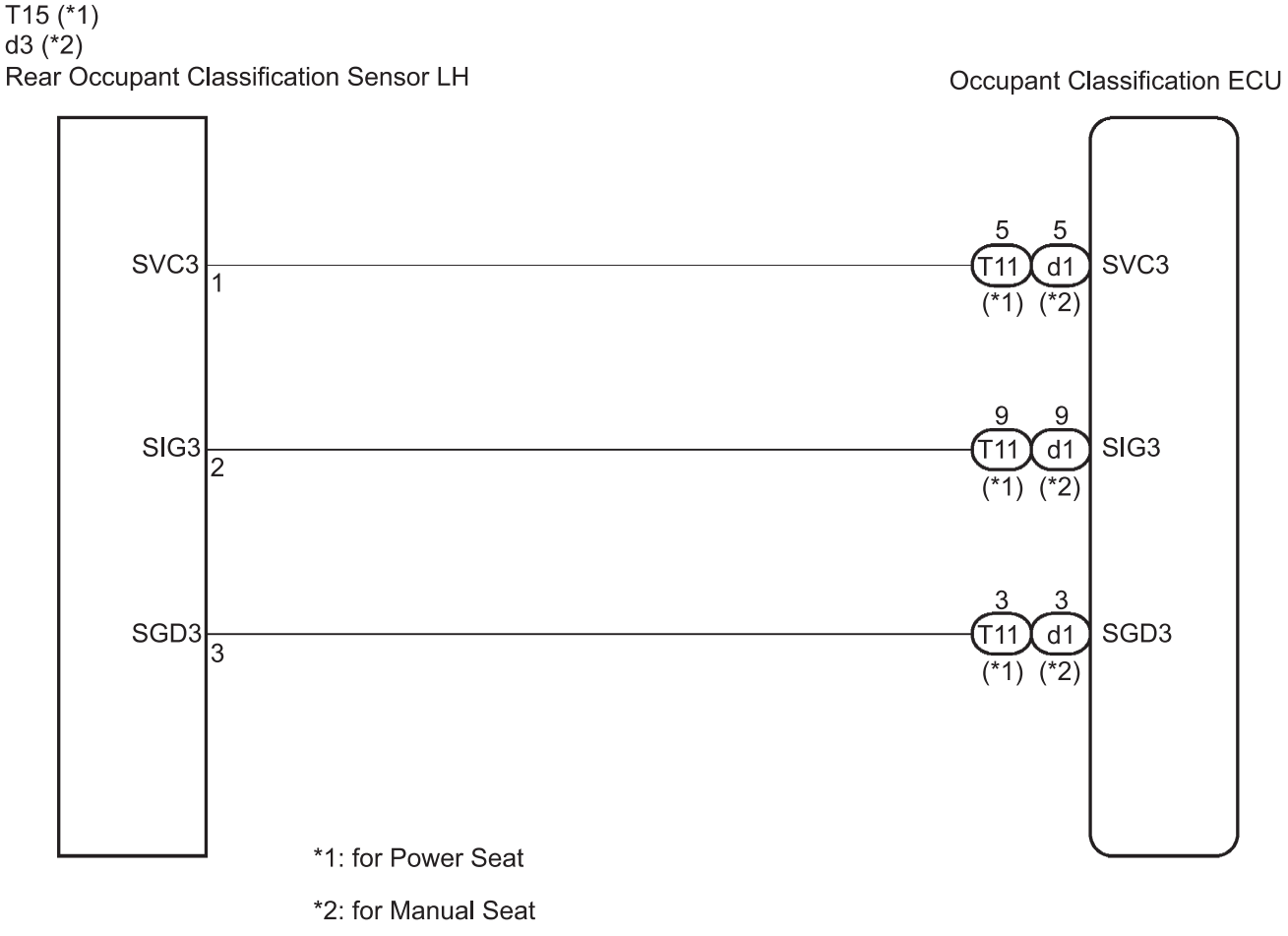
DTC	B1782	Rear Occupant Classification Sensor LH Circuit Malfunction

DESCRIPTION

The rear occupant classification sensor LH circuit consists of the occupant classification ECU and the rear occupant classification sensor LH.
DTC B1782 is recorded when a malfunction is detected in the rear occupant classification sensor LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1782	• The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the rear occupant classification sensor LH circuit for 2 seconds. • Rear occupant classification sensor LH malfunction • Occupant classification ECU malfunction	• Front seat assembly RH (Rear occupant classification sensor LH) • Front seat wire RH • Occupant classification ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front passenger seat installation bolts to see the under surface of seat cushion.
- In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	CHECK DTC

(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Check the DTCs (See page RS-248).

OK:

DTC B1782 is not output.

HINT:

Codes other than DTC B1782 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-245)**

NG

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Check that the connectors are properly connected to the occupant classification ECU and the rear occupant classification sensor LH.

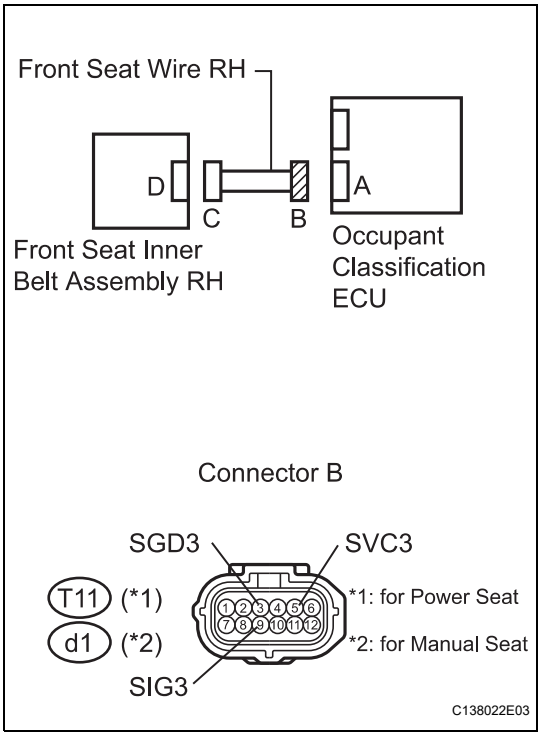
OK:

The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY, THEN GO TO STEP 1**

OK

3	CHECK FRONT SEAT WIRE RH (SHORT TO B+)



(a) Disconnect the connectors from the occupant classification ECU and the rear occupant classification sensor LH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the power switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage:

for Power seat

Tester connection	Condition	Specified condition
T11-3 (SGD3) - Body ground	Power switch on (IG)	Below 1 V
T11-5 (SVC3) - Body ground	Power switch on (IG)	Below 1 V
T11-9 (SIG3) - Body ground	Power switch on (IG)	Below 1 V

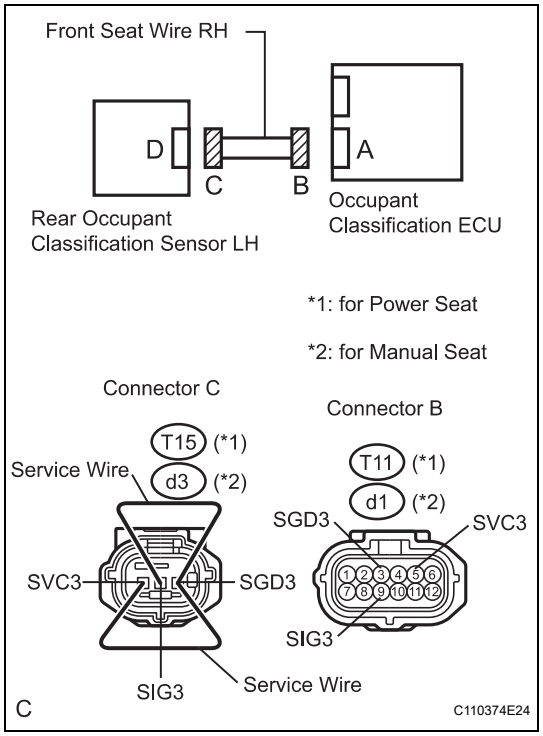
for Manual seat

Tester connection	Condition	Specified condition
d1-3 (SGD3) - Body ground	Power switch on (IG)	Below 1 V
d1-9 (SIG3) - Body ground	Power switch on (IG)	Below 1 V
d1-5 (SVC3) - Body ground	Power switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

4	CHECK FRONT SEAT WIRE RH (OPEN)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Using a service wire, connect terminals 1 (SVC3) and 3 (SGD3), and connect terminals 2 (SIG3) and 3 (SGD3) of connector C.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(d) Measure the resistance according to the value(s) in the table below.
Standard resistance:
for Power seat

Tester connection	Condition	Specified condition
T11-5 (SVC3) - T11-3 (SGD3)	Always	Below 1 Ω
T11-9 (SIG3) - T11-3 (SGD3)	Always	Below 1 Ω

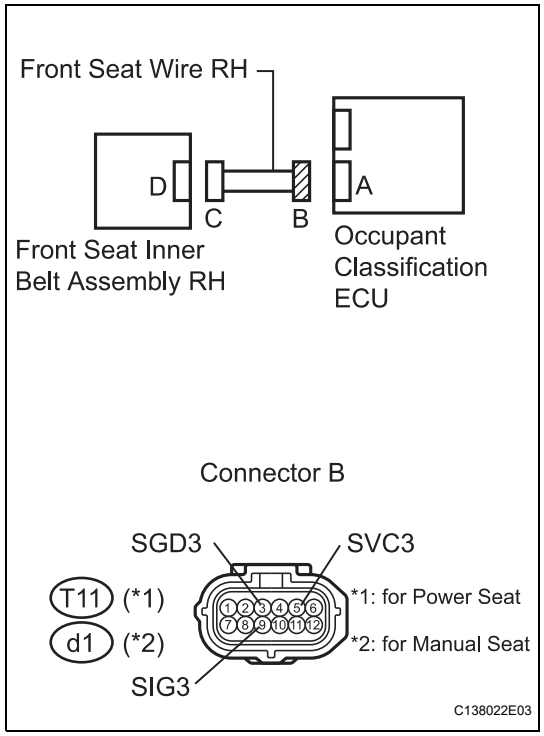
for Manual seat

Tester connection	Condition	Specified condition
d1-9 (SIG3) - d1-3 (SGD3)	Always	Below 1 Ω
d1-5 (SVC3) - d1-3 (SGD3)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

5 CHECK FRONT SEAT WIRE RH (SHORT)



(a) Disconnect the service wire from connector C.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:
for Power seat

Tester connection	Condition	Specified condition
T11-5 (SVC3) - T11-3 (SGD3)	Always	1 MΩ or Higher
T11-9 (SIG3) - T11-3 (SGD3)	Always	1 MΩ or Higher
T11-5 (SVC3) - T11-9 (SIG3)	Always	1 MΩ or Higher

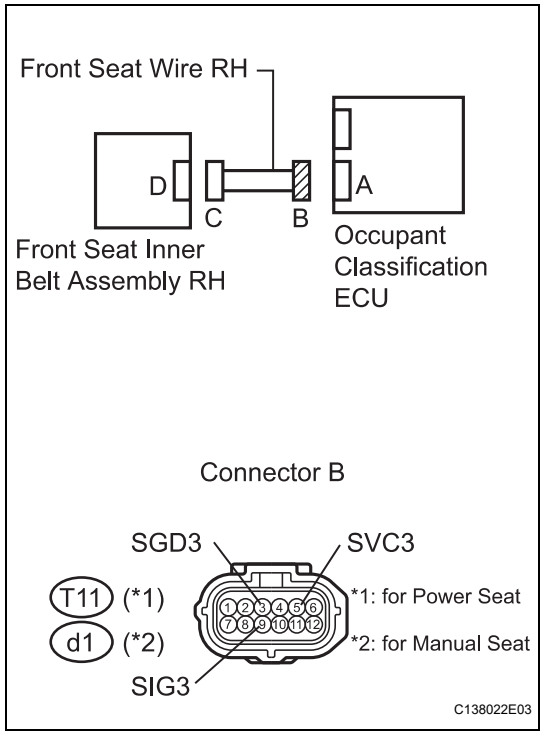
for Manual seat

Tester connection	Condition	Specified condition
d1-9 (SIG3) - d1-3 (SGD3)	Always	1 MΩ or Higher
d1-5 (SVC3) - d1-3 (SGD3)	Always	1 MΩ or Higher
d1-9 (SIG3) - d1-5 (SVC3)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

6 CHECK FRONT SEAT WIRE RH (SHORT TO GROUND)



(a) Measure the resistance according to value(s) in the table below.

Standard resistance:
for Power seat

Tester connection	Condition	Specified condition
T11-3 (SGD3) - Body ground	Always	1 MΩ or Higher
T11-5 (SVC3) - Body ground	Always	1 MΩ or Higher
T11-9 (SIG3) - Body ground	Always	1 MΩ or Higher

for Manual seat

Tester connection	Condition	Specified condition
d1-3 (SGD3) - Body ground	Always	1 MΩ or Higher
d1-9 (SIG3) - Body ground	Always	1 MΩ or Higher
d1-5 (SVC3) - Body ground	Always	1 MΩ or Higher

RS

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

7	CHECK DTC

(a) Connect the connectors to the occupant classification ECU and the rear occupant classification sensor LH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the power switch on (IG).
(d) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(e) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(f) Turn the power switch off.
(g) Turn the power switch on (IG).
(h) Check the DTCs (See page RS-248).
OK:
DTC B1782 is not output.
HINT:
Codes other than DTC B1782 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-245)**

NG

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-445).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

9	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NG → **Go to step 12**

OK

10	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 12**

OK

11	CHECK DTC

(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Check the DTCs (See page RS-248).
OK:
DTC B1782 is not output.
HINT:
Codes other than DTC B1782 may be output at this time, but they are not related to this check.

OK → **END**

NG

12	REPLACE FRONT SEAT ASSEMBLY RH

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the front seat assembly RH (See page SE-29 for power seat or SE-16 for manual seat).

NEXT

13	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NEXT

14	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

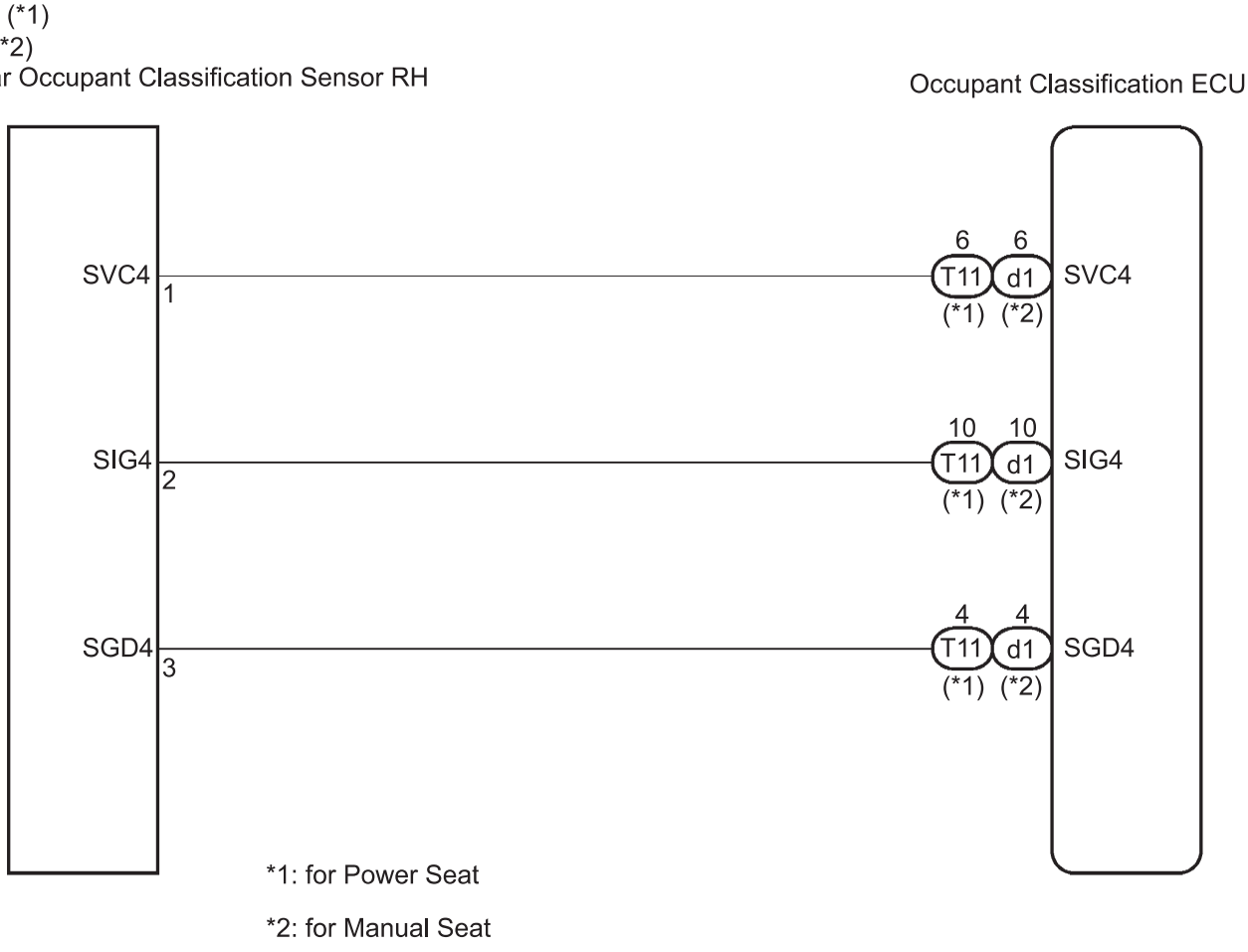
DTC	B1783	Rear Occupant Classification Sensor RH Circuit Malfunction

DESCRIPTION

The rear occupant classification sensor RH circuit consists of the occupant classification ECU and the rear occupant classification sensor RH.
DTC B1783 is recorded when a malfunction is detected in the rear occupant classification sensor RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1783	• The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the rear occupant classification sensor RH circuit for 2 seconds. • Rear occupant classification sensor RH malfunction. • Occupant classification ECU malfunction.	• Front seat assembly RH (Rear occupant classification sensor RH) • Front seat wire RH • Occupant classification ECU

WIRING DIAGRAM



C

H045935E10

INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front passenger seat installation bolts to see the under surface of seat cushion.
- In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	CHECK DTC

(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Check the DTCs (See page RS-248).

OK:

DTC B1783 is not output.

HINT:

Codes other than DTC B1783 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-245)**

NG

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Check that the connectors are properly connected to the occupant classification ECU and the rear occupant classification sensor RH.

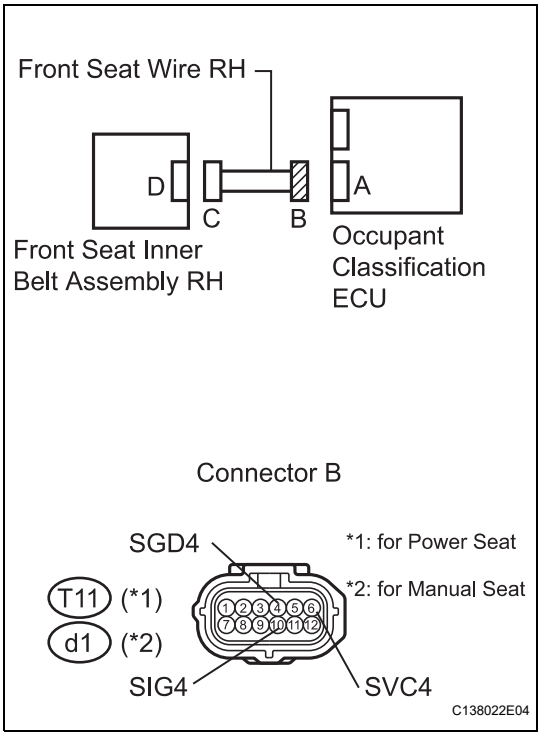
OK:

The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY, THEN GO TO STEP 1**

OK

3	CHECK FRONT SEAT WIRE RH (SHORT TO B+)



(a) Disconnect the connectors from the occupant classification ECU and the rear occupant classification sensor RH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the power switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage:

for Power seat

Tester connection	Condition	Specified condition
T11-4 (SGD4) - Body ground	Power switch on (IG)	Below 1 V
T11-6 (SVC4) - Body ground	Power switch on (IG)	Below 1 V
T11-10 (SIG4) - Body ground	Power switch on (IG)	Below 1 V

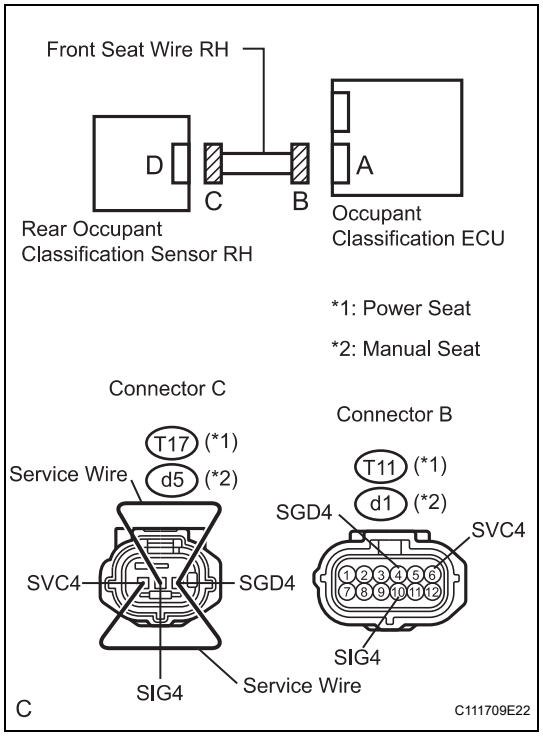
for Manual seat

Tester connection	Condition	Specified condition
d1-4 (SGD4) - Body ground	Power switch on (IG)	Below 1 V
d1-10 (SIG4) - Body ground	Power switch on (IG)	Below 1 V
d1-6 (SVC4) - Body ground	Power switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

4	CHECK FRONT SEAT WIRE RH (OPEN)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Using a service wire, connect terminals 1 (SVC4) and 3 (SGD4), and connect terminals 2 (SIG4) and 3 (SGD4) of connector C.
(d) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-6 (SVC4) - T11-4 (SGD4)	Always	Below 1 Ω
T11-10 (SIG4) - T11-4 (SGD4)	Always	Below 1 Ω

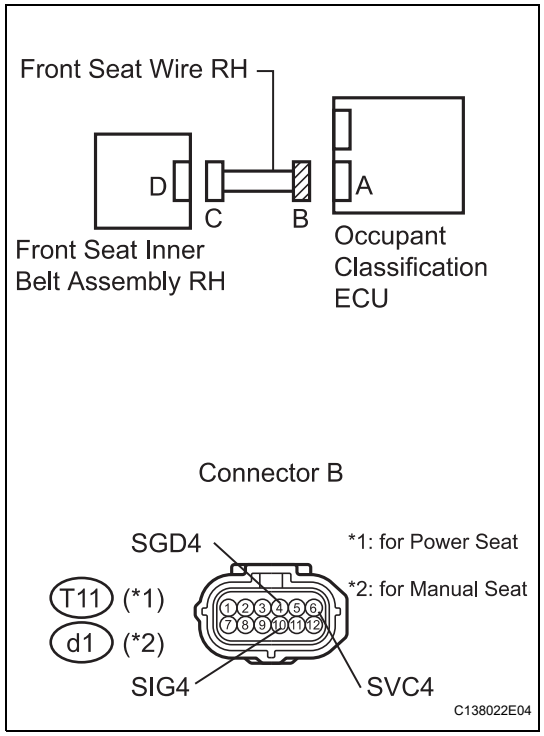
for Manual seat

Tester connection	Condition	Specified condition
d1-10 (SIG4) - d1-4 (SGD4)	Always	Below 1 Ω
d1-6 (SVC4) - d1-4 (SGD4)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

5 CHECK FRONT SEAT WIRE RH (SHORT)



(a) Disconnect the service wire from connector C.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-6 (SVC4) - T11-4 (SGD4)	Always	1 MΩ or Higher
T11-10 (SIG4) - T11-4 (SGD4)	Always	1 MΩ or Higher
T11-6 (SVC4) - T11-10 (SIG4)	Always	1 MΩ or Higher

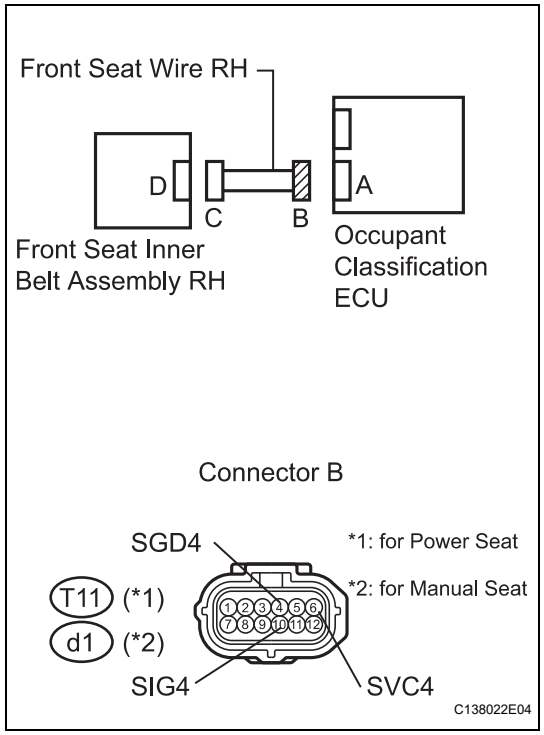
for Manual seat

Tester connection	Condition	Specified condition
d1-10 (SIG4) - d1-4 (SGD4)	Always	1 MΩ or Higher
d1-6 (SVC4) - d1-4 (SGD4)	Always	1 MΩ or Higher
d1-10 (SIG4) - d1-6 (SVC4)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

6 CHECK FRONT SEAT WIRE RH (SHORT TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-4 (SGD4) - Body ground	Always	1 MΩ or Higher
T11-6 (SVC4) - Body ground	Always	1 MΩ or Higher
T11-10 (SIG4) - Body ground	Always	1 MΩ or Higher

for Manual seat

Tester connection	Condition	Specified condition
d1-4 (SGD4) - Body ground	Always	1 MΩ or Higher
d1-10 (SIG4) - Body ground	Always	1 MΩ or Higher
d1-6 (SVC4) - Body ground	Always	1 MΩ or Higher

RS

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

7	CHECK DTC

(a) Connect the connectors to the occupant classification ECU and the rear occupant classification sensor RH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the power switch on (IG).
(d) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(e) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(f) Turn the power switch off.
(g) Turn the power switch on (IG).
(h) Check the DTCs (See page RS-248).
OK:
DTC B1783 is not output.
HINT:
Codes other than DTC B1783 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-245)**

NG

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-445).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

9	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NG → **Go to step 12**

OK

10	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 12**

OK

11	CHECK DTC

(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Check the DTCs (See page RS-248).
OK:
DTC B1783 is not output.
HINT:
Codes other than DTC B1783 may be output at this time, but they are not related to this check.

OK → **END**

NG

12	REPLACE FRONT SEAT ASSEMBLY RH

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the front seat assembly RH (See page SE-16 for power seat or SE-13 for manual seat).

NEXT

13	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NEXT

14	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

DTC	B1785	Front Occupant Classification Sensor LH Collision Detection

DESCRIPTION

DTC B1785 is output when the occupant classification ECU receives a collision detection signal sent by the front occupant classification sensor LH if an accident occurs.
DTC B1785 is also output when the front seat assembly RH is subjected to a strong impact, even if an actual accident does not occur.
However, when the occupant classification ECU outputs a collision detection signal, even if the vehicle is not in a collision, DTC B1785 can be cleared by "zero point calibration" and "sensitivity check".
Therefore, if DTC B1785 is output, first perform "zero point calibration" and "sensitivity check".

DTC No.	DTC Detecting Condition	Trouble Area
B1785	• Front seat assembly RH malfunction • Occupant classification ECU malfunction • Front occupant classification sensor LH sensed large load	• Occupant classification ECU • Front seat assembly RH (Front occupant classification sensor LH)

WIRING DIAGRAM

See page RS-261.

INSPECTION PROCEDURE

1 PERFORM ZERO POINT CALIBRATION

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NG → **Go to step 4**

OK

2 PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 4**

OK

3 CHECK DTC

(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).

(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Check the DTCs (See page RS-248).
OK:
DTC B1785 is not output.
HINT:
Codes other than DTC B1785 may be output at this time, but they are not related to this check.

OK	END

NG

4	REPLACE FRONT SEAT ASSEMBLY RH

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the front seat assembly RH (See page SE-16 for power seat or SE-29 for manual seat).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

5	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NG	Go to step 8

OK

6	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG	Go to step 8

OK

7	CHECK DTC

(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Check the DTCs (See page RS-248).
OK:
DTC B1785 is not output.
HINT:
Codes other than DTC B1785 may be output at this time, but they are not related to this check.

OK → END

NG

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-445).

NEXT

9	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NEXT

10	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

DTC	B1786	Front Occupant Classification Sensor RH Collision Detection

DESCRIPTION

DTC B1786 is output when the occupant classification ECU receives a collision detection signal sent by the front occupant classification sensor RH if an accident occurs.
DTC B1786 is also output when the front seat assembly RH is subjected to a strong impact, even if an actual accident does not occur.
However, when the occupant classification ECU outputs a collision detection signal, even if the vehicle is not in a collision, DTC B1786 can be cleared by "zero point calibration" and "sensitivity check".
Therefore, if DTC B1786 is output, first perform "zero point calibration" and "sensitivity check".

DTC No.	DTC Detection Condition	Trouble Area
B1786	• Front seat assembly RH malfunction • Occupant classification ECU malfunction • Front occupant classification sensor RH sensed large load	• Occupant classification ECU • Front seat assembly RH (Front occupant classification sensor RH)

WIRING DIAGRAM

See page RS-269.

INSPECTION PROCEDURE

1 PERFORM ZERO POINT CALIBRATION

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NG → **Go to step 4**

OK

2 PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 4**

OK

3 CHECK DTC

(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).

(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Check the DTCs (See page RS-248).
OK:
DTC B1786 is not output.
HINT:
Codes other than DTC B1786 may be output at this time, but they are not related to this check.

OK → **END**

NG

4	REPLACE FRONT SEAT ASSEMBLY RH

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the front seat assembly RH (See page SE-29 for power seat or SE-16 for manual seat).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

5	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NG → **Go to step 8**

OK

6	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 8**

OK

7	CHECK DTC

(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Check the DTCs (See page RS-248).
OK:
DTC B1786 is not output.
HINT:
Codes other than DTC B1786 may be output at this time, but they are not related to this check.

OK → END

NG

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-445).

NEXT

9	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NEXT

10	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

DTC	B1787	Rear Occupant Classification Sensor LH Collision Detection

DESCRIPTION

DTC B1787 is output when the occupant classification ECU receives a collision detection signal sent by the rear occupant classification sensor LH if an accident occurs.
DTC B1787 is also output when the front seat assembly RH is subjected to a strong impact, even if an actual accident does not occur.
However, when the occupant classification ECU outputs a collision detection signal, even if the vehicle is not in a collision, DTC B1787 can be cleared by "zero point calibration" and "sensitivity check".
Therefore, if DTC B1787 is output, first perform "zero point calibration" and "sensitivity check".

DTC No.	DTC Detecting Condition	Trouble Area
B1787	• Front seat assembly RH malfunction • Occupant classification ECU malfunction • Rear occupant classification sensor LH sensed large load	• Occupant classification ECU • Front seat assembly RH (Rear occupant classification sensor LH)

WIRING DIAGRAM

See page RS-277.

INSPECTION PROCEDURE

1 PERFORM ZERO POINT CALIBRATION

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NG → **Go to step 4**

OK

2 PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 4**

OK

3 CHECK DTC

(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).

(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Check the DTCs (See page RS-248).
OK:
DTC B1787 is not output.
HINT:
Codes other than DTC B1787 may be output at this time, but they are not related to this check.

OK	END

NG

4	REPLACE FRONT SEAT ASSEMBLY RH

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the front seat assembly RH (See page SE-29 for power seat or SE-16 for manual seat).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

5	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NG	Go to step 8

OK

6	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG	Go to step 8

OK

7	CHECK DTC

(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Check the DTCs (See page RS-248).
OK:
DTC B1787 is not output.
HINT:
Codes other than DTC B1787 may be output at this time, but they are not related to this check.

OK → END

NG

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-445).

NEXT

9	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NEXT

10	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

DTC	B1788	Rear Occupant Classification Sensor RH Collision Detection

DESCRIPTION

DTC B1788 is output when the occupant classification ECU receives a collision detection signal sent by the rear occupant classification sensor RH if an accident occurs.
DTC B1788 is also output when the front seat assembly RH is subjected to a strong impact, even if an actual accident does not occur.
However, when the occupant classification ECU outputs a collision detection signal, even if the vehicle is not in a collision, DTC B1788 can be cleared by "zero point calibration" and "sensitivity check".
Therefore, if DTC B1788 is output, first perform "zero point calibration" and "sensitivity check".

DTC No.	DTC Detection Condition	Trouble Area
B1788	• Front seat assembly RH malfunction • Occupant classification ECU malfunction • Rear occupant classification sensor RH sensed large load	• Occupant classification ECU • Front seat assembly RH (Rear occupant classification sensor RH)

WIRING DIAGRAM

See page RS-285.

INSPECTION PROCEDURE

1 PERFORM ZERO POINT CALIBRATION

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NG → **Go to step 4**

OK

2 PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 4**

OK

3 CHECK DTC

(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).

(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Check the DTCs (See page RS-248).
OK:
DTC B1788 is not output.
HINT:
Codes other than DTC B1788 may be output at this time, but they are not related to this check.

OK	END

NG

4	REPLACE FRONT SEAT ASSEMBLY RH

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the front seat assembly RH (See page SE-29 for power seat or SE-16 for manual seat).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

5	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NG	Go to step 8

OK

6	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG	Go to step 8

OK

7	CHECK DTC

(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Check the DTCs (See page RS-248).
OK:
DTC B1788 is not output.
HINT:
Codes other than DTC B1788 may be output at this time, but they are not related to this check.

OK → END

NG

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-445).

NEXT

9	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NEXT

10	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

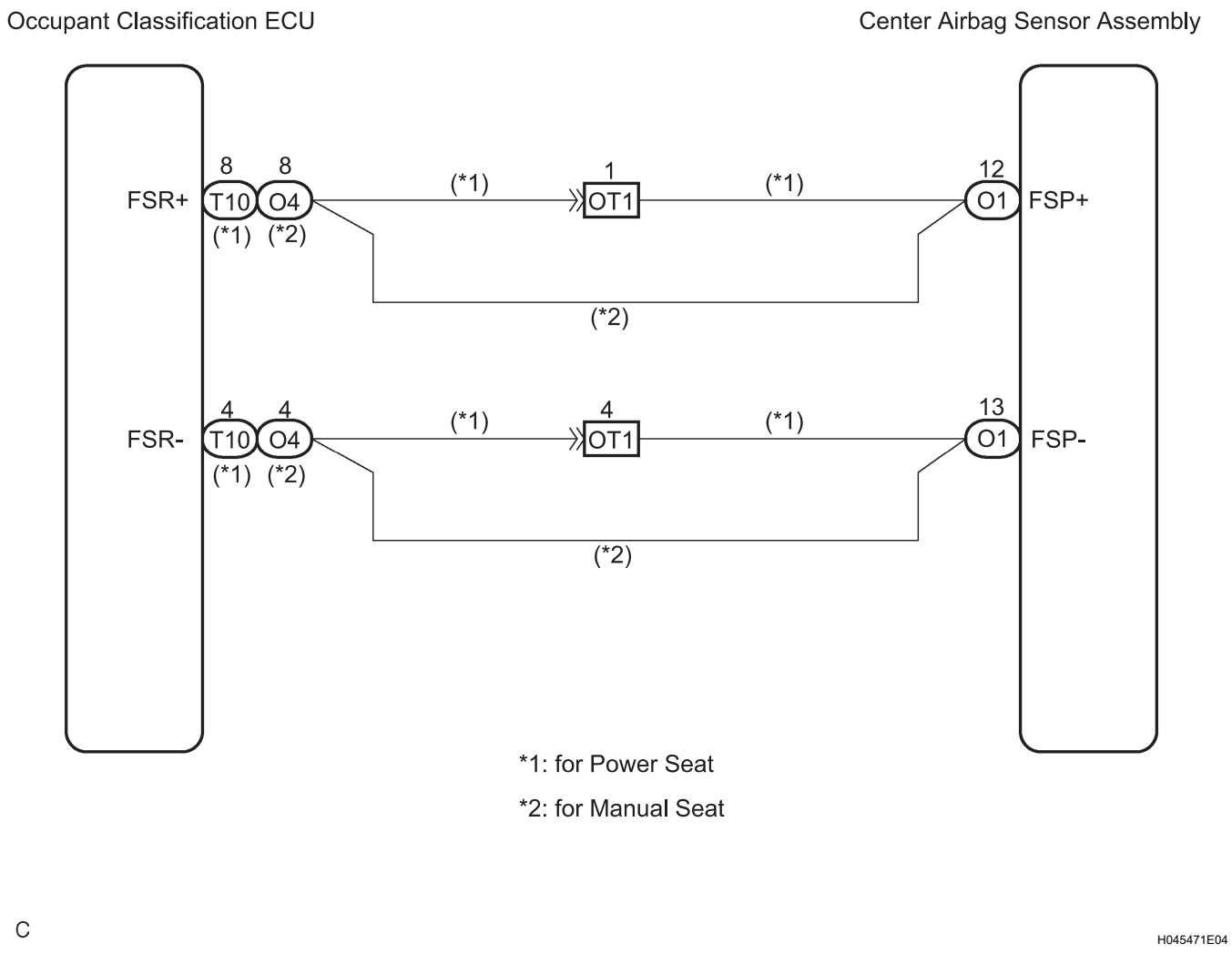
DTC	B1790	Center Airbag Sensor Assembly Communication Circuit Malfunction

DESCRIPTION

The center airbag sensor assembly communication circuit consists of the occupant classification ECU and the center airbag sensor assembly.
DTC B1790 is recorded when a malfunction is detected in the center airbag sensor assembly communication circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1790	• The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the center airbag sensor assembly communication circuit for 2 seconds. • Center airbag sensor assembly malfunction • Occupant classification ECU malfunction	• Occupant classification ECU • Center airbag sensor assembly • Floor wire No. 2 • Front seat wire RH (for Power seat)

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front passenger seat installation bolts to see the under surface of seat cushion.
- In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	CHECK DTC

(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Check the DTCs (See page RS-248).
OK:
DTC B1790 is not output.
HINT:
Codes other than DTC B1790 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-245)**

NG

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Check that the connectors are properly connected to the occupant classification ECU and the center airbag sensor assembly.
OK:
The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY, THEN GO TO STEP 1**

OK

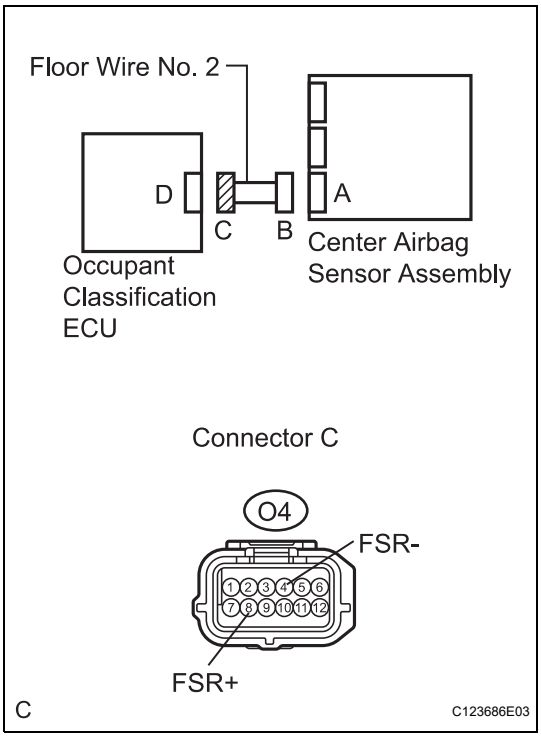
3	CHECK VEHICLE CONDITION

(a) Check the passenger seat type.
Result:
A:
for Manual seat
B:
for Power seat

B → Go to step 13

A

4	CHECK FLOOR WIRE NO. 2 (SHORT TO B+)



(a) Disconnect the connector from the center airbag sensor assembly and occupant classification ECU.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the power switch on (IG).
(d) Measure the voltage according to the value (s) in the table below.

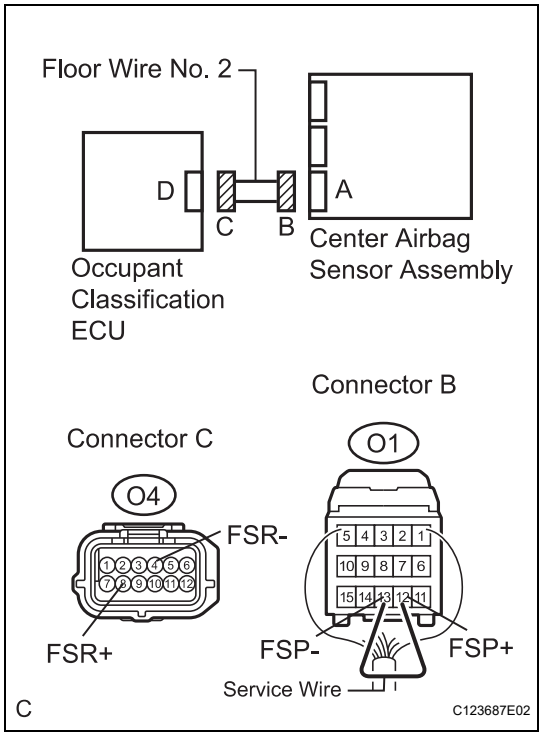
Standard voltage

Tester connection	Condition	Specified condition
O4-8 (FSR+) - Body ground	Power switch on (IG)	Below 1 V
O4-4 (FSR-) - Body ground	Power switch on (IG)	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE NO. 2

OK

5 CHECK FLOOR WIRE NO. 2 (OPEN)



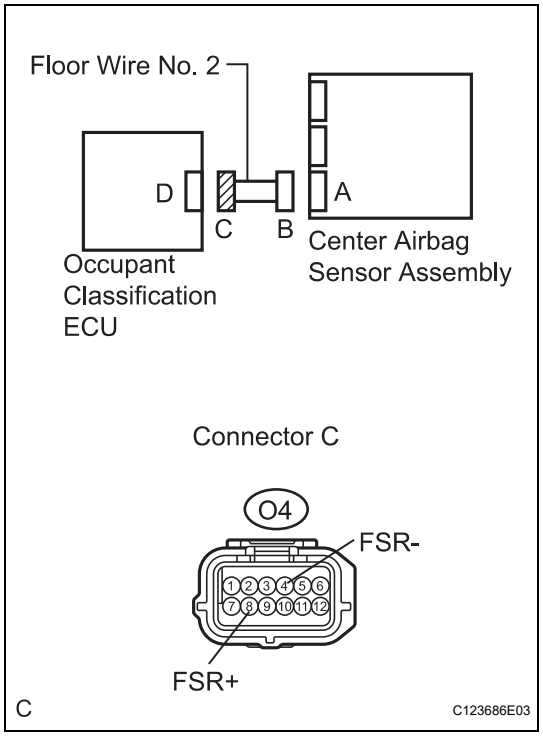
(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Using a service wire, connect terminals 12 (FSP+) and 13 (FSP-) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(d) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester connection	Condition	Specified condition
O4-8 (FSR+) - O4-4 (FSR-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

6 CHECK FLOOR WIRE NO. 2 (SHORT)



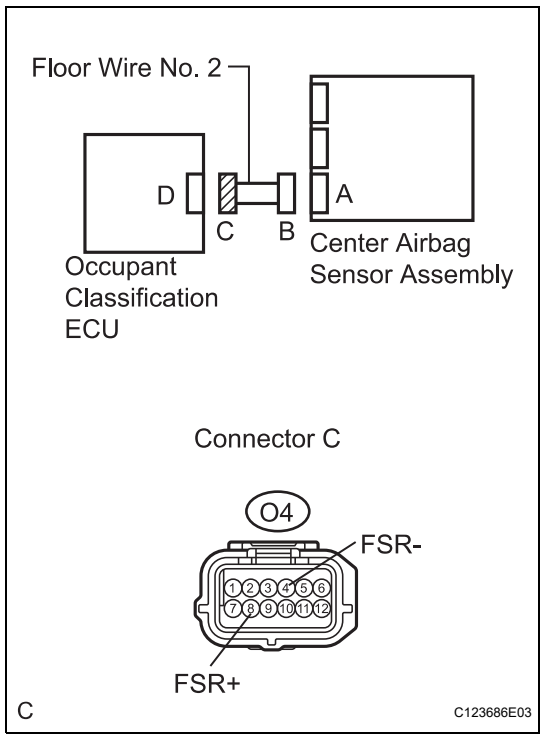
(a) Disconnect the service wire from connector B.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester connection	Condition	Specified condition
O4-8 (FSR+) - O4-4 (FSR-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

7	CHECK FLOOR WIRE NO. 2 (SHORT TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
O4-8 (FSR+) - Body ground	Always	1 MΩ or Higher
O4-4 (FSR-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

8	RECHECK DTC

(a) Connect the connectors to the occupant classification ECU and the center airbag sensor assembly.
(b) Connect the intelligent tester to the DLC3.
(c) Connect the negative (-) terminal cable to the battery.
(d) Turn the power switch on (IG).
(e) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(f) Clear the DTCs stored in the center airbag sensor assembly (See page RS-248).
(g) Turn the power switch off.
(h) Turn the power switch on (IG).
(i) Using the intelligent tester, check the DTCs of the occupant classification ECU (See page RS-41).

OK:

DTC B1790 is not output.

HINT:

Codes other than DTC B1790 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-245)**

NG

9	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (See page RS-445).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

10	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NEXT

11	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

12	RECHECK DTC

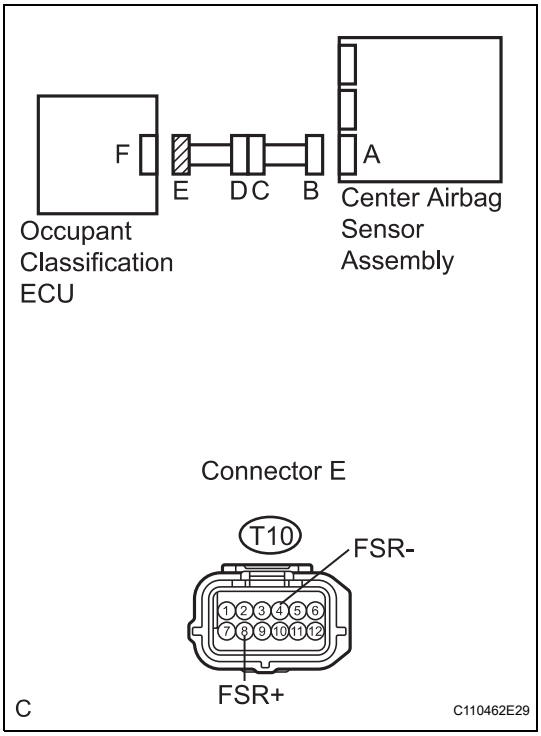
(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-248).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Using the intelligent tester, check the DTCs of the occupant classification ECU (See page RS-41).
OK:
DTC B1790 is not output.
HINT:
Codes other than DTC B1790 may be output at this time, but they are not related to this check.

NG → REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)

OK

END

13 CHECK OCCUPANT CLASSIFICATION SYSTEM CIRCUIT (TO B+)



(a) Disconnect the connector from the center airbag sensor assembly and occupant classification ECU.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the power switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

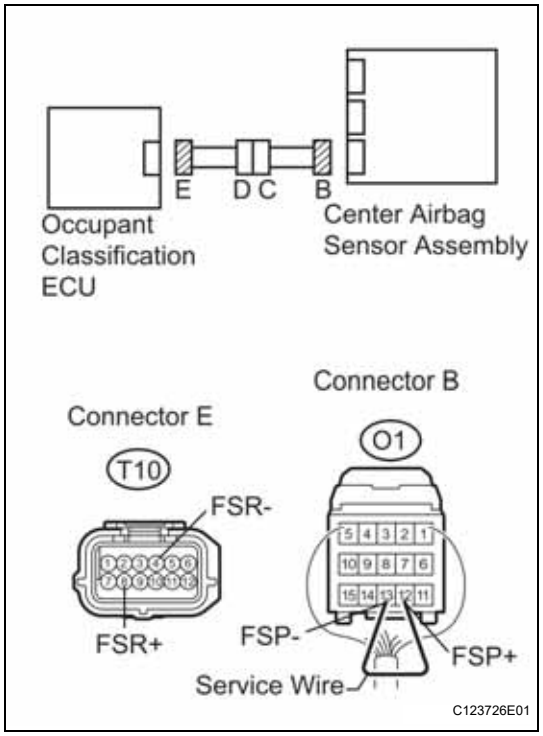
Standard voltage

Tester connection	Condition	Specified condition
T10-8 (FSR+) - Body ground	Power switch on (IG)	Below 1 V
T10-4 (FSR-) - Body ground	Power switch on (IG)	Below 1 V

NG → Go to step 22

OK

14 CHECK OCCUPANT CLASSIFICATION SYSTEM CIRCUIT (OPEN)



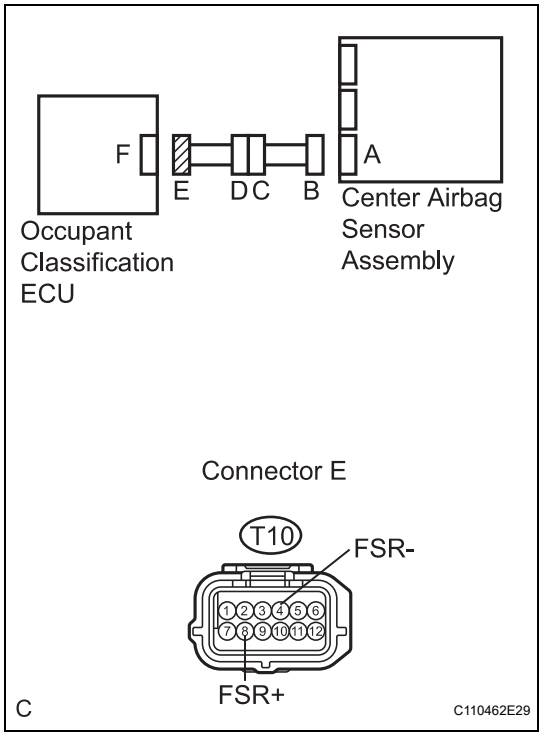
(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Using a service wire, connect terminals 12 (FSP+) and 13 (FSP-) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(d) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester connection	Condition	Specified condition
T10-8 (FSR+) - T10-4 (FSR-)	Always	Below 1 Ω

NG → **Go to step 23**

OK

15 CHECK OCCUPANT CLASSIFICATION SYSTEM CIRCUIT (SHORT)



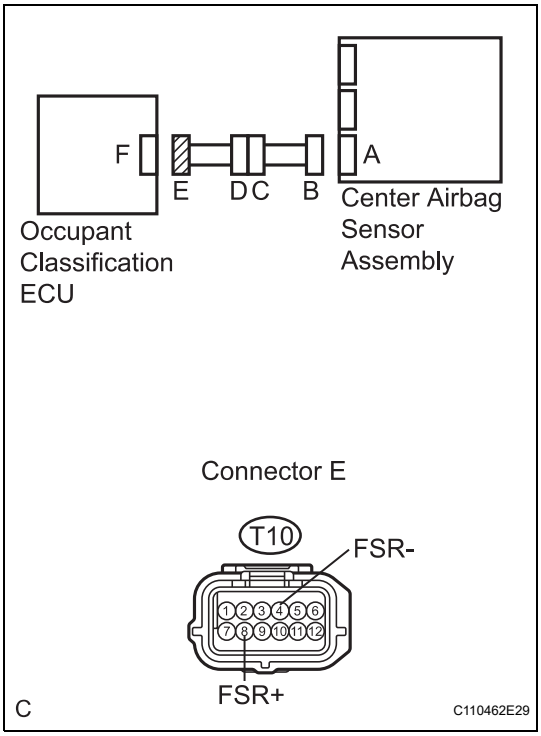
(a) Disconnect the service wire from connector B.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester connection	Condition	Specified condition
T10-8 (FSR+) - T10-4 (FSR-)	Always	1 MΩ or Higher

NG → **Go to step 24**

OK

16 CHECK OCCUPANT CLASSIFICATION SYSTEM CIRCUIT (TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
T10-8 (FSR+) - Body ground	Always	1 MΩ or Higher
T10-4 (FSR-) - Body ground	Always	1 MΩ or Higher

NG → **Go to step 25**

OK

17 RECHECK DTC

(a) Connect the connectors to the occupant classification ECU and the center airbag sensor assembly.
(b) Connect the intelligent tester to the DLC3.
(c) Connect the negative (-) terminal cable to the battery.
(d) Turn the power switch on (IG).
(e) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(f) Clear the DTCs stored in the center airbag sensor assembly (See page RS-248).
(g) Turn the power switch off.
(h) Turn the power switch on (IG).
(i) Using the intelligent tester, check the DTCs of the occupant classification ECU (See page RS-41).

OK:

DTC B1790 is not output.

HINT:

Codes other than DTC B1790 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-245)**

NG

RS

18	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (See page RS-445).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

19	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NEXT

20	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

21	RECHECK DTC

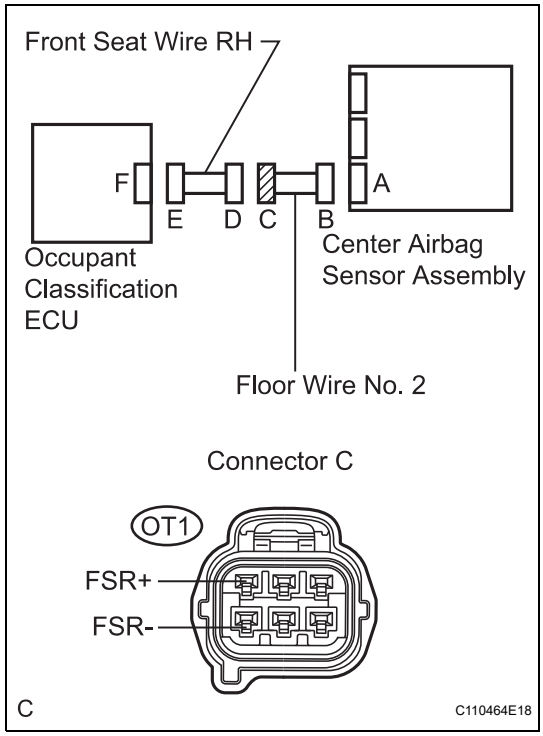
(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-248).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Using the intelligent tester, check the DTCs of the occupant classification ECU (See page RS-41).
OK:
DTC B1790 is not output.
HINT:
Codes other than DTC B1790 may be output at this time, but they are not related to this check.

NG → REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)

OK

END

22 CHECK FLOOR WIRE NO. 2 (TO B+)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the front seat wire RH connector from the floor wire No. 2.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the power switch on (IG).
(f) Measure the voltage according to the value(s) in the table below.

Standard voltage

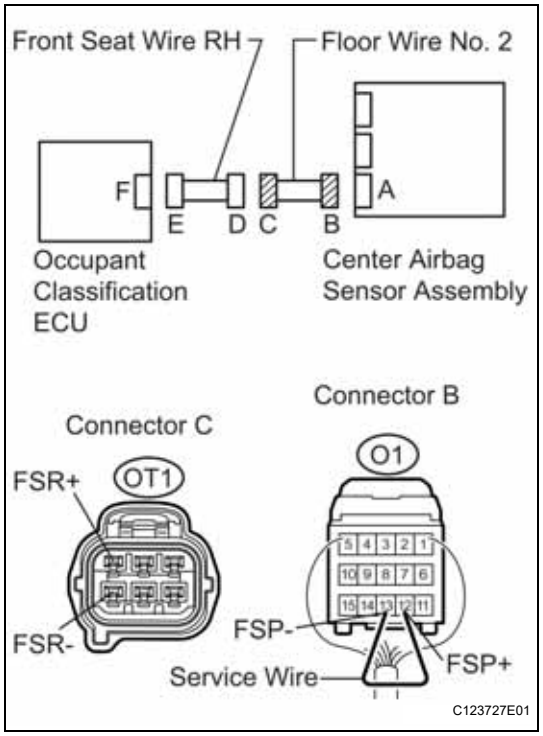
Tester connection	Condition	Specified condition
OT1-1 (FSR+) - Body ground	Power switch on (IG)	Below 1 V
OT1-4 (FSR-) - Body ground	Power switch on (IG)	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE NO. 2

OK

REPAIR OR REPLACE FRONT SEAT WIRE RH

23	CHECK FLOOR WIRE NO. 2 (OPEN)



(a) Disconnect the front seat wire RH connector from the floor wire No. 2.
HINT:
The service wire has already been inserted into connector B.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

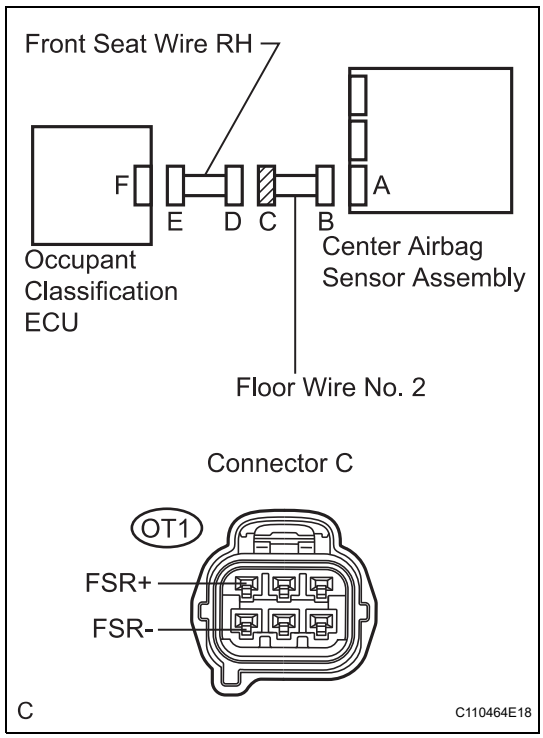
Tester connection	Condition	Specified condition
OT1-1 (FSR+) - OT1-4 (FSR-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

REPAIR OR REPLACE FRONT SEAT WIRE RH

24	CHECK FLOOR WIRE NO. 2 (SHORT)



(a) Disconnect the front seat wire RH connector from the floor wire No. 2.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

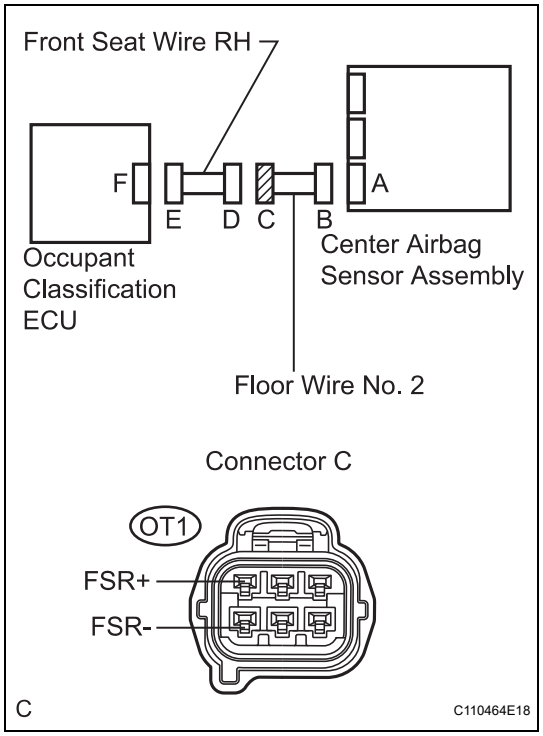
Tester connection	Condition	Specified condition
OT1-1 (FSR+) - OT1-4 (FSR-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

REPAIR OR REPLACE FRONT SEAT WIRE RH

25	CHECK FLOOR WIRE NO. 2 (TO GROUND)



(a) Disconnect the front seat wire RH connector from the floor wire No. 2.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
OT1-1 (FSR+) - Body ground	Always	1 MΩ or Higher
OT1-4 (FSR-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

REPAIR OR REPLACE FRONT SEAT WIRE RH

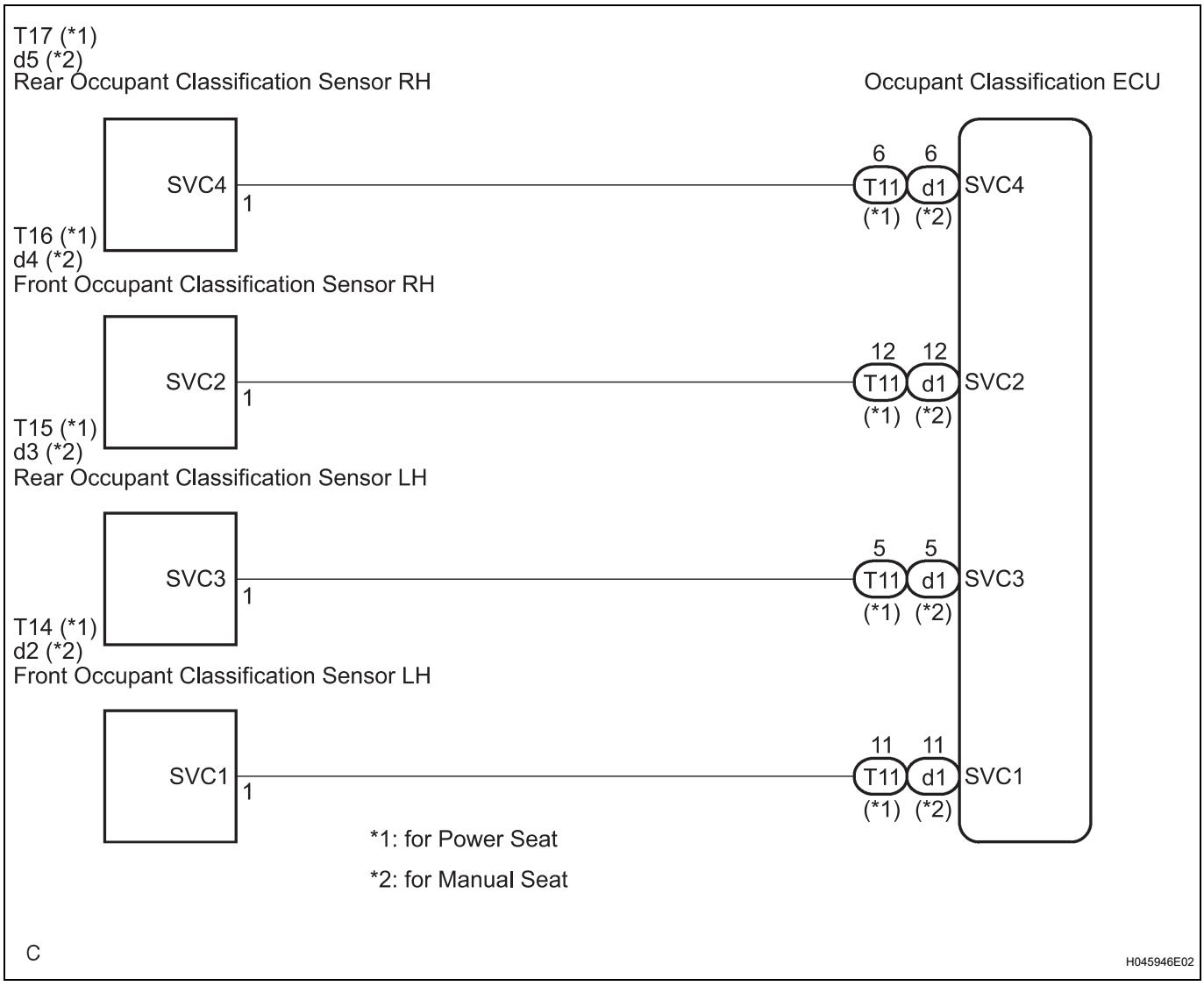
DTC	B1793	Occupant Classification Sensor Power Supply Circuit Malfunction

DESCRIPTION

The occupant classification sensor power supply circuit consists of the occupant classification ECU and the occupant classification sensors.
DTC B1793 is recorded when a malfunction is detected in the occupant classification sensor power supply circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1793	• The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the occupant classification sensor power supply circuit for 2 seconds. • Occupant classification ECU malfunction	• Front seat assembly RH (Occupant classification sensors) • Front seat wire RH • Occupant classification ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front passenger seat installation bolts to see the under surface of seat cushion.
- In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	CHECK DTC

(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Check the DTCs (See page RS-248).

OK:

DTC B1793 is not output.

HINT:

Codes other than DTC B1793 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-245)**

NG

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the occupant classification ECU and the occupant classification sensors.

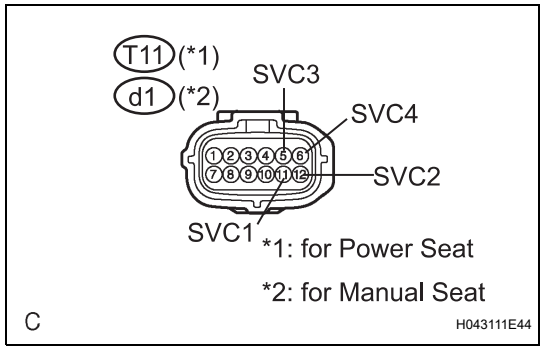
OK:

The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY, THEN GO TO STEP 1**

OK

3	CHECK FRONT SEAT WIRE RH (SHORT TO B+)



(a) Disconnect the connectors from the occupant classification ECU and the 4 occupant classification sensors.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the power switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage:

for Power seat

Tester connection	Condition	Specified condition
T11-5 (SVC3) - Body ground	Power switch on (IG)	Below 1 V
T11-6 (SVC4) - Body ground	Power switch on (IG)	Below 1 V
T11-11 (SVC1) - Body ground	Power switch on (IG)	Below 1 V
T11-12 (SVC2) - Body ground	Power switch on (IG)	Below 1 V

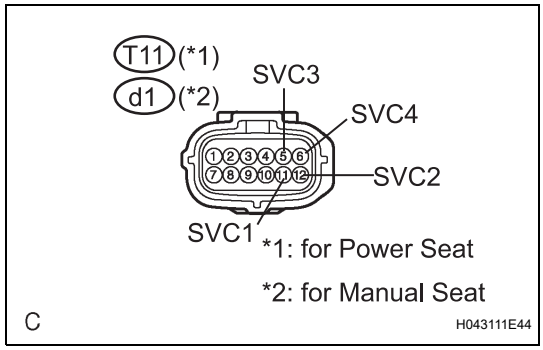
for Manual seat

Tester connection	Condition	Specified condition
d1-5 (SVC3) - Body ground	Power switch on (IG)	Below 1 V
d1-6 (SVC4) - Body ground	Power switch on (IG)	Below 1 V
d1-11 (SVC1) - Body ground	Power switch on (IG)	Below 1 V
d1-12 (SVC2) - Body ground	Power switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

4	CHECK FRONT SEAT WIRE RH (SHORT TO GROUND)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-5 (SVC3) - Body ground	Always	1 MΩ or Higher
T11-6 (SVC4) - Body ground	Always	1 MΩ or Higher
T11-11 (SVC1) - Body ground	Always	1 MΩ or Higher

RS

Tester connection	Condition	Specified condition
T11-12 (SVC2) - Body ground	Always	1 MΩ or Higher

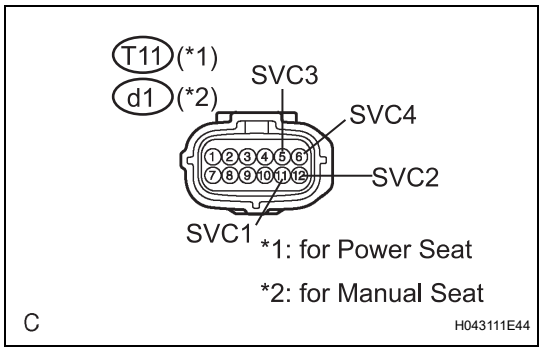
for Manual seat

Tester connection	Condition	Specified condition
d1-5 (SVC3) - Body ground	Always	1 MΩ or Higher
d1-6 (SVC4) - Body ground	Always	1 MΩ or Higher
d1-11 (SVC1) - Body ground	Always	1 MΩ or Higher
d1-12 (SVC2) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

5 CHECK FRONT SEAT WIRE RH (OPEN)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-5 (SVC3) - T15-1 (SVC3)	Always	Below 1 Ω
T11-6 (SVC4) - T17-1 (SVC4)	Always	Below 1 Ω
T11-11 (SVC1) - T14-1 (SVC1)	Always	Below 1 Ω
T11-12 (SVC2) - T16-1 (SVC2)	Always	Below 1 Ω

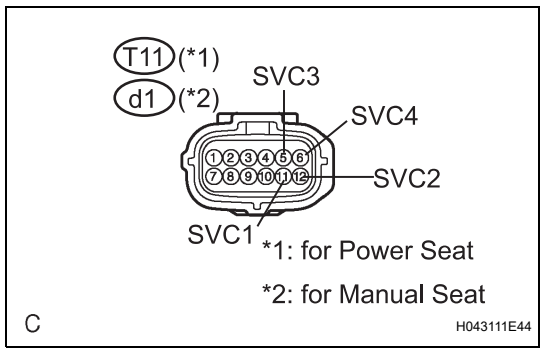
for Manual seat

Tester connection	Condition	Specified condition
d1-5 (SVC3) - d3-1 (SVC3)	Always	Below 1 Ω
d1-6 (SVC4) - d5-1 (SVC4)	Always	Below 1 Ω
d1-11 (SVC1) - d2-1 (SVC1)	Always	Below 1 Ω
d1-12 (SVC2) - d4-1 (SVC2)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

6	CHECK FRONT SEAT WIRE RH (SHORT)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-5 (SVC3) - T11-6 (SVC4)	Always	1 MΩ or Higher
T11-5 (SVC3) - T11-11 (SVC1)	Always	1 MΩ or Higher
T11-5 (SVC3) - T11-12 (SVC2)	Always	1 MΩ or Higher
T11-6 (SVC4) - T11-11 (SVC1)	Always	1 MΩ or Higher
T11-6 (SVC4) - T11-12 (SVC2)	Always	1 MΩ or Higher
T11-11 (SVC1) - T11-12 (SVC2)	Always	1 MΩ or Higher

for Manual seat

Tester connection	Condition	Specified condition
d1-5 (SVC3) - d1-6 (SVC4)	Always	1 MΩ or Higher
d1-5 (SVC3) - d1-11 (SVC1)	Always	1 MΩ or Higher
d1-5 (SVC3) - d1-12 (SVC2)	Always	1 MΩ or Higher
d1-6 (SVC4) - d1-11 (SVC1)	Always	1 MΩ or Higher
d1-6 (SVC4) - d1-12 (SVC2)	Always	1 MΩ or Higher
d1-11 (SVC1) - d1-12 (SVC2)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

7	CHECK DTC

(a) Connect the connectors to the occupant classification ECU and the 4 occupant classification sensors.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the power switch on (IG).
(d) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(e) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(f) Turn the power switch off.
(g) Turn the power switch on (IG).
(h) Check the DTCs (See page RS-248).

OK:
DTC B1793 is not output.
HINT:
Codes other than DTC B1793 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-245)**

NG

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-248).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

9	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NG → **Go to step 12**

OK

10	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 12**

OK

11	CHECK DTC

(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).

(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(d) Turn the power switch off.
(e) Turn the power switch on (IG).
(f) Check the DTCs (See page RS-248).
OK:
DTC B1793 is not output.
HINT:
Codes other than DTC B1793 may be output at this time, but they are related to this check.

OK → **END**

NG

12	REPLACE FRONT SEAT ASSEMBLY RH

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the front seat assembly RH (See page SE-29 for power seat or SE-16 for manual seat).

NEXT

13	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NEXT

14	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

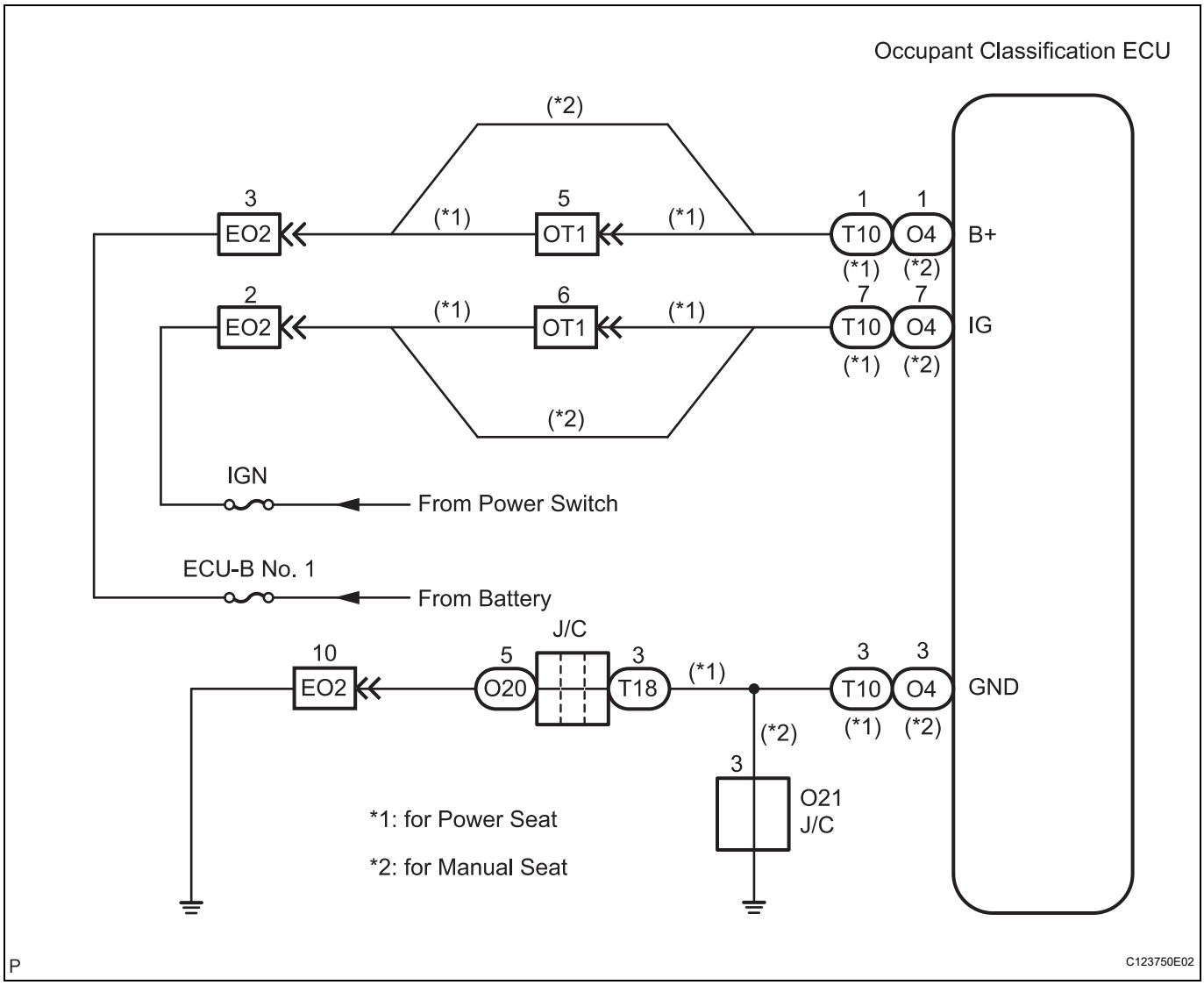
DTC	B1794	Open in Occupant Classification ECU Battery Positive Line

DESCRIPTION

This circuit consists of the occupant classification ECU and the power source circuit (battery, fuse, and wire harness).
DTC B1794 is recorded when a malfunction is detected in the occupant classification ECU or the power source circuit.
HINT:
If DTC B1794 is output after switching the power switch off-on (IG)-off 50 times in a row when a malfunction occurs in the power circuit for the occupant classification system, the DTC is output again.
This DTC is output when a malfunction is detected even after being cleared unless the normal system code is input.

DTC No.	DTC Detecting Condition	Trouble Area
B1794	• The power switch is turned from off to on (IG), hold if for 10 seconds or more, and back to off again 50 times in a row when a malfunction occurs in the circuit for the occupant classification system. • Occupant classification ECU malfunction	• Battery • ECU-B Fuse • Floor wire No. 2 • Front seat wire RH (for Power seat) • Occupant classification ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK BATTERY

(a) Measure the voltage of the battery.
Standard voltage:
11 to 14 V

NG → **REPLACE BATTERY**

OK

2	CHECK FUSE

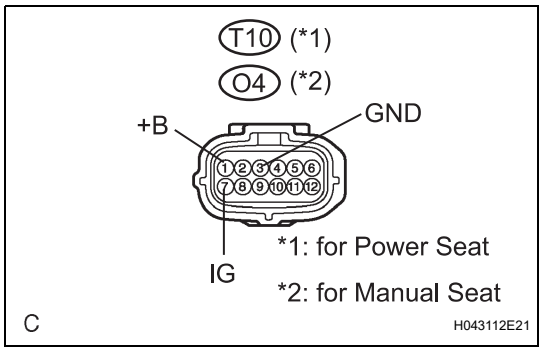
(a) Check the ECU-B fuse.
Standard resistance:
Below 1 Ω

RS

NG → REPLACE FUSE

OK

3 CHECK WIRE HARNESS (SOURCE VOLTAGE)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the occupant classification ECU.
(d) Connect the negative (-) terminal cable to the battery.
(e) Turn the power switch on (IG).
(f) Measure the voltage and resistance according to the value(s) in the table below.

Standard voltage and resistance:

for Power seat

Tester connection	Condition	Specified condition
T10-1 (+B) - Body ground	Always	10 to 14 V
T10-3 (GND) - Body ground	Always	Below 1 Ω
T10-7 (IG) - Body ground	Power switch on (IG)	10 to 14 V

for Manual seat

Tester connection	Condition	Specified condition
O4-1 (+B) - Body ground	Always	10 to 14 V
O4-3 (GND) - Body ground	Always	Below 1 Ω
O4-7 (IG) - Body ground	Power switch on (IG)	10 to 14 V

NG → REPAIR OR REPLACE WIRE HARNESS

OK

4 CHECK DTC

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Connect the connector to the occupant classification ECU.
(d) Connect the intelligent tester to the DLC3.
(e) Connect the negative (-) terminal cable to the battery.
(f) Turn the power switch on (IG).
(g) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(h) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(i) Turn the power switch off.

(j) Turn the power switch on (IG), and wait for at least 10 seconds.
(k) Using the intelligent tester, check the DTCs of the occupant classification ECU (See page RS-248).
OK:
B1794 is not output.
HINT:
Codes other than DTC B1794 may be output at this time, but they are not related to this check.

NG → **USE SIMULATION METHOD TO CHECK (See page RS-245)**

OK

5	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (See page RS-445).

NEXT

6	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform the "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NEXT

7	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform the "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

DTC	B1795	Occupant Classification ECU Malfunction

DESCRIPTION

DTC B1795 is recorded when a malfunction is detected in the occupant classification ECU.
Troubleshoot the DTC B1771 first when the DTC B1771 and B1795 are output simultaneously.

DTC No.	DTC Detecting Condition	Trouble Area
B1795	• Occupant classification ECU circuit malfunction • The occupant classification ECU receives a short circuit to ground signal in the passenger side buckle switch circuit for 2 seconds. • Occupant classification ECU malfunction	• Front seat wire RH (for Power seat) • Floor wire No. 2 • Front seat inner belt assembly RH (Passenger side buckle switch) • Occupant classification ECU

INSPECTION PROCEDURE

1 CHECK DTC

(a) Turn the power switch on (IG), and wait for at least 10 seconds.
(b) Check the DTCs (See page RS-248).
Result:
A:
DTC B1771 and B1795 are output.
B:
DTC B1795 is output.
HINT:
Codes other than DTC B1771 and B1795 may be output at this time, but they are not related to this check.

A → **GO TO DTC B1771 (See page RS-253)**

B

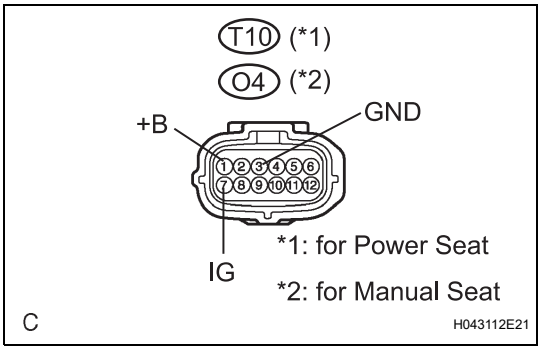
2 CHECK FUSE

(a) Check the ECU-B fuse.
Resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

3	CHECK WIRE HARNESS (SOURCE VOLTAGE)



(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Disconnect the connector from the occupant classification ECU.
(d) Connect the negative (-) terminal cable to the battery.
(e) Turn the power switch on (IG).
(f) Measure the voltage according to the value(s) in the table below.

Standard voltage:
for Power seat

Tester connection	Condition	Specified condition
T10-1 (+B) - Body ground	Always	10 to 14 V
T10-7 (IG) - Body ground	Power switch on (IG)	10 to 14 V

for Manual seat

Tester connection	Condition	Specified condition
O4-1 (+B) - Body ground	Always	10 to 14 V
O4-7 (IG) - Body ground	Power switch on (IG)	10 to 14 V

(g) Turn the power switch off.
(h) Measure the resistance according to the value(s) in the table below.

Standard resistance:
for Power seat

Tester connection	Condition	Specified condition
T10-3 (GND) - Body ground	Always	Below 1 Ω

for Manual seat

Tester connection	Condition	Specified condition
O4-3 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

4	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-248).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

5	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETED" is displayed.

NEXT

6	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

DTC	B1796	Sleep Operation Failure of Occupant Classification ECU

DESCRIPTION

During sleep mode, the occupant classification ECU reads the condition of each sensor while the power switch is off.
In this mode, if occupant classification ECU detects an internal malfunction, DTC B1796 is output.

DTC No.	DTC Detecting Condition	Trouble Area
B1796	• Occupant classification ECU malfunction	• Occupant classification ECU

INSPECTION PROCEDURE

1	CHECK DTC

(a) Turn the power switch on (IG).
(b) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(c) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(d) Turn the power switch off, and wait for at least 10 seconds.
(e) Turn the power switch on (IG).
(f) Check the DTCs (See page RS-248).
OK:
DTC B1796 is not output.
HINT:
Codes other than DTC B1796 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-33)**

NG

2	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-445).

NEXT

3	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).

OK:
"COMPLETED" is displayed.

NEXT

4	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

Trouble in Passenger Airbag ON / OFF Indicator

DESCRIPTION

The occupant classification system detects the front passenger seat condition. It then informs a passenger of the front passenger airbag assembly and front seat side airbag assembly condition (activated/not activated) by the passenger airbag ON/OFF indicator.
HINT:
Approximately 6 seconds after the power switch is turned to the on (IG), the passenger airbag ON/OFF indicator will be ON/OFF depending on the conditions listed below.

Front passenger seat condition	ON Indicator	OFF Indicator
Adult is seated.	ON	OFF
Child is seated.	OFF	ON
Vacant	OFF	OFF
Occupant classification system failure	OFF	ON

INSPECTION PROCEDURE

1 CHECK SRS WARNING LIGHT

(a) Turn the power switch on (IG), and check the SRS warning light condition.
HINT:
If this trouble occurs, the SRS warning light is off. If the light is on, a DTC is output. Troubleshoot for the output DTC.
OK:
After the primary check period, SRS warning light goes off.
HINT:
The primary check period is approximately 6 seconds after the power switch is turned on (IG).

NG → **GO TO DTC CHART (See page RS-45)**

OK

2 PERFORM ZERO POINT CALIBRATION

(a) Turn the power switch off.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETE" is displayed.

NG → **Go to step 4**

OK

3	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

OK → END

NG

4	RETIGHTEN FRONT SEAT ASSEMBLY RH BOLT

(a) Turn the power switch off.
(b) Loosen the 4 installation bolts of the front seat assembly RH.
(c) Tighten the 4 installation bolts of the front seat assembly RH to the specified torque.
Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)

NEXT

5	PERFORM ZERO POINT CALIBRATION

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETE" is displayed.

NG → Go to step 7

OK

6	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

OK → END

NG

7	CHECK CONNECTORS

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.

(c) Check that the connectors are properly connected to the occupant classification ECU and the 4 occupant classification sensors.
OK:
The connectors are properly connected.
(d) Disconnect the connectors from the occupant classification ECU and the 4 occupant classification sensors.
(e) Check that the connectors are not damaged or deformed.
OK:
The connectors are normal.

NG → **REPAIR OR REPLACE CONNECTOR, THEN GO TO STEP 1**

OK

8	CHECK DTC

(a) Connect the connectors to the occupant classification ECU and the 4 occupant classification sensors.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the power switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the occupant classification ECU (See page RS-248).
(e) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(f) Turn the power switch off.
(g) Turn the power switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (See page RS-248).
OK:
DTC is not output.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-423)**

OK

9	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the power switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-445).

NEXT

10	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.

(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-239).
OK:
"COMPLETE" is displayed.

NEXT

11	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-239).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

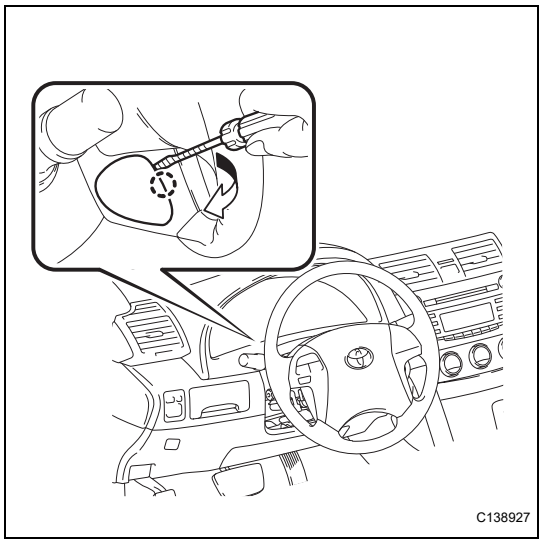
END

REMOVAL

1. **PRECAUTION**
   CAUTION:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).

2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.

