

# HOW TO USE THIS MANUAL

## GENERAL INFORMATION

IN00U-36

### 1. INDEX

An INDEX is provided on the first page of each section to guide you to the item to be repaired. To assist you in finding your way through the manual, the section title and major heading are given at the top of every page.

### 2. PRECAUTION

At the beginning of each section, a PRECAUTION is given that pertains to all repair operations contained in that section.

Read these precautions before starting any repair task.

### 3. TROUBLESHOOTING

TROUBLESHOOTING tables are included for each system to help you diagnose the problem and find the cause. The fundamentals of how to proceed with troubleshooting are described on page [IN-16](#).

Be sure to read this before performing troubleshooting.

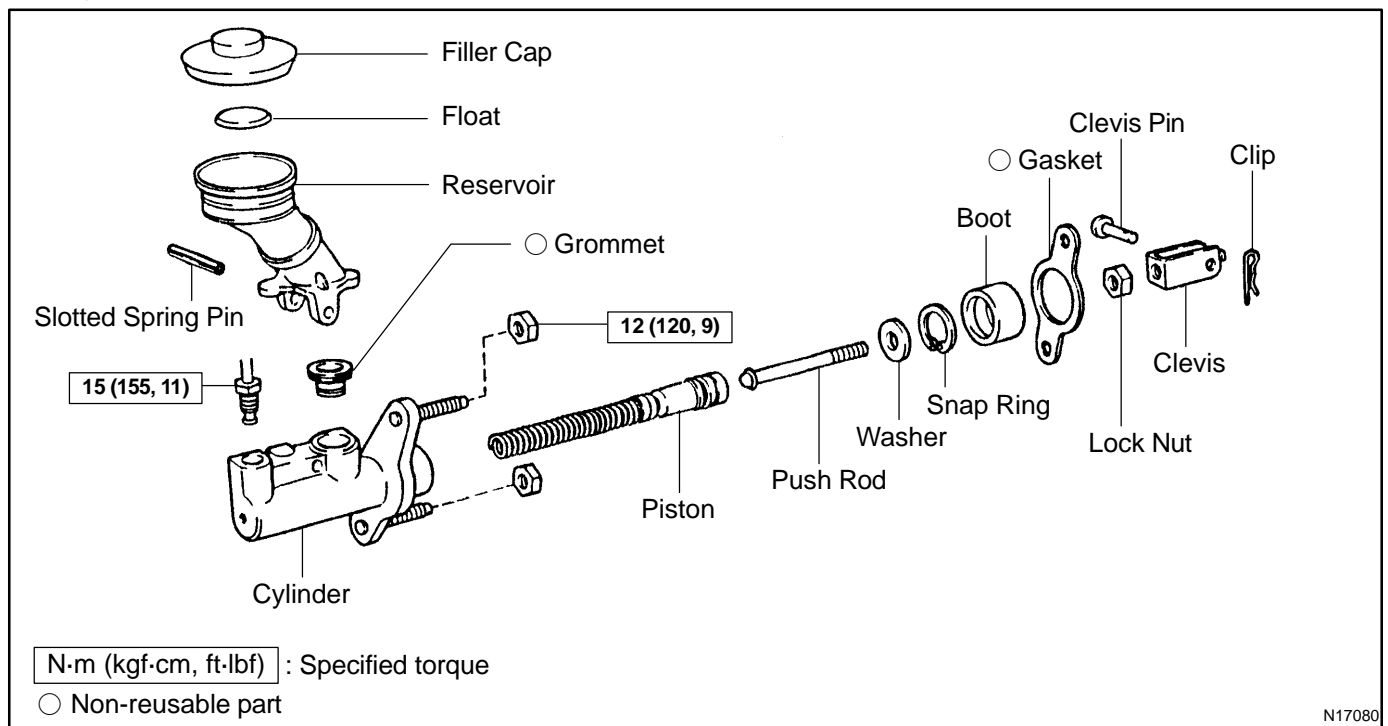
### 4. PREPARATION

Preparation lists the SST (Special Service Tools), recommended tools, equipment, lubricant and SSM (Special Service Materials) which should be prepared before beginning the operation and explains the purpose of each one.

### 5. REPAIR PROCEDURES

Most repair operations begin with an overview illustration. It identifies the components and shows how the parts fit together.

Example:



The procedures are presented in a step-by-step format:

- The illustration shows what to do and where to do it.
- The task heading tells what to do.
- The detailed text tells how to perform the task and gives other information such as specifications and warnings.

Example:

*Illustration:  
what to do and where*

*Task heading : what to do*

**21. CHECK PISTON STROKE OF OVERDRIVE BRAKE**

(a) Place SST and a dial indicator onto the overdrive brake piston as shown in the illustration.

**SST 09350-30020 (09350-06120)**

*Set part No.*

*Component part No.*

*Detailed text : how to do task*

(b) Measure the stroke applying and releasing the compressed air (392 — 785 kPa, 4 — 8 kgf/cm<sup>2</sup> or 57 — 114 psi) as shown in the illustration.

**Piston stroke: 1.40 — 1.70 mm (0.0551 — 0.0669 in.)**

*Specification*

This format provides the experienced technician with a FAST TRACK to the information needed. The upper case task heading can be read at a glance when necessary, and the text below it provides detailed information. Important specifications and warnings always stand out in bold type.

## 6. REFERENCES

References have been kept to a minimum. However, when they are required you are given the page to refer to.

## 7. SPECIFICATIONS

Specifications are presented in bold type throughout the text where needed. You never have to leave the procedure to look up your specifications. They are also found in Service Specifications section for quick reference.

## 8. CAUTIONS, NOTICES, HINTS:

- CAUTIONS are presented in bold type, and indicate there is a possibility of injury to you or other people.
- NOTICES are also presented in bold type, and indicate the possibility of damage to the components being repaired.
- HINTS are separated from the text but do not appear in bold. They provide additional information to help you perform the repair efficiently.

## 9. SI UNIT

The UNITS given in this manual are primarily expressed according to the SI UNIT (International System of Unit), and alternately expressed in the metric system and in the English System.

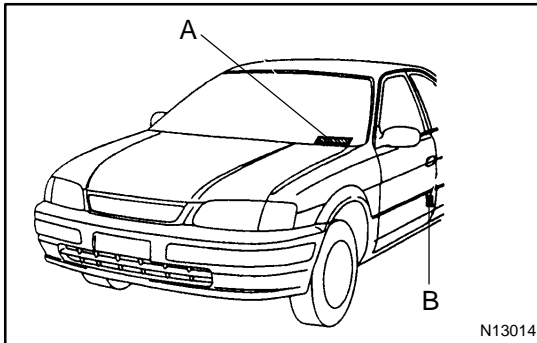
Example:

**Torque: 30 N·m (310 kgf·cm, 22 ft·lbf)**

# IDENTIFICATION INFORMATION

## VEHICLE IDENTIFICATION AND ENGINE SERIAL NUMBER

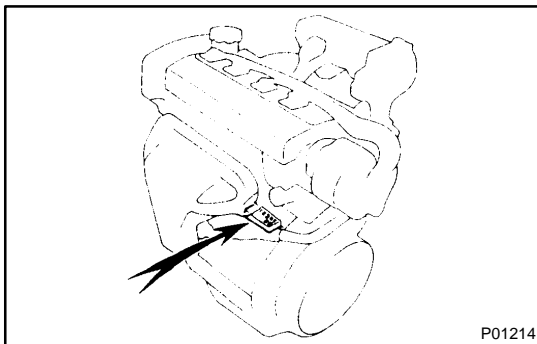
IN07B-01



### 1. VEHICLE IDENTIFICATION NUMBER

The vehicle identification number is stamped on the vehicle identification number plate and the certification label, as shown in the illustration.

- A: Vehicle Identification Number Plate
- B: Certification Label



### 2. ENGINE SERIAL NUMBER

The engine serial number is stamped on the engine block, as shown in the illustration.

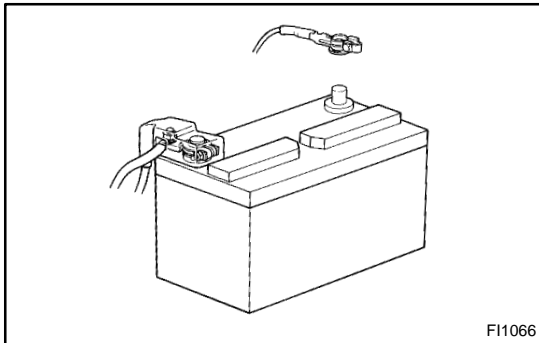
# REPAIR INSTRUCTIONS

## GENERAL INFORMATION

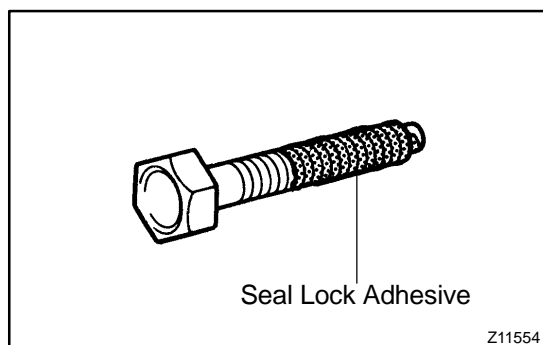
INOCO-12

### BASIC REPAIR HINT

- (a) Use fender, seat and floor covers to keep the vehicle clean and prevent damage.
- (b) During disassembly, keep parts in the appropriate order to facilitate reassembly.



- (c) Installation and removal of battery terminal:
  - (1) Before performing electrical work, disconnect the negative (-) terminal cable from the battery.
  - (2) If it is necessary to disconnect the battery for inspection or repair, first disconnect the negative (-) terminal cable.
  - (3) When disconnecting the terminal cable, to prevent damage to battery terminal, loosen the cable nut and raise the cable straight up without twisting or prying it.
  - (4) Clean the battery terminals and cable ends with a clean shop rag. Do not scrape them with a file or other abrasive objects.
  - (5) Install the cable ends to the battery terminals after loosening the nut, and tighten the nut after installation. Do not use a hammer to tap the cable ends onto the terminals.
  - (6) Be sure the cover for the positive (+) terminal is properly in place.
- (d) Check hose and wiring connectors to make sure that they are connected securely and correctly.
- (e) Non-reusable parts
  - (1) Always replace cotter pins, gaskets, O-rings, oil seals, etc. with new ones.
  - (2) Non-reusable parts are indicated in the component illustrations by the " " symbol.



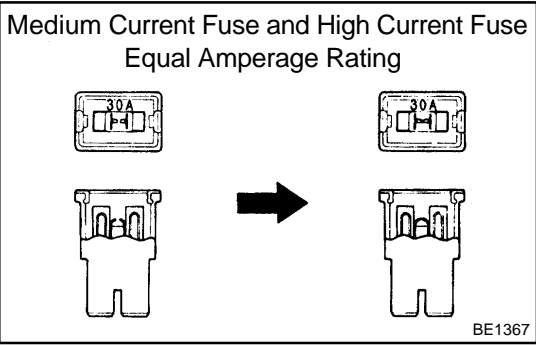
- (f) Precoated parts
 

Precoated parts are bolts, nuts, etc. that are coated with a seal lock adhesive at the factory.

  - (1) If a precoated part is retightened, loosened or caused to move in any way, it must be recoated with the specified adhesive.
  - (2) When reusing precoated parts, clean off the old adhesive and dry with compressed air. Then apply the specified seal lock adhesive to the bolt, nut or threads.



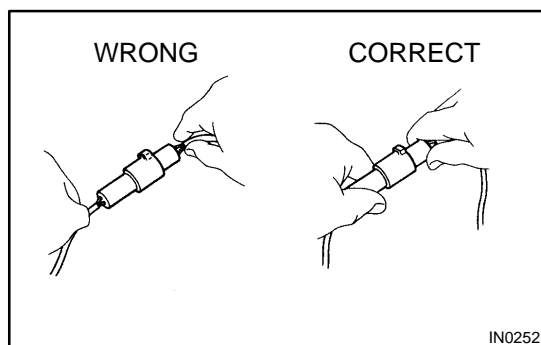
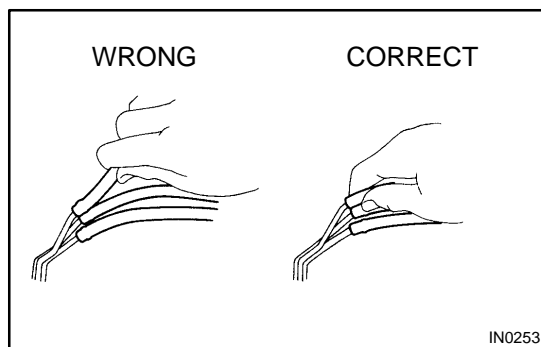
- (3) Precoated parts are indicated in the component illustrations by the "●" symbol.
- (g) When necessary, use a sealer on gaskets to prevent leaks.
- (h) Carefully observe all specifications for bolt tightening torques. Always use a torque wrench.
- (i) Use of special service tools (SST) and special service materials (SSM) may be required, depending on the nature of the repair. Be sure to use SST and SSM where specified and follow the proper work procedure. A list of SST and SSM can be found in Preparation section in this manual.



- (j) When replacing fuses, be sure the new fuse has the correct amperage rating. DO NOT exceed the rating or use one with a lower rating.

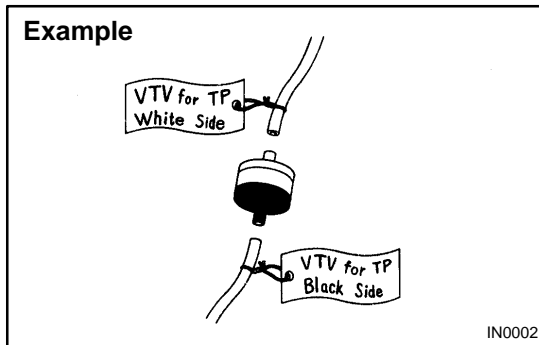
Illustration	Symbol	Part Name	Abbreviation
 BE5594	 IN0365	FUSE	FUSE
 BE5595	 IN0366	MEDIUM CURRENT FUSE	M-FUSE
 BE5596	 IN0367	HIGH CURRENT FUSE	H-FUSE
 BE5597	 IN0367	FUSIBLE LINK	FL
 BE5598	 IN0368	CIRCUIT BREAKER	CB

- (k) Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations (See page [IN-8](#) ).
- Cancel the parking brake on the level place and shift the transmission in Neutral (or N position).
  - When jacking up the front wheels of the vehicle at first place stoppers behind the rear wheels.
  - When jacking up the rear wheels of the vehicle at first place stoppers before the front wheels.
  - When either the front or rear wheels only should be jacked up, set rigid racks and place stoppers in front and behind the other wheels on the ground.
  - After the vehicle is jacked up, be sure to support it on rigid racks . It is extremely dangerous to do any work on a vehicle raised on a jack alone, even for a small job that can be finished quickly.
- (l) Observe the following precautions to avoid damage to the following 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 destroyed by static electricity.)



- (2) To disconnect vacuum hoses, pull off the end, not the middle of the hose.
- (3) To pull apart electrical connectors, pull on the connector itself, not the wires.
- (4) Be careful not to drop electrical components, such as sensors or relays. If they are dropped on a hard floor, they should be replaced and not reused.
- (5) When steam cleaning an engine, protect the electronic components, air filter and emission-related components from water.
- (6) Never use an impact wrench to remove or install temperature switches or temperature sensors.

- (7) When checking continuity at the wire connector, insert the tester probe carefully to prevent terminals from bending.
- (8) When using a vacuum gauge, never force the hose onto a connector that is too large. Use a step-down adapter for adjustment. Once the hose has been stretched, it may leak air.

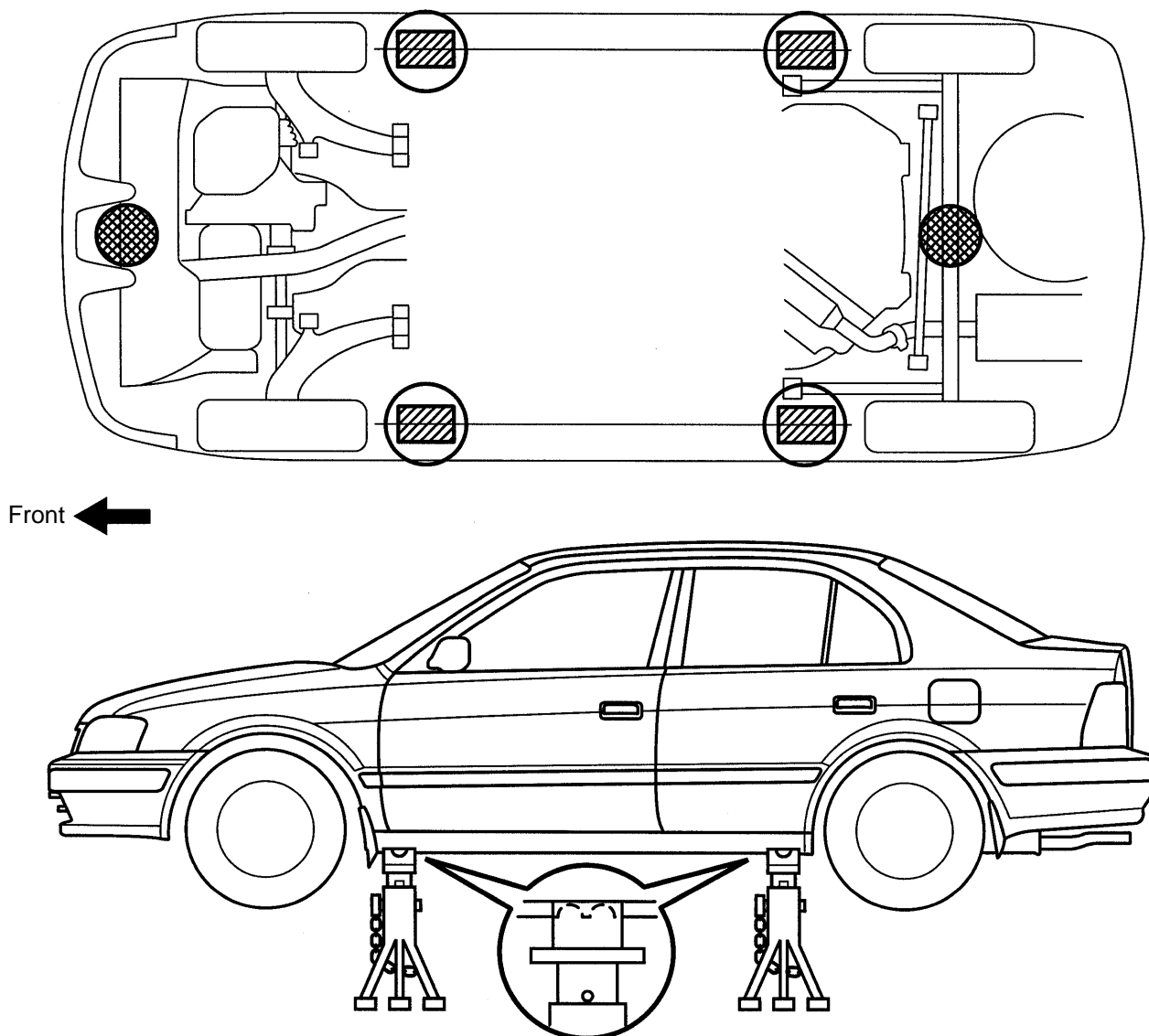


- (m) Installation and removal of vacuum hose:
  - (1) When disconnecting vacuum hoses, use tags to identify how they should be reconnected to.
  - (2) After completing a job, double check that the vacuum hoses are properly connected. A label under the hood shows the proper layout.
- (n) Unless otherwise stated, all resistance is measured at an ambient temperature of 20°C (68°F). Because the resistance may be outside specifications if measured at high temperatures immediately after the vehicle has been running, measurement should be made when the engine has cooled down.

# REPAIR INSTRUCTIONS

## VEHICLE LIFT AND SUPPORT LOCATIONS

IN011-01



### JACK POSITION

Front ..... Front crossmember

Rear ..... Rear axle beam

### CAUTION:

**Before jacking-up the front and rear, make sure the car is not carrying any extra weight.**

### PANTOGRAPH JACK POSITION

### SUPPORT POSITION

Safety stand and swing arm type lift .....

Z14535

## FOR ALL OF VEHICLES PRECAUTION

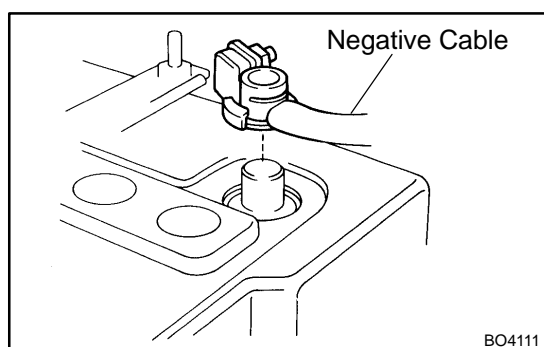
IN07J-05

### 1. FOR VEHICLES EQUIPPED WITH SRS AIRBAG AND SEAT BELT PRETENSIONER

- (a) The TERCEL is equipped with an SRS (Supplemental Restraint System), such as the driver airbag and front passenger airbag.

Failure to carry out service operations in the correct sequence could cause the supplemental restraint system to unexpectedly deploy during servicing, possibly leading to a serious accident.

Further, if a mistake is made in servicing the supplemental restraint system, it is possible the SRS may fail to operate when required. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the following items carefully, then follow the correct procedure described in this manual.



### (b) GENERAL NOTICE

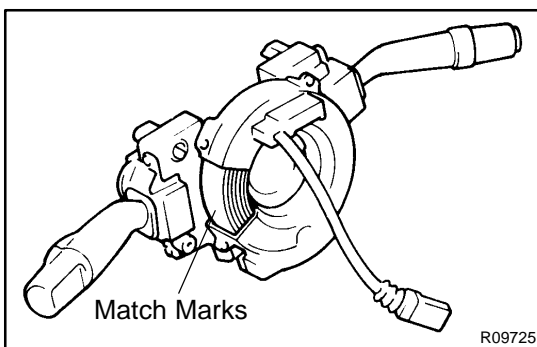
- (1) Malfunction symptoms of the supplemental restraint system are difficult to confirm, so the diagnostic trouble codes become the most important source of information when troubleshooting. When troubleshooting the supplemental restraint system, always inspect the diagnostic trouble codes before disconnecting the negative (-) terminal cable from the battery (See page [DI-148](#)).

- (2) Work must be started after 90 seconds from the time the ignition switch is turned to the "LOCK" position and the negative (-) terminal cable is disconnected from the battery.

(The supplemental restraint system is equipped with a back-up power source so that if work is started within 90 seconds of disconnecting the negative (-) terminal cable from the battery, the SRS may deploy.)

When the negative (-) terminal cable is disconnected from the battery, memory of the clock and audio systems will be cancelled. So before starting work, make a record of the contents memorized by the each memory system. Then when work is finished, reset the clock and audio systems as before. To avoid erasing the memory of each memory system, never use a back-up power supply from another battery.

- (3) Even in cases of a minor collision where the SRS does not deploy, the steering wheel pad (See page [RS-9](#) ) and front passenger airbag assembly (See page [RS-22](#) ) should be inspected.
- (4) Never use SRS parts from another vehicle. When replacing parts, replace them with new parts.
- (5) Before repairs, remove the airbag sensor if shocks are likely to be attached to the sensor during repairs.
- (6) Never disassemble and repair the airbag sensor assembly, steering wheel pad or front passenger airbag.
- (7) If the airbag sensor assembly, steering wheel pad or front passenger airbag have been dropped, or if there are cracks, dents or other defects in the case, bracket or connector, replace them with new ones.
- (8) Do not directly expose the airbag sensor assembly, steering wheel pad or front passenger airbag to hot air or flames.
- (9) Use a volt/ohmmeter with high impedance (10 k $\Omega$ /V minimum) for troubleshooting of the electrical circuit.
- (10) Information labels are attached to the periphery of the SRS components. Follow the instructions on the notices.
- (11) After work is completed, check the SRS warning light for the supplemental restraint system (See page [DI-148](#) ).



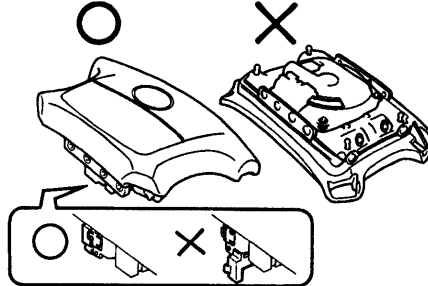
- (c) SPIRAL CABLE (in Combination Switch)
- The steering wheel must be fitted correctly to the steering column with the spiral cable at the neutral position, otherwise cable disconnection and other troubles may result. Refer to [RS-19](#) of this manual concerning correct steering wheel installation.

## (d) STEERING WHEEL PAD (with Airbag)

- (1) When removing the steering wheel pad or handling a new steering wheel pad, it should be placed with the pad top surface facing up.  
Storing the pad with its metallic surface facing upward may lead to a serious accident if the airbag deploys for some reason. In addition do not store a steering wheel pad on top of another one.
- (2) Never measure the resistance of the airbag squib. (This may cause the airbag to deploy, which is very dangerous.)
- (3) Grease should not be attached to the steering wheel pad and the pad should not be cleaned with detergents of any kind.
- (4) Store the steering wheel pad where the ambient temperature remains below 93°C (200°F), without high humidity and away from electrical noise.
- (5) When using electric welding, first disconnect the airbag connector (yellow color and 2 pins) under the steering column near the combination switch connector before starting work.
- (6) When disposing of a vehicle or the steering wheel pad alone, the airbag should be deployed using an SST before disposal (See page [RS-1 1](#)).  
Perform the operation in a safe place away from electrical noise.

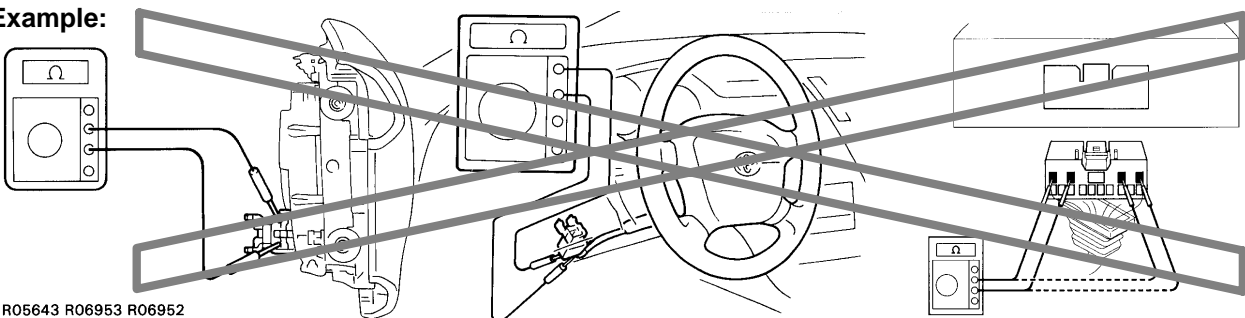
**Example:**

CORRECT      WRONG



N01560

Z13953

**Example:**

R05643 R06953 R06952

Z13950

## (e) FRONT PASSENGER AIRBAG ASSEMBLY

- (1) Always store a removed or new front passenger airbag assembly with the airbag deployment direction facing up.

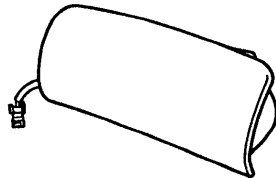
Storing the airbag assembly with the airbag deployment direction facing down could cause a serious accident if the airbag deploys.

- (2) Never measure the resistance of the airbag squib. (This may cause the airbag to deploy, which is very dangerous.)
- (3) Grease should not be attached to the front passenger airbag assembly and the airbag door should not be cleaned with detergents of any kind.
- (4) Store the airbag assembly where the ambient temperature remains below 93°C (200°F), without high humidity and away from electrical noise.
- (5) When using electric welding, first disconnect the airbag connector (yellow color and 2 pins) installed on the assembly before starting work.
- (6) When disposing of a vehicle or the airbag assembly alone, the airbag should be deployed using an SST before disposal (See page [RS-24](#)).

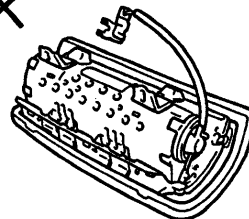
Perform the operation in a safe place away from electrical noise.

Example:

CORRECT



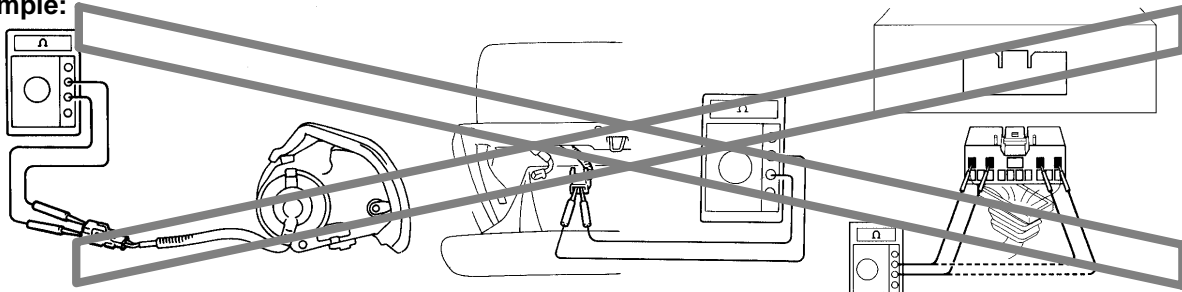
WRONG



R08766

Z13952

Example:



R05648 R05649 R06952

Z13951



## (f) AIRBAG SENSOR ASSEMBLY

- (1) Never reuse the airbag sensor assembly involved in a collision when the SRS has deployed.
- (2) The connectors to the airbag sensor assembly should be connected or disconnected with the sensor mounted on the floor. If the connectors are connected or disconnected while the airbag sensor assembly is not mounted to the floor, it could cause undesired deployment of the supplemental restraint system.
- (3) Work must be started after 90 seconds from the time the ignition switch is turned to the "LOCK" position and the negative (-) terminal cable is disconnected from the battery, even if only loosening the set bolts of the airbag sensor assembly.

## (g) WIRE HARNESS AND CONNECTOR

The SRS wire harness is integrated with the instrument panel wire harness assembly and floor wire harness assembly. The wires for the SRS wire harness are encased in a yellow corrugated tube. All the connectors for the system are also a standard yellow color. If the SRS wire harness becomes disconnected or the connector becomes broken due to an accident, etc., repair or replace it as shown on page [RS-37](#).

**2. FOR VEHICLES EQUIPPED WITH A CATALYTIC CONVERTER****CAUTION:**

**If large amount of unburned gasoline flows into the converter, it may overheat and create a fire hazard. To prevent this, observe the following precautions and explain them to your customer.**

- (a) Use only unleaded gasoline.
- (b) Avoid prolonged idling.  
Avoid running the engine at idle speed for more than 20 minutes.
- (c) Avoid spark jump test.
  - (1) Perform spark jump test only when absolutely necessary. Perform this test as rapidly as possible.
  - (2) While testing, never race the engine.
- (d) Avoid prolonged engine compression measurement.  
Engine compression tests must be done as rapidly as possible.
- (e) Do not run engine when fuel tank is nearly empty.  
This may cause the engine to misfire and create an extra load on the converter.
- (f) Avoid coasting with ignition turned off.
- (g) Do not dispose of used catalyst along with parts contaminated with gasoline or oil.

**3. IF VEHICLE IS EQUIPPED WITH MOBILE COMMUNICATION SYSTEM**

For vehicles with mobile communication systems such as two-way radios and cellular telephones, observe the following precautions.

- (1) Install the antenna as far as possible away from the ECU and sensors of the vehicle's electronic system.
- (2) Install the antenna feeder at least 20 cm (7.87 in.) away from the ECU and sensors of the vehicle's electronic systems. For details about ECU and sensors locations, refer to the section on the applicable component.
- (3) Avoid winding the antenna feeder together with other wiring as much as possible, and also avoid running the antenna feeder parallel with other wire harnesses.
- (4) Check that the antenna and feeder are correctly adjusted.
- (5) Do not install powerful mobile communications system.

**4. FOR USING OBD II SCAN TOOL OR TOYOTA HAND-HELD TESTER****CAUTION:**

**Observe the following items for safety reasons:**

- Before using the OBD II scan tool or TOYOTA hand-held tester, the OBD II scan tool's instruction book or TOYOTA hand-held tester's operator manual should be read thoroughly.
- Be sure to route all cables securely when driving with the OBD II scan tool or TOYOTA hand-held tester connected to the vehicle. (i.e. Keep cables away from feet, pedals, steering wheel and shift lever.)
- Two persons are required when test driving with the OBD II scan tool or TOYOTA hand-held tester, one person to drive the vehicle and the other person to operate the OBD II scan tool or TOYOTA hand-held tester.

# HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS

## GENERAL INFORMATION

IN07E-05

A large number of ECU controlled systems are used in the TERCEL. In general, the ECU controlled system is considered to be a very intricate system requiring a high level of technical knowledge and expert skill to troubleshoot. However, the fact is that if you proceed to inspect the circuits one by one, troubleshooting of these systems is not complex. If you have adequate understanding of the system and a basic knowledge of electricity, accurate diagnosis and necessary repair can be performed to locate and fix the problem. This manual is designed through emphasis of the above standpoint to help service technicians perform accurate and effective troubleshooting, and is compiled for the following major ECU controlled systems:

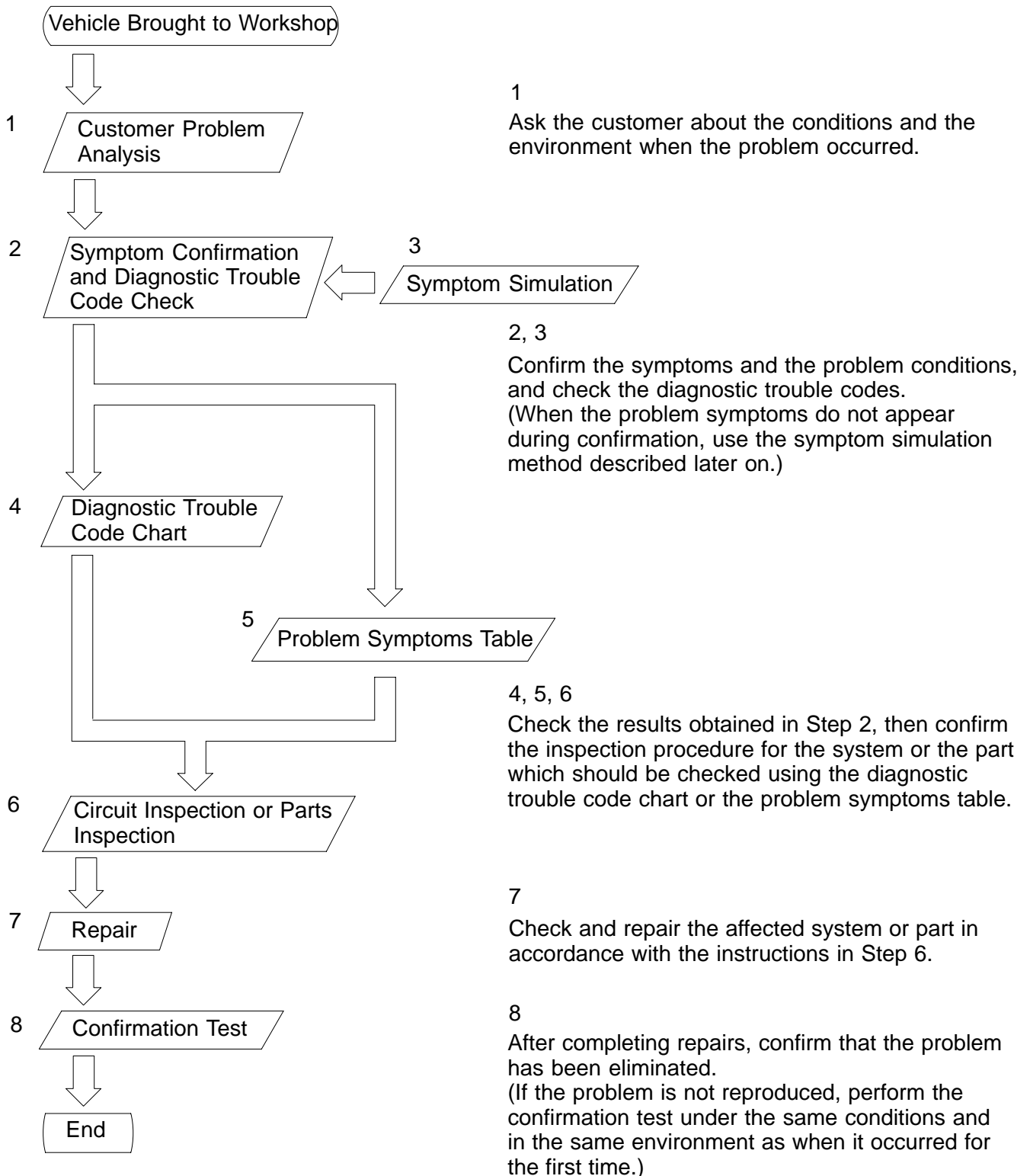
The troubleshooting procedure and how to make use of it are described on the following pages.

System	Page
1. Engine	<a href="#">DI-1</a>
2. Anti-Lock Brake System	<a href="#">DI-109</a>
3. Supplemental Restraint System	<a href="#">DI-146</a>
4. Power Door Lock Control System	<a href="#">DI-190</a>
5. Theft Deterrent System	<a href="#">DI-215</a>

- Before using the scan tool or tester, the scan tool's instruction book or tester's operator manual should be read thoroughly.
- If the scan tool or tester cannot communicate with ECU controlled systems when you have connected the cable of the scan tool or tester to DLC3, turned the ignition switch ON and operated the scan tool, there is a problem on the vehicle side or tool side.
  - (1) If communication is normal when the tool 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 tool is connected to another vehicle, the problem is probably in the tool itself, so perform the Self Test procedures outline in the Tester Operator's Manual.

## HOW TO PROCEED WITH TROUBLESHOOTING

Carry out troubleshooting in accordance with the procedure on the following page. Here, only the basic procedure is shown. Details are provided in Diagnostics section, showing the most effective methods for each circuit. Confirm the troubleshooting procedures first for the relevant circuit before beginning troubleshooting of that circuit.



## 1. CUSTOMER PROBLEM ANALYSIS

In troubleshooting, the problem symptoms must be confirmed accurately and all preconceptions must be cleared away in order to give an accurate judgment. To ascertain just what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time it occurred.

Important Point in the Problem Analysis:

The following 5 items are important points in the problem analysis. Past problems which are thought to be unrelated and the repair history, etc. may also help in some cases, so as much information as possible should be gathered and its relationship with the problem symptoms should be correctly ascertained for reference in troubleshooting. A customer problem analysis table is provided in Diagnostics section for each system for your use.

### Important Points in the Customer 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

(Sample) Engine control system check sheet.

ENGINE CONTROL SYSTEM Check Sheet				Inspector's Name
Customer's Name		Model and Model Year		
Driver's Name		Frame No.		
Data Vehicle Brought in		Engine Model		
License No.		Odometer Reading	km miles	

Problem Symptoms	<input type="checkbox"/> Engine does not Start	<input type="checkbox"/> Engine does not crank	<input type="checkbox"/> No initial combustion	<input type="checkbox"/> No complete combustion	
	<input type="checkbox"/> Difficult to Start	<input type="checkbox"/> Engine cranks slowly <input type="checkbox"/> Other _____			
	<input type="checkbox"/> Poor Idling	<input type="checkbox"/> Incorrect first idle <input type="checkbox"/> Idling rpm is abnormal <input type="checkbox"/> High (          rpm) <input type="checkbox"/> Low (          rpm) <input type="checkbox"/> Rough idling <input type="checkbox"/> Other _____			
	<input type="checkbox"/> Poor Drive ability	<input type="checkbox"/> Hesitation <input type="checkbox"/> Back fire <input type="checkbox"/> Muffler explosion (after-fire) <input type="checkbox"/> Surging <input type="checkbox"/> Knocking <input type="checkbox"/> Other _____			
	<input type="checkbox"/> Engine Stall	<input type="checkbox"/> Soon after starting <input type="checkbox"/> After accelerator pedal depressed <input type="checkbox"/> After accelerator pedal released <input type="checkbox"/> During A/C operation <input type="checkbox"/> Shifting from N to D <input type="checkbox"/> Other _____			
	<input type="checkbox"/> Others				

☐ Constant    ☐ Sometimes (          times per          day/month)

## 2. SYMPTOM CONFIRMATION AND DIAGNOSTIC TROUBLE CODE CHECK





The diagnostic system in the TERCEL fulfills various functions. The first function is the Diagnostic Trouble Code Check in which a malfunction in the signal circuits to the ECU is stored in code in the ECU memory at the time of occurrence, to be output by the 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 check functions, the problem areas can be narrowed down quickly and troubleshooting can be performed effectively. Diagnostic functions are incorporated in the following systems in the TERCEL.

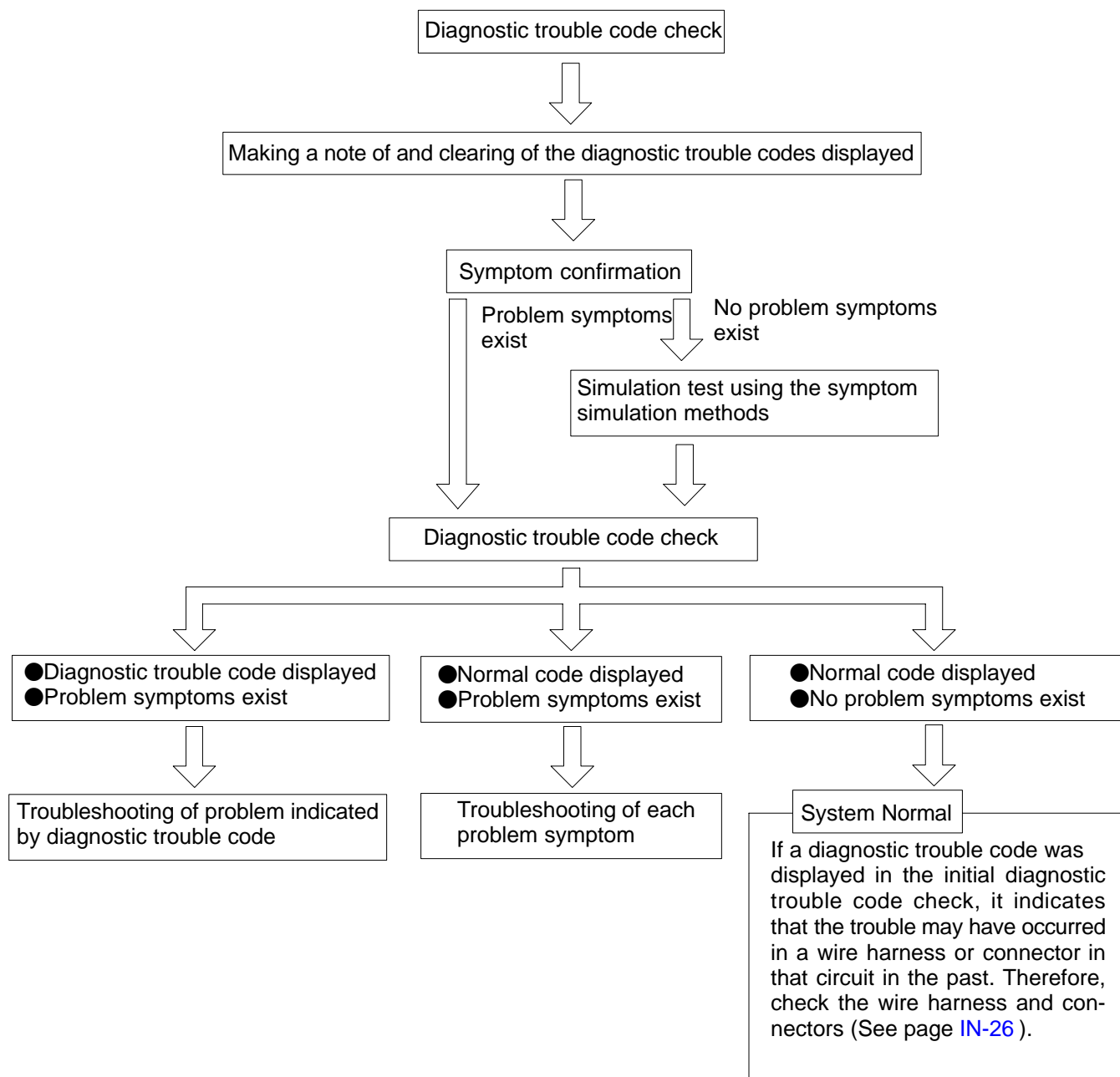
System	Diagnostic Trouble Code Check	Input Signal Check (Sensor Check)	Diagnostic Test Mode (Active Test)
1. Engine	○ (with Check Mode)	○	○
2. Anti-Lock Brake System	○	○	
3. Supplemental Restraint System	○		
4. Power Door Lock Control System			
5. Theft Deterrent System			

In diagnostic trouble code check, it is very important to determine whether the problem indicated by the diagnostic trouble code is still occurring or occurred in the past but returned to normal at present. In addition, it must be checked in the problem symptom check whether the malfunction indicated by the diagnostic trouble code is directly related to the problem symptom or not. For this reason, the diagnostic trouble codes should be checked before and after the symptom confirmation to determine the current conditions, as shown in the table below. If this is not done, it may, depending on the case, result in unnecessary troubleshooting for normally operating systems, thus making it more difficult to locate the problem, or in repairs not pertinent to the problem. Therefore, always follow the procedure in correct order and perform the diagnostic trouble code check.

### DIAGNOSTIC TROUBLE CODE CHECK PROCEDURE

Diagnostic Trouble Code Check (Make a note of and then clear)	Confirmation of Symptoms	Diagnostic Trouble Code Check	Problem Condition
Diagnostic Trouble Code Display 	Problem symptoms exist	Same diagnostic trouble code is displayed	Problem is still occurring in the diagnostic circuit
	 No problem symptoms exist	Normal code is displayed	The problem is still occurring in a place other than in the diagnostic circuit (The diagnostic trouble code displayed first is either for a past problem or it is a secondary problem)
			The problem occurred in the diagnostic circuit in the past
Normal Code Display 	Problem symptoms exist	Normal code is displayed	The problem is still occurring in a place other than in the diagnostic circuit
	 No problem symptoms exist	Normal code is displayed	The problem occurred in a place other than in the diagnostic circuit in the past

Taking into account the points on the previous page, a flow chart showing how to proceed with troubleshooting using the diagnostic trouble code check is shown below. This flow chart shows how to utilize the diagnostic trouble code check effectively, then by carefully checking the results, indicates how to proceed either to diagnostic trouble code troubleshooting or to troubleshooting of problem symptoms table.

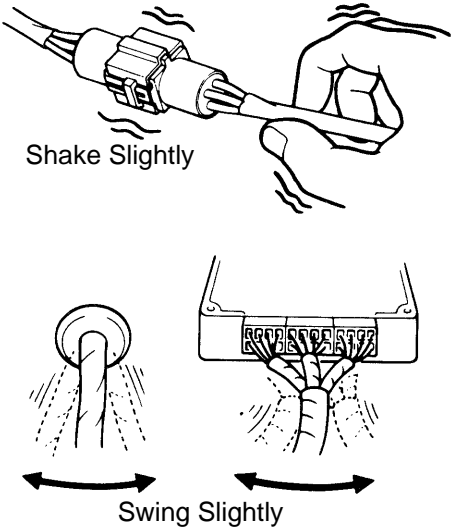
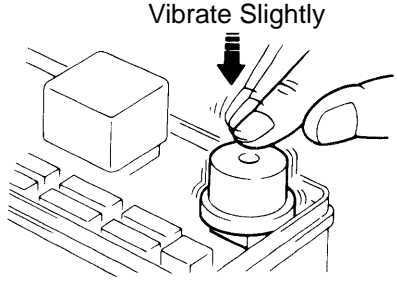


### 3. SYMPTOM SIMULATION

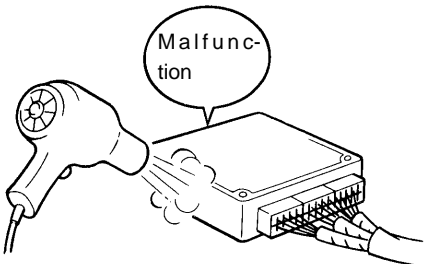
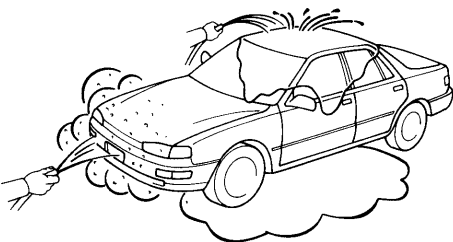
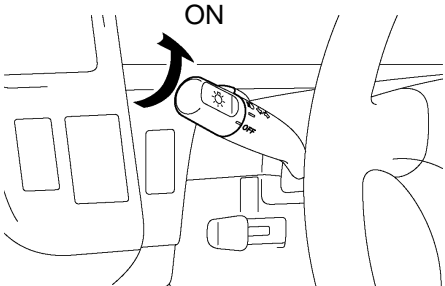
The most difficult case in troubleshooting is when there are no problem symptoms occurring. In such cases, a thorough customer problem analysis must be carried out, then simulate the same or similar conditions and environment in which the problem occurred in the customer's vehicle. No matter how much experience a technician has, or how skilled he may be, if he proceeds to troubleshoot without confirming the problem symptoms he will tend to overlook something important in the repair operation and make a wrong guess somewhere, which will only lead to a standstill. For example, for a problem which only occurs when the engine is cold, or for a problem which occurs due to vibration caused by the road during driving, etc., the problem can never be determined so long as the symptoms are confirmed with the engine hot condition or the vehicle at a standstill. Since vibration, heat or water penetration (moisture) is likely cause for problem which is difficult to reproduce, the symptom simulation tests introduced here are effective measures in that the external causes are applied to the vehicle in a stopped condition.

Important Points in the Symptom Simulation Test:

In the symptom simulation test, the problem symptoms should of course be confirmed, but the problem area or parts must also be found out. To do this, narrow down the possible problem circuits according to the symptoms before starting this test and connect a tester beforehand. After that, carry out the symptom simulation test, judging whether the circuit being tested is defective or normal and also confirming the problem symptoms at the same time. Refer to the problem symptoms table for each system to narrow down the possible causes of the symptom.

1	<b>VIBRATION METHOD: When vibration seems to be the major cause.</b>	
<p><b>CONNECTORS</b> Slightly shake the connector vertically and horizontally.</p> <p><b>WIRE HARNESS</b> Slightly shake the wire harness vertically and horizontally. The connector joint, fulcrum of the vibration, and body through portion are the major areas to be checked thoroughly.</p>	 <p>FI2331 FI2332</p>	
<p><b>PARTS AND SENSOR</b> Apply slight vibration with a finger to the part of the sensor considered to be the problem cause and check that the malfunction occurs.</p> <p><b>HINT:</b> Applying strong vibration to relays may result in open relays.</p>	 <p>FI2330</p>	



2	<b>HEAT METHOD: When the problem seems to occur when the suspect area is heated.</b>
<p>Heat the component that is the likely cause of the malfunction with a hair dryer or similar object. Check to see if the malfunction occurs.</p> <p><b>NOTICE:</b></p> <p>(1) Do not heat to more than 60°C (140°F). (Temperature is limited not to damage the components.)</p> <p>(2) Do not apply heat directly to parts in the ECU.</p>	 <p>FI2334</p>
3	<b>WATER SPRINKLING METHOD: When the malfunction seems to occur on a rainy day or in a high-humidity condition.</b>
<p>Sprinkle water onto the vehicle and check to see if the malfunction occurs.</p> <p><b>NOTICE:</b></p> <p>(1) Never sprinkle water directly into the engine compartment, but indirectly change the temperature and humidity by applying water spray onto the radiator front surface.</p> <p>(2) Never apply water directly onto the electronic components.</p> <p><b>HINT:</b></p> <p>If a vehicle is subject to water leakage, the leaked water may contaminate the ECU. When testing a vehicle with a water leakage problem, special caution must be taken.</p>	 <p>FI6649</p>
4	<b>OTHER: When a malfunction seems to occur when electrical load is excessive.</b>
<p>Turn on all electrical loads including the heater blower, head lights, rear window defogger, etc. and check to see if the malfunction occurs.</p>	 <p>B02389</p>

#### 4. DIAGNOSTIC TROUBLE CODE CHART

The inspection procedure is shown in the table below. This table permits efficient and accurate troubleshooting using the diagnostic trouble codes displayed in the diagnostic trouble code check. Proceed with troubleshooting in accordance with the inspection procedure given in the diagnostic chart corresponding to the diagnostic trouble codes displayed. The engine diagnostic trouble code chart is shown below as an example.

● **DTC No.**

Indicates the diagnostic trouble code.

● **Page or Instructions**

Indicates the page where the inspection procedure for each circuit is to be found, or gives instructions for checking and repairs.

● **Trouble Area**

Indicates the suspect area of the problem.

● **Detection Item**

Indicates the system of the problem or contents of the problem.

#### DIAGNOSTIC TROUBLE CODE CHART

**HINT:**

Parameters listed in the chart may not be exactly the same as your reading due to the type of instrument or other factors.

If a malfunction code is displayed during the DTC check mode, check the circuit for the code listed in the table below. For details of each code, turn to the page referred to under the "See page" for the respective "DTC No." in the DTC chart.

#### SAE CONTROLLED

DTC No. (See page)	Detection Item	Trouble Area	MIL*	Memory
P0100 (DI-24)	Mass Air Flow Circuit Malfunction	● Open or short in mass air flow meter circuit ● Mass air flow meter ● ECM	○	○
P0101 (DI-28)	Mass Air Flow Circuit Range/ Performance Problem	● Mass air flow meter	○	○
P0110 (DI-29)	Intake Air Temp. Circuit Malfunction	● Open or short in intake air temp. sensor circuit ● Intake air temp. sensor ● ECM	○	○
P0115 (DI-33)	Engine Coolant Temp. Circuit Malfunction	● Open or short in engine coolant temp. sensor circuit ● Engine coolant temp. sensor ● ECM	○	○
P0116 (DI-37)	Engine Coolant Temp. Circuit Range/ Performance Problem	● Engine coolant temp. sensor ● Cooling system	○	○
	Throttle Position Sensor/Switch Malfunction	● Open or short in throttle position sensor circuit ● Throttle position sensor ● ECM		
	Throttle Position Sensor/ Switch Range/ Performance Problem	● Throttle position sensor		

## 5. PROBLEM SYMPTOMS TABLE

The suspected circuits or parts for each problem symptom are shown in the table below. Use this table to troubleshoot the problem when a "Normal" code is displayed in the diagnostic trouble code check but the problem is still occurring. Numbers in the table indicate the inspection order in which the circuits or parts should be checked.

HINT:

When the problem is not detected by the diagnostic system even though the problem symptom is present, it is considered that the problem is occurring outside the detection range of the diagnostic system, or that the problem is occurring in a system other than the diagnostic system.

●Page

Indicates the page where the flow chart for each circuit is located.

●Circuit Inspection, Inspection Order

Indicates the circuit which needs to be checked for each problem symptom. Check in the order indicated by the numbers.

●Problem Symptom

●Circuit or Part Name

Indicates the circuit or part which needs to be checked.

**PROBLEM SYMPTOMS TABLE**

Symptom	Suspected Area	See page
Engine does not crank (Does not start)	1. Starter and starter relay	ST-2 ST-17
No initial combustion (Does not start)	1. ECM power source circuit 2. Fuel pump control circuit 3. ECM	DI-147 DI-151 IN-29
No complete combustion (Does not start)	1. Fuel pump control circuit	DI-151
Engine cranks normally (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	DI-144 DI-151 EM-3
Cold engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI-144 DI-151
Hot engine	1. Starter signal circuit 2. Fuel pump control circuit	DI-144 DI-151
Engine idle speed (Poor idling)	1. A/C signal circuit (Compressor circuit) 2. ECM power source circuit	AC-88
Engine idle speed (Poor idling)	1. A/C signal circuit 2. Fuel pump control circuit	
Engine idle speed (Poor idling)	1. Compression 2. Fuel pump control circuit	

## 6. CIRCUIT INSPECTION

How to read and use each page is shown below.

●Diagnostic Trouble Code No. and Detection Item

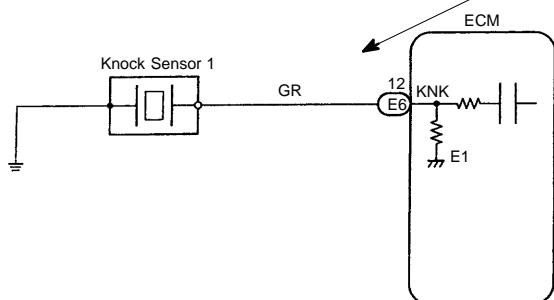
●Circuit Description  
The major role and operation, etc. of the circuit and its component parts are explained.

DTC	P0325	Knock Sensor 1 Circuit Malfunction
<b>CIRCUIT DESCRIPTION</b> Knock sensor is fitted to the cylinder block to detect engine knocking. This sensor contains a piezoelectric element which generates a voltage when it becomes deformed, which occurs when the cylinder block vibrates due to knocking. If engine knocking occurs, ignition timing is retarded to suppress it.		
DTC No.	DTC Detection Condition	Trouble Area
P0325	No knock sensor 1 signal to ECM with engine speed 1,200 rpm or more.	●Open or short in knock sensor1 circuit ●Knock sensor 1 (looseness) ●ECM

If the ECM detects the above diagnosis conditions, it operates the fail safe function in which the corrective retard angle value is set to the maximum value.

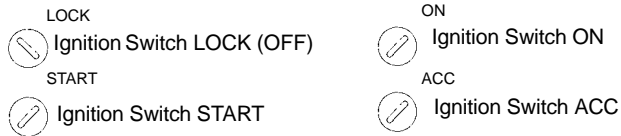
●Indicates the diagnostic trouble code, diagnostic trouble code set parameter and suspect area of the problem.

### WIRING DIAGRAM



- 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.

● Indicates the position of the ignition switch during the check.

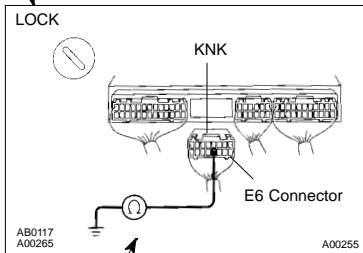


● Inspection Procedure

Use the inspection procedure to determine if the circuit is normal or abnormal, and, if it is abnormal, use it to determine whether the problem is located in the sensors, actuators, wire harness or ECU.

## INSPECTION PROCEDURE

### 1 Check continuity between terminal KNK of ECM connector and body ground.



#### PREPARATION:

- (a) Remove the glove compartment (See page SF-68).
- (b) Disconnect the E6 connector from the ECM.

#### CHECK:

Measure the resistance between terminal KNK of the ECM connector and body ground.

#### OK:

Resistance: 1 MΩ or higher

OK

Go to step 3.

NG

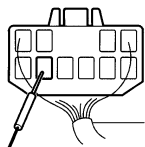
### 2 Check knock sensor (See page SF-61).

OK

Replace knock sensor.

● Indicates the place to check the voltage or resistance.

● Indicates the connector position to checked, from the front or back side.



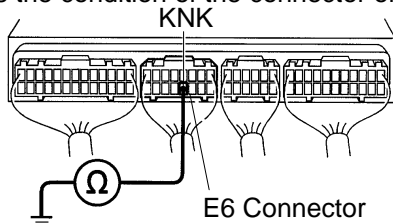
Wire Harness

Check from the connector back side.  
(with harness)

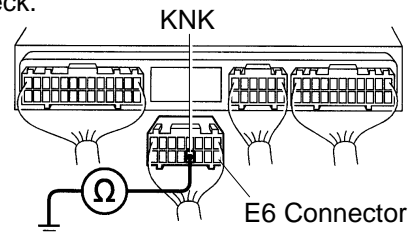


Check from the connector front side. (without harness)  
In this case, care must be taken not to bend the terminals.

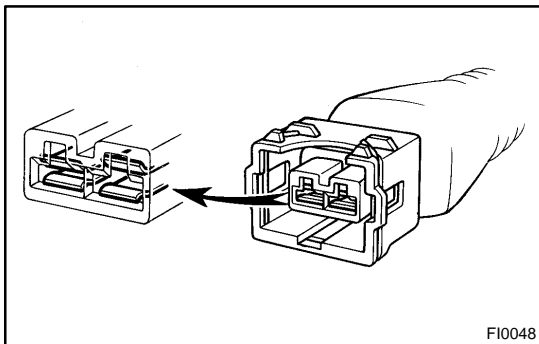
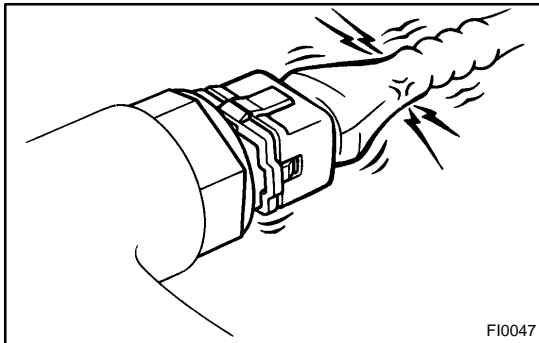
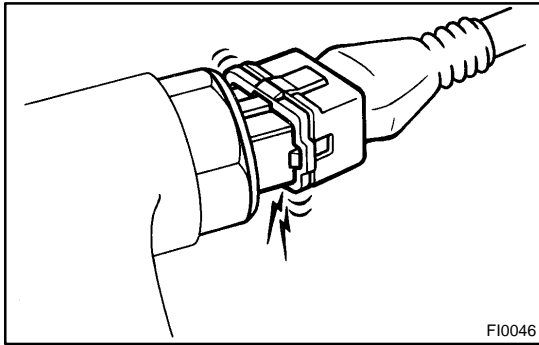
● Indicates the condition of the connector of ECU during the check.



Connector being checked is connected.



Connector being checked is disconnected.



## HOW TO USE THE DIAGNOSTIC CHART AND INSPECTION PROCEDURE

### 1. CONNECTOR CONNECTION AND TERMINAL INSPECTION

- For troubleshooting, diagnostic trouble code charts or problem symptom table are provided for each circuit with detailed inspection procedures on the following pages.
- When all the component parts, wire harnesses and connectors of each circuit except the ECU are found to be normal in troubleshooting, then it is determined that the problem is in the ECU. Accordingly, if diagnosis is performed without the problem symptoms occurring, refer to Step 8 to replace the ECU. So always confirm that the problem symptoms are occurring, or proceed with inspection while using the symptom simulation method.
- The instructions "Check wire harness and connector" and "Check and replace ECU" which appear in the inspection procedure, are common and applicable to all diagnostic trouble codes. Follow the procedure outlined below whenever these instructions appear.

#### OPEN CIRCUIT:

This could be due to a disconnected wire harness, faulty contact in the connector, a connector terminal pulled out, etc.

#### HINT:

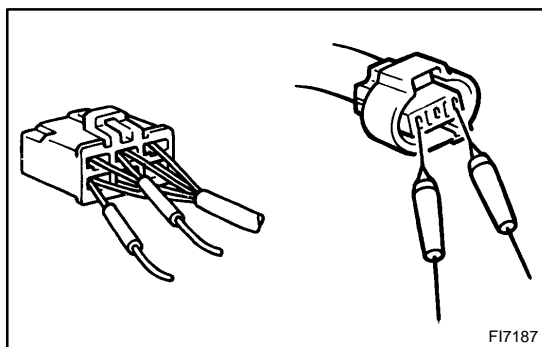
- It is rarely the case that a wire is broken in the middle of it. Most cases occur at the connector. In particular, carefully check the connectors of sensors and actuators
- Faulty contact could be due to rusting of the connector terminals, to foreign materials entering terminals or a deformation of connector terminals. Simply disconnecting and reconnecting the connectors once changes the condition of the connection and may result in a return to normal operation. Therefore, in troubleshooting, if no abnormality is found in the wire harness and connector check, but the problem disappears after the check, then the cause is considered to be in the wire harness or connectors.

#### SHORT CIRCUIT:

This could be due to a contact between wire harness and the body ground or to a short circuit occurred inside the switch, etc.

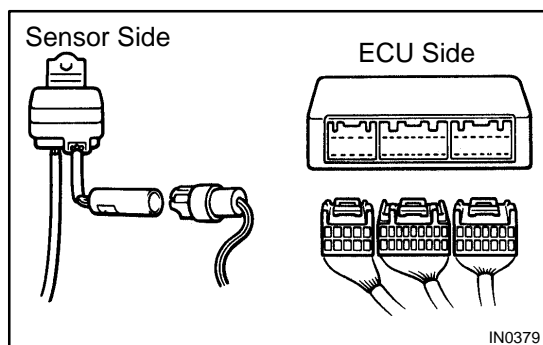
#### HINT:

When there is a short circuit between the wire harness and body ground, check thoroughly whether the wire harness is caught in the body or is clamped properly.



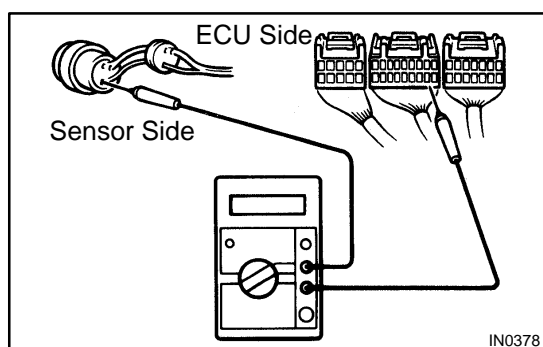
## 2. CONNECTOR HANDLING

When inserting tester probes into a connector, insert them from the rear of the connector. When necessary, use mini test leads. For water resistant connectors which cannot be accessed from behind, take good care not to deform the connector terminals.



## 3. CONTINUITY CHECK (OPEN CIRCUIT CHECK)

- (a) Disconnect the connectors at both ECU and sensor sides.

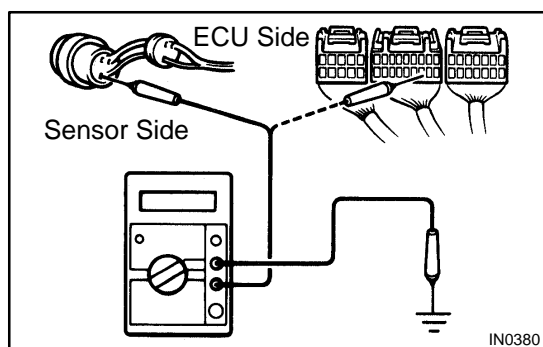


- (b) Measure the resistance between the applicable terminals of the connectors.

**Resistance: 1  $\Omega$  or less**

HINT:

Measure the resistance while lightly shaking the wire harness vertically and horizontally.



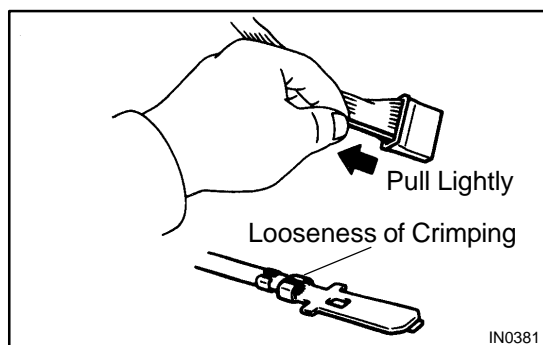
## 4. RESISTANCE CHECK (SHORT CIRCUIT CHECK)

- (a) Disconnect the connectors on both ends.
- (b) Measure the resistance between the applicable terminals of the connectors and body ground. Be sure to carry out this check on the connectors on both ends.

**Resistance: 1 M $\Omega$  or higher**

HINT:

Measure the resistance while lightly shaking the wire harness vertically and horizontally.



## 5. VISUAL CHECK AND CONTACT PRESSURE CHECK

- (a) Disconnect the connectors at both ends.
- (b) Check for rust or foreign material, etc. in the terminals of the connectors.
- (c) Check crimped portions for looseness or damage and check that the terminals are secured in lock portion.

HINT:

The terminals should not come out when pulled lightly from the back.

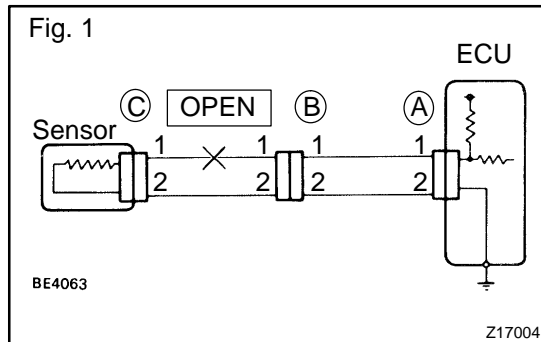
- (d) Prepare a test male terminal and insert it in the female terminal, then pull it out.

**NOTICE:**

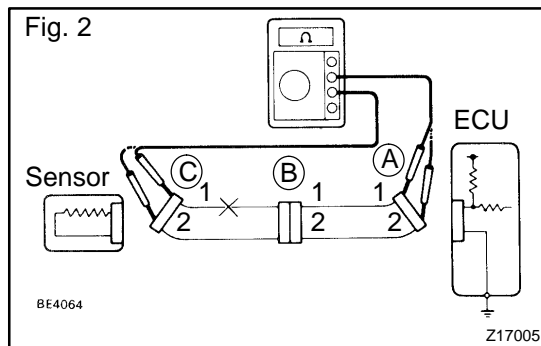
**When testing a gold-plated female terminal, always use a gold-plated male terminal.**

**HINT:**

When the test terminal is pulled out more easily than others, there may be poor contact in that section.

**6. CHECK OPEN CIRCUIT**

For the open circuit in the wire harness in Fig. 1, perform "(a) Continuity Check" or "(b) Voltage Check" to locate the section.



- (a) Check the continuity.

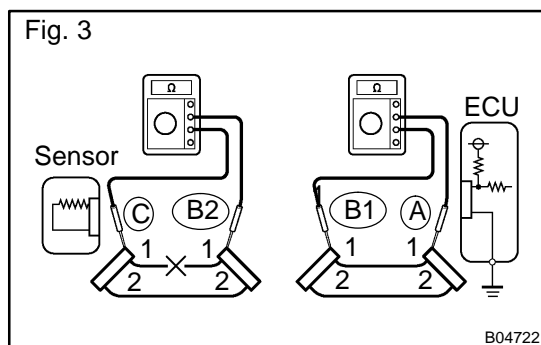
- (1) Disconnect connectors "A" and "C" and measure the resistance between them.

In the case of Fig. 2:

Between terminal 1 of connector "A" and terminal 1 of connector "C" → No continuity (open)

Between terminal 2 of connector "A" and terminal 2 of connector "C" → Continuity

Therefore, it is found out that there is an open circuit between terminal 1 of connector "A" and terminal 1 of connector "C".



- (2) Disconnect connector "B" and measure the resistance between the connectors.

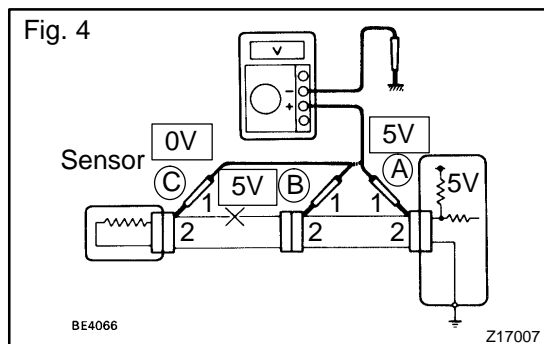
In the case of Fig. 3:

Between terminal 1 of connector "A" and terminal 1 of connector "B1" → Continuity

Between terminal 1 of connector "B2" and terminal 1 of connector "C" → No continuity (open)

Therefore, it is found out that there is an open circuit between terminal 1 of connector "B2" and terminal 1 of connector "C".





(b) Check the voltage.

In a circuit in which voltage is applied (to the ECU connector terminal), an open circuit can be checked for by conducting a voltage check.

As shown in Fig. 4, with each connector still connected, measure the voltage between body ground and terminal 1 of connector "A" at the ECU 5V output terminal, terminal 1 of connector "B", and terminal 1 of connector "C", in that order.

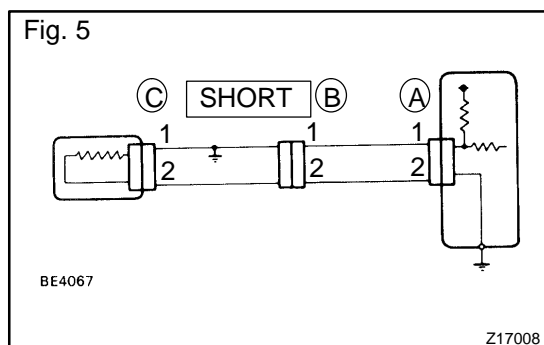
If the results are:

5V: Between Terminal 1 of connector "A" and Body Ground

5V: Between Terminal 1 of connector "B" and Body Ground

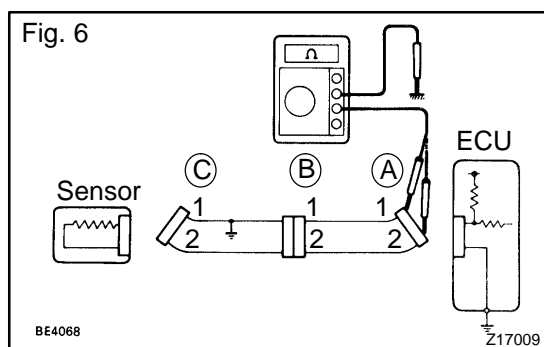
0V: Between Terminal 1 of connector "C" and Body Ground

Then it is found out that there is an open circuit in the wire harness between terminal 1 of "B" and terminal 1 of "C".



## 7. CHECK SHORT CIRCUIT

If the wire harness is ground shorted as in Fig. 5, locate the section by conducting a "continuity check with ground".



Check the continuity with ground.

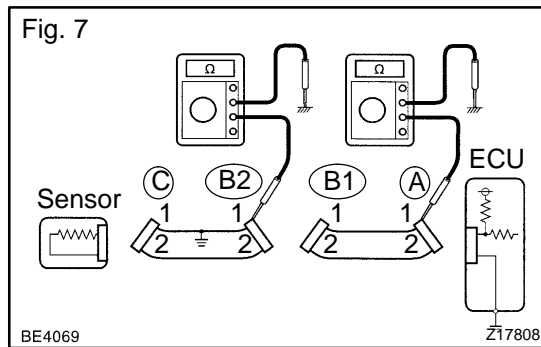
- (1) Disconnect connectors "A" and "C" and measure the resistance between terminal 1 and 2 of connector "A" and body ground.

In the case of Fig. 6:

Between terminal 1 of connector "A" and body ground → Continuity (short)

Between terminal 2 of connector "A" and body ground → No continuity

Therefore, it is found out that there is a short circuit between terminal 1 of connector "A" and terminal 1 of connector "C".



- (2) Disconnect connector "B" and measure the resistance between terminal 1 of connector "A" and body ground, and terminal 1 of connector "B2" and body ground.

In the case of Fig. 7:

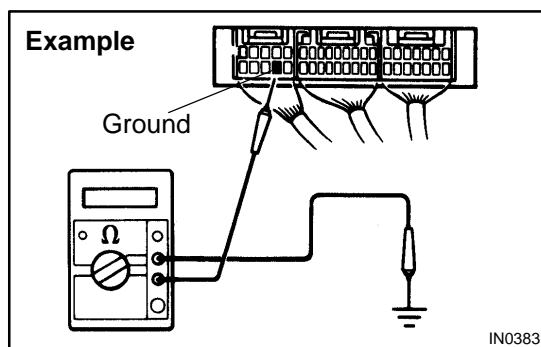
Between terminal 1 of connector "A" and body ground → No continuity

Between terminal 1 of connector "B2" and body ground → Continuity (short)

Therefore, it is found out that there is a short circuit between terminal 1 of connector "B2" and terminal 1 of connector "C".

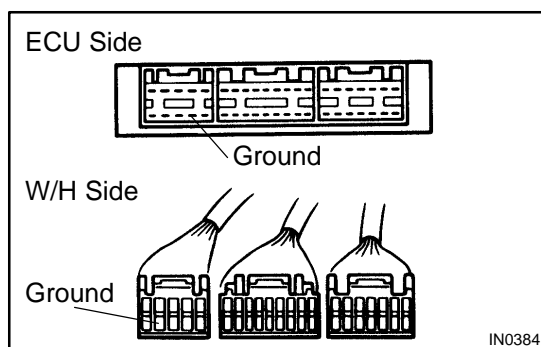
## 8. CHECK AND REPLACE ECU

First check the ECU ground circuit. If it is faulty, repair it. If it is normal, the ECU could be faulty, so replace the ECU with a normal functioning one and check that the symptoms appear.



- (1) Measure the resistance between the ECU ground terminal and the body ground.

**Resistance: 1  $\Omega$  or less**



- (2) Disconnect the ECU connector, check the ground terminals on the ECU side and the wire harness side for bend and check the contact pressure.

# TERMS

## ABBREVIATIONS USED IN THIS MANUAL

IN04Q-07

Abbreviations	Meaning
ABS	Anti-Lock Brake System
AC	Alternating Current
ACC	Accessory
ACIS	Acoustic Control Induction System
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
A/T	Automatic Transmission (Transaxle)
ATF	Automatic Transmission Fluid
AUTO	Automatic
AUX	Auxiliary
AVG	Average
AVS	Adaptive Variable Suspension
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
Calif.	California
CB	Circuit Breaker
CCo	Catalytic Converter For Oxidation
CD	Compact Disc
CF	Cornering Force
CG	Center Of Gravity
CH	Channel
COMB.	Combination
CPE	Coupe
CPS	Combustion Pressure Sensor
CPU	Central Processing Unit
CRS	Child Restraint System
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
DLI	Distributorless Ignition
DOHC	Double Over Head Cam
DP	Dash Pot
DS	Dead Soak
DSP	Digital Signal Processor
EBD	Electronic Brake Force Distribution
ECAM	Engine Control And Measurement System
ECD	Electronic Controlled Diesel
ECDY	Eddy Current Dynamometer
ECU	Electronic Control Unit
ED	Electro-Deposited Coating
EDIC	Electric Diesel Injection Control
EDU	Electronic Driving Unit
EFI	Electronic Fuel Injection
E/G	Engine
EGR-VM	Exhaust Gas Recirculation-Vacuum Modulator
ELR	Emergency Locking Retractor
ENG	Engine
ESA	Electronic Spark Advance
ETCS	Electronic Throttle Control System
EVP	Evaporator
E-VR V	Electric Vacuum Regulating Valve
EXH	Exhaust
FE	Fuel Economy
FF	Front-Engine Front-Wheel-Drive
F/G	Fuel Gage
FIPG	Formed In Place Gasket
FL	Fusible Link
F/P	Fuel Pump
FPU	Fuel Pressure Up
Fr	Front
FR	Front-Engine Rear-Wheel-Drive
F/W	Flywheel
FW/D	Flywheel Damper
FWD	Front-Wheel-Drive
GAS	Gasoline
GSA	Gear Shift Actuator
GND	Ground
HAC	High Altitude Compensator

## INTRODUCTION - TERMS

H/B	Hatchback
H-FUSE	High Current Fuse
HI	High
HID	High Intensity Discharge (Head Lamp)
HPU	Hydraulic Power Unit
HSG	Housing
HT	Hard Top
HWS	Heated Windshield System
IAC	Idle Air Control
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
J/B	Junction Block
J/C	Junction Connector
KD	Kick-Down
LAN	Local Area Network
LB	Liftback
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LH	Left-Hand
LHD	Left-Hand Drive
L/H/W	Length, Height, Width
LLC	Long-Life Coolant
LNG	Liquified Natural Gas
LO	Low
LPG	Liquified Petroleum Gas
LSD	Limited Slip Differential
LSP & PV	Load Sensing Proportioning And Bypass Valve
LSPV	Load Sensing Proportioning Valve
MAX.	Maximum
M-FUSE	Medium Current Fuse
MIC	Microphone
MIL	Malfunction Indicator Lamp
MIN.	Minimum
MP	Multipurpose
MPX	Multiplex Communication System
M/T	Manual Transmission (Transaxle)
MT	Mount
MTG	Mounting
N	Neutral

1996 TERCEL (RM440U)

NA	Natural Aspiration
No.	Number
O/D	Overdrive
OEM	Original Equipment Manufacturing
OHC	Overhead Camshaft
OHV	Overhead Valve
OPT	Option
O/S	Oversize
P & BV	Proportioning And Bypass Valve
PCS	Power Control System
PCV	Positive Crankcase Ventilation
PKB	Parking Brake
PPS	Progressive Power Steering
PS	Power Steering
PTO	Power Take-Off
R & P	Rack And Pinion
R/B	Relay Block
RBS	Recirculating Ball Type Steering
R/F	Reinforcement
RFS	Rigid Front Suspension
RH	Right-Hand
RHD	Right-Hand Drive
RLY	Relay
ROM	Read Only Memory
Rr	Rear
RR	Rear-Engine Rear-Wheel Drive
RRS	Rigid Rear Suspension
RWD	Rear-Wheel Drive
SDN	Sedan
SEN	Sensor
SICS	Starting Injection Control System
SMT	Sequential Manual Transmission
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

## INTRODUCTION - TERMS

TC	Turbocharger
TCCS	TOYOTA Computer-Controlled System
TCV	Timing Control Valve
TDC	Top Dead Center
TEMP.	Temperature
TEMS	TOYOTA Electronic Modulated Suspension
TIS	Total Information System For Vehicle Development
T/M	Transmission
TMC	TOYOTA Motor Corporation
TMMK	TOYOTA Motor Manufacturing Kentucky, Inc.
TRAC	Traction Control System
TURBO	Turbocharge
U/D	Underdrive
U/S	Undersize
VCV	Vacuum Control Valve
VENT	Ventilator
VIN	Vehicle Identification Number
VPS	Variable Power Steering
VSC	Vehicle Skid Control
VSV	Vacuum Switching Valve
VTV	Vacuum Transmitting Valve
w/	With
WGN	Wagon
W/H	Wire Harness
w/o	Without
1st	First
2nd	Second
2WD	Two Wheel Drive Vehicle (4x2)
4WD	Four Wheel Drive Vehicle (4x4)

## 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 (Diesel)	Direct Injection (DI)
DI	Distributor Ignition	-
DLC1 DLC2 DLC3	Data Link Connector 1 Data Link Connector 2 Data Link Connector 3	1: Check Connector 2: Total Diagnosis Communication Link (TDCL) 3: OBD II Diagnostic Connector
DTC	Diagnostic Trouble Code	Diagnostic Code
DTM	Diagnostic Test Mode	-
ECL	Engine Control Level	-
ECM	Engine Control Module	Engine ECU (Electronic Control Unit)
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	TOYOTA Distributorless Ignition (TDI)
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)



## INTRODUCTION - TERMS

HO <sub>2</sub> S	Heated Oxygen Sensor	Heated Oxygen Sensor (HO <sub>2</sub> S)
IAC	Idle Air Control	Idle Speed Control (ISC)
IAT	Intake Air Temperature	Intake or Inlet Air Temperature
ICM	Ignition Control Module	-
IFI	Indirect Fuel Injection	Indirect Injection (IDL)
IFS	Inertia Fuel-Shutoff	-
ISC	Idle Speed Control	-
KS	Knock Sensor	Knock Sensor
MAF	Mass Air Flow	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 Lamp	Check Engine Lamp
MST	Manifold Surface Temperature	-
MVZ	Manifold Vacuum Zone	-
NVRAM	Non-Volatile Random Access Memory	-
O <sub>2</sub> S	Oxygen Sensor	Oxygen Sensor, O <sub>2</sub> Sensor (O <sub>2</sub> S)
OBD	On-Board Diagnostic	On-Board Diagnostic System (OBD)
OC	Oxidation Catalytic Converter	Oxidation Catalyst Convert (OC), CCo
OP	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 <sub>RO</sub>
TWC+OC	Three-Way + Oxidation Catalytic Converter	CC <sub>R</sub> + CCo
VAF	Volume Air Flow	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	-

# OUTSIDE VEHICLE

## GENERAL MAINTENANCE

MA001-24

The owners are responsible for these maintenance and inspection items.

They can be done by the owner or they can have them done at a service shop.

These items include those which should be checked on a daily basis, those which, in most cases, do not require (special) tools and those which are considered to be reasonable for the owner to do.

Items and procedures for general maintenance are as follows.

### 1. GENERAL NOTES

- Maintenance items may vary from country to country. Check the owner's manual supplement in which the maintenance schedule is shown.
- Every service item in the periodic maintenance schedule must be performed.
- Periodic maintenance service must be performed according to whichever interval in the periodic maintenance schedule occurs first, the odometer reading (miles) or the time interval (months).
- Maintenance service after the last period should be performed at the same interval as before unless otherwise noted.
- Failure to do even one item can cause the engine to run poorly and increase exhaust emissions.

### 2. TIRES

- (a) Check the pressure with a gauge.

If necessary, adjust.

- (b) Check for cuts, damage or excessive wear.

### 3. WHEEL NUTS

When checking the tires, check the nuts for looseness or for missing nuts.

If necessary, tighten them.

### 4. TIRE ROTATION

Check the owner's manual supplement in which the maintenance schedule is shown.

### 5. WINDSHIELD WIPER BLADES

Check for wear or cracks whenever they do not wipe clean.

If necessary, replace.

### 6. FLUID LEAKS

- (a) Check underneath for leaking fuel, oil, water or other fluid.
- (b) If you smell gasoline fumes or notice any leak, have the cause found and corrected.

### 7. DOORS AND ENGINE HOOD

- (a) Check that all doors and including the trunk lid operate smoothly, and that all latches lock securely.
- (b) Check that the engine hood secondary latch secures the hood from opening when the primary latch is released.

# INSIDE VEHICLE

## GENERAL MAINTENANCE

The owners are responsible for these maintenance and inspection items.

They can be done by the owner or they can have them done at a service shop.

These items include those which should be checked on a daily basis, those which, in most cases, do not require (special) tools and those which are considered to be reasonable for the owner to do.

Items and procedures for general maintenance are as follows.

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- Maintenance service after the last period should be performed at the same interval as before unless otherwise noted.
- Failure to do even one item can cause the engine to run poorly and increase exhaust emissions.

### 2. LIGHTS

- (a) Check that the headlights, stop lights, taillights, turn signal lights, and other lights are all working.
- (b) Check the headlight aim.

### 3. WARNING LIGHTS AND BUZZERS

Check that all warning lights and buzzers function properly.

### 4. HORN

Check that it is working.

### 5. WINDSHIELD

Check for scratches, pits or abrasions.

### 6. WINDSHIELD WIPER AND WASHER

- (a) Check operation of the wipers and washer.
- (b) Check that the wipers do not streak.

### 7. WINDSHIELD DEFROSTER

Check that air comes out from the defroster outlet when operating the heater or air conditioner.

### 8. REAR VIEW MIRROR

Check that it is mounted securely.

### 9. SUN VISORS

Check that they move freely and are mounted securely.

### 10. STEERING WHEEL

Check that it has the specified freeplay. Be alert for changes in steering condition, such as hard steering, excessive freeplay or strange noises.

### 11. SEATS

- (a) Check that all front seat controls such as seat adjusters, seatback reliner, etc. operate smoothly.
- (b) Check that all latches lock securely in any position.
- (c) Check that the locks hold securely in any latched position.
- (d) Check that the head restraints move up and down smoothly and that the locks hold securely in any latched position.
- (e) For fold-down rear seat backs, check that the latches lock securely.

### 12. SEAT BELTS

- (a) Check that the seat belt system such as the buckles, retractors and anchors operate properly and smoothly.
- (b) Check that the belt webbing is not cut, frayed, worn or damaged.

**13. ACCELERATOR PEDAL**

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

**14. CLUTCH PEDAL (See page CL-2 )**

- (a) Check the pedal for smooth operation.
- (b) Check that the pedal has the proper freeplay.

**15. BRAKE PEDAL (See page BR-6 )**

- (a) Check the pedal for smooth operation.
- (b) Check that the pedal has the proper reserve distance and freeplay.
- (c) Check the brake booster function.

**16. BRAKES**

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

**17. PARKING BRAKE (See page BR-8 )**

- (a) Check that the lever has the proper travel.
- (b) On a safe incline, check that the vehicle is held securely with only the parking brake applied.

**18. AUTOMATIC TRANSMISSION "PARK" MECHANISM**

- (a) Check the lock release button of the selector lever for proper and smooth operation.
- (b) On a safe incline, check that the vehicle is held securely with the selector lever in the P position and all brakes released.

## UNDER HOOD

MA003-28

### GENERAL MAINTENANCE

#### 1. GENERAL NOTES

- Maintenance items may vary from country to country. Check the owner's manual supplement in which the maintenance schedule is shown.
- Every service item in the periodic maintenance schedule must be performed.
- Periodic maintenance service must be performed according to whichever interval in the periodic maintenance schedule occurs first, the odometer reading (miles) or the time interval (months).
- Maintenance service after the last period should be performed at the same interval as before unless otherwise noted.
- Failure to do even one item can cause the engine to run poorly and increase exhaust emissions.

#### 2. WINDSHIELD WASHER FLUID

Check that there is sufficient fluid in the tank.

#### 3. ENGINE COOLANT LEVEL

Check that the coolant level is between the FULL and LOW lines on the see-through reservoir.

#### 4. RADIATOR AND HOSES

- (a) Check that the front of the radiator is clean and not blocked with leaves, dirt or bugs.
- (b) Check the hoses for cracks, kinks, rot or loose connections.

#### 5. BATTERY ELECTROLYTE LEVEL

Check that the electrolyte level of all battery cells is between the upper and lower level lines on the case. If level is low, add distilled water only.

#### 6. BRAKE AND CLUTCH FLUID LEVELS

- (a) Check that the brake fluid level is near the upper level line on the see-through reservoir.
- (b) Check that the clutch fluid level is within  $\pm 5$  mm (0.20 in.) of the reservoir hem.

#### 7. ENGINE DRIVE BELTS

Check drive belt for fraying, cracks, wear or oiliness.

#### 8. ENGINE OIL LEVEL

Check the level on the dipstick with the engine turned off.

#### 9. POWER STEERING FLUID LEVEL

- (a) Check the level.
- (b) The level should be in the HOT or COLD range depending on the fluid temperature.

#### 10. AUTOMATIC TRANSMISSION FLUID LEVEL

- (a) Park the vehicle on a level surface.
- (b) With the engine idling and the parking brake applied, shift the selector into all positions from the P to L, and then shift into the P position.
- (c) Turn and pull out the dipstick and wipe off the fluid with a clean rag. Reinsert the dipstick and check that the fluid level is in the HOT range.
- (d) Do this check with the fluid at normal driving temperature (70 - 80°C, 158 - 176°F).

If the level is at the low side, add fluid.

#### NOTICE:

**Do not overfill.**

#### HINT:

Wait until the engine cools down (approx. 30 min.) before checking the fluid level after extended driving at high speeds, in hot weather, in heavy traffic or pulling a trailer.

#### 11. EXHAUST SYSTEM

Visually inspect for cracks, holes or loose supports.

If any change in the sound of the exhaust or smell of the exhaust fumes is noticed, have the cause located and corrected.

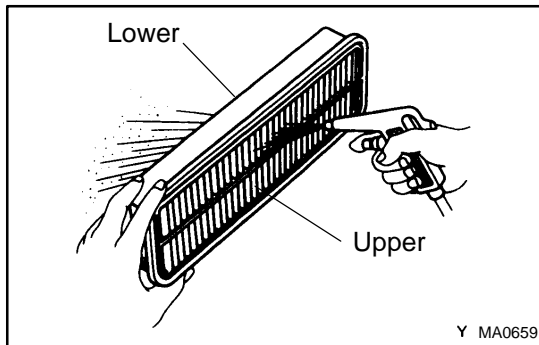
# ENGINE INSPECTION

MA00R-19

## HINT:

Inspect these items when the engine is cold.

1. **REPLACE TIMING BELT** (See pages [EM-12](#) and [EM-17](#) )
2. **INSPECT DRIVE BELTS** (See pages [CH-2](#) , [SR-3](#) and [AC-18](#) )



## 3. INSPECT AIR FILTER

- (a) Visually check that the air filter is not excessively dirty, damaged or oily.

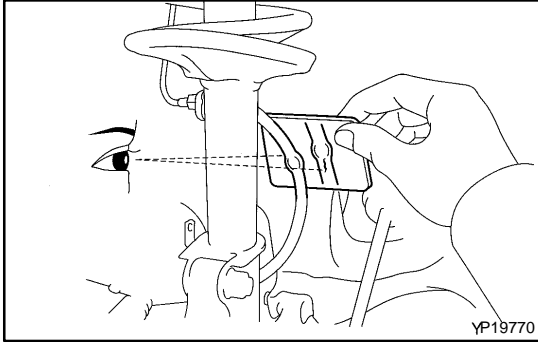
If necessary, replace the air filter.

- (b) Clean the air filter with compressed air.  
First blow from the upper side thoroughly, then blow off the lower side of the air filter.

## 4. REPLACE AIR FILTER

Replace the air filter with a new one.

5. **REPLACE SPARK PLUGS** (See page [IG-1](#) )
6. **REPLACE ENGINE OIL AND OIL FILTER** (See page [LU-3](#) )
7. **REPLACE ENGINE COOLANT** (See page [CO-2](#) )
8. **INSPECT CHARCOAL CANISTER** (See page [EC-5](#) )
9. **REPLACE GASKET IN FUEL TANK CAP** (See page [EC-5](#) )
10. **INSPECT FUEL LINES AND CONNECTIONS** (See page [EC-5](#) )
11. **INSPECT EXHAUST PIPES AND MOUNTINGS**  
Visually check the pipes, hangers and connections for severe corrosion, leaks or damage.
12. **ADJUST VALVE CLEARANCE** (See page [EM-4](#) )



MA00S-13

## BRAKE INSPECTION

### 1. INSPECT BRAKE LINE PIPES AND HOSES

#### HINT:

Check in a well lighted area. Check the entire circumference and length of the brake hoses using a mirror as required. Turn the front wheels fully right or left before checking the front brake.

#### (a) Check all brake lines and hoses.

- Check for damage.
- Check for wear.
- Check for deformation.
- Check for cracks.
- Check for corrosion.
- Check for leaks.
- Check for bends.
- Check for twists.

#### (b) Check all clamps for tightness and connections for leakage.

#### (c) Check that the hoses and lines are clear of sharp edges, moving parts and the exhaust system.

#### (d) Check that the lines installed in grommets pass through the center of the grommets.

### 2. INSPECT FRONT BRAKE PADS AND DISCS (See page [BR-26](#) )

#### HINT:

If a squealing or scraping noise comes from the brake during driving, check the pad wear indicator to see if it is contacting the disc. If so, the disc pad should be replaced.

### 3. INSPECT REAR BRAKE LININGS AND DRUMS (See page [BR-32](#) )



# CHASSIS INSPECTION

MA03P-02

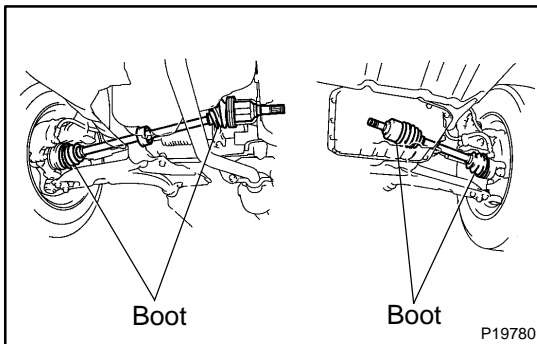
## 1. INSPECT STEERING LINKAGE

- (a) Check the steering wheel freeplay (See page [SR-10](#)).
- (b) Check the steering linkage for looseness or damage.
  - Check that the tie rod ends do not have excessive play.
  - Check that the dust seals and boots are not damaged.
  - Check that the boot clamps are not loose.

## 2. INSPECT SRS AIRBAG (See page [RS-2](#))

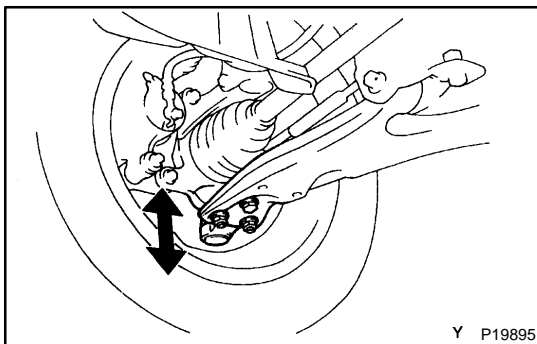
## 3. INSPECT STEERING GEAR HOUSING OIL

Check the steering gear housing for oil leakage.



## 4. INSPECT DRIVE SHAFT BOOTS

Check the drive shaft boots for clamp looseness, leakage or damage.

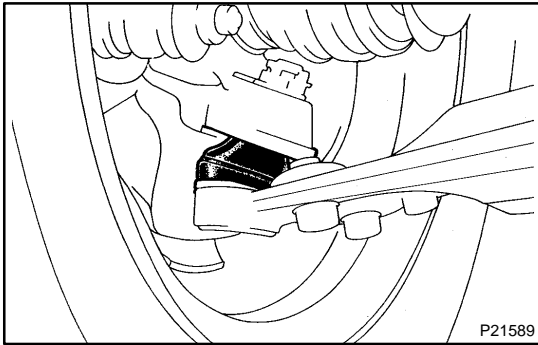


## 5. INSPECT BALL JOINT AND DUST COVERS

- (a) Inspect the ball joints for excessive looseness.
  - (1) Jack up the front of the vehicle and place wooden blocks with a height of 180 - 200 mm (7.09 - 7.87 in.) under the front tires.
  - (2) Lower the jack until there is about half a load on the front coil spring. Place stands under the vehicle for safety.
  - (3) Make sure the front wheels are in a straightforward position and block the wheel with chocks.
  - (4) Move the lower arm up and down, and check that the ball joint has no excessive play.

**Maximum ball joint vertical play: 0 mm (0 in.)**

If there is play, replace the ball joint.



- (b) Check the dust cover for damage.

## 6. CHECK TRANSAXLE OIL (FLUID)

Visually check the transaxle for oil (fluid) leakage.

If leakage is found, check for the cause and repair.

## 7. REPLACE TRANSAXLE OIL (FLUID)

- (a) M/T:

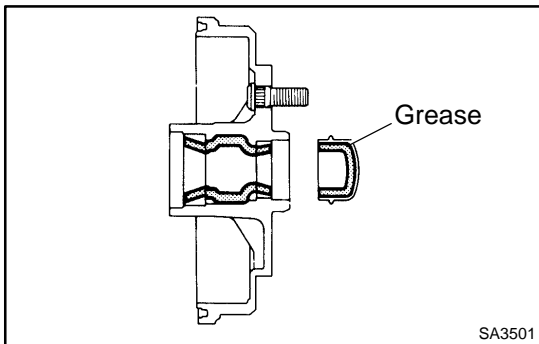
Replace the transaxle oil (See page [MX-6](#) ).

- (b) A/T:

Replace the transaxle fluid.

(A132L: See page [AX-2](#) )

(A242L: See page [AX-2](#) )



## 8. REPACK REAR WHEEL BEARINGS

- (a) Change rear wheel bearing grease.

(1) Remove the hub and inner and outer bearings. Clean in solvent and inspect the bearings for damage.

(2) Pack the bearings and axle hubs with multipurpose grease.

**Wheel bearing grease grade:**

**Lithium base multipurpose grease (NLGI No.2)**

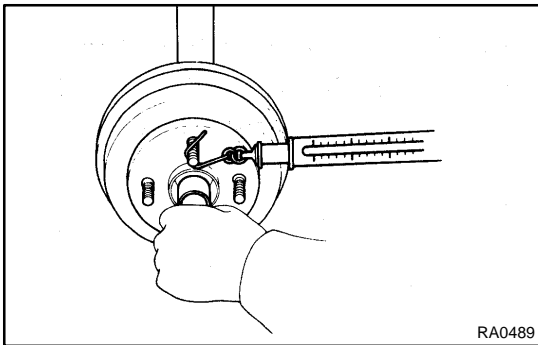
- (b) Install inner bearing and new oil seal.

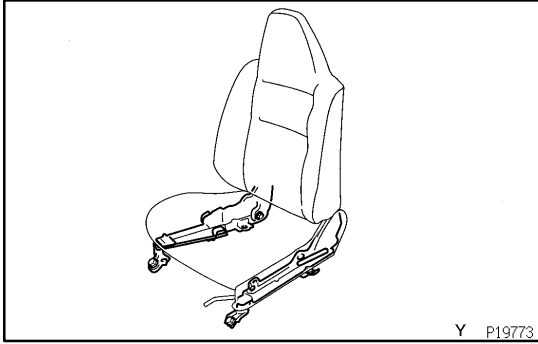
- (c) Install the hub and adjust the wheel bearing preload (See page [SA-42](#) ).

**Preload (while turning):**

**Add frictional force plus**

**0 - 11.8 N (0 - 1.2 kgf, 0 - 2.6 lbf)**





MA02M-05

## BODY INSPECTION

### 1. TIGHTEN BOLTS AND NUTS ON CHASSIS AND BODY

- (a) Tighten the front seat-to-body mounting bolts.

**Torque: 37 N·m (375 kgf-cm, 27 ft-lbf)**

- (b) Under Severe Conditions:

In addition to the above maintenance items, check for loose or missing nuts and bolts on the steering system, drive train, suspension system, fuel tank mounts, engine mounts, etc.

### 2. FINAL INSPECTION

- (a) Check the operation of the body parts:

- Hood:
  - Auxiliary catch operates properly
  - Hood locks securely when closed
- Front and rear doors:
  - Door lock operates properly
  - Doors close properly
- Luggage compartment door:
  - Door lock operates properly
- Seats:
  - Seat adjusts easily and locks securely in any position
  - Front seat back locks securely in any position
  - Folding-down rear seat backs lock securely

- (b) Road test:

- Check the engine and chassis for abnormal noises.
- Check that the vehicle does not wander or pull to one side.
- Check that the brakes work properly and do not drag.

- (b) Be sure to deliver a clean car.

Especially check the steering wheel, shift lever knob, all switch knobs, door handles and seats.

# MAINTENANCE EQUIPMENT

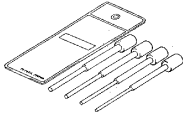
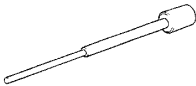
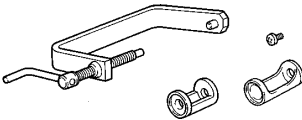
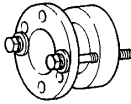
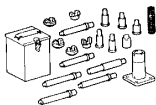






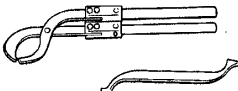
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Mirror	Brake hose
Torque wrench	





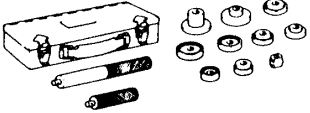
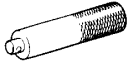



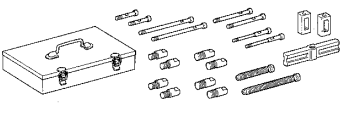
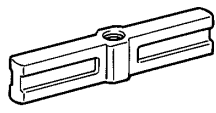
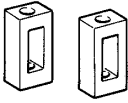
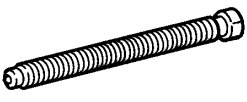
# ENGINE MECHANICAL

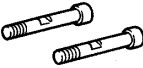
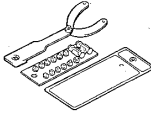
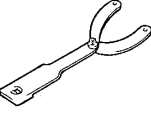
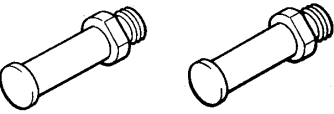

## SST (Special Service Tools)

PP3IQ-01

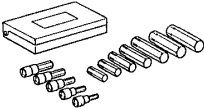
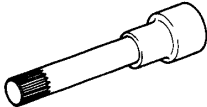

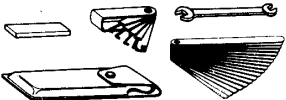
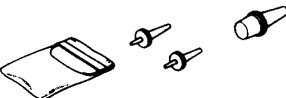
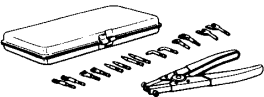
	09201-10000 Valve Guide Bushing Remover & Replacer Set	
	(09201-01060) Valve Guide Bushing Remover & Replacer 6	
	09202-70020 Valve Spring Compressor	
	09213-14010 Crankshaft Pulley Holding Tool	
	09221-25026 Piston Pin Remover & Replacer	
	(09221-00020) Body	
	(09221-00030) Spring	
	(09221-00130) Guide "G"	
	(09221-00140) Guide "H"	
	(09221-00150) Bushing "D"	
	09223-15030 Oil Seal & Bearing Replacer	
	09248-55040 Valve Clearance Adjust Tool Set	

## PREPARATION - ENGINE MECHANICAL

	(09248-05410) Valve Lifter Press	
	(09248-05420) Valve Lifter Stopper	
	09309-37010 Transmission Bearing Replacer	Crankshaft front oil seal
	09330-00021 Companion Flange Holding Tool	Crankshaft pulley
	09550-10012 Replacer Set "B"	
	(09252-10010) No. 1 Replacer Handle	Valve guide bushing Spark plug tube gasket
	(09556-10010) Differential Drive Pinion Front Bearing Remover	Spark plug tube gasket
	09816-30010 Oil Pressure Switch Socket	Knock sensor Oil pressure switch
	09843-18020 Diagnosis Check Wire	
	09950-50010 Puller C Set	
	(09951-05010) Hanger 150	Crankshaft pulley
	(09952-05010) Slide Arm	Crankshaft pulley
	(09953-05020) Center Bolt 150	Crankshaft pulley

	(09954-05020) Claw No.2	Crankshaft pulley
	09960-10010 Variable Pin Wrench Set	
	(09962-01000) Variable Pin Wrench Arm Assy	Camshaft timing pulley Camshaft sub-gear
	(09963-01000) Pin 10	Camshaft timing pulley
	(09963-00500) Pin 5	Camshaft sub-gear

## RECOMMENDED TOOLS

	09040-0001 1 Hexagon Wrench Set .	Oil filter union
	09043-50080 Bi-hexagon Wrench 8 mm .	Cylinder head bolt
	09090-04020 Engine Sling Device	For suspending engine
	09200-00010 Engine Adjust Kit .	
	09258-00030 Hose Plug Set .	Plug for vacuum hose, fuel hose, etc.
	09904-00010 Expander Set .	Intake camshaft snap ring



## EQUIPMENT

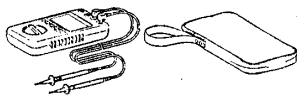
Caliper gauge	
CO/HC meter	
Compression gauge	
Connecting rod aligner	
Cylinder gauge	
Dial indicator	
Dye penetrant	
Engine tune-up tester	
Heater	
Magnetic finger	
Micrometer	
OBD II scan tool	Idle speed
Piston ring compressor	
Piston ring expander	
Plastigage	
Precision straight edge	
Soft brush	
Spring tester	Valve spring
Steel square	Valve spring
Torque wrench	
Valve seat cutter	
Vernier calipers	

## SSM (Special Service Materials)

08826-00080	Seal Packing Black or equivalent (FIPG)	Camshaft bearing cap (No. 1 and No. 2) Cylinder head cover Rear oil seal retainer
08826-00100	Seal Packing 1282B, THREE BOND 1282B or equivalent (FIPG)	Water outlet housing
08833-00070	Adhesive 1324, THREE BOND 1324 or equivalent	Spark plug tube Flywheel or drive plate bolt
08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	Oil pressure switch

# EMISSION CONTROL RECOMMENDED TOOLS

PP3IR-01

	09082-00040 TOYOTA Electrical Tester.	
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## EQUIPMENT

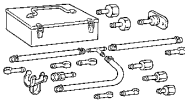
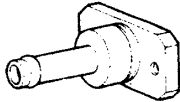
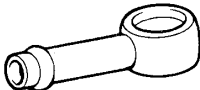

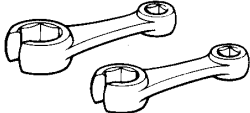
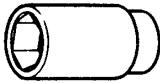


Heater	TVV
Thermometer	TVV
Torque wrench	
Vacuum gauge	

SSM (Special Service Materials)

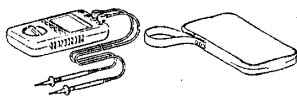
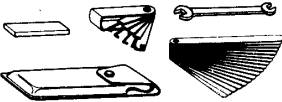
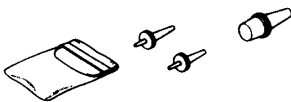
08833-00070	Adhesive 1324, THREE BOND 1324 or equivalent	TVV
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**MFI****SST (Special Service Tools)**

PP3IT-01

	09268-41046 Injection Measuring Tool Set	
	(09268-41091) NO.7 Union	
	(90405-09015) No.1 Union	
	09268-45012 EFI Fuel Pressure Gauge	
	09631-22020 Power Steering Hose Nut 14 x 17 mm Wrench Set	Fuel line flare nut
	09816-30010 Oil Pressure Switch Socket	Knock sensor
	09842-30070 Wiring "F" EFI Inspection	
	09843-18020 Diagnosis Check Wire	

RECOMMENDED TOOLS

	09082-00040 TOYOTA Electrical Tester.	
	09200-00010 Engine Adjust Kit .	
	09258-00030 Hose Plug Set .	Plug for vacuum hose, fuel hose, etc.

## EQUIPMENT

Carburetor cleaner	
OBD II scan tool	
Soft brush	Throttle body
Sound scope	Injector
Thermometer	
Torque wrench	
Vacuum gauge	



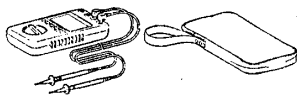

COOLING

SST (Special Service Tools)

PP30T-01

	09230-01010 Radiator Service Tool Set	
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RECOMMENDED TOOLS

	09082-00040 TOYOTA Electrical Tester.	
	09258-00030 Hose Plug Set .	

EQUIPMENT

Radiator cap tester	
Torque wrench	

COOLANT

PP191-01

Item		Capacity	Classification
Engine coolant (w/ Heater)	M/T	4.9 liters (5.2 US qts, 4.3 Imp. qts)	Ethylene-glycol base
	A/T	5.3 liters (5.6 US qts, 4.7 Imp. qts)	



**SSM (Special Service Materials)**

08826-00100	Seal Packing 1282B, THREE BOND 1282B or equivalent (FIPG)	Water pump
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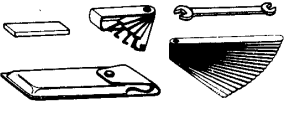
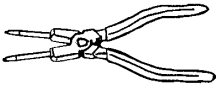
# LUBRICATION

## SST (Special Service Tools)

PP193-01

	09032-00100 Oil Pan Seal Cutter	
	09228-06501 Oil Filter Wrench	

## RECOMMENDED TOOLS

	09090-04020    Engine Sling Device	For suspending engine
	09200-00010    Engine Adjust Kit .	
	09905-00013    Snap Ring Pliers .	

EQUIPMENT

Oil pressure gauge	
Straight edge	Oil pump
Torque wrench	



LUBRICANT

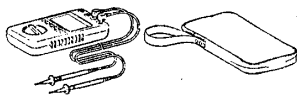
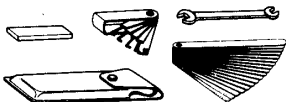
Item		Capacity	Classification
Engine oil Drain and refill  Dry fill	w/o Oil filter change	2.6 liters (2.7 US qts, 2.3 Imp. qts)	API grade SH, Energy-Conserving II multigrade engine oil or ILSAC multigrade engine oil and recommended viscosity oil
	w/ Oil filter change	2.8 liters (3.0 US qts, 2.5 Imp. qts)	
		3.7 liters (3.9 US qts, 3.3 Imp. qts)	

**SSM (Special Service Materials)**

08826-00080	Seal Packing Black or equivalent (FIPG)	Oil pump Oil pan
08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	Oil pressure switch

IGNITION  
RECOMMENDED TOOLS

PP198-01

	09082-00040 TOYOTA Electrical Tester.	
	09200-00010 Engine Adjust Kit .	

EQUIPMENT

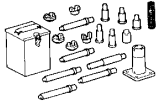

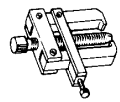

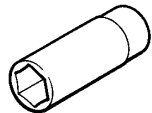
PP199-01

Spark plug cleaner	
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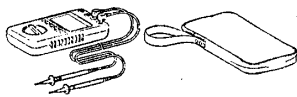
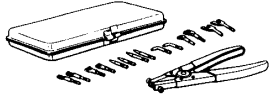
# STARTING

## SST (Special Service Tools)

PP19A-01

	09221-25026	Piston Pin Remover & Replacer	
	(09221-00090)	Guide "C"	Center bearing for planetary type
	09286-4601 1	Injection Pump Spline Shaft Puller	Armature bearing for reduction type
	09820-00030	Alternator Rear Bearing Replacer	Armature rear bearing for reduction type
	09810-38140	Starter Magnet Switch Nut Wrench 14	Terminal nut

RECOMMENDED TOOLS

	09082-00040 TOYOTA Electrical Tester.	
	09904-00010 Expander Set .	Planetary type


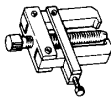
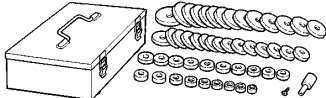

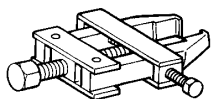

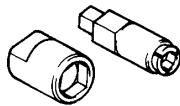
## EQUIPMENT

Caliper gauge	Center bearing for planetary type
Dial indicator	Commutator
Magnetic finger	
Micrometer	Planet carrier shaft for planetary type
Press	Reduction type
Pull scale	Brush spring
Sandpaper	Commutator
Torque wrench	
V-block	
Vernier calipers	Commutator, Brush

# CHARGING

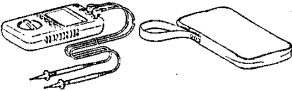
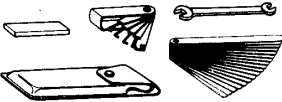
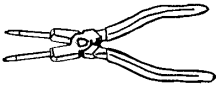
## SST (Special Service Tools)

PP19D-01

	09285-76010	Injection Pump Camshaft Bearing Cone Replacer	Rotor rear bearing cover
	09286-4601 1	Injection Pump Spline Shaft Puller	Rectifier end frame
	09950-60010	Replacer Set	
	(09951-00460)	Replacer 46	Rotor front bearing
	09820-00021	Alternator Rear Bearing Puller	
	09820-00030	Alternator Rear Bearing Replacer	Rotor rear bearing
	09820-63010	Alternator Pulley Set Nut Wrench Set	



## RECOMMENDED TOOLS

	09082-00040 TOYOTA Electrical Tester.	
	09200-00010 Engine Adjust Kit .	
	09905-00013 Snap Ring Pliers .	Generator washer


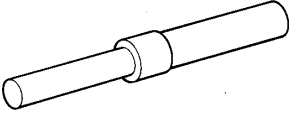
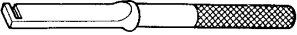
## EQUIPMENT

Battery specific gravity gauge	
Belt tension gauge	
Torque wrench	
Vernier calipers	Rotor (Slip ring), Brush

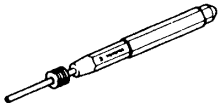
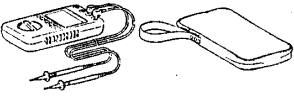
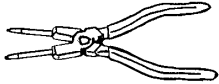
# CLUTCH

## SST (Special Service Tools)

PP14V-01

	09023-00100    Union Nut Wrench 10 mm	Clutch line
	09301-00210    Clutch Guide Tool	
	09333-00013    Clutch Diaphragm Spring Aligner	

## RECOMMENDED TOOLS

	09031-00030 Pin Punch .	Reservoir tank
	09082-00040 TOYOTA Electrical Tester.	
	09905-00013 Snap Ring Pliers .	

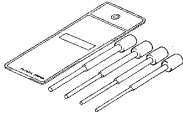
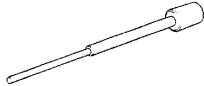
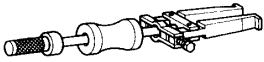
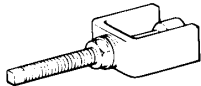
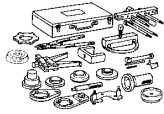



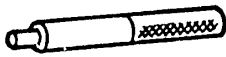

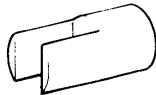

EQUIPMENT

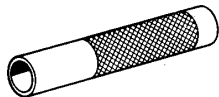
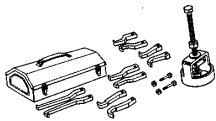

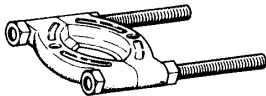
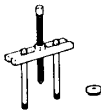
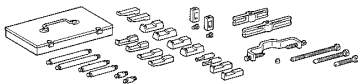
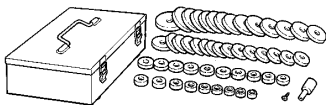



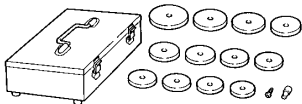
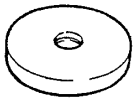
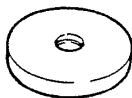
Calipers	
Dial indicator	
Torque wrench	

# MANUAL TRANSAXLE

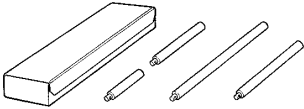

## SST (Special Service Tools)

PP3IW-01

	09201-10000	Valve Guide Bushing Remover & Replacer Set	Speedometer driven gear oil seal
	(09201-01080)	Valve Guide Bushing Remover & Replacer 8	
	09308-00010	Oil Seal Puller	Output shaft front bearing
	09309-12020	5th Driven Gear Replacer	
	09350-32014	TOYOTA Automatic Transmission Tool Set	
	(09351-32090)	Oil Seal Remover & Replacer	Differential side bearing
	(09351-321 11)	Side Bearing Race Replacer	Differential side bearing oil seal (Transmission case side)
	(09351-32120)	Overdrive Bearing Replacer	Differential side bearing
	(09351-32130)	Handle	
	(09351-32150)	Oil Seal Replacer	Differential side bearing oil seal (Transaxle case side)
	09564-3201 1	Differential Preload Adaptor	
	09608-00071	Drive Pinion Rear Bearing Cone Replacer	Input shaft rear ball bearing 4th driven gear and rear ball bearing

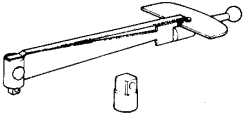

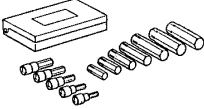
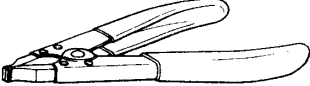
	09612-2201 1	Tilt Handle Bearing Replacer	No. 3 hub sleeve assembly
	09612-65014	Steering Worm Bearing Puller	Input shaft front bearing and oil seal Differential taper roller bearing outer race
	09921-00010	Spring Tension Tool	Speedometer driven gear oil seal
	09950-00020	Bearing Remover	
	09950-00030	Bearing Remover Attachment	
	09950-4001 1	Puller B Set	
	09950-60010	Replacer Set	
	(09951-00360)	Replacer 36	Input shaft front oil seal Differential case side bearing
	(09951-00460)	Replacer 46	Input shaft front bearing
	(09951-00620)	Replacer 62	Output shaft front bearing
	09950-60020	Replacer Set No.2	
	(09951-00680)	Replacer 68	Differential taper roller bearing outer race (Transaxle case side)
	(09951-00710)	Replacer 71	Differential taper roller bearing outer race (Transmission case side)

PREPARATION - MANUAL TRANSAXLE

	09950-70010    Handle Set	
	(09951-07150)    Handle 150	



## RECOMMENDED TOOLS

	09025-00010 Torque Wrench (30 kgf-cm)	Differential preload
	09031-00030 Pin Punch .	
	09040-0001 1 Hexagon Wrench Set .	
	09905-00012 Snap Ring No.1 Expander .	

## EQUIPMENT

Dial indicator with magnetic base	
Feeler gauge	
Magnetic finger	
Micrometer	
Torque wrench	

LUBRICANT

Item	Capacity	Classification
Manual transaxle oil (w/ Differential oil)	1.9 liters (2.0 US qts, 1.7 Imp. qts)	API GL-4 or GL-5 SAE 75W-90

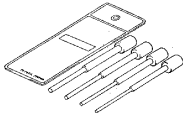
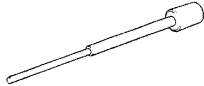

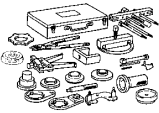
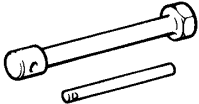
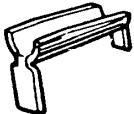
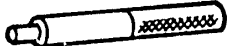

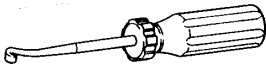
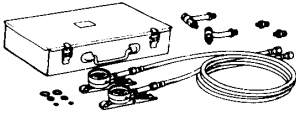
## SSM (Special Service Materials)

08826-00090	Seal Packing 1281, THREE BOND 1281 or equivalent (FIPG)	Transmission case x Transaxle case Transmission case x Case cover
08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	Straight screw plug Control shaft cover bolt

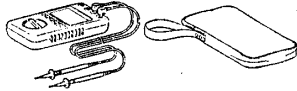
# AUTOMATIC TRANSAXLE (A132L)

## SST (Special Service Tools)

PP3IX-01

	09201-10000 Valve Guide Bushing Remover & Replacer Set	Speedometer driven gear oil seal
	(09201-01080) Valve Guide Bushing Remover & Replacer 8	
	09308-00010 Oil Seal Puller	Side gear shaft oil seal
	09350-32014 TOYOTA Automatic Transmission Tool Set	
	(09351-32010) One-way Clutch Test Tool	
	(09351-32020) Stator Stopper	
	(09351-32130) Handle	
	(09351-32150) Oil Seal Replacer	
	09921-00010 Spring Tension Tool	Speedometer driven gear oil seal
	09992-00095 Automatic Transmission Oil Pressure Gauge Set	Line pressure

RECOMMENDED TOOLS

	09082-00040 TOYOTA Electrical Tester.
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## EQUIPMENT

Dial indicator or dial indicator with magnetic base	Drive plate
Straight edge	Torque converter
Torque wrench	

LUBRICANT

Item	Capacity	Classification
Automatic transaxle flued		ATF DEXRON®II
Dry fill	5.5 liters (5.8 US qts, 4.8 Imp. qts)	
Drain and refill	2.5 liters (2.6 US qts, 2.2 Imp. qts)	
Differential oil	1.4 liters (1.5 US qts, 1.2 Imp. qts)	ATF DEXRON®II



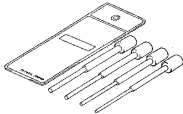
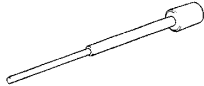
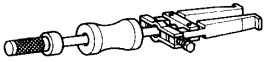
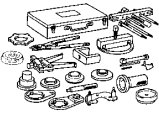
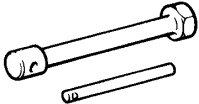
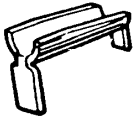
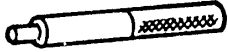


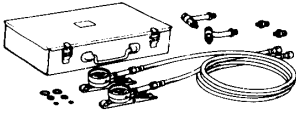
## SSM (Special Service Materials)

08833-00070	Adhesive 1324, THREE BOND 1324 or equivalent	Torque converter clutch mounting bolt
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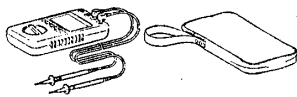
# AUTOMATIC TRANSAXLE (A242L)

## SST (Special Service Tools)

PP31Y-01

	09201-10000 Valve Guide Bushing Remover & Replacer Set	Speedometer driven gear oil seal
	(09201-01080) Valve Guide Bushing Remover & Replacer 8	
	09308-00010 Oil Seal Puller	Side gear shaft oil seal
	09350-32014 TOYOTA Automatic Transmission Tool Set	
	(09351-32010) One-way Clutch Test Tool	
	(09351-32020) Stator Stopper	
	(09351-32130) Handle	
	(09351-32150) Oil Seal Replacer	
	09921-00010 Spring Tension Tool	Speedometer driven gear oil seal
	09992-00095 Automatic Transmission Oil Pressure Gauge Set	Line pressure

RECOMMENDED TOOLS

	09082-00040 TOYOTA Electrical Tester.	
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## EQUIPMENT

Dial indicator or dial indicator with magnetic base	Drive plate
Straight edge	Torque converter
Torque wrench	

LUBRICANT

Item	Capacity	Classification
Automatic transaxle flued		ATF DEXRON®II
Dry fill	7.2 liters (7.6 US qts, 6.3 Imp. qts)	
Drain and refill	3.1 liters (3.3 US qts, 2.7 Imp. qts)	

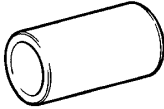


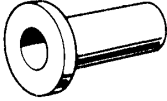

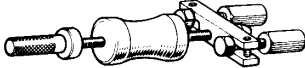



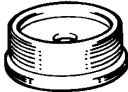
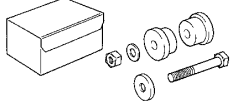

SSM (Special Service Materials)

08833-00070	Adhesive 1324, THREE BOND 1324 or equivalent	Torque converter clutch mounting bolt
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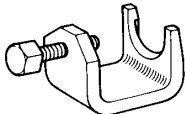
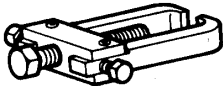
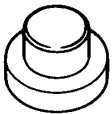
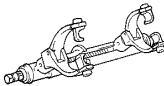
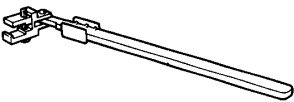
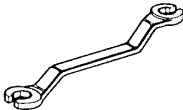
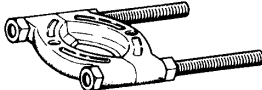
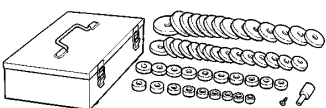



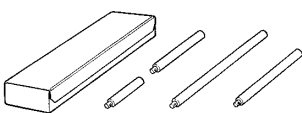
# SUSPENSION AND AXLE

## SST (Special Service Tools)


PP3IZ-01

	09223-00010	Cover & Seal Replacer	Rear suspension
	09223-15020	Oil Seal & Bearing Replacer	Front axle
	09308-00010	Oil Seal Puller	Front axle Rear axle
	09309-36010	Transmission Rear Bearing Replacer	Front drive shaft
	09316-2001 1	Transfer Bearing Replacer	Front drive shaft
	09520-00031	Rear Axle Shaft Puller	Front axle
	09550-10013	Replacer Set "B"	Rear axle
	(09553-10010)	Differential Side Bearing Replacer	
	(09557-1001 1)	Differential Drive Pinion Front Bearing Replacer	
	09608-10010	Steering Knuckle Oil Seal Replacer	Front axle
	09608-16042	Front Hub Bearing Adjusting Tool	Front drive shaft
	(09608-02021)	Bolt & Nut	

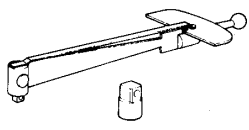
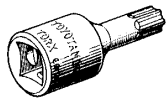
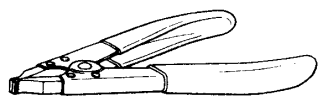
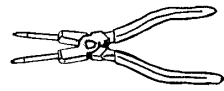
## PREPARATION - SUSPENSION AND AXLE

	(09608-02041) Retainer	
	09628-1001 1 Ball Joint Puller	Front axle
	09628-6201 1 Ball Joint Puller	Front axle Front drive shaft Front suspension
	09631-12040 Oil Seal "A" Replacer	Front axle
	09727-30021 Coil Spring Compressor	Front suspension Rear suspension
	09729-22031 Front Spring Upper Seat Holder	Front suspension
	09751-3601 1 Brake Line Union Nut 10 x 12 mm Wrench	Brake Line
	09950-00020 Bearing Remover	Front axle Front drive shaft
	09950-60010 Replacer Set	Front axle Rear axle
	(09951-00460) Replacer 46	
	(09951-00610) Replacer 61	
	(09951-00650) Replacer 65	
	09950-70010 Handle Set	Front axle Rear axle



	(09951-07150) Handle 150
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## RECOMMENDED TOOLS

	09025-00010 Small Torque Wrench (30 kgf-cm)	Front suspension
	09042-00010 Torx Socket T30 .	Front axle
	09905-00012 Snap Ring No.1 Expander .	Front drive shaft
	09905-00013 Snap Ring Pliers .	Front axle

## EQUIPMENT

Dial indicator	
Drill	
Spring tension gauge	
Torque wrench	




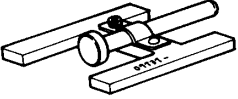
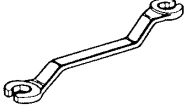

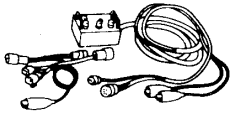


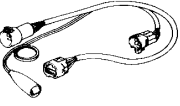
# LUBRICANT

Item	Capacity	Application
Outboard joint grease	65 - 75 g (2.3 - 2.6 oz.)	Outboard joint and boot
Inboard joint grease	112 - 122 g (4.0 - 4.3 oz.)	Inboard tulip and boot

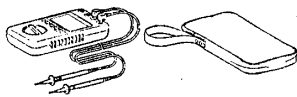
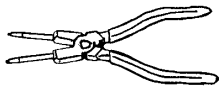
# BRAKE

## SST (Special Service Tools)

PP310-01

	09023-00100 Union Nut Wrench 10 mm	
	09709-29018 LSPV Gauge Set	
	09718-00010 Shoe Hold Down Spring Driver	
	09737-00010 Brake Booster Push Rod Gauge	
	09751-3601 1 Brake Line Union Nut 10 x 12 mm Wrench	
	09843-18020 Diagnosis Check Wire	
	09990-00150 ABS Actuator Checker and Sub-harness	
	09990-00163 ABS Actuator Checker Sheet "A"	
	09990-00200 ABS Actuator Checker Sub-harness "C"	
	09990-00300 ABS Actuator Checker Sub-harness "I"	

RECOMMENDED TOOLS

	09082-00040 TOYOTA Electrical Tester.	
	09905-00013 Snap Ring Pliers .	

## EQUIPMENT

Dial indicator	Brake disc
Micrometer	Brake disc
Torque wrench	
Vernier calipers	Brake drum

LUBRICANT

PP17V-01

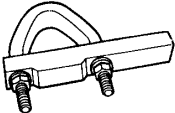
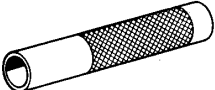
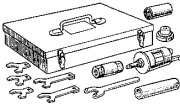



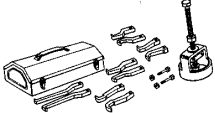
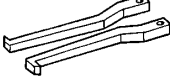
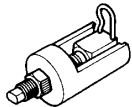

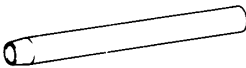
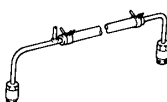
Item	Capacity	Classification
Brake fluid	-	SAEJ1703 or FMVSS No.116 DOT 3



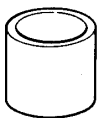
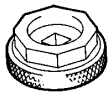
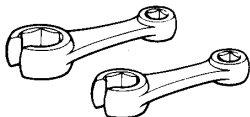
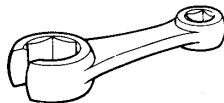
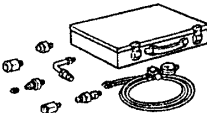


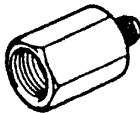
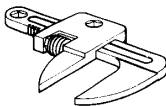
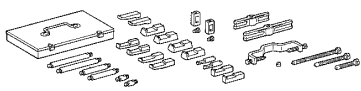
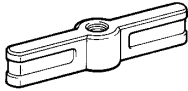
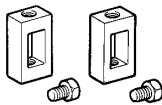
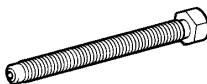
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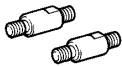
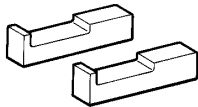

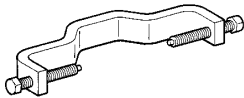
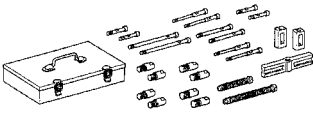
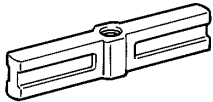
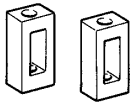
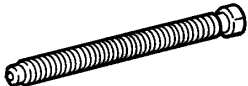
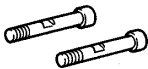
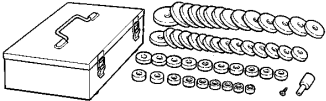



## SST (Special Service Tools)

PP3IO-01


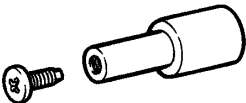
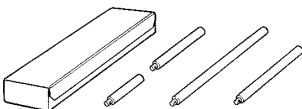


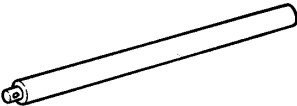
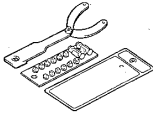
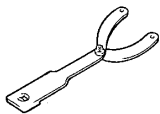
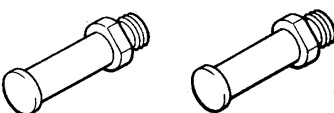
	09612-00012	Rack & Pinion Steering Rack Housing Stand	Manual steering gear PS gear
	09612-2201 1	Tilt Handle Bearing Replacer	PS gear
	09612-24014	Steering Gear Housing Overhaul Tool Set	
	(09612-10061)	Steering Pinion Bearing Replacer	Manual steering gear PS gear
	(09616-10010)	Steering Pinion Bearing Adjusting Socket	Manual steering gear
	(09616-10020)	Steering Pinion Bearing Adjusting Screw Wrench	Manual steering gear
	09612-65014	Steering Worm Bearing Puller	
	(09612-01030)	Claw "C"	PS gear
	09613-12010	Power Steering Control Valve Puller	PS gear
	09616-0001 1	Steering Worm Bearing Adjusting Socket	PS gear
	09631-10041	Steering Rack Cover "D"	PS gear
	09631-12071	Steering Rack Oil Seal Test Tool	PS gear

## PREPARATION - STEERING

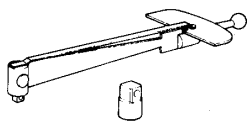
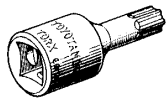
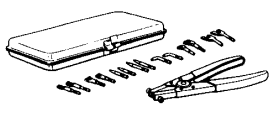
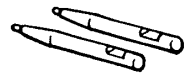
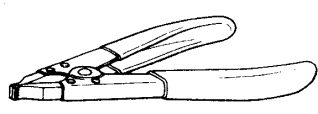
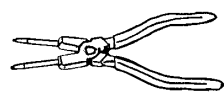
	09631-20081 Seal Ring Tool	PS gear
	09631-20090 Cylinder End Stopper Nut Wrench	PS gear
	09631-22020 Power Steering Hose Nut 14 x 17 mm Wrench Set	PS gear
	09633-00020 Power Steering Hose Nut Wrench	PS gear
	09640-10010 Power Steering Pressure Gauge Set	
	(09641-01010) Gauge Assy	Power steering fluid
	(09641-01030) Attachment B	Power steering fluid
	(09641-01060) Attachment E	Power steering fluid
	09922-10010 Variable Open Wrench	Manual steering gear PS gear
	09950-4001 1 Puller B Set	
	(09951-04010) Hanger 150	Manual steering gear PS gear
	(09952-04010) Slide Arm	Manual steering gear PS gear
	(09953-04020) Center Bolt 150	Manual steering gear PS gear

	(09954-04010) Arm 25	Manual steering gear PS gear
	(09955-04051) Claw No.5	Manual steering gear PS gear
	(09957-04010) Attachment	Manual steering gear PS gear
	(09958-0401 1) Holder	Manual steering gear PS gear
	09950-50012 Puller C Set	
	(09951-05010) Hanger 150	Non-tilt steering column
	(09952-05010) Slide Arm	Non-tilt steering column
	(09953-05020) Center Bolt 150	Non-tilt steering column
	(09954-05020) Claw No.2	Non-tilt steering column
	09950-60010 Replacer Set	
	(09951-00220) Replacer 22	PS gear
	(09951-00240) Replacer 24	Manual steering gear
	(09951-00340) Replacer 34	Manual steering gear

## PREPARATION - STEERING

	(09951-00380) Replacer 38	PS gear
	(09952-06010) Adapter	PS gear
	09950-70010 Handle Set	
	(09951-07100) Handle 100	Manual steering gear
	(09951-07150) Handle 150	Manual steering gear
	(09951-07360) Handle 360	PS gear
	09960-10010 Variable Pin Wrench Set	
	(09962-01000) Variable Pin Wrench Arm Assy	PS vane pump
	(09963-01000) Pin 10	PS vane pump

## RECOMMENDED TOOLS

	09025-00010 Torque Wrench (30 kgf-cm)	PS vane pump Manual steering gear PS gear
	09042-00010 Torx Socket T30 .	Non-tilt steering column
	09904-00010 Expander Set .	
	(09904-00050) No. 4 Claw	
	09905-00012 Snap Ring No.1 Expander .	
	09905-00013 Snap Ring Pliers .	