3. **REMOVE NO. 3 LOWER STEERING WHEEL COVER**
   (a) Using a screwdriver, disengage the claw and remove the No. 3 lower steering wheel cover.
   HINT:
   Tape up the screwdriver tip before use.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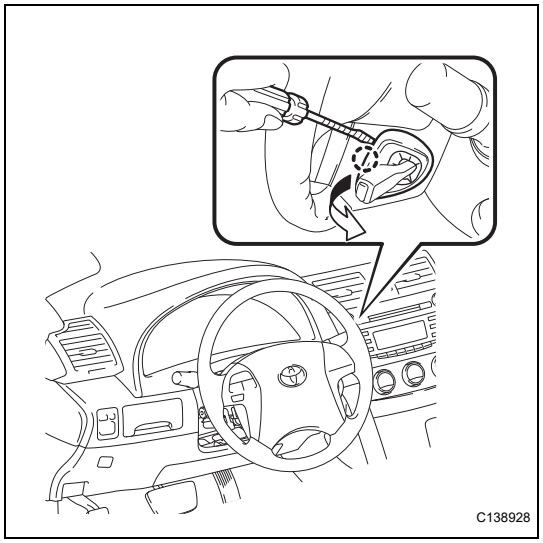
4. **REMOVE NO. 2 LOWER STEERING WHEEL COVER**
   (a) Using a screwdriver, disengage the claw and remove the No. 2 lower steering wheel cover.
   HINT:
   Tape up the screwdriver tip before use.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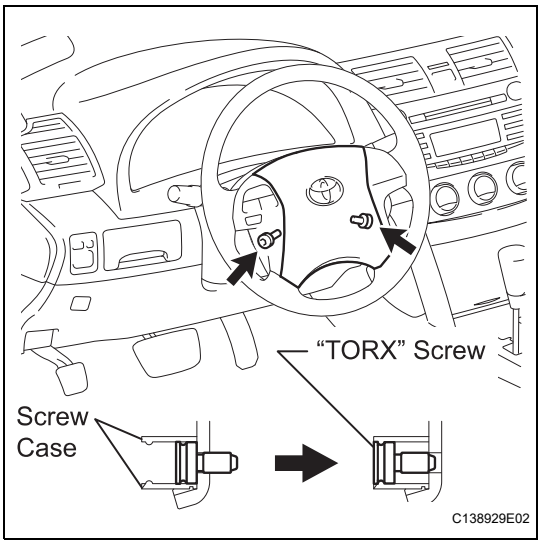
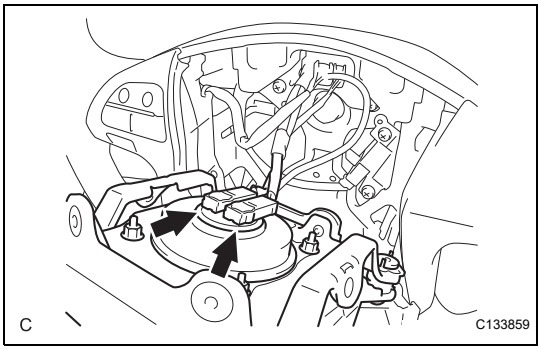


5. REMOVE STEERING PAD

(a) Using a "TORX" socket (T30), loosen the 2 "TORX" screws until the groove along the screw circumference catches on the screw case.



(b) Pull out the steering pad from the steering wheel assembly and support the steering pad with one hand.

NOTICE:
When removing the steering pad, do not pull the airbag wire harness.

(c) Disconnect the horn connector from the steering pad.

(d) Disconnect the 2 airbag connectors and remove the steering pad.

NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.

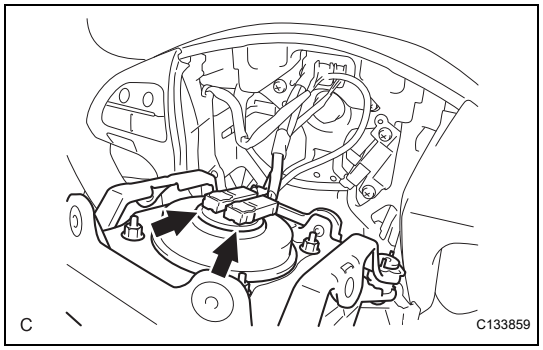
INSTALLATION

1. INSTALL STEERING PAD

(a) Check that the power switch is turned off.

(b) Check that the battery negative (-) terminal is disconnected.

CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.



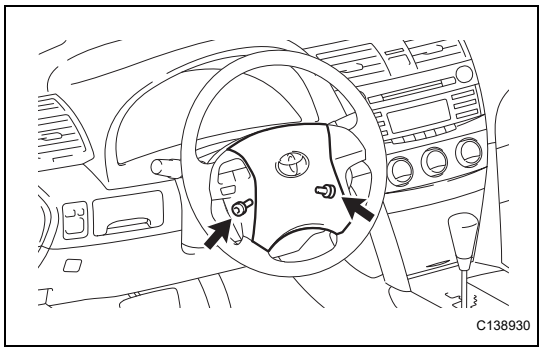
(c) Support the steering pad with one hand.

(d) Connect the 2 airbag connectors to the steering pad.

NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.

(e) Connect the horn connector to the steering pad.

(f) Confirm that the circumference groove of the "TORX" screw fits in the screw case, and place the steering pad onto the steering wheel assembly.

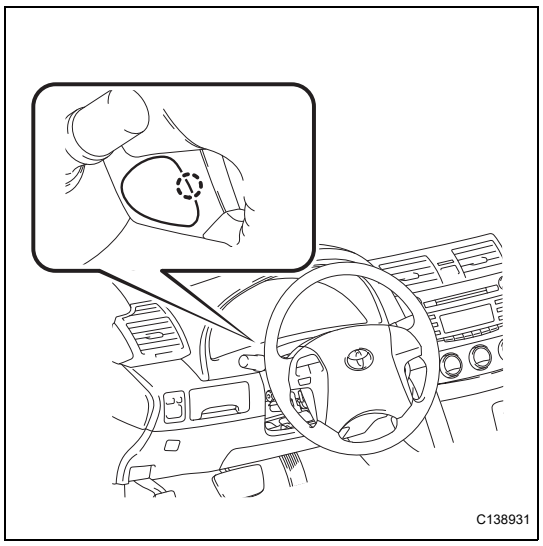


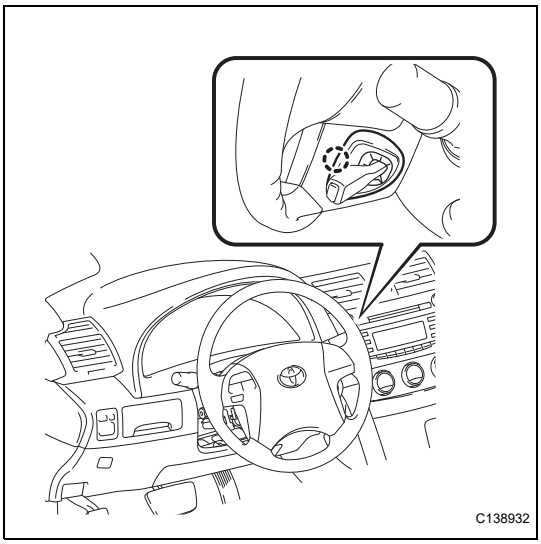
(g) Using a "TORX" socket (T30), tighten the 2 "TORX" screws.

Torque: 8.8 N*m (90 kgf*cm, 78 in.*lbf)

2. INSTALL NO. 3 LOWER STEERING WHEEL COVER

(a) Engage the claw and install the No. 3 lower steering wheel cover.





3. INSTALL NO. 2 LOWER STEERING WHEEL COVER

(a) Engage the claw and install the No. 2 lower steering wheel cover.

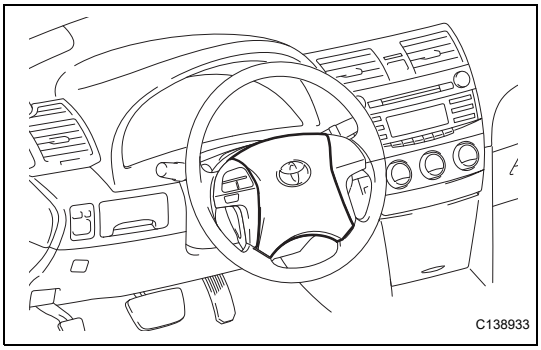
4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

5. PERFORM INITIALIZATION

(a) Perform initialization (See page IN-43).

NOTICE:

Some systems need initialization after reconnecting the cable to the negative battery terminal.



6. INSPECT STEERING PAD

(a) With the steering pad installed on the vehicle, perform a visual check. If there are any defects as mentioned below, replace the steering pad with a new one:

Cuts, minute cracks or marked discoloration on the steering pad top surface or in the grooved portion.

(b) Make sure that the horn sounds.

HINT:

If the horn does not sound, inspect the horn system (See page HO-3).

7. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light (See page RS-33).

DISPOSAL

HINT:
When scrapping a vehicle equipped with the SRS or disposing of the steering pad, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A., INC.

CAUTION:

- **Never dispose of a steering pad that has an undeployed airbag.**
- **The airbag produces an exploding sound when it is deployed, so perform the operation outdoors where it will not be a nuisance to nearby residents.**
- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.**
- **When deploying the airbag, perform the operation at least 10 m (33 ft) away from the steering pad.**
- **The steering pad becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a steering pad with a deployed airbag.**
- **Do not apply water, etc. to a steering pad with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

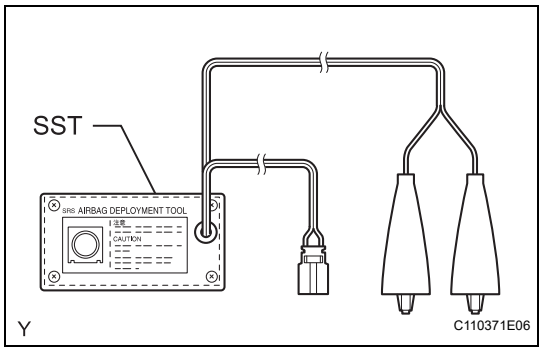
1. DISPOSE OF STEERING PAD (WHEN INSTALLED IN VEHICLE)

HINT:
Prepare a battery as the power source to deploy the airbag.

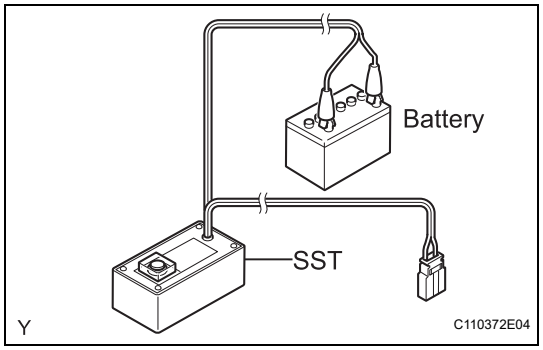
(a) Check the function of the SST.

SST 09082-00700

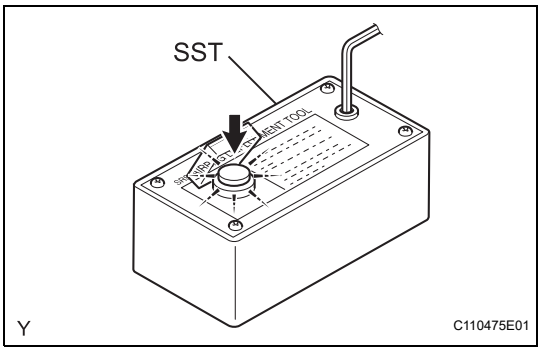
CAUTION:
When deploying the airbag, always use the specified SST:
SRS Airbag Deployment Tool



(1) Connect the SST to the battery.
Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the negative (-) terminal.



RS

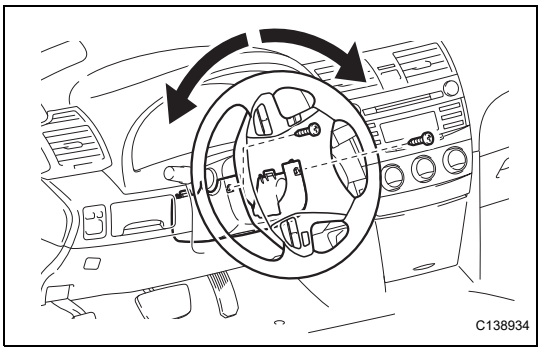


(2) Check the function of the SST.
Press the SST activation switch, and check that the LED of the SST activation switch comes on.
CAUTION:
- **Do not connect the SST connector (yellow colored one) to the airbag.**
- **If the LED comes on when the activation switch is not being pressed, SST malfunction is possible, so replace the SST with a new one.**

(3) Disconnect the SST from the battery.

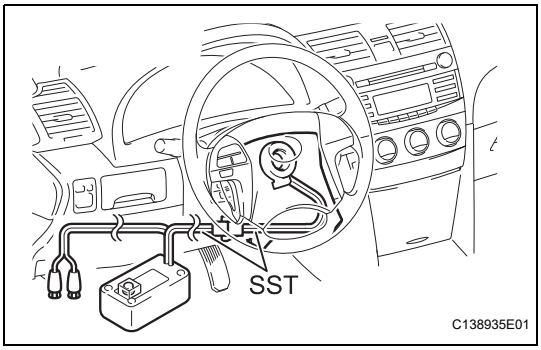
(b) Refer to PRECAUTION (See page RS-1).

(c) Disconnect the cable from the negative battery terminal.
CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.

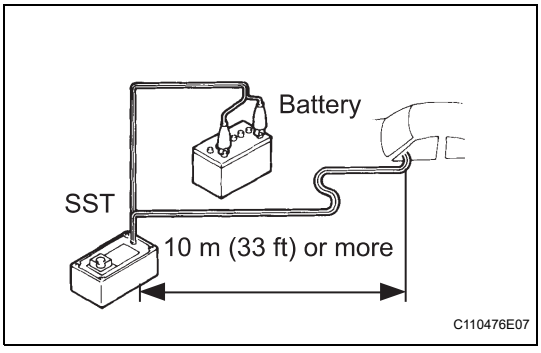


(d) Remove the steering column cover (lower).
(1) While turning the steering wheel assembly to the right and left, remove the 2 screws and steering column cover (lower).

(e) Install the SST.
CAUTION:
Check that there is no looseness in the steering wheel assembly and steering pad.
(1) Disconnect the airbag connector (yellow colored one) from the spiral cable.
NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.



(2) Connect the SST connector to the airbag connector of the spiral cable.
SST 09082-00700, 09082-00780
NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



(3) Move the SST at least 10 m (33 ft) away from the vehicle front side window.
(4) Maintaining enough clearance for the SST wire harness in the front side window, close all doors and windows of the vehicle.
NOTICE:
Take care not to damage the SST wire harness.
(5) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the negative (-) terminal.

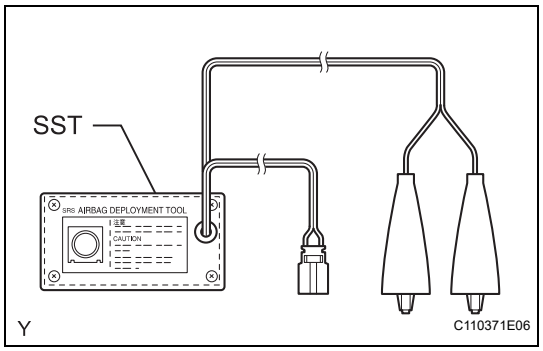
(f) Deploy the airbag.
(1) Check that no one is inside the vehicle or within a 10 m (33 ft) radius of the vehicle.
(2) Press the SST activation switch and deploy the airbag.
CAUTION:
- **When deploying the airbag, make sure that no one is near the vehicle.**
- **The steering pad becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a steering pad with a deployed airbag.**
- **Do not apply water, etc. to a steering pad with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

HINT:
The airbag is deployed as the LED of the SST activation switch comes on.

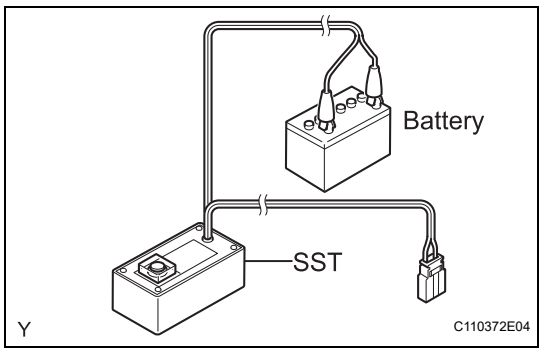
2. DISPOSE OF STEERING PAD (WHEN NOT INSTALLED IN VEHICLE)
NOTICE:
- **When disposing of the steering pad, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure detailed below when deploying the airbag.**

HINT:
Prepare a battery as the power source to deploy the airbag.

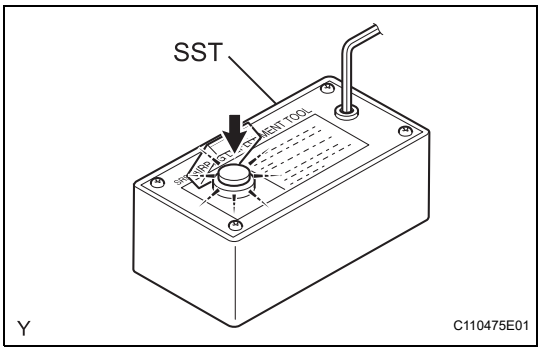
(a) Check the function of the SST.
SST 09082-00700
CAUTION:
When deploying the airbag, always use the specified SST:
SRS Airbag Deployment Tool



(1) Connect the SST to the battery.
Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the negative (-) terminal.



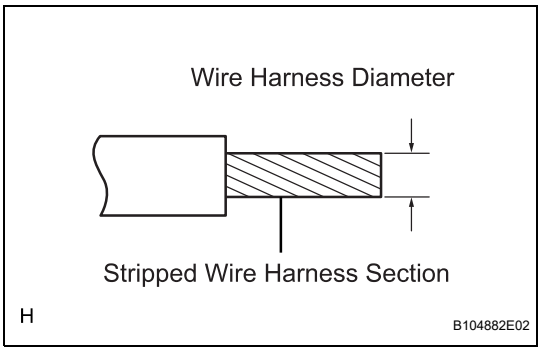
RS



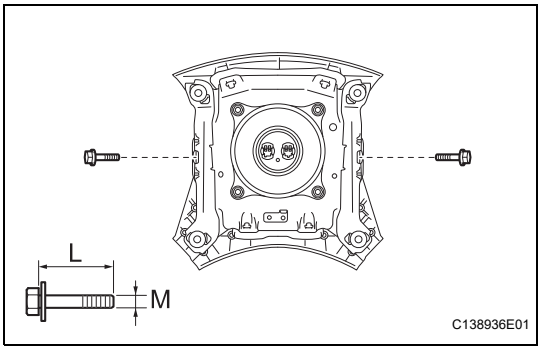
(2) Check the function of the SST.
Press the SST activation switch, and check that the LED of the SST activation switch comes on.
CAUTION:
- **Do not connect the SST connector (yellow colored one) to the airbag.**
- **If the LED comes on when the activation switch is not being pressed, SST malfunction is possible, so replace the SST with a new one.**

(3) Disconnect the SST from the battery.

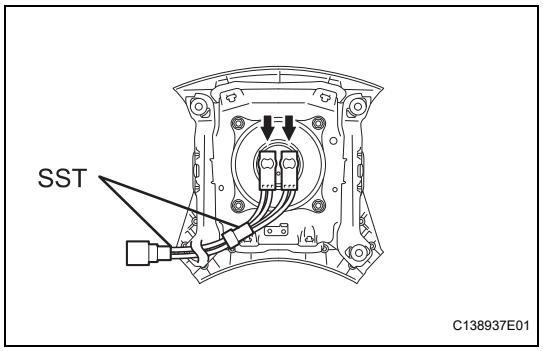
(b) Remove the steering pad (See page RS-344).
CAUTION:
- **When removing the steering pad, work must be started 90 seconds after the power switch is turned off and the negative (-) terminal cable is disconnected from the battery.**
- **When storing the steering pad, keep the airbag deployment side facing upward.**



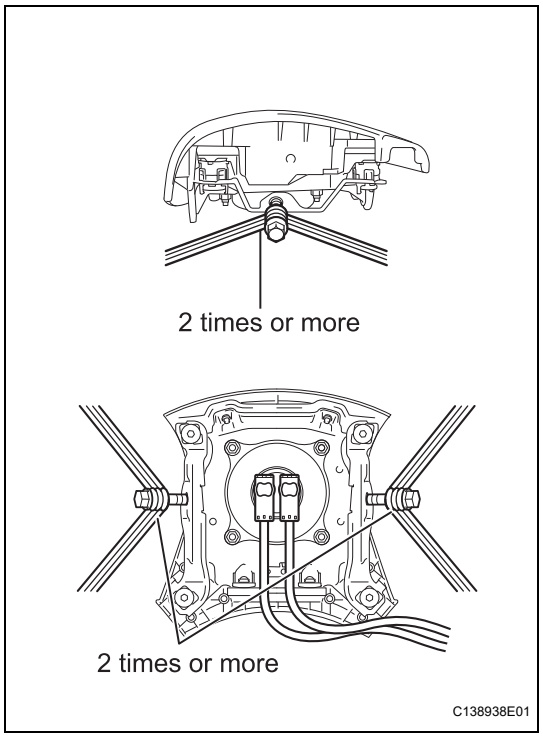
(c) Using a service-purpose wire harness for the vehicle, tie down the steering pad to the disc wheel.
Wire harness:
Stripped wire harness section
1.25 mm^2 or more (0.0019 $in.^2$ or more)
CAUTION:
If the wire harness is too thin or an alternative object is used to tie down the steering pad, it may be snapped by the shock when the airbag is deployed. Always use a wire harness for vehicle use with an area of at least 1.25 mm^2 (0.0019 $in.^2$).
HINT:
To calculate the area of the stripped wire harness section:
Area = 3.14 x $(Diameter)^2$ divided by 4



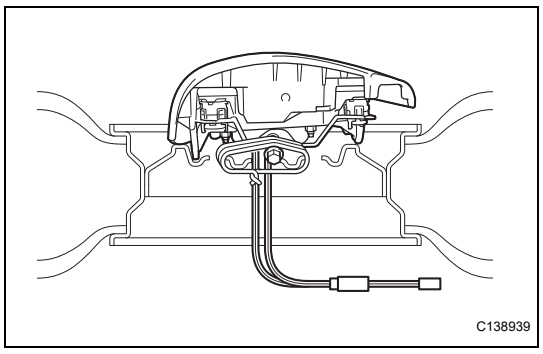
(1) Install the 2 bolts with washers into the 2 bolt holes on the steering pad.
Bolt:
L:
35.0 mm (1.378 in.)
M:
6.0 mm (0.236 in.)
Pitch:
1.0 mm (0.039 in.)
NOTICE:
- **Tighten the bolts by hand until they do not move.**
- **Do not tighten the bolts excessively.**



(2) After connecting the SST below to each other, connect them to the steering pad.
SST 09082-00802 (09082-10801, 09082-30801)

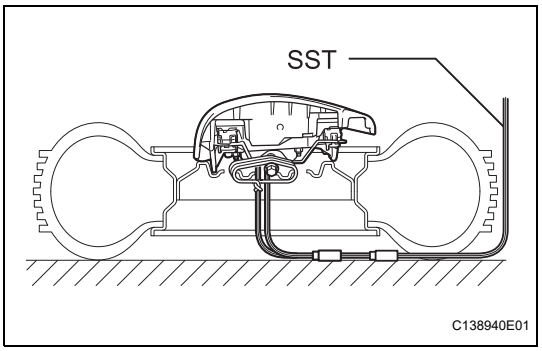


(3) Using 3 wire harnesses, wind wire harness at least 2 times each around each of the bolts installed on the left and right sides of the steering pad.
CAUTION:
- **Tightly wind the wire harness around the bolts so that there is no slack.**
- **Make sure that the wire harness is tight. If there is slack in the wire harness, the steering pad may become loose due to the shock when the airbag is deployed.**



(4) Face the airbag deployment side of the steering pad upward on top of a tire and wheel set. Separately tie the left and right sides of the steering pad to the disc wheel through the hub nut holes. Position the SST connector so that it hangs downward through the hub hole of the disc wheel.
CAUTION:
- **Make sure that the wire harness is tight. If there is slack in the wire harness, the steering pad may become loose due to the shock when the airbag is deployed.**
- **Always tie down the steering pad with the airbag deployment side facing upward.**

NOTICE:
The disc wheel will be damaged by the airbag deployment, so use an extra disc wheel.



(d) Install the SST.

CAUTION:

Place the disc wheel on level ground.

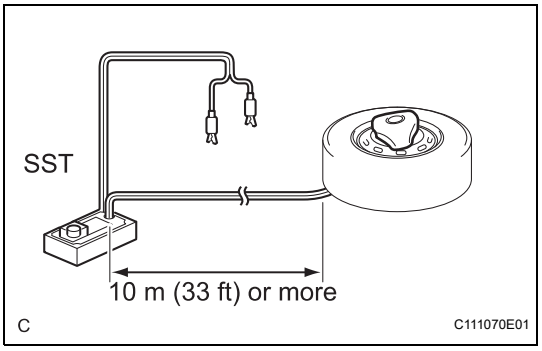
(1) Connect the SST connector.

SST 09082-00700

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the disc wheel.

(2) Move the SST at least 10 m (33 ft) away from the airbag tied down to the disc wheel.



(e) Cover the steering pad (Using a cardboard box).

(1) Cover the steering pad with the cardboard box.

(2) Place weights on the cardboard box in 4 places totalling at least 190 N (19 kg, 43 lb).

Cardboard box size:

Must exceed the following dimensions

X:

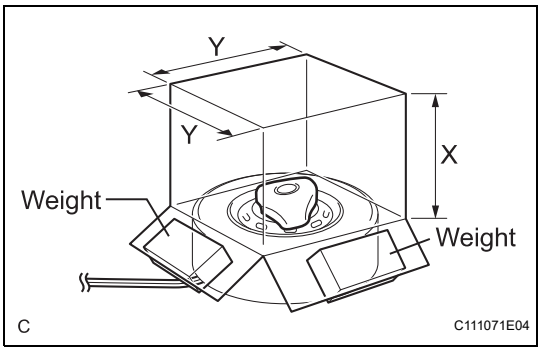
460 mm (18.11 in.)

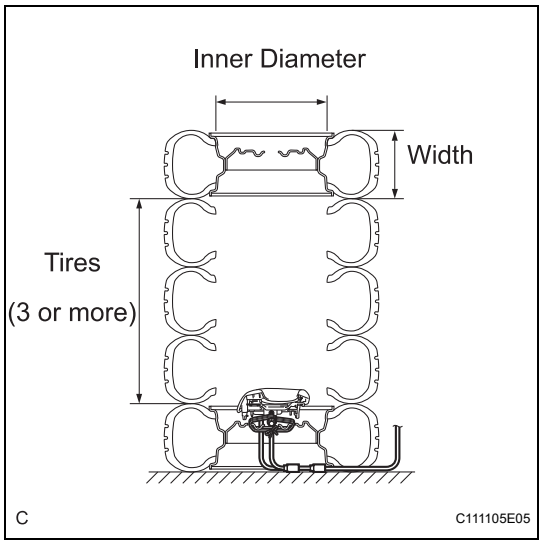
Y:

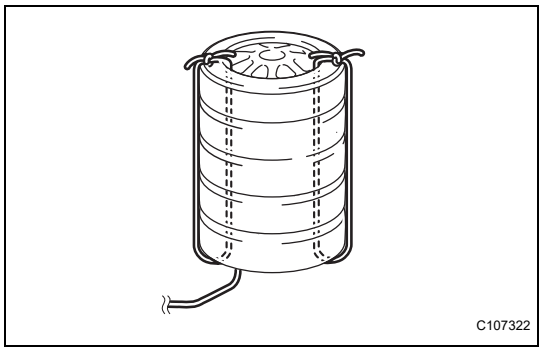
650 mm (25.59 in.)

NOTICE:

- **When dimension Y of the cardboard box exceeds the diameter of the disc wheel and tire that the steering pad is tied to, X should be the following size.**
  X = 460 mm (18.11 in.) + width of tire
- **If a cardboard box which is smaller than the specified size is used, the cardboard box will be broken by the shock from the airbag deployment.**







(f) Cover the steering pad (Using tires).

(1) Place at least 3 tires without disc wheels on the tire and disc wheel that the steering pad is tied to.

(2) Place the tire with a disc wheel on top of them.

Tire size:

Must exceed the following dimensions

Width:

185 mm (7.28 in.)

Inner diameter:

360 mm (14.17 in.)

CAUTION:

Do not use tires with disc wheels except for the top and bottom.

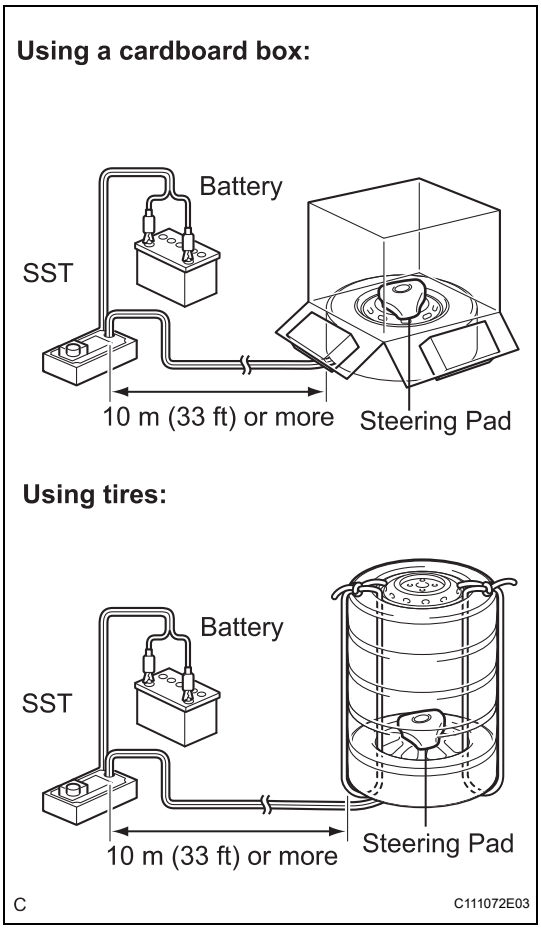
NOTICE:

- **The tires may be damaged by the airbag deployment, so use an extra tire.**
- **Do not place the SST connector under the tire because it could be damaged.**

(3) Tie the tires together with 2 wire harnesses.

CAUTION:

Make sure that the wire harness is tight. Looseness in the wire harness results in the tires coming free due to the shock when the airbag is deployed.



(g) Deploy the airbag.
(1) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the negative (-) terminal.
(2) Check that no one is within a 10 m (33 ft) radius of the disc wheel which the steering pad is tied to.
(3) Press the SST activation switch and deploy the airbag.
CAUTION:
When deploying the airbag, make sure that no one is near the tire.
HINT:
The airbag is deployed as the LED of the SST activation switch comes on.

(h) Dispose of the steering pad.
CAUTION:
- **The steering pad becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a steering pad with a deployed airbag.**
- **Do not apply water, etc. to a steering pad with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

(1) Remove the steering pad from the disc wheel.
(2) Place the steering pad in a plastic bag, tie it tightly and dispose of it as other general part disposal.

INSPECTION

1. INSPECT SPIRAL CABLE

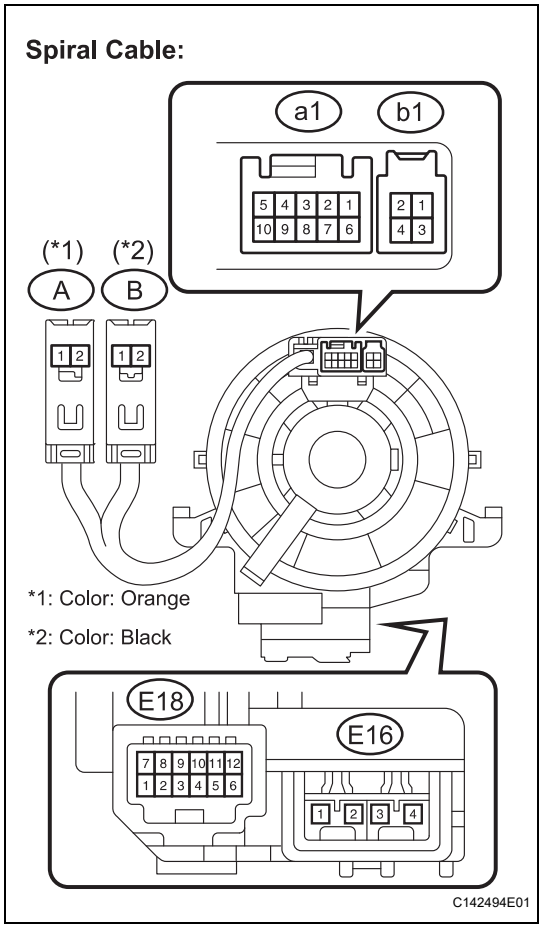
(a) If there are any defects as mentioned below, replace the spiral cable with a new one:
Scratches, cracks, dents or chips on the connector or the spiral cable.

(b) Inspect the spiral cable.

(1) Measure the resistance according to the value(s) in the table below.

NOTICE:
To avoid breakage of the spiral cable, do not turn the spiral cable more than necessary.

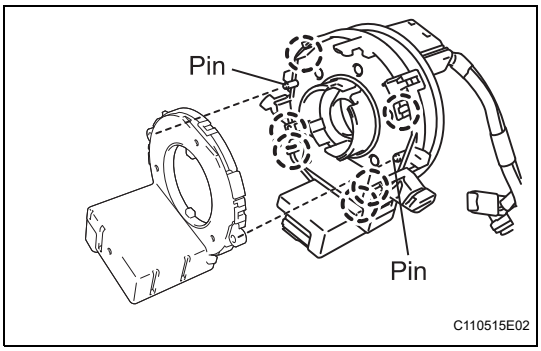
Standard resistance



Tester connection	Condition	Specified condition
a1-1 - b1-2	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
a1-1 - E18-8 (HO)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
a1-2 - E18-9 (EAC)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
a1-3 - E18-10 (AC1)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
a1-5 - E18-12 (IL+2)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
a1-6 - b1-4	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
a1-6 - E18-2 (ECC)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
a1-7 - E18-3 (+DP)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
a1-8 - E18-4 (EAU)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
a1-9 - E18-5 (AU2)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
a1-10 - E18-6 (AU1)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
b1-2 - E18-8 (HO)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	

Tester connection	Condition	Specified condition
b1-3 - E18-1 (CCS)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
b1-4 - E18-2 (ECC)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
A-1 (D-) - E16-2 (D-)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
A-2 (D+) - E16-1 (D+)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
B-1 (D2-) - E16-3 (D2-)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
B-2 (D2+) - E16-4 (D2+)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	

If the value is not within the specified range, replace the spiral cable.



INSTALLATION

1. INSTALL SPIRAL CABLE

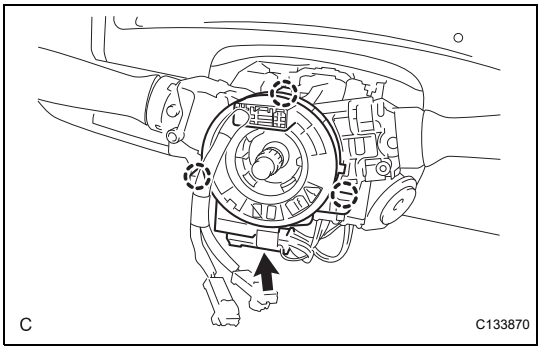
(a) Engage the 6 claws and and 2 pins, and install the spiral cable to the steering angle sensor.

2. INSTALL SPIRAL CABLE WITH STEERING ANGLE SENSOR

(a) Check that the front wheels are facing straight ahead.

(b) Set the turn signal switch to the neutral position.

NOTICE:
If it is not in the neutral position, the pin of the turn signal switch may be snapped.



(c) Engage the 3 claws and install the spiral cable with steering angle sensor.

NOTICE:
When replacing the spiral cable with a new one, remove the lock pin before installing the steering wheel assembly.

(d) Connect the connectors to the spiral cable with steering angle sensor.

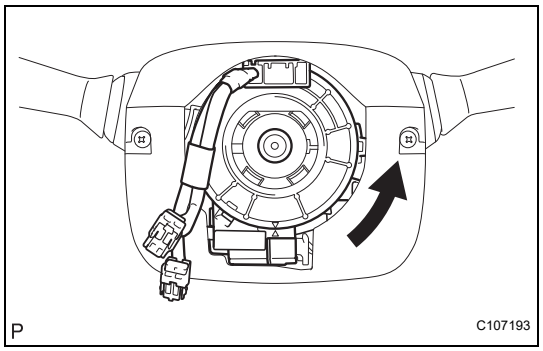
NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.

3. INSTALL STEERING COLUMN COVER (See page SR-41)

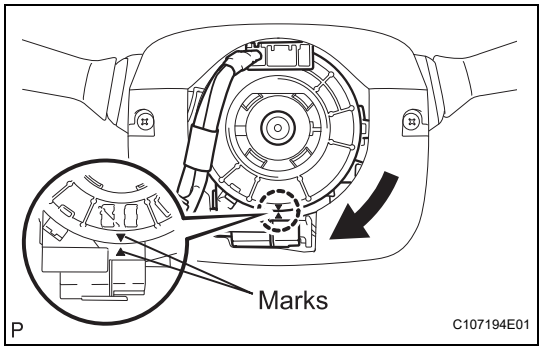
4. ADJUST SPIRAL CABLE

(a) Check that the power switch is turned off.

(b) Check that the battery negative (-) cable is disconnected.
CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.



(c) Rotate the spiral cable counterclockwise slowly by hand until it feels firm.
NOTICE:
Do not turn the spiral cable by the airbag wire harness.

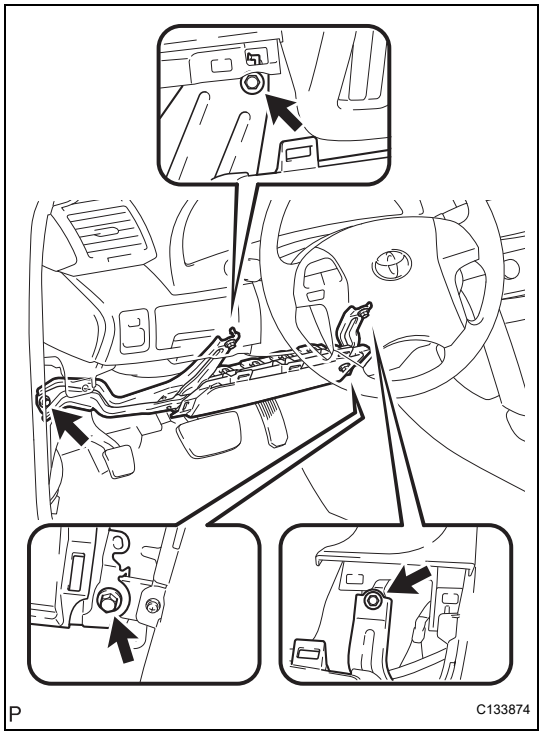


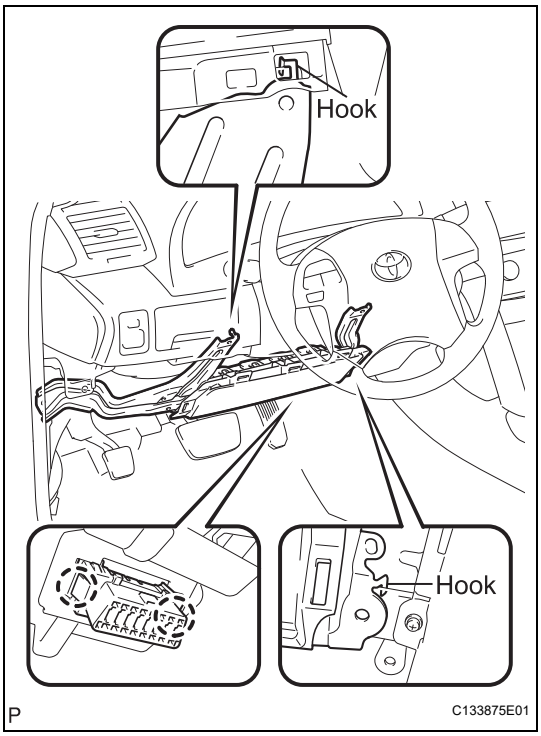
(d) Rotate the spiral cable clockwise approximately 2.5 turns to align the marks.
NOTICE:
Do not turn the spiral cable by the airbag wire harness.
HINT:
The spiral cable will rotate approximately 2.5 turns to both the left and right from the center.

5. **INSTALL STEERING WHEEL ASSEMBLY (See page SR-42)**
6. **INSPECT STEERING WHEEL CENTER POINT**
7. **INSTALL STEERING PAD (See page RS-346)**
8. **INSTALL NO. 3 LOWER STEERING WHEEL COVER (See page RS-347)**
9. **INSTALL NO. 2 LOWER STEERING WHEEL COVER (See page RS-347)**
10. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
11. **PERFORM INITIALIZATION**
    (a) Perform initialization (See page IN-43).
    NOTICE:
    Some systems need initialization after reconnecting the cable to the negative battery terminal.
12. **INSPECT STEERING PAD (See page RS-347)**
13. **INSPECT SRS WARNING LIGHT**
    (a) Inspect the SRS warning light (See page RS-33).

REMOVAL

1. **PRECAUTION**
   CAUTION:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
3. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-13)**
4. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-14)**
5. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-11)**
6. **REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY**
   (a) Remove the 4 bolts.
   (b) Disconnect the airbag connector.
   NOTICE:
   When handling the airbag connector, take care not to damage the airbag wire harness.

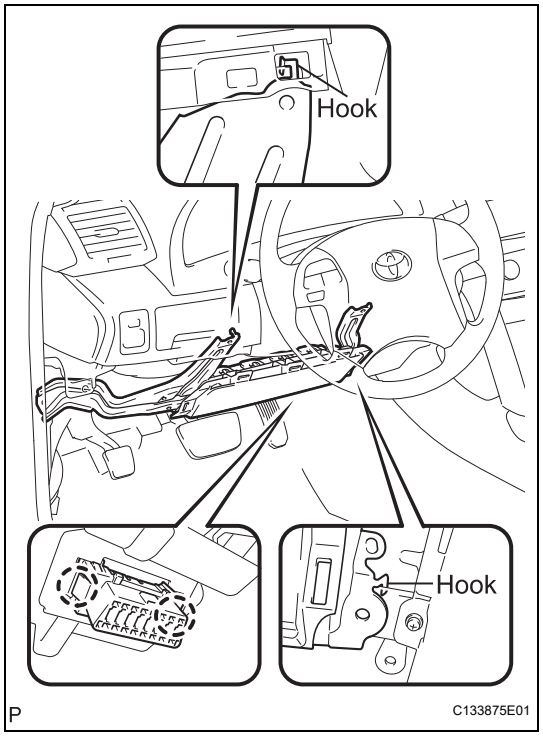


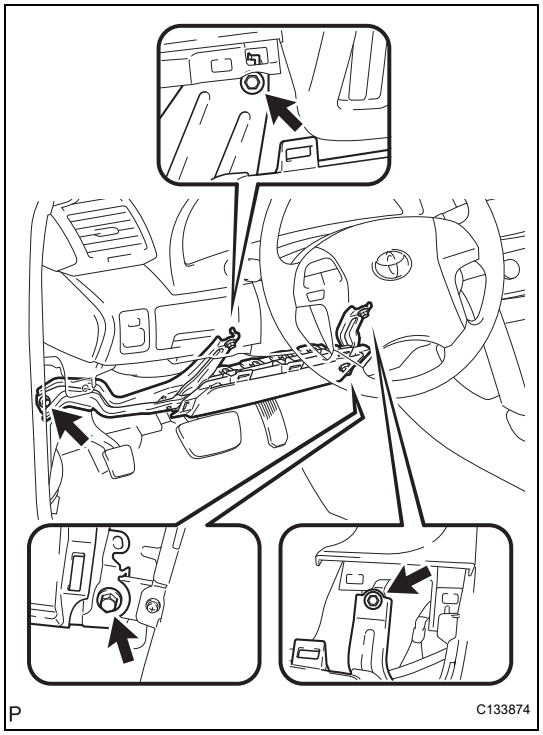


(c) Disengage the 2 claws and remove the DLC3.
(d) Disengage the 2 hooks and remove the driver side knee airbag assembly.

INSTALLATION

1. **INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY**
   (a) Check that the power switch is turned off.
   (b) Check that the battery negative (-) cable is disconnected.
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
   (c) Temporarily install the driver side knee airbag assembly with the 2 hooks.
   (d) Engage the 2 claws and install the DLC3.





   (e) Install the driver side knee airbag assembly with the 4 bolts.
   Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)
   (f) Connect the driver side knee airbag connector.
   NOTICE:
   When handling the airbag connector, take care not to damage the airbag wire harness.

2. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-35)**

3. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-41)**

4. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-41)**

5. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

6. **PERFORM INITIALIZATION**
   (a) Perform initialization (See page IN-43).
   NOTICE:
   Some systems need initialization after reconnecting the cable to the negative battery terminal.

RS

7. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light (See page RS-33).

DISPOSAL

HINT:
When scrapping a vehicle equipped with the SRS or disposing of the driver side knee airbag assembly, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A., INC.

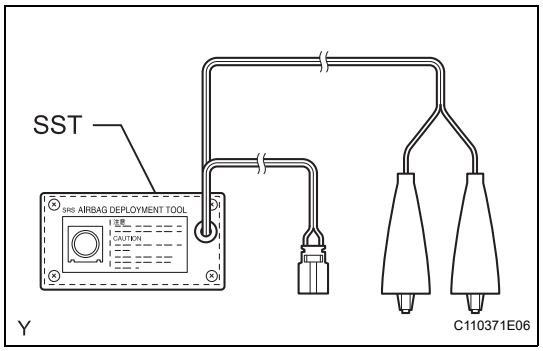
CAUTION:

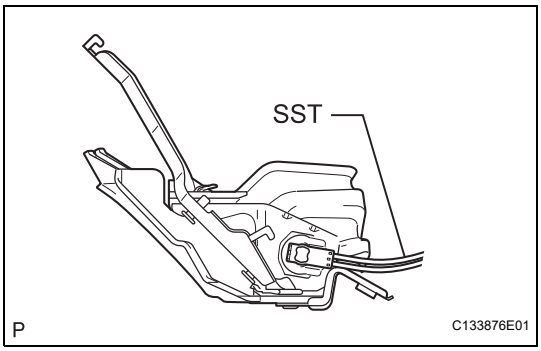
- **Never dispose of a driver side knee airbag assembly that has an undeployed airbag.**
- **The airbag produces an exploding sound when it is deployed, so perform the operation outdoors where it will not be a nuisance to nearby residents.**
- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.**
- **When deploying the airbag, perform the operation at least 10 m (33 ft) away from the driver side knee airbag assembly.**
- **The driver side knee airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a driver side knee airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a driver side knee airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

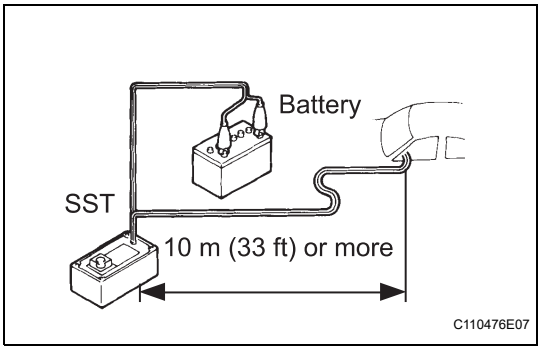
1. DISPOSE OF DRIVER SIDE KNEE AIRBAG ASSEMBLY (WHEN INSTALLED IN VEHICLE)

HINT:
Prepare a battery as the power source to deploy the airbag.

(a) Check the function of the SST (See page RS-348).
(b) Refer to PRECAUTION (See page RS-1).
(c) Disconnect the cable from the negative battery terminal.
CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
(d) Remove the driver side knee airbag assembly (See page RS-362).







(e) Install the SST.

(1) Connect the SST connector to the driver side knee airbag assembly.

SST 09082-00700, 09082-00770

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.

(2) Install the driver side knee airbag assembly (See page RS-363).

NOTICE:

Take care not to damage the SST wire harness.

(3) Move the SST at least 10 m (33 ft) away from the vehicle front side window.

(4) Maintaining enough clearance for the SST wire harness in the front side window, close all doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(5) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the battery negative (-) terminal.

(f) Deploy the airbag.

(1) Check that no one is inside the vehicle or within a 10 m (33 ft) radius of the vehicle.

(2) Press the SST activation switch and deploy the airbag.

CAUTION:

- **When deploying the airbag, make sure that no one is near the vehicle.**
- **The driver side knee airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a driver side knee airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a driver side knee airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

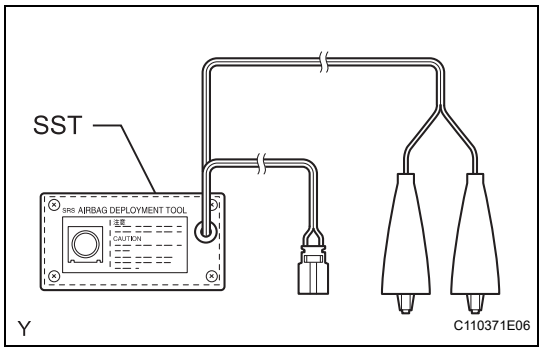
HINT:

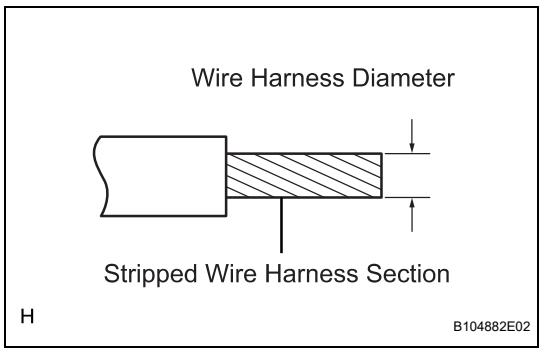
The airbag is deployed as the LED of the SST activation switch comes on.

2. DISPOSE OF DRIVER SIDE KNEE AIRBAG ASSEMBLY (WHEN NOT INSTALLED IN VEHICLE)

NOTICE:

- **When disposing of the driver side knee airbag assembly, never use the customer's vehicle to deploy the airbag.**



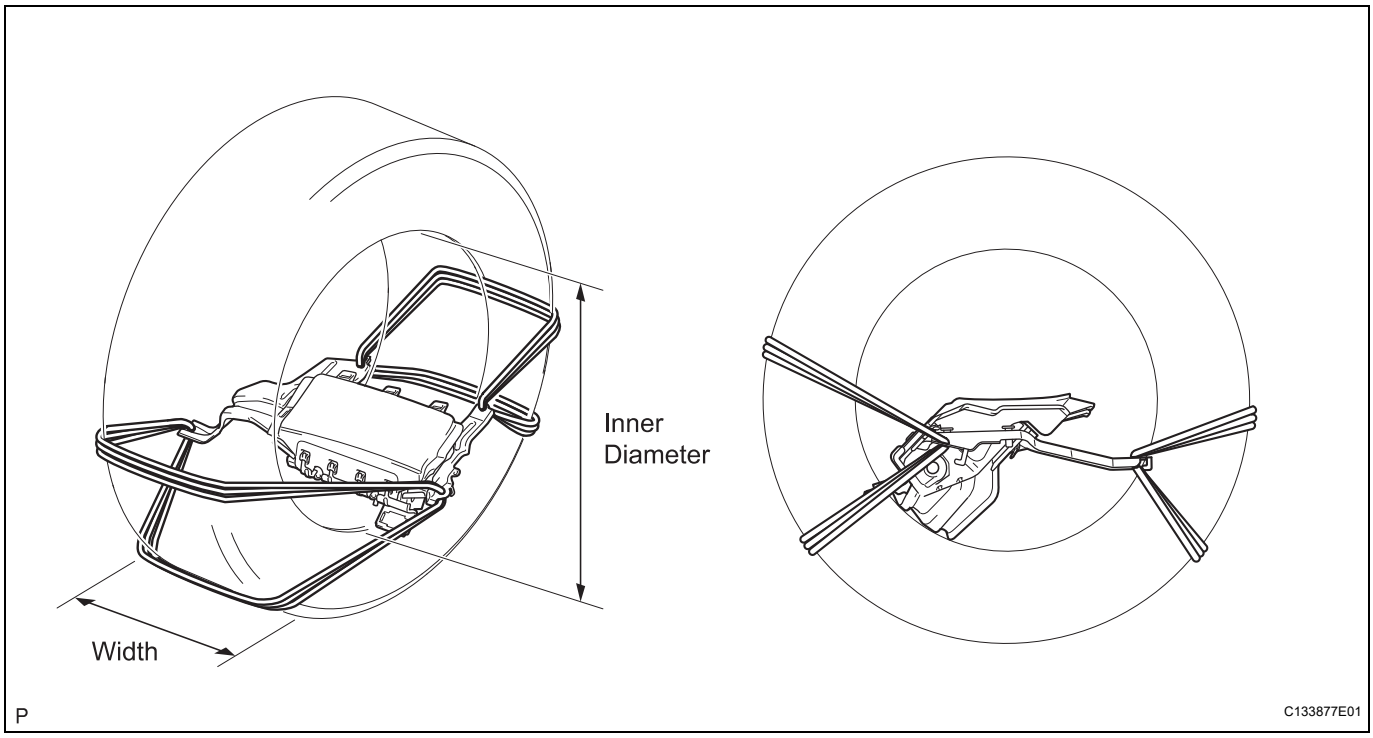


- **Be sure to follow the procedure detailed below when deploying the airbag.**

HINT:
Prepare a battery as the power source to deploy the airbag.

(a) Check the function of the SST (See page RS-350).
(b) Remove the driver side knee airbag assembly (See page RS-362).
CAUTION:
- **When removing the driver side knee airbag assembly, work must be started 90 seconds after the power switch is turned off and the negative (-) terminal cable is disconnected from the battery.**
- **When storing the driver side knee airbag assembly, keep the airbag deployment side facing upward.**

(c) Using a service-purpose wire harness for the vehicle, tie down the driver side knee airbag assembly to the tire.
Wire harness:
Stripped wire harness section
1.25 mm^2 or more (0.0019 $in.^2$ or more)
CAUTION:
If the wire harness is too thin or an alternative object is used to tie down the driver side knee airbag assembly, it may be snapped by the shock when the airbag is deployed. Always use a wire harness for vehicle use with an area of at least 1.25 mm^2 (0.0019 $in.^2$).
HINT:
To calculate the area of the stripped wire harness section:
Area = 3.14 x $(Diameter)^2$ divided by 4
(1) Position the driver side knee airbag assembly inside the tire with the airbag deployment side facing inside.
Tire size:
Must exceed the following dimensions
Width:
185 mm (7.28 in.)
Inner diameter:
360 mm (14.17 in.)

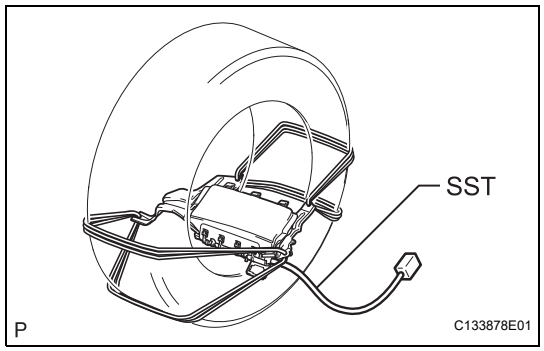


CAUTION:

- **Make sure that the wire harness is tight. If there is slack in the wire harness, the driver side knee airbag assembly may become loose due to the shock when the airbag is deployed.**
- **Always tie down the driver side knee airbag assembly with the airbag deployment side facing inside the tire.**

NOTICE:

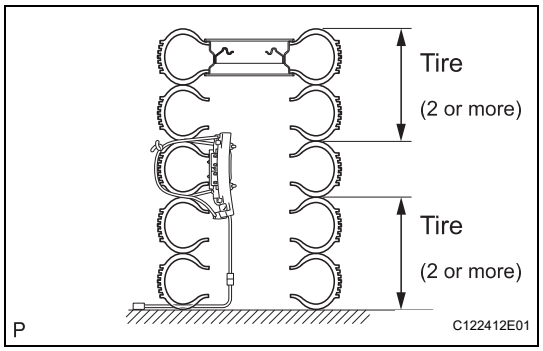
The tire may be damaged by the airbag deployment, so use an extra tire.

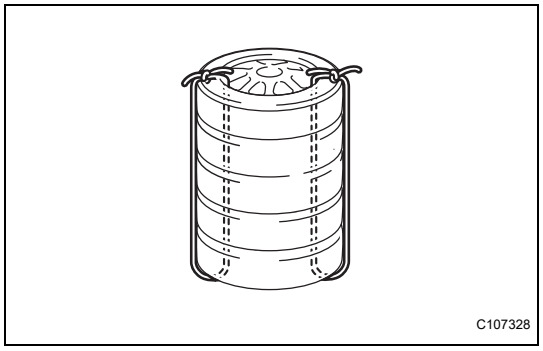


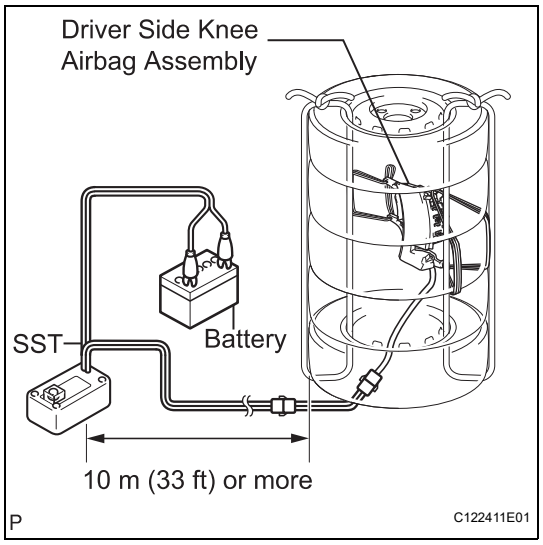
(d) Install the SST.

(1) Connect the SST connector to the driver side knee airbag assembly.

SST 09082-00770

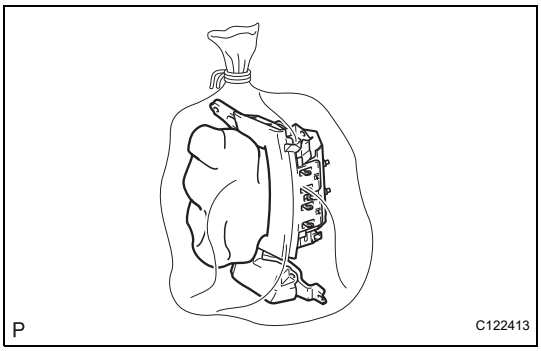






(e) Place the tires.
  (1) Place at least 2 tires under the tire which the driver side knee airbag assembly is tied to.
  (2) Place at least 2 tires over the tire which the driver side knee airbag assembly is tied to. The top tire should have the disc wheel installed.
  NOTICE:
  - **The tire may be damaged by the airbag deployment, so use an extra tire.**
  - **Do not place the SST connector under the tire because it could be damaged.**
  (3) Tie the tires together with 2 wire harnesses.
  CAUTION:
  Make sure that the wire harness is tight. Looseness in the wire harness results in the tires coming free due to the shock when the airbag is deployed.

(f) Install the SST.
  (1) Connect the SST connector.
  SST 09082-00700
  NOTICE:
  To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the tire.
  (2) Move the SST at least 10 m (33 ft) away from the airbag tied down to the tire.
(g) Deploy the airbag.
  (1) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the battery negative (-) terminal.
  (2) Check that no one is within a 10 m (33 ft) radius of the tire which the driver side knee airbag assembly is tied to.
  (3) Press the SST activation switch and deploy the airbag.
  CAUTION:
  When deploying the airbag, make sure that no one is near the tire.
  HINT:
  The airbag is deployed as the LED of the SST activation switch comes on.



(h) Dispose of the driver side knee airbag assembly.
CAUTION:
- **The driver side knee airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a driver side knee airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a driver side knee airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

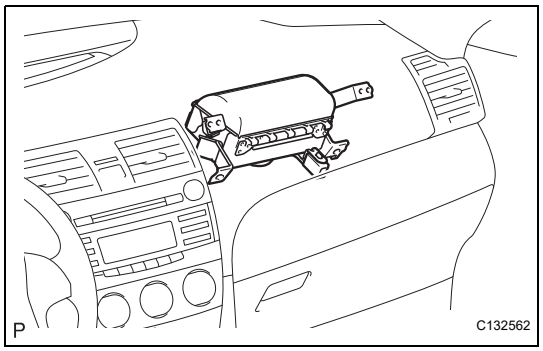
(1) Remove the driver side knee airbag assembly from the tire.
(2) Place the driver side knee airbag assembly in a plastic bag, tie it tightly and dispose of it as other general part disposal.

ON-VEHICLE INSPECTION

1. INSPECT FRONT PASSENGER AIRBAG ASSEMBLY (VEHICLE NOT INVOLVED IN COLLISION)

(a) Perform a diagnostic system check (See page RS-33).

(b) With the front passenger airbag assembly installed on the vehicle, perform a visual check. If there are any defects as mentioned below, replace the instrument panel with a new one:
Cuts, minute cracks or marked discoloration on the instrument panel around the front passenger airbag assembly.



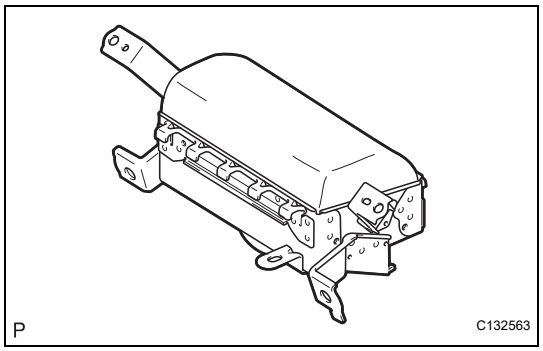
2. INSPECT FRONT PASSENGER AIRBAG ASSEMBLY (VEHICLE INVOLVED IN COLLISION AND AIRBAG HAS NOT DEPLOYED)

(a) Perform a diagnostic system check (See page RS-33).

(b) With the front passenger airbag assembly removed from the vehicle, perform a visual check. If there are any defects as mentioned below, replace the front passenger airbag assembly, instrument panel or instrument panel reinforcement with a new one:

- Cuts, minute cracks or marked discoloration on the front passenger airbag assembly.
- Cracks or other damage to the connectors.
- Deformation or cracks on the instrument panel or instrument panel reinforcement.

CAUTION:
Be sure to follow the correct removal and installation procedures.

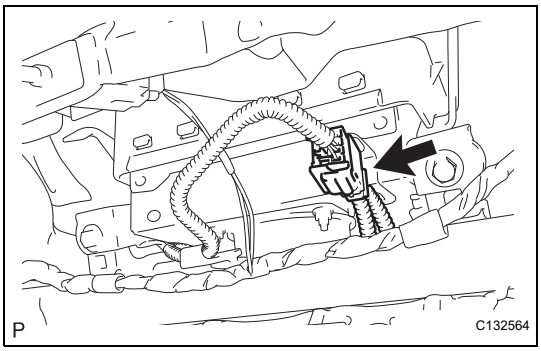


REMOVAL

1. **PRECAUTION**
   CAUTION:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).
2. **ALIGN FRONT WHEELS FACING STRAIGHT AHEAD**
3. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
4. **REMOVE NO. 3 LOWER STEERING WHEEL COVER (See page RS-345)**
5. **REMOVE NO. 2 LOWER STEERING WHEEL COVER (See page RS-345)**
6. **REMOVE STEERING PAD (See page RS-345)**
7. **REMOVE STEERING WHEEL ASSEMBLY (See page SR-36)**
8. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-13)**
9. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-14)**
10. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-11)**
11. **REMOVE STEERING COLUMN COVER (See page SR-36)**
12. **REMOVE TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY (See page SR-37)**
13. **REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-12)**
14. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-12)**
15. **REMOVE INSTRUMENT CLUSTER FINISH PANEL (See page IP-13)**
16. **REMOVE COMBINATION METER ASSEMBLY (See page IP-13)**
17. **REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-15)**
18. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-15)**
19. **REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-13)**
20. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-14)**

21. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-14)
22. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-14)
23. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-14)
24. REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-15)
25. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-15)
26. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-16)
27. REMOVE INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-16)
28. REMOVE RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-136)
29. REMOVE NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/ Navigation System) (See page NS-193)
30. REMOVE CONSOLE BOX POCKET (See page IP-17)
31. REMOVE CONSOLE BOX CARPET (See page IP-17)
32. REMOVE CONSOLE BOX ASSEMBLY (See page IP-17)
33. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (See page IP-18)
34. REMOVE NO. 1 CONSOLE BOX INSERT FRONT (See page IP-18)
35. REMOVE FRONT PILLAR GARNISH LH (See page IR-16)
36. REMOVE INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY (See page IP-18)
37. REMOVE INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY (See page IP-19)
38. REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-146)
39. REMOVE FRONT PILLAR GARNISH RH (See page IR-16)
40. REMOVE INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY (See page IP-19)
41. REMOVE INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY (See page IP-19)
42. REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side) (See page IP-19)

43. REMOVE NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-20)

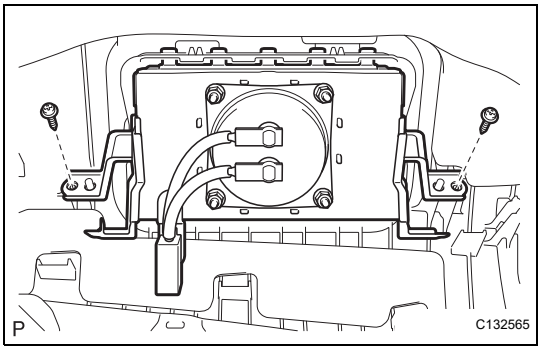


44. DISCONNECT INSTRUMENT PANEL WIRE ASSEMBLY

(a) Disconnect the connector.

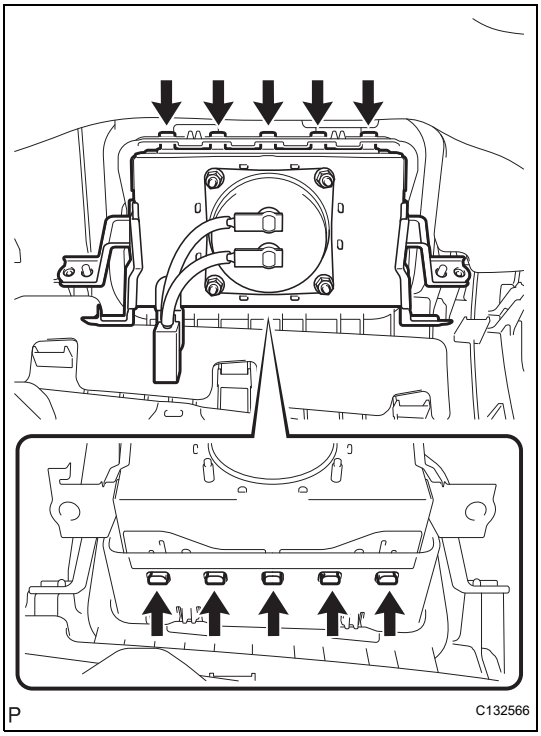
NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.

45. REMOVE INSTRUMENT PANEL SAFETY PAD ASSEMBLY (See page IP-20)

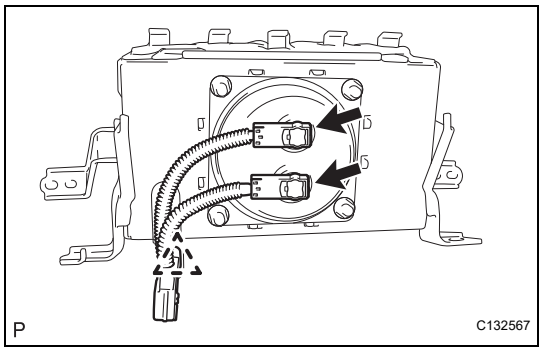


46. REMOVE FRONT PASSENGER AIRBAG ASSEMBLY

(a) Remove the 2 screws.



(b) Disengage the 10 hooks and remove the front passenger airbag assembly from the instrument panel.



47. REMOVE INSTRUMENT PANEL WIRE ASSEMBLY

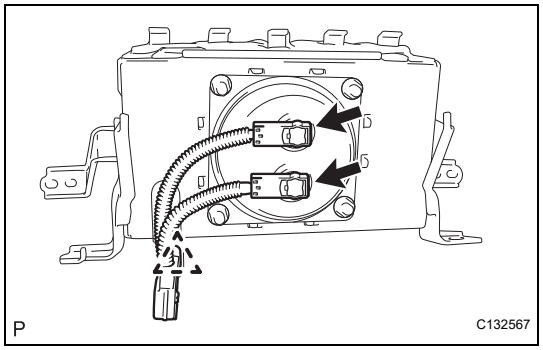
(a) Disconnect the 2 connectors.

(b) Remove the clamp and the instrument panel wire assembly from the front passenger airbag assembly.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.

INSTALLATION



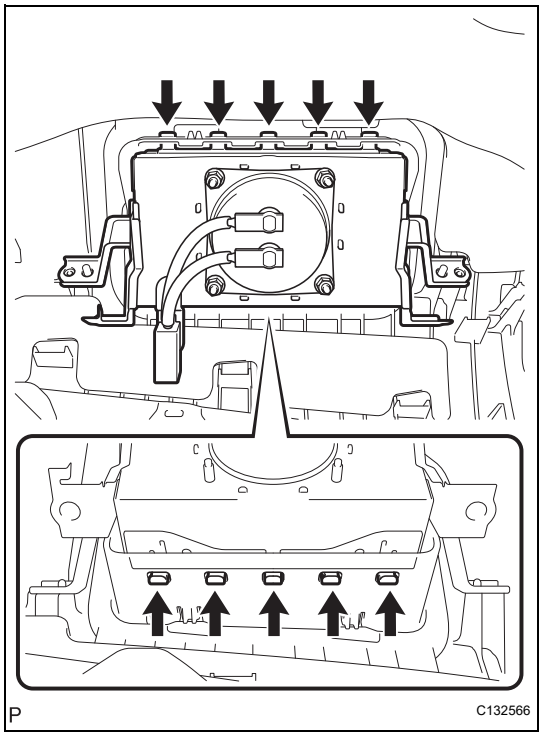
1. INSTALL INSTRUMENT PANEL WIRE ASSEMBLY

(a) Connect the 2 connectors.

(b) Install the clamp and the instrument panel wire assembly on the front passenger airbag assembly.

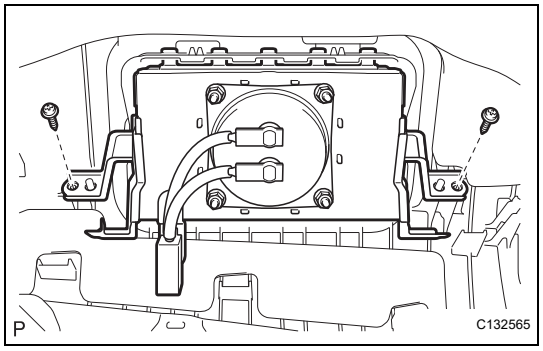
NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.



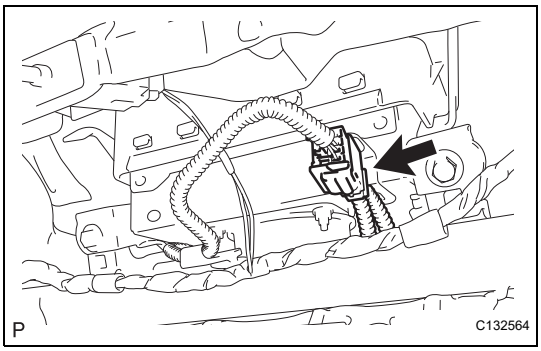
2. INSTALL FRONT PASSENGER AIRBAG ASSEMBLY

(a) Engage the 10 hooks and install the front passenger airbag assembly on the instrument panel.



(b) Install the 2 screws.

3. INSTALL INSTRUMENT PANEL SAFETY PAD ASSEMBLY (See page IP-25)



4. **CONNECT INSTRUMENT PANEL WIRE ASSEMBLY**
   (a) Connect the connector.
   NOTICE:
   When handling the airbag connector, take care not to damage the airbag wire harness.
5. **INSTALL NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-28)**
6. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-146)**
7. **INSTALL INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY (See page IP-28)**
8. **INSTALL INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY (See page IP-28)**
9. **INSTALL FRONT PILLAR GARNISH LH (See page IR-38)**
10. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side) (See page IP-28)**
11. **INSTALL INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY (See page IP-29)**
12. **INSTALL INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY (See page IP-29)**
13. **INSTALL FRONT PILLAR GARNISH RH (See page IR-39)**
14. **INSTALL NO. 1 CONSOLE BOX INSERT FRONT (See page IP-29)**
15. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (See page IP-30)**
16. **INSTALL CONSOLE BOX ASSEMBLY (See page IP-30)**
17. **INSTALL CONSOLE BOX CARPET (See page IP-30)**
18. **INSTALL CONSOLE BOX POCKET (See page IP-30)**
19. **INSTALL RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-137)**
20. **INSTALL NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/ Navigation System) (See page NS-194)**
21. **INSTALL INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-31)**
22. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-31)**
23. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-31)**
24. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-31)**

25. INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-32)
26. INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-32)
27. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-32)
28. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-33)
29. INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-33)
30. INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-42)
31. INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-42)
32. INSTALL COMBINATION METER ASSEMBLY (See page IP-33)
33. INSTALL INSTRUMENT CLUSTER FINISH PANEL (See page IP-34)
34. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-34)
35. INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-34)
36. INSTALL TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY (See page SR-41)
37. ADJUST SPIRAL CABLE (See page RS-360)
38. INSTALL STEERING COLUMN COVER (See page SR-41)
39. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-35)
40. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-41)
41. INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-41)
42. INSTALL STEERING WHEEL ASSEMBLY (See page SR-42)
43. INSTALL STEERING PAD (See page RS-346)
44. INSTALL NO. 3 LOWER STEERING WHEEL COVER (See page RS-347)
45. INSTALL NO. 2 LOWER STEERING WHEEL COVER (See page RS-347)
46. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

47. PERFORM INITIALIZATION

(a) Perform initialization (See page IN-43).

NOTICE:
Some systems need initialization after reconnecting the cable to the negative battery terminal.

48. INSPECT STEERING PAD (See page RS-347)

49. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light (See page RS-33).

DISPOSAL

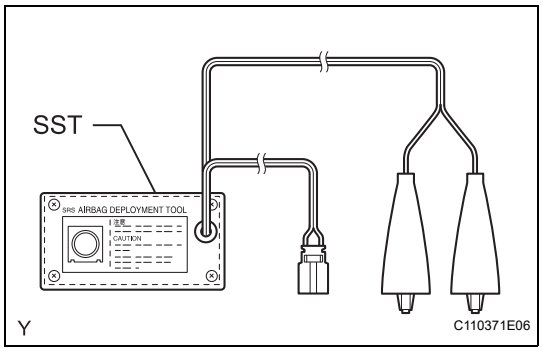
HINT:
When scrapping a vehicle equipped with the SRS or disposing of the front passenger airbag assembly, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of the TOYOTA MOTOR SALES, U.S.A., INC.

CAUTION:

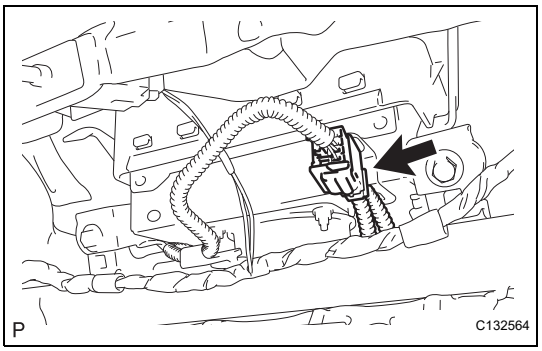
- **Never dispose of a front passenger airbag assembly that has an undeployed airbag.**
- **The airbag produces an exploding sound when it is deployed, so perform the operation outdoors where it will not be a nuisance to nearby residents.**
- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.**
- **When deploying the airbag, perform the operation at least 10 m (33 ft) away from the front passenger airbag assembly.**
- **The front passenger airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front passenger airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a front passenger airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

1. DISPOSE OF FRONT PASSENGER AIRBAG ASSEMBLY (WHEN INSTALLED IN VEHICLE)

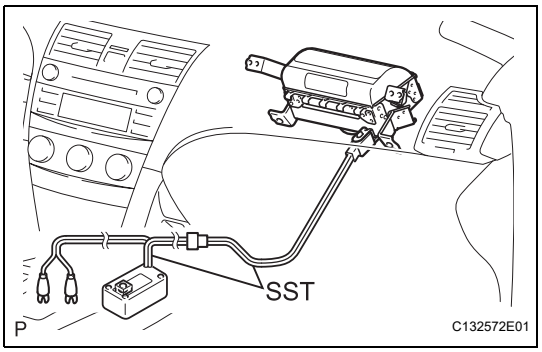
HINT:
Prepare a battery as the power source to deploy the airbag.



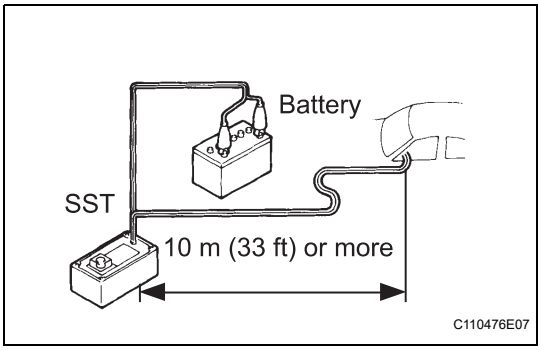
(a) Check the function of the SST (See page RS-348).
(b) Refer to PRECAUTION (See page RS-1).
(c) Disconnect the cable from the negative battery terminal.
CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
(d) Install the SST.
(1) Remove the lower instrument panel sub-assembly (See page IP-14).



(2) Disconnect the connector.
NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.



(3) Connect the SST connector to the instrument panel wire assembly.
SST 09082-00700, 09082-00780
NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



(4) Move the SST at least 10 m (33 ft) away from the vehicle front side window.
(5) Maintaining enough clearance for the SST wire harness in the front side window, close all doors and windows of the vehicle.
NOTICE:
Take care not to damage the SST wire harness.
(6) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the negative (-) terminal.

(e) Deploy the airbag.
(1) Check that no one is inside the vehicle or within a 10 m (33 ft) radius of the vehicle.
(2) Press the SST activation switch and deploy the airbag.
CAUTION:
- **When deploying the airbag, make sure that no one is near the vehicle.**
- **The front passenger airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front passenger airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a front passenger airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

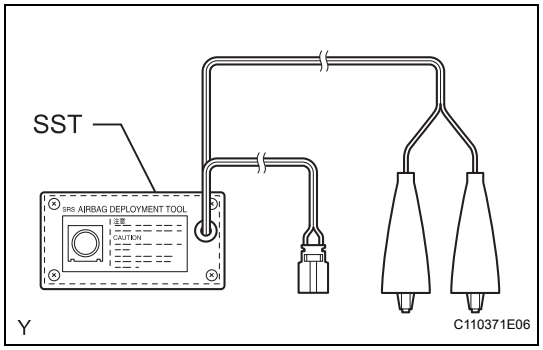
HINT:
The airbag is deployed as the LED of the SST activation switch comes on.

2. DISPOSE OF FRONT PASSENGER AIRBAG ASSEMBLY (WHEN NOT INSTALLED IN VEHICLE)

NOTICE:

- **When disposing of the front passenger airbag assembly, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure detailed below when deploying the airbag.**

HINT:
Prepare a battery as the power source to deploy the airbag.

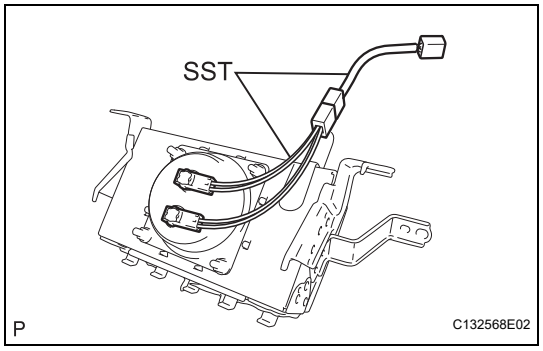


(a) Check the function of the SST (See page RS-350).

(b) Remove the front passenger airbag assembly (See page RS-379).

CAUTION:

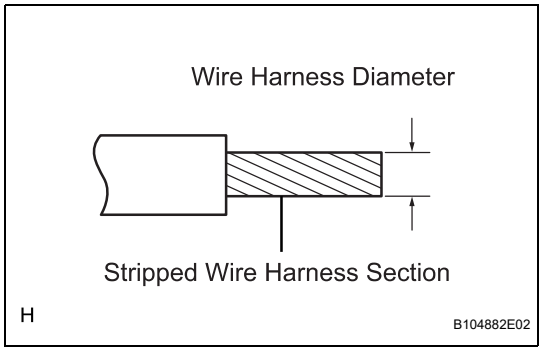
- **When removing the front passenger airbag assembly, work must be started 90 seconds after the power switch is turned off and the negative (-) terminal cable is disconnected from the battery.**
- **When storing the front passenger airbag assembly, keep the airbag deployment side facing upward.**



(c) Install the SST.

(1) After connecting the SST below to each other, connect them to the front passenger airbag assembly.

SST 09082-00802 (09082-10801, 09082-30801)



(d) Using a service-purpose wire harness for the vehicle, tie down the front passenger airbag assembly to the tire.

Wire harness:

Stripped wire harness section

1.25 mm^2 or more (0.0019 $in.^2$ or more)

CAUTION:

If the wire harness is too thin or an alternative object is used to tie down the front passenger airbag assembly, it may be snapped by the shock when the airbag is deployed. Always use a wire harness for vehicle use with an area of at least 1.25 mm^2 (0.0019 $in.^2$).

HINT:
To calculate the area of the stripped wire harness section:

RS

Area = 3.14 x (Diameter)^2 divided by 4

(1) Position the front passenger airbag assembly inside the tire with the airbag deployment side facing inside.

Tire size:

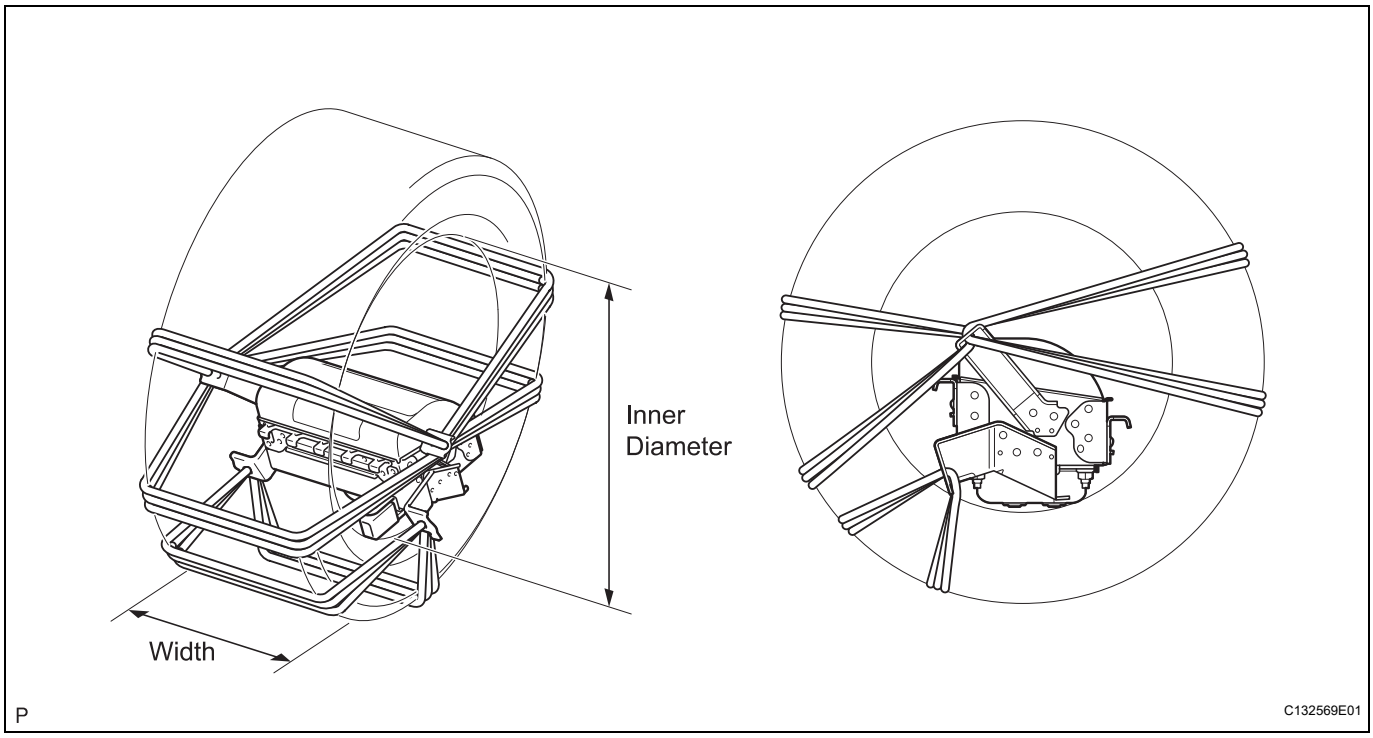
Must exceed the following dimensions

Width:

185 mm (7.28 in.)

Inner diameter:

360 mm (14.17 in.)

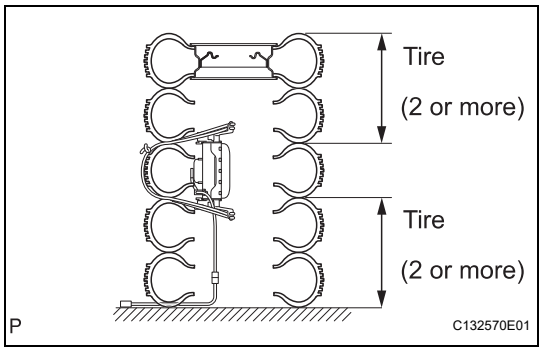


CAUTION:

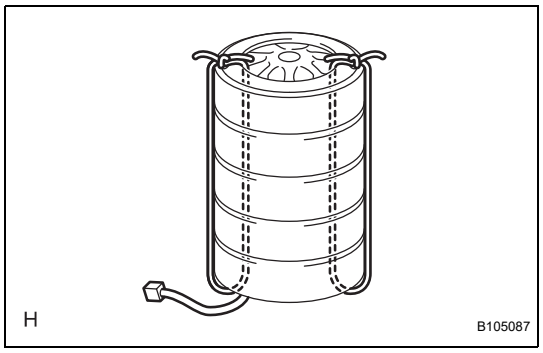
- **Make sure that the wire harness is tight. If there is slack in the wire harness, the front passenger airbag assembly may become loose due to the shock when the airbag is deployed.**
- **Always tie down the front passenger airbag assembly with the airbag deployment side facing inside the tire.**

NOTICE:

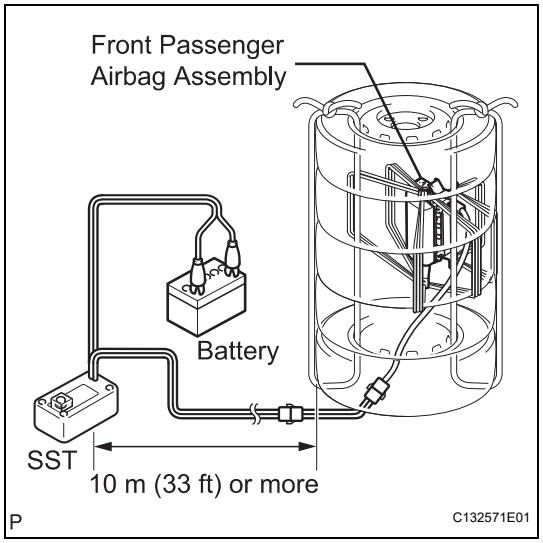
The tire will be marked by the airbag deployment, so use an extra tire.