## EQUIPMENT

Belt tension gauge	
Caliper gauge	PS vane pump
Calipers	PS vane pump
Dial indicator	PS gear
Feeler gauge	PS vane pump
Micrometer	PS vane pump
Torque wrench	

# LUBRICANT

Item		Capacity	Classification
Power steering fluid	Total	0.8 liters (0.85 US qts, 0.70 Imp. qts)	ATF DEXRON®II or III

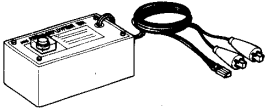

**SSM (Special Service Materials)**

08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	Manual steering gear PS gear
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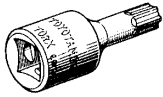
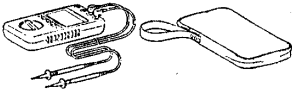


SUPPLEMENTAL RESTRAINT SYSTEM  
SST (Special Service Tools)

PP312-01

	09082-00700 SRS Airbag Deployment Tool	
	09843-18020 Diagnosis Check Wire	

## RECOMMENDED TOOLS


	09042-00020 Torx Socket T40 .	Airbag sensor assembly
	09082-00040 TOYOTA Electrical Tester.	

## EQUIPMENT

Torque wrench	
Bolt Length: 35 mm (1.38 in.) Pitch: 1.0 mm (0.039 in.) Diam: 6.0 mm (0.236 in.)	Airbag disposal
Tire Width: 185 mm (7.28 in.) Inner diam: 360 mm (14.17 in.)	Airbag disposal
Tire with disc wheel Width: 185 mm (7.28 in.) Inner diam: 360 mm (14.17 in.)	Airbag disposal
Vinyl bag	Airbag disposal

## BODY ELECTRICAL RECOMMENDED TOOLS

PP314-02

	09082-00040 TOYOTA Electrical Tester.	
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## EQUIPMENT

Test lead	
Bulb (3.4 W)	Fuel sender gauge, Seat belt warning relay
Bulb (21 W)	Turn signal flasher relay
Dry cell battery	Fuel sender gauge
Torque wrench	
Masking tape	Rear window defogger wire
Tin foil	Rear window defogger wire

SSM (Special Service Materials)

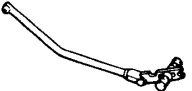
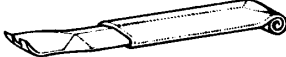

PP185-01

08888-88888	DuPont Paste No. 4817 or equivalent	Rear window defogger
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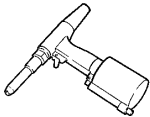


# BODY

## SST (Special Service Tools)

PP315-02

	09804-24010 Luggage Compartment Door Torsion Bar Tool	
	09806-30010 Windshield Moulding Remover	
	09812-00010 Door Hinge Set Bolt Wrench	Door side hinge bolt adjustment

RECOMMENDED TOOLS

	09050-20010    Air Riveter.	
	(09050-02010)    Dust Cap.	
	(09050-02040)    Nose Piece No.3.	



LUBRICANT

Item	Capacity	Classification
MP grease	-	-


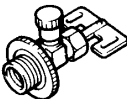








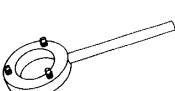

## SSM (Special Service Materials)

08833-00030	Three cement black or equivalent	Windshield moulding and glass Quarter window moulding and glass Back door moulding and glass
08850-00070	Windshield glass adhesive set No.15 or equivalent	Windshield Quarter window glass Back door moulding and glass (0 - 15°C or 32 - 59°F)
08850-00080	Windshield glass adhesive set No.35 or equivalent	Windshield Quarter window glass Back door moulding and glass (15 - 35°C or 59 - 95°F)
08850-00090	Windshield glass adhesive set No.45 or equivalent	Windshield Quarter window glass Back door moulding and glass (35 - 45°C or 95 - 113°F)

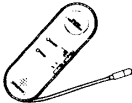
# AIR CONDITIONING

## SST (Special Service Tools)

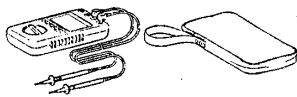
PP17B-01

	07110-58060 Air Conditioner Service Tool Set	
	(07117-58060) Refrigerant Drain Service Valve	
	(07117-58070) T-Joint	
	(07117-58080) Quick Disconnect Adapter	Discharge (diam. 16 mm)
	(07117-58090) Quick Disconnect Adapter	Suction (diam. 13 mm)
	(07117-78050) Refrigerant Charging Gauge	
	(07117-88060) Refrigerant Charging Hose	Discharge (Red)
	(07117-88070) Refrigerant Charging Hose	Suction (Blue)
	(07117-88080) Refrigerant Charging Hose	Utility (Green)
	07112-66040 Magnetic Clutch Remover	
	07112-76050 Magnetic Clutch Stopper	
	07114-84020 Snap Ring Pliers	

PREPARATION - AIR CONDITIONING

	07116-38360 Gas Leak Detector Assembly	
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RECOMMENDED TOOLS

	09082-00040 TOYOTA Electrical Tester.	
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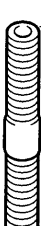


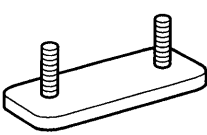

LUBRICANT

Item	Capacity	Classification
Compressor oil		ND-OIL 9 or equivalent
When replacing receiver	10 cc (0.34 fl.oz.)	
When replacing condenser	40 cc (1.4 fl.oz.)	
When replacing evaporator	40 cc (1.4 fl.oz.)	
When replacing compressor	120 cc (4.1 fl.oz.)	

# STANDARD BOLT

## HOW TO DETERMINE BOLT STRENGTH

SS00F-01

	Mark	Class		Mark	Class
Hexagon head bolt	4- 5- 6- 7- 8- 9- 10- 11-	4T 5T 6T 7T 8T 9T 10T 11T	Hexagon flange bolt	 4 Protruding lines	9T
	 Bolt head No. 4		w/ washer hexagon bolt	 5 Protruding lines	10T
			Hexagon flange bolt	 6 Protruding lines	11T
	 No mark	4T	w/ washer hexagon bolt		
Hexagon flange bolt w/ washer hexagon bolt	 No mark	4T	Stud bolt	 No mark	4T
Hexagon head bolt	 2 Protruding lines	5T		 Grooved	6T
Hexagon flange bolt w/ washer hexagon bolt	 2 Protruding lines	6T			
Hexagon head bolt	 3 Protruding lines	7T	Welded bolt		4T
Hexagon head bolt	 4 Protruding lines	8T			

V06821

## 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



# MAINTENANCE

## SERVICE DATA

SS0N3-01

Chassis	Ball joint Vertical play	Maximum	0 mm (0 in.)
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TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Front seat x Body	37	375	27

# ENGINE MECHANICAL

## SERVICE DATA

SS0N5-03

Compression pressure	at 250 rpm STD Minimum Difference of pressure between each cylinder	1,275 kPa (13.0 kgf/cm <sup>2</sup> , 185 psi) or more 981 kPa (10.0 kgf/cm <sup>2</sup> , 142 psi) 98 kPa (1.0 kgf/cm <sup>2</sup> , 14 psi) or less
Valve clearance	at cold Intake Exhaust Adjusting shim (for repair part) No. 02 04 06 08 10 12 14 16 18 20 22 24 26 28 30 32 34	0.15 - 0.25 mm (0.006 - 0.010 in.) 0.31 - 0.41 mm (0.012 - 0.016 in.) 2.500 mm (0.0984 in.) 2.550 mm (0.1004 in.) 2.600 mm (0.1024 in.) 2.650 mm (0.1043 in.) 2.700 mm (0.1063 in.) 2.750 mm (0.1083 in.) 2.800 mm (0.1102 in.) 2.850 mm (0.1122 in.) 2.900 mm (0.1142 in.) 2.950 mm (0.1161 in.) 3.000 mm (0.1181 in.) 3.050 mm (0.1201 in.) 3.100 mm (0.1220 in.) 3.150 mm (0.1240 in.) 3.200 mm (0.1260 in.) 3.250 mm (0.1280 in.) 3.300 mm (0.1299 in.)
Ignition timing	w/ Terminals TE1 and E1 connected of DLC1	10° BTDC @ idle
Idle speed	-	750 ± 50 rpm
Idle pulley tension spring	Free length Installed load at 47.4 mm (1.866 in.)	38.4 mm (1.512 in.) 32 N (3.3 kgf, 7.3 lbf)
Cylinder head	Warpage Cylinder block side Maximum Manifold side Maximum Valve guide bore diameter STD O/S 0.05 Valve seat Refacing angle Intake Exhaust Contacting angle Contacting width	0.05 mm (0.0020 in.) 0.05 mm (0.0020 in.) 11.000 - 11.027 mm (0.4331 - 0.4342 in.) 11.050 - 11.077 mm (0.4350 - 0.4361 in.) 30°, 45°, 60°, 75° 30°, 45°, 75° 45° 1.0 - 1.4 mm (0.039 - 0.055 in.)
Valve guide bushing	Inside diameter Outside diameter (for repair part) STD O/S 0.05	6.010 - 6.030 mm (0.2366 - 0.2374 in.) 11.048 - 11.059 mm (0.4350 - 0.4354 in.) 11.098 - 11.109 mm (0.4369 - 0.4374 in.)
Valve	Valve overall length STD Intake Exhaust Minimum Intake Exhaust Valve face angle Stem diameter Intake Exhaust Stem oil clearance STD Intake Exhaust Maximum Intake Exhaust Margin thickness STD Minimum	93.45 mm (3.6791 in.) 93.89 mm (3.6965 in.) 92.95 mm (3.6594 in.) 93.39 mm (3.6768 in.) 44.5° 5.970 - 5.985 mm (0.2350 - 0.2356 in.) 5.965 - 5.980 mm (0.2348 - 0.2354 in.) 0.025 - 0.060 mm (0.0010 - 0.0024 in.) 0.030 - 0.065 mm (0.0012 - 0.0026 in.) 0.08 mm (0.0031 in.) 0.10 mm (0.0039 in.) 0.8 - 1.2 mm (0.031 - 0.047 in.) 0.5 mm (0.020 in.)

Valve spring	Deviation Free length Installed tension at 31.8 mm (1.252 in.)	Maximum	2.0 mm (0.079 in.) 53.58 mm (2.1094 in.) 148 - 164 N (15.1 - 16.7 kgf, 33.3 - 36.8 lbf)
Camshaft	Thrust clearance Cam lobe height Journal diameter Journal oil clearance Circle runout Camshaft gear backlash Camshaft gear spring end free distance	STD Maximum STD Intake Exhaust Maximum Intake Exhaust Exhaust No. 1 Others STD Maximum STD Maximum	0.045 - 0.100 mm (0.0018 - 0.0039 in.) 0.12 mm (0.0047 in.) 41.514 - 41.614 mm (1.6344 - 1.6383 in.) 41.011 - 41.111 mm (1.6146 - 1.6185 in.) 41.35 mm (1.6279 in.) 40.85 mm (1.6083 in.) 24.949 - 24.965 mm (0.9822 - 0.9829 in.) 22.949 - 22.965 mm (0.9035 - 0.9041 in.) 0.035 - 0.072 mm (0.0014 - 0.0028 in.) 0.10 mm (0.0039 in.) 0.04 mm (0.0016 in.) 0.020 - 0.200 mm (0.0008 - 0.0079 in.) 0.30 mm (0.0118 in.) 22.5 - 22.9 mm (0.886 - 0.902 in.)
Valve lifter	Lifter diameter Lifter bore diameter Oil clearance	STD Maximum	27.975 - 27.985 mm (1.1014 - 1.1018 in.) 28.000 - 28.021 mm (1.1024 - 1.1032 in.) 0.015 - 0.046 mm (0.0006 - 0.0018 in.) 0.10 mm (0.0039 in.)
Manifold	Warpage	Maximum Intake Exhaust	0.1 mm (0.004 in.) 0.5 mm (0.020 in.)
Spark tube	Protrusion		47.5 - 48.5 mm (1.870 - 1.909 in.)
Cylinder block	Cylinder head surface warpage Cylinder bore diameter Main journal bore diameter (Reference)	Maximum Mark 1 2 3 Maximum Mark 1 2 3	0.05 mm (0.0020 in.) 74.000 - 74.010 mm (2.9134 - 2.9138 in.) 74.011 - 74.020 mm (2.9138 - 2.9142 in.) 74.021 - 74.030 mm (2.9142 - 2.9146 in.) 74.23 mm (2.9244 in.) 54.018 - 54.024 mm (2.1267 - 2.1269 in.) 54.025 - 54.030 mm (2.1270 - 2.1272 in.) 54.031 - 54.036 mm (2.1272 - 2.1274 in.)
Piston and piston ring	Piston diameter Piston oil clearance Piston ring groove clearance Piston ring end gap	Mark 1 2 3 STD Maximum No. 1 No. 2 STD No. 1 No. 2 Oil Maximum No. 1 No. 2 Oil	73.900 - 73.910 mm (2.9094 - 2.9098 in.) 73.910 - 73.920 mm (2.9098 - 2.9102 in.) 73.920 - 73.930 mm (2.9102 - 2.9106 in.) 0.09 - 0.11 mm (0.0035 - 0.0043 in.) 0.13 mm (0.0051 in.) 0.04 - 0.08 mm (0.0016 - 0.0031 in.) 0.03 - 0.07 mm (0.0012 - 0.0028 in.) 0.26 - 0.48 mm (0.0102 - 0.0189 in.) 0.30 - 0.57 mm (0.0118 - 0.0224 in.) 0.13 - 0.50 mm (0.0059 - 0.0197 in.) 1.07 mm (0.0421 in.) 1.02 mm (0.0354 in.) 1.10 mm (0.0433 in.)

## SERVICE SPECIFICATIONS - ENGINE MECHANICAL

Connecting rod	Thrust clearance	STD	0.15 - 0.35 mm (0.0059 - 0.0138 in.)
		Maximum	0.45 mm (0.0177 in.)
	Connecting rod oil clearance	STD STD	0.016 - 0.048 mm (0.0006 - 0.0019 in.)
		U/S 0.25	0.015 - 0.058 mm (0.0006 - 0.0023 in.)
		Maximum	0.08 mm (0.0031 in.)
	Connecting rod big end inside diameter (Reference)		
		Mark 1	46.000 - 46.007 mm (1.8110 - 1.8113 in.)
		2	46.007 - 46.014 mm (1.8113 - 1.8116 in.)
		3	46.014 - 46.021 mm (1.8116 - 1.8118 in.)
	Connecting rod bearing center wall thickness (Reference)		
Crankshaft		STD Mark 1	1.487 - 1.491 mm (0.0585 - 0.0587 in.)
		2	1.491 - 1.495 mm (0.0587 - 0.0589 in.)
		3	1.495 - 1.499 mm (0.0589 - 0.0590 in.)
		U/S 0.25	1.609 - 1.615 mm (0.0633 - 0.0636 in.)
	Rod out-of-alignment per 100 mm (3.94 in.)	Maximum	0.03 mm (0.0012 in.)
	Rod twist per 100 mm (3.94 in.)	Maximum	0.05 mm (0.0020 in.)
	Thrust clearance	STD	0.020 - 0.200 mm (0.0008 - 0.0078 in.)
		Maximum	0.30 mm (0.0118 in.)
	Thrust washer thickness	STD	2.430 - 2.480 mm (0.0957 - 0.0976 in.)
		O/S 0.125	2.493 - 2.543 mm (0.0981 - 0.1001 in.)
	Main journal oil clearance	STD STD	0.016 - 0.035 mm (0.0006 - 0.0014 in.)
		U/S 0.25	0.015 - 0.055 mm (0.0006 - 0.0022 in.)
		Maximum	0.08 mm (0.0031 in.)
	Main journal diameter	STD	49.985 - 50.000 mm (1.9679 - 1.9685 in.)
		U/S 0.25	49.745 - 49.755 mm (1.9585 - 1.9589 in.)
	Main journal bore diameter (Reference)	Mark 1	54.018 - 54.024 mm (2.1267 - 2.1269 in.)
Crankshaft		2	54.025 - 54.030 mm (2.1270 - 2.1272 in.)
		3	54.031 - 54.036 mm (2.1272 - 2.1274 in.)
	Main journal diameter (Reference)	STD Mark 0	49.996 - 50.000 mm (1.9683 - 1.9685 in.)
		1	49.991 - 49.995 mm (1.9081 - 1.9683 in.)
		2	49.985 - 49.990 mm (1.9679 - 1.9681 in.)
	Main bearing center wall thickness (Reference)		
		STD Mark 1	1.997 - 2.000 mm (0.0786 - 0.0787 in.)
		2	2.001 - 2.003 mm (0.0788 - 0.0789 in.)
		3	2.004 - 2.006 mm (0.0789 - 0.0790 in.)
		4	2.007 - 2.009 mm (0.0790 - 0.0791 in.)
		5	2.010 - 2.012 mm (0.0791 - 0.0792 in.)
		U/S 0.25	2.118 - 2.124 mm (0.0834 - 0.0836 in.)
	Crank pin diameter	STD	42.985 - 43.000 mm (1.6923 - 1.6929 in.)
		U/S 0.25	42.745 - 42.755 mm (1.6829 - 1.6833 in.)
	Circle runout	Maximum	0.06 mm (0.0024 in.)
	Main journal taper and out-of-round	Maximum	0.08 mm (0.0031 in.)
	Crank pin taper and out-of-round	Maximum	0.07 mm (0.0028 in.)

# TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Cylinder head cover x Cylinder head	7.0	70	61 in.·lbf
No. 2 idler pulley x Cylinder head	28	280	20
Camshaft timing pulley x Camshaft	51	510	37
No. 1 idler pulley x Cylinder block	18.5	185	13
Crankshaft pulley x Crankshaft	155	1,550	112
No. 2 crankshaft pulley x Crankshaft pulley	19	195	14
RH engine mounting insulator x RH engine mounting bracket	64	650	47
RH engine mounting insulator x Body	73	740	54
No. 1 engine hanger x Cylinder head	21	210	15
No. 2 engine hanger x Cylinder head	53	530	38
Cylinder head x Cylinder block	45 1st Turn 90° 2nd	450 Turn 90°	33 Turn 90°
Camshaft bearing cap x Cylinder head	13	130	9
Intake manifold x Cylinder head	19.5	195	14
Intake manifold stay x Intake manifold	20	200	15
Intake manifold stay x Cylinder block	20	200	15
Exhaust manifold x Cylinder head	48	480	35
Exhaust manifold stay x Cylinder block	40	400	29
Exhaust manifold stay x Exhaust manifold	40	400	29
Exhaust manifold heat insulator x Exhaust manifold	8.0	80	69 in.·lbf
Water outlet housing x Cylinder head	30	300	22
Camshaft position sensor x Cylinder head	8.0	80	69 in.·lbf
EGR VSV x Cylinder head	17.5	175	13
EGR valve x Cylinder head	17.5	175	13
EGR pipe x EGR valve	40	400	29
EGR pipe x Intake manifold	30	300	22
PS ump bracket x Cylinder head	43	440	32
Fuel inlet hose x Fuel filter	29	300	22
Front exhaust pipe x Exhaust manifold	62	630	49
Connecting rod cap x Connecting rod	40	400	29
Crankshaft bearing cap x Cylinder block	58	580	42
Rear oil seal retainer x Cylinder block	7.5	75	65 in.·lbf
Oil filter union x Cylinder block	25	250	18
Oil pressure switch x Cylinder block	13	130	9
RH engine mounting bracket x Cylinder block	59	590	43
Knock sensor x Cylinder block	45	450	33
Generator bracket x Cylinder block	24	240	18
Rear end plate x Cylinder block	10	100	7
Flywheel x Crankshaft	90	900	65
Drive plate x Crankshaft	90	900	65
Drive plate x Torque converter clutch	25	250	18
A/C compressor bracket x Cylinder block	27	280	20
PS pump adjusting strut x Cylinder block	21	210	15

## SERVICE SPECIFICATIONS - ENGINE MECHANICAL

LH engine mounting bracket x Transaxle case	65	650	47
LH engine mounting bracket x Insulator	49	490	35
LH engine mounting bracket x Ground strap	49	490	35
Rear engine mounting bracket x Insulator	65	650	47
A/C compressor x Bracket	25	250	18
Clutch release cylinder x Transaxle case	13	130	9
Front exhaust pipe x Tailpipe (clamp bolt)	19	190	14
Sub heated oxygen sensor x Front exhaust pipe	44	450	33

# EMISSION CONTROL

## TORQUE SPECIFICATION

SS11T-01

Part tightened	N·m	kgf·cm	ft·lbf
TVV x Water outlet housing	35	350	26
EGR valve x Cylinder head	30	300	22
EGR pipe x Intake manifold Nut	30	300	22
EGR valve x EGR pipe Union nut	40	400	30



## MFI

SS0N7-04

## SERVICE DATA

Fuel pressure regulator	Fuel pressure at no vacuum	281 - 287 kPa (2.87 - 2.93 kgf/cm <sup>2</sup> , 40.8 - 41.7 psi)
Fuel pump	Resistance at 20°C (68°F)	0.2 - 3.0 Ω
Injector	Resistance at 20°C (68°F)	13.4 - 14.2 Ω
	Injection volume	39 - 49 cm <sup>3</sup> (2.4 - 3.0 cu in.) per 15 sec.
	Difference between each cylinder	5 cm <sup>3</sup> (0.31 cu in.) or less
	Fuel leakage	1 drop or less per 3 min.
Throttle body	Throttle body fully closed angle	6°
Throttle position sensor	Resistance	
	0 mm (0 in.) VTA - E2	0.2 - 5.7 kΩ
	0.50 mm (0.020 in.) IDL - E2	2.3 kΩ or less
	0.70 mm (0.028 in.) IDL - E2	Infinity
	Throttle valve fully open VTA - E2	2.0 - 10.2 kΩ
	- VC - E2	2.5 - 5.9 kΩ
IAC valve	Resistance +B - RSO (or RSC)	
	Cold (-10°C (14°F) to 50°C (122°F))	17.0 - 24.5 Ω
	Hot (50°C (122°F) to 100°C (212°F))	21.5 - 28.5 Ω
VSV for EGR	Resistance at 20°C (68°F)	33 - 39 Ω
ECT sensor and IAT sensor	Resistance at -20°C (-4°F)	10 - 20 kΩ
	at 0°C (32°F)	4 - 7 kΩ
	at 20°C (68°F)	2 - 3 kΩ
	at 40°C (104°F)	0.9 - 1.3 kΩ
	at 60°C (140°F)	0.4 - 0.7 kΩ
	at 80°C (176°F)	0.2 - 0.4 kΩ
MAP sensor	Power source voltage	4.5 - 5.5 V
Main heated oxygen sensor	Heater coil resistance at 20°C (68°F)	11 - 16 Ω
Sub heated oxygen sensor	Heater coil resistance at 20°C (68°F)	11 - 16 Ω
Fuel cut rpm	Fuel return rpm	900 rpm

## TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Fuel line	Union bolt type	29	22
	Flare nut type	30	23
Fuel inlet hose x Fuel filter	29	290	22
Fuel outlet pipe x Fuel pump bracket	29	290	22
Fuel tank x Fuel pump set bolt	3.4	35	30 in.·lbf
Fuel pressure regulator x Delivery pipe	8.0	80	69 in.·lbf
Fuel return pipe x Delivery pipe	8.0	80	69 in.·lbf
Fuel return pipe x Fuel pressure regulator	20	200	14
Delivery pipe x Cylinder head	19	190	14
Fuel inlet hose x Delivery pipe	30	300	23
Fuel pump bracket x Fuel cut-off valve	1.5	15	13 in.·lbf
Fuel tank x Fuel tank filler pipe	3.4	35	30 in.·lbf
Fuel tank x Body	33	340	25
Throttle body x Intake manifold	19.5	195	14
Main heated oxygen sensor x Exhaust manifold	44	440	32
Sub heated oxygen sensor x Exhaust pipe	44	440	32
Knock sensor x Cylinder block	45	450	33

# COOLING

## SERVICE DATA

SS0N9-04

Thermostat	Valve opening temperature Valve lift at 95°C (203°F)	80 - 84°C (176 - 183°F) 8 mm (0.31 in.) or more
Radiator cap	Relief valve opening pressure STD Minimum	74 - 103 kPa (0.75 - 1.05 kgf/cm <sup>2</sup> , 10.7 - 14.9 psi) 59 kPa (0.6 kgf/cm <sup>2</sup> , 8.5 psi)
No. 1 electric cooling fan	Rotating amperage M/T A/T	5.7 - 7.7 A 8.6 - 11.6 A
No. 2 electric cooling fan	Rotating amperage	6.4 - 7.4 A

## TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Drain plug x Cylinder block	25	250	18
Water pump x Cylinder block	17.5	175	13
Oil dipstick guide x RH engine mounting bracket	18.5	185	14
Water inlet pipe x Cylinder block	7.5	75	65 in.·lbf
Intake manifold stay x Cylinder block	20	200	15
Water inlet x Water outlet housing	5.0	50	43 in.·lbf
Radiator upper support x Body	12	120	9
Oil cooler x Radiator lower tank	Nut A	15.0	11
	Nut B, C	8.5	75 in.·lbf
No. 1 cooling fan x Radiator	7.0	70	61 in.·lbf
No. 2 cooling fan x Radiator	7.0	70	61 in.·lbf

# LUBRICATION

## SERVICE DATA

SS0NB-01

Oil pressure		at idle speed at 3,000 rpm	29 kPa (0.3 kgf/cm <sup>2</sup> , 43 psi) or more 245 - 490 kPa (2.5 - 5.0 kgf/cm <sup>2</sup> , 36 - 71 psi)
Oil pump	Body clearance	STD	0.10 - 0.16 mm (0.0039 - 0.0063 in.)
		Maximum	0.20 mm (0.0079 in.)
	Tip clearance	STD	0.03 - 0.14 mm (0.0012 - 0.0055 in.)
		Maximum	0.20 mm (0.0079 in.)
	Side clearance	STD	2.91 - 2.97 mm (0.1145 - 0.1169 in.)
		Minimum	2.90 mm (0.1142 in.)

## TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Clutch release cylinder x Transaxle case M/T only	12	120	9
Drain plug x Oil pan	25	250	18
Oil pump x Oil pump pulley	37	370	27
Oil pump x Cylinder block	7.5	75	65 in.·lbf
Pressure regulator valve x Cylinder block	30	300	22
Oil strainer x Cylinder block	10	100	7
Oil pan x Cylinder block	13	130	10
Oil pan x Oil pump	13	130	10
Front exhaust pipe x Exhaust manifold	62	630	46
Compressor mounting bracket x Cylinder block	27	270	20
A/C compressor x Compressor mounting bracket	25	250	18

# IGNITION

## SERVICE DATA

SS0ND-04

High-tension cord	Resistance	Maximum	25 k $\Omega$ per cord
Spark plug	Recommended spark plug	ND NGK	K16TR11 BKR5EKB-11
	Correct electrode gap		1.1 mm (0.043 in.)
Ignition coil	Primary coil resistance	at cold	0.67 - 1.05 $\Omega$
		at hot	0.85 - 1.23 $\Omega$
	Secondary coil resistance	at cold	9.3 - 16.0 k $\Omega$
		at hot	11.7 - 18.8 k $\Omega$
Camshaft position sensor	Resistance	at cold	985 - 1,600 $\Omega$
		at hot	1,265 - 1,890 $\Omega$
Crankshaft position sensor	Resistance	at cold	985 - 1,600 $\Omega$
		at hot	1,265 - 1,890 $\Omega$

## TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Spark plug x Cylinder head	18	180	13
Ignition coil x Cylinder head	8.5	85	75 in.·lbf
Camshaft position sensor x Cylinder head	8	80	69 in.·lbf
Crankshaft position sensor x Oil pump	8	80	69 in.·lbf



# STARTING

## SERVICE DATA

SS0NF-07

Starter (Planetary type)	Rated voltage and output power		12 V 0.8 kW
	No-load characteristics	Current	At 11.5 V 90 A or less
		rpm	3,000 rpm or more
	Center bearing oil clearance	STD	0.03 mm (0.0012 in.)
		Maximum	0.1 mm (0.004 in.)
	Brush length	STD	14.0 mm (0.551 in.)
		Minimum	9.0 mm (0.354 in.)
	Spring installed load	STD	13.7 - 17.6 N (1.4 - 1.8 kgf, 3.1 - 4.0 lbf)
		Minimum	8.8 N (0.9 kgf, 2.0 lbf)
	Commutator		
Starter (Reduction type)	Diameter	STD	28.0 mm (1.102 in.)
		Minimum	27.0 mm (1.063 in.)
	Undercut depth	STD	0.6 mm (0.024 in.)
		Minimum	0.2 mm (0.008 in.)
	Circle runout	Maximum	0.05 mm (0.0020 in.)
	Rated voltage and output power		12 V 1.0 kW
	No-load characteristics	Current	At 11.5 V 90 A or less
		rpm	3,000 rpm or more
	Brush length	STD	13.5 mm (0.531 in.)
		Minimum	8.5 mm (0.334 in.)
	Spring installed load	STD	17.6 - 23.5 N (1.79 - 2.39 kgf, 4.0 - 5.3 lbf)
		Minimum	11.8 N (1.2 kgf, 2.6 lbf)
	Commutator		
	Diameter	STD	30.0 mm (1.181 in.)
		Minimum	29.0 mm (1.412 in.)
	Undercut depth	STD	0.6 mm (0.024 in.)
		Minimum	0.2 mm (0.008 in.)
	Circle runout	Maximum	0.05 mm (0.0020 in.)
	Magnetic switch		
	Contact plate for wear	Maximum	0.9 mm (0.035 in.)

## TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
End cover x Brush holder		1.5	15	13 in.·lbf
End cover x Starter housing	Planetary type	5.9	60	52 in.·lbf
	Reduction type	9.3	95	82 in.·lbf
Magnetic switch x Starter housing	Planetary type	8.3	85	73 in.·lbf
	Reduction type	9.3	95	82 in.·lbf
Lead wire of field frame x Magnetic switch	Planetary type	9.8	100	87 in.·lbf
	Reduction type	5.9	60	52 in.·lbf
Intake manifold x Intake manifold stay		17.5	175	13
Cylinder block x Intake manifold stay		17.5	175	13
Starter wire x Terminal 30 of starter		8.8	90	78 in.·lbf
Starter x Transaxle		37	370	27
Terminal nut x Terminal C of starter		17	173	12
Terminal nut x Terminal 30 of starter		17	173	12
Magnetic switch end cover x Magnetic switch		3.6	36	32 in.·lbf

# CHARGING

## SERVICE DATA

SS0NH-03

Battery	Specific gravity	at 20°C (68°F)	1.25 - 1.29
Drive belt	Tension	New belt Used belt	160 ± 20 lbf 100 ± 20 lbf
Generator	Rated output		12 V 70 A, 60 A
	Rotor coil resistance		
	Type A	at 20°C (68°F)	2.2 - 2.4 Ω
	Type B	at 20°C (68°F)	2.8 - 3.0 Ω
	Slip ring diameter	STD	14.2 - 14.4 mm (0.559 - 0.567 in.)
		Minimum	12.8 mm (0.504 in.)
	Brush exposed length	STD	10.5 mm (0.413 in.)
		Minimum	1.5 mm (0.059 in.)
Voltage regulator	Regulating voltage	at 25°C (77°F) at 115°C (239°F)	13.9 - 15.1 V 13.5 - 14.3 V

## TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Generator x Generator bracket	41	420	30
Generator x Adjusting lever	12	120	9
Bearing retainer x Drive end frame	2.6	27	23 in.·lbf
Rectifier end frame x Drive end frame Type A, B	4.5	46	40 in.·lbf
Generator pulley x Rotor	110	1,125	81
Rectifier holder x Coil lead on rectifier end frame Type A, B	1.96	20	17 in.·lbf
Rear end cover x Rectifier holder Type A, B	4.4	45	40 in.·lbf
Terminal insulator x Rectifier holder	4.1	42	36 in.·lbf

# CLUTCH

## SERVICE DATA

SS0KR-04

Pedal height from asphalt sheet		143.0 - 151.0 mm (5.944 - 5.945 in.)
Push rod play at pedal top		1.0 - 5.0 mm (0.039 - 0.197 in.)
Pedal freeplay		5.0 - 15.0 mm (0.197 - 0.591 in.)
Clutch release point from pedal full stroke end position		25 mm (0.98 in.) or more
Clutch start switch	ON-OFF stroke	5.0 ± 0.5 mm (0.197 ± 0.020 in.)
Slotted spring pin protrusion		1.5 - 3.5 mm (0.059 - 0.138 in.)
Disc rivet head depth	Min.	0.3 mm (0.012 in.)
Disc runout	Max.	0.8 mm (0.031 in.)
Flywheel runout	Max.	0.1 mm (0.004 in.)
Diaphragm spring finger wear	Max. depth	0.6 mm (0.024 in.)
	Max. width	5.0 mm (0.197 in.)
Diaphragm spring tip non-alignment	Max.	0.5 mm (0.020 in.)

## TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Clutch line union	15	155	11
Master cylinder installation nut	12	120	9
Bleeder plug	8.3	85	74 in.·lbf
Clutch cover x Flywheel	19	195	14
Release cylinder installation bolt	12	120	9

# MANUAL TRANSAXLE

## SERVICE DATA

SSOKP-02

Input shaft roller bearing journal diameter	Min.	24.970 mm (0.9831 in.)
Input shaft 3rd gear journal diameter	Min.	30.970 mm (1.2193 in.)
Input shaft 4th gear journal diameter	Min.	28.970 mm (1.1405 in.)
Input shaft 5th gear journal diameter (for C151)	Min.	24.870 mm (0.9791 in.)
Input shaft runout	Max.	0.05 mm (0.0020 in.)
Output shaft roller bearing journal diameter	Min.	32.970 mm (1.2980 in.)
Output shaft 1st gear journal diameter	Min.	37.970 mm (1.4949 in.)
Output shaft 2nd gear journal diameter	Min.	31.970 mm (1.2587 in.)
Output shaft runout	Max.	0.05 mm (0.0020 in.)
Gear thrust clearance 1st	STD	0.10 - 0.40 mm (0.0039 - 0.0157 in.)
	Max.	0.45 mm (0.0177 in.)
Gear thrust clearance 2nd	STD	0.10 - 0.45 mm (0.0039 - 0.0177 in.)
	Max.	0.50 mm (0.0197 in.)
Gear thrust clearance 3rd	STD	0.10 - 0.35 mm (0.0039 - 0.0138 in.)
	Max.	0.40 mm (0.0157 in.)
Gear thrust clearance 4th	STD	0.10 - 0.55 mm (0.0039 - 0.0217 in.)
	Max.	0.60 mm (0.0236 in.)
Gear thrust clearance 5th (for C151)	STD	0.10 - 0.57 mm (0.0039 - 0.0224 in.)
	Max.	0.65 mm (0.0256 in.)
1st, 2nd, 3rd, 4th and 5th (for C151) gear radial clearance	STD	0.015 - 0.058 mm (0.0006 - 0.0023 in.)
	Max.	0.070 mm (0.0028 in.)
Shift fork to hub sleeve clearance	Max.	1.0 mm (0.039 in.)
Synchronizer ring to gear clearance	Min.	0.6 mm (0.024 in.)
Drive in depth		
Input shaft front oil seal		15.8 ± 0.2 mm (0.622 ± 0.008 in.)
Speedometer driven gear oil seal		25 mm (0.98 in.)
Control shaft cover oil seal		1.0 - 2.0 mm (0.039 - 0.079 in.)
Select inner lever slotted spring pin		0 ± 0.5 mm (0 ± 0.020 in.)
No. 1 shift inner lever slotted spring pin		0 ± 0.5 mm (0 ± 0.020 in.)
No. 2 shift inner lever slotted spring pin		0 ± 0.5 mm (0 ± 0.020 in.)
Transmission case oil seal		2.4 ± 0.3 mm (0.094 ± 0.012 in.)
Transaxle case oil seal		1.9 ± 0.3 mm (0.075 ± 0.012 in.)
Differential side gear backlash		0.05 - 0.20 mm (0.0020 - 0.0079 in.)
Differential side gear thrust washer thickness		1.50 mm (0.0591 in.)
		1.55 mm (0.0610 in.)
		1.60 mm (0.0630 in.)
		1.65 mm (0.0650 in.)
		1.70 mm (0.0669 in.)
		1.75 mm (0.0689 in.)
Differential side bearing preload (at starting) (for use with SST)		
New bearing		0.8 - 1.6 N·m (8 - 16 kgf·cm, 6.9 - 13.9 in.-lbf)
Reused bearing		0.5 - 1.0 N·m (5 - 10 kgf·cm, 4.3 - 8.7 in.-lbf)

Input shaft snap ring thickness No. 2 clutch hub	Mark 0	2.30 mm (0.0906 in.)
		2.36 mm (0.0929 in.)
		2.42 mm (0.0953 in.)
		2.48 mm (0.0976 in.)
		2.54 mm (0.1000 in.)
		2.60 mm (0.1024 in.)
	Mark A	2.25 mm (0.0886 in.)
		2.31 mm (0.0909 in.)
		2.37 mm (0.0933 in.)
		2.43 mm (0.0957 in.)
		2.49 mm (0.0980 in.)
		2.55 mm (0.1004 in.)
	Mark G	2.61 mm (0.1028 in.)
		2.29 mm (0.0902 in.)
		2.35 mm (0.0925 in.)
		2.41 mm (0.0949 in.)
		2.47 mm (0.0972 in.)
		2.53 mm (0.0996 in.)
	Mark F	2.59 mm (0.1020 in.)
Output shaft snap ring thickness No. 1 clutch hub	Mark A	2.50 mm (0.0984 in.)
		2.56 mm (0.1008 in.)
		2.62 mm (0.1031 in.)
		2.68 mm (0.1055 in.)
		2.74 mm (0.1079 in.)
		2.80 mm (0.1102 in.)
Differential side bearing adjusting shim thickness	Mark A	2.10 mm (0.0827 in.)
		2.15 mm (0.0846 in.)
		2.20 mm (0.0866 in.)
		2.25 mm (0.0886 in.)
		2.30 mm (0.0906 in.)
		2.35 mm (0.0925 in.)
		2.40 mm (0.0945 in.)
		2.45 mm (0.0965 in.)
		2.50 mm (0.0984 in.)
		2.55 mm (0.1004 in.)
		2.60 mm (0.1024 in.)
		2.65 mm (0.1043 in.)
		2.70 mm (0.1063 in.)
		2.75 mm (0.1083 in.)
		2.80 mm (0.1102 in.)
		2.85 mm (0.1122 in.)
		2.90 mm (0.1142 in.)
		2.95 mm (0.1161 in.)
		3.00 mm (0.1181 in.)



# TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Transaxle x Engine			
17 mm head	64	650	47
14 mm head	46	470	34
10 mm head	7.4	75	65 in.·lbf
Engine left mounting bracket x Insulator	48	490	36
Engine rear mounting insulator x Body	78	800	58
Engine rear mounting insulator x Bracket			
B bolt	64	650	47
C bolt	90	920	67
Front exhaust pipe clamp set bolt	19	190	14
Front exhaust pipe x Exhaust manifold	62	630	46
Starter x Transaxle	39	400	29
Clutch release cylinder x Transaxle	12	120	9
Shift lever assembly x Body	12	120	9
Grommet retainer x Body	4.9	50	43 in.·lbf
Retainer x Body	4.9	50	43 in.·lbf
Output shaft front bearing lock plate set bolt	11	115	8
Transmission case x Transaxle case	29	300	22
Reverse shift arm bracket	17	175	13
Straight screw plug (Reverse restrict pin) (C151)	13	130	9
Straight screw plug	13	130	9
Straight screw plug (Shift fork shaft)	25	250	18
Straight screw plug (Lock ball assembly) (C151)	39	400	29
Straight screw plug (C141)	39	400	29
Reverse idler gear shaft lock bolt	29	300	22
Rear bearing retainer	27	280	20
Output shaft lock nut	118	1,200	87
Shift fork and shift head x Shift fork shaft	16	160	12
Shift and select lever assembly	20	200	14
Transmission case x Transmission case cover	18	185	13
Back-up light switch	40	410	30
Filler and drain plugs	39	400	29
Ring gear x Differential case	124	1,260	91
Speedometer driven gear	11	115	8
Control lever housing support bracket x Transmission case	11	115	8
Selecting bellcrank assembly x Transmission case	25	250	18
Shift and select lever shaft assembly lock bolt	29	300	22
Transaxle case receiver x Transaxle case	11	115	8
No. 1 and No. 2 oil receiver pipe	17	175	13

# AUTOMATIC TRANSAXLE (A132L)

SS0LK-02

## SERVICE DATA

Governor pressure	Vehicle speed reference	
	30 km/h (19 mph)	59 - 137 kPa (0.6 - 1.4 kgf/cm <sup>2</sup> , 9 - 20 psi)
	60 km/h (37 mph)	186 - 265 kPa (1.9 - 2.7 kgf/cm <sup>2</sup> , 27 - 38 psi)
	90 km/h (56 mph)	353 - 431 kPa (3.6 - 4.4 kgf/cm <sup>2</sup> , 51 - 63 psi)
Line pressure (Wheel locked)		
Engine Idling	D position	363 - 422 kPa (3.7 - 4.3 kgf/cm <sup>2</sup> , 53 - 61 psi)
	R position	530 - 706 kPa (5.4 - 7.2 kgf/cm <sup>2</sup> , 77 - 102 psi)
AT stall (Throttle valve fully opened)	D position	902 - 1,049 kPa (9.2 - 10.7 kgf/cm <sup>2</sup> , 131 - 152 psi)
	R position	1,412 - 1,647 kPa (14.4 - 16.8 kgf/cm <sup>2</sup> , 205 - 239 psi)
Engine stall revolution	D and R positions	2,300 ± 200 rpm
Time lag	N → D position	Less than 1.2 seconds
	N → R position	Less than 1.5 seconds
Engine idle speed (A/C OFF)	N position	750 ± 50 rpm
Throttle cable adjustment (Throttle valve fully opened)		
Between boot end face and inner cable stopper		0 - 1 mm (0 - 0.04 in.)
Torque converter clutch installation distance		More than 13.0 mm (0.512 in.)
Drive plate runout	Max.	0.20 mm (0.0079 in.)
Torque converter clutch runout	Max.	0.30 mm (0.0118 in.)
Differential oil seal drive in depth		0 ± 0.5 mm (0 ± 0.020 in.)
Speedometer driven gear oil seal drive in depth		19 mm (0.75 in.)
Shift Point		
D position		
Throttle valve fully opened	1 → 2	47 - 62 km/h (29 - 39 mph)
	2 → 3	91 - 107 km/h (57 - 66 mph)
	3 → 2	85 - 104 km/h (53 - 65 mph)
	2 → 1	36 - 46 km/h (22 - 29 mph)
L position		
Throttle valve fully closed	2 → 1	39 - 49 km/h (24 - 30 mph)
Lock-up point		
D position		
Throttle valve fully closed	Lock-up ON	63 - 72 km/h (39 - 45 mph)
	Lock-up OFF	59 - 68 km/h (37 - 42 mph)

## TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Oil pan drain plug		49	500	36
Oil pan		4.9	50	43 in·lbf
Detent spring		10	100	7
Valve body x Oil pipe clamp		10	100	7
Valve body x Oil strainer		10	100	7
Valve body x Apply pipe bracket		10	100	7
Valve body x Transaxle		10	100	7
Park/neutral position switch x Transaxle case (bolt)		5.4	55	48 in·lbf
Park/neutral position switch (nut)		6.9	70	61 in·lbf
Transaxle control shaft lever x Park/neutral position switch		13	130	9
Transaxle control shaft lever x Transaxle control cable		12	120	9
Drive plate x Crankshaft		88	900	65
Torque converter clutch x Drive plate		27	280	20
Starter		39	400	29
Transaxle housing x Engine (upper side)		64	650	47
Transaxle housing x Engine (lower side)	Bolt A	7.4	75	65 in·lbf
	Bolt B	25	250	18
	Bolt C	46	470	34
	Bolt D	64	650	47
Front exhaust pipe x Exhaust manifold		62	630	46
Front exhaust pipe x Oxygen sensor		44	450	32
Exhaust pipe clamp		19	190	14
LH engine mounting x Body		49	490	36
Engine rear mounting bracket x Engine rear mounting insulator		65	650	48
Engine rear mounting insulator x Body	Bolt A	80	800	59
	Bolt B	92	920	69

# AUTOMATIC TRANSAXLE (A242L)

SS0LI-04

## SERVICE DATA

Governor pressure	Vehicle speed reference	
	30 km/h (19 mph)	59 - 137 kPa (0.6 - 1.4 kgf/cm <sup>2</sup> , 9 - 20 psi)
	60 km/h (37 mph)	196 - 275 kPa (2.0 - 2.8 kgf/cm <sup>2</sup> , 28 - 40 psi)
	90 km/h (56 mph)	363 - 441 kPa (3.7 - 4.5 kgf/cm <sup>2</sup> , 53 - 64 psi)
Line pressure (Wheel locked)		
Engine Idling	D position	373 - 422 kPa (3.8 - 4.3 kgf/cm <sup>2</sup> , 54 - 61 psi)
	R position	549 - 706 kPa (5.6 - 7.2 kgf/cm <sup>2</sup> , 80 - 102 psi)
AT stall (Throttle valve fully opened)	D position	902 - 1,049 kPa (9.2 - 10.7 kgf/cm <sup>2</sup> , 131 - 152 psi)
	R position	1,638 - 1,902 kPa (16.7 - 19.4 kgf/cm <sup>2</sup> , 238 - 276 psi)
Engine stall revolution	D and R positions	2,300 ± 200 rpm
Time lag	N → D position	Less than 1.2 seconds
	N → R position	Less than 1.5 seconds
Engine idle speed (A/C OFF)	N position	750 ± 50 rpm
Throttle cable adjustment (Throttle valve fully opened)		
Between boot end face and inner cable stopper		0 - 1 mm (0 - 0.04 in.)
Torque converter clutch installation distance		More than 13.0 mm (0.512 in.)
Drive plate runout	Max.	0.20 mm (0.0079 in.)
Torque converter clutch runout	Max.	0.30 mm (0.0118 in.)
Differential oil seal drive in depth	LH side	5.3 ± 0.5 mm (0.209 ± 0.020 in.)
	RH side	3.1 ± 0.5 mm (0.122 ± 0.020 in.)
Speedometer driven gear oil seal drive in depth		25.0 mm (0.98 in.)
Shift Point		
D position		
Throttle valve fully opened	1 → 2	45 - 61 km/h (28 - 38 mph)
	2 → 3	89 - 106 km/h (55 - 66 mph)
	3 → 2	83 - 102 km/h (52 - 63 mph)
	2 → 1	83 - 43 km/h (19 - 27 mph)
Throttle valve fully closed	3 O/D	19 - 33 km/h (12 - 21 mph)
L position		
Throttle valve fully closed	2 → 1	44 - 56 km/h (27 - 35 mph)
Lock-up point		
D position		
Throttle valve fully closed	Lock-up ON	65 - 76 km/h (40 - 47 mph)
	Lock-up OFF	61 - 72 km/h (38 - 45 mph)

## TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Oil pan drain plug		17	175	13
Oil pan		4.9	50	43 in.·lbf
Detent spring		10	100	7
Valve body x Oil pipe clamp		10	100	7
Valve body x Oil strainer		10	100	7
Valve body x Apply pipe bracket		10	100	7
Valve body x Transaxle		10	100	7
Park/neutral position switch x Transaxle case (bolt)		5.4	55	48 in.·lbf
Park/neutral position switch (nut)		6.9	70	61 in.·lbf
Transaxle control shaft lever x Park/neutral position switch		13	130	9
Transaxle control shaft lever x Transaxle control cable		12	120	9
Drive plate x Crankshaft		88	900	65
Torque converter clutch x Drive plate		27	280	20
Starter		39	400	29
Transaxle housing x Engine (upper side)		64	650	47
Transaxle housing x Engine (lower side)	Bolt A	7.4	75	65 in.·lbf
	Bolt B	64	650	47
	Bolt C	46	470	34
Front exhaust pipe x Exhaust manifold		62	630	46
Front exhaust pipe x Oxygen sensor		44	450	32
Exhaust pipe clamp		19	190	14
LH engine mounting x Body		49	490	36
Engine rear mounting bracket x Engine rear mounting insulator		65	650	48
Engine rear mounting insulator x Body	Bolt A	80	800	59
	Bolt B	92	920	69

# SUSPENSION AND AXLE

## SERVICE DATA

SSOLO-07

Cold tire inflation pressure	Tire size 155SR13 AS	Front	240 kPa (2.4 kgf/cm <sup>2</sup> , 34 psi)
		Rear	225 kPa (2.25 kgf/cm <sup>2</sup> , 32 psi)
Vehicle height	Tire size 155SR13 AS	Front	187.9 mm (7.40 in.)
		Rear	253.2 mm (9.97 in.)
Front wheel alignment	Toe-in (Total)		0.1° ± 0.2° (1 ± 2 mm, 0.04 ± 0.08 in.)
	Tie rod end left-right error		1.5 mm (0.059 in.) or less
	Camber		-0° 20' ± 45'
		Left-right error	45' or less
	Caster		1° 20' ± 45'
		Left-right error	45' or less
Rear wheel alignment	Toe-in (Total)		0.3° ± 0.3° (3 ± 3 mm, 0.12 ± 0.12 in.)
	Camber		-0° 30' ± 45'
		Left-right error	45' or less
Front axle	Axle bearing backlash		0.05 mm (0.0020 in.) or less
	Axle hub deviation		0.05 mm (0.0020 in.) or less
Front suspension	Lower ball joint turning torque		0.8 - 2.5 N·m (8 - 25 kgf·cm, 7 - 22 in.-lbf)
Rear axle	Bearing preload (turning)		Add frictional force plus 0 - 11.8 N (0 - 1.2 kgf, 0 - 2.6 lbf)
	Axle hub axial play		0.05 mm (0.0020 in.) or less

# TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
FRONT:				
Disc brake dust cover x Steering knuckle		8.3	85	74 in.·lbf
Lower ball joint x Steering knuckle		98	1,000	72
Steering knuckle x Shock absorber		245	2,500	181
Lower ball joint x Lower suspension arm		80	820	59
Tie rod end lock nut		47	480	35
Tie rod end x Steering knuckle		49	500	36
Disc brake caliper x Steering knuckle		88	900	65
Drive shaft lock nut		216	2,200	159
Piston rod x Suspension support		47	475	34
Suspension support x Body		39	400	29
Flexible hose x Shock absorber		29	300	22
Lower suspension arm x Body	Front side	142	1,450	105
	Rear side	74	750	55
Hub nut		103	1,050	76
ABS speed sensor x Steering knuckle		7.8	80	69 in.·lbf
REAR:				
Piston rod x Suspension support		34	350	25
Suspension support x Body		39	400	29
Shock absorber x Axle beam		68	690	50
Backing plate x Axle beam		70	710	51
Parking brake cable x Backing plate		7.8	80	69 in.·lbf
Brake line x Wheel cylinder		15	155	11
Body x Axle beam		142	1,450	105
Lateral control rod x Axle beam		83	850	61
Lateral control rod x Body		113	1,150	83
ABS speed sensor x Axle beam		7.8	80	69 in.·lbf
ABS speed sensor wire x Axle beam		5.4	55	48 in.·lbf

# BRAKE

## SERVICE DATA

SS0M2-11

Brake pedal height (from asphalt sheet)	EZ grade	143.0 - 153.0 mm (5.63 - 6.02 in.)
	Except EZ grade	140.0 - 150.0 mm (5.51 - 5.91 in.)
Brake pedal freeplay		1 - 6 mm (0.04 - 0.24 in.)
Brake pedal reserve distance at 490 N (50 kgf, 110.2 lbf)	w/o ABS	More than 60 mm (2.36 in.)
	w/ ABS	More than 55 mm (2.17 in.)
Brake booster push rod to piston clearance (w/ SST)		0 mm (0 in.)
Front brake pad thickness	STD	10.0 mm (0.394 in.)
	Minimum	1.0 mm (0.039 in.)
Front brake disc thickness	STD	18.0 mm (0.709 in.)
	Minimum	17.0 mm (0.669 in.)
Front brake disc runout	Maximum	0.07 mm (0.0028 in.)
Rear brake drum inside diameter	STD	180 mm (7.087 in.)
	Maximum	181 mm (7.126 in.)
Rear brake lining thickness	STD	4.0 mm (0.157 in.)
	Minimum	1.0 mm (0.039 in.)
Rear brake drum to shoe clearance		0.6 mm (0.024 in.)
Parking brake lever travel at 196 N (20 kgf, 44.1 lbf)		5 - 8 clicks



## TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Master cylinder x Piston stopper bolt	10	100	7
Master cylinder x Reservoir	1.7	17.5	15.2 in·lbf
Master cylinder x Brake booster	13	130	9
Brake line union nut	15	155	11
Brake booster clevis lock nut	25	260	19
Brake booster x Pedal bracket	14	145	10
Front disc brake caliper installation bolt	25	255	18
Bleeding plug	8.3	85	74 in·lbf
Front disc brake torque plate x Steering knuckle	88	900	65
Front disc brake caliper x Flexible hose	30	310	22
Rear drum brake wheel cylinder x Backing plate	10	100	7
ABS actuator assembly x Body	19	195	14
ABS actuator x ABS actuator bracket assembly	5.4	55	48 in·lbf
ABS actuator x ABS actuator No. 3 bracket	19	195	14
Front speed sensor x Steering knuckle	8.0	82	71 in·lbf
Front speed sensor wire harness clamp installation bolt	5.0	51	44 in·lbf
Rear speed sensor x Axle beam	8.0	82	71 in·lbf
Rear speed sensor wire harness clamp installation bolt	5.0	51	44 in·lbf

# STEERING

## SERVICE DATA

SS0N1-03

ON-VEHICLE INSPECTION		
Steering wheel freeplay	Maximum	30 mm (1.18 in.)
Drive belt tension	New belt	140 - 180 lbf
	Used belt	80 - 120 lbf
Maximum rise of oil level		5 mm (0.20 in.)
Oil pressure at idle speed with valve closed	Minimum	6,374 kPa (65 kgf/cm <sup>2</sup> , 925 psi)
Steering effort at idle speed	Maximum	7.8 N·m (80 kgf·cm, 69 in.·lbf)
PS VANE PUMP		
Rotor shaft bushing oil clearance	STD	0.01 - 0.03 mm (0.0004 - 0.0012 in.)
	Maximum	0.07 mm (0.0028 in.)
Vane plate height	Minimum	8.0 mm (0.315 in.)
Vane plate thickness	Minimum	1.77 mm (0.0697 in.)
Vane plate length	Minimum	14.97 mm (0.5894 in.)
Vane plate to rotor groove clearance	Maximum	0.03 mm (0.0012 in.)
Vane plate length	Pump rotor and cam ring mark	
	None	14.996 - 14.998 mm (0.59039 - 0.59047 in.)
	1	14.994 - 14.996 mm (0.59032 - 0.59039 in.)
	2	14.992 - 14.994 mm (0.59024 - 0.59032 in.)
	3	14.990 - 14.992 mm (0.59016 - 0.59024 in.)
	4	14.988 - 14.990 mm (0.59008 - 0.59016 in.)
Spring free length		36 - 38 mm (1.42 - 1.49 in.)
Vane pump rotating torque	Maximum	0.3 N·m (2.8 kgf·cm, 2.4 in.·lbf) or less
MANUAL STEERING GEAR		
Steering rack runout	Maximum	0.30 mm (0.0118 in.)
Pinion preload	Turning	0.23 - 0.32 N·m (2.3 - 3.3 kgf·cm, 2.0 - 2.9 in.·lbf)
Total preload	Turning	0.6 - 1.2 N·m (6 - 12 kgf·cm, 5.2 - 10.4 in.·lbf)
PS GEAR		
Steering rack runout	Maximum	0.30 mm (0.0118 in.)
Measure oil clearance	STD	0.050 - 0.083 mm (0.00197 - 0.00327 in.)
	Maximum	0.125 mm (0.00492 in.)
Total preload	Turning	0.8 - 1.4 N·m (8 - 14 kgf·cm, 6.9 - 12.2 in.·lbf)

# TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
<b>STEERING COLUMN</b>				
Steering support x Column tube		5.4	55	48 in.-lbf
Control valve shaft x Sliding yoke		25	260	19
Steering main shaft x Sliding yoke		25	260	19
Steering column assembly set nut		25	260	19
Steering wheel set nut		34	350	25
Steering wheel pad set screw		8.8	90	78 in.-lbf
<b>PS VANE PUMP</b>				
Pressure port union x Front housing		69	700	51
Suction port union x Front housing		13	130	9
Pressure feed tube x Pressure port union		54	550	40
PS vane pump pulley set nut		43	440	32
PS vane pump assembly set nut	Bolt A	43	440	32
	Bolt B	39	400	30
<b>MANUAL STEERING GEAR</b>				
Pinion bearing adjusting screw lock nut	for use with SST	85	871	63
	for use without SST	113	1,150	83
Rack guide spring cap lock nut	for use with SST	41	419	30
	for use without SST	56	575	42
Rack x Rack end	for use with SST	43	434	31
	for use without SST	59	600	43
Tie rod end lock nut		47	480	35
Manual steering gear bracket x Body		58	590	43
Pinion shaft x Sliding yoke		25	260	19
Steering main shaft x Sliding yoke		25	260	19
Column hole cover x Body		4.9	50	43 in.-lbf
<b>PS GEAR</b>				
Cylinder end stopper		59	600	43
Self-locking nut		59	600	43
Rack housing cap		59	600	43
Rack guide spring cap lock nut	for use with SST	31	316	23
	for use without SST	44	450	33
Rack x Rack end	for use with SST	43	434	31
	for use without SST	59	600	43
Tie rod end lock nut		47	480	35
Turn pressure tube union nut	for use with SST	20	203	15
	for use without SST	25	250	18
Air control valve		29	300	22
PS gear bracket x Body		58	590	43
Engine rear mount insulator	Bolt A	64	650	47
	Bolt B	78	800	58
Engine rear mount bracket x Transaxle		48	490	35
Front exhaust pipe x Exhaust manifold		62	630	46
Front exhaust pipe clamp		19	190	14
Front exhaust pipe x Oxygen sensor		44	450	32

## SERVICE SPECIFICATIONS - STEERING

Column hole cover x Body	4.9	50	43 in.·lbf
Control valve shaft x Sliding yoke	25	260	19
Steering main shaft x Sliding yoke	25	260	19
Pressure feed and return tubes x Control valve housing	for use with SST	36	366
	for use without SST	44	450
Tube clamp set bolt	13	130	9

# SUPPLEMENTAL RESTRAINT SYSTEM

## TORQUE SPECIFICATION

SS061-41

Part tightened	N·m	kgf·cm	ft·lbf
Steering wheel	34	350	25
Steering wheel pad	8.8	90	78 in·lbf
Front passenger airbag assembly	19	195	14
Airbag sensor assembly	20	200	14

# BODY ELECTRICAL

## SERVICE DATA

SS0ME-05

INTEGRATION RELAY	
Key Unlock Warning System:	
2 - Ground (Ignition switch LOCK or ACC)	No voltage
2 - Ground (Ignition switch ON)	Battery positive voltage
3 - Ground (Constant)	Battery positive voltage
9 - Ground (Ignition switch LOCK or ACC)	No voltage
9 - Ground (Ignition switch ON)	Battery positive voltage
12 - Ground (Constant)	Battery positive voltage
DAYTIME RUNNING LIGHT MAIN RELAY	
2 - Ground (Ignition switch LOCK or ACC)	No voltage
2 - Ground (Ignition switch ON)	Battery positive voltage
18 - Ground (Ignition switch LOCK or ACC)	No voltage
18 - Ground (Ignition switch ON)	Battery positive voltage
4 - Ground (Constant)	Battery positive voltage
6 - Ground (Constant)	Battery positive voltage
10 - Ground (Constant)	Battery positive voltage
11 - Ground (Engine stop)	No voltage
11 - Ground (Engine running)	Battery positive voltage
15 - Ground (Constant)	Battery positive voltage
TURN SIGNAL FLASHER	
Flashes/Minute	60 - 120
SPEEDOMETER (USING A SPEEDOMETER TESTER)	
Standard indication (mph)	Allowable range (mph)
20	18 - 24
40	38 - 45
60	59 - 67
80	79 - 88
100	100 - 110
Standard indication (km/h)	Allowable range (km/h)
20	16 - 26
40	38 - 48
60	59 - 69
80	76 - 90
100	96 - 110
120	114 - 131
140	134 - 152
160	152 - 174
TACHOMETER (ON-VEHICLE)	
DC 13.5 V 25°C (77°F)	
Standard indication (rpm)	Allowable range (rpm)
700	610 - 750
3,000	2,850 - 3,150
5,000	4,850 - 5,150
7,000	6,790 - 7,210

## SERVICE SPECIFICATIONS - BODY ELECTRICAL

FUEL RECEIVER GAUGE	
w/ Tachometer:	Resistance ( $\Omega$ )
A - B	Approx. 115.8
A - C	Approx. 177.2
B - C	Approx. 61.4
w/o Tachometer:	Resistance ( $\Omega$ )
A - B	Approx. 171.2
A - C	Approx. 272.8
B - C	Approx. 101.6
FUEL SENDER GAUGE	
Float position: mm (in.)	Resistance ( $\Omega$ )
F: Approx. $13.0 \pm 3$ ( $0.512 \pm 0.118$ )	Approx. $3 \pm 1.0$
1/2: Approx. 61.0 (2.402)	Approx. $29 \pm 4.8$
E: Approx. $124.0 \pm 3$ ( $4.882 \pm 0.118$ )	Approx. $110 \pm 7.7$
ENGINE COOLANT TEMPERATURE RECEIVER GAUGE	
w/ Tachometer:	Resistance ( $\Omega$ )
A - B	Approx. 51.0
A - C	Approx. 148.6
B - C	Approx. 199.6
w/o Tachometer:	Resistance ( $\Omega$ )
A - B	Approx. 54.0
A - C	Approx. 175.7
B - C	Approx. 229.7
DEFOGGER SWITCH	
Timer Circuit:	
2 - Ground (Ignition switch LOCK or ACC)	No voltage
2 - Ground (Ignition switch ON)	Battery positive voltage
6 - Ground (Ignition switch LOCK or ACC)	No voltage
6 - Ground (Ignition switch ON)	Battery positive voltage

# BODY

## TORQUE SPECIFICATION

SS0NJ-06

Part tightened	N·m	kgf·cm	ft·lbf
FRONT SEAT			
Seat track x Body	37	375	27
REAR SEAT			
Seat back x Body	18	185	13
Seat x Seat center hinge	18	185	13
Seat center hinge x Body	7.8	80	69 in.·lbf
Seat x Seat hinge	18	185	13
Seat hinge x Body	7.8	80	69 in.·lbf
FRONT SEAT BELT			
Shoulder anchor x Adjustable anchor	43	440	32
Outer belt anchor x Body	43	440	32
ELR x Body	43	440	32
Adjustable anchor x Body	43	440	32
Inner belt x Seat	43	440	32
REAR SEAT BELT			
Outer belt anchor x Body	43	440	32
ELR x Body	43	440	32
Center belt x Body	43	440	32
CANADA: CRS, tether anchor x Body	21	210	15



# AIR CONDITIONING

## SERVICE DATA

SS0M9-03

Refrigerant charge volume		650 ± 50 g (22.93 ± 1.76 oz.)
Drive belt tension	New belt	160 ± 25 lbf
	Used belt	100 ± 20 lbf
Idle-up speed		850 ± 50 rpm
Magnetic clutch clearance		0.5 ± 0.15 mm (0.02 ± 0.0059 in.)

## TORQUE SPECIFICATION

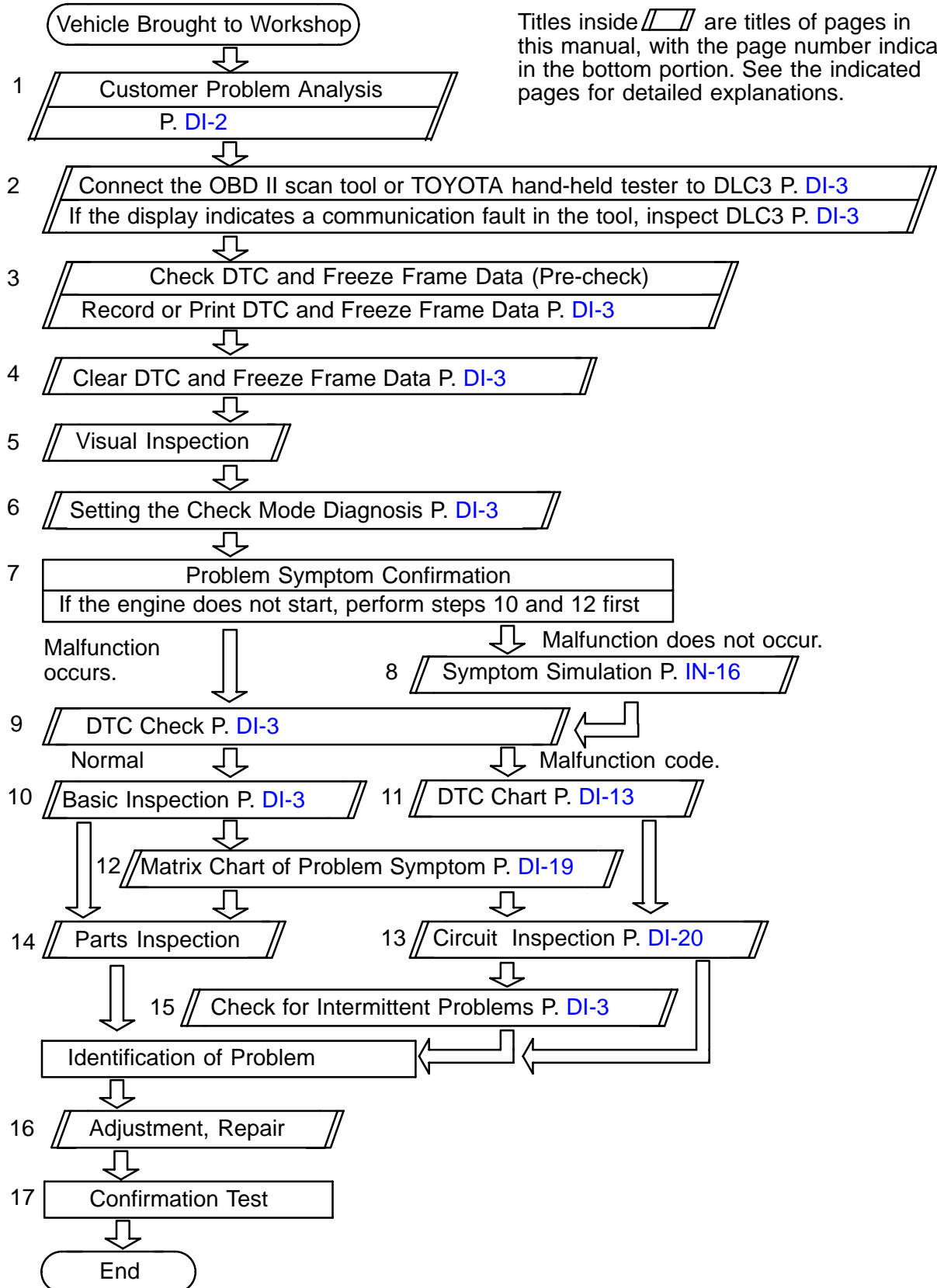
Part tightened	N·m	kgf·cm	ft·lbf
Compressor x Suction hose	10	100	7
Compressor x Discharge hose	10	100	7
Compressor x Compressor bracket	25	250	18
Receiver x Liquid tube	5.4	55	48 in.·lbf
Condenser x Liquid tube	5.4	55	48 in.·lbf
Cooling unit x Liquid tube	14	140	10
Cooling unit x Suction tube	32	330	24
Expansion valve x Evaporator	5.4	55	48 in.·lbf
Revolution detecting sensor x Compressor	11	110	8
Pressure plate x Compressor	14	140	10

# ENGINE

## HOW TO PROCEED WITH TROUBLESHOOTING

DI4LC-02

Troubleshoot in accordance with the procedure on the following pages.



# CUSTOMER PROBLEM ANALYSIS CHECK

## ENGINE CONTROL SYSTEM Check Sheet

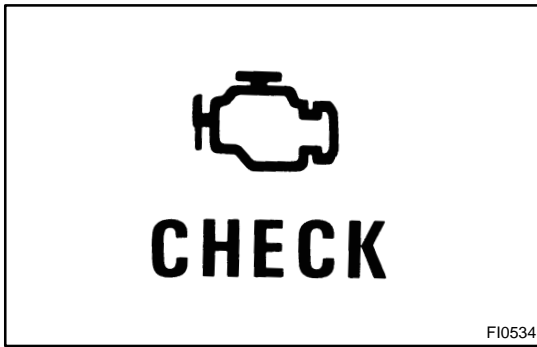
Inspector's  
Name \_\_\_\_\_

Customer's Name		Model and Model Year	
Driver's Name		Frame No.	
Date Vehicle Brought in		Engine Model	
License No.		Odometer Reading	km miles

Problem Symptoms	<input type="checkbox"/> Engine does not Start	<input type="checkbox"/> Engine does not crank	<input type="checkbox"/> No initial combustion	<input type="checkbox"/> No complete combustion
	<input type="checkbox"/> Difficult to Start	<input type="checkbox"/> Engine cranks slowly <input type="checkbox"/> Other _____		
	<input type="checkbox"/> Poor Idling	<input type="checkbox"/> Incorrect first idle <input type="checkbox"/> Idling rpm is abnormal <input type="checkbox"/> High (       rpm) <input type="checkbox"/> Low (       rpm) <input type="checkbox"/> Rough idling <input type="checkbox"/> Other _____		
	<input type="checkbox"/> Poor Driveability	<input type="checkbox"/> Hesitation <input type="checkbox"/> Back fire <input type="checkbox"/> Muffler explosion (after-fire) <input type="checkbox"/> Surging <input type="checkbox"/> Knocking <input type="checkbox"/> Other _____		
	<input type="checkbox"/> Engine Stall	<input type="checkbox"/> Soon after starting <input type="checkbox"/> After accelerator pedal depressed <input type="checkbox"/> After accelerator pedal released <input type="checkbox"/> During A/C operation <input type="checkbox"/> Shifting from N to D <input type="checkbox"/> Other _____		
	<input type="checkbox"/> Others	_____		

Dates Problem Occurred		_____		
Problem Frequency		<input type="checkbox"/> Constant <input type="checkbox"/> Sometimes (       times per       day/month) <input type="checkbox"/> Once only <input type="checkbox"/> Other _____		
Condition When Problem Occurs	Weather	<input type="checkbox"/> Fine <input type="checkbox"/> Cloudy <input type="checkbox"/> Rainy <input type="checkbox"/> Snowy <input type="checkbox"/> Various/Other _____		
	Outdoor Temperature	<input type="checkbox"/> Hot <input type="checkbox"/> Warm <input type="checkbox"/> Cool <input type="checkbox"/> Cold (approx. ____ °F/ ____ °C)		
	Place	<input type="checkbox"/> Highway <input type="checkbox"/> Suburbs <input type="checkbox"/> Inner City <input type="checkbox"/> Uphill <input type="checkbox"/> Downhill <input type="checkbox"/> Rough road <input type="checkbox"/> Other _____		
	Engine Temp.	<input type="checkbox"/> Cold <input type="checkbox"/> Warming up <input type="checkbox"/> After Warming up <input type="checkbox"/> Any temp. <input type="checkbox"/> Other _____		
	Engine Operation	<input type="checkbox"/> Starting <input type="checkbox"/> Just after starting (       min.) <input type="checkbox"/> Idling <input type="checkbox"/> Racing <input type="checkbox"/> Driving <input type="checkbox"/> Constant speed <input type="checkbox"/> Acceleration <input type="checkbox"/> Deceleration <input type="checkbox"/> A/C switch ON/OFF <input type="checkbox"/> Other _____		

Condition of MIL		<input type="checkbox"/> Remains on	<input type="checkbox"/> Sometimes light up	<input type="checkbox"/> Does not light up
DTC Inspection	Normal mode (Pre-check)	<input type="checkbox"/> Normal	<input type="checkbox"/> Malfunction code(s) (code       ) <input type="checkbox"/> Freeze frame data (       )	
	Check Mode	<input type="checkbox"/> Normal	<input type="checkbox"/> Malfunction code(s) (code       ) <input type="checkbox"/> Freeze frame data (       )	



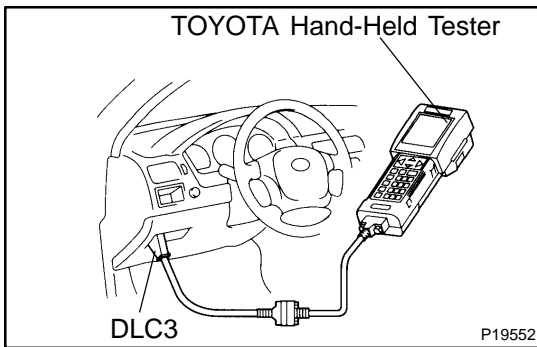
## PRE-CHECK

### 1. DIAGNOSIS SYSTEM

#### (a) Description

- When troubleshooting OBD II vehicles, the only difference from the usual troubleshooting procedure is that you need to connect OBD II scan tool complying with SAE 1978 or TOYOTA hand-held tester to the vehicle and read off various data output from the vehicle's ECM.
- OBD II regulations require that the vehicle's on-board computer lights up the Malfunction Indicator Light (MIL) on the instrument panel when the computer detects a malfunction in the computer itself or in a drive system components which affect vehicle emissions. In addition to the MIL lighting up when a malfunction is detected, the applicable Diagnostic Trouble Code (DTC) prescribed by SAE J2012 are recorded in the ECM memory (See page [DI-13](#)).

If the malfunction does not reoccur in 3 trips, the MIL goes off but the DTC remain recorded in the ECM memory.



- To check the DTC, connect the OBD II scan tool or TOYOTA hand-held tester to Data Link Connector 3 (DLC3) on the vehicle. The OBD II scan tool or TOYOTA hand-held tester also enables you to erase the DTC and check frozen frame data and various forms of engine data (For operating instructions, see the OBD II scan tool's instruction book.).
- DTC 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 freely by the manufacturer within the prescribed limits (See DTC chart on page [DI-13](#)).

- The diagnosis system operates in normal mode during normal vehicle use. It also has a check mode for technicians to simulate malfunction symptoms and troubleshoot. Most DTC use 2 trip detection logic\* to prevent erroneous detection, and ensure thorough malfunction detection. By switching the ECM to check mode when troubleshooting, the technician can cause the MIL to light up for a malfunction that is only detected once or momentarily (TOYOTA hand-held tester only) (See page [DI-3](#)).
- \*2 trip detection logic:  
When a logic malfunction is first detected, the malfunction is temporarily stored in the ECM memory. If the same malfunction is detected again during the second drive test, this second detection causes the MIL to light up.
- The 2 trip repeats the same mode a 2nd time (However, the IG switch must be turned OFF between the 1st trip and 2nd trip.).
- Freeze frame data:  
Freeze frame data records the engine condition when a misfire (DTC P0300 - P0304) or fuel trim malfunction (DTC P0171, P0172) or other malfunction (first malfunction only), is detected, as freeze frame data records the engine conditions (fuel system, calculator load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

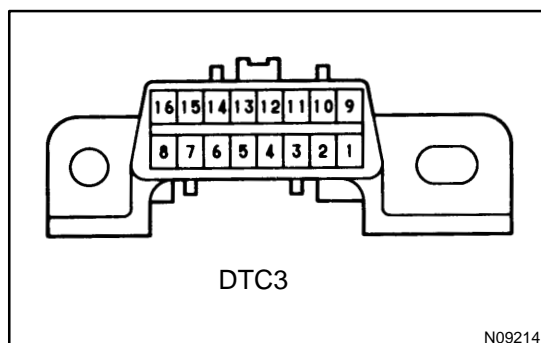
Priorities for troubleshooting:

If troubleshooting priorities for multiple DTC are given in the applicable DTC chart, these should be followed.

If no instructions are given troubleshoot DTC according to the following priorities.

- (1) DTC other than fuel trim malfunction (DTC P0171, P0172) and misfire (DTC P0300 - P0304).
  - (2) Fuel trim malfunction (DTC P0171, P0172).
  - (3) Misfire (DTC P0300 - P0304).
- (b) Check the DLC3.

The vehicle's ECM uses ISO 9141-2 for communication. The terminal arrangement of DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

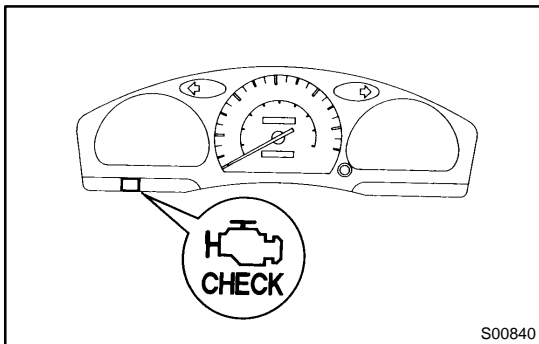


Terminal No.	Connection / Voltage or Resistance	Condition
7	Bus + Line / Pulse generation	During transmission
4	Chassis Ground - Body Ground / 1 $\Omega$ or less	Always
5	Signal Ground - Body Ground / 1 $\Omega$ or less	Always
16	Battery Positive - Body Ground / 9 - 14 V	Always

**HINT:**

If your display shows "UNABLE TO CONNECT TO VEHICLE" when you have connected the cable of the OBD II scan tool or TOYOTA hand-held tester to DLC3, turned the ignition switch ON and operated the scan tool, there is a problem on the vehicle side or tool side.

- If communication is normal when the tool is connected to another vehicle, inspect DLC3 on the original vehicle.
- If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tool its self, so consult the Service Department listed in the tool's instruction manual.

**2. Normal Mode:****INSPECT DIAGNOSIS****(a) Check the MIL.**

- (1) The MIL comes on when the ignition switch is turned ON and the engine is not running.

**HINT:**

If the MIL does not light up, troubleshoot the combination meter.

- (2) When the engine started, the MIL should go off. If the lamp remains on, the diagnosis system has detected a malfunction or abnormality in the system

**(b) Check the DTC.****NOTICE:**

**TOYOTA hand-held tester only:** When the diagnosis system is switched from the normal mode to the check mode, it erases all DTC and freeze frame data recorded in the normal mode. So before switching modes, always check the DTC and freeze frame data, and note them down.

- (1) Prepare the OBD II scan tool (complying with SAE J 1978) or TOYOTA hand-held tester.
- (2) Connect the OBD II scan tool or TOYOTA hand-held tester to DLC3 in the fuse box at the lower left of the instrument panel.
- (3) Turn the ignition switch ON and turn the OBD II scan tool or TOYOTA hand-held tester switch ON.
- (4) Use the OBD II scan tool or TOYOTA hand-held tester to check the DTC and freezed frame data; note them down (For operating instructions, see the OBD II scan tool's instruction book.).
- (5) See page [DI-13](#) to confirm the details of the DTC.

**NOTICE:**

When simulating symptoms with an OBD II scan tool (excluding TOYOTA hand-held tester) to check the DTC, use the normal mode. For code on the DTC chart subject to "2 trip detection logic", turn the ignition switch OFF after the symptom is simulated the first time. Then repeat the simulation process again. When the problem has been simulated twice, the MIL lights up and the DTC are recorded in the ECM.

**3. Check Mode:****INSPECT DIAGNOSIS****HINT:**

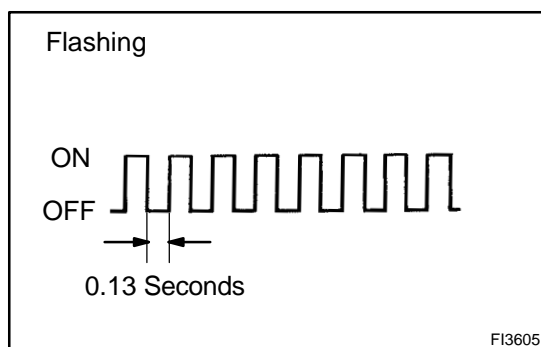
TOYOTA hand-held tester only:

Compared to the normal mode, the check mode has an increased sensitivity to detect malfunctions.

Furthermore, the same diagnostic items which are detected in the normal mode can also be detected in the check mode.

**(a) Check the DTC.****(1) Initial conditions.**

- Battery positive voltage 11V or more.
- Throttle valve fully closed.
- Transmission in "P" or "N" position.
- Air conditioning switched OFF.

**(2) Turn the ignition switch OFF.****(3) Prepare the TOYOTA hand-held tester.****(4) Connect the TOYOTA hand-held tester to DLC3 in the fuse box at the lower left of the instrument panel.****(5) Turn the ignition switch ON and switch the TOYOTA hand-held tester ON.****(6) Switch the TOYOTA hand-held tester normal mode to check mode. (Check that the MIL flashes.)****(7) Switch the engine. (The MIL goes out after the engine start.)****(8) Simulate the conditions of the malfunction described by the customer.****NOTICE:**

**Leave the ignition switch ON until you have checked the DTC, etc.**

**(9) After simulating the malfunction conditions, use the TOYOTA hand-held tester diagnosis selector to check the DTC and freeze frame data, etc.****HINT:**

Take care not to turn the ignition switch OFF. Turning the ignition switch OFF switches the diagnosis system from check mode to normal mode, so all DTC, etc. are erased.

**(10) After checking the DTC, inspect the applicable circuit.**



- (b) Clear the DTC.

The following actions will erase the DTC and freeze frame data.

- (1) Operating the OBD II scan tool (complying with SAE J1978) or TOYOTA hand-held tester to erase the codes. (See the OBD II scan tool's instruction book for operating instructions.)
- (2) Disconnecting the battery terminals or EFI fuse.

**NOTICE:**

**If the TOYOTA hand-held tester switches the ECM from normal mode to check mode or vice-versa, or if the ignition switch is turned from ON to ACC or OFF during check mode, the DTC and freeze frame data will be erased.**

#### 4. FAIL-SAFE CHART

If any of the following codes is recorded, the ECM enters fail-safe mode.

DTC No.	Fail-Safe Operation	Fail-Safe Deactivation Conditions
P0105	Ignition timing fixed at 5° BTDC	Returned to normal condition
P0110	Intake air temp. is fixed at 20°C (68°F)	Returned to normal condition
P0115	Engine coolant temp. is fixed at 80°C (176°F)	Returned to normal condition
P0120	VTA is fixed at 0°	The following condition must be repeated at least 2 times consecutively When closed throttle position switch is ON: 0.1 V · VTA · 0.95 V
P0141	The heater circuit in which an abnormality is detected is turned off	Ignition switch OFF
P0325	Max. timing retardation	Ignition switch OFF
P1300	Fuel cut	IGF signal is detected for 4 consecutive ignitions

#### 5. CHECK FOR INTERMITTENT PROBLEMS

HINT:

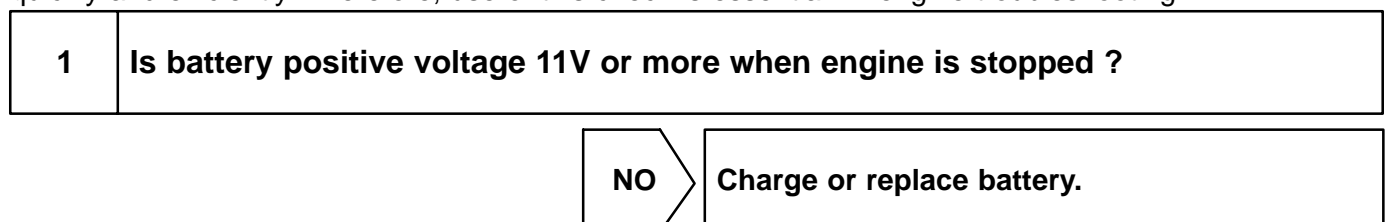
TOYOTA hand-held tester only:

By putting the vehicle's ECM in check mode, 1 trip detection logic is possible instead of 2 trip detection logic and sensitivity to detect open circuits is increased. This makes it easier to detect intermittent problems.

- (a) Clear the DTC (See page [DI-13](#)).
- (b) Set the check mode (See page [DI-13](#)).
- (c) Perform a simulation test (See page [IN-26](#)).
- (d) Check the connector and terminal (See page [IN-26](#)).
- (e) Handle the connector (See page [IN-26](#)).

#### 6. BASIC INSPECTION

When the malfunction code is not confirmed in the DTC check, troubleshooting should be performed in the order for all possible circuits to be considered as the causes of the problems. In many cases, by carrying out the basic engine check shown in the following flow chart, the location causing the problem can be found quickly and efficiently. Therefore, use of this check is essential in engine troubleshooting.



YES

**2 Is engine cranked ?**

NO

Proceed to **ST-13** , **ST-28** , **ST-31** and continue to troubleshoot.

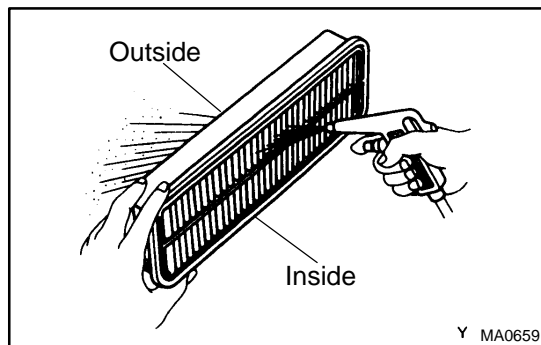
YES

**3 Does engine start ?**

NO

Go to step 7.

YES

**4 Check air filter.****PREPARATION:**

Remove the air filter.

**CHECK:**

Visual check that the air cleaner element is not excessively dirty or oily.

**HINT:**

If necessary, clean the filter with compressed air. First blow from inside thoroughly, then blow from outside of filter.

NG

Repair or replace.

OK

**5 Check engine idle speed.****PREPARATION:**

- (a) Warm up engine to normal operating temperature.
- (b) Switch off all accessories.
- (c) Switch off air conditioning.
- (d) Shift transmission into "N" position.

- (e) Remove the fuse cover on the instrument panel.
- (f) Connect the OBD II scan tool or TOYOTA hand-held tester to DLC3 on the vehicle.

**CHECK:**

Use CURRENT DATA to check the engine idle speed.

**OK:**

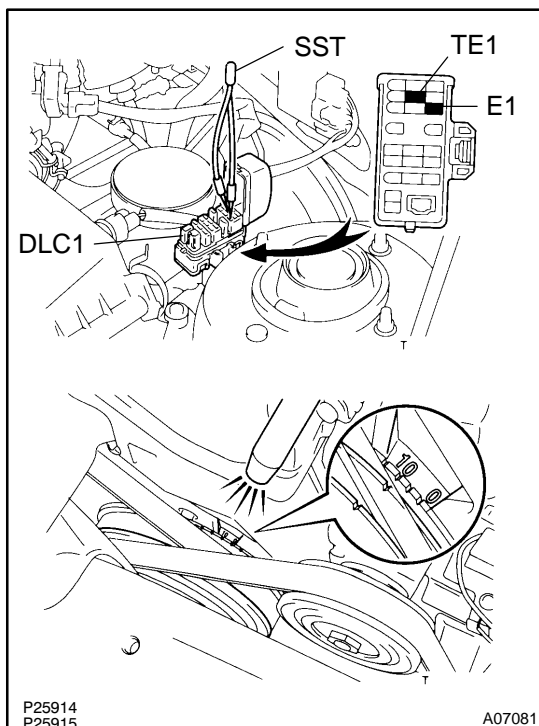
Idle speed: 700 - 800 rpm

**NG**

Proceed to matrix chart of problem symptoms on page [DI-19](#).

**OK**

**6 Check ignition timing.**

**PREPARATION:**

- (a) Warm up engine to normal operating temperature.
- (b) Shift transmission into "N" position.
- (c) Keep the engine speed at idle.
- (d) Using SST, connect terminals TE1 and E1 of DLC1.  
SST 09843-18020
- (e) Using a timing light, connect the tester to No.1 high-tension cord.

**CHECK:**

Check ignition timing.

**OK:**

Ignition timing: 10° BTDC at idle

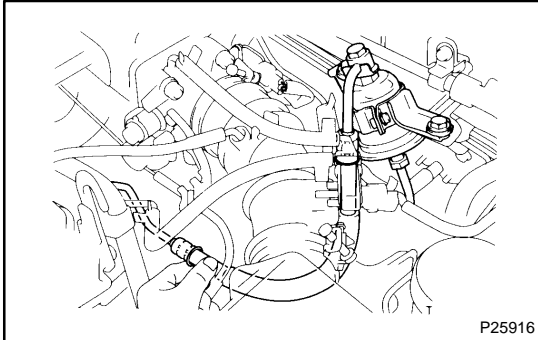
**NG**

Proceed to page [IG-1](#) and continue to troubleshoot.

**OK**

Proceed to matrix chart of problem symptoms on page [DI-19](#).

## 7 Check fuel pressure.



### PREPARATION:

- Be sure that enough fuel is in the tank.
- Turn ignition switch ON.
- Remove the fuse cover on the instrument panel.
- Connect the TOYOTA hand-held tester to DLC3 on the vehicle.
- Use ACTIVE TEST mode to operate the fuel pump.
- If you have no TOYOTA hand-held tester, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector (See page [MF-1](#)).

### CHECK:

Check for fuel pressure in the inlet hose when it is pinched off.

### HINT:

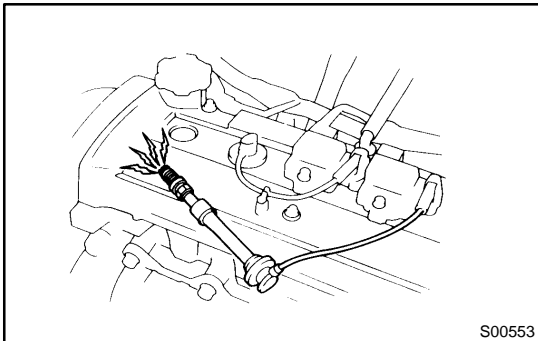
At this time, you will hear a fuel flowing noise.

NG

Proceed to page [MF-1](#) and continue to trouble-shoot.

OK

## 8 Check for spark.



### PREPARATION:

- Disconnect the high-tension cord from spark plug or remove the ignition coil.
- Remove spark plug.
- Install the spark plug to high-tension cord or ignition coil.
- Disconnect injector connector.
- Ground the spark plug.

### CHECK:

Check if spark occurs while engine is being cranked.

### NOTICE:

To prevent excess fuel being injected from the injectors during this test, do not crank the engine for more than 5 – 10 seconds at a time.

NG

Proceed to page [IG-1](#) and continue to trouble-shoot.

OK

Proceed to matrix chart of problem symptoms on page [DI-19](#).

## 7. ENGINE OPERATING CONDITION

### NOTICE:

The values given below for "Normal Condition" are representative values, so a vehicle may still be normal even if its value from those listed here. So do not decide whether a part is faulty or not solely according to the "Normal Condition" here.

### CARB mandated signals:

TOYOTA hand-held tester display	Measurement Item	Normal Condition*
FUEL SYS #1	Fuel System Bank 1 OPEN: Air-fuel ratio feedback stopped CLOSED: Air-fuel ratio feedback operating	Idling after warming up: CLOSED
CALC LOAD	Calculator Load: Current intake air volume as a proportion of max. intake air volume	Idling: 19.7 - 47.4 % Racing without load (2,500rpm): 18.8 - 46.4 %
COOLANT TEMP.	Engine Coolant Temp. Sensor Value	After warming up: 80 - 95°C (176 - 203°F)
SHORT FT #1	Short-term Fuel Trim Bank 1	0 ± 20%
LONG FT #1	Long-term Fuel Trim Bank 1	0 ± 20%
ENGINE SPD	Engine Speed	Idling: 700 - 800 rpm
VEHICLE SPD	Vehicle Speed	Vehicle Stopped: 0 km/h (0 mph)
IGN ADVANCE	Ignition Advance: Ignition Timing of Cylinder No. 1	Idling: BTDC 7 - 14°
INTAKE AIR	Intake Air Temp. Sensor Value	Equivalent to Ambient Temp.
MAP	Absolute Pressure Inside Intake Manifold	Idling: 20 - 48 kPa Racing without load (2,500 rpm): 19 - 47 kPa
THROTTLE POS	Voltage Output of Throttle Position Sensor Calculated as a percentage: 0 V → 0%, 5 V → 100%	Throttle Fully Closed: 6 - 16 % Throttle Fully Open: 64 - 98 %
O2S B1, S1	Voltage Output of Heated Oxygen Sensor Bank 1, Sensor 1	Idling: 0.1 - 0.9 V
O2FT B1, S1	Oxygen Sensor Fuel Trim Bank 1, Sensor 1 (Same as SHORT FT #1)	0 ± 20 %
O2S B1, S2	Voltage Output of Oxygen Sensor Bank 1, Sensor 2	Driving at 50 km/h (31 mph): 0.1 - 0.9 V

\*: If no conditions are specifically stated for "Idling", it means the shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.

**TOYOTA Enhanced Signals:**

TOYOTA hand-held tester display	Measurement Item	Normal Condition*
MISFIRE RPM	Engine RPM for first misfire range	Misfire 0: 0 rpm
MISFIRE LOAD	Engine load for first misfire range	Misfire 0: 0 g/r
INJECTOR	Fuel injection time for cylinder No.1	Idling: 2.66 - 3.9 ms
IAC DUTY RATIO	Intake Air Control Valve Duty Ratio Opening ratio rotary solenoid type IAC valve	Idling: 25.5 - 43 %
STARTER SIG	Starter Signal	Cranking: ON
CTP SIG	Closed Throttle Position Signal	Throttle Fully Closed: ON
A/C SIG	A/C Switch Signal	A/C ON: ON
PNP SW	Park/Neutral Position Switch Signal	P or N position: ON
FC IDL	Fuel Cut Idle: Fuel cut when throttle valve fully closed, during deceleration	Fuel cut operating: ON
FC TAU	Fuel Cut TAU: Fuel cut during very light load	Fuel cut operating: ON
CYL#1, CYL#2, CYL#3, CYL#4	Abnormal revolution variation for each cylinder	0%
IGNITION	Total number of ignition for every 1,000 revolutions	0 - 2,000 rpm
FUEL PUMP	Fuel Pump Signal	Idling: ON
TOTAL FT B1	Total Fuel Trim Bank 1: Average value for fuel trim system of bank 1	Idling: 0.8 - 1.2 V
O2 LR B1, S1	Oxygen Sensor Lean Rich Bank 1, Sensor 1 Response time for oxygen sensor output to switch from lean to rich.	Idling after warmed up: 0 - 1,000 msec.
O2 RL B1, S1	Oxygen Sensor Rich Lean Bank 1, Sensor 1 Response time for oxygen sensor output to switch from rich to lean.	Idling after warmed up: 0 - 1,000 msec.

\*: If no conditions are specifically stated for "Idling", it means the shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.

## DIAGNOSTIC TROUBLE CODE CHART

### HINT:

Parameters listed in the chart may not be exactly the same as your reading due to the type of instrument or other factors.

If a malfunction code is displayed during the DTC check in check mode, check the circuit for that code listed in the table below, for details of each code, turn to the page referred to under the "See page " for the respective "DTC No." in the DTC chart.

### SAE Controlled:

DTC No. (See Page)	Detection Item	Trouble Area	MIL*	Memory
P0105 (DI-20)	Manifold Absolute Pressure/Barometric Pressure Circuit Malfunction	<input type="radio"/> Open or short in manifold absolute pressure sensor circuit <input type="radio"/> Manifold absolute pressure sensor <input type="radio"/> ECM		
P0106 (DI-23)	Manifold Absolute Pressure/Barometric Pressure Circuit Range/Performance Problem	<input type="radio"/> Manifold absolute pressure sensor		
P0110 (DI-24)	Intake Air Temp. Circuit Malfunction	<input type="radio"/> Open or short in intake air temp. sensor circuit <input type="radio"/> Intake air temp. sensor <input type="radio"/> ECM		
P0115 (DI-28)	Engine Coolant Temp. Circuit Malfunction	<input type="radio"/> Open or short in engine coolant temp. sensor circuit <input type="radio"/> Engine coolant temp. sensor <input type="radio"/> ECM		
P0116 (DI-32)	Engine Coolant Temp. Circuit Range/Performance Problem	<input type="radio"/> Engine coolant temp. sensor <input type="radio"/> Cooling system		
P0120 (DI-33)	Throttle/Pedal Position Sensor/Switch "A" Circuit Malfunction	<input type="radio"/> Open or short in throttle position sensor circuit <input type="radio"/> Throttle position sensor <input type="radio"/> ECM		
P0121 (DI-37)	Throttle/Pedal Position Sensor/Switch "A" Circuit Range/Performance Problem	<input type="radio"/> Throttle position sensor		
P0125 (DI-38)	Insufficient Coolant Temp. for Closed Loop Fuel Control	<input type="radio"/> Open or short in oxygen sensor circuit <input type="radio"/> Oxygen sensor		
P0130 (DI-41)	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 1)	<input type="radio"/> Heated oxygen sensor <input type="radio"/> Fuel trim malfunction		
P0133 (DI-44)	Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1)	<input type="radio"/> Oxygen sensor		
P0136 (DI-45)	Heated Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	<input type="radio"/> Heated oxygen sensor		
P0141 (DI-47)	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)	<input type="radio"/> Open or short in heater circuit of heated oxygen sensor <input type="radio"/> Heated oxygen sensor heater <input type="radio"/> ECM		

\*: . . . MIL lights up

DTC No. (See Page)	Detection Item	Trouble Area	MIL*	Memory
P0171 (DI-49)	System too Lean (Fuel Trim)	<input type="radio"/> Air intake (hose loose) <input type="radio"/> Fuel line pressure <input type="radio"/> Injector blockage <input type="radio"/> Oxygen sensor malfunction <input type="radio"/> Manifold absolute pressure sensor <input type="radio"/> Engine coolant temp. sensor		
P0172 (DI-49)	System too Rich (Fuel Trim)	<input type="radio"/> Fuel line pressure <input type="radio"/> Injector blockage, leak <input type="radio"/> Oxygen sensor malfunction <input type="radio"/> Manifold absolute pressure sensor <input type="radio"/> Engine coolant temp. sensor		
P0300 (DI-52)	Random/Multiple Cylinder Misfire Detected	<input type="radio"/> Ignition system <input type="radio"/> Injector <input type="radio"/> Fuel line pressure <input type="radio"/> Compression pressure <input type="radio"/> Valve clearance not to specification <input type="radio"/> Valve timing <input type="radio"/> Manifold absolute pressure sensor <input type="radio"/> Engine coolant temp. sensor		
P0301 P0302 P0303 P0304 (DI-52)	Misfire Detected - Cylinder 1 - Cylinder 2 - Cylinder 3 - Cylinder 4			
P0325 (DI-57)	Knock Sensor 1 Circuit Malfunction	<input type="radio"/> Open or short in knock sensor 1 circuit <input type="radio"/> Knock sensor 1 (looseness) <input type="radio"/> ECM		
P0335 (DI-60)	Crankshaft Position Sensor Circuit "A" Malfunction	<input type="radio"/> Open or short in crankshaft position sensor circuit <input type="radio"/> Crankshaft position sensor <input type="radio"/> Starter <input type="radio"/> ECM		
P0340 (DI-63)	Camshaft Position Sensor Circuit Malfunction	<input type="radio"/> Open or short in camshaft position sensor circuit <input type="radio"/> Camshaft position sensor <input type="radio"/> Starter <input type="radio"/> ECM		
P0420 (DI-73)	Catalyst System Efficiency Below Threshold	<input type="radio"/> Three-way catalytic converter <input type="radio"/> Open or short in (heated) oxygen sensor circuit <input type="radio"/> (Heated) oxygen sensor		
P0500 (DI-76)	Vehicle Speed Sensor Malfunction	<input type="radio"/> Open or short in vehicle speed sensor circuit <input type="radio"/> Vehicle speed sensor <input type="radio"/> Speedometer cable <input type="radio"/> ECM		
P0505 (DI-78)	Idle Control System Malfunction	<input type="radio"/> IAC valve is stuck or closed <input type="radio"/> Open or short in IAC valve circuit <input type="radio"/> Open or short in AC1 switch circuit <input type="radio"/> Air intake (hose loose)		

\*: . . . MIL lights up

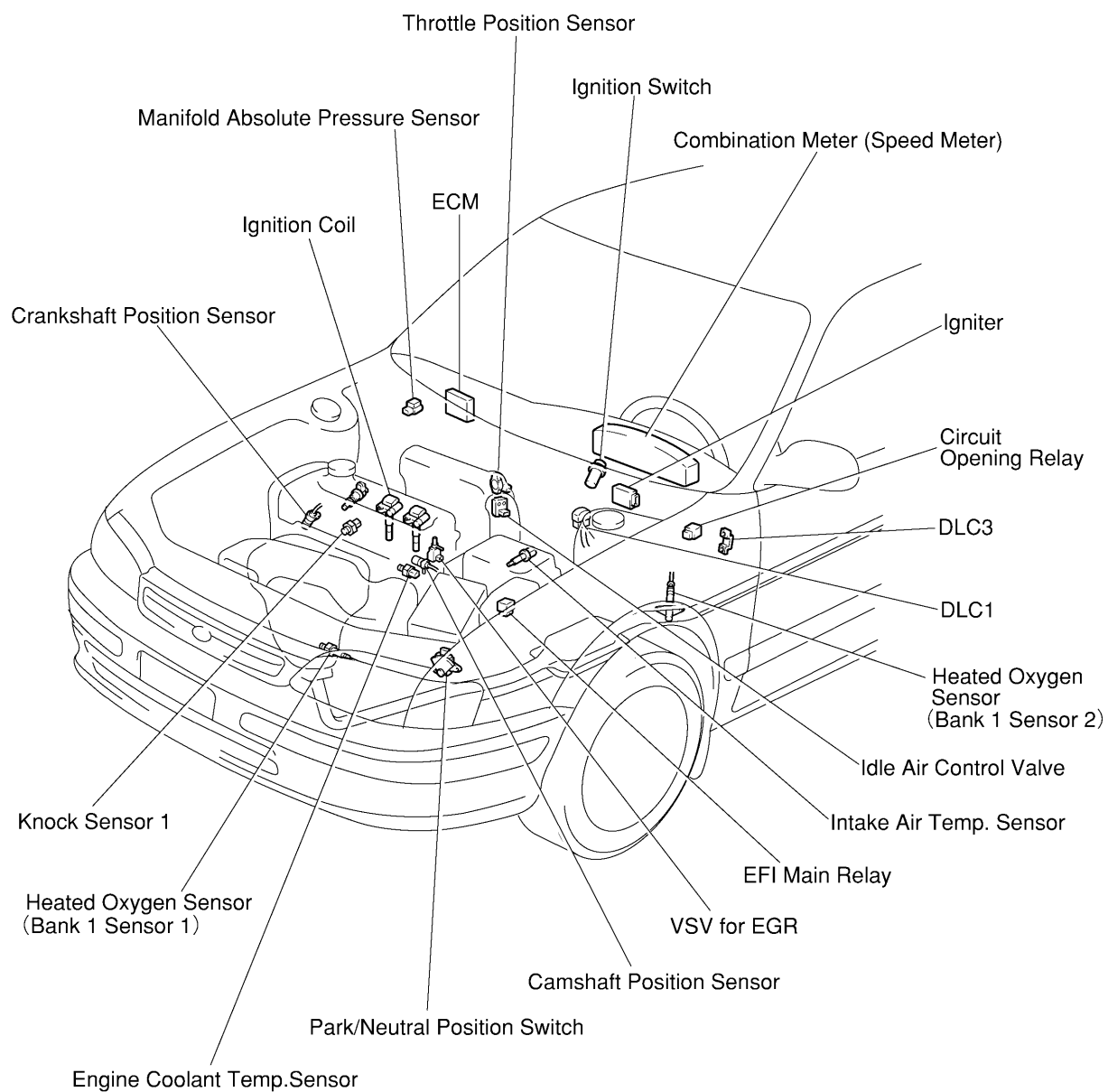


**Manufacturer Controlled:**

DTC No. (See Page)	Detection Item	Trouble Area	MIL*	Memory
P1300 (DI-84)	Igniter Circuit Malfunction	<input type="radio"/> Open or short in IGF or IGT circuit from igniter to ECM <input type="radio"/> Igniter <input type="radio"/> ECM		
P1335 (DI-89)	Crankshaft Position Sensor Circuit Malfunction (during engine running)	<input type="radio"/> Open or short in crankshaft position sensor circuit <input type="radio"/> Crankshaft position sensor <input type="radio"/> ECM	-	
P1600 (DI-92)	ECM BATT Malfunction	<input type="radio"/> Open in back up power source circuit <input type="radio"/> ECM		
P1780 (DI-94)	Park/Neutral Position Switch Malfunction	<input type="radio"/> Short in park/neutral position switch circuit <input type="radio"/> Park/neutral position switch <input type="radio"/> ECM		

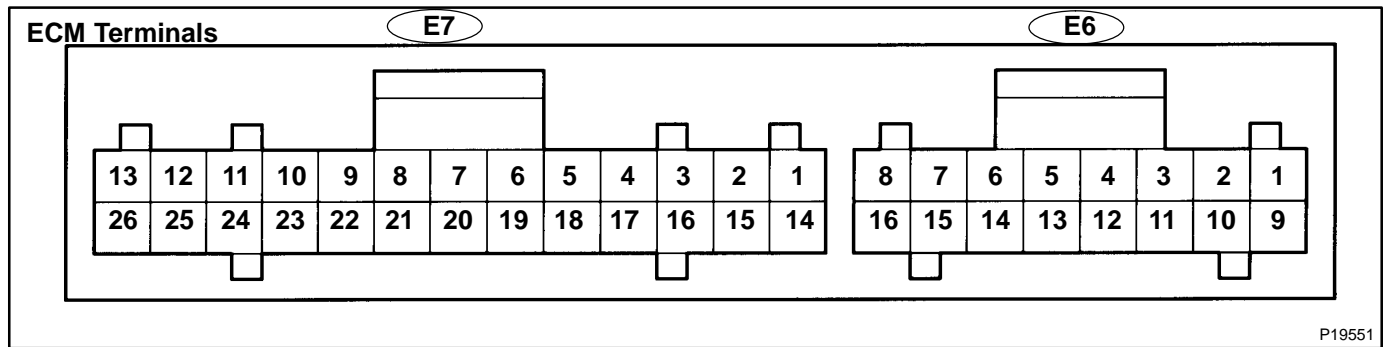
\*:-     . . . MIL does not light up  
          . . . MIL lights up

## PARTS LOCATION



A15676

# TERMINALS OF ECM



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
BATT (E6-2) - E1 (E7-24)	W-R - BR	Always	9 - 14
+B (E6-9) - E1 (E7-24)	B-R - BR	IG switch ON	9 - 14
VC (E7-18) - E2 (E7-16)	LG-R - BR	IG switch ON	4.5 - 5.5
VTA (E7-19) - E2 (E7-16)	Y-G - BR	IG switch ON Throttle valve fully closed	0.3 - 1.0
		IG switch ON Throttle valve fully open	3.2 - 4.9
PIM (E7-4) - E2 (E7-16)	P - BR	IG switch ON	3.3 - 3.9
		Apply vacuum 26.7 kPa (200 mmHg, 7.9 in.Hg)	2.5 - 3.1
THA (E7-15) - E2 (E7-16)	L-B - BR	Idling, Intake air temp. 20°C (68° F)	0.5 - 3.4
THW (E7-3) - E2 (E7-16)	G-B - BR	Idling, Engine coolant temp. 80°C (176°F)	0.2 - 1.0
STA (E7-11) - E1 (E7-24)	B-W - BR	Cranking	6.0 or more
#10 (E7-12) - E01 (E7-13)	G - BR	IG switch ON	9 - 14
		Idling	Pulse generation (See page <a href="#">DI-52</a> )
#20 (E7-11) - E01 (E7-13)	Y - BR	IG switch ON	9 - 14
		Idling	Pulse generation (See page <a href="#">DI-52</a> )
#30 (E7-25) - E01 (E7-13)	R - BR	IG switch ON	9 - 14
		Idling	Pulse generation (See page <a href="#">DI-52</a> )
#40 (E7-24) - E01 (E7-13)	L - BR	IG switch ON	9 - 14
		Idling	Pulse generation (See page <a href="#">DI-52</a> )
IGT1 (E7-6) - E1 (E7-24)	LG - BR	Idling	Pulse generation (See page <a href="#">DI-84</a> )
IGT2 (E7-5) - E1 (E7-24)	L-Y - BR	Idling	Pulse generation (See page <a href="#">DI-84</a> )
IGF (E7-7) - E1 (E7-24)	LG-B - BR	IG switch ON, Disconnect igniter connector	4.5 - 5.5
		Idling	Pulse generation (See page <a href="#">DI-84</a> )
G2 (E7-20) - NE- (E7-9)	R - W	Idling	Pulse generation (See page <a href="#">DI-60</a> )
NE (E7-21) - NE- (E7-9)	B - W	Idling	Pulse generation (See page <a href="#">DI-60</a> )
FC (E6-4) - E1 (E7-24)	G-B - BR	IG switch ON	9 - 14

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
RSC (E7-1) - E1 (E7-24)	L-R - BR	IG switch ON Disconnect "E7" of ECM connector	9 - 14
RSO (E7-14) - E1 (E7-24)	L - BR	IG switch ON Disconnect "E7" of ECM connector	9 - 14
OX1 (E7-10) - E1 (E7-24)	B - BR	Maintain engine speed at 2,500 rpm for 2 minutes. after warming up	Pulse generation
OX2 (E7-23) - E1 (E7-24)	W - BR	Maintain engine speed at 2,500 rpm for 2 minutes. after warming up	Pulse generation
HT1 (E6-6) - E03 (E7-26)	W-L - BR	Idling	Below 3.0
		IG switch ON	9 - 14
HT2 (E6-5) - E03 (E7-26)	W-R - BR	Idling	Below 3.0
		IG switch ON	9 - 14
KNK (E7-8) - E1 (E7-24)	B - BR	Idling	Pulse generation (See page <a href="#">DI-57</a> )
NSW (E7-2) - E1 (E7-24)	(M/T)	IG switch ON Other shift position in "P" or "N" position	9 - 14
		IG switch ON Shift position in "P" or "N" position	0 - 3.0
NSW (E7-2) - E1 (E7-24)	(A/T)	IG switch ON Other shift position in "P" or "N" position	9 - 14
		IG switch ON Shift position in "P" or "N" position	0 - 3.0
SPD (E6-13) - E1 (E7-24)	Y - BR	IG switch ON Rotate driving wheel slowly	Pulse generation (See page <a href="#">DI-76</a> )
TE1 (E6-8) - E1 (E7-24)	G - BR	IG switch ON	9 - 14
W (E6-10) - E1 (E7-24)	GR-L - BR	Idling	9 - 14
		IG switch ON	Below 3.0
AC1 (E6-12) - E1 (E7-24)	LG-B - BR	Idling, A/C switch ON	Below 2.0
		Idling, A/C switch OFF	9 - 14
ACT (E6-14) - E1 (E7-24)	L - BR	Idling, A/C switch ON	9 - 14
		Idling, A/C switch OFF	Below 2.0
ODSW (E6-3) - E1 (E7-24)	R-W - BR	IG switch ON, O/D main switch pushed out	9 - 14
		IG switch ON, O/D main switch pushed in	0 - 3.0
ODT (E6-11) - E1 (E7-24)	R - BR	IG switch ON, O/D main switch pushed out	9 - 14
		IG switch ON, O/D main switch pushed in	0 - 3.0

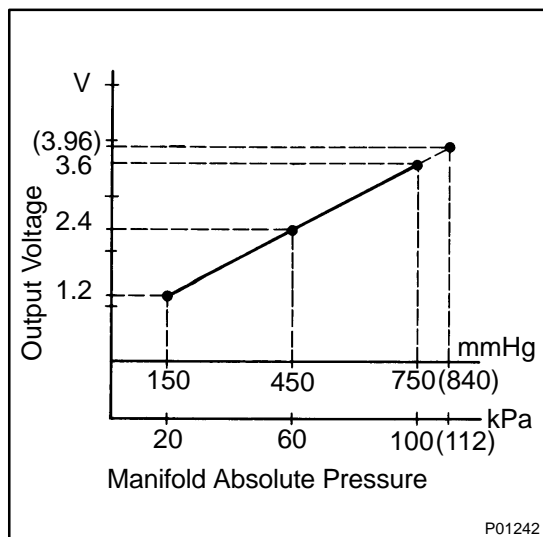
## PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Does not start (Engine does not crank)	1. Starter and starter relay	<a href="#">ST-13</a> <a href="#">ST-31</a>
Does not start (No combustion)	1. ECM power source circuit 2. Fuel pump control circuit	<a href="#">DI-97</a> <a href="#">DI-100</a>
Does not start (No complete combustion)	1. Fuel pump control circuit	<a href="#">DI-100</a>
Difficult to start (Engine cranks normally)	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	<a href="#">DI-90</a> <a href="#">DI-100</a> <a href="#">EM-3</a>
Difficult to start (Cold engine)	1. Starter signal circuit 2. Fuel pump control circuit	<a href="#">DI-90</a> <a href="#">DI-100</a>
Difficult to start (Hot engine)	1. Starter signal circuit 2. Fuel pump control circuit	<a href="#">DI-90</a> <a href="#">DI-100</a>
Poor idling (High engine idle speed)	1. A/C signal circuit 2. ECM power source circuit	<a href="#">AC-66</a> <a href="#">DI-97</a>
Poor idling (Low engine idle speed)	1. A/C signal circuit 2. Fuel pump control circuit	<a href="#">AC-66</a> <a href="#">DI-100</a>
Poor idling (Rough idling)	1. Compression 2. Fuel pump control circuit	<a href="#">EM-3</a> <a href="#">DI-100</a>
Poor idling (Hunting)	1. ECM power source circuit 2. Fuel pump control circuit	<a href="#">DI-97</a> <a href="#">DI-100</a>
Poor driveability (Hesitation/Poor acceleration)	1. Fuel pump control circuit 2. A/T faulty (A132L) A/T faulty (A242L) 3. A/C cut control circuit	<a href="#">DI-100</a> <a href="#">AX-10</a> <a href="#">AX-13</a> <a href="#">DI-106</a>
Poor driveability (Surging)	1. Fuel pump control circuit	<a href="#">DI-100</a>
Engine stall (Soon after starting)	1. Fuel pump control circuit	<a href="#">DI-100</a>
Engine stall (During A/C operation)	1. A/C signal circuit 2. Engine control module (ECM)	<a href="#">AC-66</a> <a href="#">IN-26</a>

## CIRCUIT INSPECTION

<b>DTC</b>	<b>P0105</b>	<b>Manifold Absolute Pressure/Barometric Pressure Circuit Malfunction</b>
------------	--------------	---

### CIRCUIT DESCRIPTION



By a built-in sensor unit, the manifold absolute pressure sensor detects the intake manifold pressure as a voltage. The ECM then determines the basic injection duration and basic injection advance angle based on this voltage. Since the manifold absolute pressure sensor does not use the atmospheric pressure as a criterion, but senses the absolute pressure inside the intake manifold (the pressure in proportion to the present absolute vacuum 0), it is not influenced by fluctuations in the atmospheric pressure due to high altitude and other factors. This permits it to control the air-fuel ratio at the proper level under all conditions.

DTC No.	DTC Detection Condition	Trouble Area
P0105	Open or short manifold absolute pressure sensor circuit	<ul style="list-style-type: none"> <li>● Open or short in manifold absolute pressure sensor circuit</li> <li>● Manifold absolute pressure sensor</li> <li>● ECM</li> </ul>

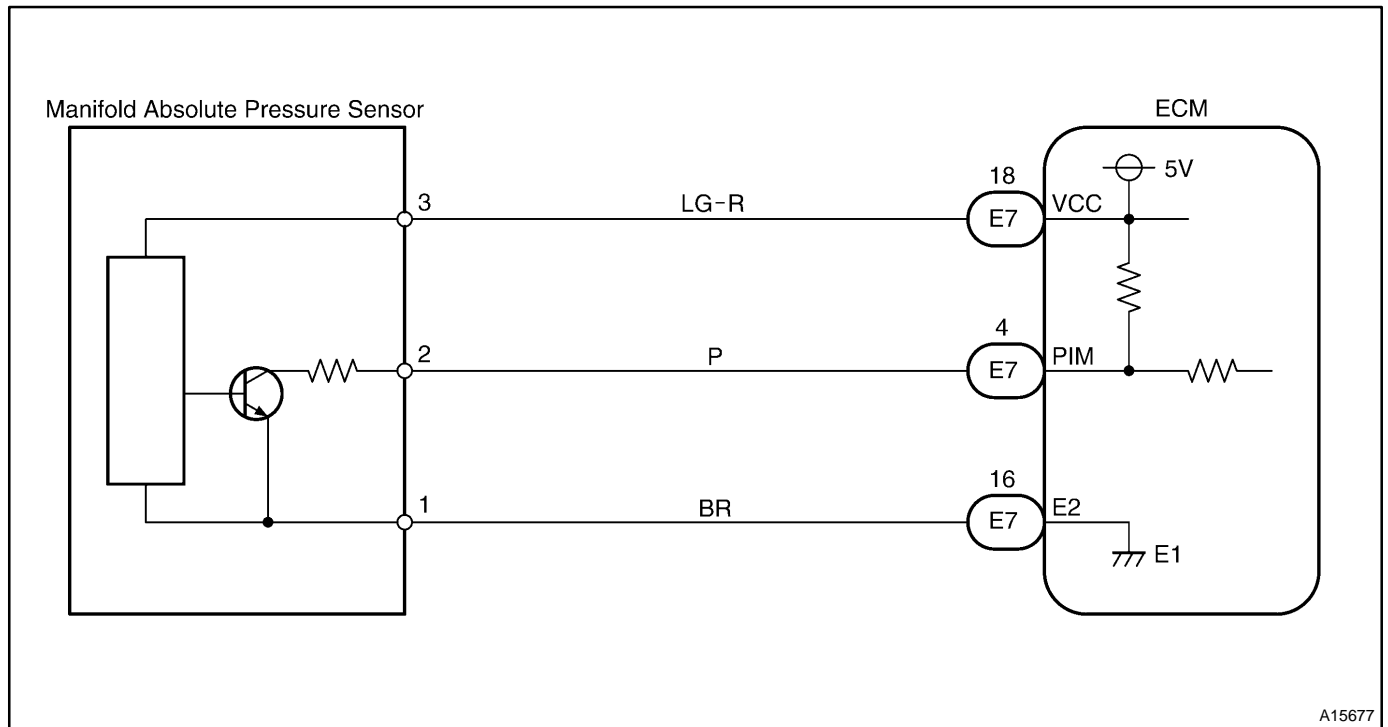
If the ECM detects DTC P0105, it operates the fail-safe function, keeping the ignition timing and injection volume constant and making it possible to drive the vehicle.

#### HINT:

After confirming DTC P0105, use the OBDII scan tool or TOYOTA hand-held tester to confirm the manifold absolute pressure from the CURRENT DATA.

Manifold absolute pressure	Trouble Area
0 kPa	PIM circuit short
130 kPa or more	VC circuit open or short PIM circuit open E2 circuit open

## WIRING DIAGRAM



## INSPECTION PROCEDURE

### HINT:

If DTC P0105, P0110, P0115, P0120 are output simultaneously, E2 (sensor ground) may be open.

1	Connect OBD II scan tool or TOYOTA hand-held tester, and read value of manifold absolute pressure.
---	--

### PREPARATION:

- Remove the fuse cover on the instrument panel.
- Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.
- Turn the ignition switch ON and OBDII scan tool or TOYOTA hand-held tester main switch ON.

### CHECK:

Read value of manifold absolute pressure on the OBD II scan tool or TOYOTA hand-held tester.

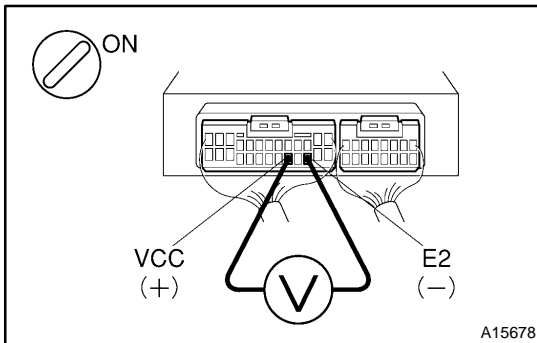
### OK:

Same value as the atmospheric pressure

OK

Check for intermittent problems (See page [DI-3](#) ).

NG

**2 Check voltage between terminals VC and E2 of ECM connector.****PREPARATION:**

- (a) Remove the lower finish panel.
- (b) Turn the ignition switch ON.

**CHECK:**

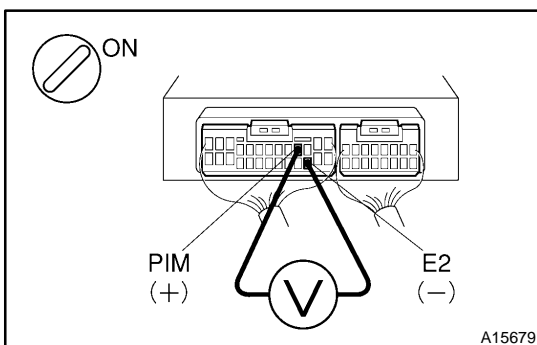
Measure the voltage between terminals VC and E2 of the ECM connector.

**OK:**

**Voltage: 4.5 - 5.5 V**

**NG**

**Check and replace ECM (See page [IN-26](#) ).**

**OK****3 Check voltage between terminals PIM and E2 of ECM connector.****PREPARATION:**

- (a) Remove the lower finish panel.
- (b) Turn ignition switch ON.

**CHECK:**

Measure voltage between terminals PIM and E2 of ECM connector.

**OK:**

**Voltage: 3.3 - 3.9 V**

**OK**

**Check and replace ECM (See page [IN-26](#) ).**

**NG****4 Check for open and short in harness and connector between manifold absolute pressure sensor and ECM.****NG**

**Repair or replace harness or connector.**

**OK**

**Replace manifold absolute pressure sensor.**



<b>DTC</b>	<b>P0106</b>	<b>Manifold Absolute Pressure/Barometric Pressure Circuit Range/Performance Problem</b>
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## CIRCUIT DESCRIPTION

Refer to DTC P0105 on page [DI-20](#) .

DTC No.	DTC Detection Condition	Trouble Area
P0106	Conditions (a) and (b) continue with engine speed 400 - 1,000 rpm: (2 trip detection logic) (a) Closed throttle position switch: ON (b) Manifold absolute pressure sensor output > 3.0 V	●Manifold absolute pressure sensor

## WIRING DIAGRAM

Refer to DTC P0105 on page [DI-20](#) .

## INSPECTION PROCEDURE

HINT:

If DTC P0105 and P0106 are output simultaneously, manifold absolute pressure sensor circuit may be open. Perform troubleshooting of DTC P0105 first.

<b>1</b>	<b>Are there any other codes (besides DTC P0106) being output?</b>
----------	--

**YES**

Go to relevant DTC chart.

**NO**

<b>2</b>	<b>Check manifold absolute pressure sensor (See page <a href="#">MF-48</a> ).</b>
----------	---

**NG**

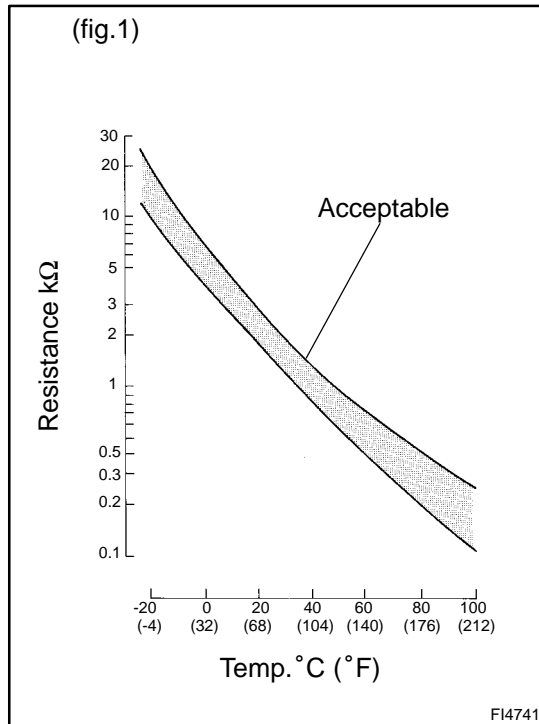
Replace manifold absolute pressure sensor.

**OK**

Check vacuum line for manifold absolute pressure sensor for blockage.

<b>DTC</b>	<b>P0110</b>	<b>Intake Air Temp. Circuit Malfunction</b>
------------	--------------	---

## CIRCUIT DESCRIPTION



The intake air temperature sensor is built into the air cleaner cap and senses the intake air temperature. A thermistor built in the sensor changes the resistance value according to the intake air temperature. The lower the intake air temperature, the greater the thermistor resistance value, and the higher the intake air temperature, the lower the thermistor resistance value (See Fig. 1). The intake air temperature sensor is connected to the ECM (See next page). The 5 V power source voltage in the ECM is applied to the intake air temperature sensor from the terminal THA via a resistor R. That is, the resistor R and the intake air temp. sensor are connected in series. When the resistance value of the intake air temperature sensor changes in accordance with changes in the intake air temperature, the potential at terminal THA also changes. Based on this signal, the ECM increases the fuel injection volume to improve driveability during cold engine operation.

If the ECM detects the DTC "P0110", it operates the fail-safe function in which the intake air temperature is assumed to be 20° (68°F).

### Reference

Intake air temp. °C (°F)	Resistance (kΩ)	Voltage (V)
-20 (-4)	16.2	4.3
0 (32)	5.9	3.4
20 (68)	2.5	2.4
40 (104)	1.1	1.5
60 (140)	0.6	0.9
80 (176)	0.3	0.5
100 (212)	0.2	0.3

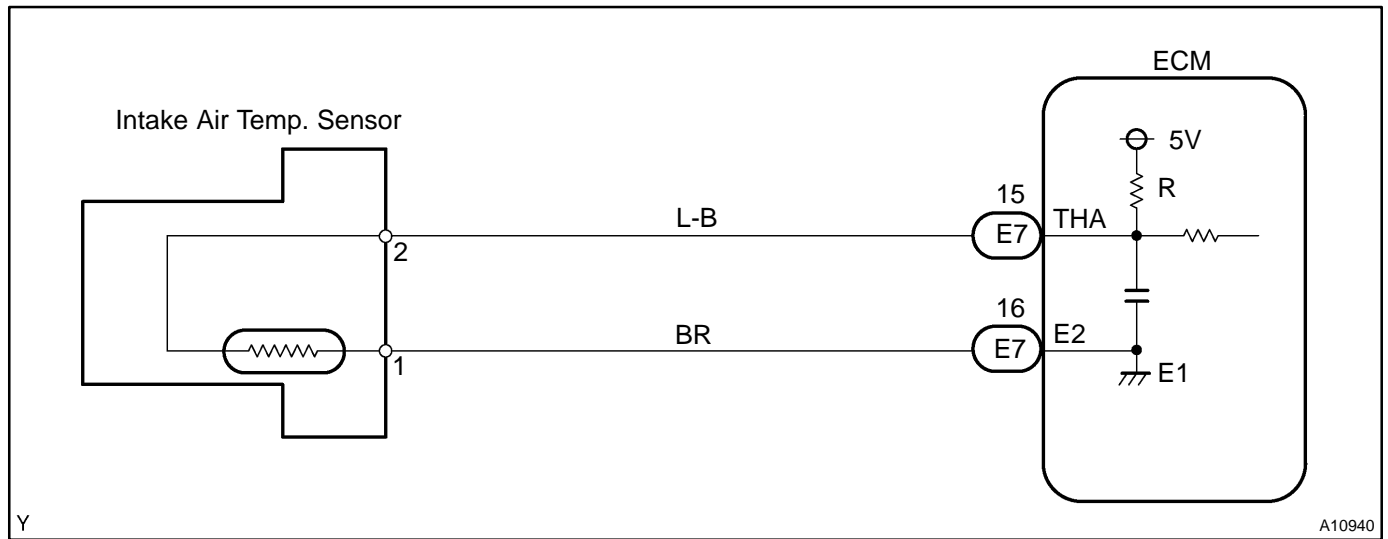
DTC No.	DTC Detecting Condition	Trouble Area
P0110	Open or short in intake air temp. sensor circuit	<ul style="list-style-type: none"> <li>● Open or short in intake air temp. sensor circuit</li> <li>● Intake air temp. sensor</li> <li>● ECM</li> </ul>

### HINT:

After confirming DTC P0110, use the OBD II scan tool or TOYOTA hand-held tester to confirm the intake air temperature from the CURRENT DATA.

Temperature Displayed	Malfunction
-40 °C (-40 °F)	Open circuit
140 °C (284 °F) or more	Short circuit

## WIRING DIAGRAM



## INSPECTION PROCEDURE

HINT:

If DTC P0105, P0106, P0110, P0115, P0120 are output simultaneously, E2 (sensor ground) may be open.

<b>1</b>	<b>Connect OBD II scan tool or TOYOTA hand-held tester, and read value of intake air temperature.</b>
----------	---

### PREPARATION:

- Remove the fuse cover on the instrument panel.
- Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.
- Turn the ignition switch ON and OBD II scan tool or TOYOTA hand-held tester main switch ON.

### CHECK:

Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

### OK:

**Same value as the actual intake air temperature.**

HINT:

- If there is open circuit, OBD II scan tool or TOYOTA hand-held tester indicates  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ).
- If there is short circuit, OBD II scan tool or TOYOTA hand-held tester indicates  $140^{\circ}\text{C}$  ( $284^{\circ}\text{F}$ ) or more.

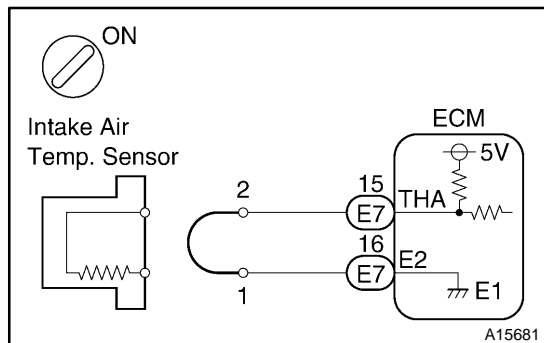
**NG**

**$-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ) ... Go to step 2.  
 $140^{\circ}\text{C}$  ( $284^{\circ}\text{F}$ ) or more ... Go to step 4.**

**OK**

**Check for intermittent problems  
 (See page [DI-3](#)).**

## 2 Check for open in harness or ECM.



### PREPARATION:

- Disconnect the intake air temp. sensor connector.
- Connect sensor wire harness terminals together.
- Turn the ignition switch ON.

### CHECK:

Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

### OK:

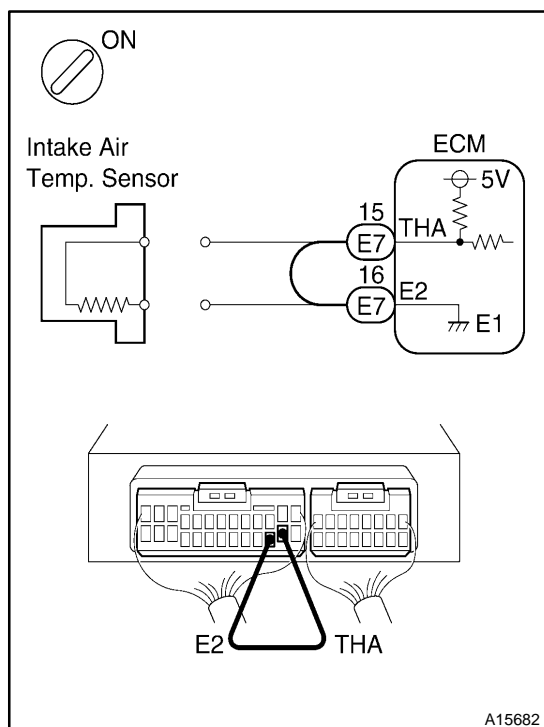
Temperature value: 140°C (284°F) or more

OK

Confirm good connection at sensor.  
If OK, replace intake air temp. sensor.

NG

## 3 Check for open in harness or ECM.



### PREPARATION:

- Remove the lower finish panel.
- Connect terminals THA and E2 of ECM connector together.

### HINT:

Intake air temperature sensor connector is disconnected. Before checking, do a visual and contact pressure check for the ECM connector (See page [IN-26](#)).

- Turn the ignition switch ON.

### CHECK:

Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

### OK:

Temperature value: 140°C (284°F) or more

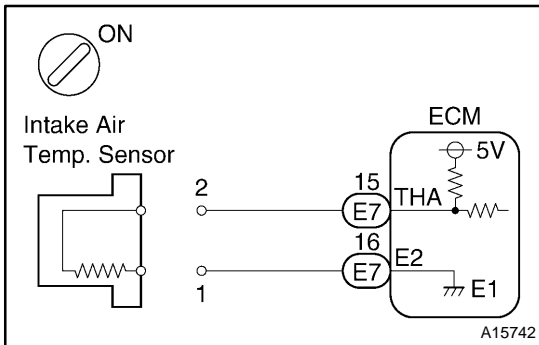
OK

Open in harness between terminal E2 or terminal THA, repair or replace harness.

NG

Confirm good connection at ECM.  
If OK, replace ECM.

#### 4 Check for short in harness and ECM.



##### **PREPARATION:**

- Disconnect the intake air temp. sensor connector.
- Turn the ignition switch ON.

##### **CHECK:**

Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

##### **OK:**

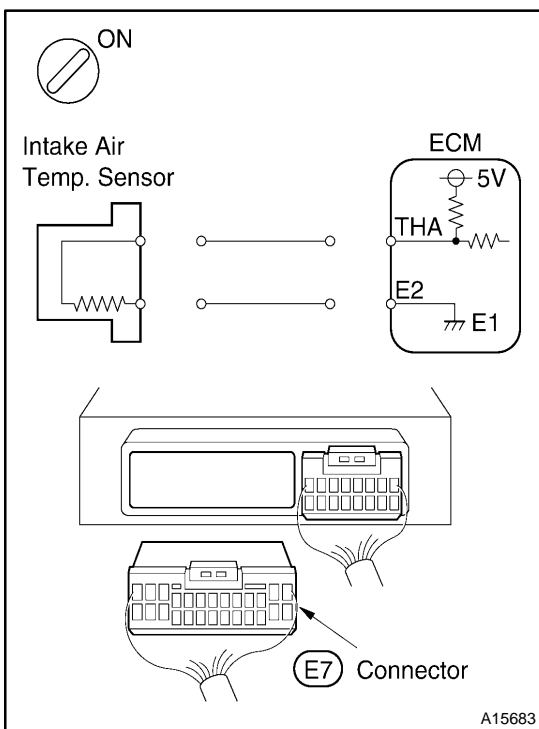
Temperature value:  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ )

**OK**

Replace intake air temp. sensor.

**NG**

#### 5 Check for short in harness or ECM.



##### **PREPARATION:**

- Remove the lower finish panel.
- Disconnect the E7 connector of ECM.

##### **HINT:**

Intake air temperature sensor connector is disconnected.

- Turn the ignition switch ON.

##### **CHECK:**

Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

##### **OK:**

Temperature value:  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ )

**OK**

Repair or replace harness or connector.

**NG**

Check and replace ECM (See page [IN-26](#)).

DTC	P0115	Engine Coolant Temp. Circuit Malfunction
-----	-------	--

CIRCUIT DESCRIPTION

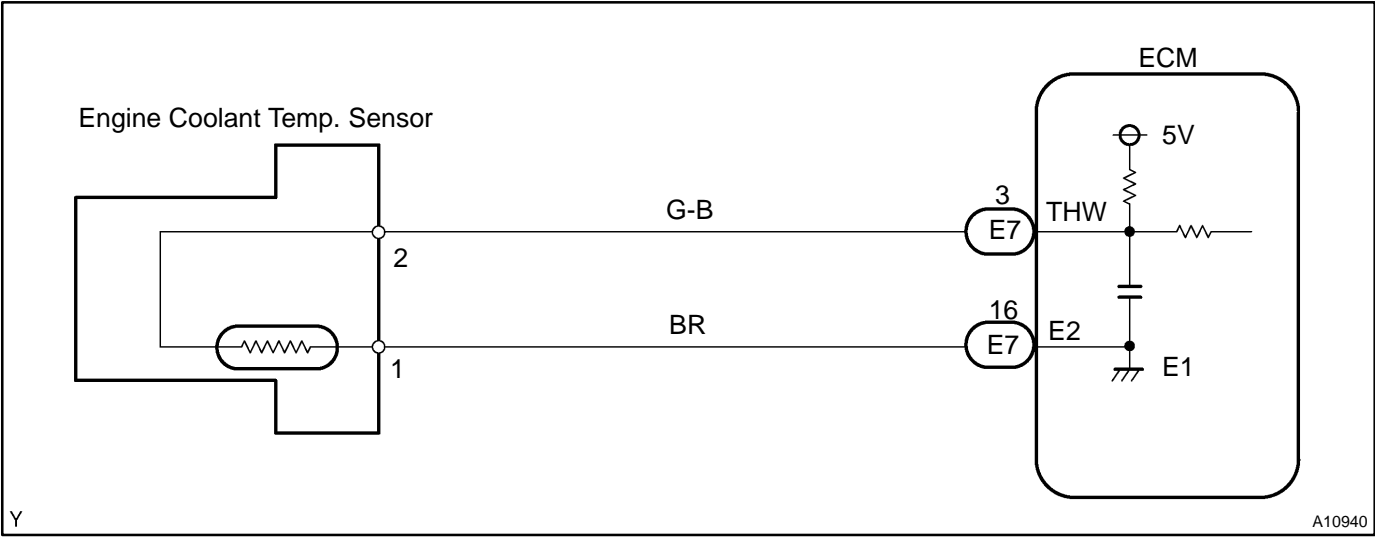
A thermistor built into the engine coolant temperature sensor changes the resistance value according to the engine coolant temperature. The structure of the sensor and connection to the ECM is the same as in the intake air temp. circuit malfunction shown on page [DI-24](#) .  
If the ECM detects the DTC P0115, it operates the fail-safe function in which the engine coolant temp. is assumed to be 80°C (176°F).

DTC No.	DTC Detection Condition	Trouble Area
P0115	Open or short in engine coolant temp. sensor circuit	●Open or short in engine coolant temp. sensor circuit ●Engine coolant temp. sensor ●ECM

HINT:  
After confirming DTC P0115, use the OBD II scan tool or TOYOTA hand-held tester to confirm the engine coolant temperature from the CURRENT DATA.

Temperature Displayed	Malfunction
-40 °C (-40 °F)	Open circuit
140 °C (284 °F) or more	Short circuit

WIRING DIAGRAM



## INSPECTION PROCEDURE

### HINT:

If DTC P0105, P0106, P0110, P0115, P0120 are output simultaneously, E2 (sensor ground) may be open.

<b>1</b>	<b>Connect OBD II scan tool or TOYOTA hand-held tester, and read value of engine coolant temperature.</b>
----------	---

### PREPARATION:

- (a) Remove the fuse cover on the instrument panel.
- (b) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.
- (c) Turn the ignition switch ON and OBD II scan tool or TOYOTA hand-held tester main switch ON.

### CHECK:

Read temperature value on the OBD II scan tool or TOYOTA hand-held tester.

### OK:

**Same value as the actual engine coolant temperature**

### HINT:

- If there is open circuit, OBD II scan tool or TOYOTA hand-held tester indicates  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ).
- If there is short circuit, OBD II scan tool or TOYOTA hand-held tester indicates  $140^{\circ}\text{C}$  ( $284^{\circ}\text{F}$ ) or more.

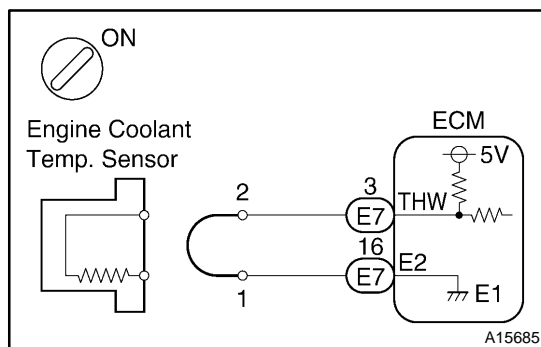
**NG**

**$-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ) ... Go to step 2.  
 $140^{\circ}\text{C}$  ( $284^{\circ}\text{F}$ ) or more ... Go to step 4.**

**OK**

**Check for intermittent problems (See page DI-3).**

<b>2</b>	<b>Check for open in harness or ECM.</b>
----------	--



### PREPARATION:

- (a) Disconnect the engine coolant temp. sensor connector.
- (b) Connect sensor wire harness terminals together.
- (c) Turn the ignition switch ON.

### CHECK:

Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

### OK:

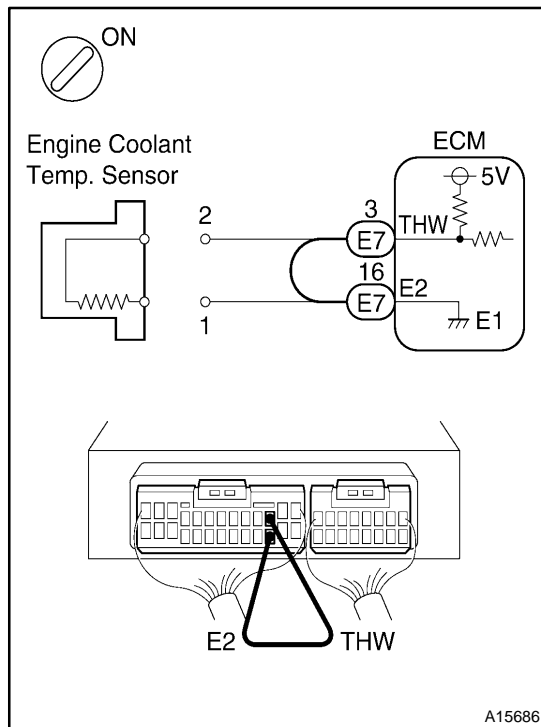
**Temperature value:  $140^{\circ}\text{C}$  ( $284^{\circ}\text{F}$ ) or more**

**OK**

**Confirm good connection at sensor. If OK, replace engine coolant temp. sensor**

**NG**

### 3 Check for open in harness or ECM.



#### PREPARATION:

- Remove the lower finish panel.
- Connect terminals THW and E2 of ECM connector together.

#### HINT:

Engine coolant temperature sensor connector is disconnected. Before checking, do a visual and contact pressure check for the ECM connector (See page [IN-26](#)).

- Turn the ignition switch ON.

#### CHECK:

Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

#### OK:

Temperature value: 140°C (284°F) or more

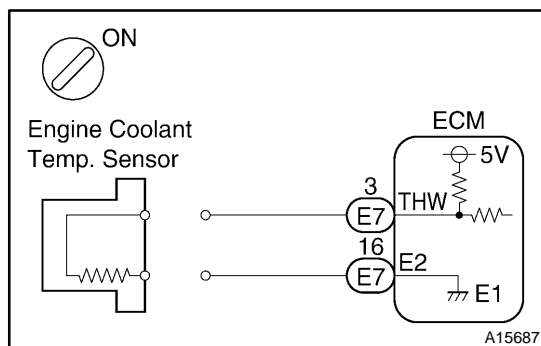
OK

Open in harness between terminal E2 or terminal THW, repair or replace harness.

NG

Confirm good connection at ECM.  
If OK, replace ECM.

### 4 Check for short in harness and ECM.



#### PREPARATION:

- Disconnect the engine coolant temperature sensor connector.
- Turn the ignition switch ON.

#### CHECK:

Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

#### OK:

Temperature value: -40°C (-40°F)

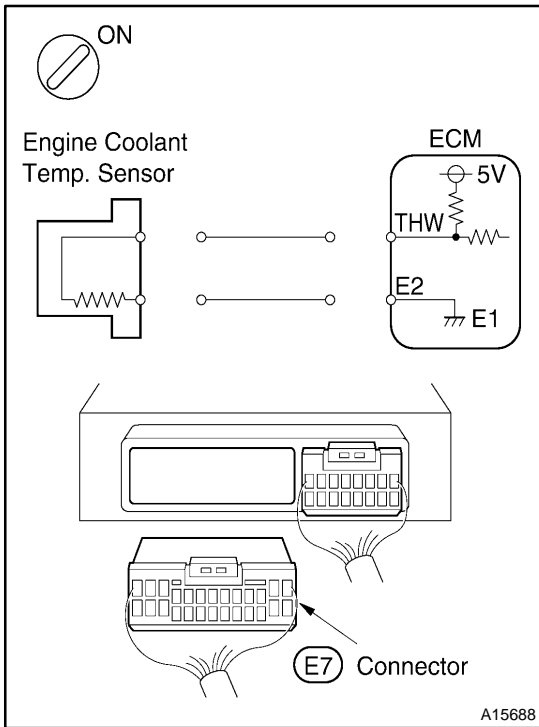
OK

Replace engine coolant temperature sensor.

NG



## 5 Check for short in harness or ECM.



### PREPARATION:

- (a) Remove the lower finish panel.
- (b) Disconnect the E7 connector of ECM.

### HINT:

The engine coolant temperature sensor connector is disconnected.

- (c) Turn the ignition switch ON.

### CHECK:

Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

### OK:

Temperature value: -40°C (-40°F)

OK

Repair or replace harness or connector.

NG

Check and replace ECM (See page [IN-26](#) ).

<b>DTC</b>	<b>P0116</b>	<b>Engine Coolant Temp. Circuit Range/ Performance Problem</b>
------------	--------------	--

## CIRCUIT DESCRIPTION

Refer to Engine Coolant Temp. Circuit Malfunction on page [DI-28](#) .

DTC No.	DTC Detection Condition	Trouble Area
P0116	20 min. or more after the engine starts, engine coolant temp. sensor value is 40°C (104°F) or less (2 trip detection logic)	●Engine coolant temp. sensor ●Cooling system

## INSPECTION PROCEDURE

HINT:

If DTC P0115 and P0116 are output Simultaneously, engine coolant temperature sensor circuit may be open. Perform troubleshooting of DTC P0115 first.

<b>1</b>	<b>Are there any other codes (besides DTC P0116) being output?</b>
----------	--

**YES**

**Go to relevant DTC chart.**

**NO**

<b>2</b>	<b>Check thermostat (See page <a href="#">CO-10</a> ).</b>
----------	--

**NG**

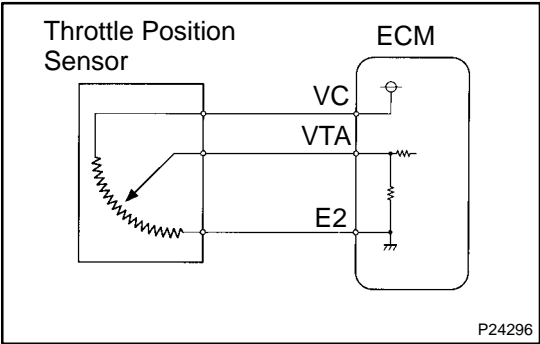
**Replace thermostat.**

**OK**

**Replace engine coolant temp. sensor.**

DTC	P0120	Throttle/Pedal Position Sensor/Switch "A" Circuit Malfunction
-----	-------	--

CIRCUIT DESCRIPTION



The throttle position sensor is mounted in the throttle body and detects the throttle valve opening angle. When the throttle valve is fully closed, a voltage of approximately 0.3 - 0.8 V is applied to terminal VTA of the ECM. The voltage applied to the terminal VTA of the ECM increases in proportion to the opening angle of the throttle valve and becomes approximately 3.2 - 4.9 V when the throttle valve is fully opened. The ECM judges the vehicle driving conditions from these signals input from terminal VTA and uses them as one of the conditions for deciding the air-fuel ratio correction, power increases correction and fuel-cut control etc.

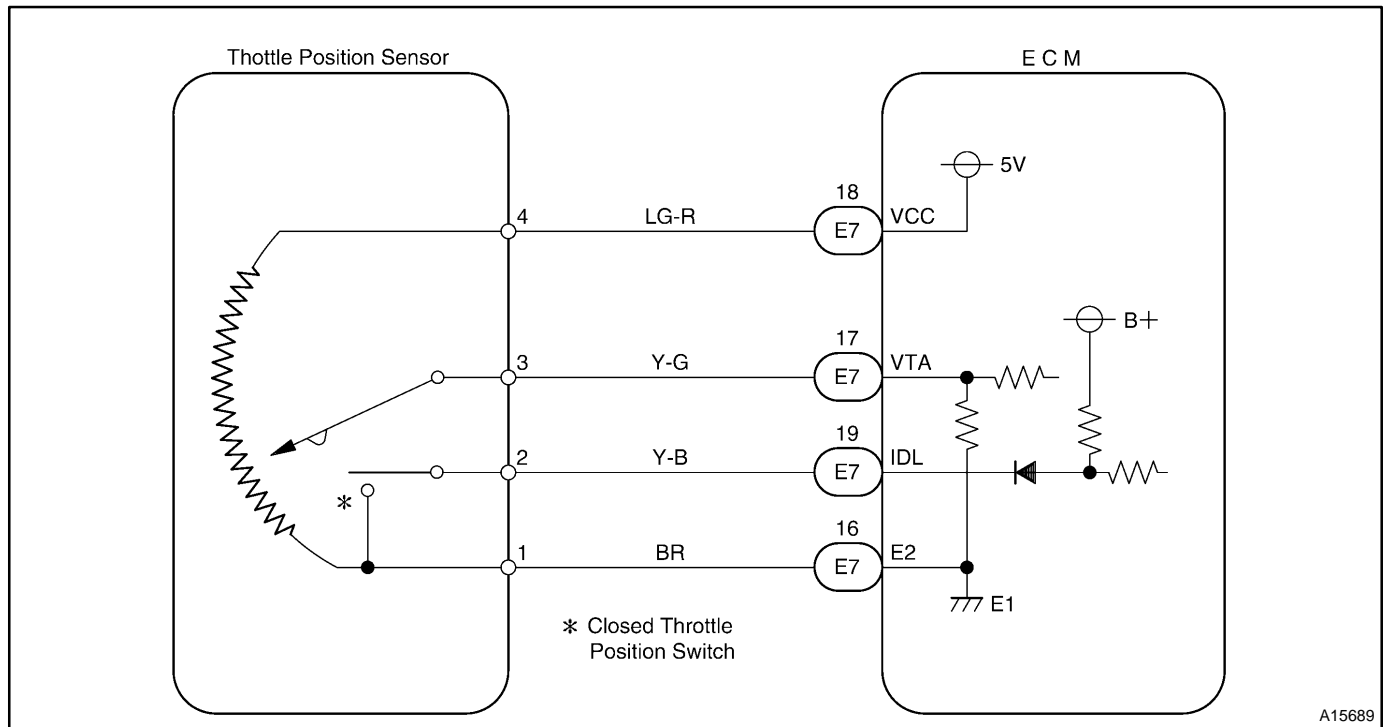
DTC No.	DTC Detection Condition	Trouble Area
P0120	Condition (a) or (b) continues: (a) VTA < 0.1 V (b) VTA > 4.9 V	●Open or short in throttle position sensor circuit ●Throttle position sensor ●ECM

HINT:

After confirming DTC P0120, use the OBD II scan tool or TOYOTA hand-held tester to confirm the throttle valve opening percentage.

Throttle valve opening position expressed as percentage		Trouble Area
Throttle valve fully closed	Throttle valve fully open	
0 %	0 %	VC line open VTA line open or short
100 %	100 %	E2 line open

## WIRING DIAGRAM

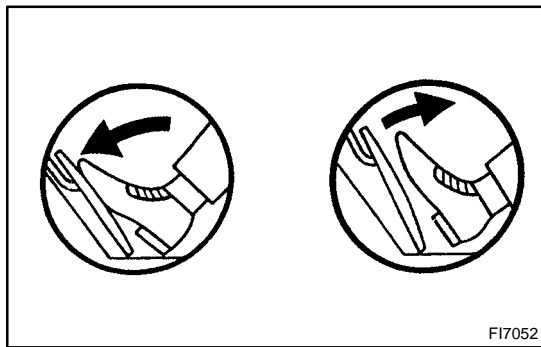


## INSPECTION PROCEDURE

HINT:

If DTC P0105, P0110, P0120 are output simultaneously, E2 (sensor ground) may be open.

- 1 **Connect OBD II scan tool or TOYOTA hand-held tester and read throttle valve opening percentage.**



### PREPARATION:

- (a) Remove the fuse cover on the instrument panel.
- (b) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.
- (c) Turn the ignition switch ON and OBD II scan tool or TOYOTA hand-held tester main switch ON.

### CHECK:

Read the throttle valve opening percentage.

### OK:

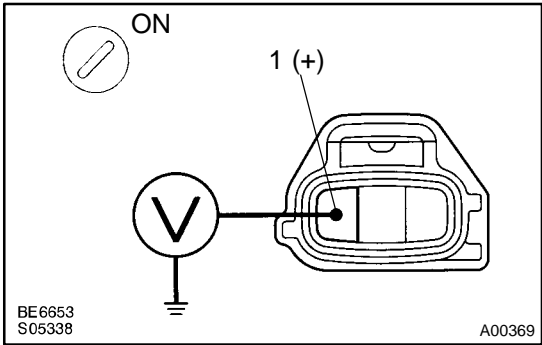
Throttle valve	Throttle valve opening position expressed as percentage
Fully open	Approx. 70 %
Fully closed	Approx. 10 %

OK

**Check for intermittent problems (See page DI-3 ).**

NG

**2 Check voltage between terminal 1 of wire harness side connector and body ground.**



**PREPARATION:**

- (a) Disconnect the throttle position sensor connector.
- (b) Turn the ignition switch ON.

**CHECK:**

Measure the voltage between terminal 1 of wire harness side connector and the body ground.

**OK:**

**Voltage: 4.5 - 5.5 V**

**NG**

**Go to step 5.**

**OK**

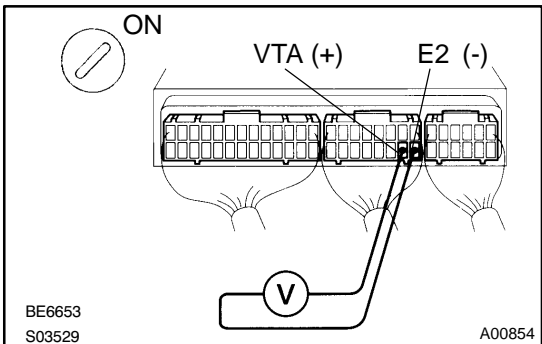
**3 Check throttle position sensor (See page MF-26 ).**

**NG**

**Replace throttle position sensor.**

**OK**

**4 Check voltage between terminals VTA and E2 of ECM connector.**



**PREPARATION:**

- (a) Remove the lower finish panel.
- (b) Turn the ignition switch ON.

**CHECK:**

Measure the voltage between terminals VTA and E2 of the ECM connector.

**OK:**

Throttle Valve	Voltage
Fully closed	0.3 - 1.0 V
Fully open	3.2 - 4.9 V

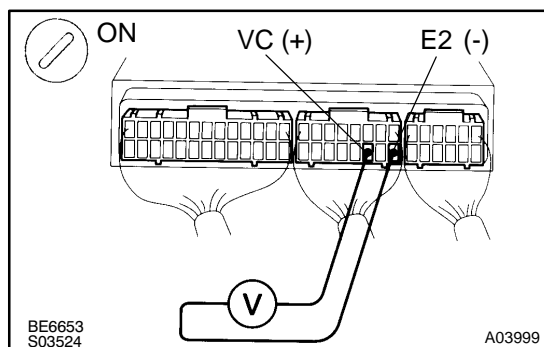
**NG**

**Check for open and short in harness and connector between ECM and throttle position sensor (VTA or E2 line) (See page IN-26 ).**

**OK**

Check and replace ECM (See page [IN-26](#) ).

**5 Check voltage between terminals VC and E2 of ECM connector.**



**PREPARATION:**

- (a) Remove the lower center finish panel.
- (b) Turn the ignition switch ON.

**CHECK:**

Measure the voltage between terminals VC and E2 of the ECM connector.

**OK:**

**Voltage: 4.5 - 5.5 V**

**NG**

Check and replace ECM (See page [IN-26](#) ).

**OK**

Check for open in harness and connector between ECM and sensor (VC line)  
(See page [IN-26](#) ).

<b>DTC</b>	<b>P0121</b>	<b>Throttle/Pedal Position Sensor/Switch "A" Circuit Range/Performance Problem</b>
------------	--------------	--

# CIRCUIT DESCRIPTION

Refer to DTC P0120 on page [DI-32](#) .

DTC No.	DTC Detection Condition	Trouble Area
P0121	While the vehicle speed drops from 30 km/h (19 mph) or more to 0 km/h (0 mph), the output value of the throttle position sensor is out of the applicable range (2 trip detection logic)	● Throttle position sensor

# INSPECTION PROCEDURE

<b>1</b>	<b>Are there any other codes (besides DTC P0121) being output?</b>
----------	--

**YES**

**Go to relevant DTC chart.**

**NO**

**Replace throttle position sensor.**

<b>DTC</b>	<b>P0125</b>	<b>Insufficient Coolant Temp. for Closed Loop Fuel Control</b>
------------	--------------	--

## CIRCUIT DESCRIPTION

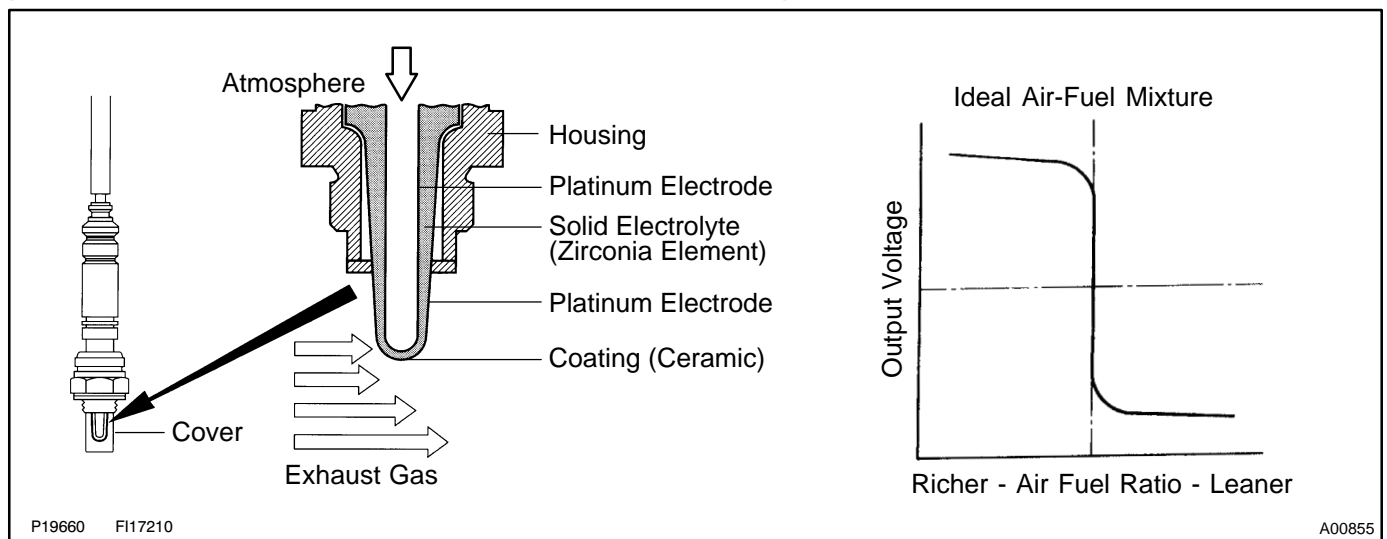
To obtain a high purification rate for the CO, HC and NO<sub>x</sub> components of the exhaust gas, a three-way catalytic converter is used, but for the most efficient use of the three-way catalytic converter, the air-fuel ratio must be precisely controlled so that it is always close to the stoichiometric air-fuel ratio.

The heated oxygen sensor has the characteristic whereby its output voltage changes suddenly in the vicinity of the stoichiometric air-fuel ratio. This characteristic is used to detect the oxygen concentration in the exhaust gas and provide feedback to the computer for control of the air-fuel ratio.

When the air-fuel ratio becomes LEAN, the oxygen concentration in the exhaust increases and the oxygen sensor informs the ECM of the LEAN condition (small electromotive force: 0 V).

When the air-fuel ratio is RICHER than the stoichiometric air-fuel ratio the oxygen concentration in the exhaust gas is reduced and the oxygen sensor informs the ECM of the RICH condition (large electromotive force: 1 V).

The ECM judges by the electromotive force from the oxygen sensor whether the air-fuel ratio is RICH or LEAN and controls the injection time accordingly. However, if malfunction of the oxygen sensor causes output of abnormal electromotive force, the ECM is unable to perform accurate air-fuel ratio control.



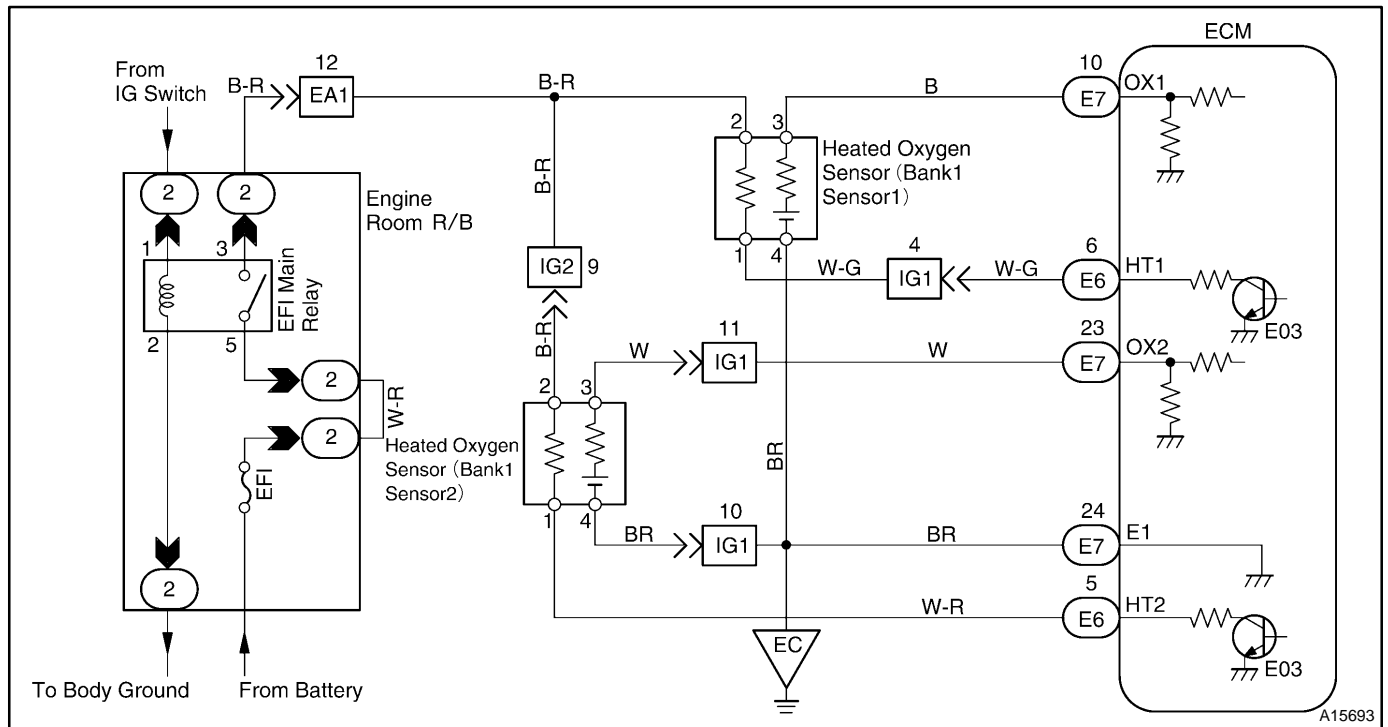
DTC No.	DTC Detection Condition	Trouble Area
P0125	After the engine is warmed up, oxygen sensor output does not indicate RICH even once when conditions (a), (b) and (c) continue for at least 1.5 minutes: (a) Engine speed: 1,500 rpm or more (b) Vehicle speed: 40 - 100 km/h (25 - 62 mph) (c) Throttle valve does not fully closed	<ul style="list-style-type: none"> <li>● Open or short in oxygen sensor circuit</li> <li>● Oxygen sensor</li> </ul>

### HINT:

After confirming DTC P0125, use the OBD II scan tool or TOYOTA hand-held tester to confirm voltage output of the heated oxygen sensor from the CURRENT DATA. If voltage output of the heated oxygen sensor is 0 V, heated oxygen sensor circuit may be open or short.



## WIRING DIAGRAM



## INSPECTION PROCEDURE

- 1 Connect OBD II scan tool or TOYOTA hand-held tester and read value for voltage output of heated oxygen sensor.

### PREPARATION:

- (a) Remove the fuse cover on the instrument panel.
- (b) Connect OBD II scan tool or TOYOTA hand-held tester to the DLC3.
- (c) Warm up the engine to the normal operating temperature.

### CHECK:

Read the voltage output of the heated oxygen sensor (bank 1 sensor 1) when the engine is suddenly raced.

### HINT:

Perform quick racing to 4,000 rpm 3 times using accelerator pedal.

### OK:

Heated oxygen sensor output a RICH signal (0.45 V or more) at least once.

OK

Check and replace ECM (See page [IN-26](#) ).

NG

- 2 Check for open and short in harness and connector between ECM and oxygen sensor (See page [IN-26](#) ).

NG

Repair or replace harness or connector.

**OK**

**Replace oxygen sensor.**

<b>DTC</b>	<b>P0130</b>	<b>Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 1)</b>
------------	--------------	--

**CIRCUIT DESCRIPTION**

Refer to DTC P0125 on page [DI-38](#) .

DTC No.	DTC Detection Condition	Trouble Area
P0130	Voltage output of oxygen sensor remains at 0.4 V or more, or 0.55 V or less, during idling after the engine is warmed up (2 trip detection logic)	●Oxygen sensor ●Fuel trim malfunction

**HINT:**

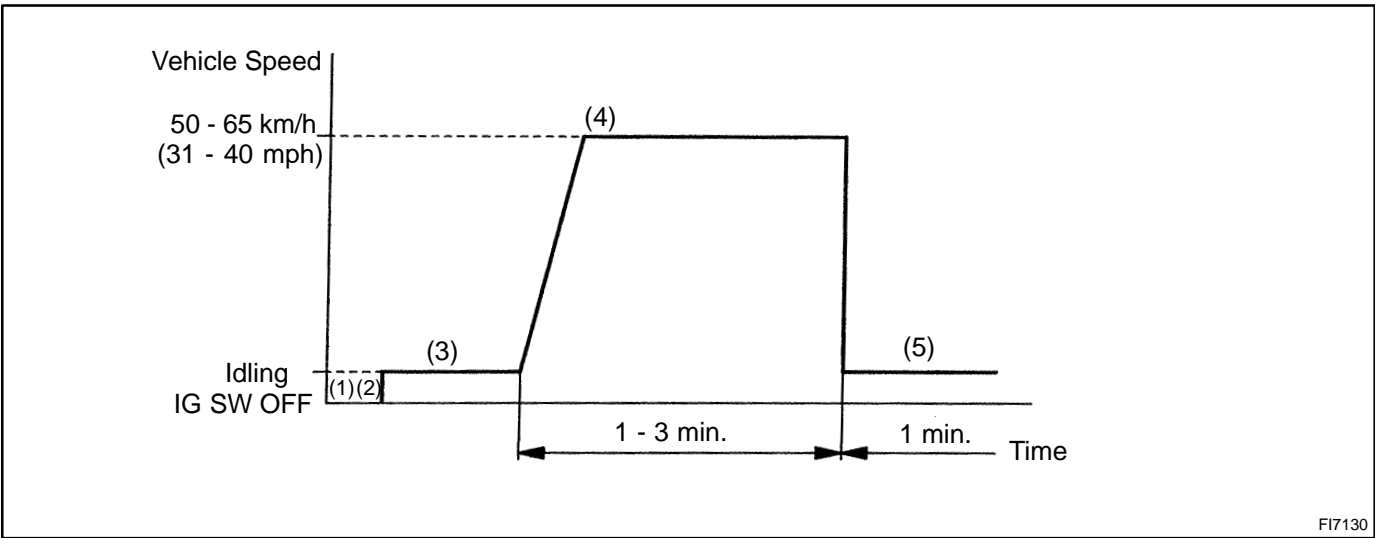
Sensor 1 refers to the sensor closer to the engine body.

The oxygen sensor's output voltage and the short-term fuel trim value can be read using the OBD II scan tool or TOYOTA hand-held tester.

**WIRING DIAGRAM**

Refer to page [DI-38](#) .

**CONFIRMATION DRIVING PATTERN**



- (1) Connect the TOYOTA hand-held tester to the DLC3.
- (2) Switch the TOYOTA hand-held tester from normal mode to check mode (See page [DI-3](#) ).
- (3) Start the engine and warm it up with all accessory switches OFF.
- (4) Drive the vehicle at 50 - 65 km/h (31 - 40 mph) for 1 - 3 minutes to warm up the oxygen sensor.
- (5) Idle the engine for 1 minute.

**HINT:**

If a malfunction exists, the MIL will light up during step (5).

**NOTICE:**

If the conditions in this test are not strictly followed, detection of the malfunction will not be possible. If you do not have a TOYOTA hand-held tester, turn the ignition switch OFF after performing steps (3) to (5), then perform steps (3) to (5) again.

## INSPECTION PROCEDURE

1	Check for open and short in harness and connector between ECM and oxygen sensor (See page <a href="#">IN-26</a> ).
---	--

NG

Repair or replace harness or connector.

OK

2	Check for oxygen sensor data.
---	-------------------------------

### **PREPARATION:**

- (a) Remove the fuse cover on the instrument panel.
- (b) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.
- (c) Warm up engine to normal operating temperature.

### **CHECK:**

Read the oxygen sensor output voltage and short-term fuel trim.

### **RESULT:**

Pattern	Oxygen sensor output voltage	Short-term fuel trim
1	Lean condition (Changes at 0.55 V or less)	Changes at about +20 %
2	Rich condition (Changes at 0.4 V or more)	Changes at about -20 %
3	Except 1 and 2	

1, 2

Check fuel trim system (See page [DI-49](#) ).

3

3	Check output voltage of oxygen sensor during idling.
---	--

**PREPARATION:**

Warm up the oxygen sensor with the engine at 2,500 rpm for approximately 90 seconds.

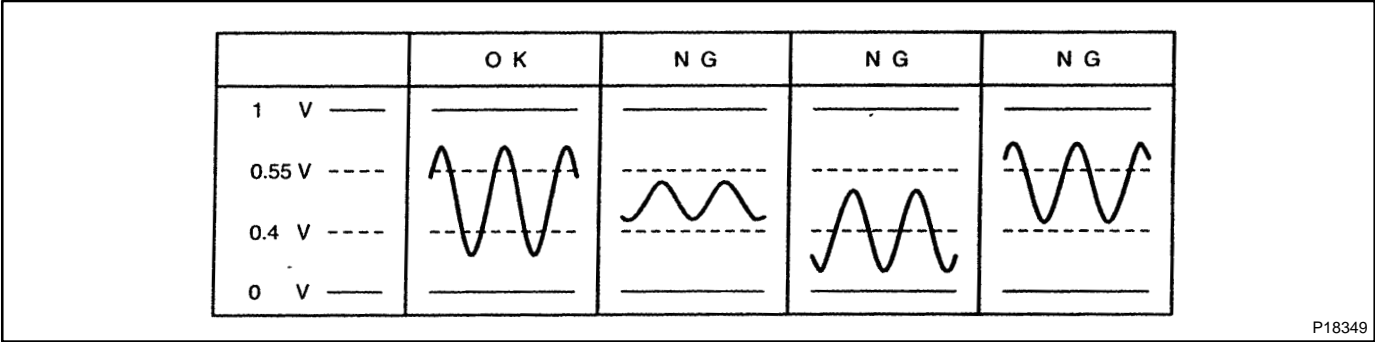
**CHECK:**

Using the OBD II scan tool or TOYOTA hand-held tester, read the output voltage of the oxygen sensor during idling.

**OK:**

Oxygen sensor output voltage:

Alternates repeatedly between approx. 0.4 V and approx. 0.55 V (See these table):



OK

Perform confirmation driving pattern.  
(See page [DI-41](#) )

NG

Replace oxygen sensor.

<b>DTC</b>	<b>P0133</b>	<b>Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1)</b>
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## CIRCUIT DESCRIPTION

Refer to DTC P0125 on page [DI-38](#) .

DTC No.	DTC Detection Condition	Trouble Area
P0133	Response time for oxygen sensor's voltage output to change from rich to lean, or from lean to rich, is 1 sec. or more during idling after the engine is warmed up (2 trip detection logic)	●Oxygen sensor

### HINT:

Sensor 1 refers to the sensor closer to the engine body.

## INSPECTION PROCEDURE

<b>1</b>	<b>Are there any other codes (besides DTC P0133) being output?</b>
----------	--

**YES**

**Go to relevant DTC chart.**

**NO**

**Replace oxygen sensor.**

<b>DTC</b>	<b>P0136</b>	<b>Heated Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)</b>
------------	--------------	---

## CIRCUIT DESCRIPTION

Refer to DTC P0125 on page [DI-38](#) .

DTC No.	DTC Detection Condition	Trouble Area
P0136	Voltage output of the heated oxygen sensor (bank 1 sensor 2) remains at 0.4 V or more, or 0.5 V or less when the vehicle is driven at 50 km/h (31 mph) or more after the engine is warmed up (2 trip detection logic).	●Heated oxygen sensor

HINT:

Sensor 2 refers to the sensor farther away from the engine body.

## WIRING DIAGRAM

Refer to page [DI-38](#) .

## INSPECTION PROCEDURE

<b>1</b>	<b>Are there any other codes (besides DTC P0136) being output?</b>
----------	--

**YES**

**Go to relevant DTC chart.**

**NO**

<b>2</b>	<b>Check for open and short in harness and connector between ECM and heated oxygen sensor (See page <a href="#">IN-26</a> ).</b>
----------	--

**NG**

**Repair or replace harness or connector.**

**OK**

3	Check output voltage of heated oxygen sensor (bank 1 sensor 2).
---	---

**PREPARATION:**

- (a) Remove the fuse cover on the instrument panel.
- (b) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.
- (c) After warming up the engine, race the engine at 2,500 rpm for 3 minutes.

**CHECK:**

Read the output voltage of the heated oxygen sensor (bank 1 sensor 2) when racing the engine after 3 minutes have elapsed.

**OK:**

Heated oxygen sensor output voltage: Alternates from 0.4 V or less to 0.5 V or more.

**OK**

Check that each connector is properly connected.

**NG**

Replace heated oxygen sensor.



<b>DTC</b>	<b>P0135</b>	<b>Heated Oxygen Sensor Heated Circuit Malfunction (Bank 1 Sensor 1)</b>
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<b>DTC</b>	<b>P0141</b>	<b>Heated Oxygen Sensor Heated Circuit Malfunction (Bank 1 Sensor 2)</b>
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## CIRCUIT DESCRIPTION

Refer to DTC P0125 on page [DI-38](#) .

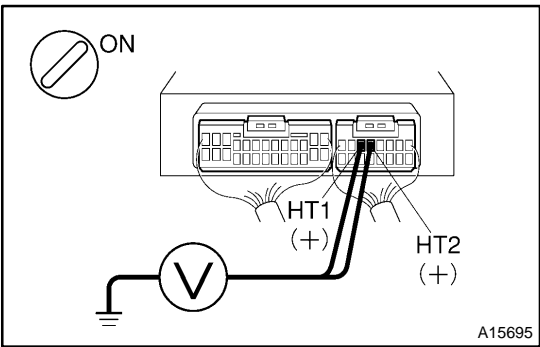
DTC No.	DTC Detection Condition	Trouble Area
P0135	When the heater operates, heater current exceeds 2 A (2 trip detection logic)	●Open or short in heater circuit of heated oxygen sensor
P0141	Heater current of 0.25 A or less when the heater operates (2 trip detection logic)	●Heated oxygen sensor heater ●ECM

## WIRING DIAGRAM

Refer to page [DI-38](#) .

## INSPECTION PROCEDURE

<b>1</b>	<b>Check voltage between terminal HT1, HT2 of ECM connector and body ground.</b>
----------	--



### PREPARATION:

- (a) Remove the lower finish panel.
- (b) Turn the ignition switch ON.

### CHECK:

Measure the voltage between terminal HT1, HT2 of the ECM connector and the body ground.

### OK:

**Voltage: 9 - 14 V**

<b>OK</b>	<b>Check and replace ECM (See page <a href="#">IN-26</a> ).</b>
-----------	---

**NG**

<b>2</b>	<b>Check resistance of heated oxygen sensor heater (See page <a href="#">MF-53</a> ).</b>
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<b>NG</b>	<b>Replace heated oxygen sensor.</b>
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**OK**

**Check and repair harness or connector between EFI main relay and heated oxygen sensor and ECM.**

<b>DTC</b>	<b>P0171</b>	<b>System too Lean (Fuel Trim)</b>
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<b>DTC</b>	<b>P0172</b>	<b>System too Rich (Fuel Trim)</b>
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## CIRCUIT DESCRIPTION

"Fuel" trim refers to the feedback compensation value compared against the basic injection time. Fuel trim includes short-term fuel trim and long-term fuel trim.

"Short-term fuel trim" is the short-term fuel compensation used to maintain the air-fuel ratio at its ideal theoretical value. The signal from the oxygen sensor indicates whether the air-fuel ratio is RICH or LEAN compared to the ideal theoretical value, triggering a reduction in fuel volume if the air-fuel ratio is rich, and an increase in fuel volume if it is lean.

"Long-term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short-term fuel trim from the central value due to individual engine differences, wear over time and changes in the usage environment.

If both the short-term fuel trim and long-term fuel trim are LEAN or RICH beyond a certain value, it is detected as a malfunction and the MIL lights up.

DTC No.	DTC Detection Condition	Trouble Area
P0171	When the air-fuel ratio feedback is stable after engine warming up, the fuel trim is considerably in error on the RICH side (2 trip detection logic)	<ul style="list-style-type: none"> <li>● Air intake (hose loose)</li> <li>● Fuel line pressure</li> <li>● Injector blockage</li> <li>● Heated oxygen sensor malfunction</li> <li>● Manifold absolute pressure sensor</li> <li>● Engine coolant temp. sensor</li> </ul>
P0172	When the air-fuel ratio feedback is stable after engine warming up, the fuel trim is considerably in error on the LEAN side. (2 trip detection logic)	<ul style="list-style-type: none"> <li>● Fuel line pressure</li> <li>● Injector blockage, leak</li> <li>● Heated oxygen sensor malfunction</li> <li>● Manifold absolute pressure sensor</li> <li>● Engine coolant temp. sensor</li> </ul>

### HINT:

- When DTC P0171 is recorded, the actual air-fuel ratio is on the LEAN side. When DTC P0172 is recorded, the actual air-fuel ratio is on the RICH side.
- If the total of the short-term fuel trim value and long-term fuel trim value is within  $\pm 25\%$ , the system is functioning normally.
- If the vehicle runs out of fuel, the air-fuel ratio is LEAN and DTC P0171 is recorded. The MIL then comes on.

**INSPECTION PROCEDURE**

1	Check air induction system (See page <a href="#">MF-1</a> ).
---	--

NG

Repair or replace.

OK

2	Check for heated oxygen sensor data.
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**PREPARATION:**

- (a) Remove the fuse cover on the instrument panel.
- (b) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.
- (c) Warm up engine to normal operating temperature.

**CHECK:**

Read the oxygen sensor output voltage and short-term fuel trim.

**RESULT:**

Pattern	Oxygen sensor output voltage	Short-term fuel trim
1	Lean condition (Changes at 0.55 V or less)	Changes at about + 20 %
2	Rich condition (Changes at 0.4 V or more)	Changes at about - 20 %
3	Except 1 and 2	

3

Check for oxygen sensor  
(See page [DI-41](#) ).

1, 2

3	Check fuel pressure (See page <a href="#">MF-1</a> ).
---	---

NG

Check and repair fuel pump, pressure regulator,  
fuel pipe line and filter. (See page [MF-5](#) )

OK

**4** Check injector injection (See page [MF-19](#) ).

**NG**

Replace injector.

**OK**

**5** Check manifold absolute pressure sensor and engine coolant temp. sensor  
(See page [DI-20](#) , [DI-28](#) ).

**NG**

Repair or replace.

**OK**

**6** Check for spark and ignition (See page [IG-1](#) ).

**NG**

Repair or replace.

**OK**

Check and replace ECM (See page [IN-26](#) ).

<b>DTC</b>	<b>P0300</b>	<b>Random/Multiple Cylinder Misfire Detected</b>
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<b>DTC</b>	<b>P0301</b>	<b>Cylinder 1 Misfire Detected</b>
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<b>DTC</b>	<b>P0302</b>	<b>Cylinder 2 Misfire Detected</b>
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<b>DTC</b>	<b>P0303</b>	<b>Cylinder 3 Misfire Detected</b>
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<b>DTC</b>	<b>P0304</b>	<b>Cylinder 4 Misfire Detected</b>
------------	--------------	------------------------------------

## CIRCUIT DESCRIPTION

Misfire: The ECM uses the crankshaft position sensor and camshaft position sensor to monitor changes in the crankshaft rotation for each cylinder.

The ECM counts the number of times the engine speed change rate indicates that misfire has occurred. And when the misfire rate equals or exceeds the count indicating that the engine condition has deteriorated, the MIL lights up.

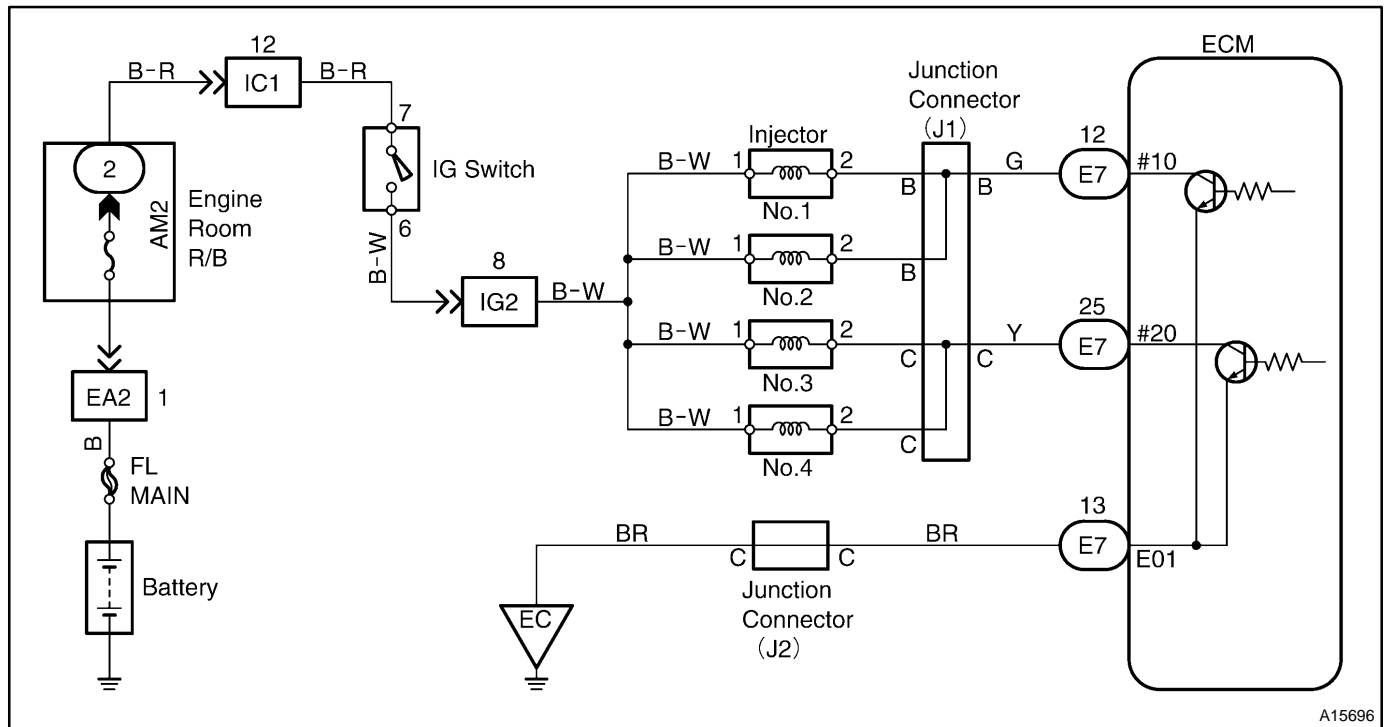
If the misfire rate is high enough and the driving conditions will cause catalyst overheating, the MIL blinks when misfiring occurs.

DTC No.	DTC Detection Condition	Trouble Area
P0300	Misfiring of random cylinders is detected during any particular 200 or 1,000 revolutions	<ul style="list-style-type: none"> <li>● Ignition system</li> <li>● Injector</li> <li>● Fuel line pressure</li> <li>● Compression pressure</li> <li>● Valve clearance not to specification</li> <li>● Valve timing</li> <li>● Manifold absolute pressure sensor</li> <li>● Engine coolant temp. sensor</li> </ul>
P0301	For any particular 200 revolutions of the engine, misfiring is detected which can cause catalyst overheating	
P0302	(This causes MIL to blink)	
P0303	For any particular 1,000 revolutions of the engine, misfiring is detected which causes a deterioration in emissions	
P0304	(2 trip detection logic)	

### HINT:

When the 2 or more codes for a misfiring cylinder are recorded repeatedly but no Random Misfire code is recorded, it indicates that the misfires were detected and recorded at different times.

## WIRING DIAGRAM



A15696

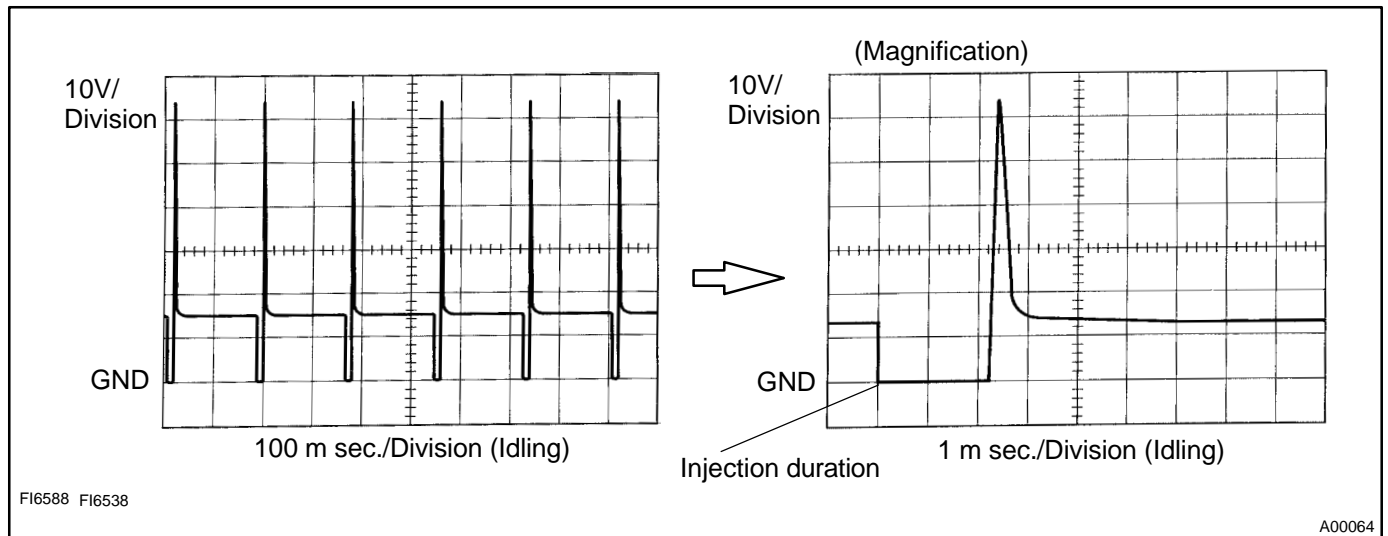
### Reference: INSPECTION USING OSCILLOSCOPE

#### INJECTOR SIGNAL WAVEFORM

With the engine idling, measure between terminals #10, #20 and E01 of ECM.

HINT:

The correct waveform is as shown.

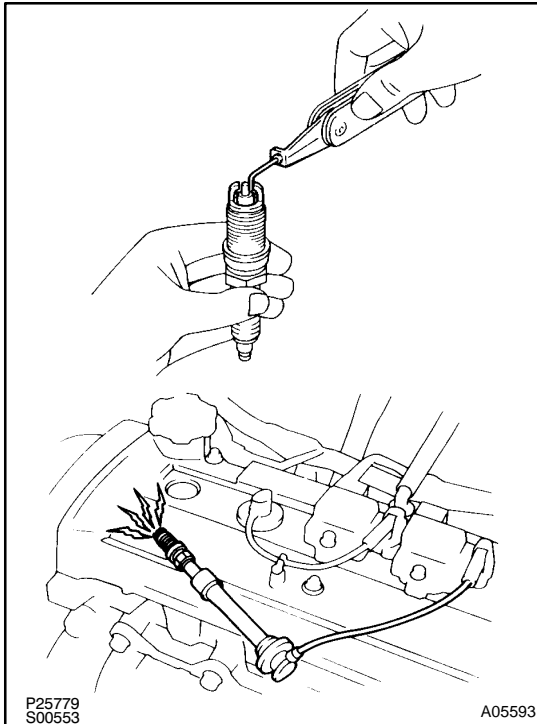


FI6588 FI6538

A00064

## INSPECTION PROCEDURE

1	<b>Check spark plug and spark of misfiring cylinder.</b>
---	--

**PREPARATION:**

- (a) Disconnect the high-tension cord or ignition coil.
- (b) Remove the spark plug.

**CHECK:**

- (a) Check plug type.
- (b) Check for carbon deposits on electrode.
- (c) Check electrode gap.

**OK:**

**(1) Twin ground electrodes type.**

**Recommended spark plug:**

**ND: K16TR11**

**NGK: BKR5EKB-11**

**(2) No large carbon deposit present.**

**Not wet with gasoline or oil.**

**(3) Electrode gap: 1.0 - 1.1 mm (0.039 - 0.043 in.)**

**PREPARATION:**

- (a) Install the spark plug to the high-tension cord or ignition coil.
- (b) Disconnect the injector connector.
- (c) Ground the spark plug.

**CHECK:**

Check if spark occurs while engine is being cranked.

**NOTICE:**

**To prevent excess fuel being injected from the injectors during this test, do not crank the engine for more than 5 - 10 seconds at a time.**

**OK:**

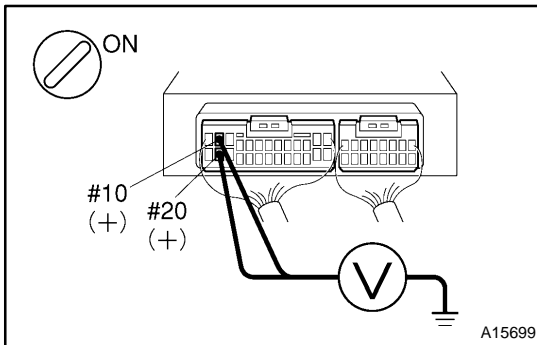
**Spark jumps across electrode gap.**

**NG**

**Replace or check ignition system (See page IG-1).**

**OK**



**2 Check voltage of ECM terminals for injector of failed cylinder.****PREPARATION:**

- (a) Remove the lower finish panel.
- (b) Turn the ignition switch ON.

**CHECK:**

Measure the voltage between applicable terminals of the ECM connector and the body ground.

**OK:**

Voltage: 9 - 14 V

OK

Go to step 4.

NG

**3 Check injector resistance of misfiring cylinder (See page MF-16 ).**

NG

Replace injector.

OK

Check for open and short in harness and connector between injector and ECM (See page IN-26 ).

**4 Check fuel pressure (See page MF-1 ).**

NG

Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page MF-5 ).

OK

**5 Check injector injection (See page MF-16 ).**

NG

Replace injector.

OK

6 Check EGR system (See page [EC-8](#)).

NG

Replace injector.

OK

7 Check manifold absolute pressure sensor and engine coolant temp. sensor (See page [DI-41](#) and [DI-45](#)).

NG

Repair or replace.

OK

Check compression pressure (See page [EM-3](#)), valve clearance (See page [EM-4](#)) and valve timing (See page [EM-17](#)).

DTC	P0325	Knock Sensor 1 Circuit Malfunction
-----	-------	------------------------------------

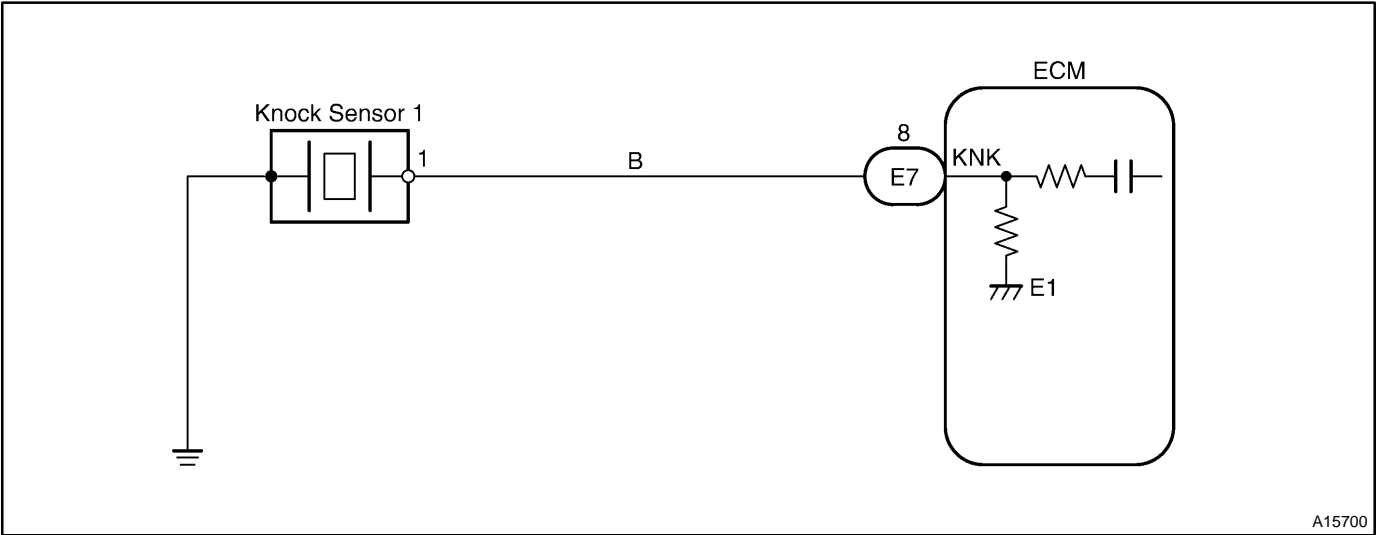
CIRCUIT DESCRIPTION

A knock sensor is fitted to the cylinder block to detect engine knocking. This sensor contains a piezoelectric element which generates a voltage when it becomes deformed, which occurs when the cylinder block vibrates due to knocking. If engine knocking occurs, ignition timing is retarded to suppress it.

DTC No.	DTC Detection Condition	Trouble Area
P0325	No knock sensor 1 signal to ECM with engine speed 1,200 rpm or more (2 trip detection logic)	●Open or short in knock sensor 1 circuit ●Knock sensor 1 (looseness) ●ECM

If the ECM detects the above diagnosis conditions, it operates the fail-safe function in which the corrective retard angle value is set to the maximum value.

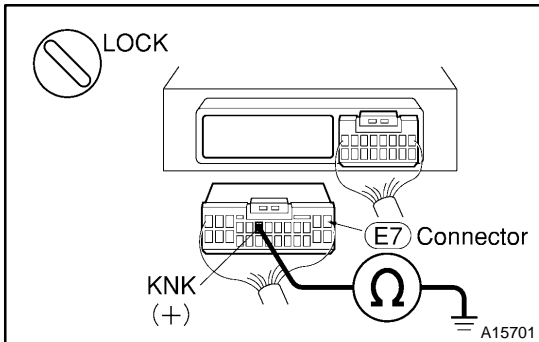
WIRING DIAGRAM



A15700

**INSPECTION PROCEDURE**

- 1 Check continuity between terminal KNK of ECM connector and body ground.**

**PREPARATION:**

- (a) Remove the lower finish panel.
- (b) Disconnect the E7 connector of ECM.

**CHECK:**

Measure the resistance between terminal KNK of the ECM connector and the body ground.

**OK:**

Resistance: 1 MΩ or higher

**OK****Go to step 3.**

- 2 Check knock sensor (See page [MF-50](#) ).**

**NG****Replace knock sensor.****OK**

- 3 Check for open and short in harness and connector between ECM and knock sensor (See page [IN-26](#) ).**

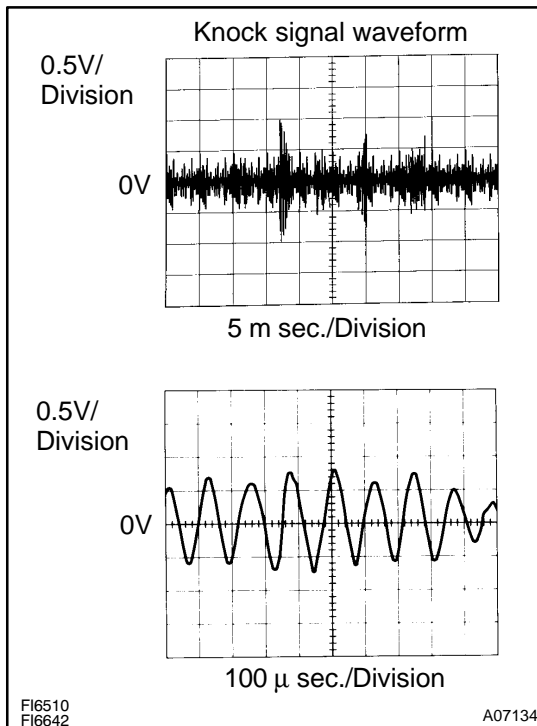
**NG****Repair or replace harness or connector.****OK**

- 4 Does malfunction disappear when a good knock sensor is installed?**

**YES****Replace knock sensor.****NO**

**Check and replace ECM (See page [IN-26](#) ).**

1996 TERCEL (RM440U)

**Reference: INSPECTION USING OSCILLOSCOPE**

- With the engine racing (4,000 rpm) measure between terminal KNK of ECM and body ground.

HINT:

The correct waveform is as shown.

- Spread the time on the horizontal axis, and confirm that period of the wave is 123  $\mu$  sec.  
(Normal mode vibration frequency of knock sensor: 8.1 KHz.)

HINT:

If normal mode vibration frequency is not 8.1 KHz, the sensor is malfunctioning.

<b>DTC</b>	<b>P0335</b>	<b>Crankshaft Position Sensor "A" Circuit Malfunction</b>
------------	--------------	---

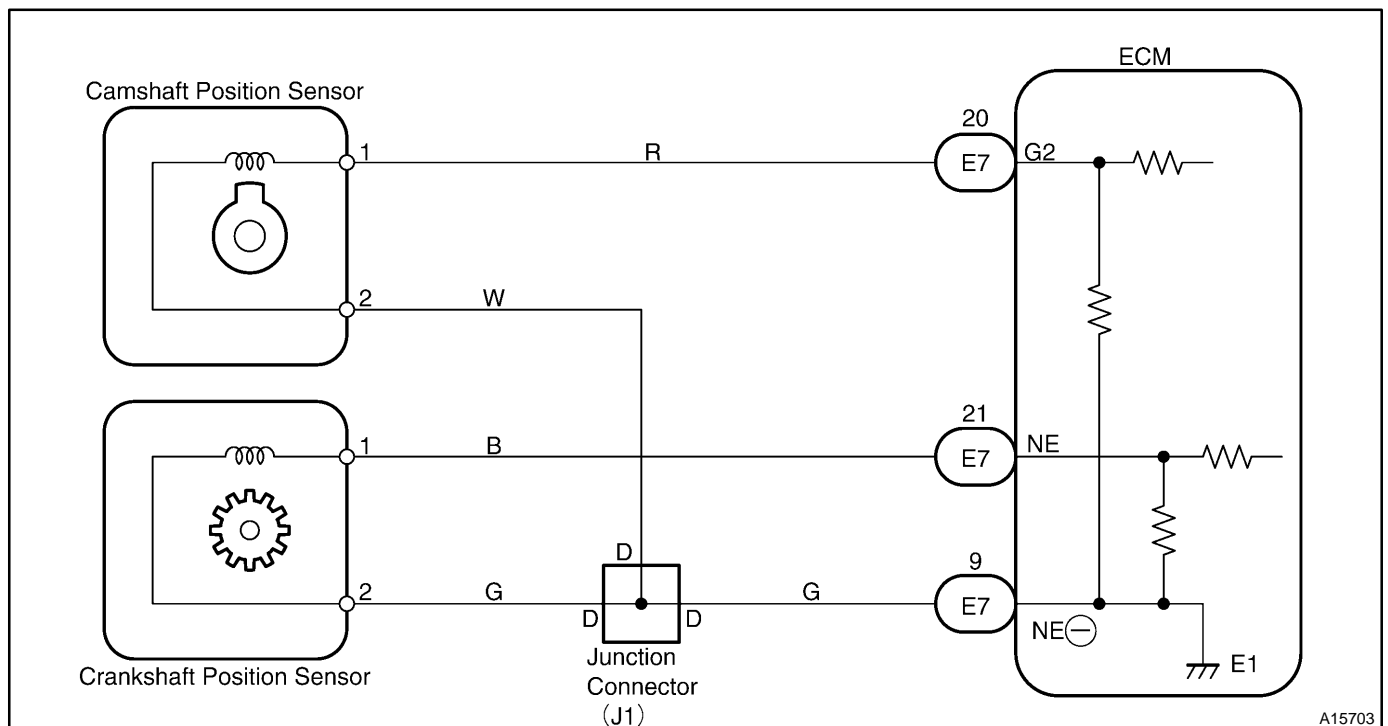
## CIRCUIT DESCRIPTION

Crankshaft position sensor (NE signal) consists of a signal plate and pickup coil.

The NE signal plate has 34 teeth and is mounted on the crankshaft. The NE signal sensor generates 34 signals of every engine revolution. The ECM detects the standard crankshaft angle based on the G signals, and the actual crankshaft angle and the engine speed by the NE signals.

DTC No.	DTC Detection Condition	Trouble Area
P0335	No crankshaft position sensor signal to ECM during cranking (2 trip detection logic)	<ul style="list-style-type: none"> <li>● Open or short in crankshaft position sensor circuit.</li> <li>● Crankshaft position sensor</li> </ul>
	No crankshaft position sensor signal to ECM with engine speed 600 rpm or more (2 trip detection logic)	<ul style="list-style-type: none"> <li>● Starter</li> <li>● ECM</li> </ul>

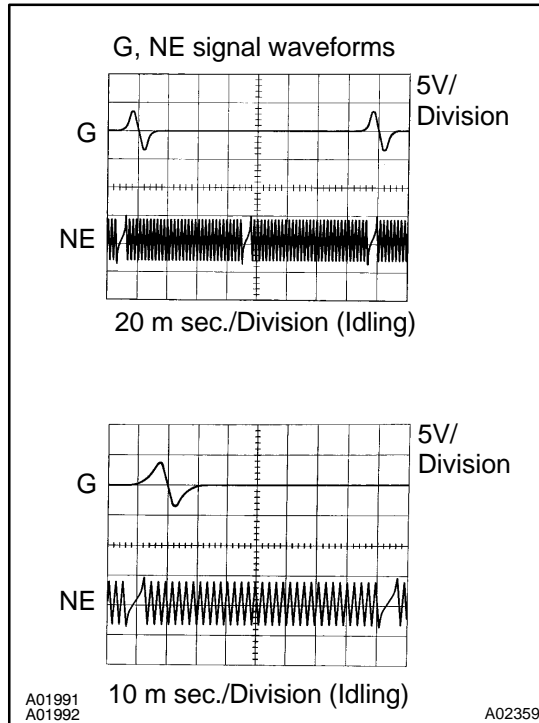
## WIRING DIAGRAM



A15703

**INSPECTION PROCEDURE**

- 1** Check resistance of crankshaft position sensor (See page [IG-1](#) ).

**Reference: INSPECTION USING OSCILLOSCOPE**

During cranking or idling, check between terminals G2, NE and NE- of ECM

HINT:

The correct waveforms are as shown.

**NG**

Replace crankshaft position sensor.

**OK**

- 2** Check for open and short in harness and connector between ECM and crankshaft position sensor (See page [IN-26](#) ).

**NG**

Repair or replace harness or connector.

**OK**

- 3** Inspect sensor installation and teeth of signal plate.

**NG**

Tighten the sensor.  
Replace signal plate.

**OK**

Check and replace ECM (See page [IN-26](#) ).



<b>DTC</b>	<b>P0340</b>	<b>Camshaft Position Sensor Circuit Malfunction</b>
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### CIRCUIT DESCRIPTION

Camshaft position sensor (G signal) consist of signal plate and pickup coil. The G signal plate has one tooth on its outer circumference and is mounted on the exhaust camshaft. When the camshafts rotate, the protrusion on the signal plate and the air gap on the pickup coil change, causing fluctuations in the magnetic field and generating an electromotive force in the pickup coil. The NE signal plate has 34 teeth and is mounted on the crankshaft. The NE signal sensor generates 34 signals for every engine revolution. The ECM detects the standard crankshaft angle based on the G signals and the actual crankshaft angle and the engine speed by the NE signals.

DTC No.	DTC Detection Condition	Trouble Area
P0340	No camshaft position sensor signal to ECM during cranking (2 trip detection logic)	<ul style="list-style-type: none"> <li>● Open or short in camshaft position sensor circuit</li> <li>● Camshaft position sensor</li> </ul>
	No camshaft position sensor signal to ECM with engine speed 600 rpm or more	<ul style="list-style-type: none"> <li>● Starter</li> <li>● ECM</li> </ul>

### WIRING DIAGRAM

Refer to [DI-60](#) .

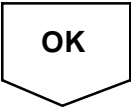
### INSPECTION PROCEDURE

<b>1</b>	<b>Check resistance of camshaft position sensor (See page <a href="#">IG-1</a> ).</b>
----------	---

**Reference: INSPECTION USING OSCILLOSCOPE**

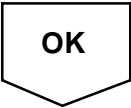
Refer to page [DI-60](#) .

<b>NG</b>	<b>Replace camshaft position sensor.</b>
-----------	--



<b>2</b>	<b>Check for open and short in harness and connector between ECM and camshaft position sensor (See page <a href="#">IN-26</a> ).</b>
----------	--

<b>NG</b>	<b>Repair or replace harness or connector.</b>
-----------	--



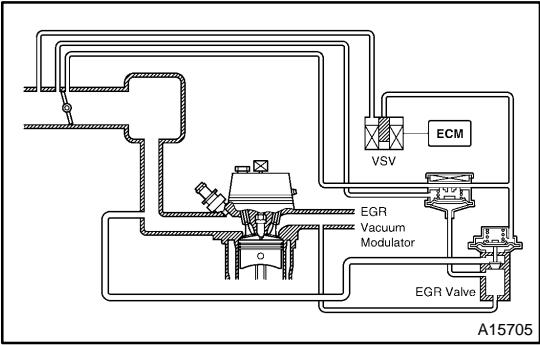
3	Inspect sensor installation
---	-----------------------------

**NG****Tighten the sensor.****OK****Check and replace ECM (See page [IN-26](#) ).**

<b>DTC</b>	<b>P0401</b>	<b>Exhaust Gas Recirculation Flow Insufficient Detected</b>
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### CIRCUIT DESCRIPTION

The EGR system recirculates exhaust gas, which is controlled to the proper quantity to suit the driving conditions, into the intake air mixture to slow down combustion, reduce the combustion temp. and reduce NOx emissions. The amount of EGR is regulated by the EGR vacuum modulator according to the engine load.



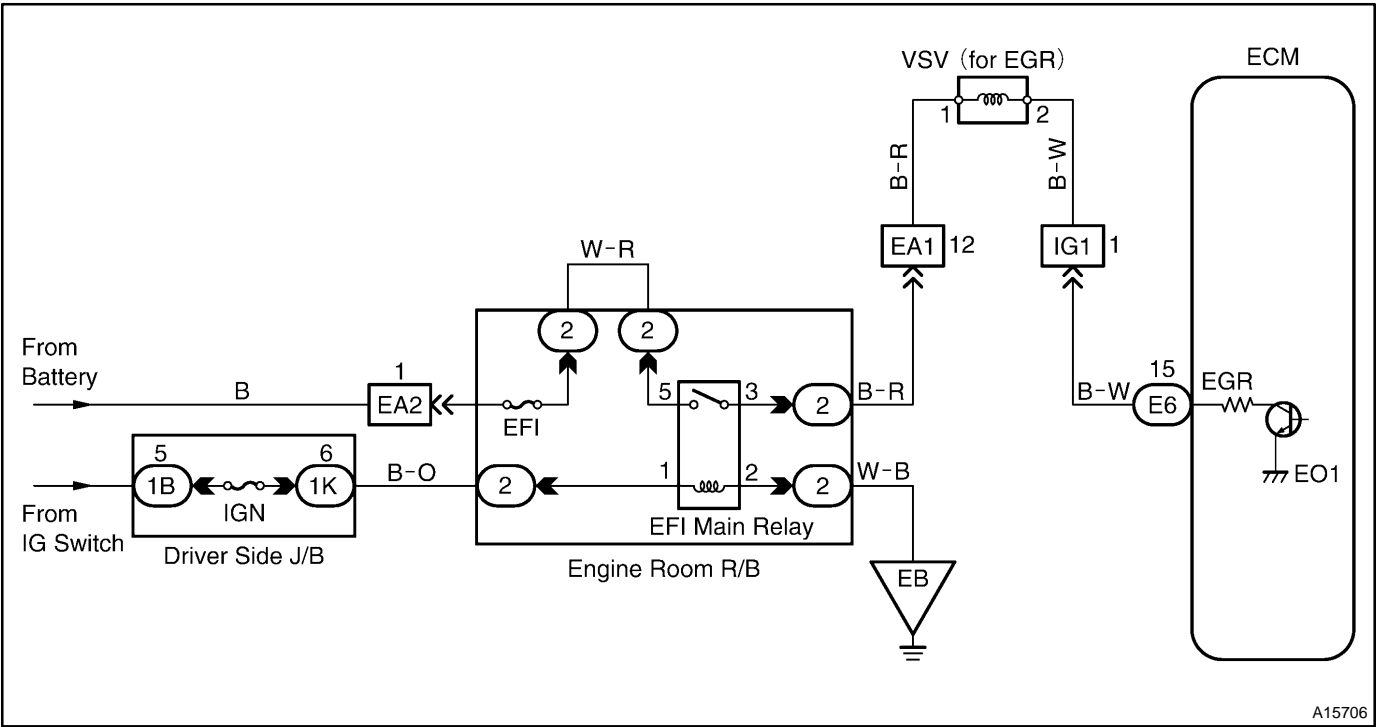
If even one of the following conditions is fulfilled, the VSV is turned OFF by a signal from the ECM.

This results in atmospheric air acting on the EGR valve, closing the EGR valve and shutting off the exhaust gas (EGR cut-off).

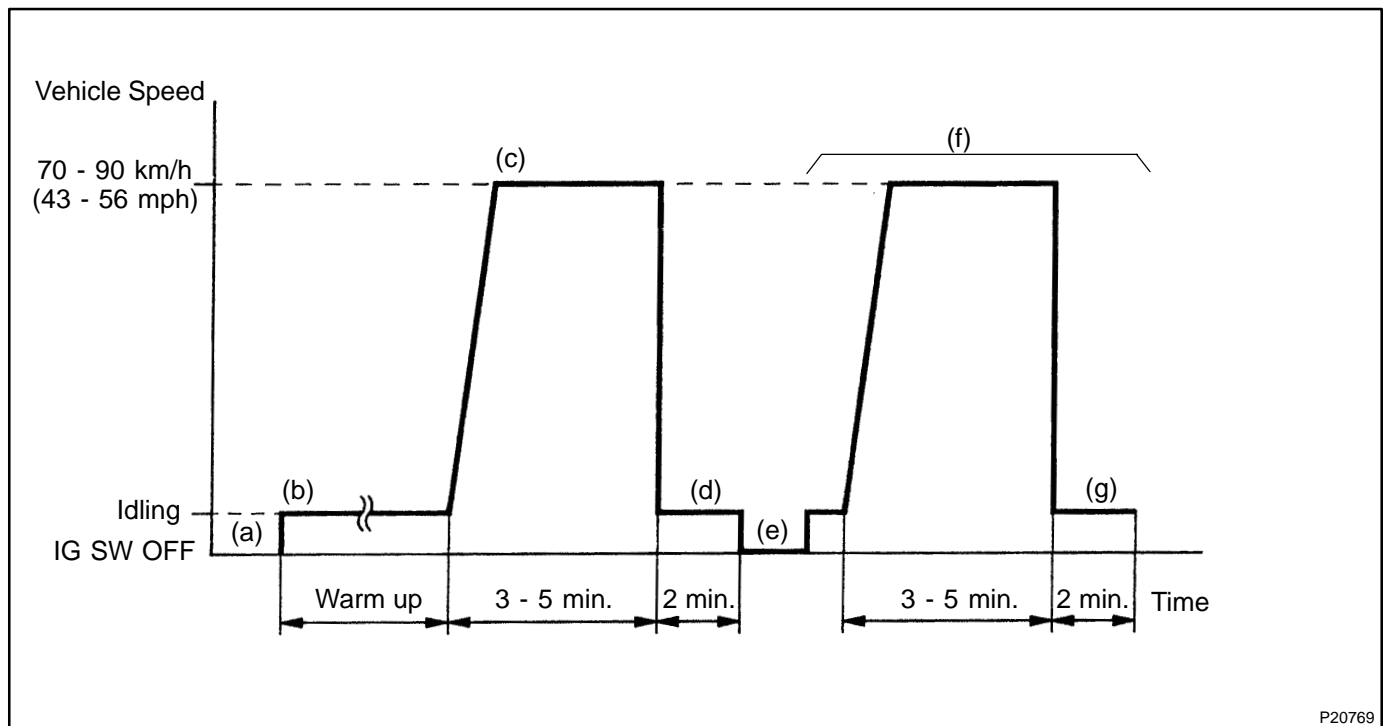
- Before the engine is warmed up.
- During deceleration (throttle valve closed).
- Light engine load (amount of intake air very small).
- Engine speed over 4,400 rpm.
- Engine racing.

DTC No.	DTC Detection Condition	Trouble Area
P0401	After the engine is warmed up, the intake manifold absolute pressure is larger than the value calculated by the ECM while the EGR system is ON. (2 trip detection logic)	<ul style="list-style-type: none"> <li>● EGR valve stuck closed</li> <li>● Open or short in VSV circuit for EGR</li> <li>● Vacuum or EGR hose disconnected</li> <li>● Manifold absolute pressure sensor</li> <li>● EGR VSV open or close malfunction</li> <li>● ECM</li> </ul>

### WIRING DIAGRAM



## SYSTEM CHECK DRIVING PATTERN



- Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.
- Start the engine and warm it up with all accessories switched OFF.
- Run the vehicle at 70 - 90 km/h (43 - 56 mph) for 3 minutes or more.
- Idle the engine for about 2 minutes.
- Stop at safe place and turn the ignition switch OFF.
- Start the engine and do steps (c) and (d) again.
- Check the READINESS TESTS mode on the OBD II scan tool or TOYOTA hand-held tester. If COMPL is displayed and the MIL does not light up, the system is normal. If INCMPL is displayed and the MIL does not light up, run the vehicle again and check it.

### HINT:

INCMPL is displayed when either condition (h) or (i) exists.

- The system check is incomplete.
- There is a malfunction in the system.

If there is a malfunction in the system, the MIL will light up after steps (b) to (f) above are done.

## INSPECTION PROCEDURE

### HINT:

- If DTC P0105 and/or P0106 and P0401 are output simultaneously, perform troubleshooting of DTC "P0105" first.
- If DTC P0401 and P0402 are output simultaneously, perform troubleshooting of DTC P0402 first.

**TOYOTA hand-held tester:**

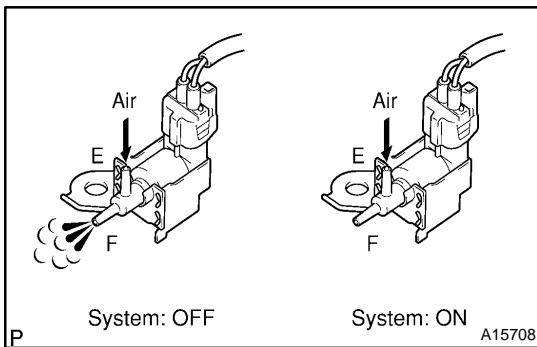
- 1** Check connection of vacuum hose, EGR hose (See page [EC-2](#) ).

**NG**

Repair or replace.

**OK**

- 2** Check VSV for EGR.

**PREPARATION:**

Select the ACTIVE TEST mode on the TOYOTA hand-held tester.

**CHECK:**

Check operation of VSV, when it is operated by the TOYOTA hand-held tester.

**OK:**

**EGR system is OFF:**

**Air from pipe E is flowing out through the air filter.**

**EGR system is ON:**

**Air from pipe E is flowing out through pipe F.**

**OK**

Go to step 4.

**NG**

- 3** Check operation of VSV for EGR (See page [EC-7](#) ).

**NG**

Replace VSV for EGR.

**OK**

Check for open and short in harness and connector between J/B No.2 and ECM (See page [IN-26](#) ).

**4** Check EGR vacuum modulator (See page [EC-7](#) ).

**NG**

Repair or replace.

**OK**

**5** Check EGR valve (See page [EC-7](#) ).

**NG**

Repair or replace.

**OK**

**6** Check manifold absolute pressure sensor (See page [DI-23](#) ).

**NG**

Repair or replace.

**OK**

Check and replace ECM (See page [IN-26](#) ).

### OBD II scan tool (excluding TOYOTA hand-held tester):

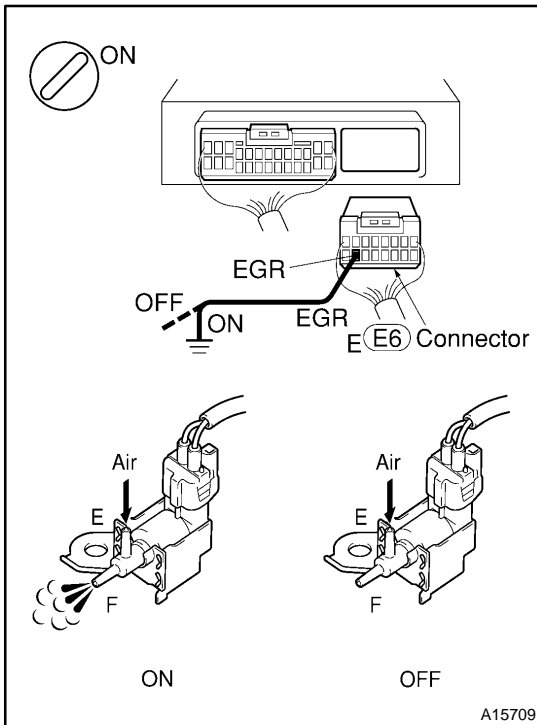
**1** Check connection of vacuum hose, EGR hose (See page [EC-2](#) ).

**NG**

Repair or replace.

**OK**

## 2 Check VSV for EGR.



### PREPARATION:

- Turn up the floor mat on the passenger side.
- Remove the 2 bolts for ECM.
- Disconnect the "E5" or "E8" connector of ECM.
- Turn the ignition switch ON.

### CHECK:

Check VSV function

- Connect terminal EGR of the ECM connector and the body ground (ON).
- Disconnect terminal EGR of the ECM connector and the body ground (OFF).

### OK:

(1) VSV is ON:

Air from pipe E is flowing out through pipe F.

(2) VSV is OFF:

Air from pipe E is flowing out through the air filter.

OK

Go to step 4.

NG

## 3 Check operation of VSV for EGR (See page DI-65 , step 3).

NG

Replace VSV for EGR.

OK

Check for open and short in harness and connector between J/B No.2 and ECM (See page IN-26 ).

## 4 Check EGR vacuum modulator (See page EC-7 ).

NG

Repair or replace.

OK

5	Check EGR valve (See page <a href="#">EC-7</a> ).
---	---

NG

Repair or replace.

OK

6	Check manifold absolute pressure sensor (See page <a href="#">DI-23</a> ).
---	--

NG

Repair and replace.

OK

Check and replace ECM (See page <a href="#">IN-26</a> ).
--



<b>DTC</b>	<b>P0402</b>	<b>Exhaust Gas Recirculation Flow Excessive Detected</b>
------------	--------------	--

## CIRCUIT DESCRIPTION

Refer to DTC P0402 on page [DI-65](#) .

DTC No.	DTC Detection Condition	Trouble Area
P0402	After the engine is warmed up, conditions (a) and (b) continue (a) The intake manifold absolute pressure is larger than the value calculated by the ECM while the EGR system is ON (b) Misfiring is detected during idling (2 trip detection logic)	● EGR valve stuck open ● Vacuum or EGR hose is connected to wrong post ● Manifold absolute pressure sensor ● ECM

## INSPECTION PROCEDURE

### HINT:

- If DTC P0105 and/or P0106 and P0402 are output simultaneously, perform troubleshooting of DTC P0105 first.
- If DTC P0401 and P0402 are output simultaneously, perform troubleshooting of DTC P0402 first.

<b>1</b>	<b>Check connection of vacuum hose, EGR hose (See page <a href="#">EC-2</a> ).</b>
----------	--

NG

Repair or replace.

OK

<b>2</b>	<b>Check EGR valve (See page <a href="#">EC-7</a> ).</b>
----------	--

NG

Repair or replace.

OK

<b>3</b>	<b>Check VSV for EGR (See page <a href="#">DI-65</a> ).</b>
----------	---

OK

Go to step 5.

NG

**4** Check operation of the for EGR (See page [EC-7](#) ).

**NG**

Replace VSV for EGR.

**OK**

Check for open and short in harness and connector between engine room R/B and ECM (See page [IN-26](#) ).

**5** Check EGR vacuum modulator (See page [EC-7](#) ).

**NG**

Repair or replace.

**OK**

**6** Check manifold absolute pressure sensor (See page [DI-23](#) ).

**NG**

Repair or replace.

**OK**

Check and replace ECM (See page [IN-26](#) ).

DTC	P0420	Catalyst System Efficiency Below Threshold
-----	-------	--

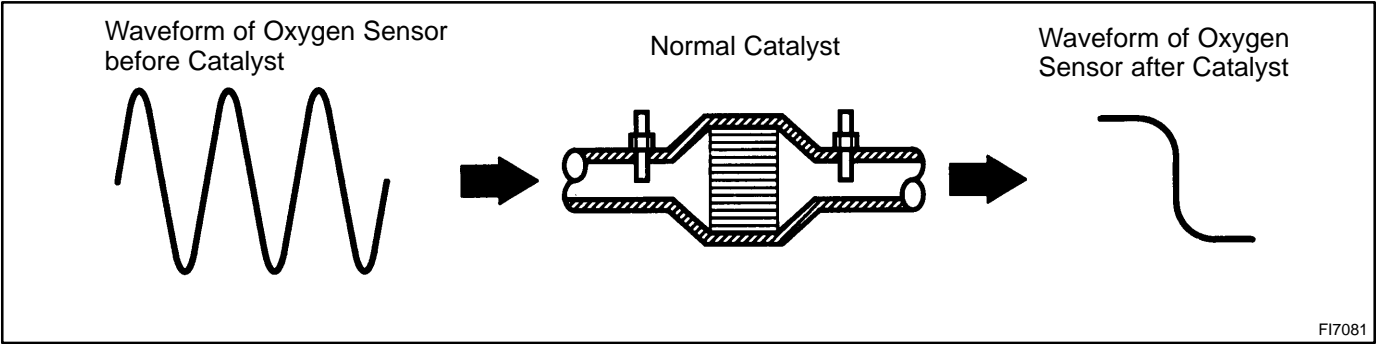
CIRCUIT DESCRIPTION

The ECM compares the waveform of the oxygen sensor located before the catalyst with the waveform of the oxygen sensor located after the catalyst to determine whether or not catalyst performance has deteriorated.

Air-fuel ratio feedback compensation keeps the waveform of the oxygen sensor before the catalyst repeatedly changing back and forth from rich to lean.

If the catalyst is functioning normally, the waveform of the oxygen sensor after the catalyst switches back and forth between rich and lean much more slowly than the waveform of the oxygen sensor before the catalyst.

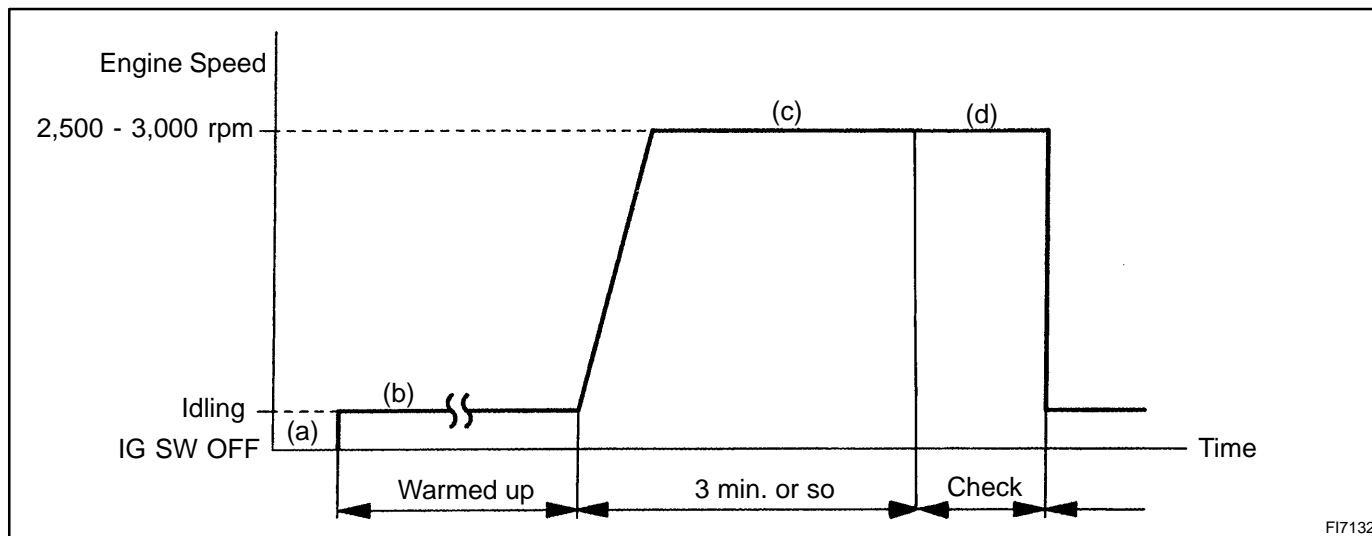
But when both waveforms change at a similar rate, it indicates that catalyst performance has deteriorated.



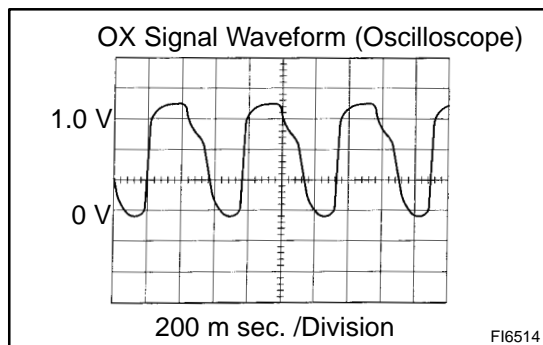
FI7081

DTC No.	DTC Detection Condition	Trouble Area
P0420	After the engine and the catalyst are warmed up, and while vehicle is driven within the set vehicle and engine speed range, the waveforms of the oxygen sensor (bank 1 sensor 1) and heated oxygen sensor (bank 1 sensor 2) have the same amplitude (2 trip detection logic)	<ul style="list-style-type: none"><li>●Three-way catalytic converter</li><li>●Open or short in (heated) oxygen sensor circuit</li><li>●(Heated) oxygen sensor</li></ul>

## CONFIRMATION ENGINE RACING PATTERN



- Connect the TOYOTA hand-held tester to the DLC3, or connect the probe of the oscilloscope between terminals OX1, OX2 and E1 of ECM.
- Start engine and warm it up with all accessories switched OFF until engine coolant temperature is stable.
- Race the engine at 2,500 - 3,000 rpm for about 3 minutes.
- After confirming that the waveform of the oxygen sensor, bank 1 sensor 1 (OX1), oscillate around 0.5 V during feedback to the ECM, check the waveform of the heated oxygen sensor, bank 1 sensor 2 (OX2).



### HINT:

If there is a malfunction in the system, the waveform of the heated oxygen sensor, bank 1 sensor 2 (OX2), is almost the same as that of the oxygen sensor, bank 1 sensor 1 (OX1), on the left.

There are some cases where, even though a malfunction exists, the MIL may either light up or not light up.

## INSPECTION PROCEDURE

1	Are there any other codes (besides DTC P0420) being output?
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; transform: rotate(-45deg); transform-origin: center;">YES</div> <div style="border: 1px solid black; padding: 5px;">Go to relevant DTC chart.</div> </div>	
<div style="border: 1px solid black; padding: 5px; transform: rotate(-45deg); transform-origin: center;">NO</div>	
2	Check heated oxygen sensor (bank 1 sensor 2) (See page <a href="#">DI-44</a> ).

NG

Repair or replace.

OK

Replace three-way catalytic converter.

<b>DTC</b>	<b>P0133</b>	<b>Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1)</b>
------------	--------------	--

## CIRCUIT DESCRIPTION

Refer to DTC P0125 on page [DI-38](#) .

DTC No.	DTC Detection Condition	Trouble Area
P0133	Response time for oxygen sensor's voltage output to change from rich to lean, or from lean to rich, is 1 sec. or more during idling after the engine is warmed up (2 trip detection logic)	●Oxygen sensor

### HINT:

Sensor 1 refers to the sensor closer to the engine body.

## INSPECTION PROCEDURE

<b>1</b>	<b>Are there any other codes (besides DTC P0133) being output?</b>
----------	--

**YES**

**Go to relevant DTC chart.**

**NO**

**Replace oxygen sensor.**

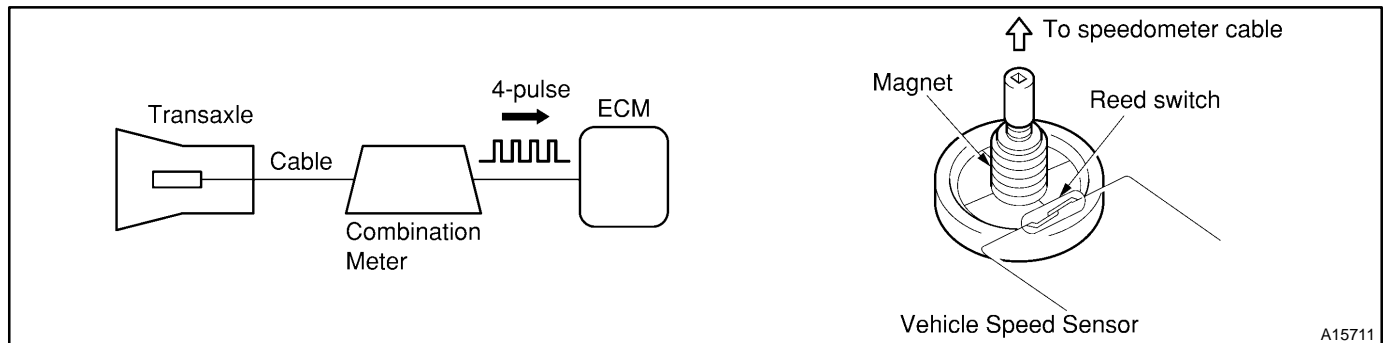
<b>DTC</b>	<b>P0500</b>	<b>Vehicle Speed Sensor Malfunction</b>
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## CIRCUIT DESCRIPTION

This sensor is mounted in the combination meter. It contains a magnet which is rotated by the speedometer cable.

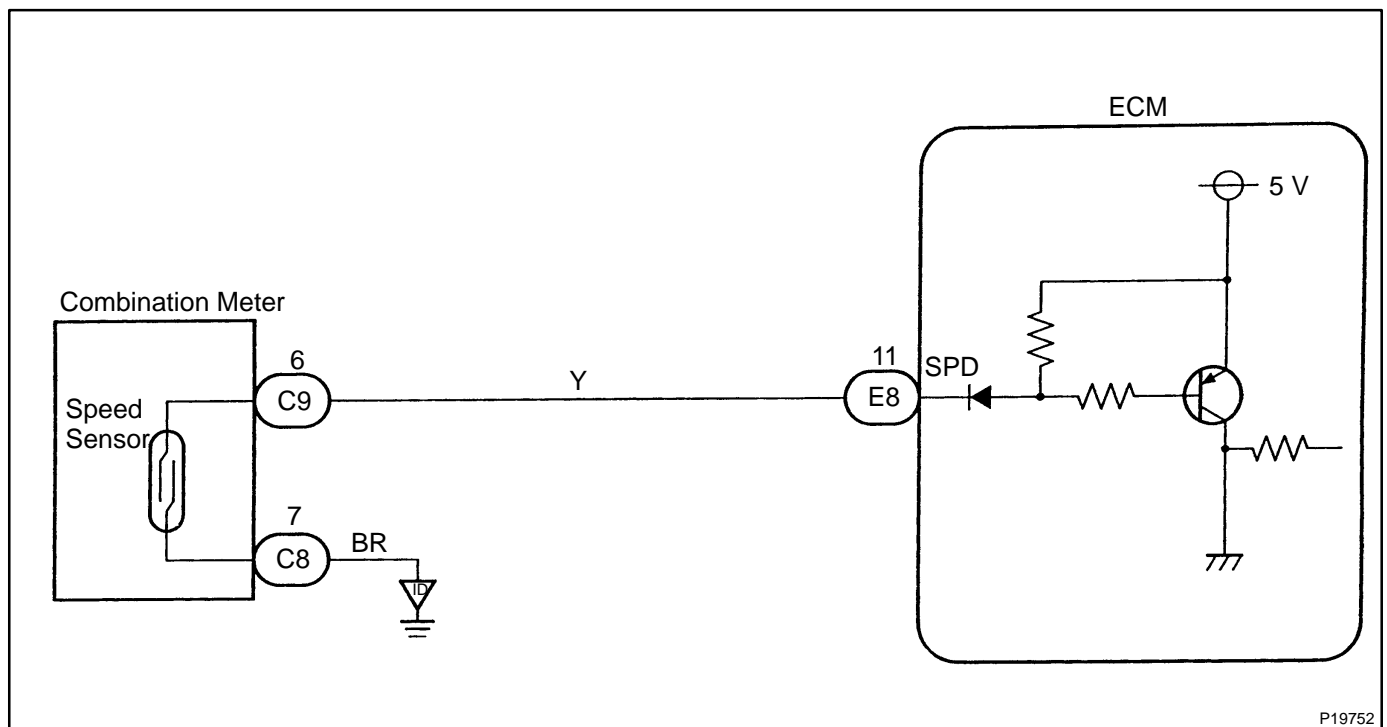
Turning the reed switch ON and OFF 4 times for every revolution of the speedometer.

It is then transmitted to the ECM. The ECM determines the vehicle speed based on the frequency of these pulse signals.



DTC No.	DTC Detection Condition	Trouble Area
P0500	No vehicle speed sensor signal to ECM when vehicle is being driven (2 trip detection logic)	<ul style="list-style-type: none"> <li>● Open or short in vehicle speed sensor circuit</li> <li>● Vehicle speed sensor</li> <li>● Speedometer cable</li> <li>● ECM</li> </ul>

## WIRING DIAGRAM



## INSPECTION PROCEDURE

### 1 Check operation of speedometer.

#### CHECK:

Drive the vehicle and check if the operation of the speedometer in the combination meter is normal.

#### HINT:

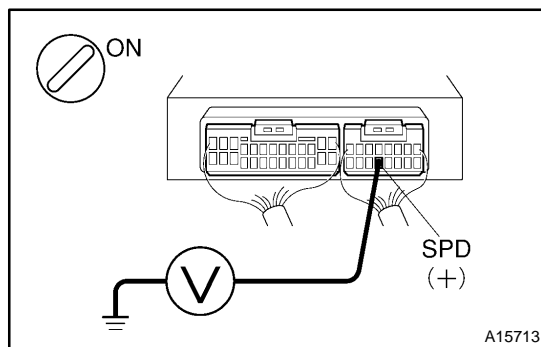
The vehicle speed sensor is operating normally if the speedometer display is normal.

NG

Check speedometer circuit. See combination meter troubleshooting.

OK

### 2 Check voltage between terminal SPD of ECM connector and body ground.



#### PREPARATION:

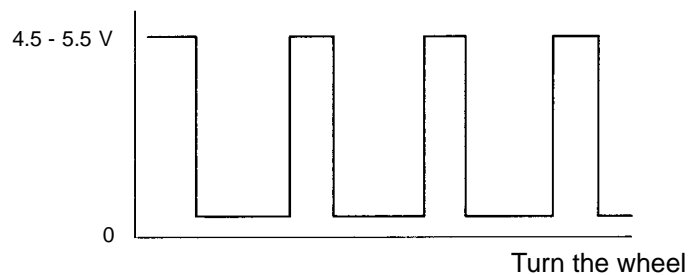
- Remove the lower finish panel.
- Shift the shift lever to neutral.
- Jack up one of the front wheels.
- Turn the ignition switch ON.

#### CHECK:

Measure the voltage between terminal SPD of the ECM connector and the body ground when the wheel is turned slowly.

#### OK:

Voltage is generated intermittently.



AT7809

NG

Check and repair harness and connector between combination meter and ECM.

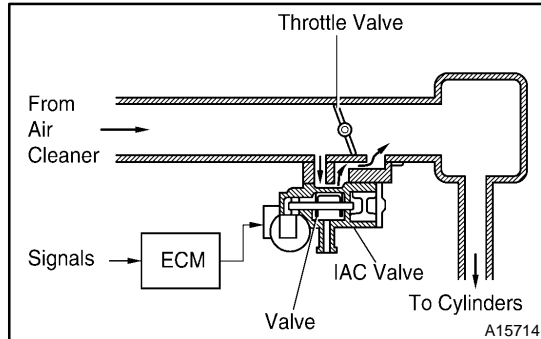
OK

Check and replace ECM (See page [IN-26](#) ).



<b>DTC</b>	<b>P0505</b>	<b>Idle Control System Malfunction</b>
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## CIRCUIT DESCRIPTION



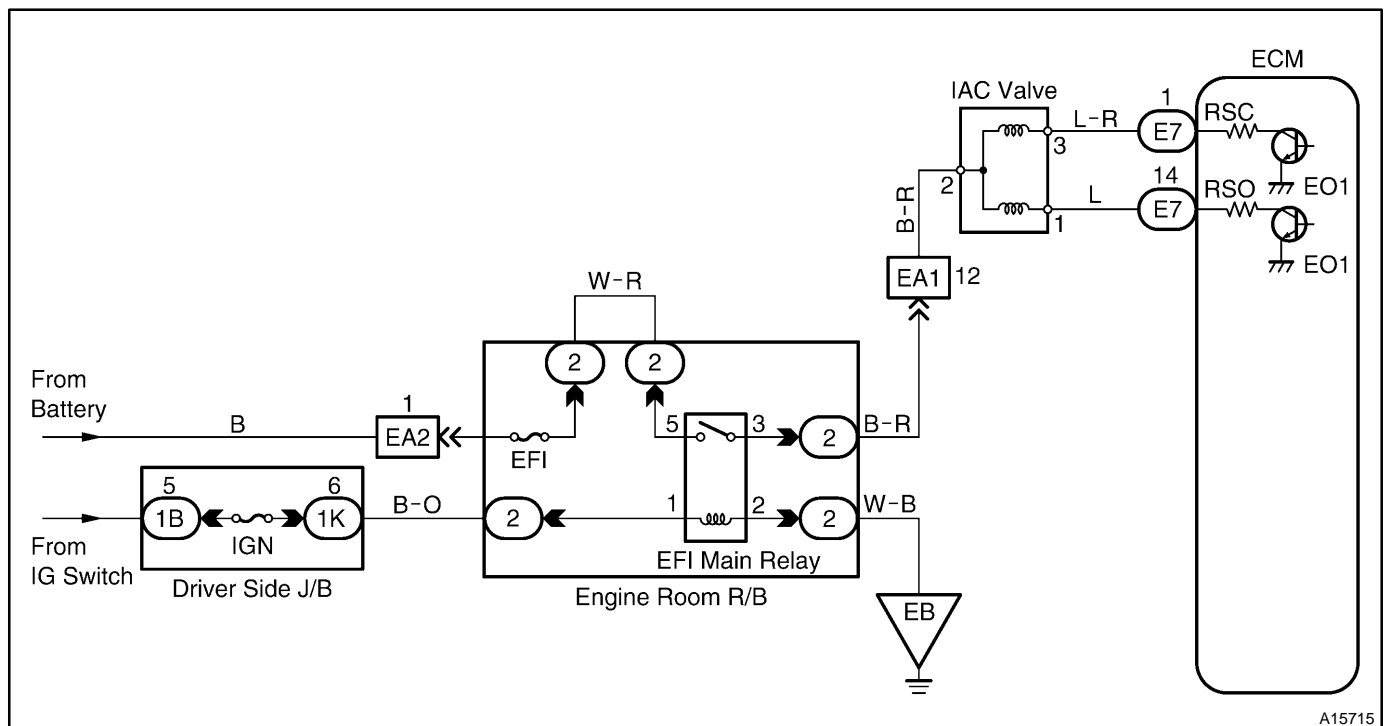
The rotary solenoid type IAC valve is located on the throttle body and intake air bypassing the throttle valve is directed to the IAC valve through a passage.

In this way the intake air volume bypassing the throttle valve is regulated, controlling the engine speed.

The ECM operates only the IAC valve to perform idle-up and provide feedback for the target idling speed.

DTC No.	DTC Detection Condition	Trouble Area
P0505	Idle speed continues to vary greatly from the target speed (2 trip detection logic)	<ul style="list-style-type: none"> <li>●AC valve is stuck or closed</li> <li>●Open or short in IAC valve circuit</li> <li>●Open or short A/C 1 signal circuit</li> <li>●Air intake (hose loose)</li> </ul>

## WIRING DIAGRAM

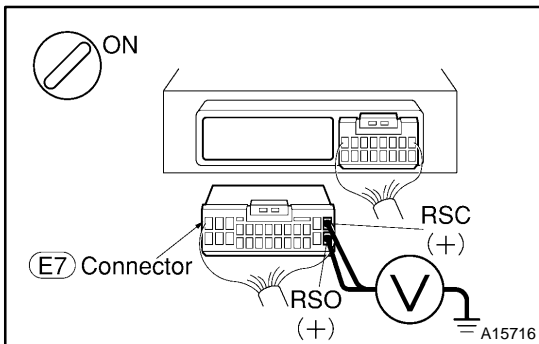


**INSPECTION PROCEDURE****1** Check air induction system (See page [MF-1](#) ).**NG**

Repair or replace.

**OK****2** Check A/C signal circuit (See page [AC-66](#) ).**NG**

Repair or replace.

**OK****3** Check voltage between terminals RSO, RSC of ECM connector and body ground.**PREPARATION:**

- (a) Remove the lower finish panel.
- (b) Disconnect the E7 connector of ECM.
- (c) Turn the ignition switch ON.

**CHECK:**

Measure the voltage between terminal RSO and RSC of the ECM connector and the body ground.

**OK:****Voltage: 9 - 14 V****OK**

Go to step 5.

**NG****4** Check IAC valve (See page [MF-33](#) ).**NG**

Replace IAC valve.

**OK**

Check for open and short in harness and connector between junction connector and IAC valve, IAC valve and ECM (See page [IN-26](#) ).

**5** Check operation of IAC valve (See page [MF-36](#) ).

**NG**

Repair or replace IAC valve.

**OK**

Check and replace ECM (See page [IN-26](#) ).

<b>DTC</b>	<b>P0510</b>	<b>Closed Throttle Position Switch Malfunction</b>
------------	--------------	--

# CIRCUIT DESCRIPTION

Refer to DTC P0120 on page [DI-33](#) .

DTC No.	DTC Detection Condition	Trouble Area
P0510	Closed throttle position switch does not turn ON even once when vehicle is driven (2 trip detection logic)	<ul style="list-style-type: none"> <li>●Open in closed throttle position switch circuit</li> <li>●Closed throttle position switch</li> <li>●ECM</li> </ul>

## HINT:

After confirming DTC P0510, use the TOYOTA hand-held tester to confirm the closed throttle position switch signal from the CURRENT DATA.

Throttle Valve	Closed Throttle Position Switch Signal	Malfunction
Fully closed	OFF	Open circuit
Fully open	ON	Short circuit

# WIRING DIAGRAM

Refer to DTC P0120 on page [DI-33](#) .

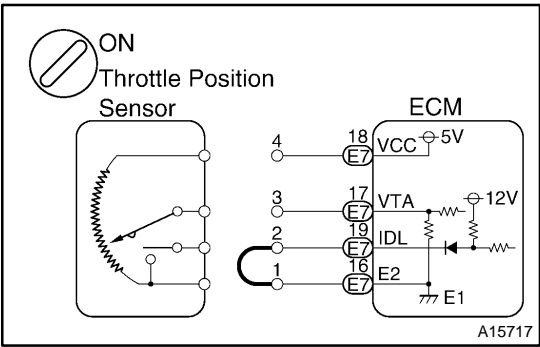
# INSPECTION PROCEDURE

## HINT:

If DTCs P0110, P0115 and P0120 are output simultaneously, E2 (sensor ground) may be open.

## TOYOTA hand-held tester:

<b>1</b>	<b>Check for open in harness or ECM.</b>
----------	--



## PREPARATION:

- Connect the TOYOTA hand-held tester to the DLC3.
- Disconnect the throttle position sensor connector.
- Connect the sensor wire harness terminals between terminals 3 and 4.
- Turn the ignition switch ON.

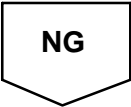
## CHECK:

Read the CTP switch signal on the TOYOTA hand-held tester.

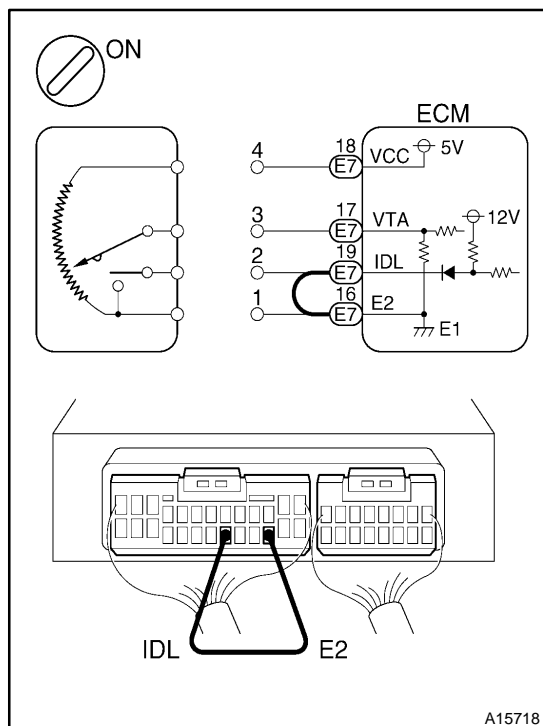
## OK:

**CTP switch signal: ON**

<b>OK</b>	<b>Confirm good connection at sensor. If OK, replace throttle position sensor.</b>
-----------	--



## 2 Check for open in harness or ECM.



### PREPARATION:

- Remove the glove compartment (See page [MF-54](#) ).
- Connect terminals IDL and E2 of the ECM connector together.

### HINT:

The throttle position sensor connector is disconnected. Before checking, do a visual check and contact pressure check for the connector (See page [IN-26](#) ).

- Turn the ignition switch ON.

### CHECK:

Read the CTP switch signal on the TOYOTA hand-held tester.

### OK:

**CTP switch signal: ON**

**OK**

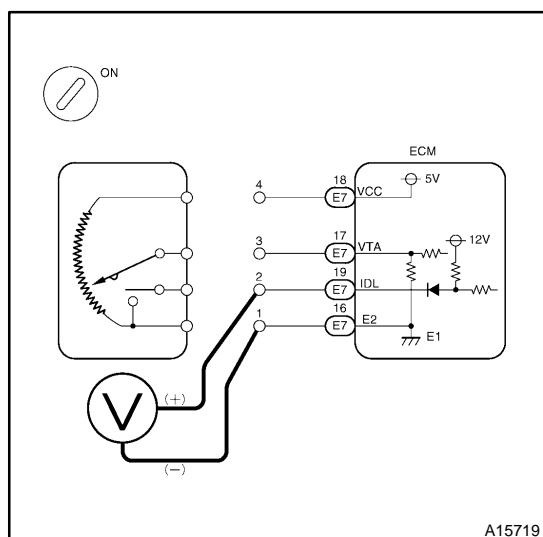
**Open in harness between ECM and throttle position sensor, repair or replace harness.**

**NG**

**Confirm connection at ECM. If OK, replace ECM.**

## OBD II scan tool (excluding TOYOTA hand-held tester):

## 1 Check for open in harness or ECM.



### PREPARATION:

- Disconnect the throttle position sensor connector.
- Turn the ignition switch ON.

### CHECK:

Measure the voltage between terminals 3 and 4 of the throttle position sensor connector.

### OK:

**Voltage: 9 - 14 V**

**OK**

**Confirm good connection at sensor. If OK, replace throttle position sensor.**

**NG****2**

**Check for open in harness and connector between throttle position sensor and ECM (See page [IN-26](#) ).**

**NG**

**Open in harness between ECM and throttle position sensor.**

**OK**

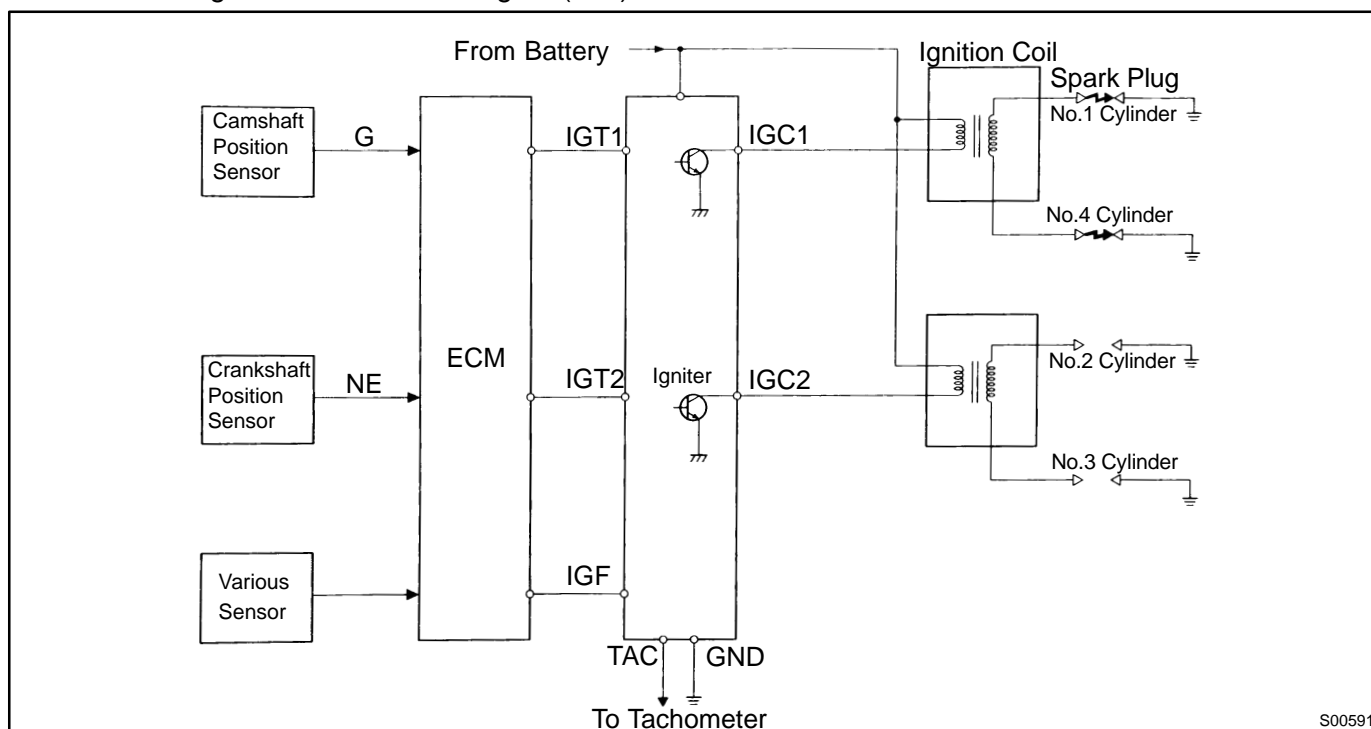
**Confirm connection at ECM. If OK, replace ECM.**

<b>DTC</b>	<b>P1300</b>	<b>Ignition Circuit Malfunction</b>
------------	--------------	-------------------------------------

## CIRCUIT DESCRIPTION

A DIS (Direct Ignition System) has been adopted. The DIS improves the ignition timing accuracy, reduces high-voltage loss, and enhances the overall reliability of the ignition system by eliminating the distributor. The DIS is a 2-cylinder simultaneous ignition system which ignites 2 cylinders simultaneously with one ignition coil. In the 2-cylinder simultaneous ignition system, each of the 2 spark plugs is connected to the end of the secondary winding. High voltage generated in the secondary winding is applied directly to the 2 spark plugs. The sparks of the 2 spark plugs pass simultaneously from the center electrode to the ground electrode.

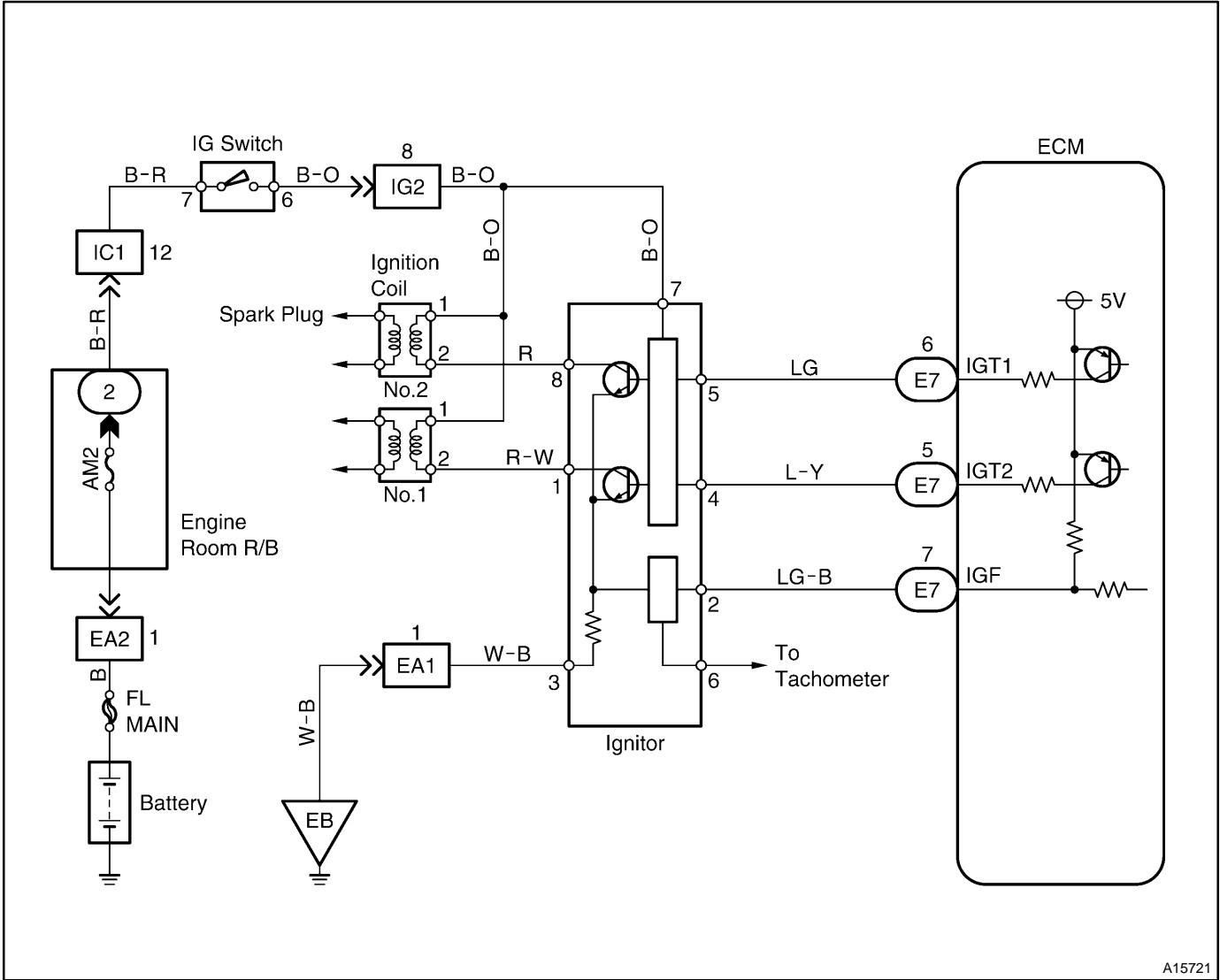
The ECM determines ignition timing and outputs the ignition signals (IGT) for each cylinder. Based on IGT signals, the igniter controls the primary ignition signals (IGC) for all ignition coils. At the same time, the igniter also sends an ignition confirmation signal (IGF) as a fail-safe measure to the ECM.



S00591

DTC No.	DTC Detection Condition	Trouble Area
P1300	No IGF signal to ECM while engine is running	<ul style="list-style-type: none"> <li>● Open or short in IGF or IGT circuit from igniter to ECM</li> <li>● Igniter</li> <li>● ECM</li> </ul>

# WIRING DIAGRAM



A15721

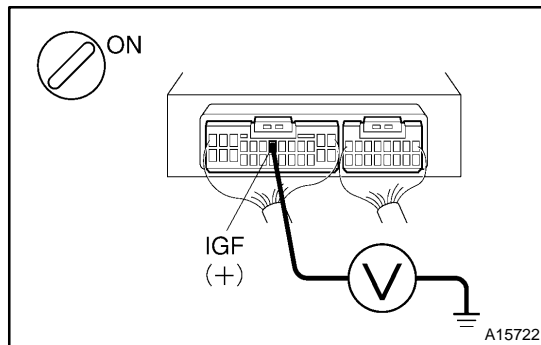
## INSPECTION PROCEDURE

1	Check spark plug and spark (See page <a href="#">IG-1</a> ).
<div>OK</div> <div>NG</div> <div>Go to step 4.</div>	
2	Check for open and short in harness and connector in IGF signal circuit between ECM and igniter (See page <a href="#">IN-26</a> ).
<div>NG</div> <div>Repair or replace harness or connector.</div>	



OK

- 3 Disconnect igniter connector and check voltage between terminal IGF of ECM connector and body ground.**

**PREPARATION:**

- (a) Disconnect the igniter connector.
- (b) Remove the lower finish panel.
- (c) Turn the ignition switch ON.

**CHECK:**

Measure the voltage between terminal IGF of the ECM connector and the body ground.

**OK:**

**Voltage: 4.5 - 5.5 V**

OK

**Replace igniter.**

NG

**Check and replace ECM (See page [IN-26](#) ).**

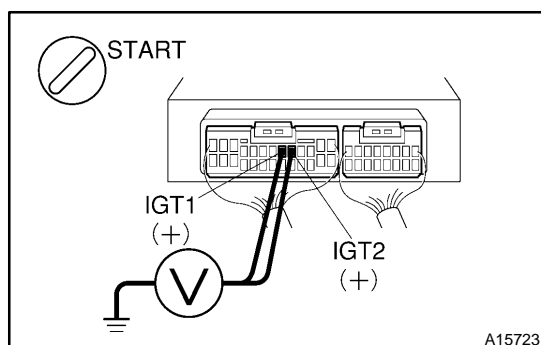
- 4 Check for open and short in harness and connector in IGT1 and IGT2 signal circuits between ECM and igniter (See page [IN-26](#) ).**

NG

**Repair or replace harness or connector.**

OK

- 5 Check voltage between terminals IGT1 and IGT2 of ECM connector and body ground.**

**PREPARATION:**

Remove the lower finish panel.

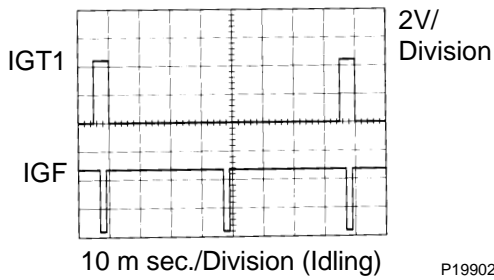
**CHECK:**

Measure the voltage between terminals IGT1 and IGT2 of the ECM connector and the body ground when the engine is cranked.

**OK:**

**Voltage: More than 0.1 V and less than 4.5 V**

IGT1 / IGF signal waveform

**Reference: INSPECTION USING OSCILLOSCOPE**

During idling, check waveform between terminals IGT1 and E1 of ECM.

HINT:

The correct waveform are as shown.

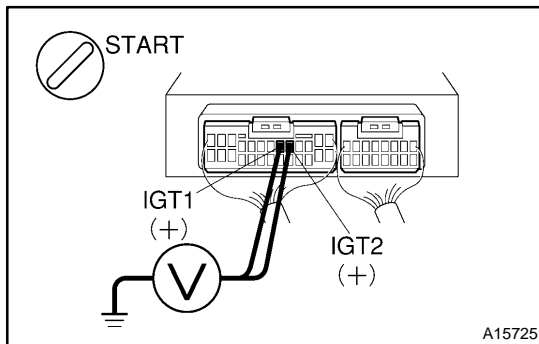
IGT2 signal waveform is same as the IGT1 signal waveform.

NG

Check and replace ECM (See page [IN-26](#) ).

OK

- 6 Disconnect igniter connector and check voltage between terminals IGT1 and IGT2 of ECM connector and body ground.**

**PREPARATION:**

- (a) Disconnect the igniter connector.
- (b) Remove the lower finish panel.

**CHECK:**

Measure the voltage between terminals IGT1 and IGT2 of the ECM connector and the body ground when the engine is cranked.

**OK:**

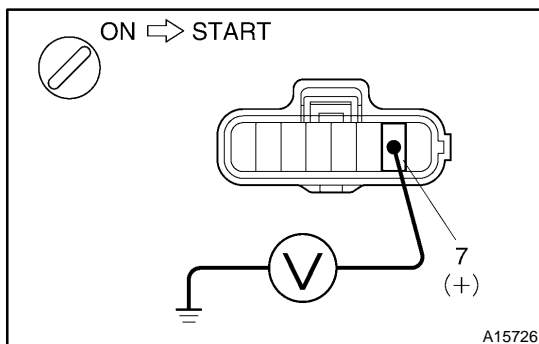
Voltage: More than 0.1 V and less than 4.5 V

NG

Check and replace ECM (See page [IN-26](#) ).

OK

- 7 Check voltage between terminal 7 of igniter connector and body ground.**

**PREPARATION:**

Disconnect the igniter connector.

**CHECK:**

Measure the voltage between terminal 7 of igniter connector and the body ground, when ignition switch is turned to ON and START position.

**OK:**

Voltage: 9 - 14 V

NG

Check and repair igniter power source circuit.

OK

8	Check for open and short in harness and connector between ignition switch and ignition coil, ignition coil and igniter (See page <a href="#">IN-26</a> ).
---	---

NG

Repair or replace harness or connector.

OK

9	Check ignition coil (See page <a href="#">IG-1</a> ).
---	---

NG

Replace ignition coil.

OK

Replace igniter.

<b>DTC</b>	<b>P1335</b>	<b>Crankshaft Position Sensor Circuit Malfunction (During engine running)</b>
------------	--------------	---

### CIRCUIT DESCRIPTION

Refer to DTC P0335 on page [DI-60](#) .

DTC No.	DTC Detection Condition	Trouble Area
P1335	No crankshaft position sensor signal to ECM with engine speed 1,000 rpm or more	<ul style="list-style-type: none"> <li>●Open or short in crankshaft position sensor circuit</li> <li>●Crankshaft position sensor</li> <li>●ECM</li> </ul>

### WIRING DIAGRAM

Refer to DTC P0335 on page [DI-60](#) .

DTC	P1500	Starter Signal Circuit Malfunction
-----	-------	------------------------------------

## CIRCUIT DESCRIPTION

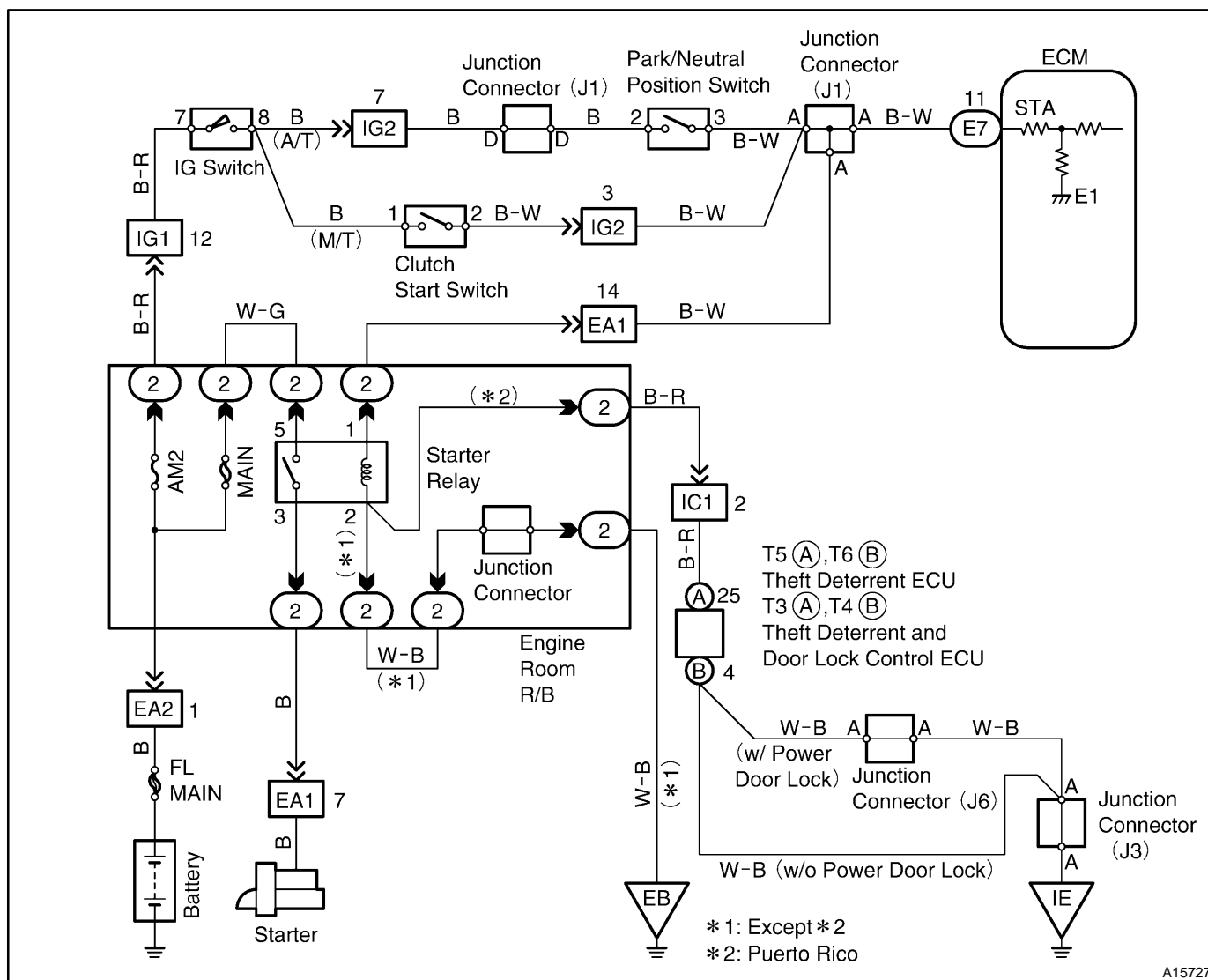
When the engine is cranked, the intake air flow is slow, so fuel vaporization is poor. A rich mixture is therefore necessary in order to achieve good startability. While the engine is being cranked, the battery voltage is applied to terminal STA of the ECM. The starter signal is mainly used to increase the fuel injection volume for the starting injection control and after-start injection control.

DTC No.	DTC Detection Condition	Trouble Area
P1500	No starter signal to ECM	<ul style="list-style-type: none"> <li>● Open or short in starter signal circuit</li> <li>● Open or short in ignition switch or starter relay circuit</li> <li>● ECM</li> </ul>

### HINT:

In this circuit, diagnosis can only be made in the check mode.

## WIRING DIAGRAM



A15727

## INSPECTION PROCEDURE

### HINT:

This diagnostic chart is based on the premise that the engine is cranked normally. If the engine is not cranked, proceed to the problem symptoms table on page [DI-19](#).

1	Connect TOYOTA hand-held tester, and check STA signal.
---	--

### PREPARATION:

- (a) Connect the TOYOTA hand-held tester to the DLC3.
- (b) Turn the ignition switch ON and push the TOYOTA hand-held tester main switch ON.

### CHECK:

Read the STA signal on the TOYOTA hand-held tester while the starter operates.

### OK:

Ignition Switch Position	ON	START
STA Signal	OFF	ON

**OK**

Proceed to next circuit inspection shown on problem symptoms table (See page [DI-19](#)).

**NG**

2	Check for open in harness and connector between ECM and starter relay (See page <a href="#">IN-26</a> ).
---	--

**NG**

Repair or replace connector.

**OK**

Check and replace ECM.

DTC	P1600	ECM BATT Malfunction
-----	-------	----------------------

## CIRCUIT DESCRIPTION

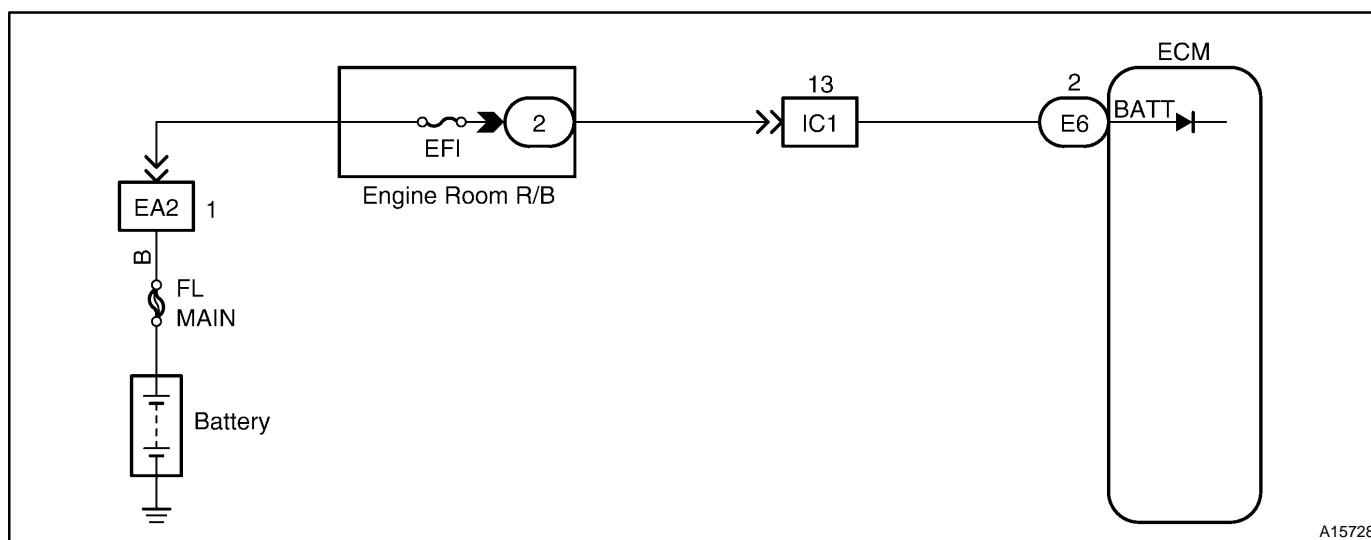
Battery positive voltage is supplied to terminal BATT of the ECM even when the ignition switch is OFF for use by the DTC memory and air-fuel ratio adaptive control value memory, etc.