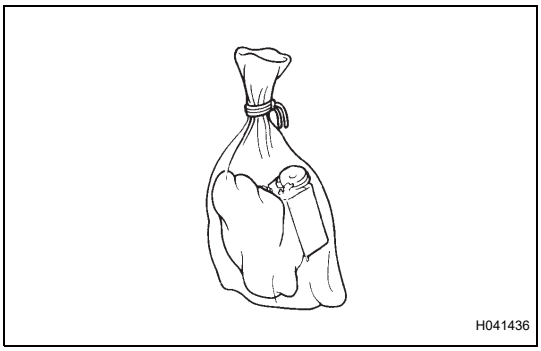
(e) Place the tires.
(1) Place at least 2 tires under the tire which the front passenger airbag assembly is tied to.
(2) Place at least 2 tires over the tire which the front passenger airbag assembly is tied to. The top tire should have a disc wheel installed.
NOTICE:
Do not place the SST connector under the tire because it could be damaged.



(3) Tie the tires together with 2 wire harnesses.
CAUTION:
Make sure that the wire harness is tight. Looseness in the wire harness results in the tires coming free due to the shock when the airbag is deployed.



(f) Install the SST.
(1) Connect the SST connector.
SST 09082-00700
NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the tire.
(2) Move the SST at least 10 m (33 ft) away from the airbag tied down to the tire.
(g) Deploy the airbag.
(1) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the battery negative (-) terminal.
(2) Check that no one is within a 10 m (33 ft) radius of the tire which the front passenger airbag assembly is tied to.
(3) Press the SST activation switch and deploy the airbag.
CAUTION:
When deploying the airbag, make sure that no one is near the tire.
HINT:
The airbag is deployed as the LED of the SST activation switch comes on.



(h) Dispose of the front passenger airbag assembly.
CAUTION:
- **The front passenger airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front passenger airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a front passenger airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

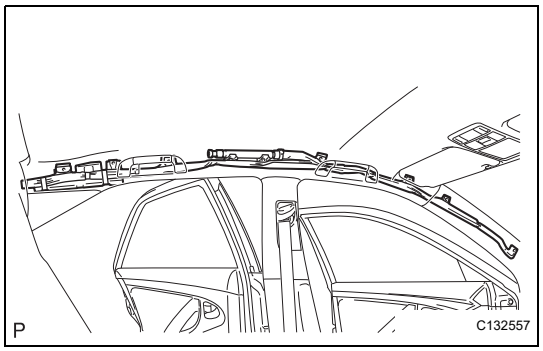
(1) Remove the front passenger airbag assembly from the tire.
(2) Place the front passenger airbag assembly in a plastic bag, tie it tightly and dispose of it as other general part disposal.

ON-VEHICLE INSPECTION

1. INSPECT CURTAIN SHIELD AIRBAG ASSEMBLY (VEHICLE NOT INVOLVED IN COLLISION)

(a) Perform a diagnostic system check (See page RS-33).

(b) With the curtain shield airbag assembly installed on the vehicle, perform a visual check. If there are any defects as mentioned below, replace the front pillar garnish or roof headlining assembly with a new one:
Cuts, minute cracks or marked discoloration on the front pillar garnish or roof headlining assembly around the curtain shield airbag assembly.

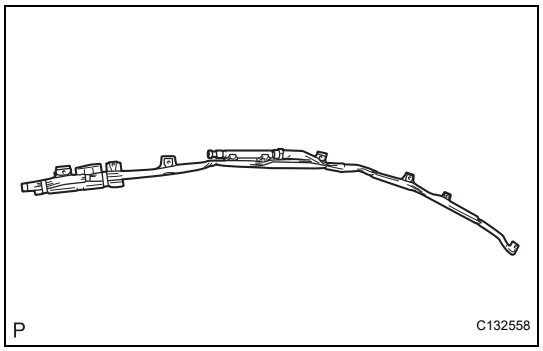


2. INSPECT CURTAIN SHIELD AIRBAG ASSEMBLY (VEHICLE INVOLVED IN COLLISION AND AIRBAG HAS NOT DEPLOYED)

(a) Perform a diagnostic system check (See page RS-33).

(b) With the curtain shield airbag assembly removed from the vehicle, perform a visual check. If there are any defects as mentioned below, replace the curtain shield airbag assembly with a new one:
- Cuts, minute cracks or marked discoloration on the curtain shield airbag assembly.
- Cracks or other damage to the connectors.

CAUTION:
Be sure to follow the correct removal and installation procedures.



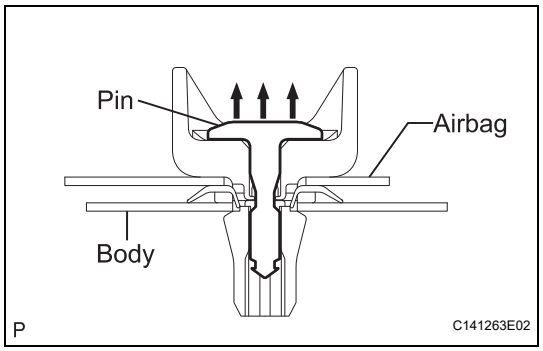
REMOVAL

HINT:
- Use the same procedure for the RH side and the LH side.
- The procedure listed below are for the LH side.

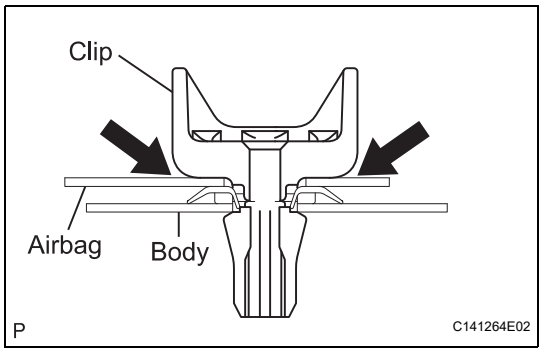
1. **PRECAUTION**
   CAUTION:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (for Manual Seat)**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
3. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**
4. **REMOVE SEAT TRACK COVER LH (for Power Seat) (See page SE-29)**
5. **REMOVE INNER SEAT TRACK BRACKET COVER LH (for Power Seat) (See page SE-29)**
6. **REMOVE FRONT SEAT ASSEMBLY LH (for Power Seat) (See page SE-29)**
7. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**
8. **REMOVE SEAT TRACK COVER RH (for Manual Seat) (See page SE-16)**
9. **REMOVE INNER SEAT TRACK BRACKET COVER RH (for Manual Seat) (See page SE-16)**
10. **REMOVE FRONT SEAT ASSEMBLY RH (for Manual Seat) (See page SE-16)**
11. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**
12. **REMOVE SEAT TRACK COVER RH (for Power Seat) (See page IR-12)**
13. **REMOVE INNER SEAT TRACK BRACKET COVER RH (for Power Seat) (See page IR-12)**
14. **REMOVE FRONT SEAT ASSEMBLY RH (for Power Seat) (See page IR-12)**
15. **REMOVE REAR DOOR SCUFF PLATE LH (See page IR-13)**
16. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP LH**
17. **REMOVE REAR DOOR SCUFF PLATE RH (See page IR-13)**
18. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH**

19. REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-44)
20. REMOVE REAR SEAT HEADREST ASSEMBLY (See page SE-44)
21. REMOVE REAR CENTER SEAT HEADREST ASSEMBLY
22. REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-44)
23. REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-44)
24. REMOVE REAR SIDE SEATBACK ASSEMBLY LH (See page SE-45)
25. REMOVE REAR SIDE SEATBACK ASSEMBLY RH (See page SE-45)
26. REMOVE REAR DOOR INSIDE HANDLE BEZEL PLUG LH (See page ED-64)
27. REMOVE DOOR ASSIST GRIP COVER LH (See page ED-64)
28. REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY LH (See page ED-65)
29. REMOVE REAR DOOR INNER GLASS WEATHERSTRIP LH (See page ED-66)
30. REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-13)
31. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-14)
32. REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP LH
33. REMOVE LAP BELT OUTER ANCHOR COVER (for LH Side) (See page IR-14)
34. DISCONNECT FRONT SEAT OUTER BELT ASSEMBLY LH (See page IR-14)
35. REMOVE LOWER CENTER PILLAR GARNISH LH (See page IR-14)
36. REMOVE UPPER CENTER PILLAR GARNISH LH (See page IR-15)
37. REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-15)
38. REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-15)
39. REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP RH
40. REMOVE LAP BELT OUTER ANCHOR COVER (for RH Side) (See page IR-15)

41. **DISCONNECT FRONT SEAT OUTER BELT ASSEMBLY RH (See page IR-15)**
42. **REMOVE LOWER CENTER PILLAR GARNISH RH (See page IR-15)**
43. **REMOVE UPPER CENTER PILLAR GARNISH RH (See page IR-15)**
44. **REMOVE ROOF SIDE INNER GARNISH LH (See page IR-15)**
45. **REMOVE ROOF SIDE INNER GARNISH RH (See page IR-15)**
46. **REMOVE FRONT PILLAR GARNISH LH (See page IR-16)**
47. **REMOVE FRONT PILLAR GARNISH RH (See page IR-16)**
48. **REMOVE ROOF CONSOLE BOX ASSEMBLY (See page IR-17)**
49. **REMOVE VISOR ASSEMBLY LH (See page IR-17)**
50. **REMOVE VISOR ASSEMBLY RH (See page IR-18)**
51. **REMOVE VISOR HOLDER (See page IR-18)**
52. **REMOVE FRONT ASSIST GRIP SUB-ASSEMBLY (See page IR-18)**
53. **REMOVE REAR ASSIST GRIP SUB-ASSEMBLY (See page IR-18)**
54. **REMOVE NO. 1 ROOM LIGHT ASSEMBLY (w/o Sliding Roof) (See page IR-19)**
55. **REMOVE SPOT LIGHT ASSEMBLY (w/ Sliding Roof) (See page IR-19)**
56. **REMOVE SUN ROOF OPENING TRIM MOULDING (w/ Sliding Roof) (See page IR-20)**
57. **REMOVE ROOF HEADLINING ASSEMBLY (w/o Sliding Roof) (See page IR-20)**
58. **REMOVE ROOF HEADLINING ASSEMBLY (w/ Sliding Roof) (See page IR-21)**
59. **REMOVE CURTAIN SHIELD AIRBAG ASSEMBLY**
    (a) Disconnect the connector.
    NOTICE:
    When handling the airbag connector, take care not to damage the airbag wire harness.

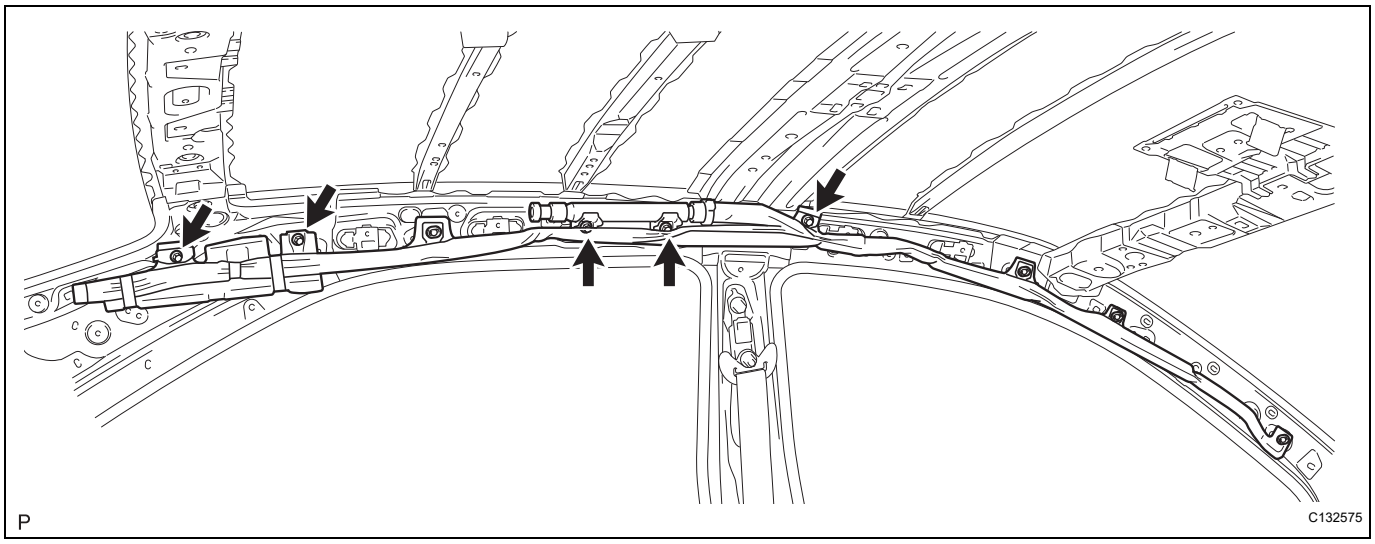


(b) Remove the 4 clips.
(1) Using a clip remover, remove the pin.



(2) Insert needle nose pliers in the position shown in the illustration.
(3) Catch the clip with the needle nose pliers, and remove the clip and curtain shield airbag assembly as a unit.

(c) Remove the 5 bolts and curtain shield airbag assembly.



(d) Remove the 4 clips and the 4 spacers from the curtain shield airbag assembly.

NOTICE:

Replace the clips and spacers with new ones even if they are not damaged.

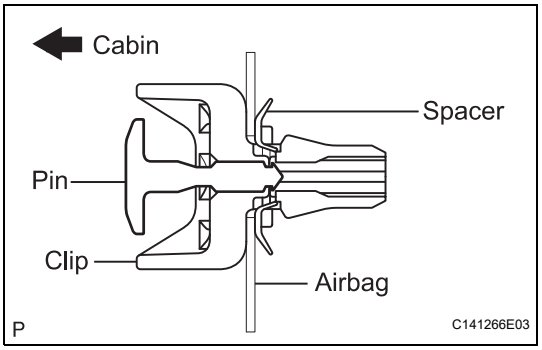
INSTALLATION

1. INSTALL CURTAIN SHIELD AIRBAG ASSEMBLY

(a) Check that the power switch is turned off.

(b) Check that the battery negative (-) cable is disconnected.

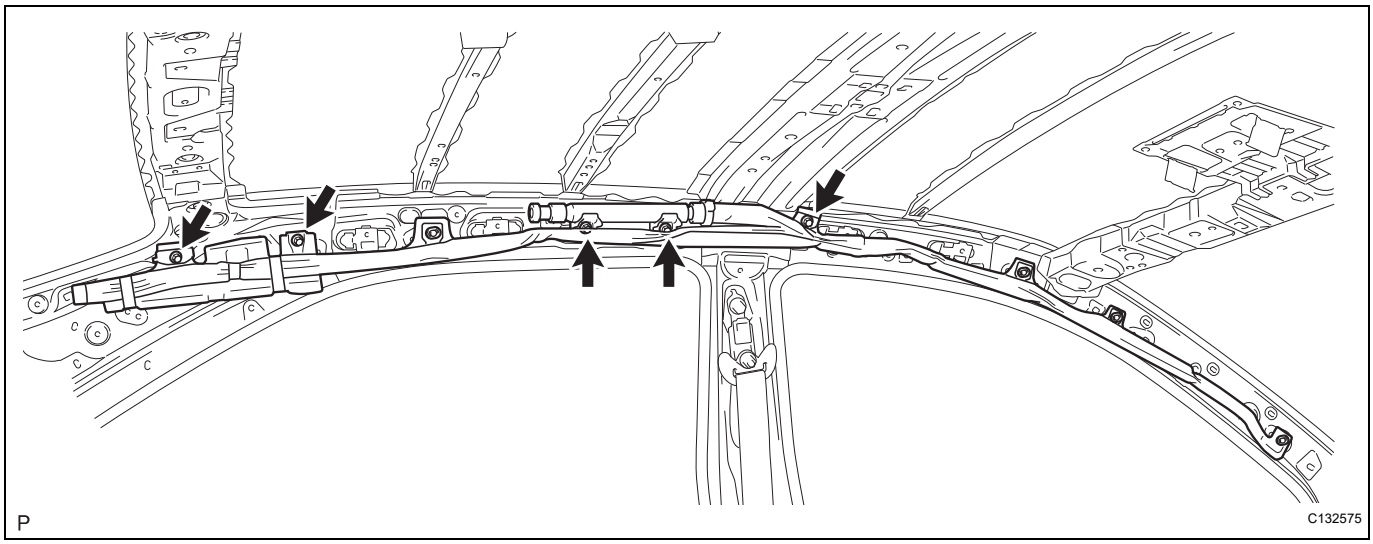
CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.



(c) Install 4 new clips and 4 new spacers to the curtain shield airbag assembly as shown in the illustration.

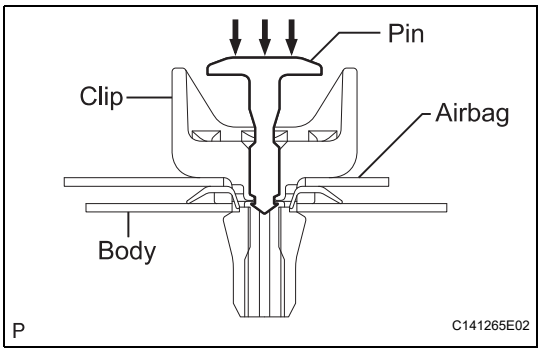
NOTICE:
- **Do not push the pin into the clip.**
- **Make sure that the clips are installed in the correct direction.**
- **Make sure that the spacers are not damaged, engaged securely, and installed in the correct direction.**

(d) Install the curtain shield airbag assembly with the 5 new bolts.



Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)

NOTICE:
Do not twist the curtain shield airbag assembly when installing it.



(e) Install the curtain shield airbag assembly to the body with the 4 clips as shown in the illustration.

NOTICE:
Securely push the pin in the clip.

(f) Mark the clips.

HINT:
Be sure to mark the clips to leave a record of replacement.

(g) Connect the connector.

NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.

2. INSTALL ROOF HEADLINING ASSEMBLY (w/o Sliding Roof) (See page IR-33)
3. INSTALL ROOF HEADLINING ASSEMBLY (w/ Sliding Roof) (See page IR-34)
4. INSTALL SUN ROOF OPENING TRIM MOULDING (w/ Sliding Roof) (See page IR-35)
5. INSTALL SPOT LIGHT ASSEMBLY (w/ Sliding Roof) (See page IR-35)
6. INSTALL NO. 1 ROOM LIGHT ASSEMBLY (w/o Sliding Roof) (See page IR-36)
7. INSTALL FRONT ASSIST GRIP SUB-ASSEMBLY (See page IR-36)
8. INSTALL REAR ASSIST GRIP SUB-ASSEMBLY (See page IR-37)
9. INSTALL VISOR HOLDER (See page IR-37)
10. INSTALL VISOR ASSEMBLY LH (See page IR-37)
11. INSTALL VISOR ASSEMBLY RH (See page IR-37)
12. INSTALL ROOF CONSOLE BOX ASSEMBLY (See page IR-38)
13. INSTALL FRONT PILLAR GARNISH LH (See page IR-38)
14. INSTALL FRONT PILLAR GARNISH RH (See page IR-39)
15. INSTALL ROOF SIDE INNER GARNISH LH (See page IR-39)
16. INSTALL ROOF SIDE INNER GARNISH RH (See page IR-39)
17. INSTALL UPPER CENTER PILLAR GARNISH LH (See page IR-40)
18. INSTALL LOWER CENTER PILLAR GARNISH LH (See page IR-40)
19. CONNECT FRONT SEAT OUTER BELT ASSEMBLY LH (See page IR-40)
20. INSTALL LAP BELT OUTER ANCHOR COVER (for LH Side) (See page IR-40)
21. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-41)
22. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-41)
23. INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-41)
24. INSTALL UPPER CENTER PILLAR GARNISH RH (See page IR-41)

25. INSTALL LOWER CENTER PILLAR GARNISH RH (See page IR-41)
26. CONNECT FRONT SEAT OUTER BELT ASSEMBLY RH (See page IR-41)
27. INSTALL LAP BELT OUTER ANCHOR COVER (for RH Side) (See page IR-41)
28. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-42)
29. INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-42)
30. INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-42)
31. INSTALL REAR DOOR INNER GLASS WEATHERSTRIP LH (See page ED-80)
32. INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY LH (See page ED-81)
33. INSTALL DOOR ASSIST GRIP COVER LH (See page ED-82)
34. INSTALL REAR DOOR INSIDE HANDLE BEZEL PLUG LH (See page ED-82)
35. INSTALL REAR SIDE SEATBACK ASSEMBLY LH (See page SE-54)
36. INSTALL REAR SIDE SEATBACK ASSEMBLY RH
37. INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-54)
38. INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-54)
39. INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-55)
40. INSTALL REAR CENTER SEAT HEADREST ASSEMBLY
41. INSTALL REAR SEAT HEADREST ASSEMBLY
42. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-43)
43. INSTALL REAR DOOR SCUFF PLATE LH (See page IR-43)
44. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-43)
45. INSTALL REAR DOOR SCUFF PLATE RH (See page IR-43)
46. INSTALL FRONT SEAT ASSEMBLY LH (for Power Seat) (See page SE-38)
47. INSTALL INNER SEAT TRACK BRACKET COVER LH (for Power Seat) (See page SE-39)

48. **INSTALL SEAT TRACK COVER LH (for Power Seat) (See page SE-39)**
49. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**
50. **INSTALL FRONT SEAT ASSEMBLY RH (for Power Seat) (See page IR-44)**
51. **INSTALL INNER SEAT TRACK BRACKET COVER RH (for Power Seat) (See page IR-44)**
52. **INSTALL SEAT TRACK COVER RH (for Power Seat) (See page IR-44)**
53. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**
54. **INSTALL FRONT SEAT ASSEMBLY RH (for Manual Seat) (See page SE-23)**
55. **INSTALL INNER SEAT TRACK BRACKET COVER RH (for Manual Seat) (See page SE-24)**
56. **INSTALL SEAT TRACK COVER RH (for Manual Seat) (See page SE-24)**
57. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**
58. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (for Manual Seat)**
59. **PERFORM INITIALIZATION**
    (a) Perform initialization (See page IN-43).
    NOTICE:
    Some systems need initialization after reconnecting the cable to the negative battery terminal.
60. **INSPECT SRS WARNING LIGHT**
    (a) Inspect the SRS warning light (See page RS-33).
61. **INSPECT SLIDE ADJUSTER LOCK (for Manual Seat)**
62. **INSPECT FRONT SEAT ASSEMBLY (for Power Seat) (See page SE-39)**

DISPOSAL

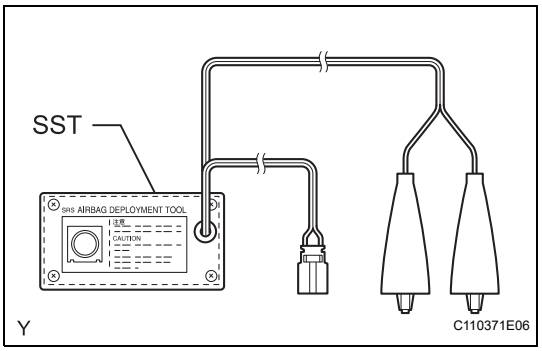
HINT:
When scrapping a vehicle equipped with the SRS or disposing of the curtain shield airbag assembly, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A., INC.

CAUTION:

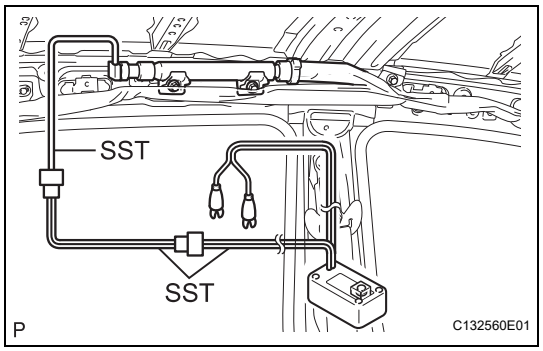
- **Never dispose of a curtain shield airbag assembly that has an undeployed airbag.**
- **The airbag produces an exploding sound when it is deployed, so perform the operation outdoors where it will not be a nuisance to nearby residents.**
- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.**
- **When deploying the airbag, perform the operation at least 10 m (33 ft) away from the curtain shield airbag assembly.**
- **The curtain shield airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a curtain shield airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a curtain shield airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

1. DISPOSE OF CURTAIN SHIELD AIRBAG ASSEMBLY (WHEN INSTALLED IN VEHICLE)

HINT:
Prepare a battery as the power source to deploy the airbag.



(a) Check the function of the SST (See page RS-348).
(b) Refer to PRECAUTION (See page RS-1).
(c) Disconnect the cable from the negative battery terminal.
CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
(d) Remove the roof headlining assembly (See page IR-12).
(e) Install the SST.
(1) Disconnect the connector from the curtain shield airbag assembly.
NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.

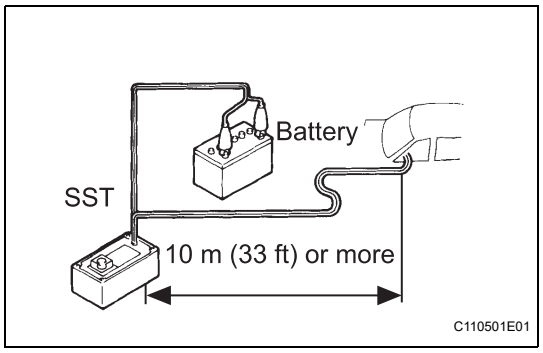


(2) After connecting the SST below to each other, connect them to the curtain shield airbag assembly.

SST 09082-00700, 09082-00802 (09082-10801, 09082-20801)

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



(3) Move the SST at least 10 m (33 ft) away from the vehicle rear side window.

(4) Maintaining enough clearance for the SST wire harness in the rear side window, close all doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(5) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the battery negative (-) terminal.

(f) Deploy the airbag.

(1) Check that no one is inside the vehicle or within a 10 m (33 ft) radius of the vehicle.

(2) Press the SST activation switch and deploy the airbag.

CAUTION:

- **When deploying the airbag, make sure that no one is near the vehicle.**
- **The curtain shield airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a curtain shield airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a curtain shield airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

HINT:

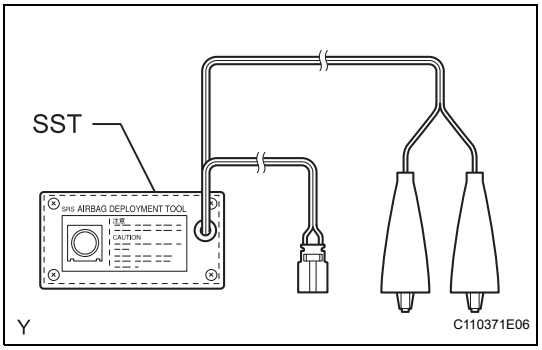
The airbag is deployed as the LED of the SST activation switch comes on.

2. DISPOSE OF CURTAIN SHIELD AIRBAG ASSEMBLY (WHEN NOT INSTALLED IN VEHICLE)

NOTICE:

- **When disposing of the curtain shield airbag assembly, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure detailed below when deploying the airbag.**

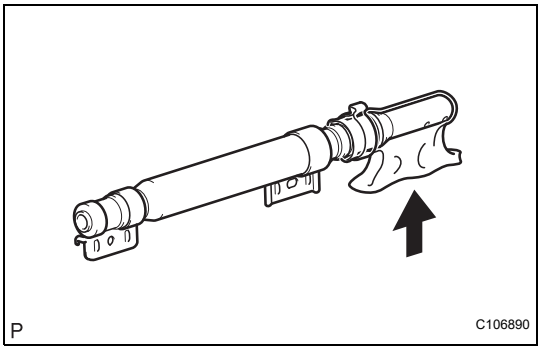
HINT:
Prepare a battery as the power source to deploy the airbag.



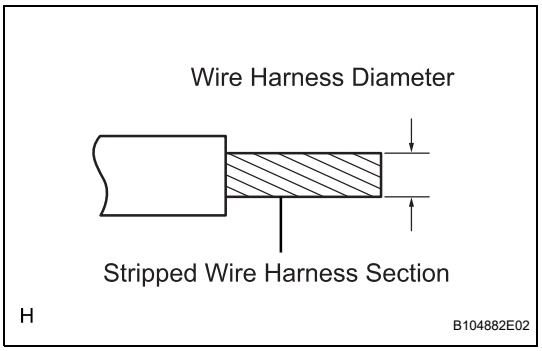
(a) Check the function of the SST (See page RS-350).

(b) Remove the curtain shield airbag assembly (See page RS-401).

CAUTION:
When removing the curtain shield airbag assembly, work must be started 90 seconds after the power switch is turned off and the negative (-) terminal cable is disconnected from the battery.



(c) Cut off the deployment section of the curtain shield airbag assembly.



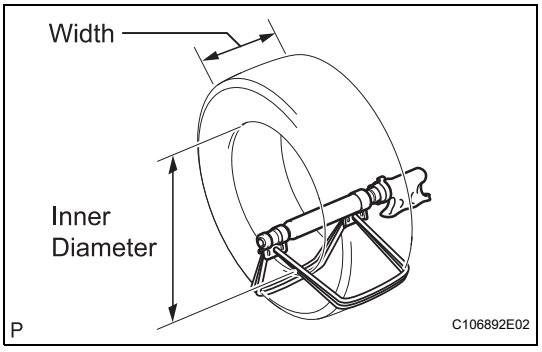
(d) Using a service-purpose wire harness for the vehicle, tie down the curtain shield airbag assembly to the tire.

Wire harness:
Stripped wire harness section
1.25 mm^2 or more (0.0019 $in.^2$ or more)

CAUTION:
If the wire harness is too thin or an alternative object is used to tie down the curtain shield airbag assembly, it may be snapped by the shock when the airbag is deployed. Always use a wire harness for vehicle use with an area of at least 1.25 mm^2 (0.0019 $in.^2$).

HINT:
To calculate the area of the stripped wire harness section:

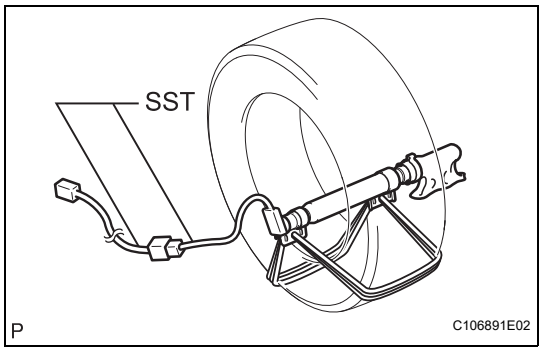
Area = 3.14 x $(Diameter)^2$ divided by 4



(1) Position the curtain shield airbag assembly inside the tire as shown in the illustration.

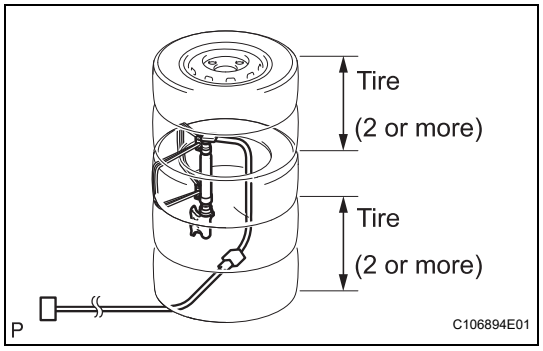
Tire size:
Must exceed the following dimensions
Width:
185 mm (7.28 in.)
Inner diameter:
360 mm (14.17 in.)

CAUTION:
Make sure that the wire harness is tight. If there is slack in the wire harness, the curtain shield airbag assembly may become loose due to the shock when the airbag is deployed.
NOTICE:
The tire will be marked by the airbag deployment, so use an extra tire.

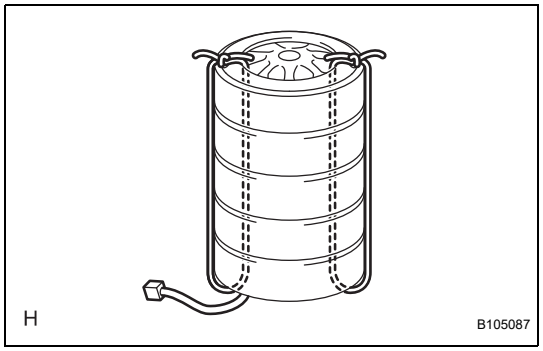


(e) Install the SST.
(1) After connecting the SST below to each other, connect them to the curtain shield airbag assembly.
SST 09082-00802 (09082-10801, 09082-20801)

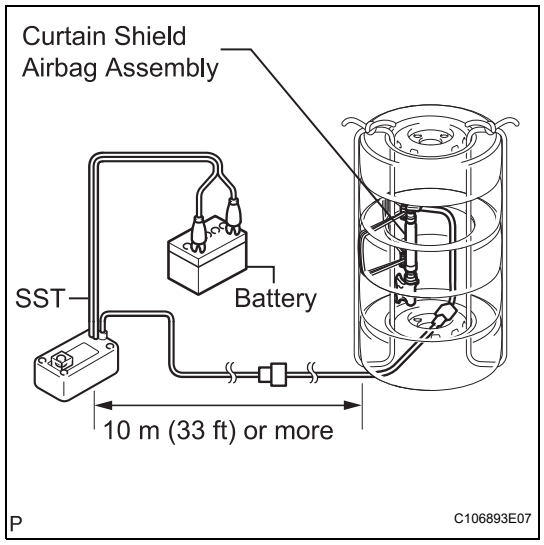
(f) Place the tires.
CAUTION:
Do not place the deployment direction of the curtain shield airbag assembly facing toward the ground.



(1) Place at least 2 tires under the tire which the curtain shield airbag assembly is tied to.
(2) Place at least 2 tires over the tire which the curtain shield airbag assembly is tied to. The top tire should have the disc wheel installed.
NOTICE:
Do not place the SST connector under the tire because it could be damaged.

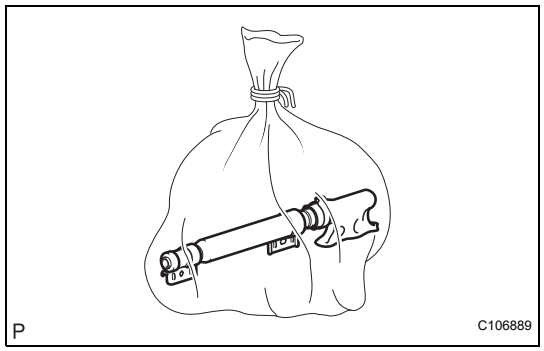


(3) Tie the tires together with 2 wire harnesses.
CAUTION:
Make sure that the wire harness is tight. Looseness in the wire harness results in the tires coming free due to the shock when the airbag is deployed.



(g) Install the SST.
  (1) Connect the SST connector.
  SST 09082-00700
  NOTICE:
  To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the tire.
  (2) Move the SST at least 10 m (33 ft) away from the airbag tied down to the tire.

(h) Deploy the airbag.
  (1) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the battery negative (-) terminal.
  (2) Check that no one is within a 10 m (33 ft) radius of the tire which the curtain shield airbag assembly is tied to.
  (3) Press the SST activation switch and deploy the airbag.
  CAUTION:
  When deploying the airbag, make sure that no one is near the tire.
  HINT:
  The airbag is deployed as the LED of the SST activation switch comes on.



(i) Dispose of the curtain shield airbag assembly.
CAUTION:
- **The curtain shield airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a curtain shield airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a curtain shield airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

  (1) Remove the curtain shield airbag assembly from the tire.
  (2) Place the curtain shield airbag assembly in a plastic bag, tie it tightly and dispose of it as other general part disposal.

ON-VEHICLE INSPECTION

1. **INSPECT CENTER AIRBAG SENSOR ASSEMBLY (VEHICLE NOT INVOLVED IN COLLISION)**
   (a) Perform a diagnostic system check (See page RS-33).

2. **INSPECT CENTER AIRBAG SENSOR ASSEMBLY (VEHICLE INVOLVED IN COLLISION AND AIRBAG HAS NOT DEPLOYED)**
   (a) Perform a diagnostic system check (See page RS-33).

3. **INSPECT CENTER AIRBAG SENSOR ASSEMBLY (VEHICLE INVOLVED IN COLLISION AND AIRBAG IS DEPLOYED)**
   (a) Replace the center airbag sensor assembly.
   CAUTION:
   Be sure to follow the correct removal and installation procedures.
   HINT:
   The center airbag sensor assembly should be replaced after any of the airbags has deployed, as it has been subjected to the impact.

REMOVAL

1. **PRECAUTION**
   CAUTION:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
3. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-14)**
4. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-14)**
5. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-14)**
6. **REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-15)**
7. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-15)**
8. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-13)**
9. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-14)**
10. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-11)**
11. **REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-15)**
12. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-15)**
13. **REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-13)**
14. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-14)**
15. **REMOVE CONSOLE BOX POCKET (See page IP-17)**
16. **REMOVE CONSOLE BOX CARPET (See page IP-17)**
17. **REMOVE CONSOLE BOX ASSEMBLY (See page IP-17)**
18. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-16)**
19. **REMOVE NO. 1 CONSOLE BOX INSERT FRONT (See page IP-18)**
20. **REMOVE NO. 2 CONSOLE BOX INSERT FRONT (See page IP-18)**

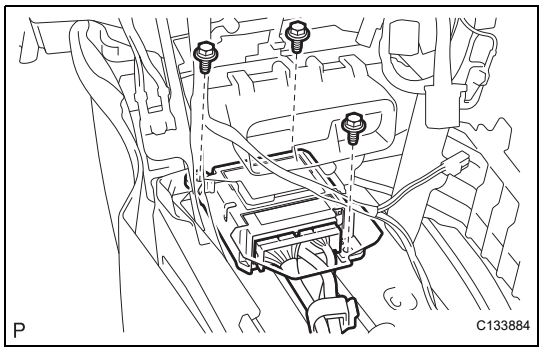
21. REMOVE NO. 1 CONSOLE BOX DUCT (See page AC-188)

22. REMOVE CENTER AIRBAG SENSOR ASSEMBLY

(a) Turn back the carpet.

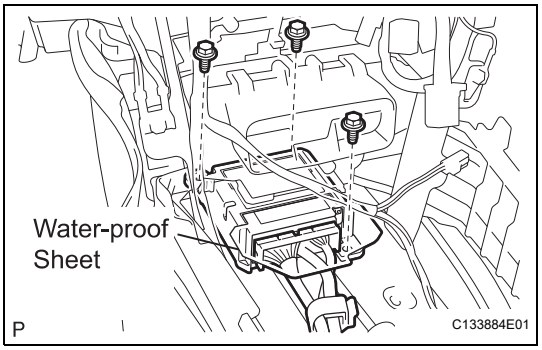
(b) Disconnect the holder (with connectors).
NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.

(c) Remove the 3 bolts and center airbag sensor assembly.



INSTALLATION

1. **INSTALL CENTER AIRBAG SENSOR ASSEMBLY**
   (a) Check that the power switch is turned off.
   (b) Check that the battery negative (-) cable is disconnected.
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.



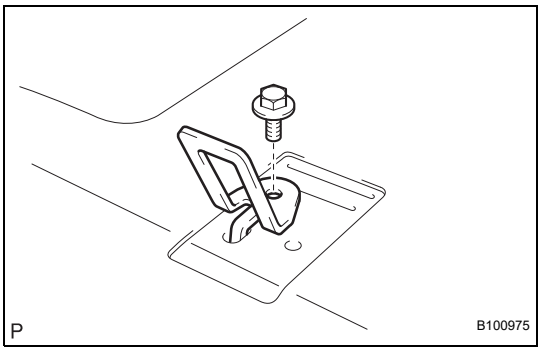
   (c) Install the center airbag sensor assembly with the 3 bolts.
   Torque: 17.5 N*m (179 kgf*cm, 13 ft.*lbf)
   NOTICE:
   - **If the center airbag sensor assembly has been dropped, or there are any cracks, dents or other defects in the case, bracket or connector, replace it with a new one.**
   - **When installing the center airbag sensor assembly, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**

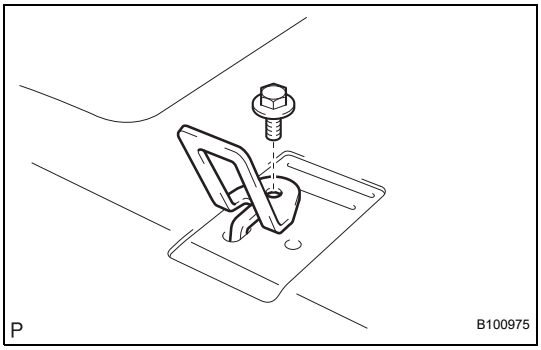
   (d) Check that there is no looseness in the installation parts of the center airbag sensor assembly.
   (e) Connect the holder (with connectors).
   NOTICE:
   When handling the airbag connector, take care not to damage the airbag wire harness.
   (f) Check that the water-proof sheet is properly set.
2. **INSTALL NO. 1 CONSOLE BOX DUCT (See page AC-204)**
3. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (See page IP-30)**
4. **INSTALL NO. 1 CONSOLE BOX INSERT FRONT (See page IP-29)**
5. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-31)**
6. **INSTALL CONSOLE BOX ASSEMBLY (See page IP-30)**
7. **INSTALL CONSOLE BOX CARPET (See page IP-30)**
8. **INSTALL CONSOLE BOX POCKET (See page IP-30)**
9. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-33)**
10. **INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-33)**
11. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-42)**
12. **INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-42)**

13. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-35)**
14. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-41)**
15. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-41)**
16. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-31)**
17. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-31)**
18. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-32)**
19. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-32)**
20. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-32)**
21. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
22. **PERFORM INITIALIZATION**
    (a) Perform initialization (See page IN-43).
    NOTICE:
    Some systems need initialization after reconnecting the cable to the negative battery terminal.
23. **INSPECT SRS WARNING LIGHT**
    (a) Inspect the SRS warning light (See page RS-33).

REMOVAL

1. REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-44)
2. REMOVE REAR SEAT HEADREST ASSEMBLY
3. REMOVE REAR CENTER SEAT HEADREST ASSEMBLY
4. REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-44)
5. REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-44)
6. REMOVE REAR SIDE SEATBACK ASSEMBLY LH (See page SE-45)
7. REMOVE REAR SIDE SEATBACK ASSEMBLY RH (See page SE-45)
8. REMOVE REAR DOOR SCUFF PLATE LH (See page IR-13)
9. DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH
10. REMOVE REAR DOOR SCUFF PLATE RH (See page IR-13)
11. DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH
12. REMOVE CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH (See page SB-51)
13. DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (See page SB-33)
14. REMOVE ROOF SIDE INNER GARNISH LH (See page IR-15)
15. REMOVE ROOF SIDE INNER GARNISH RH (See page IR-15)
16. DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-40)
17. DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-41)
18. REMOVE REAR SEAT SHOULDER BELT COVER (See page SB-33)
19. REMOVE REAR SEAT SHOULDER BELT HOLE COVER (See page SB-33)
20. REMOVE PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-33)





21. **REMOVE CHILD RESTRAINT SEAT TETHER ANCHOR BRACKET**
    (a) Remove the 3 bolts and the 3 child restraint seat tether anchor brackets.

INSTALLATION

1. **INSTALL CHILD RESTRAINT SEAT TETHER ANCHOR BRACKET**
    (a) Install the 3 child restraint seat tether anchor brackets with the 3 bolts.
    Torque: 21 N*m (214 kgf*cm, 16 ft.*lbf)
2. **INSTALL PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-34)**
3. **INSTALL REAR SEAT SHOULDER BELT HOLE COVER (See page SB-35)**
4. **INSTALL REAR SEAT SHOULDER BELT COVER (See page SB-35)**
5. **CONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-42)**
6. **CONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-42)**
7. **INSTALL ROOF SIDE INNER GARNISH LH (See page IR-39)**
8. **INSTALL ROOF SIDE INNER GARNISH RH (See page IR-39)**
9. **CONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (See page SB-35)**
10. **INSTALL CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH (See page SB-51)**
11. **CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-43)**
12. **INSTALL REAR DOOR SCUFF PLATE LH (See page IR-43)**
13. **CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-43)**
14. **INSTALL REAR DOOR SCUFF PLATE RH (See page IR-43)**
15. **INSTALL REAR SIDE SEATBACK ASSEMBLY LH (See page SE-54)**

16. **INSTALL REAR SIDE SEATBACK ASSEMBLY RH**
    HINT:
    Use the same procedure for the RH side and the LH side.
17. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-54)**
18. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-54)**
19. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**
20. **INSTALL REAR SEAT HEADREST ASSEMBLY**
21. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-55)**

DTC	B278A	Short to GND in Immobiliser System Power Source Circuit

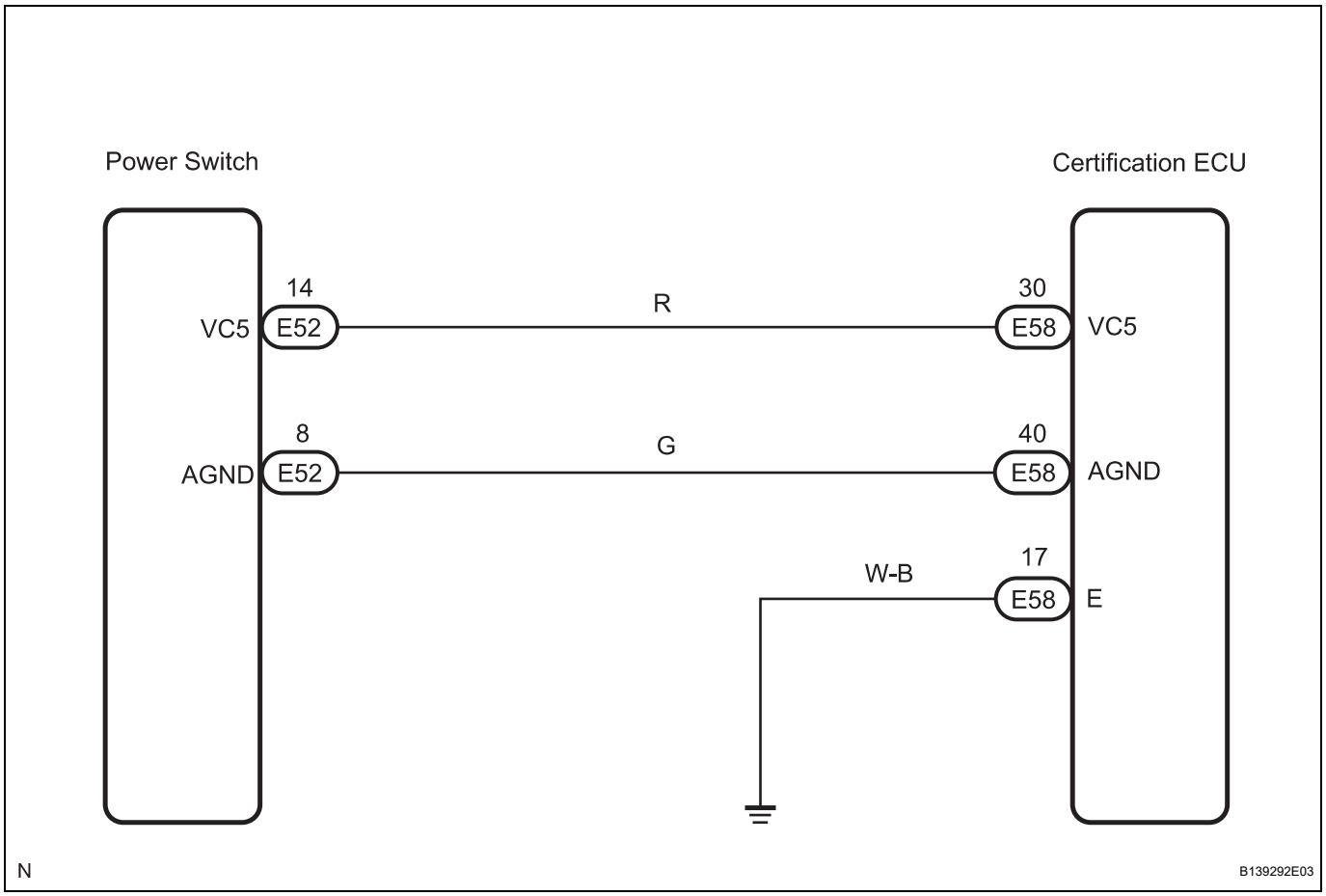
DESCRIPTION

This DTC is output when the power switch power source supply line is open or shorted.

DTC No.	DTC Detection Condition	Trouble Area
B278A	Power switch power source supply line is open or shorted	• Wire harness • Power switch • Certification ECU

EI

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

If the certification ECU is replaced, register the key and ECU communication ID (See page EI-9).

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-25).

(b) Recheck for DTCs (See page EI-25).

Result

Result	Proceed to
B278A output recurs	A
B278A output does not recur	B

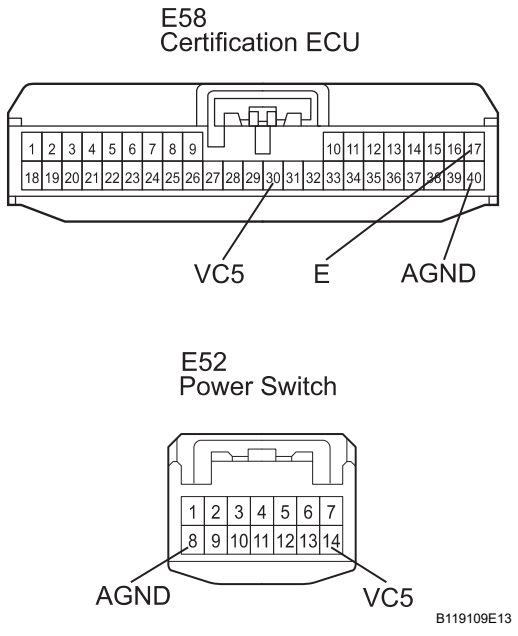
B → USE SIMULATION METHOD TO CHECK

A

2 CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - POWER SWITCH)

EI

Wire Harness Side Connector Front View:



(a) Disconnect the E58 ECU and E52 switch connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

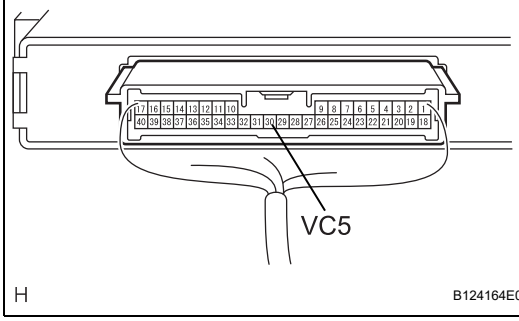
Tester Connection	Specified Condition
E58-30 (VC5) - E52-14 (VC5)	Below 1 Ω
E58-40 (AGND) - E52-8 (AGND)	
E58-30 (VC5) - Body ground	10 kΩ or higher
E58-40 (AGND) - Body ground	

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 CHECK HARNESS AND CONNECTOR (POWER SWITCH POWER SOURCE)

Wire Harness Side Connector Rear View:



(a) Reconnect the E58 ECU and E52 switch connectors.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

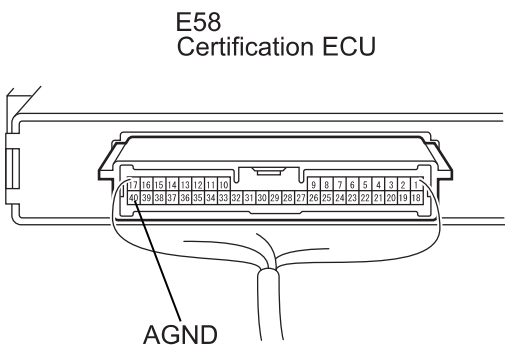
Tester Connection	Condition	Specified Condition
E58-30 (VC5) - Body ground	Key is not in cabin	Below 1 V
	Power switch pressed	4.6 to 5.4 V

NG → REPLACE CERTIFICATION ECU

OK

4	CHECK HARNESS AND CONNECTOR (POWER SWITCH BODY GROUND)

Wire Harness Side Connector Rear View:



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E58-40 (AGND) - Body ground	Below 1 Ω

EI

NG → **REPLACE CERTIFICATION ECU**

OK

REPLACE POWER SWITCH (See page ST-126)

DTC	B2790	ID BOX EEPROM Malfunction

DESCRIPTION

This DTC is output when the ID code box detects an internal malfunction.

DTC No.	DTC Detection Condition	Trouble Area
B2790	ID code box detects internal malfunction	ID code box

EI

INSPECTION PROCEDURE

NOTICE:

If the ID code box is replaced, register the key and ECU communication ID (See page EI-9).

1	REPLACE ID CODE BOX

NEXT

END

DTC	B2791	Communication Condition Failure between ECM

DESCRIPTION

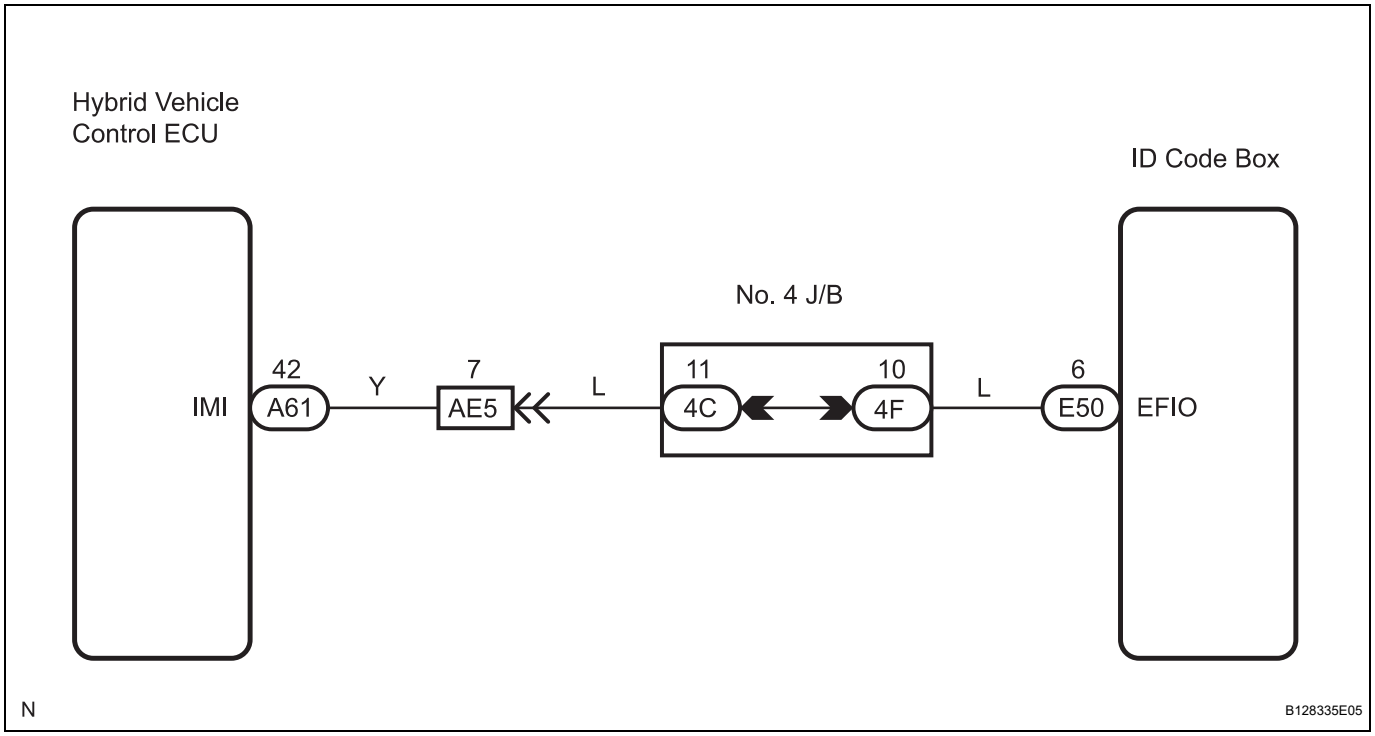
This DTC is output when the ID code box does not respond to a verification request signal from the hybrid vehicle control ECU.

HINT:

- If the power switch is turned off immediately after the hybrid control system starts, DTC B2791 will be detected. If DTC B2791 is cleared, this DTC will not recur because it does not indicate a malfunction.
- If this DTC B2791 is detected simultaneously with DTC B2799-542 or B2799-790, troubleshoot DTC B2799-542 or B2799-790 first.

DTC No.	DTC Detection Condition	Trouble Area
B2791	ID code box does not respond to a verification request signal from hybrid vehicle control ECU	-

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

If the engine can be started even when DTC B2791 is output, the ID code box can be considered normal. Be sure to recheck for DTCs after clearing the DTCs (See page EI-9).

1	CHECK HYBRID CONTROL SYSTEM

(a) Delete the DTCs (See page EI-25).

(b) Check that the hybrid control system starts.

Result

Result	Proceed to
Hybrid control system does not start	A

Result	Proceed to
Hybrid control system starts	B

HINT:
Perform this step when the is turned off immediately after the hybrid control system starts.

B → END

EI

A

2 CHECK DTC OUTPUT

(a) Recheck for DTCs (See page EI-25).
Result

Result	Proceed to
B2791 and other DTC output	A
No DTC output	B

HINT:
If the hybrid control system does not start, DTC B2791 will not be detected separately from other DTCs because DTC B2791 will be output together with other DTCs. Troubleshoot DTCs other than DTC B2791.

B → **GO TO SMART KEY SYSTEM (See page ST-10)**

A

REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

DTC	B2799-542	Engine Immobiliser System Malfunction

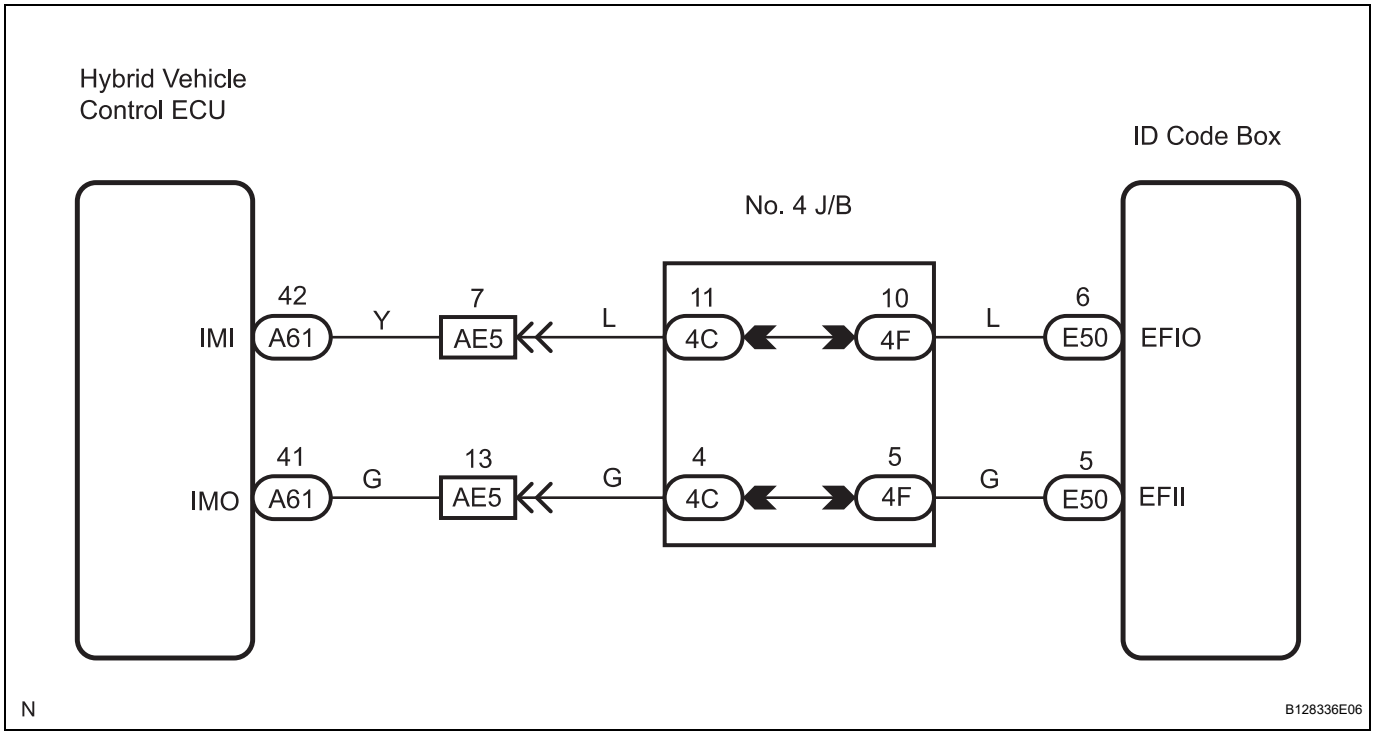
DTC	B2799-790	Engine Immobiliser System Malfunction

DESCRIPTION

This DTC is output when one of the following occurs: 1) the hybrid vehicle control ECU detects errors in its own communications with the ID code box; 2) the hybrid vehicle control ECU detects errors in the communication lines; or 3) the ECU communication ID between the ID code box and hybrid vehicle control ECU is different and an hybrid control system start is attempted. Before troubleshooting for this DTC, make sure no certification ECU DTCs are present. If present, troubleshoot the certification ECU DTCs first.

DTC No.	DTC Detection Condition	Trouble Area
B2799 - 542 E2799 - 790	One of following conditions is met: • Error in communication between hybrid vehicle control ECU and ID code box • Error in communication lines • Communication ID is different between ID code box and hybrid vehicle control ECU during communication	• Wire harness • Hybrid vehicle control ECU • ID code box

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- **If the ID code box is replaced, register the key and ECU communication ID (See page EI-9).**
- **If the hybrid vehicle control ECU is replaced, register the ECU communication ID (See page EI-9).**

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-25).
(b) Recheck for DTCs (See page EI-25).
Result

Result	Proceed to
B2799 output recurs	A
B2799 output does not recur	B

B → USE SIMULATION METHOD TO CHECK

A

2	RE-REGISTER ECU COMMUNICATION ID

(a) Re-register the ECU communication ID (See page EI-9) between the ID code box and hybrid vehicle control ECU.

NEXT

3	CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-25).
(b) Recheck for DTCs (See page EI-25).
Result

Result	Proceed to
B2799 output recurs	A
B2799 output does not recur	B

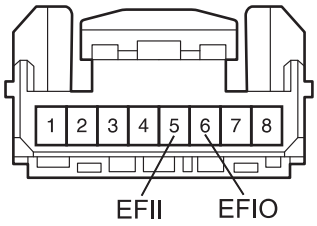
B → END

A

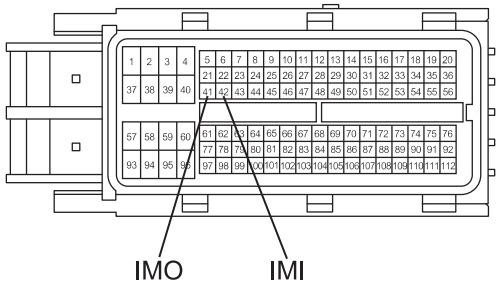
4	CHECK HARNESS AND CONNECTOR (ID CODE BOX - HYBRID VEHICLE CONTROL ECU)

Wire Harness Side Connector Front View:

E50
ID Code Box



A61
Hybrid Vehicle Control ECU



B139364E01

(a) Disconnect the E50 ID code box and A61 hybrid vehicle control ECU connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E50-5 (EFII) - A61-41 (IMO)	Below 1 Ω
E50-6 (EFIO) - A61-42 (IMI)	
E50-5 (EFII) - Body ground	10 kΩ or higher
E50-6 (EFIO) - Body ground	

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

5	REPLACE HYBRID VEHICLE CONTROL ECU

(a) Replace the hybrid vehicle control ECU (See page HV-570).

NEXT

6	REGISTER ECU COMMUNICATION ID

(a) Register the ECU communication ID between the ID code box and hybrid vehicle control ECU (See page EI-9).

NEXT

7	CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-25).
(b) Recheck for DTCs (See page EI-25).

Result

Result	Proceed to
B2799 output recurs	A
B2799 output does not recur	B

B → END

EI

A

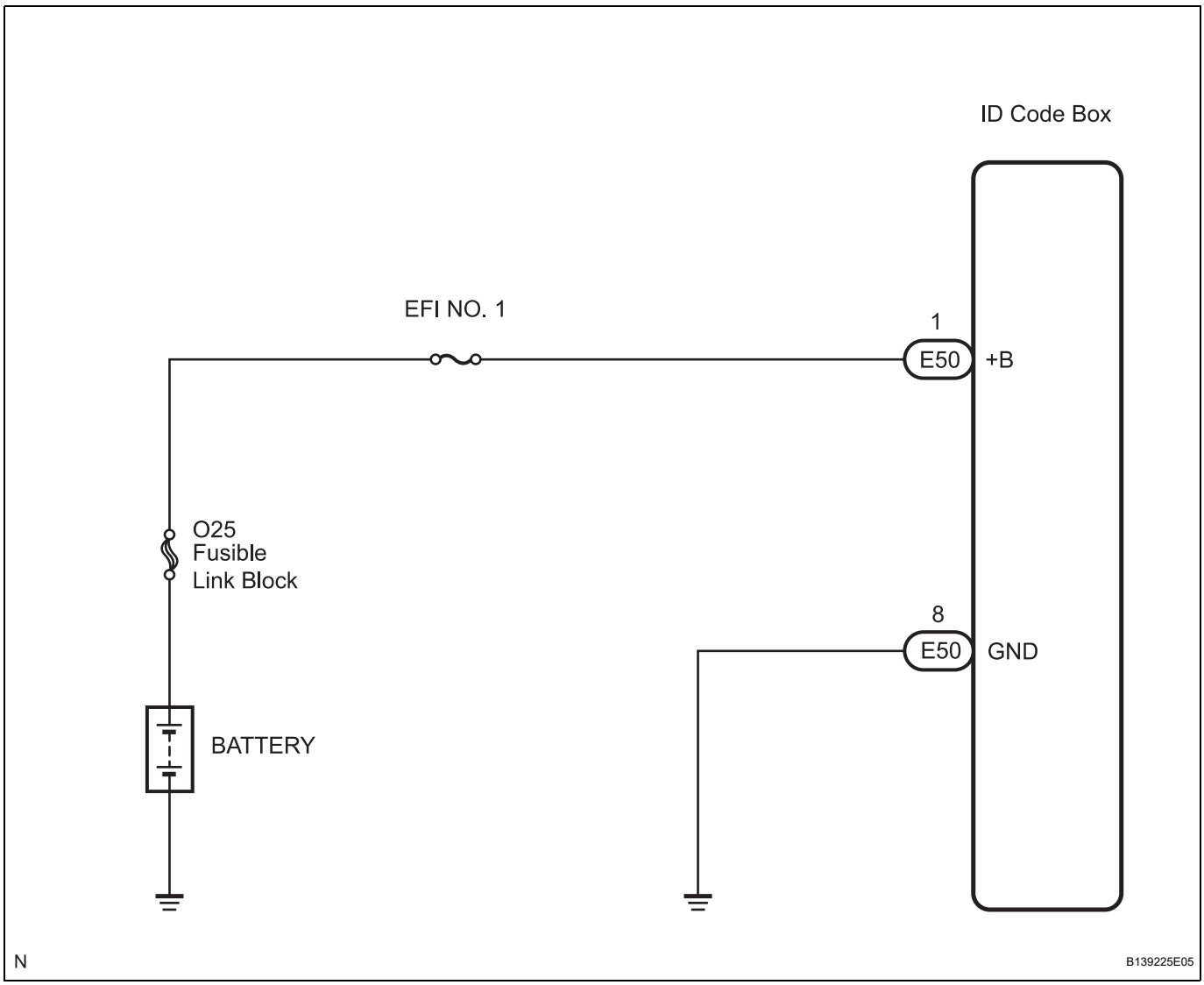
REPLACE ID CODE BOX

ID Code Box Power Source Circuit

DESCRIPTION

This circuit provides power to operate the ID code box.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

If the ID code box is replaced, register the key and ECU communication ID (See page EI-9).

1	**INSPECT FUSE (EFI NO. 1)**

(a) Remove the EFI No. 1 fuse from the No. 1 engine room R/B.

(b) Measure the resistance of the fuse.

Standard resistance:

Below 1 Ω

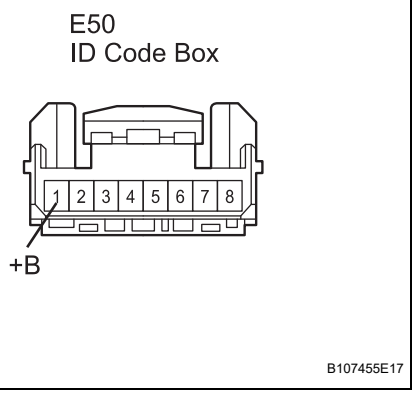
NG → REPLACE FUSE

OK

2 CHECK HARNESS AND CONNECTOR (ID CODE BOX - BATTERY)

EI

Wire Harness Side Connector Front View:



(a) Disconnect the E50 ID code box connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

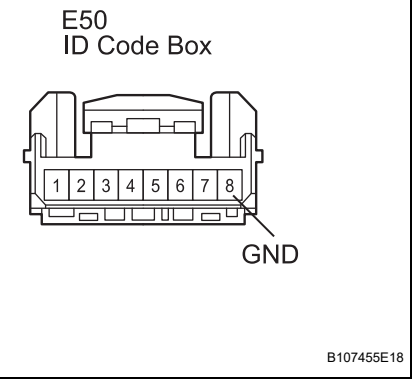
Tester Connection	Specified Condition
E50-1 (+B) - Body ground	10 to 14 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 CHECK HARNESS AND CONNECTOR (ID CODE BOX - BODY GROUND)

Wire Harness Side Connector Front View:



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E50-8 (GND) - Body ground	Below 1 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

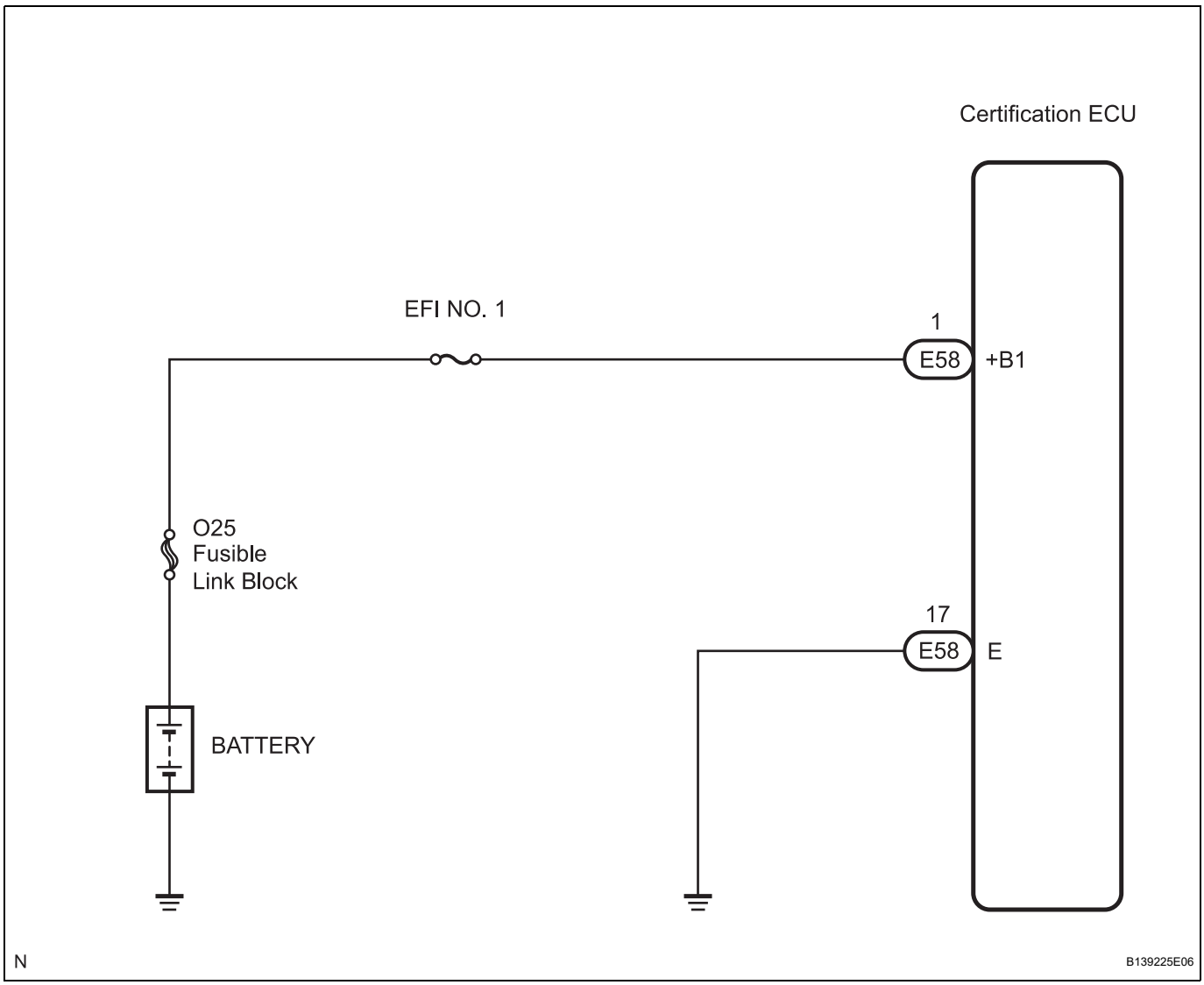
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page EI-16)

Certification ECU Power Source Circuit

DESCRIPTION

This circuit provides power to operate the certification ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

If the certification ECU is replaced, register the key and ECU communication ID (See page EI-9).

1	**INSPECT FUSE (EFI NO. 1)**

(a) Remove the EFI No. 1 fuse from the No. 1 engine room R/B.

(b) Measure the resistance of the fuse.

Standard resistance:

Below 1 Ω

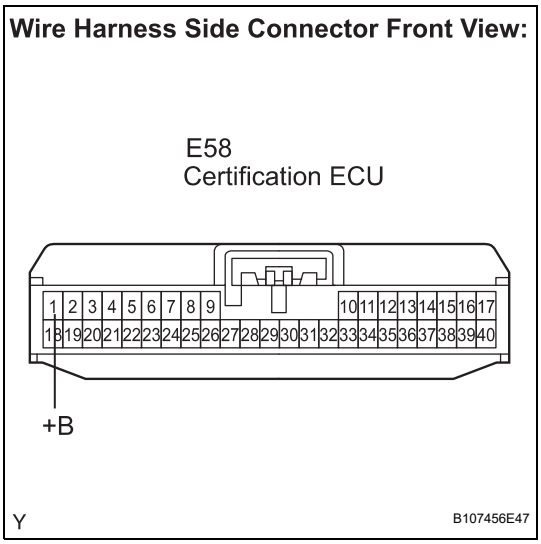
NG → REPLACE FUSE

OK

2 CHECK WIRE HARNESS (CERTIFICATION ECU - BATTERY)

EI

Wire Harness Side Connector Front View:



(a) Disconnect the E58 ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

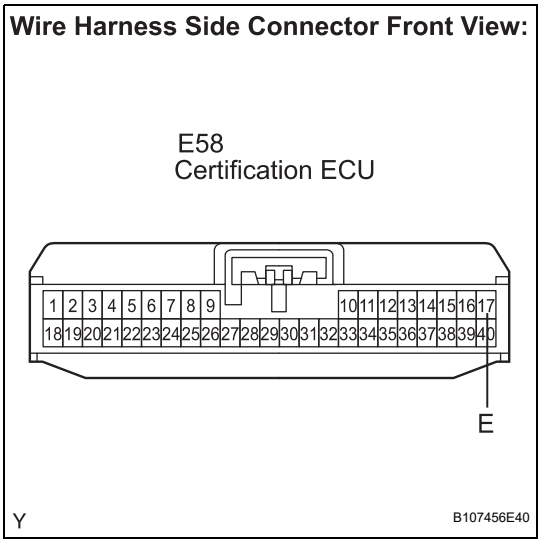
Tester Connection	Specified Condition
E58-1 (+B) - Body ground	10 to 14 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - BODY GROUND)

Wire Harness Side Connector Front View:



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E58-17 (E) - Body ground	Below 1 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

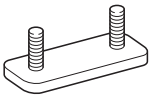
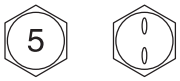
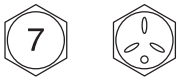
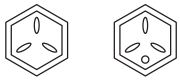
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page EI-16)

STANDARD BOLT

HOW TO DETERMINE BOLT STRENGTH

Bolt Type

Hexagon Head Bolt			Stud Bolt	Weld Bolt	Class
Normal Recess Bolt		Deep Recess Bolt			
	No Mark	No Mark	No Mark		4T
					5T
	w/ Washer	w/ Washer			6T
					7T
					8T
					9T
					10T
					11T

SS

SPECIFIED TORQUE FOR STANDARD BOLTS

Class	Diameter (mm)	Pitch (mm)	Specified torque					
			Hexagon head bolt			Hexagon flange bolt		
			N*m	kgf*cm	ft.*lbf	N*m	kgf*cm	ft.*lbf
4T	6	1	5	55	48 in.*lbf	6	60	52 in.*lbf
	8	1.25	12.5	130	9	14	145	10
	10	1.25	26	260	19	29	290	21
	12	1.25	47	480	35	53	540	39
	14	1.5	74	760	55	84	850	61
	16	1.5	115	1,150	83	-	-	-
5T	6	1	6.5	65	56 in.*lbf	7.5	75	65 in.*lbf
	8	1.25	15.5	160	12	17.5	175	13
	10	1.25	32	330	24	36	360	26
	12	1.25	59	600	43	65	670	48
	14	1.5	91	930	67	100	1,050	76
	16	1.5	140	1,400	101	-	-	-
6T	6	1	8	80	69 in.*lbf	9	90	78 in.*lbf
	8	1.25	19	195	14	21	210	15
	10	1.25	39	400	29	44	440	32
	12	1.25	71	730	53	80	810	59
	14	1.5	110	1,100	80	125	1,250	90
	16	1.5	170	1,750	127	-	-	-
7T	6	1	10.5	110	8	12	120	9
	8	1.25	25	260	19	28	290	21
	10	1.25	52	530	38	58	590	43
	12	1.25	95	970	70	105	1,050	76
	14	1.5	145	1,500	108	165	1,700	123
	16	1.5	230	2,300	166	-	-	-
8T	8	1.25	29	300	22	33	330	24
	10	1.25	61	620	45	68	690	50
	12	1.25	110	1,100	80	120	1,250	90
9T	8	1.25	34	340	25	37	380	27
	10	1.25	70	710	51	78	790	57
	12	1.25	125	1,300	94	140	1,450	105
10T	8	1.25	38	390	28	42	430	31
	10	1.25	78	800	58	88	890	64
	12	1.25	140	1,450	105	155	1,600	116
11T	8	1.25	42	430	31	47	480	35
	10	1.25	87	890	64	97	990	72
	12	1.25	155	1,600	116	175	1,800	130

2AZ-FXE ENGINE CONTROL SYSTEM

SERVICE DATA

Camshaft timing oil control valve assembly		
Standard resistance	at 20°C (68°F)	6.9 to 7.9 Ω
Camshaft position sensor		
Standard resistance	1 (G+) - 2(G-)	835 to 1,400 Ω at Cold
	1 (G+) - 2(G-)	1,060 to 1,645 Ω at Hot
Crankshaft position sensor		
Standard resistance	Cold	985 to 1,600 Ω
	Hot	1,265 to 1,890 Ω
Throttle body assembly		
Standard resistance	at 20°C (68°F)	
	2 (M+) - 1 (M-)	0.3 to 100 Ω
E.F.I. engine coolant temperature sensor		
Standard resistance	Approx. 20°C (68°F)	2.32 to 2.59 kΩ
	Approx. 80°C (176°F)	0.310 to 0.326 kΩ
Knock sensor		
Standard resistance	at 20°C (68°F)	120 to 280 kΩ
Circuit opening relay (engine room R/B Unit D)		
Specified condition	1E-8 - 1E-12	Below 1 Ω
	1E-7 - 1E-13	10 kΩ or higher
	1E-7 - 1E-13	Below 1 Ω (when battery voltage is applied to terminals 1G-5 and 1H-9)
EFI relay (engine room R/B Unit D)		
Specified condition	1E-9 - 1E-10	Below 1 Ω
	1E-7 - 1E-12	10 kΩ or higher
	1E-7 - 1E-12	Below 1 Ω (when battery voltage is applied to terminals 1H-10 and 1H-2)

TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Throttle body assembly x Intake manifold		30	305	22
Knock sensor x Cylinder block sub-assembly		20	204	15
Accelerator pedal rod assembly x Body		5.4	55	48 in.*lbf
Camshaft timing oil control valve assembly x Cylinder head sub-assembly		9.0	92	80 in.*lbf
Camshaft position sensor x Cylinder head sub-assembly		9.0	92	80 in.*lbf
Crankshaft position sensor x Timing chain cover sub-assembly		9.0	92	80 in.*lbf
Engine coolant temperature sensor x Cylinder head sub-assembly		20	204	15
Intake manifold x Cylinder head sub-assembly		30	306	22
Cowl top panel outer sub-assembly x Body	Nut	5.0	51	44 in.*lbf
	Bolt	85	867	63

2AZ-FXE ENGINE MECHANICAL

SERVICE DATA

Ignition timing	with Terminals TC and CG of DLC3 connected	8 to 12°BTC at idle (Transmission in neutral)
	with Terminals TC and CG of DLC3 disconnected	5 to 15°BTC at idle (Transmission in neutral)
Idle speed		950 to 1,050 rpm (Transmission in neutral)
Compression	Compression pressure	1.360 MPa (13.9 kgf/cm^2, 198 psi)
	Minimum pressure	0.98 MPa (10 kgf/cm^2, 142 psi)
	Difference between each cylinder	100 kPa (1.0 kgf/cm^2, 14 psi)
Valve clearance (cold)	Intake	0.19 to 0.29 mm (0.0075 to 0.0114 in.)
	Exhaust	0.38 to 0.48 mm (0.0150 to 0.0189 in.)
Balanceshaft		
Standard thrust clearance		0.050 to 0.090 mm (0.0020 to 0.0035 in.)
Maximum thrust clearance		0.09 mm (0.0035 in.)
Standard oil clearance		0.004 to 0.049 mm (0.0002 to 0.0019 in.)
Maximum oil clearance		0.049 mm (0.0019 in.)
Housing journal bore diameter	Mark 1	26.000 to 26.006 mm (1.0236 to 1.0239 in.)
	Mark 2	26.007 to 26.012 mm (1.0239 to 1.0241 in.)
	Mark 3	26.013 to 26.018 mm (1.0241 to 1.0243 in.)
Journal diameter	Mark 1	22.985 to 23.000 mm (0.9049 to 0.9055 in.)
	Mark 2	22.985 to 23.000 mm (0.9049 to 0.9055 in.)
	Mark 3	22.985 to 23.000 mm (0.9049 to 0.9055 in.)
	Standard bolt length	58.3 to 59.7 mm (2.295 to 2.350 in.)
	Maximum bolt length	60.3 mm (2.374 in.)
Bearing center wall thickness	Mark 1	1.486 to 1.489 mm (0.0585 to 0.0586 in.)
	Mark 2	1.490 to 1.492 mm (0.0586 to 0.0587 in.)
	Mark 3	1.493 to 1.495 mm (0.0587 to 0.0589 in.)
Oil pump drive sprocket	Minimum sprocket diameter (with chain)	48.2 mm (1.898 in.)
Oil pump drive shaft sprocket	Minimum sprocket diameter (with chain)	48.2 mm (1.898 in.)
Crankshaft timing sprocket	Minimum sprocket diameter (with chain)	51.6 mm (2.031 in.)
Chain tensioner slipper	Maximum wear	1.0 mm (0.039 in.)
Chain vibration damper No. 1	Maximum wear	1.0 mm (0.039 in.)
Chain tensioner plate	Maximum wear	0.5 mm (0.020 in.)
Cylinder head set bolt	Standard bolt length	141.3 to 142.7 mm (5.563 to 5.618 in.)
	Maximum bolt length	144.2 mm (5.677 in.)
Chain sub-assembly	Maximum chain elongation	114.5 mm (4.508 in.)
No. 2 Chain sub-assembly	Maximum chain elongation	102.2 mm (4.024 in.)
Camshaft timing gear assembly	Minimum gear or sprocket diameter (with chain)	97.3 mm (3.831 in.)
Camshaft timing sprocket	Minimum gear or sprocket diameter (with chain)	97.3 mm (3.831 in.)
Camshaft (Intake)		
Maximum circle runout		0.03 mm (0.0012 in.)
Standard cam lobe height		44.516 to 44.616 mm (1.7526 to 1.7565 in.)
Maximum cam lobe height		44.406 mm (1.7483 in.)
No. 1 journal diameter		35.971 to 35.985 mm (1.4162 to 1.4167 in.)
Outer journal diameter		22.959 to 22.975 mm (0.9039 to 0.9045 in.)

Standard thrust clearance	Intake	0.040 to 0.095 mm (0.0016 to 0.0037 in.)
Maximum thrust clearance		0.110 mm (0.0043 in.)
Standard oil clearance	No. 1 journal bearing mark 1	0.007 to 0.038 mm (0.0003 to 0.0015 in.)
	No. 1 journal bearing mark 2	0.008 to 0.038 mm (0.0003 to 0.0015 in.)
	No. 1 journal bearing mark 3	0.008 to 0.038 mm (0.0003 to 0.0015 in.)
	Other journals	0.025 to 0.062 mm (0.0010 to 0.0024 in.)
Maximum oil clearance		0.070 mm (0.0028 in.)
Cylinder head journal bore diameter	Mark 1	40.000 to 40.008 mm (1.5748 to 1.5752 in.)
	Mark 2	40.009 to 40.017 mm (1.5752 to 1.5755 in.)
	Mark 3	40.018 to 40.025 mm (1.5755 to 1.5758 in.)
Standard bearing center wall thickness	Mark 1	2.000 to 2.004 mm (0.0787 to 0.0789 in.)
	Mark 2	2.005 to 2.008 mm (0.0789 to 0.0791 in.)
	Mark 3	2.009 to 2.012 mm (0.0791 to 0.0792 in.)
Camshaft journal diameter	Mark 1	35.971 to 35.985 mm (1.4162 to 1.4167 in.)
	Mark 2	35.971 to 35.985 mm (1.4162 to 1.4167 in.)
	Mark 3	35.971 to 35.985 mm (1.4162 to 1.4167 in.)
Camshaft No. 2 (Exhaust)		
Maximum circle runout		0.03 mm (0.0012 in.)
Standard cam lobe height		45.983 to 46.083 mm (1.8104 to 1.8143 in.)
Minimum cam lobe height		45.873 mm (1.8060 in.)
No. 1 journal diameter		35.971 to 35.985 mm (1.4162 to 1.4167 in.)
Other journal diameter		22.959 to 22.975 mm (0.9039 to 0.9045 in.)
Standard thrust clearance	Exhaust	0.080 to 0.135 mm (0.0032 to 0.0053 in.)
Maximum thrust clearance		0.150 mm (0.0059 in.)
Standard oil clearance	No. 1 journal	0.015 to 0.054 mm (0.0006 to 0.0021 in.)
	Other journals	0.025 to 0.062 mm (0.0010 to 0.0024 in.)
Maximum oil clearance		0.100 mm (0.0039 in.)
Cylinder head journal bore diameter	Mark 1	40.000 to 40.008 mm (1.5748 to 1.5752 in.)
	Mark 2	40.009 to 40.017 mm (1.5752 to 1.5755 in.)
	Mark 3	40.018 to 40.025 mm (1.5755 to 1.5758 in.)
Standard bearing center wall thickness	Mark 1	2.000 to 2.004 mm (0.00787 to 0.0789 in.)
	Mark 2	2.005 to 2.008 mm (0.0789 to 0.0791 in.)
	Mark 3	2.009 to 2.012 mm (0.0791 to 0.0792 in.)
Camshaft journal diameter	Mark 1	35.971 to 35.985 mm (1.4162 to 1.4167 in.)
	Mark 2	35.971 to 35.985 mm (1.4162 to 1.4167 in.)
	Mark 3	35.971 to 35.985 mm (1.4162 to 1.4167 in.)
Intake manifold	Maximum warpage	0.20 mm (0.0079 in.)
Exhaust manifold	Maximum warpage	0.70 mm (0.0276 in.)
Cylinder head		
Maximum warpage	Cylinder block side	0.05 mm (0.0020 in.)
	Intake manifold side	0.08 mm (0.0031 in.)
	Exhaust manifold side	0.08 mm (0.0031 in.)
Inner compression spring	Free length	47.43 mm (1.867 in.)
	Maximum deviation	1.6 mm (0.063 in.)
Intake valve	Standard overall length	101.71 mm (4.0043 in.)
	Minimum overall length	101.21 mm (3.9846 in.)
	Valve stem diameter	5.470 to 5.485 mm (0.2154 to 0.2159 in.)
	Standard margin thickness	1.05 to 1.45 mm (0.0413 to 0.0571 in.)
	Minimum margin thickness	0.50 mm (0.0197 in.)