DTC No.	DTC Detection Condition	Trouble Area
P1600	Open in back up power source circuit	<ul style="list-style-type: none"> <li>● Open in back up power source circuit</li> <li>● ECM</li> </ul>

HINT:

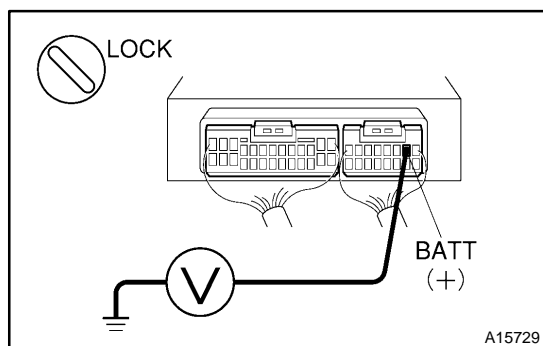
If DTC P1600 appear, the ECM does not store another DTC.

## WIRING DIAGRAM



## INSPECTION PROCEDURE

1	Check voltage between terminal BATT of ECM connector and body ground.
---	---



### PREPARATION:

Remove the lower finish panel.

### CHECK:

Measure the voltage between terminal BATT of the ECM connector and the body ground.

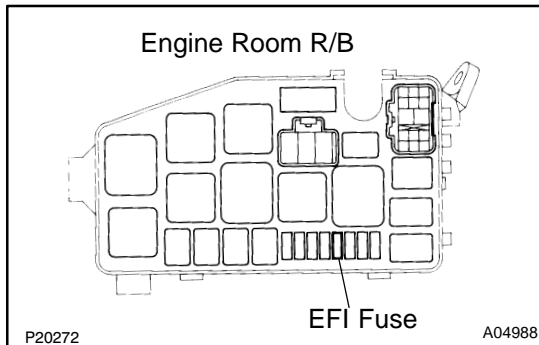
### OK:

Voltage: 9 - 14 V

OK

Check and replace ECM (See page [IN-26](#) ).

NG

**2 Check EFI fuse.****PREPARATION:**

Remove the EFI fuse from the engine room R/B.

**CHECK:**

Check the continuity of the EFI fuse.

**OK:**

Continuity

NG

Check for short in all harness and components connected to EFI fuse.

OK

Check and repair harness or connector between battery, EFI fuse and ECM



<b>DTC</b>	<b>P1780</b>	<b>Park/Neutral Position Switch Malfunction</b>
------------	--------------	---

## CIRCUIT DESCRIPTION

The park/neutral position switch goes on when the shift lever is in the N or P shift position. When it goes on terminal NSW of the ECM is grounded to body ground via the starter relay thus the terminal NSW voltage becomes 0 V. When the shift lever is in the D, 2, L or R position, the park/neutral position switch goes off, so the voltage of ECM terminal NSW becomes battery positive voltage, the voltage of the ECM internal power source.

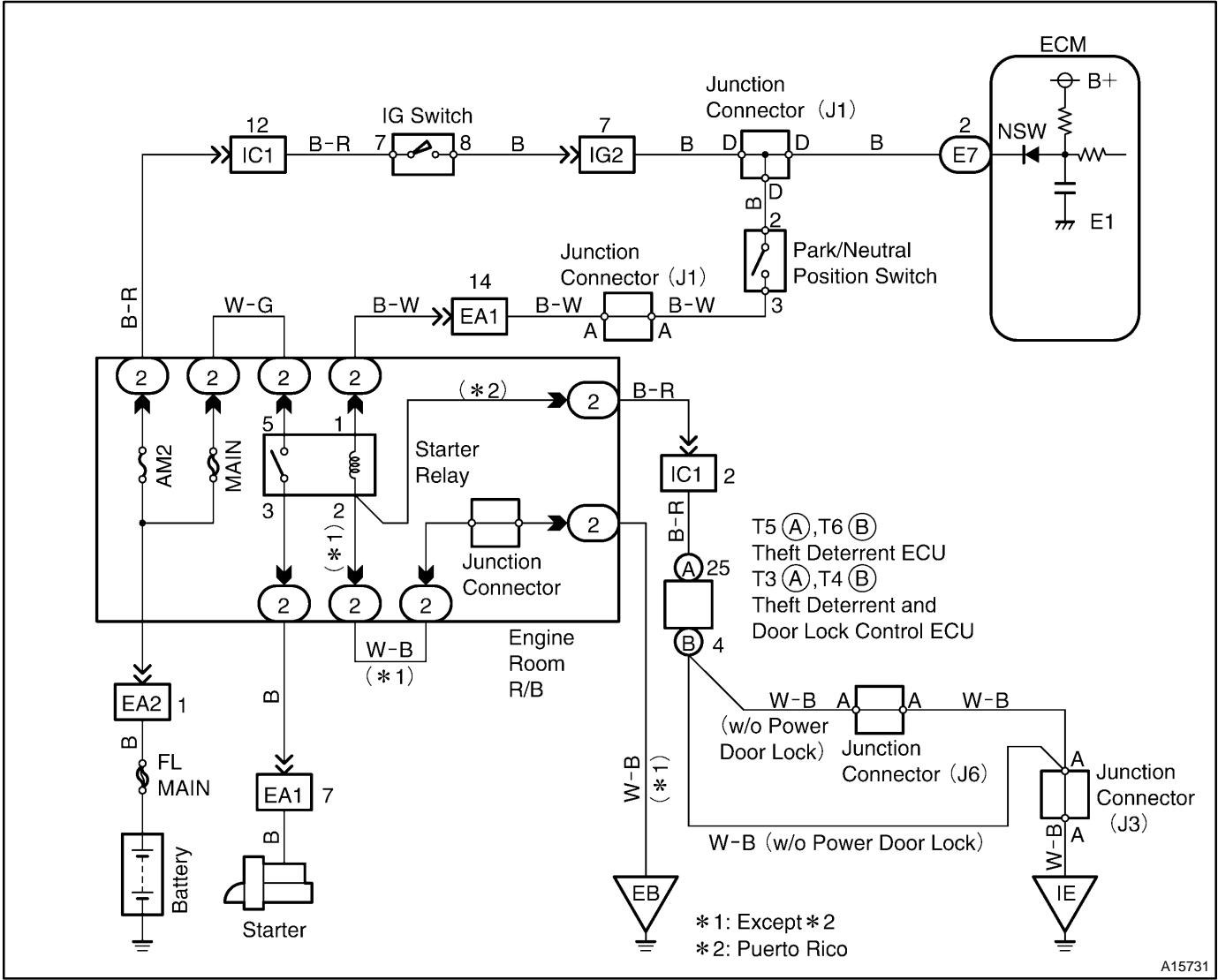
If the shift lever is moved from the N position to the D position, this signal is used for air-fuel ratio correction and for idle speed control (estimated control), etc.

DTC No.	DTC Detection Condition	Trouble Area
P1780	When driving under conditions (a) and (b) for 30 seconds or more, the park/neutral position switch is ON (N position) (2 trip detection logic) (a) Vehicle speed: 80 km/h (50 mph) or more (b) Engine speed: 2,000 - 3,000 rpm	<ul style="list-style-type: none"> <li>● Short in park/neutral position switch circuit</li> <li>● Park/neutral position switch</li> <li>● ECM</li> </ul>

### HINT:

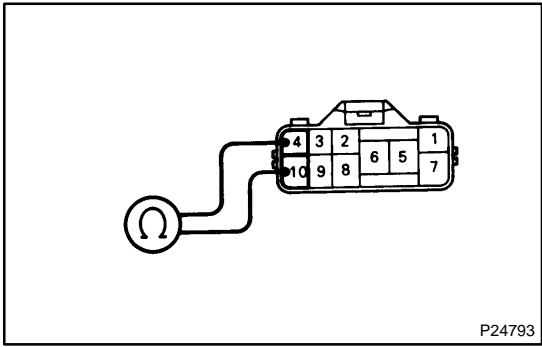
- After confirming DTC P1780, use the TOYOTA hand-held tester to confirm the PNP switch signal from the CURRENT DATA.
- After confirming DTC P1780, in the case that the diagnostic trouble codes are erased by disconnecting the battery terminals or EFI fuse, after operating the shift lever few times from P or N position to D position, confirm the PNP switch signal using the CURRENT DATA of the TOYOTA hand-held tester. If the PNP switch signal is not displayed on TOYOTA hand-held tester, the circuit of PNP switch signal may be short.

# WIRING DIAGRAM



# INSPECTION PROCEDURE

1	Check park/neutral position switch.
---	-------------------------------------



## PREPARATION:

Disconnect the park/neutral position switch connector.

## CHECK:

Check continuity between each terminal shown below when the shift lever is positioned to each range.

## OK:

Shift Position	Terminal No. to continuity	
P	4 - 7	5 - 6
R	4 - 8	-
N	4 - 10	5 - 6
D	4 - 9	-
2	2 - 4	-
L	3 - 4	-

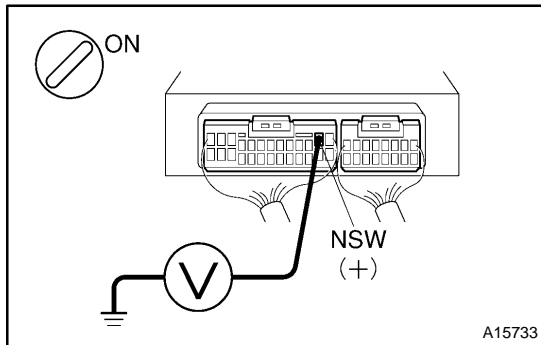
NG

Replace park/neutral position switch.

OK

2

Check voltage between terminal NSW of ECM connector and body ground.

**PREPARATION:**

- (a) Remove the lower finish panel.
- (b) Turn the ignition switch ON.

**CHECK:**

Measure the voltage between terminal NSW of the ECM connector and the body ground after the shift lever is moved to the following positions.

Shift lever position	P or N	L, 2, D or R
Voltage	0 - 3 V	9 - 14 V

OK

Check and replace ECM (See page [IN-26](#) ).

NG

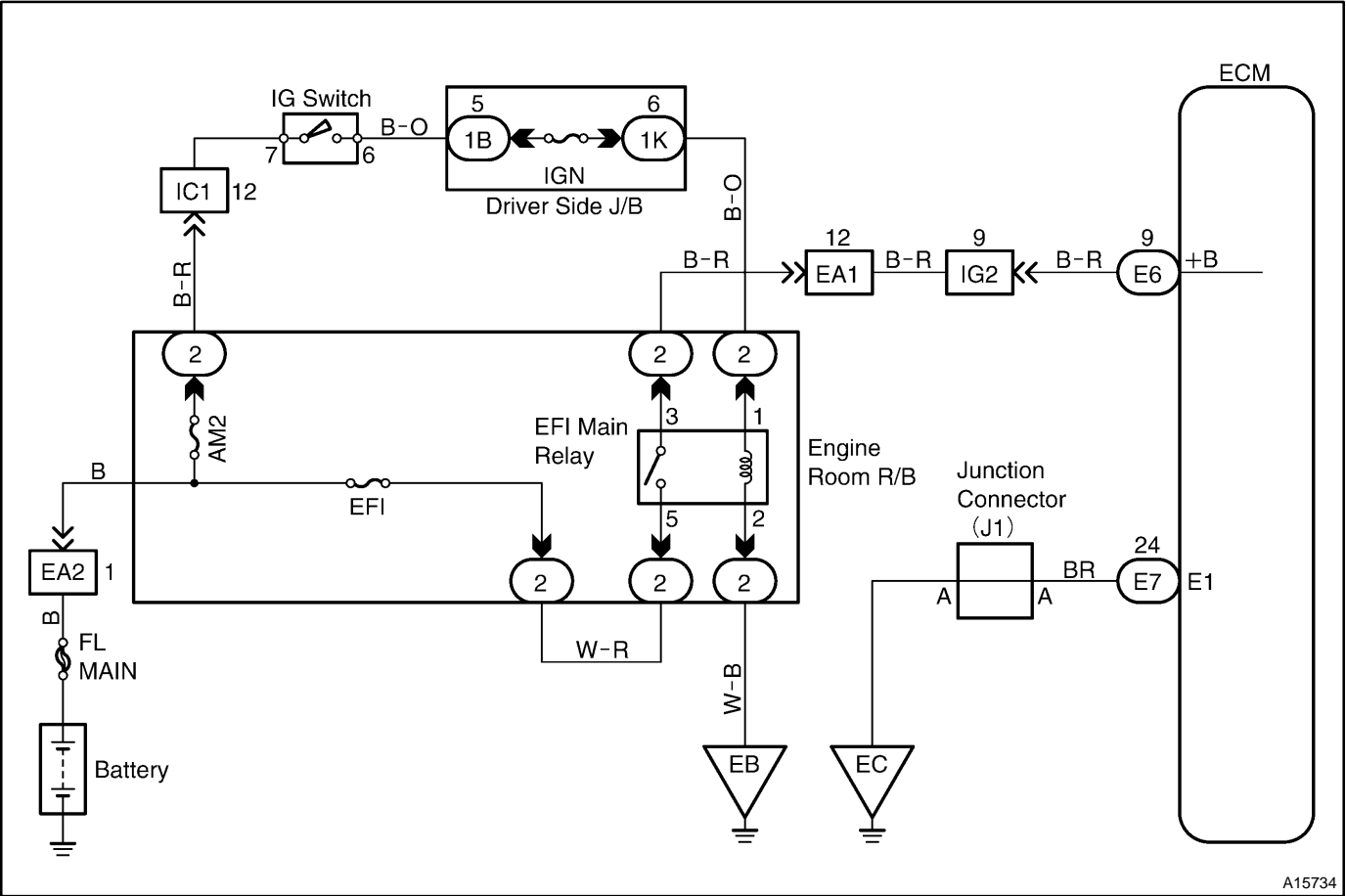
Check for open and short in harness and connector between ECM and park/neutral position switch (See page [IN-26](#) ).

# ECM Power Source Circuit

## CIRCUIT DESCRIPTION

When the ignition switch is turned ON, battery positive voltage is applied to the coil, closing the contacts of the EFI main relay and supplying power to the terminal +B of the ECM.

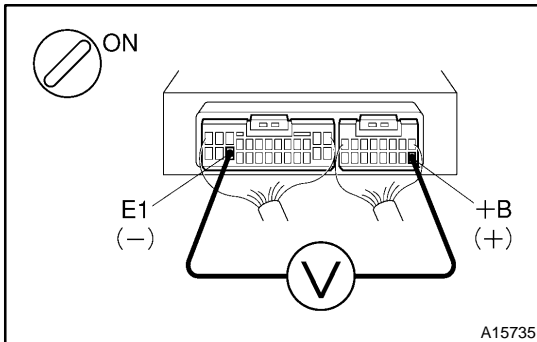
## WIRING DIAGRAM



A15734

**INSPECTION PROCEDURE**

- |          |  |
|----------|--|
| <b>1</b> | <b>Check voltage between terminals +B and E1 of ECM connector.</b> |
|----------|--|

**PREPARATION:**

- (a) Remove the lower finish panel.
- (b) Turn the ignition switch ON.

**CHECK:**

Measure the voltage between terminals +B and E1 of the ECM connectors.

**OK:**

**Voltage: 9 - 14 V**

**OK**

Proceed to next circuit inspection shown on matrix chart (See page [DI-19](#)).

**NG**

- |          |  |
|----------|--|
| <b>2</b> | <b>Check for open in harness and connector between terminal E1 of ECM and body ground (See page <a href="#">IN-26</a> ).</b> |
|----------|--|

**NG**

Repair or replace harness or connector.

**OK**

- |          |   |
|----------|---|
| <b>3</b> | <b>Check EFI main relay (Marking: EFI) (See page <a href="#">MF-38</a> ).</b> |
|----------|---|

**NG**

Replace EFI main relay.

**OK**

- |          |  |
|----------|--|
| <b>4</b> | <b>Check EFI fuse (See page <a href="#">DI-92</a> , step 2).</b> |
|----------|--|

**NG**

Check for short in all harness and components connected to EFI fuse.

**OK**

- |          |  |
|----------|--|
| <b>5</b> | <b>Check for open in harness and connector between EFI main relay (Marking: EFI) and battery, EFI main relay (Marking: EFI) and ECM (See page <a href="#">IN-26</a> ).</b> |
|----------|--|

**NG**

**Repair or replace harness or connector.**

**OK**

- |          |   |
|----------|---|
| <b>6</b> | <b>Check IGN fuse of driver side J/B.</b> |
|----------|---|

**NG**

**Check for short in all harness and components connected to IGN fuse.**

**OK**

- |          |  |
|----------|--|
| <b>7</b> | <b>Check ignition switch (See page <a href="#">BE-1 1</a> ).</b> |
|----------|--|

**NG**

**Replace ignition switch.**

**OK**

**Check for open in harness and connector between ignition switch and EFI main relay, EFI main relay and body ground (See page [IN-26](#) ).**

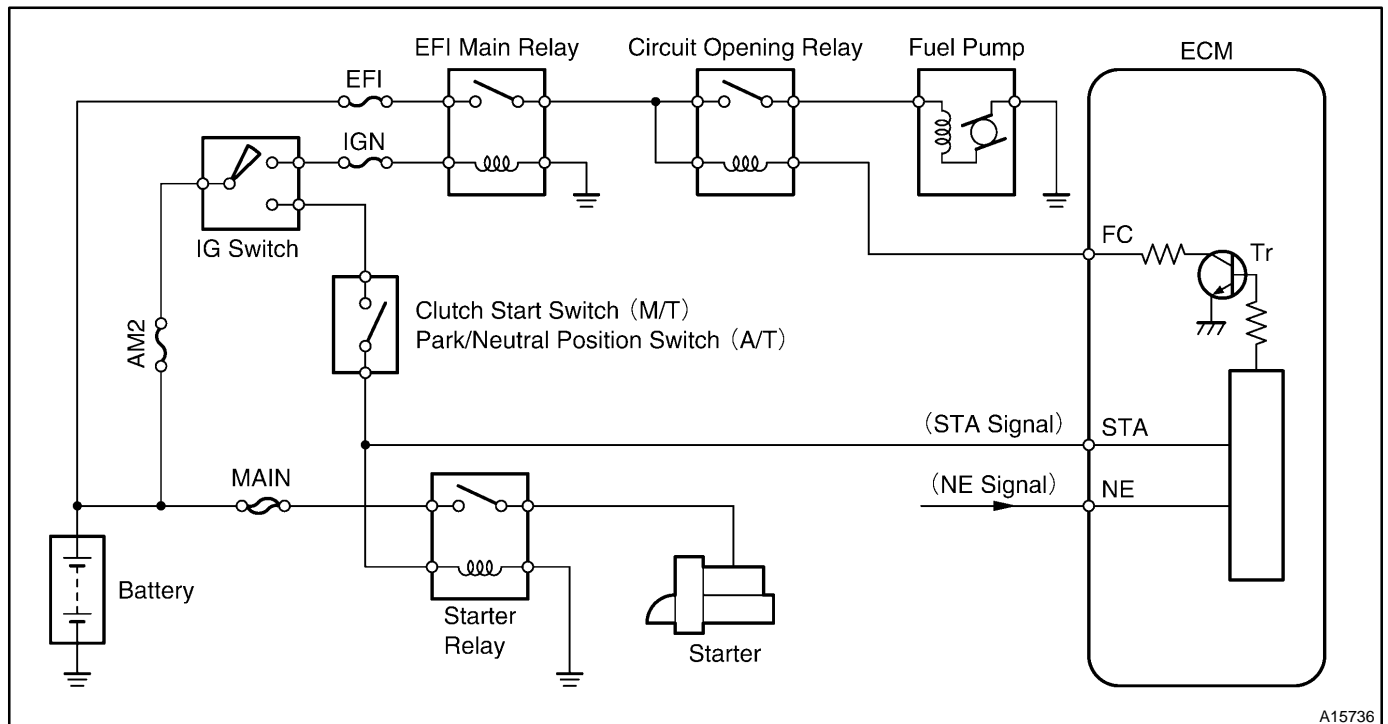
## Fuel Pump Control Circuit

### CIRCUIT DESCRIPTION

In the diagram below, when the engine is cranked, current flows from terminal ST of the ignition switch to the starter relay coil and also current flows to terminal STA of ECM (STA signal).

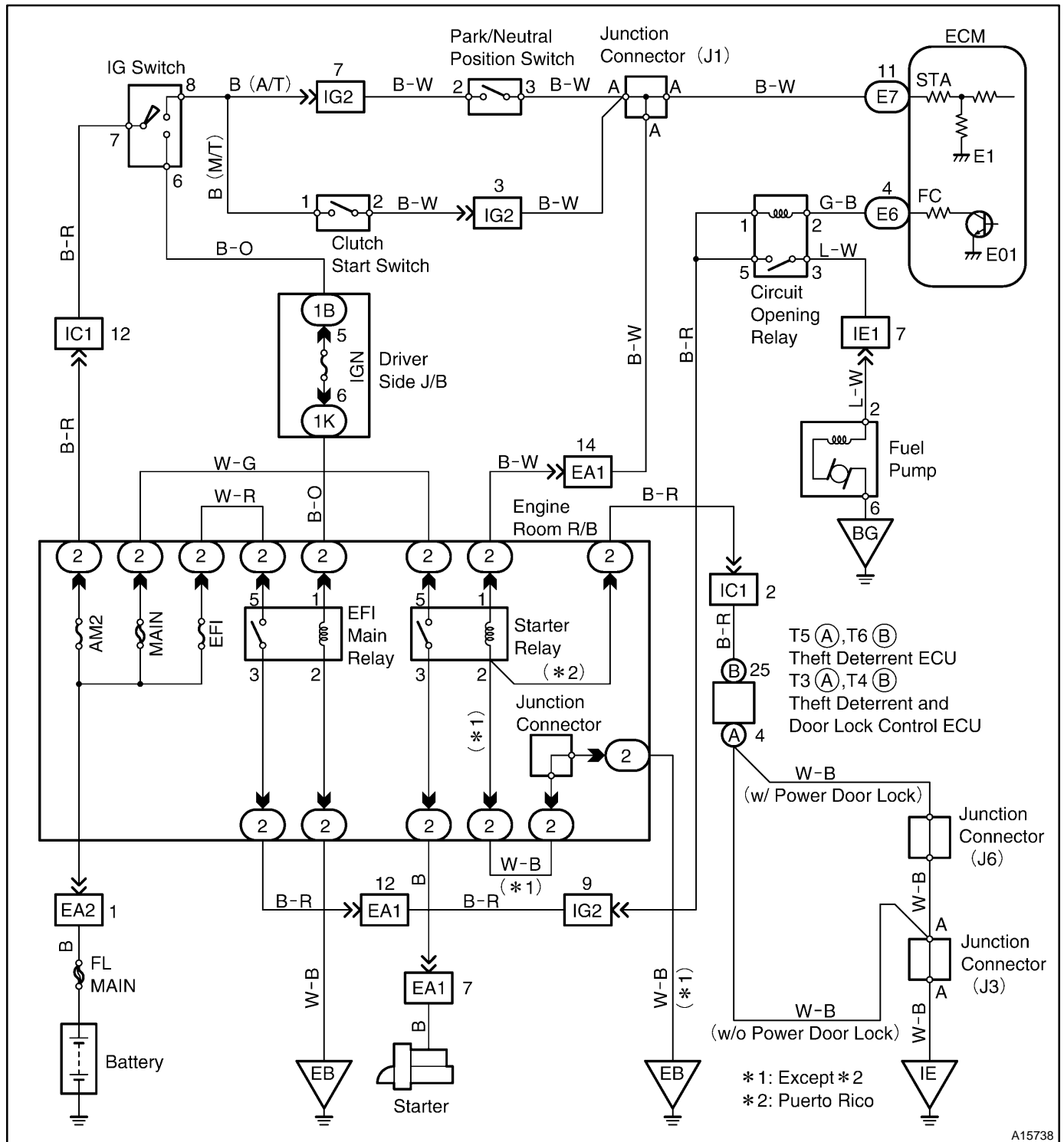
When the STA signal and NE signal are input to the ECM, Tr is turned ON, current flows to coil of the circuit opening relay, the relay switches on, power is supplied to the fuel pump and the fuel pump operates.

While the NE signal is generated (engine running), the ECM keeps Tr ON (circuit opening relay ON) and the fuel pump also keeps operating.



A15736

## WIRING DIAGRAM



A15738



**INSPECTION PROCEDURE****TOYOTA hand-held tester:**

- |   |  |
|---|--|
| 1 | Connect TOYOTA hand-held tester and check operation of fuel pump (See page <a href="#">MF-1</a> ). |
|---|--|

**OK**

Check for starter signal circuit.

**NG**

- |   |   |
|---|---|
| 2 | Check for ECM power source circuit (See page <a href="#">DI-97</a> ). |
|---|---|

**NG**

Repair or replace.

**OK**

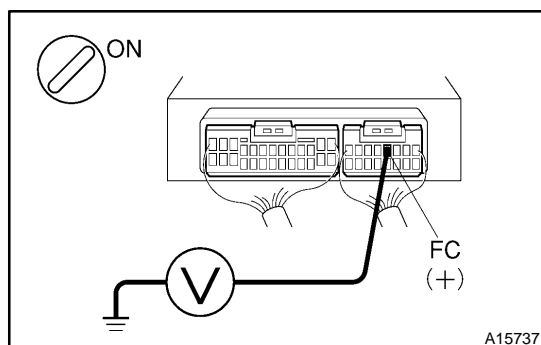
- |   |  |
|---|--|
| 3 | Check circuit opening relay (See page <a href="#">MF-40</a> ). |
|---|--|

**NG**

Replace circuit opening relay.

**OK**

- |   |   |
|---|---|
| 4 | Check voltage between terminal FC of ECM and body ground. |
|---|---|

**PREPARATION:**

- (a) Remove the lower finish panel.
- (b) Turn ignition switch ON.

**CHECK:**

Measure voltage between terminal FC of ECM and body ground.

**OK:**

**Voltage: 9 - 14 V**

**NG**

Check for open in harness and connector between EFI main relay and circuit opening relay, circuit opening relay and ECM.

**OK**

**5** Check fuel pump (See page [MF-1](#) ).

**NG**

Repair or replace fuel pump.

**OK**

**6** Check for open in harness and connector between circuit opening relay and fuel pump, fuel pump and body ground (See page [IN-26](#) ).

**NG**

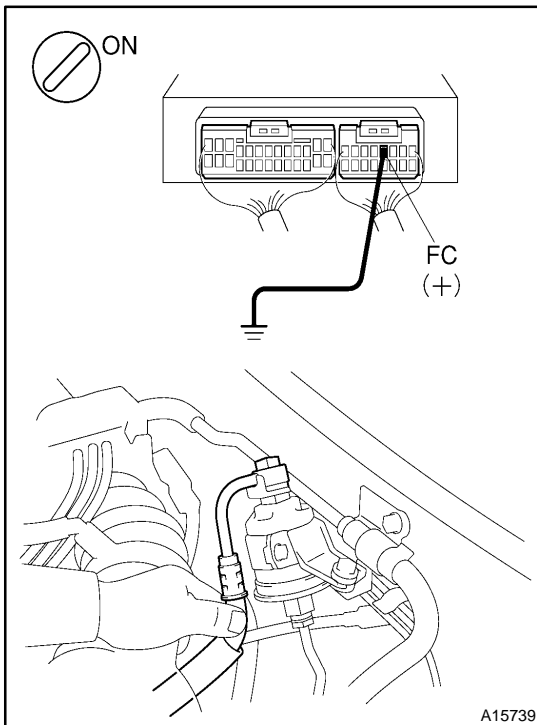
Repair or replace harness or connector.

**OK**

Check and replace ECM (See page [IN-26](#) ).

### OBD II scan tool (excluding TOYOTA hand-held tester):

**1** Check fuel pump operation.



#### **PREPARATION:**

- Remove the lower finish panel.
- Turn the ignition switch ON.

#### **CHECK:**

- Connect terminal FC of the ECM and the body ground together.
- Check for fuel pressure in the fuel inlet hose when it is pinched off.

#### **OK:**

**There is pressure in the inlet hose**

#### **HINT:**

At this time, you will hear a fuel flowing noise.

**OK**

Check for starter signal circuit.

**NG****2****Check for ECM power source circuit (See page [DI-97](#) ).****NG****Repair or replace.****OK****3****Check circuit opening relay (See page [MF-40](#) ).****NG****Replace circuit opening relay.****OK****4****Check voltage between terminal FC of ECM connector and body ground.  
(See page [DI-100](#) )****NG****Check for open in harness and connector between EFI main relay and circuit opening relay, circuit opening relay and ECM.****OK****5****Check fuel pump (See page [MF-1](#) ).****NG****Repair or replace fuel pump.****OK****6****Check for open in harness and connector between circuit opening relay and fuel pump, fuel pump and body ground (See page [IN-26](#) ).**

```
graph TD; A[OK] --> B{NG}; B --> C[Repair or replace harness or connector.];
```

**NG**

**Repair or replace harness or connector.**

**OK**

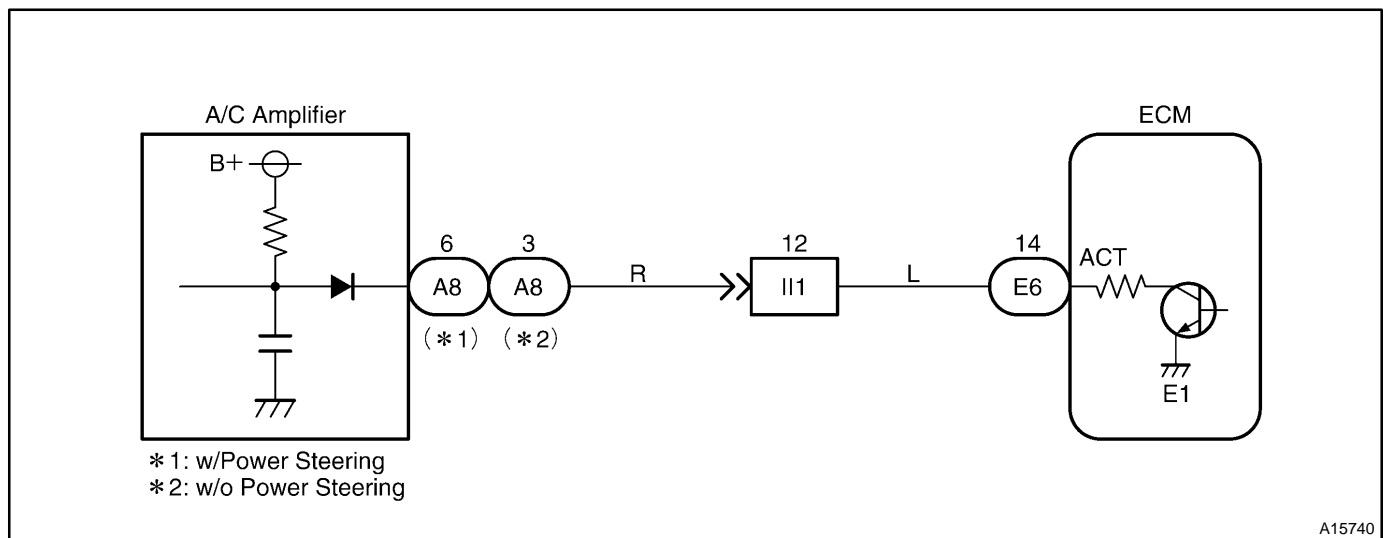
**Check and replace ECM (See page [IN-26](#) ).**

## A/C Cut Control Circuit

### CIRCUIT DESCRIPTION

This circuit cuts air conditioning operation during vehicle acceleration in order to increase acceleration performance. During acceleration with the vehicle speed at 25 km/h (16 mph) or less, engine speed at 1,200 rpm or less and throttle valve opening angle at 50° or more, the A/C magnet switch is turned OFF for several seconds.

### WIRING DIAGRAM



### INSPECTION PROCEDURE

#### TOYOTA hand-held tester:

1	Connect TOYOTA hand-held tester and check operation of air conditioning cut control.
---	--

#### PREPARATION:

- Remove the fuse cover on the instrument panel.
- Connect the TOYOTA hand-held tester to the DLC3.
- Turn ignition switch ON and TOYOTA hand-held tester main switch ON.
- Start the engine and air conditioning switch ON.

#### HINT:

A/C magnet clutch is turned ON.

- Select the ACTIVE TEST mode on the TOYOTA hand-held tester.

#### CHECK:

Check operation of A/C magnet clutch cut when air conditioning cut control is operated by the TOYOTA hand-held tester.

#### OK:

A/C magnet clutch is turned OFF

OK

Proceed to next circuit inspection shown on matrix chart (See page [DI-19](#)).

NG

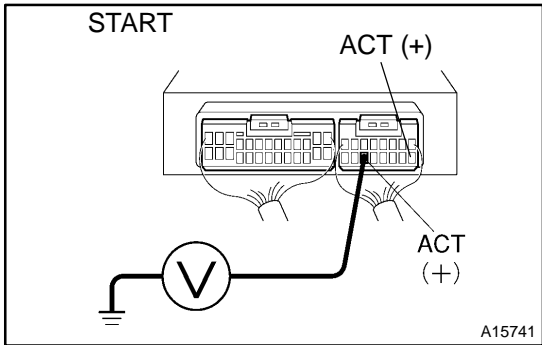
2 Check for open and short in harness and connector between ECM and A/C amplifier (See page [IN-26](#) ).

NG

Repair or replace harness or connector.

OK

3 Check voltage between terminal ACT of ECM and body ground.



**PREPARATION:**

- (a) Remove the lower finish panel.
- (b) Start the engine.

**CHECK:**

Measure the voltage between terminal ACT of the ECM connector and the body ground when A/C switch is turned to ON and OFF.

**OK:**

A/C switch condition	Voltage
ON	9 - 14 V
OFF	Below 2.0 V

NG

Check and replace A/C amplifier.

OK

Check and replace ECM (See page [IN-26](#) ).

**OBD II scan tool (excluding TOYOTA hand-held tester):**

1 Check voltage between terminal ACT of ECM connector and body ground (See page [DI-106](#) , step 3).

OK

Check and repair ECM (See page [IN-26](#) ).

NG

2	Check for open and short in harness and connector between ECM and A/C amplifier (See page <a href="#">IN-26</a> ).
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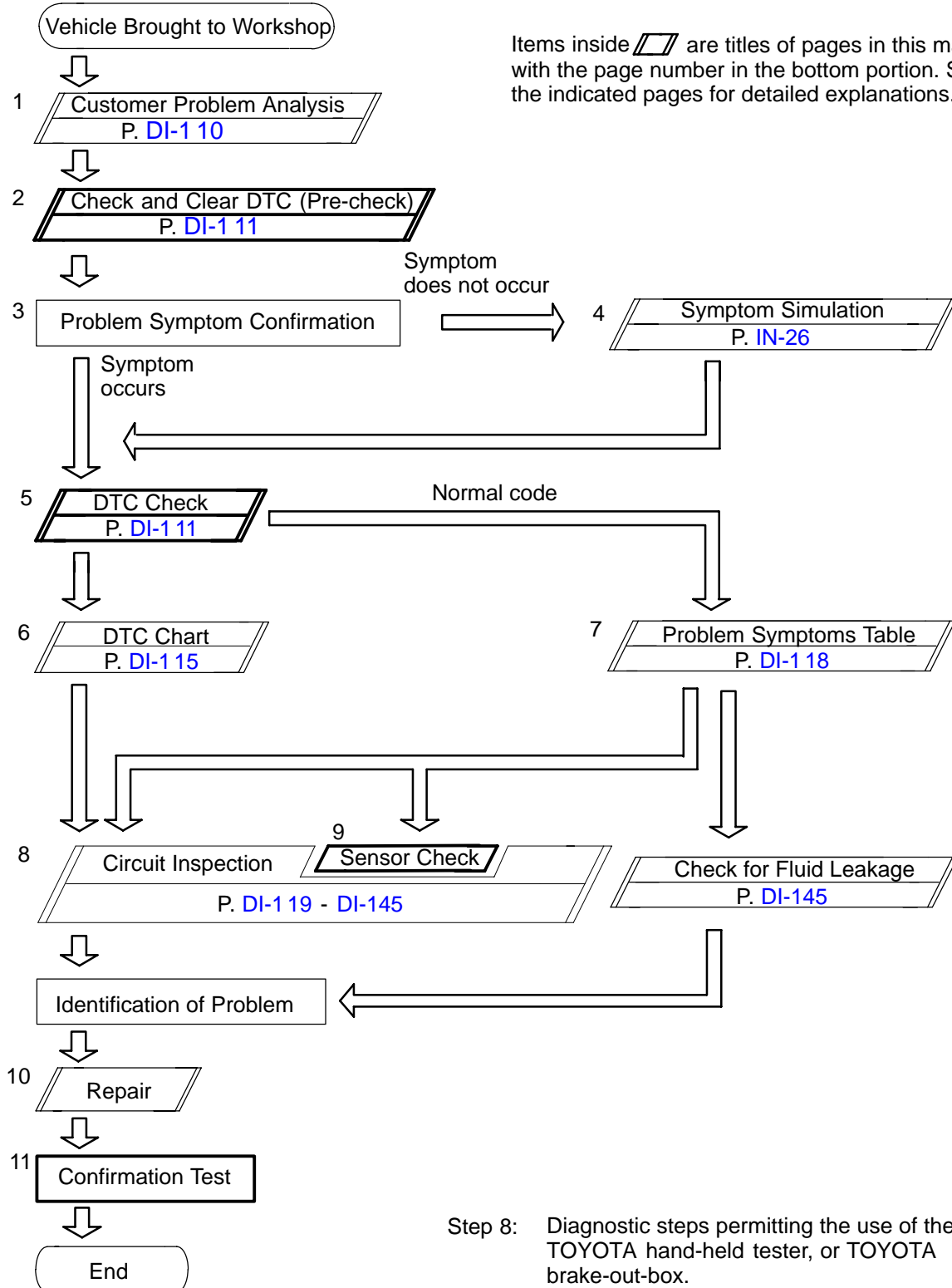
**NG****Repair or replace harness or connector.****OK****Check and replace A/C amplifier.**

# ANTI-LOCK BRAKE SYSTEM

## HOW TO PROCEED WITH TROUBLESHOOTING

DI4LN-02

Troubleshooting in accordance with the procedure on the following pages.





# CUSTOMER PROBLEM ANALYSIS CHECK

## ABS Check Sheet

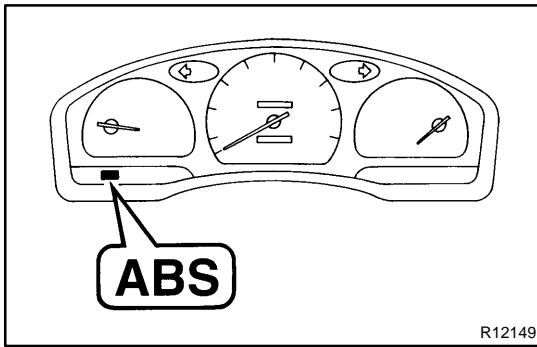
 Inspector's  
Name : \_\_\_\_\_

Customer's Name		Registration No.	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	Odometer Reading	km miles

Date Problem First Occurred	/ /
Frequency Problem Occurs	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent (    times a day)

Symptoms	<input type="checkbox"/> ABS does not operate.	
	<input type="checkbox"/> ABS does not operate intermittently.	
	ABS Warning Light Abnormal	<input type="checkbox"/> Remains ON <input type="checkbox"/> Does not Light Up

DTC Check	1st Time	<input type="checkbox"/> Normal Code <input type="checkbox"/> Malfunction Code (Code    )
	2nd Time	<input type="checkbox"/> Normal Code <input type="checkbox"/> Malfunction Code (Code    )



## PRE-CHECK

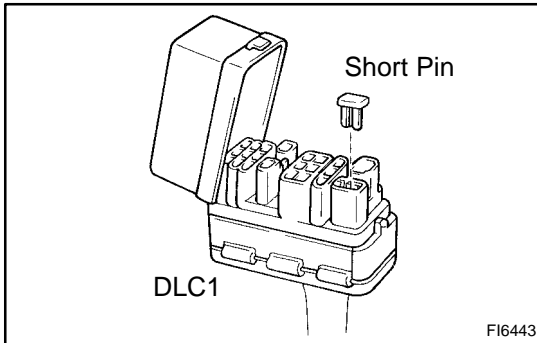
### 1. DIAGNOSIS SYSTEM

#### (a) Check the indicator.

When the ignition switch is turned ON, check that the ABS warning light goes on for 3 seconds.

#### HINT:

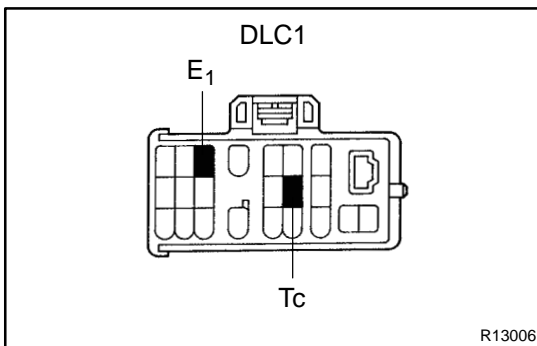
If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light circuit (See page [DI-138](#) ).



#### (b) Check the DTC.

(1) Turn the ignition switch ON.

(2) Disconnect the short pin from the DLC1.



(3) Using SST, connect terminals Tc and E<sub>1</sub> of the DLC1.

SST 09843-18020

(4) Read the DTC from the ABS warning light on the combination meter.

#### HINT:

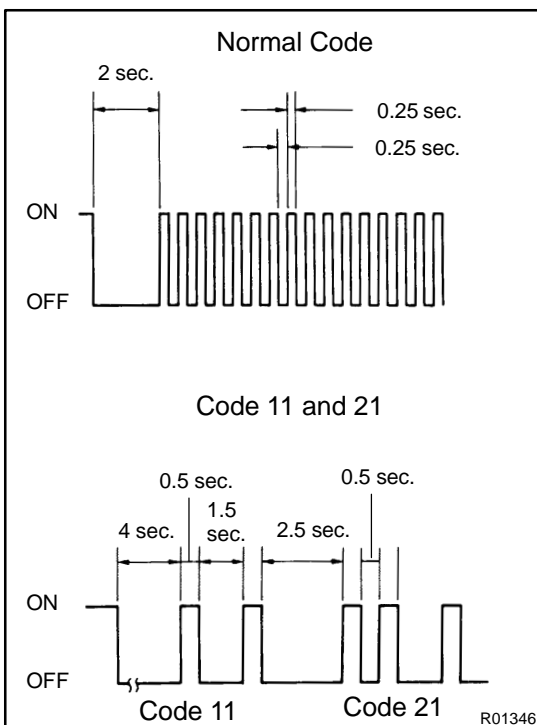
- If no code appears, inspect the diagnostic circuit or ABS warning light circuit (See page [DI-141](#) or [DI-138](#) ).

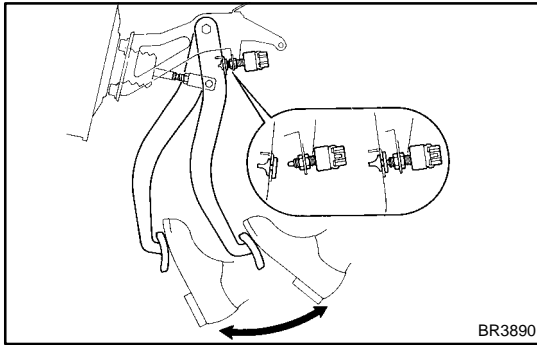
- As an example, the blinking patterns for normal code and codes 11 and 21 are shown in the illustration.

(5) Code are explained in the code table on page [DI-1 15](#).

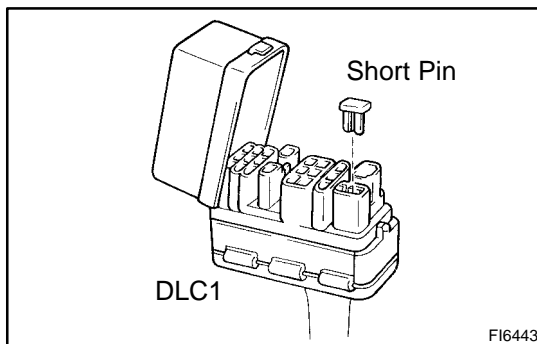
(6) After completing the check, disconnect terminals Tc and E<sub>1</sub>, and turn off the display.

If 2 or more malfunctions are indicated at the same time, the lowest numbered DTC will be displayed 1st.





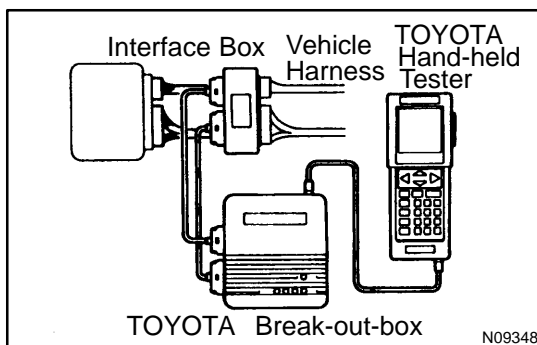
- (c) Clear the DTC.
- (1) Using SST, connect terminals Tc and E<sub>1</sub> of the DLC1 and remove the short pin from the DLC1.  
SST 09843-18020
  - (2) IG switch ON.
  - (3) Clear the DTC stored in ECU by depressing the brake pedal 8 or more times within 3 seconds.
  - (4) Check that the warning light shows the normal code.
  - (5) Remove the SST from the terminals of the DLC1.  
SST 09843-18020



- (6) Connect the short pin to the DLC1.

**HINT:**

Cancellation can also be done by removing the DOME fuse, but in this case, other memory systems will also be cancelled out.

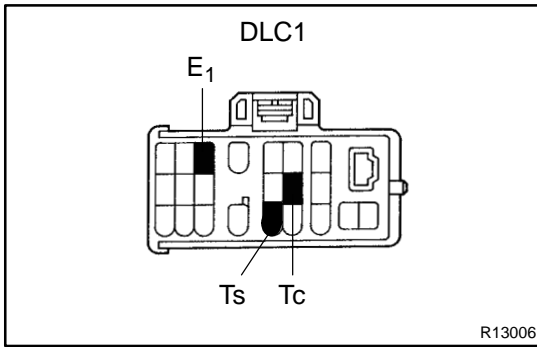


- (d) Using TOYOTA break-out-box and TOYOTA hand-held tester, measure the ECU terminal values.
- (1) Hook up the TOYOTA hand-held tester and TOYOTA break-out-box to the vehicle.
  - (2) Read the ECU input/output values by following the prompts on the tester screen.

**HINT:**

TOYOTA hand-held tester has a "Snapshot" function. This records the measured values and is effective in the diagnosis of intermittent problems.

Please refer to the TOYOTA hand-held tester/TOYOTA break out-box operators manual for further details.



## 2. SPEED SENSOR SIGNAL CHECK

(a) Check the speed sensor signal.

- (1) Turn the ignition switch OFF.
- (2) Using SST, connect terminals Ts and E<sub>1</sub> of the DLC1.

SST 09843-18020

(3) Start the engine.

(4) Check that the ABS warning light blinks.

HINT:

If the ABS warning light does not blink, inspect the ABS warning light circuit (See page [DI-138](#)).

(5) Drive the vehicle faster than 45 km/h (28 mph) for several seconds.

(6) Stop the vehicle.

(7) Using SST, connect terminals Tc and E<sub>1</sub> of the DLC1.

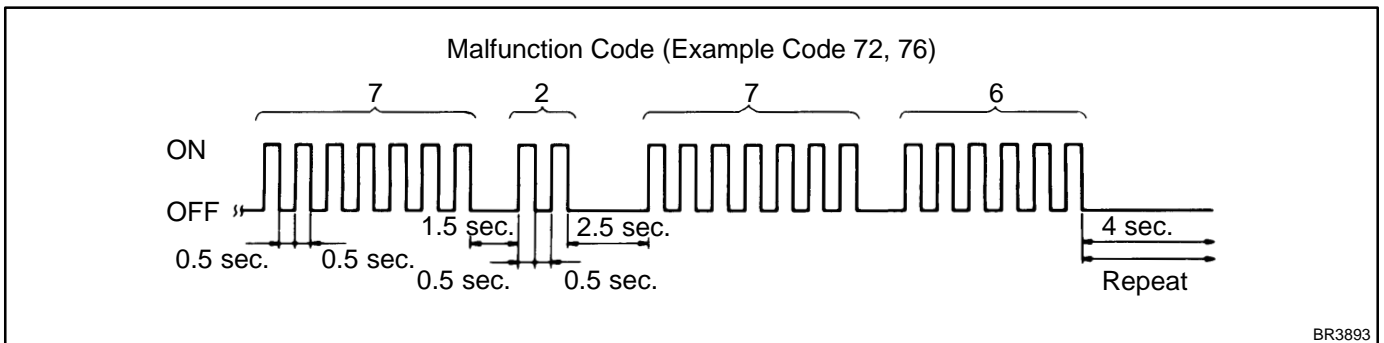
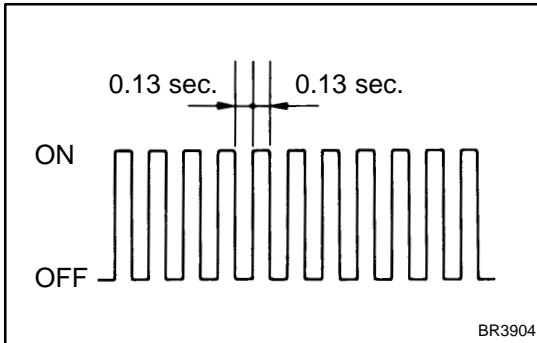
SST 09843-18020

(8) Read the number of blinks of the ABS warning light.

HINT:

See the list of DTCs shown on the next page.

- If every sensor is normal, a normal code is output (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated).
- If 2 or more malfunctions are indicated at the same time, the lowest numbered code will be displayed 1st.



(9) After doing the check, disconnect terminals Ts and E<sub>1</sub>, and Tc and E<sub>1</sub> of the DLC1, and turn ignition switch OFF.

(b) Check the DTC of speed sensor function.

Code No.	Diagnosis	Trouble Area
71	Low output voltage of right front speed sensor	<ul style="list-style-type: none"> <li>● Right front speed sensor</li> <li>● Sensor installation</li> </ul>
72	Low output voltage of left front speed sensor	<ul style="list-style-type: none"> <li>● Left front speed sensor</li> <li>● Sensor installation</li> </ul>
73	Low output voltage of right rear speed sensor	<ul style="list-style-type: none"> <li>● Right rear speed sensor</li> <li>● Sensor installation</li> </ul>
74	Low output voltage of left rear speed sensor	<ul style="list-style-type: none"> <li>● Left rear speed sensor</li> <li>● Sensor installation</li> </ul>
75	Abnormal change in output voltage of right front speed sensor	<ul style="list-style-type: none"> <li>● Right front speed sensor rotor</li> </ul>
76	Abnormal change in output voltage of left front speed sensor	<ul style="list-style-type: none"> <li>● Left front speed sensor rotor</li> </ul>
77	Abnormal change in output voltage of right rear speed sensor	<ul style="list-style-type: none"> <li>● Right rear speed sensor rotor</li> </ul>
78	Abnormal change in output voltage of left rear speed sensor	<ul style="list-style-type: none"> <li>● Left rear speed sensor rotor</li> </ul>

## DIAGNOSTIC TROUBLE CODE CHART

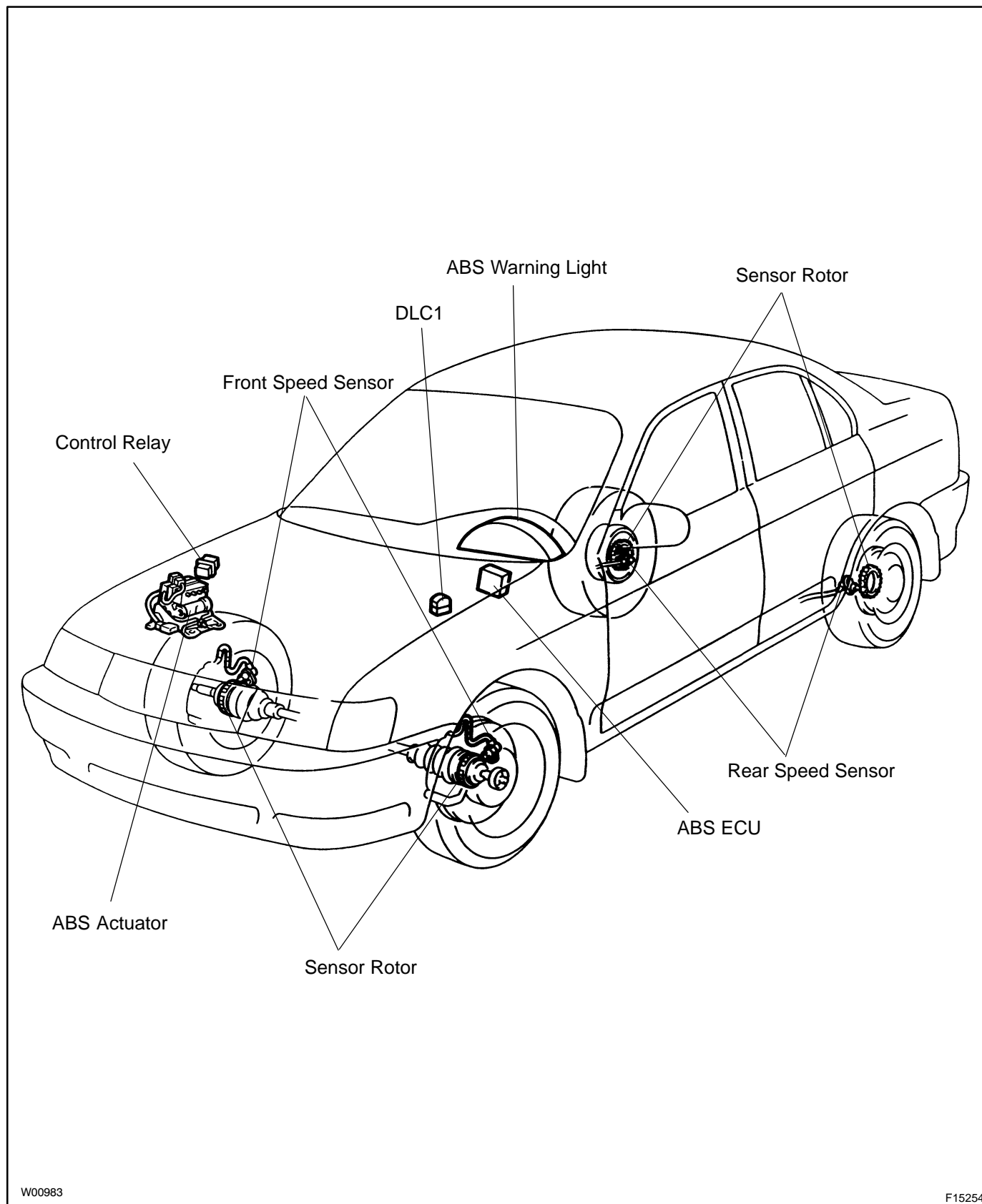
### HINT:

Using SST 09843-18020, connect the terminals Tc and E<sub>1</sub>, and remove the short pin.

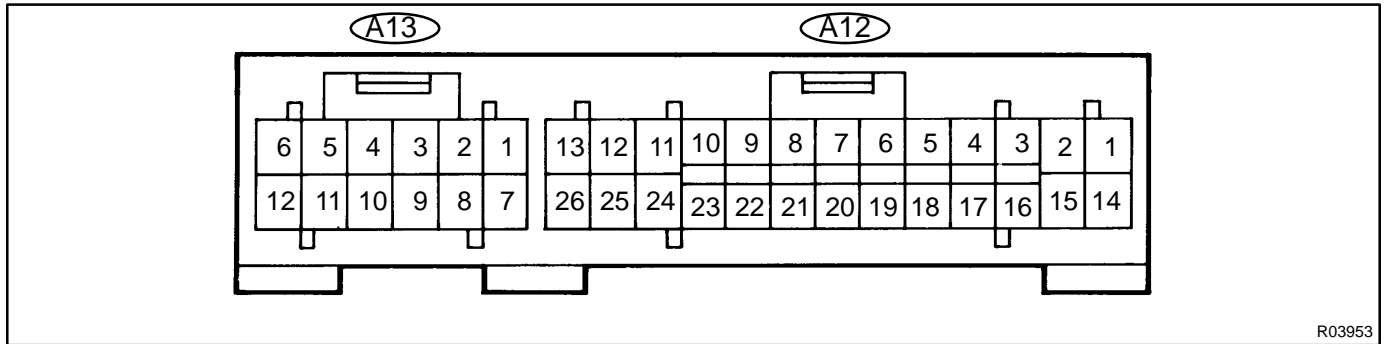
If a malfunction code is displayed during the DTC check, check the circuit listed for that the code. For details of each code, turn to the page referred to under the "See page" for respective "DTC No." in the DTC chart.

DTC No. (See page)	Detection Item	Trouble Area
11 (DI-119)	Open circuit in ABS control (solenoid) relay circuit	<ul style="list-style-type: none"> <li>●ABS control (solenoid) relay</li> <li>●Open or short in ABS control (solenoid) relay circuit</li> <li>●ECU</li> </ul>
12 (DI-119)	Short circuit in ABS control (solenoid) relay circuit	<ul style="list-style-type: none"> <li>●ABS control (solenoid) relay</li> <li>●B+ short in ABS control (solenoid) relay circuit</li> <li>●ECU</li> </ul>
13 (DI-122)	Open circuit in ABS control (motor) relay circuit	<ul style="list-style-type: none"> <li>●ABS control (motor) relay</li> <li>●Open or short in ABS control (motor) relay circuit</li> <li>●ECU</li> </ul>
14 (DI-122)	Short circuit in ABS control (motor) relay circuit	<ul style="list-style-type: none"> <li>●ABS control (motor) relay</li> <li>●B+ short in ABS control (motor) relay circuit</li> <li>●ECU</li> </ul>
21 (DI-125)	Open or short circuit in solenoid circuit for right front wheel	<ul style="list-style-type: none"> <li>●ABS actuator</li> <li>●Open or short in SFR circuit</li> <li>●ECU</li> </ul>
22 (DI-125)	Open or short circuit in solenoid circuit for left front wheel	<ul style="list-style-type: none"> <li>●ABS actuator</li> <li>●Open or short in SFL circuit</li> <li>●ECU</li> </ul>
23 (DI-125)	Open or short circuit in solenoid circuit for right rear wheel	<ul style="list-style-type: none"> <li>●ABS actuator</li> <li>●Open or short in SRR circuit</li> <li>●ECU</li> </ul>
24 (DI-125)	Open or short circuit in solenoid circuit for left rear wheel	<ul style="list-style-type: none"> <li>●ABS actuator</li> <li>●Open or short in SRL circuit</li> <li>●ECU</li> </ul>
31 (DI-128)	Right front wheel speed sensor signal malfunction	<ul style="list-style-type: none"> <li>●Right front, left front, right rear or left rear speed sensor</li> <li>●Open or short in each speed sensor circuit</li> <li>●ECU</li> </ul>
32 (DI-128)	Left front wheel speed sensor signal malfunction	
33 (DI-128)	Right rear wheel speed sensor signal malfunction	
34 (DI-128)	Left rear wheel speed sensor signal malfunction	
41 (DI-132)	Low battery positive voltage or abnormally high battery positive voltage	<ul style="list-style-type: none"> <li>●Battery</li> <li>●C regulator</li> <li>●Open or short in power source circuit</li> <li>●ECU</li> </ul>
51 (DI-135)	Pump motor is locked Open in pump motor ground	<ul style="list-style-type: none"> <li>●ABS pump motor</li> </ul>
Always ON	Malfunction in ECU	<ul style="list-style-type: none"> <li>●ECU</li> </ul>

## PARTS LOCATION



## TERMINALS OF ECU



R03953

Symbols (Terminal No.)	Wiring Color	Condition	STD Voltage (V)
IG1 (A12-5) - GND (A13-7)	B-Y - W-B	IG switch ON	10 - 14
SR (A12-20) - R+ (A12-4)	G-B - L-B	IG switch ON	9 - 14
MR (A12-7) - R+ (A12-4)	G-R - L-B	IG switch ON	Below 1.0
SFRR (A13-5) - GND (A13-7)	Y-R - W-B	IG switch ON	ABS warning light OFF
SFRH (A13-6) - GND (A13-7)	Y - W-B	IG switch ON	ABS warning light OFF
SFLR (A12-2) - GND (A13-7)	R-B - W-B	IG switch ON	ABS warning light OFF
SFLH (A12-1) - GND (A13-7)	P - W-B	IG switch ON	ABS warning light OFF
SRRR (A12-15) - GND (A13-7)	L-W - W-B	IG switch ON	ABS warning light OFF
SRRH (A12-14) - GND (A13-7)	R-W - W-B	IG switch ON	ABS warning light OFF
SRLR (A13-11) - GND (A13-7)	G-Y - W-B	IG switch ON	ABS warning light OFF
SRLH (A13-12) - GND (A13-7)	Y-B - W-B	IG switch ON	ABS warning light OFF
AST (A12-8) - GND (A13-7)	LG - W-B	IG switch ON	ABS warning light OFF
MT (A12-26) - GND (A13-7)	LG-B ↔ W-B	IG switch ON	Below 1.5
WA (A12-18) - GND (A13-7)	R-L - W-B	IG switch ON	ABS warning light ON
		IG switch ON	ABS warning light OFF
STP (A12-12) - GND (A13-7)	G-W - W-B	Stop light switch OFF	Below 1.5
		Stop light switch ON	8 - 14
Tc (A12-25) - GND (A13-7)	P-B - W-B	IG switch ON	10 - 14
Ts (A12-24) - GND (A13-7)	L - W-B	IG switch ON	10 - 14
FR+ (A12-10) - FR- (A12-9)	B - W	IG switch ON	Slowly turn right front wheel
FL+ (A12-22) - FL- (A12-23)	R - G	IG switch ON	Slowly turn left front wheel
RR+ (A13-8) - RR- (A13-9)	L - LG	IG switch ON	Slowly turn right rear wheel
RL+ (A13-3) - RL- (A13-2)	V - P	IG switch ON	Slowly turn left rear wheel



## PROBLEM SYMPTOMS TABLE

If a normal 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 page for troubleshooting.

Symptoms	Suspected Area	See page
ABS does not operate	<p>Only when 1 – 4 are all normal and the problem is still occurring, replace the ABS ECU</p> <p>6. Check the DTC, reconfirming that the normal code is output</p> <p>7. IG power source circuit</p> <p>8. Speed sensor circuit</p> <p>9. Check the ABS actuator with a checker</p> <p>If abnormal, check the hydraulic circuit for leakage (See page <a href="#">DI-145</a>).</p>	<p><a href="#">DI-1 11</a></p> <p><a href="#">DI-132</a></p> <p><a href="#">DI-128</a></p> <p><a href="#">BR-35</a></p>
ABS does not operate efficiently	<p>Only when 1 - 4 are all normal and the problem is still occurring, replace the ABS ECU</p> <p>1. Check the DTC, reconfirming that the normal code is output</p> <p>2. Speed sensor circuit</p> <p>3. Stop light switch circuit</p> <p>4. Check the ABS actuator with a checker</p> <p>If abnormal, check the hydraulic circuit for leakage (See page <a href="#">DI-145</a>)</p>	<p><a href="#">DI-1 11</a></p> <p><a href="#">DI-128</a></p> <p><a href="#">DI-136</a></p> <p><a href="#">BR-35</a></p>
ABS warning light abnormal	<p>1. ABS warning light circuit</p> <p>2. ABS ECU</p>	<p><a href="#">DI-138</a></p> <p>-</p>
DTC check cannot be done	<p>Only when 1 and 2 are all normal and the problem is still occurring, replace the ABS ECU</p> <p>1. ABS warning light circuit</p> <p>2. Tc terminal circuit</p>	<p><a href="#">DI-138</a></p> <p><a href="#">DI-141</a></p>
Speed sensor signal check cannot be done	<p>1. Ts terminal circuit</p> <p>2. ABS ECU</p>	<p><a href="#">DI-143</a></p> <p>-</p>

## CIRCUIT INSPECTION

DTC	11, 12	ABS Control (Solenoid) Relay Circuit
-----	--------	--------------------------------------

## CIRCUIT DESCRIPTION

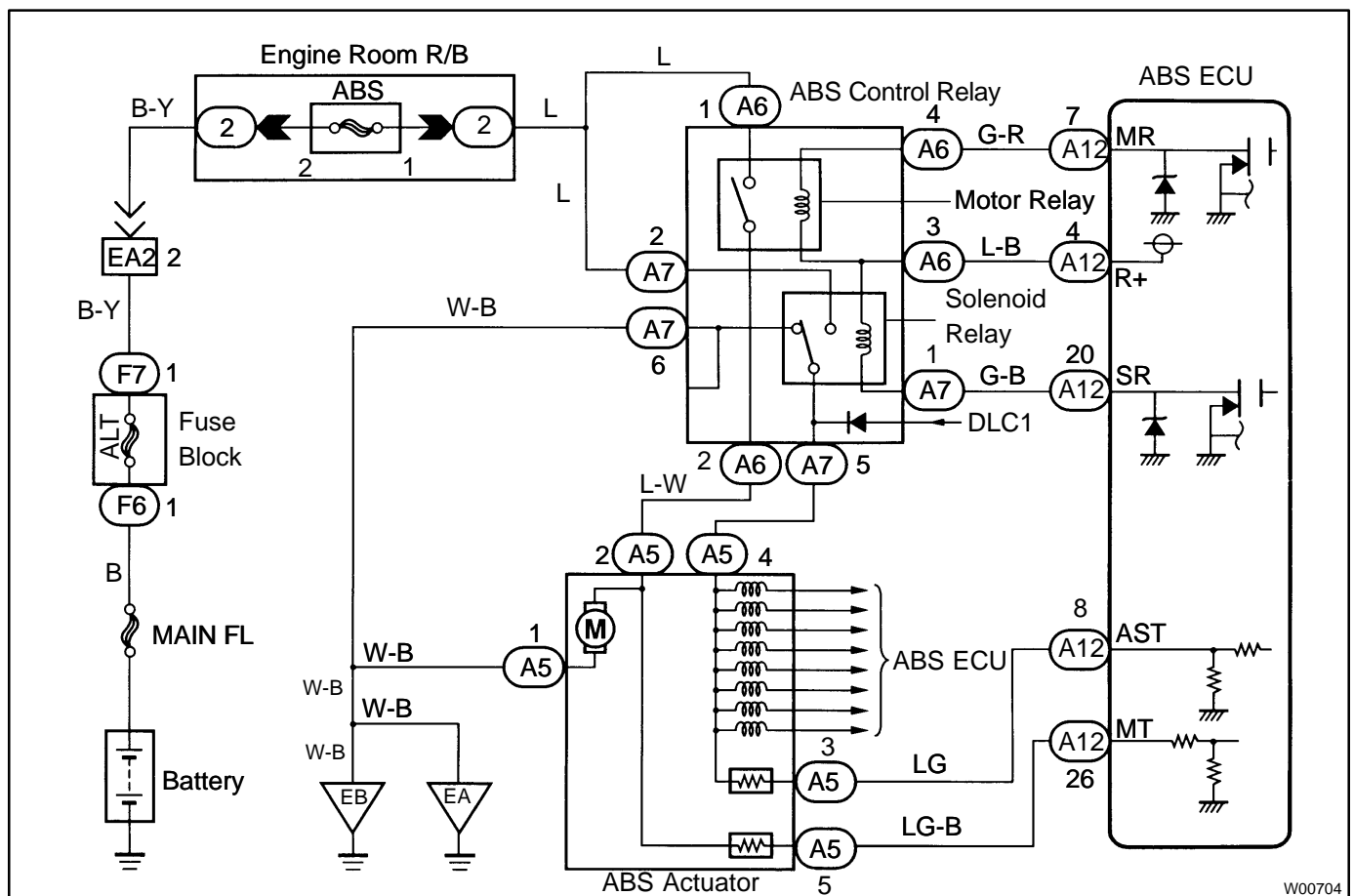
This relay supplies power to each ABS solenoid. After the ignition switch is turned ON, if the initial check is OK, the relay goes on.

DTC No.	DTC Detecting Condition	Trouble Area
11	Conditions 1 and 2 continue for 0.2 sec. or more: 1. ABS control (solenoid) relay terminal (SR) voltage: Battery positive voltage 2. ABS control (solenoid) relay monitor terminal (AST) voltage: 0 V	<ul style="list-style-type: none"> <li>●ABS control (solenoid) relay</li> <li>●Open or short in ABS control (solenoid) relay circuit</li> <li>●ECU</li> </ul>
12	Conditions 1 and 2 continue for 0.2 sec. or more: 1. ABS control (solenoid) relay terminal (SR) voltage: 0 V 2. ABS control (solenoid) relay monitor terminal (AST) voltage: Battery positive voltage	<ul style="list-style-type: none"> <li>●ABS control (solenoid) relay</li> <li>●B+ short in ABS control (solenoid) relay circuit</li> <li>●ECU</li> </ul>

Fail safe function:

If trouble occurs in the ABS control (solenoid) relay circuit, the ECU cuts off current to the ABS control (solenoid) relay and prohibits ABS control.

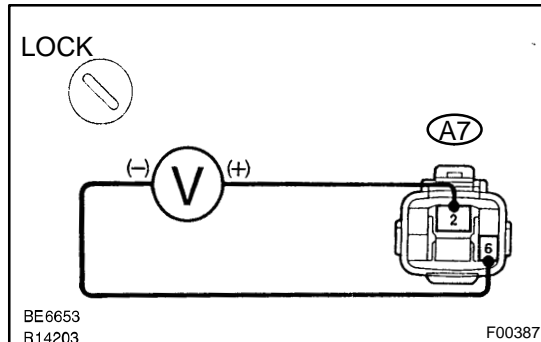
## WIRING DIAGRAM



W00704

## INSPECTION PROCEDURE

- 1 Check voltage between terminals A7-2 and A7-6 of ABS control relay connector.

**PREPARATION:**

Disconnect the ABS control relay connector.

**CHECK:**

Measure the voltage between terminals A7-2 and A7-6 of the ABS control relay harness side connector.

**OK:**

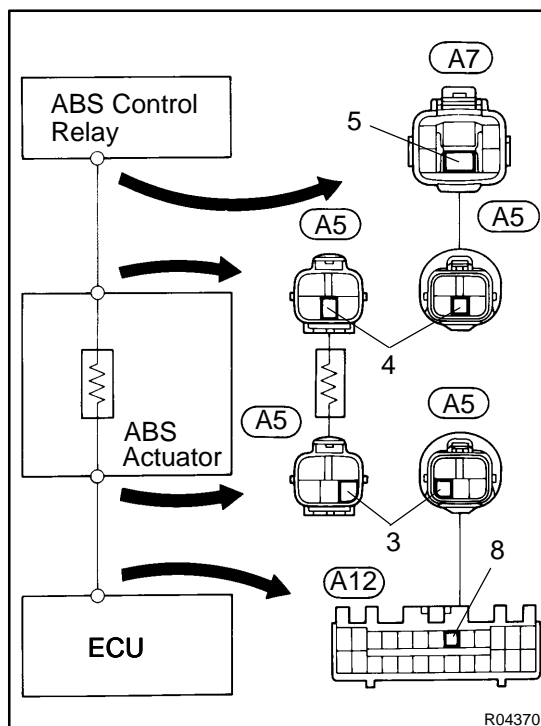
**Voltage: 10 - 14 V**

**NG**

**Check and repair harness or connector.**

**OK**

- 2 Check continuity between terminal A7-5 and A5-4, A5-4 and A5-3, and A5-3 and A12-8.

**PREPARATION:**

Disconnect the connector from the ABS actuator.

**CHECK:**

Check the continuity between terminals A7-5 and A5-4, A5-4 and A5-3, and A5-3 and A12-8.

**OK:**

**Continuity**

**HINT:**

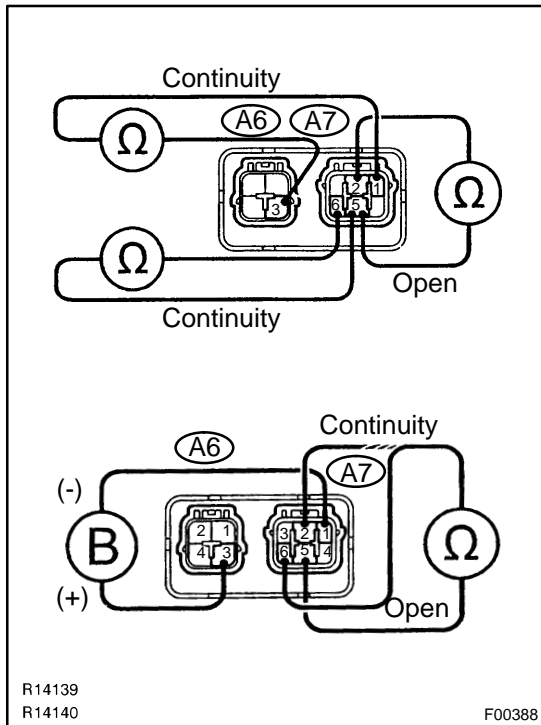
There is a resistance of 32 - 34  $\Omega$  between terminals A5-4 and A5-3.

**NG**

**Repair or replace harness or ABS actuator.**

**OK**

### 3 Check ABS control relay.

**CHECK:**

Check the continuity between each terminal of the ABS control (solenoid) relay.

**OK:**

Terminals A7-1 and A6 -3	Continuity (Reference value 80 Ω)
Terminals A7-5 and A7 -6	Continuity
Terminals A7-2 and A7-5	Open

**CHECK:**

- Apply battery voltage between terminals A7-1 and A6-3.
- Check the continuity between each terminal of the ABS control relay.

**OK:**

Terminals A7-5 and A7-6	Open
Terminals A7-2 and A7-5	Continuity

**NG****Replace ABS control relay.****OK**

### 4 Check for open and short in harness and connector between ABS control relay and ABS ECU (See page [IN-26](#)).

**NG****Repair or replace harness or connector.****OK**

If same code is still output after DTC is deleted, check contact condition of each connection. If connections are normal, ECU may be defective.

DTC	13, 14	ABS Control (Motor) Relay Circuit
-----	--------	-----------------------------------

## CIRCUIT DESCRIPTION

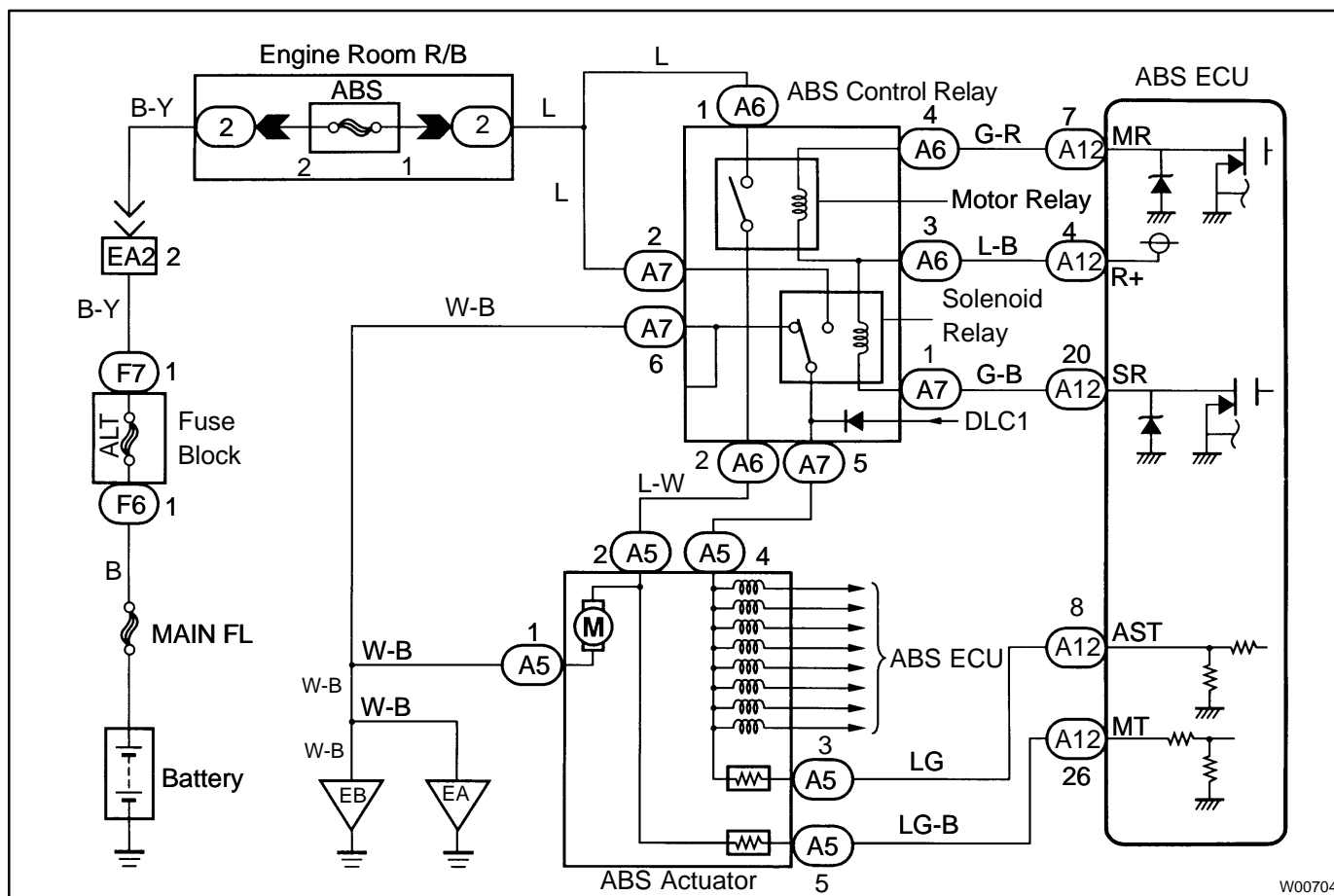
The ABS control (motor) relay supplies power to the ABS pump motor. While the ABS is activated, the ECU switches the ABS control (motor) relay on and operates the ABS pump motor.

DTC No.	DTC Detecting Condition	Trouble Area
13	Conditions 1 and 2 continue for 0.2 sec. or more: 1. ABS control (motor) relay terminal (MR) voltage: Battery positive voltage 2. ABS control (motor) relay monitor terminal (MT) voltage: 0 V	<ul style="list-style-type: none"> <li>●ABS control (motor) relay</li> <li>●Open or short in ABS control (motor) relay circuit</li> <li>●ECU</li> </ul>
14	Conditions 1 and 2 continued for 4 sec. or more: 1. ABS control (motor) relay terminal (MR) voltage: 0 V 2. ABS control (motor) relay monitor terminal (MT) voltage: Battery positive voltage	<ul style="list-style-type: none"> <li>●ABS control (motor) relay</li> <li>●B+ short in ABS control (motor) relay circuit</li> <li>●ECU</li> </ul>

Fail safe function:

If trouble occurs in the ABS control (motor) relay circuit, the ECU cuts off the current to the ABS control (solenoid) relay and prohibits ABS control.

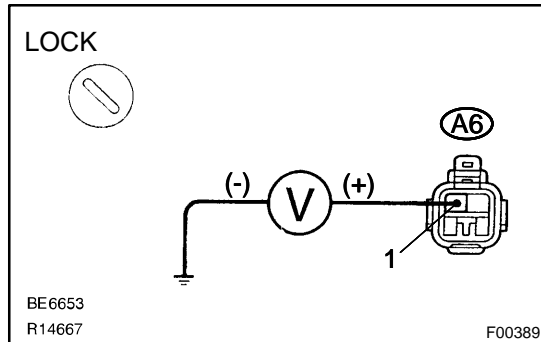
## WIRING DIAGRAM



W00704

## INSPECTION PROCEDURE

1	Check voltage between terminals A6-1 of ABS control relay and body ground
---	---

**PREPARATION:**

Disconnect the ABS control relay connector.

**CHECK:**

Measure the voltage between terminals A6-1 of the ABS control relay harness side connector and body ground.

**OK:**

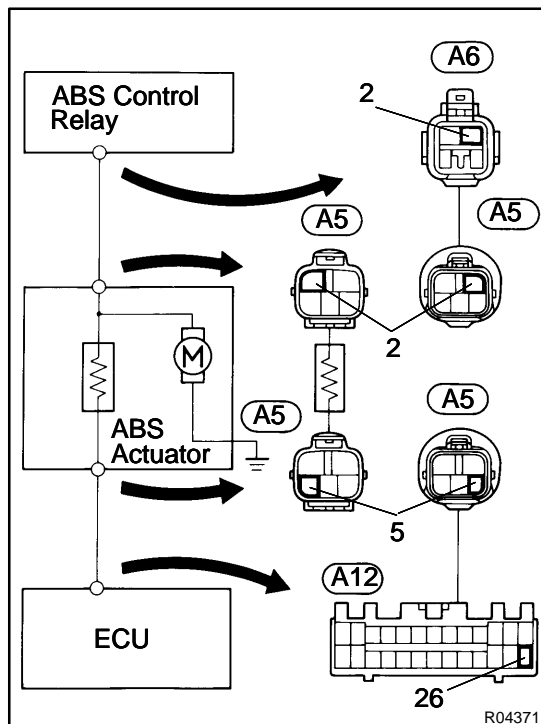
**Voltage: 10 - 14 V**

**NG**

**Check and repair harness or connector.**

**OK**

2	Check continuity between terminals A6-2 and A5-2, A5-2 and A5-5, and A5-5 and A12-26.
---	---

**PREPARATION:**

Disconnect the connector from the ABS actuator.

**CHECK:**

Check the continuity between terminals A6-2 and A5-2, A5-2 and A5-5, and A5-5 and A12-26.

**OK:**

**Continuity**

**HINT:**

There is a resistance of 32 - 34  $\Omega$  between terminals A5-2 and A5-5.

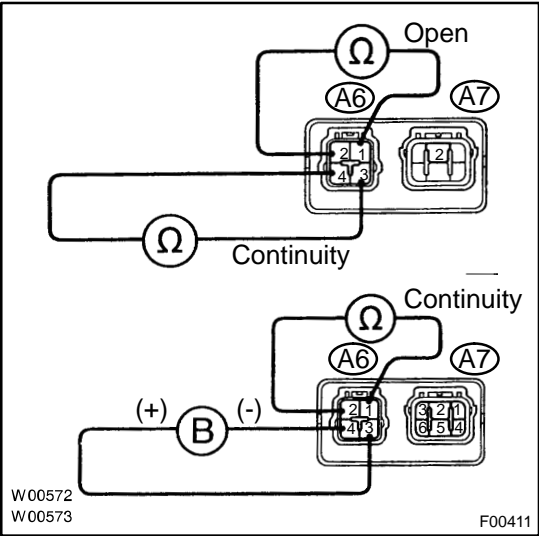
**NG**

**Repair or replace harness or ABS actuator.**

**OK**

3

Check ABS control relay.



**CHECK:**  
Check the continuity between each terminal of the ABS control relay.

Terminals A6-3 and A6-4	Continuity (Reference value 62 Ω)
Terminals A6-1 and A6-2	Open

**CHECK:**  
(a) Apply battery voltage between terminals A6-3 and A6-4.  
(b) Check the continuity between terminals of the ABS control relay.

Terminals A6-1 and A6-2	Continuity
-------------------------	------------

NG

Replace ABS control relay.

OK

4

Check for open and short in harness and connector between ABS control relay and ABS ECU (See page IN-26 ).

NG

Repair or replace harness or connector.

OK

If same code is still output after DTC is deleted, check contact condition of each connection. If connections are normal, ECU may be defective.

<b>DTC</b>	<b>21, 22, 23, 24</b>	<b>ABS Actuator Solenoid Circuit</b>
------------	-----------------------	--------------------------------------

## CIRCUIT DESCRIPTION

This solenoid goes on when signals are received from the ECU and controls the pressure acting on the brake cylinders, thus controlling the braking force.

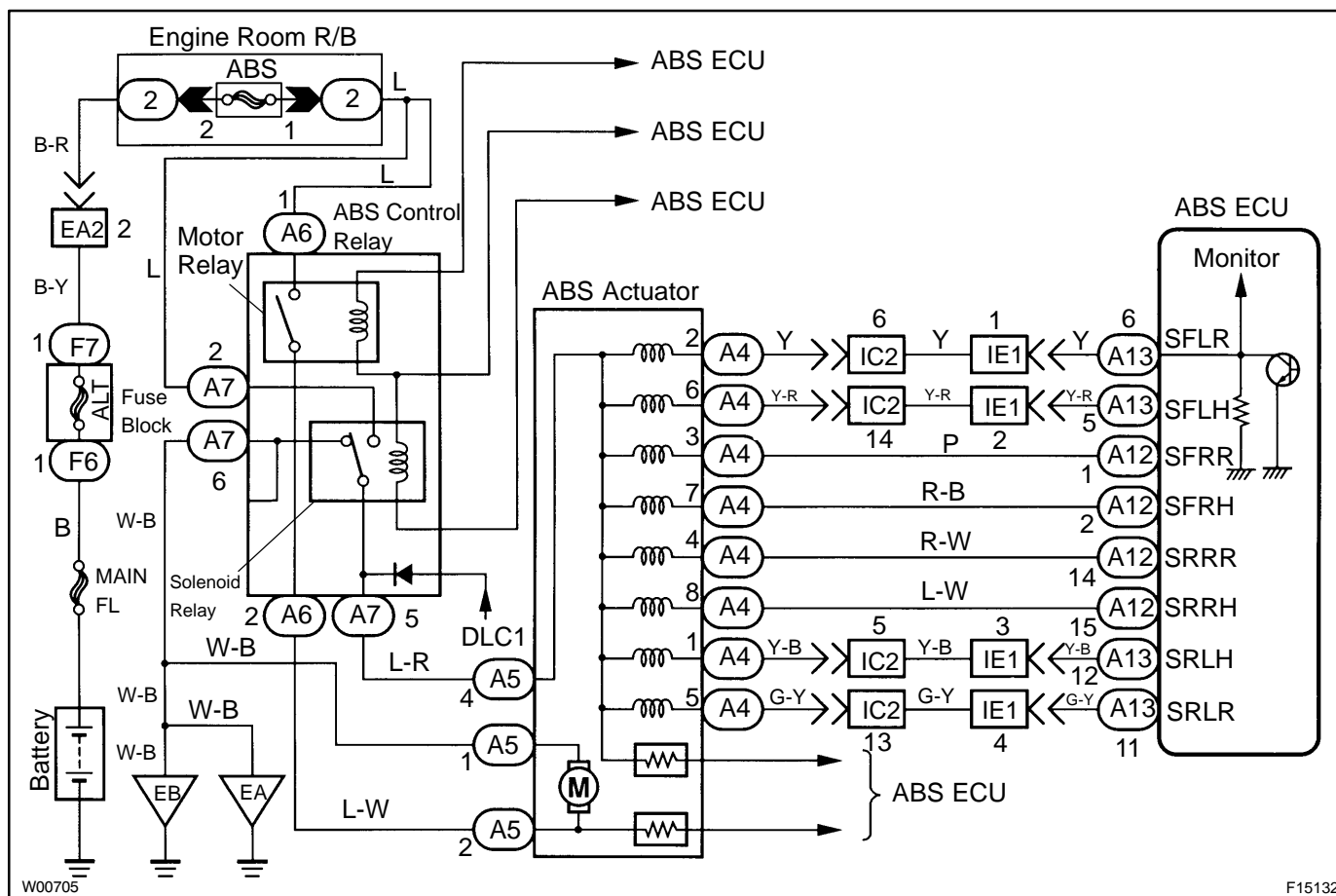
DTC No.	DTC Detecting Condition	Trouble Area
21	Conditions 1 through 3 continue for 0.05 sec. or more: 1. ABS control (solenoid) relay terminal (SR) voltage: Battery positive voltage 2. Voltage or ABS ECU terminal AST: Battery positive voltage 3. When power transistor of ECU is ON, voltage of terminal SFR is 0 V or battery positive voltage	<ul style="list-style-type: none"> <li>●ABS actuator</li> <li>●Open or short in SFR circuit</li> <li>●ECU</li> </ul>
22	Conditions 1 through 3 continue for 0.05 sec. or more: 1. ABS control (solenoid) relay terminal (SR) voltage: Battery positive voltage 2. Voltage or ABS ECU terminal AST: Battery positive voltage 3. When power transistor of ECU is ON, voltage of terminal SFL is 0 V or battery positive voltage	<ul style="list-style-type: none"> <li>●ABS actuator</li> <li>●Open or short in SFL circuit</li> <li>●ECU</li> </ul>
23	Conditions 1 through 3 continue for 0.05 sec. or more: 1. ABS control (solenoid) relay terminal (SR) voltage: Battery positive voltage 2. Voltage or ABS ECU terminal AST: Battery positive voltage 3. When power transistor of ECU is ON, voltage of terminal SRR is 0 V or battery positive voltage	<ul style="list-style-type: none"> <li>●ABS actuator</li> <li>●Open or short in SRR circuit</li> <li>●ECU</li> </ul>
24	Conditions 1 through 3 continue for 0.05 sec. or more: 1. ABS control (solenoid) relay terminal (SR) voltage: Battery positive voltage 2. Voltage or ABS ECU terminal AST: Battery positive voltage 3. When power transistor of ECU is ON, voltage of terminal SRL is 0 V or battery positive voltage	<ul style="list-style-type: none"> <li>●ABS actuator</li> <li>●Open or short in SRL circuit</li> <li>●ECU</li> </ul>

Fail safe function:

If trouble occurs in the actuator solenoid circuit, the ECU cuts off current to the ABS control (solenoid) relay and prohibits ABS control.

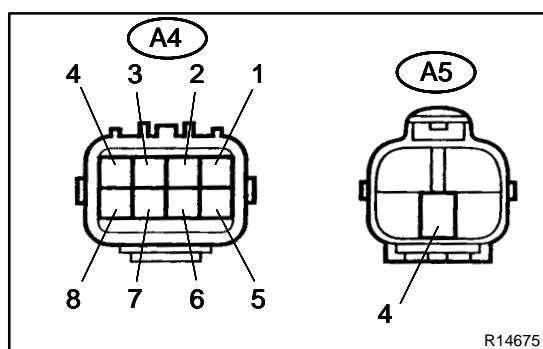


## WIRING DIAGRAM



## INSPECTION PROCEDURE

### 1 Check ABS actuator solenoid.



#### PREPARATION:

Disconnect the 2 connectors from the ABS actuator.

#### CHECK:

Check the continuity between terminals A5-4 and A4-1, 2, 3, 4, 5, 6, 7, 8 of the ABS actuator connector.

#### OK:

#### Continuity

#### HINT:

- Resistance of each of the solenoids SFRH, SFLH, SRRH and SRLH is 5.0  $\Omega$ .
- Resistance of each of the solenoids SFRR, SFLR, SRRR and SRLR is 2.2  $\Omega$ .

NG

Replace ABS actuator.

OK

2	Check for open and short in harness and connector between ABS ECU and actuator (See page <a href="#">IN-26</a> ).
---	---

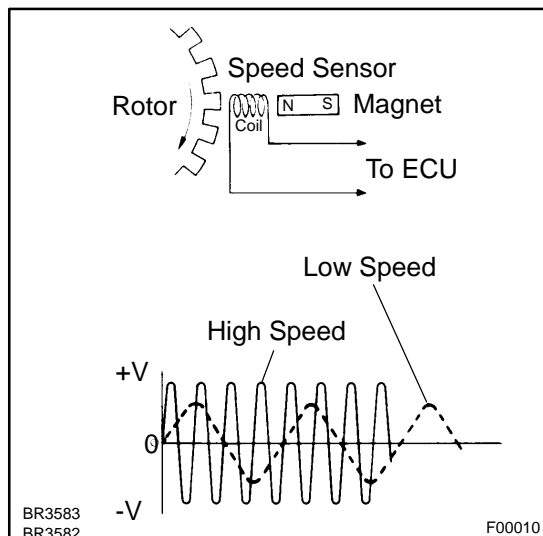
NG	Repair or replace harness or connector.
----	---

OK

If same code is still output after DTC is deleted, check contact condition of each connection. If connections are normal, ECU may be defective.

<b>DTC</b>	<b>31, 32, 33, 34</b>	<b>Speed Sensor Circuit</b>
------------	-----------------------	-----------------------------

## CIRCUIT DESCRIPTION



The speed sensor detects wheel speed and sends the appropriate signals to the ECU. These signals are used to control the ABS system. The front and rear rotors each have 48 serrations.

When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates an AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotors, the frequency is used by the ECU to detect the speed of each wheel.

DTC No.	DTC Detecting Condition	Trouble Area
31, 32, 33, 34	Detection of any of conditions 1 through 3: 1. At vehicle speed of 10 km/h (6 mph) or more, pulses are not input for 5 sec. 2. Momentary interruption of the speed sensor signal occurs at least 7 times in the time between switching the ignition switch ON and switching it OFF 3. Abnormal fluctuation of speed sensor signals with the vehicle speed 20 km/h (12 mph) or more	<ul style="list-style-type: none"> <li>● Right front, left front, right rear or left rear speed sensor</li> <li>● Open or short in each speed sensor circuit</li> <li>● ECU</li> </ul>

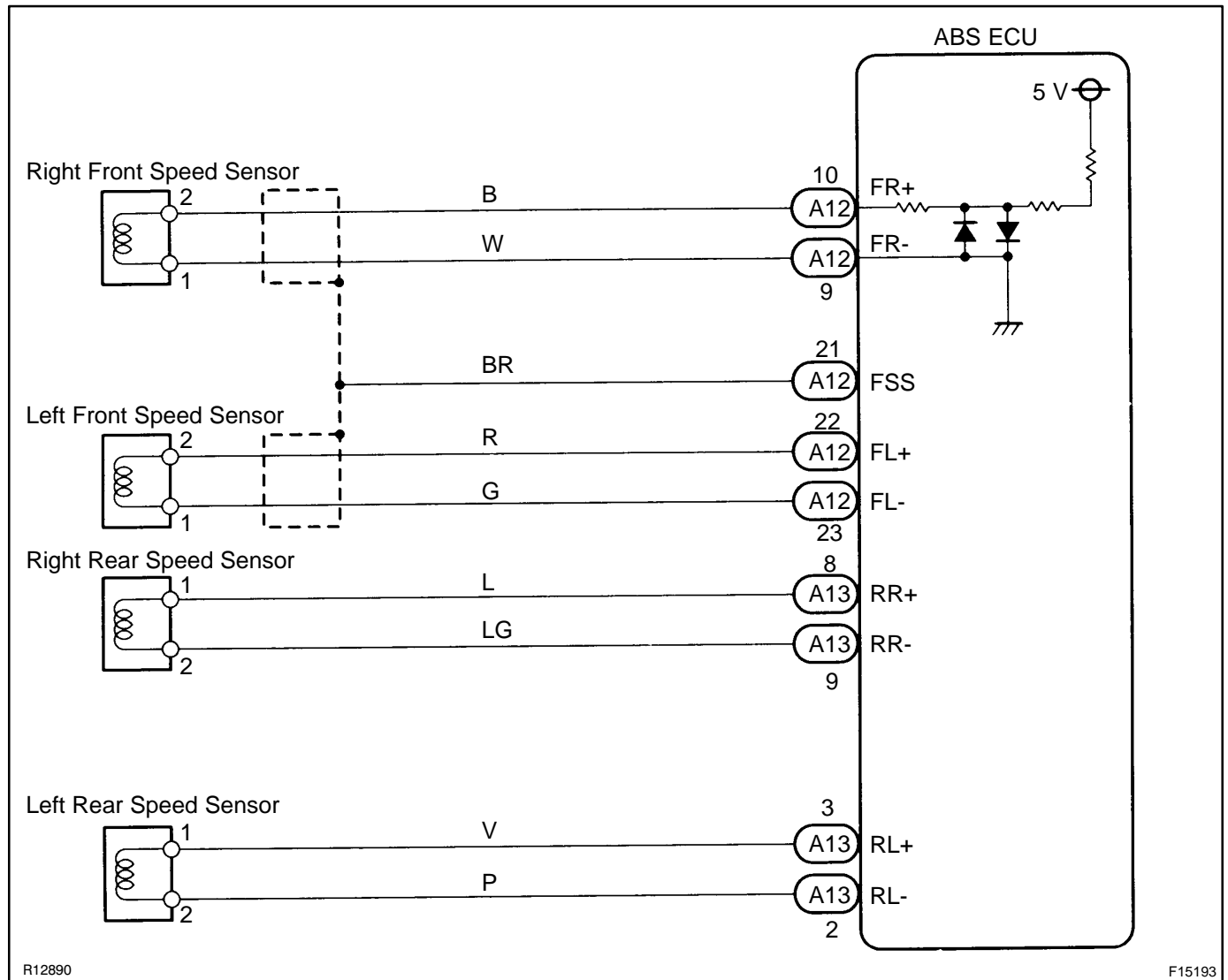
### HINT:

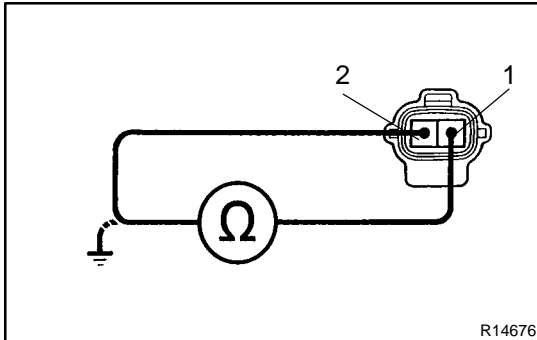
- DTC 31 is for the right front speed sensor.
- DTC 32 is for the left front speed sensor.
- DTC 33 is for the right rear speed sensor.
- DTC 34 is for the left rear speed sensor.

### Fail safe function:

If trouble occurs in the speed sensor circuit, the ECU cuts off current to the ABS control (solenoid) relay and prohibits ABS control.

## WIRING DIAGRAM



**INSPECTION PROCEDURE****1 Check speed sensor.****Front:****PREPARATION:**

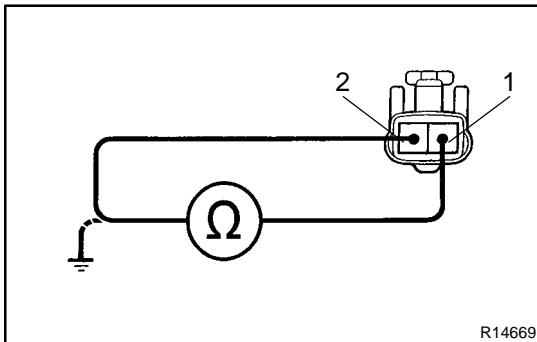
Disconnect the speed sensor connector.

**CHECK:**

Measure the resistance between terminals 1 and 2 of the speed sensor connector.

**OK:****Resistance: 0.6 - 2.5 kΩ****CHECK:**

Measure the resistance between terminals 1 and 2 of the speed sensor connector and body ground.

**OK:****Resistance: 1 MΩ or higher****Rear:****PREPARATION:**

Disconnect the speed sensor connector.

**CHECK:**

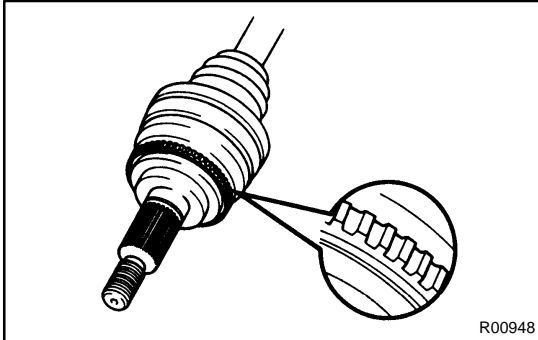
Measure the resistance between terminals 1 and 2 of the speed sensor connector.

**OK:****Resistance: 0.8 - 1.8 kΩ****CHECK:**

Measure the resistance between terminals 1 and 2 of the speed sensor connector and body ground.

**OK:****Resistance: 1 MΩ or higher****NG****Replace speed sensor.****NOTICE:****Check the speed sensor signal last (See page [DI-1 11](#)).****OK****2 Check for open and short in harness and connector between each speed sensor and ECU (See page [IN-26](#) ).****NG****Repair or replace harness or connector.****OK**

### 3 Check sensor rotor and sensor installation.



**Front:**

**PREPARATION:**

Remove the drive shaft (See page [SA-18](#) ).

**CHECK:**

Check the sensor rotor serrations.

**OK:**

**No scratches or missing teeth.**

**CHECK:**

Check the sensor tip.

**OK:**

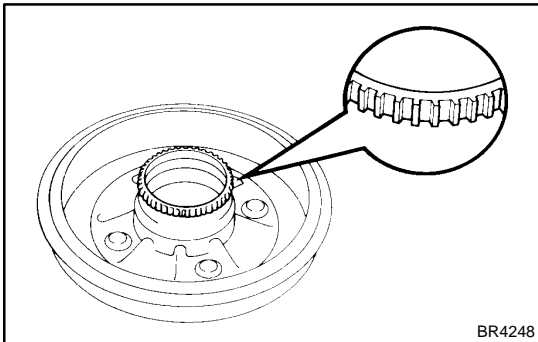
**No scratches or foreign objects on the sensor tip.**

**CHECK:**

Check the front speed sensor installation.

**OK:**

**The installation bolt is tightened properly and there is no clearance between the sensor and steering knuckle.**



**Rear:**

**PREPARATION:**

Remove the drum (See page [SA-39](#) ).

**CHECK:**

Check the sensor rotor serrations.

**OK:**

**No scratches or missing teeth.**

**CHECK:**

Check the sensor tip.

**OK:**

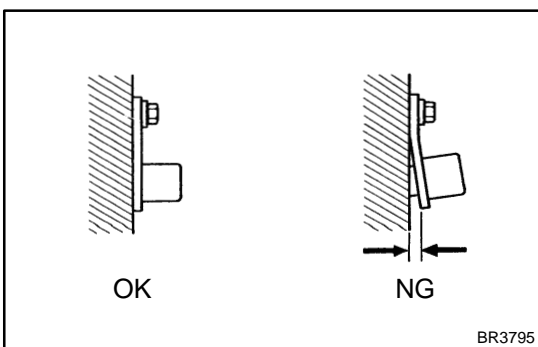
**No scratches or foreign objects on the sensor tip.**

**CHECK:**

Check the rear speed sensor installation.

**OK:**

**The installation bolt is tightened properly and there is no clearance between the sensor and rear axle carrier.**



**NG**

**Replace speed sensor or rotor.**

**NOTICE:**

**Check the speed sensor signal last (See page [DI-1 11](#)).**

**OK**

**Check and replace ABS ECU.**

<b>DTC</b>	<b>41</b>	<b>IG Power Source Circuit</b>
------------	-----------	--------------------------------

## CIRCUIT DESCRIPTION

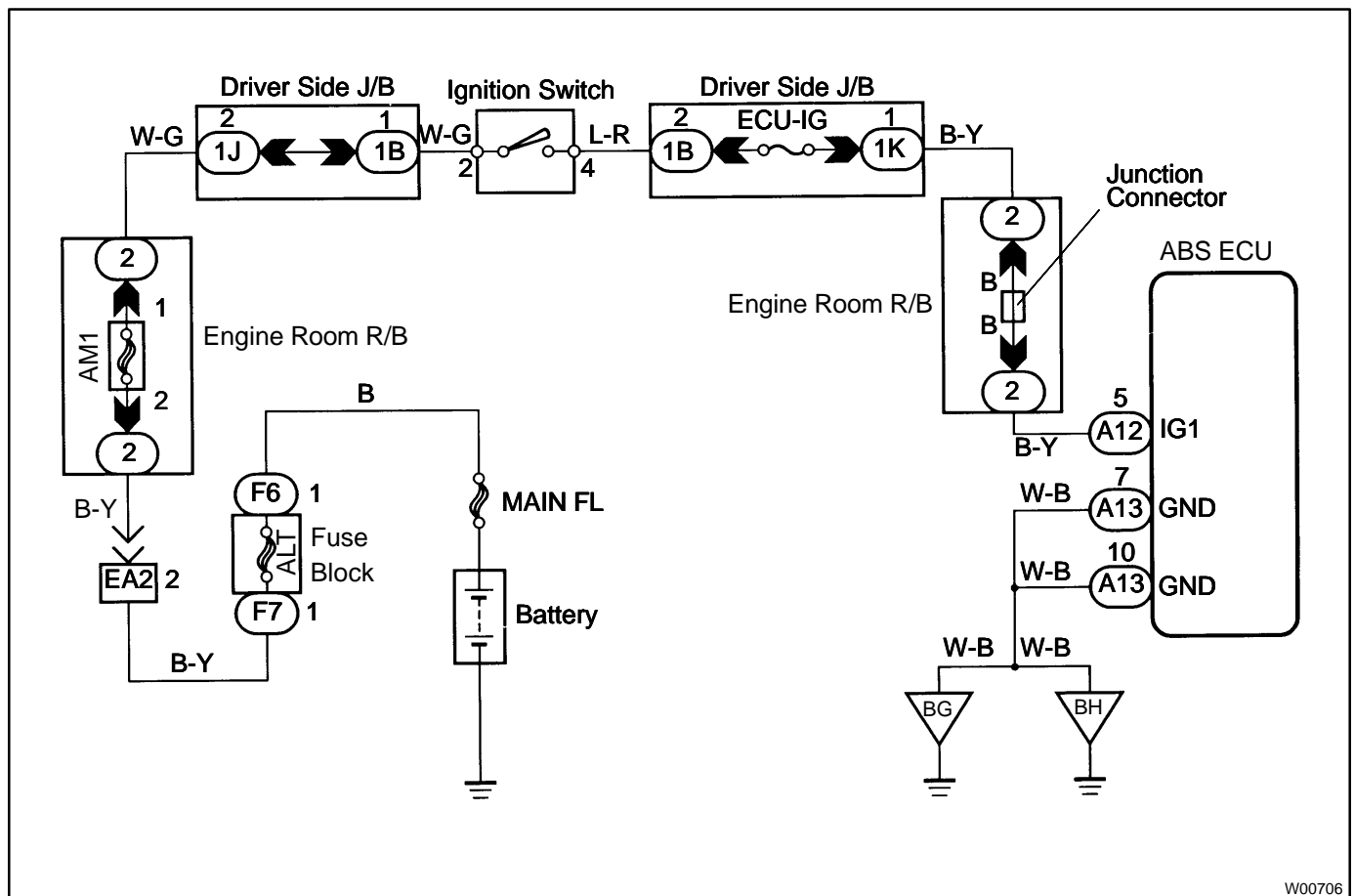
This is the power source for the ECU and, hence the CPU and the actuators.

DTC No.	DTC Detecting Condition	Trouble Area
41	Vehicle speed is 3 km/h (1.9 mph) or more and voltage of ECU terminal IG1 remains at more than 17 V or below 9.5 V for more than 10 sec.	<ul style="list-style-type: none"> <li>Battery</li> <li>C regulator</li> <li>Open or short in power source circuit</li> <li>ECU</li> </ul>

Fail safe function:

If trouble occurs in the power source circuit, the ECU cuts off current to the ABS control (solenoid) relay and prohibits ABS control.

## WIRING DIAGRAM



W00706

## INSPECTION PROCEDURE

## 1 Check battery positive voltage.

**OK:**

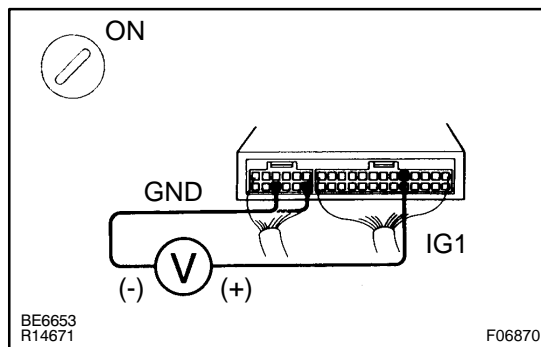
Voltage: 10 - 14 V

**NG**

Check and repair charging system.

**OK**

## 2 Check voltage between terminals IG1 and GND of ABS ECU connector.

**PREPARATION:**

Disconnect the ABS ECU with connectors still connected.

**CHECK:**

- (a) Turn the ignition switch ON.
- (b) Measure the voltage between terminals IG1 and GND of the ABS ECU connector.

**OK:**

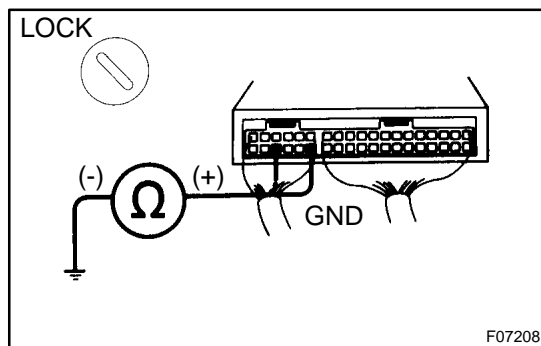
Voltage: 10 - 14 V

**NG**

Check and repair ABS ECU.

**OK**

## 3 Check continuity between terminal GND of ECU connector and body ground.

**CHECK:**

Measure the resistance between terminal GND of the ABS ECU connector and body ground.

**OK:**

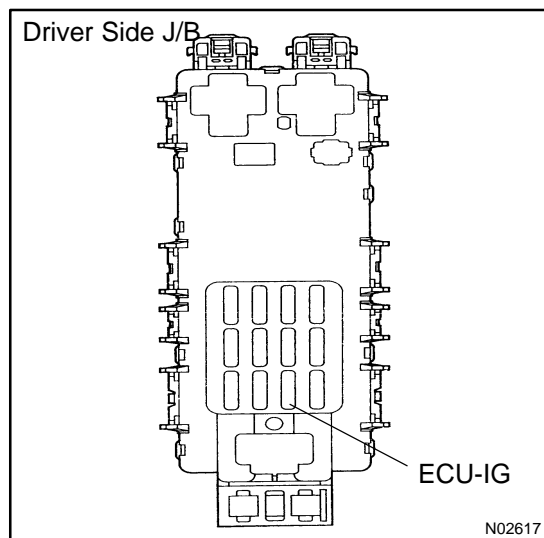
Resistance: 1 Ω or less

**OK**

Repair or replace harness or connector.

**NG**



**4 Check ECU-IG fuse.****PREPARATION:**

Remove the ECU-IG fuse from the driver side J/B.

**CHECK:**

Check the continuity of the ECU-IG fuse.

**OK:**

**Continuity**

**NG**

**Check for short in all harness and components connected to ECU-IG fuse (See attached wiring diagram).**

**OK**

**Check for open circuit in harness and connector between ABS ECU and battery (See page [IN-26](#))**

<b>DTC</b>	<b>51</b>	<b>ABS Pump Motor Lock</b>
------------	-----------	----------------------------

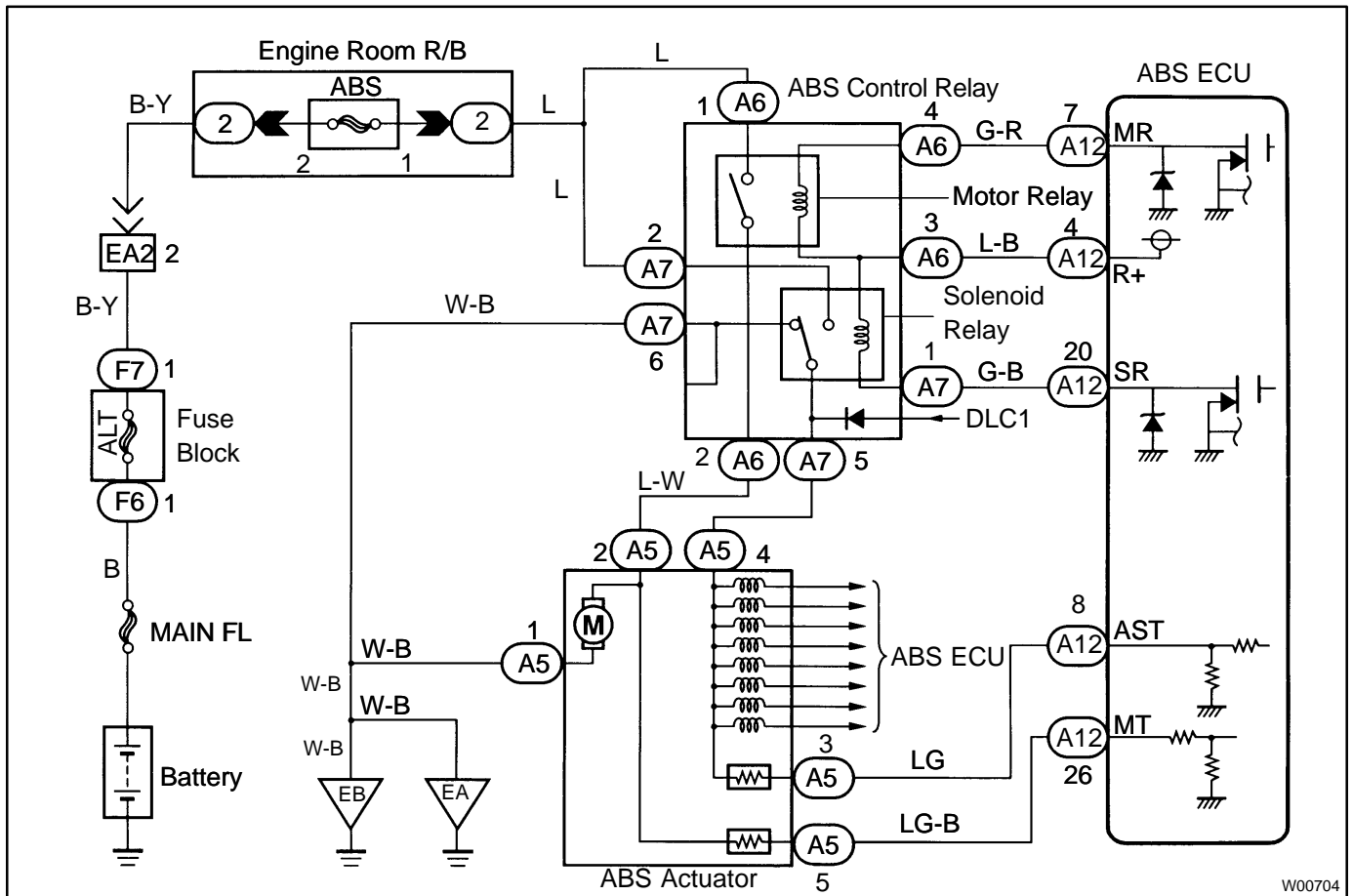
## CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
51	Pump motor is not operating normally during initial check	●ABS pump motor

Fail safe function:

If trouble occurs in the ABS pump motor, the ECU cuts off the current to the ABS control (solenoid) relay and prohibits ABS control.

## WIRING DIAGRAM



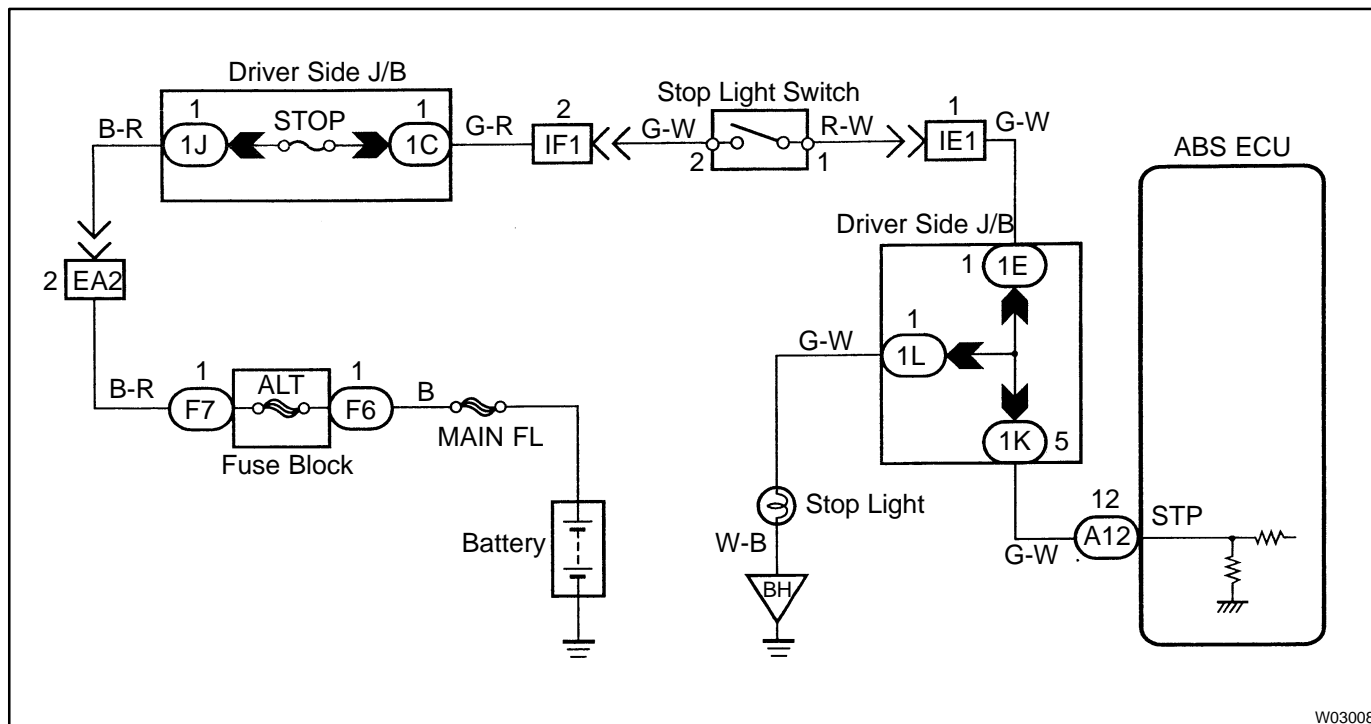
W00704

## Stop Light Switch Circuit

### CIRCUIT DESCRIPTION

This stop light switch senses whether the brake pedal is depressed or released, and sends the signal to the ECU.

### WIRING DIAGRAM



W03008

### INSPECTION PROCEDURE

- 1 Check operation of stop light.

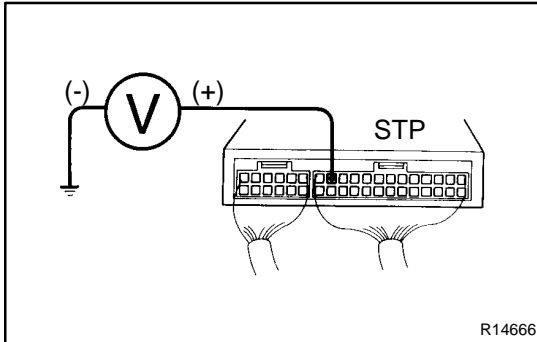
#### CHECK:

Check that stop light lights up when brake pedal is depressed and turns off when brake pedal is released.

NG

Repair stop light circuit (See page [BE-28](#))

OK

**2 Check voltage between terminal STP of ABS ECU and body ground.****PREPARATION:**

Remove the ABS ECU with connectors still connected.

**CHECK:**

Measure the voltage between terminal STP of the ABS ECU and body ground when the brake pedal is depressed.

**OK:**

**Voltage: 8 - 14 V**

**OK**

Proceed to next circuit inspection shown on problem symptoms table (See page [DI-1 18](#)).

**NG****3 Check for open in harness and connector between ABS ECU and stop light switch (See page [DI-1 18](#)).****NG**

Repair or replace harness or connector.

**OK**

Check and replace ABS ECU.

1996 TERCEL (RM440U)

# INSPECTION PROCEDURE

Troubleshooting in accordance with the chart below for each trouble symptom.

ABS warning light does not light up	Go to step 1
ABS warning light remains on	Go to step 3
<b>1</b>	<b>Check ABS warning light.</b>

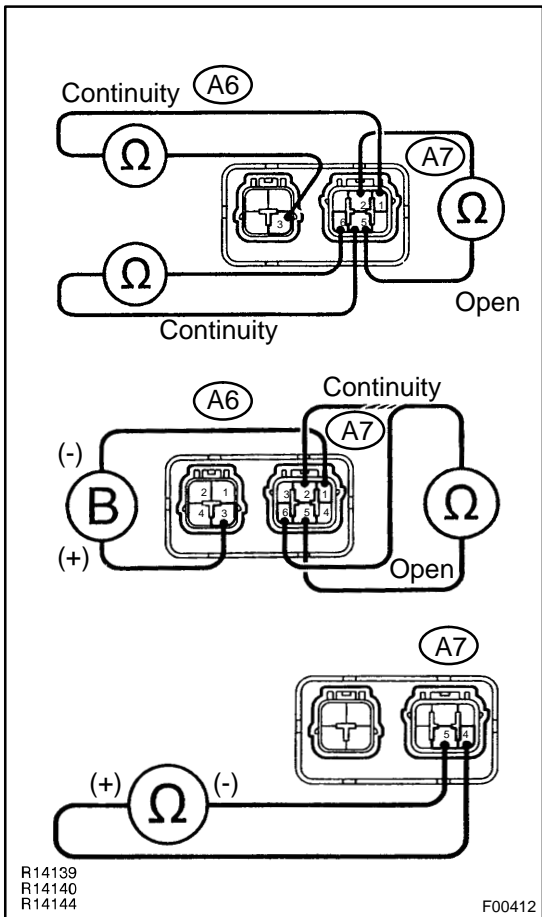
See Combination Meter Troubleshooting on page [BE-2](#).

NG

Replace bulb or combination meter assembly.

OK

<b>2</b>	<b>Check ABS control relay.</b>
----------	---------------------------------



## PREPARATION:

Disconnect the connectors from the control relay.

## CHECK:

Check the continuity between each terminal of the ABS control relay.

## OK:

Terminals A7-1 and A6-3	Continuity (Reference value 80 Ω)
Terminals A7-5 and A7-6	Continuity
Terminals A7-2 and A7-5	Open

## CHECK:

- Apply battery voltage between terminals A7-1 and A6-3.
- Check the continuity between each terminal of the ABS control relay.

## OK:

Terminals A7-5 and A7-6	Open
Terminals A7-2 and A7-5	Continuity

## CHECK:

Connect the  $\cdot$  test lead to terminal of A7-4 and the  $\ominus$  lead to terminal A7-5. Check the continuity between the terminals.

## OK:

## Continuity

If there is no continuity, connect the  $\ominus$  test lead to terminal A7-4 and the  $\cdot$  lead to terminal A7-5. Recheck continuity between the terminals.

NG

Replace ABS control relay.

OK

Repair or replace and check for open in harness and connector between DLC1 and ABS control relay and body ground (See page [IN-26](#) ).

**3** Is DTC output?

Check DTC on page [DI-1 11](#).

**YES**

Repair circuit indicated by code output.

**NO**

**4** Does ABS warning light go off if short pin is removed?

**NO**

Check for short in harness and connector between warning light and DLC1 and ECU (See page [IN-26](#) ).

**YES**

**5** Check ABS control relay (See step 2).

**NG**

Replace ABS control relay.

**OK**

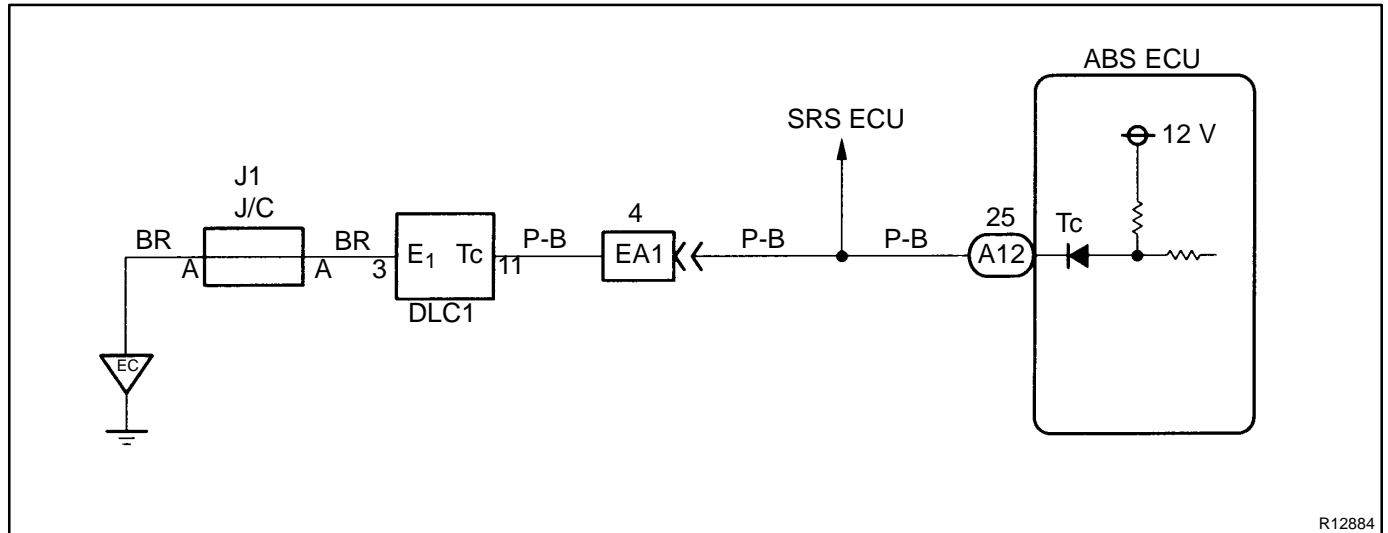
Repair or replace and check for short in harness and connector between DLC1 and ABS control relay (See page [IN-26](#) ).

## Tc Terminal Circuit

### CIRCUIT DESCRIPTION

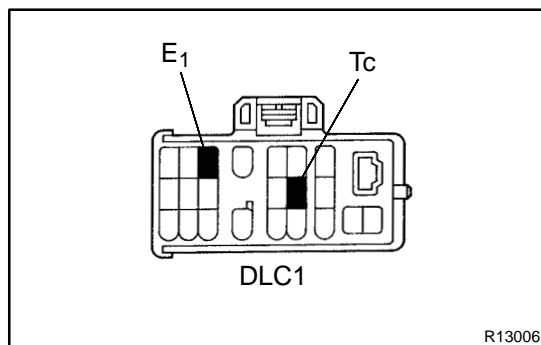
Connecting between terminals Tc and E<sub>1</sub> of the DLC1 cause the ECU to display the DTC by flashing the ABS warning light.

### WIRING DIAGRAM



### INSPECTION PROCEDURE

- 1 Check voltage between terminals Tc and E<sub>1</sub> of DLC1.



#### CHECK:

- (a) Turn the ignition switch ON.
- (b) Measure the voltage between terminals Tc and E<sub>1</sub> of the DLC1.

#### OK:

**Voltage: 10 - 14 V**

**OK**

If ABS warning light does not blink even after Tc and E<sub>1</sub> are connected, ECU may be defective.

**NG**



2	Check for open and short in harness and connector between ABS ECU and DLC1, and DLC1 and body ground (See page <a href="#">IN-26</a> ).
---	---

NG

Repair or replace harness or connector.

OK

Check and replace ABS ECU.

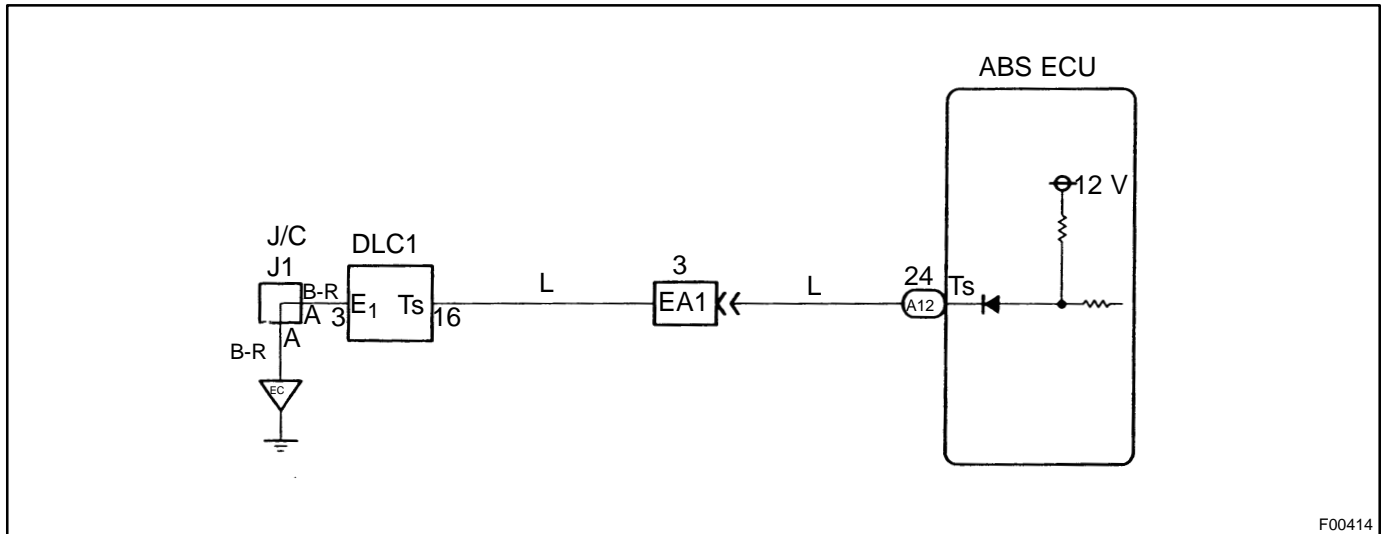
## Ts Terminal Circuit

### CIRCUIT DESCRIPTION

The sensor check circuit detects abnormalities in the speed sensor signal which cannot be detected with the DTC check.

Connecting terminals Ts and E<sub>1</sub> of the DLC1 in the engine compartment starts the check.

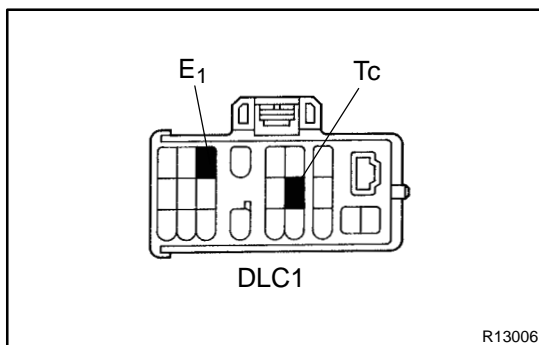
### WIRING DIAGRAM



F00414

### INSPECTION PROCEDURE

- 1 Check voltage between terminals Ts and E<sub>1</sub> of DLC1.



#### CHECK:

- Turn the ignition switch ON.
- Measure the voltage between terminals Ts and E<sub>1</sub> of the DLC1.

#### OK:

**Voltage: 10 - 14 V**

**OK**

If ABS warning light does not blink even after Ts and E<sub>1</sub> are connected, ECU may be defective.

**NG**

2	Check for open and short in harness and connector between ABS ECU and DLC1, and DLC1 and body ground (See page <a href="#">IN-26</a> ).
---	---

NG

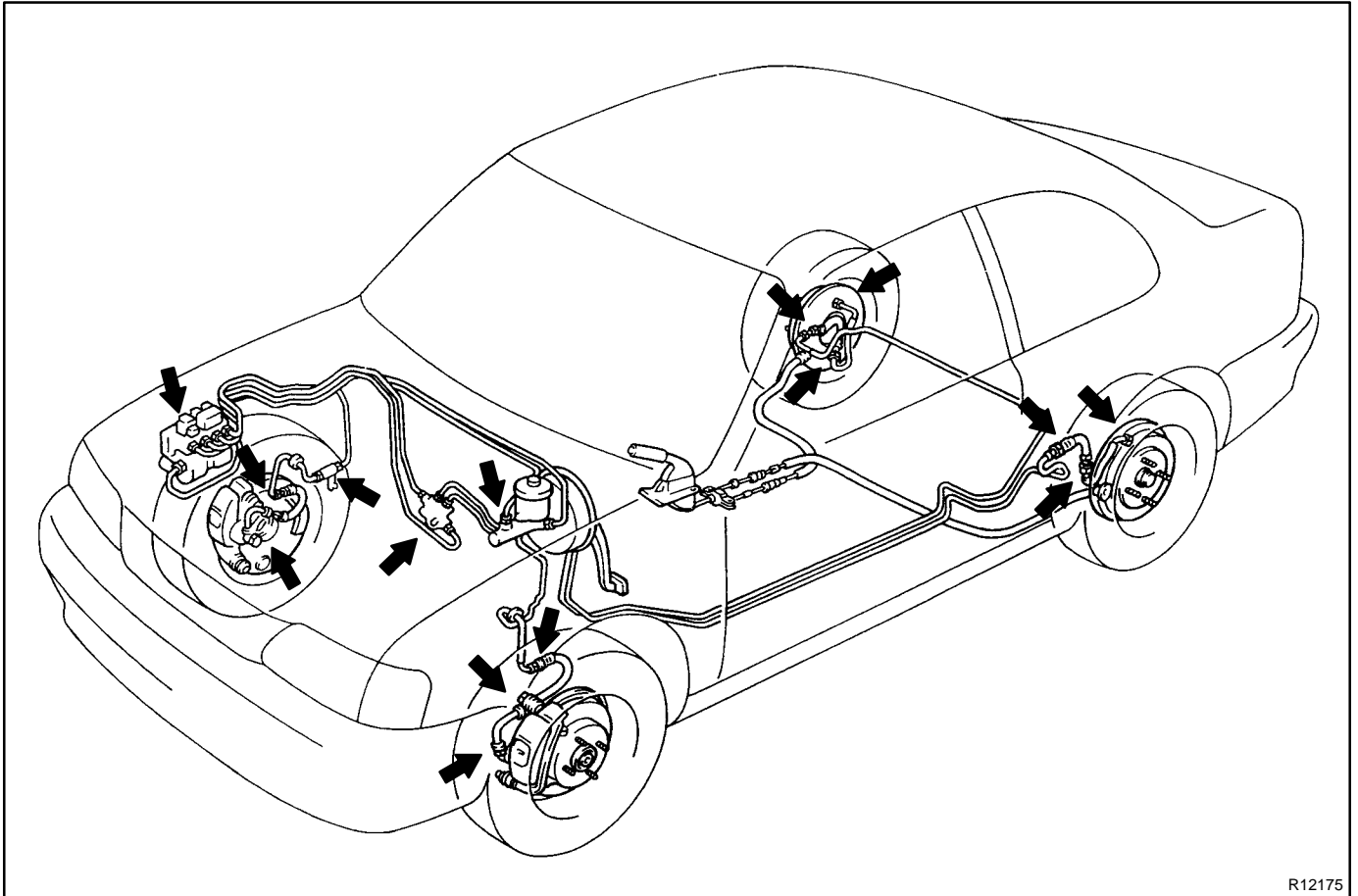
Repair or replace harness or connector.

OK

Check and replace ABS ECU.

## Check for Fluid Leakage

Check for fluid leakage from actuator or hydraulic lines.

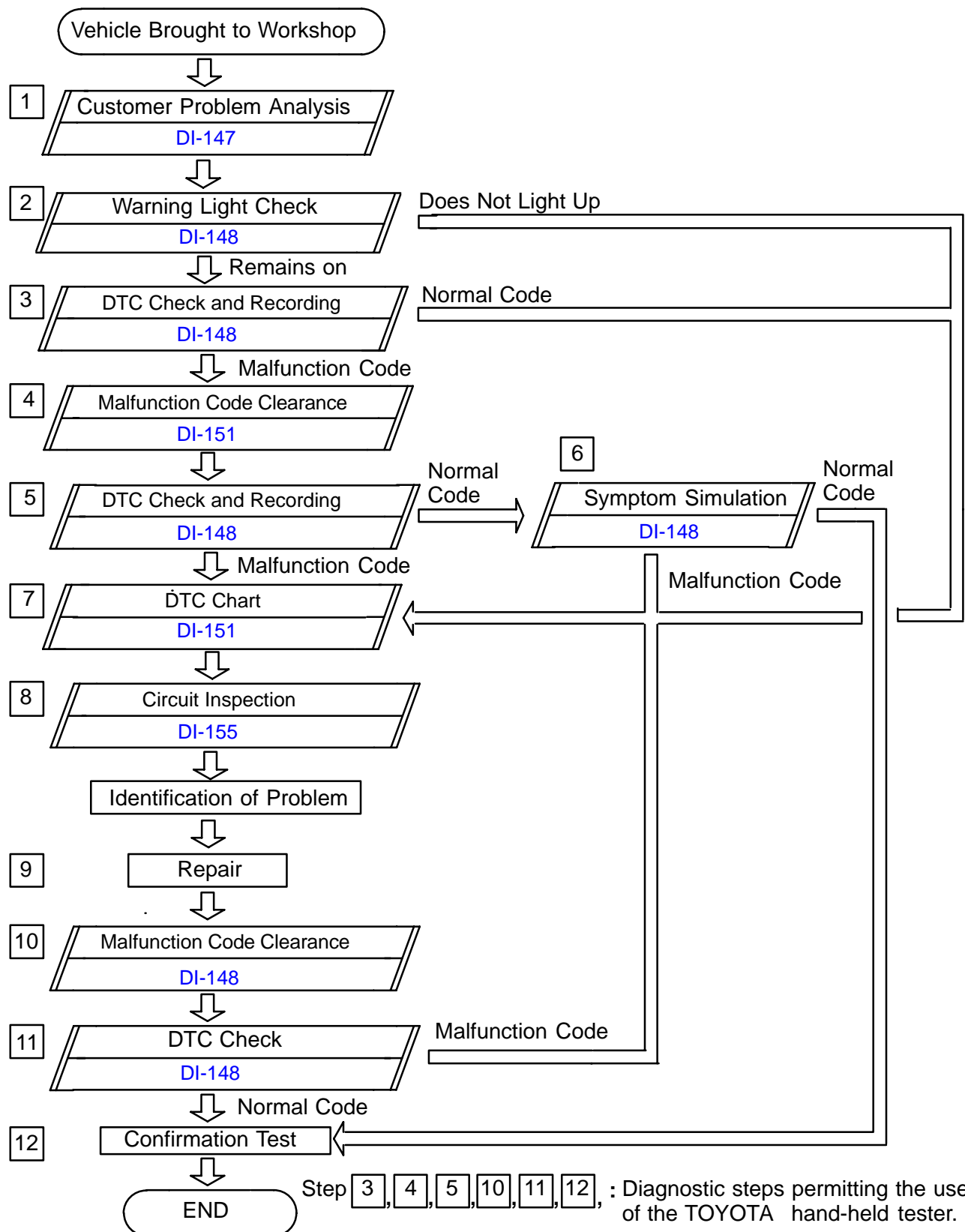


# SUPPLEMENTAL RESTRAINT SYSTEM

## HOW TO PROCEED WITH TROUBLESHOOTING

DI4M4-01

Perform troubleshooting in accordance with the procedure on the following pages.