Exhaust valve	Standard overall length	101.15 mm (3.9823 in.)
	Minimum overall length	100.70 mm (3.9646 in.)
	Valve stem diameter	5.465 to 5.480 mm (0.2152 to 0.2157 in.)
	Standard margin thickness	1.20 to 1.60 mm (0.0472 to 0.0630 in.)
	Minimum margin thickness	0.50 mm (0.0197 in.)
Intake valve guide bush	Bush inside diameter	5.510 to 5.530 mm (0.2169 to 0.2177 in.)
	Standard bush oil clearance	0.025 to 0.060 mm (0.0010 to 0.0024 in.)
	Minimum bush oil clearance	0.080 mm (0.0031 in.)
Bush bore diameter	Use STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
	Use O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)
Protrusion height		9.6 to 10.0 mm (0.3779 to 0.3937 in.)
Standard oil clearance		0.025 to 0.060 mm (0.0010 to 0.0024 in.)
Exhaust valve guide bush	Bush inside diameter	5.510 to 5.530 mm (0.2169 to 0.2177 in.)
	Standard oil clearance	0.030 to 0.065 mm (0.0012 to 0.0026 in.)
	Minimum oil clearance	0.100 mm (0.0039 in.)
Bush bore diameter	Use STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
	Use O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)
Protrusion height		9.6 to 10.0 mm (0.3779 to 0.3937 in.)
Standard oil clearance		0.030 to 0.065 mm (0.0012 to 0.0026 in.)
Valve lifter	Lifter diameter	30.966 to 30.976 mm (1.2191 to 1.2195 in.)
	Lifter bore diameter	31.009 to 31.025 mm (1.2208 to 1.2215 in.)
	Standard oil clearance	0.033 to 0.059 mm (0.0013 to 0.0023 in.)
	Maximum oil clearance	0.070 mm (0.0028 in.)
Connecting rod		
Standard thrust clearance		0.160 to 0.362 mm (0.0063 to 0.0143 in.)
Maximum thrust clearance		0.362 mm (0.0143 in.)
Standard oil clearance		0.032 to 0.063 mm (0.0013 to 0.0025 in.)
Maximum oil clearance		0.063 mm (0.0025 in.)
Connecting rod bearing center wall thickness (Reference)	Mark 1	1.485 to 1.488 mm (0.0585 to 0.0586 in.)
	Mark 2	1.489 to 1.491 mm (0.0586 to 0.0587 in.)
	Mark 3	1.492 to 1.494 mm (0.0587 to 0.0588 in.)
Connecting rod small end bore diameter		22.005 to 22.014 mm (0.8663 to 0.8667 in.)
Connecting rod small end bore diameter (Reference)	Mark A	22.005 to 22.008 mm (0.8663 to 0.8665 in.)
	Mark B	22.009 to 22.011 mm (0.8665 to 0.8666 in.)
	Mark C	22.012 to 22.014 mm (0.8666 to 0.8667 in.)
Standard oil clearance		0.005 to 0.011 mm (0.0002 to 0.0004 in.)
Maximum oil clearance		0.011 mm (0.0004 in.)
Maximum rod out-of alignment per 100 mm (3.94 in.)		0.05 mm (0.0020 in.)
Maximum rod twist per 100 mm (3.94 in.)		0.15 mm (0.0059 in.)
Cylinder block	Maximum warpage	0.05 mm (0.0020 in.)
	Standard cylinder bore diameter	88.500 to 88.513 mm (3.4843 to 3.4847 in.)
	Maximum cylinder bore diameter	88.633 mm (3.4894 in.)
Piston		
Standard piston diameter		88.469 to 88.479 mm (3.4830 to 3.4834 in.)
Standard piston oil clearance		0.021 to 0.044 mm (0.0008 to 0.0017 in.)
Maximum piston oil clearance		0.10 mm (0.0039 in.)
Piston pin bore diameter		22.001 to 22.010 mm (0.8662 to 0.8665 in.)
Piston pin bore diameter (Reference)	Mark A	22.001 to 22.004 mm (0.8662 to 0.8663 in.)
	Mark B	22.005 to 22.007 mm (0.8663 to 0.8664 in.)
	Mark C	22.008 to 22.010 mm (0.8664 to 0.8665 in.)

Piston ring		
Ring groove clearance	No. 1 Ring	0.020 to 0.070 mm (0.0008 to 0.0028 in.)
	No. 2 Ring	0.020 to 0.060 mm (0.0008 to 0.0024 in.)
	Oil Ring	0.020 to 0.070 mm (0.0008 to 0.0028 in.)
Standard end gap	No. 1 Ring	0.24 to 0.31 mm (0.0094 to 0.0122 in.)
	No. 2 Ring	0.33 to 0.43 mm (0.0130 to 0.0169 in.)
	Oil Ring	0.10 to 0.30 mm (0.0040 to 0.0119 in.)
Maximum end gap	No. 1 Ring	0.89 mm (0.0350 in.)
	No. 2 Ring	1.37 mm (0.0539 in.)
	Oil Ring	0.73 mm (0.0287 in.)
Piston pin		
Standard piston pin diameter		21.997 to 22.006 mm (0.8660 to 0.8664 in.)
Piston pin diameter (Reference)	Mark A	21.997 to 22.000 mm (0.8660 to 0.8661 in.)
	Mark B	22.001 to 22.003 mm (0.8662 to 0.8663 in.)
	Mark C	22.004 to 22.006 mm (0.8663 to 0.8664 in.)
	Mark A	21.997 to 22.000 mm (0.8660 to 0.8661 in.)
	Mark B	22.001 to 22.003 mm (0.8662 to 0.8663 in.)
	Mark C	22.004 to 22.006 mm (0.8663 to 0.8664 in.)
Standard oil clearance		0.001 to 0.007 mm (0.0004 to 0.0003 in.)
Maximum oil clearance		0.010 mm (0.0004 in.)
Connecting rod bolt	Standard diameter	7.0 to 7.3 mm (0.276 to 0.287 in.)
	Maximum diameter	7.0 mm (0.276 in.)
Crankshaft		
Standard thrust clearance		0.040 to 0.240 mm (0.0016 to 0.0095 in.)
Maximum thrust clearance		0.30 mm (0.0118 in.)
Thrust washer thickness		1.930 to 1.980 mm (0.0760 to 0.0780 in.)
Cylinder block main journal bore diameter (Reference)	Mark 0	59.000 to 59.002 mm (2.3228 to 2.3229 in.)
	Mark 1	59.003 to 59.004 mm (2.3230 to 2.3230 in.)
	Mark 2	59.005 to 59.006 mm (2.3230 to 2.3231 in.)
	Mark 3	59.007 to 59.009 mm (2.3231 to 2.3232 in.)
	Mark 4	59.010 to 59.011 mm (2.3232 to 2.3233 in.)
	Mark 5	59.012 to 59.013 mm (2.3233 to 2.3234 in.)
	Mark 6	59.014 to 59.016 mm (2.3234 to 2.3235 in.)
Main journal diameter		54.988 to 55.000 mm (2.1648 to 2.1654 in.)
Main journal diameter (Reference)	Mark 0	54.999 to 55.000 mm (2.1653 to 2.1654 in.)
	Mark 1	54.997 to 54.998 mm (2.1652 to 2.1653 in.)
	Mark 2	54.995 to 54.996 mm (2.1652 to 2.1652 in.)
	Mark 3	54.993 to 54.994 mm (2.1651 to 2.1651 in.)
	Mark 4	54.991 to 54.992 mm (2.1650 to 2.1650 in.)
	Mark 5	54.988 to 54.990 mm (2.1649 to 2.1650 in.)
Standard main bearing center wall thickness (Reference)	Mark 1	1.993 to 1.996 mm (0.0785 to 0.0786 in.)
	Mark 2	1.997 to 1.999 mm (0.0786 to 0.0787 in.)
	Mark 3	2.000 to 2.002 mm (0.0787 to 0.0788 in.)
	Mark 4	2.003 to 2.005 mm (0.0789 to 0.0789 in.)
Maximum circle runout		0.03 mm (0.0012 in.)
Standard oil clearance		0.017 to 0.040 mm (0.0007 to 0.0016 in.)
Maximum oil clearance		0.060 mm (0.0024 in.)
Maximum main journal taper and out-of-round		0.003 mm (0.0001 in.)
Maximum crank pin taper and out-of round		0.003 mm (0.0001 in.)
Crank pin diameter		47.990 to 48.000 mm (1.8894 to 1.8898 in.)

Crankshaft bearing cap set bolt	Standard diameter	7.3 to 7.5 mm (0.287 to 0.295 in.)
	Minimum diameter	7.2 mm (0.284 in.)

2AZ-FXE FUEL

SERVICE DATA

Fuel pressure		304 to 343 kPa (3.1 to 3.5 kgf/cm^2, 44.1 to 49.7 psi)
Fuel pressure : at fuel pressure remains for 5 minutes after engine has stopped		147 kPa (1.5 kgf/cm^2, 21 psi) or more
Fuel injector		
Resistance	at 20°C (68°F)	11.6 to 12.4 Ω
Injection volume		76 to 92 cm^3 (4.6 to 5.6 cu in.) per 15 seconds
Difference between each injector		16 cm^3 (0.98 cu in.) or less
Fuel drop		1 drop or less per 12 minutes
Fuel pump		
Resistance	at 20°C (68°F)	0.2 to 3.0 Ω

TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Fuel delivery pipe x Cylinder head		20	204	15
Fuel pressure pulsation damper x Fuel delivery pipe		9.0	92	80 in.*lbf
Fuel tank bent tube set plate x Fuel tank assembly		5.9	60	52 in.*lbf
Fuel main tube support x Fuel tank assembly		5.4	55	48 in.*lbf
Fuel tank band sub-assembly No. 1 x Body		39	400	29
Fuel tank filler pipe support x Body		18	185	13
Fuel tank protector lower center x Fuel tank assembly		5.4	55	48 in.*lbf
Parking brake cable assembly No. 2 x Body	Bolt	6.0	61	53 in.*lbf
	Nut	8.5	87	75 in.*lbf
Parking brake cable assembly No. 3 x Body	Bolt	6.0	61	53 in.*lbf
	Nut	8.5	87	75 in.*lbf
Stabilizer bar bracket x Suspension member		31	316	23

2AZ-FXE EMISSION CONTROL

SERVICE DATA

VSV for EVAP		
Standard resistance	1 - 2	23 to 28 Ω at 20°C (68°F)
	1 - Body ground	10 MΩ or higher
	2 - Body ground	10 MΩ or higher
Air fuel ratio sensor		
Standard resistance	1 (HT) - 2 (+B)	1.8 to 3.4 Ω at 20°C (68°F)
Oxygen sensor		
Standard resistance	1 (HT) - 2 (+B)	11 to 16 Ω at 20°C (68°F)
Fuel vapor containment valve		
Standard resistance	1 - 2	25 to 30 Ω at 20°C (68°F)

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Charcoal canister assembly x Body	39	398	29
Charcoal canister assembly x Charcoal canister bracket	5.4	55	48 in.*lbf
Air fuel ratio sensor x Front pipe assembly	44	449	32
Oxygen sensor x Front pipe assembly	44	449	32
Fuel vapor containment valve x Fuel solenoid valve return bracket	8.0	82	71 in.*lbf
Fuel solenoid valve return bracket x Fuel tank assembly	5.4	55	48 in.*lbf

2AZ-FXE EXHAUST

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Center exhaust pipe assembly x Tail pipe assembly	43	438	32
Front exhaust pipe assembly x Exhaust manifold	62	632	46
Front exhaust pipe assembly x Center exhaust pipe assembly	56	571	41
Front exhaust pipe No. 1 support bracket x Body	33	337	24
Rear exhaust pipe No. 1 support bracket x Body	33	337	24
Heated oxygen sensor x Front exhaust pipe assembly	44	449	32

2AZ-FXE COOLING

SERVICE DATA

THERMOSTAT

Condition	Specified Condition
Standard valve opening temperature	80 to 84 °C (176 to 183 °F)
Standard valve lift	10 mm (0.39 in.) or more at 95 °C (203 °F)

COOLING FAN MOTOR

Item	Condition	Specified Condition
Cooling fan motor	at 20°C (68 °F)	7.4 to 10.9 A
No. 2 cooling fan motor	at 20°C (68 °F)	7.4 to 10.9 A

COOLING FAN RELAY

Item	Tester Connection	Specified Condition
No. 1 fan relay	3 - 5	10 Ωor higher
	3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)
No. 2 fan relay	3 - 4	Below 1 Ω
	3 - 5	10 Ωor higher
	3 - 4	10 Ωor higher (when battery voltage is applied to terminals 1 and 2)
	3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)
No. 3 fan relay	3 - 5	10 Ωor higher
	3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

RADIATOR

Item	Condition	Specified Condition
Radiator reservoir cap	For brand-new cap	93.3 to 122.7 kPa (0.95 to 1.25 kgf/cm^2, 13.5 to 17.8 psi)
	After using cap	78.5 kPa (0.8 kgf/cm^2, 11.4 psi)

TORQUE SPECIFICATIONS

COOLANT

Part Tightened	N*m	kgf*cm	ft.*lbf
Cylinder block drain cock plug x Cylinder block	13	130	9

WATER PUMP

Part Tightened	N*m	kgf*cm	ft.*lbf
Water pump x Cylinder block	9.0	92	80 in.*lbf
Water pump pulley x Water pump	26	265	19

THERMOSTAT

Part Tightened	N*m	kgf*cm	ft.*lbf
Water inlet x Cylinder block	9.0	92	80 in.*lbf

RADIATOR

Part Tightened	N*m	kgf*cm	ft.*lbf
Condenser assembly x Radiator assembly	5.0	51	44 in.*lbf
Upper radiator support x Radiator support LH and RH	7.0	71	62 in.*lbf
Upper radiator support x Hood lock assembly	7.5	77	66 in.*lbf

2AZ-FXE LUBRICATION

SERVICE DATA

OIL PRESSURE

Condition	Specified Condition
Idle	29 kPa (0.3 kgf/cm^2, 4.3 psi) or more
2,500 rpm	145 to 280 kPa (1.5 to 2.9 kgf/cm^2,18 to 34 psi)

OIL PUMP

Item	Condition	Specified Condition
Oil pump rotor	Standard side clearance	0.030 to 0.085 mm (0.0012 to 0.0033 in.)
	Maximum side clearance	0.16 mm (0.0063 in.)
	Standard tip clearance	0.080 to 0.160 mm (0.0031 to 0.0063 in.)
	Maximum tip clearance	0.35 mm (0.0138 in.)
	Standard body clearance	0.100 to 0.170 mm (0.0039 to 0.0067 in.)
	Maximum body clearance	0.325 mm (0.01128 in.)
Oil pump drive chain	Maximum chain elongation	52.4 mm (2.063 in.)
Oil pump sprocket	Minimum crankshaft sprocket diameter (with chain)	48.2 mm (1.898 in.)
	Minimum oil pump drive shaft sprocket	48.2 mm (1.898 in.)
Chain tensioner plate	Maximum wear	0.5 mm (0.020 in.)

TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Oil filter x Stiffening crankcase		13	133	10
Oil drain plug x Oil pan		25	255	18
Oil pump cover x Oil pump		8.8	90	78 in.*lbf
Oil pump relief valve x Oil pump		49	500	36
Oil pump strainer x Oil pump		8.8	90	78 in.*lbf
Oil pump X Cylinder block		19	194	14
Oil pressure switch x Cylinder block		15	153	11
Timing chain cover x Cylinder block, Cylinder head	Bolt A	9.0	92	80 in.*lbf
	Bolt B	25	255	18
	Bolt C	55	561	41
	Nut	11	112	8
Stud bolt x Cylinder block		22	220	16
Oil cooler x Cylinder block	Union bolt	79	800	58
	Nut	9.0	92	80 in.*lbf

SS

2AZ-FXE IGNITION

SERVICE DATA

Spark Plug	Standard electrode gap	1.0 to 1.1 mm (0.039 to 0.043 in.) for new spark plug
	Maximum electrode gap	1.3 mm (0.051 in.) for used spark plug

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Spark plug x Cylinder head subassembly	19	194	14
Ignition coil assembly x Cylinder head cover	9.0	92	80 in.*lbf

2AZ-FXE STARTING

SERVICE DATA

Power switch	Resistance	Pushed: 7 (SS1) - 5 (GND)	Below 1Ω
		Pushed: 2 (SS2) - 5 (GND)	
		Not pushed: 7 (SS1) - 5 (GND)	10 kΩ or higher
		Not pushed: 2 (SS2) - 5 (GND)	

P311 HYBRID VEHICLE CONTROL

SERVICE DATA

Inverter radiator cap

Item	Specified Condition
Standard valve (for brand-new cap)	15 to 44 kPa (0.15 to 0.45 kgf/cm^2, 2.1 to 6.4 psi)
Minimum standard valve (after using cap)	12 kPa (0.12 kgf/cm^2, 1.7 psi)

Relay

Item	Tester Connection	Specified Condition
IGCT relay Resistance	3 - 5	10 kΩ or more
	3 - 5	Below 1Ω When battery voltage applied to terminals 1 and 2)

Item	Tester Connection	Specified Condition
No. 1 circuit breaker sensor Resistance	1 - 2	0.65 to 1.0 kΩ at 20°C (68°F)

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Drain plug x Hybrid transaxle assembly	39	398	29
High voltage fuse x Inverter with converter assembly	4.0	41	35in.*lbf
Inverter with converter assembly x Inverter bracket	12	122	9
No. 6 inverter bracket x Inverter with converter assembly	10	102	7
No. 6 inverter bracket x Body	10	102	7
Frame wire x Inverter with converter assembly	8.0	82	71in.*lbf
Connector cover x Inverter with converter assembly	8.0	82	71in.*lbf
No. 2 inverter bracket x Inverter with converter assembly	10	102	7
No. 2 inverter bracket x Body	10	102	7
Inverter reserve tank sub-assembly x Inverter with converter assembly	10	102	7
Generator cable x Inverter with converter assembly	8.0	82	71in.*lbf
Motor cable x Inverter with converter assembly	8.0	82	71in.*lbf
ECM bracket x Hybrid vehicle control ECU	3.0	31	27in.*lbf
ECU cover x Hybrid vehicle control ECU	3.0	31	27in.*lbf
Hybrid vehicle control ECU x Body	5.5	56	49in.*lbf
Water with motor and bracket pump assembly x Body	10	102	7
Water with motor and bracket pump assembly x Inverter bracket	10	102	7
Radiator assembly (for inverter) x Radiator assembly (for engine)	5.0	51	44in.*lbf
Radiator assembly (for inverter) x Cooler condenser assembly	9.0	92	80in.*lbf
Frame wire x Body	8.4	85	74in.*lbf
Frame wire (AMD cable) x Inverter terminal	9.0	92	80in.*lbf
Frame wire (high voltage cable) x HV relay assembly	9.0	92	80in.*lbf
Accelerator pedal rod x Body	5.4	55	48in.*lbf
No. 1 circuit breaker sensor x Inverter with converter assembly	8.5	87	75in.*lbf

HYBRID BATTERY CONTROL

SERVICE DATA

SMRB (HV relay assembly) Resistance	h4-1 - s1-1	10 kΩ or more
	h4-1 - s1-1	Below 1Ω (When battery voltage applied to terminals n3-2 and n3-3)
	CON2 (n3-3) - GND (n3-2)	18.8 to 32.1 Ω at -35 to 80°C (-31 to 176°F)
SMRG (HV relay assembly) Resistance	h3-1 - t1-1	10 kΩ or more
	h3-1 - t1-1	Below 1Ω (When battery voltage applied to terminals n3-1 and n3-2)
	CON3 (n3-1) - GND (n3-2)	18.8 to 32.1 Ω at -35 to 80°C (-31 to 176°F)
Battery blower relay Resistance	3 - 5	10 kΩ or more
	3 - 5	Below 1Ω When battery voltage applied to terminals 1 and 2)

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Battery carrier bracket x HV Battery	8.0	82	71in.*lbf
Inverter terminal x HV Battery	8.0	82	71in.*lbf
HV Battery x Body	19	194	14
Frame wire (AMD cable) x Inverter terminal	9.0	92	80in.*lbf
Battery smart unit x HV Battery	8.0	82	71in.*lbf
High voltage fuse x HV relay assembly	4.5	46	40in.*lbf
HV relay assembly x HV Battery	8.0	82	71in.*lbf
Ground cable x HV Battery	8.0	82	71in.*lbf
Filter noise capacitor x HV relay assembly	8.0	82	71in.*lbf
No. 5 battery carrier panel x HV Battery	8.0	82	71in.*lbf
No. 1 battery cover lid x No. 5 battery carrier panel	8.0	82	71in.*lbf
No. 1 battery cover lid x HV Battery	8.0	82	71in.*lbf
Frame wire (high voltage cable) x HV relay assembly	9.0	92	80in.*lbf
Upper battery carrier sub-assembly x HV Battery	8.0	82	71in.*lbf
Ground cable x HV Battery	8.0	82	71in.*lbf
Ground cable x Upper battery carrier sub-assembly	8.0	82	71in.*lbf
Wire harness clamp bracket x Upper battery carrier sub-assembly	8.0	82	71in.*lbf
Battery cooling blower assembly x HV Battery	8.0	82	71in.*lbf
No. 2 HV battery intake duct x Body	8.0	82	71in.*lbf
Hybrid vehicle converter x HV Battery	8.0	82	71in.*lbf
AMD cable x Hybrid vehicle converter	8.0	82	71in.*lbf
High voltage cable x Hybrid vehicle converter	8.0	82	71in.*lbf
No. 2 battery exhaust duct x Body	8.0	82	71in.*lbf

DRIVE SHAFT

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Front wheel set nut	103	1,050	76
Lower ball joint x Front suspension lower No. 1 arm	75	765	55
Tie rod end x Steering knuckle	49	500	36
Axle assembly x Front drive shaft	294	3,000	217
Front drive shaft center bearing set bolt	32	330	24
Front speed sensor set bolt	8.0	82	71 in.*lbf
Front flexible hose and speed sensor wire harness x Shock absorber	19	192	14
Front stabilizer link x Front shock absorber	74	755	55

AXLE

SERVICE DATA

Front axle hub bearing for looseness	Maximum: 0.05 mm (0.0020 in.)
Front axle hub for runout	Maximum: 0.05 mm (0.0020 in.)
Rear axle hub bearing for looseness	Maximum: 0.05 mm (0.0020 in.)
Rear axle hub for runout	Maximum: 0.07 mm (0.0027 in.)

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Front wheel set nut	103	1,050	76
Front disc brake caliper x Steering knuckle	107	1,090	79
Front axle assembly x Front shock absorber	210	2,140	155
Axle assembly x Front drive shaft	294	3,000	217
Front disc brake dust cover x Steering knuckle	8.3	85	73 in.*lbf
Rear wheel set nut	103	1,050	76
Rear axle carrier x Rear disc brake caliper	62	630	46
Rear flexible hose x Rear shock absorber	19	192	14
Rear shock absorber x Rear axle carrier	180	1,836	133
Rear axle hub and bearing set bolt	80	816	59
Rear strut rod x Rear axle carrier	113	1,150	83
Rear No. 2 suspension arm x Rear axle carrier	100	1,020	74
Rear No. 1 suspension arm x Rear axle carrier	100	1,020	74

SUSPENSION

SERVICE DATA

Front wheel alignment	Toe-in (total)	
	A - B	0 +- 2 mm (0 - 0.08 in.)
	Rack end length difference	1.5 mm (0.06 in.) or less

Front wheel alignment	Vehicle height	
	Front A - B	129 mm (5.08 in.)
	Rear C - D	56 mm (2.20 in.)

Front wheel alignment	Wheel turning angle	
	Inside wheel	38°22'+-2° (38.37°+-2°)
	Outside wheel reference	33°33' (33.55°)

Front wheel alignment	Camber	
	Camber	-0°40'+-45' (-0.67°+-0.75°)
	Right-left difference	45' (0.75°) or less

Front wheel alignment	Caster	
	Caster	2°55'+-45' (2.92°+-0.75°)
	Right-left difference	45' (0.75°) or less

Front wheel alignment	Steering axis inclination	
	Steering axis inclination	12°15'+-45' (12.25°+-0.75°)
	Right-left difference	45' (0.75°) or less

front lower ball joint	Lower ball joint turning torque	1.0 to 3.4 N*m (10 to 35 kgf*cm, 9 to 30 in.*lbf)
front stabilizer link assembly	Stabilizer link ball joint turning torque	0.05 to 2.0 N*m (0.5 to 20 kgf*cm, 0.4 to 18 in.*lbf)

Rear wheel alignment	Toe-in (total)	
	A +B	0° +- 24' (0° +- 0.4°)
	C - D	4 +- 2mm (0.16 +- 0.08 in.)
	Rack end length difference	1.5 mm (0.06 in.) or less

Rear wheel alignment	Camber	
	Camber	-1°20'+-45' (-1.33°+-0.75°)
	Right-left difference	45' (0.75°) or less

Rear stabilizer link assembly	Stabilizer link ball joint turning torque	0.05 to 1.0 N*m (0.5 to 10 kgf*cm, 0.4 to 8.9 in.*lbf)

TORQUE SPECIFICATIONS

FRONT:

Part tighten	N*m	kgf*cm	ft.*lbf
Suspension support x Body	85	867	63
Shock absorber x Axle	210	2,141	155
Speed sensor wire harness x Shock absorber	19	194	14
Piston rod x Suspension support	70	714	52
Stabilizer link x Shock absorber	74	755	55
Suspension lower No. 1 arm x Member	A 200 B 206	A 2,040 B 2,100	A 148 B 152
Engine mounting insulator x Member	87	887	64
Lower ball joint x Steering knuckle	123	1,250	91
Stabilizer bracket x Member	27	275	20
Stabilizer link x Stabilizer bar	74	755	55
Front wheel set nut	103	1,050	76
Tie rod end lock nut	74	755	55

REAR:

Part tighten	N*m	kgf*cm	ft.*lbf
Suspension support x Body	39	398	29
Shock absorber x Axle carrier	180	1,840	133
Piston rod x Suspension support	55	561	41
Speed sensor wire harness x Shock absorber	5.0	51	44 in.*lbf
Flexible hose x Shock absorber	19	194	14
Stabilizer link x Shock absorber	39	398	29
Strut rod x Axle carrier	113	1,152	83
Strut rod x Body	113	1,152	83
Parking brake No. 3 cable x Body	6.0	61	53 in.*lbf
Suspension No. 1 arm x Suspension member	100	1,020	74
Suspension No. 1 arm x Axle carrier	100	1,020	74
Suspension No. 2 arm x Suspension member	100	1,020	74
Suspension No. 2 arm x Axle carrier	100	1,020	74
Stabilizer bracket x Suspension member	31	316	23
Stabilizer link x Stabilizer bar	39	398	29
Suspension member x Suspension member lower stopper	A 55 B 38	A 561 B 388	A 41 B 28
Suspension member x Body	56	571	41
Rear wheel set nut	103	1,050	76
No. 2 Suspension arm lock nut	56	571	41

TIRE AND WHEEL

SERVICE DATA

Cold tire inflation pressure

Tire size	Front	Rear
P215/60R16 94V	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)

When driving under the above vehicle conditions at sustained high speeds above 160 km/h (100 mph), in countries where such speeds are permitted by law, inflate the front and rear tires to 240 kPa (2.4 kgf*cm^2, 35 psi) provided that it does not exceed the maximum cold tire inflation pressure molded on the tire sidewall.

Tire runout	1.4 mm (0.055 in.) or less
Imbalance after adjustment	8.0 g (0.018 lb) or less

TORQUE SPECIFICATIONS

TIRE PRESSURE WARNING RECEIVER

Part tightened	N*m	kgf*cm	ft.*lbf
Tire pressure warning receiver set bolt	7.5	77	66 in.*lbf

TIRE PRESSURE WARNING VALVE AND TRANSMITTER

Part tightened	N*m	kgf*cm	ft.*lbf
Tire pressure warning valve and transmitter set nut	4.0	41	35 in.*lbf
Front wheel set nuts	103	1,050	76
Rear wheel set nuts	103	1,050	76

TIRE PRESSURE WARNING ECU

Part tightened	N*m	kgf*cm	ft.*lbf
Tire pressure warning ECU set nut	7.5	77	66 in.*lbf

BRAKE CONTROL

SERVICE DATA

Brake actuator assembly operation	FR system solenoids	Sensor	10 to 20 sec. after check start (V)	35 sec. or more after check start (V)
		MAS CYL PRESS 1	0.3 to 0.7	0.3 to 0.7
		MAS CYL PRESS 2	0.3 to 0.7	0.3 to 0.7
		FR PRESS SENS	2.5 to 4.5	0.3 to 0.7
		FL PRESS SENS	0.3 to 0.7	0.3 to 0.7
		RR PRESS SENS	0.3 to 0.7	0.3 to 0.7
		RL PRESS SENS	0.3 to 0.7	0.3 to 0.7
	FL system solenoids	Sensor	10 to 20 sec. after check start (V)	35 sec. or more after check start (V)
		MAS CYL PRESS 1	0.3 to 0.7	0.3 to 0.7
		MAS CYL PRESS 2	0.3 to 0.7	0.3 to 0.7
		FR PRESS SENS	0.3 to 0.7	0.3 to 0.7
		FL PRESS SENS	2.5 to 4.5	0.3 to 0.7
		RR PRESS SENS	0.3 to 0.7	0.3 to 0.7
		RL PRESS SENS	0.3 to 0.7	0.3 to 0.7
	RR system solenoids	Sensor	10 to 20 sec. after check start (V)	35 sec. or more after check start (V)
		MAS CYL PRESS 1	0.3 to 0.7	0.3 to 0.7
		MAS CYL PRESS 2	0.3 to 0.7	0.3 to 0.7
		FR PRESS SENS	0.3 to 0.7	0.3 to 0.7
		FL PRESS SENS	0.3 to 0.7	0.3 to 0.7
		RR PRESS SENS	2.5 to 4.5	0.3 to 0.7
		RL PRESS SENS	0.3 to 0.7	0.3 to 0.7
	RL system solenoids	Sensor	10 to 20 sec. after check start (V)	35 sec. or more after check start (V)
		MAS CYL PRESS 1	0.3 to 0.7	0.3 to 0.7
		MAS CYL PRESS 2	0.3 to 0.7	0.3 to 0.7
		FR PRESS SENS	0.3 to 0.7	0.3 to 0.7
		FL PRESS SENS	0.3 to 0.7	0.3 to 0.7
		RR PRESS SENS	0.3 to 0.7	0.3 to 0.7
		RL PRESS SENS	2.5 to 4.5	0.3 to 0.7

PRESSURE SENSOR OPERATION	Brake effort {N (kgf, lbf)}	MAS CYL PRS 1 (V)	MAS CYL PRS 2 (V)
	200 (20.4, 45)	0.85 to 1.15	0.85 to 1.15
	500 (51, 112)	1.85 to 2.15	1.85 to 2.15

SS

PRESSURE SENSOR OPERATION	Front right side	Brake effort {N (kgf, lbf)}	Front right wheel hydraulic pressure {MPa (kgf/cm^2, psi)}	FR PRESS SENS (V)
		50 (5.1, 11)	2.4 (24.5, 348)	0.85 to 1.15
		100 (10.2, 22)	5.0 (51.0, 725)	1.35 to 1.65
		150 (15.3, 34)	5.0 (51.0, 725)	1.35 to 1.65
		200 (20.4, 45)	5.1 (52.0, 740)	1.4 to 1.7
	Front left side	Brake effort {N (kgf, lbf)}	Front left wheel hydraulic pressure {MPa (kgf/cm^2, psi)}	FL PRESS SENS (V)
		50 (5.1, 11)	2.4 (24.5, 348)	0.85 to 1.15
		100 (10.2, 22)	5.0 (51.0, 725)	1.35 to 1.65
		150 (15.3, 34)	5.0 (51.0, 725)	1.35 to 1.65
		200 (20.4, 45)	5.1 (52.0, 740)	1.4 to 1.7
	Rear right side	Brake effort {N (kgf, lbf)}	Rear right wheel hydraulic pressure {MPa (kgf/cm^2, psi)}	RR PRESS SENS (V)
		50 (5.1, 11)	2.4 (24.5, 348)	0.85 to 1.15
		100 (10.2, 22)	5.0 (51.0, 725)	1.35 to 1.65
		150 (15.3, 34)	5.0 (51.0, 725)	1.35 to 1.65
		200 (20.4, 45)	5.0 (51.0, 725)	1.35 to 1.65
	Rear left side	Brake effort {N (kgf, lbf)}	Rear left wheel hydraulic pressure {MPa (kgf/cm^2, psi)}	RL PRESS SENS (V)
		50 (5.1, 11)	2.4 (24.5, 348)	0.85 to 1.15
		100 (10.2, 22)	5.0 (51.0, 725)	1.35 to 1.65
		150 (15.3, 34)	5.0 (51.0, 725)	1.35 to 1.65
		200 (20.4, 45)	5.0 (51.0, 725)	1.35 to 1.65

	Tester connection	Condition	Specified Condition
Brake actuator assembly	31 (BM1) - 1 (GND1)	Always	Below 10 Ω
	32 (BM2) - 1 (GND1)	Always	Below 10 Ω
	31 (BM1) - 32 (BM2)	Always	Below 1 Ω
	1 (GND1) - 2 (GND2)	Always	Below 1 Ω
	31 (BM1) - 3 (MTT)	Always	950 to 1,050 Ω
	32 (BM2) - 3 (MTT)	Always	950 to 1,050 Ω

Front speed sensor	LH	1 (FL+) - 2 (FL-)	Always	1.4 to 1.8 kΩ at 20°C (68 °F)
		1 (FL+) - Body ground	Always	10 kΩ or higher
		2 (FL-) - Body ground	Always	10 kΩ or higher
	RH	1 (FR+) - 2 (FR-)	Always	1.4 to 1.8 kΩ at 20°C (68 °F)
		1 (FR+) - Body ground	Always	10 kΩ or higher
		2 (FR-) - Body ground	Always	10 kΩ or higher
Skid control sensor	LH	1 (RR+) - 2 (RR-)	Always	1.45 kΩ at 20°C (68 °F)
		1 (RR+) - Body ground	Always	10 kΩ or higher
		2 (RR-) - Body ground	Always	10 kΩ or higher
	RH	1 (RL+) - 2 (RL-) Below	Always	1.45 kΩ at 20°C (68 °F)
		1 (RL+) - Body ground 10	Always	10 kΩ or higher
		2 (RL-) - Body ground	Always	10 kΩ or higher
ABS MAIN relay		Resistance 3 - 5	Always	10 kΩ or higher
		Resistance 3 - 5	Apply B+ between terminals 1 and 2	Below 1 Ω

ABS MOTOR relay		Resistance 3 - 5	Always	10 kΩ or higher
		Resistance 3 - 5	Apply B+ between terminals 1 and 2	Below 1 Ω

BRAKE

SERVICE DATA

Brake pedal height		129.9 to 139.9 mm(5.114 to 5.508 in.9
Standard stop light switch clearance		1.5 to 2.5 mm (0.059 to 0.098 in.)
Brake pedal free play		1.0 to 2.0 mm (0.039 to 0.079 in.)
Brake pedal reserve distance from dash panel at 490 N (50 kgf, 110 lbf)		80 mm (3.15 in.)
Front brake pad lining thickness	Standard	12.0 mm (0472 in.)
	Minimum	1.0 mm (0.039 in.)
Front brake disc thickness	Standard	28.0 mm (1.102 in.)
	Minimum	25.0 mm (0.983 in.)
Front brake disc runout	Maximum	0.05 mm (0.0020in.)
Rear disc brake pad lining thickness	Standard	11.0 mm (0.433 in.)
	Minimum	1.0 mm (0.039 in.)
Rear brake disc thickness	Standard	10.0 mm (0.390 in.)
	Minimum	8.5 mm (0.334 in.)
Rear brake disc runout	Maximum	0.15 mm (0.0059 in.)

TORQUE SPECIFICATIONS

Parts tightened	N*m	kgf*cm	ft.*lbf
Brake booster clevis lock nut	26	265	19
Brake pedal stroke sensor	8.5	87	75 in.*lbf
Brake light switch	1.5	15	13 in.*lbf
Brake pedal sub-assembly set bolt	37	377	27
Brake pedal assembly x Body	19	194	14
Brake pedal assembly x Brake master cylinder with simulator assembly	13	133	10
Master cylinder union x Brake master cylinder sub-assembly	1.8	18	16 in.*lbf
Brake master cylinder sub-assembly x Body	13	133	10
Brake master cylinder sub-assembly x Brake line	15 (14)	155 (143)	11 (10)
Brake master cylinder sub-assembly x Brake stroke simulator line	15 (14)	155 (143)	11 (10)
Brake stroke simulator cylinder sub-assembly x Brake stroke simulator line	15 (14)	155 (143)	11 (10)
Brake master cylinder reservoir sub-assembly x Body	5.0	51	44 in.*lbf
Brake stroke simulator cylinder sub-assembly x Brake stroke simulator bracket	8.0	82	71 in.*lbf
Brake stroke simulator cylinder sub-assembly x Brake line	15 (14)	155 (143)	11 (10)
Heater water pump assembly x body	9.8	100	87 in.*lbf
Front brake cylinder mounting x Steering knuckle	107	1,090	79
Bleeder plug	8.3	85	74 in.*lbf
Front disc brake cylinder mounting x Front disc brake cylinder assembly	34	350	25
Front disc brake cylinder assembly x Flexible hose	29	300	21
Flexible hose x Brake line	15 (14)	155 (143)	11 (10)
Front flexible hose x Absorber	19	194	14
Rear disc brake cylinder mounting set bolt	62	632	46
Rear disc brake cylinder mounting x Rear disc brake cylinder assembly	27	275	20
Rear disc brake cylinder assembly x Flexible hose	33	337	24
Rear flexible hose x Absorber	19	194	14

( ): For use with SST

PARKING BRAKE

SERVICE DATA

Parking brake pedal travel at 300 N (31 kgf, 68 lbf)		7 to 10 notches
Brake disc inside diameter	Standard	170 mm (6.69 in.)
	Maximum	171 mm (6.73 in.)
Parking brake shoe lining thickness	Standard	2.0 mm (0.079 in.)
	Maximum	1.0 mm (0.039 in.)
Clearance between parking brake shoe and parking brake she lever		Less than 0.35 mm (0.014 in.)

TORQUE SPECIFICATIONS

Parts tightened		N*m	kgf*cm	ft.*lbf
Wheel nut		103	1050	76
No. 1 wire adjusting nut x Lock nut		5.4	55	48 in.*lbf
Parking brake pedal assembly x Body		39	398	29
No. 1 parking brake cable assembly x Body	Bolt	15	153	11
	Nut	5.4	55	48 in.*lbf
No. 1 parking brake cable assembly x No. 4 parking brake cable assembly		5.0 (5.4)	51 (55)	44 in.*lbf (48 in.*lbf)
Floor shift lever assembly x Body		12	122	9
No. 3 parking brake cable assembly x Body	Bolt (A)	8.5	87	75 in.*lbf
	Bolt (B)	6.0	61	53 in.*lbf
	Nut (C)	6.0	61	53 in.*lbf
No. 3 parking brake assembly x Backing plate		8.0	82	71 in.*lbf
Rear disc brake caliper set bolt		62	632	46
Parking brake shoe guide plate set bolt		18	184	13
No. 2 front floor heat lower insulator x Body		4.9	50	43 in.*lbf
Cross member floor No. 4 reinforcement sub-assembly x Body		19	194	14

(): for use without SST

STEERING COLUMN

SERVICE DATA

Steering free play (Maximum)	30 mm (1.18 in.)

TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
Steering intermediate shaft assembly x Steering column assembly	35	360	26
Steering column assembly set nuts	21	214	15
Steering column assembly set bolt	21	214	15
Steering intermediate shaft assembly x Power steering link assembly	35	360	26
Steering wheel assembly set nut	50	510	37
Front wheel LH set nuts	103	1,050	76

POWER STEERING

SERVICE DATA

STEERING WHEEL

Steering effort (Reference)	6.0 N*m (60 kgf*cm, 53 in.*lbf)

POWER STEERING LINK

Tie rod end sub-assembly stud bolt turning torque	0.98 to 3.92 N*m (10 to 40 kgf*cm, 8.7 to 34.7 in.*lbf)
Total preload	1.0 to 2.0 N*m (10 to 20 kgf*cm, 8.9 to 17.7 in.*lbf)

TORQUE SPECIFICATIONS

POWER STEERING LINK

Part tightened	N*m	kgf*cm	ft.*lbf
Steering rack end sub-assembly	74 (103)	755 (1,050)	55 (76)
Power steering link assembly set bolts	70	714	52
Tie rod assembly x Steering knuckle	49	500	36
No. 1 front stabilizer bracket LH set bolts	27	275	20
No. 1 front stabilizer bracket RH set bolts	27	275	20
Steering intermediate shaft assembly x Power steering link assembly	35	360	26
Front wheels set nuts	103	1,050	76

( ): For use without SST

POWER STEERING ECU

Part tightened	N*m	kgf*cm	ft.*lbf
Power steering ECU assembly set nuts	8.5	87	75 in.*lbf
Power steering ECU assembly set bolt	8.5	87	75 in.*lbf

AIR CONDITIONING

SERVICE DATA

Refrigerant charge volume (Standard:)	480 to 580g (16.9 to 20.5 oz.)

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
AIR CONDITIONING UNIT			
Air conditioning unit assembly x Body	9.8	100	87 in.*lbf
Instrument panel reinforcement assembly x Body (Collar)	6.0	61	53 in.*lbf
Instrument panel reinforcement assembly x Body (Passenger seat)	20	204	15
Instrument panel reinforcement assembly x Body (Driver seat)	17	175	13
Air conditioning tube assembly x Cooler expansion valve	3.5	35	30 in.*lbf
Suction pipe sub-assembly x Air conditioning tube assembly	9.8	100	87 in.*lbf
BLOWER UNIT			
Blower assembly x Instrument panel reinforcement assembly	9.8	100	87 in.*lbf
ELECTRIC INVERTER COMPRESSOR			
Electric inverter compressor x Engine	25	255	18
No. 1 cooler refrigerant discharge hose x Electric inverter compressor	9.8	100	87 in.*lbf
No. 1 cooler refrigerant suction hose x Electric inverter compressor	9.8	100	87 in.*lbf
CONDENSER			
Cooler condenser assembly x Radiator assembly	5.0	51	44 in.*lbf
Cooler refrigerant discharge pipe x Cooler condenser assembly	9.8	100	87 in.*lbf
Air conditioner tube and accessory x Cooler condenser assembly	9.8	100	87 in.*lbf
Cap x cooler condenser assembly	2.9	30	26 in.*lbf
HEATER WATER PUMP			
Heater water pump x Body	9.8	100	87 in.*lbf

SUPPLEMENTAL RESTRAINT SYSTEM

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Steering pad x Steering wheel assembly	8.8	90	78 in.*lbf
Driver side knee airbag assembly x Instrument panel reinforcement	10	102	7
Curtain shield airbag assembly x Body	11	112	8
Center airbag sensor assembly x Body	17.5	179	13
Front airbag sensor x Body	17.5	179	13
Side airbag sensor x Body	9.0	92	80 in.*lbf
Rear airbag sensor x Body	9.0	92	80 in.*lbf
Seat position sensor x Front seat assembly	8.0	82	71 in.*lbf

SEAT BELT

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
FRONT SEAT INNER BELT ASSEMBLY			
Front seat inner belt assembly x Front seat assembly	42	428	31
FRONT SEAT OUTER BELT ASSEMBLY			
Front seat outer belt assembly (Floor anchor) x Body	42	428	31
Front seat outer belt assembly (Shoulder anchor) x Front shoulder belt anchor adjuster assembly	42	428	31
Front shoulder belt anchor adjuster assembly x Body	42	428	31
Front seat outer belt assembly (for Upper bolt) x Body	7.5	77	66 in.*lbf
Front seat outer belt assembly (for Lower bolt) x Body	42	428	31
REAR SEAT INNER BELT ASSEMBLY			
Rear seat inner with center belt assembly RH x Body	42	428	31
Rear seat inner with center belt assembly LH floor anchor x Body	42	428	31
Rear seat inner with center belt assembly LH x Body	42	428	31
REAR SEAT OUTER BELT ASSEMBLY			
Rear seat outer belt assembly floor anchor (For LH side) x Body	42	428	31
Rear seat outer belt assembly floor anchor (For RH side) x Body	42	428	31
Rear seat outer belt assembly x Body	42	428	31
CHILD RESTRAINT SEAT TETHER ANCHOR			
Child restraint seat tether anchor bracket x Body	21	214	16
CHILD RESTRAINT SEAT ANCHOR BRACKET			
Child restraint seat anchor bracket subassembly x Body	18	184	13

CRUISE CONTROL

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Cruise control main switch x Steering wheel	2.4	24	21 in.*lbf

LIGHTING

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
HEADLIGHT ASSEMBLY			
Headlight assembly x Body	5.4	55	48 in.*lbf
REAR COMBINATION LIGHT ASSEMBLY			
Rear combination assembly x Body	5.4	55	48 in.*lbf
Rear light assembly x Body	5.4	55	48 in.*lbf
HIGH MOUNTED STOP LIGHT ASSEMBLY			
High mounted stop light assembly x Package tray trim panel assembly	1.6	16	14 in.*lbf
FRONT DOOR COURTESY SWITCH			
Front door courtesy switch assembly x Body	8.0	82	71 in.*lbf
REAR DOOR COURTESY SWITCH			
Rear door courtesy switch assembly x Body	8.0	82	71 in.*lbf

WIPER AND WASHER

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
FRONT WIPER MOTOR			
Front wiper arm and blade assembly LH x Windshield wiper motor and link assembly	20	204	15
Front wiper arm and blade assembly RH x Windshield wiper motor and link assembly	20	204	15
Windshield wiper motor and link assembly x Body	7.5	77	66 in.*lbf
Windshield wiper link assembly x Windshield wiper motor assembly	5.4	55	48 in.*lbf

DOOR LOCK

TORQUE SPECIFICATIONS

FRONT DOOR LOCK

Part Tightened	N*m	kgf*cm	ft*lbf
Front door lock assembly x Door panel	5.0	51	44 in.*lbf

REAR DOOR LOCK

Part Tightened	N*m	kgf*cm	ft*lbf
Rear door lock assembly x Door panel	5.0	51	44 in.*lbf

METER

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Steering pad switch x Steering wheel	2.4	24	21 in.*lbf
Upper steering column cover x Lower steering column cover	2.0	20	18 in.*lbf

AUDIO / VISUAL

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Steering pad switch x Steering wheel	2.4	24	21 in.*lbf

HORN

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Low pitched horn x Body	20	204	15
High pitched horn x Body	20	204	15

WINDSHIELD / WINDOWGLASS

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
POWER WINDOW REGULATOR MOTOR			
Front power window regulator motor assembly x Front door window regulator sub-assembly	5.4	55	48 in.*lbf
Front door window regulator sub-assembly x Front door	8.0	82	71 in.*lbf
Front door glass sub-assembly x Front door window regulator sub-assembly	5.5	56	49 in.*lbf
Rear power window regulator motor assembly x Rear door window regulator sub-assembly	5.4	55	48 in.*lbf
Rear door window regulator sub-assembly x Rear door	8.0	82	71 in.*lbf
WINDSHIELD GLASS			
Inner rear view mirror assembly x Windshield glass	1.8	18	16 in.*lbf
Front wiper arm and blade assembly x Windshield wiper motor and link assembly	20	204	15
BACK WINDOW GLASS			
Rear seat inner with center belt assembly LH x Body	42	428	31
Rear restraint seat anchor bracket sub-assembly LH x Body	18	184	13
Rear seat outer belt assembly x Body	42	428	31
Rear side seatback assembly x Body	18	184	13
Separate type rear seatback assembly x Body	18	184	13

MIRROR

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Inner rear view mirror x Windshield glass	1.8	18	16 in.*lbf
Outer rear view mirror assembly x Door panel	5.5	56	49 in.*lbf

INSTRUMENT PANEL

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Instrument panel reinforcement x Passenger airbag	20	204	15
Upper steering column cover x Lower steering column cover	2.0	20	18 in.*lbf
Instrument panel safety pad x No. 2 antenna cord sub-assembly	7.0	71	62 in.*lbf

SEAT

TORQUE SPECIFICATIONS

FRONT SEAT

Part Tightened	N*m	kgf*cm	ft.*lbf
Front seat back cover bracket x Front seat frame	5.5	56	49 in.*lbf
Front seat x Body	37	377	27

REAR SEAT

Part Tightened	N*m	kgf*cm	ft.*lbf
Separate type rear seat back assembly x Body	18	184	13
Rear side seat back assembly x Body	18	184	13

ENGINE HOOD / DOOR

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
HOOD			
Hood hinge x Hood panel	13	133	10
Hood lock x Body	7.5	77	66 in.*lbf
FRONT DOOR			
Door check x Body	26	265	19
Door check x Door panel	8.0	82	71 in.*lbf
Door hinge x Body	26	265	19
Door hinge x Door panel	26	265	19
Door lock x Door panel	5.0	51	44 in.*lbf
Door lock striker x Body	23	235	17
Power window regulator motor x Window regulator	5.4	55	48 in.*lbf
Window regulator x Door panel	8.0	82	71 in.*lbf
Door glass x Window regulator	5.5	56	49 in.*lbf
Outer rear view mirror x Door panel	5.5	56	49 in.*lbf
Door outside handle frame x Door panel	4.0	41	35 in.*lbf
REAR DOOR			
Door check x Body	26	265	19
Door check x Door panel	8.0	82	71 in.*lbf
Door hinge x Body	26	265	19
Door hinge x Door panel	26	265	19
Door lock x Door panel	5.0	51	44 in.*lbf
Door lock striker x Body	23	235	17
Power window regulator motor x Window regulator	5.4	55	48 in.*lbf
Window regulator x Door panel	8.0	82	71 in.*lbf
Door outside handle frame x Door panel	4.0	41	35 in.*lbf
LUGGAGE DOOR			
Luggage door hinge x Door panel	7.5	77	66 in.*lbf
Luggage lock striker x Body	5.5	56	49 in.*lbf
Luggage lock x Door panel	5.5	56	49 in.*lbf
Luggage lock cylinder x Door panel	5.5	56	49 in.*lbf

EXTERIOR

TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
Front bumper reinforcement sub-assembly x Body	34	347	25
Rear bumper reinforcement sub-assembly x Body	68	693	50
Luggage compartment door lock cylinder assembly x Luggage compartment door outside garnish	5.5	56	49 in.*lbf

INTERIOR

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Front seat outer belt assembly LH floor anchor x Body	42	428	31
Front seat outer belt assembly RH floor anchor x Body	42	428	31

SLIDING ROOF

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Sliding roof glass sub-assembly x Sliding roof housing sub-assembly	4.0	41	35 in.*lbf
Sliding roof housing sub-assembly (Bolt) x Body	5.5	56	49 in.*lbf
Sliding roof housing sub-assembly (Nut) x Body	5.5	56	49 in.*lbf
Sliding roof drive gear sub-assembly x Sliding roof housing sub-assembly	5.4	55	48 in.*lbf
Sliding roof piece sub-assembly LH x Sliding roof housing sub-assembly	2.0	20	18 in.*lbf
Sliding roof piece sub-assembly RH x Sliding roof housing sub-assembly	2.0	20	18 in.*lbf
Sliding roof side stopper x Sliding roof housing sub-assembly	2.0	20	18 in.*lbf

P311 HYBRID TRANSMISSION / TRANSAXLE

SERVICE DATA

Oil pressure		9.8 kpa (0.1 kgf/cm^2, 1.4 psi)
Bolt length A		55 mm (2.17 in.)
Bolt length B		65 mm (2.56 in.)
Bolt length C		38 mm (1.47 in.)
Bolt length D		32 mm (1.26 in.)
Bolt diameter A		12 mm (0.47 in.)
Bolt diameter B		10 mm (0.39 in.)
Bolt diameter C		8 mm (0.32 in.)
Bolt diameter D		10 mm (0.39 in.)
Hybrid vehicle transaxle oil seal depth	LH side	-0.5 to 0.5 mm (-0.020 to 0.020 in.)
	RH side	-0.5 to 0.5 mm (-0.020 to 0.020 in.)

TORQUE SPECIFICATIONS

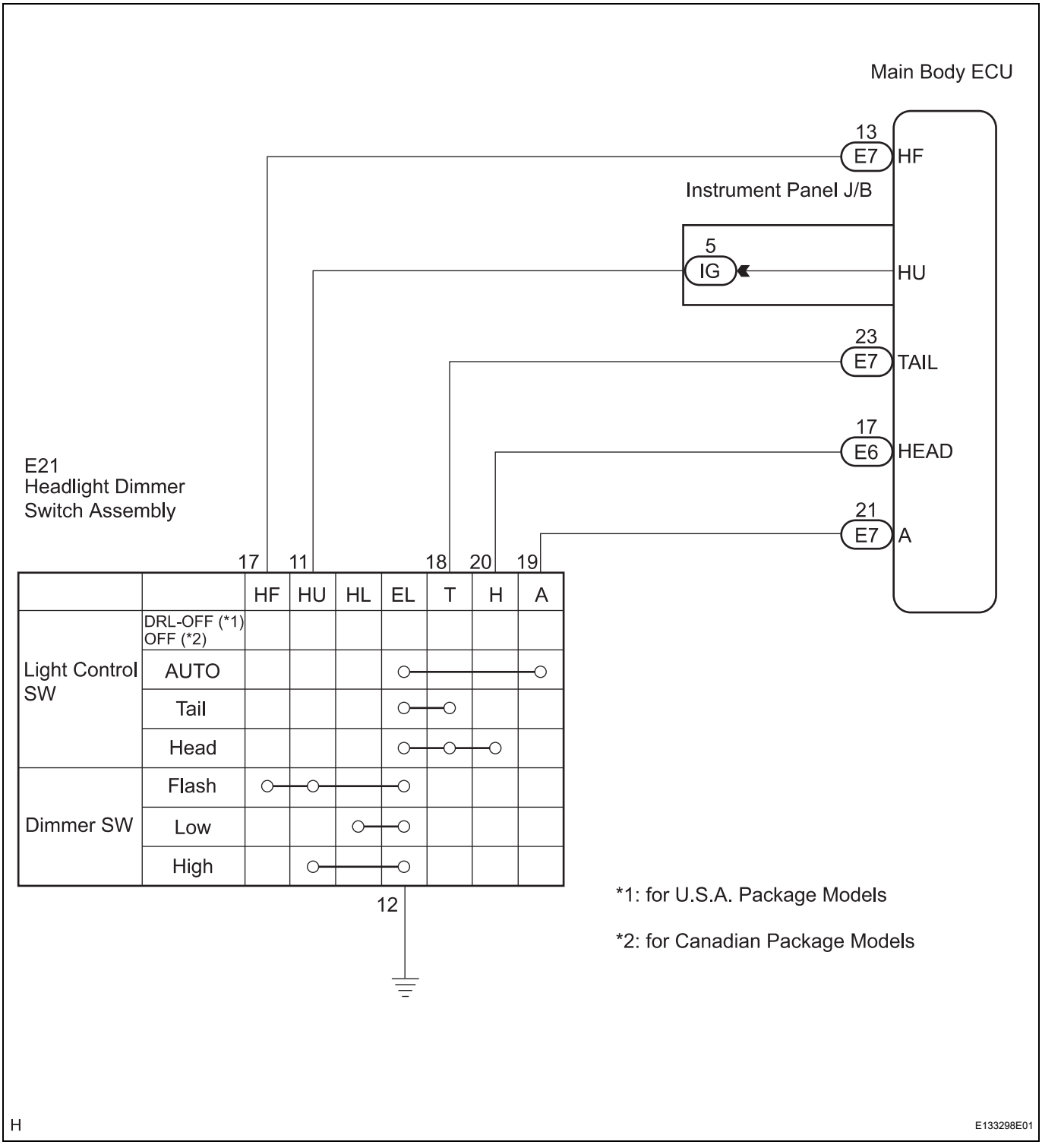
Part Tightened	N*m	kgf*cm	ft.*lbf
Hybrid transaxle x Pump cover plug	8.0	82	71 in.*lbf
Shift lever position sensor x Hybrid vehicle transaxle	13	133	10
Shift lever position sensor x Lock nut	6.9	70	61 in.*lbf
Shift lever position sensor x Control shaft lever	13	133	10
Transaxle control cable end x Control shaft lever	15	150	11
Transaxle control cable assembly x Body	5.0	51	44 in.*lbf
Air cleaner inlet assembly x Vehicle	5.0	51	44 in.*lbf
Engine x Transaxle (Bolt A)	64	653	47
Engine x Transaxle (Bolt B)	46	469	34
Engine x Transaxle (Bolt C)	28	286	21
Engine x Transaxle (Bolt D)	44	450	33
Front engine mounting bracket x Hybrid vehicle transaxle	64	653	47
Transmission oil pump cover plug x Hybrid vehicle transaxle	27	275	20
HV transaxle mass damper x Hybrid vehicle transaxle	39	398	29
Automatic transmission case cover x Hybrid vehicle transaxle	7.0	71	62 in.*lbf
Hybrid vehicle transaxle x Drain plug (Fluid)	39	398	29
Hybrid vehicle transaxle x Filler plug (Fluid)	39	398	29
Hybrid vehicle transaxle x Drain plug (Coolant)	39	398	29
Hybrid vehicle transaxle x Bracket	8.0	82	71 in.*lbf
Hybrid vehicle transaxle x Hybrid inverter protector	10	102	7
Hybrid vehicle transaxle x No. 3 transmission control cable bracket	14	143	10
Hybrid vehicle transaxle x No. 2 transmission control cable bracket	12	120	9
Hybrid vehicle transaxle x No. 1 transmission control cable bracket	12	120	9
Hybrid vehicle transaxle x Wire harness bracket	8.4	86	74 in.*lbf
Hybrid vehicle transaxle x Ground wire	12	120	9
No. 2 shift cable grommet retainer x Vehicle	5.0	51	44 in.*lbf

Light Control Switch Circuit

DESCRIPTION

This circuit detects the condition of the headlight dimmer switch assembly.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Select the items below in the DATA LIST, and read the display on the intelligent tester.

MAIN BODY (MAIN BODY ECU):

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
DIMMER SW	Dimmer switch HIGH signal / ON or OFF	ON: Dimmer switch in HIGH or FLASH OFF: Dimmer switch in neither HIGH nor FLASH	-
HIGH FLASHER SW	Dimmer switch FLASH signal / ON or OFF	ON: Dimmer switch in FLASH OFF: Dimmer switch not in FLASH	-
AUTO LIGHT SW	Light control switch AUTO signal / ON or OFF	ON: Light control switch in AUTO OFF: Light control switch not in AUTO	-
HEAD LIGHT SW	Light control switch HEAD signal / ON or OFF	ON: Light control switch in HEAD OFF: Light control switch not in HEAD	-
TAIL LIGHT SW	Light control switch TAIL signal / ON or OFF	ON: Light control switch in TAIL or HEAD OFF: Light control switch in neither TAIL nor HEAD	-

OK:
Normal conditions listed above are displayed.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

2	INSPECT HEADLIGHT DIMMER SWITCH ASSEMBLY

(a) Inspect the headlight dimmer switch assembly (See page LI-96).
OK:
The headlight dimmer switch assembly is normal.

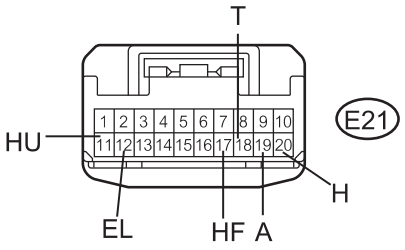
NG → **REPLACE HEADLIGHT DIMMER SWITCH ASSEMBLY**

OK

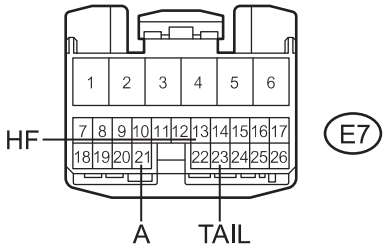
3	CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL J/B ASSEMBLY - SWITCH ASSEMBLY)

Wire Harness Side:

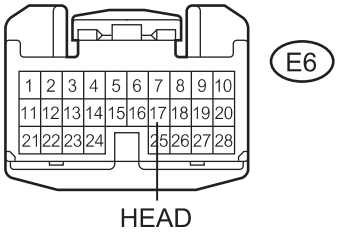
Headlight Dimmer Switch Assembly



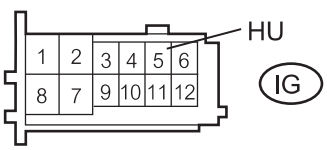
Main Body ECU



Main Body ECU



Instrument Panel J/B Assembly



H

E121507E08

(a) Disconnect the E21 headlight dimmer switch assembly connector.
(b) Disconnect the E6 and E7 main body ECU connectors.
(c) Disconnect the IG instrument panel J/B connector.
(d) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E21-11 (HU) - IG-5 (HU)	Always	Below 1 Ω
E21-17 (HF) - E7-13 (HF)	Always	Below 1 Ω
E21-18 (T) - E7-23 (TAIL)	Always	Below 1 Ω
E21-19 (A) - E7-21 (A)	Always	Below 1 Ω
E21-20 (H) - E6-17 (HEAD)	Always	Below 1 Ω
E21-11 (HU) - Body ground	Always	10 kΩ or higher
E21-17 (HF) - Body ground	Always	10 kΩ or higher
E21-18 (T) - Body ground	Always	10 kΩ or higher
E21-19 (A) - Body ground	Always	10 kΩ or higher
E21-20 (H) - Body ground	Always	10 kΩ or higher
E21-12 (EL) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

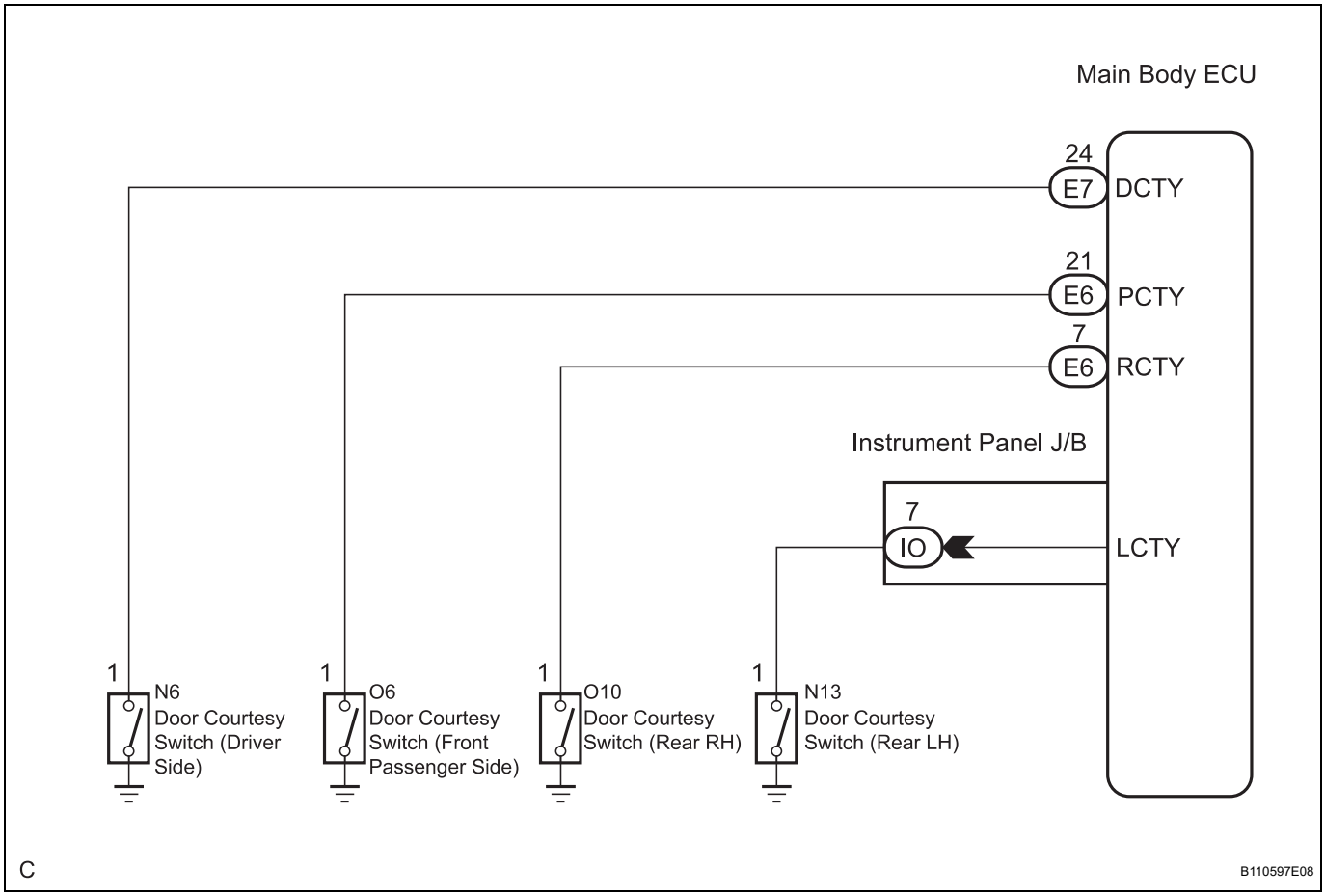
REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

Door Courtesy Switch Circuit

DESCRIPTION

The main body ECU detects the condition of the door courtesy switches.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Select the items below in the DATA LIST, and read the display on the intelligent tester.

MAIN BODY (MAIN BODY ECU):

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
D DOR CTY SW	Driver side door courtesy switch signal / ON or OFF	ON: Driver side door is open OFF: Driver side door is closed	-
P DOR CTY SW	Passenger side door courtesy switch signal / ON or OFF	ON: Passenger side door is open OFF: Passenger side door is closed	-
RR DOR CTY SW	Rear right door courtesy switch signal / ON or OFF	ON: Rear right door is open OFF: Rear right door is closed	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
RL DOR CTY SW	Rear left door courtesy switch signal / ON or OFF	ON: Rear left door is open OFF: Rear left door is closed	-

OK:
Normal conditions listed above are displayed.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

LI

2 INSPECT DOOR COURTESY SWITCH

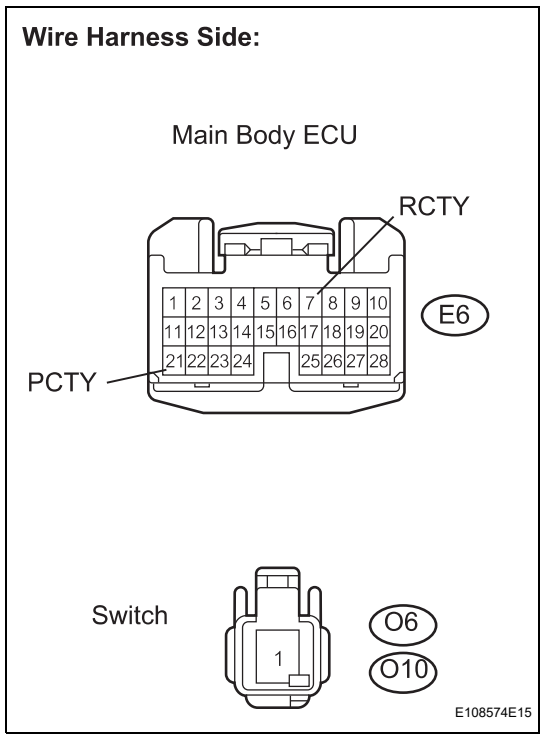
(a) Inspect the front door courtesy switch (See page LI-105).
(b) Inspect the rear door courtesy switch (See page LI-107).

OK:
Door courtesy switches are normal.

NG → **REPLACE DOOR COURTESY SWITCH**

OK

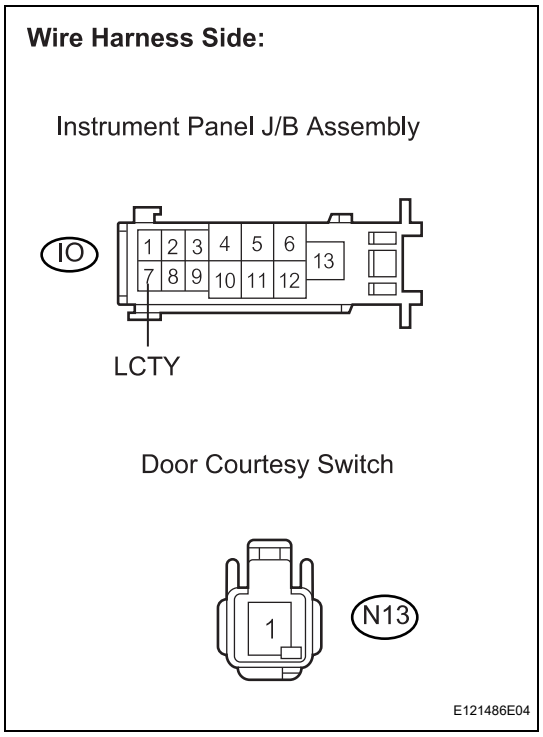
3 CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - DOOR COURTESY SWITCH)



(a) Check the harness and connector between the main body ECU and door courtesy switches (passenger side and rear RH).
(1) Disconnect the E6 main body ECU connector.
(2) Disconnect the O6 and O10 switch connectors.
(3) Measure the resistance according to the value(s) in the table below.

Standard resistance

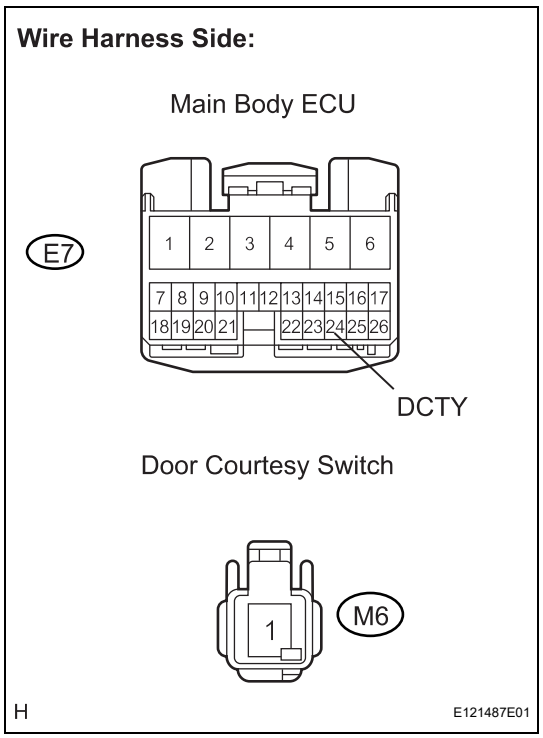
Tester Connection	Condition	Specified Condition
E6-7 (RCTY) - O10-1 (Rear RH)	Always	Below 1 Ω
E6-21 (PCTY) - O6-1 (Front passenger side)	Always	Below 1 Ω
O10-1 (Rear RH) - Body ground	Always	10 kΩ or higher
O6-1 (Front passenger side) - Body ground	Always	10 kΩ or higher



(b) Check the harness and connector between the instrument panel J/B assembly and rear LH door courtesy switch.
(1) Disconnect the IO instrument panel J/B assembly connector.
(2) Disconnect the N13 switch connector.
(3) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
IO-7 (LCTY) - N13-1 (Rear LH)	Always	Below 1 Ω
IO-7 (LCTY) - Body ground	Always	10 kΩ or higher

LI



(c) Check the harness and connector between the main body ECU and driver side door courtesy switch.
(1) Disconnect the E7 main body ECU connector.
(2) Disconnect the M6 switch connector.
(3) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
E7-24 (DCTY) - M6-1 (Driver side)	Always	Below 1 Ω
E7-24 (DCTY) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

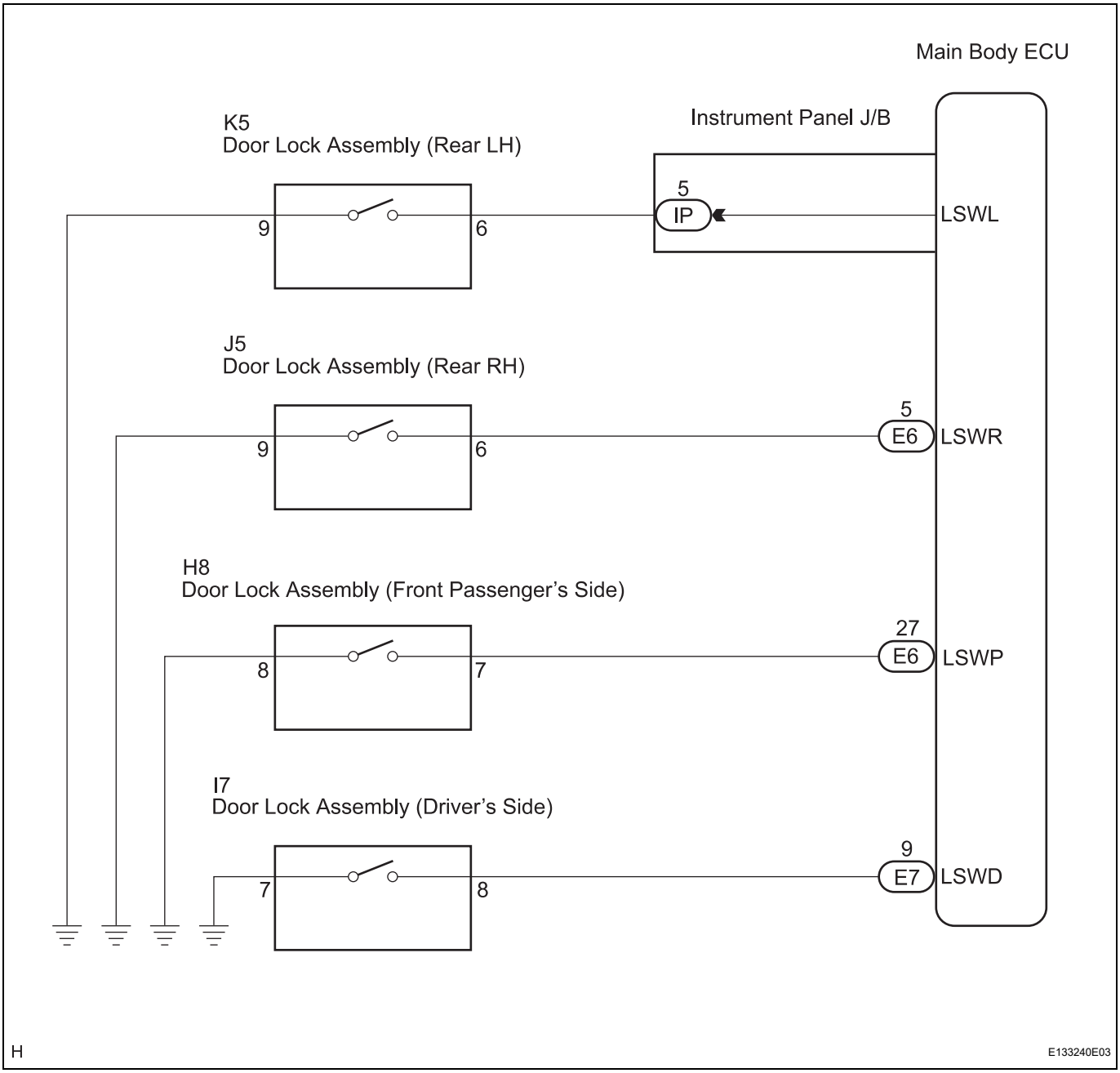
REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

Door LOCK Position Circuit

DESCRIPTION

The main body ECU receives each door lock position switch signal to control the illuminated entry system.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.

(c) Select the items below in the DATA LIST, and read the display on the intelligent tester.

MAIN BODY (MAIN BODY ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
D LOCK POS SW	Driver side door lock position switch signal / ON or OFF	ON: Driver side door is unlocked OFF: Driver side door is locked	-
P LOCK POS SW	Passenger side door lock position switch signal / ON or OFF	ON: Passenger side door is unlocked OFF: Passenger side door is locked	-
RR LOCK POS SW	Rear right door lock position switch signal / ON or OFF	ON: Rear right door is unlocked OFF: Rear right door is locked	-
RL LOCK POS SW	Rear left door lock position switch signal / ON or OFF	ON: Rear left door is unlocked OFF: Rear left door is locked	-

OK:

Normal conditions listed above are displayed.

NG → **GO TO POWER DOOR LOCK CONTROL SYSTEM**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

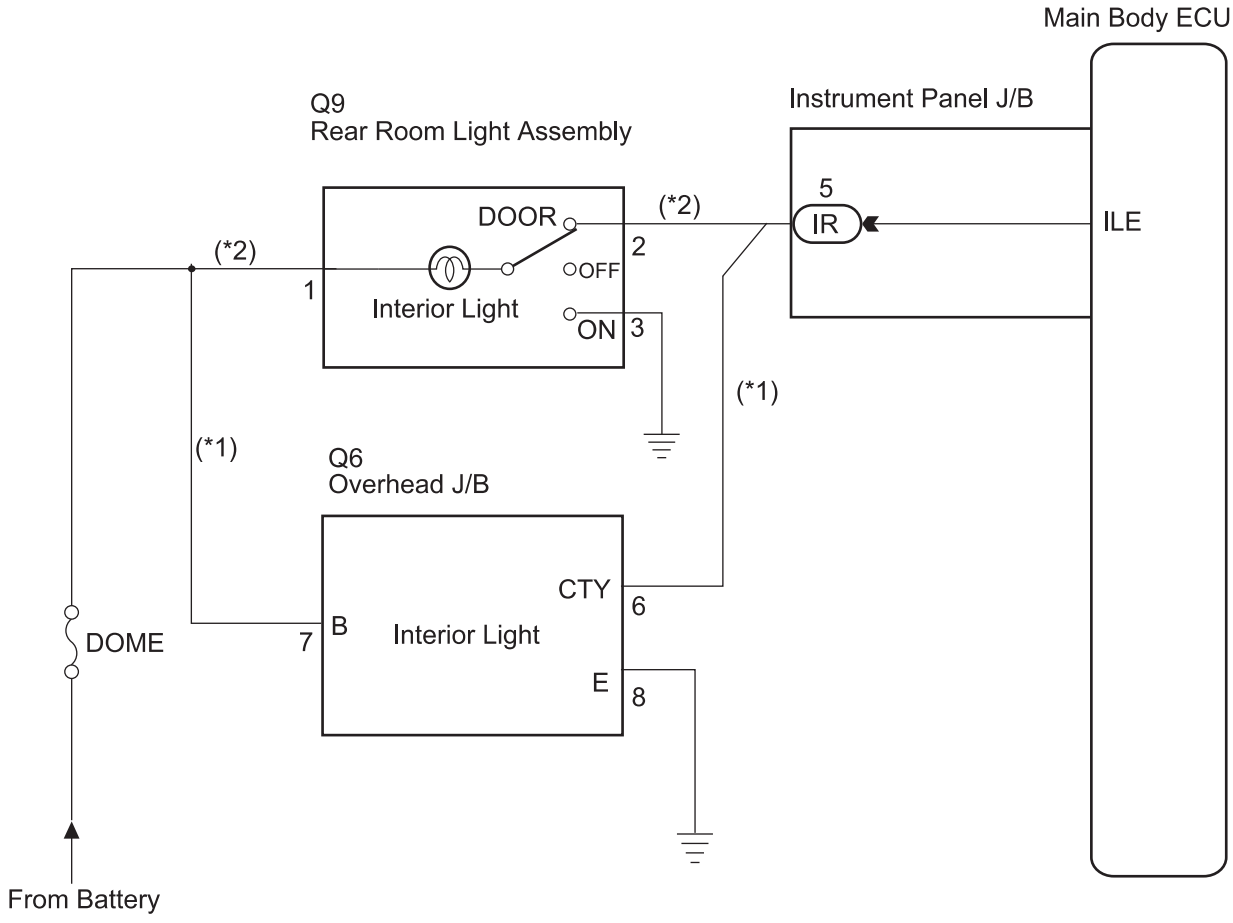
Interior Light Circuit

DESCRIPTION

The interior light is controlled by the main body ECU. The operation and condition of this control are described below.

Operation	Condition
Fade in	When any of the following conditions is met, the interior light will fade in. • Any door is opened. • Any door is unlocked when the power switch is off and all doors are closed. • Power switch is turned from on (ACC) to off when all doors are closed.
Fade out immediately	When either of the following conditions is met, the interior light will fade out. • Power switch is turned from off to on (ACC or IG) when all doors are closed. • All doors are locked when the power switch is off.
Illuminate for approximately 15 seconds, and then fade out	All doors are closed when the power switch is off.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST USING INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn intelligent tester main switch on.

(c) Select the item(s) below in the ACTIVE TEST, and check the operation.

MAIN BODY (MAIN BODY ECU):

Tester Display	Test Part	Control Range	Diagnostic Note
INTERIOR LAMP	Interior light (Interior light switch in DOOR position and all doors are closed).	ON / OFF	-

OK:
The interior light illuminates.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

LI

NG

2 CHECK VEHICLE CONDITION

(a) Check the vehicle condition.

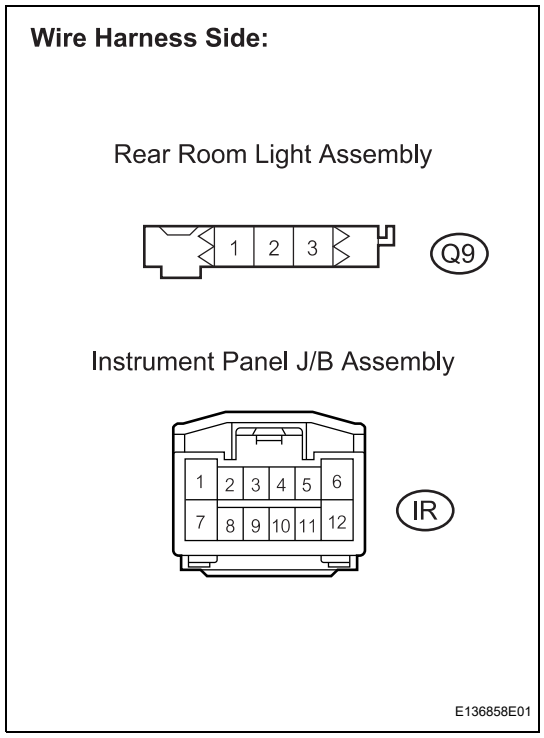
Result

Condition	Proceed to
without Sliding Roof	**A**
with Sliding Roof	**B**

B → **Go to step 4**

A

3 CHECK HARNESS AND CONNECTOR (LIGHT - BATTERY AND INSTRUMENT PANEL J/B ASSEMBLY)



(a) Disconnect the Q9 rear room light assembly connector.
(b) Disconnect the IR instrument panel J/B assembly connector.
(c) Measure the voltage and resistance according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
Q9-1 - Body ground	**Always**	**10 to 14 V**

Standard resistance

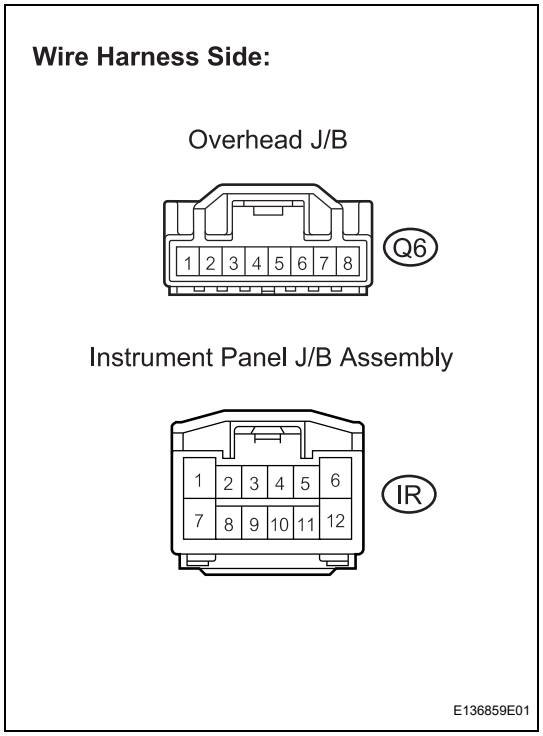
Tester Connection	Condition	Specified Condition
IR-5 - Q9-2	**Always**	**Below 1 Ω**
IR-5 - Body ground	**Always**	**10 kΩ or higher**

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

4	CHECK HARNESS AND CONNECTOR (LIGHT - BATTERY AND INSTRUMENT PANEL J/B ASSEMBLY)



(a) Disconnect the Q6 overhead J/B connector.
(b) Disconnect the IR instrument panel J/B assembly connector.
(c) Measure the voltage and resistance according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
Q6-7 - Body ground	Always	10 to 14 V

Standard resistance

Tester Connection	Condition	Specified Condition
IR-5 - Q6-6	Always	Below 1 Ω
IR-5 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

Power Switch Illumination Circuit

DESCRIPTION

The power switch illumination is controlled by the main body ECU. The operation and condition of this control are described below.

Operation	Condition
Fade in	When any of the following conditions is met, the power switch illumination will fade in. • Any door is opened. • Any door is unlocked when the power switch is off and all doors are closed. • Power switch is turned from on (ACC) to off when all doors are closed.
Fade out immediately	When either of the following conditions is met, the power switch illumination will fade out. • Power switch is turned from off to on (ACC or IG) when all doors are closed. • All doors are locked when the power switch is off.
Illuminate for approximately 15 seconds, and then fade out	All doors are closed when the power switch is off.

WIRING DIAGRAM

INSPECTION PROCEDURE

1 **PERFORM ACTIVE TEST USING INTELLIGENT TESTER**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Turn the intelligent tester main switch on.
(d) Select the item(s) below in the ACTIVE TEST, and check the operation.

MAIN BODY (MAIN BODY ECU):

Tester Display	Test Part	Control Range	Diagnostic Note
LIGHTING IND	Power switch illumination	ON / OFF	-

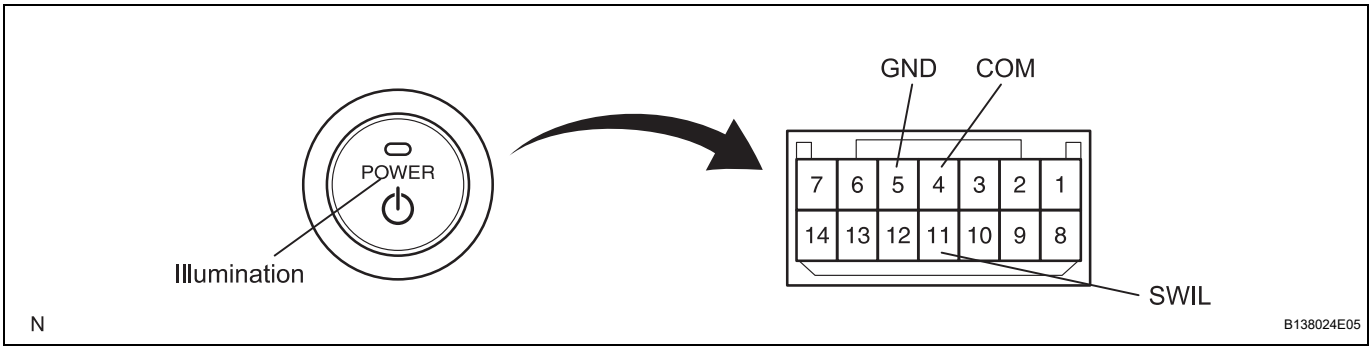
OK:
The power switch illumination comes on.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

2 **INSPECT POWER SWITCH**

(a) Remove the power switch.



(b) Apply the battery voltage to the power switch.
(c) Check that the illumination comes on.
OK

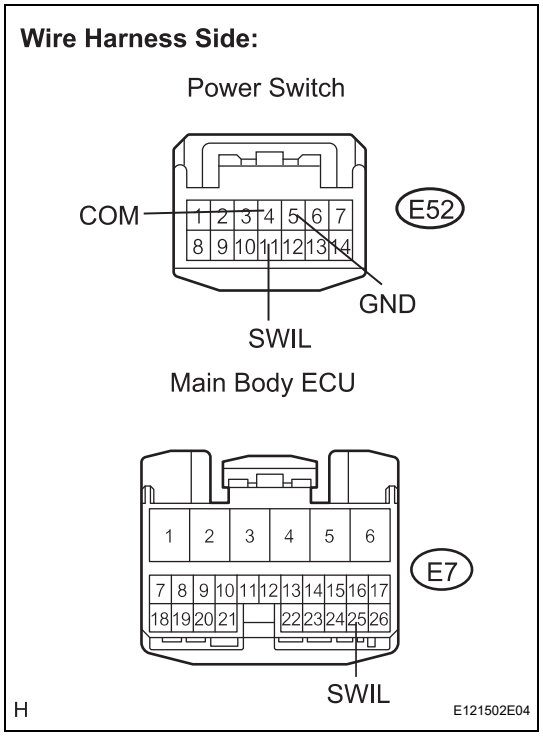
Measurement Condition	Specified Condition
Battery positive (+) → Terminal 11 (SWIL) Battery negative (-) → Terminal 5 (GND) or 4 (COM)	Power switch illumination comes on

NG → **REPLACE POWER SWITCH**

OK

LI

3 CHECK HARNESS AND CONNECTOR



(a) Disconnect the E7 main body ECU connector.
(b) Disconnect the E52 power switch connector.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
E52-11 (SWIL) - E7- 25 (SWIL)	Always	Below 1 Ω
E52-4 (COM) or E52-5 (GND) - Body ground	Always	Below 1 Ω
E7-25 (SWIL) - Body ground	Always	Below 10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

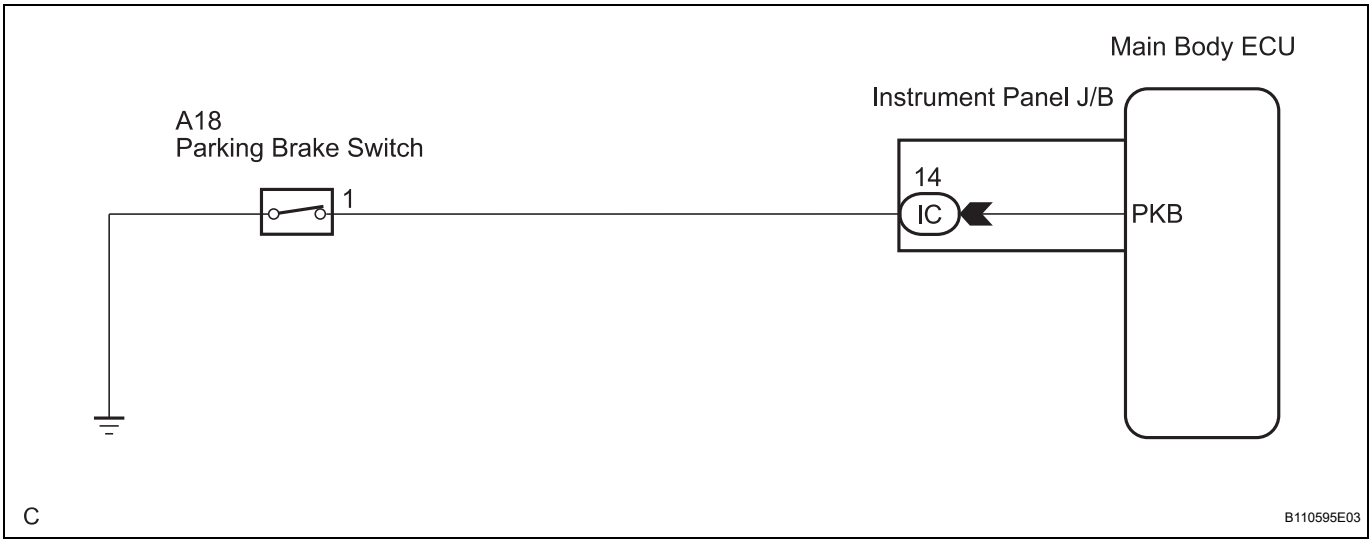
REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

Parking Brake Switch Circuit

DESCRIPTION

The main body ECU receives a parking brake switch signal to control the daytime running light system.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

MAIN BODY (MAIN BODY ECU):

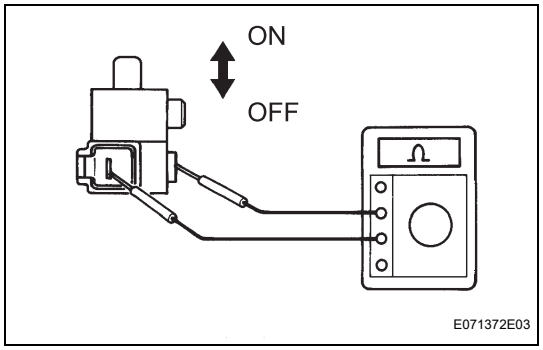
Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
PARKING BRAKE SW	Parking brake SW signal / ON or OFF	ON: Parking brake switch is ON OFF: Parking brake switch is OFF	-

OK:
Normal conditions listed above are displayed.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

2 INSPECT PARKING BRAKE SWITCH ASSEMBLY



(a) Remove the parking brake switch assembly.
(b) Measure the resistance according to the value(s) in the table below.

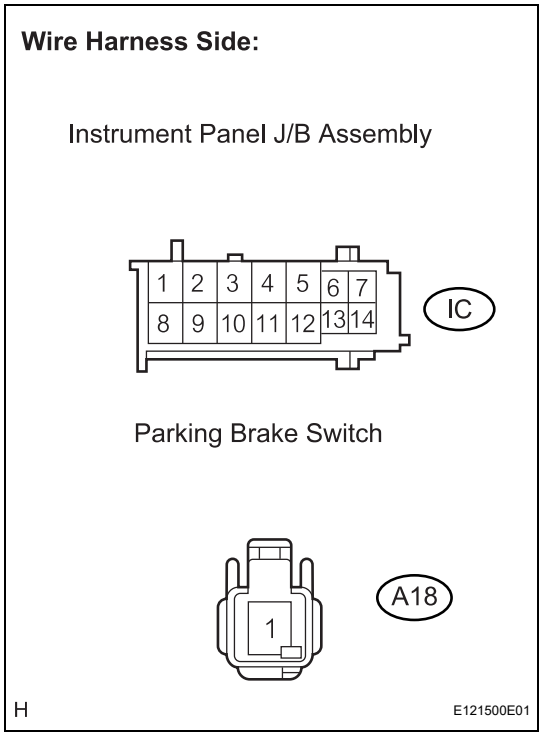
Standard resistance

Tester Connection	Condition	Specified Condition
1 - Switch body	Shaft is pushed in	10 kΩ or higher
1 - Switch body	Shaft is not pushed in	Below 1 Ω

NG → **REPLACE PARKING BRAKE SWITCH ASSEMBLY**

OK

3 CHECK HARNESS AND CONNECTOR (SWITCH - INSTRUMENT PANEL J/B ASSEMBLY)



(a) Disconnect the IC instrument panel J/B assembly connector.
(b) Disconnect the A18 switch connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
IC-14 - A18-1	Always	Below 1 Ω
IC-14 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

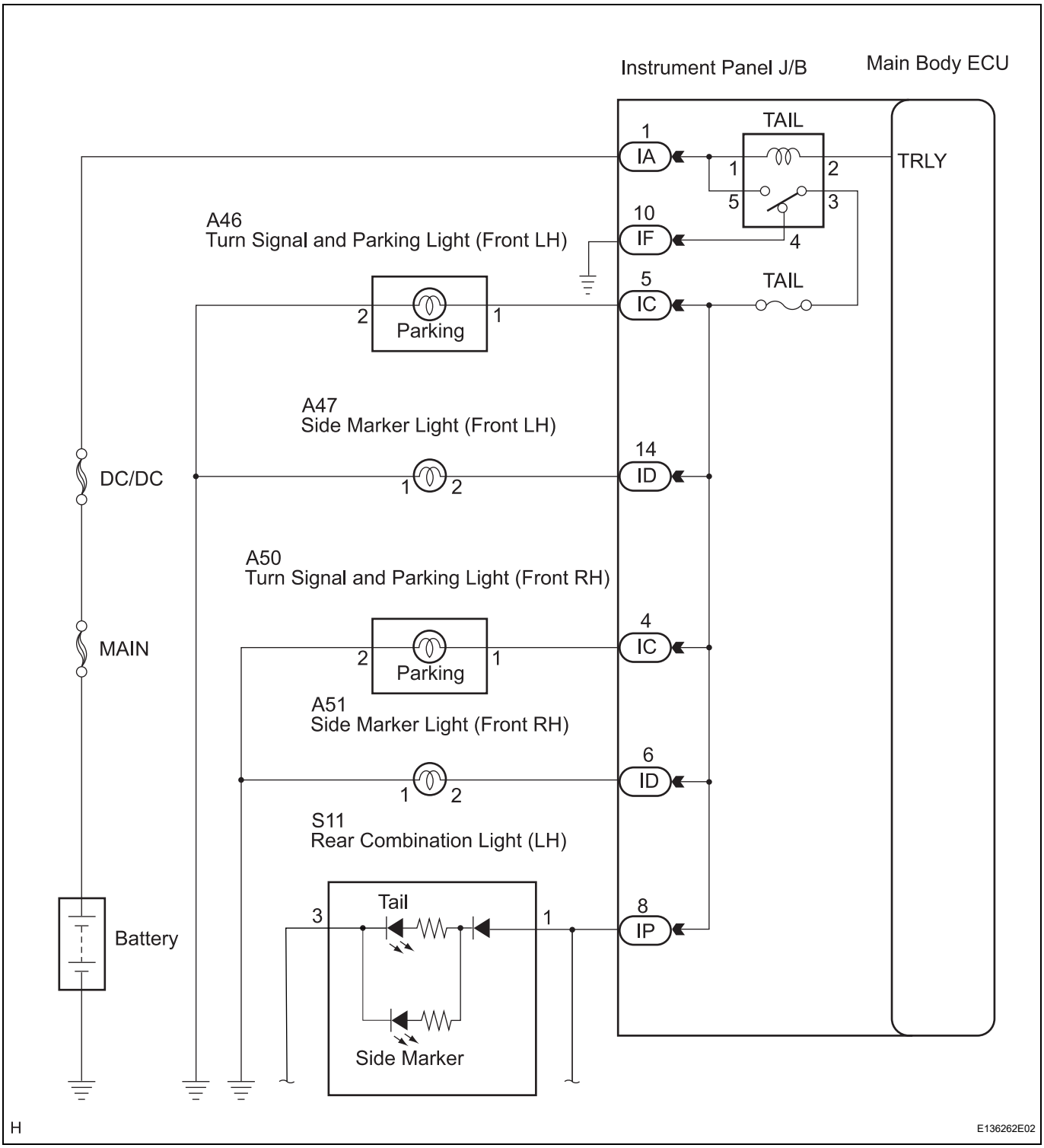
LI

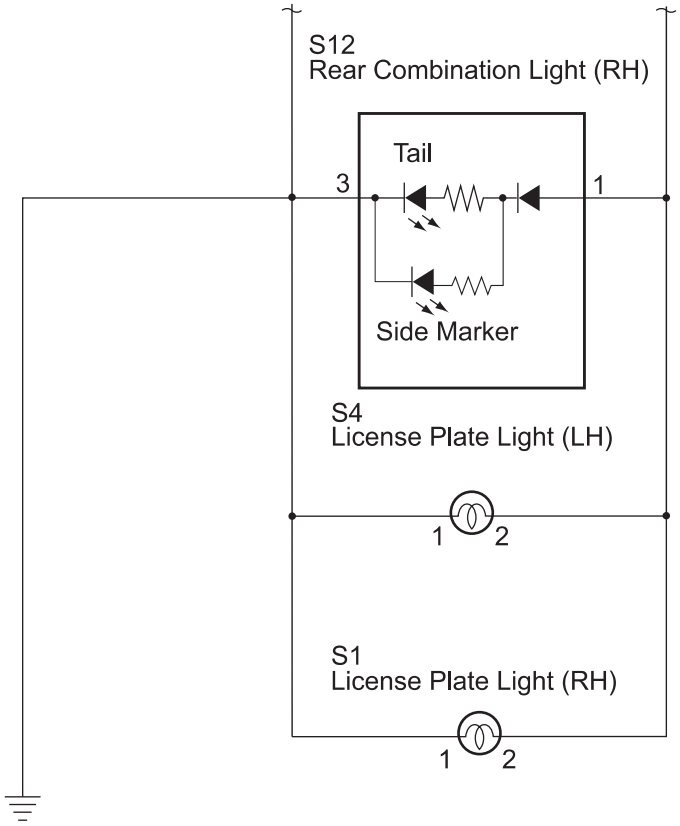
Taillight Relay Circuit

DESCRIPTION

The main body ECU receives a light control switch TAIL signal from the headlight dimmer switch assembly, and turns the taillight relay on.

WIRING DIAGRAM





H

E136263E01

INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Select the item below in the ACTIVE TEST and then check that the relay operates.

MAIN BODY (MAIN BODY ECU):

Item	Test Details	Diagnostic Note
TAIL LIGHT	Taillight relay ON / OFF	-

OK:

The taillight relay operates. (Taillights illuminate.)

OK	PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

NG

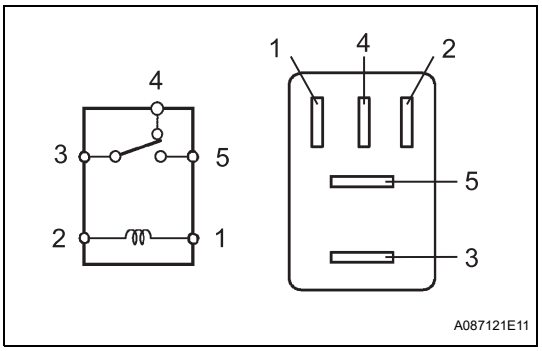
2	INSPECT FUSE (TAIL)

(a) Remove the TAIL fuse from the instrument panel J/B assembly.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

3	INSPECT TAILLIGHT RELAY



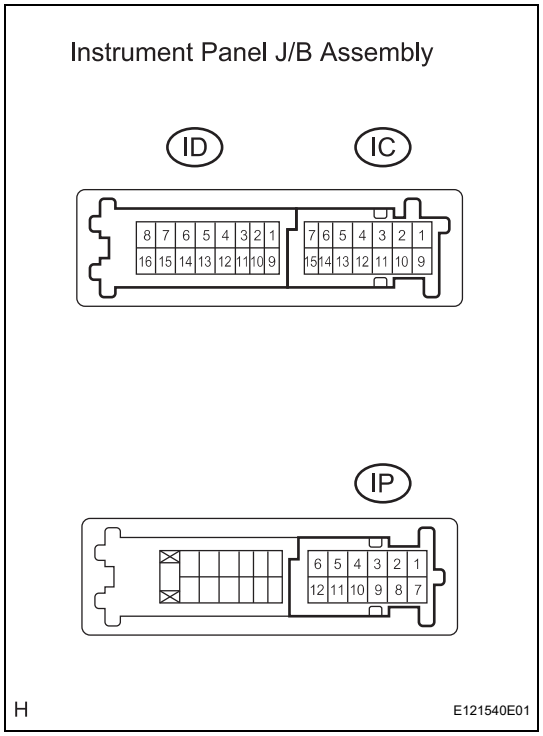
(a) Remove the taillight relay from the instrument panel J/B assembly.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)
3 - 4	Below 1 Ω
	10 kΩ or higher (When battery voltage is applied to terminals 1 and 2)

NG → **REPLACE TAILLIGHT RELAY**

OK

4 INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY



(a) Measure the voltage according to the value(s) in the table below.

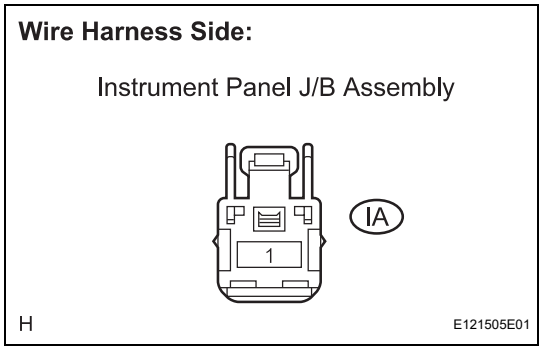
Standard voltage

Tester Connection	Condition	Specified Condition
IC-4 - Body ground	Light control switch OFF → TAIL	Below 1 V → 10 to 14 V
IC-5 - Body ground	Light control switch OFF → TAIL	Below 1 V → 10 to 14 V
ID-6 - Body ground	Light control switch OFF → TAIL	Below 1 V → 10 to 14 V
ID-14 - Body ground	Light control switch OFF → TAIL	Below 1 V → 10 to 14 V
IP-8 - Body ground	Light control switch OFF → TAIL	Below 1 V → 10 to 14 V

OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR (INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY - BODY GROUND)**

NG

5 CHECK HARNESS AND CONNECTOR (BATTERY - INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY)



(a) Disconnect the IA instrument panel J/B assembly connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
IA-1 - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

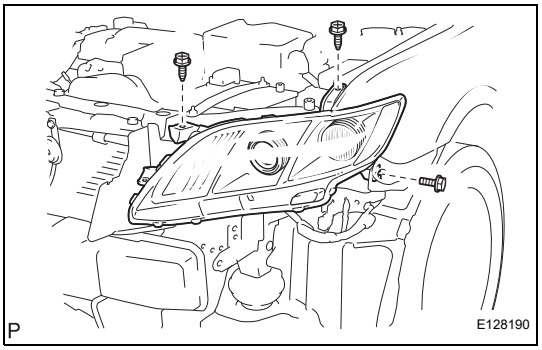
REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

LI

REMOVAL

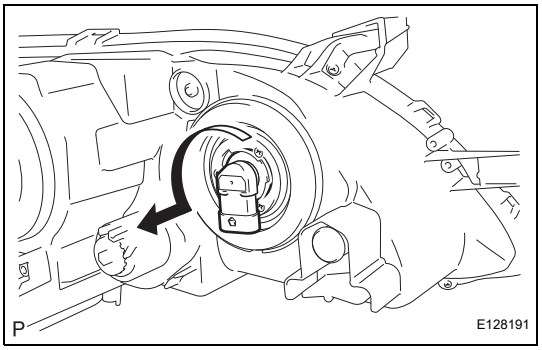
1. **REMOVE FRONT BUMPER ASSEMBLY (See page ET-3)**

2. **REMOVE HEADLIGHT ASSEMBLY**
   (a) Remove the bolt and 2 screws.
   (b) Disconnect the connectors and remove the headlight assembly.

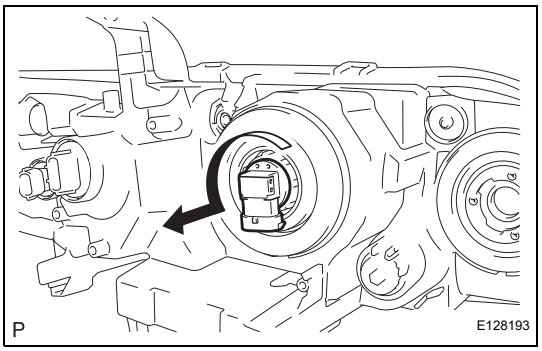


DISASSEMBLY

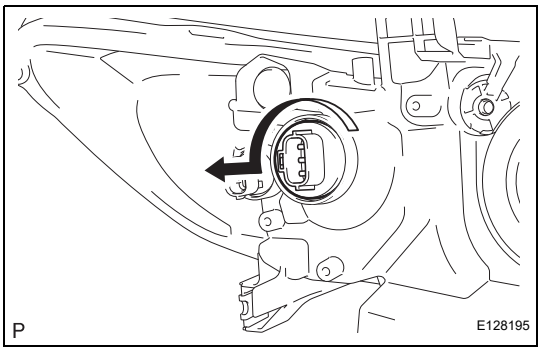
1. **REMOVE NO. 1 HEADLIGHT BULB**
   (a) Remove the No. 1 headlight bulb as shown in the illustration.

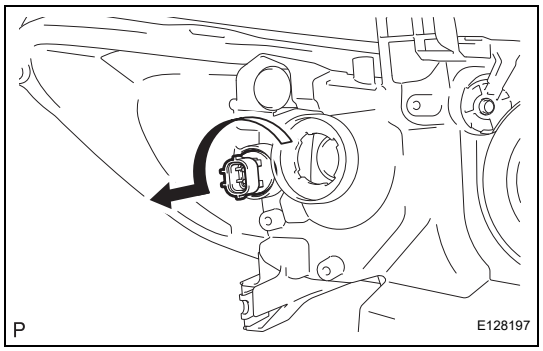


2. **REMOVE NO. 2 HEADLIGHT BULB**
   (a) Remove the No. 2 headlight bulb as shown in the illustration.



3. **REMOVE FRONT TURN SIGNAL LIGHT BULB**
   (a) Turn the front turn signal light bulb and the front turn signal light socket in the direction indicated by the arrow and remove them as a unit.
   (b) Remove the front turn signal light bulb from the front turn signal light socket.





4. REMOVE FRONT SIDE MARKER LIGHT BULB

(a) Turn the front side marker light bulb and the front side marker light socket in the direction indicated by the arrow and remove them as a unit.

(b) Remove the front side marker light bulb from the front side marker light socket.

LI

ADJUSTMENT

HINT:
It is possible that a bulb is incorrectly installed, affecting headlight aim. Bulb installation should be considered prior to performing the adjustment procedure.

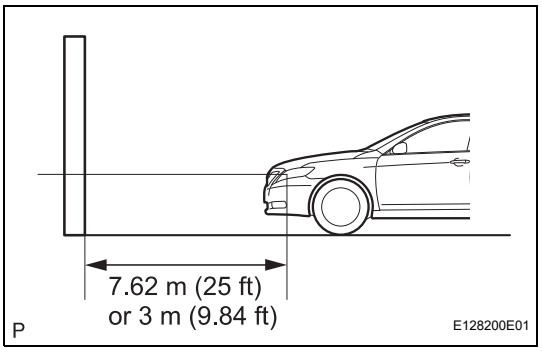
1. VEHICLE PREPARATION FOR HEADLIGHT AIM ADJUSTMENT

(a) Prepare the vehicle according to the following conditions:
- Ensure there is no damage or deformation to the body around the headlights.
- Fill the fuel tank.
- Make sure that the oil is filled to the specified level.
- Make sure that the coolant is filled to the specified level.
- Inflate the tires to the appropriate pressure.
- Unload the trunk and vehicle, ensuring that the spare tire, tools, and jack are in their original positions.
- Sit a person of average weight (68 kg, 150 lb) in the driver's seat.

2. PREPARATION FOR HEADLIGHT AIMING (Using a headlight aim test machine)

(a) Adjust the headlight aim in accordance with the headlight aim test machine instructions.

3. PREPARATION FOR HEADLIGHT AIMING (Using a Screen)



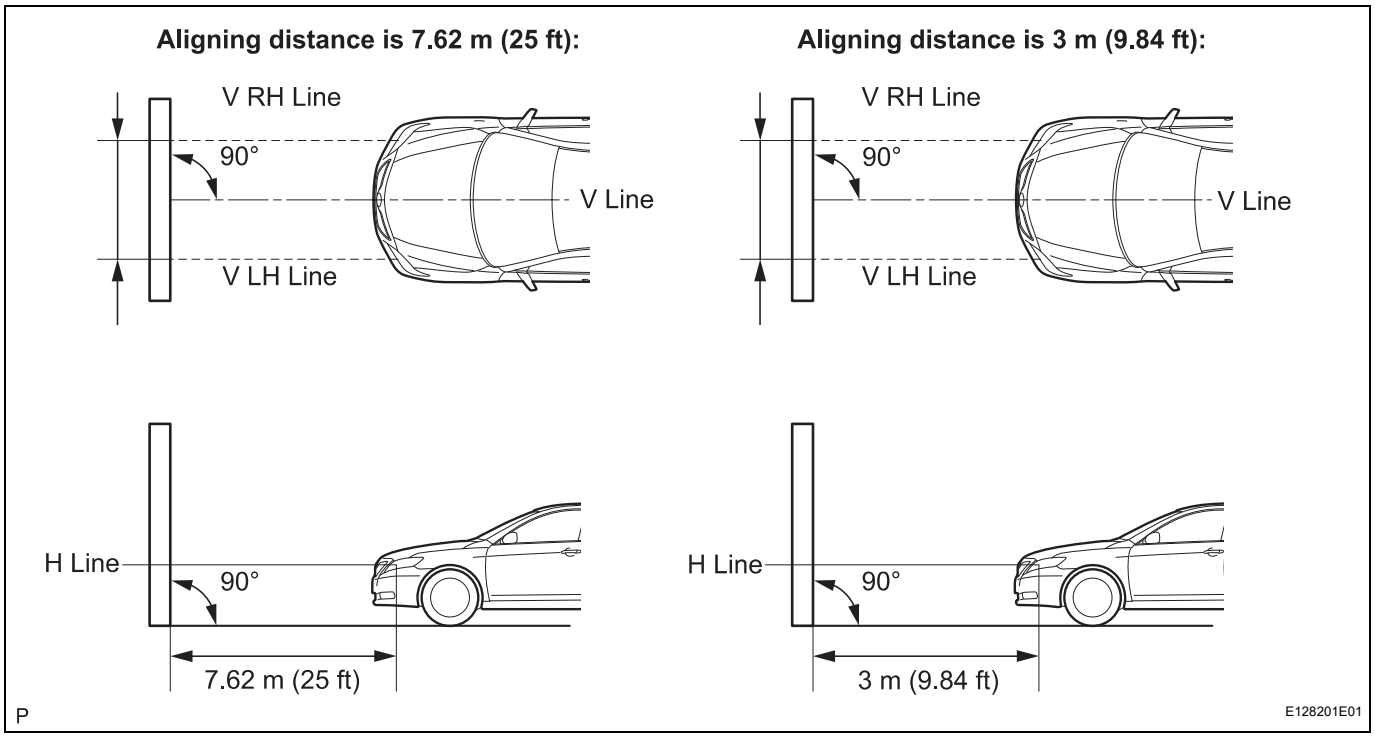
(a) Prepare the vehicle:
- Place the vehicle in a location that is dark enough to clearly observe the cutoff line. The cutoff line is a distinct line, below which light from the headlights can be observed and above which it cannot.
- Place the vehicle at a 90° angle to the wall.
- Create a 7.62 m (25 ft) distance between the vehicle (headlight bulb center) and the wall.
- Make sure that the vehicle is on a level surface.
- Bounce the vehicle up and down to settle the suspension.

NOTICE:
A distance of 7.62 m (25 ft) between the vehicle (headlight bulb center) and the wall is necessary for proper aim adjustment. If sufficient space is not available, secure a distance of exactly 3 m (9.84 ft) to allow for checking and adjustment of headlight aim. (The size of the target zone will change with the distance, so follow the instructions in the illustration.)

(b) Prepare a piece of thick white paper (approximately 2 m (6.6 ft) (height) x 4 m (13.1 ft) (width)) to use as a screen.

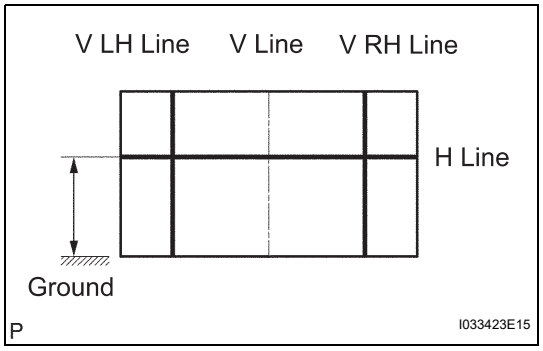
(c) Draw a vertical line down the center of the screen (V line).

(d) Set the screen as shown in the illustration.



HINT:

- Stand the screen perpendicular to the ground.
- Align the V line on the screen with the center of the vehicle.



(e) Draw base lines (H, V LH, and V RH lines) on the screen as shown in the illustration.

HINT:

- The base lines differ for "low-beam inspection" and "high-beam inspection".
- Mark the headlight bulb center marks on the screen. If the center mark cannot be observed on the headlight, use the center of the headlight bulb or the manufacturer's name marked on the headlight as the center mark.

(1) H Line (Headlight height):
Draw a horizontal line across the screen so that it passes through the center marks. The H line should be at the same height as the headlight bulb center marks of the low-beam headlights.

(2) V LH Line, V RH Line (Center mark position of left-hand (LH) and right-hand (RH) headlights):
Draw two vertical lines so that they intersect the H line at each center mark (aligned with the center of the low-beam headlight bulbs).

4. HEADLIGHT AIMING INSPECTION

(a) Cover the headlight or disconnect the connector of the headlight on the opposite side to prevent light from the headlight that is not being inspected from affecting the headlight aiming inspection.

NOTICE:

Do not keep the headlight covered for more than 3 minutes. The headlight lens is made of synthetic resin, which may melt or be damaged due to excessive heat.

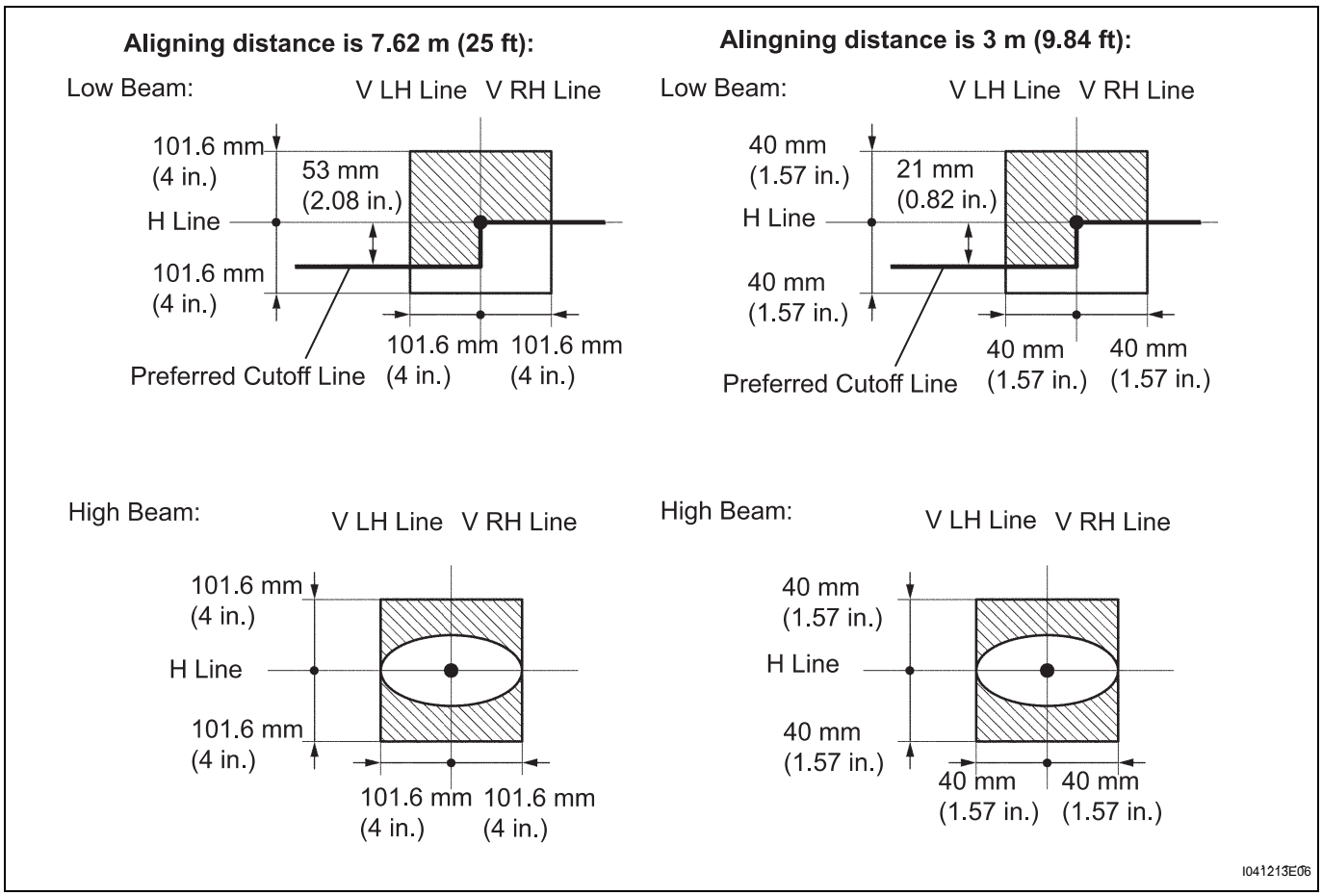
HINT:

When checking the aim of the high-beam, cover the low-beam or disconnect the connector.

(b) Start the engine.

(c) Replacement text:

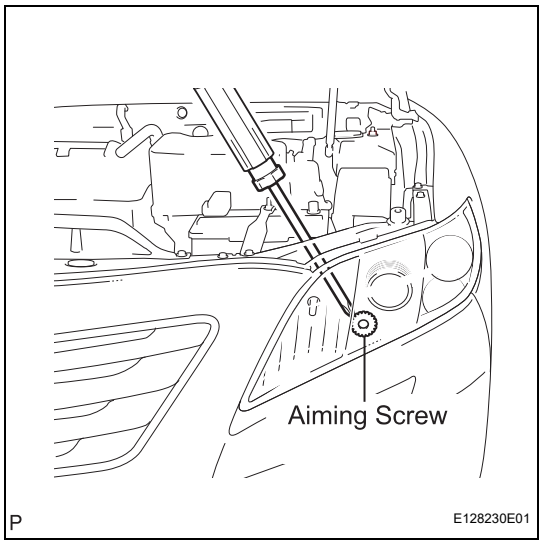
Turn on the headlight and check if the cutoff line matches the preferred cutoff line in the following illustration.



HINT:

- Since the low-beam light and the high-beam light are a unit, if the aim on the low beam is correct, the high beam should also be correct. However, check both beams just to make sure.

- If the alignment distance is 7.62 m (25 ft):
  The cutoff line should be within 101.6 mm (4 in.) above or below the H line as well as 101.6 mm (4 in.) left or right of the V line with low-beam (SAE J599).
- If the alignment distance is 3 m (9.84 ft):
  The low beam cutoff line should be within 40 mm (1.57 in.) above or below the H line as well as 40 mm (1.57 in.) left or right of the V line (SAE J599).
- If the alignment distance is 7.62 m (25 ft):
  The high beam center of intensity should be within 101.6 mm (4 in.) above or below the H line as well as 101.6 mm (4 in.) left or right of the V line (SAE J599).
- If the alignment distance is 3 m (9.84 ft):
  The high beam center of intensity should be within 40 mm (1.57 in.) above or below the H line as well as 40 mm (1.57 in.) left or right of the V line (SAE J599).
- If the alignment distance is 7.62 m (25 ft):
  The low beam cutoff line should be 53 mm (2.08 in.) below the H line (preferred cutoff line target).
- If the alignment distance is 3 m (9.84 ft):
  The low beam cutoff line should be 21 mm (0.82 in.) below the H line (preferred cutoff line target).



5. HEADLIGHT AIMING ADJUSTMENT

(a) Adjust the aim vertically:
Adjust the headlight aim into the specified range by turning aiming screw with a screwdriver.

NOTICE:

The final turn of the aiming screw should be made in the clockwise direction. If the screw is tightened excessively, loosen it and then retighten it, so that the final turn of the screw is in the clockwise direction.

HINT:

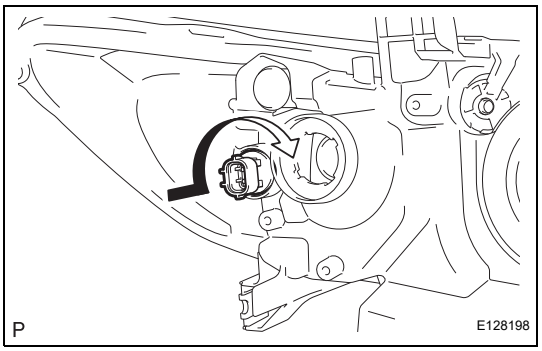
- Since the low-beam light and high-beam light are a unit, if the aim on the low beam is correct, the high beam should also be correct. If it is not possible to correctly adjust headlight aim, check bulb, headlight unit, and headlight unit reflector installation.
- The headlight aim moves up when turning the aiming screw clockwise, and moves down when turning the aiming screw counterclockwise.

REASSEMBLY

1. INSTALL FRONT SIDE MARKER LIGHT BULB

(a) Install the front side marker light bulb to the front side marker light socket.

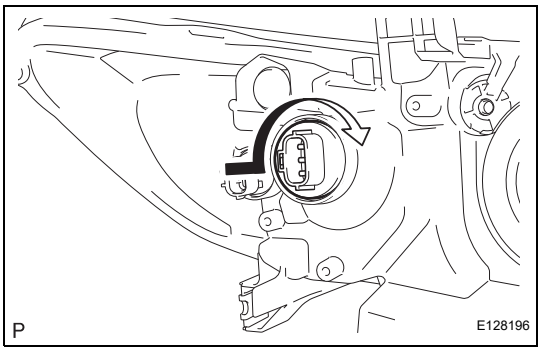
(b) Turn the front side marker light bulb and front side marker light socket in the direction indicated by the arrow and install them as a unit.



2. INSTALL FRONT TURN SIGNAL LIGHT BULB

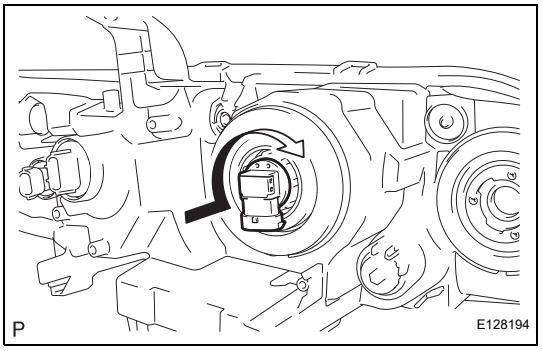
(a) Install the front turn signal light bulb to the front turn signal light socket.

(b) Turn the front turn signal light bulb and front turn signal light socket in the direction indicated by the arrow and install them as a unit.



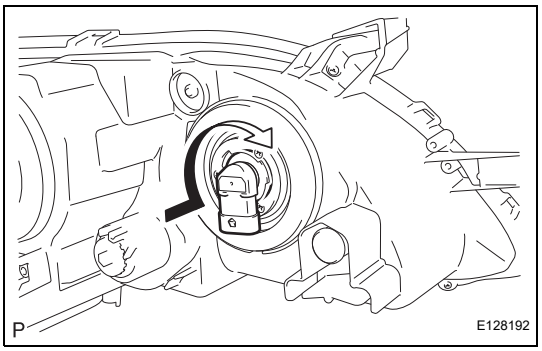
3. INSTALL NO. 2 HEADLIGHT BULB

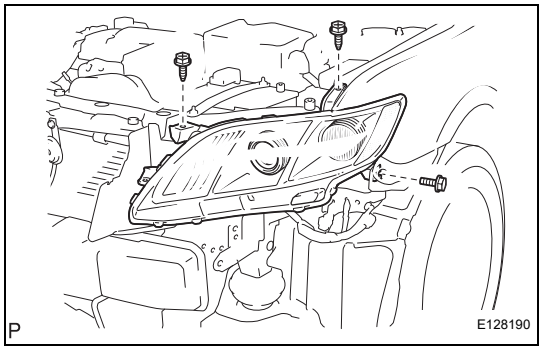
(a) Install the No. 2 headlight bulb as shown in the illustration.



4. INSTALL NO. 1 HEADLIGHT BULB

(a) Install the No. 1 headlight bulb as shown in the illustration.





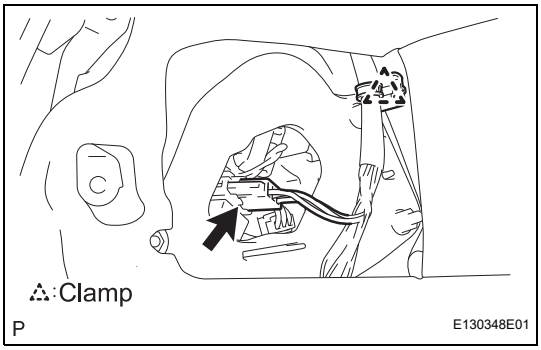
INSTALLATION

1. **INSTALL HEADLIGHT ASSEMBLY**
   (a) Connect the connectors.
   (b) Install the headlight assembly with the bolt and 2 screws.
   Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
2. **INSTALL FRONT BUMPER ASSEMBLY (See page ET-9)**
3. **VEHICLE PREPARATION FOR HEADLIGHT AIM ADJUSTMENT (See page LI-60)**
4. **PREPARATION FOR HEADLIGHT AIMING (Using a headlight aim test machine) (See page LI-61)**
5. **PREPARATION FOR HEADLIGHT AIMING (Using a screen) (See page LI-61)**
6. **HEADLIGHT AIMING INSPECTION (See page LI-63)**
7. **HEADLIGHT AIMING ADJUSTMENT (See page LI-64)**

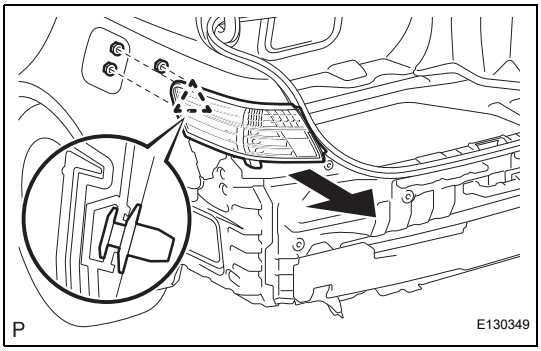
LI

REMOVAL

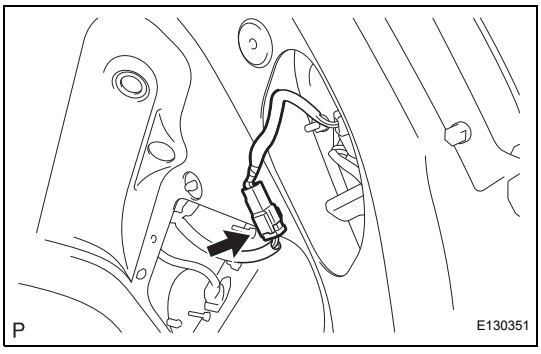
1. **REMOVE REAR BUMPER ASSEMBLY (See page ET-12)**
2. **REMOVE LUGGAGE COMPARTMENT FLOOR MAT**
3. **REMOVE SPARE WHEEL COVER CLAMP**
4. **REMOVE SPARE WHEEL COVER ASSEMBLY**
5. **REMOVE NO. 1 LUGGAGE COMPARTMENT TRIM HOOK (See page ED-97)**
6. **REMOVE REAR FLOOR FINISH PLATE (See page ED-97)**
7. **REMOVE REAR COMBINATION LIGHT ASSEMBLY**
   (a) Disconnect the connector and clamp.

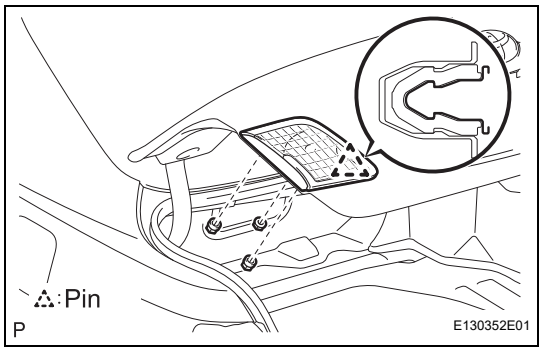


   (b) Remove the 3 nuts.
   (c) Disengage the clip and remove the rear combination light assembly.



8. **REMOVE LUGGAGE COMPARTMENT DOOR COVER (See page ET-50)**
9. **REMOVE REAR LIGHT ASSEMBLY**
   (a) Disconnect the connector.



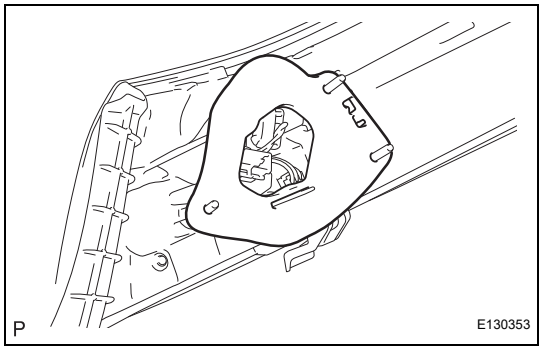


(b) Remove the 3 nuts.
(c) Disengage the pin and remove the rear light assembly.

DISASSEMBLY

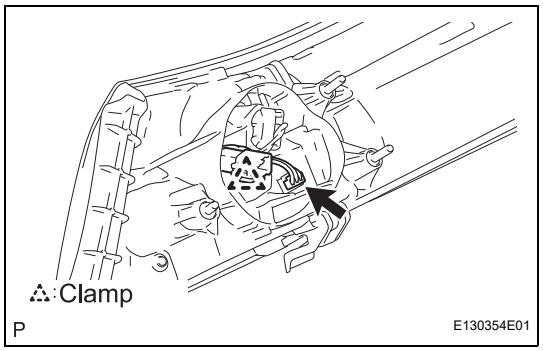
1. REMOVE REAR COMBINATION LIGHT GASKET

(a) Remove the rear combination light gasket.
NOTICE:
- **Be sure to remove the all traces of the old gasket from the body.**
- **Do not reuse the removed gasket. Be sure to install a new rear combination light gasket to prevent water ingress.**

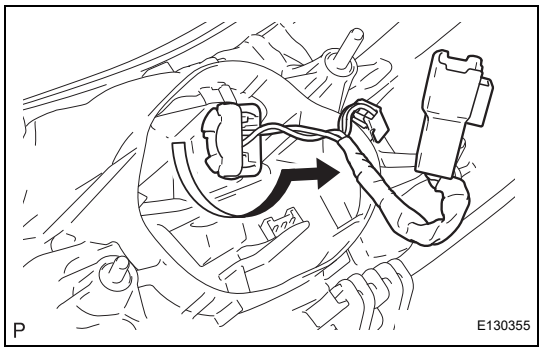


2. REMOVE REAR TURN SIGNAL LIGHT BULB

(a) Disconnect the connector and clamp.

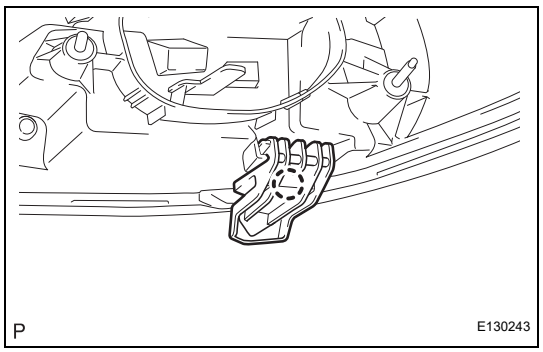


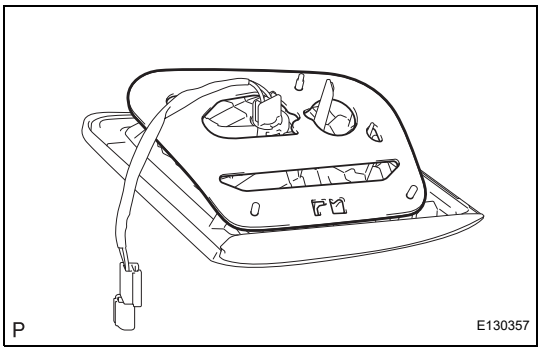
(b) Turn the rear turn signal light bulb and the rear combination light socket and wire in the direction indicated by the arrow and disconnect them as a unit.
(c) Remove the rear turn signal light bulb from the rear combination light socket and wire.



3. REMOVE REAR BUMPER RETAINER UPPER

(a) Disengage the claw and remove the rear bumper retainer upper.



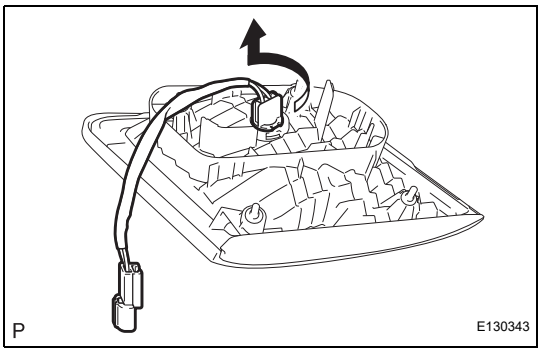


4. REMOVE REAR LIGHT GASKET

(a) Remove the rear light gasket.

NOTICE:

- **Be sure to remove all traces of the old gasket from the body.**
- **Do not reuse the removed gasket. Be sure to install a new rear light gasket to prevent water ingress.**



5. REMOVE BACK UP LIGHT BULB

(a) Turn the back up light bulb and the rear light socket and wire in the direction indicated by the arrow and remove them as a unit.

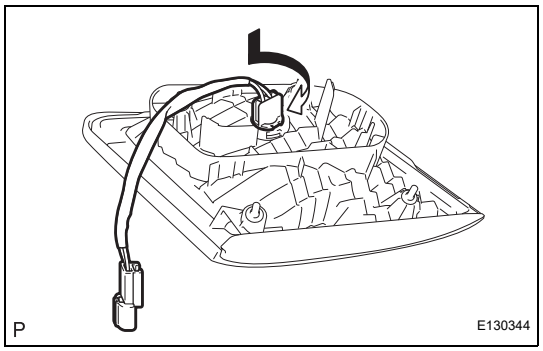
(b) Remove the back up light bulb from the rear light socket and wire.

REASSEMBLY

1. INSTALL BACK UP LIGHT BULB

(a) Install the back up light bulb to the rear light socket and wire.

(b) Turn the back up light bulb and rear light socket and wire in the direction indicated by the arrow and install them as a unit.

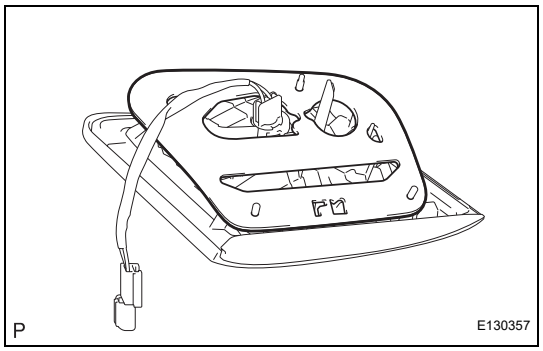


2. INSTALL REAR LIGHT GASKET

(a) Install a new rear light gasket.

NOTICE:

- **Be sure to remove all traces of the old gasket from the body.**
- **Do not reuse the removed gasket. Be sure to install a new rear light gasket to prevent water ingress.**

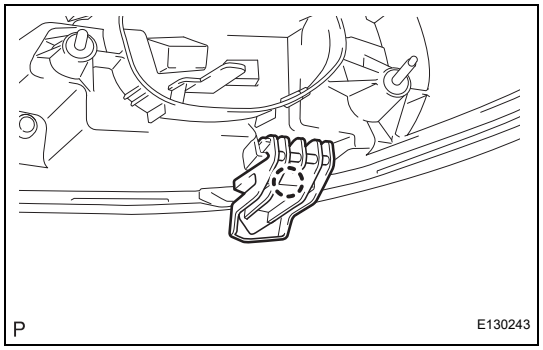


3. INSTALL REAR BUMPER RETAINER UPPER

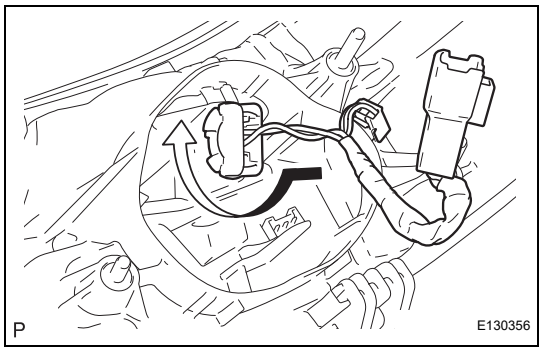
(a) Engage the claw and install the rear bumper retainer upper.

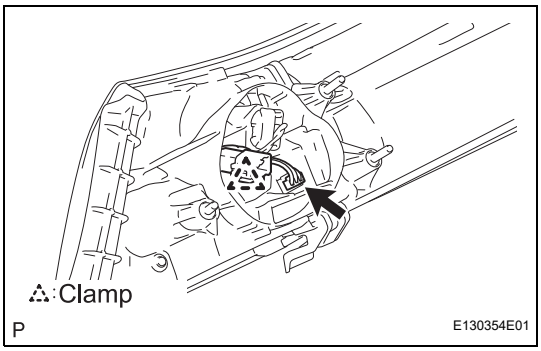
4. INSTALL REAR TURN SIGNAL LIGHT BULB

(a) Install the rear turn signal light bulb to the rear combination light socket and wire.



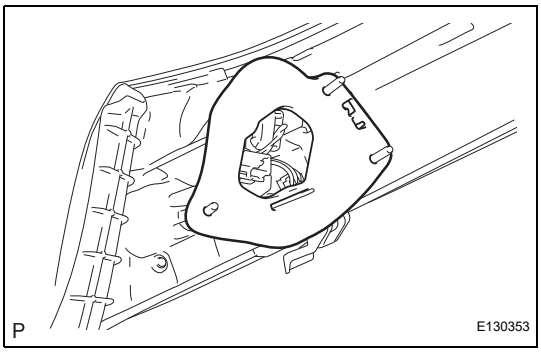
(b) Turn the rear turn signal light bulb and rear combination light socket and wire in the direction indicated by the arrow and install them as a unit.





(c) Connect the connector and clamp.

LI

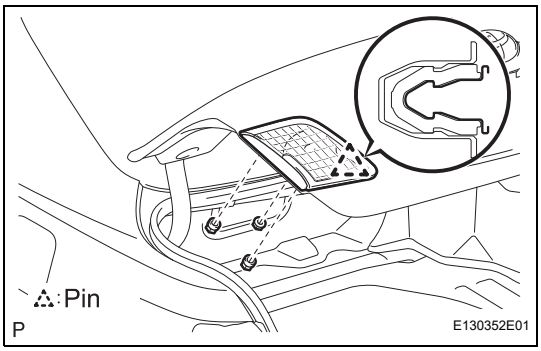


5. INSTALL REAR COMBINATION LIGHT GASKET

(a) Install a new rear combination light gasket.

NOTICE:

- **Be sure to remove all traces of the old gasket from the body.**
- **Do not reuse the removed gasket. Be sure to install a new rear combination light gasket to prevent water ingress.**



INSTALLATION

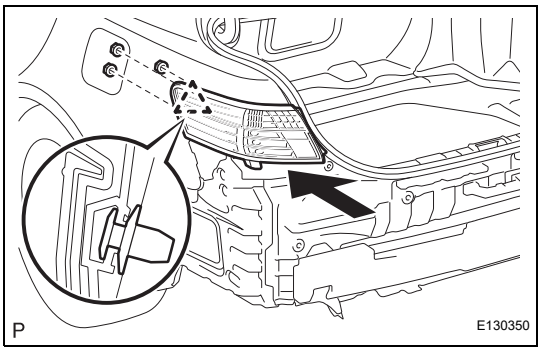
1. INSTALL REAR LIGHT ASSEMBLY

(a) Engage the pin and install the rear light assembly.

(b) Install the 3 nuts.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

2. INSTALL LUGGAGE COMPARTMENT DOOR COVER (See page ET-53)

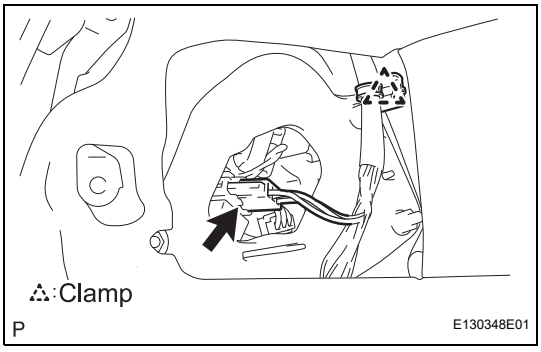


3. INSTALL REAR COMBINATION LIGHT ASSEMBLY

(a) Engage the clip and install the rear combination light assembly.

(b) Install the 3 nuts.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



(c) Connect the connector and clamp.

4. INSTALL REAR FLOOR FINISH PLATE (See page ED-103)

5. INSTALL NO. 1 LUGGAGE COMPARTMENT TRIM HOOK (See page ED-103)

6. INSTALL SPARE WHEEL COVER ASSEMBLY

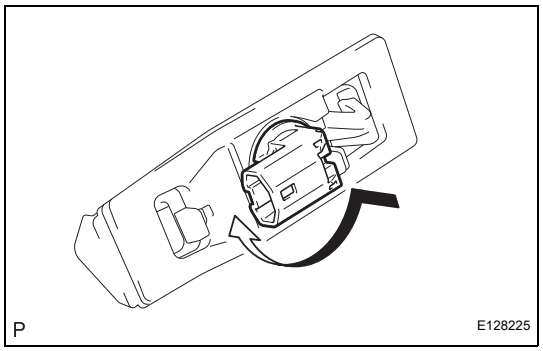
7. INSTALL SPARE WHEEL COVER CLAMP

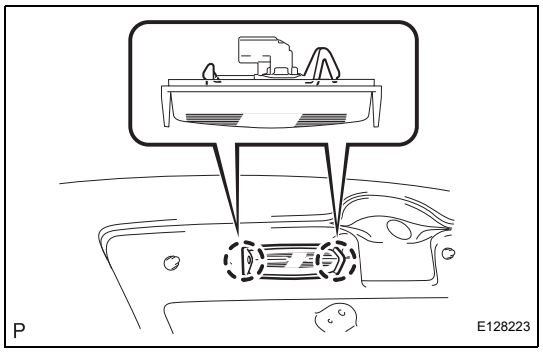
8. INSTALL LUGGAGE COMPARTMENT FLOOR MAT

9. **INSTALL REAR BUMPER ASSEMBLY (See page ET-16)**

REASSEMBLY

1. **INSTALL LICENSE PLATE LIGHT BULB**
   (a) Install the license plate light bulb to the license plate light socket.
   (b) Turn the license plate light bulb and the license plate light socket in the direction indicated by the arrow and install them as a unit.



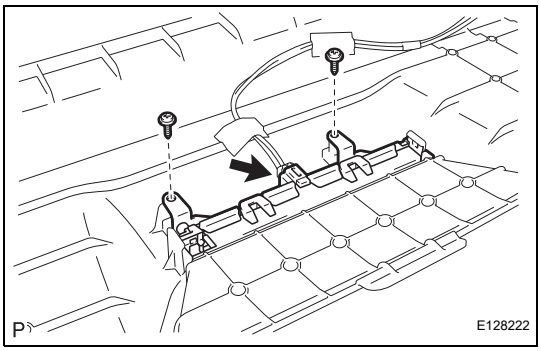


INSTALLATION

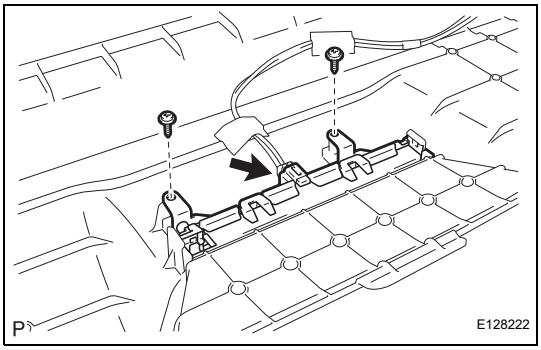
1. **INSTALL LICENSE PLATE LIGHT ASSEMBLY**
   (a) Engage the 2 claws to install the license plate light assembly.
   (b) Connect the connector.
2. **INSTALL LUGGAGE COMPARTMENT DOOR OUTSIDE GARNISH (See page ET-52)**
3. **INSTALL LUGGAGE COMPARTMENT DOOR LOCK CYLINDER ASSEMBLY (See page ED-87)**
4. **INSTALL LUGGAGE DOOR OPENING SWITCH ASSEMBLY (See page DL-193)**
5. **INSTALL LUGGAGE COMPARTMENT DOOR COVER (See page ET-53)**

REMOVAL

1. REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-44)
2. REMOVE REAR SEAT HEADREST ASSEMBLY
3. REMOVE REAR CENTER SEAT HEADREST ASSEMBLY
4. REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-44)
5. REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-44)
6. REMOVE REAR SIDE SEATBACK ASSEMBLY LH (See page SE-45)
7. REMOVE REAR SIDE SEATBACK ASSEMBLY RH (See page SE-45)
8. REMOVE REAR DOOR SCUFF PLATE LH (See page IR-13)
9. DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH
10. REMOVE REAR DOOR SCUFF PLATE RH (See page IR-13)
11. DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH
12. REMOVE CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH (See page SB-51)
13. DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (See page SB-33)
14. REMOVE ROOF SIDE INNER GARNISH LH (See page IR-15)
15. REMOVE ROOF SIDE INNER GARNISH RH (See page IR-15)
16. DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-40)
17. DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-41)
18. REMOVE REAR SEAT SHOULDER BELT COVER (See page SB-33)
19. REMOVE REAR SEAT SHOULDER BELT HOLE COVER (See page SB-33)
20. REMOVE PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-33)



21. **REMOVE CENTER STOP LIGHT SET**
    (a) Disconnect the connector.
    (b) Remove the 2 screws and the center stop light set.



INSTALLATION

1. **INSTALL CENTER STOP LIGHT SET**
    (a) Connect the connector.
    (b) Install the center stop light set with the 2 screws.
    Torque: 1.6 N*m (16 kgf*cm, 14 in.*lbf)
2. **INSTALL PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-34)**
3. **INSTALL REAR SEAT SHOULDER BELT HOLE COVER (See page SB-35)**
4. **INSTALL REAR SEAT SHOULDER BELT COVER (See page SB-35)**
5. **CONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-42)**
6. **CONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-42)**
7. **INSTALL ROOF SIDE INNER GARNISH LH (See page IR-39)**
8. **INSTALL ROOF SIDE INNER GARNISH RH (See page IR-39)**
9. **CONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (See page SB-35)**
10. **INSTALL CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH (See page SB-51)**
11. **CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH**
12. **INSTALL REAR DOOR SCUFF PLATE LH (See page IR-41)**
13. **CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH**
14. **INSTALL REAR DOOR SCUFF PLATE RH (See page IR-43)**
15. **INSTALL REAR SIDE SEATBACK ASSEMBLY LH (See page SE-54)**
16. **INSTALL REAR SIDE SEATBACK ASSEMBLY RH**
17. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-54)**

18. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-54)**
19. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**
20. **INSTALL REAR SEAT HEADREST ASSEMBLY**
21. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-55)**

INSTALLATION

1. **INSTALL ROOF CONSOLE BOX ASSEMBLY (See page IR-38)**

INSTALLATION

1. **INSTALL NO. 1 ROOM LIGHT ASSEMBLY (w/o Sliding Roof) (See page IR-36)**
2. **INSTALL SPOT LIGHT ASSEMBLY (w/ Sliding Roof) (See page IR-35)**

INSTALLATION

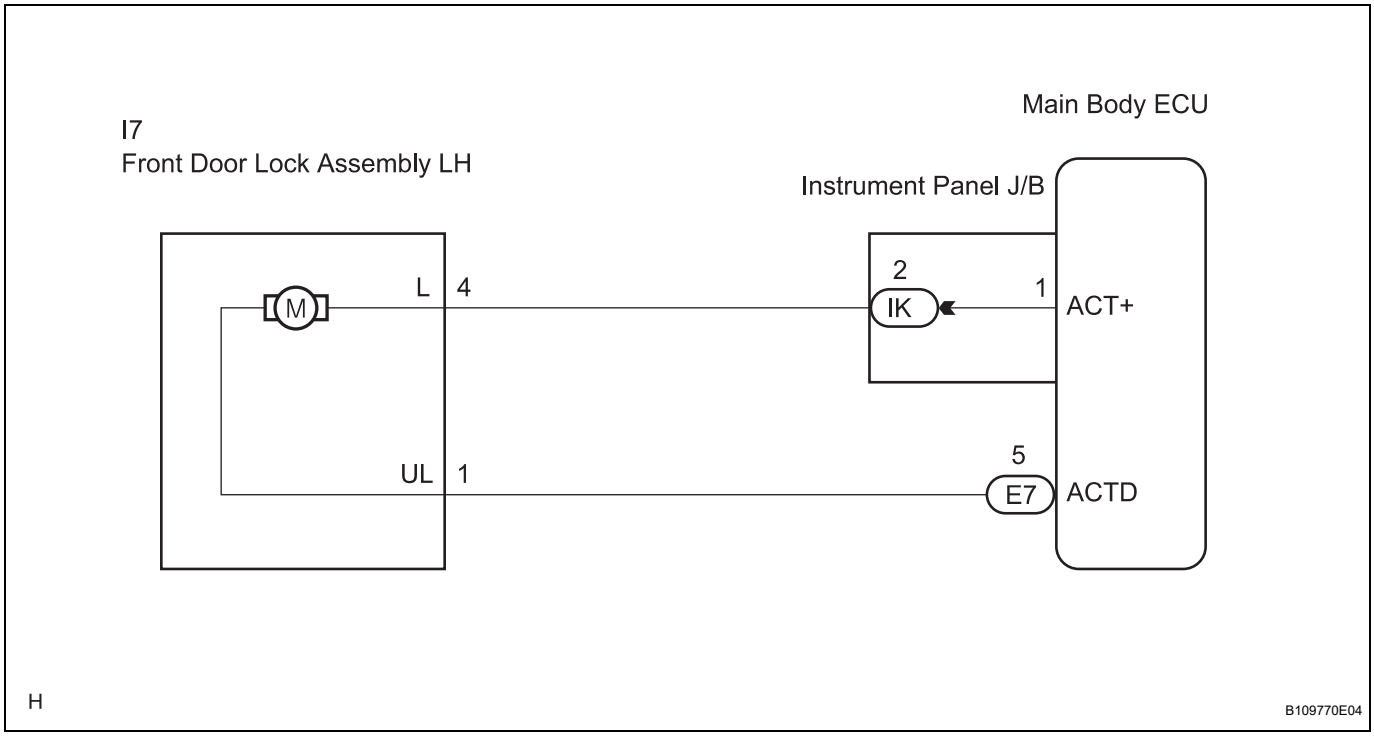
1. **INSTALL DOOR COURTESY LIGHT ASSEMBLY (See page ED-42)**

Driver Side Door Lock Motor Circuit

DESCRIPTION

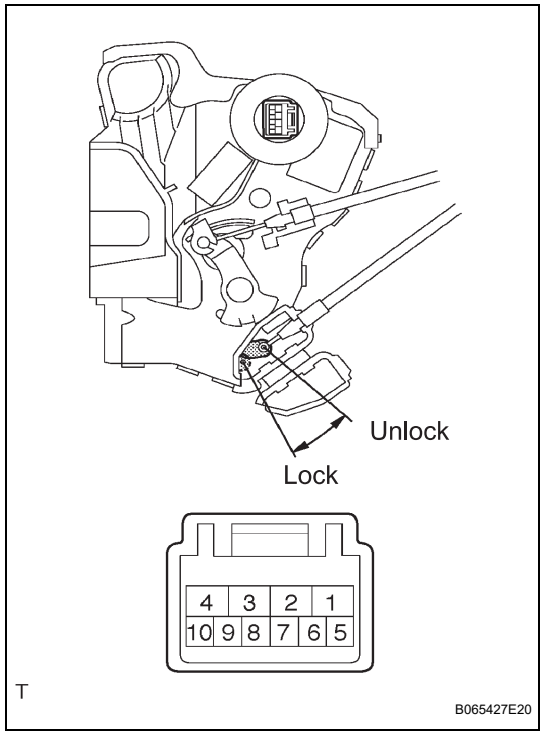
The driver's door lock motor is built into the driver's door lock assembly.
The main body ECU controls the driver's door lock motor to lock/unlock the driver's door. This ECU applies current from terminal ACT+ to terminal ACTD to operate the motor to lock the door. It reverses the direction of the current flow to operate the motor to unlock the door.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**INSPECT FRONT DOOR LOCK ASSEMBLY (DOOR LOCK MOTOR)**



(a) Remove the front door lock assembly LH.
(b) Apply battery voltage and check operation of the door lock motor.
OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock

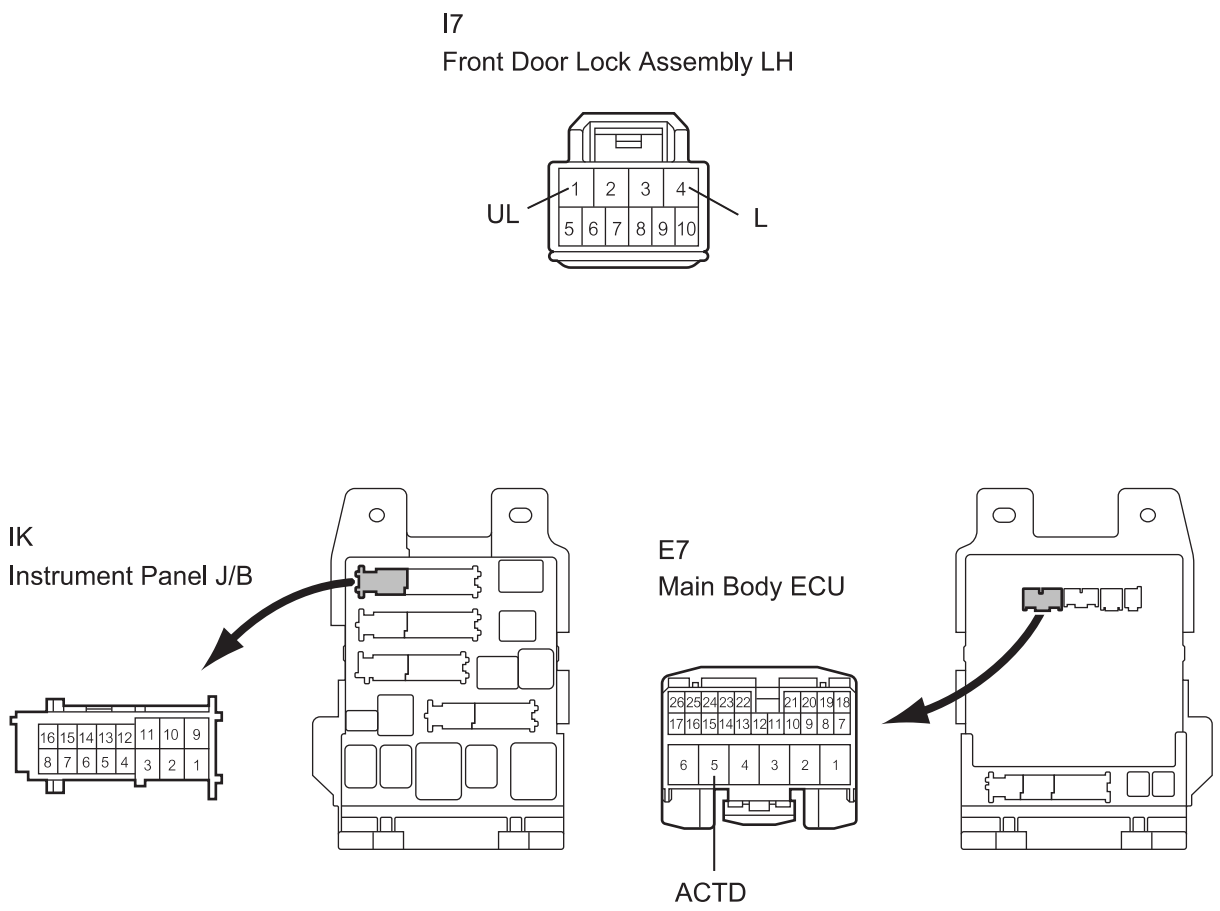
NG → **REPLACE FRONT DOOR LOCK ASSEMBLY**

OK

2	**CHECK WIRE HARNESS (FRONT DOOR LOCK - MAIN BODY ECU (INSTRUMENT PANEL J/B))**

(a) Disconnect the front door lock assembly LH connector.

Wire Harness Side:



(b) Disconnect the ECU (instrument panel J/B) connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
I7-4 (L) - IK-2	Always	Below 1 Ω
I7-1 (UL) - E7-5 (ACTD)	Always	Below 1 Ω
IK-2 - Body ground	Always	10 kΩ or higher
E7-5 (ACTD) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

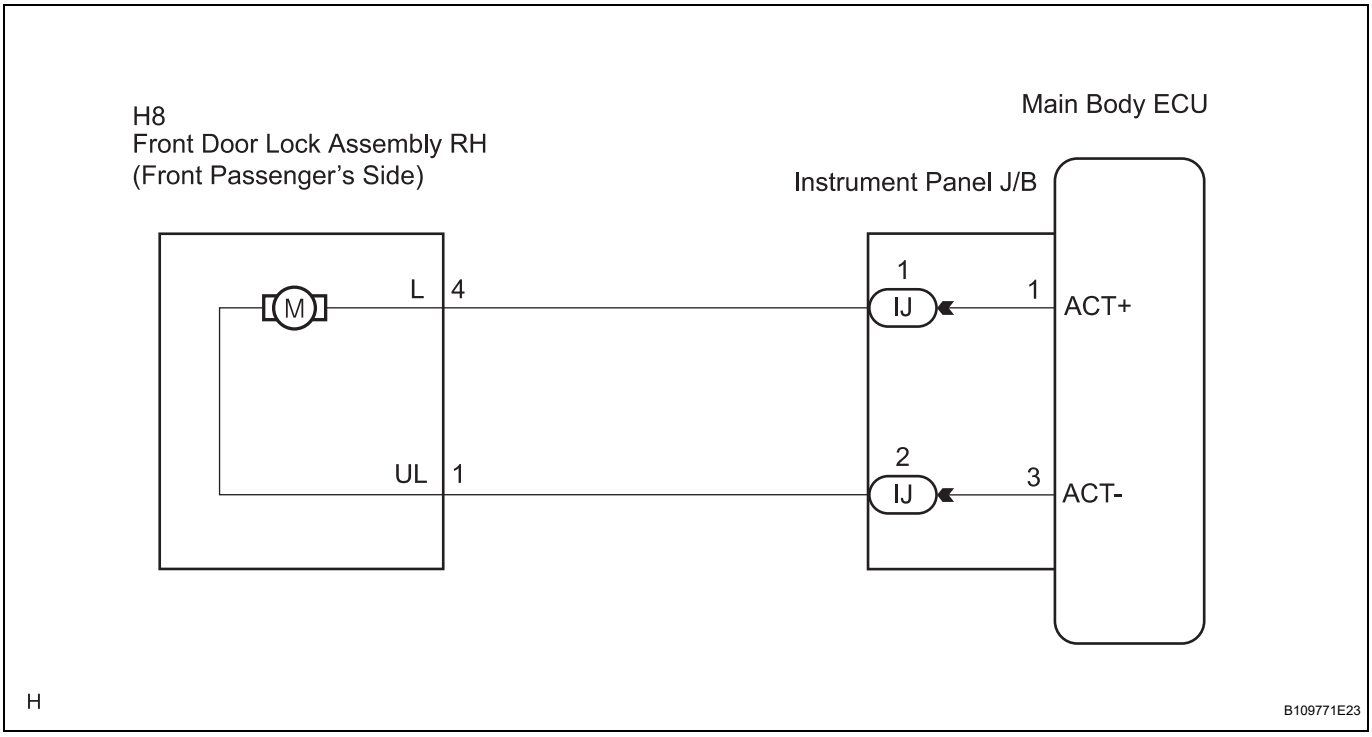
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Front Passenger Side Door Lock Motor Circuit

DESCRIPTION

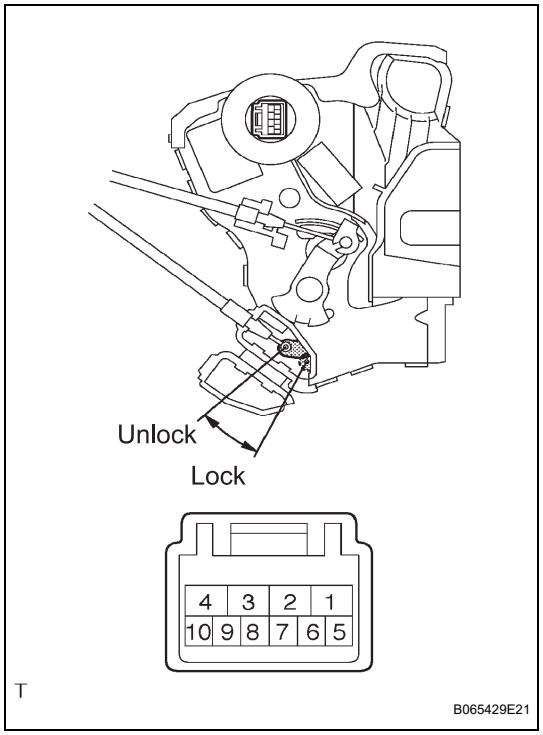
The front passenger door lock motor is built into the front passenger door lock assembly.
The main body ECU controls the front passenger door lock motor to lock/unlock the front passenger door. This ECU applies current from terminal ACT+ to terminal ACT- to operate the motor to lock the door. It reverses the direction of the current flow to operate the motor to unlock the door.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**INSPECT FRONT DOOR LOCK ASSEMBLY (DOOR LOCK MOTOR)**



(a) Remove the front door lock assembly RH.
(b) Apply battery voltage and check operation of the door lock motor.
OK

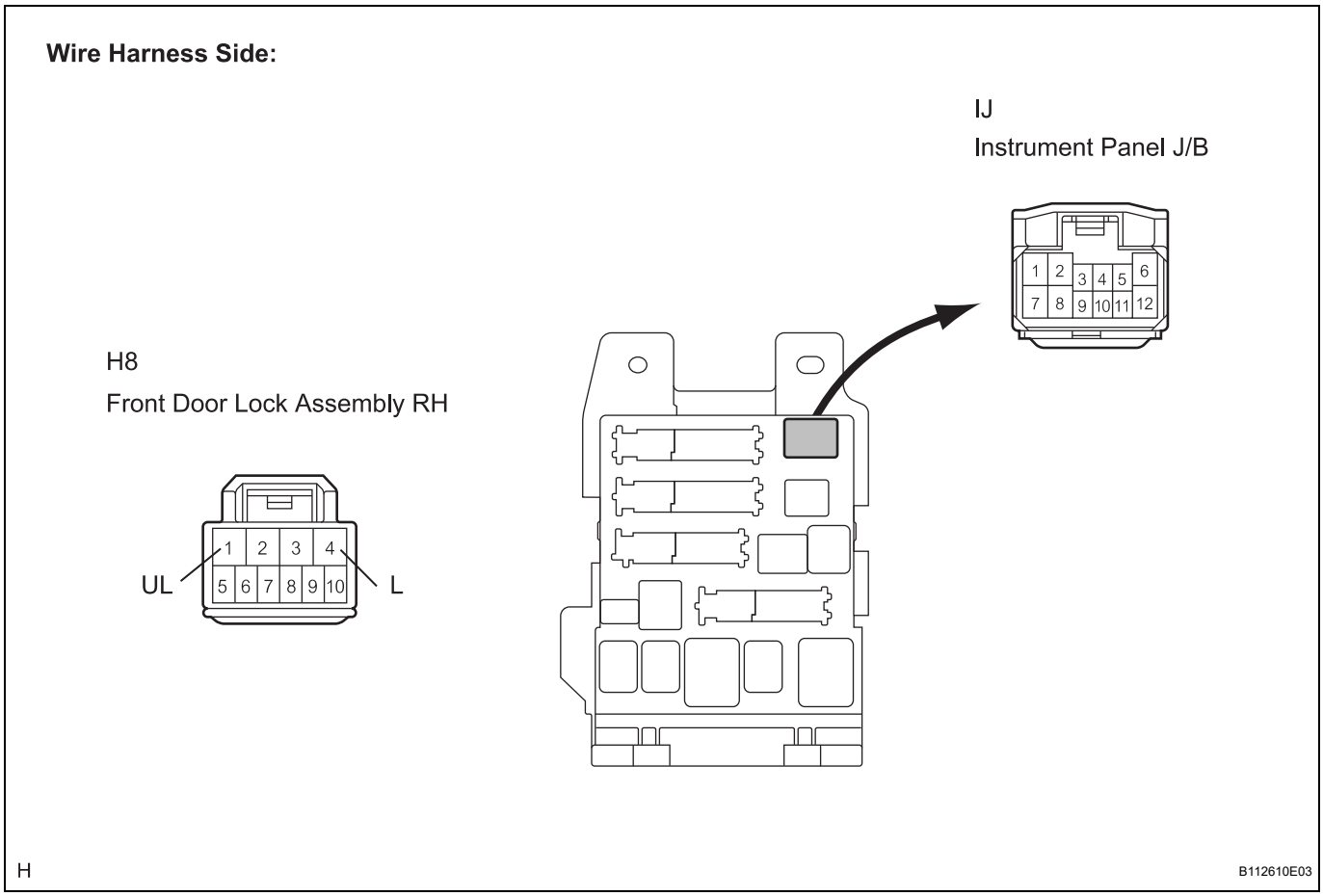
Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock

NG → **REPLACE FRONT DOOR LOCK ASSEMBLY**

OK

2	**CHECK WIRE HARNESS (FRONT DOOR LOCK - MAIN BODY ECU (INSTRUMENT PANEL J/B))**

(a) Disconnect the front door lock assembly RH connector.



(b) Disconnect the ECU (instrument panel J/B) connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
H8-4 (L) - IJ-1	Always	Below 1 Ω
H8-1 (UL) - IJ-2	Always	Below 1 Ω
IJ-1 - Body ground	Always	10 kΩ or higher
IJ-2 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

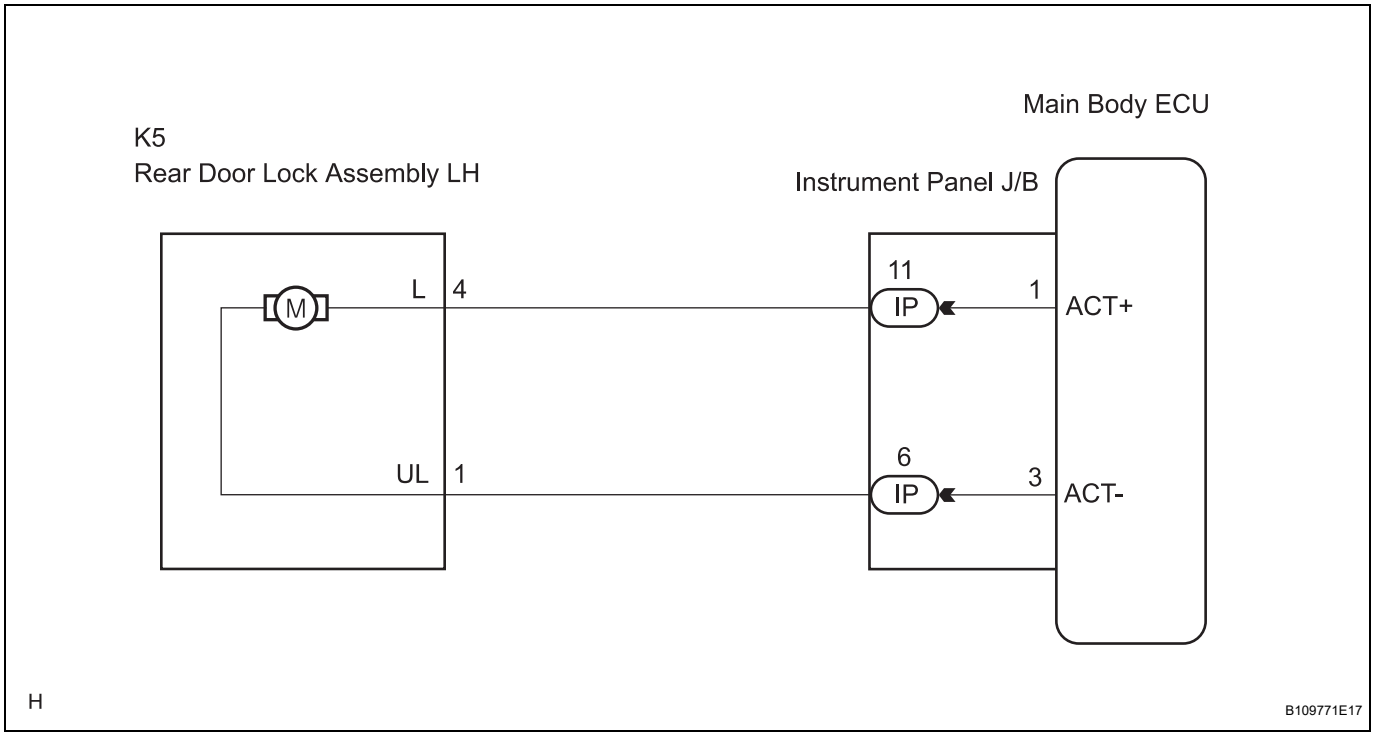
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Rear Door Lock Motor LH Circuit

DESCRIPTION

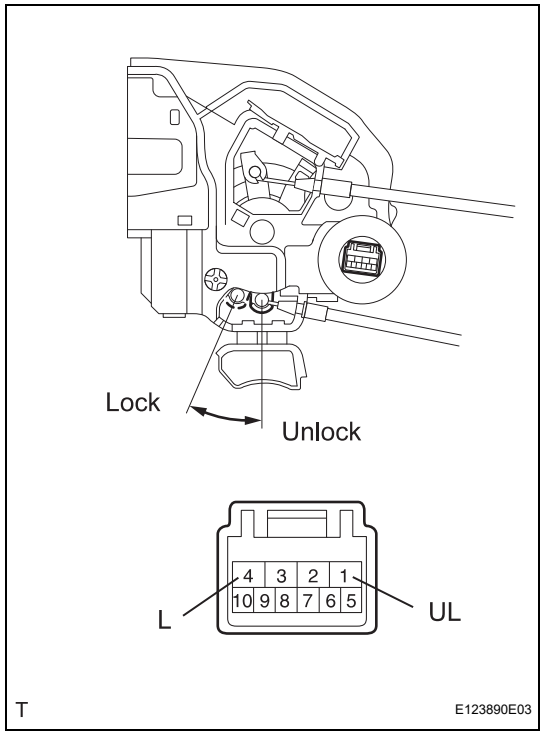
The rear left door lock motor is built into the rear left door lock assembly.
The main body ECU controls the rear left door lock motor to lock/unlock the rear left door. This ECU applies current from terminal ACT+ to terminal ACT- to operate the motor to lock the door. It reverses the direction of the current flow to operate the motor to unlock the door.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT REAR DOOR LOCK ASSEMBLY



(a) Remove the rear door lock assembly LH.
(b) Apply battery voltage and check operation of the door lock motor.

OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock

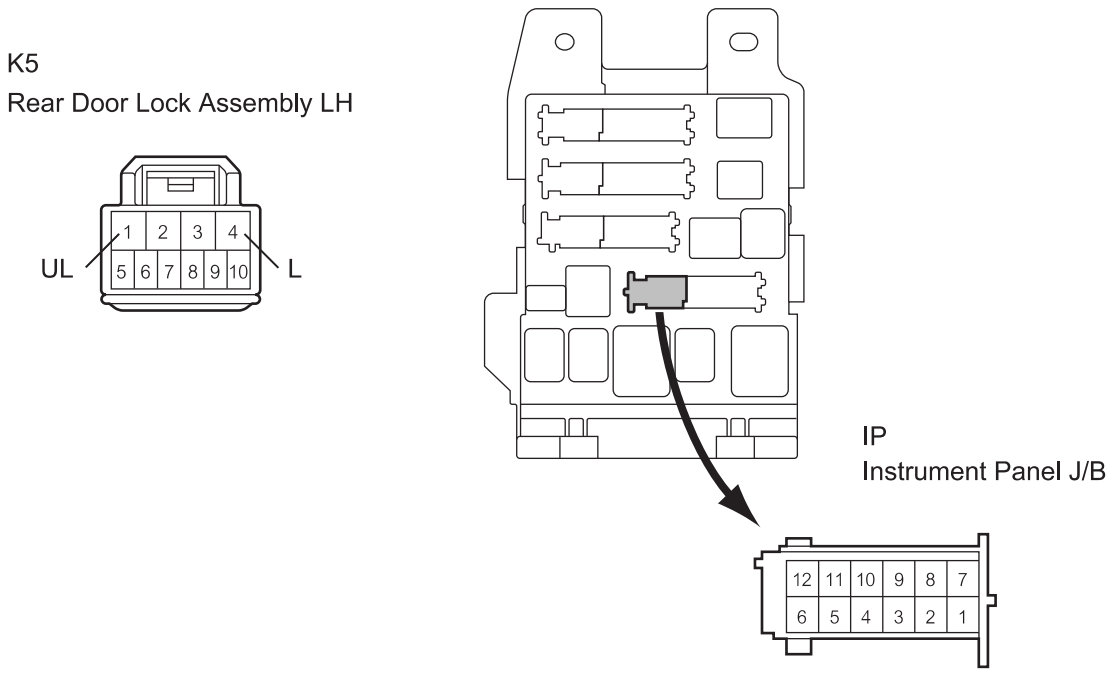
NG → **REPLACE REAR DOOR LOCK ASSEMBLY**

OK

2	CHECK WIRE HARNESS (REAR DOOR LOCK - MAIN BODY ECU (INSTRUMENT PANEL J/B))

(a) Disconnect the rear door lock assembly LH connector.

Wire Harness Side:



(b) Disconnect the ECU (instrument panel J/B) connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
K5-4 (L) - IP-11	Always	Below 1 Ω
K5-1 (UL) - IP-6	Always	Below 1 Ω
IP-11 - Body ground	Always	10 kΩ or higher
IP-6 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

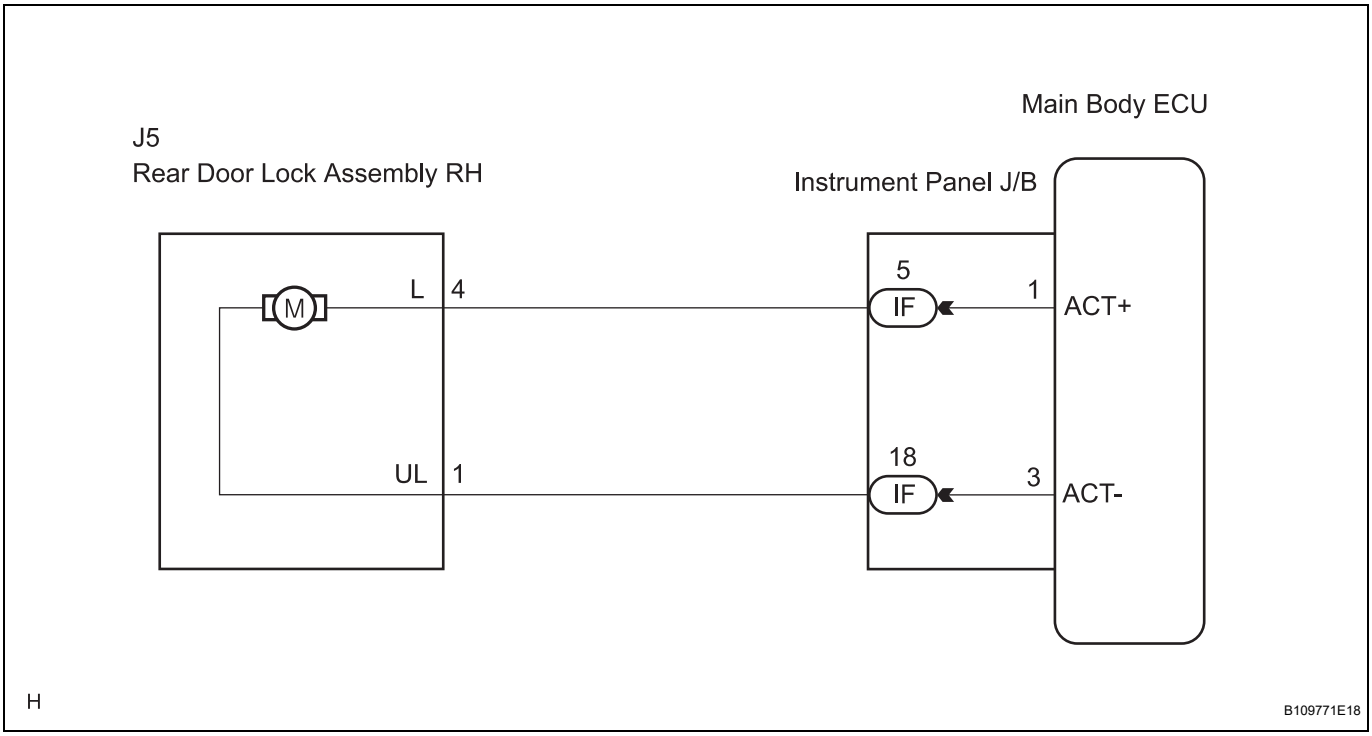
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Rear Door Lock Motor RH Circuit

DESCRIPTION

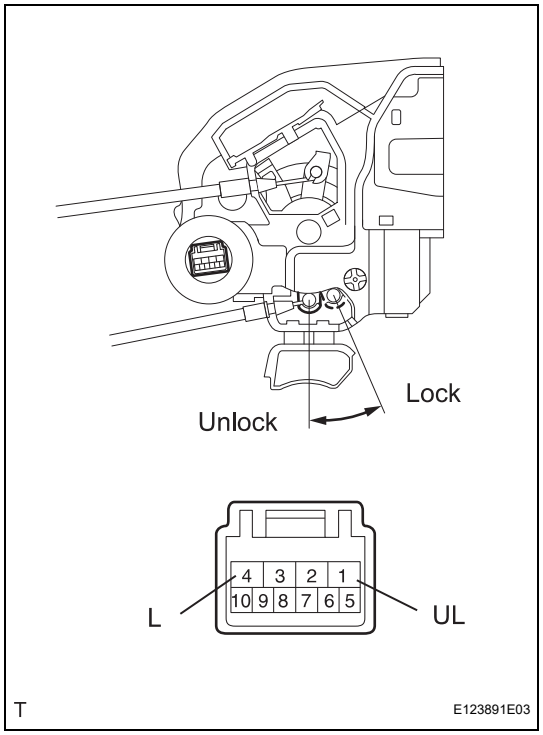
The rear right door lock motor is built into the rear right door lock assembly.
The main body ECU controls the rear right door lock motor to lock/unlock the rear right door. This ECU applies current from terminal ACT+ to terminal ACT- to operate the motor to lock the door. It reverses the direction of the current flow to operate the motor to unlock the door.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT REAR DOOR LOCK ASSEMBLY



(a) Remove the rear door lock assembly RH.
(b) Apply battery voltage and check operation of the door lock motor.
OK

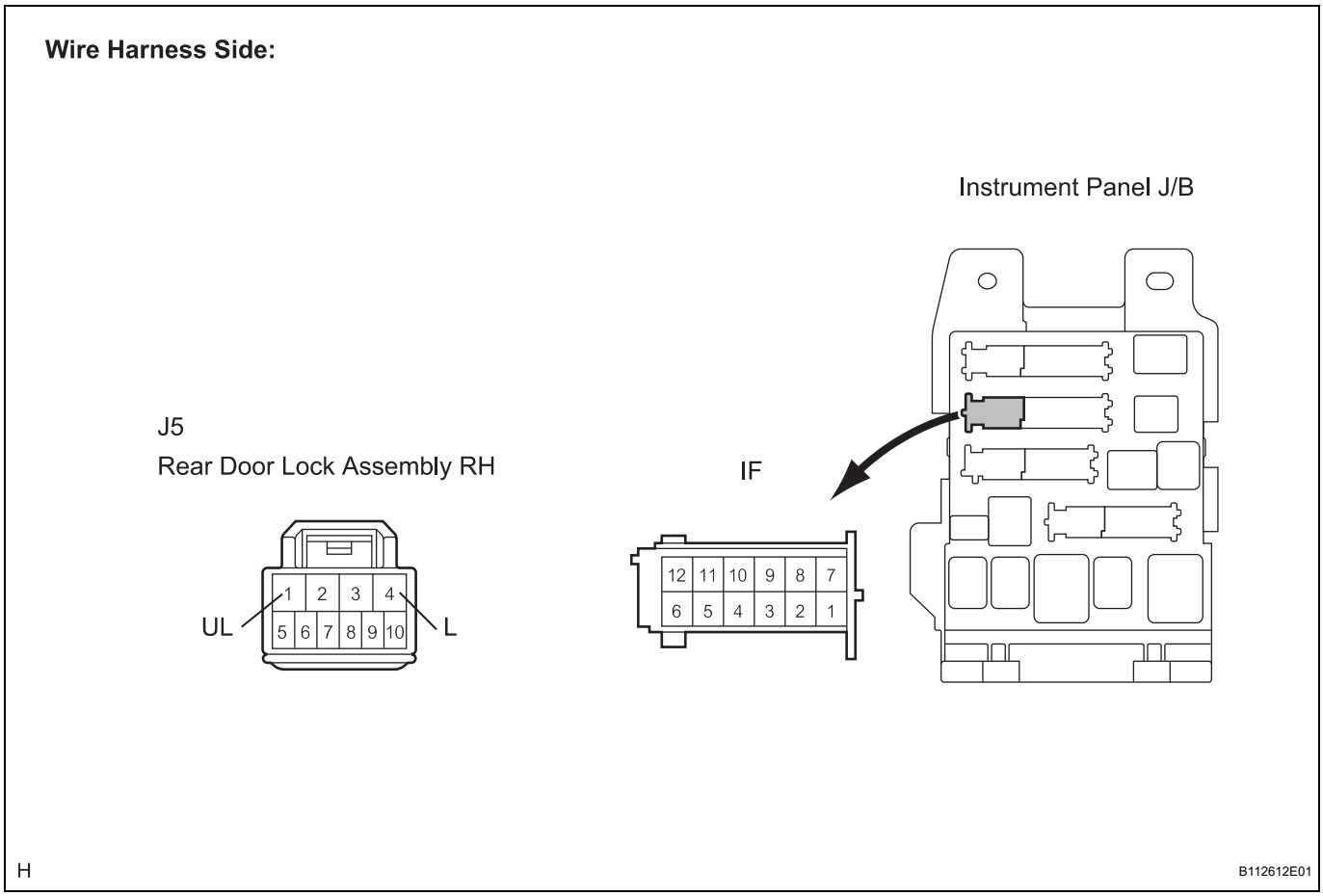
Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock

NG → **REPLACE REAR DOOR LOCK ASSEMBLY**

OK

2	CHECK WIRE HARNESS (REAR DOOR LOCK - MAIN BODY ECU (INSTRUMENT PANEL J/B))

(a) Disconnect the rear door lock assembly RH connector.



(b) Disconnect the ECU (instrument panel J/B) connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
J5-4 (L) - IF-5	Always	Below 1 Ω
J5-1 (UL) - IF-18	Always	Below 1 Ω
IF-5 - Body ground	Always	10 kΩ or higher
IF-18 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

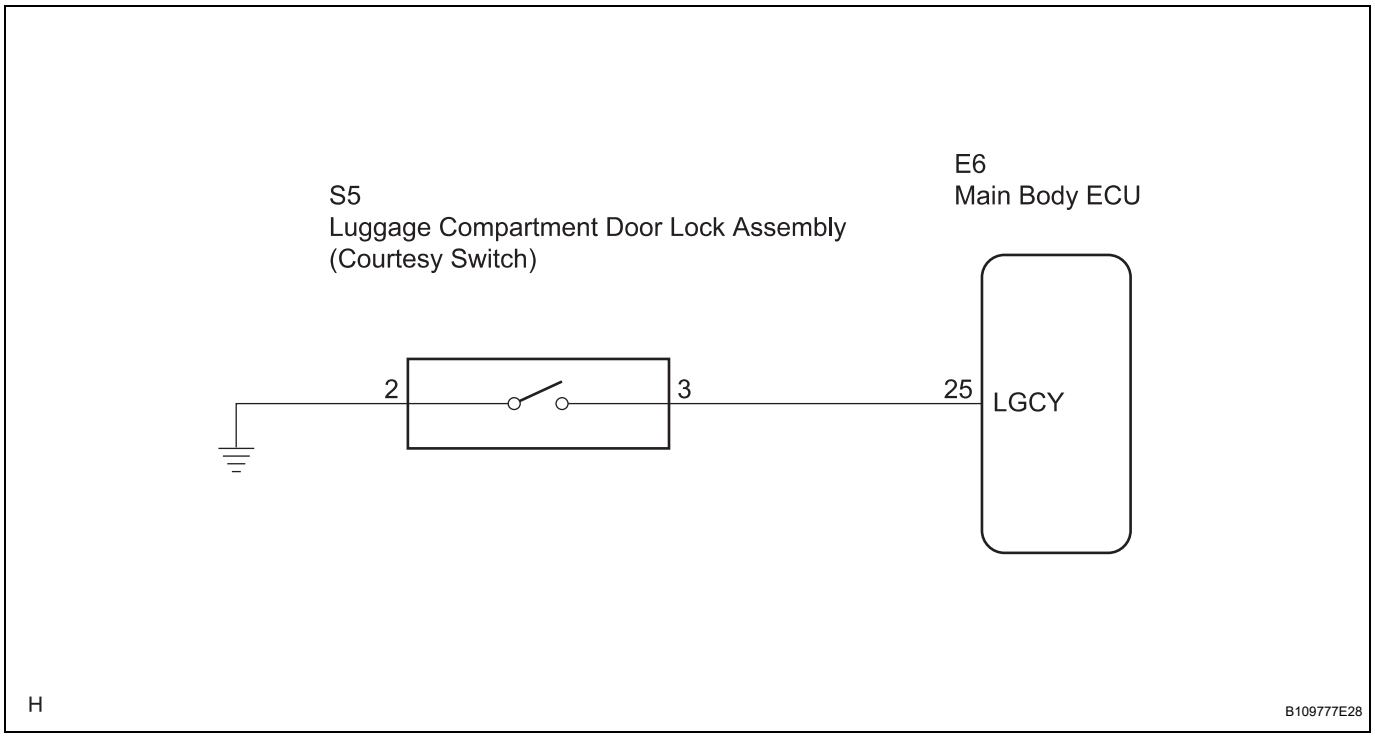
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Luggage Compartment Door Courtesy Switch Circuit

DESCRIPTION

The door courtesy switch turns on when the door is open and turns off when the door is closed.
The main body ECU detects the condition of the door courtesy switch.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF DATA LIST (DOOR COURTESY SWITCH)

(a) Check the DATA LIST for proper functioning of the door courtesy switch.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
LUGG COURTSY SW	Luggage compartment door courtesy light switch signal / ON or OFF	ON: Luggage compartment door is OPEN OFF: Luggage compartment door is CLOSED	-

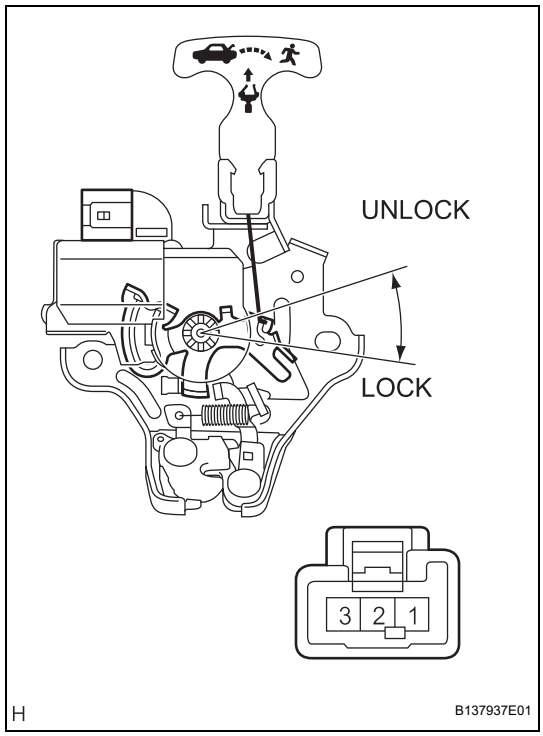
OK:
"ON" (door is open) and "OFF" (door is closed) appear on the screen.

NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2	**INSPECT LUGGAGE COMPARTMENT DOOR LOCK ASSEMBLY (DOOR COURTESY SWITCH)**



(a) Remove the luggage compartment door lock.
(b) Measure the resistance between the specified terminals of the switch.

Standard resistance

Tester Connection	Condition	Specified Condition
2 - 3	UNLOCK	Below 1 Ω
2 - 3	LOCK	10 kΩ or higher

NG → **REPLACE LUGGAGE COMPARTMENT DOOR LOCK ASSEMBLY**

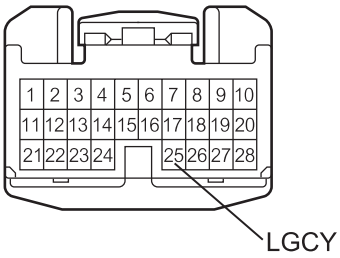
OK

DL

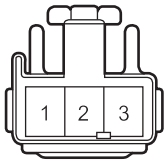
3	CHECK WIRE HARNESS (LUGGAGE COMPARTMENT DOOR LOCK - MAIN BODY ECU)

Wire Harness Side:

E6 Main Body ECU



S5 Luggage Compartment Door Lock Assembly (Door Courtesy Switch)



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(a) Disconnect the ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
S5-3 - E6-25 (LGCY)	Always	Below 1 Ω
S5-3 - Body ground	Always	10 kΩ or higher
S5-2 - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

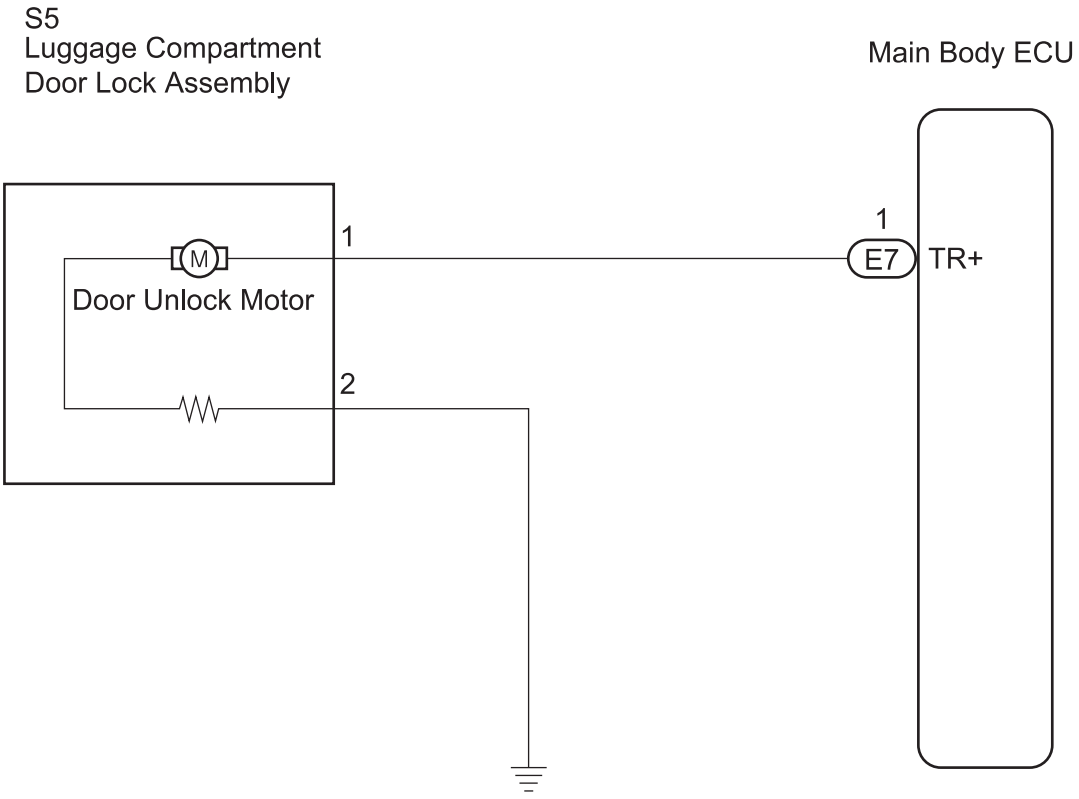
DL

Luggage Compartment Door Lock Circuit

DESCRIPTION

The luggage compartment door unlock motor is built into the luggage compartment door lock assembly. The main body ECU receives a luggage compartment door unlock signal from the luggage compartment door lock cylinder or electrical key switch and operates the door unlock motor.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST (LUGGAGE COMPARTMENT DOOR)

(a) Select the ACTIVE TEST, use the intelligent tester to generate a control command, and then check that the door lock operates.

MAIN BODY:

Item	Test Details	Diagnostic Note
TRUNK/BDOR OPEN	Operate luggage compartment door unlock motor UNLOCK	-

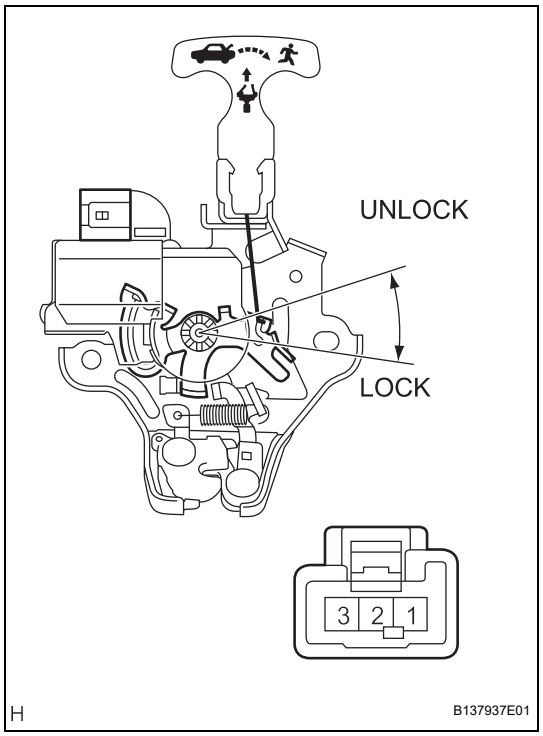
OK:
Door lock is locked/unlocked.

NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2 INSPECT LUGGAGE COMPARTMENT DOOR LOCK ASSEMBLY (DOOR LOCK MOTOR)



(a) Remove the luggage compartment door lock assembly.
(b) Apply battery voltage and check operation of the door lock motor.

OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 2	Unlock

NG → **REPLACE LUGGAGE COMPARTMENT DOOR LOCK ASSEMBLY**

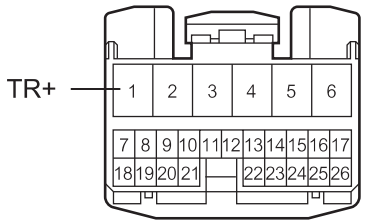
OK

DL

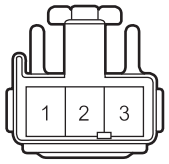
3	CHECK WIRE HARNESS (LUGGAGE COMPARTMENT DOOR LOCK - MAIN BODY ECU)

Wire Harness Side:

E7 Main Body ECU



S5 Luggage Compartment Door Lock Assembly



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(a) Disconnect the ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E7-1 (TR+) - S5-1	Always	Below 1 Ω
S5-1 - Body ground	Always	10 kΩ or higher
S5-2 - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

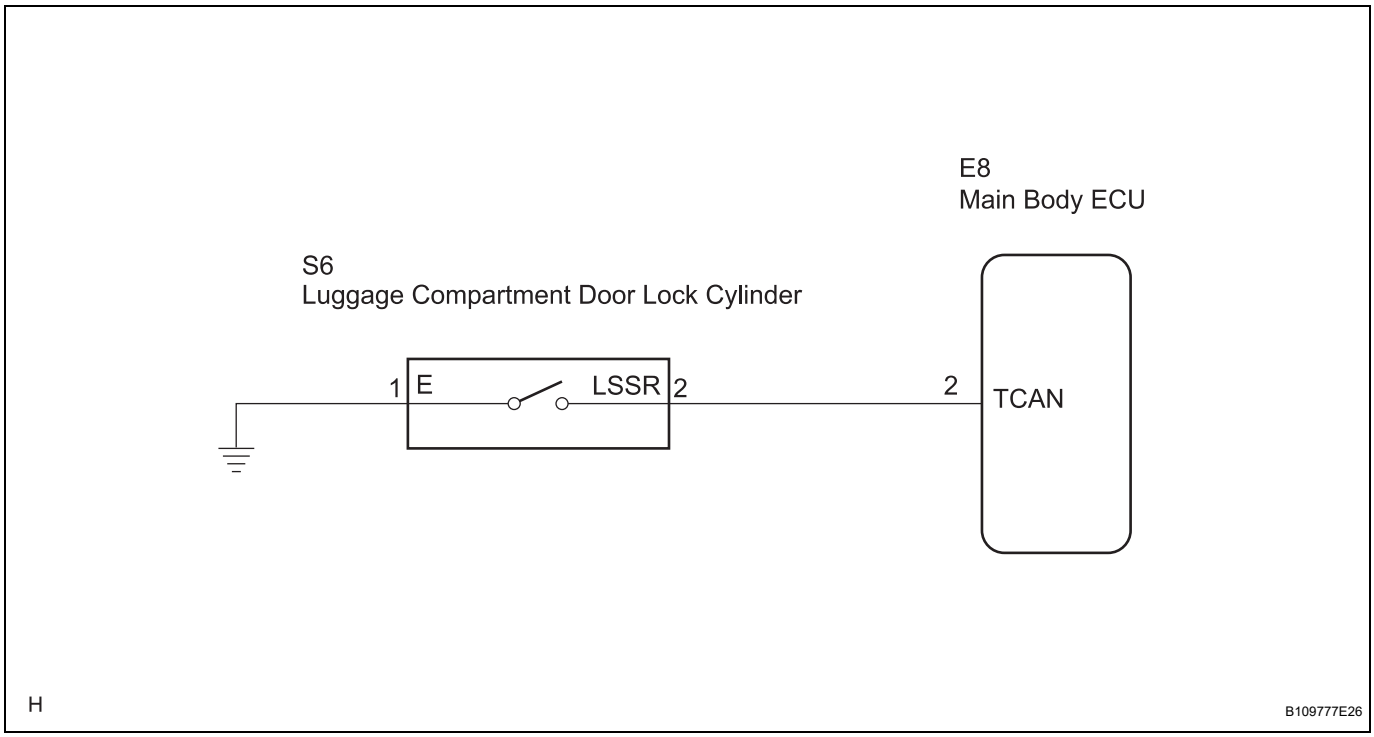
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Luggage Compartment Door Key Cylinder Switch Circuit

DESCRIPTION

When the luggage compartment door lock cylinder is turned to CANCEL the door by key, there is continuity between terminal TCAN of the main body ECU and body ground.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester main switch on.
(c) Select the item below in the "DATA LIST" and read the display on the intelligent tester.

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
TRUNK KEY UNLK	Luggage compartment door key cylinder switch/ON or OFF	ON: Mechanical key inserted and turned to CANCEL position OFF: Mechanical key inserted and turned to except CANCEL position	-

OK:

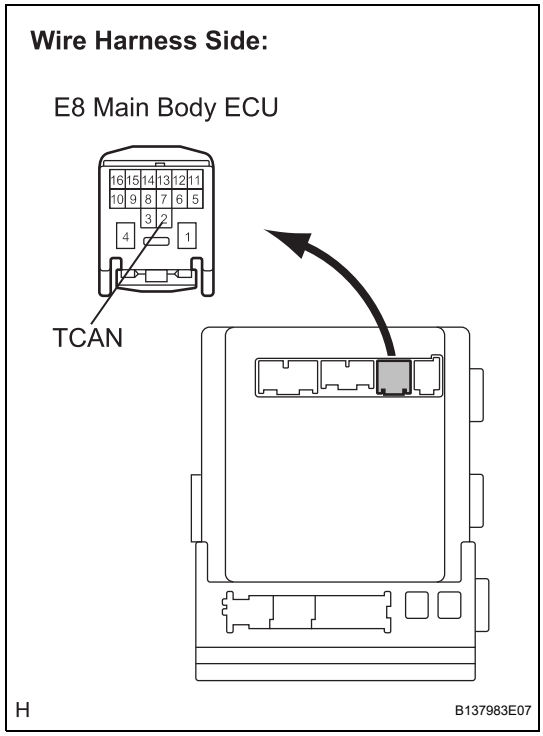
When the mechanical key is operated, the display changes as shown above.

NG	Go to step 2

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2 INSPECT MAIN BODY ECU (TCAN TERMINAL)



(a) Turn the power switch off.
(b) Disconnect the ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

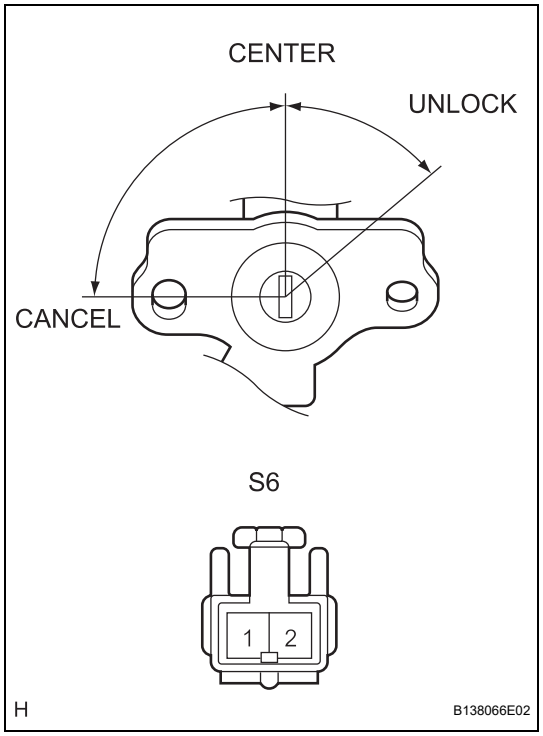
Tester Connection	Condition	Specified Condition
E8-2 (TCAN) - Body ground	Luggage compartment door lock cylinder CENTER	10 kΩ or higher
E8-2 (TCAN) - Body ground	Luggage compartment door lock cylinder CANCEL	Below 1 Ω
E8-2 (TCAN) - Body ground	Luggage compartment door lock cylinder UNLOCK	10 kΩ or higher

NG → **Go to step 3**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

3	INSPECT LUGGAGE COMPARTMENT DOOR LOCK CYLINDER



(a) Disconnect the luggage compartment door lock cylinder connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
S6-1 - S6-2	Luggage compartment door lock cylinder CENTER	10 kΩ or higher
S6-1 - S6-2	Luggage compartment door lock cylinder CANCEL	Below 1 Ω
S6-1 - S6-2	Luggage compartment door lock cylinder UNLOCK	10 kΩ or higher

DL

NG → **REPLACE LUGGAGE COMPARTMENT DOOR LOCK CYLINDER**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (MAIN BODY ECU, BODY GROUND - DOOR LOCK CYLINDER)

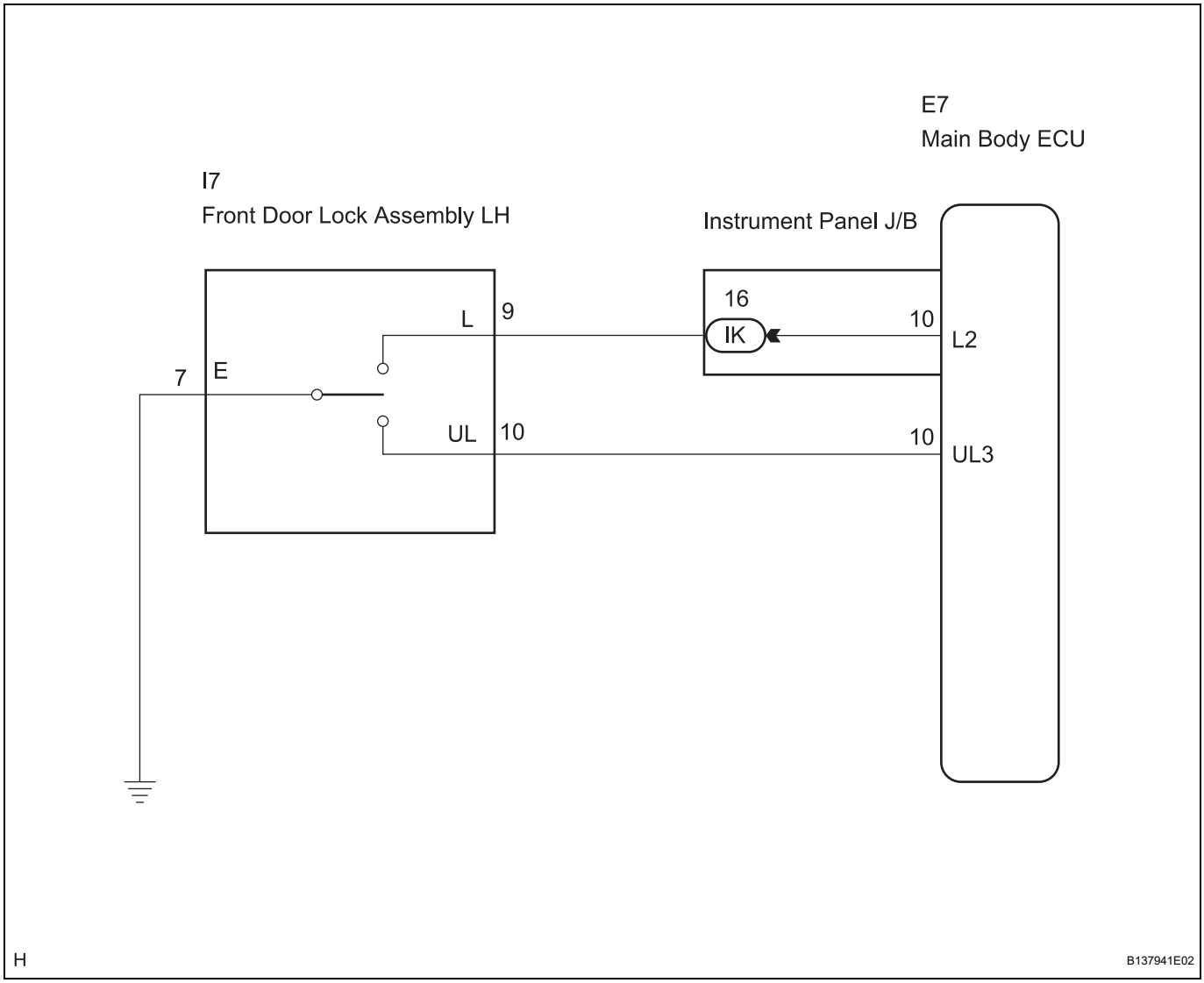
Driver Side Door Key Lock and Unlock Switch Circuit

DESCRIPTION

The driver's door key lock and unlock switch is built into the driver's door lock assembly.
When the driver's door key cylinder is turned to lock all the doors by key, there is continuity between terminals L and E of the key lock and unlock switch. When the cylinder is turned to unlock the door(s), there is continuity between terminals UL and E.
Terminals L2 and UL3 of the main body ECU are connected to the door lock assembly, and door lock/unlock request signals (by key) are input to the main body ECU.
The main body ECU constantly applies voltage to terminal L of the driver's door lock assembly via terminal L2. When the driver's door key cylinder is turned to lock all the doors by key, current flows from terminal L2 to terminal L.
The main body ECU also applies constant voltage to terminal UL of the door lock assembly via terminal UL3. When the door key cylinder is turned in the direction to unlock the door(s) by key, current flows from terminal UL3 to terminal UL.

DL

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF DATA LIST

(a) Check the DATA LIST to ensure proper function of the door unlock detection switch.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
DOR KEY SW-LOCK	Driver door lock/unlock switch lock signal (key-linked lock switch) /ON or OFF	ON: Driver side door key cylinder is turned to LOCK OFF: Driver side door key cylinder is not turned to LOCK	-
DOR KEY SW-ULCK	Driver door lock/unlock switch unlock signal (key-linked unlock switch) /ON or OFF	ON: Driver side door key cylinder is turned to UNLOCK OFF: Driver side door key cylinder is not turned to UNLOCK	-

OK:

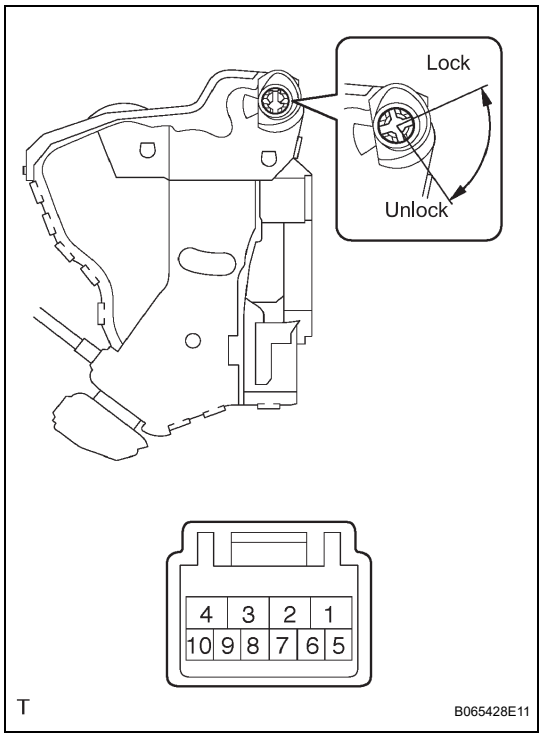
The display is as specified in the normal condition column.

NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2	INSPECT FRONT DOOR LOCK ASSEMBLY (DOOR KEY LOCK AND UNLOCK SWITCH)



(a) Remove the front door lock assembly LH.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
7 - 9	ON (Door lock set to LOCK)	Below 1 Ω
7 - 9 7 - 10	OFF (Free)	10 kΩ or higher
7 - 10	ON (Door lock set to UNLOCK)	Below 1 Ω

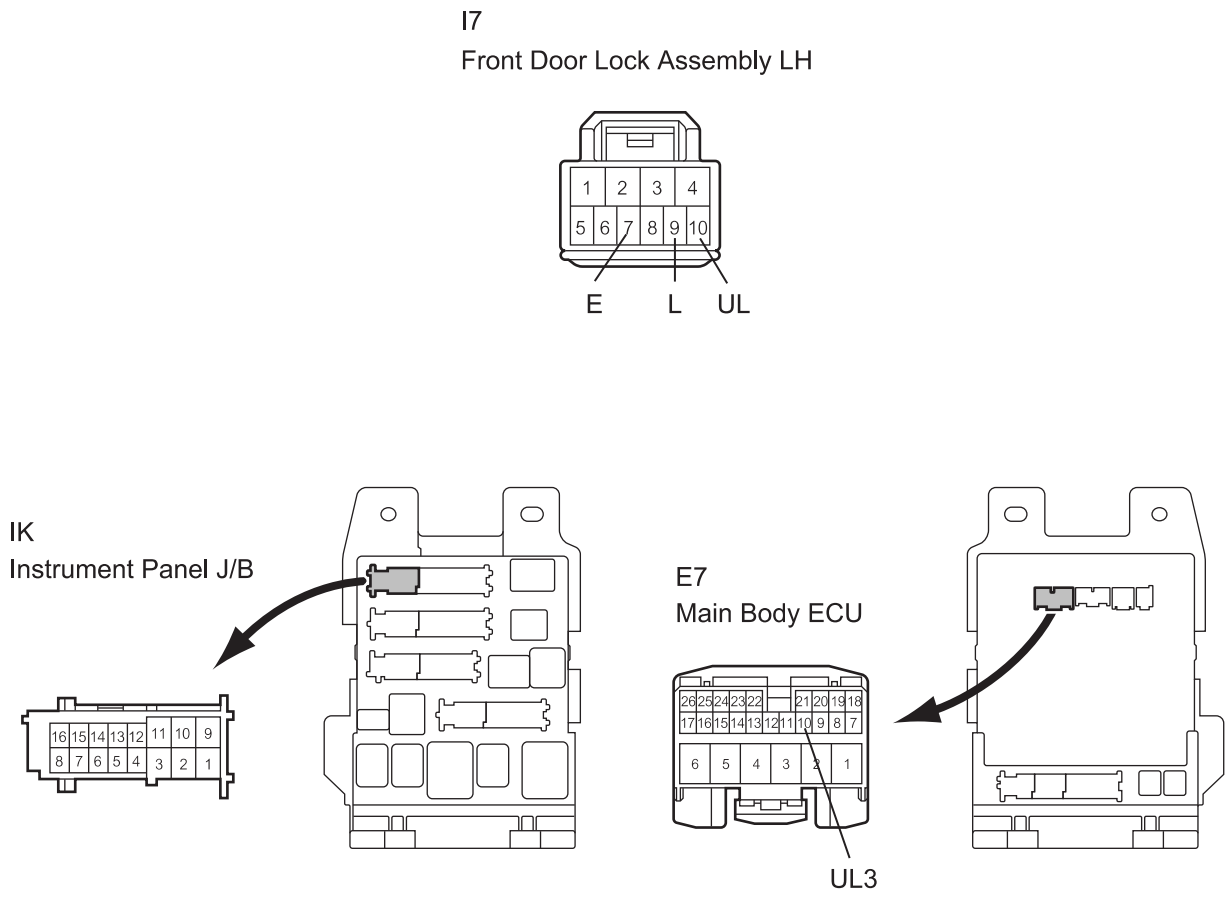
NG → **REPLACE FRONT DOOR LOCK ASSEMBLY**

OK

3	CHECK WIRE HARNESS (FRONT DOOR LOCK ASSEMBLY - MAIN BODY ECU)

(a) Disconnect the front door lock assembly LH connector.

Wire Harness Side:



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(b) Disconnect the main body ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
I7-9 (L) - IK-16	Always	Below 1 Ω
I7-10 (UL) - E7-10 (UL3)	Always	Below 1 Ω
I7-7 (E) - Body ground	Always	Below 1 Ω
I7-9 (L) - Body ground	Always	10 kΩ or higher
I7-10 (UL) - Body ground	Always	10 kΩ or higher

NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE MAIN BODY ECU

Door Control Switch Circuit

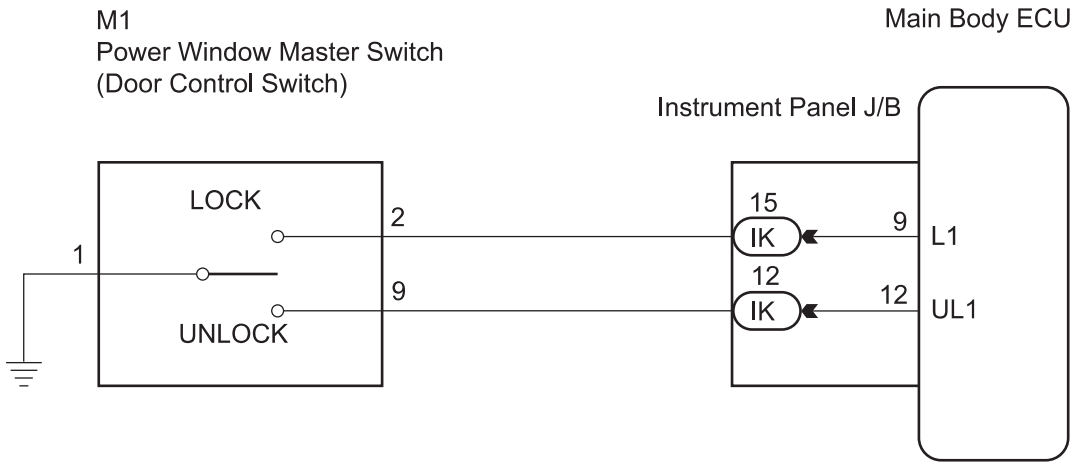
DESCRIPTION

When the lock side of the door control switch is pressed, continuity is established between terminal 2 (driver side) or 4 (passenger side) and terminal 1 (driver side) or 3 (passenger side) of the switch. When the unlock side of the switch is pressed, continuity is established between terminal 9 (driver side) or 2 (passenger side) and terminal 1 (driver side) or 3 (passenger side).
Terminals L1 and UL1 of the main body ECU are connected to the door control switch and door lock/unlock request signals (by door control switch operation) are input to the ECU.
The main body ECU constantly applies voltage to terminal 2 (driver side) or 4 (passenger side) of the door control switch via terminal L1. When the door control switch is operated to lock all doors, current flows from terminal L1 to terminal 2 (driver side) or 4 (passenger side). The main body ECU determines that this is door lock request signal input.
The main body ECU also applies constant voltage to terminal 9 (driver side) or 2 (passenger side) of the door control switch via terminal UL1. When the door control switch is operated to unlock the doors, current flows from terminal UL1 to terminal 9 (driver side) or 2 (passenger side). The main body ECU determines that this is door unlock request signal input.

DL

WIRING DIAGRAM

DRIVER SIDE:



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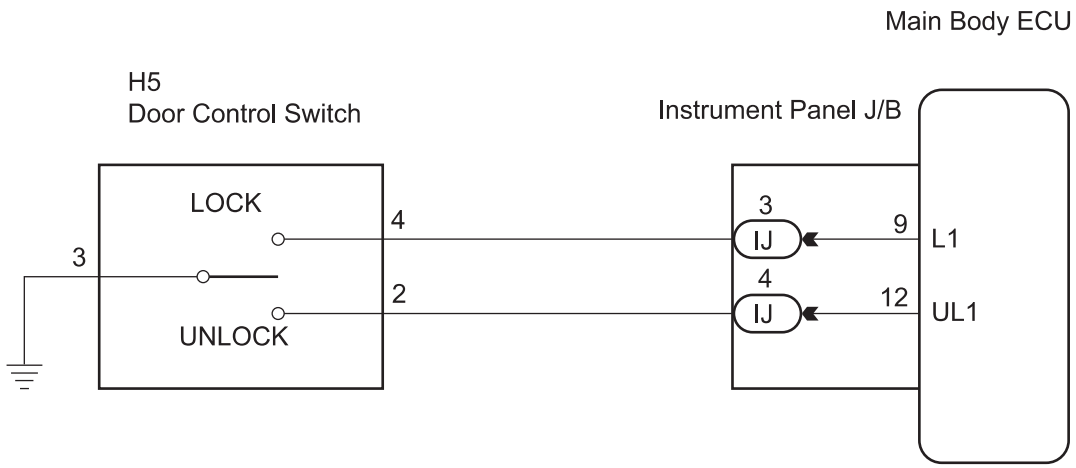
PASSENGER SIDE:



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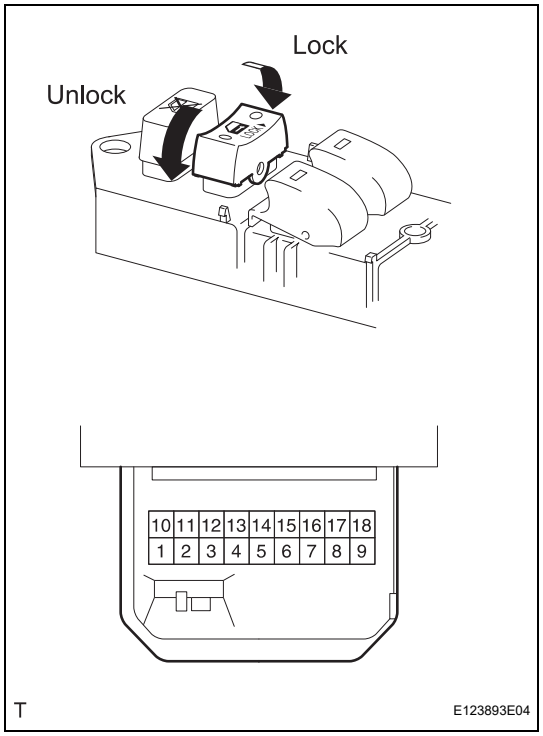
DL

INSPECTION PROCEDURE

1	INSPECT DOOR CONTROL SWITCH ASSEMBLY



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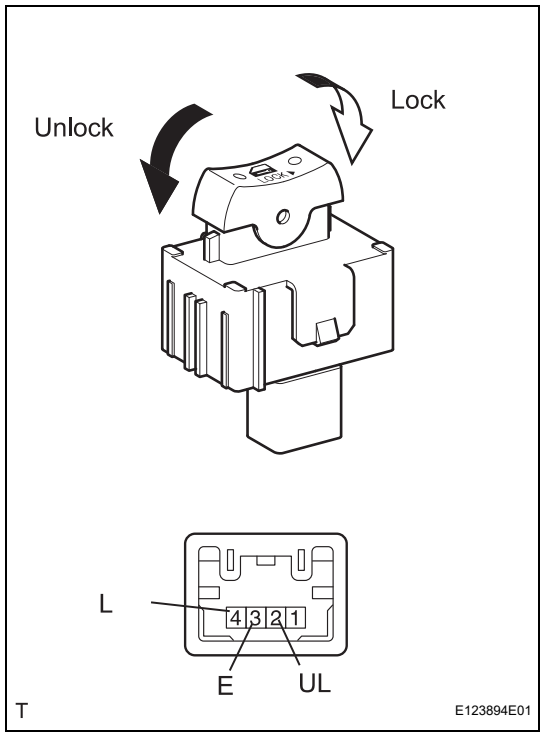
(a) Inspect driver side.
  (1) Remove the master switch.
  (2) Measure the resistance of the door control switch.
  Standard resistance

Tester Connection	Switch Condition	Specified Condition
2 - 1	Lock	Below 1 Ω
2 - 1	OFF (Free)	10 kΩ or higher
9 - 1	Unlock	Below 1 Ω
9 - 1	OFF (Free)	10 kΩ or higher



(b) Inspect passenger side.
(1) Remove the door control switch assembly.
(2) Measure the resistance according to the value(s) in the table below.

Standard resistance

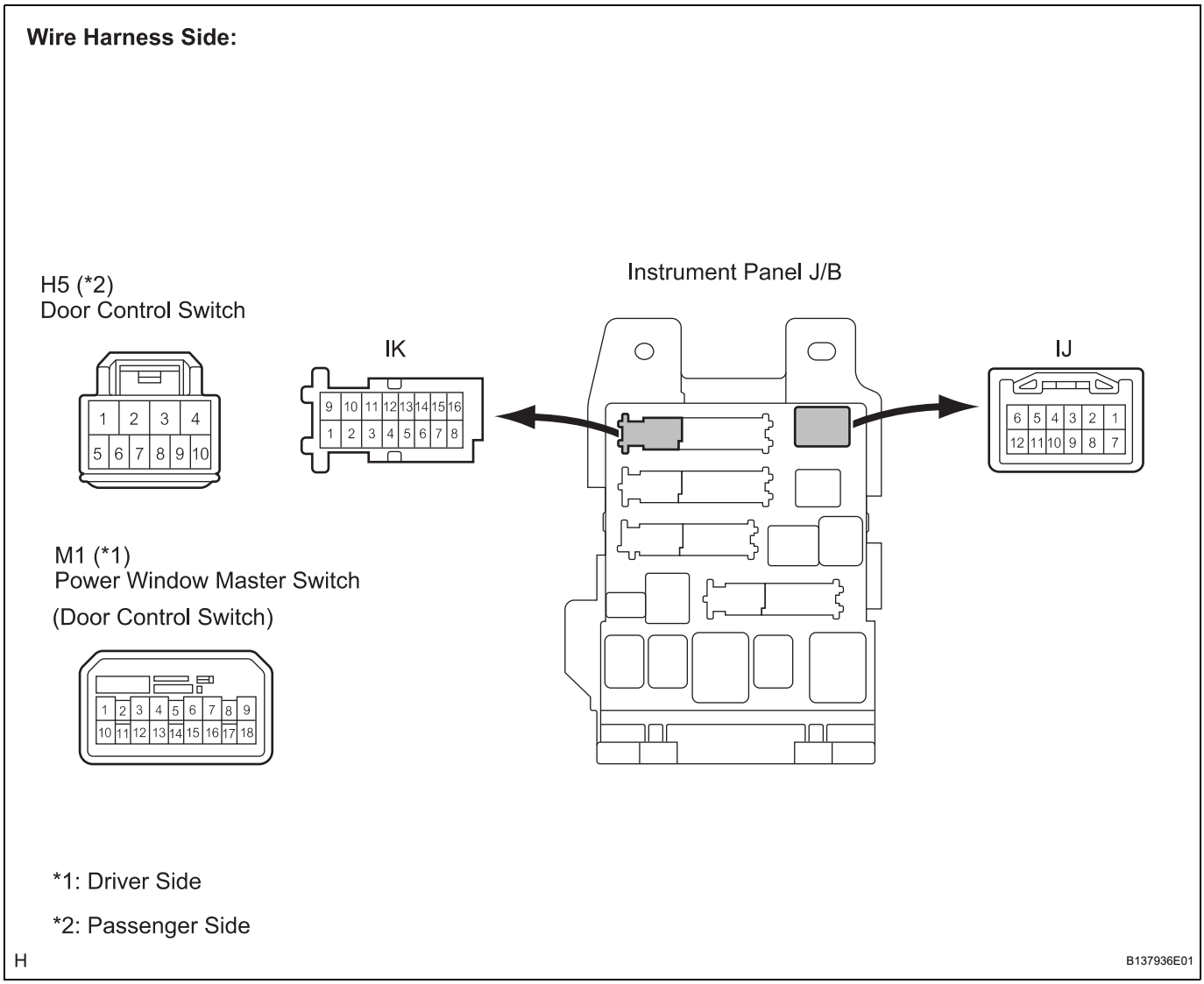
Tester Connection	Switch Condition	Specified Condition
4 - 3	Lock	Below 1 Ω
4 - 3 2 - 3	OFF (Free)	10 kΩ or higher
2 - 3	Unlock	Below 1 Ω

NG → **REPLACE DOOR CONTROL SWITCH OR MASTER SWITCH**

OK

2	**CHECK WIRE HARNESS (DOOR CONTROL SWITCH - MAIN BODY ECU (INSTRUMENT PANEL J/B))**

(a) Disconnect the door control switch connector.



(b) Disconnect the ECU (instrument panel J/B) connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
*1 M1-2 - IK-15	Always	Below 1 Ω
*1 M1-9 - IK-12	Always	Below 1 Ω
*1 M1-1 - Body ground	Always	Below 1 Ω
*1 IK-15 - Body ground	Always	10 kΩ or higher
*1 IK-12 - Body ground	Always	10 kΩ or higher
*2 H5-4 - IJ-3	Always	Below 1 Ω
*2 H5-2 - IJ-4	Always	Below 1 Ω
*2 H5-3 - Body ground	Always	Below 1 Ω
*2 IJ-3 - Body ground	Always	10 kΩ or higher
*2 IJ-4 - Body ground	Always	10 kΩ or higher

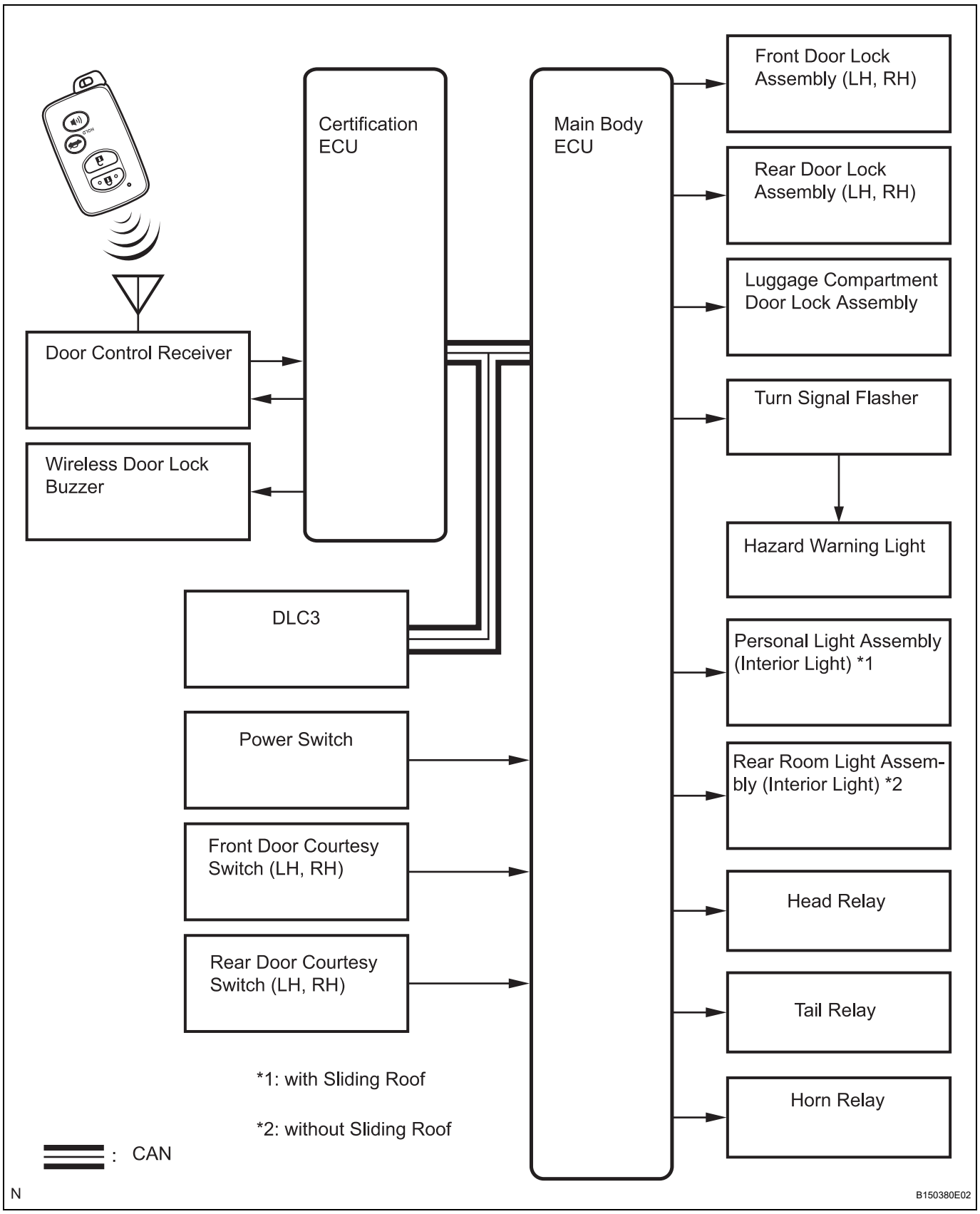
*1: Driver Side
*2: Passenger Side

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

SYSTEM DIAGRAM



Transmitting ECU (Transmitter)	Receiving ECU (Receiver)	Signal	Line
Certification ECU	Main body ECU	Wireless door lock signal	CAN

SYSTEM DESCRIPTION

1. WIRELESS DOOR LOCK CONTROL SYSTEM

The wireless door lock control system functions to lock and unlock all the doors from a distance. The system is controlled by a hand-held transmitter which sends radio waves to the door control receiver. The certification ECU performs an ID code identification process and engages the door lock control.

2. FUNCTION OF MAIN COMPONENTS

Component	Function
Door control transmitter	• Has LOCK, UNLOCK, LUGGAGE OPEN, and PANIC switches. • Transmits weak radio waves (recognition codes and function codes) to the door control receiver.
Door control receiver	Receives weak radio waves from the door control transmitter and sends them to the certification ECU.
• Front door courtesy light switch • Rear door courtesy light switch • Luggage compartment door courtesy light switch	Turns on when a door is opened and turns off when it is closed. Outputs door status codes (open or closed) to the main body ECU.
Door lock position switch	Transmits the door lock positions of each door to the main body ECU.
Wireless door lock buzzer	Emits beep (answer back) when doors are locked or unlocked, or luggage compartment door is opened by wireless operation.
Certification ECU	Sends wireless door lock control signals in response to the code data from the door control receiver and signals from each ECU.

3. SYSTEM FUNCTION

The door control transmitter has the LOCK, UNLOCK, LUGGAGE OPEN, and PANIC switches. Operating these switches activates each function.

The wireless door lock control system has the following functions:

HINT:

The default settings of the following functions are ON. Part of these functions can be customized (See page DL-71).

Function	Operation
All door lock	Pressing the LOCK switch locks all doors.
All door unlock (2-step unlock)	Pressing the UNLOCK switch twice within 3 seconds unlocks all the doors after the driver's door is unlocked.
Automatic lock	If none of the doors is opened within 60 seconds after they are unlocked by the wireless door lock control, all the doors will lock again automatically.
Luggage compartment door open	Pressing the LUGGAGE OPEN switch of the transmitter opens the luggage compartment door.
Answer back	• When the doors are locked by wireless operation, the hazard warning lights flash once and the wireless door lock buzzer sounds once. • When the doors are unlocked by wireless operation, the hazard warning lights flash twice and the wireless door lock buzzer sounds twice. • When the luggage compartment door is opened by wireless operation, the wireless door lock buzzer sounds.
Panic alarm	Pressing the PANIC switch of the transmitter for longer than about 0.8 seconds causes the following alarms to activate: • Sounds the horn and security horn. • Flashes the hazard lights, headlights, and taillights. • Illuminates the front interior light (when the switch is in the DOOR position). While the panic alarm is operating, pressing any switch of the transmitter cancels the alarm operation.

Function	Operation
Door ajar warning	The buzzer sounds when LOCK is pressed when any of the doors are ajar. When all the doors are closed or when UNLOCK is pressed, the buzzer will stop after it sounds for 10 seconds continuously.
Illuminated entry	When all the doors are locked, pressing the UNLOCK switch causes the interior light to come on simultaneously with the unlock operation.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
The wireless door lock control system troubleshooting procedures are based on the premise that the power door lock control system is operating normally. Check the power door lock control system first before troubleshooting the wireless door lock control system.
Use this procedure to troubleshoot the wireless door lock control system.

DL

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

(a) Interview the customer to confirm the trouble (See page IN-72).

NEXT

3	INSPECT COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM

(a) Use the intelligent tester to check for normal function of the CAN communication system.
Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	See page CA-29

A

4	DTC CHECK

(a) Check for a DTC and note any codes that are output.
(b) Delete the DTC.
(c) Recheck for DTCs. Try to prompt the DTC by simulating the original activity that the DTC suggests.
Result

Result	Proceed to
DTC does not recur	A
DTC recurs	See page DL-78

A

5	SYMPTOM SIMULATION

NEXT

6	PROBLEM SYMPTOMS TABLE

(a) If the fault is not listed in the problem symptoms table, proceed to A.
(b) If the fault is listed in the problem symptoms table, proceed to B.

B → Go to step 8

A

7	PERFORM TROUBLESHOOTING ACCORDING TO MALFUNCTION SYMPTOM

(a) Terminals of ECU (See page DL-74).
(b) DATA LIST/ACTIVE TEST (See page DL-78).

NEXT

8	ADJUST, REPAIR OR REPLACE

NEXT

9	CONFIRMATION TEST

NEXT

END

DL

OPERATION CHECK

1. FUNCTIONS AND OPERATING CONDITIONS

(a) The wireless door LOCK/UNLOCK function:
This wireless door lock control function operates only when the following 4 conditions are met:
(1) There is no wireless transmitter in the cabin.
(2) All the doors are closed.
(3) The power door lock system is functioning normally.
(4) The function is not disabled by customization.
HINT:
The UNLOCK function operates even when any of the doors are open.

(b) The wireless transmitter operational range differs depending on the situation.
(1) The operational range differs depending on the user, the way the transmitter is held, and the location.
(2) In certain areas, the operational range will be reduced due to the vehicle body shape and the influence of the surrounding environment.
(3) Since the transmitter uses weak radio waves, the operational range may be reduced or the transmitter may not function if interference or stronger radio waves occur in the area where the transmitter is used.
(4) When the battery is low, the operational range is reduced and/or the transmitter may not function.
HINT:
If the transmitter has been left in a place that is exposed to direct sunlight, such as on the instrument panel, the battery may be weakened or other problems may occur.

2. CHECK WIRELESS DOOR LOCK CONTROL FUNCTIONS

HINT:
- The switches built into the door control transmitter send radio waves to the door lock control receiver.
- The operational range must be taken into account during checks.

(a) Establish conditions that allow the wireless control function to be operated successfully.
(b) Check these basic functions.
(1) Check that all the doors lock when the LOCK switch is pressed.
(2) Check that the driver's door unlocks when the UNLOCK switch is pressed once, and all doors unlock when pressed twice within 3 seconds.
(c) Check the automatic lock function.
(1) Check that if the driver's door or all doors are unlocked with the UNLOCK switch and none of the doors are opened or locked within approximately 60 seconds, the doors automatically re-lock.

(2) Check that if the driver's door or all doors are unlocked with the UNLOCK switch and a door is opened or locked within approximately 60 seconds, the automatic lock function does not operate.

(d) Check the interior light ON function.
HINT:
Turn the interior light switch to the DOOR position before the check.
(1) Check that the interior light comes on simultaneously with the unlocking operation when the UNLOCK switch has been pressed.
(2) Check that the interior light goes off in approximately 15 seconds if none of the doors is opened after the unlocking operation.

(e) Check the answer back function.
(1) When the doors are locked by wireless operation, the hazard warning lights flash once and the wireless door lock buzzer sounds once.
(2) When the doors are unlocked by wireless operation, the hazard warning lights flash twice and the wireless door lock buzzer sounds twice.
(3) When the luggage compartment door is opened by wireless operation, the wireless door lock buzzer sounds.

(f) Check the switch operation fail-safe function.
(1) Check that the doors cannot be locked by operating a switch while the wireless transmitter is in the cabin.
(2) Check that the doors cannot be locked or unlocked by operating a switch on the unregistered transmitter, and that the doors are locked and unlocked by operating a switch on the registered transmitter.

(g) Check the chattering prevention function.
(1) Check that the corresponding operation occurs only once, and does not repeat itself while the switch is kept pressed. Check that the corresponding operation is carried out when the switch is operated repeatedly at 1-second intervals.

(h) Check the luggage compartment door opener function.
(1) Check that the luggage compartment door opens when the LUGGAGE OPEN switch is held down for 0.6 seconds or more.

(i) Check the door ajar warning function.
(1) Check that the wireless door lock buzzer sounds for approximately 10 seconds when the LOCK switch is pressed with any of the doors ajar or open.

(j) Check the panic alarm function.
(1) Check that the following alarms operate when the PANIC switch is pressed longer than about 0.8 seconds:
- The vehicle horns and security horn sounds.
- The hazard warning lights, head lights and taillights flash.
- The interior light illuminates (when the switch is in the DOOR position).

(2) Check that during the panic alarm is operating, pressing any switch of transmitter cancels the alarm operation.

CUSTOMIZE PARAMETERS

HINT:
The following items can be customized.
NOTICE:

- **When the customer requests a change in a function, first make sure that customization of the function(s) is possible.**
- **Be sure to record the current settings before customizing.**
- **When troubleshooting a function, first make sure that the function is not set to OFF.**

1. PERFORM CUSTOMIZATION

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the power switch on(IG).
(c) Enter the following menus: CUSTOMIZE / INDIVIDUAL CHANGE / WIRELESS D LOCK.

WIRELESS DOOR LOCK CONTROL SYSTEM

Display (item)	Default	Function	Setting
TRUNK LID OPER (Wireless trunk opener function setting)	0.8 s PR ON	This function changes operation method of transmitter to open luggage compartment door. • 1 TIME: Push once • 2 TIMES: Push twice • 0.8 s PR: Push and hold for 0.8 seconds • OFF: Does not operate	1 TIME/2 TIMES/0.8 s PR/ OFF
WIRELESS OPER (Wireless door lock control function)	ON	Function that turns wireless door lock function ON/OFF	ON/OFF
HAZARD ANS BACK (Hazard answer-back for wireless door lock control)	ON	• When the doors are locked by wireless operation, the hazard warning lights flash once. • When the doors are unlocked by wireless operation, the hazard warning lights flash twice.	ON/OFF
OPEN DOOR WARN (Door ajar warning)	ON	The buzzer sounds when LOCK is pressed when any of the doors are ajar.	ON/OFF
AUTO LOCK DELAY (Auto lock time)	60 s	This function regulates the interval between unlocking and automatic relocking of doors.	30 s/60 s
UNLOCK /2OPER (Wireless unlock operated twice)	ON	This function unlocks the driver's door when the UNLOCK switch is pressed once, and unlocks all doors when pressed twice within 3 seconds. If set to OFF, pressing UNLOCK once unlocks all doors.	ON/OFF
ALARM FUNCTION (Panic function)	ON	This function operates the theft deterrent system when PANIC is pressed and held for 0.8 seconds.	ON/OFF
WIRLS BUZZ RESP (Wireless buzzer answer-back)	ON	Wireless door lock buzzer response/ON or OFF	ON/OFF

PROBLEM SYMPTOMS TABLE

If a normal system code is displayed during the DTC check, but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

HINT:

- The following is the troubleshooting procedure for the wireless door lock control of a vehicle without the smart key system.
- For the troubleshooting procedure for the wireless door lock control of a vehicle with the smart key system, refer to the wireless door lock control system (without Smart Key System).
- Inspect the fuse and relay before investigating the suspected areas shown in the table below.
- Inspect each malfunction circuit in numerical order for its corresponding symptom.

WIRELESS DOOR LOCK CONTROL SYSTEM:

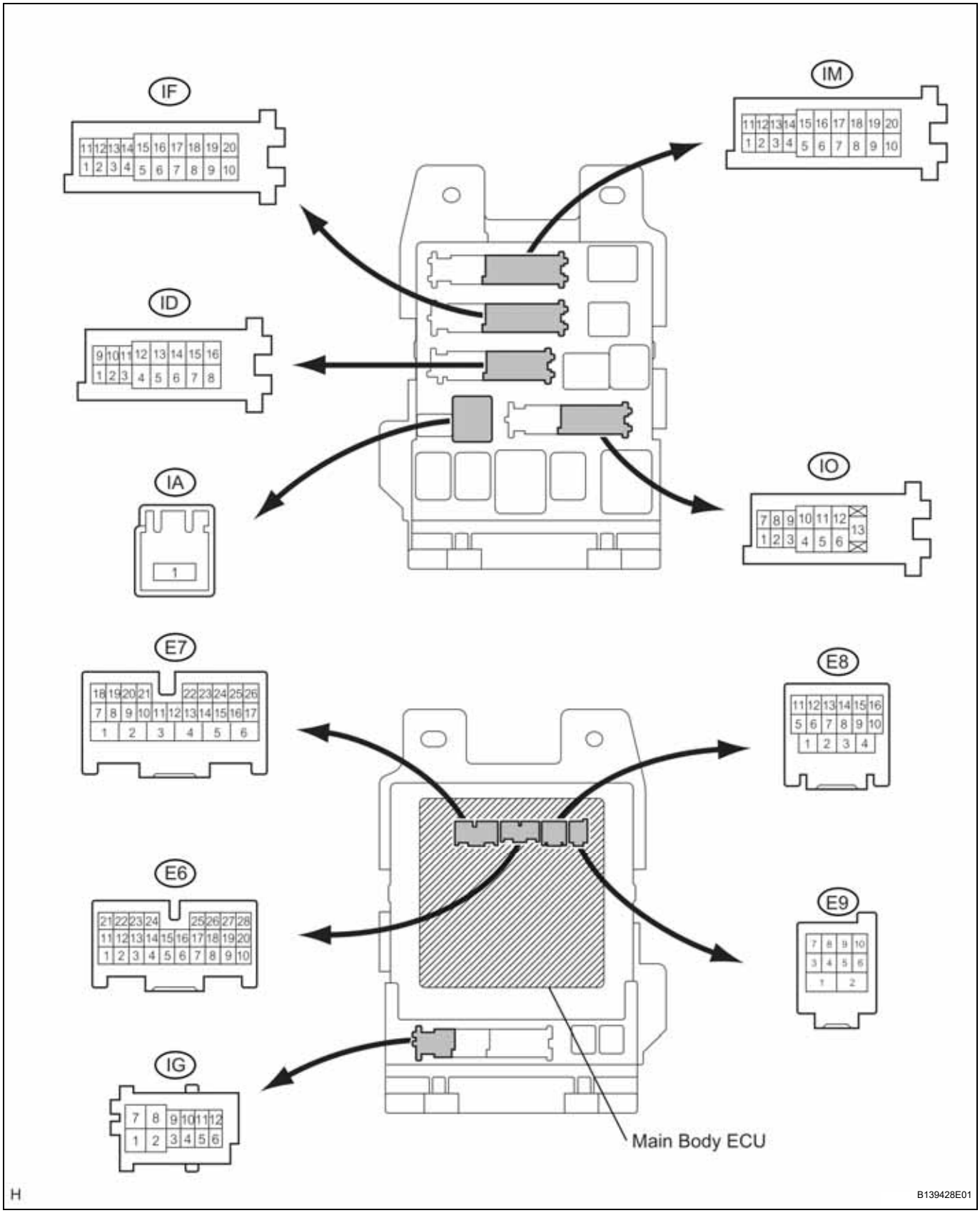
Symptom	Suspected Area	See page
The wireless door lock control system does not operate.	1. Perform the operation check	DL-68
	2. Check if the CAN communication DTC is output	CA-22
	3. Door control transmitter	DL-168
	4. Door courtesy switch circuit	LI-41
	5. Luggage compartment door courtesy switch	DL-43
	6. Power source circuit	DL-86
	7. Replace the door control receiver	-
	8. Replace the certification ECU	-
	9. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
The automatic lock function does not operate normally.	1. Perform the operation check	DL-68
	2. Door courtesy switch circuit	LI-41
	3. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
The illuminated entry function only does not operate.	1. Perform the operation check	DL-68
	2. Lighting system	LI-12
	3. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
The answer back function does not operate (Wireless door lock buzzer).	1. Perform the operation check	DL-68
	2. Wireless door lock buzzer circuit	DL-83
	3. Replace the certification ECU	-
	4. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
The answer back function does not operate (Hazard warning light).	1. Perform the operation check	DL-68
	2. Wire harness	-
	3. Turn signal flasher assembly	LI-113
	4. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-

Symptom	Suspected Area	See page
The door ajar warning function only does not operate.	1. Perform the operation check	DL-68
	2. Door courtesy switch circuit	LI-41
	3. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
The panic alarm function only does not operate.	1. Perform the operation check	DL-68
	2. Door control transmitter	DL-168
	3. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
The panic alarm function does not operate (Vehicle horn).	1. Perform the operation check	DL-68
	2. Horn system	HO-3
	3. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
The panic alarm function does not operate (Hazard warning light).	1. Perform the operation check	DL-68
	2. Wire harness	-
	3. Turn signal flasher assembly	LI-113
	4. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
The panic alarm function does not operate (Headlight or taillight).	1. Perform the operation check	DL-68
	2. Lighting system	LI-12
	3. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-

TERMINALS OF ECU

1. CHECK MAIN BODY ECU (INSTRUMENT PANEL J/B)

(a) Disconnect the main body ECU (instrument panel J/B) connectors.



(b) Measure the resistance and voltage between each terminal of the wire harness side connectors and body ground.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
RCTY (E6-7) - Body ground	GR - Body ground	Rear courtesy light switch RH input	Rear door RH CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω
PCTY (E6-21) - Body ground	Y - Body ground	Passenger side courtesy light switch input	Passenger side door CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω
LGCY (E6-25) - Body ground	W - Body ground	Luggage compartment door courtesy light switch input	Luggage compartment door CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω
DCTY (E7-24) - Body ground	L - Body ground	Driver side door courtesy light switch input	Driver side door CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω
ACC (IA-1) - Body ground	B - Body ground	Ignition power supply (ACC signal)	Power switch on (ACC) → off	10 to 14 V → Below 1 V
IG (IA-1) - Body ground	B - Body ground	Ignition power supply (IG signal)	Power switch on (IG) → off	10 to 14 V → Below 1 V
BATB (IA-1) - Body ground	B - Body ground	+B (power battery system) power supply	Always	10 to 14 V
ALTB (ID-16) - Body ground	W - Body ground	+B (power system alternator system) power supply	Always	10 to 14 V
GND1 (IF-10) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
GND2 (IM-9) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
LCTY (IO-7) - Body ground	LG - Body ground	Rear courtesy light switch LH input	Rear door LH CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the main body ECU (instrument panel J/B) connectors.

(d) Measure the voltage between each terminal of the wire harness side connectors and body ground.

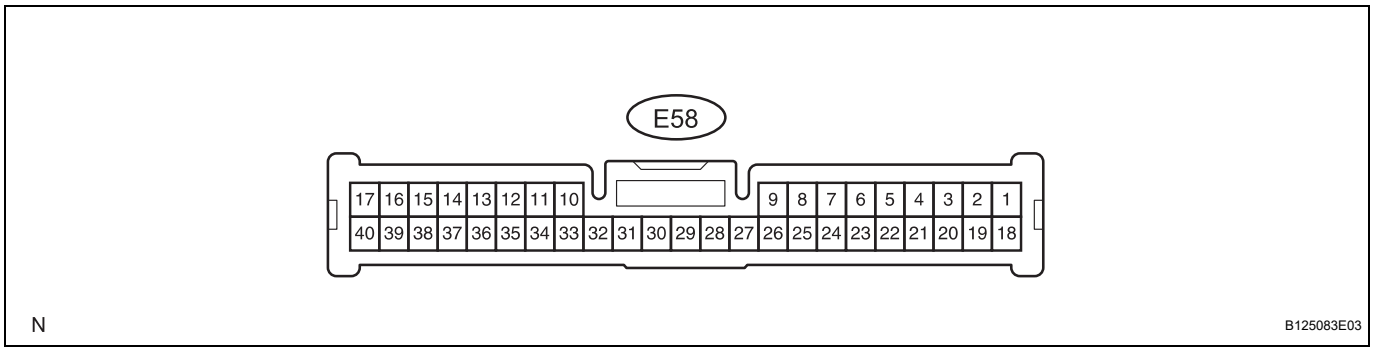
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
TR+ (E7-1) - Body ground	B - Body ground	Luggage compartment door opener motor input	Luggage compartment door CLOSED (LOCKED) → OPEN (UNLOCKED)	Below 1 V → 10 to 14 V*1
HAZ (E8-4) - Body ground	W - Body ground	Turn signal flasher relay signal	Any transmitter switch is pressed → not pressed	Below 1 V → 10 to 14 V*2

HINT:

- *1: When operating the motor.
- *2: When operating the answer back function.

2. CHECK CERTIFICATION ECU ASSEMBLY

(a) Disconnect the E58 ECU connector.



(b) Measure the voltage and resistance of the wire harness side connector.

DL

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B (E58-1) - E (E58-17)	W - W-B	Battery power supply	Always	10 to 14 V
E (E58-17) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
IG (E58-18) - E (E58-17)	LG - W-B	IG power supply	Power switch on (IG)	10 to 14 V
IG (E58-18) - E (E58-17)	LG - W-B	IG power supply	Power switch off	Below 1 V

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the E58 ECU connector.

(d) Measure the voltage according to the values(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BZR (E58-21) - Body ground	O - Body ground	Wireless door lock buzzer	Wireless door lock buzzer OFF → ON	0 V → Pulse generation
RC0 (E58-29) - E (E58-17)	G - W-B	Door control receiver power supply	Power switch off, all doors closed and transmitter switch not pressed	Below 1 V
RC0 (E58-29) - E (E58-17)	G - W-B	Door control receiver power supply	Power switch off, all doors closed and transmitter switch pressed	4.6 to 5.4 V
RDA (E58-38) - E (E58-17)	Y - W-B	Door control receiver output signal	Power switch off, all doors closed and transmitter switch not pressed	10 to 14 V
RDA (E58-38) - E (E58-17)	Y - W-B	Door control receiver output signal	Power switch off, all doors closed and transmitter switch pressed	Pulse generation

If the result is not as specified, the ECU may have a malfunction.

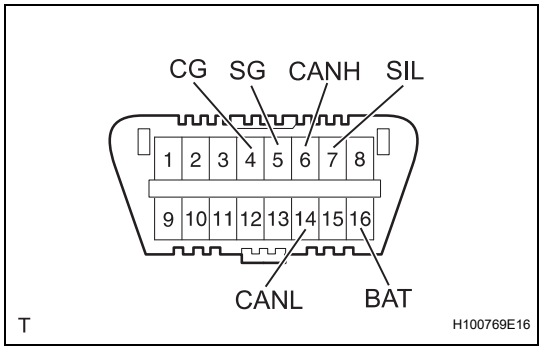
DIAGNOSIS SYSTEM

1. DESCRIPTION

The main body ECU stores trouble codes when trouble occurs on the vehicle.
The diagnostic system allows for reading of the trouble codes from the DLC3.
Use the intelligent tester to check and solve the problem.

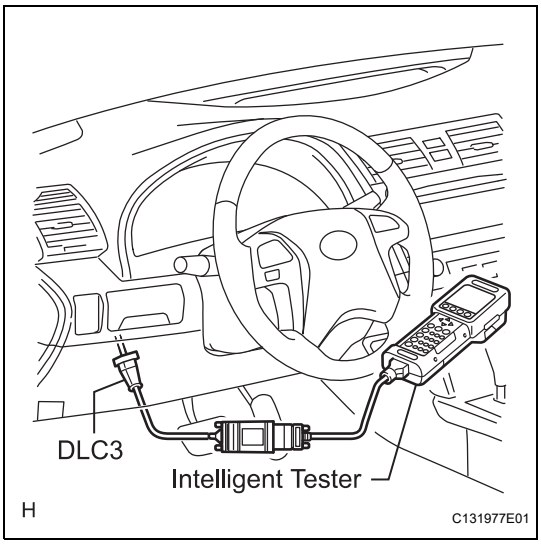
2. CHECK DLC3

(a) The main body ECU uses ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.



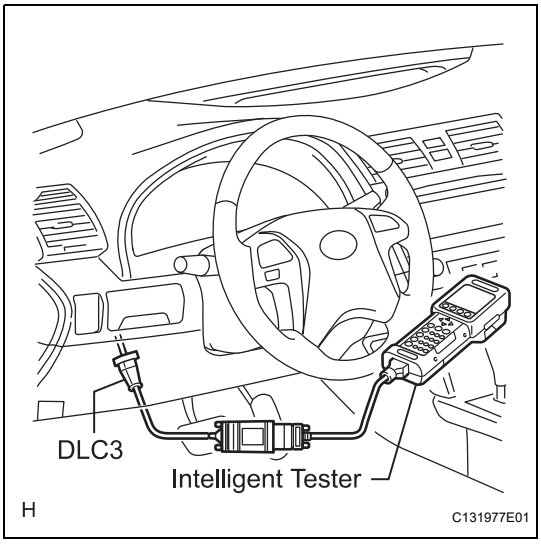
Symbols (Terminal No.)	Terminal Description	Condition	Specified condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	CAN bus line	Power switch off*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Power switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Power switch off*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Power switch off*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Power switch off*	6 kΩ or higher

NOTICE:
***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors.**
If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.



(b) Connect the cable of the intelligent tester (with CAN VIM) to the DLC3, turn the power switch on (READY) and attempt to use the intelligent tester. If the screen displays a communication error message, a problem exists in the vehicle or in the tester.
- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

DL



DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (READY).
(c) Enter the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read DTC's by following the prompts on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

2. CLEAR DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (READY).
(c) Enter the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES.
(d) Erase the DTC's by following the directions on the tester screen.

HINT:
Refer to the intelligent tester operator's manual for further details.

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the intelligent tester DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten diagnostic time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the power switch on (READY).
(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / MAIN BODY or SMART / DATA LIST / DIAG&CUSTOMIZE.
(d) Read the DATA LIST according to the display on the tester.

MAIN BODY (Main body ECU):

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
WIRELESS OPER	Wireless door lock control function / ON or OFF	ON: Operating OFF: Not operating	-
HAZARD ANS BACK	Hazard answer-back of wireless / ON or OFF	ON: Operating OFF: Not operating	-
OPEN DOOR WARN	Open door warning / ON or OFF	ON: Operating OFF: Not operating	-
AUTO LOCK DELAY	Automatic lock time / 60 s or 30 s	60 s: 60 seconds 30 s: 30 seconds	-
UNLOCK /2OPER	2 time operation of wireless unlock / ON or OFF	ON: All doors unlock when UNLOCK is pressed twice OFF: All doors unlock when UNLOCK is pressed once	-
WIRLS BUZZ RESP	Wireless door lock buzzer response / ON or OFF	ON: Operating OFF: Not operating	-
TRUNK LID OPER	Luggage compartment door open function type / 1 TIME/2 TIMES/0.8 s PR/OFF	1 TIME: Luggage compartment door opens when LUGGAGE OPEN switch is pressed once 2 TIMES: Luggage compartment door opens when LUGGAGE OPEN switch is pressed twice 0.8 s PR: Luggage compartment door opens when LUGGAGE OPEN switch is pressed and held down for 0.8 seconds OFF: Not operating	-

SMART (Certification ECU):

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
ALARM FUNCTION	Panic function / ON or OFF	ON: Operating OFF: Not operating	-

2. ACTIVE TEST

HINT:

Performing the intelligent tester ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to shorten the diagnostic time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the power switch on (READY).
(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / MAIN BODY or SMART / ACTIVE TEST.

(d) Perform the ACTIVE TEST according to the display on the tester.

MAIN BODY (Main body ECU):

Tester Display	Test Part	Control Range	Diagnostic Note
HAZARD	Turns the turn signal flasher relay	ON/OFF	Observe headlight and rear combination light for correct operation
VEHICLE HORN	Vehicle horn	ON/OFF	-
TRUNK/BDOR OPEN	Turns luggage compartment door opener motor	ON/OFF	Observe luggage compartment door

SMART (Certification ECU):

Tester Display	Test Part	Control Range	Diagnostic Note
WIRELESS BUZZER	Wireless door lock buzzer	ON/OFF	-

DIAGNOSTIC TROUBLE CODE CHART

HINT:
If a trouble code is indicated during the DTC check, check the circuit listed for that code in the table below. Then proceed to the appropriate page.