# CUSTOMER PROBLEM ANALYSIS CHECK

## Supplemental Restraint System Check Sheet

 Inspector's  
Name
 

Customer's Name		Registration No.	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	Odometer Reading	km Miles

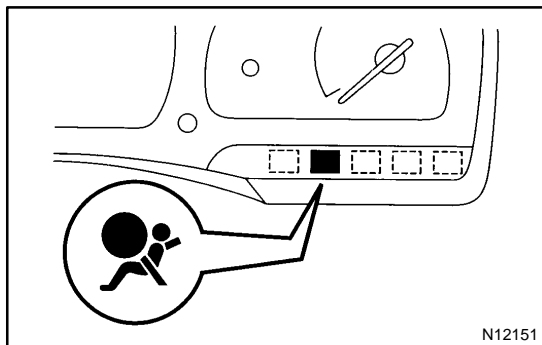
Date Problem Dist Occurred	/ /
Weather	<input type="checkbox"/> Fine <input type="checkbox"/> Cloudy <input type="checkbox"/> Rainy <input type="checkbox"/> Snowy <input type="checkbox"/> Other
Temperature	Approx.

Vehicle Operation	<input type="checkbox"/> Starting <input type="checkbox"/> Idling <input type="checkbox"/> Driving [ <input type="checkbox"/> Constant speed <input type="checkbox"/> Acceleration <input type="checkbox"/> Deceleration <input type="checkbox"/> Other ]
Road Conditions	
Details Of Problem	

Vehicle Inspection, Repair History Prior to Occurrence of Malfunction (Including Supplemental Restraint System)	
---	--

### Diagnosis System Inspection

SRS Warning Light Inspection	1st Time	<input type="checkbox"/> Remains ON <input type="checkbox"/> Sometimes Light Up <input type="checkbox"/> Does Not Light Up
	2nd Time	<input type="checkbox"/> Remains ON <input type="checkbox"/> Sometimes Light Up <input type="checkbox"/> Does Not Light Up
DTC Inspection	1st Time	<input type="checkbox"/> Normal Code <input type="checkbox"/> Malfunction Code [ Code. ]
	2nd Time	<input type="checkbox"/> Normal Code <input type="checkbox"/> Malfunction Code [ Code. ]



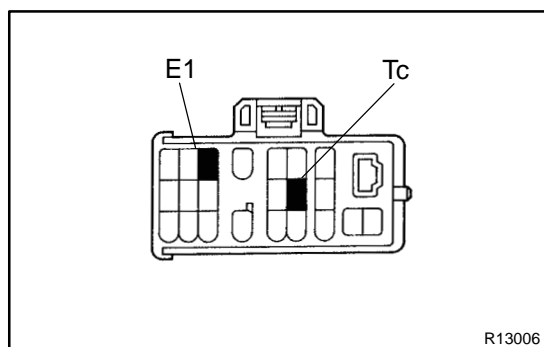
## PRE-CHECK

### 1. SRS WARNING LIGHT CHECK

- Turn the ignition switch to ACC or ON and check that the SRS warning light lights up.
- Check that the SRS warning light goes out after approx. 6 seconds.

#### HINT:

- When the ignition switch is at ACC or ON and the SRS warning light remains on or flashes, the airbag sensor assembly has detected a malfunction code.
- If, after approx. 6 seconds have elapsed, the SRS warning light sometimes lights up or the SRS warning light lights up even when the ignition switch is OFF, a short in the SRS warning light circuit can be considered likely. Proceed to "SRS warning light system malfunction" on page [DI-180](#) , [DI-182](#) .



### 2. DTC CHECK (Using diagnosis check wire)

- Output the DTC.
  - Turn the ignition switch to the ACC or ON position and wait approx. 20 seconds.
  - Using SST, connect terminals Tc and E1 of the DLC1.

SST 09843-18020

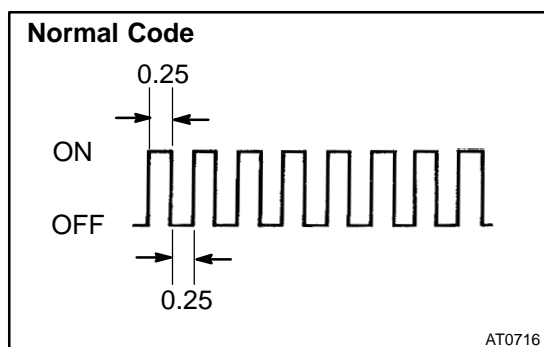
#### NOTICE:

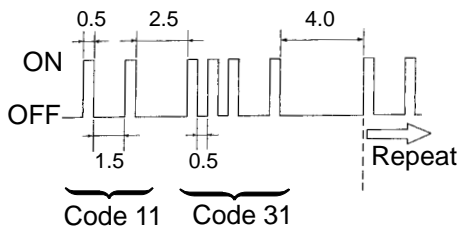
**Never make a mistake with the terminal connection position as this will cause a malfunction.**

- Read the DTC.

Read the 2-digit DTC as indicated by the number of times the SRS warning light blinks. As an example, the blinking patterns, normal, 11 and 31 are as shown on the illustration.

- Normal code indication.  
The light will blink 2 times per second.
- Malfunction code indication.  
The first blinking output indicates the first digit of a 2-digit DTC. After a 1.5 second pause, the second blinking output will indicate the second digit.



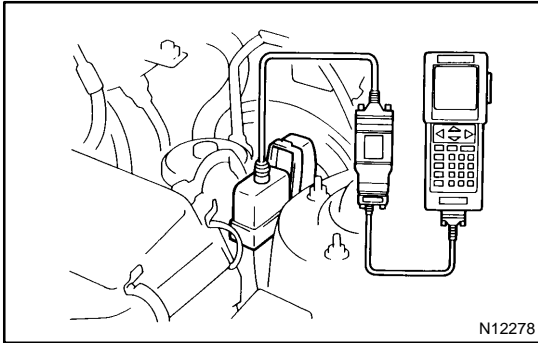
**Code 11 and 31**

AB0056

If there are 2 or more codes, there will be a 2.5 second pause between each code. After all the codes have been output, there will be a 4.0 second pause and they will all be repeated.

**HINT:**

- In the event of a number of trouble codes, indication will start from the smallest numbered code.
- If it does not output a DTC or outputs a DTC without terminal connection, proceed to the Tc terminal circuit inspection on page [DI-185](#).



N12278

**3. DTC CHECK (Using TOYOTA hand-held tester)**

- (a) Hook up the TOYOTA hand-held tester to the DLC1.
- (b) Read the DTCs by following the prompts on the tester screen.

**HINT:**

Please refer to the TOYOTA hand-held tester operator's manual, for further details.

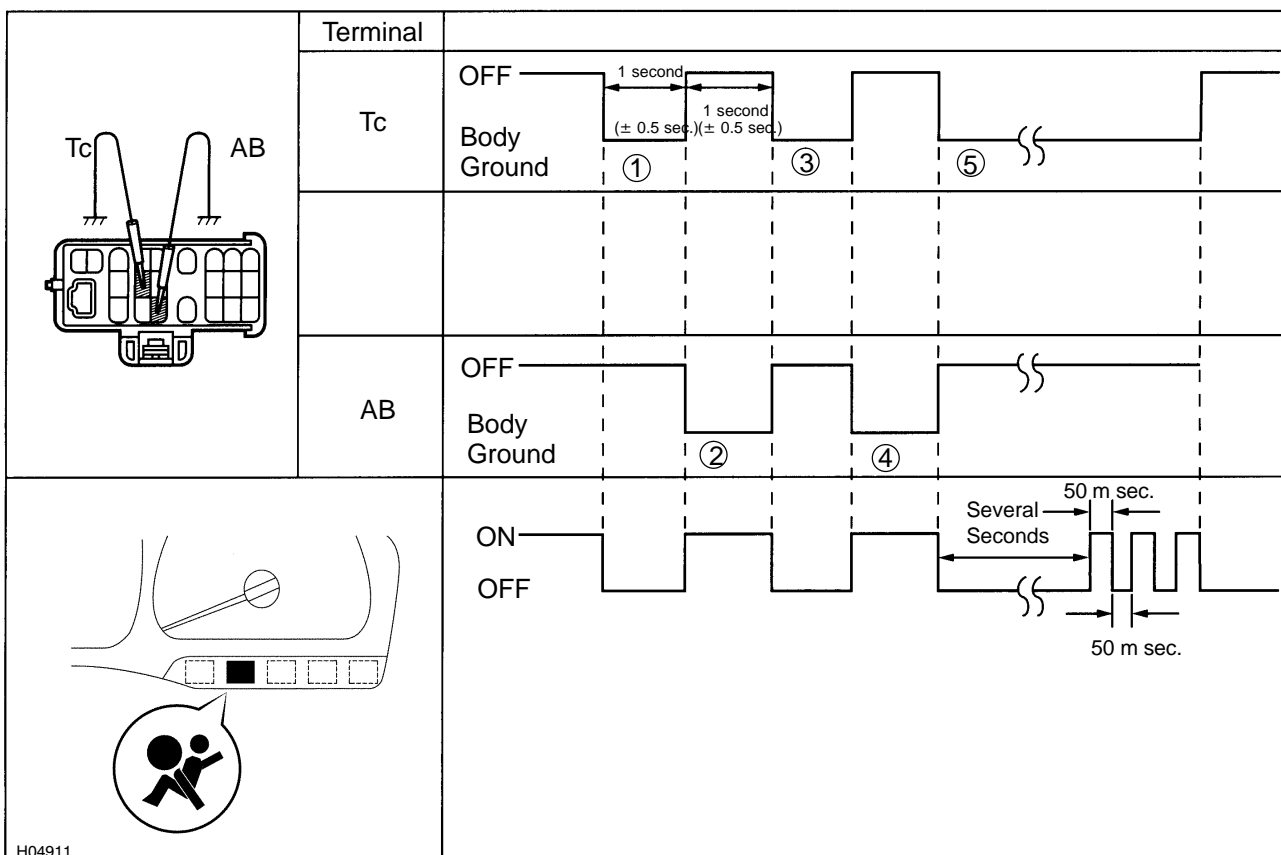


#### 4. DTC CLEARANCE (Using diagnosis check wire)

- (a) Connect the 2 service wires to terminals Tc and AB of DLC1.
- (b) Turn the ignition switch to ACC or ON and wait approx. 6 seconds.
- (c) Starting with the Tc terminal, apply body ground alternately to terminal Tc and terminal AB twice each in cycles of 1.0 seconds. Confirm that body ground is absolute. Finally, keep applying body ground to terminal Tc.

HINT:

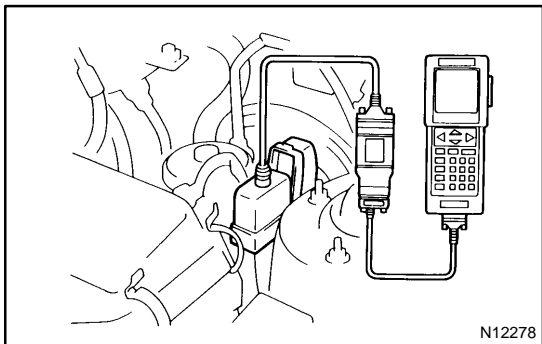
When alternately grounding terminals Tc and AB, release ground from one terminal and immediately apply it to the other terminal within an interval of 0.2 seconds. If DTCs do not clear, repeat the above procedure until the codes are cleared.



H04911

H01461

H05581



- (d) Several seconds after doing the clearing procedure, the SRS warning light will blink in a 50 m sec. cycle to indicate the codes have been cleared.

## 5. DTC CLEARANCE (Using TOYOTA hand-held tester)

- Hook up the TOYOTA hand-held tester to the DLC1.
- Clear the DTCs by following the prompts on the tester screen.

HINT:

Please refer to the TOYOTA hand-held tester operator's manual for further details.

## DIAGNOSTIC TROUBLE CODE CHART

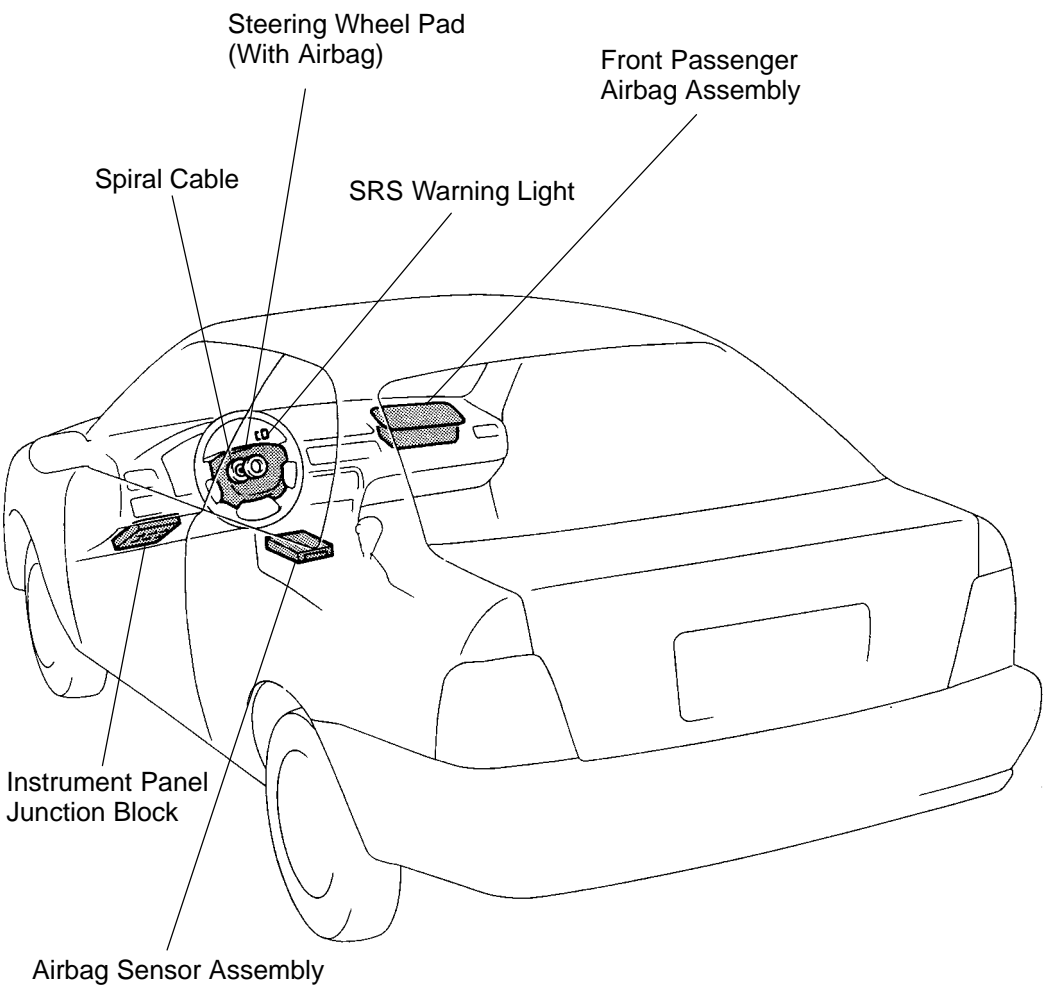
If a malfunction code is displayed during the DTC check, check the circuit listed for that code in the table below (Proceed to the page given for that circuit.).

DTC No. (See Page)	Detection Item	Trouble Area	SRS Warning Light
Normal (DI-177)	● System normal	-	OFF
	● Source Voltage drop	● Battery ● Airbag sensor assembly	ON
11 (DI-155)	● Short in squib circuit (to ground)	● Steering wheel pad (D squib) ● Front passenger airbag assembly (P squib) ● Spiral cable ● Airbag sensor assembly ● Wire harness	ON
12 (DI-162)	● Short in squib circuit (to B+)	● Steering wheel pad (D squib) ● Front passenger airbag assembly (P squib) ● Spiral cable ● Airbag sensor assembly ● Wire harness	ON
14 (DI-168)	● Open in D squib circuit	● Steering wheel pad (D squib) ● Spiral cable ● Airbag sensor assembly ● Wire harness	ON
31 (DI-172)	● Airbag sensor assembly malfunction	● Airbag sensor assembly	ON
54 (DI-174)	● Open in P squib circuit	● Front passenger airbag assembly (P squib) ● Airbag sensor assembly ● Wire harness	ON

### HINT:

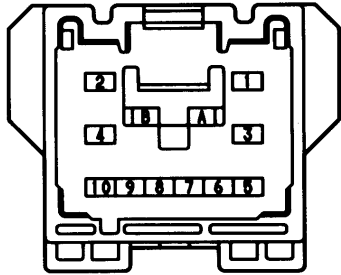
- When the SRS warning light remains lit up and the DTC is the normal code, this means a source voltage drops.  
This malfunction is not stored in memory by the airbag sensor assembly and if the power source voltage returns to normal, the SRS warning light will automatically go out.
- When 2 or more codes are indicated, the codes will be displayed in numeral order starting from the lowest numbered code.
- If a code not listed on the chart is displayed, the airbag sensor assembly is faulty.

## PARTS LOCATION



N12263

TERMINALS OF ECM



No.	Symbol	Terminal Name
A	-	Electrical Connection Check Mechanism
B	-	Electrical Connection Check Mechanism
1	P <sup>-</sup>	Squib ⊖ (Passenger)
2	P <sup>+</sup>	Squib · (Passenger)
3	D <sup>-</sup>	Squib ⊖ (Driver)
4	D <sup>+</sup>	Squib · (Driver)
5	E <sub>1</sub>	Ground
6	E <sub>2</sub>	Ground
7	T <sub>c</sub>	Diagnosis
8	LA	SRS Warning Light
9	IG <sub>2</sub>	Power Source (IGN Fuse)
10	ACC	Power Source (CIG Fuse)

## PROBLEM SYMPTOMS TABLE

Proceed with troubleshooting of each circuit in the table below.

Symptom	Suspect Area	See page
<ul style="list-style-type: none"> <li>● With the ignition switch at ACC or ON, the SRS warning light sometimes lights up after approx. 6 seconds have elapsed.</li> <li>● SRS warning light is always lit up even when ignition switch is in the LOCK position.</li> </ul>	<ul style="list-style-type: none"> <li>● SRS warning light system malfunction (Always lit up when ignition switch is in LOCK position.)</li> </ul>	DI-180
<ul style="list-style-type: none"> <li>● With the ignition switch at ACC or ON, the SRS warning light does not light up.</li> </ul>	<ul style="list-style-type: none"> <li>● SRS warning light system malfunction (Does not light up, when ignition switch is turned to ACC or ON.)</li> </ul>	DI-182
<ul style="list-style-type: none"> <li>● DTC not displayed.</li> <li>● SRS warning light is always lit up a DTC check procedure.</li> <li>● DTC displayed without Tc and E1 terminal connection.</li> </ul>	<ul style="list-style-type: none"> <li>● Tc terminal circuit</li> </ul>	DI-185

# CIRCUIT INSPECTION

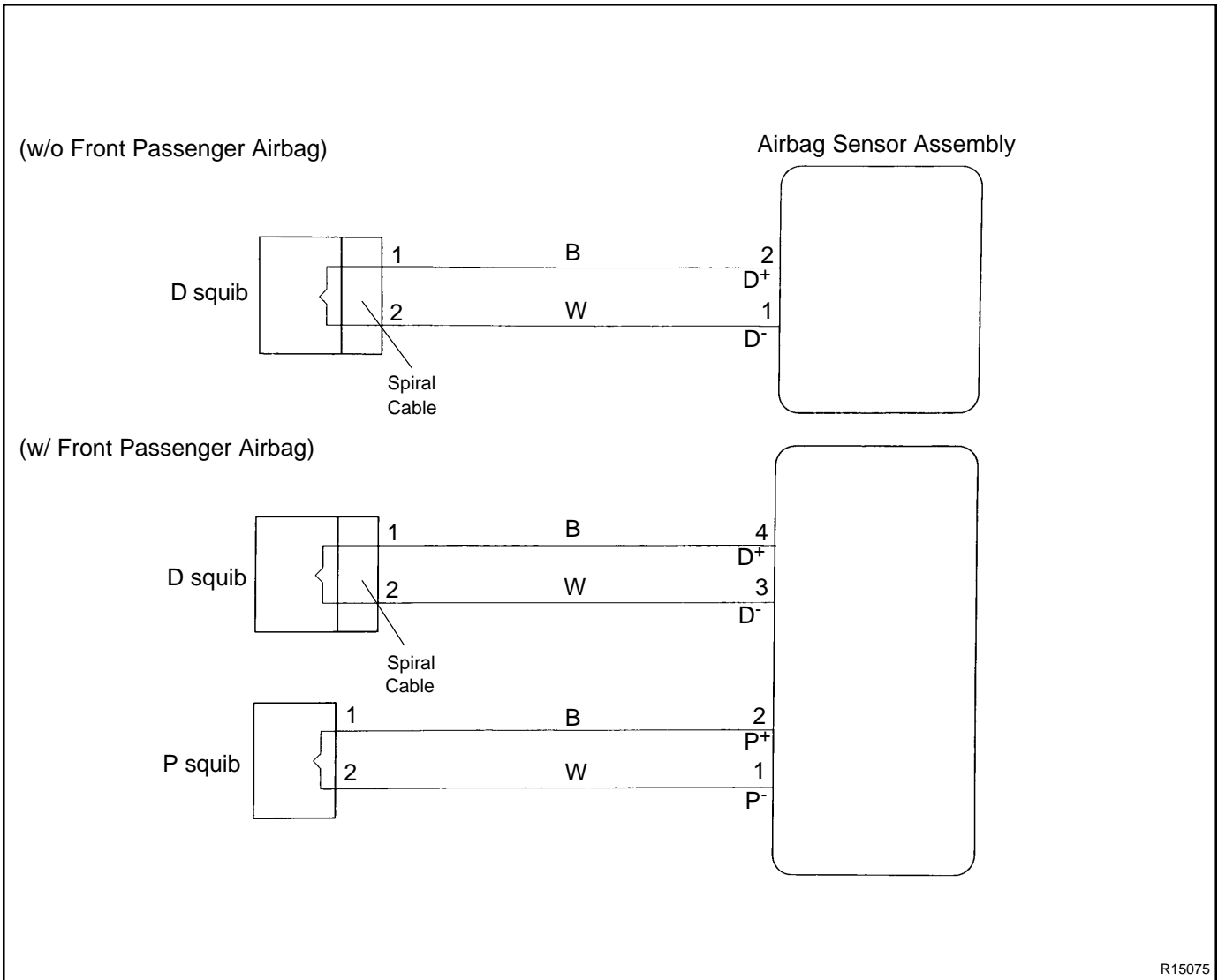
<b>DTC</b>	<b>11</b>	<b>Short in Squib Circuit (to Ground)</b>
------------	-----------	---

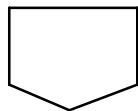
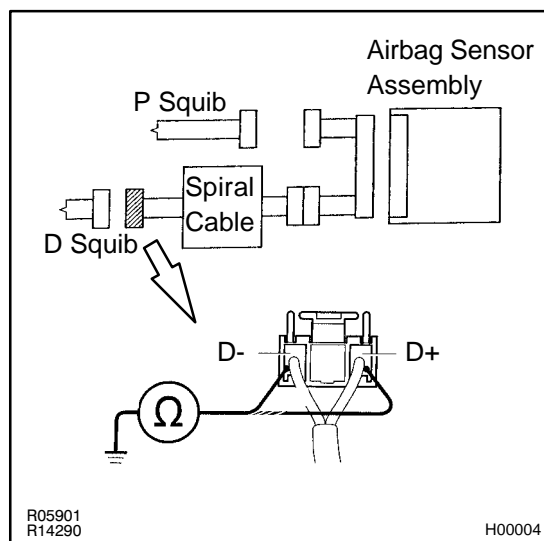
## CIRCUIT DESCRIPTION

The squib circuit consists of the airbag sensor assembly, spiral cable, steering wheel pad and front passenger airbag assembly. If causes the SRS to deploy when the SRS deployment conditions are satisfied. For details of the function of each component, see FUNCTION OF COMPONENTS on page RS-2 . DTC 11 is recorded when ground short is detected in the squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
11	<ul style="list-style-type: none"> <li>Short circuit in squib wire harness (to ground)</li> <li>Squib malfunction</li> <li>Spiral cable malfunction</li> <li>Airbag sensor assembly malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Steering wheel pad (D squib)</li> <li>Front passenger airbag assembly (P squib)</li> <li>Spiral cable</li> <li>Airbag sensor assembly</li> <li>Wire harness</li> </ul>

## WIRING DIAGRAM



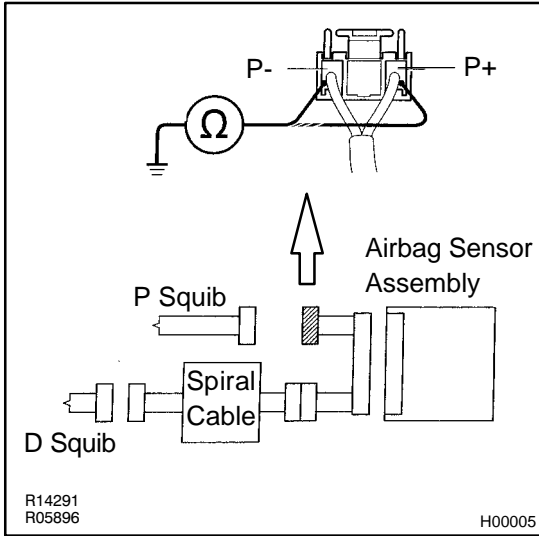
**INSPECTION PROCEDURE****1** Preparation. (See step 1 on page [DI-177](#))**2** Check D squib circuit.**CHECK:**

For the connector (on the spiral cable side) between the spiral cable and steering wheel pad, measure the resistance between D<sup>+</sup>, D<sup>-</sup> and body ground.

**OK:**

**Resistance: 1MΩ or higher**

**NG****Go to step 7.****OK**

**3****Check P squib circuit.****CHECK:**

For the connector (on the airbag sensor assembly side) between the airbag sensor assembly and front passenger airbag assembly, measure the resistance between P<sup>+</sup>, P<sup>-</sup> and body ground.

**OK:**

**Resistance: 1MΩ or Higher**

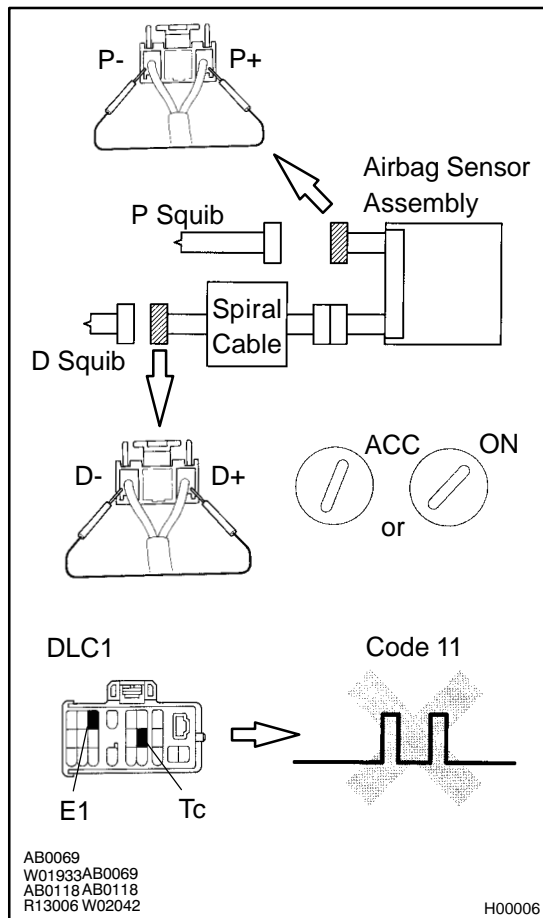
**NG**

**Repair or replace harness or connector between the airbag sensor assembly and front passenger airbag assembly.**

**OK**



## 4 Check airbag sensor assembly.



### PREPARATION:

- Connect connector to airbag sensor assembly.
- Using a service wire, connect D+ and D- on spiral cable side of connector between spiral cable and steering wheel pad.
- Using a service wire, connect P+ and P- on airbag sensor assembly side of connector between airbag sensor assembly and front passenger airbag assembly.
- Connect negative (-) terminal cable to battery, and wait at least 2 seconds.

### CHECK:

- Turn ignition switch to ACC or ON and wait at least 20 seconds.
- Clear malfunction code stored in memory.  
(See page [DI-148](#))
- Turn ignition switch to LOCK, and wait at least 20 seconds.
- Turn ignition switch to ACC or ON, and wait at least 20 seconds.
- Using SST, connect terminals Tc and E1 of DLC 1.  
SST 09843-18020
- Check DTC

### OK:

**DTC 11 is not output.**

### HINT:

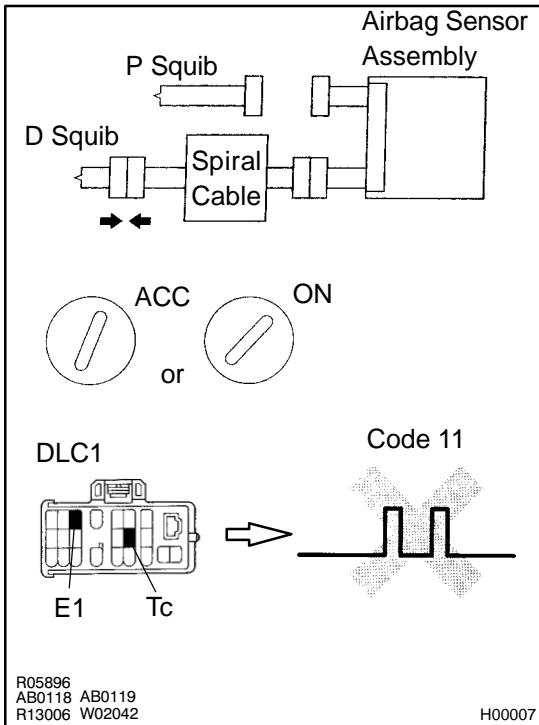
Codes other than code 11 may be output at this time, but they are not relevant to this check.

**NG**

**Replace airbag sensor assembly.**

**OK**

# 5 Check D squib.



## PREPARATION:

- Turn ignition switch to LOCK.
- Disconnect negative (-) terminal cable from the battery, and wait at least 90 seconds.
- Connect steering wheel pad connector.
- Connect negative (-) terminal cable to battery, and wait at least 2 seconds.

## CHECK:

- Turn ignition switch to ACC or ON, and wait at least 20 seconds.
- Clear malfunction code stored in memory.  
(See page [DI-148](#) )
- Turn ignition switch to LOCK, and wait at least 20 seconds.
- Turn ignition switch to ACC or ON, and wait at least 20 seconds.
- Using SST, connect terminals Tc and E1 of DLC 1.  
SST 09843-18020
- Check DTC.

## OK:

**DTC 11 is not output.**

## HINT:

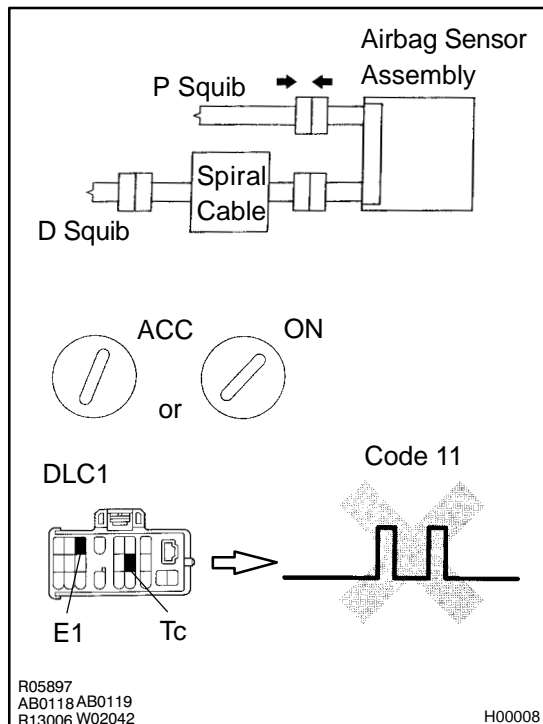
Codes other than code 11 may be output at this time, but they are not relevant to this check.

**NG**

**Replace steering wheel pad.**

**OK**

6

**Check P squib.****PREPARATION:**

- Turn ignition switch to LOCK.
- Disconnect negative (-) terminal cable from the battery, and wait at least 90 seconds.
- Connect front passenger airbag assembly connector.
- Connect negative (-) terminal cable to battery, and wait at least 2 seconds.

**CHECK:**

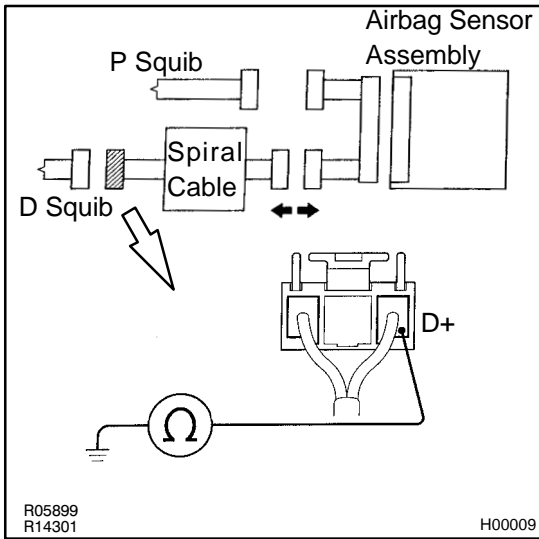
- Turn ignition switch to ACC or ON, and wait at least 20 seconds.
- Clear malfunction code stored in memory.  
(See page [DI-148](#) )
- Turn ignition switch to LOCK, and wait at least 20 seconds.
- Turn ignition switch to ACC or ON, and wait at least 20 seconds.
- Using SST, connect terminals Tc and E1 of DLC 1.  
SST 09843-18020
- Check DTC.

**OK:****DTC 11 is not output.****HINT:**

Codes other than code 11 may be output at this time, but they are not relevant to this check.

**NG****Replace front passenger airbag assembly.****OK**

**From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.**

**7****Check spiral cable.****PREPARATION:**

Disconnect connector between airbag sensor assembly and spiral cable.

**CHECK:**

Measure resistance between D+ on spiral cable side of connector between spiral cable and steering wheel pad and body ground.

**OK:**

**Resistance: 1MΩ or Higher**

**NG****Repair or replace spiral cable.****OK**

**Repair or replace harness or connector between airbag sensor assembly and spiral cable.**

<b>DTC</b>	<b>12</b>	<b>Short in Squib Circuit (to B+)</b>
------------	-----------	---------------------------------------

## CIRCUIT DESCRIPTION

The squib circuit consists of the airbag sensor assembly, spiral cable, steering wheel pad and front passenger airbag assembly. It causes the SRS to deploy when the SRS deployment conditions are satisfied.

For details of the function of each components, see FUNCTION OF COMPONENTS on page RS-2 .

DTC 12 is recorded when a B+ short is detected in the squib circuit.

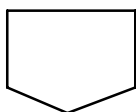
DTC No.	DTC Detection Condition	Trouble Area
12	<ul style="list-style-type: none"> <li>● Short circuit in squib wire harness (to B+)</li> <li>● Squib malfunction</li> <li>● Spiral cable malfunction</li> <li>● Airbag sensor assembly malfunction</li> </ul>	<ul style="list-style-type: none"> <li>● Steering wheel pad (D squib)</li> <li>● Front passenger airbag assembly (P squib)</li> <li>● Spiral cable</li> <li>● Airbag sensor assembly</li> <li>● Wire harness</li> </ul>

## WIRING DIAGRAM

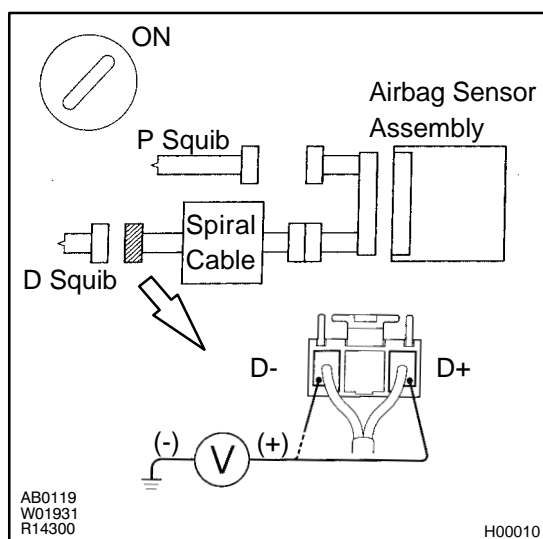
Refer to page DI-155 for the WIRING DIAGRAM.

## INSPECTION PROCEDURE

<b>1</b>	<b>Preparation. (See step 1 on page DI-177 )</b>
----------	--



<b>2</b>	<b>Check D squib circuit.</b>
----------	-------------------------------



### CHECK:

For the connector (on the spiral cable side) between the spiral cable and steering wheel pad, measure the voltage between D<sup>+</sup>, D<sup>-</sup> and body ground.

### OK:

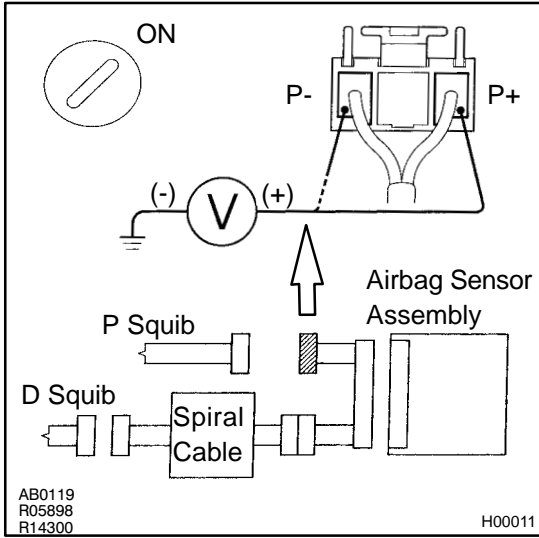
**Voltage: 0 V**

**NG**

**Go to step 7.**

**OK**

### 3 Check P squib circuit.



#### **CHECK:**

For the connector (on the airbag sensor assembly side) between airbag sensor assembly and front passenger airbag assembly, measure the voltage between P<sup>+</sup>, P<sup>-</sup> and body ground.

#### **OK:**

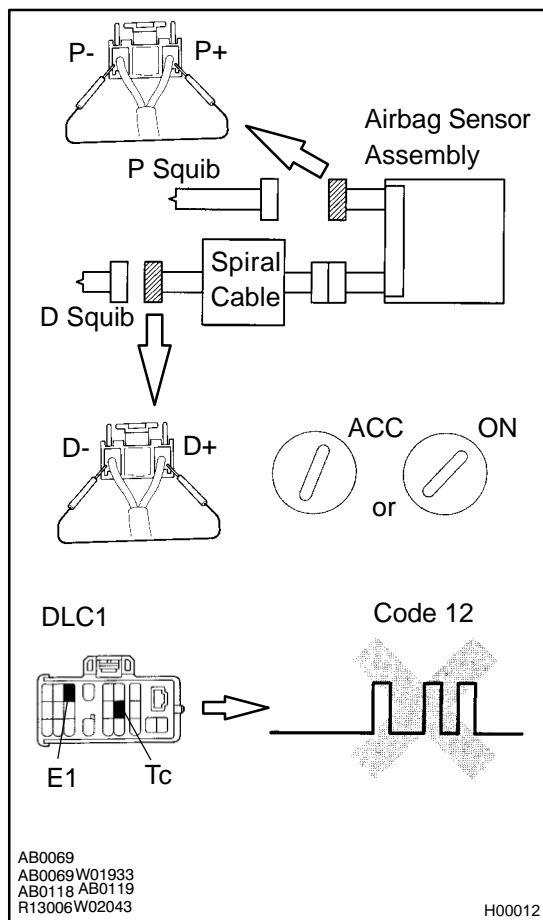
**Voltage: 0V**

**NG**

**Repair or replace harness or connector between the airbag sensor assembly and front passenger airbag assembly.**

**OK**

## 4 Check airbag sensor assembly.



### PREPARATION:

- Connect connector to airbag sensor assembly.
- Using a service wire, connect D<sup>+</sup> and D<sup>-</sup> on spiral cable side of connector between spiral cable and steering wheel pad.
- Using a service wire, connect P<sup>+</sup> and P<sup>-</sup> on airbag sensor assembly side of connector between airbag sensor assembly and front passenger airbag assembly.
- Connect negative (-) terminal cable to battery, and wait at least 2 seconds.

### CHECK:

- Turn ignition switch to ACC or ON and wait at least 20 seconds.
- Clear malfunction code stored in memory.  
(See page [DI-148](#) )
- Turn ignition switch to LOCK, and wait at least 20 seconds.
- Turn ignition switch to ACC or ON, and wait at least 20 seconds.
- Using SST, connect terminals Tc and E1 of DLC1.  
SST 09843-18020
- Check DTC.

### OK:

**DTC 12 is not output.**

### HINT:

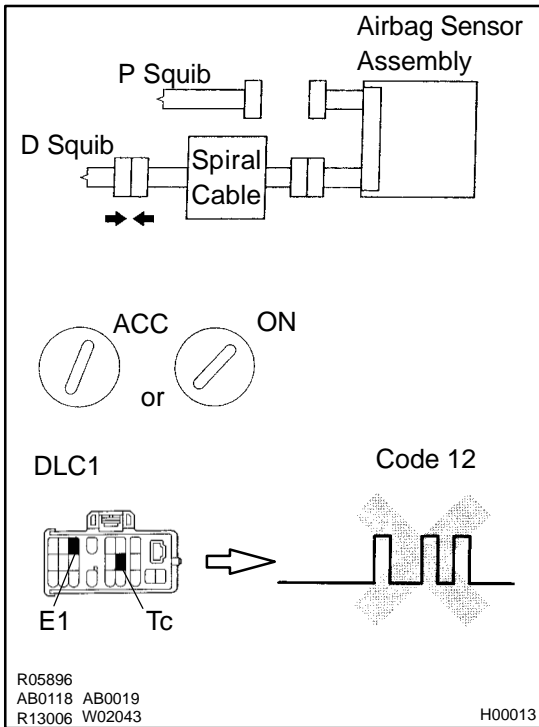
Codes other than code 12 may be output at this time, but they are not relevant to this check.

**NG**

**Replace airbag sensor assembly.**

**OK**

# 5 Check D squib.



## PREPARATION:

- Turn ignition switch to LOCK.
- Disconnect negative (-) terminal cable from the battery, and wait at least 90 seconds.
- Connect steering wheel pad connector.
- Connect negative (-) terminal cable to battery, and wait at least 2 seconds.

## CHECK:

- Turn ignition switch to ACC or ON, and wait at least 20 seconds.
- Clear malfunction code stored in memory. (See page [DI-148](#) )
- Turn ignition switch to LOCK, and wait at least 20 seconds.
- Turn ignition switch to ACC or ON, and wait at least 20 seconds.
- Using SST, connect terminals Tc and E1 of DLC1. SST 09843-18020
- Check DTC.

## OK:

**DTC 12 is not output.**

## HINT:

Codes other than code 12 may be output at this time, but they are not relevant to this check.

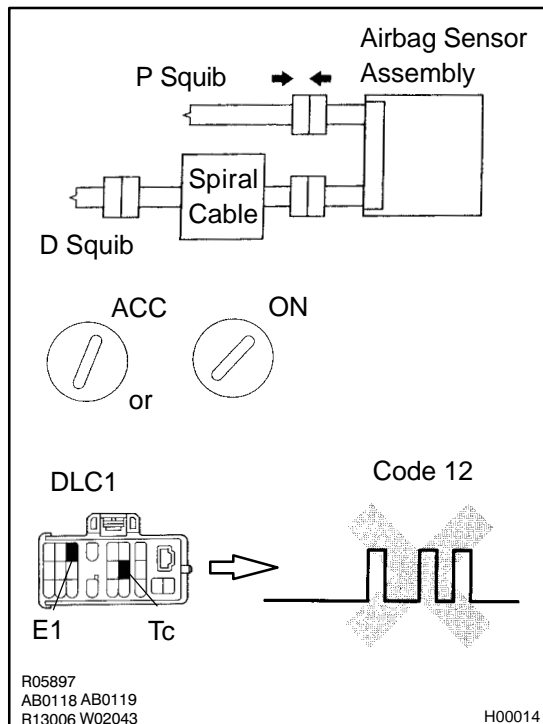
**NG**

**Replace steering wheel pad.**

**OK**



6

**Check P squib.****PREPARATION:**

- Turn ignition switch to LOCK.
- Disconnect negative (-) terminal cable from the battery, and wait at least 90 seconds.
- Connect front passenger airbag assembly connector.
- Connect negative (-) terminal cable to battery, and wait at least 2 seconds.

**CHECK:**

- Turn ignition switch to ACC or ON, and wait at least 20 seconds.
- Clear malfunction code stored in memory.  
(See page [DI-148](#) )
- Turn ignition switch to LOCK, and wait at least 20 seconds.
- Turn ignition switch to ACC or ON, and wait at least 20 seconds.
- Using SST, connect terminals Tc and E1 of DLC1.  
SST 09843-18020
- Check DTC.

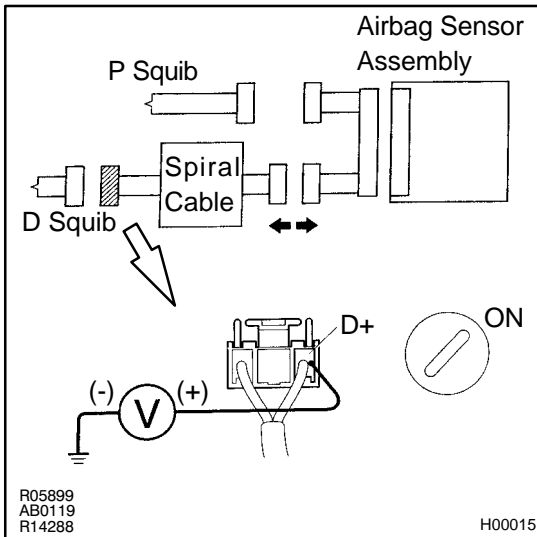
**OK:****DTC 12 is not output.****HINT:**

Codes other than code 12 may be output at this time, but they are not relevant to this check.

**NG****Replace front passenger airbag assembly.****OK**

**From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

## 7 Check spiral cable.



### PREPARATION:

- Turn ignition switch to LOCK.
- Disconnect connector between airbag sensor assembly and spiral cable.
- Turn ignition switch ON.

### CHECK:

Measure voltage at D+ on spiral cable side of connector between spiral cable and steering wheel pad and body ground.

### OK:

**Voltage: 0 V**

**NG**

**Repair or replace spiral cable.**

**OK**

**Repair or replace harness or connector between airbag sensor assembly and spiral cable.**

<b>DTC</b>	<b>14</b>	<b>Open in D Squib Circuit</b>
------------	-----------	--------------------------------

## CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assembly, spiral cable and steering wheel pad. It causes the airbag to deploy when the airbag deployment conditions are satisfied.

For details of the function of each components, see FUNCTION OF COMPONENTS on page RS-2 .

DTC 14 is recorded when an open is detected in the D squib circuit.

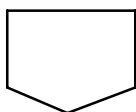
DTC No.	DTC Detection Condition	Trouble Area
14	<ul style="list-style-type: none"> <li>● Short circuit in D<sup>+</sup> wire harness or D<sup>-</sup> wire harness of squib</li> <li>● D squib malfunction</li> <li>● Spiral cable malfunction</li> <li>● Airbag sensor assembly malfunction</li> </ul>	<ul style="list-style-type: none"> <li>● Steering wheel pad (D squib)</li> <li>● Spiral cable</li> <li>● Airbag sensor assembly</li> <li>● Wire harness</li> </ul>

## WIRING DIAGRAM

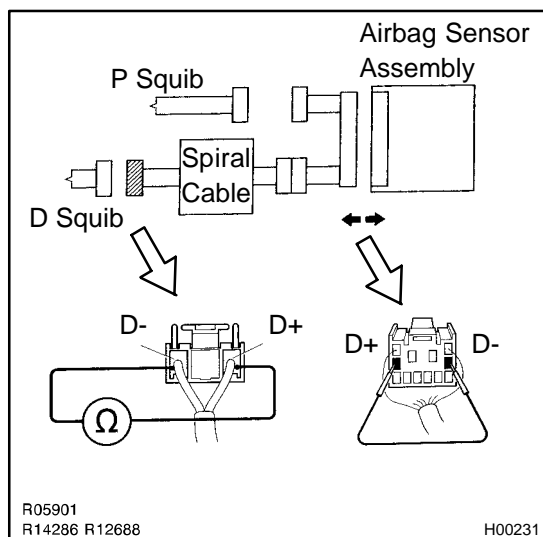
Refer to page DI-155 for the WIRING DIAGRAM.

## INSPECTION PROCEDURE

<b>1</b>	<b>Preparation (See step 1 on page DI-177 )</b>
----------	---



<b>2</b>	<b>Check D squib circuit.</b>
----------	-------------------------------



### PREPARATION:

Using a service wire, connect D<sup>+</sup>, and D<sup>-</sup> on airbag sensor assembly connector.

### CHECK:

For the connector (on the spiral cable side) between the spiral cable and steering wheel pad, measure the resistance between D<sup>+</sup> and D<sup>-</sup>.

### OK:

**Resistance: Below 1 Ω**

**NG**

**Go to step 5.**

**OK**

1996 TERCEL (RM440U)

P Squib

Airbag Sensor Assembly

Spiral Cable

D Squib

ACC ON

or

D- D+

DLC1

Code 14

E1 Tc

R05895 AB0069  
AB0118 AB0119  
R13006 W02044

H00017

- (a) Connect connector to airbag sensor assembly.
- (b) Using a service wire, connect D<sup>+</sup> and D<sup>-</sup> on spiral cable side of connector between spiral cable and steering wheel pad.
- (c) Connect negative (-) terminal cable to battery, and wait at least 2 seconds.

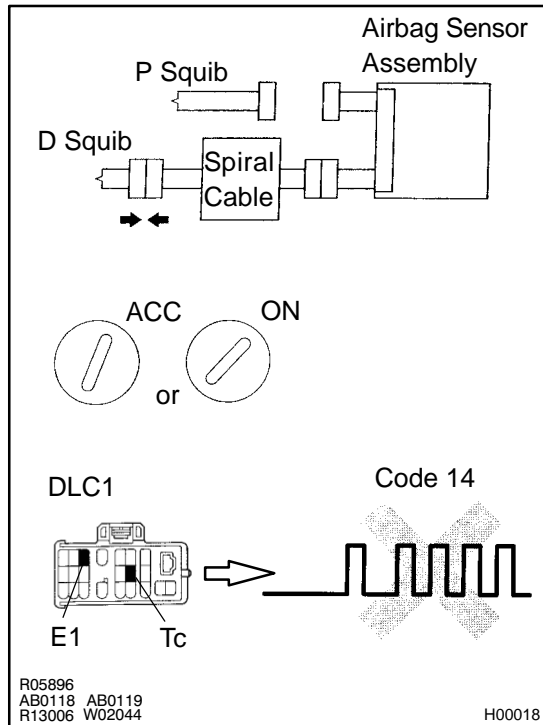
- (a) Turn ignition switch to ACC or ON and wait at least 20 seconds.
- (b) Clear malfunction code stored on memory (See page [DI-148](#) ).
- (c) Turn ignition switch to LOCK, and wait at least 20 seconds.
- (d) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
- (e) Using SST, connect terminals Tc and E1 of DLC 1.  
SST 09843-18020
- (f) Check DTC.

Codes other than code 14 may be output at this time, but they are not relevant to this check.

**Replace airbag sensor assembly.**

1996 TERCEL (RM440U)

# 4 Check D squib.



## PREPARATION:

- Turn ignition switch to LOCK.
- Disconnect negative (-) terminal cable from the battery, and wait at least 90 seconds.
- Connect steering wheel pad connector.
- Connect negative (-) terminal cable to battery, and wait at least 2 seconds.

## CHECK:

- Turn ignition switch to ACC or ON, and wait at least 20 seconds.
- Clear malfunction code stored in memory (See page [DI-148](#) ).
- Turn ignition switch to LOCK, and wait at least 20 seconds.
- Turn ignition switch to ACC or ON, and wait at least 20 seconds.
- Using SST, connect terminals Tc and E1 of DLC 1.  
SST 09843-18020
- Check DTC.

## OK:

**DTC 14 is not output.**

## HINT:

Codes other than code 14 may be output at this time, but they are not relevant to this check.

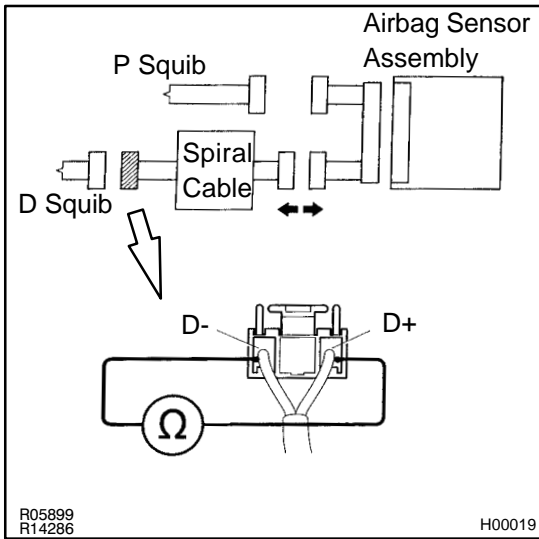
**NG**

**Replace steering wheel pad.**

**OK**

**From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

## 5 Check spiral cable.



### PREPARATION:

Disconnect connector between airbag sensor assembly and spiral cable.

### CHECK:

For the connector (on the spiral cable side) between the spiral cable and steering wheel pad, measure the resistance between D<sup>+</sup> and D<sup>-</sup>.

### OK:OK:

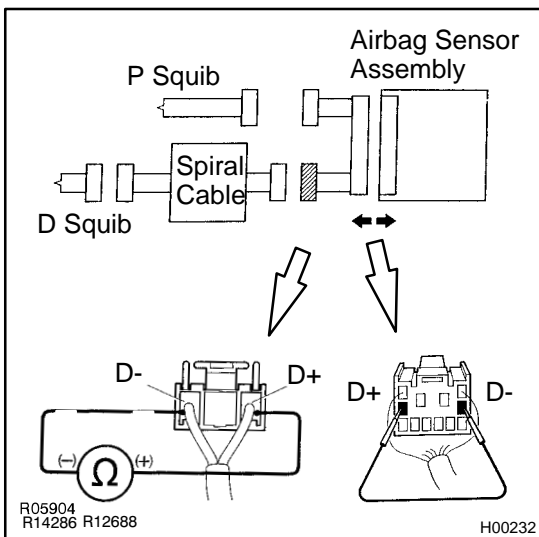
Resistance: Below 1 Ω

NG

Repair or replace spiral cable.

OK

## 6 Check harness between airbag sensor assembly and spiral cable.



### PREPARATION:

Using a service wire, connect D<sup>+</sup> and D<sup>-</sup> on airbag sensor assembly connector.

### CHECK:

For the connector (on the airbag sensor assembly side) between the airbag sensor assembly and spiral cable, measure the resistance between D<sup>+</sup> and D<sup>-</sup>.

### OK:

Resistance: Below 1 Ω

NG

Repair or replace harness or connector between airbag sensor assembly and spiral cable.

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

<b>DTC</b>	<b>31</b>	<b>Airbag Sensor Assembly Malfunction</b>
------------	-----------	---

## CIRCUIT DESCRIPTION

The airbag sensor assembly consists of a airbag sensor, safing sensor, drive circuit, diagnosis circuit and ignition control, etc.

It receives signals from the airbag sensor, judges whether or not the SRS must be activated, and diagnostic system malfunction.

DTC 31 is recorded when occurrence of a malfunction in the airbag sensor assembly is detected.

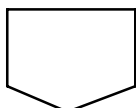
DTC No.	DTC Detection Condition	Trouble Area
31	●Airbag sensor assembly malfunction	●Airbag sensor assembly

## INSPECTION PROCEDURE

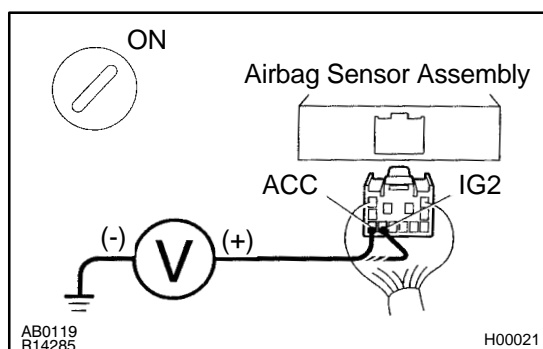
HINT:

When a malfunction code other than code 31 is displayed at the same time, first repair the malfunction indicated by the malfunction code other than code 31.

<b>1</b>	<b>Preparation (See step 1 on page <a href="#">DI-177</a> )</b>
----------	---



<b>2</b>	<b>Check voltage at IG2 and ACC of airbag sensor assembly.</b>
----------	--



### PREPARATION:

- (a) Connect negative (-) terminal cable to battery.
- (b) Turn ignition switch ON.

### CHECK:

Measure voltage between terminals IG2 and ACC of airbag sensor assembly and body ground.

### OK:

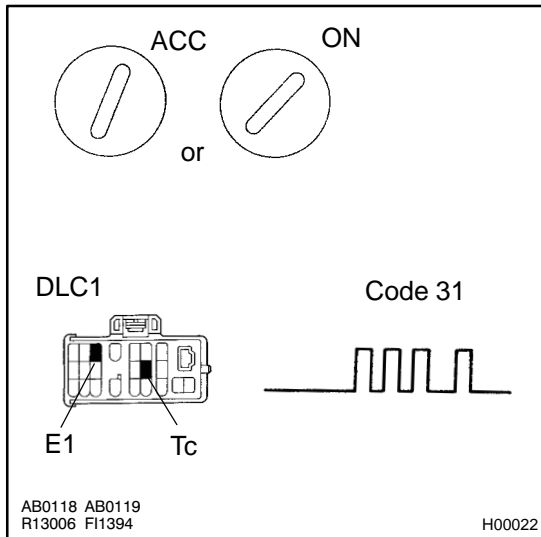
**Voltage: Below 16 V**



**Check battery and charging system (See page [CH-2](#) ).**



### 3 Is DTC 31 output again?



#### **PREPARATION:**

Clear malfunction code.

#### **CHECK:**

- Turn ignition switch to LOCK, and wait at least 20 seconds.
- Turn ignition switch to ACC or ON, and wait at least 20 seconds.
- Repeat operation in step (a) and (b) at least 5 times.
- Using SST, connect terminals Tc and E1 of DLC 1.  
SST 09843-18020
- Check DTC.

**NO**

**Using simulation method, reproduce malfunction symptoms (See page [IN-16](#) ).**

**YES**

**Replace airbag sensor assembly.**



<b>DTC</b>	<b>54</b>	<b>Open in P Squib Circuit</b>
------------	-----------	--------------------------------

## CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assembly and front passenger airbag assembly. It causes the airbag to deploy when the airbag deployment conditions are satisfied.

For details of the function of each components, see FUNCTION OF COMPONENTS on page RS-2 .

DTC 54 is recorded when an open is detected in the P squib circuit.

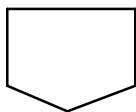
DTC No.	DTC Detection Condition	Trouble Area
54	<ul style="list-style-type: none"> <li>● Open circuit in P+ wire harness or P- wire harness of squib</li> <li>● P squib malfunction</li> <li>● Airbag sensor assembly malfunction</li> </ul>	<ul style="list-style-type: none"> <li>● Front passenger airbag assembly (P squib)</li> <li>● Airbag sensor assembly</li> <li>● Wire harness</li> </ul>

## WIRING DIAGRAM

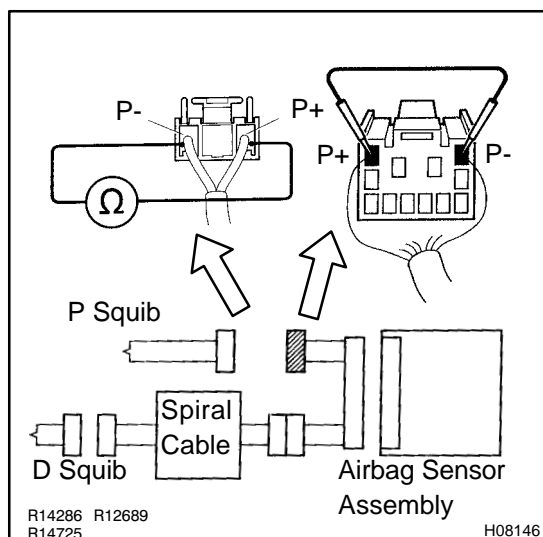
Refer to page DI-155 for the WIRING DIAGRAM.

## INSPECTION PROCEDURE

<b>1</b>	<b>Preparation (See step 1 on page DI-177 )</b>
----------	---



<b>2</b>	<b>Check P squib circuit.</b>
----------	-------------------------------



### PREPARATION:

Using a service wire, connect P+ and P- on airbag sensor assembly connector.

### CHECK:

For the connector (on the airbag sensor assembly side) between the airbag sensor assembly and front passenger airbag assembly measure the resistance between P+ and P- .

### OK:

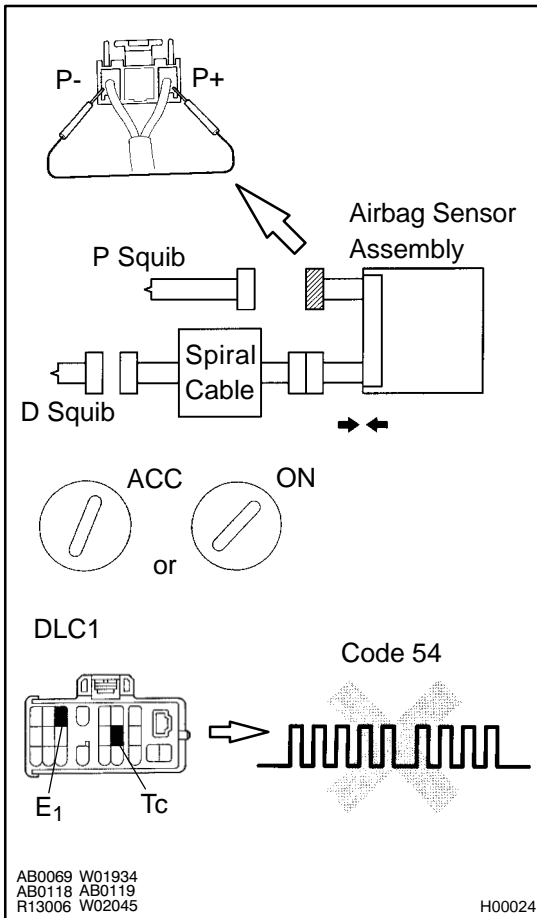
**Resistance: Below 1 Ω**

**NG**

**Repair or replace harness or connector between airbag sensor assembly and front passenger airbag assembly.**

**OK**

### 3 Check airbag sensor assembly.



#### PREPARATION:

- Connect connector to airbag sensor assembly.
- Using a service wire, connect P<sup>+</sup> and P<sup>-</sup> on airbag sensor assembly side of connector between airbag sensor assembly and front passenger airbag assembly.
- Connect negative (-) terminal cable to battery, and wait at least 2 seconds.

#### CHECK:

- Turn ignition switch to ACC or ON and wait at least 20 seconds.
- Clear malfunction code stored in memory (See page [DI-148](#) ).
- Turn ignition switch to LOCK, and wait at least 20 seconds.
- Turn ignition switch to ACC or ON, and wait at least 20 seconds.
- Using SST, connect terminal Tc and E1 of DLC1.  
SST 09843-18020
- Check DTC.

#### OK:

**DTC 54 is not output.**

#### HINT:

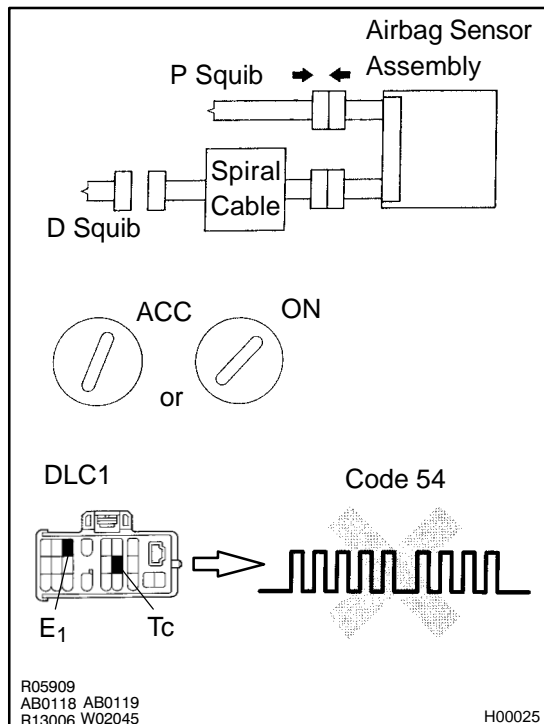
Codes other than code 54 may be output at this time, but they are not relevant to this check.

**NG**

**Replace airbag sensor assembly.**

**OK**

# 4 Check P squib.



## PREPARATION:

- Turn ignition switch to LOCK.
- Disconnect negative (-) terminal cable from the battery, and wait at least 90 seconds.
- Connect front passenger airbag assembly connector.
- Connect negative (-) terminal cable to battery, and wait at least 2 seconds.

## CHECK:

- Turn ignition switch to ACC or ON and wait at least 20 seconds.
- Clear malfunction code stored in memory (See page [DI-148](#) ).
- Turn ignition switch to LOCK, and wait at least 20 seconds.
- Turn ignition switch to ACC or ON, and wait at least 20 seconds.
- Using SST, connect terminals Tc and E1 of DLC1.  
SST 09843-18020
- Check DTC.

## OK:

**DTC 54 is not output.**

## HINT:

Codes other than code 54 may be output at this time, but they are not relevant to this check.

**NG**

**Replace front passenger airbag assembly.**

**OK**

**From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

<b>DTC</b>	<b>Normal</b>	<b>Source Voltage Drop</b>
------------	---------------	----------------------------

## CIRCUIT DESCRIPTION

The SRS is equipped with a voltage-increase circuit (DC-DC converter) in the airbag sensor assembly in case the source voltage drops.

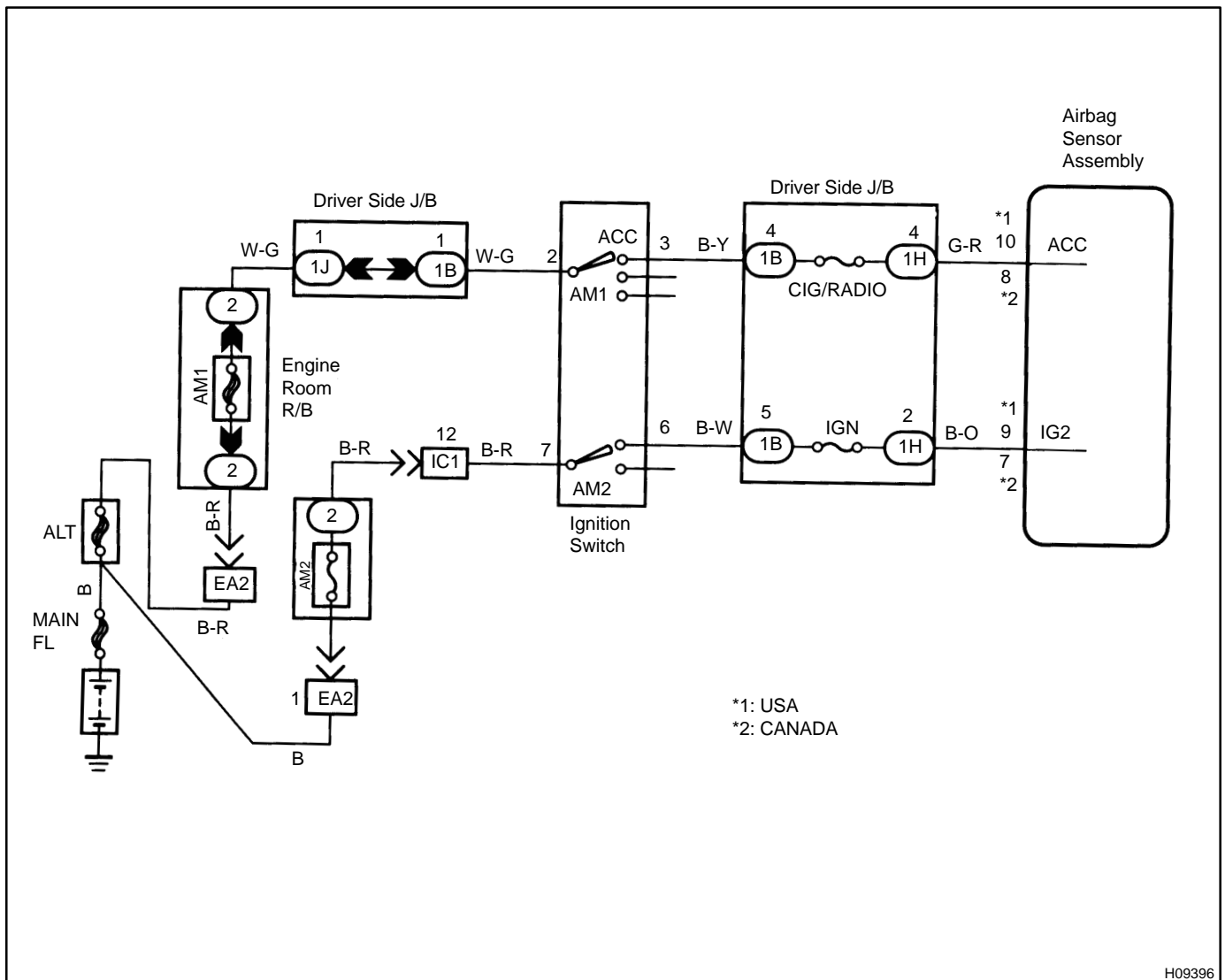
When the battery voltage drops, the voltage-increase circuit (DC-DC converter) functions to increase the voltage of the SRS to normal voltage.

The diagnosis system malfunction display for this circuit is different to other circuits-when the SRS warning light remains lit up and the DTC is a normal code, source voltage drop is indicated.

Malfunction in this circuit is not recorded in the airbag sensor assembly and the source voltage returns to normal, the SRS warning light automatically goes off.

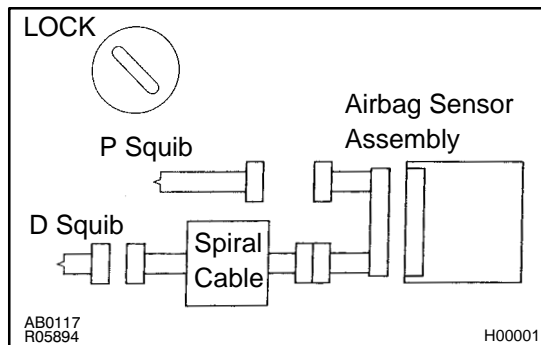
DTC No.	DTC Detection Condition	Trouble Area
(Normal)	Source voltage drop.	<ul style="list-style-type: none"> <li>● Battery</li> <li>● Airbag sensor assembly</li> </ul>

## WIRING DIAGRAM



## INSPECTION PROCEDURE

### 1 Preparation.

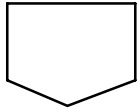


#### PREPARATION:

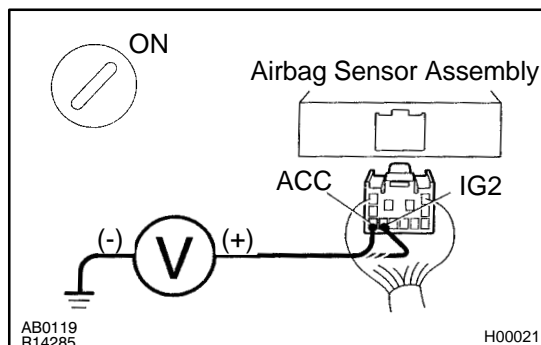
- Disconnect negative (-) terminal cable from the battery, and wait at least 90 seconds.
- Remove steering wheel pad (See page [SR-13](#)).
- Disconnect connector of front passenger airbag assembly (See page [RS-21](#)).
- Disconnect connector of airbag sensor assembly (See page [RS-33](#)).

#### CAUTION:

Store the steering wheel pad with the front surface facing upward.



### 2 Check source voltage.



#### PREPARATION:

- Connect negative (-) terminal cable to battery.
- Turn ignition switch ON.

#### CHECK:

Measure voltage at IG2 or ACC on sensor and operate electric system. (defogger, wiper, headlight, heater blower, etc.)

#### OK:

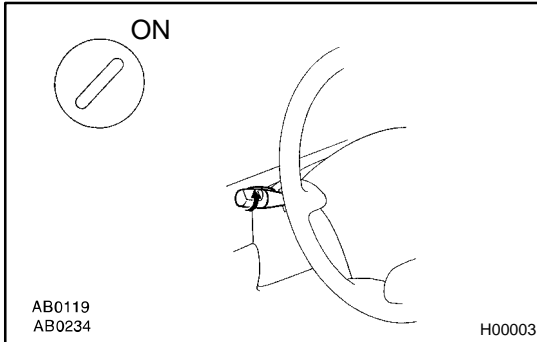
Voltage: 10 - 14 V

NG

Check the harness between battery and airbag sensor assembly, check the battery and charging system.

OK

3

**Does SRS warning light turn off?****PREPARATION:**

- (a) Turn ignition switch to LOCK.
- (b) Connect steering wheel pad connector.
- (c) Connect front passenger airbag assembly connector.
- (d) Connect airbag sensor assembly connector.
- (e) Turn ignition switch ON.

**CHECK:**

Operate electric system checked in defogger, wiper, headlight, heater blower, etc. and check that SRS warning light goes off.

**NO**

**Check for DTCs. If a DTC is output, perform troubleshooting for the DTC. If a normal code is output, replace airbag sensor assembly.**

**YES**

**From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

## SRS Warning Light System Malfunction (Always lit up when ignition switch is in LOCK position.)

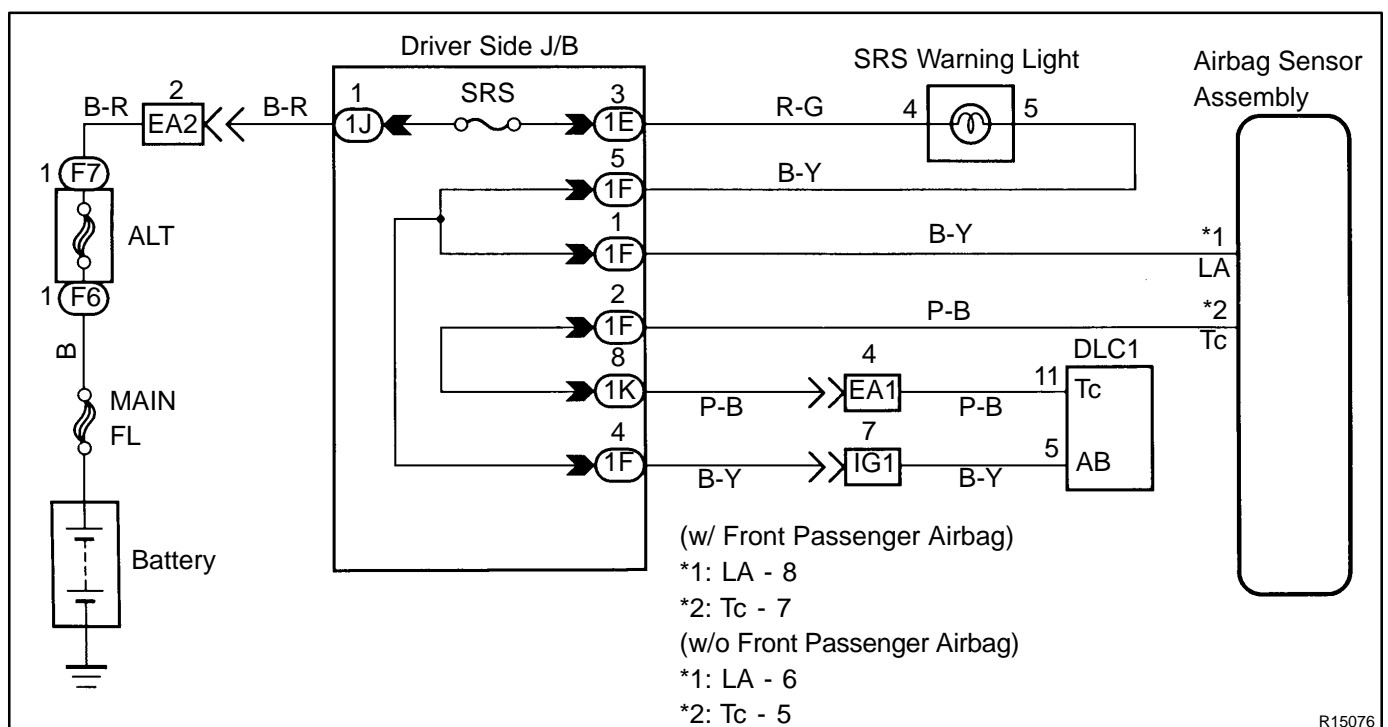
### CIRCUIT DESCRIPTION

The SRS warning light is located on the combination meter.

When the SRS is normal, the SRS warning light lights up for approx. 6 seconds after the ignition switch is turned from the LOCK position to ACC or ON position, and then turns off automatically.

If there is a malfunction in the SRS, the SRS warning light lights up to inform the driver of the abnormality. When terminals Tc and E1 of the DLC1 are connected, the DTC is displayed by the blinking of the SRS warning light.

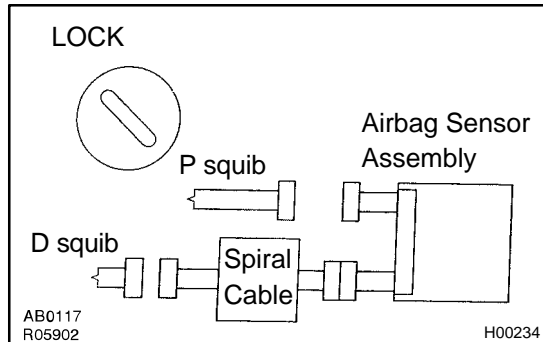
### WIRING DIAGRAM



R15076

## INSPECTION PROCEDURE

### 1 Preparation.

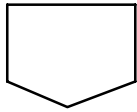


#### **PREPARATION:**

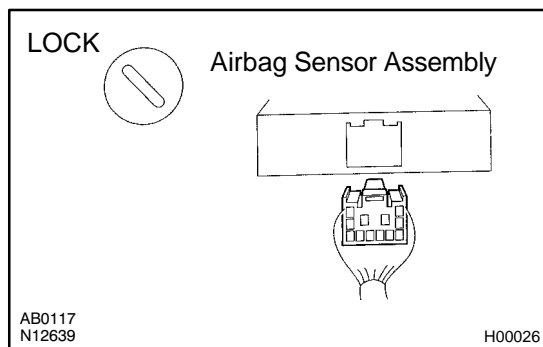
- Disconnect negative (-) terminal cable from the battery, and wait at least 90 seconds.
- Remove steering wheel pad (See page [SR-13](#) ).
- Disconnect connector of front passenger airbag assembly (See page [RS-21](#) ).

#### **CAUTION:**

Store the steering wheel pad with the front surface facing upward.



### 2 Does SRS warning light turn off?



#### **PREPARATION:**

- Disconnect airbag sensor assembly connector.
- Connect negative (-) terminal cable to battery.

#### **CHECK:**

Check operation of SRS warning light.

**NO**

Check SRS warning light circuit or terminal AB circuit of DLC1.

**YES**

Replace airbag sensor assembly.



## SRS Warning Light System Malfunction (Does not light up when ignition switch is turned to ACC or ON.)

### CIRCUIT DESCRIPTION

The SRS warning light is located on the combination meter.

When the SRS is normal, the SRS warning light lights up for approx. 6 seconds after the ignition switch is turned from LOCK position to ACC or ON position, and then turns off automatically.

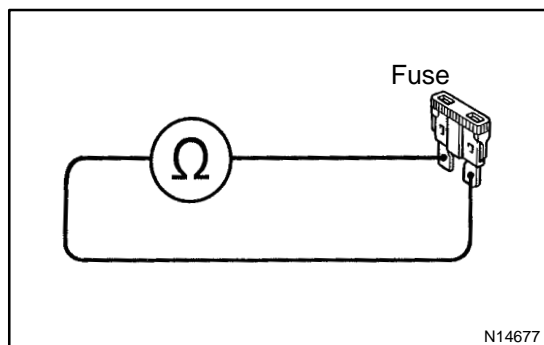
If there is a malfunction in the SRS, the SRS warning light lights up to inform the driver of the abnormality. When terminals Tc and E1 of the DLC1 are connected, the DTC is displayed by the blinking of the SRS warning light.

### WIRING DIAGRAM

Refer to page [DI-180](#) for the WIRING DIAGRAM.

### INSPECTION PROCEDURE

#### 1 Check SRS Fuse.



#### PREPARATION:

Remove SRS fuse.

#### CHECK:

Check continuity of SRS fuse.

#### OK:

**Continuity**

**HINT:**

- Fuse may be burnt out even if it appears to be OK during visual inspection.
- If fuse is OK, install it.

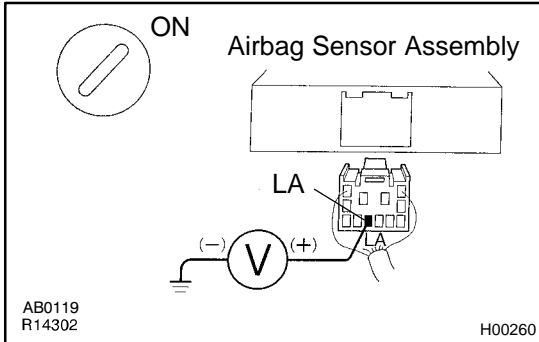
**NG**

**Go to step 5.**

**OK**

#### 2 Preparation. (See step 1 on page [DI-177](#) )

### 3 Check SRS warning light circuit.



#### PREPARATION:

- Connect negative (-) terminal cable to battery.
- Turn ignition switch to ACC or ON.

#### CHECK:

Measure voltage LA terminal of harness side connector of airbag sensor assembly.

#### OK:

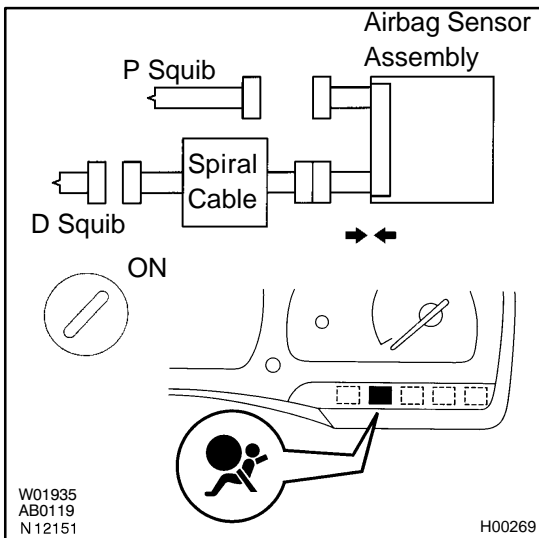
**Voltage: 10 - 14 V**

**NG**

**Check SRS warning light bulb / repair SRS warning light circuit.**

**OK**

### 4 Does SRS warning light come on?



#### PREPARATION:

- Disconnect negative (-) terminal cable from the battery.
- Connect airbag sensor assembly connector.
- Connect negative (-) terminal cable to battery, and wait at least 2 seconds.
- Turn ignition switch to ACC or ON.

#### CHECK:

Check operation of SRS warning light.

**NO**

**Check terminal LA of airbag sensor assembly. If normal, replace airbag sensor assembly.**

**YES**

**From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

5	Is new SRS fuse burnt out again?
---	----------------------------------

**NO**

Using simulation method, reproduce malfunction symptoms (See page [IN-16](#) ).

**YES**

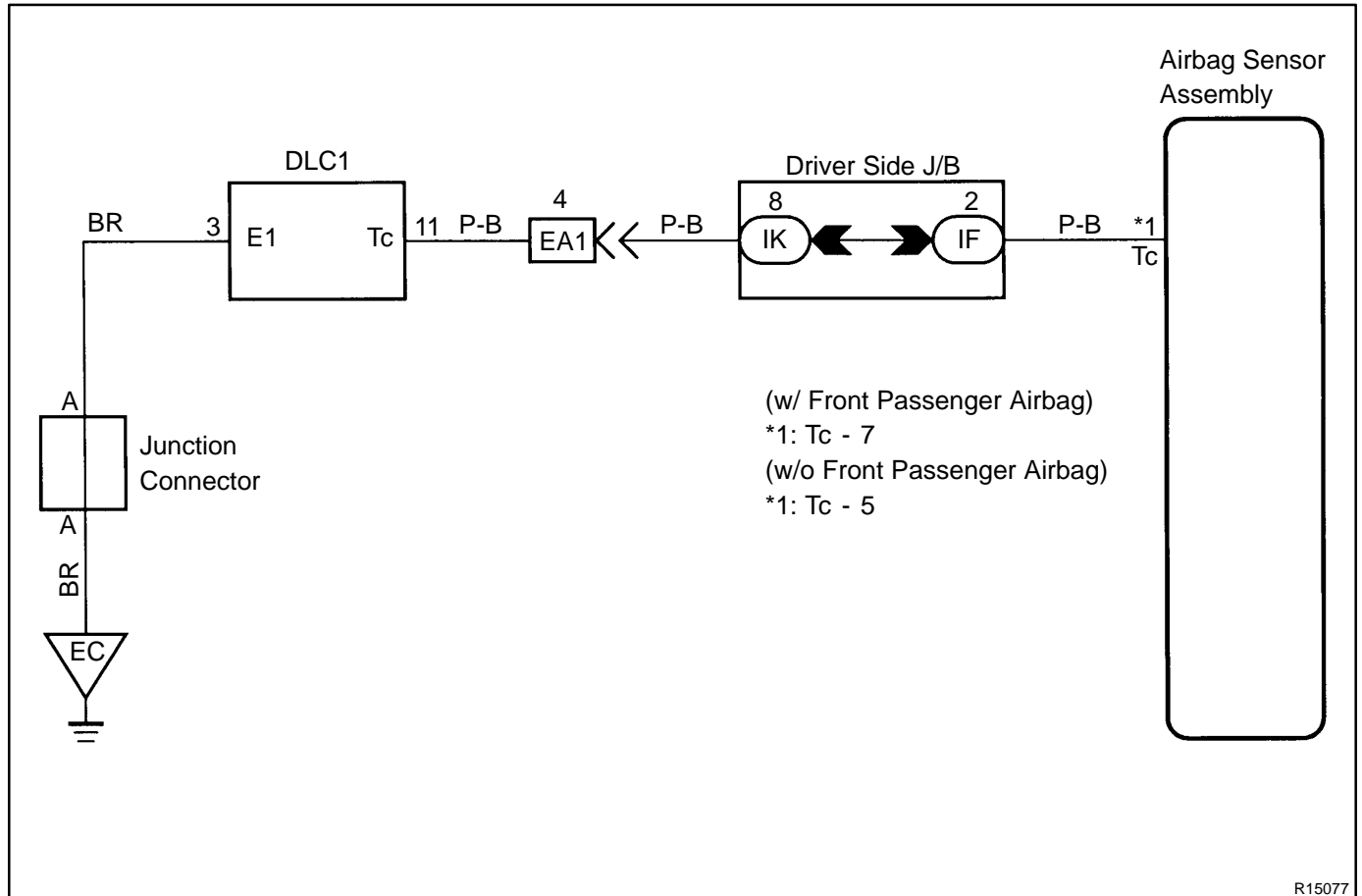
Check harness between SRS fuse and SRS warning light.

## Tc Terminal Circuit

### CIRCUIT DESCRIPTION

By connecting terminals Tc and E1 of the DLC1 the airbag sensor assembly is set in the DTC output mode. The DTCs are displayed by the blinking of the SRS warning light.

### WIRING DIAGRAM

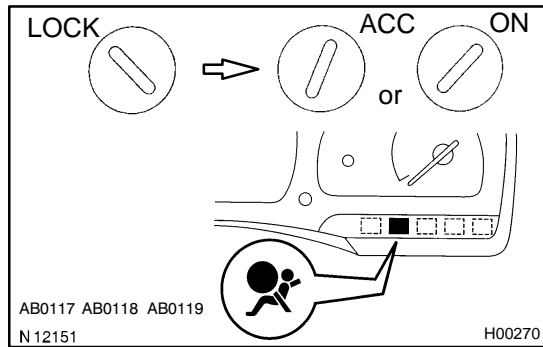


## INSPECTION PROCEDURE

### HINT:

If the DTC is not displayed, do the following troubleshooting.

#### 1 Does SRS warning light up for approx. 6 seconds?



#### **CHECK:**

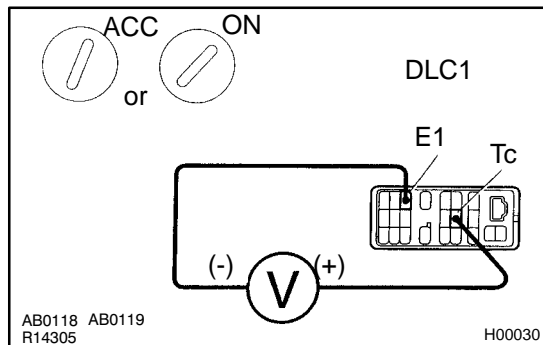
Check operation of SRS warning light after ignition switch is turned from LOCK position to ACC or ON position.

NO

Check SRS warning light system.  
(See page [DI-180](#) , [DI-182](#) )

YES

#### 2 Check voltage between terminals Tc and E1 of DLC1.



#### **PREPARATION:**

Turn ignition switch to ACC or ON.

#### **CHECK:**

Measure voltage between terminals Tc and E1 of DLC1.

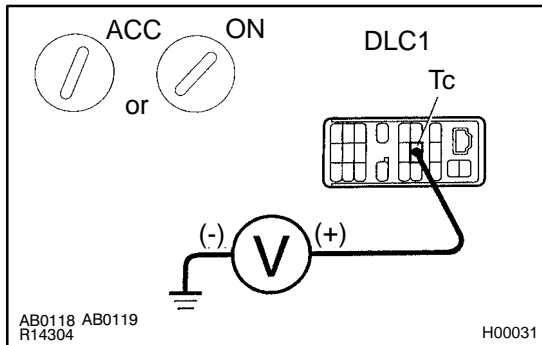
#### **OK:**

Voltage: 10 - 14 V

OK

Go to step 4.

NG

**3****Check voltage between terminal Tc of DLC1 and body ground****CHECK:**

Measure voltage between terminal Tc of DLC1 and body ground.

**OK:**

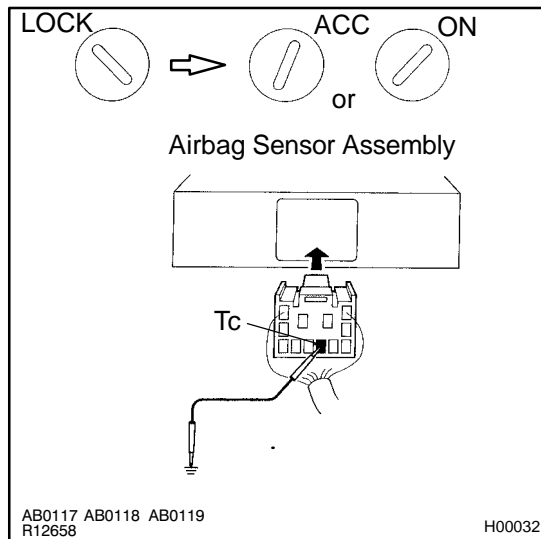
**Voltage: 10 - 14 V**

**OK**

**Check harness between terminal E1 of DLC1 and body ground.**

**NG**

# 4 Check airbag sensor assembly.



## PREPARATION:

- (a) Turn ignition switch to LOCK.
- (b) Disconnect negative (-) terminal cable from the battery, and wait at least 90 seconds.
- (c) Remove steering wheel pad (See page [SR-13](#)).
- (d) Disconnect connector of front passenger airbag assembly (See page [RS-21](#)).
- (e) Disconnect connector of airbag sensor assembly (See page [RS-33](#)).
- (f) Insert service wire into terminal Tc from back side as shown.
- (g) Connect airbag sensor assembly connector with service wire.
- (h) Connect negative (-) terminal cable to battery.
- (i) Turn ignition switch to ACC or ON and wait at least 20 seconds.
- (j) Connect service wire of terminal Tc to body ground.

## CHECK:

Check operation of SRS warning light.

## OK:

SRS warning light comes on.

## NOTICE:

Never make a mistake with the terminal connection position as this will cause a malfunction.

OK

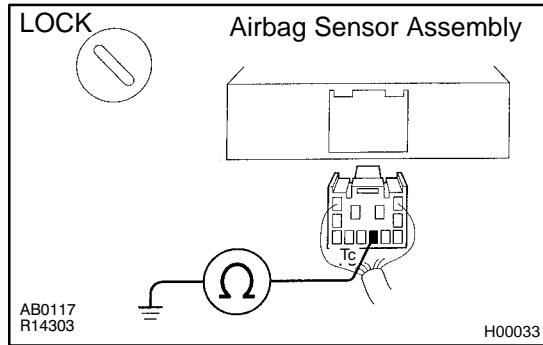
Check harness between airbag sensor assembly and DLC1.

NG

Replace airbag sensor assembly.

If the DTC is displayed without a DTC check procedure, do the following troubleshooting.

- |          |  |
|----------|--|
| <b>1</b> | <b>Check resistance between terminal Tc of airbag sensor assembly and body ground.</b> |
|----------|--|



**PREPARATION:**

- (a) Turn ignition switch to LOCK.
- (b) Disconnect negative (-) terminal cable from the battery, and wait at least 90 seconds.
- (c) Disconnect airbag sensor assembly connector.

**CHECK:**

Check resistance between terminal Tc of airbag sensor assembly connector and body ground.

**OK:**

**Resistance: 1MΩ or higher**

**NG**

**Repair or replace harness or connector.**

**OK**

**Replace airbag sensor assembly.**

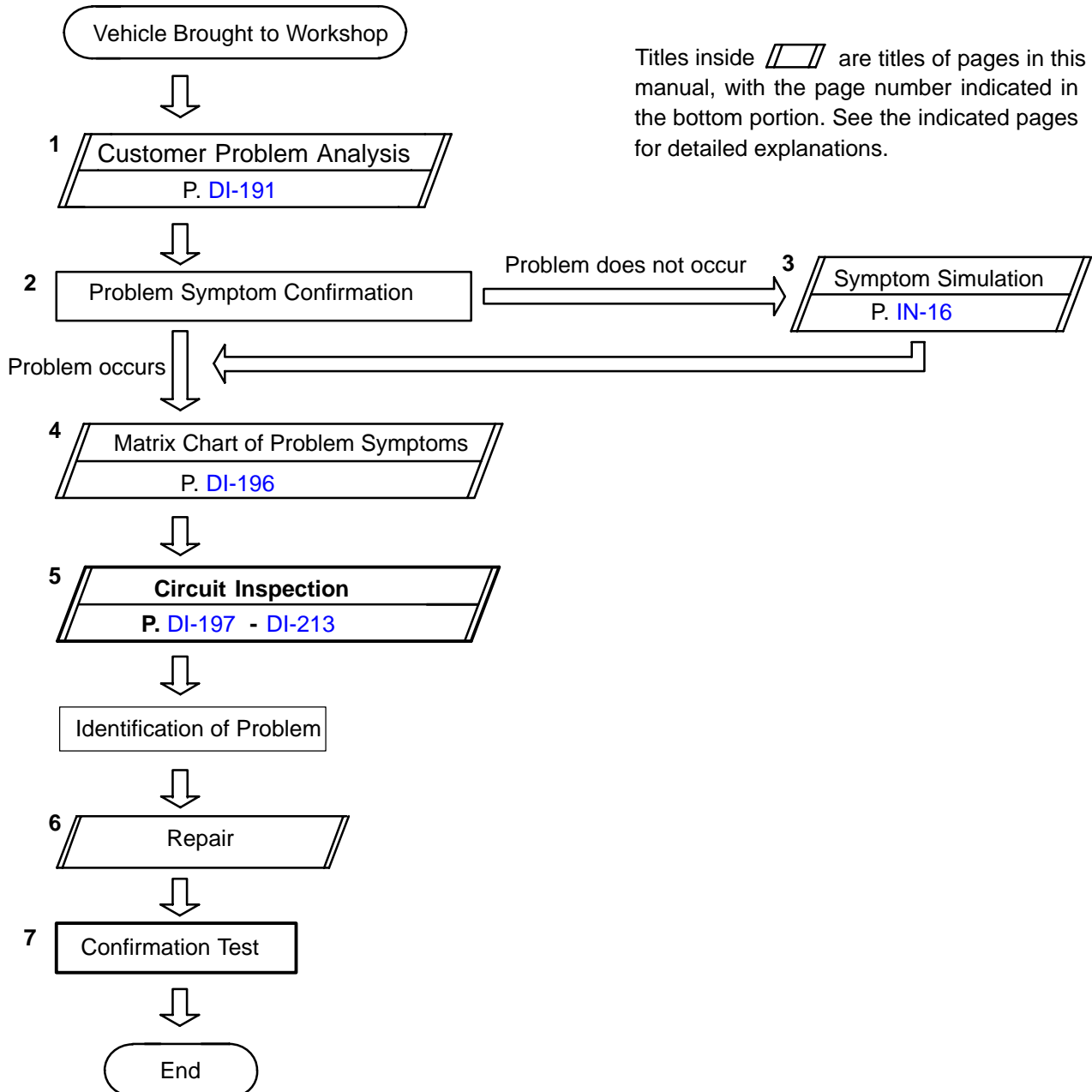


# POWER DOOR LOCK CONTROL SYSTEM

## HOW TO PROCEED WITH TROUBLESHOOTING

DI4MM-01

Perform troubleshooting in accordance with the procedure on the following page.



# CUSTOMER PROBLEM ANALYSIS CHECK

## DOOR LOCK CONTROL SYSTEM Check Sheet

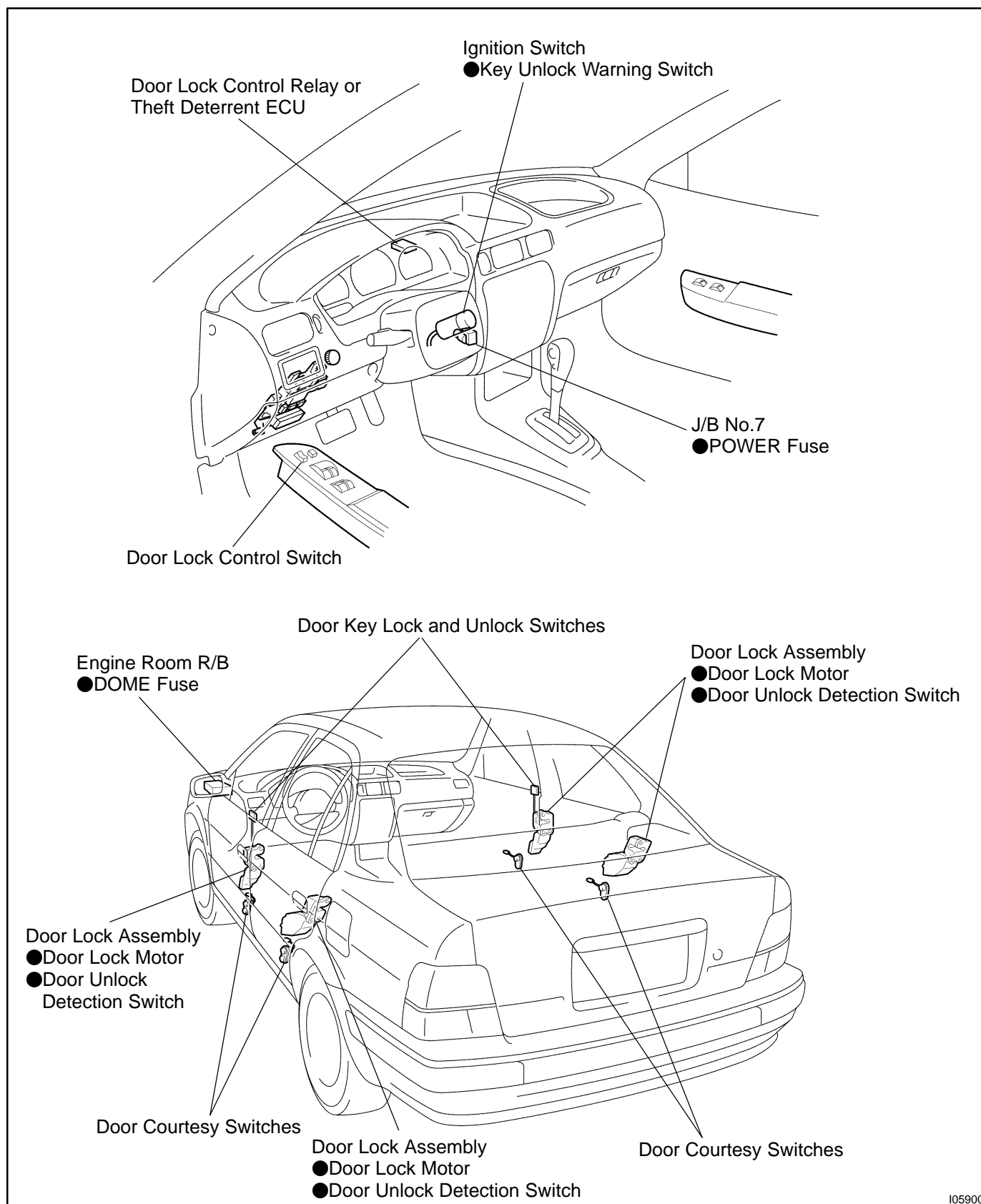
Inspector's name: \_\_\_\_\_

Customer's Name		Registration No.	
		Registration Year	
		Frame No.	
Date of Vehicle Brought in	/ /	Odometer Reading	km Mile

Date Problem First Occurred		/ /
Frequency Problem Occurs		<input type="radio"/> Constant <input type="radio"/> Sometimes (    Times per    day, month) <input type="radio"/> Once only
Weather Conditions When Problem Occurred	Weather	<input type="radio"/> Fine <input type="radio"/> Cloudy <input type="radio"/> Rainy <input type="radio"/> Snowy <input type="radio"/> Various/Others
	Outdoor temperature	<input type="radio"/> Hot <input type="radio"/> Warm <input type="radio"/> Cool <input type="radio"/> Cold (Approx.    °F (    °C))

Problem Symptom	<input type="radio"/> Malfunction in Door Lock/Unlock Operation Using Door Lock Control Switch.	<input type="radio"/> Driver's door lock control switch	<input type="radio"/> Driver's door <input type="radio"/> Passenger's door <input type="radio"/> Rear RH door <input type="radio"/> Rear LH door
		<input type="radio"/> Passenger's door lock control switch	<input type="radio"/> Driver's door <input type="radio"/> Passenger's door <input type="radio"/> Rear RH door <input type="radio"/> Rear LH door
	<input type="radio"/> Malfunction in Door Lock/Unlock Operation Using Key.	<input type="radio"/> Driver's door key lock and unlock switch	<input type="radio"/> Driver's door <input type="radio"/> Passenger's door <input type="radio"/> Rear RH door <input type="radio"/> Rear LH door
		<input type="radio"/> Passenger's door key lock and unlock switch	<input type="radio"/> Driver's door <input type="radio"/> Passenger's door <input type="radio"/> Rear RH door <input type="radio"/> Rear LH door
	<input type="radio"/> Malfunction in Key Confinement Prevention Function.		
	<input type="radio"/> Malfunction in Luggage Compartment Door Opener Function.		
	<input type="radio"/> Others.		

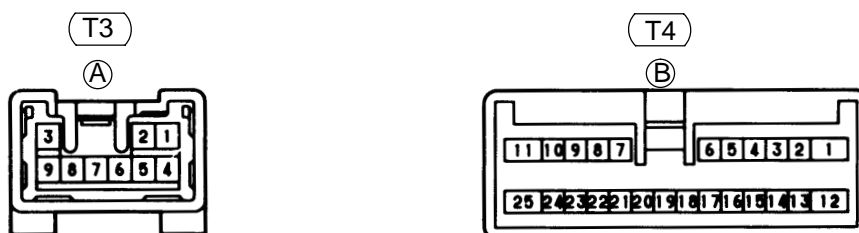
## PARTS LOCATION



105900

# TERMINALS OF ECM

## w/ Theft Deterrent System



**Theft Deterrent and Door Lock Control ECU**

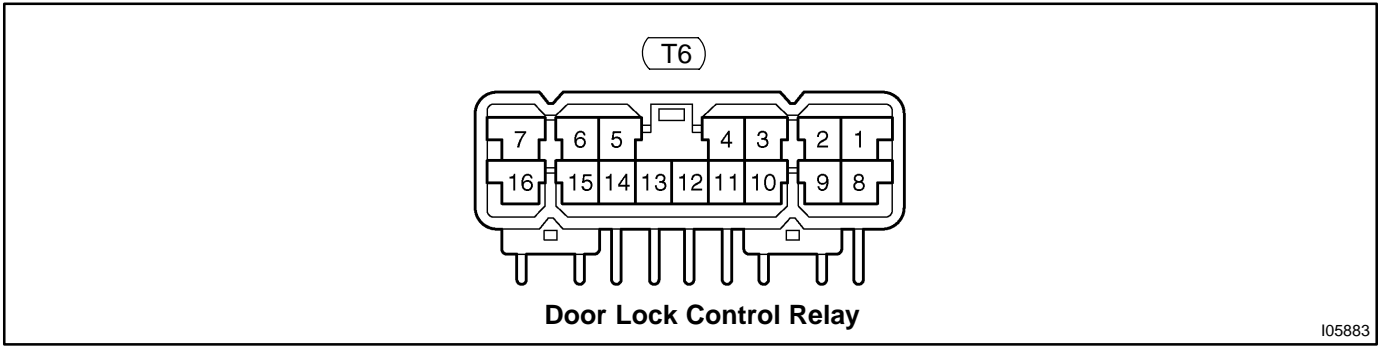
I00302 I00303

I00304

Terminals	Symbols	Condition	STD Value
A2 ↔ A3	ACT- - ACT+	Ignition switch "OFF".	Below 50 Ω
A4 ↔ Ground	E - Ground	Always.	Below 1 Ω
A4 ↔ A8	E - ACC	Ignition switch "ACC".	10 - 14 V
A9 ↔ Ground	+ B2 - Ground	Always.	10 - 14 V
B1 ↔ Ground	+ B1 - Ground	Always.	10 - 14 V
B2 ↔ A4	LSWR - E	Door unlock detection switch "ON". (Rear door)	Below 1 Ω
		Door unlock detection switch "OFF". (Rear door)	1 MΩ or higher
B3 ↔ A4	CTY - E	Door courtesy switch "ON". (Except driver's door opened)	Below 1 Ω
		Door courtesy switch "OFF". (Except driver's door closed)	1 MΩ or higher
B4 ↔ A4	DSWL - E	Luggage compartment door courtesy switch "ON".	Below 1 Ω
		Luggage compartment door courtesy switch "OFF".	1 MΩ or higher
B5 ↔ A4	L1 - E	Door lock control switch "LOCK".	Below 1 Ω
		Door lock control switch "OFF" or "UNLOCK".	1 MΩ or higher
B6 ↔ A4	UL3 - E	Driver's door key lock and unlock switch "UNLOCK".	Below 1 Ω
		Driver's door key lock and unlock switch "OFF" or "LOCK".	1 MΩ or higher
B7 ↔ A4	DSWD - E	Door courtesy switch "ON". (Driver's door opened)	Below 1 Ω
		Door courtesy switch "OFF". (Driver's door closed)	1 MΩ or higher
B8 ↔ A4	UL1 - E	Door lock control switch "UNLOCK".	Below 1 Ω
		Door lock control switch "OFF" or "LOCK".	1 MΩ or higher
B9 ↔ A4	LUG - E	Luggage compartment door key lock and unlock switch "ON".	Below 1 Ω
		Luggage compartment door key lock and unlock switch "OFF".	1 MΩ or higher
B10 ↔ A4	HEAD - E	Light control switch other than "HEAD".	10 - 14 V
B11 ↔ A4	SH - E	Always.	10 - 14 V
B12 ↔ B1	IND - +B1	Indicator light "ON".	Below 1 Ω

Terminals	Symbols	Condition	STD Value
B14 ↔ A4	DSWH - E	Engine hood courtesy switch "ON".	Below 1 Ω
		Engine hood courtesy switch "OFF".	1 MΩ or higher
B15 ↔ A4	LSWD - E	Door unlock detection switch "ON". (Driver's)	Below 1 Ω
		Door unlock detection switch "OFF". (Driver's)	1 MΩ or higher
B16 ↔ A4	UL2 - E	Door key lock and unlock switch "UNLOCK". (Passenger's)	Below 1 Ω
		Door key lock and unlock switch "OFF" or "LOCK". (Passenger's)	1 MΩ or higher
B19 ↔ A4	DSWP - E	Door courtesy switch "ON". (Passenger's)	Below 1 Ω
		Door courtesy switch "OFF". (Passenger's)	1 MΩ or higher
B20 ↔ A4	KSW - E	Key unlock warning switch "ON". (Key is inserted into key cylinder)	Below 1 Ω
		Key unlock warning switch "OFF".	1 MΩ or higher
B21 ↔ A4	LSWP - E	Door unlock detection switch "ON". (Passenger's)	Below 1 Ω
		Door unlock detection switch "OFF". (Passenger's)	1 MΩ or higher
B22 ↔ A4	L2 - E	Door key lock and unlock switch "LOCK". (Driver's)	Below 1 Ω
		Door key lock and unlock switch "OFF" or "UNLOCK". (Driver's)	1 MΩ or higher
B23 ↔ A4	TAIL - E	Light control switch "OFF".	10 - 14 V
B24 ↔ A4	HORN - E	Horn switch "OFF".	10 - 14 V
B25 ↔ A4	SRLY - E	Ignition switch is turned to "ST". (when park / neutral position switch "P" position)	10 - 14 V

# w/o Theft Deterrent System



Terminals	Symbols	Condition	STD Value
3 ↔ 4	ACT(-) - ACT(+)	Ignition switch "OFF".	Below 50 Ω
8 ↔ Ground	B - Ground	Always.	10 - 14 V
9 ↔ 16	UL3 - E	Door key lock and unlock switch "UNLOCK". (Driver's)	Below 1 Ω
		Door key lock and unlock switch "OFF" or "LOCK". (Driver's)	1 MΩ or higher
10 ↔ 16	L1 - E	Door lock control switch "LOCK" and door key lock and unlock switch "LOCK" .	Below 1 Ω
		Door lock control switch "OFF" or "UNLOCK" and door key lock and unlock switch "OFF" or "UNLOCK".	1 MΩ or higher
11 ↔ 16	UL1 - E	Door lock control switch "UNLOCK" .	Below 1 Ω
		Door lock control switch "OFF" or "LOCK".	1 MΩ or higher
16 ↔ Ground	E - Ground	Always.	Below 1 Ω

## PROBLEM SYMPTOMS TABLE

Perform troubleshooting of the circuits for the applicable problem symptom in the order given in the chart below.

Proceed to the page given for each circuit.

HINT:

- If the instruction "Proceed to next circuit inspection shown on matrix chart" is given in the flow chart for each circuit, proceed to the circuit with the next highest number in the table to continue the check.
- If the trouble still reappears even though there are no abnormalities in any of the other circuits, then check and replace the Theft Deterrent and Door Lock Control ECU (Door Lock Control Relay) as the last step.

Symptom	Suspect Area	See page
No functions of the door lock control system operate.	1. ECU power source circuit.* 2. Actuator power source circuits. 3. Door lock motor circuit. 4. Theft deterrent ECU or door lock control relay.	<a href="#">DI-197</a> <a href="#">DI-200</a> <a href="#">DI-203</a> <a href="#">IN-26</a>
All doors or some doors are not locked and unlocked with the door lock control switch and door key lock and unlock switch.	1. Door lock motor circuit. 2. Theft deterrent ECU or door lock control relay.	<a href="#">DI-203</a> <a href="#">IN-26</a>
Doors cannot be locked or unlocked with the door lock control switch. (Doors lock and unlock normally with the door key lock and unlock switch).	1. Door lock control switch circuit. 2. Theft deterrent ECU or door lock control relay.	<a href="#">DI-206</a> <a href="#">IN-26</a>
Doors are not locked or unlocked with the key operated switch. (Doors lock and unlock normally with the door lock control switch.)	1. Door key lock and unlock switch circuit. 2. Theft deterrent ECU or door lock control relay.	<a href="#">DI-209</a> <a href="#">IN-26</a>
Key confinement prevention function does not operate.	1. Key unlock warning switch circuit. 2. Door unlock detection switch circuit. 3. Theft deterrent ECU or door lock control relay.	<a href="#">DI-211</a> <a href="#">DI-213</a> <a href="#">IN-26</a>

\*: w/ Theft Deterrent System

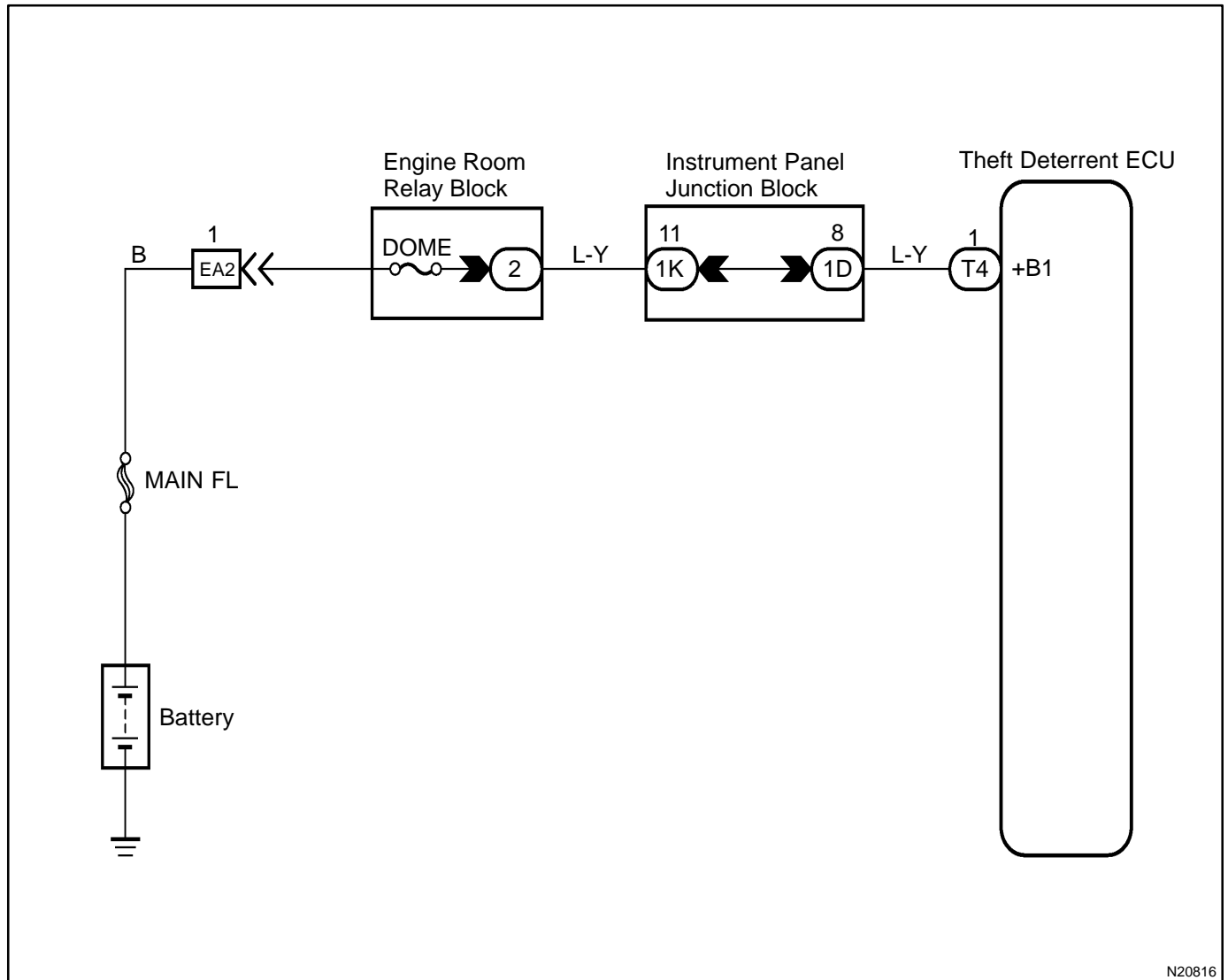
## CIRCUIT INSPECTION

### ECU Power Source Circuit (w / Theft deterrent System)

## CIRCUIT DESCRIPTION

This circuit provides power to operate the theft deterrent and door lock ECU.

## WIRING DIAGRAM

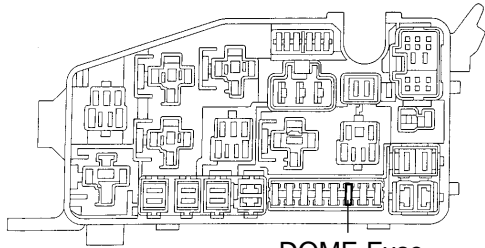




## INSPECTION PROCEDURE

## 1 Check DOME fuse.

## ●Engine Room Relay Block



DOME Fuse

N12865

**PREPARATION:**

Remove DOME fuse from engine room relay block.

**CHECK:**

Check continuity of DOME fuse.

**OK:**

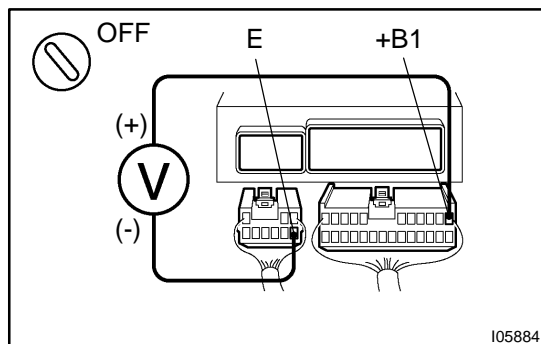
Continuity

NG

Check for short in all the harness and components connected to the DOME fuse  
(See attached wiring diagram).

OK

## 2 Check voltage between terminals +B1 and E of ECU connector.

**PREPARATION:**

Disconnect the theft deterrent and door lock ECU connectors.

**CHECK:**

Measure voltage between terminals +B1 and E of ECU connector.

**OK:**

Voltage: 10 - 14 V

OK

Proceed to next circuit inspection shown on  
matrix chart (See page [DI-196](#)).

NG

3	Check for open in harness and connector between ECU and body ground (See page <a href="#">IN-26</a> ).
---	---

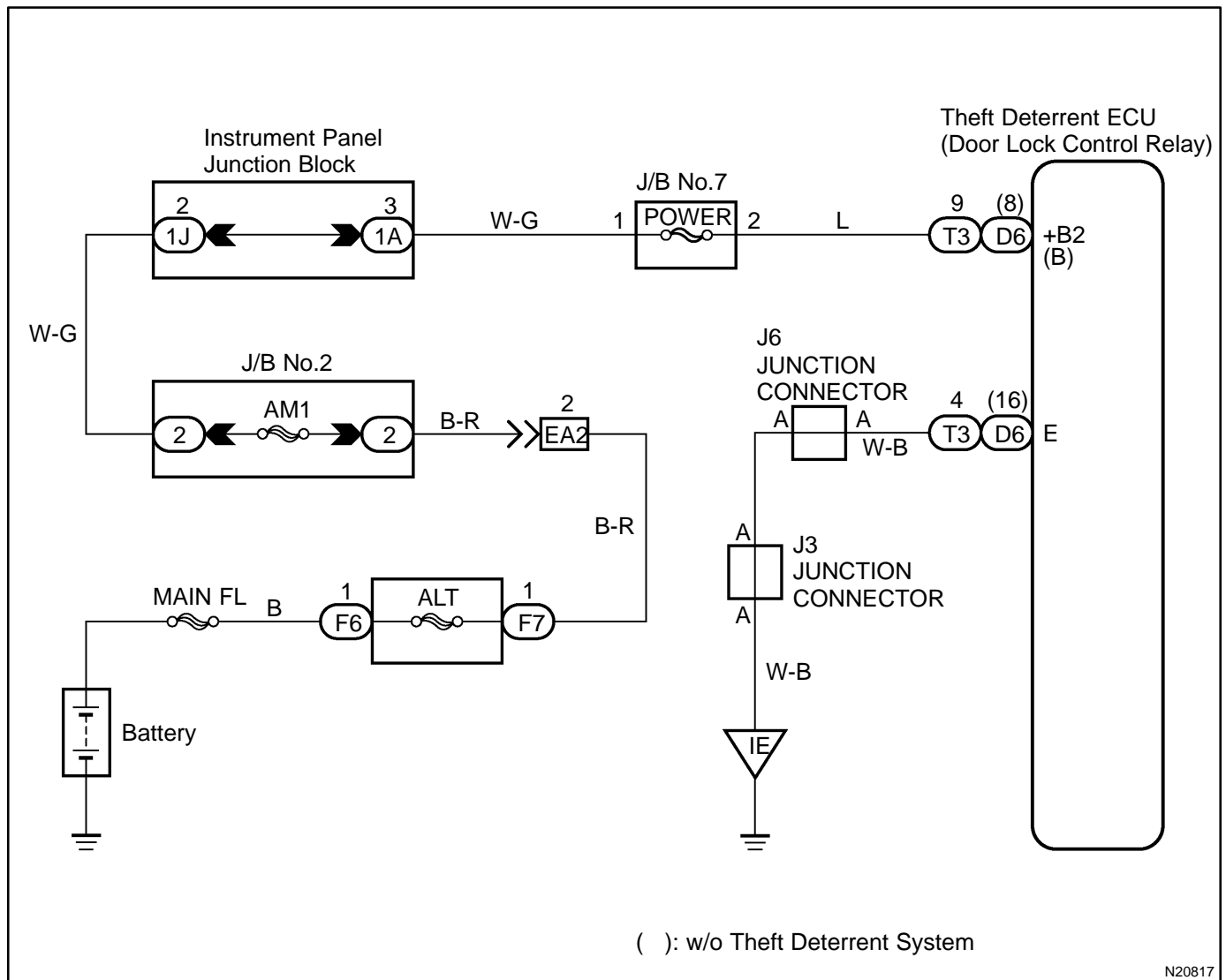
**NG****Repair or replace harness or connector.****OK****Check and repair harness connector between ECU and battery.**

## Actuator Power Source Circuit

### CIRCUIT DESCRIPTION

This circuit provides power to drive the door lock motor.

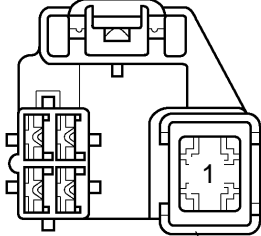
### WIRING DIAGRAM



N20817

**INSPECTION PROCEDURE****1 Check POWER M-fuse.**

○Relay Block No.7



POWER M-Fuse

N13109

**PREPARATION:**

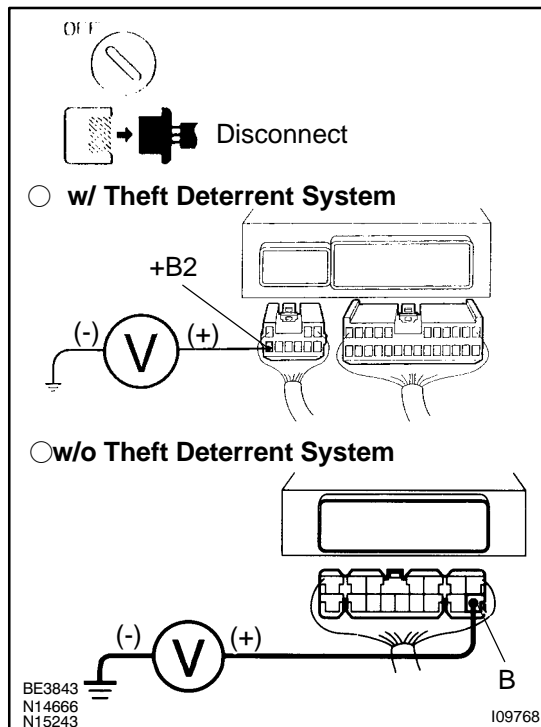
- (a) Remove the finish low center panel.
- (b) Remove the POWER M-fuse from R/B No.7.

**CHECK:**

Check continuity of POWER M-fuse.

**OK:****Continuity****NG****Check for short in all the harness and components connected to the POWER M-fuse (See attached wiring diagram). \*1****OK**

## 2 Check voltage between terminal +B2 (B) of ECU connector and body ground.



### PREPARATION:

Disconnect the theft deterrent and door lock ECU connector.

### CHECK:

Measure voltage between terminal +B2 (B) of ECU connector and body ground.

### OK:

**Voltage: 10 - 14 V**

OK

Proceed to next circuit inspection shown on matrix chart (See page [DI-196](#) ).

NG

Check and repair harness and connectors between ECU and battery (See page [DI-196](#) ).

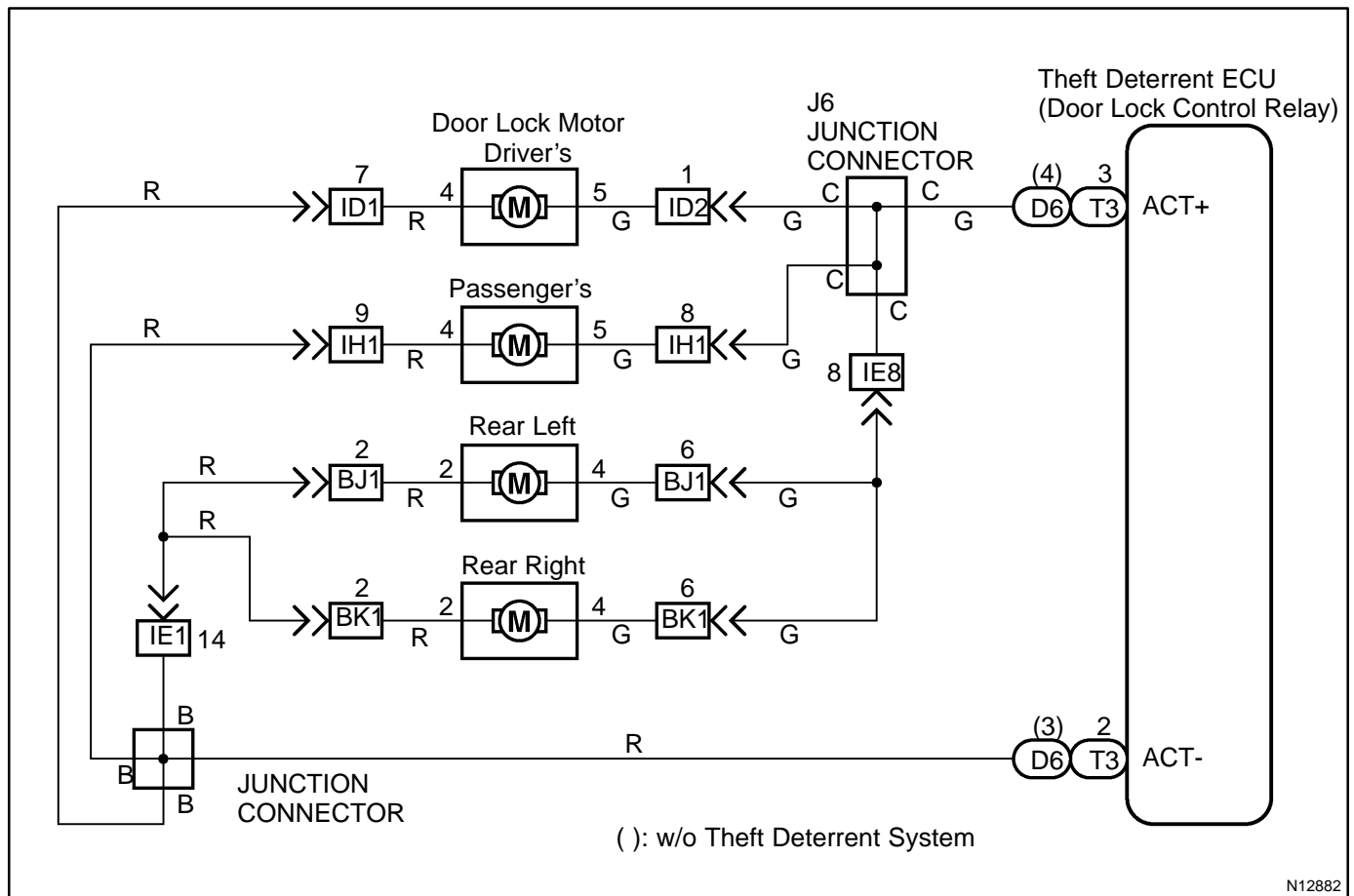
\*1: The power source is supplied to the actuator (door lock motor) through the theft deterrent and door lock ECU. If a short circuit of the W/H or actuator occurs in the actuator circuit, the POWER M-fuse may become OPEN, so also inspect the actuator (door lock motor circuit on page [DI-203](#) ).

## Door Lock Motor Circuit

## CIRCUIT DESCRIPTION

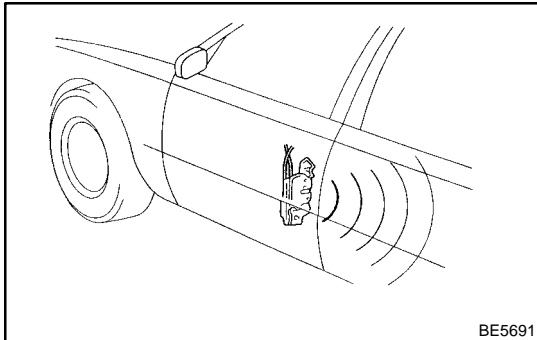
This door lock motor locks and unlocks the door in accordance with signals from the ECU.

## WIRING DIAGRAM



## INSPECTION PROCEDURE

## 1 Check operating sound of door lock motor.

**CHECK:**

Check operating sound of door lock motor, when door lock control switch is pushed to the lock side and unlock side.

**OK:**

Can hear operating sound of door lock motor.

**HINT:**

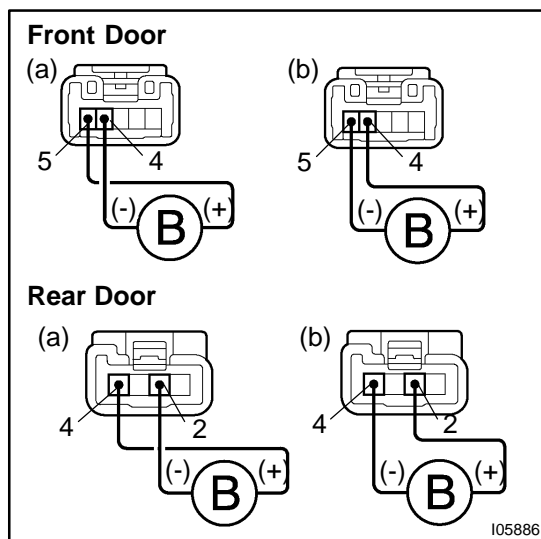
Inspect the door which is malfunctioning.

OK

Repair or replace door lock control link.

NG

## 2 Check door lock motor.

**PREPARATION:**

- (a) Remove the door trim and service hold cover.
- (b) Disconnect the door lock motor connector.

**CHECK:**

- (a) Connect positive · lead to terminal 5 (4) and negative  $\ominus$  lead to terminal 4 (2) of door lock motor connector.
- (b) Connect positive · lead to terminal 4 (2) and negative  $\ominus$  lead to terminal 5 (4) of door lock motor connector.

( ): Rear Door

**OK:**

(1) Door lock motor locks door.

(2) Door lock motor unlocks door.

**HINT:**

This inspection must be carried out within 2 seconds.

OK

Replace door lock motor.

NG

3	Check harness and connectors between ECU and door lock motor (See page <a href="#">IN-26</a> ).
---	--

NG

Repair or replace harness or connector.

OK

Proceed to next circuit inspection shown on  
matrix chart (See page [DI-196](#) ).

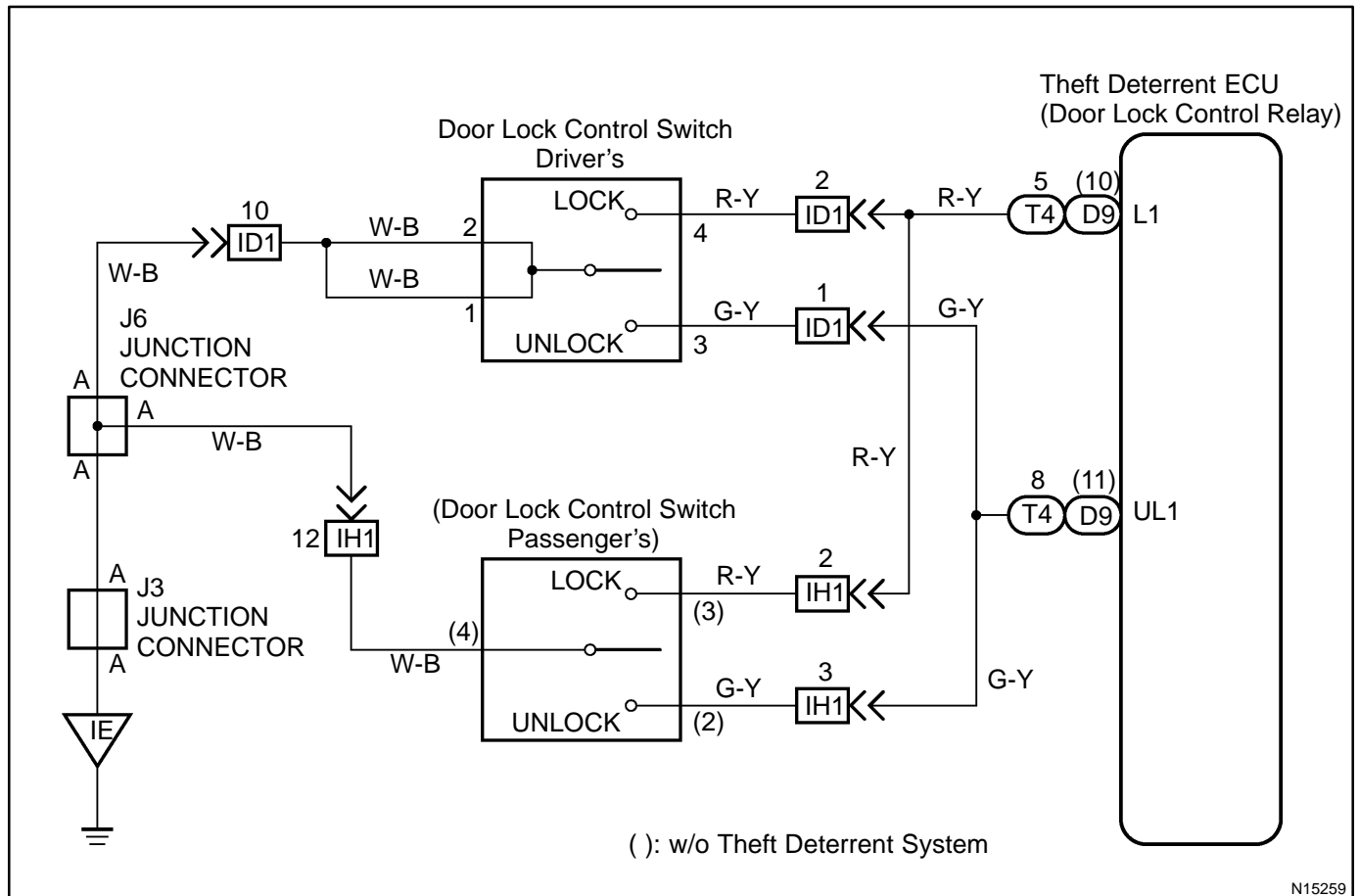


## Door Lock Control Switch Circuit

### CIRCUIT DESCRIPTION

When the door lock control switch is pushed to the lock side, Lock terminal of the switch is grounded, and when the switch is pushed to the unlock side, Unlock terminal is grounded (See wiring diagram below).

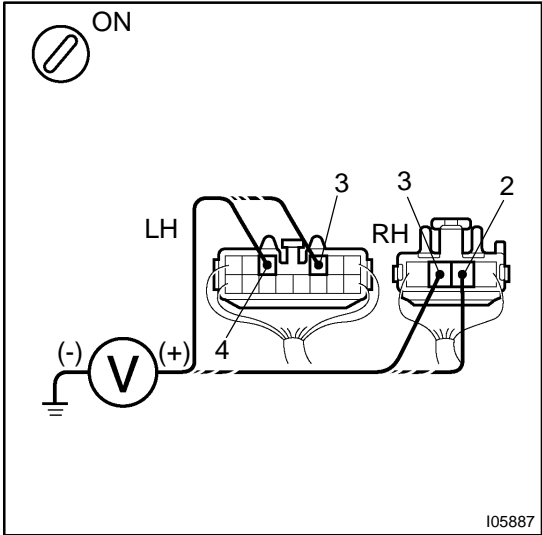
### WIRING DIAGRAM



N15259

# INSPECTION PROCEDURE

1	Check voltage between terminals 2(3), 1(1) of door lock control switch connector and body ground.
---	---



## PREPARATION:

Remove the door trim and service hold cover.

## CHECK:

- Turn ignition switch ON.
- Measure voltage between terminals 3(2), 4(3) of door lock control switch connector and body ground, when door lock control switch is pressed to the lock side, unlock side and not pressed.

## OK:

Switch position	Terminal	
	3(2)	4(3)
Lock side	Below 1 V	8 - 10 V
Unlock side	8 - 10 V	Below 1 V
OFF	8 - 10 V	8 - 10 V

## HINT:

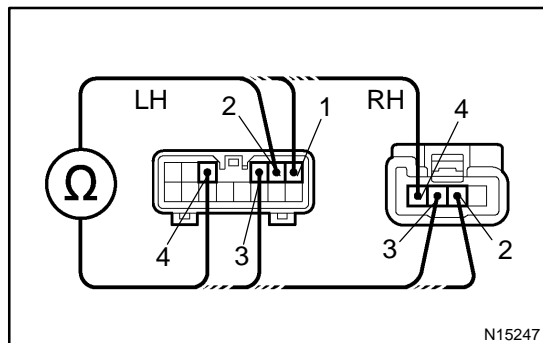
The terminal number without brackets is for the LH, the number with brackets is for the RH.

OK

Proceed to next circuit inspection shown on matrix chart (See page [DI-196](#) ).

NG

## 2 Check door lock control switch.



### PREPARATION:

Disconnect the door lock control switch connector.

### CHECK:

Check continuity between terminals 4 (3), 3 (2), 1, 2 (4) of door lock control switch connector, when door lock control switch is pressed to the lock side, and unlock side and not pressed.

### OK:

Switch position	Terminal
Lock side	4 (3) - 1, 2 (4)
Unlock side	3 (2) - 1, 2 (4)
OFF	-

### HINT:

The terminal number without brackets is for the LH, the number with brackets is for the RH.

NG

Replace door lock control switch.

OK

## 3 Check harness and connectors between ECU and door lock control switch, switch and body ground (See page IN-26 ).

NG

Repair or replace harness or connector.

OK

Check and replace ECU. \*1

\*1: Malfunction of the ECU can be considered possible only when the problem symptom is the following:

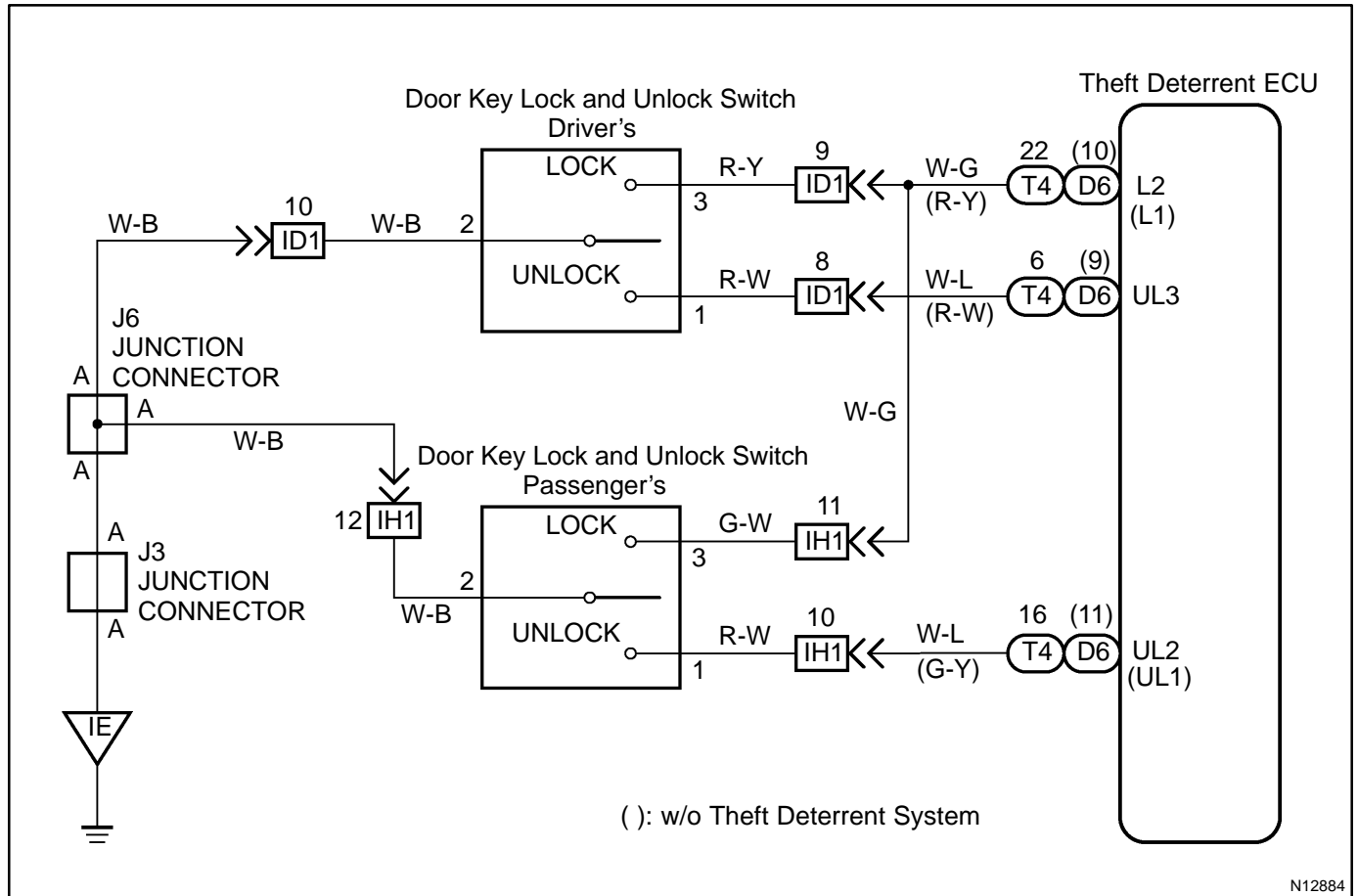
- Lock and/or unlock using the Door Lock Control Switch cannot be done, neither on the driver's side nor on the passenger's side.

## Door Key Lock and Unlock Switch Circuit

### CIRCUIT DESCRIPTION

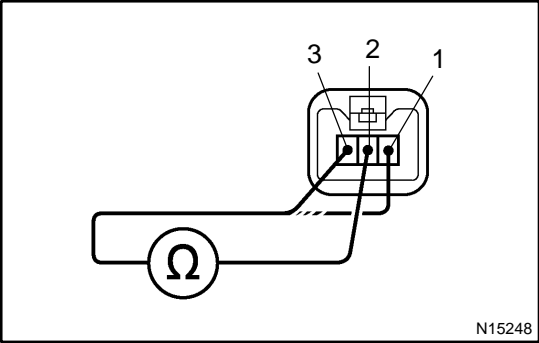
The door key lock and unlock switch is built in the door key cylinder. When the key is turned to the lock side, terminal 3 of the switch is grounded and when the key is turned to the unlock side, terminal 1 of the switch is grounded.

### WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check door key lock and unlock switch.
---	--



PREPARATION:

- (a) Remove the door trim and service hole cover.
- (b) Disconnect the door key lock and unlock switch connector.

CHECK:

Check continuity between terminals 1, 3 and 2 or door key lock and unlock switch connector, when door key lock and unlock switch is turned to the lock side, unlock side and not turned.

OK:

Switch position	Tester connection	Specified condition
Lock side	2 - 3	Continuity
Unlock side	1 - 2	Continuity
OFF	-	No continuity

NG	Replace door key lock and unlock switch.
----	--

OK

2	Check harness and connectors between ECU and switch, switch and body ground (See page IN-26 ).
---	--

NG	Repair or replace harness or connector.
----	---

OK

Proceed to next circuit inspection shown on matrix chart (See page DI-196 ).

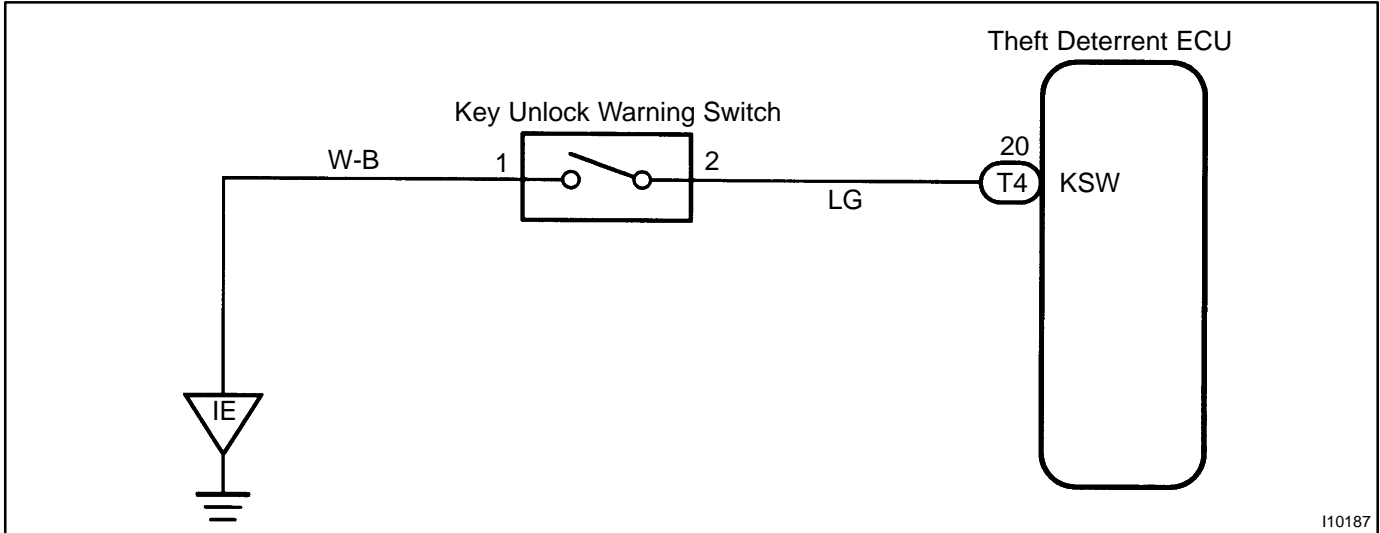
# Key Unlock Warning Switch Circuit

## CIRCUIT DESCRIPTION

The key unlock warning switch goes on when the ignition key is inserted in the key cylinder and goes off when the ignition key is removed.

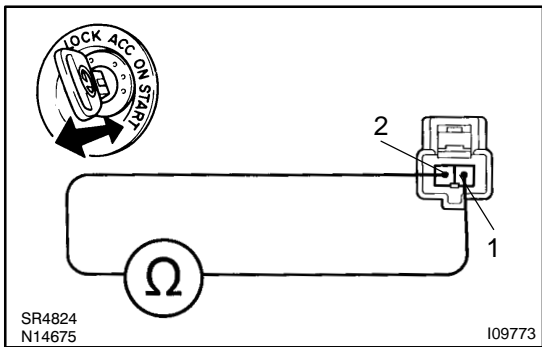
The ECU operates the key confinement prevention function while the key unlock warning switch is on.

## WIRING DIAGRAM



## INSPECTION PROCEDURE

- 1 Check key unlock warning switch.



### PREPARATION:

Disconnect key unlock warning switch connector.

### CHECK:

Check continuity between terminals 1 and 2 of key unlock warning switch connector, when the key is inserted to the key cylinder or removed.

### OK:

Switch position	Tester connection	Specified condition
ON (Key inserted)	1 - 2	Continuity
OFF (Key removed)	-	No continuity

NG

Replace key unlock warning switch.

OK

**2****Check harness and connectors between ECU and key unlock warning switch, key unlock warning switch and body ground (See page [IN-26](#) ).****NG****Repair or replace harness or connector.****OK****Proceed to next circuit inspection shown on matrix chart (See page [DI-196](#) ).**

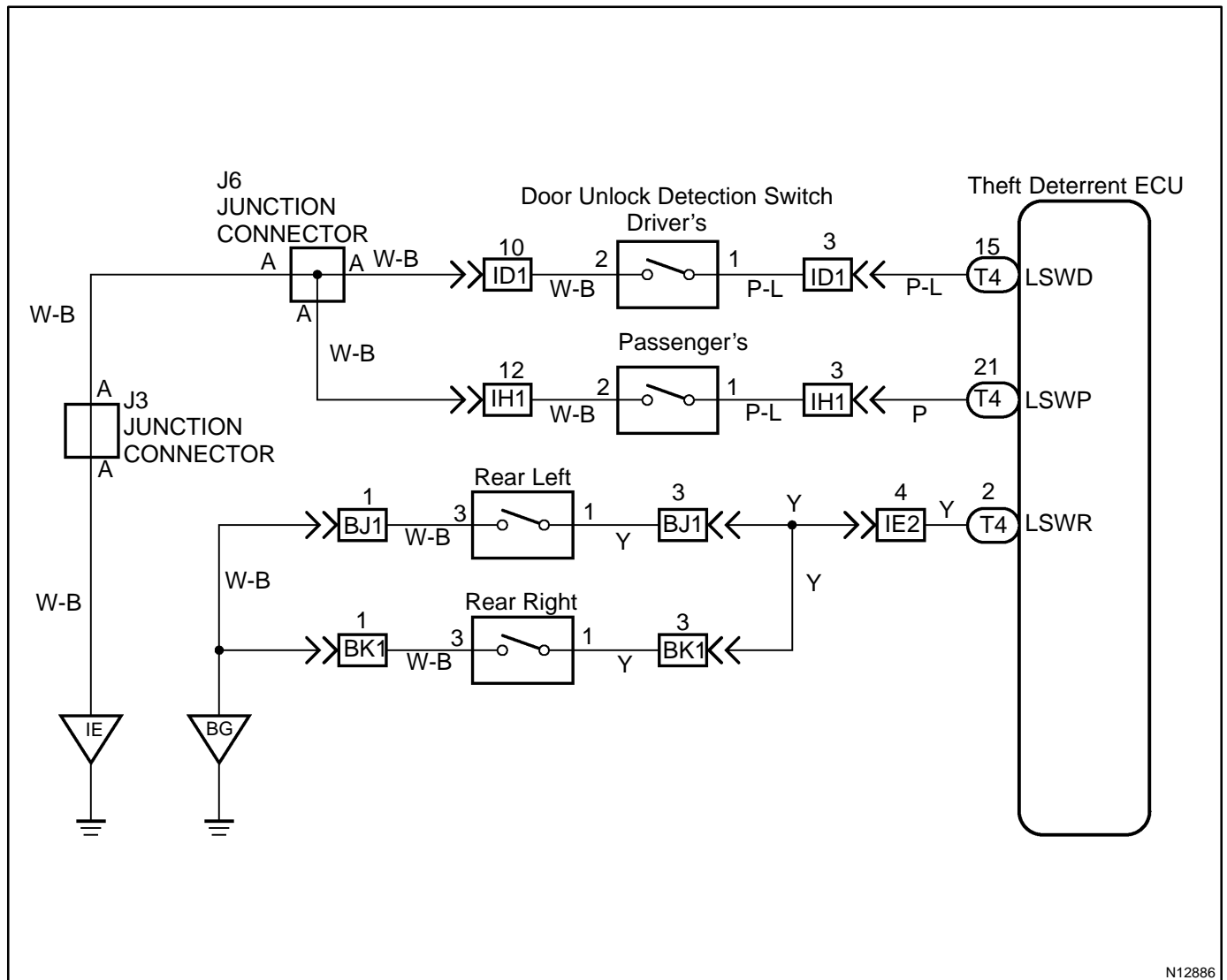
## Door Unlock Detection Switch Circuit

### CIRCUIT DESCRIPTION

The door unlock detection switch is built in the door lock motor assembly. This switch is on when the door lock knob is in the unlock position and off when the lock knob is in the lock position.

The ECU detects the front door lock knob conditions in this circuit. It is used as one of the operating conditions for the key confinement prevention function.

### WIRING DIAGRAM



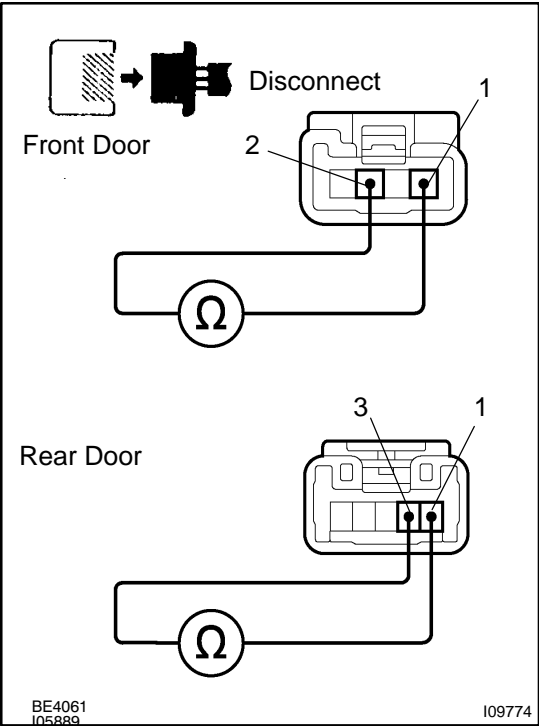
N12886



INSPECTION PROCEDURE

1

Check door unlock detection switch.



**PREPARATION:**

- (a) Remove the door trim and service hole cover.
- (b) Disconnect door unlock detection switch connector.

**CHECK:**

Check continuity between terminals 1 and 2 (3) of door unlock detection switch connector, when the door lock knob is operated to the lock side and unlock side.

**OK:**

Switch Condition	Tester connection	Specified condition
Door unlock	1 - 2 (3)	Continuity
Door lock	-	No continuity

( ): Rear Door

OK

NG

Replace door unlock detection switch.

2

Check harness and connectors between door lock control ECU and door unlock detection switch, door unlock detection switch and body ground  
(See page [IN-26](#) ).

OK

NG

Repair or replace harness or connector.

Proceed to next circuit inspection shown on matrix chart (See page [DI-196](#) ).

# THEFT DETERRENT SYSTEM

## HOW TO PROCEED WITH TROUBLESHOOTING

DI4MY-01

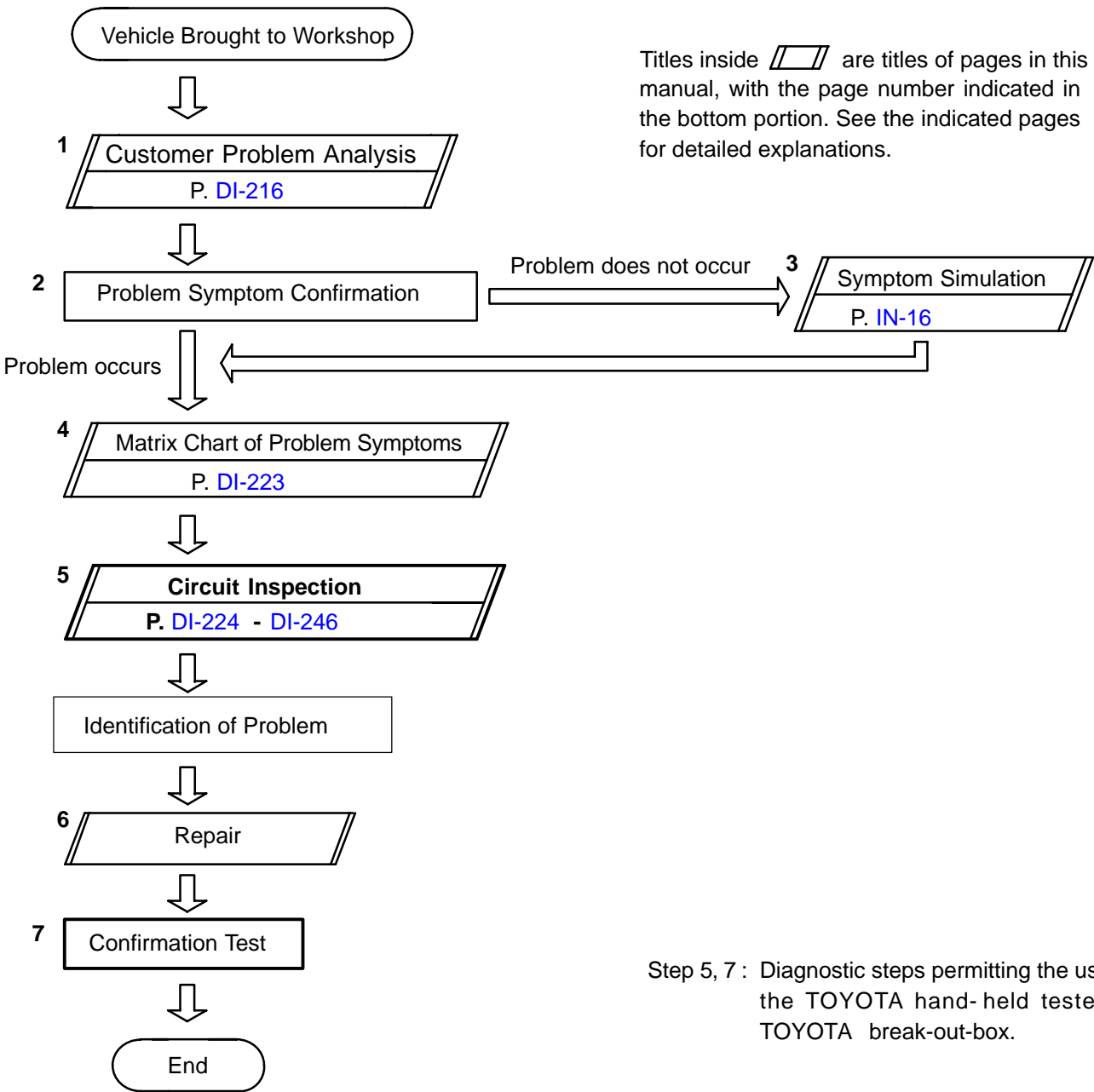
### HINT:

Troubleshooting of the theft deterrent system is based on the premise that the door lock control system is operating normally. Accordingly, before troubleshooting the theft deterrent system, first make certain that the door lock control system is operating normally.

For troubleshooting using a volt/ohm meter, see pages [DI-215](#) .

Be sure to use troubleshooting procedure appropriate to the diagnostic tool being used.

Perform troubleshooting in accordance with the procedure on the following page.



# CUSTOMER PROBLEM ANALYSIS CHECK

**THEFT DETERRENT SYSTEM Check Sheet**

Inspector's name: \_\_\_\_\_

Customer's Name		Registration No.	
		Registration Year	
		Frame No.	
Date of Vehicle Brought in	/ /	Odometer Reading	km Mile

Date Problem First Occurred	/ /		
Frequency Problem Occurs	<input type="radio"/> Constant <input type="radio"/> Sometimes (    Times per    day, month) <input type="radio"/> Once only		
Weather Conditions When Problem Occurred	Weather	<input type="radio"/> Fine <input type="radio"/> Cloudy <input type="radio"/> Rainy <input type="radio"/> Snowy <input type="radio"/> Various/Others	
	Outdoor temperature	<input type="radio"/> Hot <input type="radio"/> Warm <input type="radio"/> Cool <input type="radio"/> Cold (Approx.    °F (    °C))	

Problem Symptom	<input type="radio"/> Theft deterrent system cannot be set.		
	<input type="radio"/> Indicator light does not flash when the theft deterrent system is set. (It stays on or does not light at all.)		
	<input type="radio"/> Theft deterrent system does not operate.	<input type="radio"/> When unlocked using the door lock knob. <input type="radio"/> When the engine hood is opened.	<u>Malfunction</u> <input type="radio"/> Horns only <input type="radio"/> Theft deterrent horn only <input type="radio"/> Headlights only <input type="radio"/> Taillights only <input type="radio"/> Starter cut only <input type="radio"/> Door lock operation only
	<input type="radio"/> System cannot be canceled once set.	<input type="radio"/> When door is unlocked using key or wireless door lock control system. <input type="radio"/> When the key is inserted in the ignition key cylinder and turned to ACC or ON position. (However, only when the system has never operated) <input type="radio"/> When the luggage compartment door is opened with the key.	
	<input type="radio"/> System cannot be canceled during warning operation.	<input type="radio"/> When door is unlocked using key or wireless door lock control system. <input type="radio"/> When the key is inserted in the ignition key cylinder and turned to ACC or ON position.	
	<input type="radio"/> Warning operation starts when the system is set and the door or luggage compartment door is opened with the key.		
<input type="radio"/> Others.			

## PRE-CHECK

### 1. SETTING OF THE THEFT DETERRENT SYSTEM

#### Setting Conditions

- (a) Close all the doors.
- (b) Close the engine hood and luggage compartment door.
- (c) Remove the ignition key from the ignition key cylinder.

#### Setting Operation

When any of the following operations (a), (b) or (c) is performed, the theft deterrent indicator light will light up as described.

- (1) Lock the left or right front door using the key  
(All doors are locked by key-interlinked lock operation).
- (2) Lock all the doors using the wireless door lock control system.
- (3) With the rear doors locked and with one of the front doors locked, lock the other front door without using the key (keyless door lock).

Elapsed time after operation	Indicator light
Within about 30 seconds	Light up
After about 30 seconds	Blinks *1

\*1: 1 sec. or, 1 sec. off

#### HINT:

When the theft deterrent system is set, doors cannot be locked or unlocked with the door lock control switch and the luggage compartment door cannot be unlocked with the luggage compartment door opener switch.

### 2. CANCELING OF THE THEFT DETERRENT SYSTEM IN THE SET CONDITION

Check if the theft deterrent indicator light is blinking.

#### Canceling Operation

When any of the following operations (a), (b), (c) or (d) is performed, the theft deterrent system is canceled and indicator light will go off.

#### Condition

- (1) Unlock the left or right front door using the key.
- (2) Unlock all the doors using the wireless door lock control system.
- (3) Insert the ignition key in the ignition key cylinder and turn it to the ACC or ON position  
(This is operative only when the theft deterrent system has never operated).
- (4) Unlock the luggage compartment door with the key. \*1

\*1: The theft deterrent system is temporarily canceled only while the luggage compartment door is open. Approximately 2 seconds after the luggage compartment door is closed, the theft deterrent system is reset.

### 3. CHECK OF THE THEFT DETERRENT SYSTEM OPERATION

Check if the theft deterrent indicator light is blinking.

When any of the following operations (a) or (b) is performed, the system sounds the horns and theft deterrent horn and flashes the headlights and taillights for about one minute to alert. At the same time, the system disconnects the starter motor circuit and locks all doors (if all doors are not locked, the system repeats door locking operation every 2 seconds during the one minute alert time).

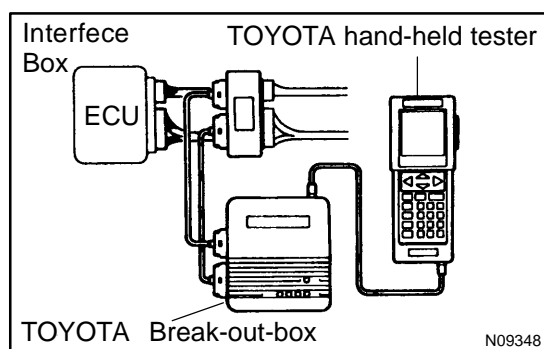
- (1) Open the engine hood using the engine hood opener lever.
- (2) Unlock any of the front or rear doors without key operation.

#### 4. CANCELLING OF THE THEFT DETERRENT SYSTEM IN OPERATING CONDITION

The theft deterrent operation can be canceled when any of the following conditions is met:

No.	Condition	Canceling Operation
1	Unlock left or right door with the key.	●
2	Unlock doors with wireless door lock control system.	●
3	Insert key into ignition key cylinder and turn it to ACC or ON position.	●
4	About 1 minute passes after theft deterrent operation begins.	Automatic stop *1

\*1: In this case the theft deterrent system resets after about 2 seconds if all doors are closed.



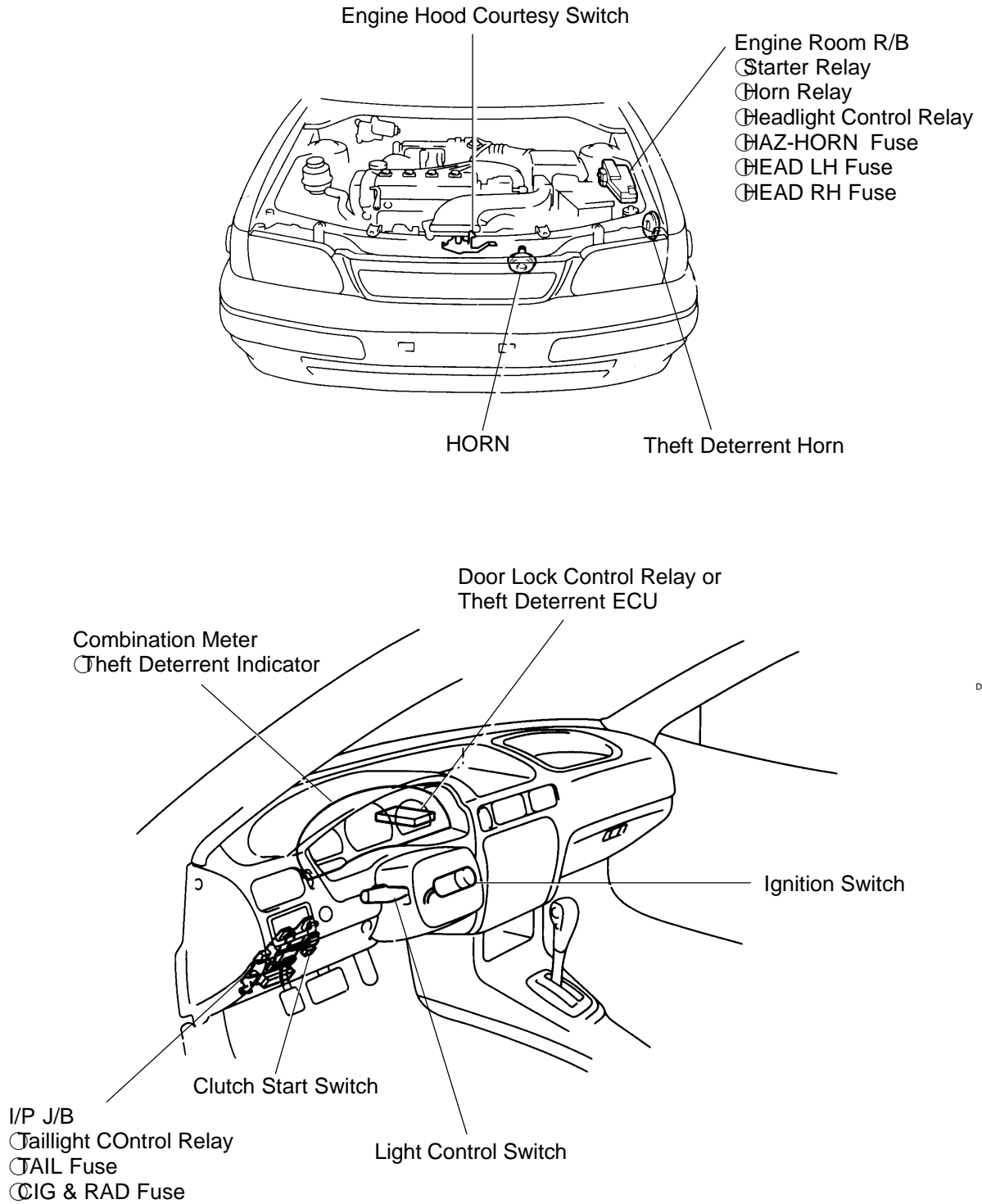
#### 5. ECU TERMINAL VOLTAGE MEASUREMENT BY USING TOYOTA BREAK-OUT-BOX AND TOYOTA HAND-HELD TESTER

- Hook up the TOYOTA break-out-box and TOYOTA hand-held tester to the vehicle.
- Read the ECU input/output values by following the prompts on the tester screen. Please refer to the TOYOTA break-out-box operator's manual.

##### HINT:

TOYOTA hand-held tester has a "Snapshot" function. This records the measured data and is effective in the diagnosis of intermittent problems.

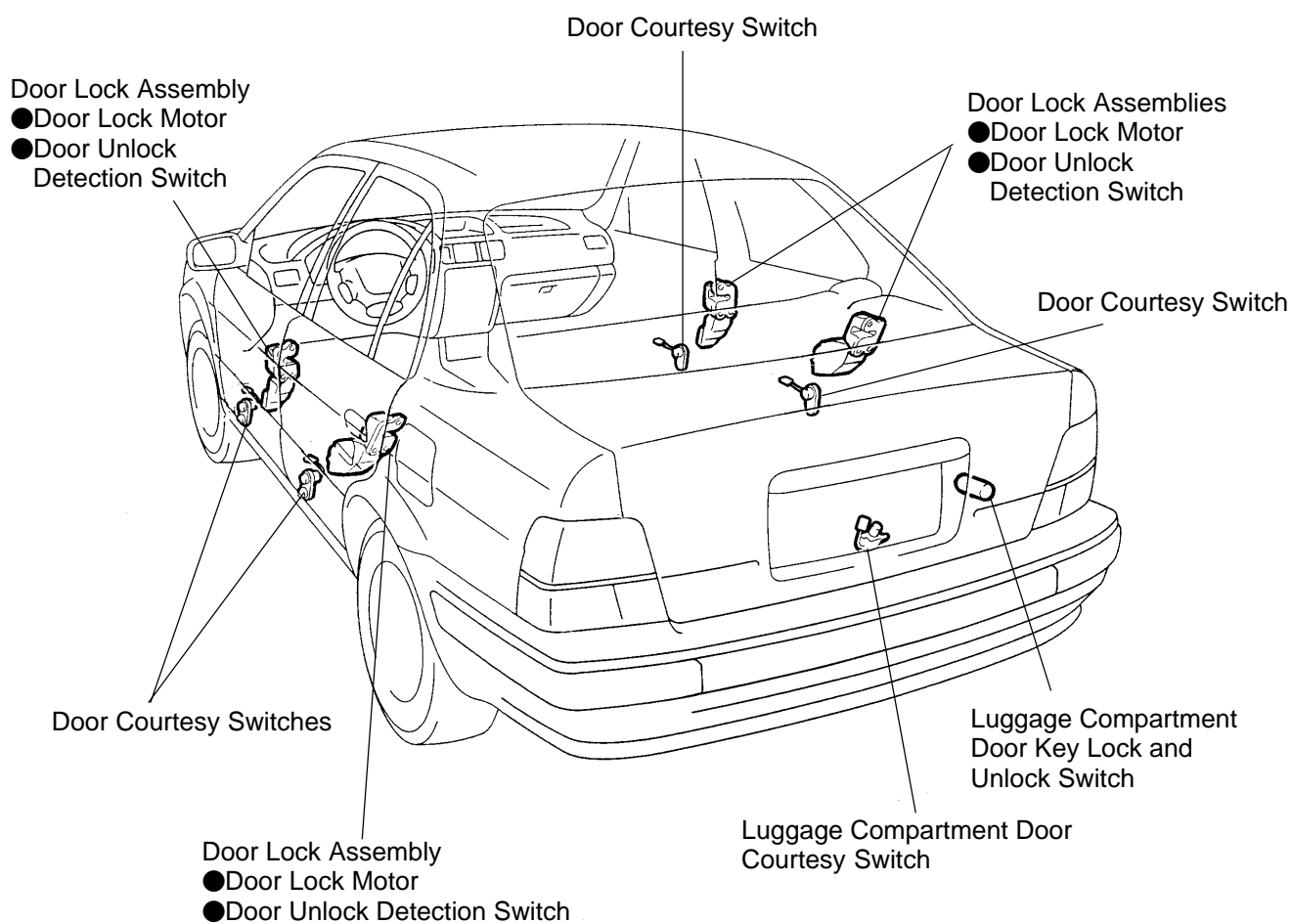
## PARTS LOCATION



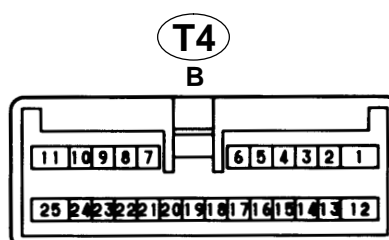
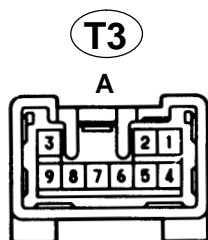
DI4N1-01

N12446  
 N12538

I10188



# TERMINALS OF ECM



Theft Deterrent and Dor Lock Control ECU

I00302 I00303

I00304

Terminals	Symbols	Condition	STD Value
A2 - A3	ACT- ↔ ACT+	Ignition switch "OFF".	Below 50 Ω
A4 - Ground	E ↔ Ground	Always.	Below 1 Ω
A4 - A8	E ↔ ACC	Ignition switch "ACC".	10 - 14 V
A9 - Ground	+B2 ↔ Ground	Always.	10 - 14 V
B1 - Ground	+B1 ↔ Ground	Always.	10 - 14 V
B2 ↔ A4	LSWR ↔ E	Door unlock detection switch "ON". (Rear door)	Below 1 Ω
		Door unlock detection switch "OFF". (Rear door)	1 MΩ or higher
B3 ↔ A4	CTY ↔ E	Door courtesy switch "ON". (Except driver's door opened)	Below 1 Ω
		Door courtesy switch "OFF". (Except driver's door closed)	1 MΩ or higher
B4 ↔ A4	DSWL ↔ E	Luggage compartment door courtesy switch "ON".	Below 1 Ω
		Luggage compartment door courtesy switch "OFF".	1 MΩ or higher
B5 ↔ A4	L1 ↔ E	Door lock control switch "LOCK".	Below 1 Ω
		Door lock control switch "OFF" or "UNLOCK".	1 MΩ or higher
B6 ↔ A4	UL3 ↔ E	Door key lock and unlock switch driver's door "UNLOCK".	Below 1 Ω
		Door key lock and unlock switch driver's door "OFF" or "LOCK".	1 MΩ or higher
B7 ↔ A4	DSWD ↔ E	Door courtesy switch "ON". (Driver's door opened)	Below 1 Ω
		Door courtesy switch "OFF". (Driver's door closed)	1 MΩ or higher
B8 ↔ A4	UL1 ↔ E	Door lock control switch "UNLOCK".	Below 1 Ω
		Door lock control switch "OFF" or "LOCK".	1 MΩ or higher
B9 ↔ A4	LUG ↔ E	Luggage compartment door key lock and unlock switch "ON".	Below 1 Ω
		Luggage compartment door key lock and unlock switch "OFF".	1 MΩ or higher
B10 - A4	HEAD ↔ E	Light control switch other than "HEAD".	10 - 14 V
B11 - A4	SH ↔ E	Always.	10 - 14 V
B12 - A4	IND ↔ E	Indicator light circuit.	Below 1 Ω
B14 ↔ A4	DSWH ↔ E	Engine hood courtesy switch "ON".	Below 1 Ω
		Engine hood courtesy switch "OFF".	1 MΩ or higher



B15 ↔ A4	LSWD ↔ E	Door unlock detection switch "ON". (Driver's)	Below 1 Ω
		Door unlock detection switch "OFF". (Driver's)	1 MΩ or higher
B16 ↔ A4	UL2 ↔ E	Door key lock and unlock switch "UNLOCK". (Passenger's)	Below 1 Ω
		Door key lock and unlock switch "OFF" or "LOCK". (Passenger's)	1 MΩ or higher
B19 ↔ A4	DSWP ↔ E	Door courtesy switch "ON". (Passenger's)	Below 1 Ω
		Door courtesy switch "OFF". (Passenger's)	1 MΩ or higher
B20 ↔ A4	KSW ↔ E	Key unlock warning switch "ON". (Key is inserted into key cylinder)	Below 1 Ω
		Key unlock warning switch "OFF".	1 MΩ or higher
B21 ↔ A4	LSWP ↔ E	Door unlock detection switch "OFF". (Passenger's)	Below 1 Ω
		Door unlock detection switch "ON". (Passenger's)	1 MΩ or higher
B22 ↔ A4	L2 ↔ E	Door key lock and unlock switch "LOCK". (Driver's)	Below 1 Ω
		Door key lock and unlock switch "OFF" or "UNLOCK". (Driver's)	1 MΩ or higher
B23 - A4	TALL ↔ E	Light control switch "OFF".	10 - 14 V
B24 - A48	HORN ↔ E	Horn switch "OFF".	10 - 14 V
B25 - A4	SRLY ↔ E	Ignition switch is turned to "ST". (When park / neutral position switch "P" position)	10 - 14 V

## PROBLEM SYMPTOMS TABLE

Proceed to the reference page shown in the matrix chart below for each malfunction symptom and troubleshoot for each circuit.

### HINT:

Troubleshooting of the theft deterrent system is based on the premise that the door lock control system is operating normally. Accordingly, before troubleshooting the theft deterrent system, first make certain that the door lock control system is operating normally.

Details of Problem			Inspecting Circuit*1	See page
The theft deterrent system cannot be set			1. Indicator light circuit	DI-224
			2. Luggage compartment door key lock and unlock switch circuit	DI-241
			3. Luggage compartment door courtesy switch circuit	DI-239
			4. Door courtesy switch circuit	DI-244
			5. Door unlock detection switch circuit	DI-213
			6. Engine hood courtesy switch circuit	DI-246
The indicator light does not blink when system is set			Indicator light circuit	DI-224
When the system is set	When the rear door is unlocked	The system does not operate	Door unlock detection switch circuit	DI-213
	When the luggage compartment door is opened by a method other than the key		Luggage compartment door courtesy switch circuit	DI-239
	When the engine hood is opened		Engine hood courtesy switch circuit	DI-246
While the system is in warning operation	Horns do not sound		Horn relay circuit	DI-231
	Theft deterrent horn does not sound		Theft deterrent horn circuit	DI-228
	Headlights do not flash		Headlight control relay circuit	DI-233
	Taillights do not flash		Taillight control relay circuit	DI-235
	The starter cut is not cut off		Starter relay circuit	DI-226
	The rear door lock is not locked in unlock condition		Door unlock detection switch circuit	DI-213
When the system is set	It is not canceled when the ignition key is turned to ACC or ON position		Ignition switch circuit	DI-237
	It still operates when the luggage compartment door is opened with the key		Luggage compartment door key lock and unlock switch circuit	DI-241
System is still set even when a rear door is open			Door courtesy switch circuit	DI-244
Even when the system is not set	Horns sound		Horn relay circuit	DI-231
	Theft deterrent horn sounds		Theft deterrent horn circuit	DI-228
	Headlights stay on		Headlight control relay circuit	DI-233
	Taillights stay on		Taillight control relay circuit	DI-235

\*1: If numbers are given to the circuit, proceed with troubleshooting in the order indicated by those numbers.

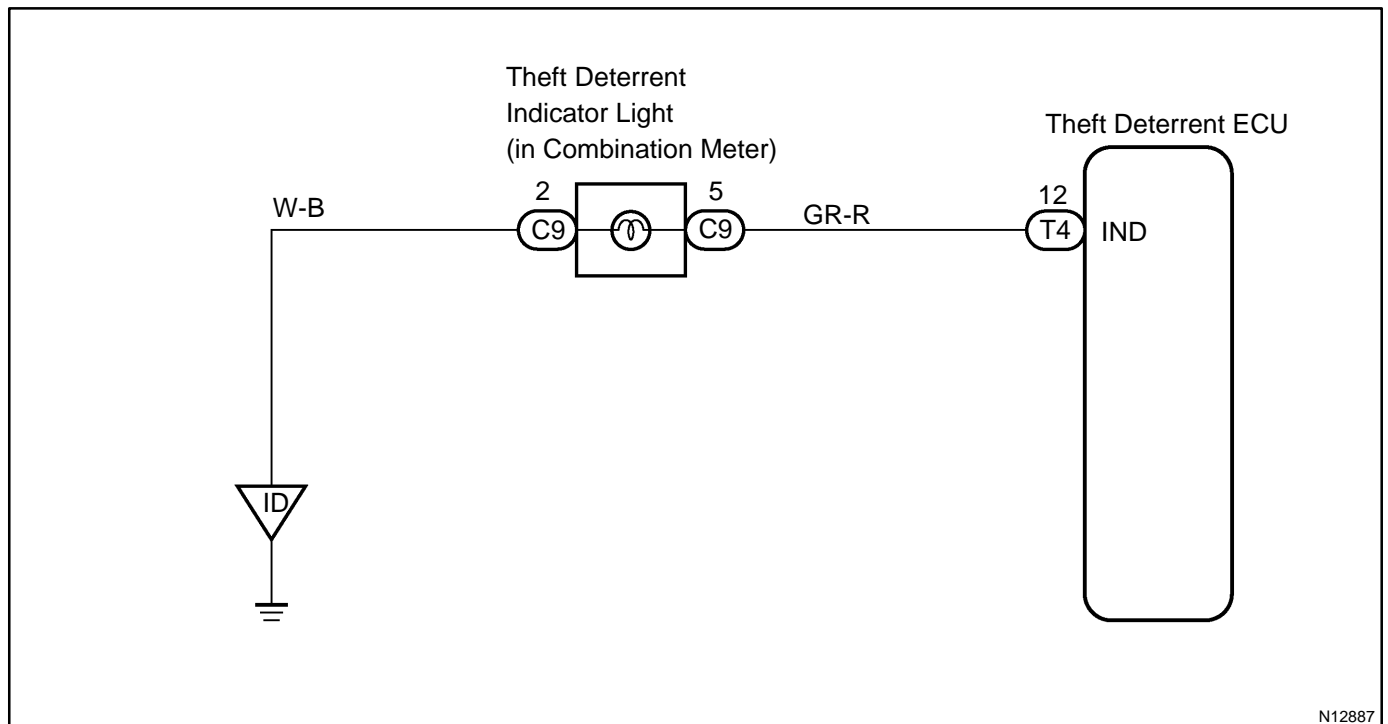
## CIRCUIT INSPECTION

### Indicator Light Circuit

### CIRCUIT DESCRIPTION

When the theft deterrent system is preparing to set, this circuit lights up the indicator light. When the system has been set, it continually turns the indicator light on for 1 second and turns it off for 1 second, thus blinking the indicator light.

### WIRING DIAGRAM



### INSPECTION PROCEDURE

1	Check indicator light.
---	------------------------

#### PREPARATION:

Remove combination meter.

#### CHECK:

Connect positive  $\cdot$  lead to terminal C5 and negative  $\ominus$  lead to terminal C2 of combination meter connector then check indicator light comes on.

NG

Replace combination meter.

OK

2	<b>Check harness and connector between theft deterrent ECU and indicator light, indicator light and body ground (See page <a href="#">IN-26</a> ).</b>
---	--

NG	<b>Repair or replace harness or connector.</b>
----	--

OK
----

<b>Check and replace theft deterrent ECU.*1</b>
---

\*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown on matrix chart (See page [DI-223](#) ).

## Starter Relay Circuit

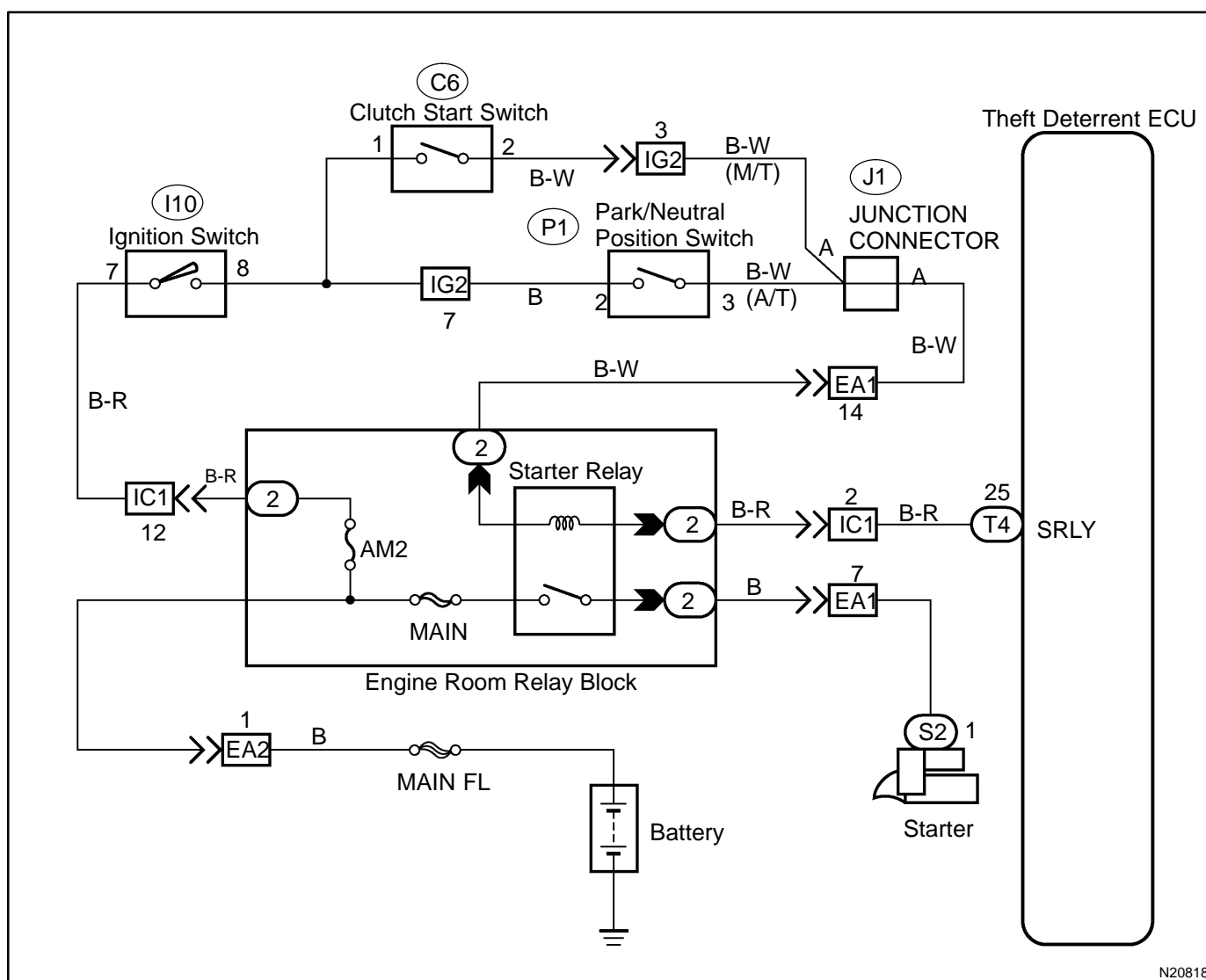
### CIRCUIT DESCRIPTION

When the theft deterrent system is activated, contact (a) in the ECU becomes open, creating an open circuit in terminal SRLY circuit and making the starter inoperative (starter cut).

In this condition, if one of the following operations is done, the contact (a) in the ECU is grounded, thus canceling the starter cut:

- (1) Unlock the front LH or RH door with key.
- (2) Unlock the doors with the wireless door lock control system.

### WIRING DIAGRAM



N20818

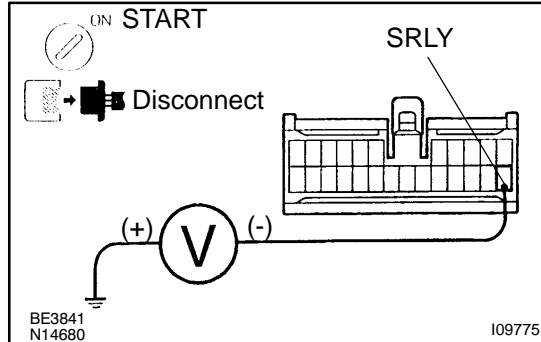
## INSPECTION PROCEDURE

### HINT:

This troubleshooting is based on the premise that engine cranking occurs.

If the engine does not crank, proceed to the engine troubleshooting on [DI-1](#).

- |          |  |
|----------|--|
| <b>1</b> | <b>Check voltage between terminal SRLY of theft deterrent ECU connector and body ground.</b> |
|----------|--|



### PREPARATION:

- (a) Disconnect the theft deterrent ECU connector.
- (b) Transmission in neutral position.

### CHECK:

Measure voltage between terminal SRLY of theft deterrent ECU connector and body ground, when ignition switch is turned to ST position.

### OK:

**Voltage: 10 - 14V**

**OK**

**Check and repair theft deterrent ECU.**

**NG**

**Check and repair harness and connector between starter and theft deterrent ECU (See page [IN-26](#)).**

## Theft Deterrent Horn Circuit

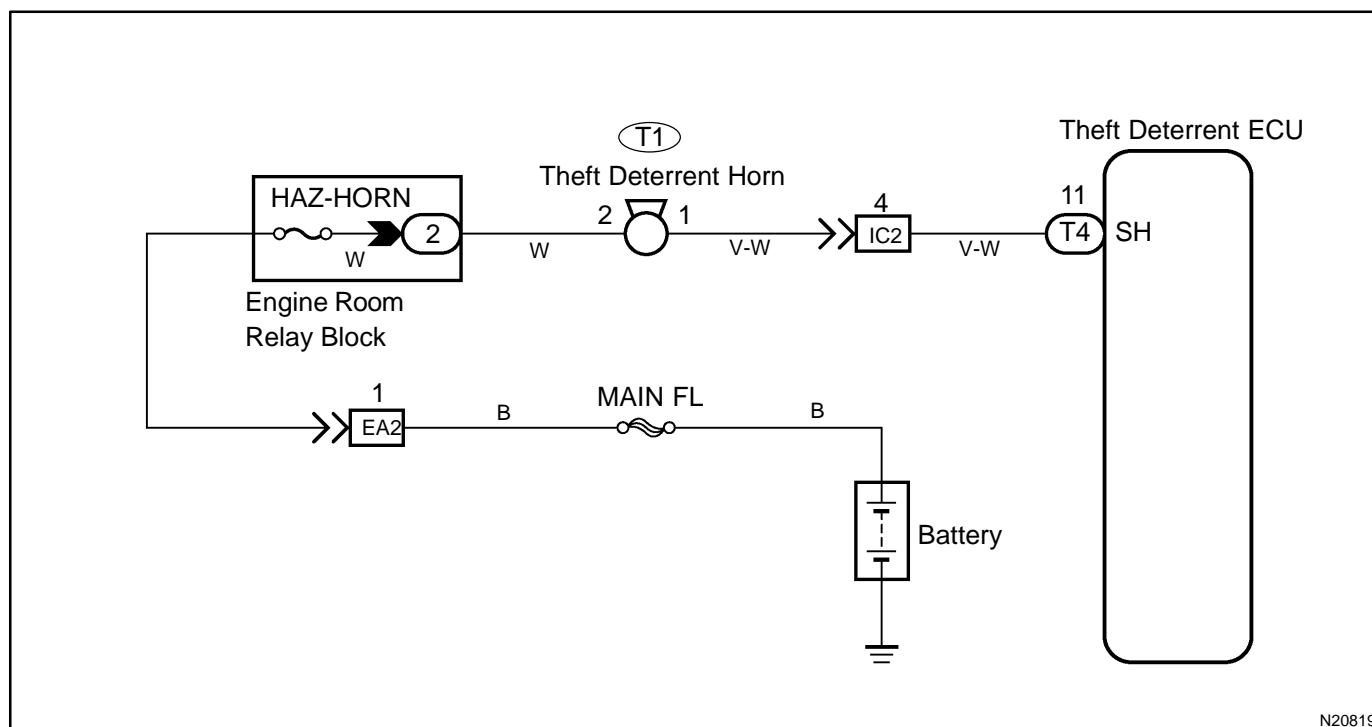
## CIRCUIT DESCRIPTION

When the theft deterrent system is activated, contact (a) and contact (b) in the ECU close alternately in cycles of approximately 0.2 sec., causing the theft deterrent horn to blow (See the wiring diagram below).

In this condition, if any of the following operations is done, the contact (a) in the ECU opens, thus stopping the theft deterrent horn from blowing:

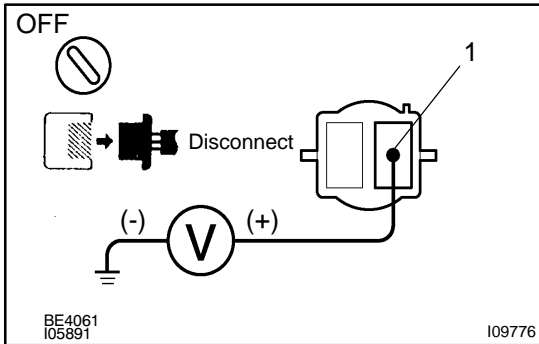
- (1) Unlock the front LH or RH door with key.
- (2) Turn the ignition switch to ACC or ON position.
- (3) Unlock the doors with the wireless door lock control system.
- (4) Wait for approximately 60 seconds.

## WIRING DIAGRAM



## INSPECTION PROCEDURE

- |          |  |
|----------|--|
| <b>1</b> | <b>Check voltage between terminal 1 of theft deterrent horn connector and body ground.</b> |
|----------|--|



### PREPARATION:

Remove the theft deterrent horn and disconnect the connector.

### CHECK:

Measure voltage between terminal 1 of theft deterrent horn connector and body ground.

### OK:

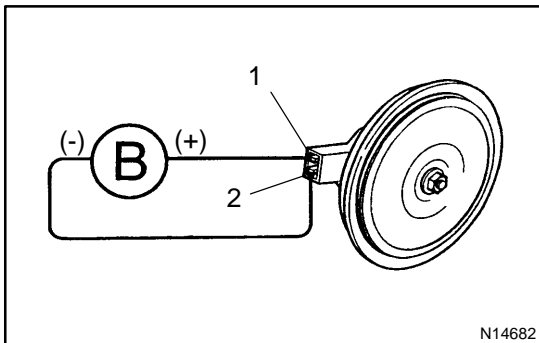
**Voltage: 10 - 14V**

**NG**

**Check and repair harness and connector between HORN fuse and theft deterrent horn.**

**OK**

- |          |                                    |
|----------|------------------------------------|
| <b>2</b> | <b>Check theft deterrent horn.</b> |
|----------|------------------------------------|



### CHECK:

Connect positive  $\cdot$  lead to terminal 1 and negative  $\ominus$  lead to terminal 2 to theft deterrent horn connector.

### OK:

**Theft deterrent horn blows.**

**NG**

**Replace theft deterrent horn.**

**OK**



3	Check harness and connector between theft deterrent ECU and theft deterrent horn (See page <a href="#">IN-26</a> ).
---	---

NG

Check and repair harness or connector.

OK

Check and replace theft deterrent ECU.

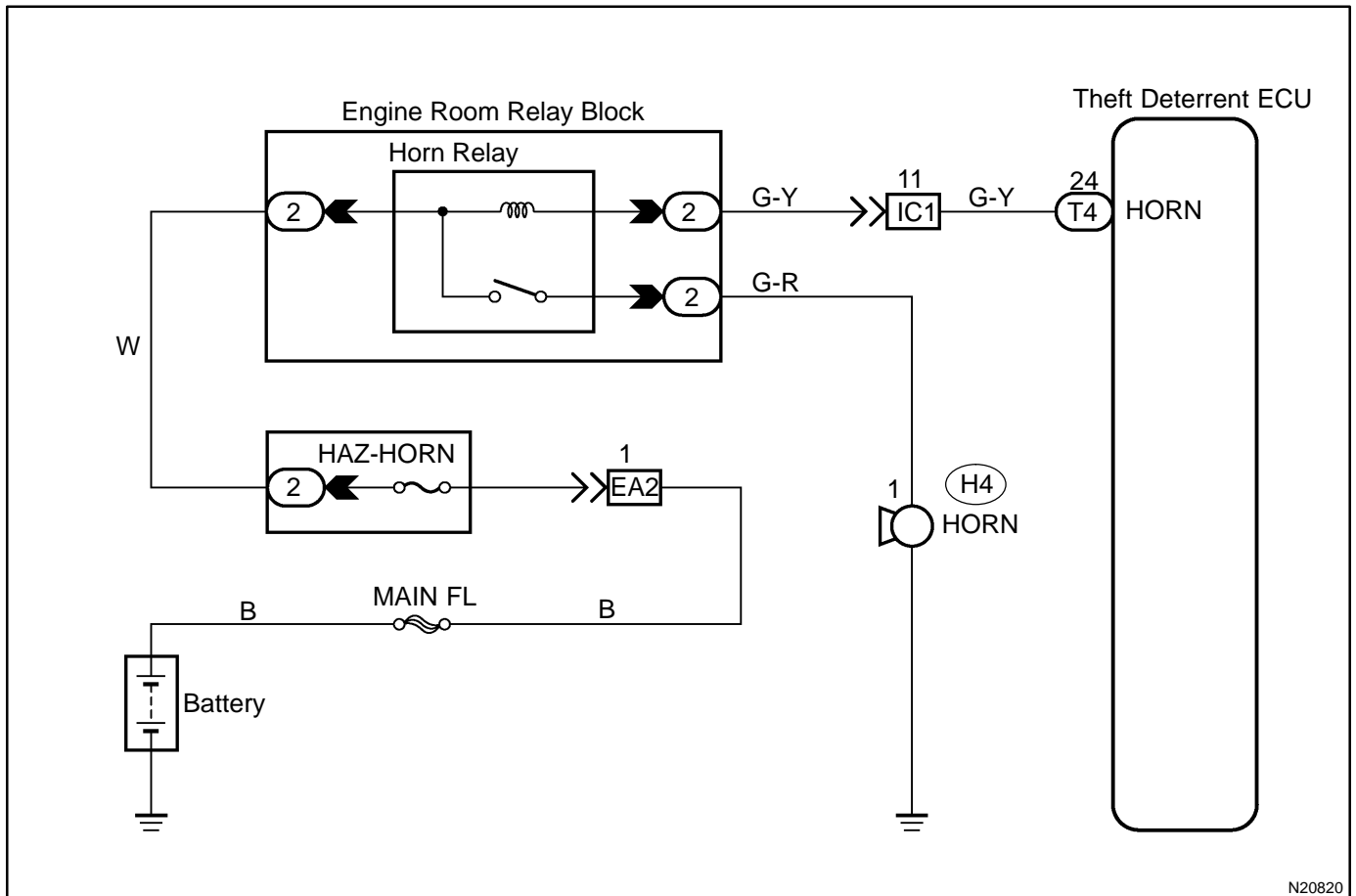
## Horn Relay Circuit

### CIRCUIT DESCRIPTION

When the theft deterrent system is activated, it causes the Tr in the ECU to switch on and off in approximately 0.4 sec. cycles. This switches the horn relay on and off, thus the horns blow (See the wiring diagram below). In this condition, if any of the following operations is done, the Tr in the ECU goes off and the horn relay switches off, thus stopping the horns from blowing:

- (1) Unlock the front LH or RH door with key.
- (2) Turn the ignition switch to ACC or ON position.
- (3) Unlock the doors with the wireless door lock control system.
- (4) Wait for approximately 60 seconds.

### WIRING DIAGRAM



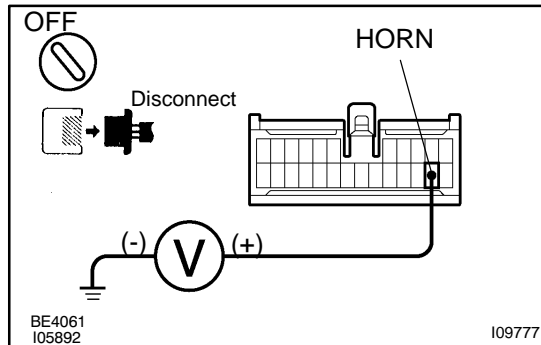
N20820

## INSPECTION PROCEDURE

### HINT:

The flow chart below is based on the premise that the horns blow normally whenever the horn switch is operated.

- |          |  |
|----------|--|
| <b>1</b> | <b>Check voltage between terminal HORN of theft deterrent ECU connector and body ground.</b> |
|----------|--|



### PREPARATION:

Disconnect the theft deterrent ECU connectors.

### CHECK:

Measure voltage between terminal HORN of theft deterrent ECU connector and body ground.

### OK:

**Voltage: 10~14V**

**OK**

**Check and replace theft deterrent ECU.**

**NG**

**Check and repair harness and connector between theft deterrent ECU and horn relay.**

## Headlight Control Relay Circuit

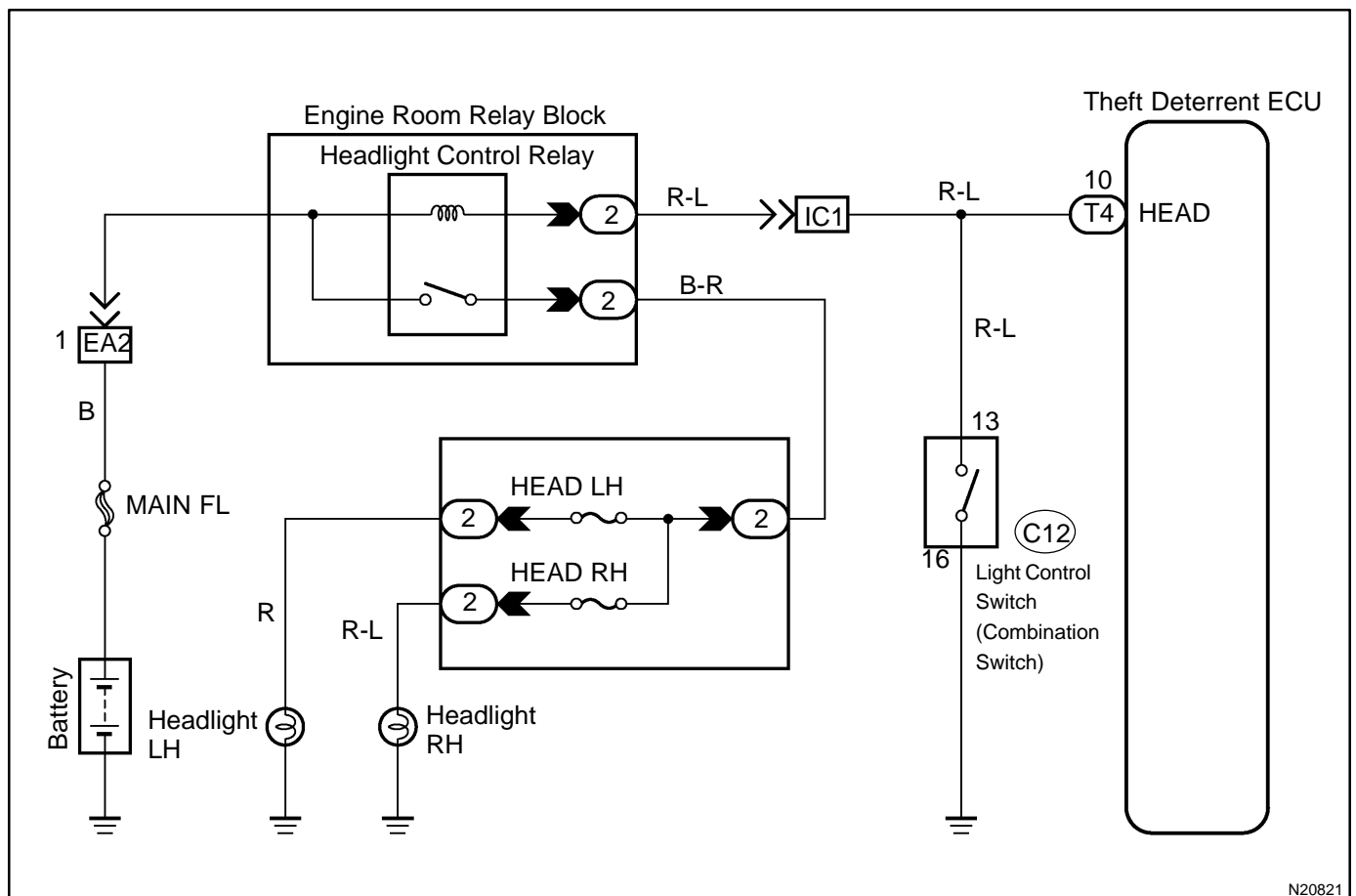
### CIRCUIT DESCRIPTION

When the theft deterrent system is activated, it causes the Tr in the ECU to switch on and off at approximately 0.4 sec. cycles. This switches the headlight control relay on and off, thus flashing the headlights (See the wiring diagram below).

In this condition, if any of the following operations is done, the Tr in the ECU goes off and the headlight control relay switches off, thus stopping the headlights flashing:

- (1) Unlock the front LH or RH door with key.
- (2) Turn the ignition switch to ACC or ON position.
- (3) Unlock the doors with the wireless door lock control system.
- (4) Wait for approximately 60 seconds.

### WIRING DIAGRAM



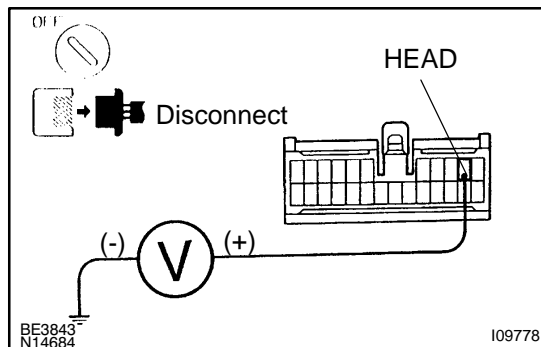
N20821

## INSPECTION PROCEDURE

### HINT:

The flow chart below is based on the premise that the headlights flash normally whenever the light control switch is operated. If headlight operation is not normal when the light control switch is operated, proceed to troubleshooting on page [BE-2](#).

- |          |  |
|----------|--|
| <b>1</b> | <b>Check voltage between terminal HEAD of theft deterrent ECU connector and body ground.</b> |
|----------|--|



### PREPARATION:

Disconnect the theft deterrent ECU connector.

### CHECK:

Measure voltage between terminal HEAD of theft deterrent ECU connector and body ground.

### OK:

**Voltage: 10 - 14V**

**OK**

**Check and replace theft deterrent ECU.**

**NG**

**Check and repair harness and connector between theft deterrent ECU and headlight control relay.**

## Taillight Control Relay Circuit

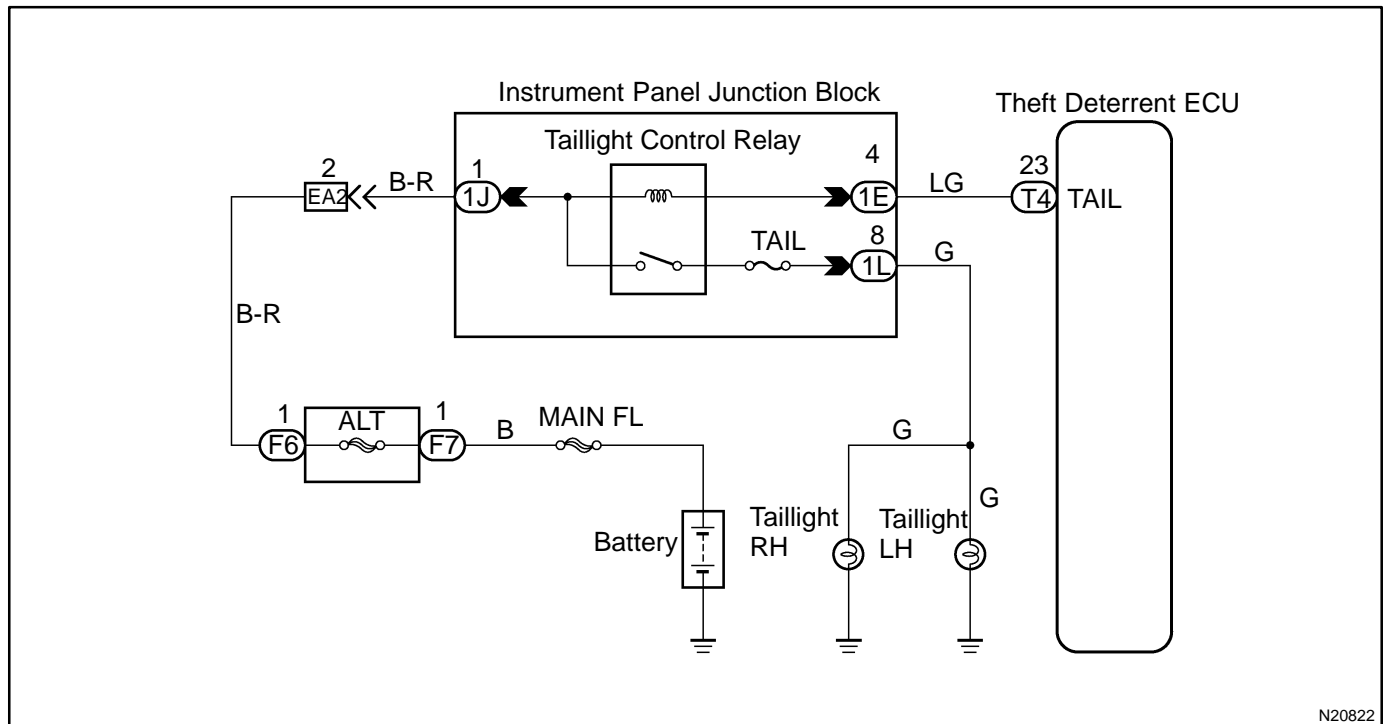
### CIRCUIT DESCRIPTION

When the theft deterrent system is activated, it causes the Tr in the ECU to switch on and off at approximately 0.4 sec. intervals. This switches the taillight control relay on and off, thus flashing the taillights (See the wiring diagram below).

In this condition, if any of the following operations is done, the Tr in the ECU goes off and the taillight control relay switches off, thus stopping the taillights flashing:

- (1) Unlock the front LH or RH door with key.
- (2) Turn the ignition switch to ACC or ON position.
- (3) Unlock the doors with the wireless door lock control system.
- (4) Wait for approximately 60 seconds.

### WIRING DIAGRAM



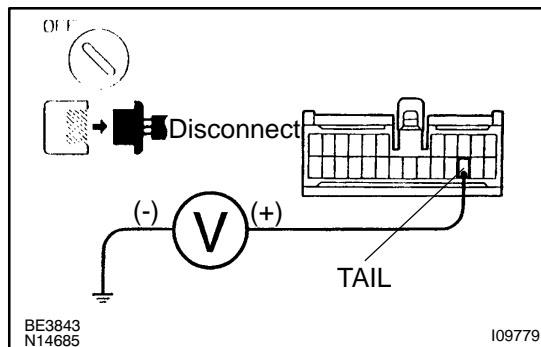
N20822

## INSPECTION PROCEDURE

### HINT:

The flow chart below is based on the premise that the taillights light up normally whenever the light control switch is operated. If taillight operation is not normal when the light control switch is operated, proceed to troubleshooting on page [BE-2](#).

- |   |  |
|---|--|
| 1 | <b>Check voltage between terminal TAIL of theft deterrent ECU connector and body ground.</b> |
|---|--|



### PREPARATION:

Disconnect the theft deterrent ECU connector.

### CHECK:

Measure voltage between terminal TAIL of theft deterrent ECU connector and body ground.

### OK:

**Voltage: 10 - 14V**

OK

**Check and replace theft deterrent ECU.**

NG

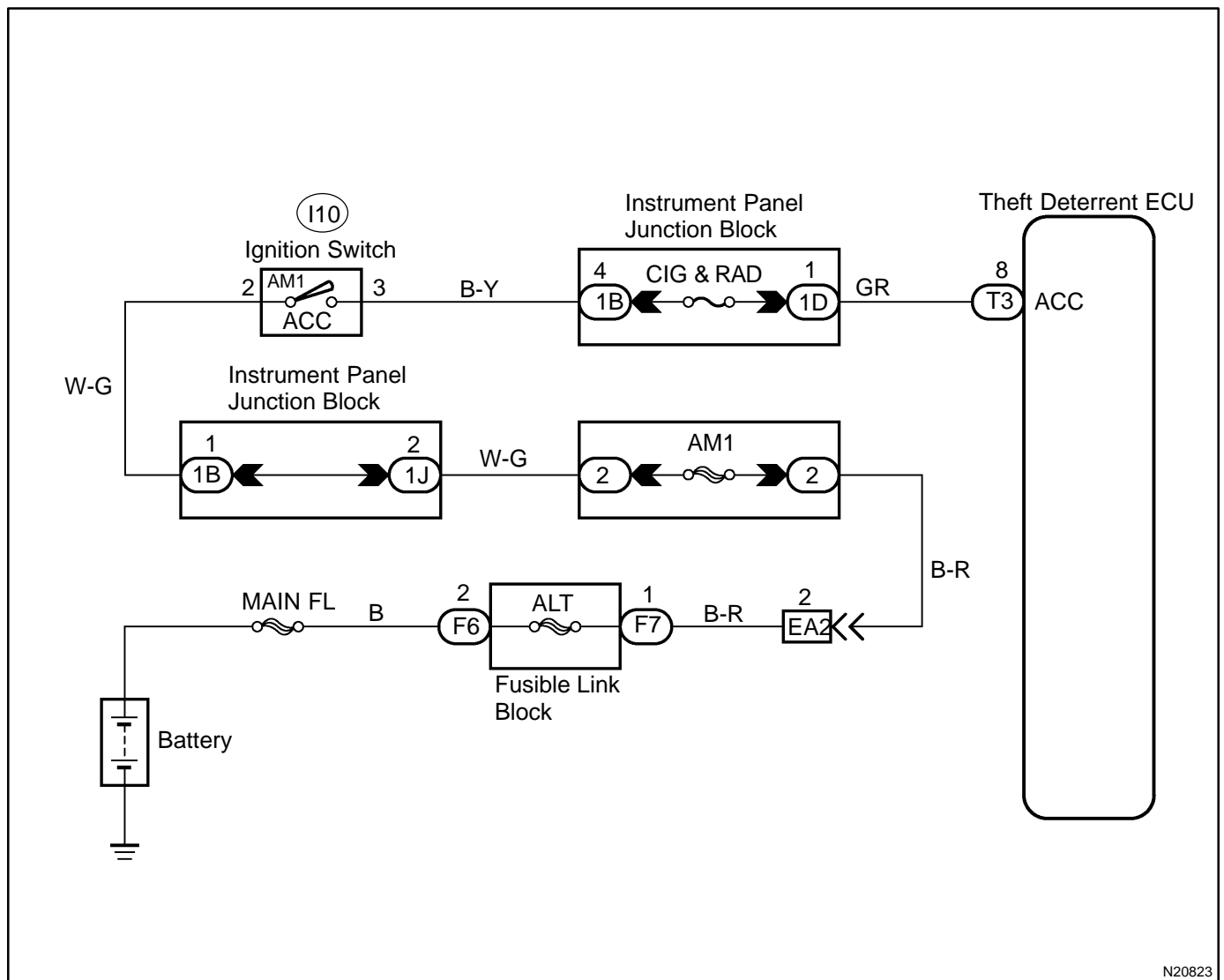
**Check and repair harness and connector between theft deterrent ECU and taillight control relay.**

## Ignition Switch Circuit

### CIRCUIT DESCRIPTION

When the ignition switch is turned to the ACC position, battery positive voltage is applied to the terminal ACC of the ECU. Also, if the ignition switch is turned to the ON position, battery positive voltage is applied to the terminals ACC and IG of the ECU. When the battery positive voltage is applied to the terminal ACC of the ECU while the theft deterrent system is activated, the warning stops. Furthermore, power supplied from the terminals ACC and IG of the ECU is used as power for the door courtesy switch, and position switch, etc.

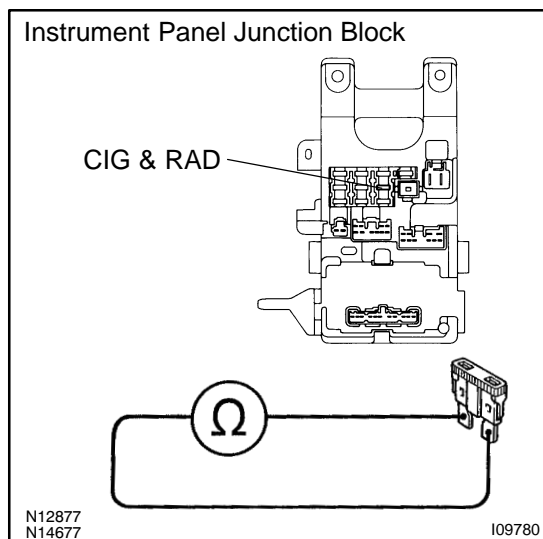
### WIRING DIAGRAM





## INSPECTION PROCEDURE

## 1 Check CIG / RAD fuses.

**PREPARATION:**

- (a) Remove the fuse box cover.
- (b) Remove CIG & RAD fuse from instrument panel junction block.

**CHECK:**

Check continuity of CIG & RAD fuses.

**OK:**

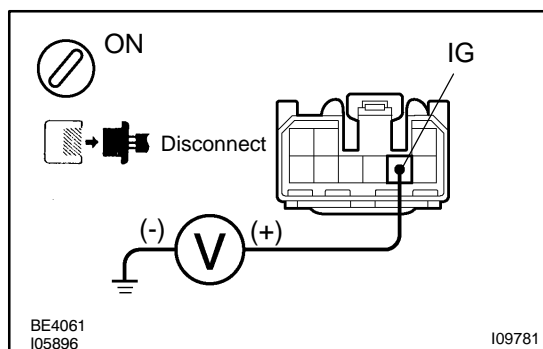
Continuity

NG

Check for short in all the harness and components connected to the CIG & RAD fuse (See attached wiring diagram).

OK

## 2 Check voltage between terminals ACC of theft deterrent ECU and body ground.

**PREPARATION:**

- (a) Disconnect the theft deterrent ECU connectors.
- (b) Turn ignition switch ON.

**CHECK:**

Measure voltage between terminals ACC of theft deterrent ECU connector and body ground.

**OK:**

Voltage: 10 - 14 V

OK

Check and replace theft deterrent ECU.

NG

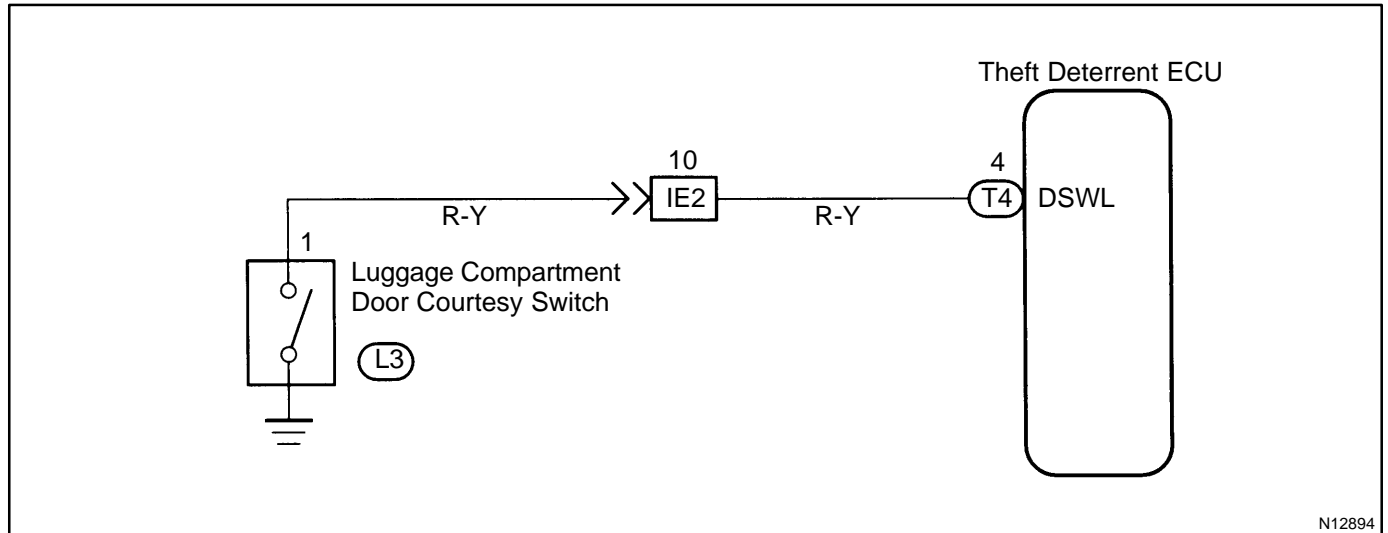
Check and repair harness and connector between theft deterrent ECU and battery (See page [IN-26](#) ).

## Luggage Compartment Door Courtesy Switch Circuit

### CIRCUIT DESCRIPTION

The luggage compartment door courtesy switch goes on when the luggage compartment door is opened and goes off when the luggage compartment door is closed.

### WIRING DIAGRAM



### INSPECTION PROCEDURE

1	Check operation of luggage compartment door courtesy light.
---	---

#### CHECK:

Check that luggage compartment door courtesy light goes off when luggage compartment door courtesy switch is pushed, and comes on when switch is not pushed.

NG

Check and repair luggage compartment door courtesy light circuit (See page [BE-24](#) ).

OK

2	Check for open in harness and connector between theft deterrent ECU and luggage compartment door courtesy switch (See page <a href="#">IN-26</a> ).
---	---

**NG****Repair or replace harness or connectors.****OK****Check and replace theft deterrent ECU.\*1**

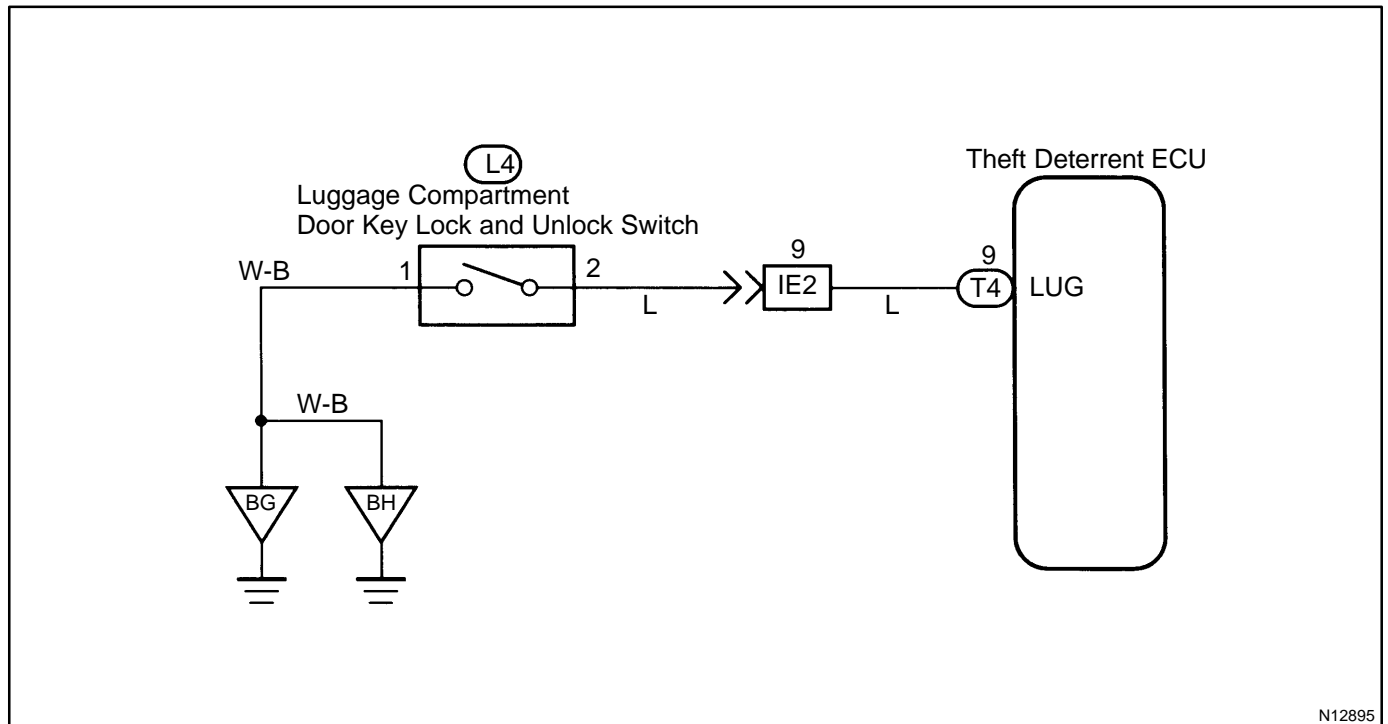
\*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown on matrix chart (See page [DI-223](#) ).

## Luggage Compartment Door Key Lock and Unlock Switch Circuit

### CIRCUIT DESCRIPTION

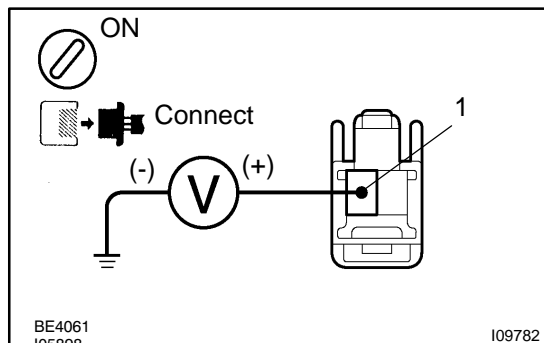
The luggage compartment door key lock and unlock switch goes on when the luggage compartment door key cylinder is turned to the unlock side with the key.

### WIRING DIAGRAM



## INSPECTION PROCEDURE

- 1** Check voltage between terminal 1 of luggage compartment door key lock and unlock switch connector and body ground.

**PREPARATION:**

- (a) Remove luggage compartment door trim.  
(b) Turn ignition switch ON.

**CHECK:**

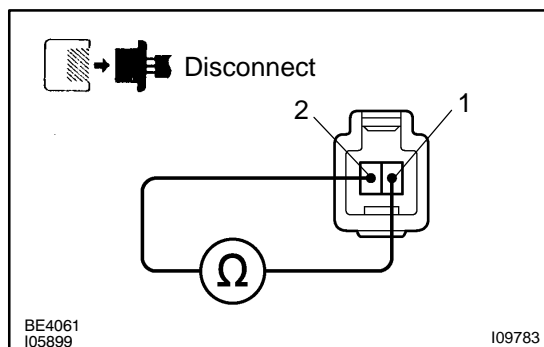
Measure voltage between terminal 1 of luggage compartment door key lock and unlock switch connector and body ground, when the key is turned to the unlock side and not turned.

**OK:**

Key operation	Voltage
Turned to the unlock side	0 V
Not turned	Battery positive voltage

**OK****Check and replace theft deterrent ECU.\*1****NG**

- 2** Check luggage compartment door key lock and unlock switch.

**PREPARATION:**

Disconnect luggage compartment door key lock and unlock switch connector.

**CHECK:**

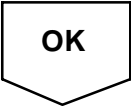
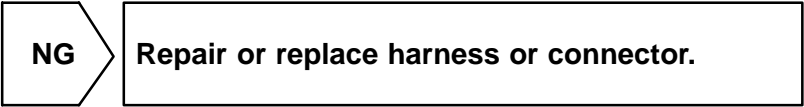
Check continuity between terminals 1 and 2, when the key is turned to the unlock side and not turned.

**OK:**

Key operation	Tester connection	Specified condition
Turned to unlock side	1 - 2	Continuity
Not turned	-	No continuity

**NG****Repair or replace luggage compartment door key lock and unlock switch.****OK**

3	<b>Check harness and connector between theft deterrent ECU and switch, switch and body ground (See page <a href="#">IN-26</a> ).</b>
---	--



**Check and replace theft deterrent ECU.**

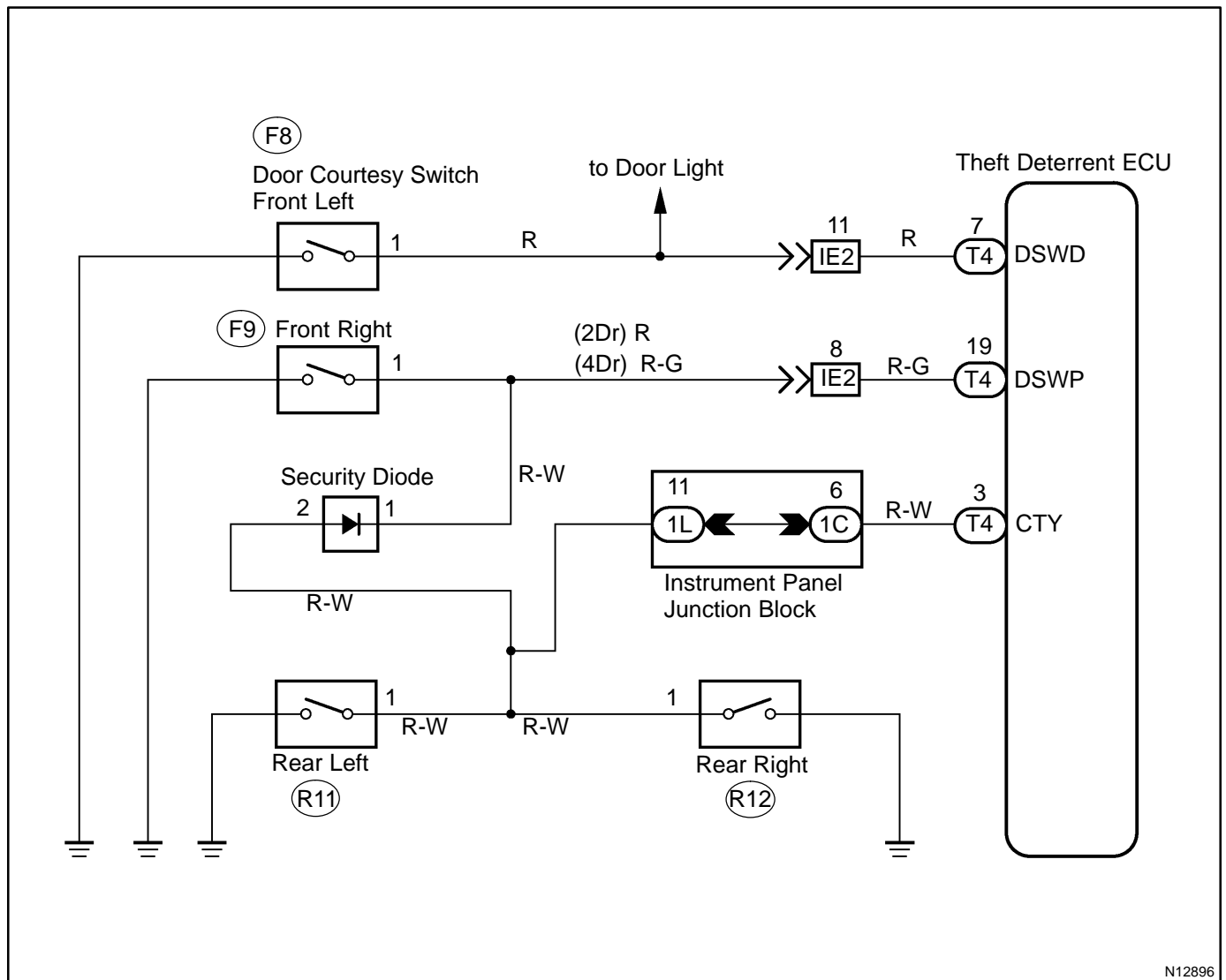
\*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown on matrix chart (See page [DI-223](#) ).

## Door Courtesy Switch Circuit

### CIRCUIT DESCRIPTION

The door courtesy switch goes on when the door is opened and goes off when the door is closed.

### WIRING DIAGRAM



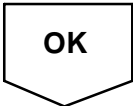
N12896

# INSPECTION PROCEDURE

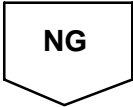
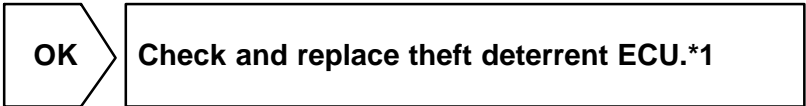
1	Check operation of open door warning light.
---	---

**CHECK:**

Check that open door warning light comes on when each door is opened, and goes off when all doors are closed.



2	Check for open in harness and connector between theft deterrent ECU and door courtesy switch (See page <a href="#">IN-26</a> ).
---	---



**Repair or replace harness or connector.**

\*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown on matrix chart (See page [DI-223](#) ).

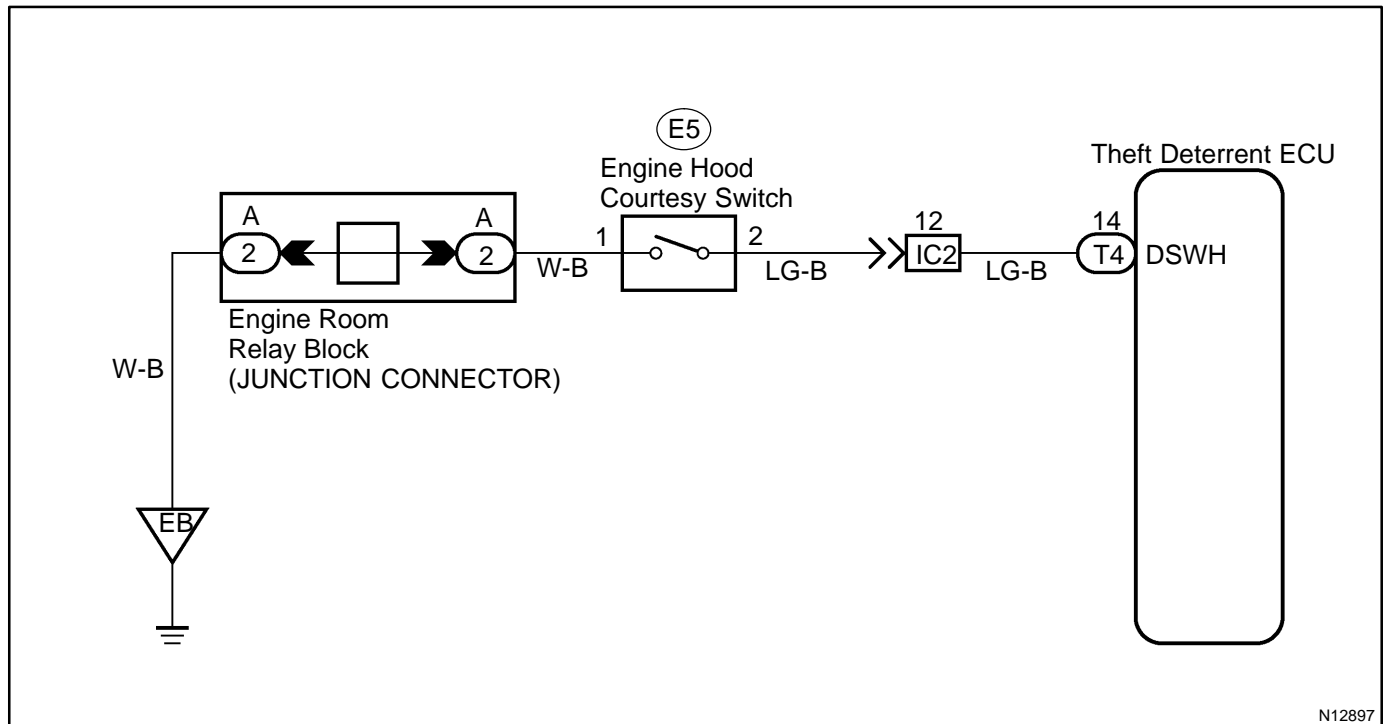


## Engine Hood Courtesy Switch Circuit

### CIRCUIT DESCRIPTION

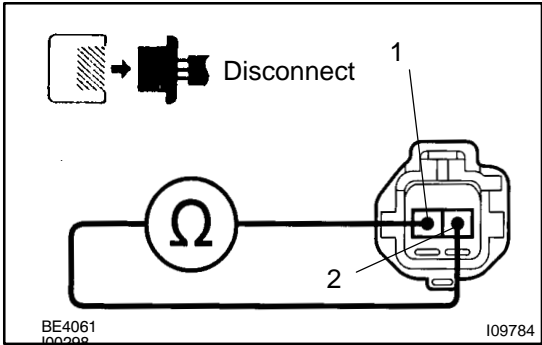
The engine hood courtesy switch is built into the engine hood lock assembly and goes on when the engine hood is opened and goes off when the engine hood is closed.

### WIRING DIAGRAM



# INSPECTION PROCEDURE

1	Check engine hood courtesy switch.
---	------------------------------------



## PREPARATION:

- (a) Remove engine hood lock assembly.
- (b) Disconnect engine hood courtesy switch connector.

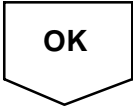
## CHECK:

Check continuity between terminals 1 and 2 when engine hood lock is locked and unlocked.

## OK:

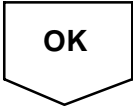
Engine hood lock	Tester connection	Specified condition
LOCK	-	No continuity
UNLOCK	1 - 2	Continuity

NG	Replace engine hood courtesy switch.
----	--------------------------------------



2	Check harness and connector between theft deterrent ECU and switch, switch and body ground (See page <a href="#">IN-26</a> ).
---	---

NG	Repair or replace harness or connector.
----	---



Check and replace theft deterrent ECU (See page <a href="#">IN-26</a> ).
--

## CO/HC INSPECTION

EM18U-02

**HINT:**

This check is used only to determine whether or not the idle CO/HC complies with regulations.

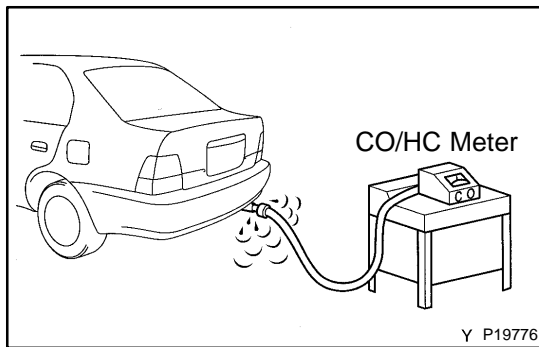
**1. INITIAL CONDITIONS**

- (a) Engine coolant at normal operating temperature.
- (b) Air cleaner installed.
- (c) All pipes and hoses of air induction system connected.
- (d) All accessories switched OFF.
- (e) All vacuum lines properly connected.

**HINT:**

All vacuum hoses for EGR systems, etc. should be properly connected.

- (f) SFI system wiring connectors fully plugged.
- (g) Ignition timing set correctly.
- (h) Transmission in neutral position.
- (i) CO/HC meter calibrated by hand.

**2. START ENGINE****3. RACE ENGINE AT 2,500 RPM FOR APPROX. 180 SECONDS**

- 4. INSERT CO/HC METER TESTING PROBE AT LEAST 40 cm (1.3 ft) INTO TAILPIPE DURING IDLING**
- 5. IMMEDIATELY CHECK CO/HC CONCENTRATION AT IDLE AND/OR 2,500 RPM**

**HINT:**

When doing the 2 mode (2,500 rpm and idle) test, follow the measurement order prescribed by the applicable local regulations.

If the CO/HC concentration does not comply with regulations, troubleshoot according to the table below. Check and correct the cause if necessary.

HC	CO	Phenomenon	Cause
High	Normal	Rough idle	1. Faulty ignition: <ul style="list-style-type: none"> <li>• Incorrect timing</li> <li>• Fouled, shorted or improperly gapped plugs</li> <li>• Open or crossed high-tension cords</li> <li>• No contact between coil and plug</li> </ul> 2. Incorrect valve clearance 3. Leaky EGR valve 4. Leaky intake and exhaust valves 5. Leaky cylinder
High	Low	Rough idle (Fluctuating HC reading)	1. Vacuum leak: <ul style="list-style-type: none"> <li>• PCV hose</li> <li>• EGR valve</li> <li>• Intake manifold (Air intake chamber)</li> <li>• Throttle body</li> <li>• Cylinder head gasket</li> <li>• Brake booster line</li> </ul> 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air filter 2. Faulty MFI system: <ul style="list-style-type: none"> <li>• Faulty pressure regulator</li> <li>• Clogged fuel return line</li> <li>• Defective engine coolant temperature sensor</li> <li>• Defective intake air temperature sensor</li> <li>• Faulty ECM</li> <li>• Faulty injector</li> <li>• Faulty throttle position sensor</li> </ul>

Y

V06898

# COMPRESSION INSPECTION

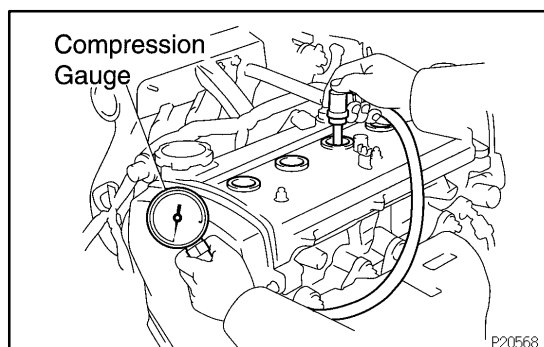
## HINT:

If there is lack of power, excessive oil consumption or poor fuel economy, measure the compression pressure.

### 1. WARM UP AND STOP ENGINE

Allow the engine to warm up to normal operating temperature.

### 2. REMOVE SPARK PLUGS (See page IG-1 )



### 3. CHECK CYLINDER COMPRESSION PRESSURE

- Insert a compression gauge into the spark plug hole.
- Fully open the throttle.
- While cranking the engine, measure the compression pressure.

## HINT:

Always use a fully charged battery to obtain engine revolutions of 250 rpm or more.

- Repeat steps (a) through (c) for each cylinder.

## NOTICE:

**This measurement must be done in as short a time as possible.**

### Compression pressure:

**1,275 kPa (13.0 kgf/cm<sup>2</sup>, 185 psi) or more**

### Minimum pressure:

**980 kPa (10.0 kgf/cm<sup>2</sup>, 142 psi)**

### Difference between each cylinder:

**100 kPa (1.0 kgf/cm<sup>2</sup>, 14 psi) or less**

- If the cylinder compression in one or more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat steps (a) through (c) for cylinders with low compression.

- If adding oil helps the compression, chances are that the piston rings and/or cylinder bore are worn or damaged.
- If pressure stays low, a valve may be sticking or seating is improper, or there may be leakage past the gasket.

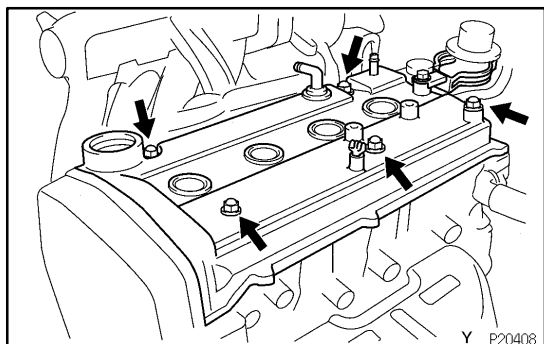
### 4. REINSTALL SPARK PLUGS

# VALVE CLEARANCE INSPECTION

## HINT:

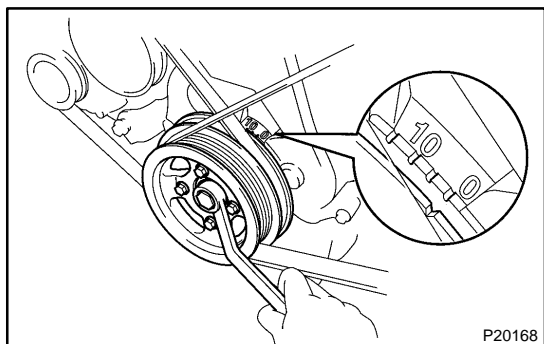
Inspect and adjust the valve clearance when the engine is cold.

1. **DISCONNECT PCV HOSES FROM CYLINDER HEAD COVER**
2. **REMOVE HIGH-TENSION CORDS AND IGNITION COILS FROM SPARK PLUGS**



3. **REMOVE CYLINDER HEAD COVER**

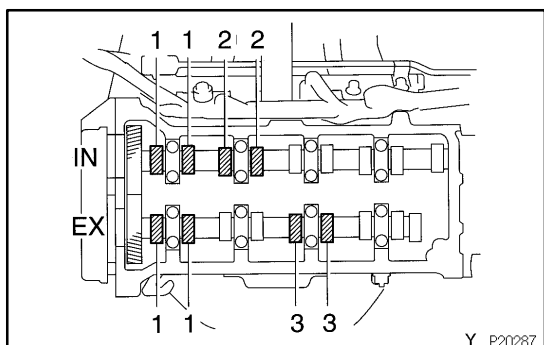
- (a) Remove the oil filler cap.
- (b) Remove the 5 cap nuts and seal washers.
- (c) Pry out the cylinder head cover, and remove the cover and gasket.



4. **SET NO.1 CYLINDER TO TDC/COMPRESSION**

- (a) Turn the crankshaft pulley, and align its groove with the timing mark "0" of the No.1 timing belt cover.
- (b) Check that the valve lifters on the No.1 cylinder are loose and valve lifters on the No.4 cylinder are tight.

If not, turn the crankshaft 1 complete revolution (360°) and align the marks as above.

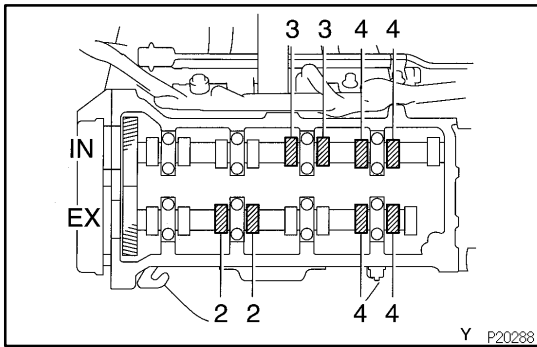


5. **INSPECT VALVE CLEARANCE**

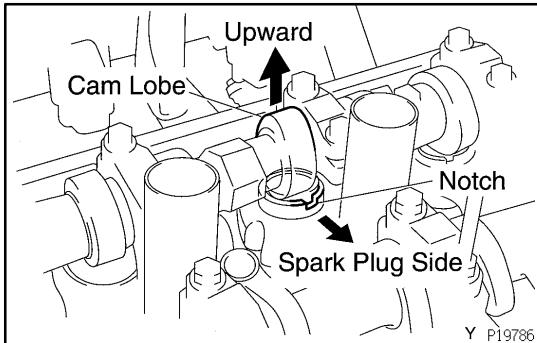
- (a) Check only the valves indicated.
  - (1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.
  - (2) Record the out-of-specification valve clearance measurements. They will be used later to determine the required replacement adjusting shim.

### Valve clearance (Cold):

Intake	0.15 - 0.25 mm (0.006 - 0.010 in.)
Exhaust	0.31 - 0.41 mm (0.012 - 0.016 in.)

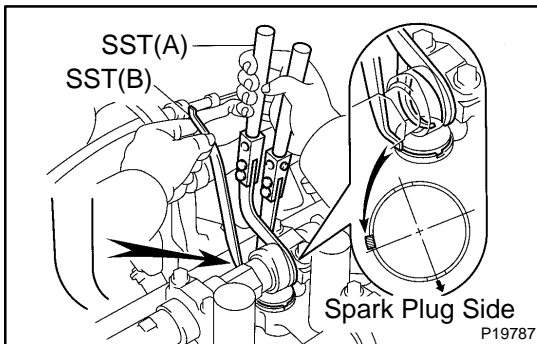


- (b) Turn the crankshaft pulley 1 revolution ( $360^\circ$ ) and align its groove with the timing mark "0" of the No.1 timing belt cover.
- (c) Check only the valves indicated as shown. Measure the valve clearance (See procedure in step (a)).



## 6. ADJUST VALVE CLEARANCE

- (a) Remove the adjusting shim.
  - (1) Turn the crankshaft to position the cam lobe of the camshaft on the adjusting valve points upward.
  - (2) Position the notch of the valve lifter so that the shim can be removed with a small screwdriver as shown in the illustration.

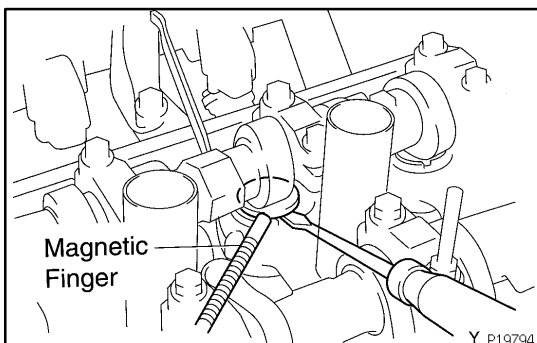
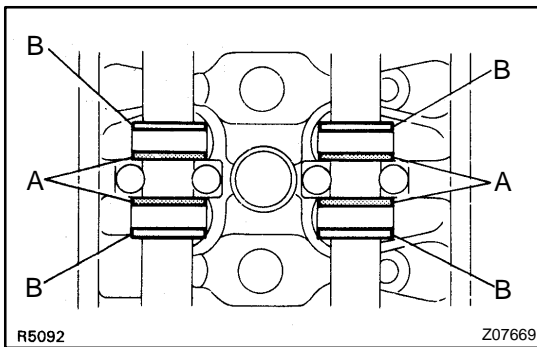


- (3) Using SST (A), press down the valve lifter and place SST (B) between the camshaft and valve lifter flange. Remove SST (A).

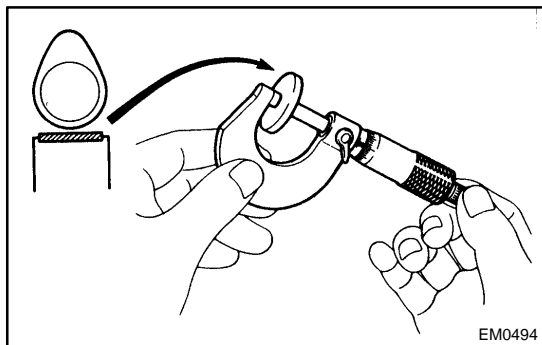
SST 09248-55040 (09248-05410, 09248-05420)

### HINT:

- Apply SST (B) at slight angle on the side marked with "9", at the position shown in the illustration.
- Set SST (A) at position A, if position A is too narrow, at position B, as shown in the illustration.



- (4) Remove the adjusting shim with a small screwdriver and magnetic finger.



- (b) Determine the replacement adjusting shim size by the following Formula or Charts on the next 2 pages:

- (1) Using a micrometer, measure the thickness of the removed shim.
  - (2) Calculate the thickness of a new shim so that the valve clearance comes within specified value.
- T ..... Thickness of removed shim  
 A ..... Measured valve clearance  
 N ..... Thickness of new shim

**Intake:**

$$N = T + (A - 0.20 \text{ mm (0.008 in.)})$$

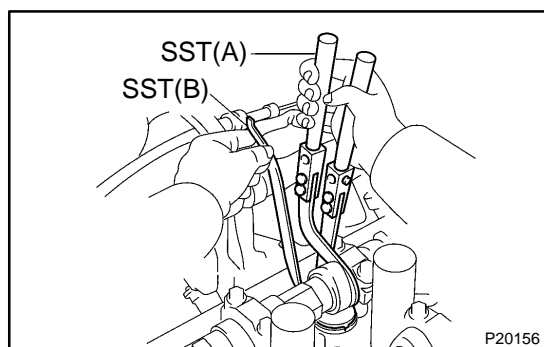
**Exhaust:**

$$N = T + (A - 0.36 \text{ mm (0.014 in.)})$$

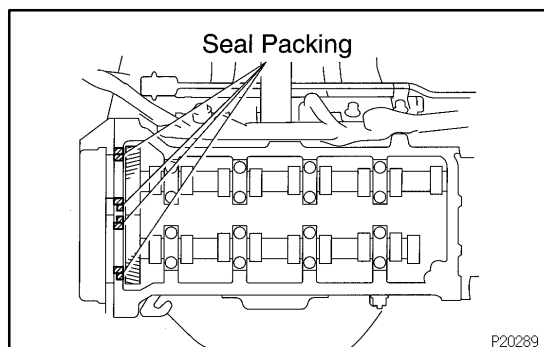
Select a new shim with a thickness as close as possible to the calculated value.

**HINT:**

Shims are available in 17 increments of 0.05 mm (0.0020 in.), from 2.50 mm (0.0984 in.) to 3.30 mm (0.1299 in.).



- (c) Install a new adjusting shim.
- (1) Place a new adjusting shim on the valve lifter.
  - (2) Using SST (A), press down the valve lifter and remove SST (B).
- SST 09248-55040 (09248-05410, 09248-05020)
- (d) Recheck the valve clearance.

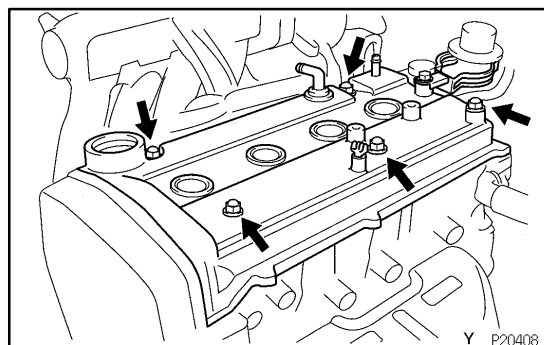


**7. REINSTALL CYLINDER HEAD COVER**

- (a) Apply seal packing to the cylinder head as shown in the illustration.

**Seal packing:**

**Part No. 08826-00080 or equivalent**



- (b) Install the gasket to the cylinder head cover.
- (c) Install the cylinder head cover with the 5 seal washers and cap nuts.
- Torque: 7.0 N·m (70 kgf·cm, 61 in.-lbf)**
- (d) Install oil filler cap.
- 8. REINSTALL IGNITION COILS AND HIGH-TENSION CORDS**
- 9. RECONNECT EGR VACUUM MODULATOR**
- 10. RECONNECT PCV HOSES TO CYLINDER HEAD COVER**



## Adjusting Shim Selection Chart (Intake)

Measured clearance mm (in.)	Installed shim thickness mm (in.)	2.500 (0.0984)	2.525 (0.0994)	2.550 (0.1004)	2.575 (0.1014)	2.600 (0.1024)	2.625 (0.1034)	2.650 (0.1043)	2.675 (0.1053)	2.700 (0.1063)	2.725 (0.1071)	2.750 (0.1079)	2.775 (0.1083)	2.800 (0.1087)	2.825 (0.1094)	2.850 (0.1102)	2.875 (0.1110)	2.900 (0.1118)	2.925 (0.1122)	2.950 (0.1126)	2.975 (0.1134)	3.000 (0.1142)	3.025 (0.1150)	3.050 (0.1157)	3.075 (0.1161)	3.100 (0.1165)	3.125 (0.1173)	3.150 (0.1181)	3.175 (0.1189)	3.200 (0.1197)	3.225 (0.1201)	3.250 (0.1205)	3.275 (0.1213)	3.300 (0.1220)	3.325 (0.1228)	3.350 (0.1236)	3.375 (0.1244)	3.400 (0.1252)	3.425 (0.1260)	3.450 (0.1268)	3.475 (0.1276)	3.500 (0.1284)	3.525 (0.1292)	3.550 (0.1300)	3.575 (0.1308)	3.600 (0.1316)	3.625 (0.1324)	3.650 (0.1332)	3.675 (0.1340)	3.700 (0.1348)	3.725 (0.1356)	3.750 (0.1364)	3.775 (0.1372)	3.800 (0.1380)	3.825 (0.1388)	3.850 (0.1396)	3.875 (0.1404)	3.900 (0.1412)	3.925 (0.1420)	3.950 (0.1428)	3.975 (0.1436)	4.000 (0.1444)	4.025 (0.1452)	4.050 (0.1460)	4.075 (0.1468)	4.100 (0.1476)	4.125 (0.1484)	4.150 (0.1492)	4.175 (0.1500)	4.200 (0.1508)	4.225 (0.1516)	4.250 (0.1524)	4.275 (0.1532)	4.300 (0.1540)	4.325 (0.1548)	4.350 (0.1556)	4.375 (0.1564)	4.400 (0.1572)	4.425 (0.1580)	4.450 (0.1588)	4.475 (0.1596)	4.500 (0.1604)	4.525 (0.1612)	4.550 (0.1620)	4.575 (0.1628)	4.600 (0.1636)	4.625 (0.1644)	4.650 (0.1652)	4.675 (0.1660)	4.700 (0.1668)	4.725 (0.1676)	4.750 (0.1684)	4.775 (0.1692)	4.800 (0.1700)	4.825 (0.1708)	4.850 (0.1716)	4.875 (0.1724)	4.900 (0.1732)	4.925 (0.1740)	4.950 (0.1748)	4.975 (0.1756)	5.000 (0.1764)	5.025 (0.1772)	5.050 (0.1780)	5.075 (0.1788)	5.100 (0.1796)	5.125 (0.1804)	5.150 (0.1812)	5.175 (0.1820)	5.200 (0.1828)	5.225 (0.1836)	5.250 (0.1844)	5.275 (0.1852)	5.300 (0.1860)	5.325 (0.1868)	5.350 (0.1876)	5.375 (0.1884)	5.400 (0.1892)	5.425 (0.1900)	5.450 (0.1908)	5.475 (0.1916)	5.500 (0.1924)	5.525 (0.1932)	5.550 (0.1940)	5.575 (0.1948)	5.600 (0.1956)	5.625 (0.1964)	5.650 (0.1972)	5.675 (0.1980)	5.700 (0.1988)	5.725 (0.1996)	5.750 (0.2004)	5.775 (0.2012)	5.800 (0.2020)	5.825 (0.2028)	5.850 (0.2036)	5.875 (0.2044)	5.900 (0.2052)	5.925 (0.2060)	5.950 (0.2068)	5.975 (0.2076)	6.000 (0.2084)	6.025 (0.2092)	6.050 (0.2100)	6.075 (0.2108)	6.100 (0.2116)	6.125 (0.2124)	6.150 (0.2132)	6.175 (0.2140)	6.200 (0.2148)	6.225 (0.2156)	6.250 (0.2164)	6.275 (0.2172)	6.300 (0.2180)	6.325 (0.2188)	6.350 (0.2196)	6.375 (0.2204)	6.400 (0.2212)	6.425 (0.2220)	6.450 (0.2228)	6.475 (0.2236)	6.500 (0.2244)	6.525 (0.2252)	6.550 (0.2260)	6.575 (0.2268)	6.600 (0.2276)	6.625 (0.2284)	6.650 (0.2292)	6.675 (0.2300)	6.700 (0.2308)	6.725 (0.2316)	6.750 (0.2324)	6.775 (0.2332)	6.800 (0.2340)	6.825 (0.2348)	6.850 (0.2356)	6.875 (0.2364)	6.900 (0.2372)	6.925 (0.2380)	6.950 (0.2388)	6.975 (0.2396)	7.000 (0.2404)	7.025 (0.2412)	7.050 (0.2420)	7.075 (0.2428)	7.100 (0.2436)	7.125 (0.2444)	7.150 (0.2452)	7.175 (0.2460)	7.200 (0.2468)	7.225 (0.2476)	7.250 (0.2484)	7.275 (0.2492)	7.300 (0.2500)	7.325 (0.2508)	7.350 (0.2516)	7.375 (0.2524)	7.400 (0.2532)	7.425 (0.2540)	7.450 (0.2548)	7.475 (0.2556)	7.500 (0.2564)	7.525 (0.2572)	7.550 (0.2580)	7.575 (0.2588)	7.600 (0.2596)	7.625 (0.2604)	7.650 (0.2612)	7.675 (0.2620)	7.700 (0.2628)	7.725 (0.2636)	7.750 (0.2644)	7.775 (0.2652)	7.800 (0.2660)	7.825 (0.2668)	7.850 (0.2676)	7.875 (0.2684)	7.900 (0.2692)	7.925 (0.2700)	7.950 (0.2708)	7.975 (0.2716)	8.000 (0.2724)	8.025 (0.2732)	8.050 (0.2740)	8.075 (0.2748)	8.100 (0.2756)	8.125 (0.2764)	8.150 (0.2772)	8.175 (0.2780)	8.200 (0.2788)	8.225 (0.2796)	8.250 (0.2804)	8.275 (0.2812)	8.300 (0.2820)	8.325 (0.2828)	8.350 (0.2836)	8.375 (0.2844)	8.400 (0.2852)	8.425 (0.2860)	8.450 (0.2868)	8.475 (0.2876)	8.500 (0.2884)	8.525 (0.2892)	8.550 (0.2900)	8.575 (0.2908)	8.600 (0.2916)	8.625 (0.2924)	8.650 (0.2932)	8.675 (0.2940)	8.700 (0.2948)	8.725 (0.2956)	8.750 (0.2964)	8.775 (0.2972)	8.800 (0.2980)	8.825 (0.2988)	8.850 (0.2996)	8.875 (0.3004)	8.900 (0.3012)	8.925 (0.3020)	8.950 (0.3028)	8.975 (0.3036)	9.000 (0.3044)	9.025 (0.3052)	9.050 (0.3060)	9.075 (0.3068)	9.100 (0.3076)	9.125 (0.3084)	9.150 (0.3092)	9.175 (0.3100)	9.200 (0.3108)	9.225 (0.3116)	9.250 (0.3124)	9.275 (0.3132)	9.300 (0.3140)	9.325 (0.3148)	9.350 (0.3156)	9.375 (0.3164)	9.400 (0.3172)	9.425 (0.3180)	9.450 (0.3188)	9.475 (0.3196)	9.500 (0.3204)	9.525 (0.3212)	9.550 (0.3220)	9.575 (0.3228)	9.600 (0.3236)	9.625 (0.3244)	9.650 (0.3252)	9.675 (0.3260)	9.700 (0.3268)	9.725 (0.3276)	9.750 (0.3284)	9.775 (0.3292)	9.800 (0.3300)	9.825 (0.3308)	9.850 (0.3316)	9.875 (0.3324)	9.900 (0.3332)	9.925 (0.3340)	9.950 (0.3348)	9.975 (0.3356)	10.000 (0.3364)	10.025 (0.3372)	10.050 (0.3380)	10.075 (0.3388)	10.100 (0.3396)	10.125 (0.3404)	10.150 (0.3412)	10.175 (0.3420)	10.200 (0.3428)	10.225 (0.3436)	10.250 (0.3444)	10.275 (0.3452)	10.300 (0.3460)	10.325 (0.3468)	10.350 (0.3476)	10.375 (0.3484)	10.400 (0.3492)	10.425 (0.3500)	10.450 (0.3508)	10.475 (0.3516)	10.500 (0.3524)	10.525 (0.3532)	10.550 (0.3540)	10.575 (0.3548)	10.600 (0.3556)	10.625 (0.3564)	10.650 (0.3572)	10.675 (0.3580)	10.700 (0.3588)	10.725 (0.3596)	10.750 (0.3604)	10.775 (0.3612)	10.800 (0.3620)	10.825 (0.3628)	10.850 (0.3636)	10.875 (0.3644)	10.900 (0.3652)	10.925 (0.3660)	10.950 (0.3668)	10.975 (0.3676)	11.000 (0.3684)	11.025 (0.3692)	11.050 (0.3700)	11.075 (0.3708)	11.100 (0.3716)	11.125 (0.3724)	11.150 (0.3732)	11.175 (0.3740)	11.200 (0.3748)	11.225 (0.3756)	11.250 (0.3764)	11.275 (0.3772)	11.300 (0.3780)	11.325 (0.3788)	11.350 (0.3796)	11.375 (0.3804)	11.400 (0.3812)	11.425 (0.3820)	11.450 (0.3828)	11.475 (0.3836)	11.500 (0.3844)	11.525 (0.3852)	11.550 (0.3860)	11.575 (0.3868)	11.600 (0.3876)	11.625 (0.3884)	11.650 (0.3892)	11.675 (0.3900)	11.700 (0.3908)	11.725 (0.3916)	11.750 (0.3924)	11.775 (0.3932)	11.800 (0.3940)	11.825 (0.3948)	11.850 (0.3956)	11.875 (0.3964)	11.900 (0.3972)	11.925 (0.3980)	11.950 (0.3988)	11.975 (0.3996)	12.000 (0.4004)	12.025 (0.4012)	12.050 (0.4020)	12.075 (0.4028)	12.100 (0.4036)	12.125 (0.4044)	12.150 (0.4052)	12.175 (0.4060)	12.200 (0.4068)	12.225 (0.4076)	12.250 (0.4084)	12.275 (0.4092)	12.300 (0.4100)	12.325 (0.4108)	12.350 (0.4116)	12.375 (0.4124)	12.400 (0.4132)	12.425 (0.4140)	12.450 (0.4148)	12.475 (0.4156)	12.500 (0.4164)	12.525 (0.4172)	12.550 (0.4180)	12.575 (0.4188)	12.600 (0.4196)	12.625 (0.4204)	12.650 (0.4212)	12.675 (0.4220)	12.700 (0.4228)	12.725 (0.4236)	12.750 (0.4244)	12.775 (0.4252)	12.800 (0.4260)	12.825 (0.4268)	12.850 (0.4276)	12.875 (0.4284)	12.900 (0.4292)	12.925 (0.4300)	12.950 (0.4308)	12.975 (0.4316)	13.000 (0.4324)	13.025 (0.4332)	13.050 (0.4340)	13.075 (0.4348)	13.100 (0.4356)	13.125 (0.4364)	13.150 (0.4372)	13.175 (0.4380)	13.200 (0.4388)	13.225 (0.4396)	13.250 (0.4404)	13.275 (0.4412)	13.300 (0.4420)	13.325 (0.4428)	13.350 (0.4436)	13.375 (0.4444)	13.400 (0.4452)	13.425 (0.4460)	13.450 (0.4468)	13.475 (0.4476)	13.500 (0.4484)	13.525 (0.4492)	13.550 (0.4500)	13.575 (0.4508)	13.600 (0.4516)	13.625 (0.4524)	13.650 (0.4532)	13.675 (0.4540)	13.700 (0.4548)	13.725 (0.4556)	13.750 (0.4564)	13.775 (0.4572)	13.800 (0.4580)	13.825 (0.4588)	13.850 (0.4596)	13.875 (0.4604)	13.900 (0.4612)	13.925 (0.4620)	13.950 (0.4628)	13.975 (0.4636)	14.000 (0.4644)	14.025 (0.4652)	14.050 (0.4660)	14.075 (0.4668)	14.100 (0.4676)	14.125 (0.4684)	14.150 (0.4692)	14.175 (0.4700)	14.200 (0.4708)	14.225 (0.4716)	14.250 (0.4724)	14.275 (0.4732)	14.300 (0.4740)	14.325 (0.4748)	14.350 (0.4756)	14.375 (0.4764)	14.400 (0.4772)	14.425 (0.4780)	14.450 (0.4788)	14.475 (0.4796)	14.500 (0.4804)	14.525 (0.4812)	14.550 (0.4820)	14.575 (0.4828)	14.600 (0.4836)	14.625 (0.4844)	14.650 (0.4852)	14.675 (0.4860)	14.700 (0.4868)	14.725 (0.4876)	14.750 (0.4884)	14.775 (0.4892)	14.800 (0.4900)	14.825 (0.4908)	14.850 (0.4916)	14.875 (0.4924)	14.900 (0.4932)	14.925 (0.4940)	14.950 (0.4948)	14.975 (0.4956)	15.000 (0.4964)	15.025 (0.4972)	15.050 (0.4980)	15.075 (0.4988)	15.100 (0.4996)	15.125 (0.5004)	15.150 (0.5012)	15.175 (0.5020)	15.200 (0.5028)	15.225 (0.5036)	15.250 (0.5044)	15.275 (0.5052)	15.300 (0.5060)	15.325 (0.5068)	15.350 (0.5076)	15.375 (0.5084)	15.400 (0.5092)	15.425 (0.5100)	15.450 (0.5108)	15.475 (0.5116)	15.500 (0.5124)	15.525 (0.5132)	15.550 (0.5140)	15.575 (0.5148)	15.600 (0.5156)	15.625 (0.5164)	15.650 (0.5172)	15.675 (0.5180)	15.700 (0.5188)	15.725 (0.5196)	15.750 (0.5204)	15.775 (0.5212)	15.800 (0.5220)	15.825 (0.5228)	15.850 (0.5236)	15.875 (0.5244)	15.900 (0.5252)	15.925 (0.5260)	15.950 (0.5268)	15.975 (0.5276)	16.000 (0.5284)	16.025 (0.5292)	16.050 (0.5300)	16.075 (0.5308)	16.100 (0.5316)	16.125 (0.5324)	16.150 (0.5332)	16.175 (0.5340)	16.200 (0.5348)	16.225 (0.5356)	16.250 (0.5364)	16.275 (0.5372)	16.300 (0.5380)	16.325 (0.5388)	16.350 (0.5396)	16.375 (0.5404)	16.400 (0.5412)	16.425 (0.5420)	16.450 (0.5428)	16.475 (0.5436)	16.500 (0.5444)	16.525 (0.5452)	16.550 (0.5460)	16.575 (0.5468)	16.600 (0.5476)	16.625 (0.5484)	16.650 (0.5492)	16.675 (0.5500)	16.700 (0.5508)	16.725 (0.5516)	16.750 (0.5524)	16.775 (0.5532)	16.800 (0.5540)	16.825 (0.5548)	16.850 (0.5556)	16.875 (0.5564)	16.900 (0.5572)	16.925 (0.5580)	16.950 (0.5588)	16.975 (0.5596)	17.000 (0.5604)	17.025 (0.5612)	17.050 (0.5620)	17.075 (0.5628)	17.100 (0.5636)	17.125 (0.5644)	17.150 (0.5652)	17.175 (0.5660)	17.200 (0.5668)	17.225 (0.5676)	17.250 (0.5684)	17.275 (0.5692)	17.300 (0.5700)	17.325 (0.5708)	17.350 (0.5716)	17.375 (0.5724)	17.400 (0.5732)	17.425 (0.5740)	17.450 (0.5748)	17.475 (0.5756)	17.500 (0.5764)	17.525 (0.5772)	17.550 (0.5780)	17.575 (0.5788)	17.600 (0.5796)	17.625 (0.5804)	17.650 (0.5812)	17.675 (0.5820)	17.700 (0.5828)	17.725 (0.5836)	17.750 (0.5844)	17.775 (0.5852)	17.800 (0.5860)	17.825 (0.5868)	17.850 (0.5876)	17.875 (0.5884)	17.900 (0.5892)	17.925 (0.5900)	17.950 (0.5908)	17.975 (0.5916)	18.000 (0.5924)	18.025 (0.5932)	18.050 (0.5940)	18.075 (0.5948)	18.100 (0.5956)	18.125 (0.5964)	18.150 (0.5972)	18.175 (0.5980)	18.200 (0.5988)	18.225 (0.5996)	18.250 (0.6004)	18.275 (0.6012)	18.300 (0.6020)	18.325 (0.6028)	18.350 (0.6036)	18.375 (0.6044)	18.400 (0.6052)	18.425 (0.6060)	18.450 (0.6068)	18.475 (0.6076)	18.500 (0.6084)	18.525 (0.6092)	18.550 (0.6100)	18.575 (0.6108)	18.600 (0.6116)	18.625 (0.6124)	18.650 (0.6132)	18.675 (0.6140)	18.700 (0.6148)	18.725 (0.6156)	18.750 (0.6164)	18.775 (0.6172)	18.800 (0.6180)	18.825 (0.6188)	18.850 (0.6196)	18.875 (0.6204)	18.900 (0.6212)	18.925 (0.6220)	18.950 (0.6228)	18.975 (0.6236)	19.000 (0.6244)	19.025 (0.6252)	19.050 (0.6260)	19.075 (0.6268)	19.100 (0.6276)	19.125 (0.6284)	19.150 (0.6292)	19.175 (0.6300)	19.200 (0.6308)	19.225 (0.6316)	19.250 (0.6324)	19.275 (0.6332)	19.300 (0.6340)	19.325 (0.6348)	19.350 (0.6356)	19.375 (0.6364)	19.400 (0.6372)	19.425 (0.6380)	19.450 (0.6388)	19.475 (0.6396)	19.500 (0.6404)	19.525 (0.6412)	19.550 (0.6420)	19.575 (0.6428)	19.600 (0.6436)	19.625 (0.6444)	19.650 (0.6452)	19.675 (0.6460)	19.700 (0.6468)	19.725 (0.6476)	19.750 (0.6484)	19.775 (0.6492)	19.800 (0.6500)	19.825 (0.6508)	19.850 (0.6516)	1
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## Adjusting Shim Selection Chart (Exhaust)

Measured clearance mm (in.)	Installed shim thickness mm (in.)	New shim thickness mm (in.)																															
		Shim No.	Thickness	Shim No.	Thickness																												
0.000 – 0.020 (0.0000 – 0.0008)	2.500 (0.0984)	02	2.500 (0.0984)	20	2.950 (0.1161)																												
0.021 – 0.040 (0.0008 – 0.0016)	2.525 (0.0994)	04	2.550 (0.1004)	22	3.000 (0.1181)																												
0.041 – 0.060 (0.0016 – 0.0024)	2.550 (0.1004)	06	2.600 (0.1024)	24	3.050 (0.1201)																												
0.061 – 0.080 (0.0024 – 0.0031)	2.575 (0.1014)	08	2.650 (0.1043)	26	3.100 (0.1220)																												
0.081 – 0.100 (0.0032 – 0.0039)	2.575 (0.1014)	10	2.700 (0.1063)	28	3.150 (0.1240)																												
0.101 – 0.120 (0.0040 – 0.0047)	2.600 (0.1024)																																
0.121 – 0.140 (0.0048 – 0.0055)	2.620 (0.1031)																																
0.141 – 0.160 (0.0056 – 0.0063)	2.620 (0.1031)																																
0.161 – 0.180 (0.0063 – 0.0071)	2.640 (0.1039)																																
0.181 – 0.200 (0.0071 – 0.0079)	2.650 (0.1043)																																
0.201 – 0.220 (0.0079 – 0.0087)	2.660 (0.1047)																																
0.221 – 0.240 (0.0087 – 0.0094)	2.660 (0.1047)																																
0.241 – 0.260 (0.0095 – 0.0102)	2.680 (0.1055)																																
0.261 – 0.280 (0.0103 – 0.0110)	2.680 (0.1055)																																
0.281 – 0.300 (0.0111 – 0.0118)	2.700 (0.1063)																																
0.301 – 0.309 (0.0119 – 0.0122)	2.700 (0.1063)																																
0.310 – 0.410 (0.0122 – 0.0161)	2.720 (0.1071)																																
0.411 – 0.430 (0.0162 – 0.0169)	2.740 (0.1079)																																
0.431 – 0.450 (0.0170 – 0.0177)	2.750 (0.1083)																																
0.451 – 0.470 (0.0178 – 0.0185)	2.760 (0.1087)																																
0.471 – 0.490 (0.0185 – 0.0193)	2.760 (0.1087)																																
0.491 – 0.510 (0.0193 – 0.0201)	2.780 (0.1094)																																
0.511 – 0.530 (0.0201 – 0.0209)	2.780 (0.1094)																																
0.531 – 0.550 (0.0209 – 0.0217)	2.800 (0.1102)																																
0.551 – 0.570 (0.0217 – 0.0224)	2.820 (0.1110)																																
0.571 – 0.590 (0.0225 – 0.0232)	2.820 (0.1110)																																
0.591 – 0.610 (0.0233 – 0.0240)	2.840 (0.1118)																																
0.611 – 0.630 (0.0241 – 0.0248)	2.840 (0.1118)																																
0.631 – 0.650 (0.0248 – 0.0256)	2.860 (0.1126)																																
0.651 – 0.670 (0.0256 – 0.0264)	2.860 (0.1126)																																
0.671 – 0.690 (0.0264 – 0.0272)	2.880 (0.1134)																																
0.691 – 0.710 (0.0272 – 0.0280)	2.880 (0.1134)																																
0.711 – 0.730 (0.0280 – 0.0287)	2.900 (0.1142)																																
0.731 – 0.750 (0.0288 – 0.0295)	2.900 (0.1142)																																
0.751 – 0.770 (0.0296 – 0.0303)	2.920 (0.1150)																																
0.771 – 0.790 (0.0304 – 0.0311)	2.920 (0.1150)																																
0.791 – 0.810 (0.0311 – 0.0319)	2.940 (0.1157)																																
0.811 – 0.830 (0.0319 – 0.0327)	2.940 (0.1157)																																
0.831 – 0.850 (0.0327 – 0.0335)	2.960 (0.1161)																																
0.851 – 0.870 (0.0335 – 0.0343)	2.960 (0.1161)																																
0.871 – 0.890 (0.0343 – 0.0350)	2.980 (0.1169)																																
0.891 – 0.910 (0.0351 – 0.0358)	2.980 (0.1169)																																
0.911 – 0.930 (0.0359 – 0.0366)	2.980 (0.1173)																																
0.931 – 0.950 (0.0367 – 0.0374)	2.980 (0.1173)																																
0.951 – 0.970 (0.0374 – 0.0382)	3.000 (0.1181)																																
0.971 – 0.990 (0.0382 – 0.0390)	3.000 (0.1181)																																
0.991 – 1.010 (0.0390 – 0.0398)	3.020 (0.1189)																																
1.011 – 1.030 (0.0398 – 0.0406)	3.020 (0.1189)																																
1.031 – 1.050 (0.0406 – 0.0413)	3.040 (0.1197)																																
1.051 – 1.070 (0.0414 – 0.0421)	3.040 (0.1197)																																
1.071 – 1.090 (0.0422 – 0.0429)	3.060 (0.1201)																																
1.091 – 1.110 (0.0430 – 0.0437)	3.060 (0.1201)																																
1.111 – 1.130 (0.0437 – 0.0445)	3.080 (0.1213)																																
1.131 – 1.150 (0.0445 – 0.0453)	3.080 (0.1213)																																
1.151 – 1.170 (0.0453 – 0.0461)	3.100 (0.1220)																																
1.171 – 1.190 (0.0461 – 0.0469)	3.100 (0.1220)																																
1.191 – 1.210 (0.0469 – 0.0476)	3.120 (0.1228)																																
	3.120 (0.1228)																																
	3.140 (0.1236)																																
	3.140 (0.1236)																																
	3.150 (0.1240)																																
	3.150 (0.1240)																																
	3.160 (0.1244)																																
	3.160 (0.1244)																																
	3.180 (0.1252)																																
	3.180 (0.1252)																																
	3.200 (0.1260)																																
	3.200 (0.1260)																																
	3.225 (0.1270)																																
	3.225 (0.1270)																																
	3.250 (0.1280)																																
	3.250 (0.1280)																																
	3.275 (0.1289)																																
	3.275 (0.1289)																																
	3.300 (0.1299)																																
	3.300 (0.1299)																																

## Exhaust valve clearance (Cold):

0.31 - 0.41 mm (0.012 - 0.016 in.)