WIRELESS DOOR LOCK CONTROL SYSTEM:

DTC Code	Detection Item	Trouble Area	See page
B1242	Wireless Door Lock Tuner Circuit Malfunction	1. Door control receiver 2. Wire harness 3. Certification ECU	DL-80

DTC	B1242	Wireless Door Lock Tuner Circuit Malfunction

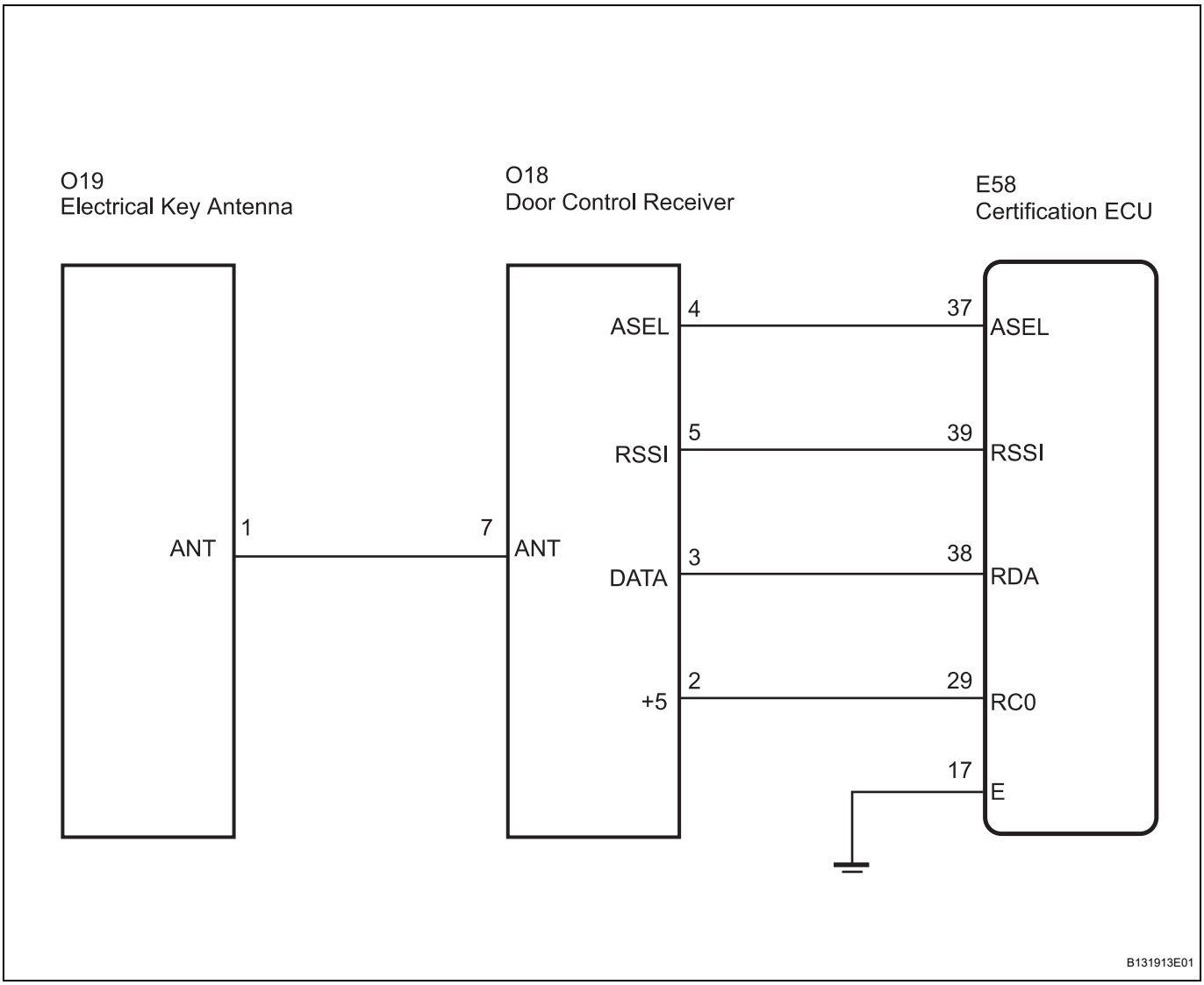
DESCRIPTION

- The electrical key antenna is used to receive electric waves relating to the entry functions of the smart access system with push-button start. The certification ECU decodes the requested smart access system with push-button start operation by identifying a key code based on electric waves received via the electrical key antenna and the door control receiver.
- The door control receiver receives a signal from the wireless door control transmitter and sends signals to the main body ECU through the certification ECU.
- The certification ECU then sends a command to each ECU according to the requested operation. (e.g. If door lock operation is requested, the ECU sends a door lock command to the main body ECU.)

DTC No.	DTC Detection Condition	Trouble Area
B1242	The certification ECU detects that there is a short in the circuit between terminals RSSI, or between terminals DATA and RDA.	• Door Control Receiver • Wire harness • Certification ECU

DL

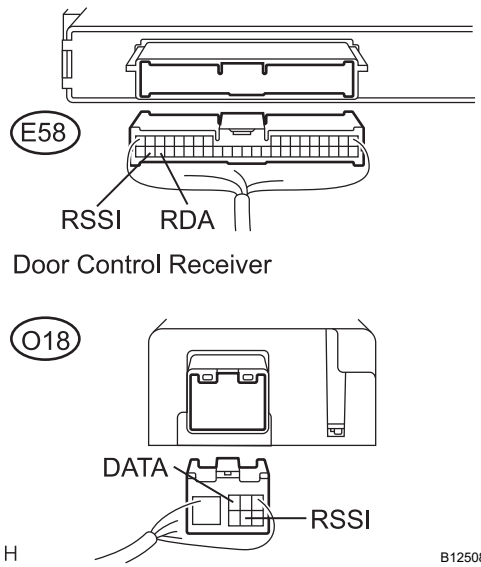
WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - DOOR CONTROL RECEIVER)

Connector Wire Harness View:



(a) Disconnect the E58 certification ECU connector and O18 door control receiver connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

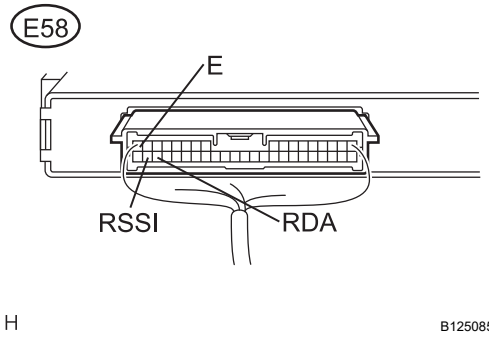
Symbol (Tester Connection)	Condition	Specified Condition
RSSI (E58-39) - RSSI (O18-5)	Always	Below 1 Ω
RDA (E58-38) - DATA (O18-3)	Always	Below 1 Ω
RSSI (E58-39) - RDA (E58-38)	Always	10 kΩ or higher
RSSI (E58-39) - Body ground	Always	10 kΩ or higher
RDA (E58-38) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 INSPECT CERTIFICATION ECU

Connector Wire Harness View:



(a) Reconnect the E58 ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Symbol (Tester Connection)	Condition	Specified Condition
RSSI (E58-39) - E (E58-17)	Power switch OFF, all doors closed, the electrical key is not in the actuation area	Below 1 V
	Power switch OFF, all doors closed, the electrical key is in the actuation area	4.6 to 5.4 V
RDA (E58-38) - E (E58-17)	Power switch OFF, all doors closed and transmitter switch not pressed	Below 1 V
	Power switch OFF, all doors closed and transmitter switch pressed	4.6 to 5.4 V

NG → **REPLACE CERTIFICATION ECU**

OK

3	REPLACE DOOR CONTROL RECEIVER

(a) Replace the door control receiver with a normal one.
(b) Perform the registration procedure.
OK:
The system returns to normal operation.

NG → **REPLACE CERTIFICATION ECU**

OK

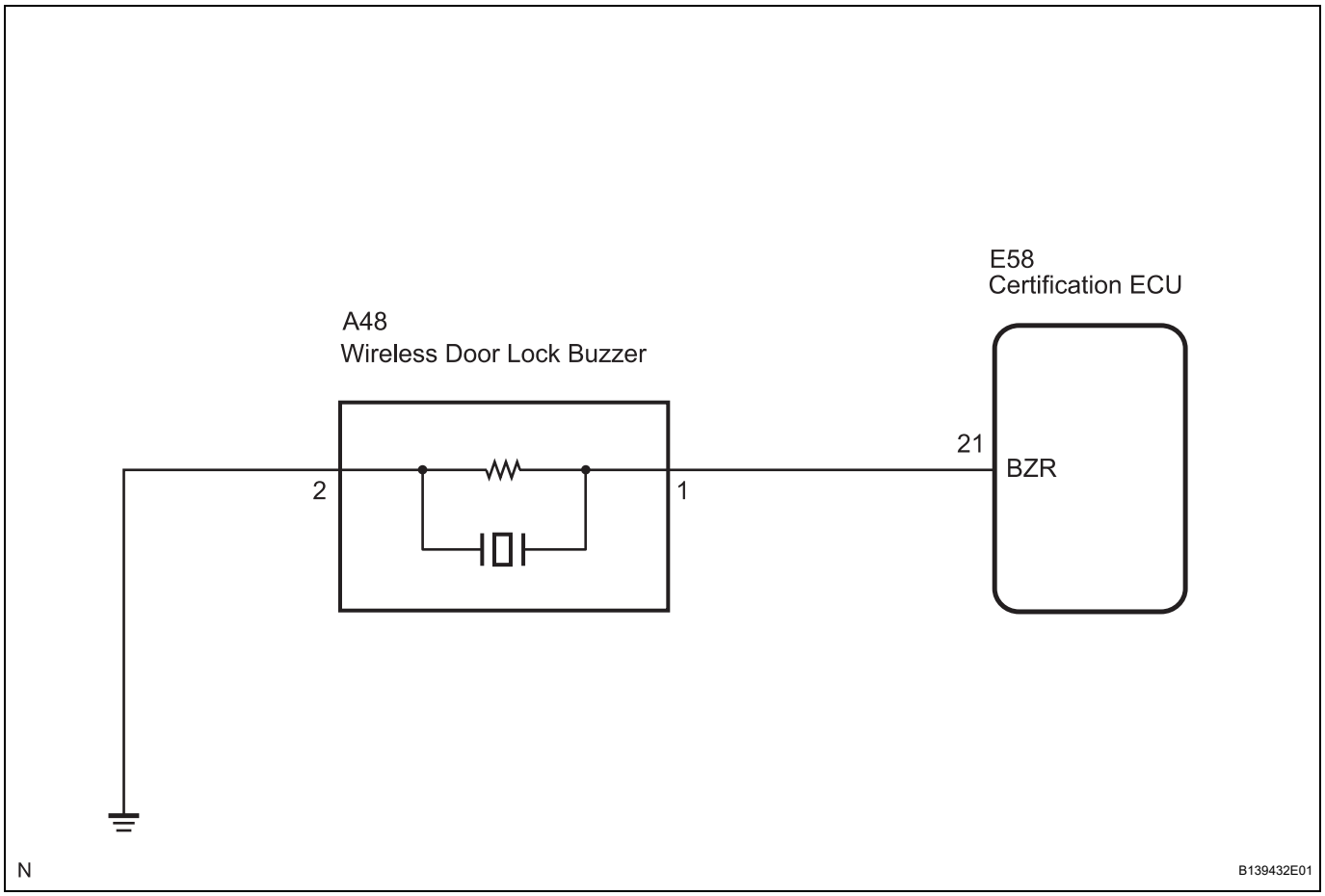
DL **END**

Wireless Door Lock Buzzer Circuit

DESCRIPTION

The certification ECU activates the wireless door lock buzzer when detecting a lock/unlock signal from the door control transmitter.

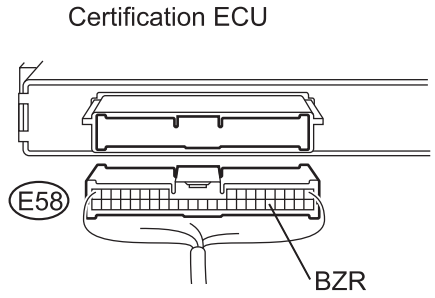
WIRING DIAGRAM



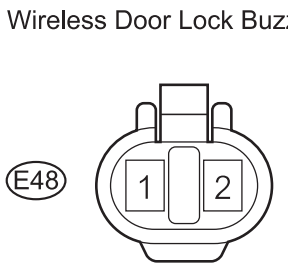
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - WIRELESS DOOR LOCK BUZZER - BODY GROUND)

Connector Wire Harness View:



Wire Harness Side Connector Front View:



B150399E02

(a) Disconnect the E58 certification ECU connector and A48 wireless door lock buzzer connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

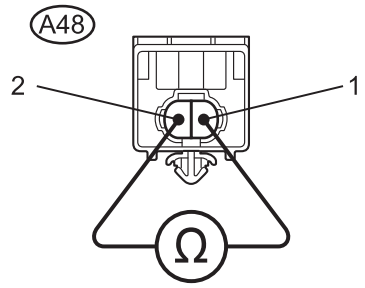
Symbol (Tester Connection)	Condition	Specified Condition
BZR (E58-21) - A48-1	Always	Below 1 Ω
BZR (E58-21) - Body ground	Always	10 kΩ or higher
A48-2 - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	INSPECT WIRELESS DOOR LOCK BUZZER

Wireless Door Lock Buzzer:



N B144393E01

(a) Measure the resistance according to the value(s) in the table below.
HINT:
The buzzer activation circuit is built into the ECU, not into the buzzer itself. When battery voltage is applied directly to the buzzer, the buzzer will not sound.

Standard resistance

Tester Connection	Condition	Specified Condition
A48-1 - A48-2	Always	Approx. 1 kΩ

NG → **REPLACE WIRELESS DOOR LOCK BUZZER**

OK

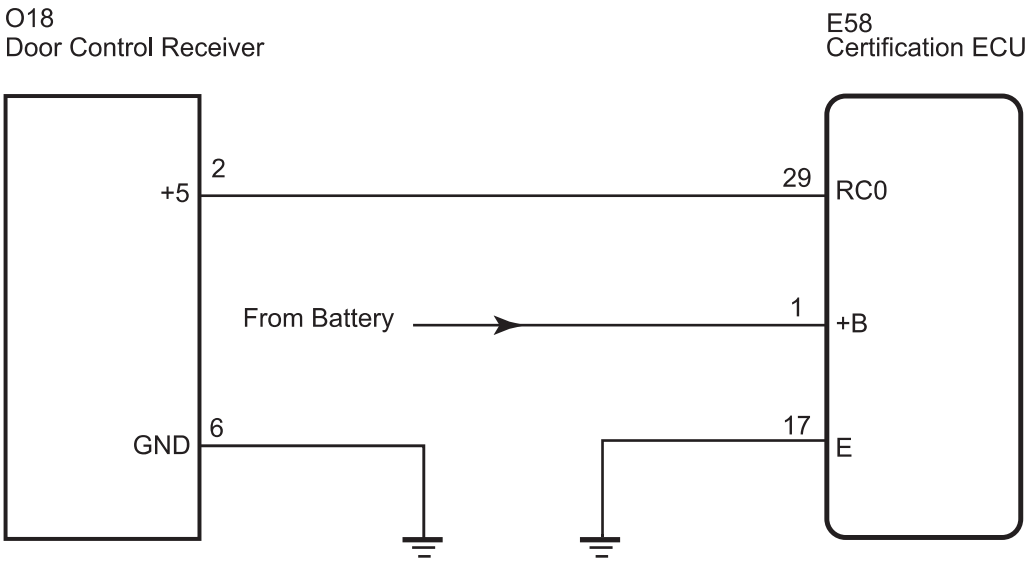
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Power Source Circuit

DESCRIPTION

The certification ECU provides power for the door control receiver operation.

WIRING DIAGRAM

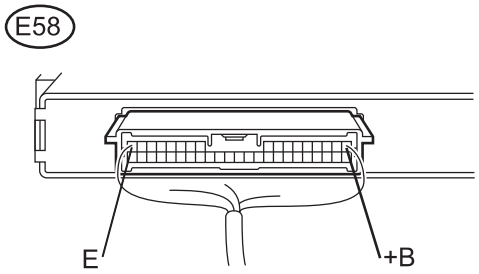


INSPECTION PROCEDURE

1	INSPECT CERTIFICATION ECU (+B TERMINAL)

Connector Wire Harness View:

Certification ECU



(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

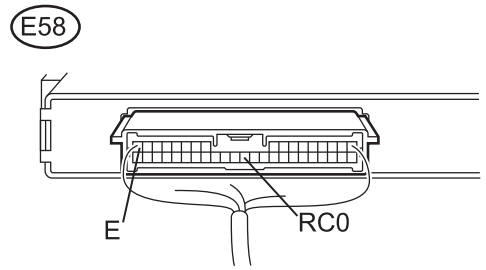
Symbol (Tester Connection)	Condition	Specified Condition
+B (E58-1) - E (E58-17)	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	INSPECT CERTIFICATION ECU (RC0 TERMINAL)

Connector Wire Harness View:



(a) Measure the voltage according to value(s) in the table below.

Standard voltage

Symbol (Tester Connection)	Condition	Specified Condition
RC0 (E58-29) - E (E58-17)	Power switch off, all doors closed and transmitter switch not pressed	Below 1 V
	Power switch off, all doors closed and transmitter switch pressed	4.6 to 5.4 V

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OK → **Go to step 4**

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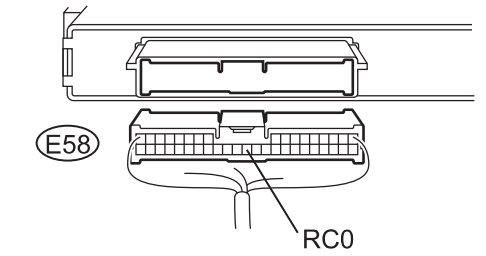
3	CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - BATTERY - BODY GROUND)

Connector Wire Harness Side:



(a) Disconnect the E58 certification ECU connector.
(b) Measure the voltage and resistance according to the value(s) in the table below.

Standard resistance

Symbol (Tester Connection)	Condition	Specified Condition
RC0 (E58-29) - Body ground	Always	Below 1 V
	Always	10 kΩ or higher

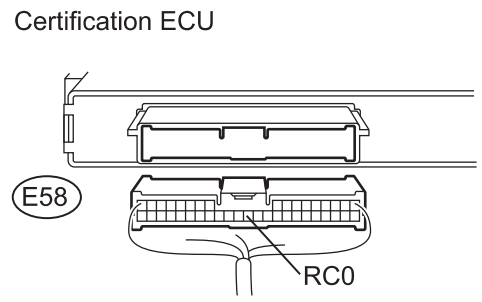
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

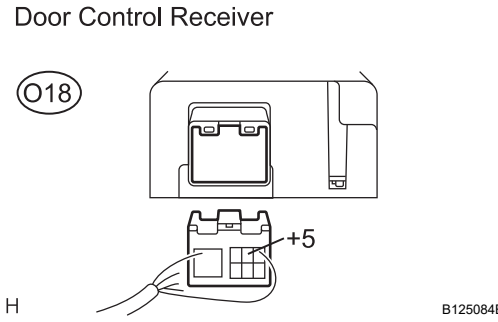
OK

REPLACE CERTIFICATION ECU

4	CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - DOOR CONTROL RECEIVER)

Connector Wire Harness View:





(a) Disconnect the O18 door control receiver connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

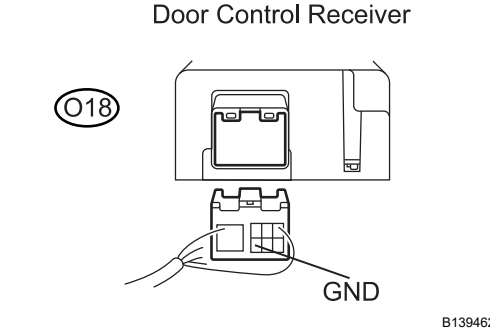
Symbol (Tester Connection)	Condition	Specified Condition
RC0 (E58-29) - +5 (O18-2)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5	CHECK HARNESS AND CONNECTOR (BODY GROUND)

Connector Wire Harness View:



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

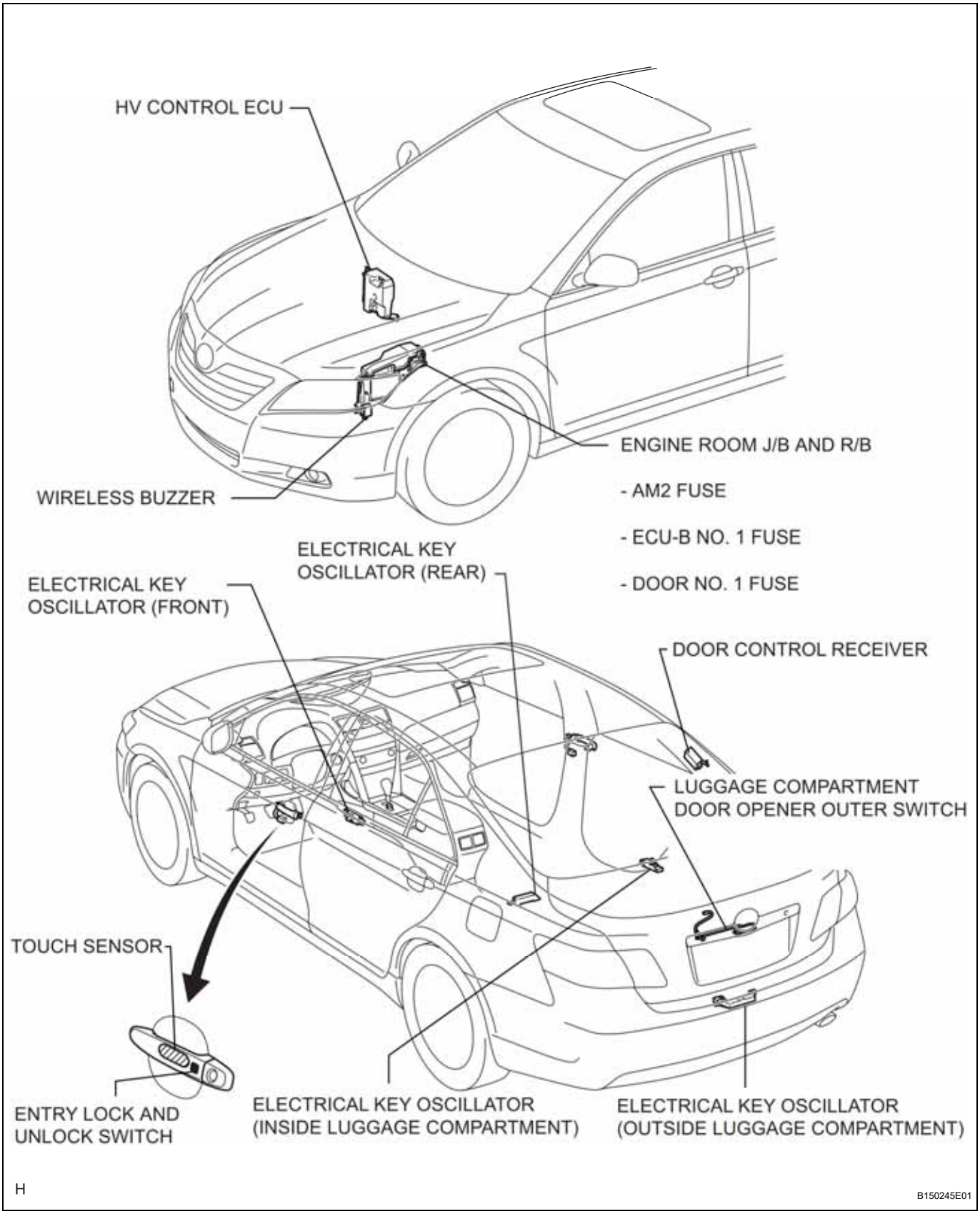
Symbol (Tester Connection)	Condition	Specified Condition
GND (O18-6) - Body ground	Always	Below 1 Ω

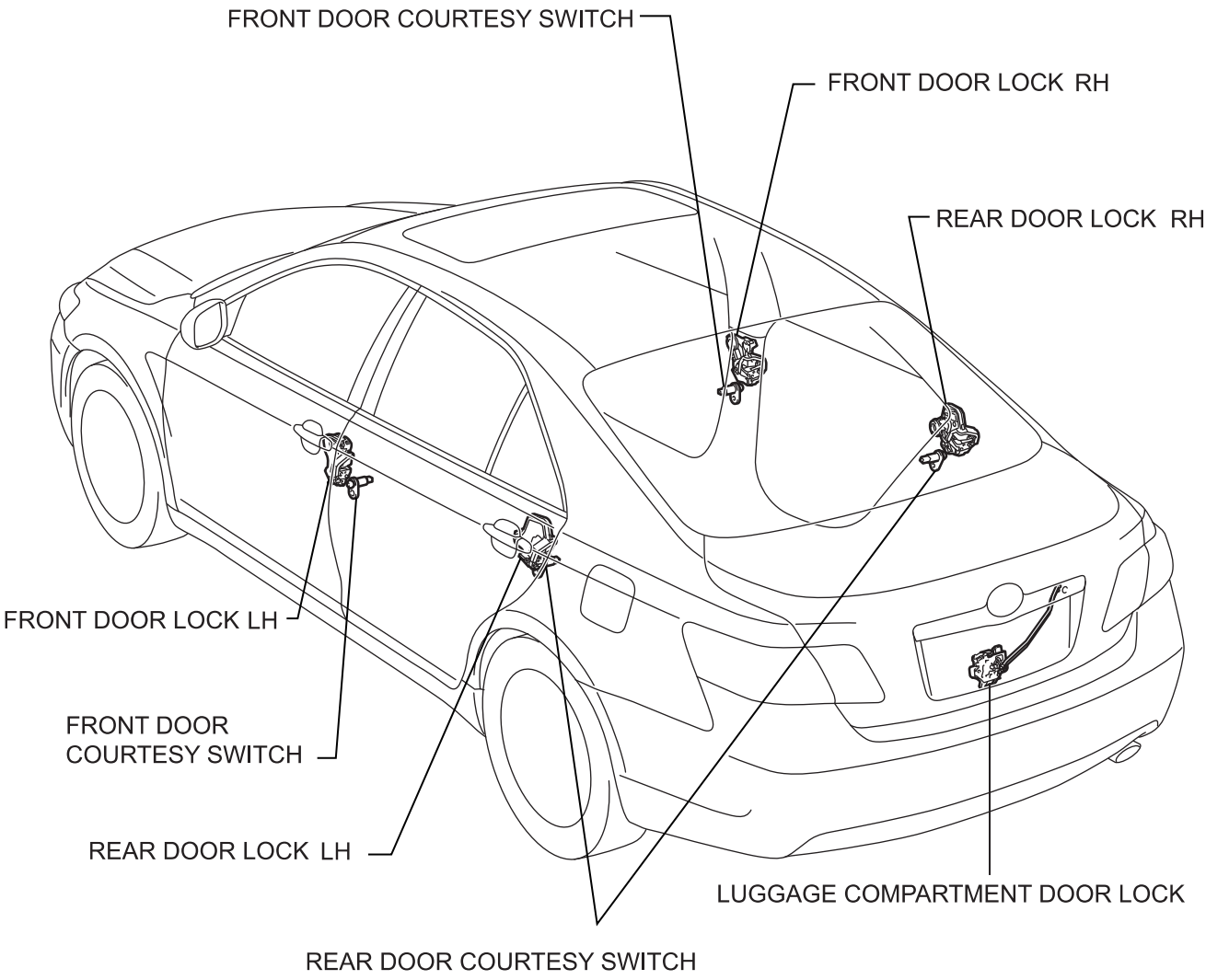
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

PARTS LOCATION





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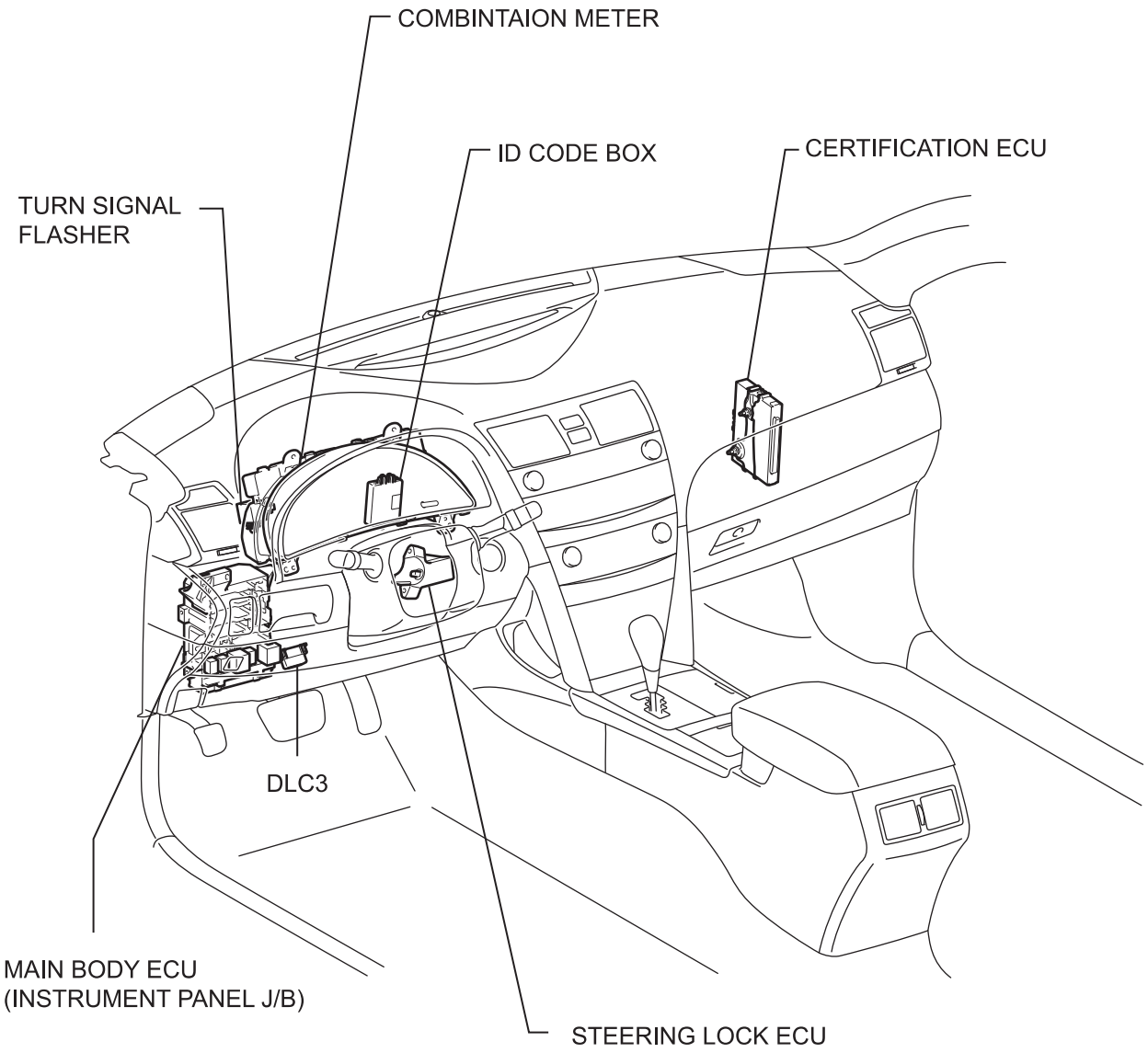

- DOOR NO. 2 FUSE
- ECU-ACC FUSE
- ECU IG NO. 1 FUSE

H

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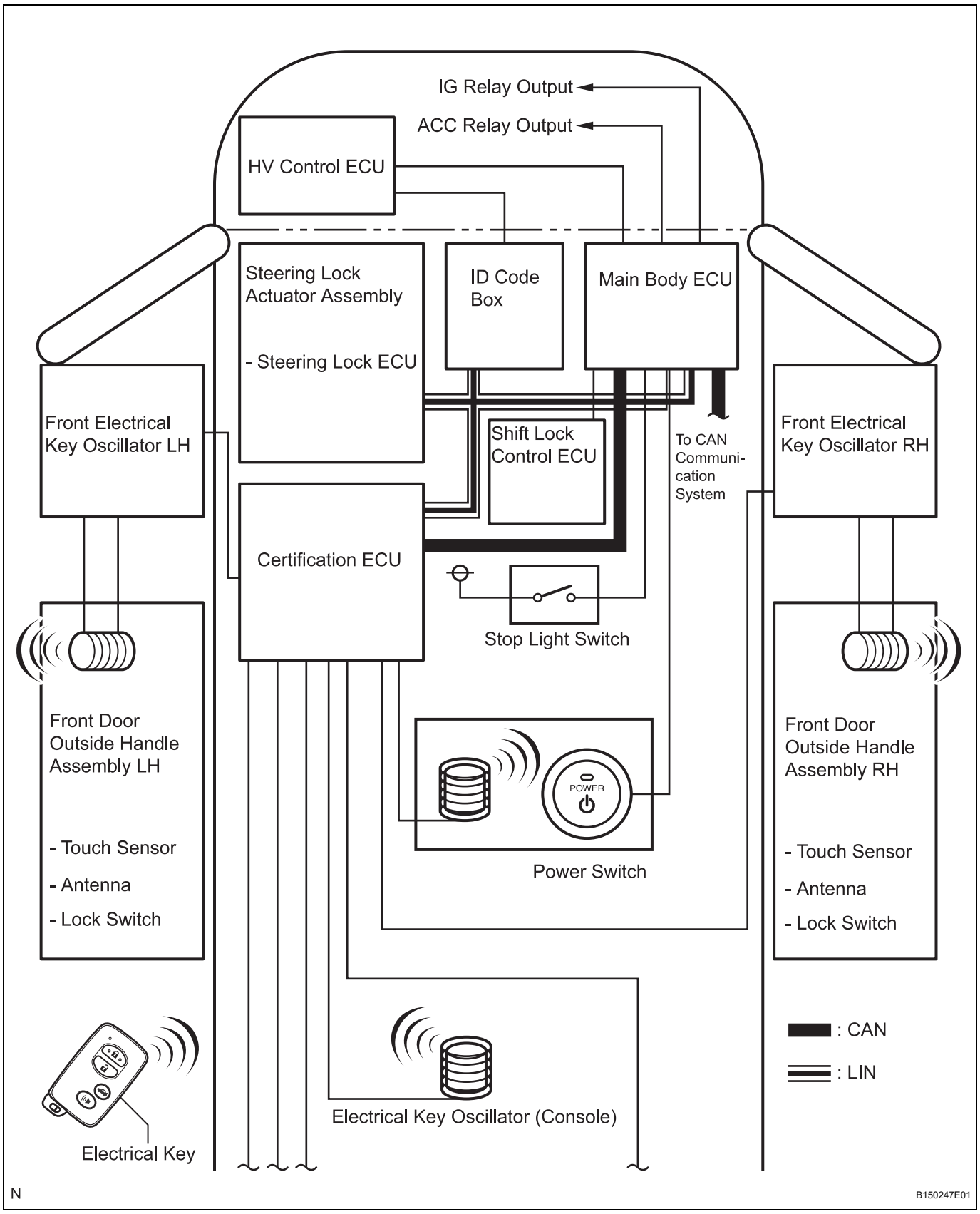
SYSTEM DIAGRAM



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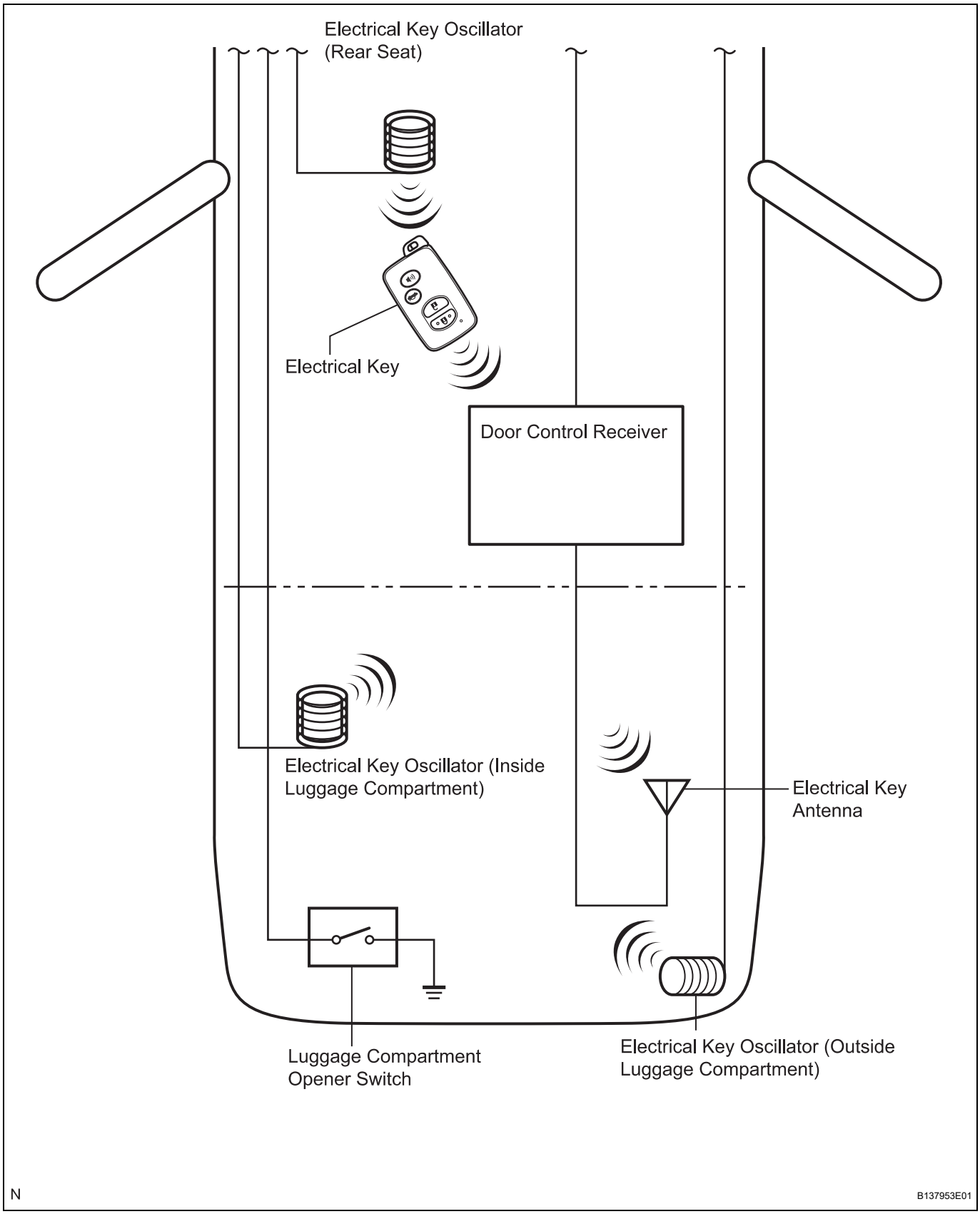
Electrical Key Oscillator
(Rear Seat)
Electrical Key
Door Control Receiver
Electrical Key Oscillator (Inside
Luggage Compartment)
Electrical Key
Antenna
Luggage Compartment
Opener Switch
Electrical Key Oscillator (Outside
Luggage Compartment)
N
B137953E01

Transmitting ECU (Transmitter)	Receiving ECU	Signals	Communication method
Main body ECU	Certification ECU	Power switch signal	CAN
		Courtesy light switch signal	
		Door lock output signal	
		Luggage compartment door output request signal	
		Wireless door lock buzzer request signal	
		Door lock position switch signal	
		D/P door key operated switch signal	
		Luggage compartment door key operated switch signal	
Main body ECU	Combination meter	Wireless door lock buzzer request signal	CAN
Certification ECU	Main body ECU	Illumination light request signal	CAN
		Light answer back signal	
		Door lock/unlock request signal	
Certification ECU	Driver seat ECU	Memory call replay request signal	CAN
Certification ECU	Combination meter	Meter buzzer single-shot request signal	CAN
		Meter buzzer intermittence request signal	
		Meter buzzer continuation request signal	
		Door open display signal	
		Keyless warning signal	
		Low key battery warning signal	
		Shift position warning signal	
		Steering lock abnormal warning	
		Steering lock unlock warning	
Combination meter	Certification ECU/Main body ECU	Vehicle speed signal	CAN
ID code box	Certification ECU	Matching request random number signal	LIN
		EEP ROM access malfunction	
		Model code matching signal	
		Model code mismatching signal	
		HV control ECU code receiving status	
		Registered key number response signal	
		Diagnosis mode switching signal	
		Registered key number signal	
Certification ECU	ID code box	3 bit code request signal	LIN
		ID code matching result signal	
		Registered key number signal	
		Vehicle type handle signal	
Certification ECU	• ID code box • Steering lock ECU	L code registration mode signal	LIN
		Diagnosis mode request signal	
		DTC clear request signal	
		L code registration status signal	
Steering lock ECU	• Certification ECU • ID code box	Steering lock request signal	LIN
		Steering unlock signal	
		Steering lock confirmation signal	
		Steering unlock confirmation signal	
		Diagnosis response signal	
		Steering unlock drive relay signal	
		Steering lock drive relay signal	
		Steering lock motor operation signal	

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Transmitting ECU (Transmitter)	Receiving ECU	Signals	Communication method
Main body ECU	Certification ECU	Shift position P signal	LIN
		HV control system on (READY) status signal	
		ACC relay operating status signal	
		IG relay operating status signal	
Main body ECU	Steering lock ECU	Steering lock relay power supply status signal	LIN
Steering lock ECU	• Certification ECU • Main body ECU	Steering lock catching malfunction signal	LIN
		Push button start malfunction signal	

SYSTEM DESCRIPTION

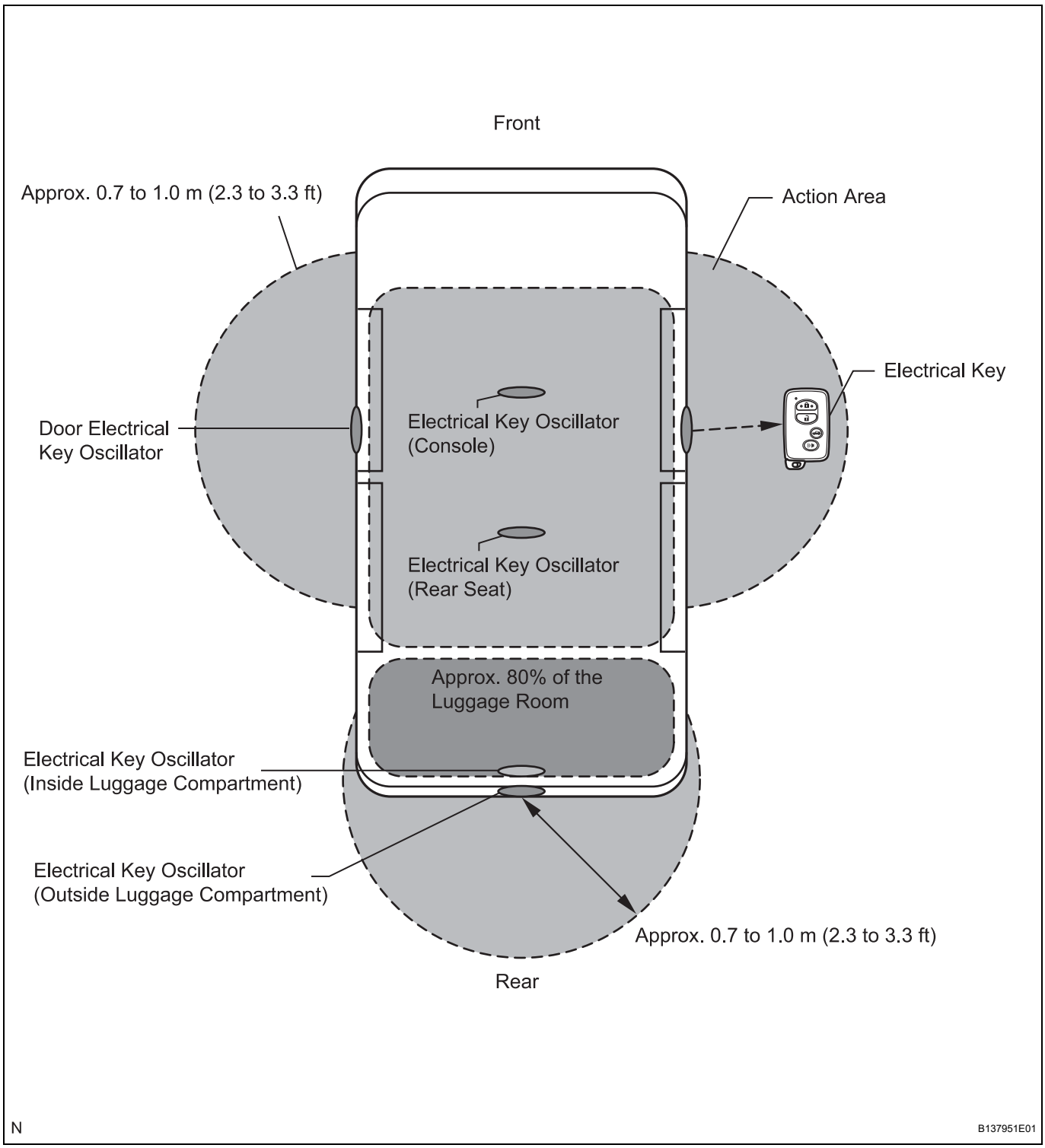
CAUTION:
If using a pacemaker, be sure to read the manual of the pacemaker before using the electrical key because the radio waves of the electrical key may affect the pacemaker.

1. SMART KEY SYSTEM DESCRIPTION

(a) In addition to conventional mechanical key and wireless door lock control functions, the smart key system enables door locking/unlocking, steering lock releasing, and luggage compartment door opening without operating the electrical key. The only requirement is that the electrical key is in the user's possession.

- This system is controlled by the certification ECU. When the certification ECU detects the presence of an electrical key in one of the detection areas, it identifies and checks the ID code, and outputs operation signals to the related ECU in accordance with their functions.
- The detection areas are formed by 6 oscillators (2 door oscillators, 2 luggage compartment oscillators, and 2 cabin oscillators).

2. DETECTION AREA



(a) Precautions for the entire system:
- Be sure to carry the electrical key during inspection of the smart key system.
- As weak radio waves are used to detect the electrical key, the electrical key detection area may decrease, or the electrical key may not be detected correctly in the following situations:
  (a) The electrical key battery is depleted.

(b) Any facilities that generate strong radio waves, such as a TV tower, power plant, broadcast station, or gas station, are located near the inspection site.
(c) A wireless device, such as a cellular phone, is carried with the electrical key.
(d) The electrical key is in contact with or covered with metal.
(e) Another wireless door lock control function is operated near the vehicle.
(f) The electrical key is located near a device that generates high voltage or noise.

- The electrical key may be difficult to operate for a reason relating to the vehicle body shape.
- The electrical key may not be detected correctly if it is around the vehicle's windows, the door handle, or the center of the bumper even when it is in the detection area outside the vehicle.
- The electrical key may not be detected correctly if it is on the instrument panel, auxiliary box of the driver's side instrument panel, rear package tray, floor, or in the glove box even when it is in the detection area inside the vehicle.
- The HV control system cannot be on (READY) even when the electrical key is in the detection area inside the luggage compartment.
- The electrical key may not operate if the electrical key is not held properly.
- The smart key system does not operate in the following conditions:
  (a) The smart key system is canceled.
  (b) The electrical key battery is completely depleted (the indicator does not blink when pushing any of the buttons on the electrical key).

3. FUNCTION OF MAIN COMPONENTS

Component	Function
Electrical Key	Consists of mechanical key, transmitter for wireless door lock control, and transceiver for smart key system
Certification ECU	Controls smart key system in accordance with signals from each oscillator, various switches, ECUs, and electrical key • Judges and certifies ID code from entry door control receiver • Transmits Power immobiliser unset signal to ID code box • Transmits steering unlock signals to steering lock ECU
Main Body ECU (Instrument Panel J/B)	Controls push button start function in accordance with signals from various switches, ECUs, and combination meter • Transmits electrical key verification request signal to certification ECU in accordance with power switch signal, and turns relays ON and OFF • Receives request signal from certification ECU and actuates door lock motor to unlock or lock door • Transmits each door condition signal to certification ECU
ID Code ECU	Receives steering unlock or Power immobiliser unset signals from certification ECU, certifies them, and transmits unset signals to steering lock ECU or HV control ECU
Outside Door Handle (driver and front passenger doors) (touch sensor)	Detects that person touches inside of outside handle

Component	Function
Outside Door Handle (driver and front passenger doors) (lock switch)	Transmits door lock request signals to certification ECU
Door Electrical Key Oscillator (driver and passenger doors)	Receives request signal from certification ECU, and forms detection area around front door
Indoor Electrical Key Oscillator (console and rear seat)	Receives request signal from certification ECU, and forms detection area in vehicle interior
Luggage Compartment Electrical Key Oscillator (inner)	Receives request signal from certification ECU, and forms detection area in luggage compartment
Luggage Compartment Electrical Key Oscillator (outer)	Receives request signal from certification ECU, and forms detection area around luggage compartment door
Door Control Receiver	• Receives ID code from electrical key in detection area and transmits it to certification ECU • Receives ID code from electrical key in luggage compartment and transmits it to certification ECU
Electrical Key Antenna	Receives ID code from electrical key and transmits it to entry door control receiver
Luggage Compartment Opener Switch	Transmits luggage compartment door open request signal to certification ECU
Stop Light Switch	Outputs state of brake pedal to main body ECU
Wireless Door Lock Buzzer • Combination Meter – Multi-information Display – Buzzer	When certification ECU detects human errors such as those below, it warns driver by sounding wireless door lock buzzer, displaying information and sounding a buzzer in combination meter in accordance with request signal from ECU Example: • Electrical key is taken out of vehicle • Driver leaves vehicle while Power is still running • Driver leaves vehicle while shift lever is in any position other than P

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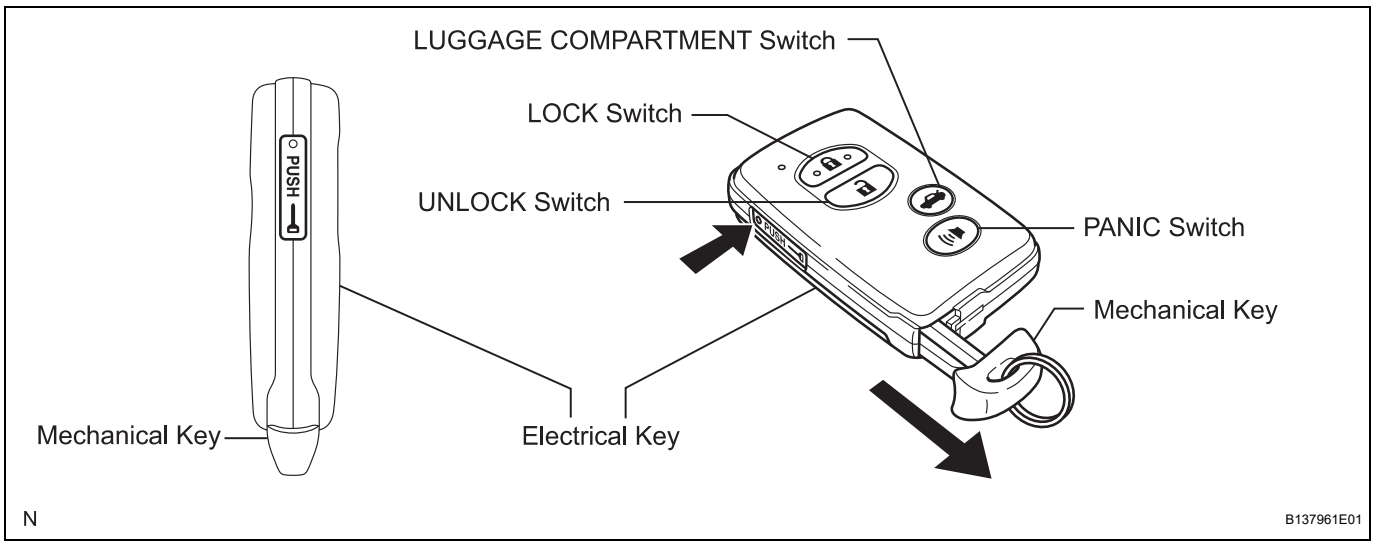
4. CONSTRUCTION AND OPERATION

(a) Electrical Key

The electrical key consists of a mechanical key, a transmitter for the wireless door lock control, and a transceiver for the smart key system.

- The transceiver for the smart key system receives signals from the oscillators and sends the ID code to the tuner.
- The transmitter for the wireless door lock control has a LOCK switch, UNLOCK switch, LUGGAGE COMPARTMENT switch, and PANIC switch.
- This mechanical key works for the driver door, luggage compartment door, and glove box, but cannot start the HV control system.

A total of 7 electrical keys can be registered.



(b) Oscillator (front door oscillator, front and rear oscillator, luggage compartment inner oscillator, luggage compartment outer oscillator)
Each oscillator transmits the request signal received from the certification ECU, and forms an electrical key detection area to detect the presence of an electrical key. The detection area formed by front door oscillator and luggage compartment outer oscillator is approximately 0.7 to 1.0 m (2.3 to 3.3 ft) from the outside handle of front door or the center of the rear bumper.

- The detection area of front door oscillator is formed by transmitting a request signal every 0.25 seconds while the power switch is off and each door is locked. In this way, it detects the proximity of an electrical key. During entry lock, the detection area is formed with the lock switch on.
- The detection area of the luggage compartment outer oscillator is formed when the power luggage door open switch is on.
- The detection area of the indoor oscillator (front and rear) is formed when the driver door is opened or closed entry luggage compartment open, electrical key lock-in prevention, while HV control system is on (READY), when a warning is activated, or when the lock switch is on.
- The detection area of the luggage compartment inner oscillator is formed when the luggage compartment door is closed, entry luggage compartment open, electrical key lock-in prevention the luggage compartment open switch is pressed.

5. ENTRY FUNCTION OPERATION

(a) The smart key system has the following functions:

Function	Outline
Mechanical Key	Operation is same as conventional mechanical key.
Wireless Door Lock Control	This function remotely locks and unlocks all doors or luggage compartment. Operation is same as wireless door lock control system. However, receiver in certification ECU uses entry door control receiver to control locking and unlocking.
Entry Illumination	When person carrying electrical key enters detection area, door will enter unlock standby mode and front map light will illuminate.
Entry Unlock	When electrical key is located in detection area of door oscillator, door will unlock by touching inside of outside door handle.
Entry Unlock Mode Switching (See page DL-118)	Changes doors that can be unlocked with entry unlock function between 2 modes. • Driver door mode • All door mode
Entry Lock	When electrical key is located in detection area of door oscillator and power switch is off, door can be locked by pressing lock switch on outside door handle.
Entry Luggage Compartment Open	When electrical key is in detection area of luggage compartment outer oscillator, luggage compartment opens by pressing luggage compartment open switch.
Window Close	With the electrical key in the actuation area of any door oscillators, all open windows are closed when the lock switch on the door outside handle is pressed for 3 seconds or more.
Electrical Key Lock-in Prevention	• Prevents confinement of electrical key if door is locked using outside door handle while electrical key is still inside vehicle. • If all doors are locked and luggage compartment door is closed while electrical key is still in luggage compartment, warning buzzer sounds. If luggage compartment open switch is operated, luggage compartment door can be opened.
Warning	When any of situations below occur, smart key system causes certification ECU to sound buzzer in combination meter and wireless door lock buzzer, and display information in order to alert driver. • Exit warning if shift lever position is not P and power source mode is not off. • Exit warning if shift lever position is P and power source mode is not off. • Warning if occupant leaves with electrical key. • Warning if power switch is operated while electrical key is outside actuation area. • Warning if entry lock is operated while electrical key is inside cabin. • Warning if electrical key battery is weak. • The electrical key is left in the vehicle. • A door is ajar. • The electrical key is left in the luggage compartment. • Steering lock does not release. • The steering lock mechanism is malfunctioning. • The main body ECU is malfunctioning. • An Power start method is displayed.
Battery Saving	If electrical key is constantly located within actuation area of door oscillator, system maintains periodic communication with electrical key. Therefore, if vehicle remains parked in that state for a long time, electrical key battery and vehicle battery could be drained.
Key Cancel (See page DL-118)	Following electrical key functions can be cancelled by performing certain operations: • Entry Unlock/Lock • Entry Luggage Compartment Open • Electrical key Lock-in Prevention • Warning
Electrical Key Code Registration	The total number of electrical keys that can be registered is seven. Enables the registration (writing and storing) of transmitter recognition codes in the EEPROM that is contained in the certification ECU.

6. **WIRELESS DOOR LOCK AND UNLOCK AND LUGGAGE COMPARTMENT OPEN FUNCTION**
Push the LOCK/UNLOCK/PANIC/LUGGAGE COMPARTMENT switch on the electrical key to operate each function. For details, (See page DL-68).

7. **ENTRY UNLOCK FUNCTION**
   (a) The detection area is formed by communication between a door oscillator and door control receiver when the door is locked in order to detect access of the person carrying the electrical key.
   (b) When the person carrying the electrical key enters the detection area around the vehicle, the matching of the ID codes for a door oscillator and electrical key will automatically be performed. After the matching is completed, the door will enter unlock standby mode.
   (c) In unlock standby mode, the antenna built into the outside handle starts sensing. If the outside handle is held (the back side of the handle is touched), the door unlock operation will be performed. At this time, the hazard warning light blinks twice and the wireless door lock buzzer sounds twice.
   (d) If any of the doors are not opened after a door unlock operation, all doors will automatically lock after 60 seconds.

8. **ENTRY LOCK FUNCTION**
   (a) After leaving the vehicle carrying the electrical key, push the lock switch on the outside handle when all the doors are closed.
   (b) The certification ECU determines whether the electrical key is located inside or outside of the cabin based on the information from a door oscillator and room oscillator. Then matching of the ID codes is performed.
   (c) When the matching result shows that the ID codes of the electrical key and indoor antenna do not match and the ID codes of the electrical key and door oscillator match, the door lock function will operate. At this time, the hazard warning lights blink once and the wireless door lock buzzer sounds once.
   (d) If the electrical key is located inside of the cabin, the door lock function will not operate and the alarm buzzer (beep sound) will sound for 2 seconds.

9. **ENTRY LUGGAGE COMPARTMENT OPEN FUNCTION**
Stand in front of the luggage compartment with the electrical key and push the power luggage compartment opener switch to start the matching of the ID codes for the electrical key oscillator (outside luggage compartment). If the ID codes match, luggage compartment door open operation will be performed.

10. PREVENTION OF ELECTRICAL KEY CONFINEMENT FUNCTION

(a) If you attempt to lock the door through keyless operation (move the lock knob to the lock position and then close the door) with the electrical key in the cabin, the system determines that the electrical key is located in the cabin and unlocks the door.

(b) If the luggage compartment is closed with the electrical key in it, the alarm will sound and the luggage compartment can be opened only when all the doors are locked in order to prevent electrical key confinement in the vehicle.

11. ENTRY ILLUMINATION FUNCTION

When a person carrying the electrical key enters the detection area, the door will enter unlock standby mode and the front map light will illuminate.

HINT:

The entry illumination function operates when the electrical key enters the vehicle exterior detection area from out of the detection area. If the electrical key remains in the detection area for 3 seconds or more, the illumination function does not operate.

12. WARNING FUNCTION

(a) General

When any of the situations below occur, the smart key system causes the certification ECU to sound the buzzer in the combination meter and the wireless door lock buzzer, and illuminate the combination meter's multi-information display in order to alert the driver.

Warning Function Operation Condition	Situation
Exit warning if shift lever position is not P and power source mode is not off.	A
Exit warning if shift lever position is P and power source mode is not off.	B
Warning if occupant leaves with electrical key.	C
Warning if power switch is operated while electrical key is outside detection area.	D
Warning if entry lock is operated while electrical key is inside cabin.	E
Warning if electrical key battery is weak.	F
The electrical key is left in the vehicle.	G
A door is ajar.	H
The electrical key is left in the luggage compartment.	I
Steering lock does not release.	J
The steering lock mechanism is malfunctioning.	K
The main body ECU is malfunctioning.	L
An Power start method is displayed.	M

(b) Situation A

There are 2 patterns for situation A.

Pattern 1: In situation A, the door is opened and the user tries to leave the vehicle.

Pattern 2: Then the user holds the electrical key and tries to move away from the vehicle.

In these situations, the following control is performed:

- Pattern 1

Possible Effects without Warning	Sudden vehicle start, vehicle theft, vehicle roll-away
Warning Condition	Certification ECU gives warning when all following conditions are satisfied: • Shift lever position is not P • Power switch is not off • Driver side door is opened • Vehicle speed is 5 km/h (3.1 mph)
Combination Meter • Buzzer	Warning: Continuous sound Warning is stopped when one of following conditions is met: • Power switch is off • Shift lever position is P • Driver side door is opened • Vehicle speed is above 5 km/h (3.1 mph)
Combination Meter • Multi-information Display	Warning: Information below is displayed alternately on combination meter: • "SHIFT TO P RANGE" Warning is stopped when one of following conditions is met: • Power switch is off • Shift lever position is P • Driver side door is opened • Vehicle speed is above 5 km/h (3.1 mph)
Wireless Door Lock Buzzer	-

- Pattern 2

Possible Effects without Warning	Sudden vehicle start, vehicle theft, vehicle roll-away
Warning Condition	Certification ECU gives warning when all following conditions are satisfied: • Shift lever position is not P • Power switch is not off • Driver side door is opened and closed • Vehicle speed is 0 km/h (0 mph) • Electrical key is not in cabin or luggage compartment
Combination Meter • Buzzer	Warning: Continuous sound Warning is stopped when one of following conditions is met: • Power switch is off • Shift lever position is P • Electrical key is in cabin or luggage compartment • Vehicle speed is above 0 km/h (0 mph)
Combination Meter • Multi-information Display	Warning: Information below is displayed alternately on combination meter: • "SHIFT TO P RANGE" • "KEY IS NOT DETECTED" "Key is not detected" warning is stopped when either of following conditions is met: • Power switch is off • Electrical key is in cabin "Shift to P range" warning is stopped when one or following conditions is met: • Power switch is off • Vehicle speed is above 0 km/h (0 mph) • Shift lever position is P

DL

Possible Effects without Warning	Sudden vehicle start, vehicle theft, vehicle roll-away
Wireless Door Lock Buzzer	Warning: Continuous sound Warning is stopped when one of following conditions is met: • Power switch is off • Shift lever position is P • Electrical key is in cabin or luggage compartment • Vehicle speed is above 0 km/h (0 mph)

(c) Situation B

There are 2 patterns for situation B.

Pattern 1: In situation B, the door is opened and the user tries to leave the vehicle.

Then the user holds the electrical key and tries to move away from the vehicle.

Pattern 2: Then the user tries to use the entry lock and presses the lock switch.

In these situations, the following control is performed:

• Pattern 1

Possible Effects without Warning	Vehicle theft, Power cannot be restarted
Warning Condition	Certification ECU gives warning when all following conditions are satisfied: • Shift lever position is P • Power switch is not off • Driver side door is opened and closed • Electrical key is not in cabin or luggage compartment
Combination Meter • Buzzer	Warning: Sounds once
Combination Meter • Multi-information Display	Warning: Information below is displayed on combination meter: • "KEY IS NOT DETECTED" Warning is stopped when either of following conditions is met: • Power switch is off • Electrical key is in cabin or luggage compartment
Wireless Door Lock Buzzer	Warning: Sounds 3 times Warning is stopped when either of following conditions is met: • Power switch is off • Electrical key is in cabin or luggage compartment

• Pattern 2

Possible Effects without Warning	Vehicle theft
Warning Condition	Certification ECU gives warning when all following conditions are satisfied: • Shift lever position is P • Power switch is not off • All doors are closed • Lock switch is "ON" • Electrical key is not in cabin or luggage compartment
Combination Meter • Buzzer	-
Combination Meter • Multi-information Display	-
Wireless Door Lock Buzzer	Warning: Sounds for 2 seconds

(d) Situation C
In this situation, the following control is performed:

Possible Effects without Warning	Power cannot be restarted
Warning Condition	Certification ECU gives warning when all following conditions are satisfied: • Power switch is not off • Door other than driver side door is opened and closed • Vehicle speed is 0 km/h (0 mph) • Electrical key is not in cabin or luggage compartment
Combination Meter • Buzzer	Warning: Sounds once
Combination Meter • Multi-information Display	Warning: Information below is displayed on combination meter: • "KEY IS NOT DETECTED" Warning is stopped when one of following conditions is met: • Power switch is off • Vehicle speed is above 0 km/h (0 mph) • Electrical key is in cabin or luggage compartment
Wireless Door Lock Buzzer	Warning: Sounds 3 times Warning is stopped when one of following conditions is met: • Power switch is off • Vehicle speed is above 0 km/h (0 mph) • Electrical key is in cabin or luggage compartment

(e) Situation D
In this situation, the following control is performed:

Possible Effects without Warning	Confuses the user
Warning Condition	Certification ECU gives warning when both following conditions are satisfied: • Power switch is not off • Electrical key is not in cabin
Combination Meter • Buzzer	Warning: Sounds once
Combination Meter • Multi-information Display	Warning: Information below is displayed on combination meter for 8 seconds (disappears after 8 seconds): • "KEY IS NOT DETECTED"
Wireless Door Lock Buzzer	-

(f) Situation E
In this situation, the following control is performed:

Possible Effects without Warning	Vehicle theft
Warning Condition	Certification ECU gives warning when all following conditions are satisfied: • Power switch is off • All doors are closed • Lock switch is "ON" • Electrical key is in cabin or luggage compartment
Combination Meter • Buzzer	-
Combination Meter • Multi-information Display	-
Wireless Door Lock Buzzer	Warning: Sounds for 2 seconds

(g) Situation F
In this situation, the following control is performed:

Possible Effects without Warning	Smart key system does not function
Warning Condition	Certification ECU gives warning when all following conditions are satisfied: • Power switch is turned off after being left on (IG) for over 20 minutes • Electrical key battery voltage is low • Electrical key is in cabin or luggage compartment
Combination Meter • Buzzer	Warning: Sounds once
Combination Meter • Multi-information Display	Information below is displayed on combination meter: • "LOW KEY BATTERY"
Wireless Door Lock Buzzer	-

(h) Situation: G
There are two patterns for situation G:
Pattern 1: When the driver's door is open, the driver changes the power source mode to ACC and attempts to leave the vehicle.
Pattern 2: When the driver's door is open, the driver changes the power source mode from ON to OFF and attempts to leave the vehicle. In these situations, the following control is performed:
• Pattern 1. and Pattern 2.

Possible Effects without Warning	Vehicle theft
Warning Condition	The warning is activated when one of the following conditions is met: • Power switch is on (ACC) and the driver door is opened • Power switch is off, the steering is unlocked, and the driver door is opened
Combination Meter • Buzzer	Continues to sound at short and even intervals
Combination Meter • Multi-information Display	-
Wireless Door Lock Buzzer	-
Power Switch Indicator Light	-
Warning Stop Condition	Warning is stopped when one of the following conditions is met: • Power switch is not off • Driver side door is closed • Power switch is off and the steering is locked

(i) Situation: H
The lock switch on the door outside handle is pressed to perform entry lock with a door open.
In this situation, the following control is performed:

Possible Effects without Warning	Vehicle theft
Warning Condition	The warning is activated when all of the following conditions are met: • Power switch is off • Any doors are opened • Entry lock button on the outer door handle is operated
Combination Meter • Buzzer	-
Combination Meter • Multi-information Display	-
Wireless Door Lock Buzzer	Warning: Continuous sound
Power Switch Indicator Light	-

Possible Effects without Warning	Vehicle theft
Warning Stop Condition	Warning is stopped when one of the following conditions is met: • Power switch is off • All doors are closed • Wireless door lock remote function is unlocked • Entry unlock is operated • 10 seconds have elapsed since the wireless door lock buzzer was activated

(j) Situation: I
The luggage compartment door is closed with the electrical key left in the luggage compartment.
In this situation, the following control is performed:

Possible Effects without Warning	Key Confinement
Warning Condition	The warning is activated when all of the following conditions are met: • Vehicle speed is 5 mph (3.1 km/h) • All doors are closed • Entry luggage compartment open function is available
Combination Meter • Buzzer	-
Combination Meter • Multi-information Display	-
Wireless Door Lock Buzzer	Sounds for 2 seconds
Warning Stop Condition	The luggage compartment is opened using the entry luggage compartment open function and the electrical key is removed from the luggage compartment

(k) Situation: J
Steering lock cannot be released. In this situation, the following control is performed.:

Possible Effects without Warning	Steering usability function
Warning Condition	The steering lock cannot be released, thus the HV control system is prevented from on (READY)
Combination Meter • Buzzer	-
Combination Meter • Multi-information Display	Warning Information below is displayed alternately on combination meter: Displayed for 15 seconds (and then automatically turned off) "S/T IS NOT UNLOCED"
Wireless Door Lock Buzzer	-
Power Switch Indicator Light	The green indicator blinks at 1-second intervals (goes off automatically in 15 seconds)
Warning Stop Condition	The power switch is pressed while the steering wheel is turned left and right, and the steering lock successfully disengages

(l) Situation: K
A malfunction of the steering lock ECU is detected.
In this situation, the following control is performed:

Possible Effects without Warning	Malfunction detection
Warning Condition	A malfunction of the steering lock ECU is detected
Combination Meter • Buzzer	-
Combination Meter • Multi-information Display	Warning: Information below is displayed alternately on combination meter: "CHECK S/T OFF"
Combination Meter • Master Warning Light	Flash
Wireless Door Lock Buzzer	-
Power Switch Indicator Light	The amber indicator blinks at 2-second intervals

Possible Effects without Warning	Malfunction detection
Warning Stop Condition	The steering lock ECU returns to normal

(m) Situation: L
A malfunction of the main body ECU is detected.
In this situation, the following control is performed:

Possible Effects without Warning	Malfunction detection
Warning Condition	A malfunction in the main body ECU is detected
Combination Meter • Buzzer	-
Combination Meter • Multi-information Display	-
Combination Meter • Master Warning Light	-
Wireless Door Lock Buzzer	-
Power Switch Indicator Light	The amber indicator blinks at 2-second intervals
Warning Stop Condition	The main body ECU returns to normal

(n) Situation: M
A warning message appears on the meter when the driver does not follow the proper procedure to start the vehicle.
In this situation, the following control is performed:

Possible Effects without Warning	Usability function
Warning Condition	The warning is activated when all of the following conditions are met: • Power source is in a mode other than "ON" • Any doors are closed and opened • The power source is changed from OFF to ACC more than once with the Power off and brake pedal not depressed
Combination Meter • Buzzer	-
Combination Meter • Multi-information Display	Warning • Information below is displayed alternately on combination meter: "WHEN STARTING THE Power DEPRESS THE BRAKE PEDAL"
Combination Meter • Master Warning Light	-
Wireless Door Lock Buzzer	-
Power Switch Indicator Light	-
Warning Stop Condition	The warning is stopped when one of the following conditions is met: • 10 seconds have elapsed since a warning message was displayed • The Power switch is pushed with the brake pedal depressed

13. BATTERY SAVING

(a) Vehicle Battery Saving Function
In the smart key system, signals are emitted outside of the vehicle at a prescribed interval (0.25 seconds) when the doors are locked. Therefore, the vehicle battery could be drained if the vehicle remains parked for a long time. For this reason, the controls listed below are carried out:

Condition	Control
Both conditions below are met for 5 days: • Electrical key is not in detection area • Touch sensor or lock switch operation is not performed	Signal transmission interval is extended from 0.25 to 0.75 seconds
Both conditions below are met for 14 days: • Electrical key is not in detection area • Touch sensor or lock switch operation is not performed	Automatically deactivates the smart key system

Reinstatement Conditions
- A wireless door lock control signal (lock, unlock) is input and the ID code matches.
- A user carries the electrical key and pushes a lock switch on an outside door handle.
- A door is locked or unlocked by the mechanical key.

(b) Electrical Key Battery and Vehicle Battery Saving Function

In the smart key system, if the electrical key is constantly located within the vehicle exterior detection area of the doors, the system maintains periodic communication with the electrical key. Therefore, if the vehicle remains parked in that state for a long time, the electrical key battery and the vehicle battery could be drained. For this reason, if this state continues longer than 10 minutes, the smart key system automatically becomes deactivated.

Reinstatement Conditions
- A wireless door lock control signal (lock, unlock) is input and the ID code matches.
- A user carries the electrical key and pushes a lock switch on an outside door handle.
- A door is locked or unlocked by the mechanical key.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the smart key system.
- The intelligent tester can be used in steps 4, 5 and 7.
- When troubleshooting the smart key system using the intelligent tester with the power switch off, connect the intelligent tester to the vehicle and repeat turning any of the courtesy light switches on and off until communication between the tester and the vehicle begins (the interval between ON and OFF should be less than 1.5 sec.).

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS CHECK

HINT:

- In troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.
- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.
- The following 5 items are important points in the problem analysis:

What	Vehicle model, system name
When	Date, time, occurrence frequency
Where	Road conditions
Under what conditions?	Running conditions, driving conditions, weather conditions
How did it happen?	Problem symptoms

NEXT

3	INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT

4 **INSPECT COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM**

(a) Use the intelligent tester to check if the CAN Communication System is functioning normally (See page CA-7).

Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → **GO TO CAN COMMUNICATION SYSTEM**

A

DL

5 **CHECK FOR DTC**

(a) Check for DTCs and note any codes that are output (See page DL-130).
(b) Delete the DTCs.
(c) Recheck for DTCs.

Result

Result	Proceed to
DTC does not reoccur	A
DTC reoccurs	B

B → **GO TO DIAGNOSTIC TROUBLE CODE CHART**

A

6 **PROBLEM SYMPTOMS TABLE**

NEXT

7 **OVERALL ANALYSIS AND TROUBLESHOOTING**

(a) On-vehicle inspection (See page DL-133)
(b) DATA LIST/ACTIVE TEST (See page DL-130)
(c) Terminals of ECU (See page DL-124)

NEXT

8 **REPAIR OR REPLACEMENT**

NEXT

9	**CONFIRMATION TEST**

NEXT

END

CUSTOMIZE PARAMETERS

1. CUSTOMIZING FUNCTION WITH INTELLIGENT TESTER

HINT:

The items in the table below can be customized.

NOTICE:

- **When the customer requests a change in a function, first make sure that the function can be customized.**
- **Be sure to make a note of the current setting before customizing.**
- **When troubleshooting a function, first make sure that the function is set to the default setting.**

SMART:

Display (Item)	Default	Contents	Setting
PARK WAIT TIME (Wait time to permit opening door after locking)	2.5s	Function that sets waiting time to permit opening door after door is locked with entry lock function.	0.5s / 1.5s / 2.5s / 5.0s
SMART UNLOCK	D_DOOR	Function that switches the entry unlock detection area.	ALL / D_DOOR
IGNITION AREA (SMART ignition available area)	ALL	Function to choose the available area for electrical key to start HV control system and cancel the steering lock.	FRONT / ALL
SMART TRUNK (Luggage compartment opening operation)	ON	Function to open a luggage compartment when the driver has the electrical key and presses the luggage open button.	ON / OFF

WIRELESS DOOR LOCK:

Display (Item)	Default	Contents	Setting
ALARM FUNCTION (Panic function)	ON	Function to operate the theft deterrent system by keeping pressing the lock button of the transmitter for 2.5 seconds. If there is a panic button, press the panic button instead of the lock button.	ON / OFF

WARNING:

Display (Item)	Default	Contents	Setting
KEY LOW-BATT WRN	ON	Function to set a warning function for the time when a key battery becomes weak.	ON / OFF

2. CUSTOMIZING FUNCTION WITHOUT INTELLIGENT TESTER (Entry Unlock Mode Switching Function)

(a) To change the vehicle to entry unlock mode switching function, make sure the vehicle power is off and simultaneously press and hold the electrical key's LOCK switch and another electrical key switch for 4.5 seconds.

When the switches are pressed and held for 4.5 seconds, the entry door unlock mode changes in the following order: driver door mode, all door mode.

NOTICE:

After pressing and holding the switches for 4.5 seconds, wait 4.5 seconds before performing the same procedure again.

- Driver door unlock mode:
  When the driver door's touch sensor is touched, only the driver door unlocks. When another touch sensor is touched, all doors unlock.

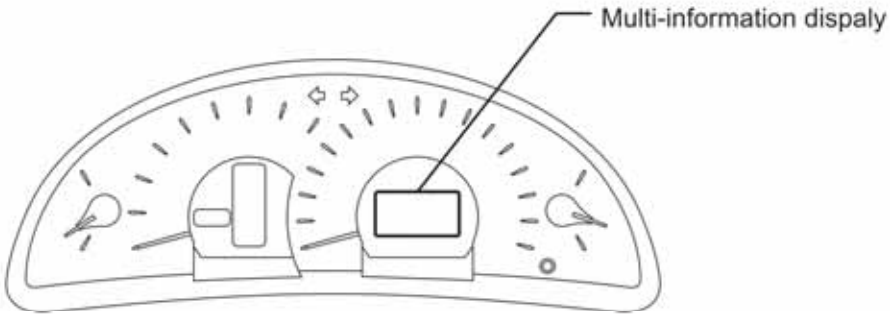
- All door unlock mode:
  When the touch sensor is touched, all doors unlock.

(b) The certification ECU receives this signal from the door control receiver and changes the smart key system to the entry unlock mode.

(c) The certification ECU sounds the buzzers of the wireless door lock buzzer and combination meter to inform the user that the mode has been switched.

DL

Mode	Wireless Door Lock Buzzer	Combination Meter		
		Multi-information Display		Buzzer
Driver Door (Default)	ON / OFF — Sounds 3 times	Displayed for 5 sec.	Passenger, rear LH and RH door "open" indication	Sounds once
All Doors (Customized)	ON / OFF — Sounds 2 times	Displayed for 5 sec.	All door "open" indication	Sounds once



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HINT:
The function only changes the entry unlock mode of the smart key system. It does not switch the unlocking of the wireless door lock control.

3. CUSTOMIZING FUNCTION WITHOUT INTELLIGENT TESTER (Electrical Key Cancel)

The electrical key cancel operation disables the following functions:

- Entry Ignition (HV control system is on (READY))
- Entry Unlock/Lock
- Entry Luggage Compartment Open
- Electrical Key Lock-in Prevention
- Warning
- Memory Call

The operation procedures are as follows:

Precondition:

Power switch off, driver side door closed and unlocked.

(a) Unlock the driver side door once with the UNLOCK switch of the electrical key.

(b) Open the driver door within 5 seconds.

(c) Unlock the driver side door twice with the UNLOCK switch of the electrical key within 5 seconds.

(d) Repeat open → close twice for the driver door within 30 seconds, and open again.
(Driver door: Open → Close → Open → Close → Open)

(e) Unlock the driver side door twice with the UNLOCK switch of the electrical key within 5 seconds.

(f) Repeat open → close once for the driver door within 30 seconds, and open again.
(Driver door: Open → Close → Open)

(g) Close the driver door within 5 seconds.
When electrical key cancel is activated, the wireless door lock buzzer sounds twice.
To return to the original condition, perform the procedures again. When the original condition is returned, the wireless door lock buzzer sounds once.

PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of the problem symptoms. The potential causes of the symptoms are listed in order of probability in the "Suspected area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

SMART KEY SYSTEM:

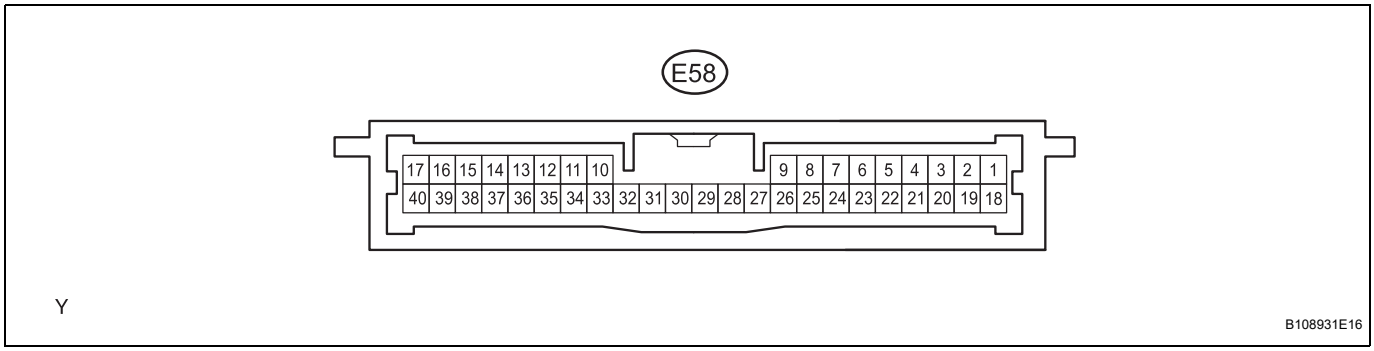
Symptom	Suspected Area	See page
Entry lock/unlock does not operate.	1. Check for DTCs in the smart key system (Starting function).	ST-23
	2. Refer to PROBLEM SYMPTOMS TABLE of the power door lock control system ("All doors cannot be locked/unlocked simultaneously by neither door control switch nor door key cylinder").	DL-11
	3. Courtesy light switch circuit	LI-41
	4. Lock position switch circuit	-
	- Driver door	DL-19
	- Front passenger door	DL-22
	- Rear passenger door LH	DL-25
	- Rear passenger door RH	DL-28
	5. Entry lock switch circuit	DL-147
	6. Touch sensor circuit	DL-151
	7. Antenna circuit	DL-154
	8. Refer to "ID code matching inside the cabin cannot be performed".	-
	9. Door oscillator circuit	DL-142
	10. Replace the main body ECU.	-
	11. Replace the certification ECU.	-
Luggage compartment does not open (when the electrical key is outside the vehicle).	1. Check for DTCs in the smart key system (Starting function).	ST-23
	2. Check if any function is cancelled due to customization.	DL-118
	3. Operate the luggage compartment opener switch on the electrical key to check the wireless function.	DL-68
	4. Refer to PROBLEM SYMPTOMS TABLE of the wireless door lock control system ("The wireless door lock control system does not operate").	DL-71
	5. Check operation of the cabin oscillator in active test.	DL-130
	6. Luggage oscillator circuit	DL-156
	7. Luggage compartment opener switch circuit	DL-162
	8. Replace the main body ECU.	-
	9. Replace the certification ECU.	-
All entry function does not operate.	1. Registration of the key.	EI-9
	2. Certification ECU power source circuit	DL-164
	3. Replace certification ECU.	-

Symptom	Suspected Area	See page
Function to prevent electrical key confinement in the luggage compartment does not operate. (The luggage compartment does not open.)	1. Check for DTCs in the smart key system (Starting function).	ST-23
	2. Power door lock control system	DL-11
	3. Courtesy light switch circuit	LI-41
	4. Lock position switch circuit	-
	- Driver door	DL-19
	- Front passenger door	DL-22
	- Rear passenger door LH	DL-25
	- Rear passenger door RH	DL-28
	5. Check if any function is not cancelled due to customization.	DL-118
	6. Operate the LOCK/UNLOCK switch on the key to check the wireless function.	DL-68
	7. Refer to PROBLEM SYMPTOMS TABLE of the wireless door lock control system ("The wireless door lock control system does not operate").	DL-71
	8. Check operation of the cabin oscillator in active test.	DL-130
	9. Luggage oscillator circuit	DL-156
	10. Replace the main body ECU.	-
	11. Replace the certification ECU.	-
Function to prevent electrical key confinement in the luggage compartment does not operate. (The alarm does not sound.)	1. Check if the function to prevent electrical key confinement in the luggage compartment operates.	DL-133
	2. Check if answer back is performed when the wireless door lock is operated.	DL-68
	3. Replace the certification ECU.	-
The outside alarm of the answer back and entry systems does not sound.	1. Check if the function to prevent electrical key confinement in the luggage compartment operates.	DL-133
	2. Check that "WIRELESS BUZZER" and "HAZARD" in the ACTIVE TEST of the main body ECU are YES. (If it is NO, go to wireless door lock control system.)	DL-130
	3. Wireless door lock tuner circuit (DTC B1242)	DL-138
	4. Replace the certification ECU.	-
The inside alarm of the entry system does not sound.	1. Operate the LOCK/UNLOCK switch on the electrical key to check the wireless function.	DL-68
	2. Refer to PROBLEM SYMPTOMS TABLE of the wireless door lock control system ("Wireless door lock function").	DL-71
	3. Check if the electrical key reminder buzzer sounds.	DL-133
	4. Replace the certification ECU.	-
ID code matching inside the cabin cannot be performed.	1. Check if any function is cancelled due to customization.	DL-118
	2. Operate the LOCK/UNLOCK switch on the key to check the wireless function.	DL-68
	3. Refer to PROBLEM SYMPTOMS TABLE of the wireless door lock control system ("The wireless door lock control system does not operate").	DL-71
	4. Check the cabin oscillator operation in the active test.	DL-130
	5. Room oscillator circuit	DL-159
	6. Luggage oscillator circuit	DL-156
	7. Replace the certification ECU.	-

Symptom	Suspected Area	See page
ID code matching outside the cabin cannot be performed.	1. Check if any function is cancelled due to customization.	DL-118
	2. Operate the LOCK/UNLOCK switch on the electrical key to check the wireless function.	DL-68
	3. Refer to PROBLEM SYMPTOMS TABLE of the wireless door lock control system ("The wireless door lock control system does not operate").	DL-71
	4. Check operation of each door oscillator in active test.	DL-130
	5. Door oscillator circuit	DL-142
	6. Normal	-
Key reminder buzzer does not sound.	1. Perform ACTIVE TEST for the combination meter.	DL-130
	2. Check "COURTESY SW" in the DATA LIST of the door control system.	DL-17
	3. Check the key reminder buzzer when the power switch is on (ACC) and the drivers door is opened.	-
	4. Check if the steering wheel is locked when all power supplies are OFF and the drivers door is opened.	-
	5. Refer to PROBLEM SYMPTOMS TABLE of the steering lock system ("Steering wheel cannot be locked").	SR-10
	6. Check that the "LCK BAR STUCK" item in the DATA LIST of the certification ECU displays OK.	DL-130
	7. Replace the steering lock ECU.	-
	8. Replace the certification ECU.	-

TERMINALS OF ECU

1. CHECK CERTIFICATION ECU



(a) Disconnect the E58 ECU connector.
(b) Measure the voltage and resistance according to the value(s) in the table below.