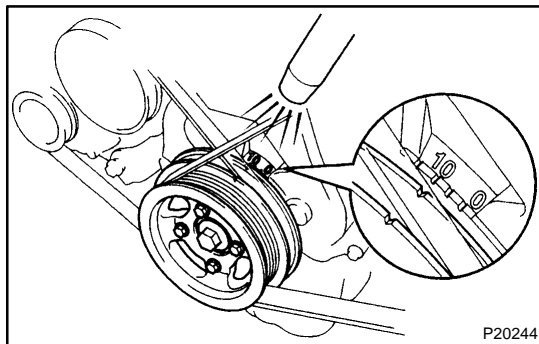
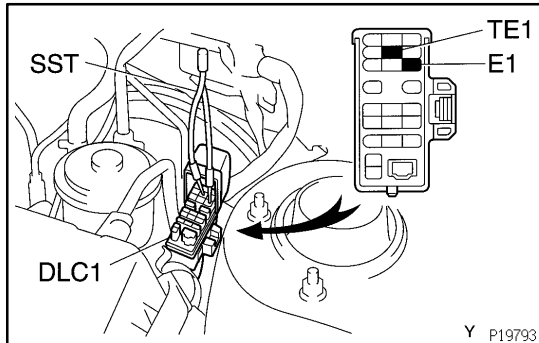
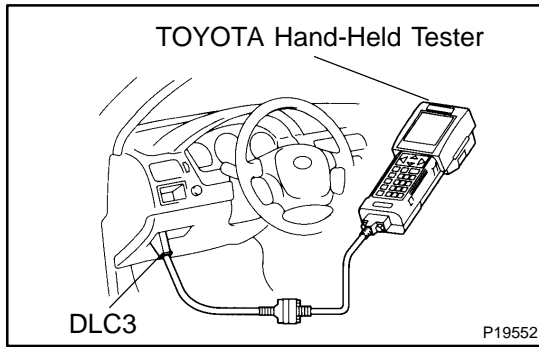
EXAMPLE: The 2.800 mm (0.1102 in.) shim is installed,  
and the measured clearance is 0.450 mm (0.0177 in.).

Replace the 2.800 mm (0.1102 in.) shim with a new No.18  
shim.

## New shim thickness mm (in.)

Shim No.	Thickness	Shim No.	Thickness
02	2.500 (0.0984)	20	2.950 (0.1161)
04	2.550 (0.1004)	22	3.000 (0.1181)
06	2.600 (0.1024)	24	3.050 (0.1201)
08	2.650 (0.1043)	26	3.100 (0.1220)
10	2.700 (0.1063)	28	3.150 (0.1240)
12	2.750 (0.1083)	30	3.200 (0.1260)
14	2.800 (0.1102)	32	3.250 (0.1280)
16	2.850 (0.1122)	34	3.300 (0.1299)
18	2.900 (0.1142)		

HINT: New shims have the thickness in millimeters  
imprinted on the face.



## IGNITION TIMING INSPECTION

EMOK9-03

### 1. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

### 2. CONNECT TOYOTA HAND-HELD TESTER OR OBDII SCAN TOOL

- Remove the fuse cover on the instrument panel.
- Connect the TOYOTA hand-held tester or OBDII scan tool to the DLC3.
- Please refer to the TOYOTA hand-held tester or OBDII scan tool operator's manual for further details.

### 3. CONNECT TIMING LIGHT

### 4. INSPECT IGNITION TIMING

- Using SST, connect terminals TE1 and E1 of the DLC1.  
SST 09843-18020

- Using a timing light, check the ignition timing.

**Ignition timing:**

**10° BTDC @ idle**

**(w/ Cooling fan OFF and transmission in neutral position)**

- Remove the SST from the DLC1.  
SST 09843-18020

### 5. FURTHER CHECK IGNITION TIMING

Check that the ignition timing advances.

**Ignition timing:**

**7 - 17° BTDC @ idle**

**(w/ Cooling fan OFF and transmission in neutral position)**

**HINT:**

The timing mark moves in a range between 7° and 17°.

### 6. DISCONNECT TIMING LIGHT

### 7. DISCONNECT TOYOTA HAND-HELD TESTER OR OBDII SCAN TOOL

# IDLE SPEED INSPECTION

## 1. INITIAL CONDITIONS

- (a) Engine coolant at normal operating temperature.
- (b) Air cleaner installed.
- (c) All pipes and hoses of air induction system connected.
- (d) All accessories switched OFF.
- (e) All vacuum lines properly connected.

### HINT:

All vacuum hoses for EGR system, etc. should be properly connected.

- (f) SFI system wiring connectors fully plugged.
- (g) Ignition timing set correctly.
- (h) Transmission in neutral position.

## 2. CONNECT TOYOTA HAND-HELD TESTER OR OBDII SCAN TOOL (See page [EM-9](#))

## 3. INSPECT IDLE SPEED

- (a) Race the engine speed at 2,500 rpm for approx. 90 seconds.
- (b) Check the idle speed.

### Idle speed:

**750 ± 50 rpm**

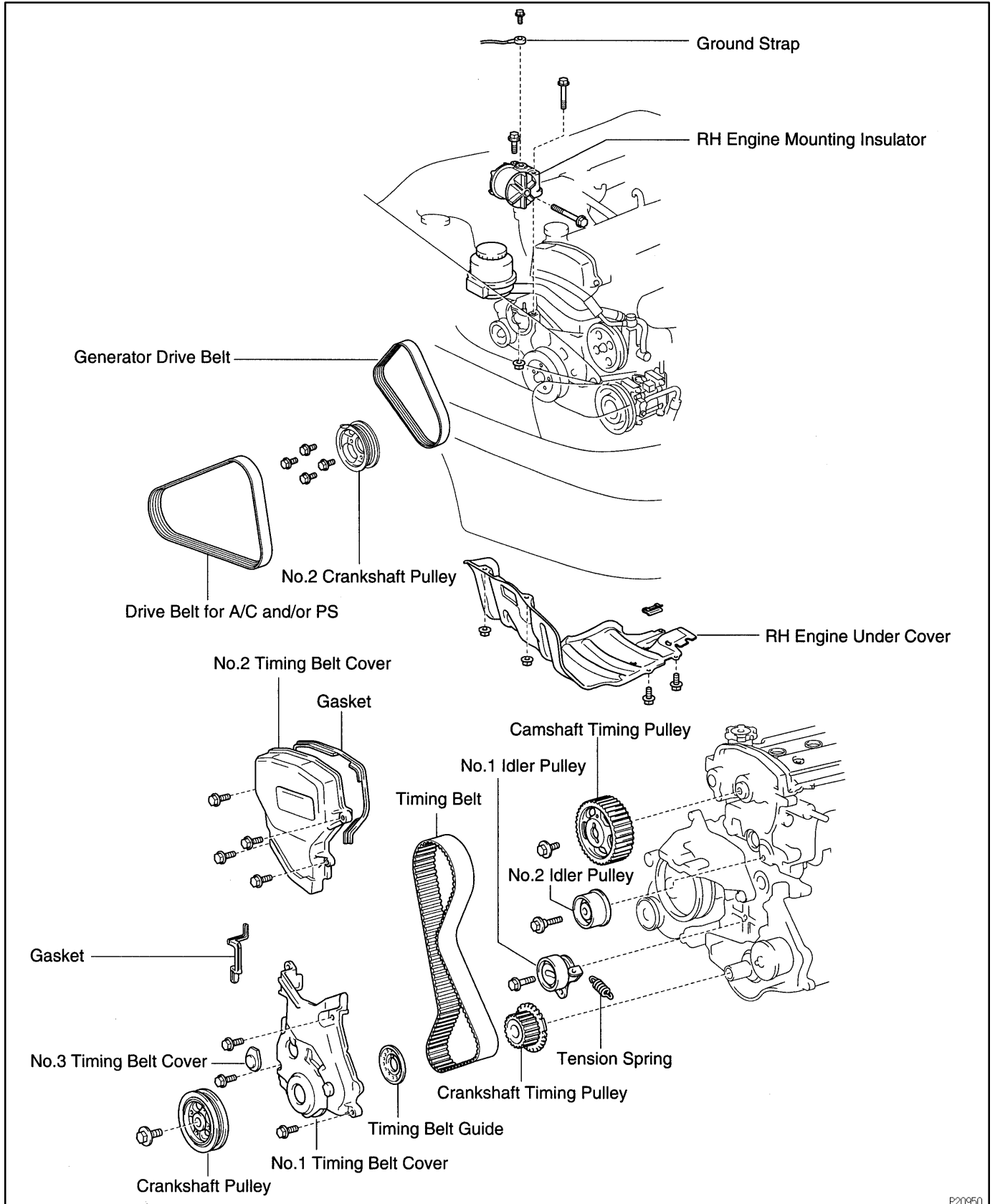
**(w/ Cooling fan OFF and transmission in neutral position)**

If the idle speed is not as specified, check the IAC valve and air intake system.

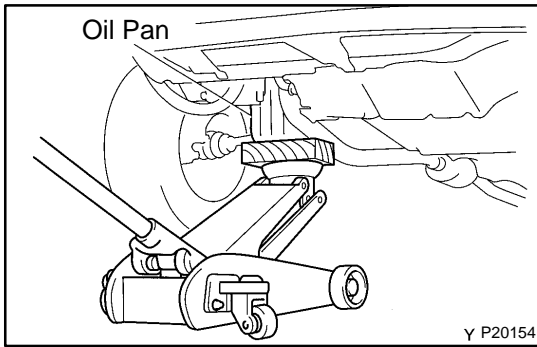
## 4. DISCONNECT TOYOTA HAND-HELD TESTER OR OBDII SCAN TOOL

# TIMING BELT COMPONENTS

EMOK4-05



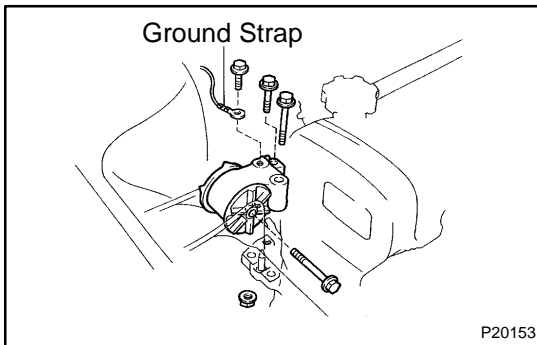
P20950



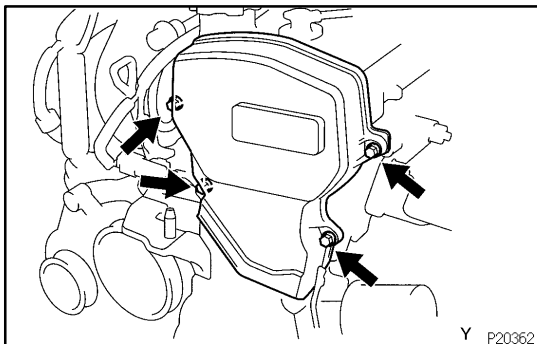
## REMOVAL

1. REMOVE RH ENGINE UNDER COVER
2. w/ A/C and/or w/ PS:  
REMOVE DRIVE BELT
3. REMOVE GENERATOR DRIVE BELT
4. SLIGHTY JACK UP ENGINE
5. SLIGHTLY JACK UP ENGINE

Raise the engine enough to remove the weight from the engine mounting on the right side.

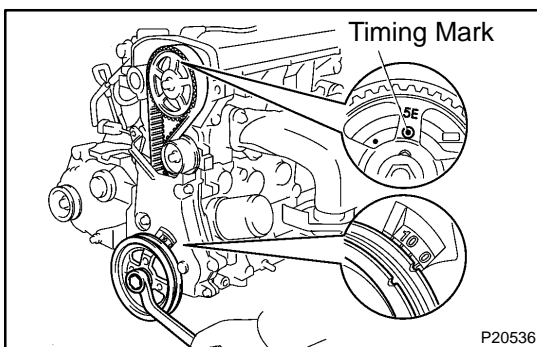


6. REMOVE RH ENGINE MOUNTING INSULATOR
  - (a) Remove the bolt and disconnect the ground strap.
  - (b) Remove the through bolt, 2 bolts, nut and mounting insulator.



7. REMOVE NO.2 TIMING BELT COVER
 

Remove the 4 bolts, timing belt cover and gasket.

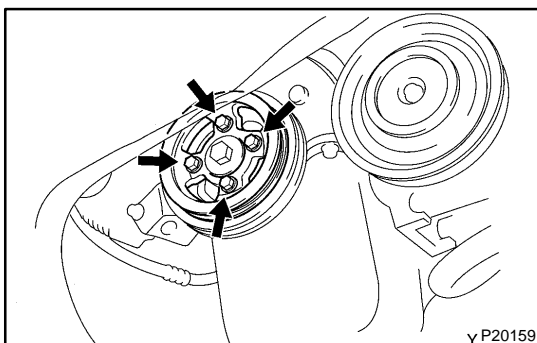


8. SET NO.1 CYLINDER TO TDC/COMPRESSION
  - (a) Turn the crankshaft pulley, and align its groove with the timing mark "0" of the No.1 timing belt cover.

### NOTICE:

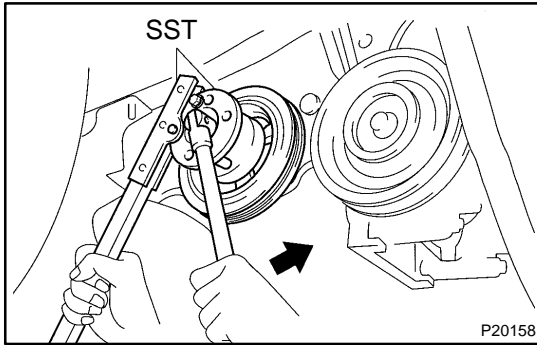
**Always turn the crankshaft clockwise.**

- (b) Check that the hole of the camshaft timing pulley on the side with the 5E mark is aligned with the timing mark of the No.1 bearing cap.  
If not, turn the crankshaft pulley 1 complete revolution (360°).

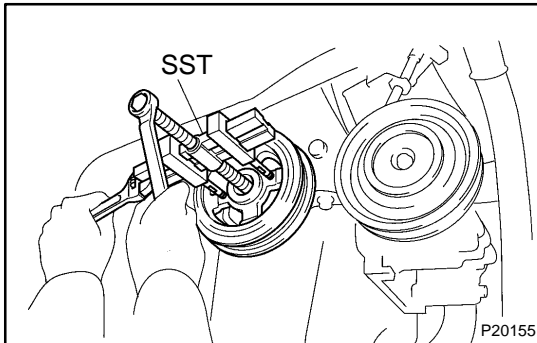


9. w/ A/C and/or w/ PS:  
REMOVE NO.2 CRANKSHAFT PULLEY
 

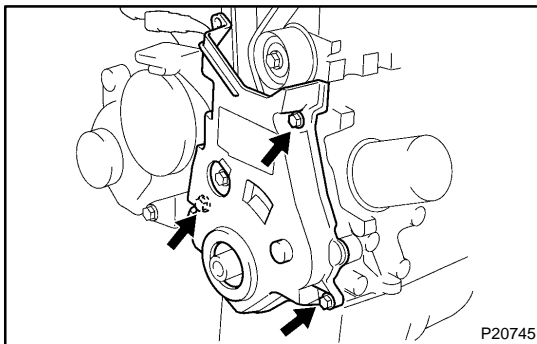
Remove the 4 bolts and No.2 crankshaft pulley.

**10. REMOVE CRANKSHAFT PULLEY**

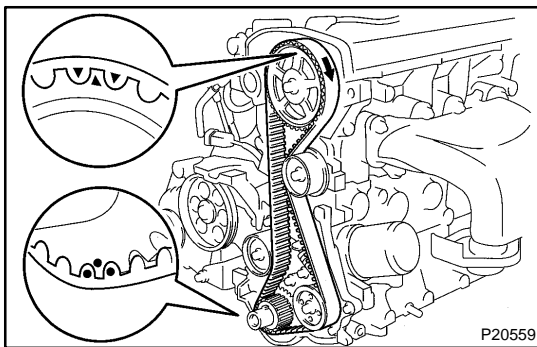
- (a) Using SST, remove the pulley bolt.  
SST 09213-14010, 09330-00021



- (b) Using SST, remove the pulley.  
SST 09950-50010 (09951-05010, 09952-05010,  
09953-05020, 09954-05020)

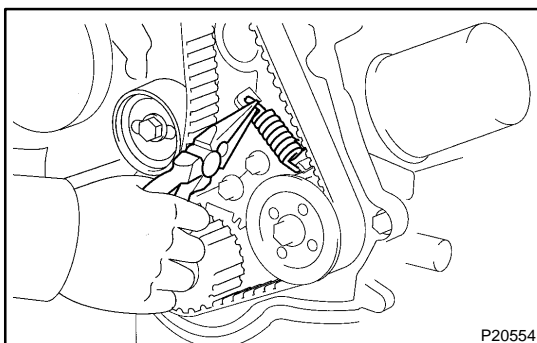
**11. REMOVE NO.3 TIMING BELT COVER****12. REMOVE NO.1 TIMING BELT COVER**

Remove the 3 bolts, timing belt cover and gasket.

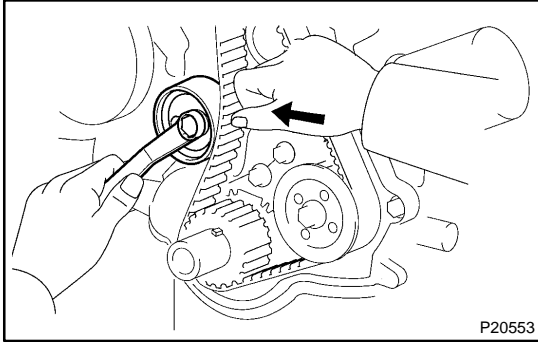
**13. REMOVE TIMING BELT GUIDE****14. REMOVE TIMING BELT****HINT:**

When re-using timing belt:

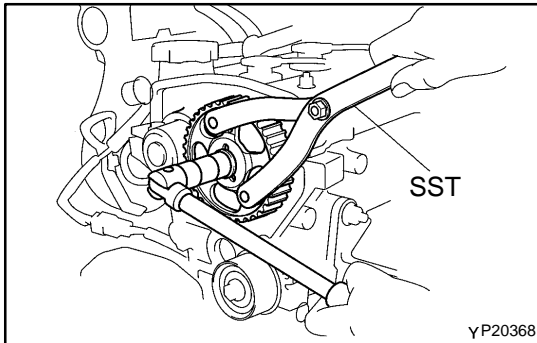
Draw a direction arrow on the timing belt (in direction of engine revolution), and place matchmarks on the timing belt and pulleys as shown in the illustration.



- (a) Remove the tension spring.

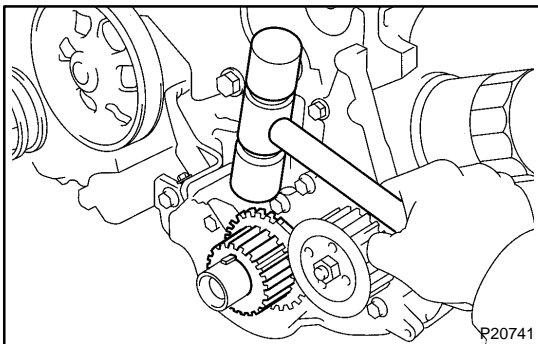


- (b) Loosen the No.1 idler pulley bolt and push it left as far as it will go and then temporarily tighten it.
- (c) Remove the timing belt.

**15. REMOVE CAMSHAFT TIMING PULLEY**

Using SST, remove the bolt and timing pulley.

SST 09960-10010 (09962-01000, 09963-01000)

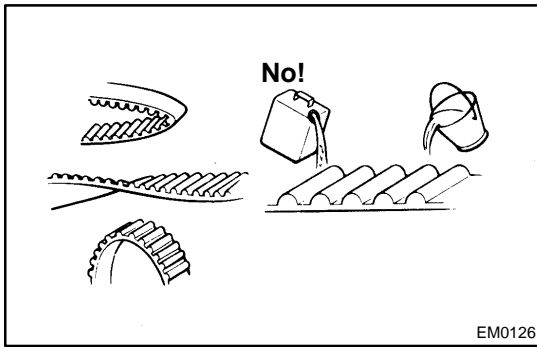
**16. REMOVE NO.1 IDLER PULLEY****17. REMOVE NO.2 IDLER PULLEY****18. REMOVE CRANKSHAFT TIMING PULLEY**

If the timing pulley cannot be removed by hand, use a plastic-faced hammer.

**NOTICE:**

**Do not pry the rotor part of the pulley with the screwdriver.**





## INSPECTION

### 1. INSPECT TIMING BELT

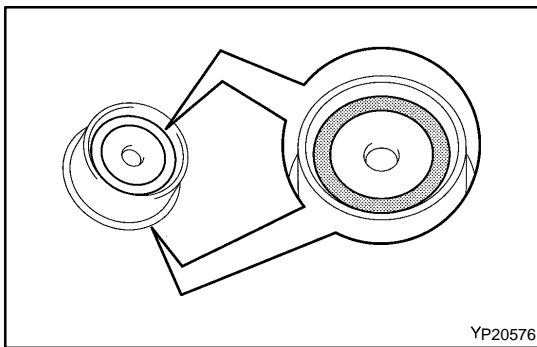
#### NOTICE:

- Do not bend, twist or turn the timing belt inside out.
- Do not allow the timing belt to come into contact with oil, water or steam.
- Do not utilize timing belt tension when installing or removing the mounting bolt of the camshaft timing pulley.

If there are any defects as shown in the illustration, check these points:

- (a) Premature parting
  - Check for proper installation.
  - Check the timing cover gasket for damage and proper installation.
- (b) If the belt teeth are cracked or damaged, check to see if either camshaft or oil pump is locked.
- (c) If there is noticeable wear or cracks on the belt face, check to see if there are nicks on the side of the idler pulley lock.
- (d) If there is wear or damage on only one side of the belt, check the belt guide and the alignment of each pulley.
- (e) If there is noticeable wear on the belt teeth, check the timing belt cover for damage and check gasket has been installed correctly and for foreign material on the pulley teeth.

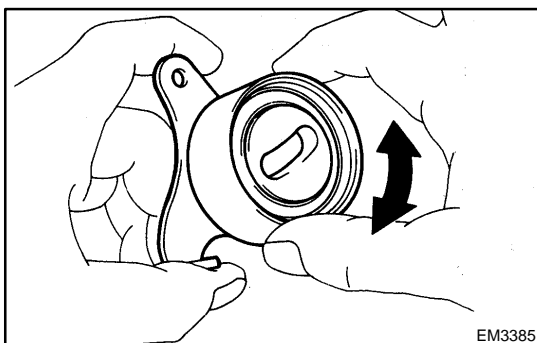
If necessary, replace the timing belt.



### 2. INSPECT IDLER PULLEYS

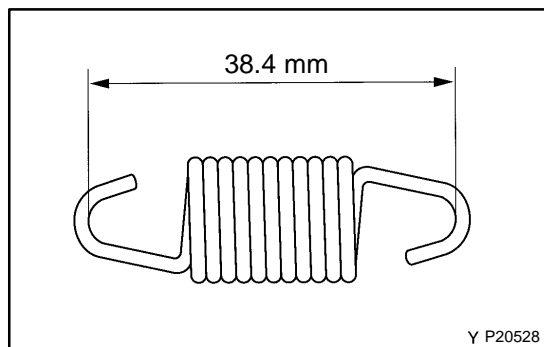
- (a) Visually check the seal portion of the idler pulley for oil leakage.

If leakage is found, replace the idler pulley.



- (b) Check that the idler pulley turns smoothly.

If necessary, replace the idler pulley.



### 3. INSPECT TENSION SPRING

- (a) Measure the free length of tension spring.

**Free length:**

**38.4 mm (1.512 in.)**

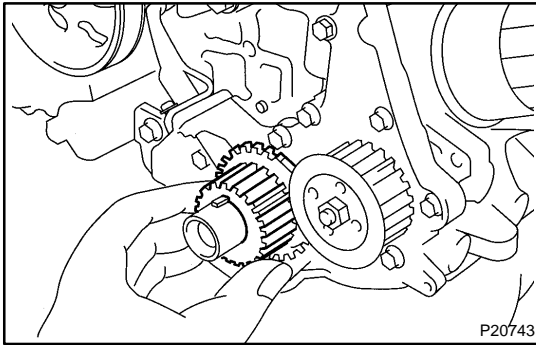
If the free length is not as specified, replace the tension spring.

- (b) Measure the tension of the tension spring at the specified installed length.

**Installed tension (at 47.4 mm (1.866 in.)):**

**32 N (3.3 kgf, 7.3 lbf)**

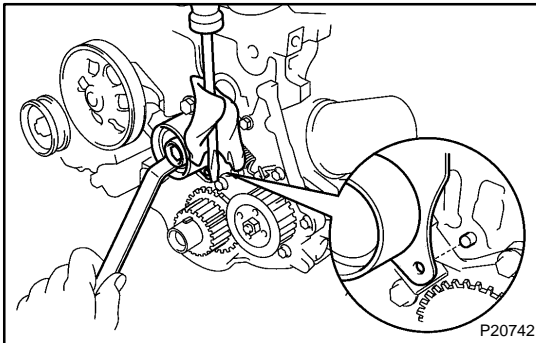
If the installed tension is not as specified, replace the tension spring.



## INSTALLATION

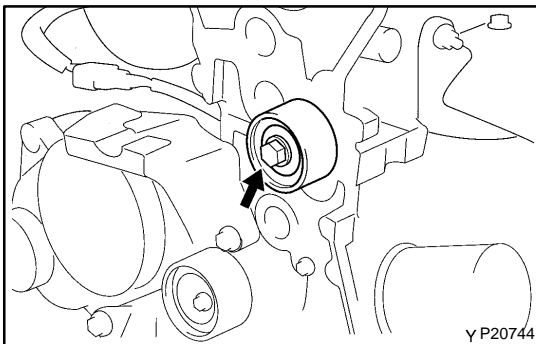
### 1. INSTALL CRANKSHAFT TIMING PULLEY

- (a) Align the pulley set key with the key groove of the pulley.
- (b) Slide on the timing pulley, facing the rotor side of the crankshaft position sensor inward.



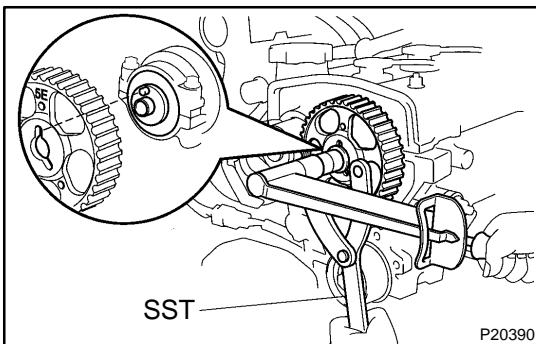
### 2. TEMPORARILY INSTALL NO.1 IDLER PULLEY AND TENSION SPRING

- (a) Install the tension spring to the idler pulley.
- (b) Align the bracket pin hole with the pivot pin.
- (c) Install the idler pulley with the bolt. Do not tighten the bolt yet.
- (d) Pry the idler pulley toward the left as far as it will go and temporarily tighten the bolt.
- (e) Check that the idler pulley moves smoothly.



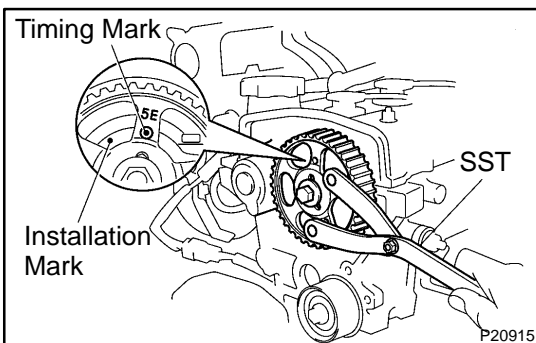
### 3. INSTALL NO.2 IDLER PULLEY

- (a) Install the idler pulley with the bolt.  
**Torque: 28 N·m (280 kgf-cm, 20 ft-lbf)**
- (b) Check that the idler pulley moves smoothly.



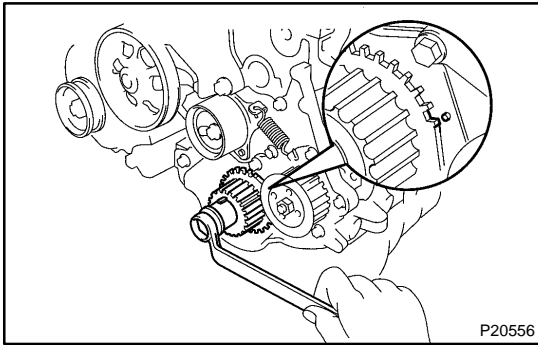
### 4. INSTALL CAMSHAFT TIMING PULLEY

- (a) Align the camshaft knock pin with the knock pin groove on the pulley side with the 5E mark, and slide on the timing pulley.
- (b) Using SST, install the pulley bolt.  
SST 09960-10010 (09962-01000, 09963-01000)  
**Torque: 51 N·m (510 kgf-cm, 37 ft-lbf)**

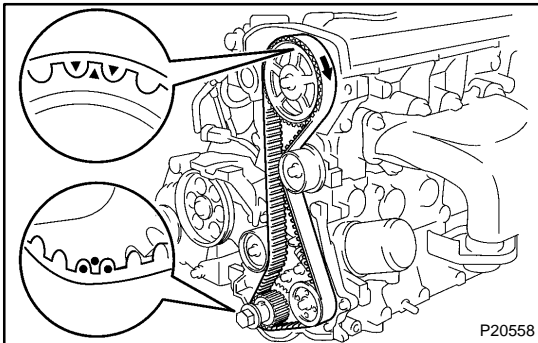


### 5. SET NO.1 CYLINDER TO TDC/COMPRESSION

- (a) Using SST, align the hole of the camshaft timing pulley on the side with the 5E mark with the timing mark of the bearing cap.  
SST 09960-10010 (09962-01000, 09963-01000)



- (b) Using the crankshaft pulley bolt, turn the crankshaft and align the timing marks of the crankshaft timing pulley and oil pump body.



## 6. INSTALL TIMING BELT

### NOTICE:

**The engine should be cold.**

### HINT:

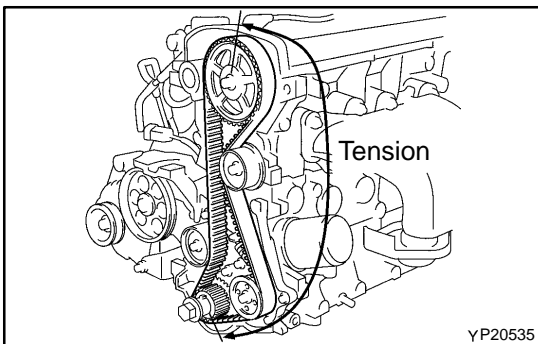
When re-using timing belt:

Align the points marked during removal, and install the belt with the arrow pointing in the direction of engine revolution.

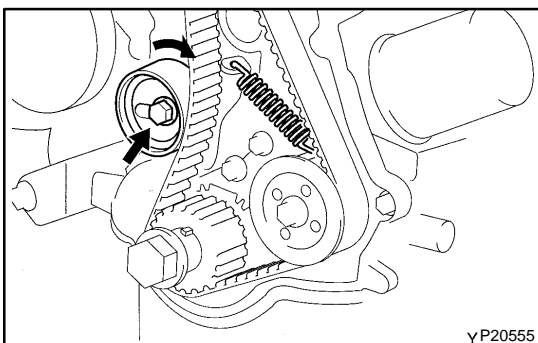
- (a) Remove any oil or water on the pulleys, and keep them clean.

### NOTICE:

**Only wipe the pulleys; do not use any cleansing agent.**

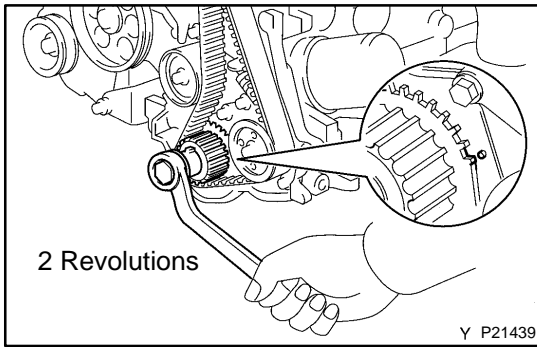


- (b) Install the timing belt, and check the tension between the crankshaft timing pulley and camshaft timing pulley.



## 7. CHECK VALVE TIMING

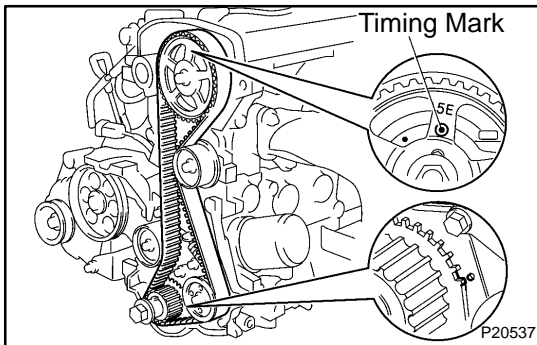
- (a) Loosen the No.1 idler pulley mount bolt, until the pulley is moved slightly by the spring tension.



- (b) Slowly turn the crankshaft pulley 2 revolutions from TDC to TDC.

**NOTICE:**

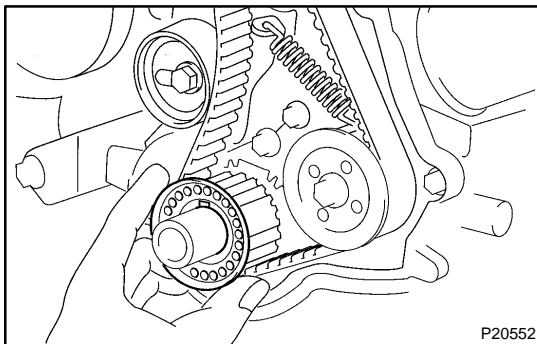
**Always turn the crankshaft clockwise.**



- (c) Check that each pulley aligns with the timing marks as shown in the illustration.

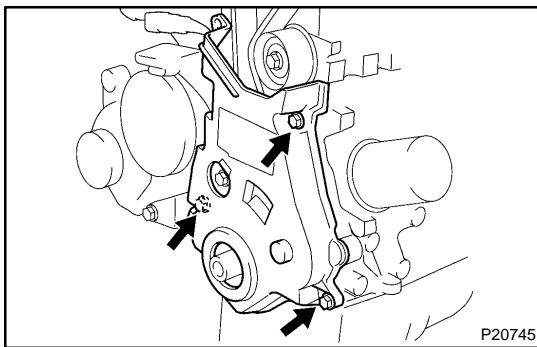
If the timing marks do not align, remove the timing belt and reinstall it.

- (d) Tighten the No.1 idler pulley bolt.  
**Torque: 18.5 N·m (185 kgf·cm, 13 ft·lbf)**
- (e) Remove the crankshaft pulley bolt.



**8. INSTALL TIMING BELT GUIDE**

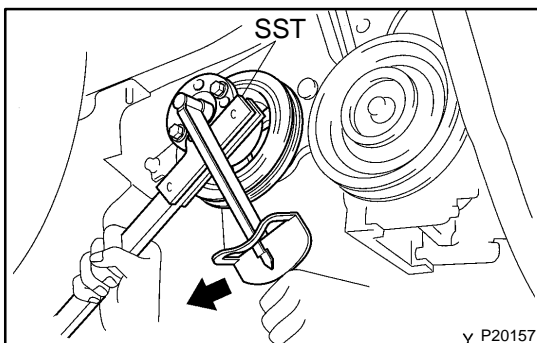
Install the guide, facing the cup side outward.



**9. INSTALL NO.1 TIMING BELT COVER**

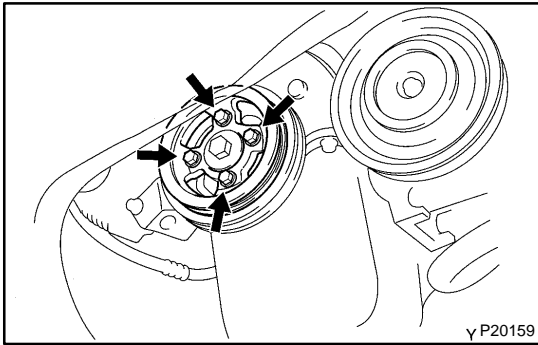
- (a) Install the gasket to the belt cover.  
 (b) Install the belt cover with the 3 bolts.

**10. INSTALL NO.3 TIMING BELT COVER**



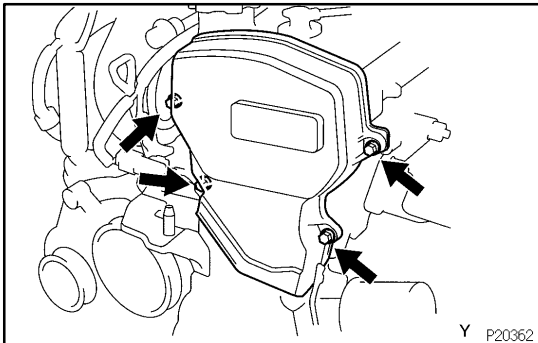
**11. INSTALL CRANKSHAFT PULLEY**

- (a) Align the pulley set key with the key groove of the pulley, and slide on the pulley.  
 (b) Using SST, install the pulley bolt.  
 SST 09213-14010, 09330-00021  
**Torque: 155 N·m (1,550 kgf·cm, 112 ft·lbf)**

**12. w/ A/C and/or w/ PS:****INSTALL NO.2 CRANKSHAFT PULLEY**

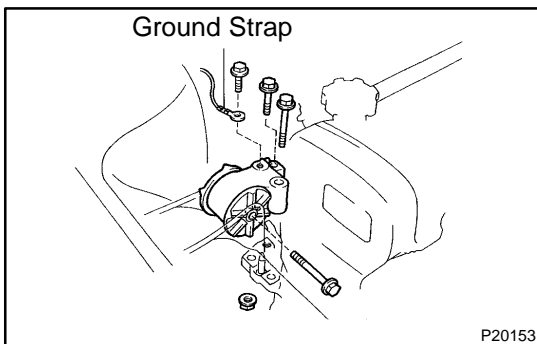
Install the No.2 crankshaft pulley with the 4 bolts.

**Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)**

**13. INSTALL NO.2 TIMING BELT COVER**

(a) Install the gasket to the belt cover.

(b) Install the belt cover with the 4 bolts.

**14. INSTALL RH ENGINE MOUNTING INSULATOR**

(a) Attach the RH mounting insulator to the mounting bracket and body, and temporarily install the through bolt, 2 bolts and nut.

(b) Torque the 2 bolts, nut and through bolt of the RH mounting insulator.

**Torque:**

**Through bolt**

**73 N·m (740 kgf·cm, 54 ft·lbf)**

**Others**

**64 N·m (650 kgf·cm, 47 ft·lbf)**

(c) Connect the ground strap with the bolt.

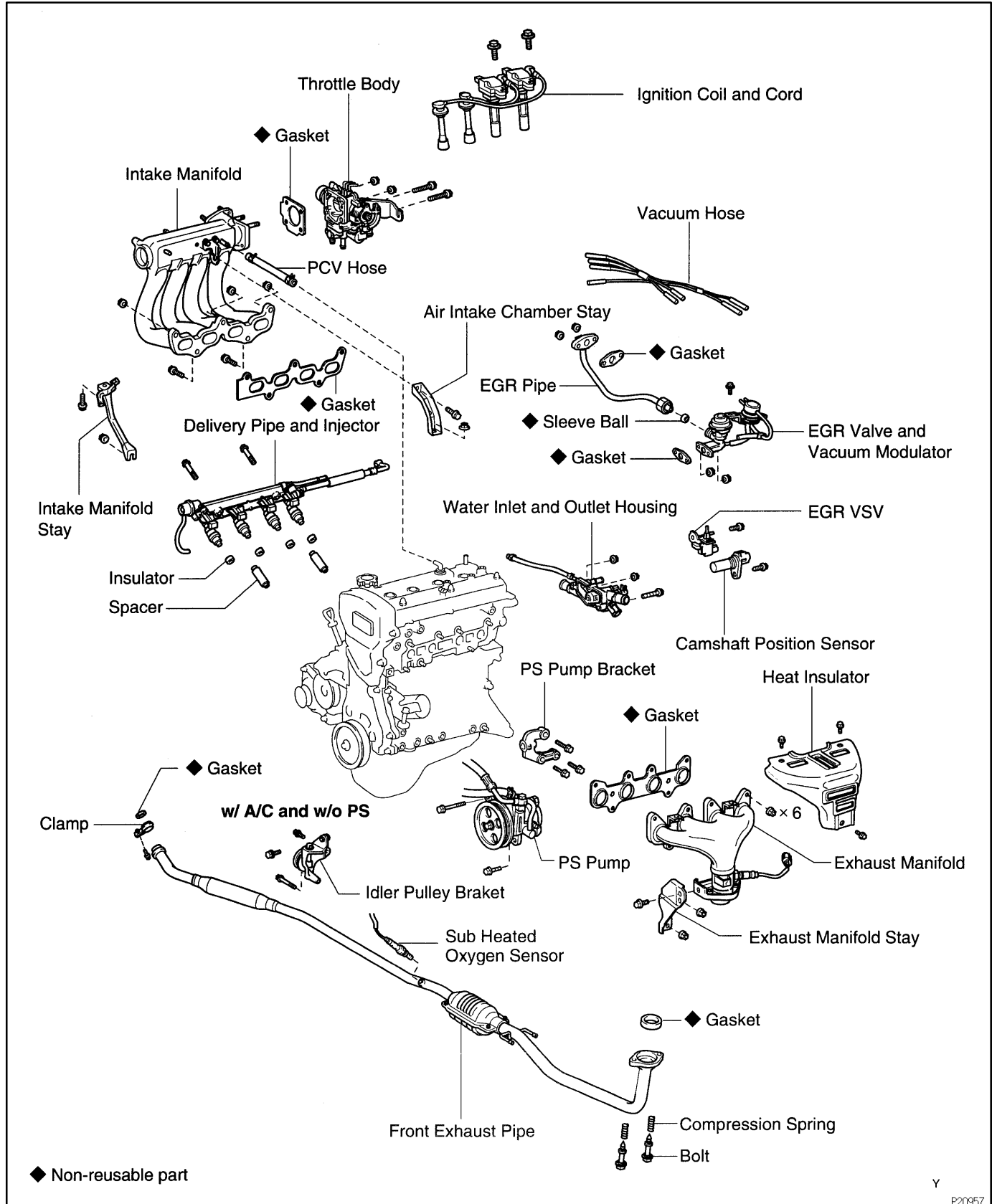
**15. INSTALL GENERATOR DRIVE BELT (See page [CH-2](#))****16. w/ A/C and/or w/ PS:****INSTALL DRIVE BELT**

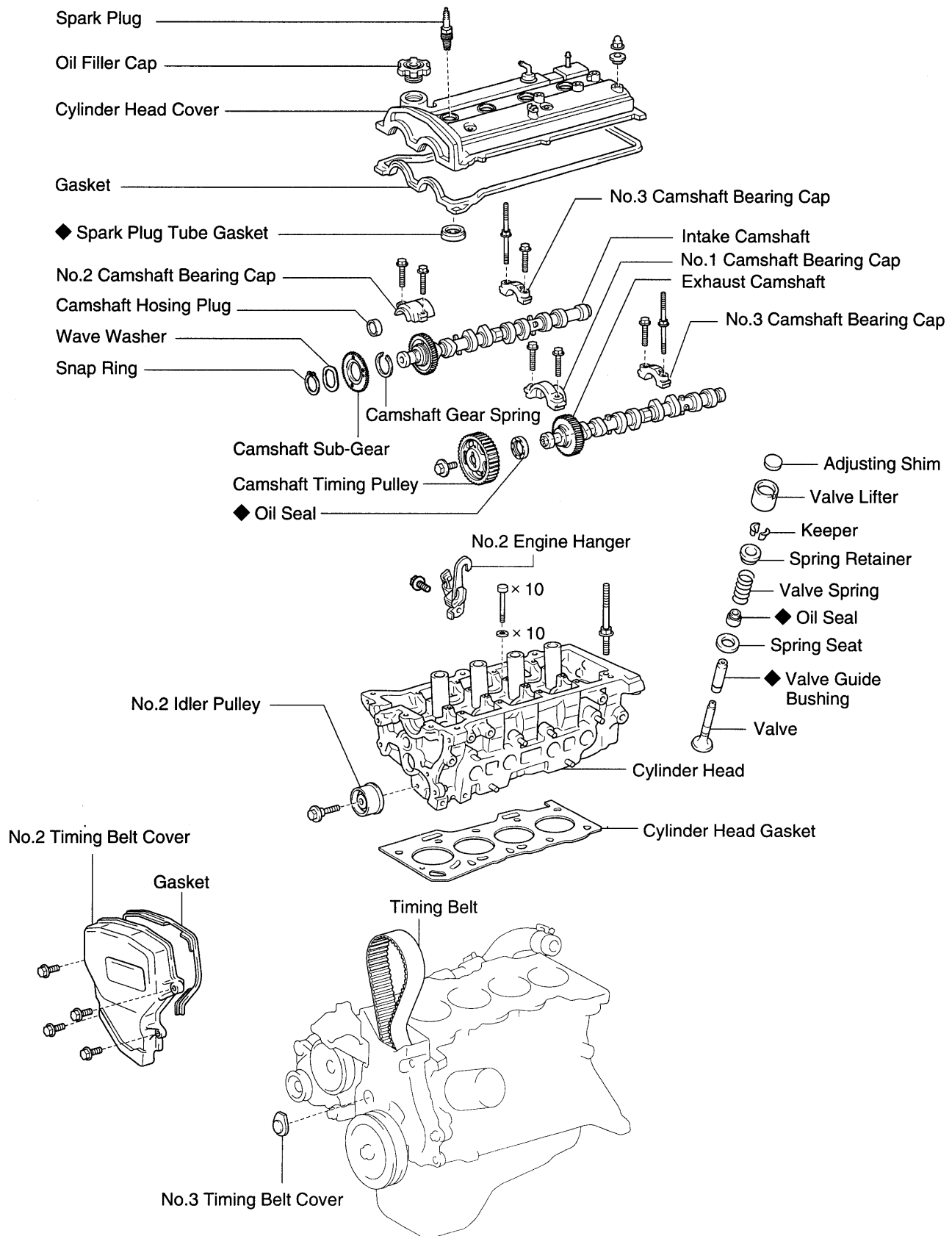
(See page [AC-18](#) and [SR-3](#))

**17. INSTALL RH ENGINE UNDER COVER**

# CYLINDER HEAD COMPONENTS

EM0JX-05



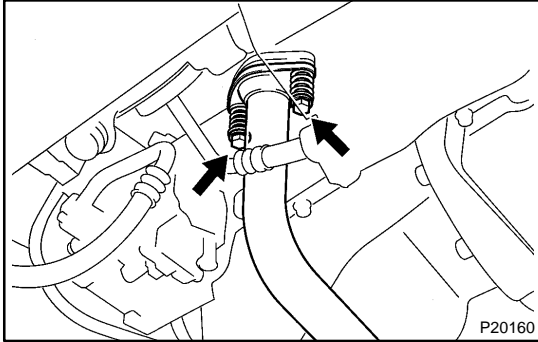


◆ Non-reusable part

Y

P20952



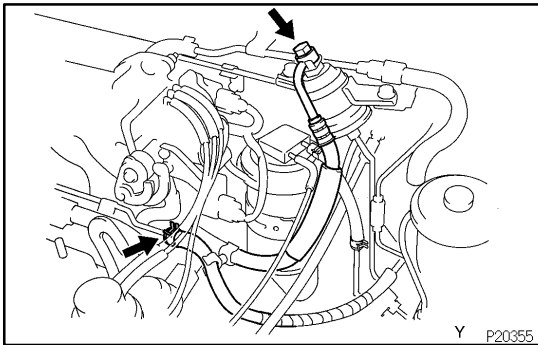


## REMOVAL

1. REMOVE RH ENGINE UNDER COVER
2. DRAIN ENGINE COOLANT
3. DISCONNECT FRONT EXHAUST PIPE

Remove the 2 bolts and 2 compression springs, and disconnect the front exhaust pipe.

4. A/T:  
DISCONNECT THROTTLE CABLE
5. DISCONNECT ACCELERATOR CABLE
6. REMOVE AIR CLEANER ASSEMBLY WITH AIR INTAKE CONNECTOR

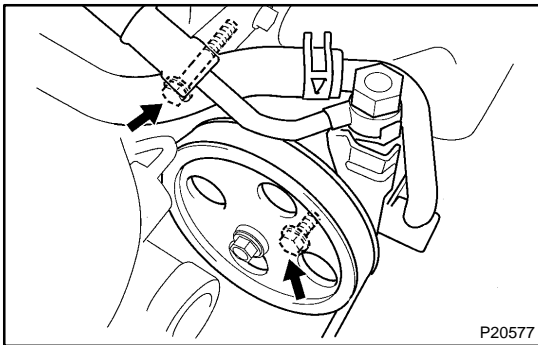


## 7. DISCONNECT FUEL HOSE

Remove the union bolt and gaskets, and disconnect the fuel inlet hose.

### NOTICE:

Catch leaking fuel in a container.

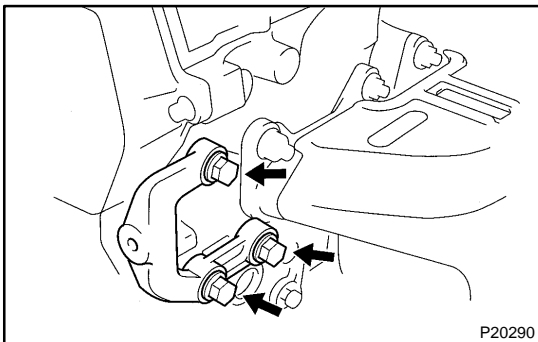


## 8. w/ PS: REMOVE PS PUMP AND PUMP BRACKET WITHOUT DISCONNECTING HOSES

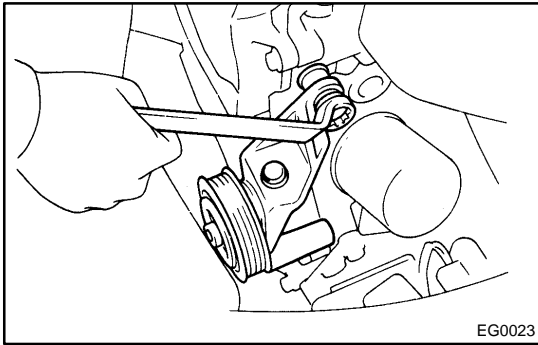
- (a) Loosen the 2 bolts, and remove the PS drive belt.
- (b) Remove the 2 bolts, and disconnect the PS pump from the engine.

### HINT:

Put aside the PS pump, and suspend it.



- (c) Remove the 3 bolts and PS pump bracket.



**9. w/ A/C and w/o PS:**

**REMOVE IDLER PULLEY BRACKET**

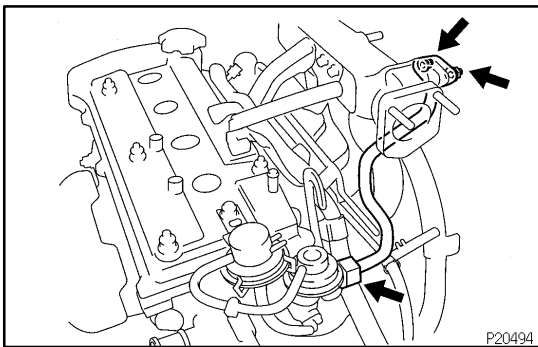
- (a) Loosen the idler pulley mounting nut and adjusting bolt, and remove the drive belt.
- (b) Remove the 3 bolts and idler pulley bracket.

**10. REMOVE IGNITION COILS AND SPARK PLUGS**

**11. DISCONNECT VACUUM HASES**

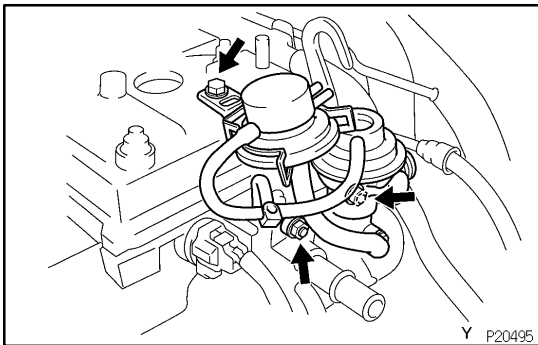
- (a) Disconnect the vacuum hose from the EGR valve.
- (b) Disconnect the 3 vacuum hoses from the throttle body.
- (c) Disconnect the vacuum hose from the TVV (to charcoal canister).
- (d) Disconnect the vacuum hose from the TVV (to throttle body).
- (e) Disconnect the vacuum hose from the EGR VSV.

**12. REMOVE THROTTLE BODY (See page [MF-28](#) )**



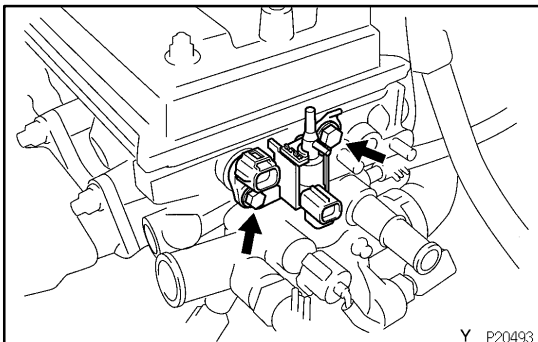
**13. REMOVE EGR PIPE**

Loosen the union nut, and remove the 2 nuts, EGR pipe and gasket.



**14. REMOVE EGR VALVE AND VACUUM MODULATOR**

- (a) Remove the bolt and disconnect the vacuum modulator.
- (b) Remove the 2 nuts, EGR valve, EGR vacuum modulator with the bracket and gasket.

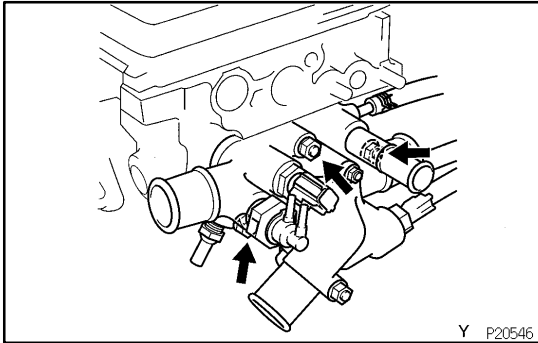


**15. REMOVE EGR VSV AND CAMSHAFT POSITION SENSOR**

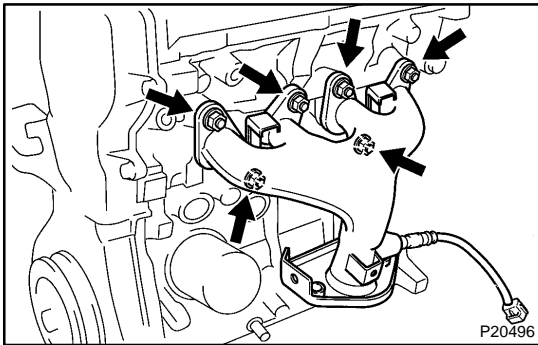
- (a) Disconnect the EGR VSV and camshaft position sensor connector.
- (b) Remove the bbolt and EGR VSV.
- (c) Remove the bolt, camshaft position sensor and O-ring.

**16. REMOVE WATER INLET AND OUTLET HOUSING**

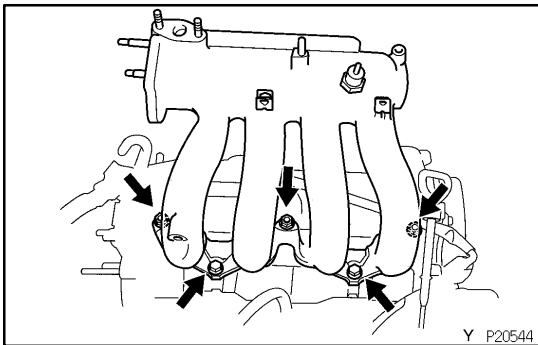
- (a) Disconnect the engine coolant temperature sender gauge connector.
- (b) Disconnect the engine coolant temperature sensor connector.
- (c) Disconnect the fan engine coolant temperature switch connector.
- (d) Disconnect the 2 radiator hoses.
- (e) Disconnect the water inlet hose.
- (f) Disconnect the heater outlet hose.
- (g) Remove the bolt, 2 nuts, the water inlet and outlet housing.

**17. REMOVE EXHAUST MANIFOLD**

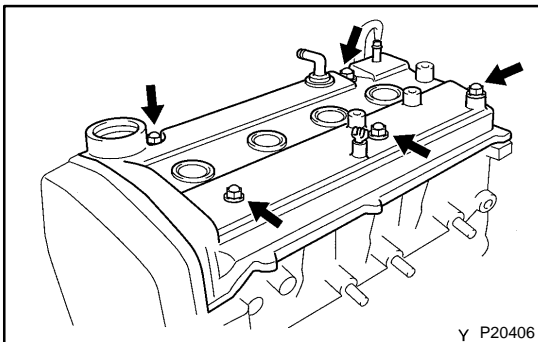
- (a) Remove the 3 bolts and heat insulator.
- (b) Remove the bolt, 2 nuts and exhaust manifold stay.
- (c) Remove the 6 nuts, exhaust manifold and gasket.

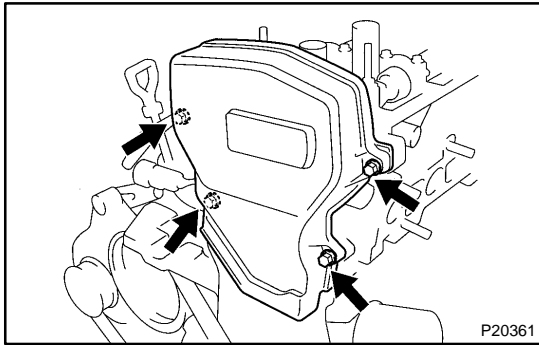
**18. REMOVE DELIVERY PIPE AND INJECTORS (See page MF-18 )****19. DISCONNECT BRAKE BOOSTER AND MAP VACUUM HOSES****20. REMOVE INTAKE MANIFOLD**

- (a) Disconnect the engine wire clamps from the intake manifold stay.
- (b) Remove the bolt, nut and intake manifold stay.
- (c) Remove the 2 bolts, 3 nuts, intake manifold and gasket with air pipe.

**21. REMOVE CYLINDER HEAD COVER**

- (a) Remove the oil filler cap.
- (b) Remove the 5 cap nuts and seal washers.
- (c) Pry out the cylinder head cover, and remove the cover and gasket.

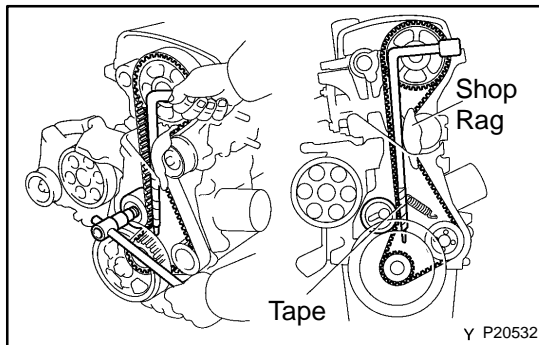


**22. REMOVE NO.2 TIMING BELT COVER**

Remove the 4 bolts, No.2 timing belt cover and gasket.

**23. REMOVE GENERATOR DRIVE BELT**

Loosen the pivot nut and adjusting bolt, and remove the generator drive belt.

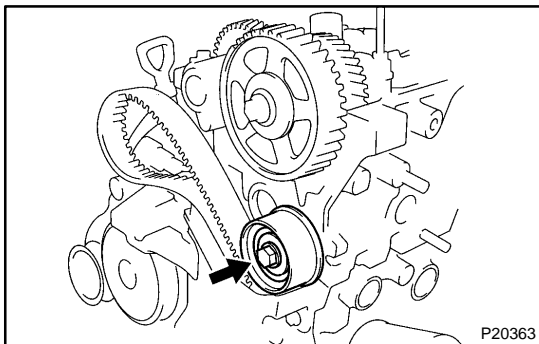
**24. REMOVE NO.3 TIMING BELT COVER FROM NO.1 TIMING BELT COVER****25. SET NO.1 CYLINDER TO TDC/COMPRESSION (See page EM-12 )****26. REMOVE TIMING BELT FROM CAMSHAFT TIMING PULLEY**

- (a) Loosen the mount bolt of the No.1 idler pulley and shift pulley toward the left as far as it will go and then temporarily tighten it.

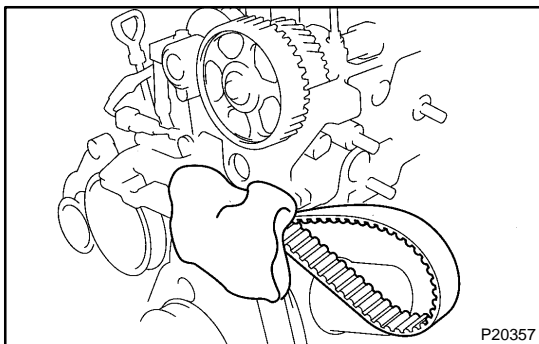
**NOTICE:**

**Be careful not to damage the timing belt.**

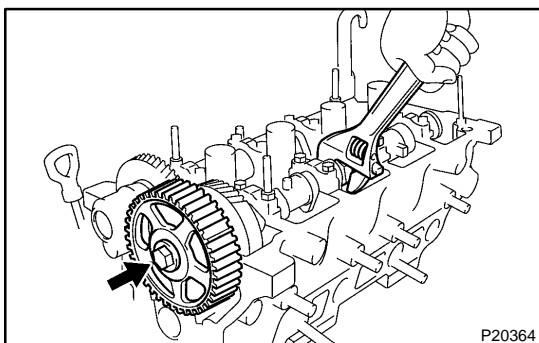
- (b) Remove the timing belt from the camshaft timing pulley.

**27. REMOVE NO.2 IDLER PULLEY**

Remove the bolt and idler pulley.

**NOTICE:**

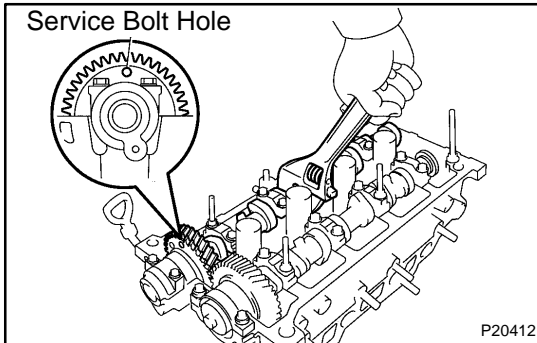
- Support the timing belt, so the meshing of the crankshaft timing pulley and timing belt does not shift.
- Be careful not to drop anything inside the timing belt cover.
- Do not allow the belt to come into contact with oil, water or duct.

**28. REMOVE CAMSHAFT TIMING PULLEY**

Secure the hexagonal portion of the camshaft, and remove the bolt and pulley.

**29. REMOVE INTAKE AND EXHAUST CAMSHAFTS****NOTICE:**

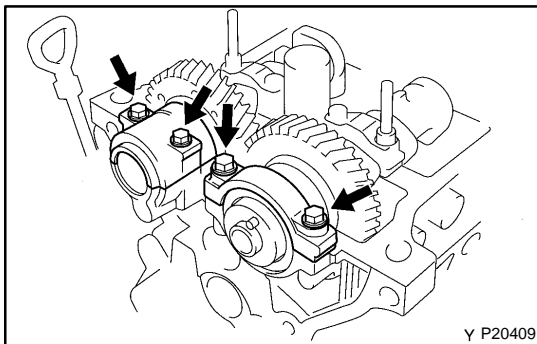
Since the thrust clearance of the camshaft is small, the camshaft must be held level while it is being removed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



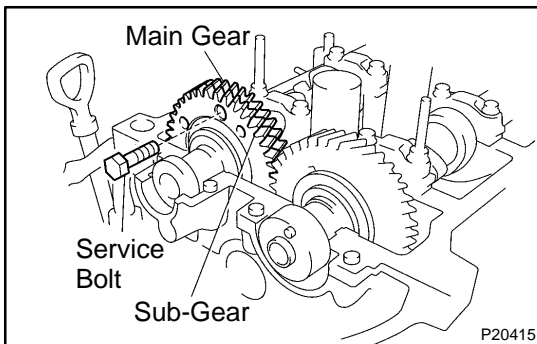
- (a) Set the intake camshaft as shown in the illustration so that the service bolt holes of the intake camshaft gears are directly above.

**HINT:**

This helps to lift the exhaust camshaft levelly and evenly by pushing No.2 and No.4 cylinder cam lobes of the intake camshaft toward their valve lifters.



- (b) Remove the 4 bolts, No.1 and No.2 bearing caps.  
(c) Remove the oil seal and housing plug.



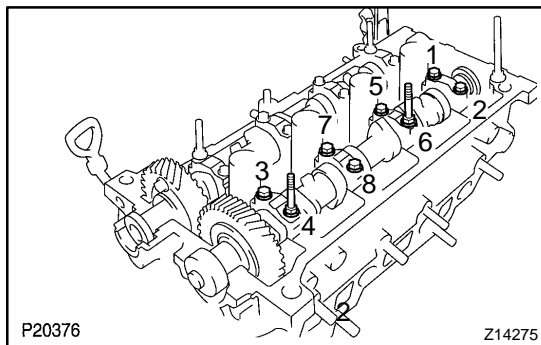
- (d) Secure the intake camshaft sub-gear to the main gear with a service bolt.

**Recommended service bolt:**

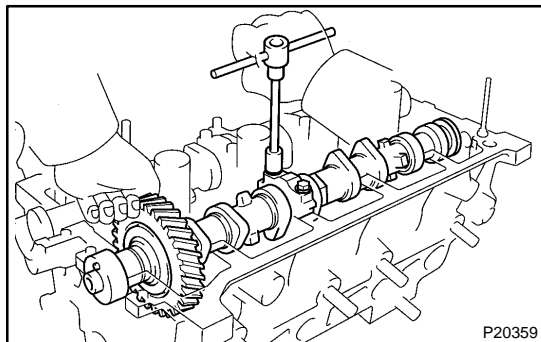
Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	16 - 20 mm (0.63 - 0.79 in.)

**HINT:**

When removing the camshaft, make sure that the torsional spring force of the sub-gear has been eliminated by the above operation.



- (e) Uniformly loosen and remove the 8 No.3 bearing cap bolts, in several passes, in the sequence shown.
- (f) Remove the 4 bearing caps and intake camshaft.

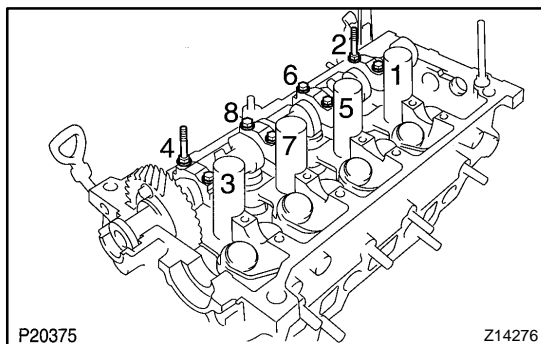
**HINT:**

If the camshaft is not being lifted out straight and level, reinstall the bearing cap with the 2 bolts.

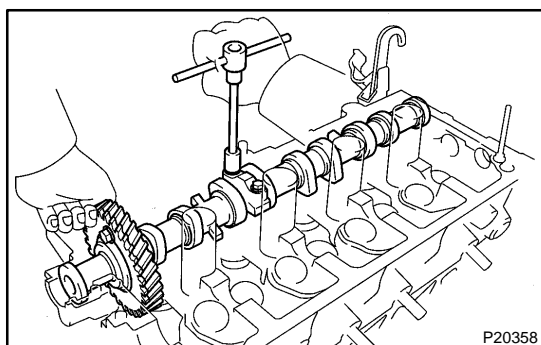
Then alternately loosen and remove the 2 bearing cap bolts with the camshaft gear pulled up.

**NOTICE:**

**Do not pry on or attempt to force the camshaft with a tool or other object.**



- (g) Uniformly loosen and remove the 8 No.3 bearing cap bolts, in several passes, in the sequence shown.
- (h) Remove the 4 bearing caps and intake camshaft.

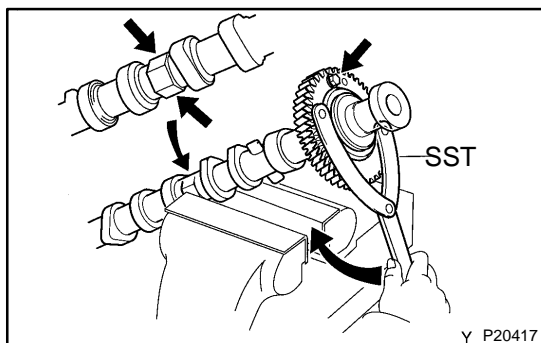
**HINT:**

If the camshaft is not being lifted out straight and level, reinstall the bearing cap with the 2 bolts.

Then alternately loosen and remove the 2 bearing cap bolts with the camshaft gear pulled up.

**NOTICE:**

**Do not pry on or attempt to force the camshaft with a tool or other object.**

**30. DISASSEMBLE INTAKE CAMSHAFT**

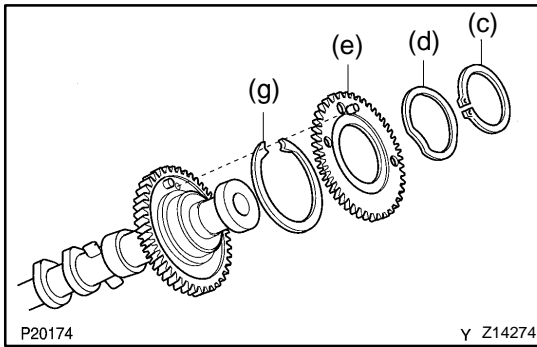
- (a) Mount the hexagon head portion of the camshaft in a soft jaw vise.

**NOTICE:**

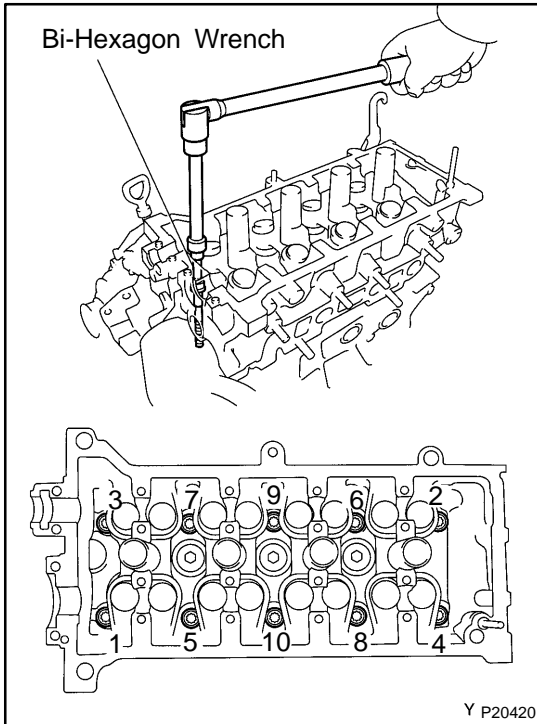
**Be careful not to damage the camshaft.**

- (b) Using SST, turn the sub-gear clockwise, and remove the service bolt.

SST 09960-10010 (09962-0100, 09963-00500)



- (c) Using snap ring pliers, remove the snap ring.
- (d) Remove the wave washer.
- (e) Remove the camshaft sub-gear.
- (f) Remove the camshaft gear spring.

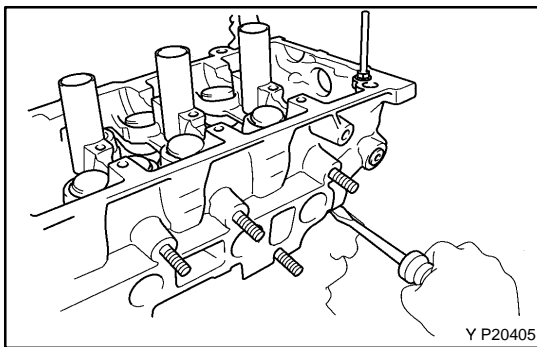


### 31. REMOVE CYLINDER HEAD

- (a) Using a bi-hexagon wrench 8 mm, uniformly loosen and remove the 10 cylinder head bolts, in several passes, in the sequence shown.

#### NOTICE:

Cylinder head warpage or cracking could result from removing bolts in incorrect order.



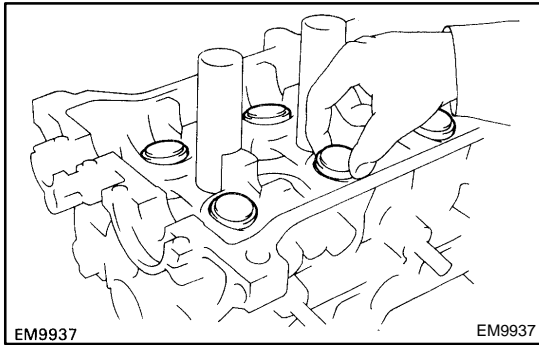
- (b) Lift the cylinder head from the dowels on the cylinder block and place the head on wooden blocks on a bench.

#### HINT:

If the cylinder head is difficult to lift off, pry with a screwdriver between the cylinder head and block saliences.

#### NOTICE:

Be careful not to damage the contact surfaces of the cylinder head and cylinder block.

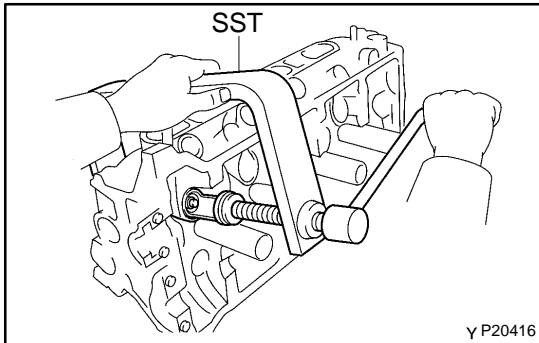


## DISASSEMBLY

1. REMOVE NO.2 ENGINE HANGER
2. REMOVE STUD BOLT FOR CYLINDER HEAD COVER
3. REMOVE VALVE LIFTERS AND SHIMS

HINT:

Arrange the valve lifters and shims in correct order.



## 4. REMOVE VALVES

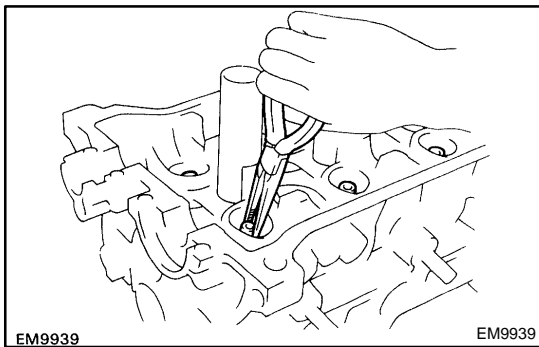
- (a) Using SST, compress the valve spring and remove the 2 keepers.

SST 09202-70010

- (b) Remove the spring retainer, valve spring, valve and spring seat.

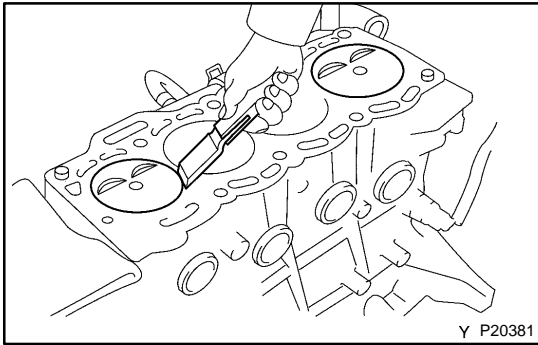
HINT:

Arrange the valves, valve springs, spring seats and spring retainers in correct order.



- (c) Using needle-nose pliers, remove the oil seal.

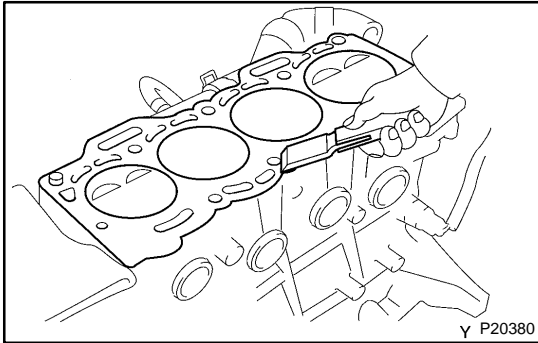




## INSPECTION

### 1. CLEAN TOP SURFACES OF PISTONS AND CYLINDER BLOCK

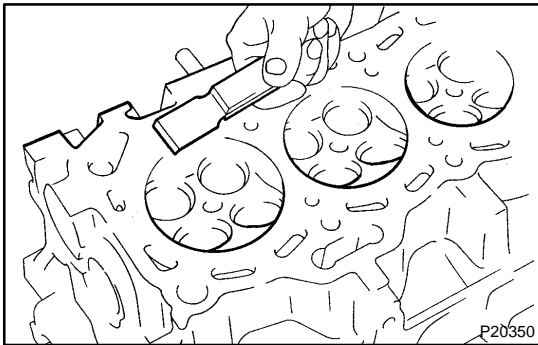
- (a) Turn the crankshaft, and bring each piston to top dead center (TDC). Using a gasket scraper, remove all the carbon from the piston top surface.



- (b) Using a gasket scraper, remove all the gasket material from the cylinder block surface.
- (c) Using compressed air, blow carbon and oil from the bolt holes.

#### CAUTION:

**Protect your eyes when using high-pressure compressed air.**

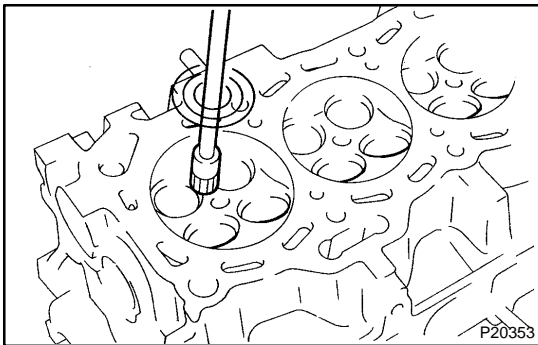


### 2. CLEAN CYLINDER HEAD

- (a) Remove the gasket material.
- (b) Using a gasket scraper, remove all the gasket material from the cylinder block contact surface.

#### NOTICE:

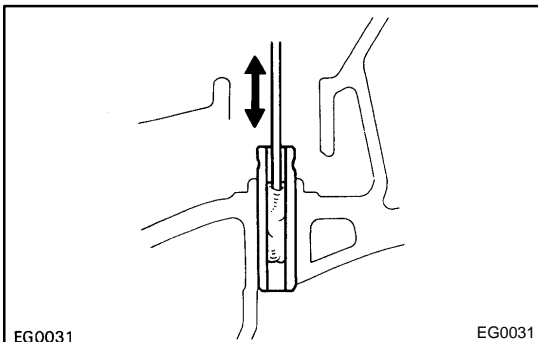
**Be careful not to scratch the cylinder block contact surface.**



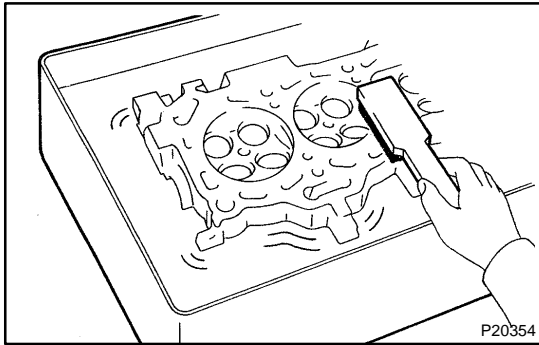
- (c) Clean the combustion chambers.
- (d) Using a wire brush, remove all the carbon from the combustion chambers.

#### NOTICE:

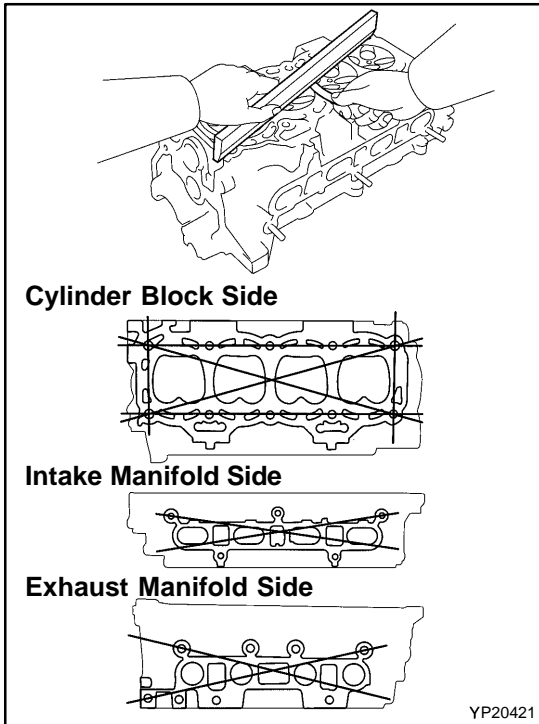
**Be careful not to scratch the cylinder block contact surface.**



- (e) Clean the valve guide bushings.
- (f) Using a valve guide bushing brush and solvent, clean all the guide bushings.



- (g) Clean the cylinder head.
- (h) Using a soft brush and solvent, thoroughly clean the cylinder head.



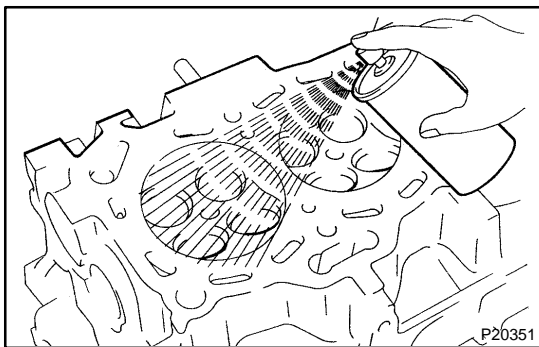
### 3. INSPECT CYLINDER HEAD

- (a) Inspect the for flatness.
- (b) Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder block and the manifolds for warpage.

#### Maximum warpage:

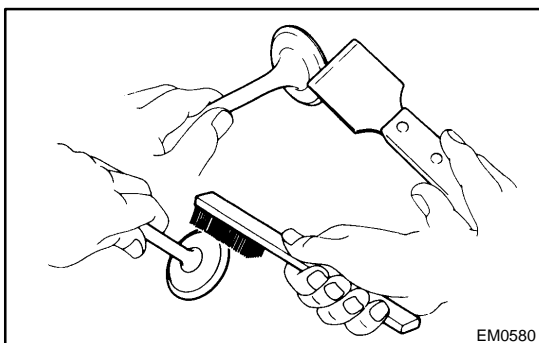
Cylinder block side	0.05 mm (0.0020 in.)
Manifold side	0.05 mm (0.0020 in.)

If warpage is greater than maximum, replace the cylinder head.



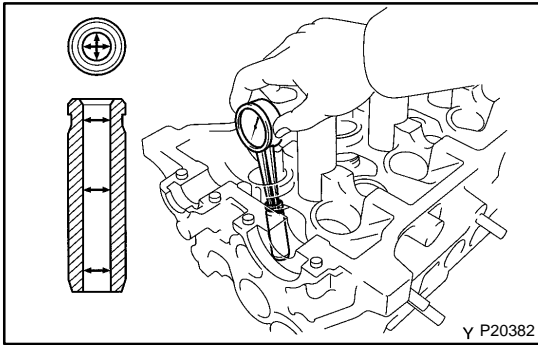
- (c) Inspect the for cracks.
- (d) Using a dye penetrant, check the combustion chambers, intake ports, exhaust ports and cylinder block surface for cracks.

If cracked, replace the cylinder head.



### 4. CLEAN VALVES

- (a) Using a gasket scraper, chip off any carbon from the valve head.
- (b) Using a wire brush, thoroughly clean the valve.

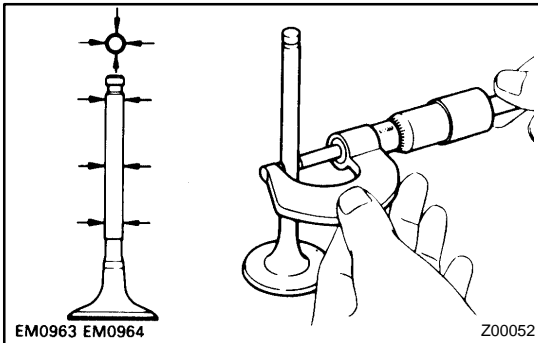


## 5. INSPECT VALVE STEMS AND GUIDE BUSHINGS

- (a) Using a caliper gauge, measure the inside diameter of the guide bushing.

**Bushing inside diameter:**

**6.010 - 6.030 mm (0.2366 - 0.2374 in.)**



- (b) Using a micrometer, measure the diameter of the valve stem.

**Valve stem diameter:**

Intake	5.970 - 5.985 mm (0.2350 - 0.2356 in.)
Exhaust	5.965 - 5.980 mm (0.2348 - 0.2354 in.)

- (c) Subtract the valve stem diameter measurement from the guide bushing inside diameter measurement.

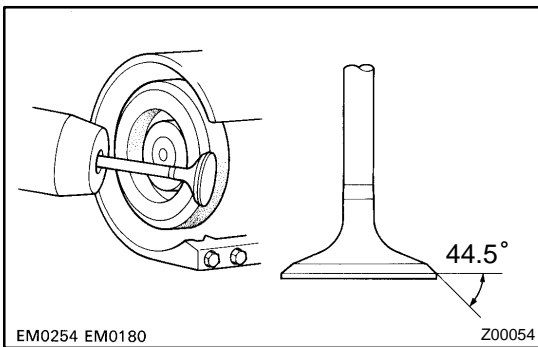
**Standard oil clearance:**

Intake	0.025 - 0.060 mm (0.0010 - 0.0024 in.)
Exhaust	0.030 - 0.065 mm (0.0012 - 0.0026 in.)

**Maximum oil clearance:**

Intake	0.08 mm (0.0031 in.)
Exhaust	0.10 mm (0.0039 in.)

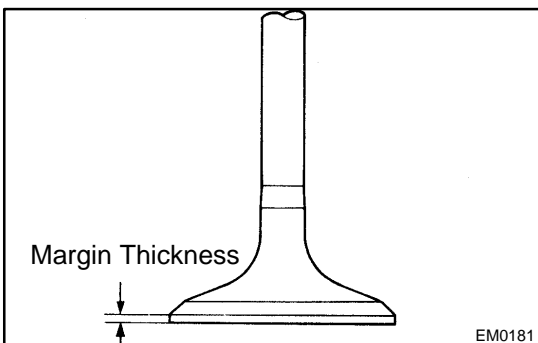
If the clearance is greater than maximum, replace the valve and guide bushing (See page [EM-40](#)).



## 6. INSPECT AND GRIND VALVES

- (a) Grind the valve enough to remove pits and carbon.  
(b) Check that the valve is ground to the correct valve face angle.

**Valve face angle: 44.5°**



- (c) Check the valve head margin thickness.

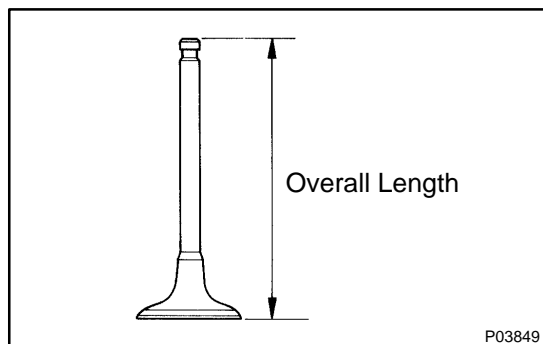
**Standard margin thickness:**

**0.8 - 1.2 mm (0.031 - 0.047 in.)**

**Minimum margin thickness:**

**0.5 mm (0.020 in.)**

If the margin thickness is less than minimum, replace the valve.



- (d) Check the valve overall length.

**Standard overall length:**

Intake	93.45 mm (3.6791 in.)
Exhaust	93.89 mm (3.6768 in.)

**Minimum overall length:**

Intake	92.95 mm (3.6594 in.)
Exhaust	93.39 mm (3.6768 in.)

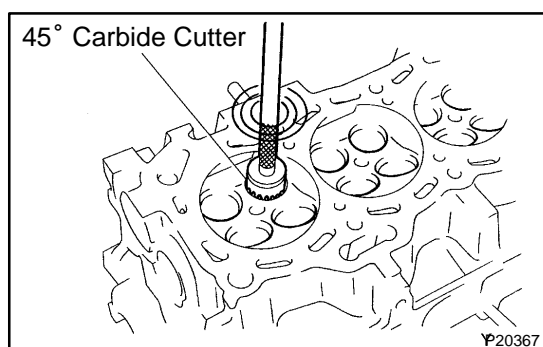
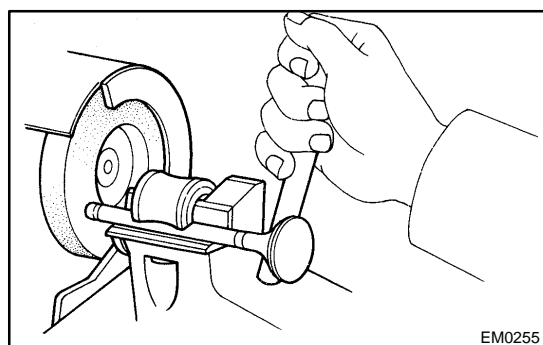
If the overall length is less than minimum, replace the valve.

- (e) Check the surface of the valve stem tip for wear.

If the valve stem tip is worn, resurface the tip with a grinder or replace the valve.

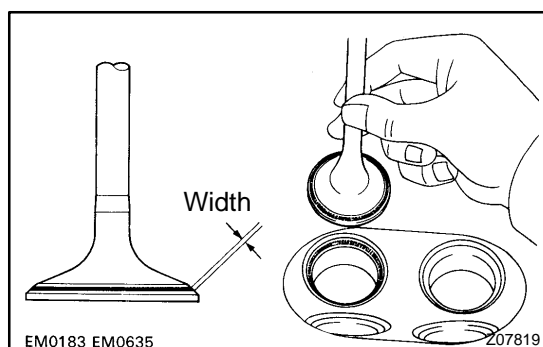
**NOTICE:**

**Do not grind off more than minimum.**



**7. INSPECT AND CLEAN VALVE SEATS**

- (a) Using a 45° carbide cutter, resurface the valve seats. Remove only enough metal to clean the seats.



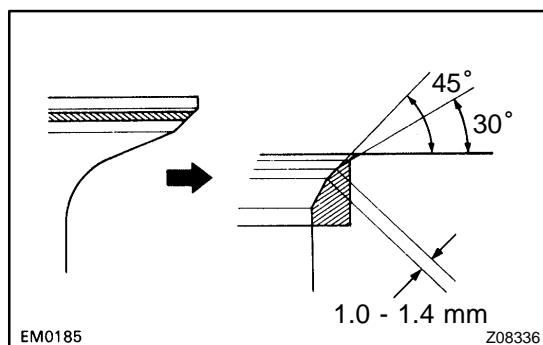
- (b) Check the valve seating position.  
(c) Apply a light coat of prussian blue (or white lead) to the valve face. Lightly press the valve against the seat. Do not rotate valve.

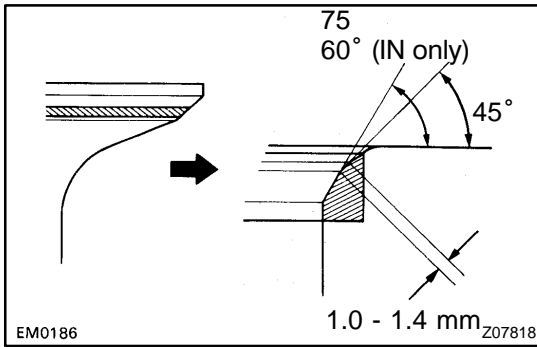
- (d) Check the valve face and seat for the following:
- (1) If blue appears 360° around the face, the valve is concentric. If not, replace the valve.
  - (2) If blue appears 360° around the valve seat, the guide and face are concentric. If not, resurface the seat.
  - (3) Check that the seat contact is in the middle of the valve face with the following width:

**1.0 - 1.4 mm (0.039 - 0.055 in.)**

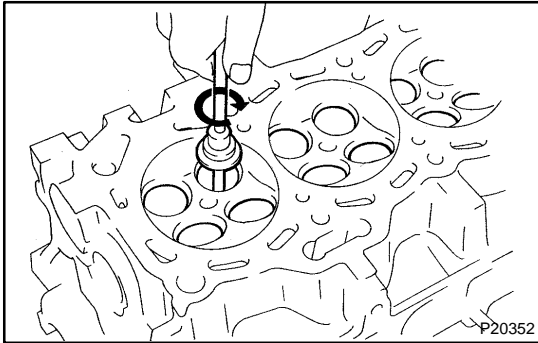
If not, correct the valve seats as follows:

- (1) If the seating is too high on the valve face, use 30° and 45° cutters to correct the seat.

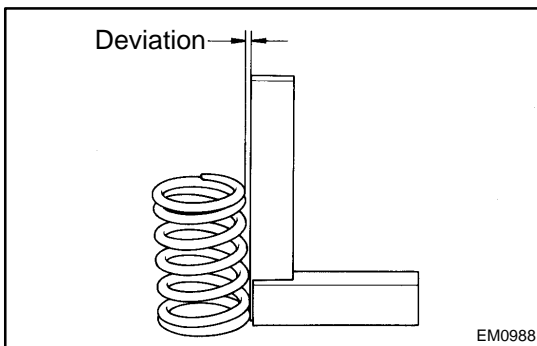




- (2) If the seating is too low on the valve face, use 75°, 60° (IN only) and 45° cutters to correct the seat.



- (e) Hand-lap the valve and valve seat with an abrasive compound.  
(f) After hand-lapping, clean the valve and valve seat.

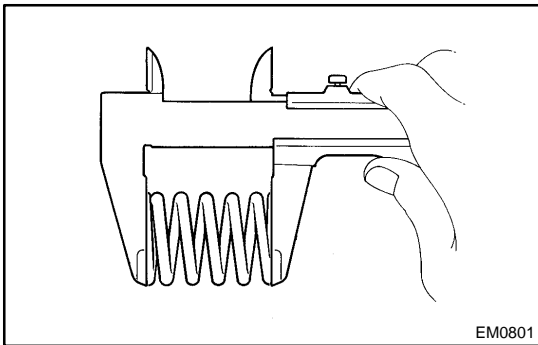


## 8. INSPECT VALVE SPRINGS

- (a) Using a steel square, measure the deviation of the valve spring.

**Maximum deviation: 2.0 mm (0.079 in.)**

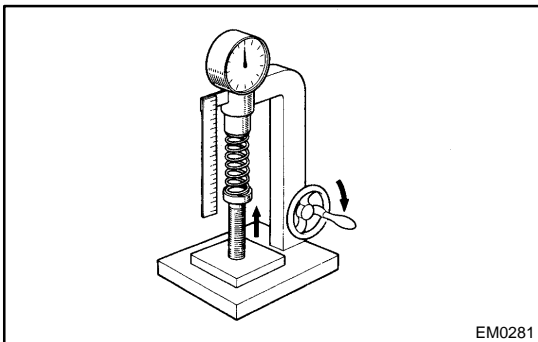
If the deviation is greater than maximum, replace the valve spring.



- (b) Using a vernier caliper, measure the free length of the valve spring.

**Free length: 53.58 mm (2.1094 in.)**

If the free length is not as specified, replace the valve spring.



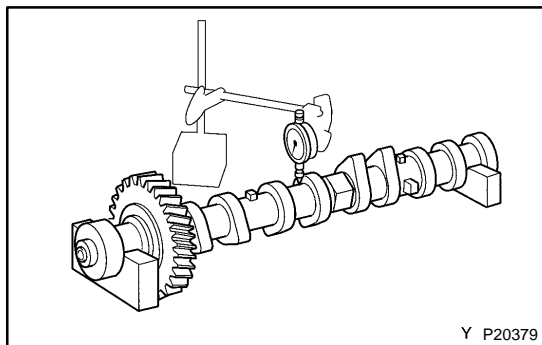
- (c) Using a spring tester, measure the tension of the valve spring at the specified installed length.

**Installed tension:**

**148 - 164 N (15.1 - 16.7 kgf, 33.3 - 36.8 lbf)**

**at 31.8 mm (1.252 in.)**

If the installed tension is not as specified, replace the valve spring.



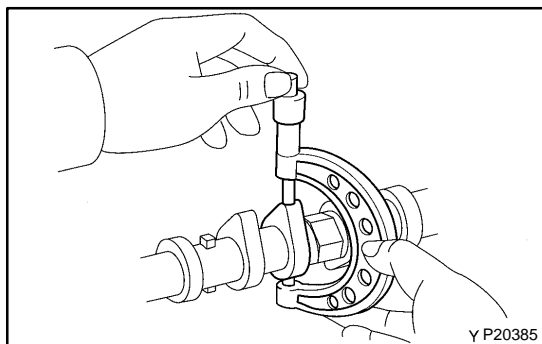
## 9. INSPECT CAMSHAFTS AND BEARINGS

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: 0.04 mm (0.0016 in.)**

If the circle runout is greater than maximum, replace the camshaft.



## 10. INSPECT CAM LOBES

Using a micrometer, measure the cam lobe height.

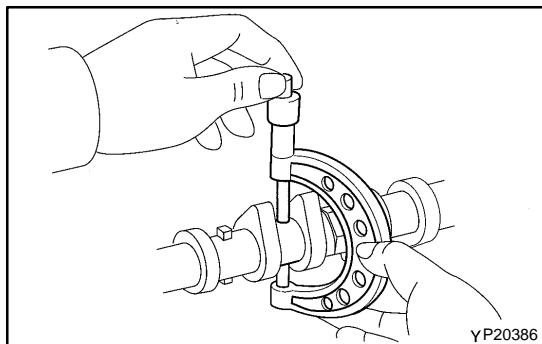
**Standard cam lobe height:**

Intake	41.514 - 41.614 mm (1.6344 - 1.6383 in.)
Exhaust	41.011 - 41.111 mm (1.6146 - 1.6185 in.)

**Minimum cam lobe height:**

Intake	41.35 mm (1.6279 in.)
Exhaust	40.85 mm (1.6083 in.)

If the cam lobe height is less than minimum, replace the camshaft.



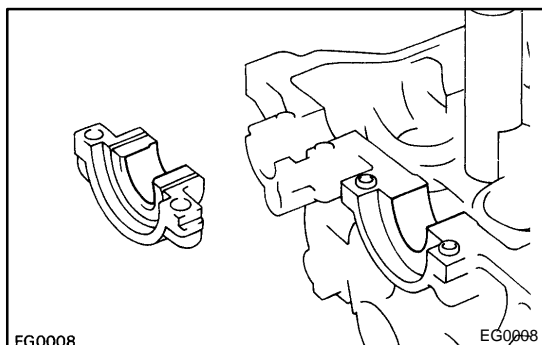
## 11. INSPECT CAMSHAFT JOURNALS

Using a micrometer, measure the journal diameter.

**Journal diameter:**

Exhaust No.1	24.949 - 24.965 mm (0.9822 - 0.9829 in.)
Others	22.949 - 22.965 mm (0.9035 - 0.9041 in.)

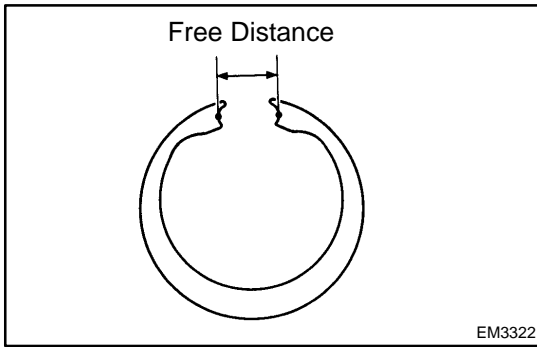
If the journal diameter is not as specified, check the oil clearance.



## 12. INSPECT CAMSHAFT BEARINGS

Check that bearings for flaking and scoring.

If the bearings are damaged, replace the bearing caps and cylinder head as a set.



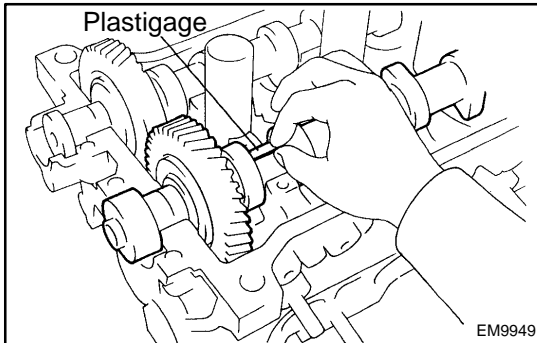
### 13. INSPECT CAMSHAFT GEAR SPRING

Using a vernier caliper, measure the free distance between the spring ends.

**Free distance:**

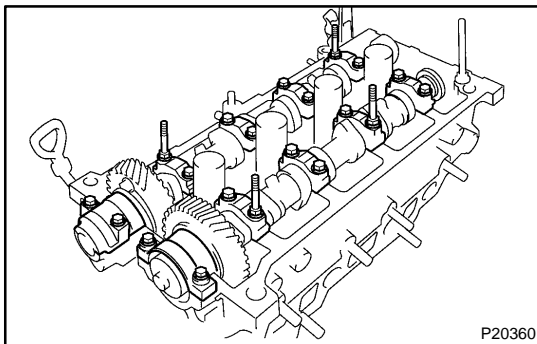
**22.5 - 22.9 mm (0.886 - 0.902 in.)**

If the free distance is not as specified, replace the gear spring.



### 14. INSPECT CAMSHAFT JOURNAL OIL CLEARANCE

- Clean the bearing caps and camshaft journals.
- Place the camshafts on the cylinder head.
- Lay a strip of Plastigage across each of the camshaft journals.



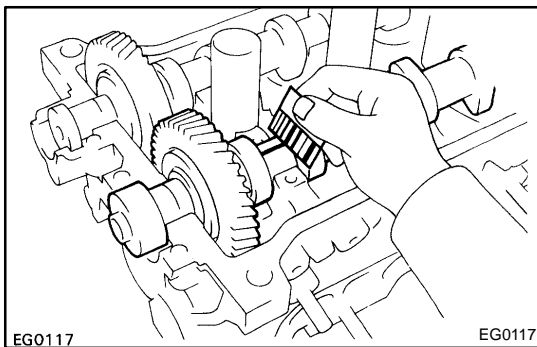
- Install the bearing caps (See page [EM-44](#) ).

**Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)**

#### NOTICE:

**Do not turn the camshaft.**

- Remove the bearing caps.



- Measure the Plastigage at its widest point.

**Standard oil clearance:**

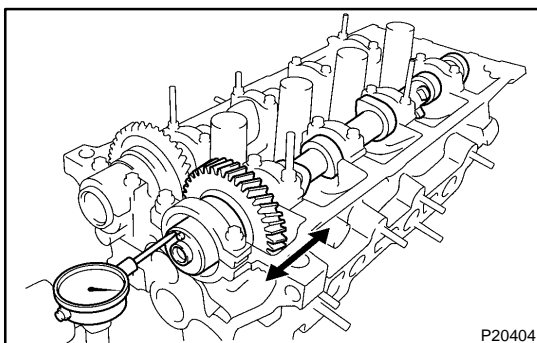
**0.035 - 0.072 mm (0.0014 - 0.0028 in.)**

**Maximum oil clearance:**

**0.10 mm (0.0039 in.)**

If the oil clearance is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.

- Completely remove the Plastigage.



### 15. INSPECT CAMSHAFT THRUST CLEARANCE

- Install the camshaft (See page [EM-44](#) ).
- Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.

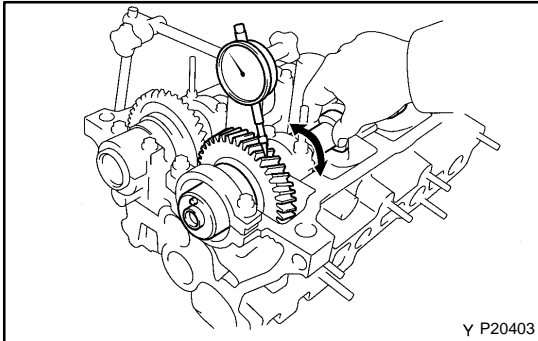
**Standard thrust clearance:**

**0.045 - 0.100 mm (0.0018 - 0.0039 in.)**

**Maximum thrust clearance:**

**0.12 mm (0.0047 in.)**

If the thrust clearance is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.



#### 16. INSPECT CAMSHAFT GEAR BACKLASH

- (a) Install the camshafts without installing the exhaust cam sub-gear (See page [EM-44](#)).
- (b) Using a dial indicator, measure the backlash.

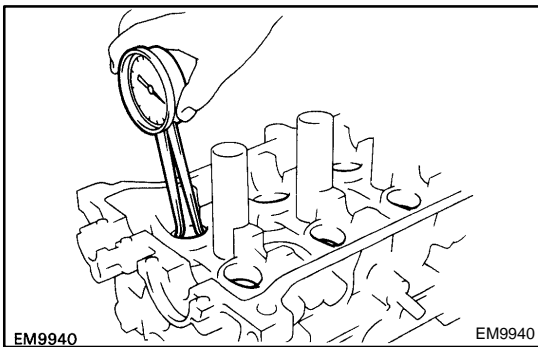
**Standard backlash:**

**0.020 - 0.200 mm (0.0008 - 0.0079 in.)**

**Maximum backlash:**

**0.30 mm (0.0188 in.)**

If the backlash is greater than maximum, replace the camshafts.

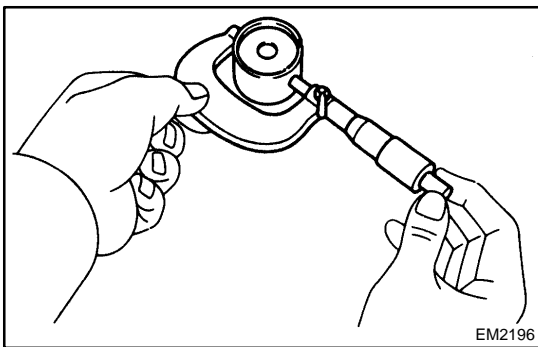


#### 17. INSPECT VALVE LIFTERS AND LIFTER BORES

- (a) Using a caliper gauge, measure the lifter bore diameter of the cylinder head.

**Lifter bore diameter:**

**28.000 - 28.021 mm (1.1024 - 1.1032 in.)**



- (b) Using a micrometer, measure the lifter diameter.

**Lifter diameter:**

**27.975 - 27.985 mm (1.1014 - 1.1018 in.)**

- (c) Subtract the lifter diameter measurement from the lifter bore diameter measurement.

**Standard oil clearance:**

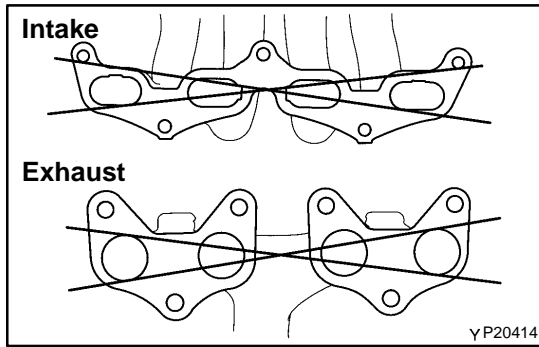
**0.015 - 0.046 mm (0.0005 - 0.0018 in.)**

**Maximum oil clearance:**

**0.10 mm (0.0039 in.)**

If the oil clearance is greater than maximum, replace the lifter. If necessary, replace the cylinder head.





### 18. INSPECT INTAKE AND EXHAUST MANIFOLDS

Using a precision straight edge and feeler gauge, measure the surface contacting the cylinder head for warpage.

**Maximum warpage:**

**Intake**

**0.1 mm (0.004 in.)**

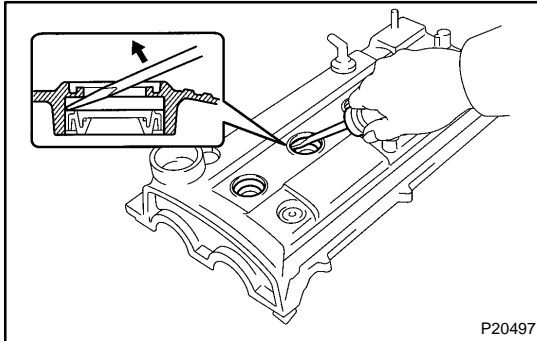
**Exhaust**

**0.5 mm (0.020 in.)**

If warpage is greater than maximum, replace the manifold.

### 19. IF NECESSARY, REPLACE SPARK PLUG TUBE GASKETS

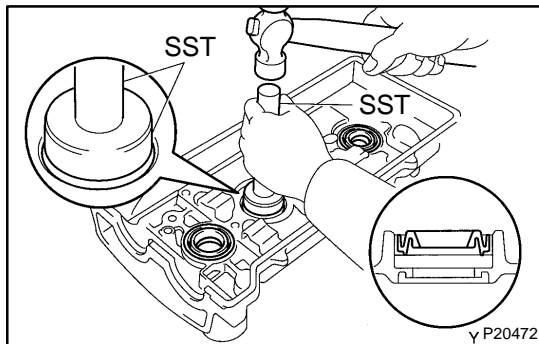
- (a) Using a screwdriver, pry off the tube gasket.

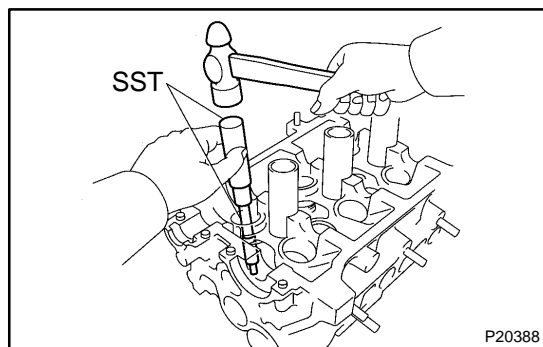


- (b) Using SST and a hammer, tap in a new tube gasket until the upper edge of the cylinder head cover.

SST 09550-10012 (09252-10010, 09556-10010)

- (c) Apply MP grease to the gasket lip.

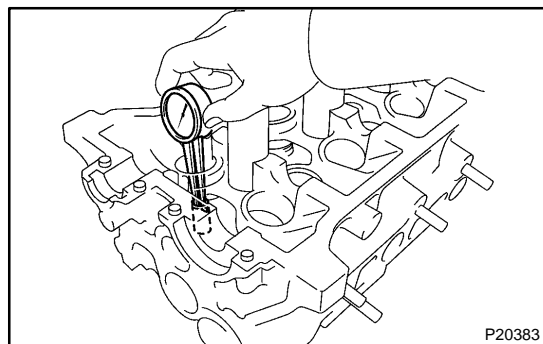




## REPLACEMENT

### REPLACE VALVE GUIDE BUSHINGS

- (a) Using SST and a hammer, tap out the guide bushing.  
 SST 09201-10000 (09201-01060),  
 09550-10012 (09252-10010)



- (b) Using a caliper gauge, measure the bushing bore diameter of the cylinder head.

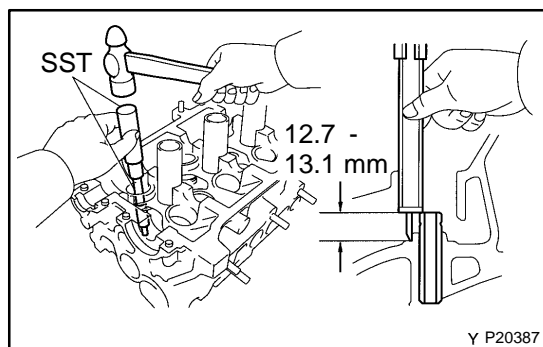
Both intake and exhaust

Bushing bore diameter mm (in.)	Bushing size
11.000 - 11.027 (0.4331 - 0.4342)	Use STD
11.050 - 11.077 (0.4350 - 0.4361)	Use O/S 0.05

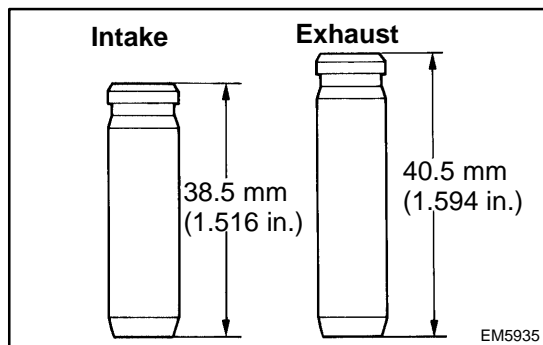
- (c) Select a new guide bushing (STD size or O/S 0.05).  
 If the bushing bore diameter of the cylinder head is greater than 11.027 mm (0.4341 in.), machine the bushing bore to the following dimension:

**11.050 - 11.077 mm (0.4350 - 0.4361 in.)**

- If the bushing bore diameter of the cylinder head is greater than 11.077 mm (0.4361 in.), replace the cylinder head.

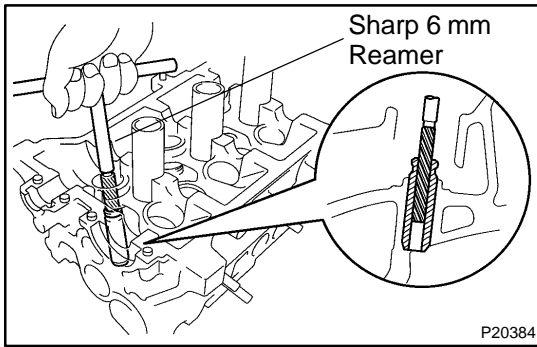


- (d) Using SST and a hammer, tap in a new guide bushing to where there is 12.7 - 13.1 mm (0.500 - 0.510 in.) left protruding from the cylinder head.  
 SST 09201-70010



#### HINT:

Different bushings are used for the intake and exhaust.

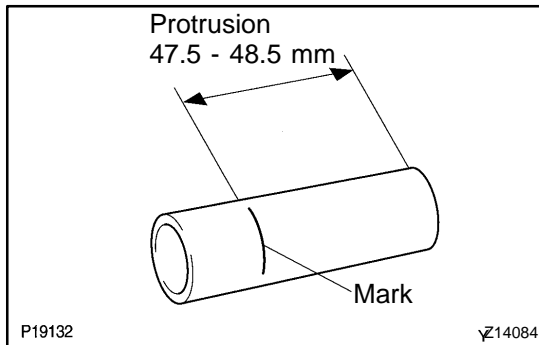


- (e) Using a sharp 6 mm reamer, ream the guide bushing to obtain the standard specified clearance (See page [EM-31](#)) between the guide bushing and valve stem.

## REASSEMBLY

### HINT:

- Thoroughly clean all parts to be assembled.
- Before installing the parts, apply new engine oil to all sliding and rotating surfaces.
- Replace all gaskets and oil seals with new ones.



### 1. INSTALL SPARK PLUG TUBES

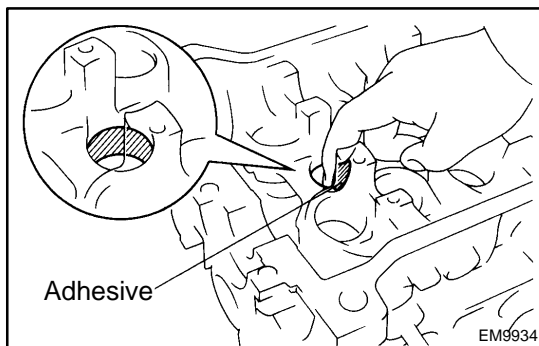
#### HINT:

When using a new cylinder head, spark plug tubes must be installed.

- (a) Mark the standard position away from the edge, onto the spark plug tube.

**Standard protrusion:**

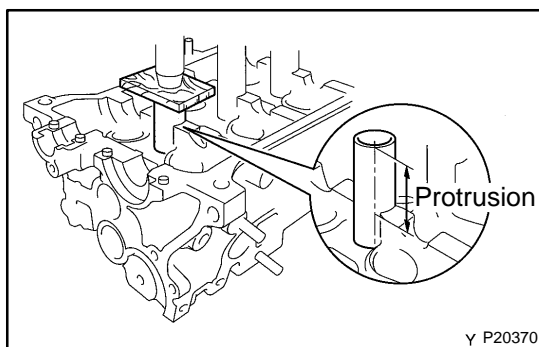
**47.5 - 48.5 mm (1.870 - 1.909 in.)**



- (b) Apply adhesive to the spark plug tube hole of the cylinder head.

**Adhesive:**

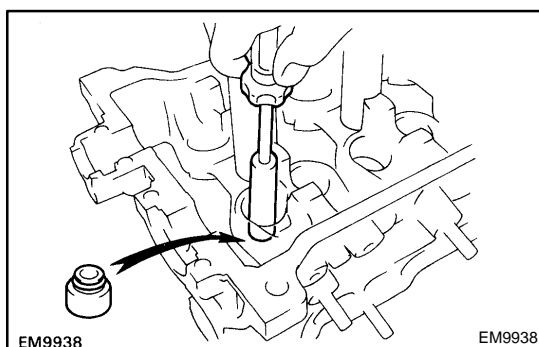
**Part No. 08833-00070, Adhesive 1324, THREE BOND 1324 or equivalent**



- (c) Using a press, press in a new spark plug tube until there is standard protrusion protruding from the camshaft bearing cap installation surface of the cylinder head.

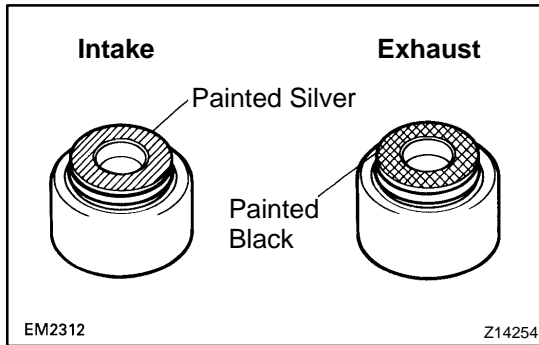
#### NOTICE:

**Avoid pressing a new spark plug tube in too far by measuring the amount of protrusion while pressing.**



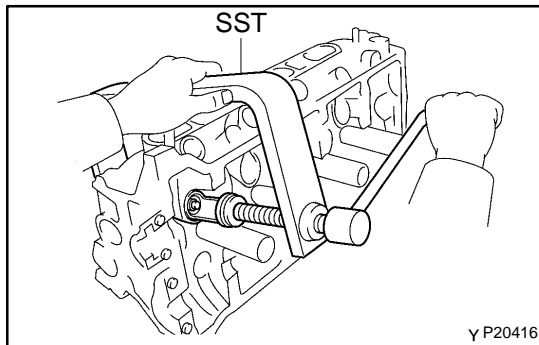
### 2. INSTALL VALVES

- (a) Using a 10 mm socket-driver, push in a new oil seal.

**HINT:**

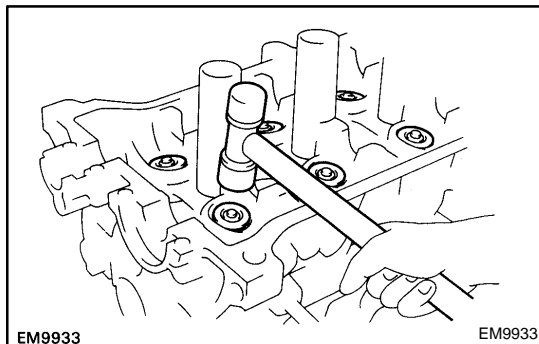
The intake valve oil seal is silver and the exhaust valve oil seal is black.

- (b) Install the valve.
- (c) Install the spring seat.
- (d) Install the valve spring.
- (e) Install the spring retainer.



- (f) Using SST, compress the valve spring and place the 2 keepers around the valve stem.

SST 09202-70010



- (g) Using a plastic-faced hammer, lightly tap the valve stem tip to assure proper fit.

**3. INSTALL VALVE LIFTERS AND SHIMS**

- (a) Install the valve lifter and shim.
- (b) Check that the valve lifter rotates smoothly by hand.

**4. INSTALL STUD BOLT FOR CYLINDER HEAD COVER****5. INSTALL NO.2 ENGINE HANGER**

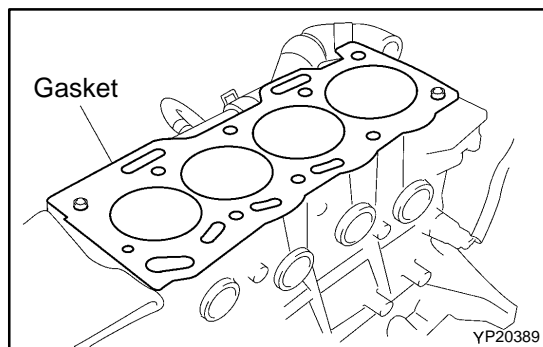
**Torque:**

**No. 1**

**21 N·m (210 kgf·cm, 15 ft·lbf)**

**No. 2**

**53 N·m (530 kgf·cm, 38 ft·lbf)**



## INSTALLATION

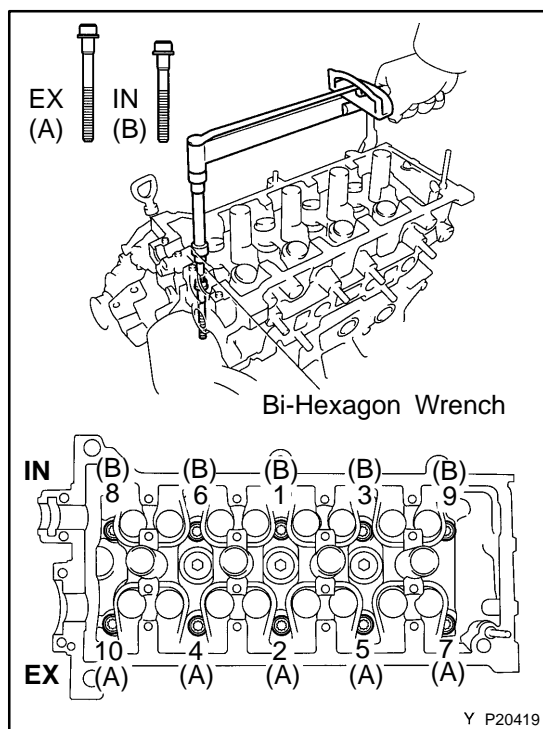
### 1. PLACE CYLINDER HEAD ON CYLINDER BLOCK

- Place a new cylinder head gasket in position on the cylinder block.

#### NOTICE:

**Be careful of the installation direction.**

- Place the cylinder head in position on the cylinder head gasket.



### 2. INSTALL CYLINDER HEAD BOLTS

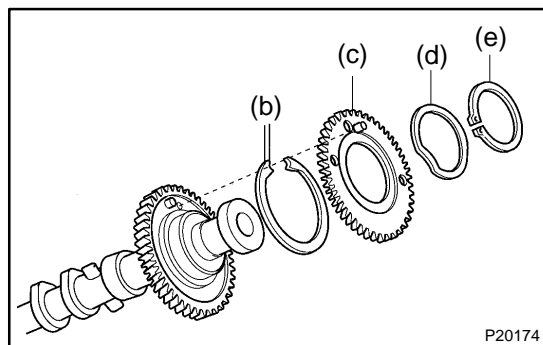
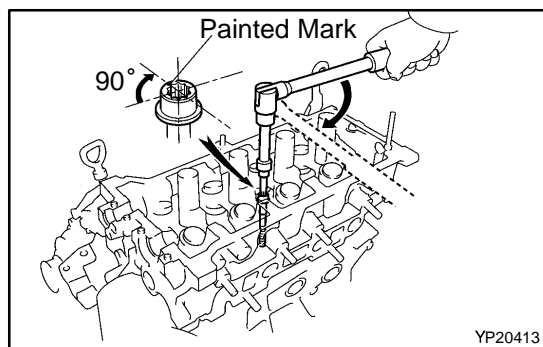
#### HINT:

- The cylinder head bolts are tightened in 2 progressive steps (steps (b) and (d)).
  - If any cylinder head bolt is broken or deformed, replace it.
  - There are 2 lengths of cylinder head bolts, long (A) and short (B).
- Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.
  - First, using a bi-hexagon wrench 8 mm, install and uniformly tighten the 10 cylinder head bolts, in several passes, in the sequence shown.

**Torque: 45 N·m (450 kgf-cm, 33 ft-lbf)**

If any one of the cylinder head bolts does not meet the torque specification, replace the cylinder head bolt.

- Mark the front of the cylinder head bolt head with paint.
- Retighten the cylinder head bolts 90° in the numerical order shown.
- Check that the painted mark is now at a 90° angle to front.



### 3. ASSEMBLE INTAKE CAMSHAFT

- Mount the hexagonal wrench head portion of the camshaft in a vise.

#### NOTICE:

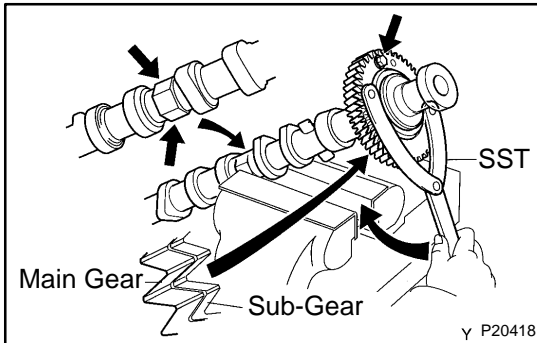
**Be careful not to damage the camshaft.**

- Install the camshaft gear spring.
- Install the camshaft sub-gear.
- Install the wave washer.

#### HINT:

Align the pins on the gears with the gear spring ends.

- (e) Using snap ring pliers, install the snap ring.



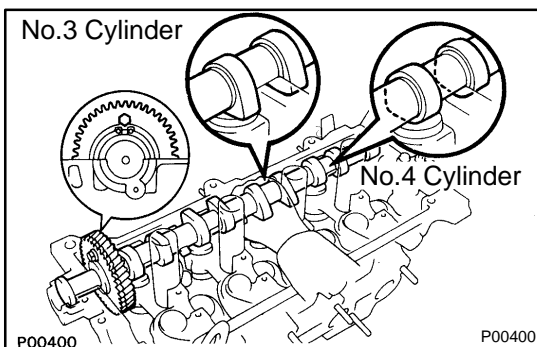
- (f) Using SST, align the holes of the camshaft main gear and sub-gear by turning camshaft sub-gear clockwise, and install a service bolt.

SST 09960-10010 (09962-01000, 09963-00500)

#### 4. INSTALL INTAKE AND EXHAUST CAMSHAFTS

##### NOTICE:

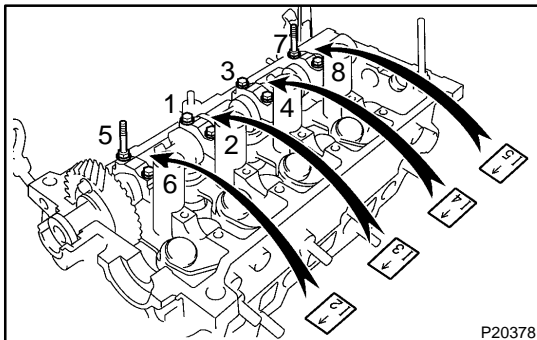
Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being installed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



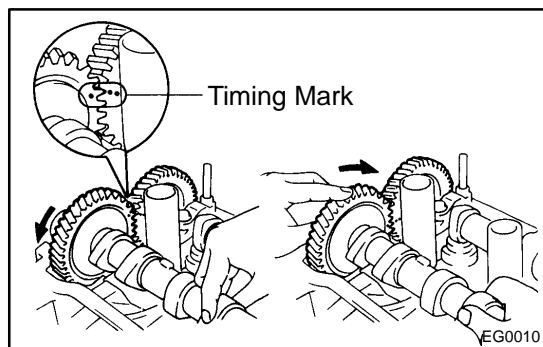
- (a) Apply engine oil to the thrust portion of intake camshaft.  
(b) Place the intake camshaft as shown in the illustration so that the service bolt of the intake camshaft gears are directly above.

##### HINT:

This helps to lift the intake camshaft in a level and uniform manner by pushing No.3 and No.4 cylinder cam lobes of the intake camshaft toward their valve lifters.



- (c) Install the 4 bearing caps in their proper locations.  
(d) Temporarily tighten the bearing cap bolts uniformly and alternately, in several passes, in the sequence shown until the bearing caps are snug with the cylinder head.

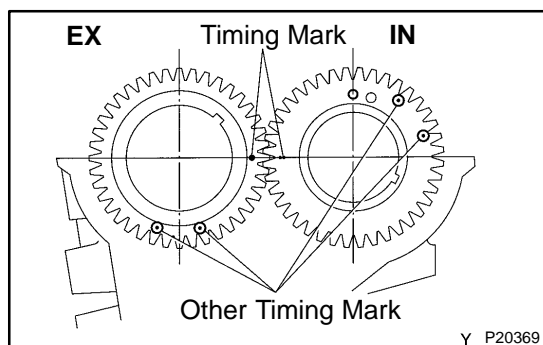


- (e) Apply engine oil to thrust portion of the exhaust camshaft.
- (f) Engage the exhaust camshaft gear to the intake camshaft gear by matching the timing marks on each gear.