DL

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B (E58-1) - Body ground	W - Body ground	+B power supply	Always	10 to 14 V
IG (E58-18) - Body ground	LG - Body ground	Ignition power supply	Power switch off	Below 1 V
IG (E58-18) - Body ground	LG - Body ground	Ignition power supply	Power switch on (IG)	10 to 14 V
E (E58-17) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
ACC (E58-19) - Body ground	L - Body ground	ACC power supply	Power switch off	Below 1 V
ACC (E58-19) - Body ground	L - Body ground	ACC power supply	Power switch on (ACC)	10 to 14 V
TSW1 (E58-3) - Body ground	GR - Body ground	Entry lock switch signal	Front lock switch LH not pushed	10 kΩ or higher
TSW1 (E58-3) - Body ground	GR - Body ground	Entry lock switch signal	Front lock switch LH pushed	Below 1 Ω
TSW2 (E58-4) - Body ground	L - Body ground	Entry lock switch signal	Front lock switch RH not pushed	10 kΩ or higher
TSW2 (E58-4) - Body ground	L - Body ground	Entry lock switch signal	Front lock switch RH pushed	Below 1 Ω
LIN (E58-10) - Body ground	O - Body ground	LIN line	Always	10 kΩ or higher
CANH (E58-27) - Body ground	B - Body ground	CAN line	Always	10 kΩ or higher
CANL (E58-28) - Body ground	W - Body ground	CAN line	Always	10 kΩ or higher
AGND (E58-40) - Body ground	G - Body ground	Ground	Always	Below 1 Ω
TSW5 (E58-7) - Body ground	G - Body ground	Luggage compartment opener switch signal	Opener switch OFF	10 kΩ or higher
TSW5 (E58-7) - Body ground	G - Body ground	Luggage compartment opener switch signal	Opener switch ON	Below 1 Ω

If the result is not as specified, the wire harness side may have a malfunction.
(c) Reconnect the E58 ECU connector.
(d) Measure the voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CLG1 (E58-33) - CG1B (E58-34)	LG - L	Door electrical key oscillator (front LH) sensor signal	All doors closed, all doors locked and power switch off	Alternating between 5 V and below 1 V
CLG1 (E58-33) - CG1B (E58-34)	LG - L	Door electrical key oscillator (front LH) sensor signal	Door unlocked or door open	Below 1 V
SEN1 (E58-22) - E (E58-17)	B - W-B	Touch sensor detection signal	Outside door handle touched	Below 1 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SEN1 (E58-22) - E (E58-17)	B - W-B	Touch sensor detection signal	Outside door handle not touched	10 to 14 V
SEL1 (E58-5) - E (E58-17)	V - W-B	Touch sensor activation control signal	Move the key more than 5 m (16.4 ft) away from the front door LH	10 to 14 V
SEL1 (E58-5) - E (E58-17)	V - W-B	Touch sensor activation control signal	Bring key to the outside handle	Below 1 V
CLG2 (E58-35) - CG2B (E58-36)	GR - BR	Door electrical key oscillator (front RH) sensor signal	All doors closed, all doors locked and power switch off	Alternating between 5 V and below 1 V
CLG2 (E58-35) - CG2B (E58-36)	GR - BR	Door electrical key oscillator (front RH) sensor signal	Door unlocked or door open	Below 1 V
SEN2 (E58-23) - E (E58-17)	O - W-B	Touch sensor detection signal	Outside door handle touched	Below 1 V
SEN2 (E58-23) - E (E58-17)	O - W-B	Touch sensor detection signal	Outside door handle not touched	10 to 14 V
SEL2 (E58-6) - E (E58-17)	P - W-B	Touch sensor activation control signal	Move the key more than 5 m (16.4 ft) away from the front door RH	10 to 14 V
SEL2 (E58-6) - E (E58-17)	P - W-B	Touch sensor activation control signal	Bring key to the outside handle	Below 1 V
CLG5 (E58-11) - CG5B (E58-12)	R - W	Indoor electrical key oscillator (front) sensor signal	Within 30 seconds driver side door opened and closed, power switch off	Alternating between 5 V and below 1 V
CLG5 (E58-11) - CG5B (E58-12)	R - W	Indoor electrical key oscillator (front) sensor signal	Power switch on (IG)	Below 1 V
CLG6 (E58-13) - CG6B (E58-14)	Y - B	Indoor electrical key oscillator (rear) sensor signal	Within 30 seconds after driver side door opened and closed, power switch off	Alternating between 5 V and below 1 V
CLG6 (E58-13) - CG6B (E58-14)	Y - B	Indoor electrical key oscillator (rear) sensor signal	Power switch on (IG)	Below 1 V
CLG7 (E58-15) - CG7B (E58-16)	R - W	Luggage electrical key oscillator (inner) sensor signal	Luggage compartment door opening switch ON	Alternating between 5 V and below 1 V
CLG7 (E58-15) - CG7B (E58-16)	R - W	Luggage electrical key oscillator (inner) sensor signal	Luggage compartment door opening switch OFF	Below 1 V
CLG8 (E58-31) - CG8B (E58-32)	V - P	Luggage electrical key oscillator (outer) sensor signal	Luggage compartment door opening switch ON	Alternating between 5 V and below 1 V
CLG8 (E58-31) - CG8B (E58-32)	V - P	Luggage electrical key oscillator (outer) sensor signal	Luggage compartment door opening switch OFF	Below 1 V
RC0 (E58-29) - E (E58-17)	G - W-B	Entry door control receiver power source	Power switch off, all doors closed and electrical key switch on	4.5 to 5.5 V
RC0 (E58-29) - E (E58-17)	G - W-B	Entry door control receiver power source	Power switch off, all doors closed and electrical key switch off	Below 1 V
RSSI (E58-39) - E (E58-17)	R - W-B	Entry door control receiver electric wave existence signal	Power switch off, all doors closed, the electrical key is not in the action area	10 to 14 V
RSSI (E58-39) - E (E58-17)	R - W-B	Entry door control receiver electric wave existence signal	Power switch off, all doors closed, the electrical key is in the action area	Below 1 V

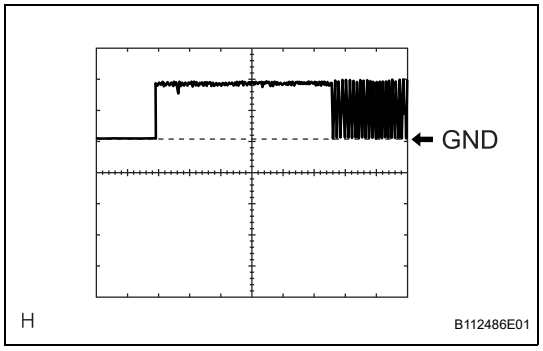
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
RDA (E58-38) - E (E58-17)	Y - W-B	Entry door control receiver data input signal	Power switch off, all doors closed and electrical key switch off	10 to 14 V (Pulse generation)
RDA (E58-38) - E (E58-17)	Y - W-B	Entry door control receiver data input signal	Power switch off, all doors closed and electrical key switch on	Pulse generation
RDA (E58-38) - Body ground	Y - Body ground	Tuner input signal	Power switch off, all doors closed, the electrical key is not in the action area	10 to 14 V (Pulse generation)
RDA (E58-38) - Body ground	Y - Body ground	Tuner input signal	The electrical key is in the action area.	Pulse generation
ASEL (E58-37) - Body ground	V - Body ground	Cabin / luggage receiver select signal	Power switch off, luggage compartment door closed and the electrical key is in the luggage action area	4.6 to 6 V
ASEL (E58-37) - Body ground	V - Body ground	Cabin / luggage receiver select signal	Power switch off, luggage compartment door open	Below 1 V
VC5 (E58-30) - Body ground	R - Body ground	Transponder key amplifier power supply	Electrical key is not in the cabin.	Below 1 V
VC5 (E58-30) - Body ground	R - Body ground	Transponder key amplifier power supply	Have the electrical key outside the cabin and open the driver's door.	4.6 to 5.4 V
TXCT (E58-8) - Body ground	GR - Body ground	Transponder key amplifier output signal	Electrical key is not in the cabin.	Below 1 V
TXCT (E58-8) - Body ground	GR - Body ground	Transponder key amplifier output signal	• Have the electrical key outside the cabin and open the driver's door. • Hold the electrical key close to the power switch with the brake pedal depressed.	Pulse generation (see waveform 1)
CODE (E58-9) - Body ground	W - Body ground	Transponder key amplifier communication signal	Electrical key is not in the cabin.	Below 1 V
CODE (E58-9) - Body ground	W - Body ground	Transponder key amplifier communication signal	Have the electrical key outside the cabin and open the driver's door.	Pulse generation (see waveform 2)
BZR (E58-21) - Body ground	O - Body ground	Wireless door lock buzzer signal	Wireless door lock buzzer OFF	Below 1 V
BZR (E58-21) - Body ground	O - Body ground	Wireless door lock buzzer signal	Wireless door lock buzzer ON	Pulse generation

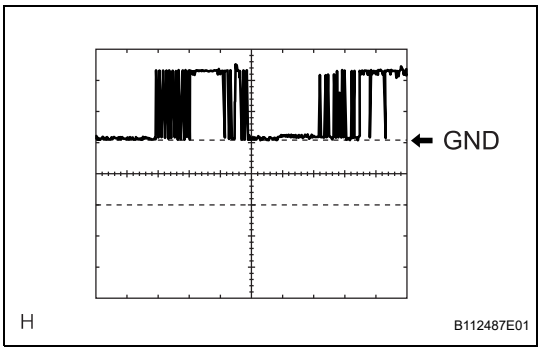
If the result is not as specified, the ECU may have a malfunction.

(e) Inspect using an oscilloscope.

Waveform 1 (Reference):

Terminal	TXCT - Body ground
Tool Setting	2 V/DIV., 10 ms./DIV.
Condition	Have the electrical key outside the cabin and open the driver's door.





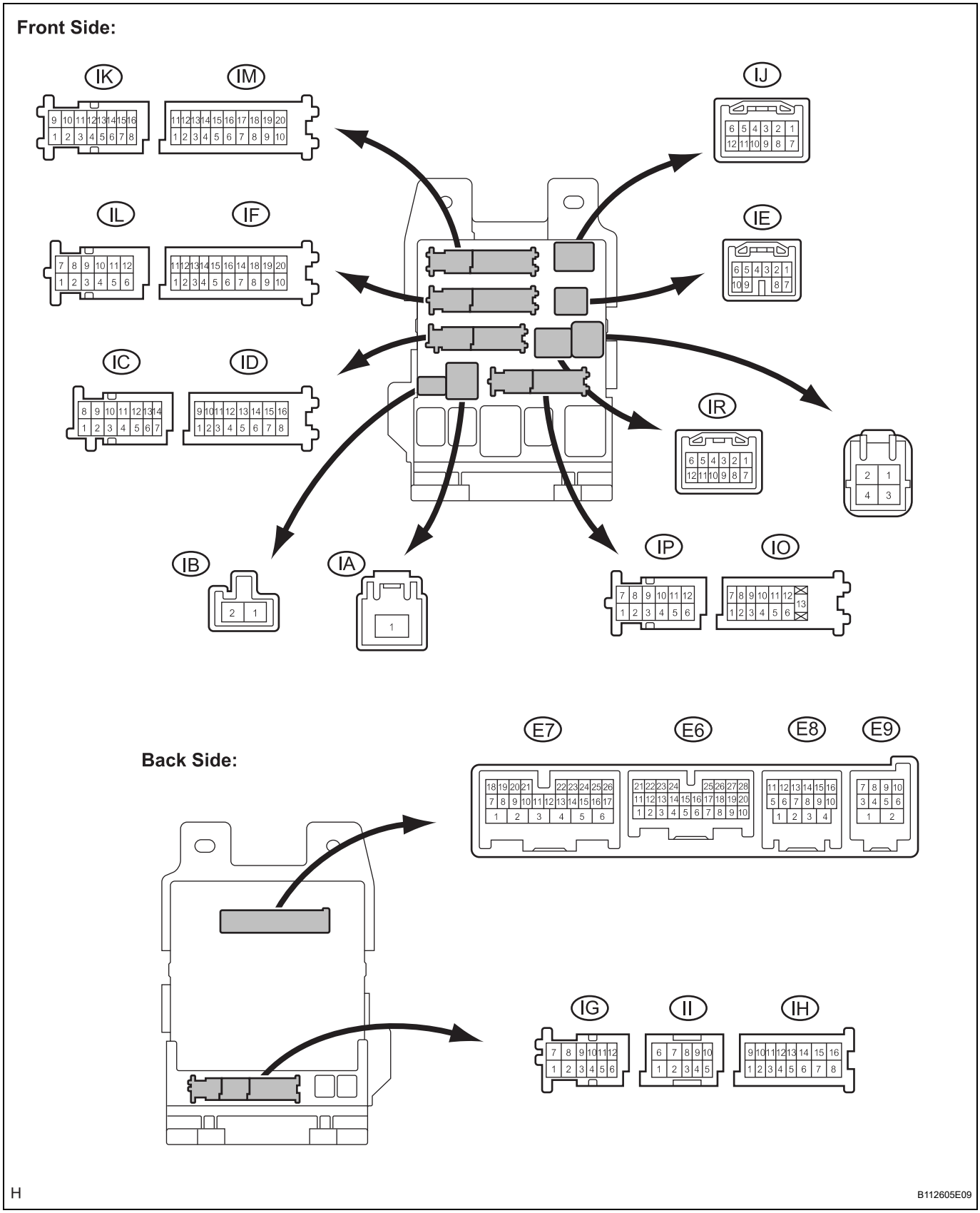
(f) Inspect using an oscilloscope.

Waveform 2 (Reference):

Terminal	CODE - Body ground
Tool Setting	2 V/DIV., 20 ms./DIV.
Condition	• Have the electrical key outside the cabin and open the driver's door. • Hold the electrical key close to the power switch with the brake pedal depressed.

2. MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

(a) Measure the voltage and resistance according to the value(s) in the table below.



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CANN (E8-15) - Body ground	W - Body ground	CAN Line	Always	10 kΩ or higher
CANP (E8-16) - Body ground	B - Body ground	CAN Line	Always	10 kΩ or higher
STP (IL-7) - Body ground	L - Body ground	Stop light switch signal	Brake pedal depressed	10 to 14 V
STP (IL-7) - Body ground	L - Body ground	Stop light switch signal	Brake pedal depressed	Below 1 V

If the result is not as specified, the junction block may have a malfunction.

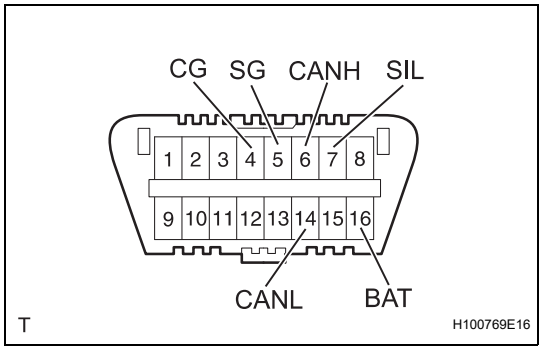
DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) Smart key system data and the Diagnostic Trouble Codes (DTCs) can be read from the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the intelligent tester to check for malfunctions and perform repairs.

2. CHECK DLC3

The ECU uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.



Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	CAN bus line	Power switch OFF*	54 to 69 Ω
CANH (6) - Battery positive (+)	HIGH-level CAN bus line	Power switch OFF*	6 kΩ or higher
CANH (6) - CG (4)	HIGH-level CAN bus line	Power switch OFF*	200 Ω or higher
CANL (14) - Battery positive (+)	LOW-level CAN bus line	Power switch OFF*	6 kΩ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Power switch OFF*	200 Ω or higher

NOTICE:

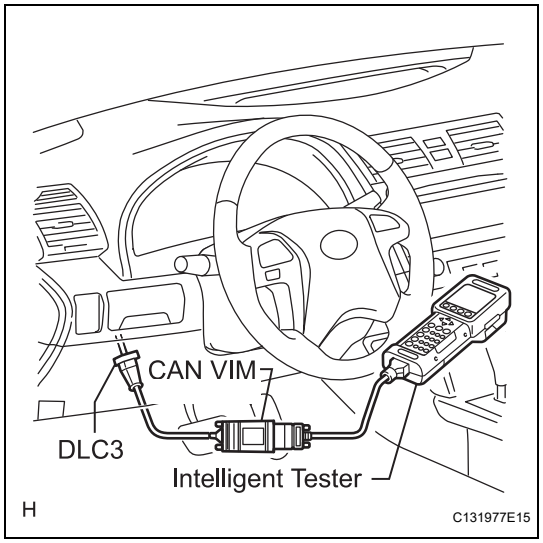
***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors.**

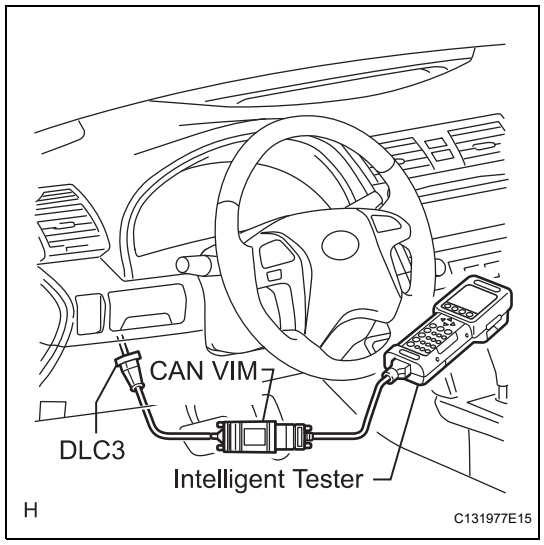
If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

Connect the cable of the intelligent tester (with CAN VIM) to the DLC3, turn the power switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.





DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Enter the following menu items: DIAGNOSIS / OBD/ MOBD / DTC INFO / CURRENT CODES.
(d) Read the DTC by following the prompts on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

2. CLEAR DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Enter the following menu items: DIAGNOSIS / OBD/ MOBD / DTC INFO / CLEAR CODES.
(d) Erase the DTC by following the directions on the tester screen.

HINT:
Refer to the intelligent tester operator's manual for further details.

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST relay in troubleshooting is one way to save time.

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG). When the intelligent tester cannot be turned on due to a malfunction or other problem, refer to "precautions when using the intelligent tester" (See page DL-89).

(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / DATA LIST.

(d) Read the DATA LIST according to the display on the tester.

SMART KEY (Certification ECU):

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
D TOUCH SENSOR	Driver side door touch sensor / ON or OFF	ON: Sensor is touched OFF: Sensor is not touched	-
P TOUCH SENSOR	Front passenger side door touch sensor / ON or OFF	ON: Sensor is touched OFF: Sensor is not touched	-
D TRIGGER SW	Driver side door lock switch / ON or OFF	ON: Switch is touched OFF: Switch is not touched	-
P TRIGGER SW	Front passenger side door lock switch / ON or OFF	ON: Switch is touched OFF: Switch is not touched	-
TR/B-DOOR UNLK	Luggage compartment door unlock switch / ON or OFF	ON: Switch is pushed OFF: Switch is not pushed	-
IG SW	Power switch / ON or OFF	ON: Power switch is on (IG) OFF: Power switch is off	-
ACC SW	Power switch / ON or OFF	ON: Power switch is on (ACC) OFF: Power switch is off	-
P/S 10-MIN	Power save counter - 10 minutes / Min: 0; Max: 255	Power save counter after door LOCK/UNLOCK-10 minutes	-
P/S 5-DAY	Power save counter - 5 days / Min: 0; Max: 255	Power save counter after door LOCK/UNLOCK-5 days	-
P/S 14-DAY	Power save counter - 14 days / Min: 0; Max: 255	Power save counter after door LOCK/UNLOCK-14 days	-
UNMATCH V-ID	Unmatched vehicle-ID / YES or NO	YES: Key ID matches vehicle NO: Key ID does not match vehicle	-
NO RESPONSE	No response / YES or NO	YES: Response from key NO: No response from key	-
UNMATCH FORMAT	Unmatched response code and format / YES or NO	YES: Key ID code matches NO: Key ID code does not match	-
LOW BATTERY	Key low battery / YES or NO	YES: Key battery voltage drops NO: Key battery voltage is normal	-
WRONG CODE	ID code difference / YES or NO	YES: Key ID code matches NO: Key ID code does not match	-
WRONG C CODE	Challenge code difference (Response) / YES or NO	YES: Key ID code matches NO: Key ID code does not match	-
WRONG ID CODE	ID code difference / YES or NO	YES: Key ID code matches NO: Key ID code does not match	-
WRONG ROL CODE	Rolling code difference / YES or NO	YES: Key rolling code matches NO: Key rolling code does not match	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
DOOR UNLOCK MOD	Door unlock mode / ALL, D_DOOR	Mode status is displayed	-
FUNCTION CANCEL	Entry door lock function cancel / ON or OFF	Mode status is displayed	-
MASTER KEY	Master key / MATCH or NO MATCH	MATCH: Key code is sent NO MATCH: Unmatched key code	-
SUB KEY	Sub key / MATCH or NO MATCH	MATCH: Key code is sent NO MATCH: Unmatched key code	-
BCC	Transponder chip data / OK or NG	OK: Correct data sensing NG: Incorrect data sensing	-
STATUS	Transponder chip data / OK or NG	OK: Data OK NG: Data error	-
ENCRYPT CODE	Transponder chip data / OK or NG	OK: Data OK NG: Data error	-
SERIAL NUMBER	Transponder chip data / OK or NG	OK: Data OK NG: Data error	-
FRAME	Transponder chip data / OK or NG	OK: Data OK NG: Data error	-
RESPONSE	Transponder chip data / OK or NG	OK: With no response NG: With a response	-
#CODE	Diagnostic trouble code / Min.: 0, Max.: 255	-	-
IGNITION AREA	Entry available area / FRONT or ALL	Customization status is displayed	-
PARK WAIT TIME	Parking wait time / 0.5s, 1.5s, 2.5s, 5.0s	Customization status is displayed	-
TRUNK OPEN MODE	Luggage compartment door open mode with vehicle locked / ON or OFF	Customization status is displayed	-
KEY LO-BATT WRN	Key low battery warning / ON or OFF	Customization status is displayed	-

MAIN BODY:

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
LUGG COURTESY SW	Luggage compartment door courtesy light switch signal / ON or OFF	ON: Luggage compartment door open OFF: Luggage compartment door closed	-
D DOR CTY SW	Driver side door courtesy light switch signal / ON or OFF	ON: Driver side door open OFF: Driver side door closed	-
P DOR CTY SW	Front passenger side door courtesy light switch signal / ON or OFF	ON: Front passenger side door open OFF: Front passenger side door closed	-
RL DOR CTY SW	Rear door courtesy light switch LH signal / ON or OFF	ON: Rear door open OFF: Rear door closed	-
RR DOR CTY SW	Rear door courtesy light switch RH signal / ON or OFF	ON: Rear door open OFF: Rear door closed	-
TRUNK KEY UNLOCK	Luggage compartment door lock/ unlock switch / ON or OFF	ON: Luggage compartment door lock switch is pushed OFF: Luggage compartment door lock switch is not pushed	-
IG SW	Power switch / ON or OFF	ON: Power switch is on (IG) OFF: Power switch is off	-

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / ACTIVE TEST.
(d) Perform the ACTIVE TEST according to the display on the tester.

SMART KEY (Certification ECU):

Tester Display	Test Part	Control Range	Diagnostic Note
OVERHEAD TUNER	Door control receiver	ON / OFF	-
IN LUG TUNER	Luggage receiver	ON / OFF	-
D TRANSMITTER	Driver side electrical key oscillator	ON / OFF	-
P TRANSMITTER	Front passenger side electrical key oscillator	ON / OFF	-
FR TRANSMITTER	Indoor electrical key oscillator (console)	ON / OFF	-
RR TRANSMITTER	Indoor electrical key oscillator (rear seat)	ON / OFF	-
IN_BDR TRNSMTTR	Luggage compartment door inner oscillator	ON / OFF	-
BDOOR TRNSMTTR	Luggage compartment door outer oscillator	ON / OFF	-
D SELECT SIG	Driver side select	ON / OFF	-
P SELECT SIG	Front passenger side select	ON / OFF	-
WIRELESS BUZZER	Wireless buzzer	ON / OFF	-

MAIN BODY:

Tester Display	Test Part	Control Range	Diagnostic Note
TRNK/BDOR OPEN	Luggage compartment door open signal	ON / OFF	-
HAZARD	Hazard warning light	ON / OFF	-

DIAGNOSTIC TROUBLE CODE CHART

HINT:
If a trouble code is indicated during the DTC check, check the circuit listed for that code in the table below. Then proceed to the appropriate page.

Power door lock control system:

DTC Code	Detection Item	Trouble Area	See page
B1242	Wireless Door Lock Tuner Circuit Malfunction	1. Electrical key antenna 2. Door control receiver 3. Wire harness 4. Certification ECU	DL-138

ON-VEHICLE INSPECTION

1. SMART KEY SYSTEM OPERATION INSPECTION

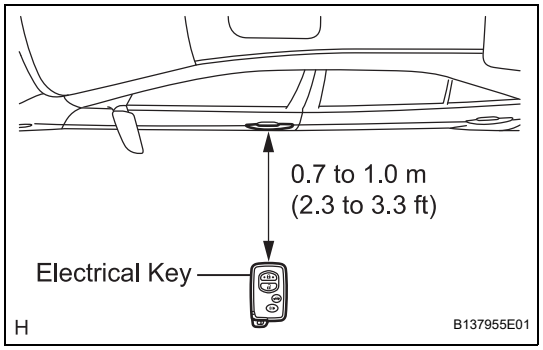
HINT:

Refer to PROBLEM SYMPTOMS TABLE if the results of the following checks are not normal (See page DL-121).

(a) Check the entry unlock function.

(1) Use the wireless lock operation to lock the doors. With the electrical key in your possession, touch a door's outside handle (touch sensor) and check that the door unlocks.

(b) Check the entry unlock operation's detection area.



(1) Step 1: Hold the electrical key at the same height as the door's outside handle (approximately 0.8 m (2.6 ft)). Pay attention to the direction of the electrical key in the illustration.

(2) Step 2: When the electrical key is brought within 0.7 to 1.0 m (2.3 to 3.3 ft) of the vehicle, check that the system enters unlock standby mode.

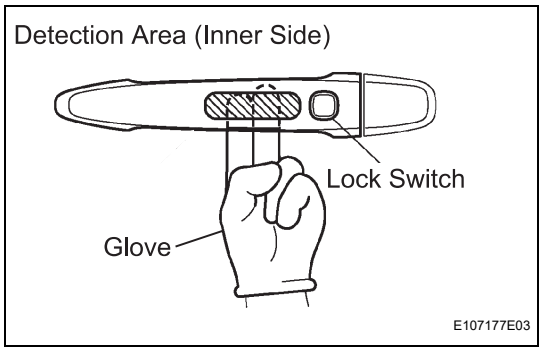
HINT:

Unlock standby mode is signified by the electrical key's red LED illuminating.

(3) Step 3: After the system enters unlock standby mode, touch the outside handle's sensor within 3 seconds. Check that the door unlocks.

NOTICE:

The electrical key cannot communicate with the system within a 0.2 m (0.6 ft) radius of each outside handle.



(4) Step 4: Repeat steps 2 and 3 for the remaining doors.

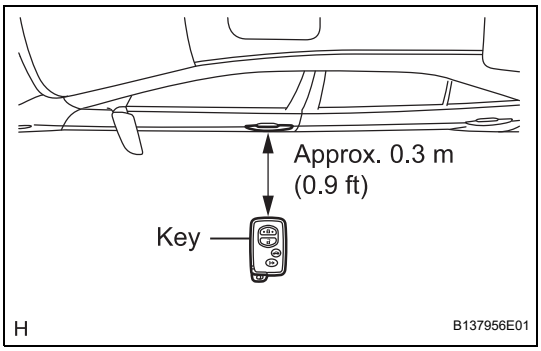
(5) Step 5: Inspect the door electrical key oscillator's response sensitivity. Wear protective gloves, set the system to unlock standby mode, and check that touching the inner side of the outside handle (the highlighted area in the illustration) with your finger causes the door to unlock.

NOTICE:

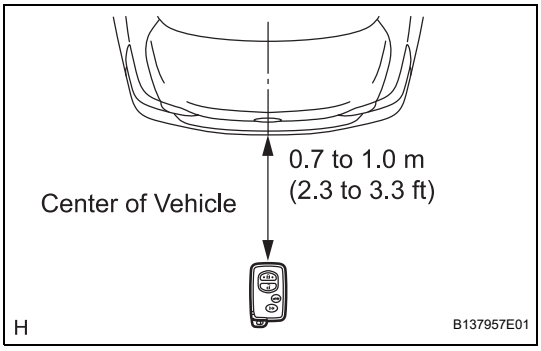
When touching the highlighted area, tapping too quickly or having extended contact may not trigger the sensor. In such a case, the door will not unlock.

(6) Step 6: Repeat step 5 for the remaining doors.

DL



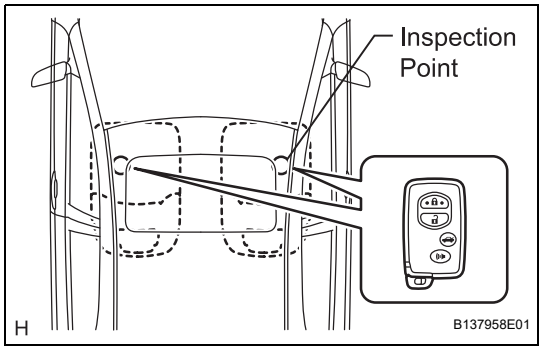
(c) Check the entry lock function.
  (1) Step 1: Close all of the vehicle's doors. With the electrical key in your possession outside the vehicle, check that pressing the lock switch locks the doors.
  (2) Step 2: Inspect the entry lock operation's detection area and the indoor electrical key antenna for wave leaks. Hold the electrical key at a height of 1 m (3.3 ft) (0.1 m (0.3 ft) above the lower edge of the window frame. Pay attention to the direction and position of the electrical key in the illustration. When the electrical key is approximately 0.3 m (0.9 ft) from the vehicle and the lock switch is pressed, check that the all doors lock and the warning buzzer (for when the electrical key is forgotten) does not sound. If the warning buzzer sounds, the indoor electrical key antenna may have a wave leak.
  HINT:
  Do not press the lock switch with the same hand that is holding the electrical key because the electrical key cannot communicate with the system within a 0.2 m (0.6 ft) radius of the outside handle. The doors will not lock.
  (3) Step 3: Repeat steps 1 and 2 for the remaining doors.



(d) Check the entry luggage compartment door open function.
  (1) Close the luggage compartment door. With the electrical key in your possession, check that pressing the power luggage door open switch opens the luggage compartment door.
  (2) Inspect the entry luggage compartment door open operation's detection area. Hold the electrical key at the same height as the power luggage door open switch (approximately 0.8 m (2.6 ft)) and align the key with the center of the rear of the vehicle. Pay attention to the direction of the electrical key shown in the illustration. When the electrical key is brought within 0.7 to 1.0 m (2.3 to 3.3 ft) of the vehicle, check that pressing the power luggage door open switch opens the luggage compartment door.

(e) Check the entry ignition function (HV control system is on (READY)).
  (1) When the HV control system is off:
  With the electrical key in your possession and the brake pedal depressed and the shift position is P, check that pressing the power switch releases the steering wheel lock and the HV control system is on (READY).

HINT:
The HV control system can be on (READY) only when the power switch indicator illuminates in green.

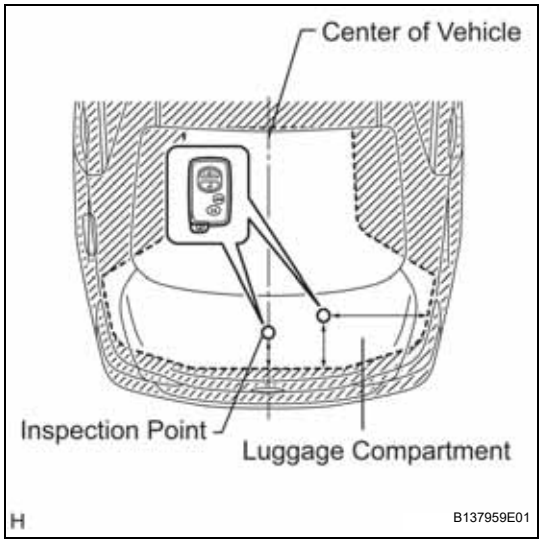


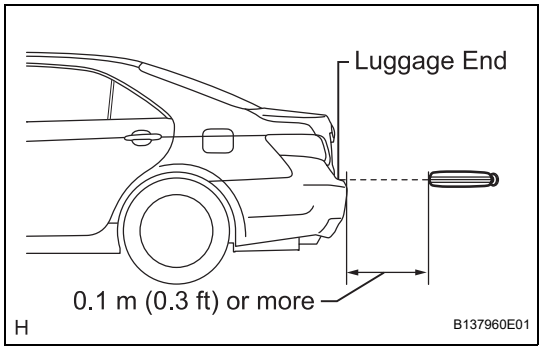
(2) When the HV control system is on (READY): With the electrical key in your possession and vehicle stopped, check that pressing the power switch stops the engine.
HINT:
The shift position must be P to stop the HV control system.

(3) Inspect the entry ignition (HV control system on (READY)) operation's detection area. Pay attention to the direction of the electrical key in the illustration. When the electrical key is in either of the 2 inspection points in the illustration, check that the HV control system can be on (READY).
NOTICE:
The engine cannot be started when the electrical key is on the instrument panel, rear package tray, or in the glove box.

(f) Check the electrical key lock-in prevention function.

(1) Place the electrical key in the luggage compartment with all doors locked. Check that: 1) closing the luggage compartment door triggers the electrical key's wireless buzzer (which lasts approximately 2 seconds), and 2) pressing the power luggage door open switch opens the luggage compartment door.





(2) Inspect the electrical key lock-in prevention's detection area. Pay attention to the direction of the electrical key shown in the illustration. When the electrical key is in either of the 2 inspection points in the illustration, check that: 1) closing the luggage compartment door sounds the electrical key's wireless buzzer, and 2) pressing the power luggage door open switch opens the luggage compartment door.
NOTICE:
If the electrical key is inside a metal storage item, such as a metal briefcase or metal box, the electrical key will not be detected by the system.

(3) Inspect the electrical key lock-in prevention's detection area and the entry door control receiver for wave leaks. Hold the electrical key at the same height as the lower edge of the luggage compartment door and align the key with the center of the rear of the vehicle. Pay attention to the direction and position of the electrical key shown in the illustration. When the electrical key is over 0.1 m (0.3 ft) from the vehicle's rear bumper, check that the electrical key's wireless buzzer does not sound.
If the warning buzzer sounds, the entry door control receiver may have a wave leak.

(g) Check the electrical key cancel function.
(1) While the power switch is on (IG), check that the power luggage door open switch, entry ignition, electrical key lock-in prevention and warning are the only switch in the smart key system that can be operated.
(2) While the electrical key cancel function (smart key system cancel function) is ON, check that all functions in the smart key system cannot be operated.

(h) Check the answer-back function (hazard warning light flashing and buzzer sounding).

Entry Operation	Hazard Warning Light	Buzzer
Entry Door Lock	Flashes once	Sounds once
Entry Door Unlock	Flashes twice	Sounds twice
Entry Luggage Compartment Door Open	Does not flash	Does not sound

(i) Check that the electrical key reminder warning buzzer sounds.
(1) Carry the electrical key in the vehicle and close the driver side door. Then turn the power switch off or on (ACC).
(2) Open the driver side door and check that the buzzer sounds intermittently.

(j) Check that the electrical key reminder warning buzzer stops.
(1) When the buzzer is sounding, check that the buzzer stops sounding if either of the following is performed:
- Close the driver side door (front door courtesy light switch is off).
- Turn the power switch on (IG, ACC) and lock the steering lock.

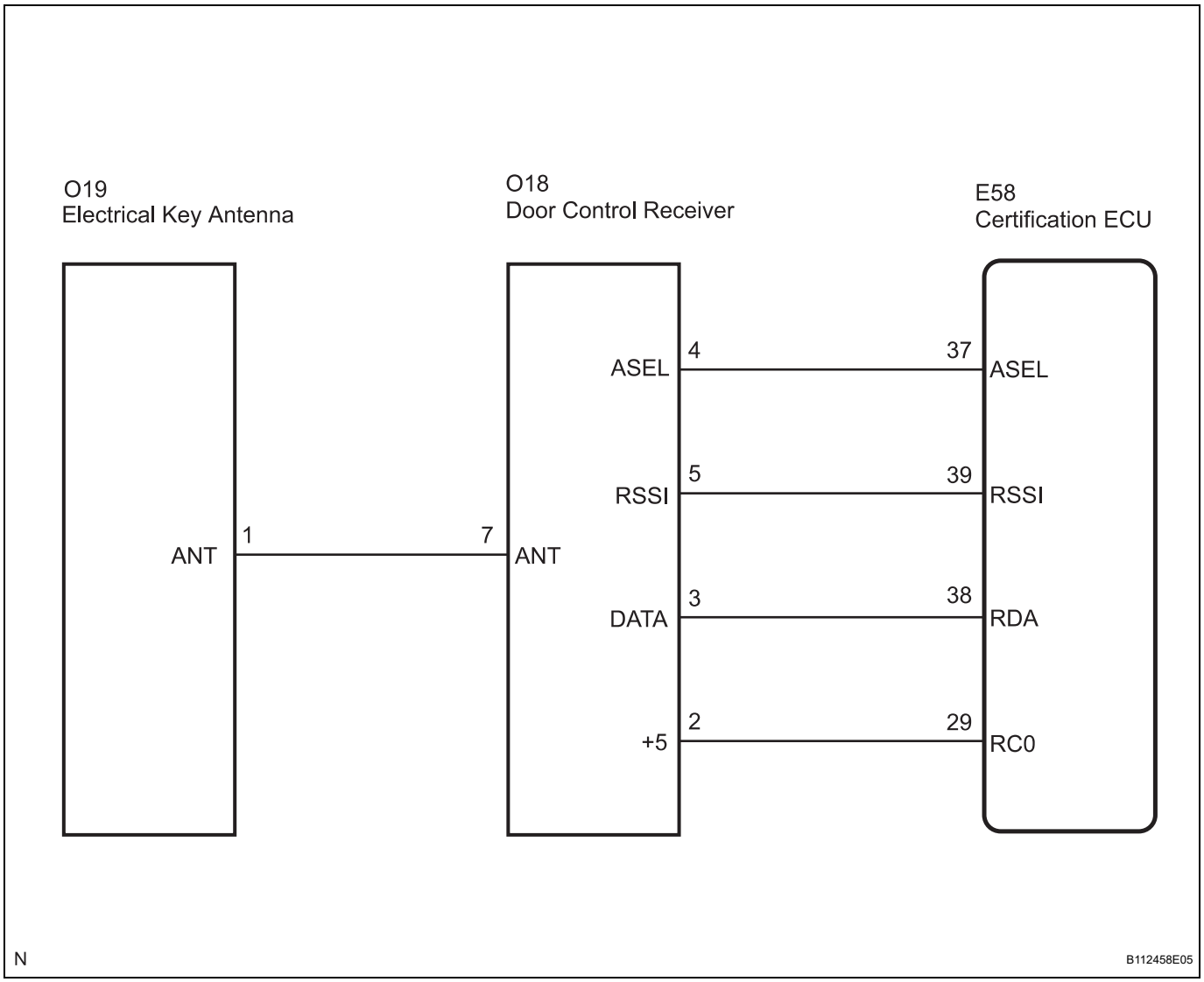
DTC	B1242	Wireless Door Lock Tuner Circuit Malfunction

DESCRIPTION

- The electrical key antenna and the door control receiver are used as antennas for the entry and wireless door lock functions of the smart key system.
- The certification ECU decodes the requested smart key system operation by identifying a key code based on electric waves received via the electrical key antenna and the door control receiver. The ECU then sends a command, according to the requested operation, to each ECU. (e.g. If door lock operation is requested, the ECU sends a door lock command to the main body ECU RH.)

DTC No.	DTC Detection Condition	Trouble Area
B1242	If the certification ECU detects that terminal RDA or RSSI is short-circuited, this DTC is stored.	• Electrical key antenna • Door control receiver • Wire harness • Certification ECU

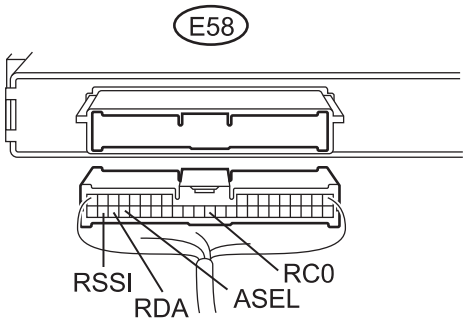
WIRING DIAGRAM



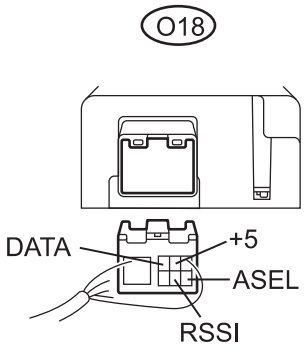
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - DOOR CONTROL RECEIVER)

Certification ECU:



Door Control Receiver:



H

B112460E04

(a) Disconnect the E58 ECU connector.
(b) Disconnect the O18 receiver connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

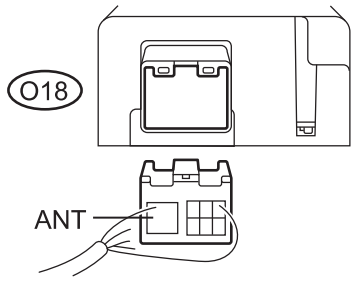
Tester Connection (Symbols)	Condition	Specified Condition
E58-37 (ASEL) - O18-4 (ASEL)	Always	Below 1 Ω
E58-39 (RSSI) - O18-5 (RSSI)	Always	Below 1 Ω
E58-38 (RDA) - O18-3 (DATA)	Always	Below 1 Ω
E58-29 (RC0) - O18-2 (+5)	Always	Below 1 Ω
E58-37 (ASEL) - Body ground	Always	10 kΩ or higher
E58-39 (RSSI) - Body ground	Always	10 kΩ or higher
E58-38 (RDA) - Body ground	Always	10 kΩ or higher
E58-29 (RC0) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

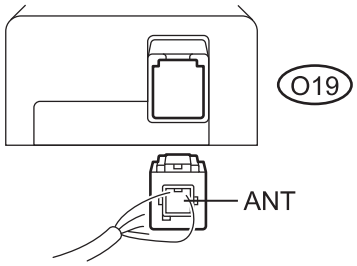
OK

2	CHECK HARNESS AND CONNECTOR (DOOR CONTROL RECEIVER - ELECTRICAL KEY ANTENNA)

Door Control Receiver:



Electrical Key Antenna:



H

B112462E03

(a) Disconnect the O19 antenna connector.
(b) Measure the resistance according to the value(s) in the table below.
HINT:
Perform the measurement with the O18 receiver connector disconnected.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
O18-7 (ANT) - O19-1 (ANT)	Always	Below 1 Ω
O18-7 (ANT) - Body ground	Always	10 kΩ or higher

DL

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK AND REPLACE DOOR CONTROL RECEIVER (RECONFIRM DTC)

(a) Replace the receiver.
(b) Clear the DTCs and repeat the procedure to recheck for DTCs (See page DL-130).

OK:

DTC is not output.

OK → **END (RECEIVER IS DEFECTIVE)**

NG

4	CHECK AND REPLACE ELECTRICAL KEY ANTENNA (RECONFIRM DTC)

(a) Replace the antenna.
(b) Clear the DTCs and repeat the procedure to recheck for DTCs (See page DL-130).
OK:
DTC is not output.

OK → **END (ANTENNA IS DEFECTIVE)**

NG

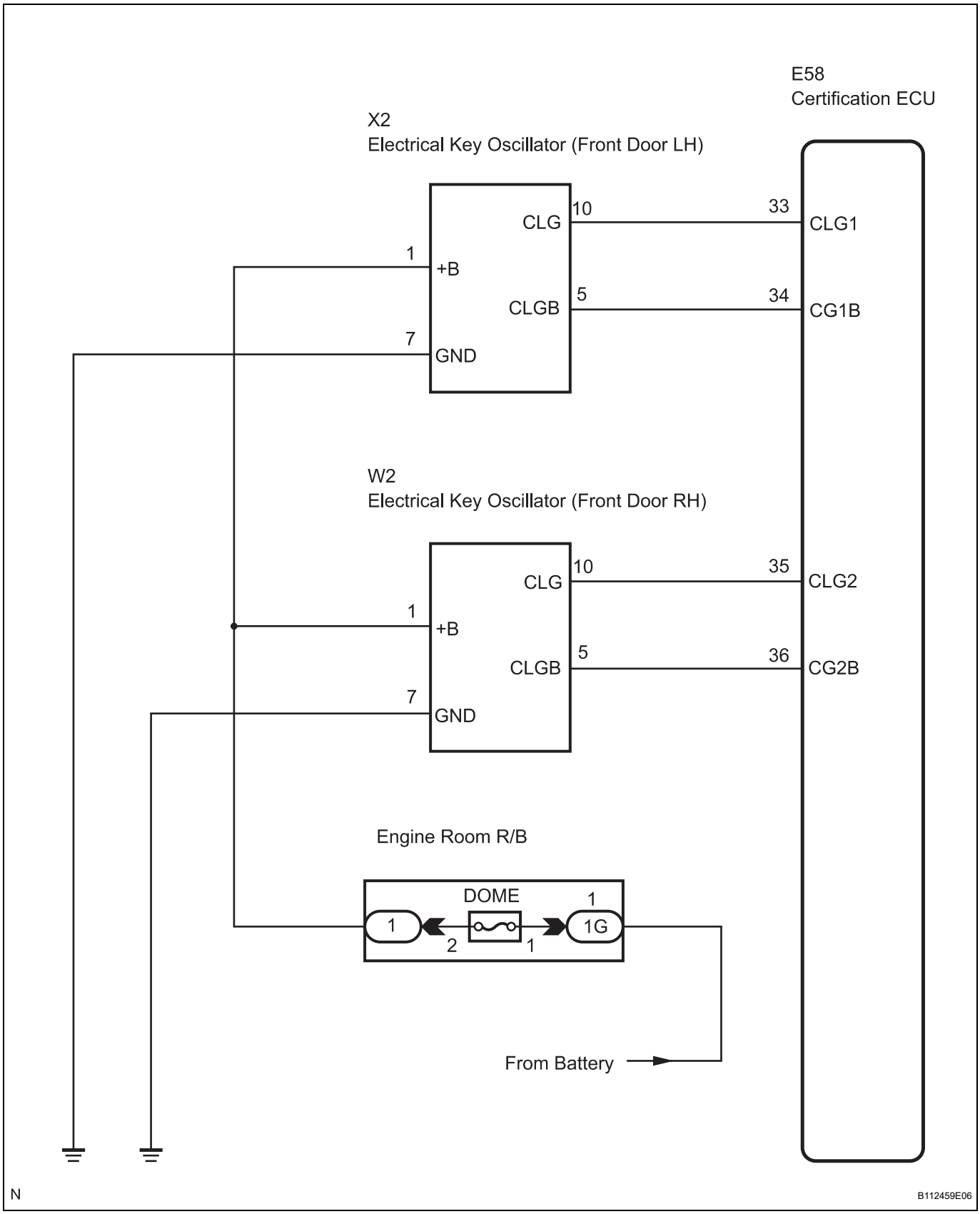
REPLACE CERTIFICATION ECU

Door Oscillator Circuit

DESCRIPTION

Door oscillators are built into each door. Each of them forms its own action area around its door and detects the presence of the electrical key.

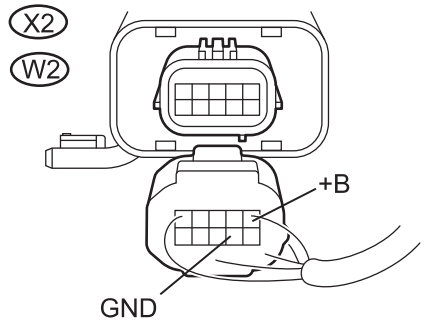
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT ELECTRICAL KEY OSCILLATOR

Door Oscillator:



H B112463E04

(a) Disconnect the oscillator connectors.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage:

Front LH side

Tester Connection (Symbols)	Condition	Specified Condition
X2-1 (+B) - X2-7 (GND)	Always	10 to 14 V

Front RH side

Tester Connection (Symbols)	Condition	Specified Condition
W2-1 (+B) - W2-7 (GND)	Always	10 to 14 V

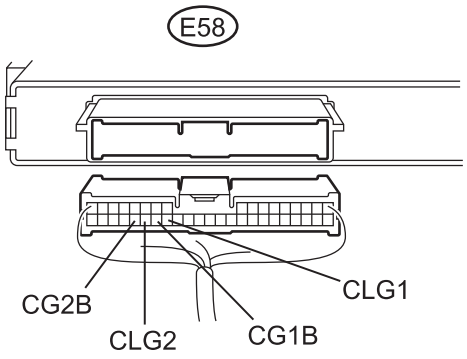
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

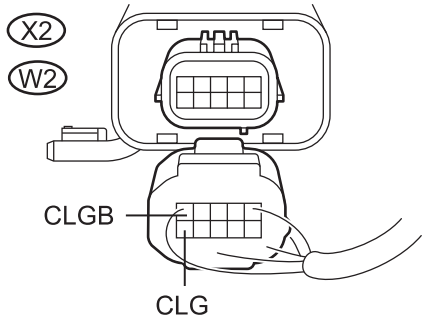
DL

2	CHECK HARNESS AND CONNECTOR (ELECTRICAL KEY OSCILLATOR - CERTIFICATION ECU)

Certification ECU:



Door Oscillator:



H

B112464E09

(a) Disconnect the E58 ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E58-33 (CLG1) - X2-10 (CLG)	Always	Below 1 Ω
E58-34 (CG1B) - X2-5 (CLGB)	Always	Below 1 Ω
E58-35 (CLG2) - W2-10 (CLG)	Always	Below 1 Ω
E58-36 (CG2B) - W2-5 (CLGB)	Always	Below 1 Ω
E58-33 (CLG1) - Body ground	Always	10 kΩ or higher
E58-34 (CG1B) - Body ground	Always	10 kΩ or higher
E58-35 (CLG2) - Body ground	Always	10 kΩ or higher
E58-36 (CG2B) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK AND REPLACE ELECTRICAL KEY OSCILLATOR (CHECK OPERATION OF OSCILLATOR)

(a) Replace the door oscillator.
(b) Check that the entry LOCK/UNLOCK function operates normally.

OK:

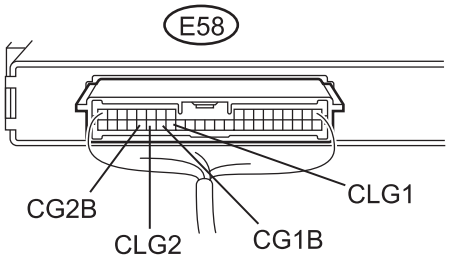
Entry LOCK/UNLOCK function operates normally.

OK → **END (ELECTRICAL KEY OSCILLATOR IS DEFECTIVE)**

NG

4	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (CERTIFICATION ECU OUTPUT SIGNAL)

Certification ECU:



(a) Reconnect the ECU and the oscillator connectors.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Enter the following menus: DIAGNOSIS / OBD/MOBD / ACTIVE TEST.
(e) Following the display on the tester, select the "ACTIVE TEST".

SMART KEY (Certification ECU):

Item	Vehicle Condition/Test Details
D TRANSMITTER	Door Oscillator ON/OFF
P TRANSMITTER	Door Oscillator ON/OFF

(f) Measure the frequency according to the value(s) in the table below.

Standard

Tester Connection (Symbols)	Condition	Specified Condition
E58-33 (CLG1) - E58-34 (CG1B)	During ACTIVE TEST	Frequency is generated (higher than 0 Hz)
E58-35 (CLG2) - E58-36 (CG2B)	During ACTIVE TEST	Frequency is generated (higher than 0 Hz)

NG → **REPLACE CERTIFICATION ECU**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

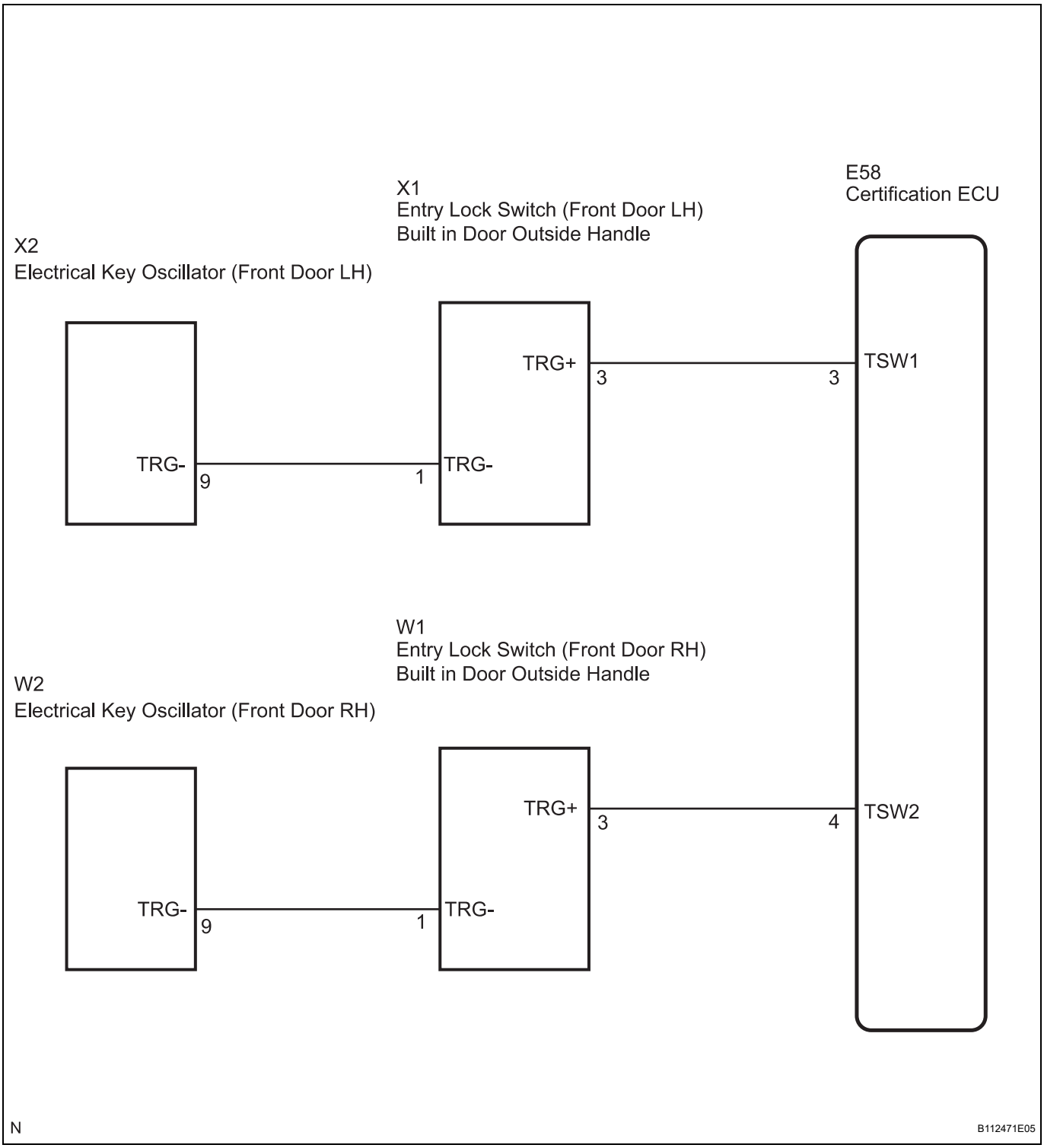
DL

Entry Lock Switch Circuit

DESCRIPTION

The entry lock switches (trigger switch) are built into the outside handles of the LH/RH door. The certification ECU detects the conditions of each lock switch.

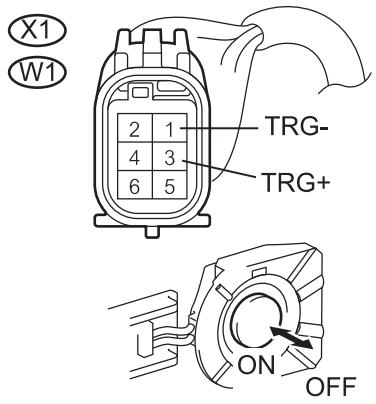
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT ENTRY LOCK SWITCH

Lock Switch:



H B112465E09

(a) Remove the outside handle.
(b) Disconnect the connectors.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
X1-1 (TRG-) - X1-3 (TRG+)	Lock switch not pushed	10 kΩ or higher
	Lock switch pushed	Below 1 Ω
W1-1 (TRG-) - W1-3 (TRG+)	Lock switch not pushed	10 kΩ or higher
	Lock switch pushed	Below 1 Ω

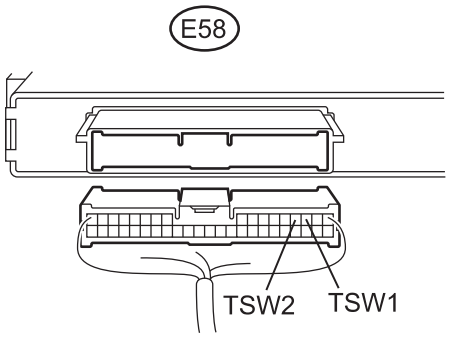
NG → **REPLACE OUTSIDE HANDLE ASSEMBLY**

OK

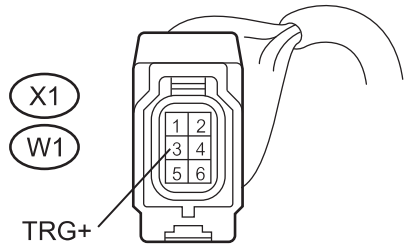
DL

2	CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - ENTRY LOCK SWITCH)

Certification ECU:



Lock Switch Wire Harness:



H

B138034E02

(a) Disconnect the E58 ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

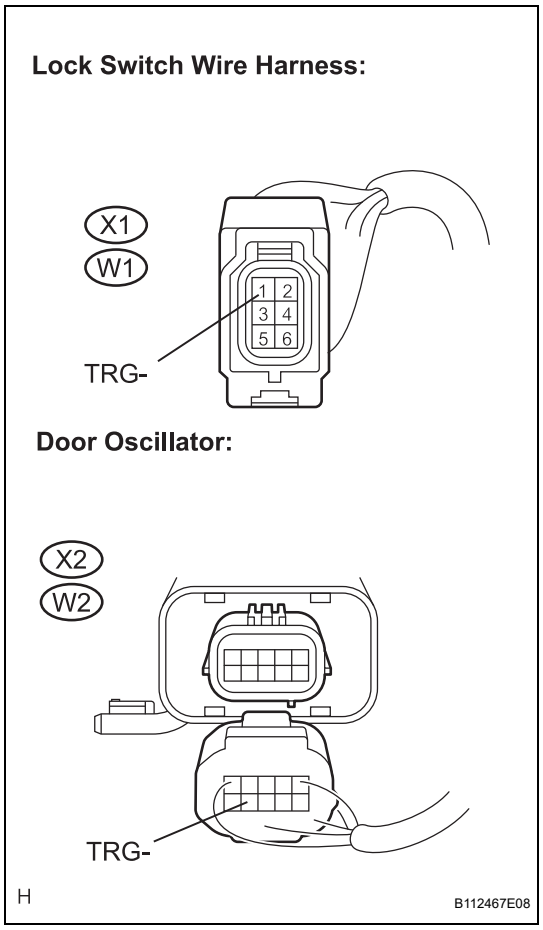
Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E58-3 (TSW1) - X1-3 (TRG+)	Always	Below 1 Ω
E58-4 (TSW2) - W1-3 (TRG+)	Always	Below 1 Ω
E58-3 (TSW1) - Body ground	Always	10 kΩ or higher
E58-4 (TSW2) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK HARNESS AND CONNECTOR (ELECTRICAL KEY OSCILLATOR - ENTRY LOCK SWITCH)



(a) Disconnect the door oscillator connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
X2-9 (TRG-) - X1-1 (TRG-)	Always	Below 1 Ω
W2-9 (TRG-) - W1-1 (TRG-)	Always	Below 1 Ω
X2-9 (TRG-) - Body ground	Always	10 kΩ or higher
W2-9 (TRG-) - Body ground	Always	10 kΩ or higher

DL

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	CHECK AND REPLACE ELECTRICAL KEY OSCILLATOR

(a) Replace the electrical key oscillator.
(b) Check that the entry LOCK/UNLOCK function operates normally.

OK:

Entry LOCK/UNLOCK function operates normally.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

OK

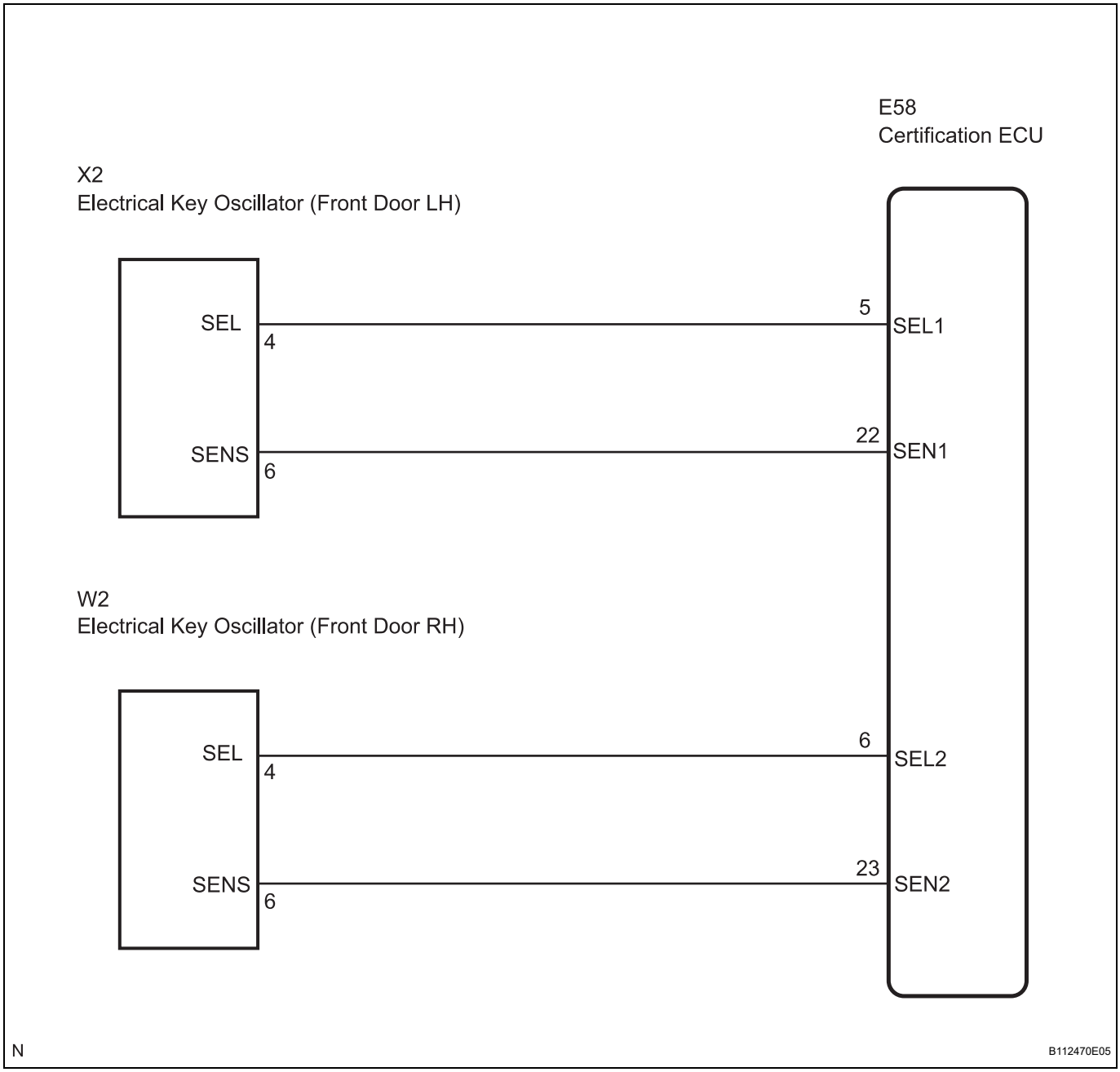
END (ELECTRICAL KEY OSCILLATOR IS DEFECTIVE)

Touch Sensor Circuit

DESCRIPTION

This circuit receives a signal indicating whether a touch sensor signal is detected.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).

(c) Following the display on the tester, select "DATA LIST".

SMART KEY (Certification ECU):

Item	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
D TOUCH SENSOR	Status of touch sensor front LH/ ON or OFF	ON: Touch sensor is touched OFF: Touch sensor is not touched	-
P TOUCH SENSOR	Status of touch sensor front RH/ ON or OFF	ON: Touch sensor is touched OFF: Touch sensor is not touched	-

OK:
"ON" (screen is touched) or "OFF" (screen is not touched) appears on the tester screen.

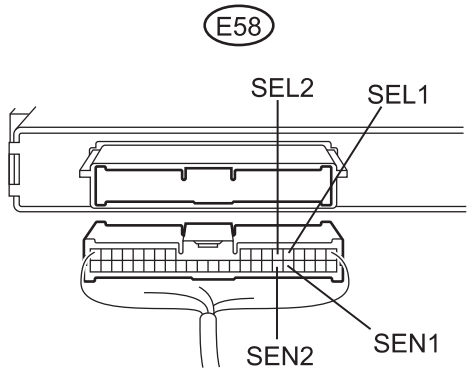
OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

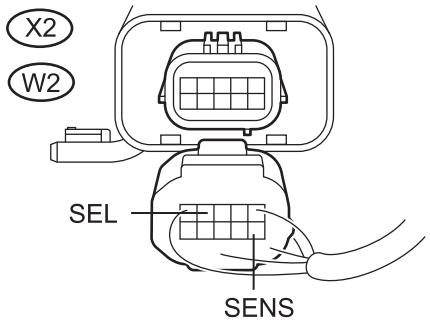
DL

2 CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - ELECTRICAL KEY OSCILLATOR)

Certification ECU:



Door Oscillator:



H

B112464E10

(a) Disconnect the E58 ECU connector.
(b) Disconnect the oscillator connectors.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E58-5 (SEL1) - X2-4 (SEL)	Always	Below 1 Ω
E58-22 (SEN1) - X2-6 (SENS)	Always	Below 1 Ω
E58-6 (SEL2) - W2-4 (SEL)	Always	Below 1 Ω
E58-23 (SEN2) - W2-6 (SENS)	Always	Below 1 Ω
E58-5 (SEL1) - Body ground	Always	10 kΩ or higher
E58-22 (SEN1) - Body ground	Always	10 kΩ or higher
E58-6 (SEL2) - Body ground	Always	10 kΩ or higher
E58-23 (SEN2) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK AND REPLACE ELECTRICAL KEY OSCILLATOR (CHECK OPERATION OF OSCILLATOR)

(a) Replace the electrical key oscillator.
(b) Check that the entry UNLOCK function operates normally.
OK:
Entry UNLOCK function operates normally.

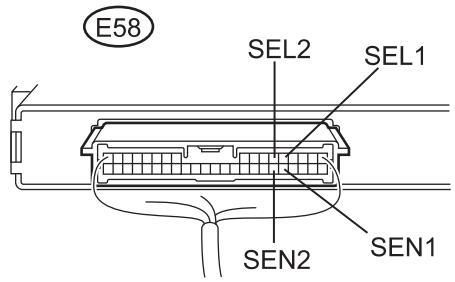
OK → **END (ELECTRICAL KEY OSCILLATOR IS DEFECTIVE)**

DL

NG

4	INSPECT CERTIFICATION ECU

Certification ECU:



H B112461E23

(a) Reconnect the ECU and the oscillator connectors.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
E58-5 (SEL1) - Body ground	Move the key more than 5 m (16.4 ft) away from the front door LH	10 to 14 V
E58-5 (SEL1) - Body ground	Bring key to the outside handle	Below 1 V
E58-6 (SEL2) - Body ground	Move the key more than 5 m (16.4 ft) away from the front door RH	10 to 14 V
E58-6 (SEL2) - Body ground	Bring key to the outside handle	Below 1 V
E58-22 (SEN1) - Body ground	Front door LH outside handle is not held (Bring the electrical key to the outside handle)	10 to 14 V
E58-22 (SEN1) - Body ground	Front door LH outside handle is held	Below 1 V
E58-23 (SEN2) - Body ground	Front door RH outside handle is not held (Bring the electrical key to the outside handle)	10 to 14 V
E58-23 (SEN2) - Body ground	Front door RH outside handle is held	Below 1 V

NG → **REPLACE CERTIFICATION ECU**

OK

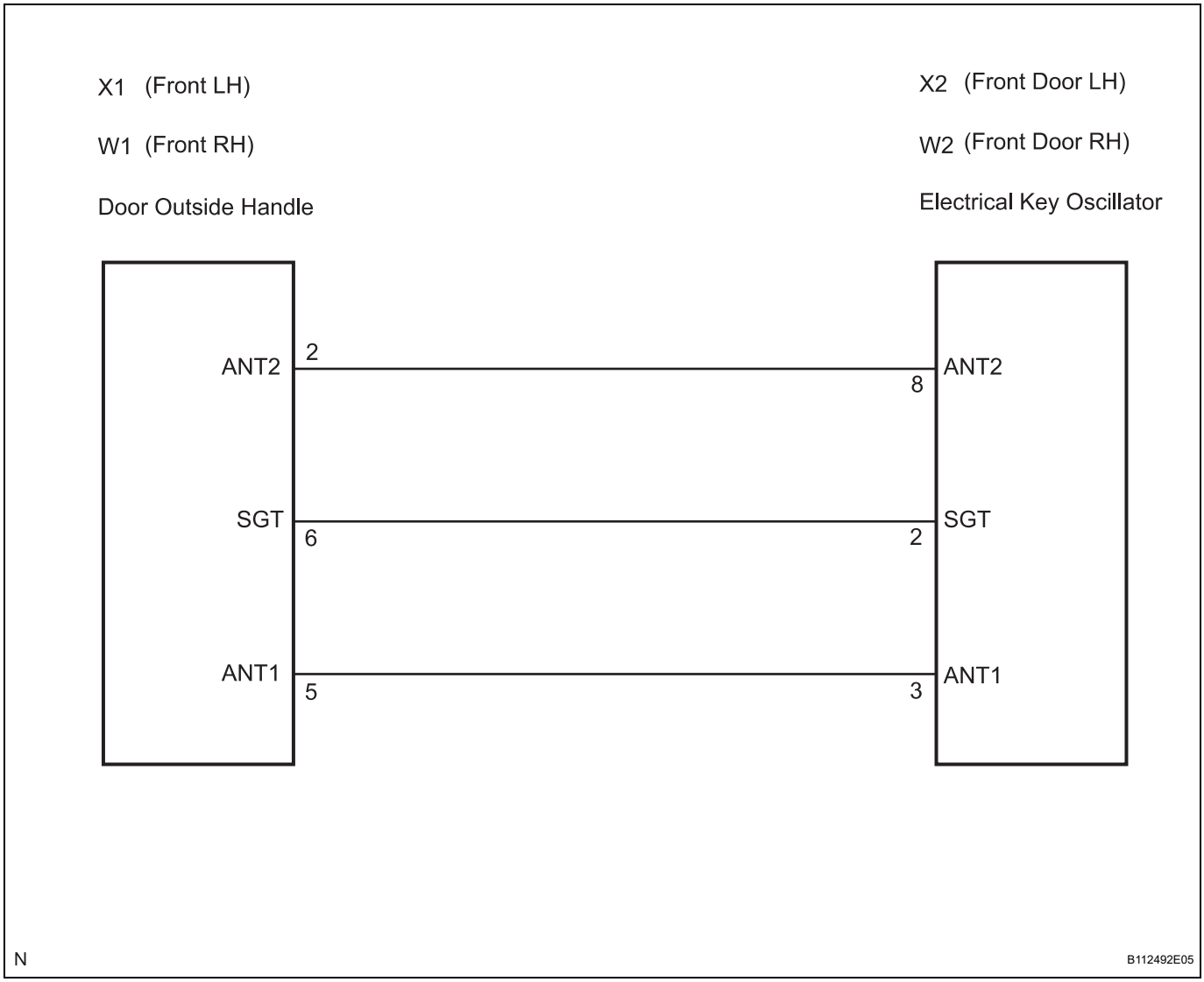
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Antenna Circuit

DESCRIPTION

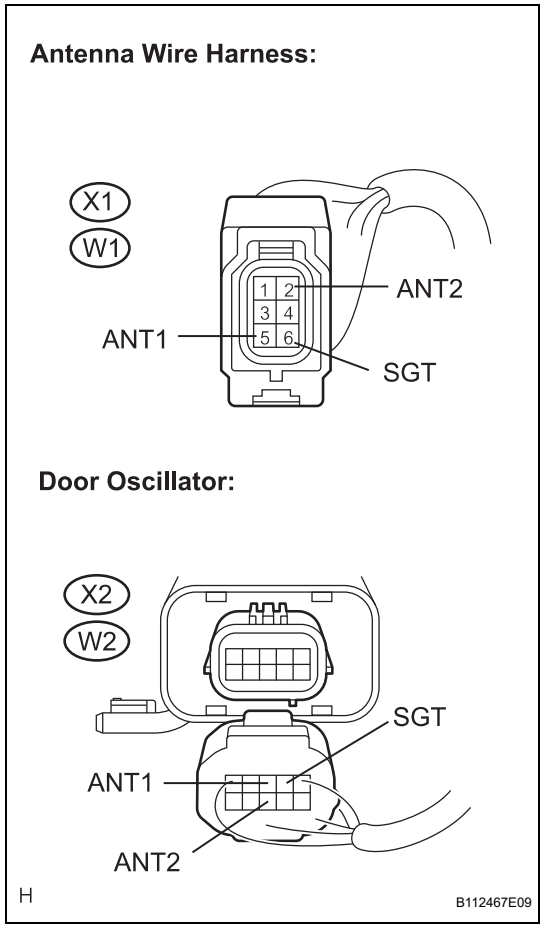
Terminals ANT1 and ANT2 of the antenna (door outside handle) detect if the electrical key is within the action area around the door outside handle.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (ELECTRICAL KEY OSCILLATOR - ANTENNA)



(a) Remove the outside handle.
(b) Disconnect the antenna and door oscillator connectors.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
X1-2 (ANT2) - X2-8 (ANT2) (*1)	Always	Below 1 Ω
X1-6 (SGT) - X2-2 (SGT) (*1)	Always	Below 1 Ω
X1-5 (ANT1) - X2-3 (ANT1) (*1)	Always	Below 1 Ω
X1-2 (ANT2) - Body ground (*1)	Always	10 kΩ or higher
X1-6 (SGT) - Body ground (*1)	Always	10 kΩ or higher
X1-5 (ANT1) - Body ground (*1)	Always	10 kΩ or higher
W1-2 (ANT2) - W2-8 (ANT2) (*2)	Always	Below 1 Ω
W1-6 (SGT) - W2-2 (SGT) (*2)	Always	Below 1 Ω
W1-5 (ANT1) - W2-3 (ANT1) (*2)	Always	Below 1 Ω
W1-2 (ANT2) - Body ground (*2)	Always	10 kΩ or higher
W1-6 (SGT) - Body ground (*2)	Always	10 kΩ or higher
W1-5 (ANT1) - Body ground (*2)	Always	10 kΩ or higher

*1: Driver side
*2: Passenger side

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	CHECK AND REPLACE DOOR OUTSIDE HANDLE

(a) Replace the door outside handle.
(b) Check that the entry LOCK/UNLOCK function operates normally.

OK:

Entry LOCK/UNLOCK function operates normally.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

OK

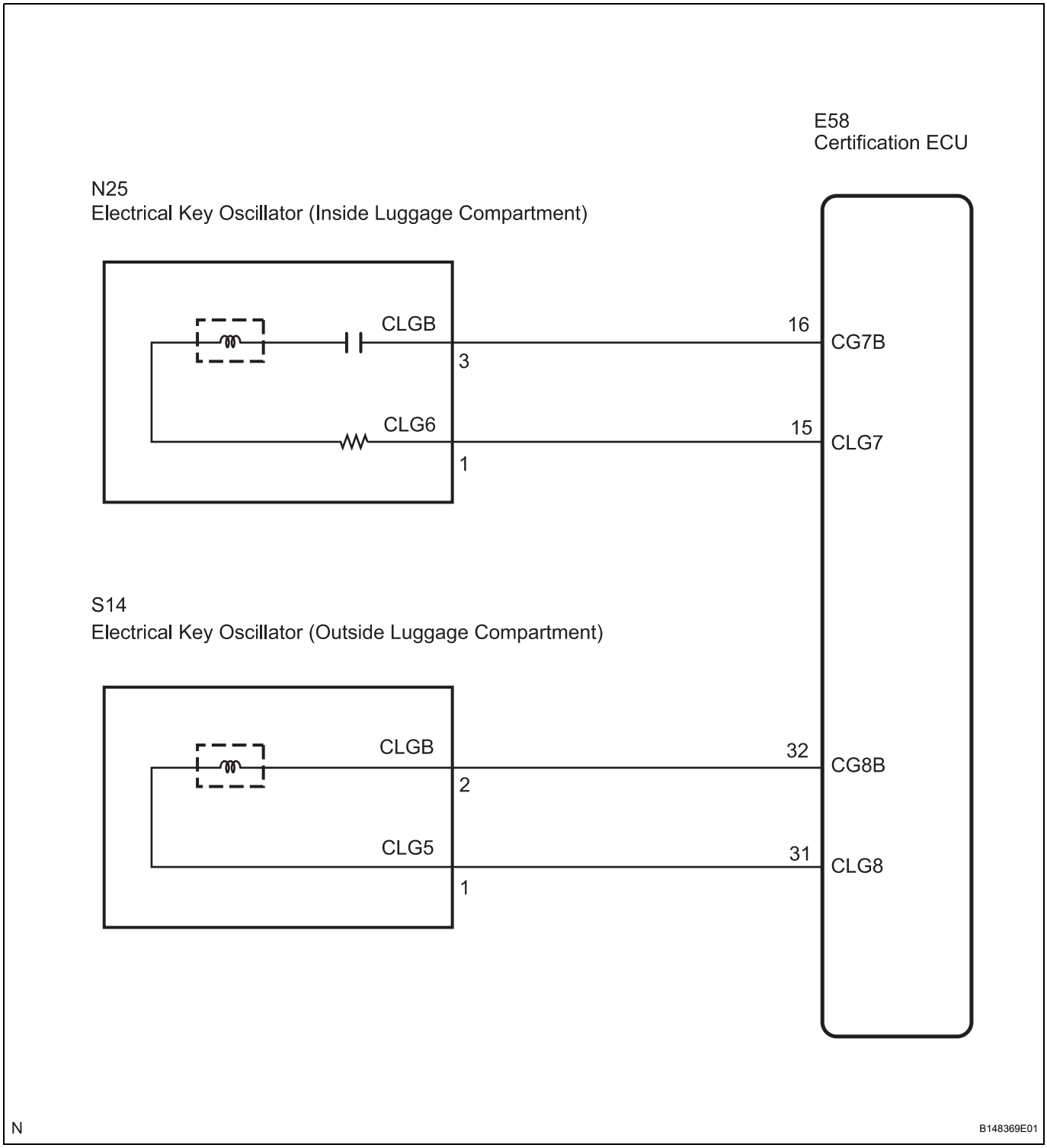
END (DOOR OUTSIDE HANDLE IS DEFECTIVE)

Luggage Oscillator Circuit

DESCRIPTION

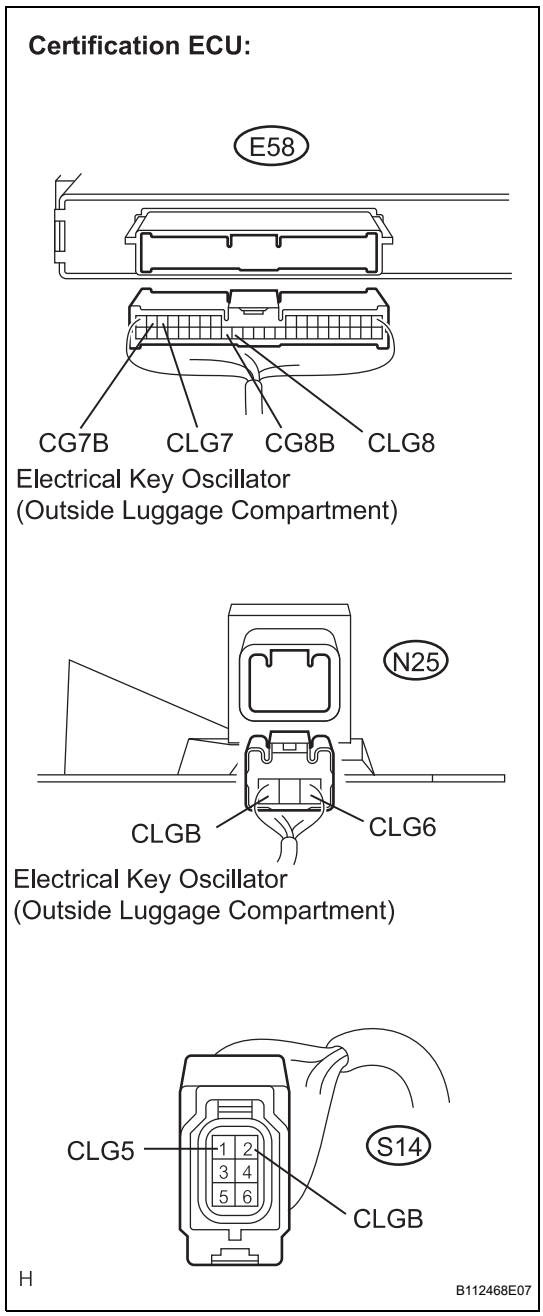
The certification ECU activates the inner and outer luggage compartment oscillators. The power is supplied from the certification ECU to both the inner and outer luggage compartment oscillators. The inner and outer luggage compartment oscillator circuits have the same wiring. If the entry luggage compartment function has a problem, check both the inner and outer luggage compartment oscillator circuits.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - ELECTRICAL KEY OSCILLATOR)



(a) Disconnect the E58 ECU connector.
(b) Disconnect the oscillator connectors.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E58-16 (CG7B) - N25-3 (CLGB)	Always	Below 1 Ω
E58-15 (CLG7) - N25-1 (CLG6)	Always	Below 1 Ω
E58-32 (CG8B) - S14-2 (CLGB)	Always	Below 1 Ω
E58-31 (CLG8) - S14-1 (CLG5)	Always	Below 1 Ω
E58-16 (CG7B) - Body ground	Always	10 kΩ or higher
E58-15 (CLG7) - Body ground	Always	10 kΩ or higher
E58-32 (CG8B) - Body ground	Always	10 kΩ or higher
E58-31 (CLG8) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

2	CHECK AND REPLACE ELECTRICAL KEY OSCILLATOR

(a) Replace the electrical key oscillator.
(b) Check that the luggage compartment door entry LOCK/UNLOCK function operates normally.

OK:

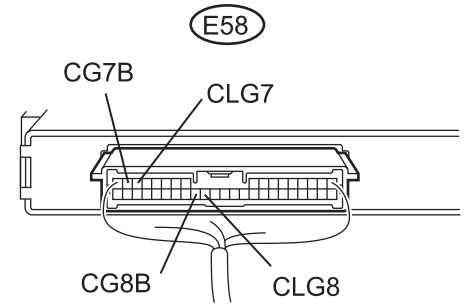
Luggage compartment door entry LOCK/UNLOCK function operates normally.

OK → **END (ELECTRICAL KEY OSCILLATOR IS DEFECTIVE)**

NG

3 PERFORM ACTIVE TEST BY INTELLIGENT TESTER

Certification ECU:



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(a) Reconnect the oscillator and the ECU connectors.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Following the display on the tester, select the "ACTIVE TEST".

SMART KEY (Certification ECU):

Item	Vehicle Condition/Test Details
IN-BDR TRNSMTTR	Electrical key oscillator (Luggage compartment inner) ON/OFF
BDOOR TRNSMTTR	Electrical key oscillator (Luggage compartment outer) ON/OFF

(e) Measure the frequency according to the value(s) in the table below.

Standard

Tester Connection (Symbols)	Condition	Specified Condition
E58-16 (CG7B) - E58-15 (CLG7)	During ACTIVE TEST	Frequency is generated (higher than 0 Hz)
E58-32 (CG8B) - E58-31 (CLG8)	During ACTIVE TEST	Frequency is generated (higher than 0 Hz)

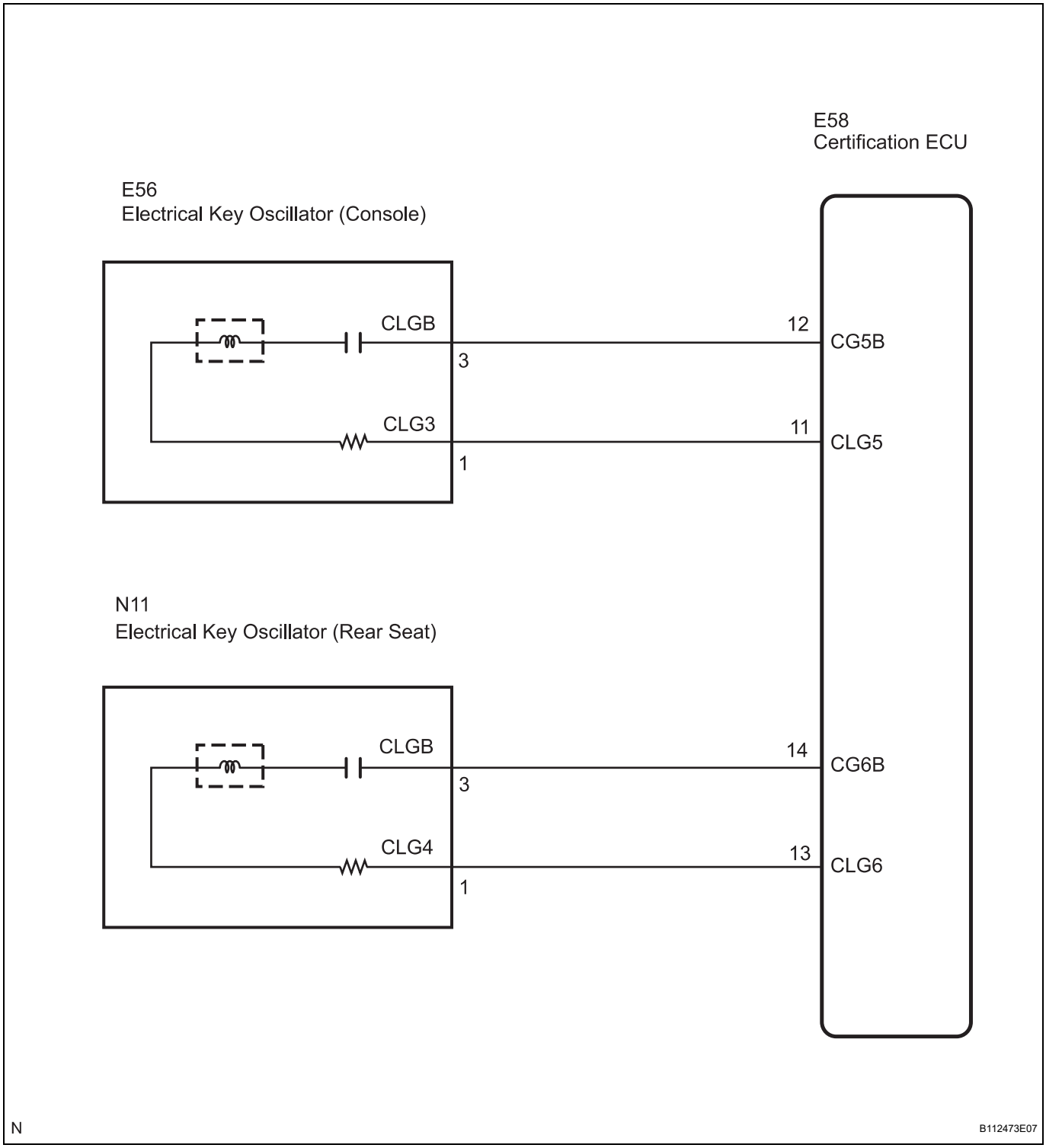
NG → **REPLACE CERTIFICATION ECU**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Room Oscillator Circuit

DESCRIPTION

The certification ECU activates the front and rear cabin oscillators. The power is supplied from the certification ECU to both the front and rear cabin oscillators. The front and rear cabin oscillator circuits have the same wiring. If the smart key system does not operate properly inside the vehicle, check both the front and rear cabin oscillator circuits.

WIRING DIAGRAM