**NOTICE:**

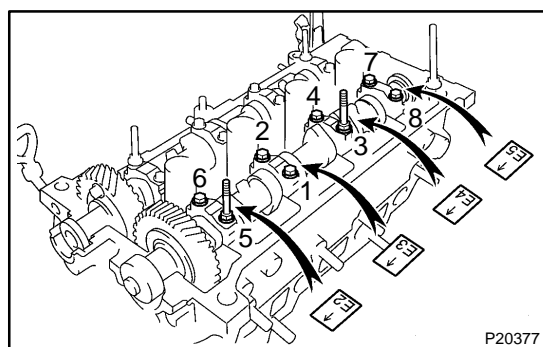
**There are also assembly reference marks on each gear as shown in the illustration. Do not use these marks.**

- (g) Roll down the exhaust camshaft onto the bearing journals while engaging gears with each other.

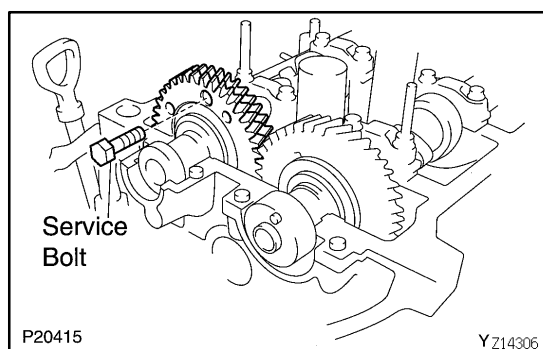
**HINT:**

The above angle allows the No.2 and No.4 cylinder cam lobes of the exhaust camshaft to push their valve lifters evenly.

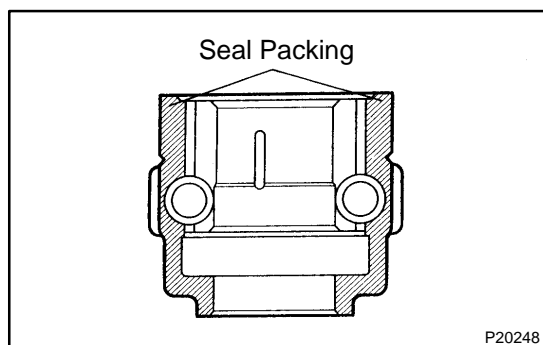
- (h) Lightly push the exhaust camshaft gear without applying excessive force.



- (i) Install the 4 bearing caps in their proper locations.
- (j) Temporarily tighten the bearing cap bolts uniformly and alternately, in several passes, in the sequence shown until the bearing caps are snug with the cylinder head.



- (k) Remove the service bolt.

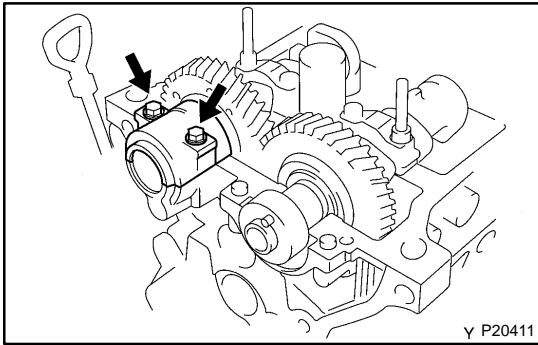


- (l) Clean the installed surfaces of the No.2 bearing cap and cylinder head with cleaner.
- (m) Apply seal packing to the No.2 bearing cap as shown.

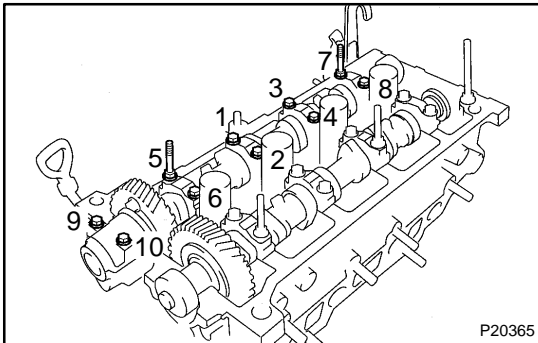
**Seal packing:**

**Part No. 08826-00080 or equivalent**

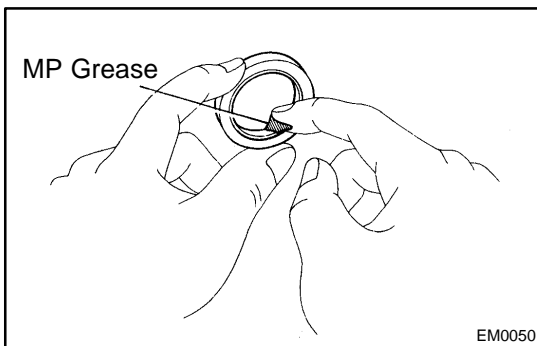




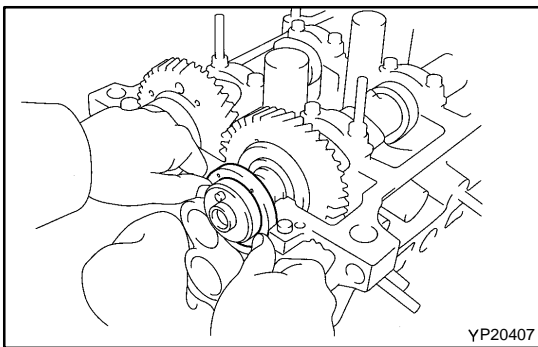
- (n) Place the No.2 bearing cap in its proper location. When doing this, check that there is no gap between the cylinder head and the contact surface of bearing cap.
- (o) Temporarily tighten the bearing cap bolts, alternately tightening the left and right bolts uniformly.
- (p) Install the camshaft housing plug.



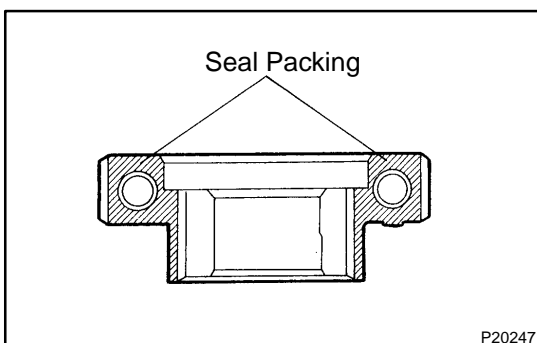
- (q) Install and uniformly tighten the 10 bearing cap bolts, in several passes, in the sequence shown.  
**Torque: 13 N·m (13 kgf·cm, 9 ft·lbf)**



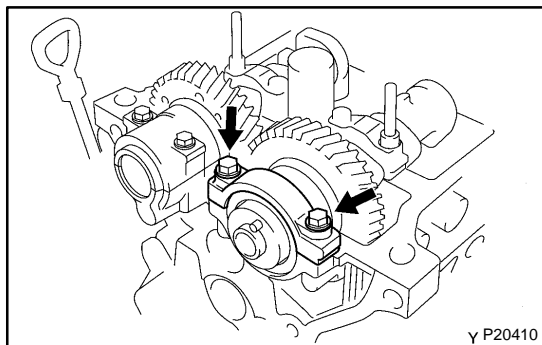
- (r) Apply MP grease to a new camshaft oil seal lip.



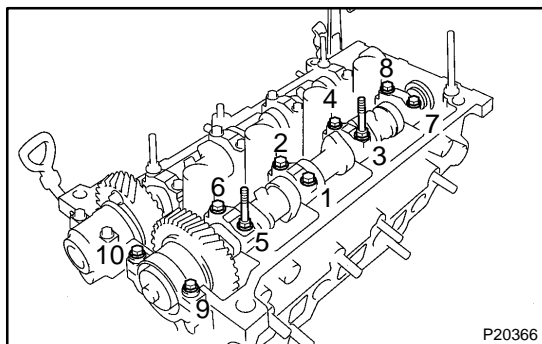
- (s) Install the oil seal as far as the deepest part of the cylinder head.



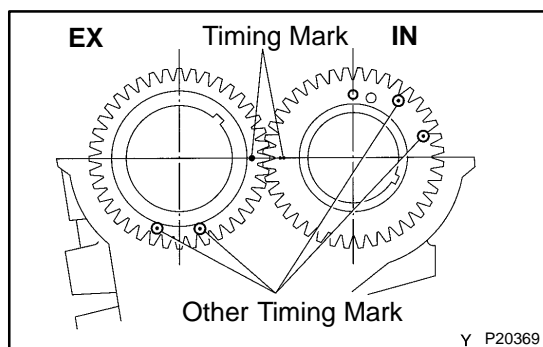
- (t) Clean the installed surfaces of the No.1 bearing cap and cylinder head with cleaner.
- (u) Apply seal packing to the No.1 bearing cap as shown.  
**Seal packing:**  
**Part No. 08826-00080 or equivalent**



- (v) Place the No.1 bearing cap in its proper location. When doing this, check that there is no gap between the cylinder head and the contact surface of bearing cap.
- (w) Temporarily tighten the bearing cap bolts, alternately tightening the left and right bolts uniformly.

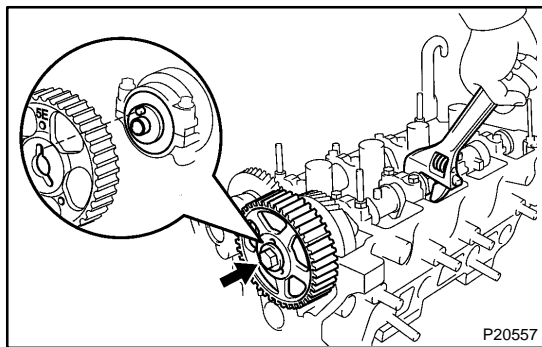


- (x) Install and uniformly tighten the 10 bearing cap bolts, in several passes, in the sequence shown.  
**Torque: 13 N·m (130 kgf-cm, 9 ft-lbf)**



- (y) Turn the camshaft 1 revolution and check that the timing marks of the camshaft gears are aligned.

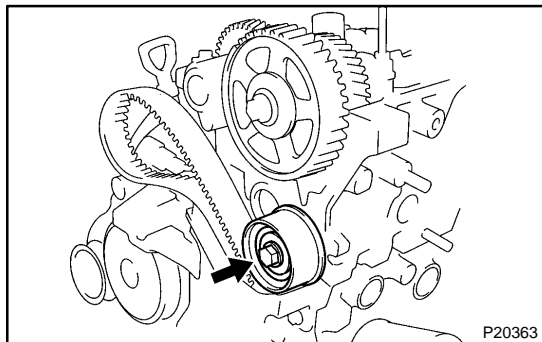
## 5. CHECK AND ADJUST VALVE CLEARANCE (See page [EM-4](#))



## 6. INSTALL CAMSHAFT TIMING PULLEY

- (a) Align the camshaft knock pin with the knock pin groove on the pulley side with the 5E mark, and slide the pulley.
- (b) Secure the hexagonal portion of the camshaft, and install and torque the bolt.

**Torque: 51 N·m (510 kgf-cm, 37 ft-lbf)**



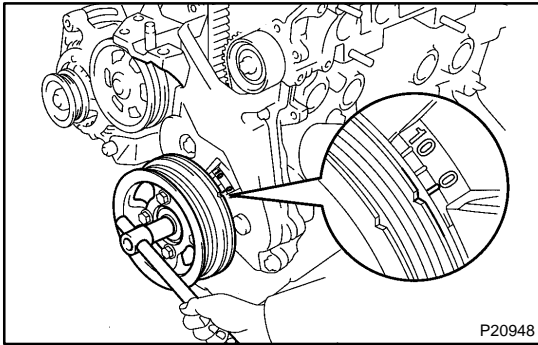
## 7. INSTALL NO.2 IDLER PULLEY

Install the idler pulley with the bolt. Torque the bolt.

**Torque: 28 N·m (280 kgf-cm, 20 ft-lbf)**

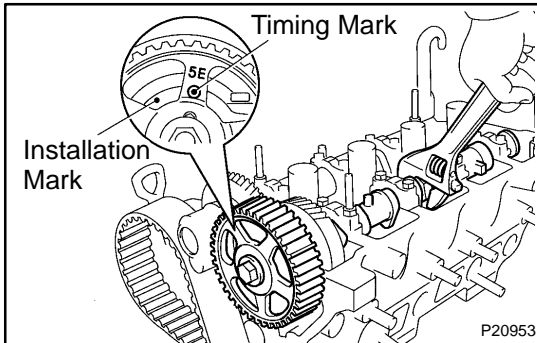
### HINT:

Remove any oil or water on the idler pulley and keep it clean.

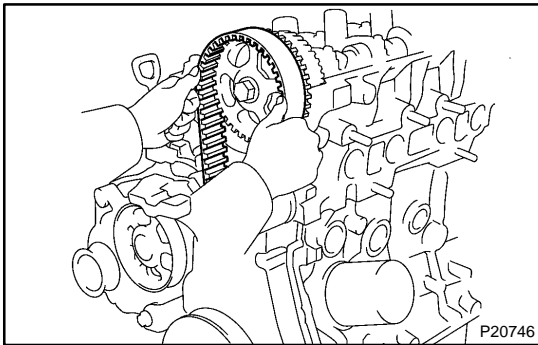


## 8. SET NO.1 CYLINDER TO TDC/COMPRESSION

- (a) Turn the crankshaft pulley, and align its groove with timing mark "0" of the No.1 timing belt cover.

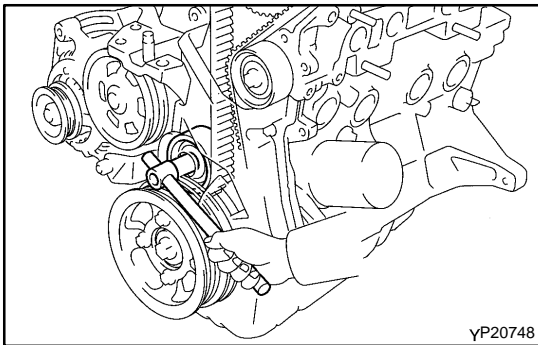


- (b) Turn the camshaft, and align the hole of the camshaft timing pulley on the side with the 5E mark with the timing mark of the bearing cap.

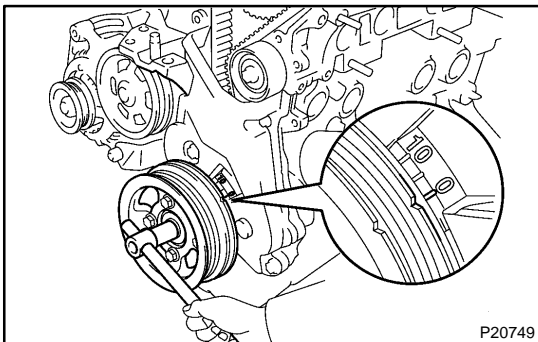


## 9. INSTALL TIMING BELT

- (a) Starting from the right hand side of the pulley and installing the belt counterclockwise.



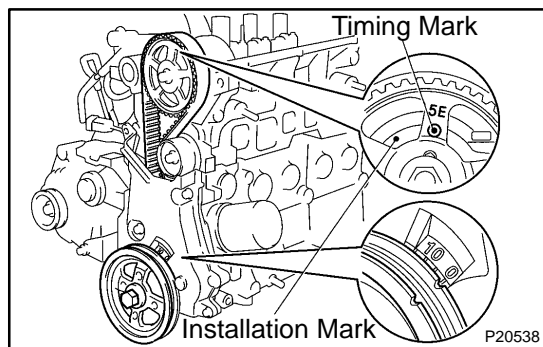
- (b) Loosen the No.1 idler pulley mounting bolt until the pulley is moved slightly by the spring tension.



- (c) Turn the crankshaft pulley 2 revolutions from TDC to TDC.

### NOTICE:

**Always turn the crankshaft clockwise.**



- (d) Check that each pulley aligns with the timing marks as shown in the illustration.

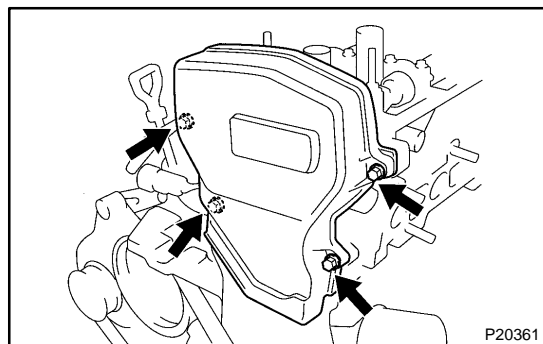
If the timing marks do not align, remove the timing belt and reinstall it.

- (e) Tighten the mounting bolt of the No.1 idler pulley.

**Torque: 18.5 N·m (185 kgf·cm, 13 ft·lbf)**

#### 10. INSTALL NO.3 TIMING BELT COVER

11. INSTALL GENERATOR DRIVE BELT (See page [CH-2](#))

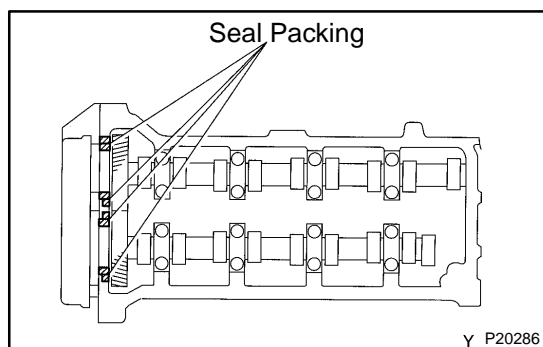


#### 12. INSTALL NO.2 TIMING BELT COVER

- (a) Install the gasket to the belt cover.

- (b) Install the belt cover with the 4 bolts.

13. INSTALL CHARCOAL CANISTER (See page [EM-17](#))

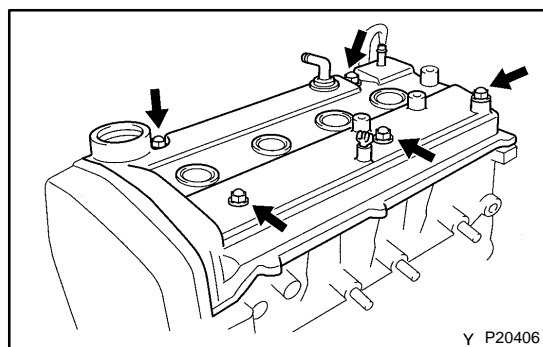


#### 14. INSTALL CYLINDER HEAD COVER

- (a) Apply seal packing to the cylinder head as shown in the illustration.

**Seal packing:**

**Part No. 08826-00080 or equivalent**

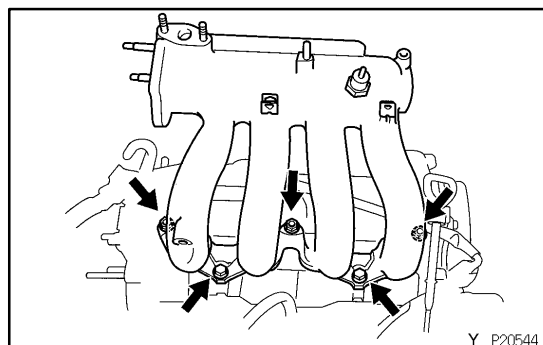


- (b) Install the gasket to the cylinder head cover.

- (c) Install the cylinder head cover with the 5 seal washers and nuts.

**Torque: 7.0 N·m (70 kgf·cm, 61 in·lbf)**

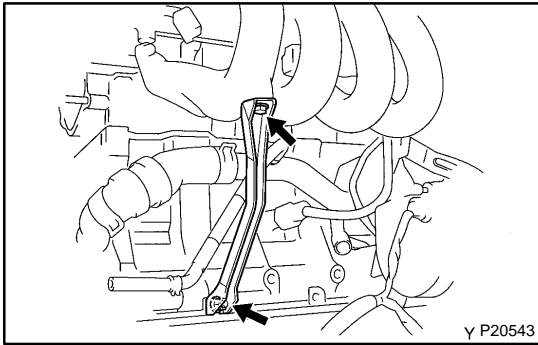
- (d) Install the oil filler cap.



#### 15. INSTALL INTAKE MANIFOLD

- (a) Install air pipe a new gasket and the intake manifold with the 2 bolts and 3 nuts.

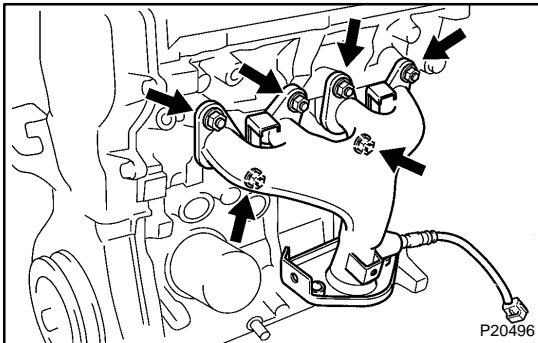
**Torque: 19.5 N·m (195 kgf·cm, 14 ft·lbf)**



- (b) Install the manifold stay with the bolt and nut.  
**Torque: 20 N·m (200 kgf-cm, 15 ft-lbf)**
- (c) Connect the engine wire clamps to the intake manifold stay.

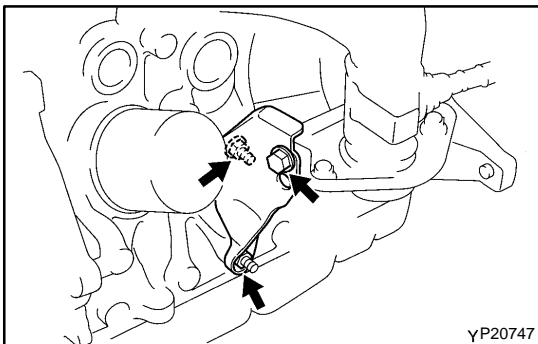
**16. CONNECT BRAKE BOOSTER AND MAP VACUUM HOSES**

- 17. INSTALL INJECTORS AND DELIVERY PIPE (See page MF-22)**



**18. INSTALL EXHAUST MANIFOLD**

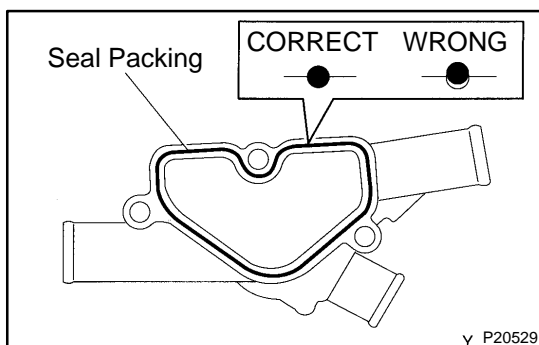
- (a) Install a new gasket and the exhaust manifold with the 6 nuts. Uniformly tighten the nuts in several passes.  
**Torque: 48 N·m (480 kgf-cm, 35 ft-lbf)**



- (b) Place the exhaust manifold stay snug against the cylinder block and exhaust manifold.
- (c) First, tighten the bolt (A) and then the 2 nuts.  
**Torque: 40 N·m (400 kgf-cm, 29 ft-lbf)**
- (d) Install the heat insulator with the 3 bolts.  
**Torque: 8.0 N·m (80 kgf-cm, 69 in.-lbf)**

**19. INSTALL WATER INLET AND OUTLET HOUSING**

- (a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contacting surfaces of the water outlet housing and cylinder head.
  - Using a razor blade and gasket scraper, remove all the packing (FIPG) material from the gasket surfaces.
  - Thoroughly clean all components to remove all the loose material.
  - Clean both sealing surfaces with a non-residue solvent.



- (b) Apply seal packing to the water outlet housing as shown in the illustration.

**Seal packing:**

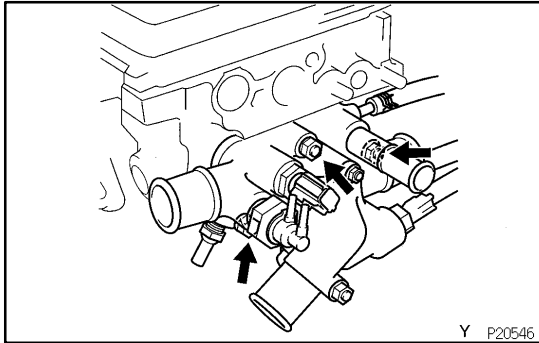
**Part No. 08826-00100, THREE BOND 1282B or equivalent**

- Install a nozzle that has been cut to a 2 - 3 mm (0.08 - 0.12 in.) opening.

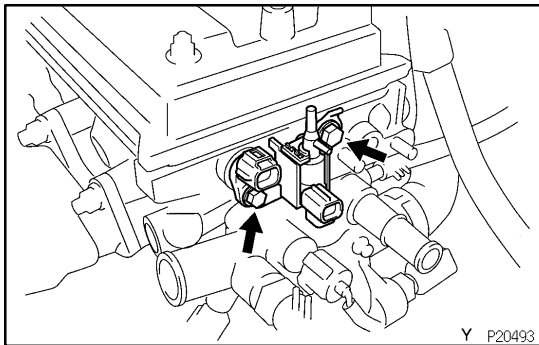
**HINT:**

Avoid applying an excess amount to the surface. Be especially careful near oil passages.

- Parts must be assembled within 15 minutes of application. Otherwise, the material must be removed and reapplied.
- Immediately remove nozzle from tube and reinstall cap.
- Do not pour in any coolant until at least 2 hours after installation is completed.

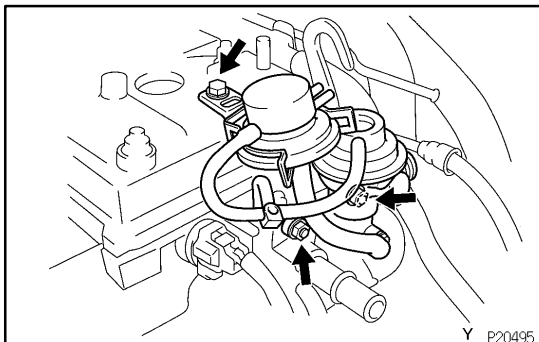


- (c) Install the water outlet housing with the bolt and 2 nuts.  
**Torque: 17.5 N·m (175 kgf·cm, 13 ft·lbf)**
- (d) Connect the 2 radiator hoses.
- (e) Connect the water inlet hose.
- (f) Connect the heater outlet hose.
- (g) Connect the engine coolant temperature sensor connector.
- (h) Connect the engine coolant temperature sender gauge connector.
- (i) Connect the fan engine coolant temperature switch connector.



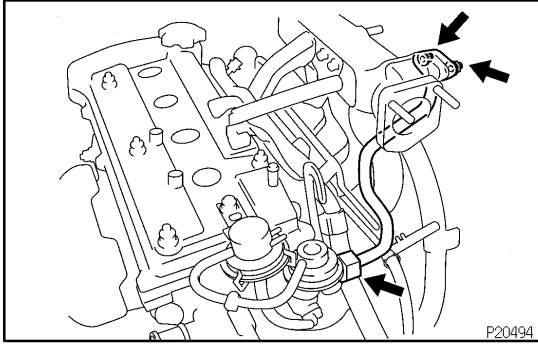
## 20. INSTALL CAMSHAFT POSITION SENSOR AND EGR VSV

- (a) Install a new O-ring to the position sensor.
- (b) Install the position sensor with the bolt.  
**Torque: 8.0 N·m (80 kgf·cm, 69 in·lbf)**
- (c) Install the EGR VSV with the bolt.  
**Torque: 17.5 N·m (175 kgf·cm, 13 in·lbf)**
- (d) Connect the position sensor and EGR VSV connectors.



## 21. INSTALL EGR VALVE AND VACUUM MODULATOR

- (a) Install a new gasket and the EGR valve with the 2 nuts.  
**Torque: 30 N·m (300 kgf·cm, 22 in·lbf)**
- (b) Install the EGR vacuum modulator and bracket with the bolt.

**22. INSTALL EGR PIPE**

Install a new gasket, sleeve ball and the EGR pipe with the union nut and 2 nuts.

**Torque:**

**Union nut**

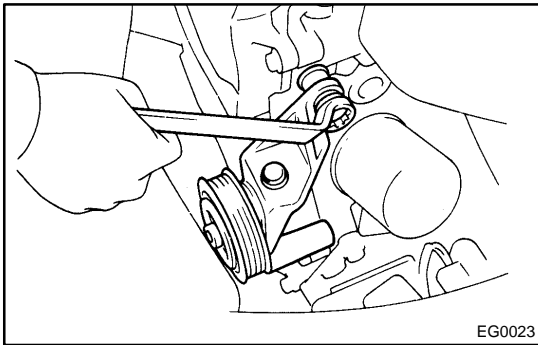
**40 N·m (400 kgf·cm, 29 in.-lbf)**

**Nut**

**30 N·m (300 kgf·cm, 22 in.-lbf)**

**23. INSTALL THROTTLE BODY (See page MF-32 )****24. CONNECT VACUUM HOSES**

- Connect the vacuum hose from the EGR valve.
- Connect the 3 vacuum hoses from the throttle body.
- Connect the vacuum hose from TVV (to charcoal canister).
- Connect the vacuum hose from the TVV (to throttle body).
- Connect the vacuum hose from the EGR VSV.

**25. INSTALL IGNITION COILS AND SPARK PLUGS****26. w/ A/C and w/o PS:****INSTALL IDLER PULLEY BRACKET**

- Install the idler pulley bracket with the 3 bolts.

**Torque:**

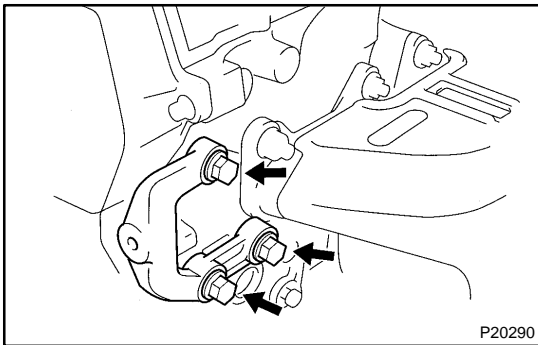
**12 mm head bolt**

**27 N·m (275 kgf·cm, 20 ft·lbf)**

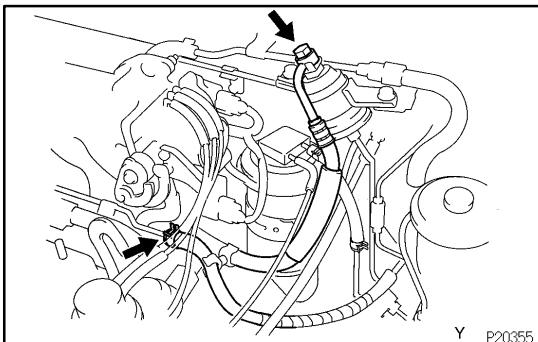
**14 mm head bolt**

**37 N·m (375 kgf·cm, 27 ft·lbf)**

- Install and adjust the drive belt (See page AC-18 ).

**27. w/ PS:****INSTALL PS PUMP BRACKET AND PS PUMP**

- Install the PS pump bracket with the 3 bolts.  
**Torque: 44 N·m (440 kgf·cm, 32 ft·lbf)**
- Temporarily install the PS pump and drive belt with the 2 bolts (See page SR-33 ).
- Adjust the belt tension (See page SR-3 ).

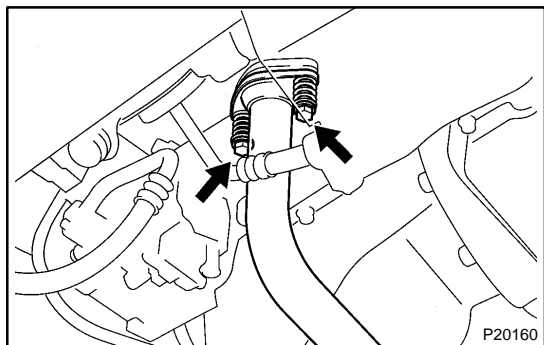
**28. CONNECT FUEL HOSE**

Connect the fuel inlet hose with the union bolt and 2 new gaskets.

**Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)**

**29. INSTALL AIR CLEANER ASSEMBLY WITH AIR INTAKE CONNECTOR****30. INSTALL ACCELERATOR CABLE, AND ADJUST IT****31. A/T:**

**CONNECT THROTTLE CABLE, AND ADJUST IT**

**32. CONNECT FRONT EXHAUST PIPE**

- (a) Place a new gasket on the exhaust pipe.
- (b) Connect the exhaust pipe to the exhaust manifold with the 2 compression spring and 2 bolts.

**Torque: 62 N·m (630 kgf-cm, 46 ft-lbf)**

**33. INSTALL RH ENGINE UNDER COVER****34. FILL WITH ENGINE COOLANT (See page [CO-2](#) )****35. START ENGINE AND CHECK FOR LEAKS****36. PERFORM ENGINE ADJUSTMENT****37. PERFORM ROAD TEST**

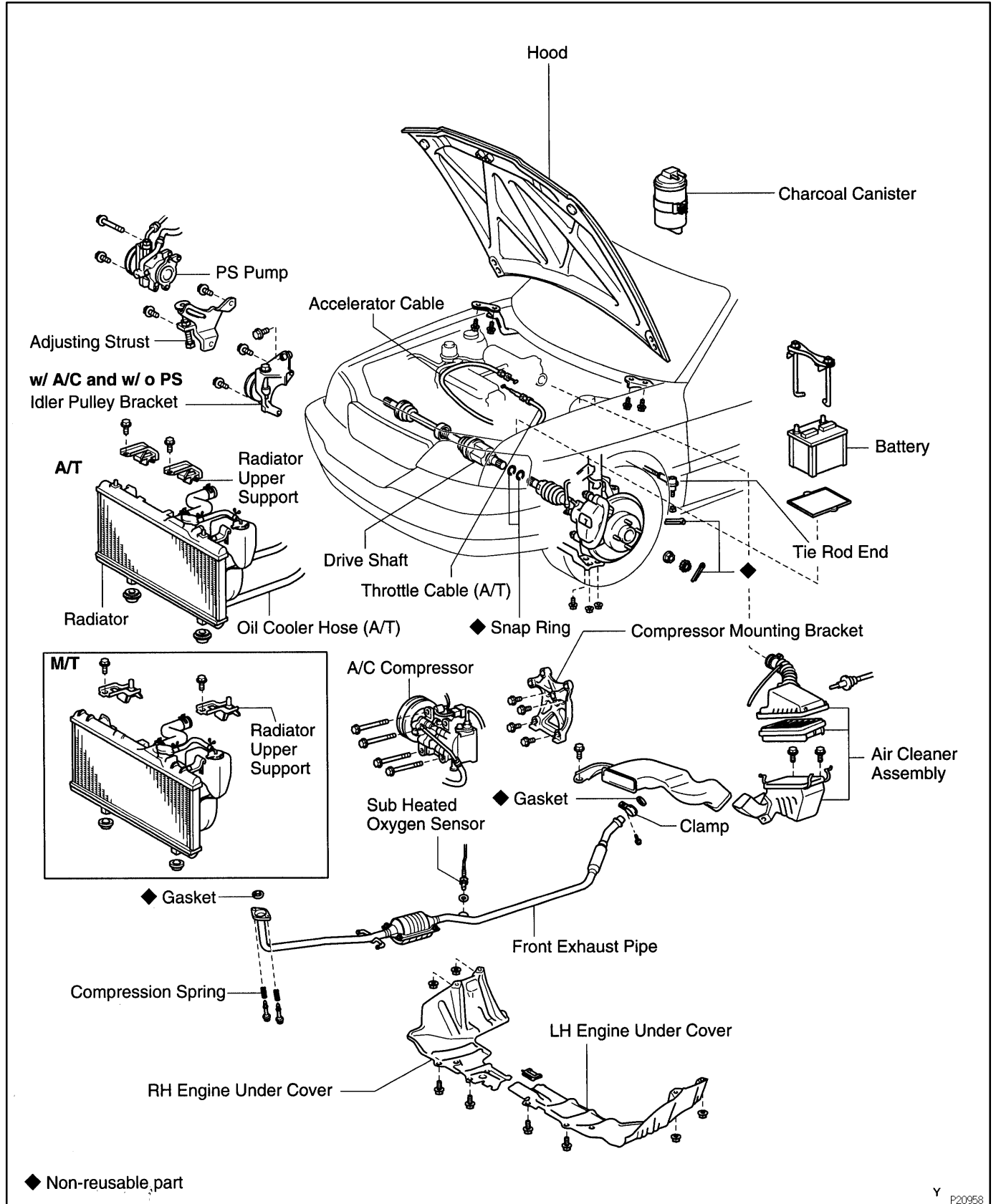
Check for abnormal noise, shock, slippage, correct shift points and smooth operation.

**38. RECHECK ENGINE COOLANT AND ENGINE OIL LEVELS**

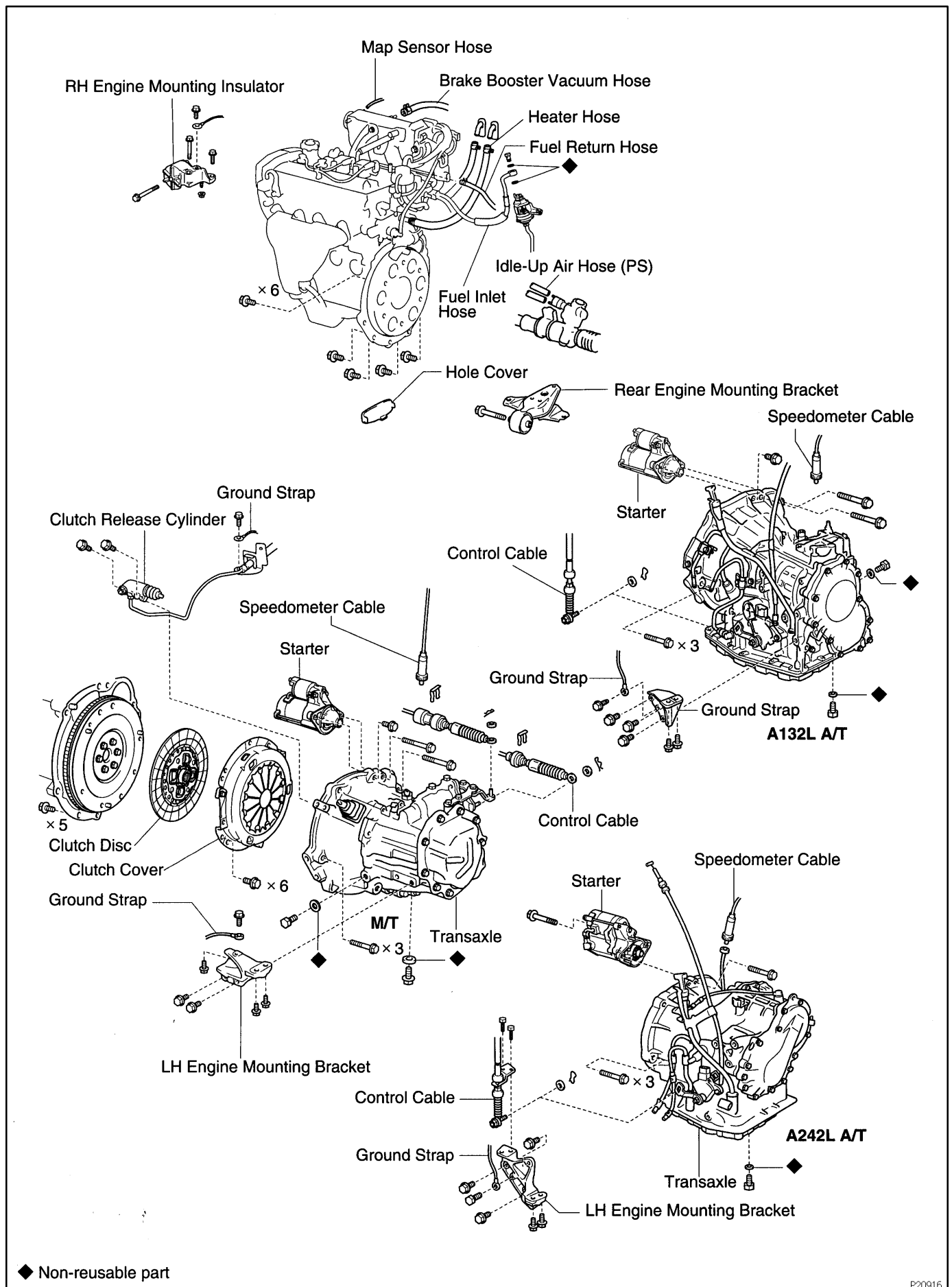


# ENGINE UNIT COMPONENTS

EMOJU-06



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P20916

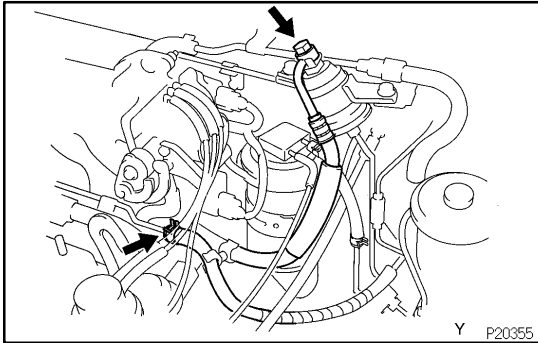
## REMOVAL

1. REMOVE BATTERY
2. REMOVE HOOD
3. REMOVE ENGINE UNDER COVERS
4. DRAIN ENGINE COOLANT
5. DRAIN TRANSAXLE OIL (FLUID)
6. REMOVE AIR CLEANER ASSEMBLY WITH AIR INTAKE CONNECTOR
7. REMOVE RADIATOR (See page [CO-16](#) )
8. DISCONNECT ACCELERATOR CABLE
9. DISCONNECT FUEL HOSE

Remove the union bolt and gaskets, and disconnect the fuel inlet hose.

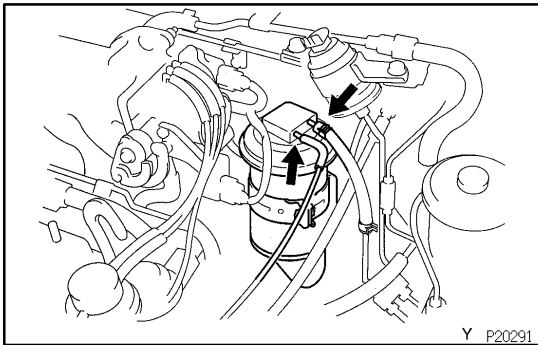
### NOTICE:

Catch leaking fuel in a container.



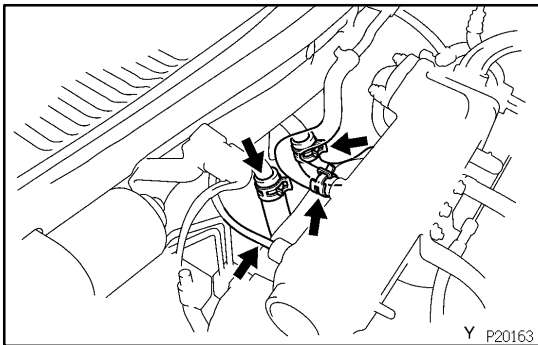
## 10. REMOVE CHARCOAL CANISTER

- (a) Disconnect the canister hoses.
- (b) Remove the charcoal canister.



## 11. DISCONNECT HOSES

- (a) Disconnect the brake booster vacuum hose.
- (b) Disconnect the MAP sensor hose.
- (c) Disconnect the heater hoses.



## 12. DISCONNECT SPEEDOMETER CABLE FROM TRANSAXLE

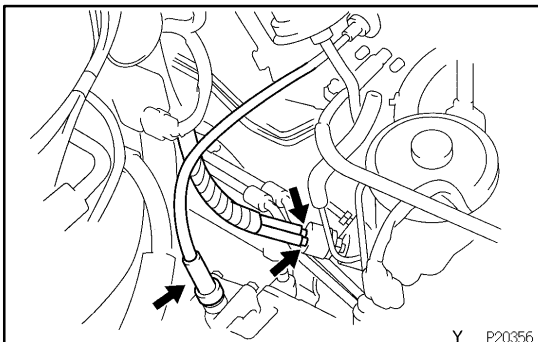
### 13. w/ PS:

## DISCONNECT IDLE-UP AIR HOSES FROM AIR CONTROL VALVE

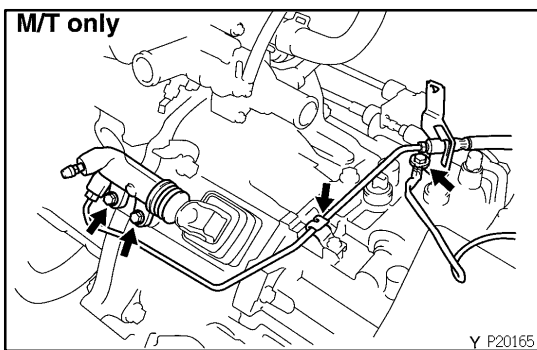
## 14. DISCONNECT ENGINE WIRE HARNESS

Disconnect these connectors and wires:

- Main heated oxygen sensor connector
- Oil pressure switch connector

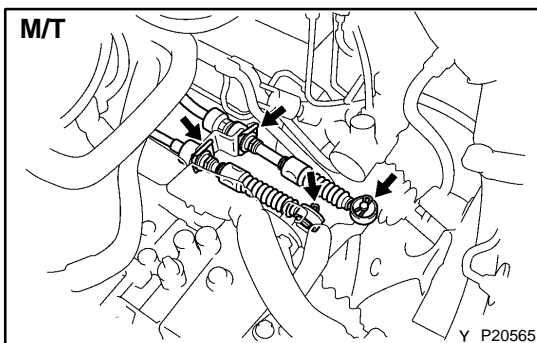


- Engine coolant temperature sender gauge connector
- Engine coolant temperature sensor connector
- Camshaft position sensor connector
- EGR VSV
- Fan engine coolant temperature switch connector
- A/T only:  
Lock-up solenoid connector
- A/T only:  
Park/Neutral position switch connector
- M/T only:  
Backup light switch connector
- A/T only:  
No.2 vehicle speed sensor connector
- Ground strap
- Throttle position sensor connector
- IAC valve connector
- Injector connectors
- Crankshaft position sensor connector
- Knock sensor connector
- Starter connector and wire
- Generator connector and wire



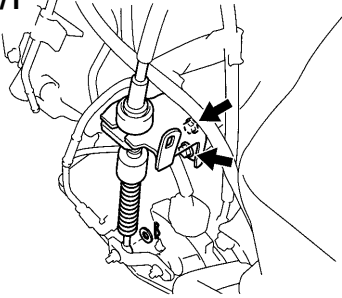
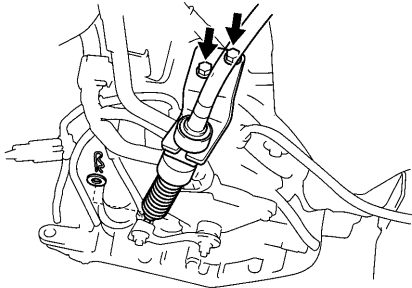
**15. M/T only:**  
**REMOVE CLUTCH RELEASE CYLINDER WITHOUT DISCONNECTING TUBE**

- (a) Remove the 3 bolts, release cylinder and tube from the transaxle.
- (b) Disconnect the ground strap.



**16. M/T:**  
**DISCONNECT CONTROL CABLE(S) FROM TRANS-AXLE**

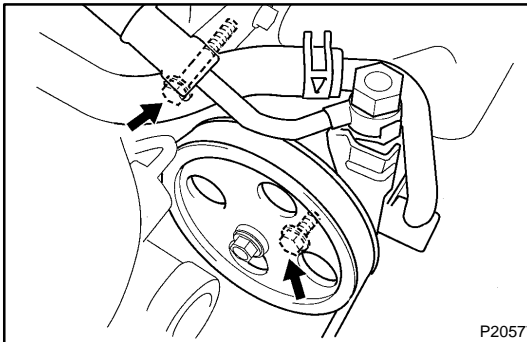
- (a) Remove the clip and plate washer.
- (b) Remove the retainer from the cable.

**A132 LA/T****A242 LA/T**

P20572

**17. A/T:  
DISCONNECT CONTROL CABLE(S) FROM TRANS-  
AXLE**

- (a) Remove the clip and plate washer.
- (b) Remove the 2 bolts from the LH engine mounting bracket.



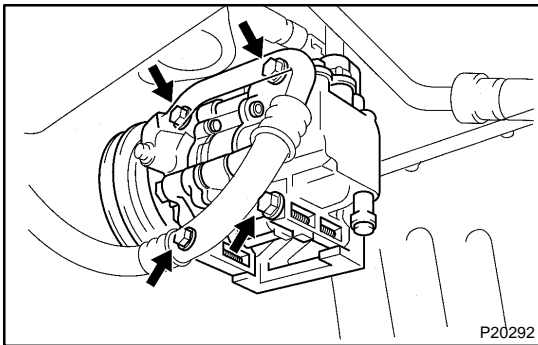
P20577

**18. w/ PS:  
REMOVE PS PUMP WITHOUT DISCONNECTING  
HOSES**

- (a) Loosen the 2 bolts, and remove the PS drive belt.
- (b) Remove the 2 bolts, and disconnect the PS pump from the engine.

**HINT:**

Put aside the PS pump, and suspend it.



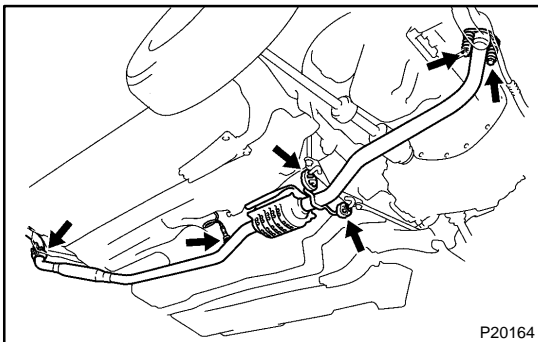
P20292

**19. w/ A/C:  
REMOVE A/C COMPRESSOR**

- (a) Disconnect the compressor connector.
- (b) Remove the 4 compressor mounting bolts.

**HINT:**

Put aside the compressor, and suspend it.

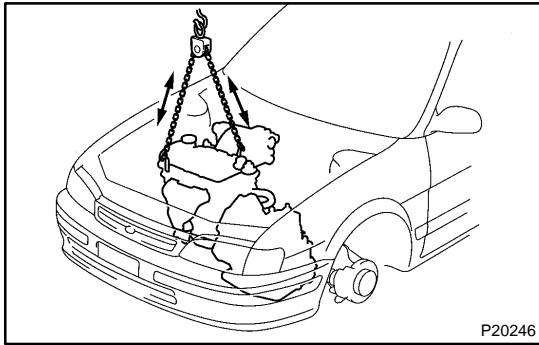


P20164

**20. REMOVE FRONT EXHAUST PIPE**

- (a) Disconnect the heated oxygen sensor.
- (b) Remove the 2 bolts, compression springs and disconnect the exhaust pipe.
- (c) Remove the bolts and rear clamp.
- (d) Disconnect the 2 rings and remove the front exhaust pipe.

**21. REMOVE DRIVE SHAFTS (See page SA-18 )**



## 22. REMOVE ENGINE WITH TRANSAXLE FROM VEHICLE

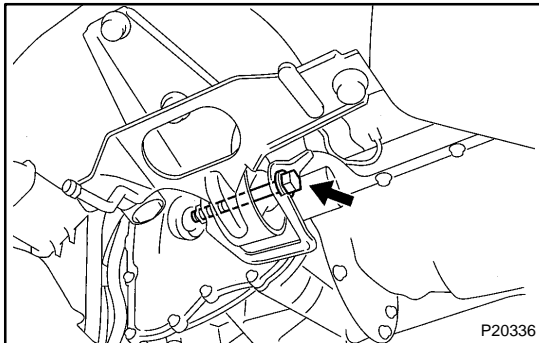
- (a) Install the No.1 engine hanger in the correct direction.

**Part No.:**

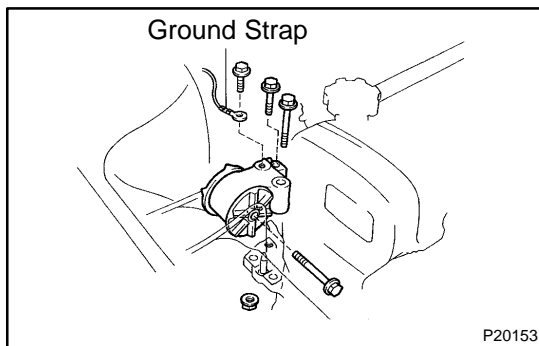
**No.1 engine hanger 12281-11031**

**Bolt 91642-80825**

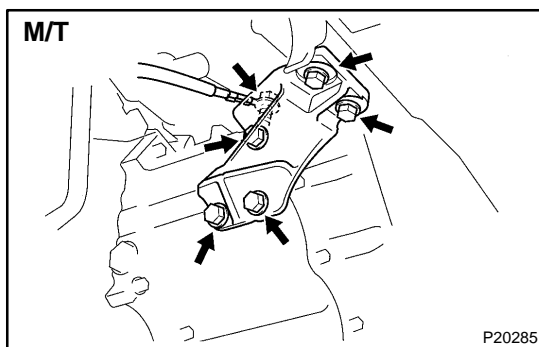
- (b) Attach the engine sling device to the engine hangers.



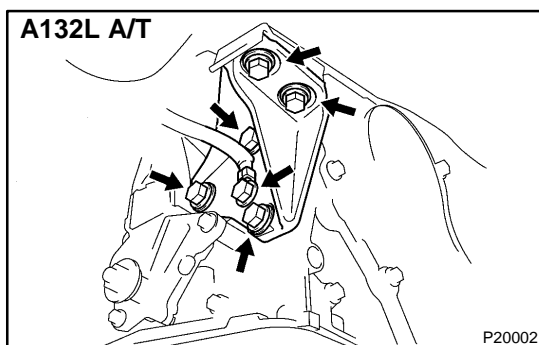
- (c) Remove the rear engine mounting insulator through bolt.



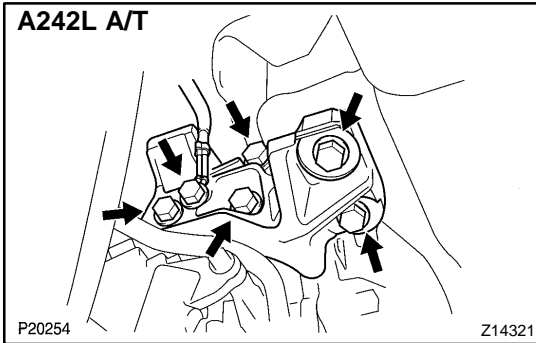
- (d) Remove the bolt and disconnect the ground strap.  
(e) Remove the through bolt, 2 bolts, nut and RH engine mounting insulator.



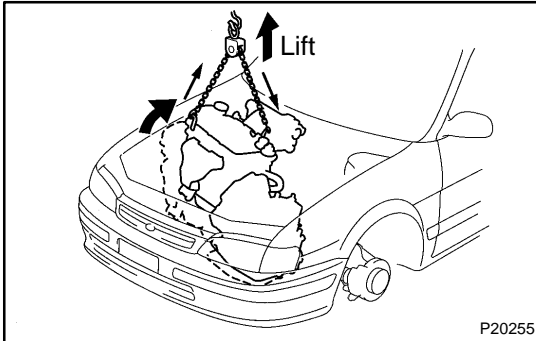
- (f) M/T:  
Remove the bolt and disconnect the ground strap.  
(g) Remove the 5 bolts and LH engine mounting bracket.



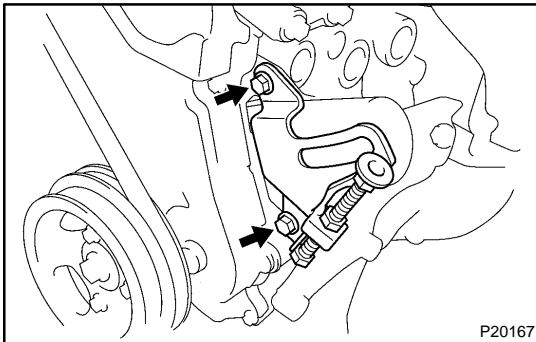
- (h) A132L A/T:  
Remove the bolt and disconnect the ground strap.  
(i) Remove the 5 bolts and LH engine mounting bracket.

**A242L A/T**

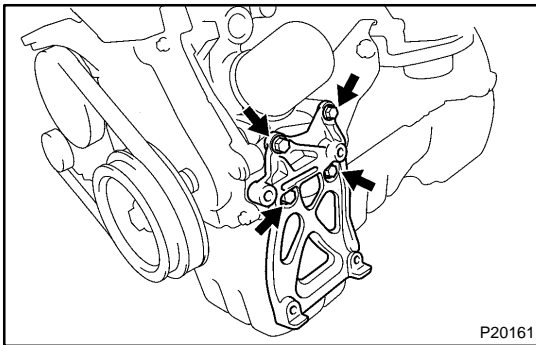
- (j) A242L A/T:  
Remove the bolt and disconnect the ground strap.
- (k) Remove the 5 bolts and LH engine mounting bracket.



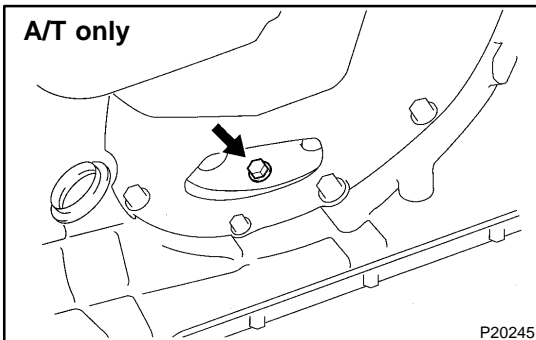
- (l) Lift the engine out of the vehicle slowly and carefully.  
HINT:  
Clear the battery carrier support while lowering the transaxle.
- (m) Place the engine with the transaxle onto the stand.



- 23. w/PS:**  
**REMOVE PS PUMP ADJUSTING STRUT**  
Remove the 2 bolts and PS pump adjusting strut.



- 24. w/A/C:**  
**REMOVE A/C COMPRESSOR MOUNTING BRACKET**  
Remove the 4 bolts and compressor mounting bracket.



- 25. A/T only:**  
**REMOVE TORQUE CONVERTER CLUTCH MOUNTING BOLTS**
- (a) Remove the engine rear end plate hole cover.
  - (b) Turn the crankshaft to gain access to each bolt.
  - (c) Hold the crankshaft pulley bolt with a wrench.
  - (d) Remove the 6 bolts.
- 26. REMOVE STARTER (See page ST-3 and ST-16)**
- 27. SEPARATE ENGINE AND TRANSAXLE**

## INSTALLATION

### 1. ASSEMBLE ENGINE AND TRANSAXLE

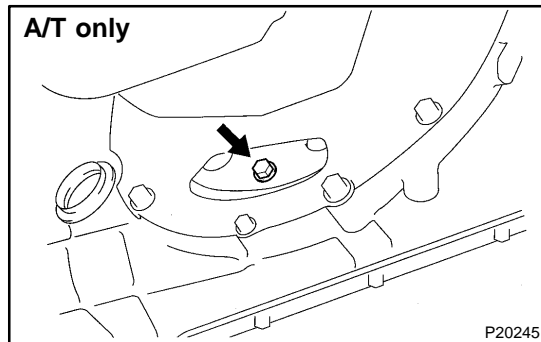
M/T: (See page [MX-4](#) )

A132L A/T: (See page [AX-26](#))

A242L A/T: (See page [AX-30](#))

### 2. INSTALL STARTER

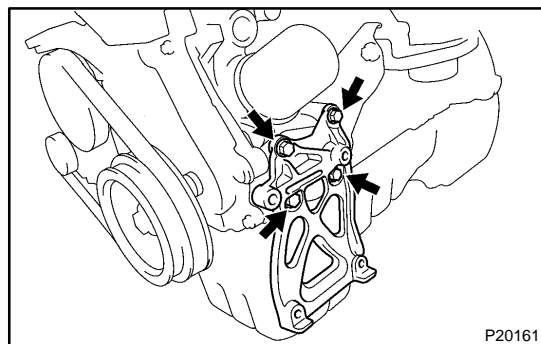
(See page [ST-14](#) and [ST-30](#) )



### 3. A/T only:

#### INSTALL TORQUE CONVERTER CLUTCH MOUNTING BOLTS

- First, install the gray bolt and then 5 bolts.
  - Tighten the bolts evenly.
- Torque: 27 N·m (280 kgf-cm, 20 ft-lbf)**
- Install the engine rear end plate hole cover.

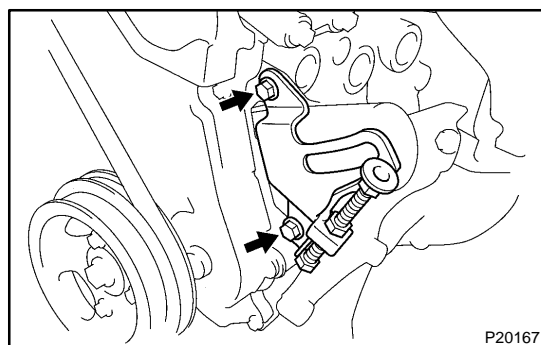


### 4. w/A/C:

#### INSTALL A/C COMPRESSOR MOUNTING BRACKET

Install the compressor mounting bracket with the 4 bolts.

**Torque: 27 N·m (280 kgf-cm, 20 ft-lbf)**

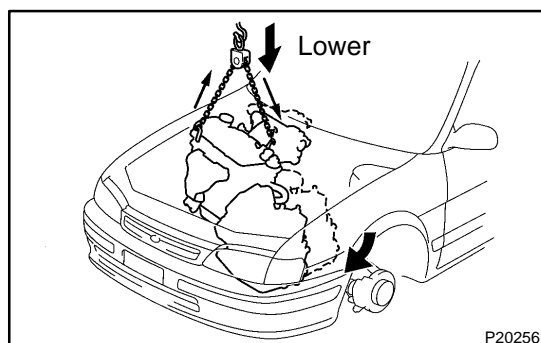


### 5. w/PS:

#### INSTALL PS PUMP ADJUSTING STRUT

Install the PS pump adjusting strut with the 2 bolts.

**Torque: 21 N·m (210 kgf-cm, 15 ft-lbf)**



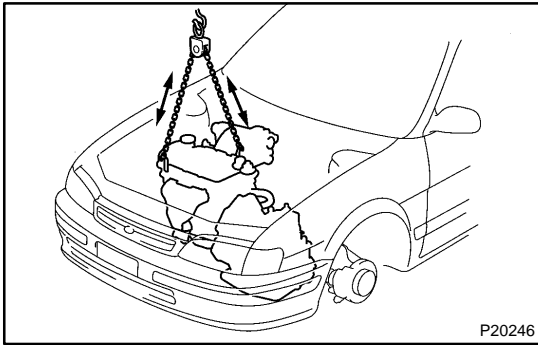
### 6. INSTALL ENGINE AND TRANSAXLE ASSEMBLY IN VEHICLE

- Attach the engine sling device to the engine hangers.
- Lower the engine into the engine compartment.
- Tilt the transaxle downward, lower the engine and clear the LH engine mounting.

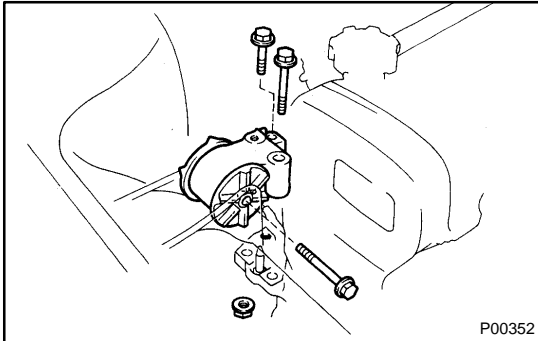
#### NOTICE:

Be careful not to hit the PS gear housing, park/neutral position switch and throttle position switch.

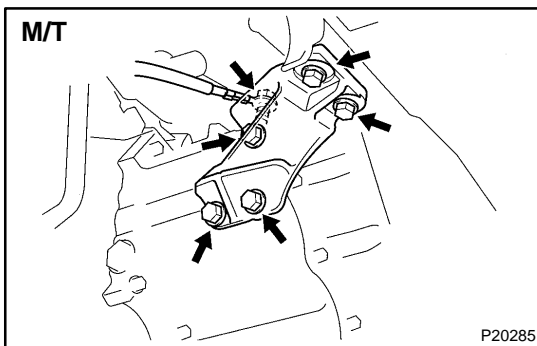




- (d) Keep the engine level, and align RH and LH engine mountings with the body bracket.



- (e) Attach the RH engine mounting insulator to the mounting bracket and body, and temporarily install the through bolt, 2 bolts and nut.



- (f) Install the LH engine mounting bracket to the transaxle and mounting insulator with the 5 bolts. Torque the bolts.

**Torque:**

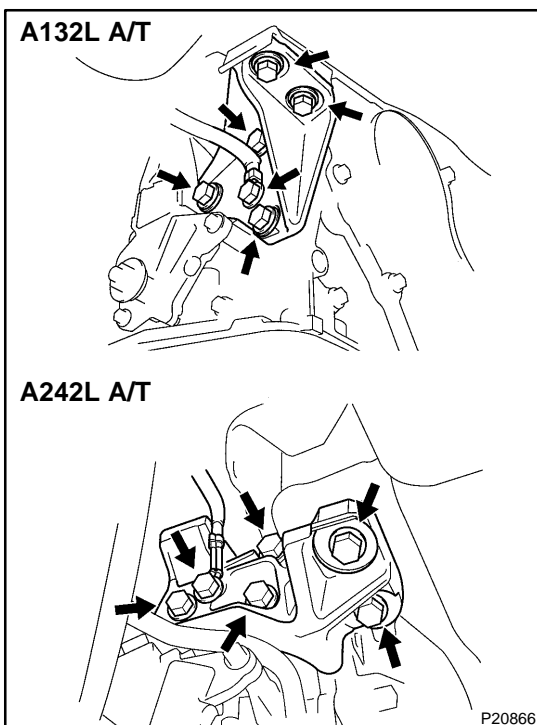
**Bracket to transaxle (bolt head: NT)**

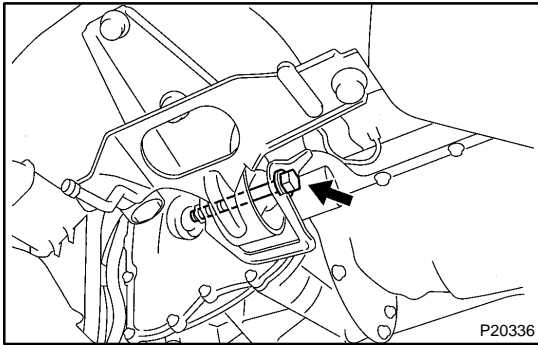
**65 N·m (650 kgf·cm, 47 ft·lbf)**

**Bracket to insulator (bolt head: 7T)**

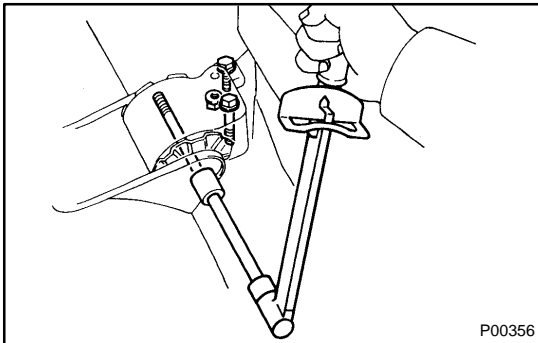
**49 N·m (490 kgf·cm, 35 ft·lbf)**

- (g) Connect the ground strap with the bolt.  
**Torque: 49 N·m (490 kgf·cm, 35 ft·lbf)**



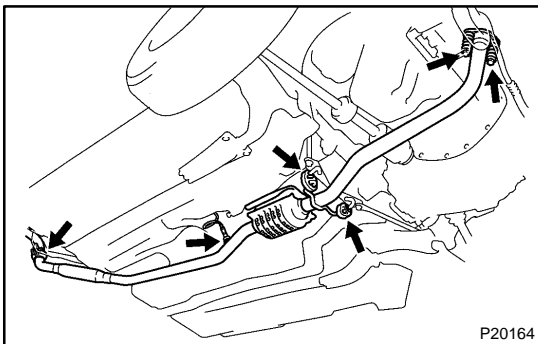


- (h) Install and torque the rear engine mounting insulator through bolt.  
**Torque: 65 N·m (650 kgf-cm, 47 ft-lbf)**
- (i) Remove the engine sling device from the engine.



- (j) Torque the 2 bolts, nut and through bolt of the RH mounting insulator.  
**Torque:**  
**Bolt and nut**  
**64 N·m (650 kgf-cm, 47 ft-lbf)**  
**Through bolt**  
**73 N·m (740 kgf-cm, 54 ft-lbf)**
- (k) Connect the ground strap with the bolt.

**7. INSTALL DRIVE SHAFTS (See page SA-18 )**

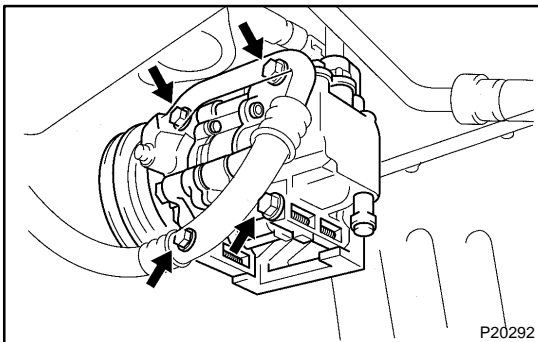


**8. INSTALL FRONT EXHAUST PIPE**

- (a) Connect the 2 rings to the front exhaust pipe.  
 (b) Place a new gasket on the exhaust pipe.  
 (c) Connect the exhaust pipe to the exhaust manifold with 2 compression springs and 2 bolts.  
**Torque: 62 N·m (630 kgf-cm, 46 ft-lbf)**  
 (d) Install the exhaust pipe to the tail pipe with the clamp.  
**Torque: 19 N·m (190 kgf-cm, 14 ft-lbf)**  
 (e) Install the heated oxygen sensor.  
**Torque: 44 N·m (450 kgf-cm, 33 ft-lbf)**

**HINT:**

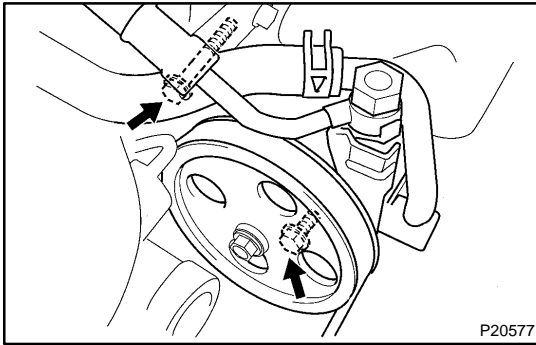
- Before installing the heated oxygen sensor, twist the sensor wire counterclockwise 3 and 1/2 turns.
- After installing the heated oxygen sensor, check that the sensor wire is not twisted. If it is twisted, remove the heated oxygen sensor and reinstall it.



**9. w/ A/C:**

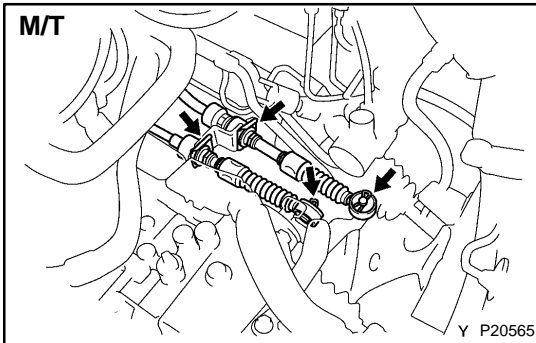
**INSTALL A/C COMPRESSOR**

- (a) Install the A/C compressor to the bracket with the 4 bolts.  
**Torque: 25 N·m (250 kgf-cm, 18 ft-lbf)**  
 (b) Connect A/C compressor connector.



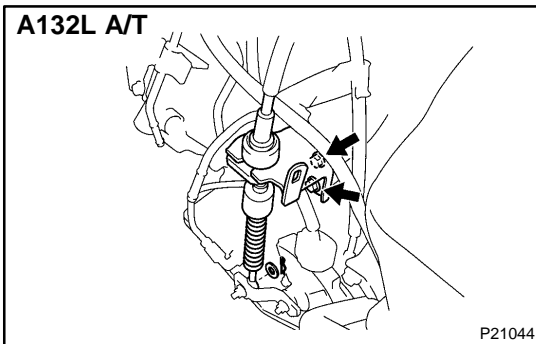
**10. w/ PS:  
INSTALL PS PUMP**

- (a) Install the PS pump and drive belt with the 2 bolts.
- (b) Adjust the drive belt tension (See page [SR-3](#) ).



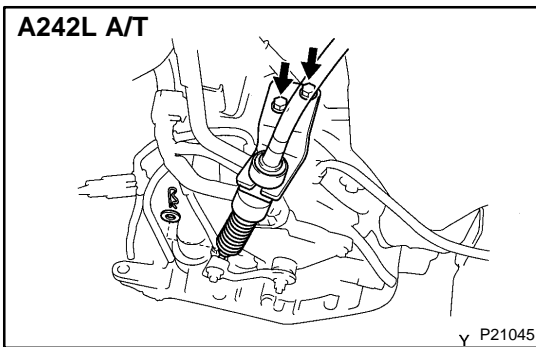
**11. M/T:  
CONNECT CONTROL CABLE(S) TO TRANSAXLE**

- (a) Install the retainer to the cable.
- (b) Connect the linkage with the plate washer and clip.



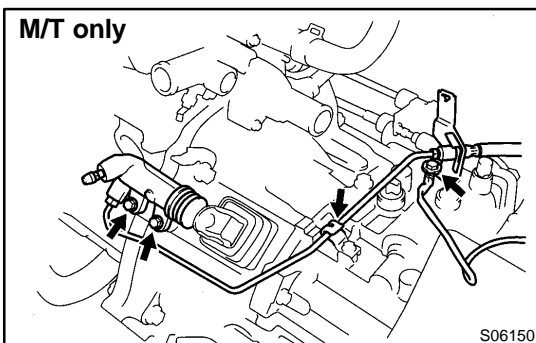
**12. A132L A/T:  
CONNECT CONTROL CABLE(S) TO TRANSAXLE**

- (a) Install the support bracket to the LH engine mounting bracket with the 2 bolts.
- (b) Connect the linkage with the plate washer and clip.



**13. A242L A/T:  
CONNECT CONTROL CABLE(S) TO TRANSAXLE**

- (a) Install the support bracket to the LH engine mounting bracket with the 2 bolts.
- (b) Connect the linkage with the plate washer and clip.



**14. M/T only:  
INSTALL CLUTCH RELEASE CYLINDER**

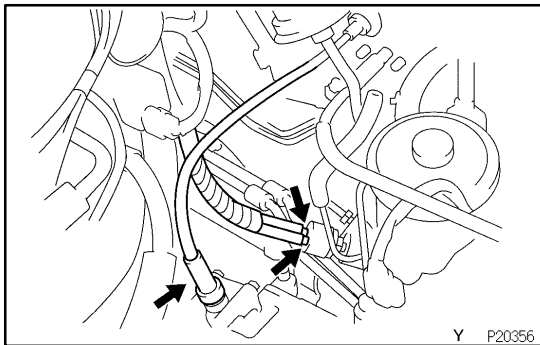
Install the release cylinder, tube and ground strap with the 3 bolts.

**Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)**

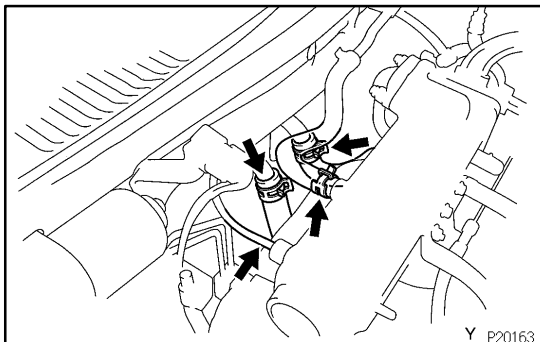
**15. CONNECT ENGINE WIRE HARNESS**

Connect these connectors and wires:

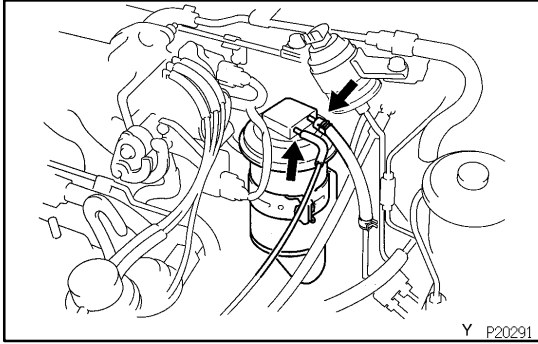
- Main heated oxygen sensor connector
- Oil pressure switch connector
- Engine coolant temperature sender gauge connector
- Engine coolant temperature sensor connector
- Camshaft position sensor connector
- EGR VSV
- Fan engine coolant temperature switch connector
- A/T only:  
Lock-up solenoid connector
- A/T only:  
Park/Neutral position switch connector
- M/T only:  
Backup light switch connector
- A/T only:  
No.2 vehicle speed sensor connector
- Ground strap
- Throttle position sensor connector
- IAC valve connector
- Injector connectors
- Crankshaft position sensor connector
- Knock sensor connector
- Starter connector and wire
- Generator connector and wire

**16. w/ PS:**

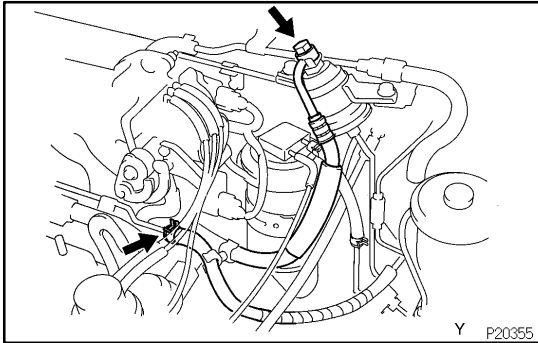
**CONNECT IDLE-UP AIR HOSES TO AIR CONTROL VALVE**

**17. CONNECT SPEEDOMETER CABLE****18. CONNECT HOSES**

- (a) Connect the brake booster vacuum hose.
- (b) Connect the MAP sensor hose.
- (c) Connect the heater hoses.

**19. INSTALL CHARCOAL CANISTER**

- (a) Install the charcoal canister to the bracket.
- (b) Connect the canister hoses.

**20. CONNECT FUEL HOSE**

Connect the fuel inlet hose with the union bolt and 2 new gaskets.

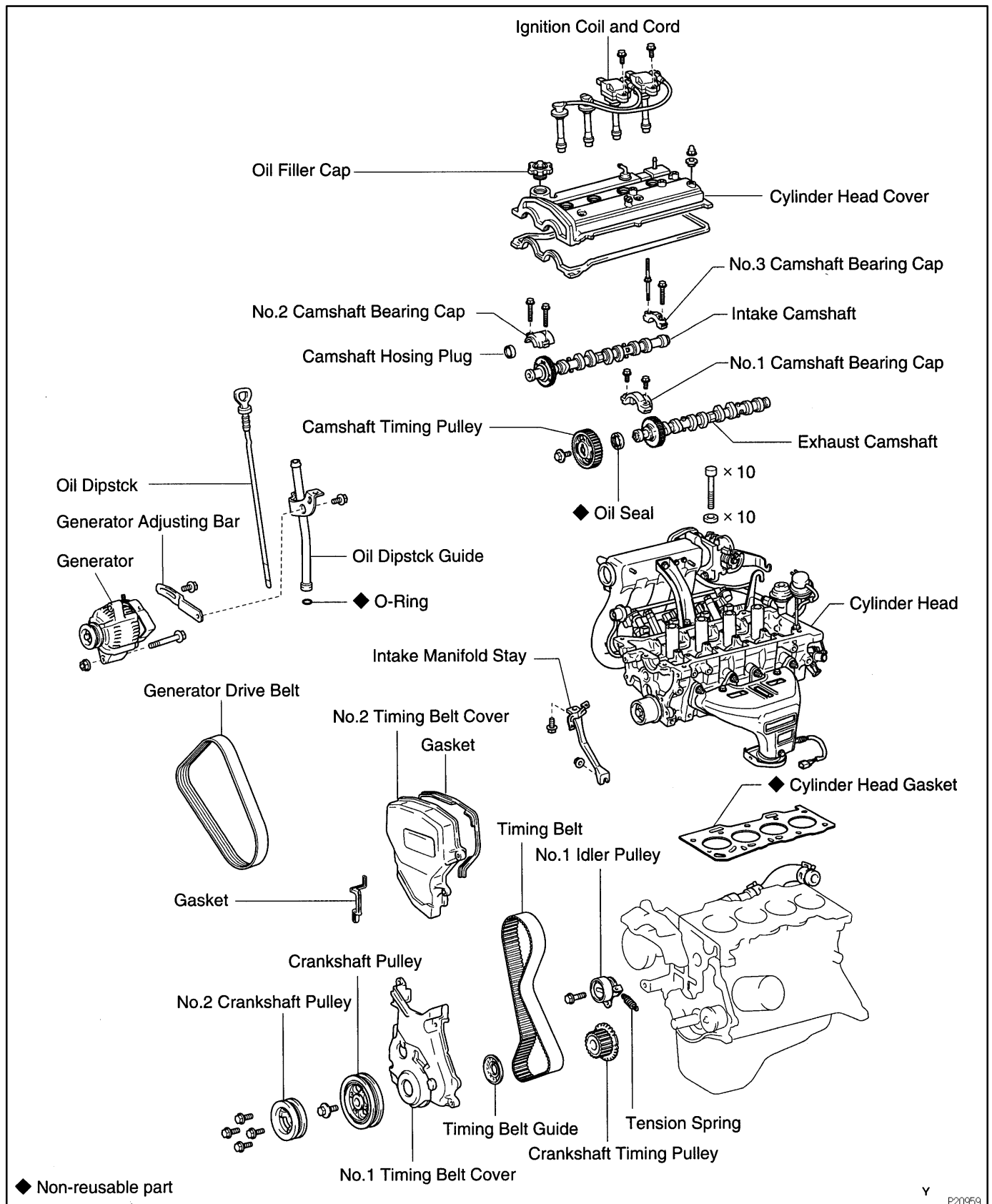
**Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)**

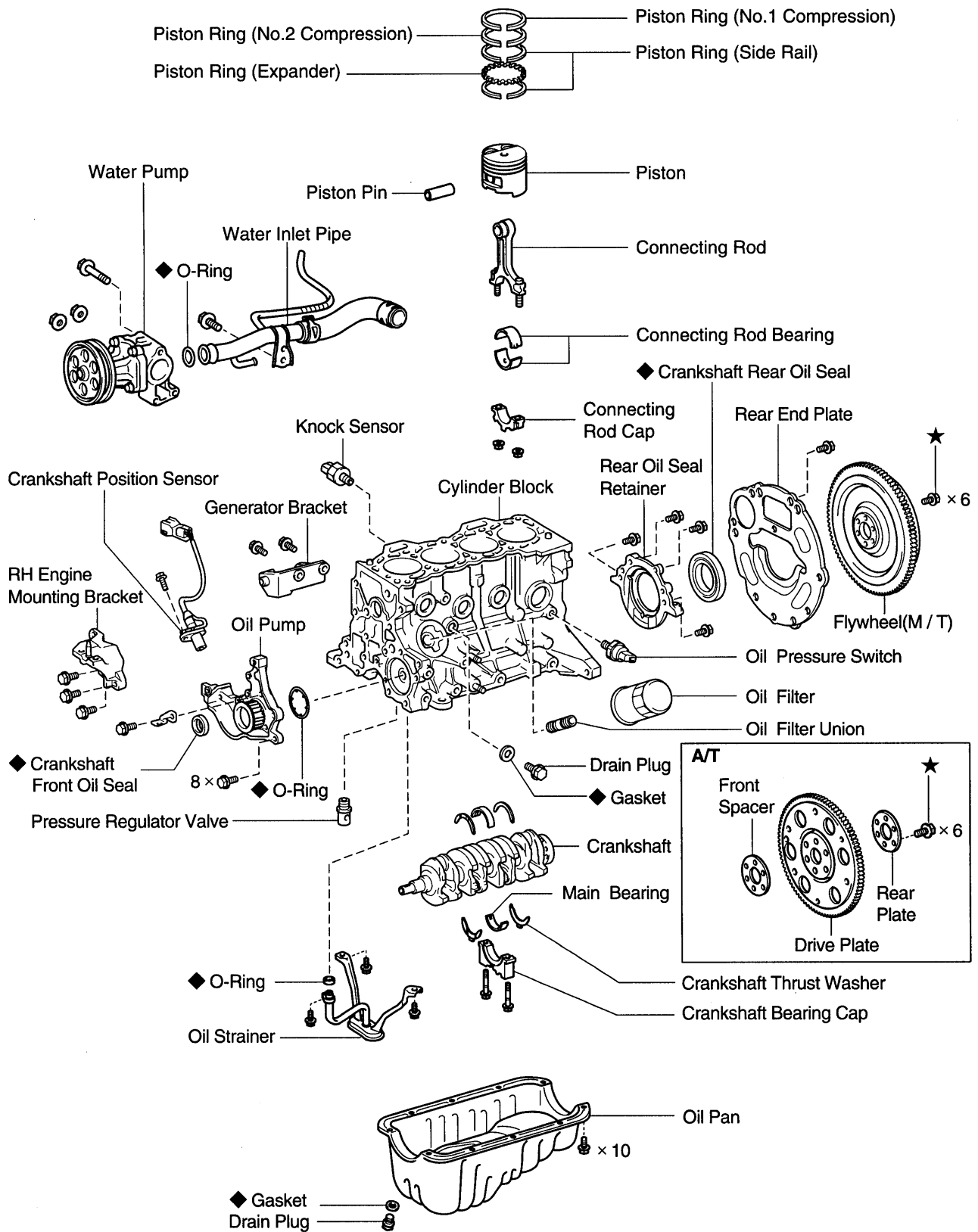
- 21. CONNECT ACCELERATOR CABLE, AND ADJUST IT**
- 22. INSTALL RADIATOR (See page [CO-22](#))**
- 23. INSTALL AIR CLEANER ASSEMBLY WITH AIR INTAKE CONNECTOR**
- 24. FILL WITH TRANSAXLE OIL (FLUID)**
- 25. FILL WITH ENGINE COOLANT**
- 26. INSTALL ENGINE UNDER COVERS**
- 27. INSTALL HOOD**
- 28. START ENGINE AND CHECK FOR LEAKS**
- 29. PERFORM ENGINE ADJUSTMENT**
- 30. PERFORM ROAD TEST**

Check for abnormal noise, shock, slippage, correct shift points and smooth operation.
- 31. RECHECK ENGINE COOLANT AND ENGINE OIL LEVELS**

# CYLINDER BLOCK COMPONENTS

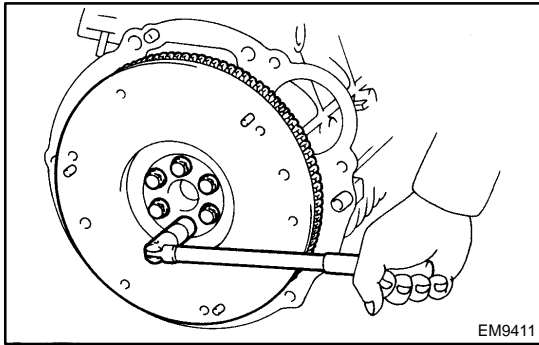
EMOJP-05





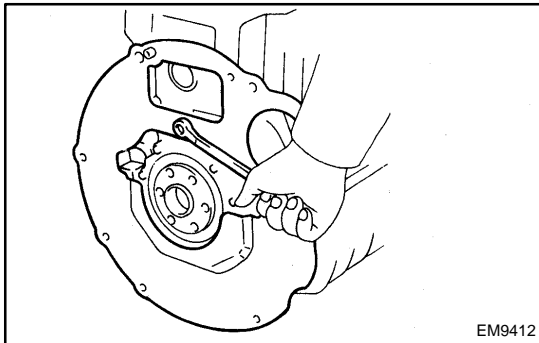
◆ Non-reusable part  
★ Precoated part

P20767

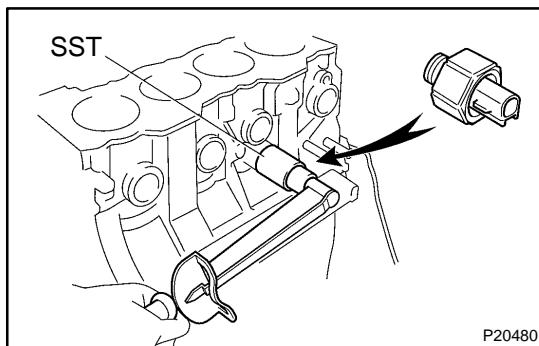


## DISASSEMBLY

1. **M/T:**  
**REMOVE CLUTCH COVER AND DISC**
2. **REMOVE FLYWHEEL (M/T) OR DRIVE PLATE (A/T)**

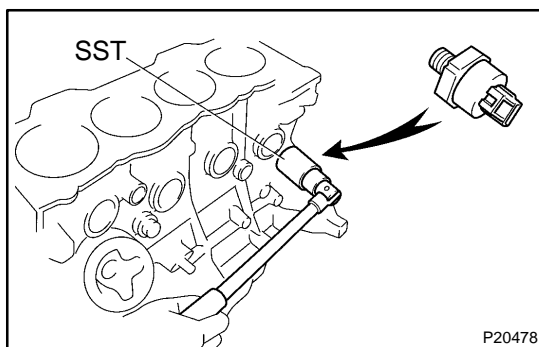


3. **REMOVE REAR END PLATE**
4. **INSTALL ENGINE TO ENGINE STAND FOR DISASSEMBLY**
5. **REMOVE TIMING BELT AND PULLEYS**
6. **REMOVE CYLINDER HEAD**
7. **REMOVE OIL DIPSTICK GUIDE AND GENERATOR ADJUSTING BAR**
8. **REMOVE WATER PUMP WITH WATER INLET PIPE**
9. **REMOVE GENERATOR BRACKET**

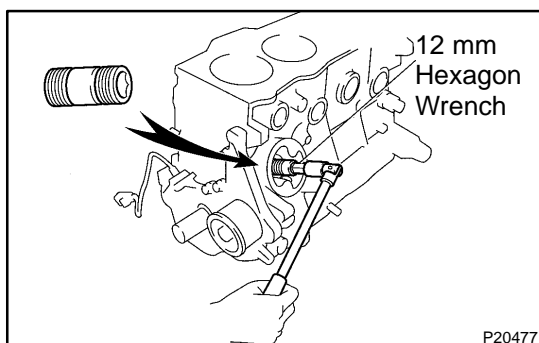


10. **REMOVE KNOCK SENSOR**  
Using SST, remove the knock sensor.  
SST 09816-30010

11. **REMOVE RH ENGINE MOUNTING BRACKET**
12. **REMOVE OIL FILTER**

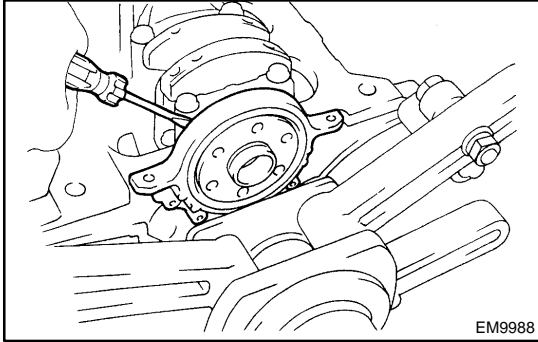


13. **REMOVE OIL PRESSURE SWITCH**  
Using SST, remove the oil pressure switch.  
SST 09816-30010
14. **REMOVE OIL PUMP AND PRESSURE REGULATOR VALVE**

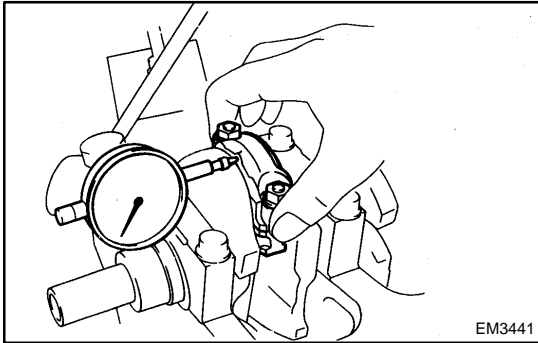


15. **REMOVE OIL FILTER UNION**  
Using a 12 mm hexagon wrench, remove the oil filter union.



**16. REMOVE REAR OIL SEAL RETAINER**

- (a) Remove the 4 bolts.
- (b) Using a screwdriver, remove the oil seal retainer by prying the portions between the oil seal retainer and main bearing cap.

**17. CHECK CONNECTING ROD THRUST CLEARANCE**

Using a dial indicator, measure the thrust clearance while moving the rod back and forth.

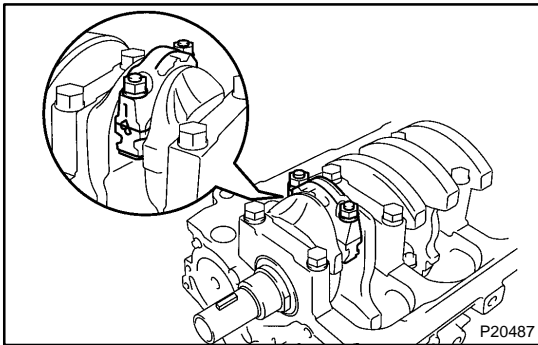
**Standard thrust clearance:**

**0.15 - 0.35 mm (0.0059 - 0.0138 in.)**

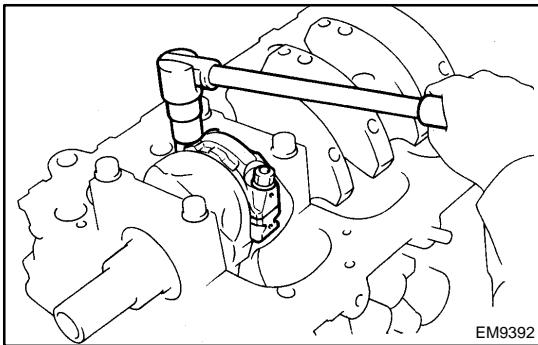
**Maximum thrust clearance:**

**0.45 mm (0.0177 in.)**

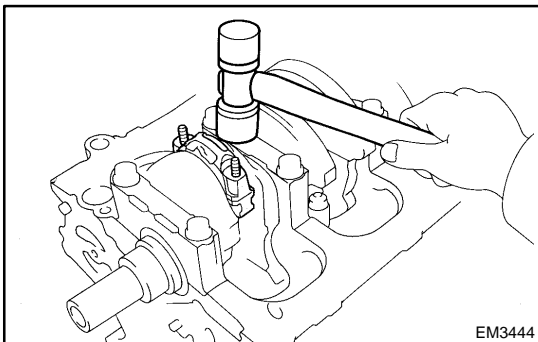
If the thrust clearance is greater than maximum, replace the connecting rod assembly. If necessary, replace the crankshaft.

**18. REMOVE CONNECTING ROD CAPS AND CHECK OIL CLEARANCE**

- (a) Check the matchmarks on the connecting rod and cap to ensure correct reassembly.



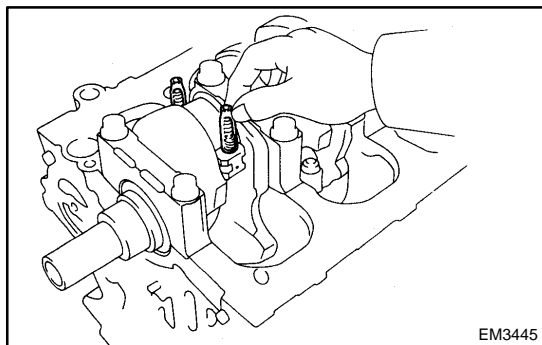
- (b) Remove the 2 connecting rod cap nuts.



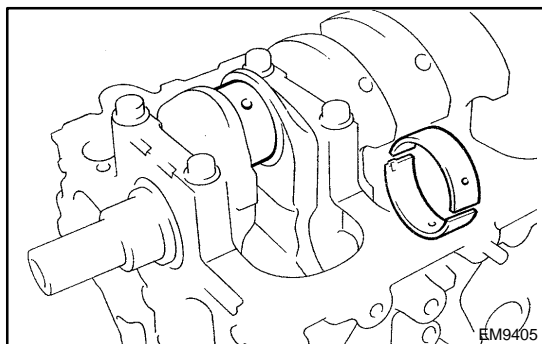
- (c) Using a soft-faced hammer, lightly tap the connecting rod bolt and lift the cap and lower bearing.

**HINT:**

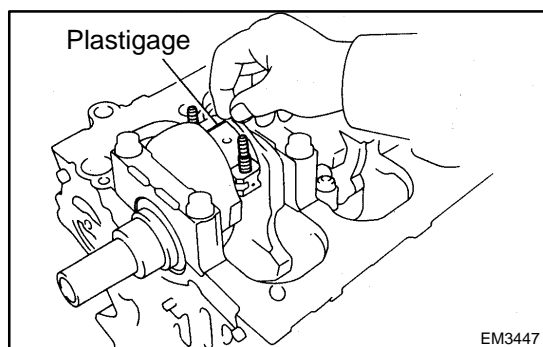
Keep the lower bearing inserted with the connecting rod cap.



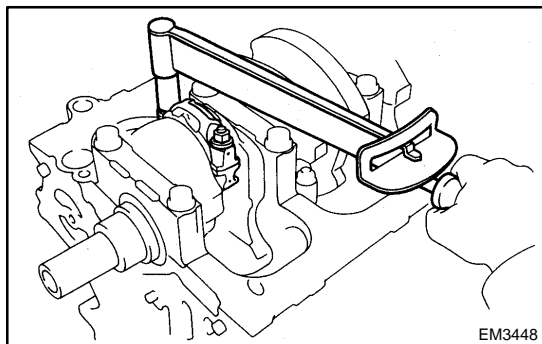
- (d) Cover the connecting rod bolts with a short piece of hose to protect the crankshaft from damage.



- (e) Clean the crank pin and bearing.  
 (f) Check the crank pin bearing is for pitting and scratches. If the crank pin or bearing is damaged, replace the bearings. If necessary, grind or replace the crankshaft.



- (g) Lay a strip of Plastigage across the crank pin.

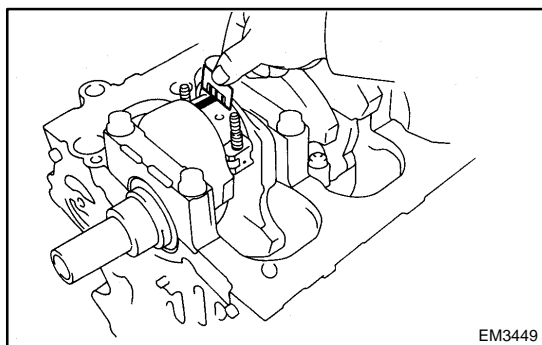


- (h) Install the connecting rod cap (See page [EM-85](#) ).  
**Torque: 40 N·m (400 kgf·cm, 29 ft·lbf)**

**NOTICE:**

**Do not turn the crankshaft.**

- (i) Remove the connecting rod cap  
 (See procedure (b) and (c) above).



- (j) Measure the Plastigage at its widest point.

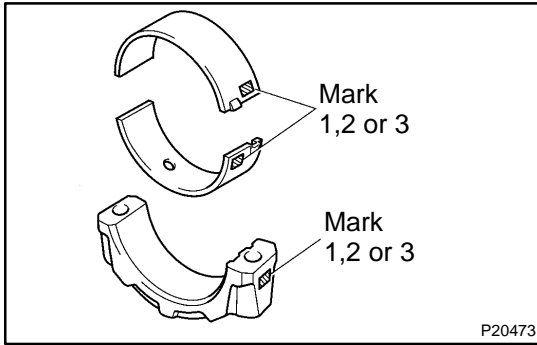
**Standard oil clearance:**

STD	0.016 - 0.048 mm (0.0006 - 0.0019 in.)
U/S 0.25	0.015 - 0.058 mm (0.0006 - 0.0023 in.)

**Maximum oil clearance:**

**0.08 mm (0.0031 in.)**

If the oil clearance is greater than maximum, replace the bearings. If necessary, grind or replace the crankshaft.



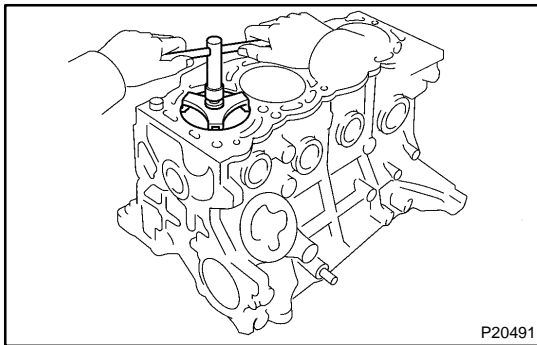
**HINT:**

If using a standard bearing, replace with one having the same number as marked on the bearing cap. There are 3 sizes of standard bearings, marked "1", "2" and "3" accordingly.

**Reference:**

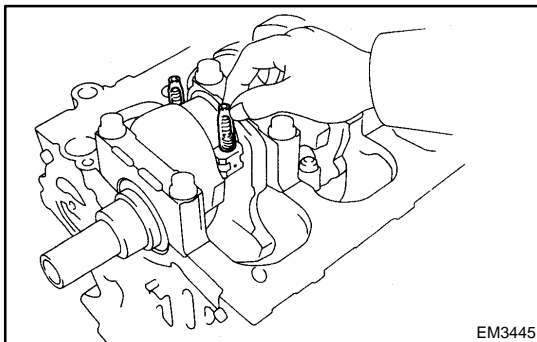
Connecting rod big end inside diameter Standard sized  U/S 0.25	Mark 1	46.000 - 46.007 mm (1.8110 - 1.8113 in.)
	Mark 2	46.007 - 46.014 mm (1.8113 - 1.8116 in.)
	Mark 3	46.014 - 46.021 mm (1.8116 - 1.8118 in.)
	-	46.000 - 46.021 mm (1.8110 - 1.8118 in.)
Crankshaft crank pin diameter Standard sized U/S 0.25	-	42.985 - 43.000 mm (1.6923 - 1.6929 in.)
	-	42.745 - 42.755 mm (1.6829 - 1.6833 in.)
Bearing center wall thickness Standard sized  U/S 0.25	Mark 1	1.487 - 1.491 mm (0.0585 - 0.0587 in.)
	Mark 2	1.491 - 1.495 mm (0.0587 - 0.0589 in.)
	Mark 3	1.495 - 1.499 mm (0.0589 - 0.0590 in.)
	-	1.609 - 1.615 mm (0.0633 - 0.0636 in.)

(k) Completely remove the Plastigage.



**19. REMOVE PISTON AND CONNECTING ROD ASSEMBLIES**

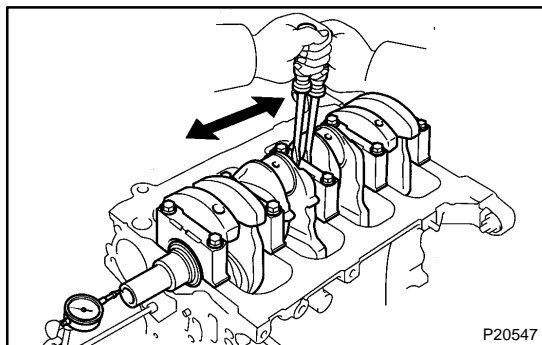
(a) Using a ridge reamer, remove all the carbon from the top of the cylinder.



(b) Cover the rod bolts with a short piece of hose to protect the crankshaft from damage.  
(c) Push out the piston and connecting rod assembly and the 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 correct order.



## 20. CHECK CRANKSHAFT THRUST CLEARANCE

Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

**Standard thrust clearance:**

**0.02 - 0.20 mm (0.0008 - 0.0079 in.)**

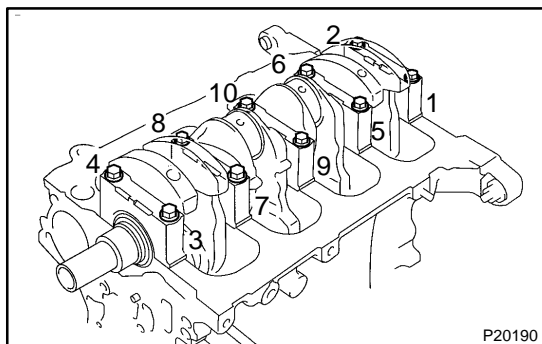
**Maximum thrust clearance:**

**0.3 mm (0.012 in.)**

If the thrust clearance is greater than maximum, replace the thrust washers as a set.

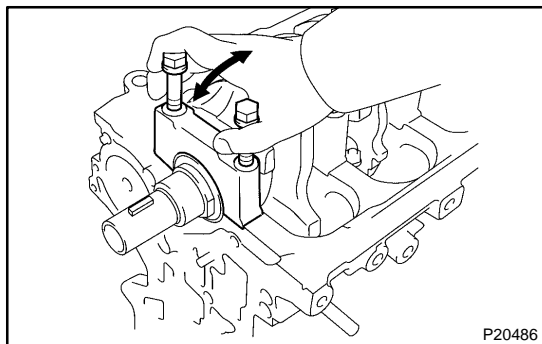
**Thrust washer thickness:**

STD	2.430 - 2.480 mm (0.0957 - 0.0976 in.)
O/S 0.125	2.493 - 2.543 mm (0.0981 - 0.1001 in.)



## 21. REMOVE MAIN BEARING CAPS AND CHECK OIL CLEARANCE

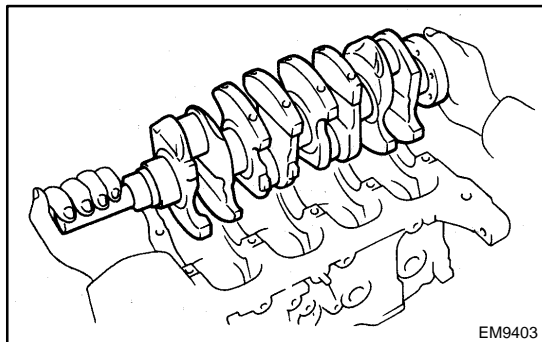
- (a) Uniformly loosen and remove the 10 main bearing cap bolts, in several passes, in the sequence shown.



- (b) Using the removed main bearing cap bolts, pry the main bearing cap back and forth, and remove the 5 main bearing caps, 5 lower bearings and 2 lower thrust washers (No.3 main bearing cap only).

**HINT:**

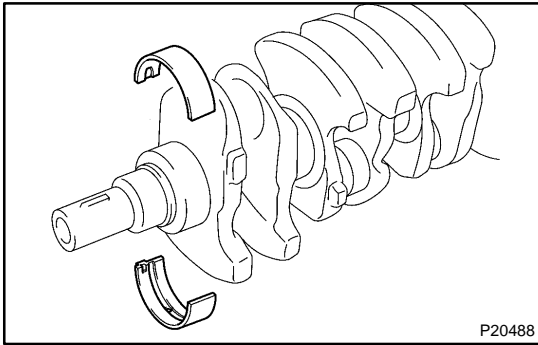
- Keep the lower bearing inserted together with cap.
- Arrange the main bearing caps and lower thrust washers in correct order.



- (c) Lift out the crankshaft.

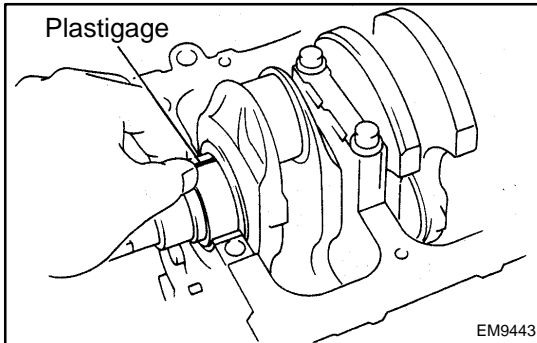
**HINT:**

Keep the upper bearings and upper thrust washers together with the cylinder block.

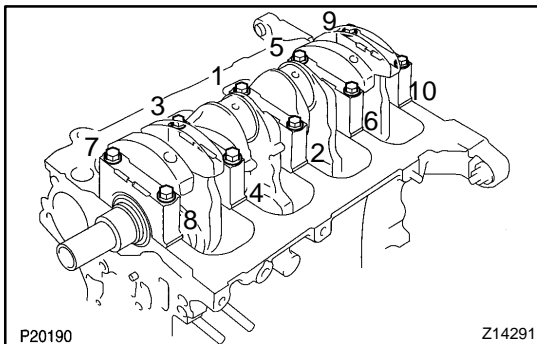


- (d) Clean each main journal and bearing.
- (e) Check each main journal and bearing for pitting and scratches.

If the journal or bearing is damaged, replace the bearing.  
If necessary, grind or replace the crankshaft.



- (f) Place the crankshaft on the cylinder block.
- (g) Lay a strip of Plastigage across each journal.



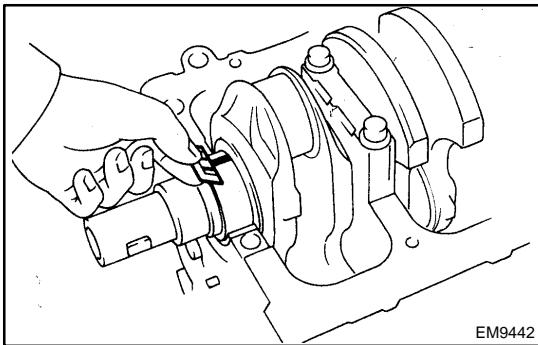
- (h) Install the main bearing caps (See page [EM-85](#)).

**Torque: 58 N·m (580 kgf-cm, 42 ft-lbf)**

**NOTICE:**

**Do not turn the crankshaft.**

- (i) Remove the main bearing caps.  
(See procedure (a) and (b) above)



- (j) Measure the Plastigage at its widest point.

**Standard oil clearance:**

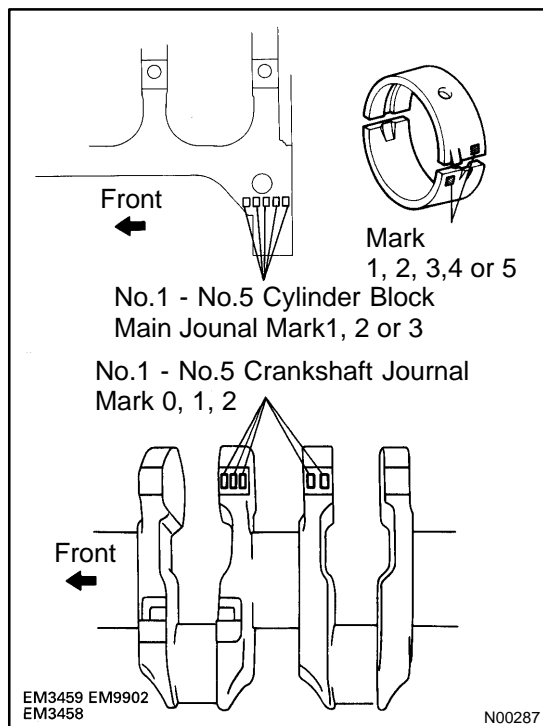
STD	0.016 - 0.035 mm (0.0006 - 0.0014 in.)
U/S 0.25	0.015 - 0.055 mm (0.0006 - 0.0022 in.)

**Maximum oil clearance: 0.08 mm (0.0031 in.)**

**HINT:**

- If replacing the cylinder block subassembly, the bearing standard clearance will be: 0.018- 0.045 mm (0.0007-0.0018 in.).

If the oil clearance is greater than maximum replace the bearings. If necessary, grind or replace the crankshaft.



- If using a standard bearing, replace it with one having the same number. If the number of the bearing cannot be determined, select the correct bearing by adding together the numbers imprinted on the cylinder block and crankshaft, then selecting the bearing with the same number as the total. There are 5 sizes of standard bearings, marked "1", "2", "3", "4" and "5" accordingly.

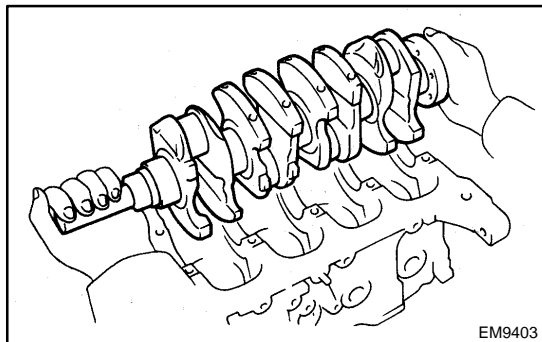
	Number marked								
Cylinder block	1			2			3		
Crankshaft	0	1	2	0	1	2	0	1	2
Use bearing	1	2	3	2	3	4	3	4	5

EXAMPLE: Cylinder block "2" + Crankshaft "1"  
= Total number 3 (Use bearing "3")

### Reference:

Cylinder block main journal bore diameter Standard sized  U/S 0.25	Mark 1 Mark 2 Mark 3 -	54.018 - 54.024 mm (2.1267 - 2.1269 in.) 54.025 - 54.030 mm (2.1270 - 2.1272 in.) 54.031 - 54.036 mm (2.1272 - 2.1274 in.) 54.018 - 54.036 mm (2.1267 - 2.1274 in.)
Crankshaft journal diameter Standard sized  U/S 0.25	Mark 0 Mark 1 Mark 2 -	49.996 - 50.000 mm (1.9683 - 1.9685 in.) 49.991 - 49.995 mm (1.9681 - 1.9683 in.) 49.985 - 49.990 mm (1.9679 - 1.9681 in.) 49.745 - 49.755 mm (1.9585 - 1.9589 in.)
Bearing center wall thickness Standard sized  U/S 0.25	Mark 1 Mark 2 Mark 3 Mark 4 Mark 5 -	1.997 - 2.000 mm (0.0786 - 0.0787 in.) 2.001 - 2.003 mm (0.0788 - 0.0789 in.) 2.004 - 2.006 mm (0.0789 - 0.0790 in.) 2.007 - 2.009 mm (0.0790 - 0.0791 in.) 2.010 - 2.012 mm (0.0791 - 0.0792 in.) 2.118 - 2.124 mm (0.0834 - 0.0836 in.)

- (k) Completely remove the Plastigage.

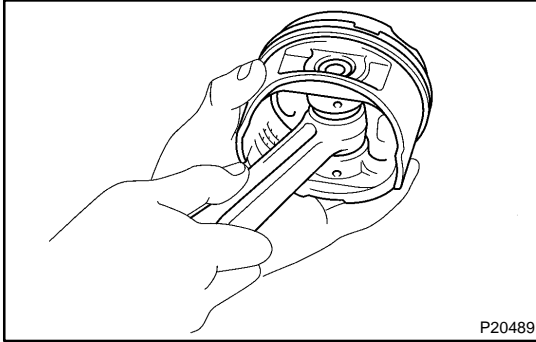


## 22. REMOVE CRANKSHAFT

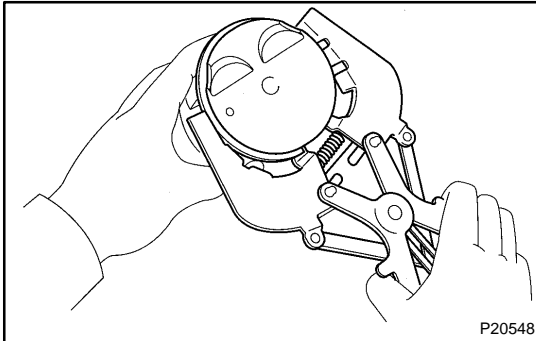
- Lift out the crankshaft.
- Remove the upper main bearings and upper thrust washers from the cylinder block.

### HINT:

Arrange the main bearings and thrust washers in correct order.

**23. CHECK FIT BETWEEN PISTON AND PIN**

Try to move the piston back and forth on the piston pin.  
If any movement is felt, replace the piston and pin as a set.

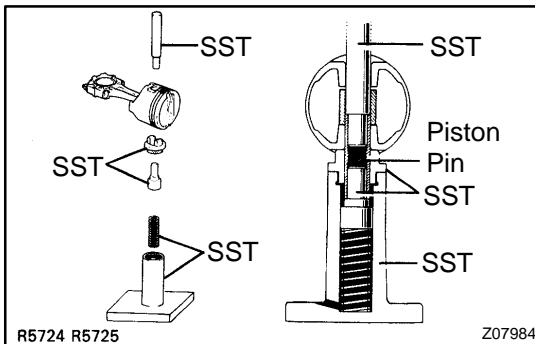
**24. REMOVE PISTON RINGS**

(a) Using a piston ring expander, remove the compression rings.

(b) Remove the 2 side rails and oil ring expander by hand.

HINT:

Arrange the rings in the correct order only.

**25. DISCONNECT CONNECTING ROD FROM PISTON**

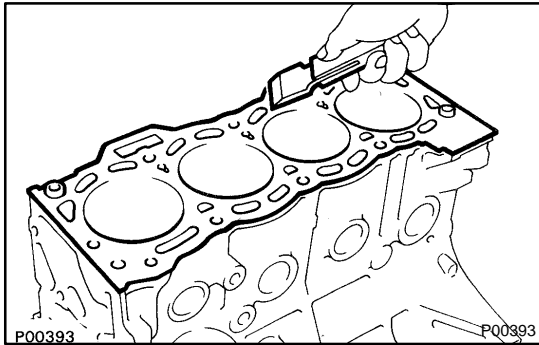
(a) Using SST, press out the piston pin from the piston.

(b) Remove the connecting rod.

SST 09221-25024 (09221-00020, 09221-00030,  
09221-00130, 09221-00140, 09221-00150)

HINT:

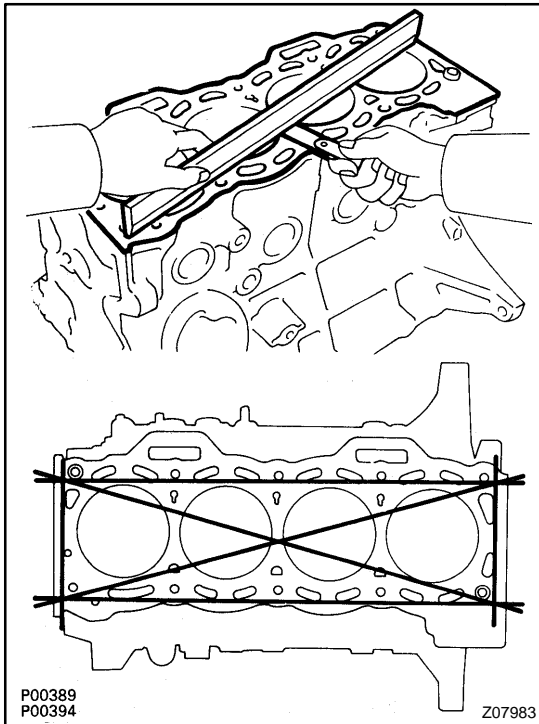
- The piston and pin are a matched set.
- Arrange the pistons, pins, rings, connecting rods and bearings in correct order.



## INSPECTION

### 1. CLEAN CYLINDER BLOCK

- Remove the gasket material.
- Using a gasket scraper, remove all the gasket material from the top surface of the cylinder block.
- Clean the cylinder block.
- Using a soft brush and solvent, thoroughly clean the cylinder block.

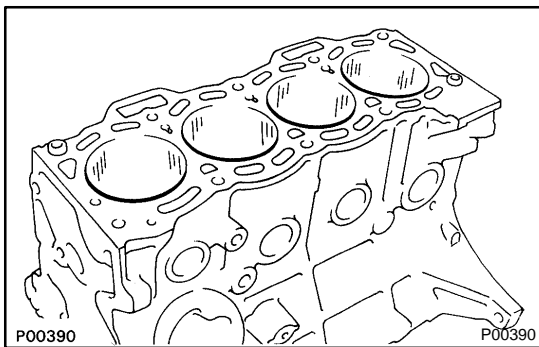


### 2. INSPECT TOP SURFACE OF CYLINDER BLOCK FOR FLATNESS

Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder head gasket for warpage.

**Maximum warpage: 0.05 mm (0.0020 in.)**

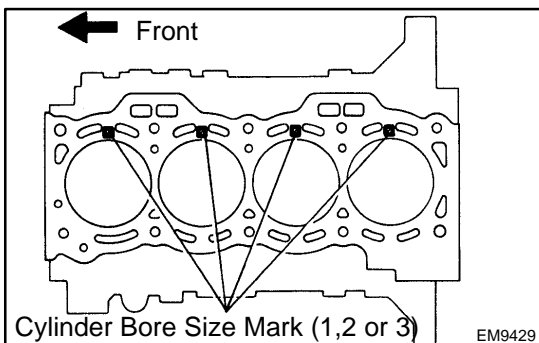
If warpage is greater than maximum, replace the cylinder block.



### 3. INSPECT CYLINDER FOR VERTICAL SCRATCHES

Visually check the cylinder for vertical scratches.

If deep scratches are present, replace the cylinder block.

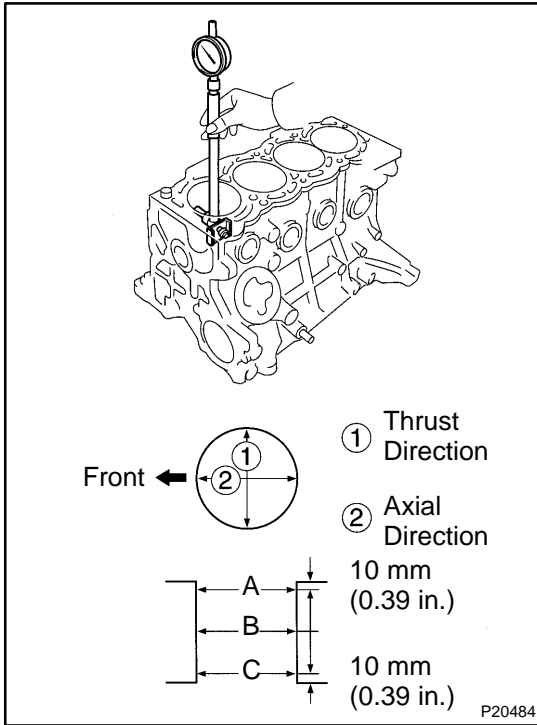


### 4. INSPECT CYLINDER BORE DIAMETER

HINT:

There are 3 sizes of the standard cylinder bore diameter, marked "1", "2" and "3" accordingly. The mark is stamped on the top of the cylinder block.





Using a cylinder gauge, measure the cylinder bore diameter at positions A, B and C in the thrust and axial directions.

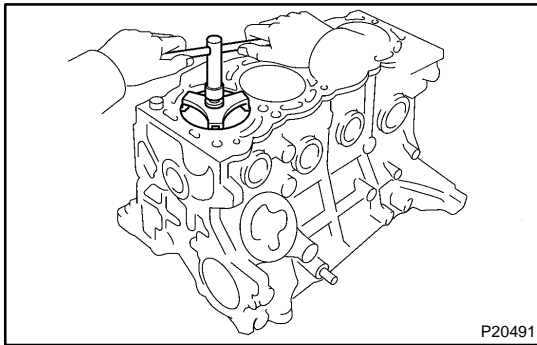
**Standard diameter:**

Mark "1"	74.000 - 74.010 mm (2.9134 - 2.9138 in.)
Mark "2"	74.011 - 74.020 mm (2.9138 - 2.9142 in.)
Mark "3"	74.021 - 74.030 mm (2.9142 - 2.9146 in.)

**Maximum diameter:**

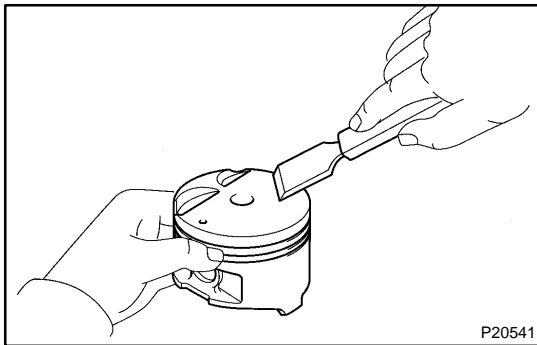
**74.23 mm (2.9224 in.)**

If the diameter is greater than maximum, replace the cylinder block.



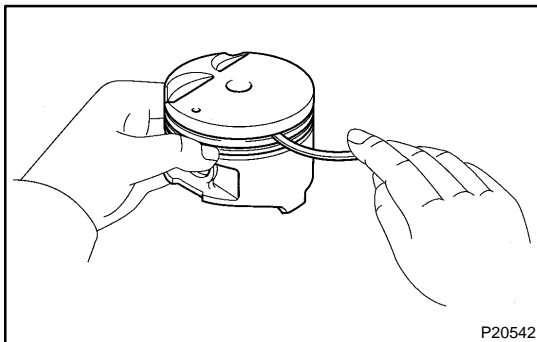
**5. REMOVE CYLINDER RIDGE**

If the wear is less than 0.2 mm (0.008 in.), using a ridge reamer, grind the top of the cylinder.

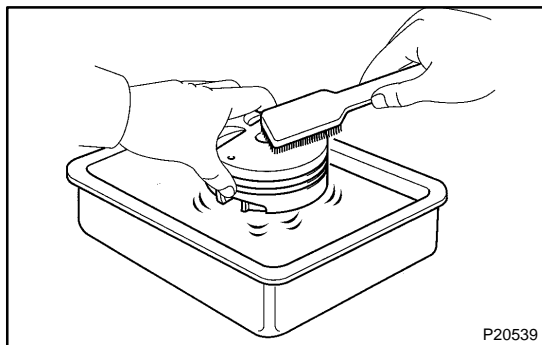


**6. CLEAN PISTON**

(a) Using a gasket scraper, remove the carbon from the piston top.



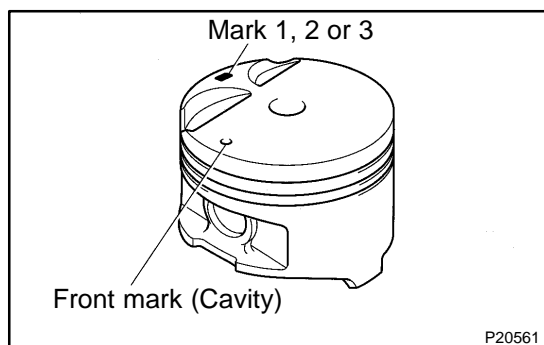
(b) Using a groove cleaning tool or broken ring, clean the ring grooves.



- (c) Using a soft brush and solvent, thoroughly clean the piston.

**NOTICE:**

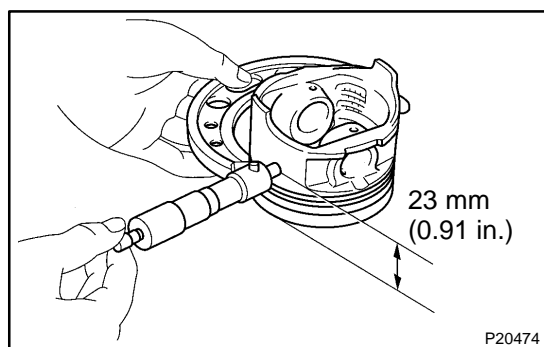
**Do not damage the piston.**



## 7. INSPECT PISTON OIL CLEARANCE

**HINT:**

There are 3 sizes of the standard piston diameter, marked "1", "2" and "3" accordingly. The mark is stamped on the piston top.



- (a) Using a micrometer, measure the piston diameter at right angles to the piston pin center line, 23 mm (0.91 in.) from the piston head.

**Piston diameter:**

Mark "1"	73.900 - 73.910 mm (2.9094 - 2.9098 in.)
Mark "2"	73.910 - 73.920 mm (2.9098 - 2.9120 in.)
Mark "3"	73.920 - 73.930 mm (2.9120 - 2.9106 in.)

- (b) Measure the cylinder bore diameter in the thrust directions (See step 4).

- (c) Subtract the piston diameter measurement from the cylinder bore diameter measurement.

**Standard oil clearance:**

**0.09 - 0.11 mm (0.0035 - 0.0043 in.)**

**Maximum oil clearance:**

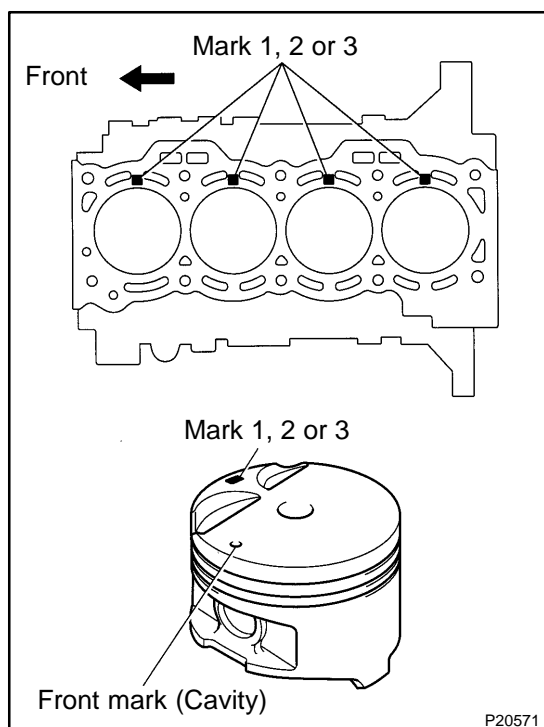
**0.13 mm (0.0051 in.)**

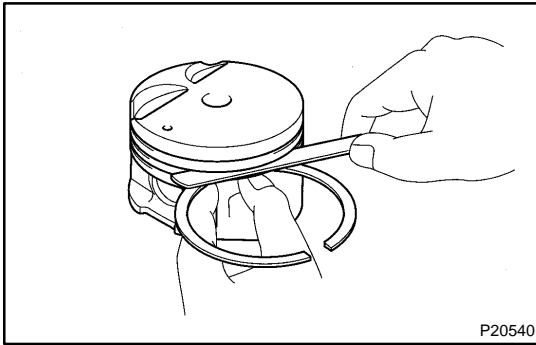
If the oil clearance is greater than maximum, replace all 4 pistons. If necessary, replace the cylinder block.

**HINT:**

Use new cylinder block:

Use a piston with the same number mark as the cylinder bore diameter marked on the cylinder block.





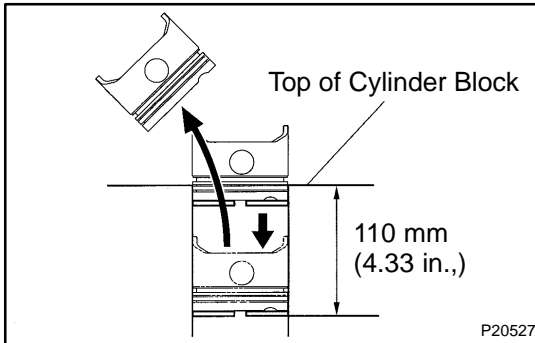
## 8. INSPECT PISTON RING GROOVE CLEARANCE

Using a feeler gauge, measure the clearance between new piston ring and the wall of the ring groove.

### Ring groove clearance:

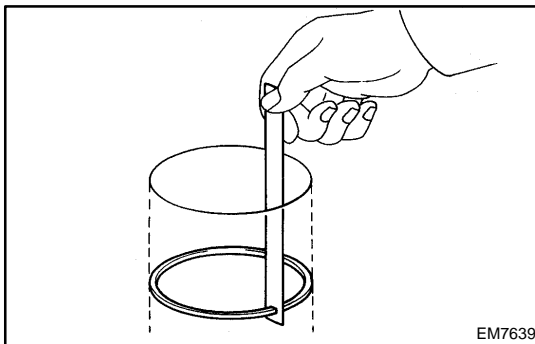
No.1	0.04 - 0.08 mm (0.0016 - 0.0031 in.)
No.2	0.03 - 0.07 mm (0.0012 - 0.0028 in.)

If the oil clearance is greater than maximum, replace the piston.



## 9. INSPECT PISTON RING END GAP

- Insert the piston ring into the cylinder bore.
- 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.



- Using a feeler gauge, measure the end gap.

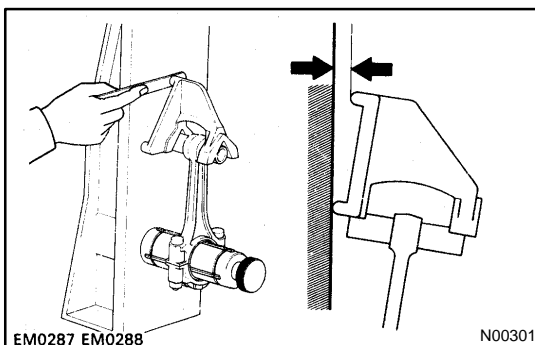
### Standard end gap:

No.1	0.26 - 0.48 mm (0.0102 - 0.0189 in.)
No.2	0.36 - 0.57 mm (0.0142 - 0.0224 in.)
Oil (Side rail)	0.13 - 0.50 mm (0.0051 - 0.0197 in.)

### Maximum end gap:

No.1	1.07 mm (0.0421 in.)
No.2	1.02 mm (0.0402 in.)
Oil (Side rail)	1.10 mm (0.0433 in.)

If the end gap is greater than maximum, replace the piston ring. If necessary, replace the cylinder block.



## 10. INSPECT CONNECTING RODS

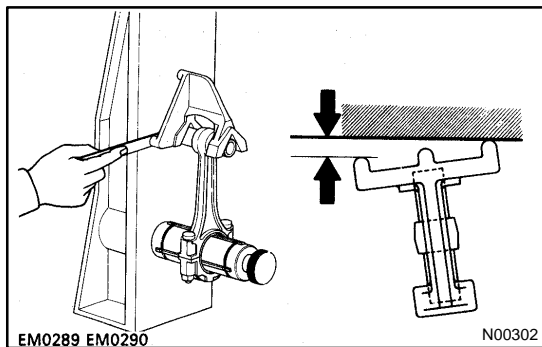
Using a rod aligner, check the connecting rod alignment.

- Check for out-of-alignment.

### Maximum out-of-alignment:

**0.03 mm (0.0012 in.) per 100 mm (3.94 in.)**

If out-of-alignment is greater than maximum, replace the connecting rod assembly.



- Check for twist

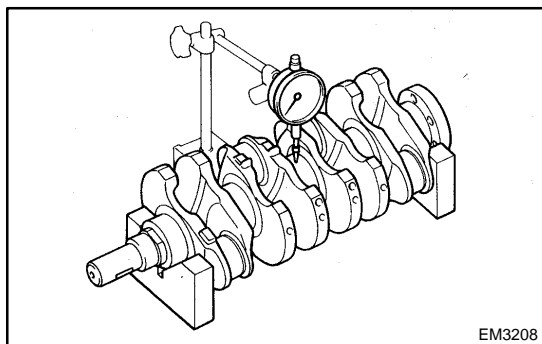
**Maximum twist:**

**0.05 mm (0.0020 in.) per 100 mm (3.94 in.)**

If twist is greater than maximum, replace the connecting rod assembly.

**HINT:**

If replacing the connection rods, replace the same number of connecting rod bearings as that of new connecting rod caps.

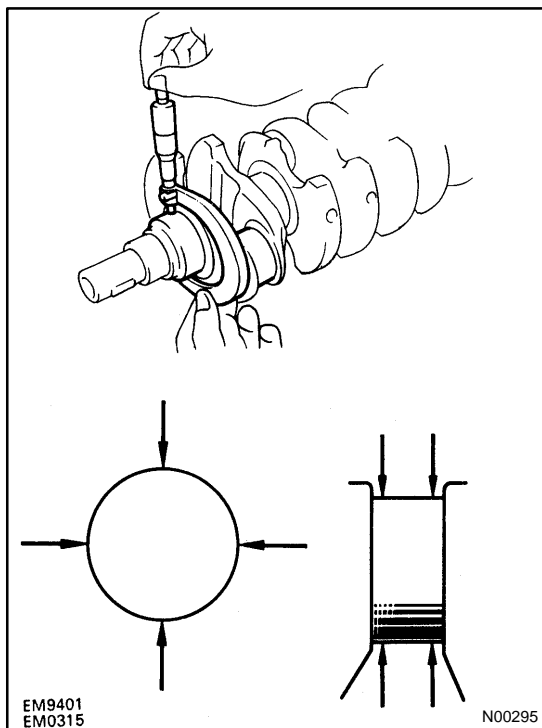


## 11. INSPECT CRANKSHAFT FOR RUNOUT

- Place the crankshaft on V-blocks.
- Using a dial indicator, measure the circle runout at the center journal.

**Maximum circle runout: 0.06 mm (0.0024 in.)**

If the circle runout is greater than maximum, replace the crankshaft.



## 12. INSPECT MAIN JOURNALS AND CRANK PINS

- Using a micrometer, measure the diameter of each main journal and crank pin.

**Main journal diameter:**

STD	49.985 - 50.000 mm (1.9679 - 1.9685 in.)
U/S 0.25	49.745 - 49.755 mm (1.9585 - 1.9589 in.)

**Crank pin diameter:**

STD	42.985 - 43.000 mm (1.6923 - 1.6929 in.)
U/S 0.25	42.745 - 42.755 mm (1.6829 - 1.6833 in.)

If the diameter is not as specified, check the oil clearance (See page [EM-70](#) ).

If necessary, grind or replace the crankshaft.

- Check each main journal and crank pin for taper and out-of-round as shown.

**Maximum taper:**

**0.08 mm (0.0031 in.)**

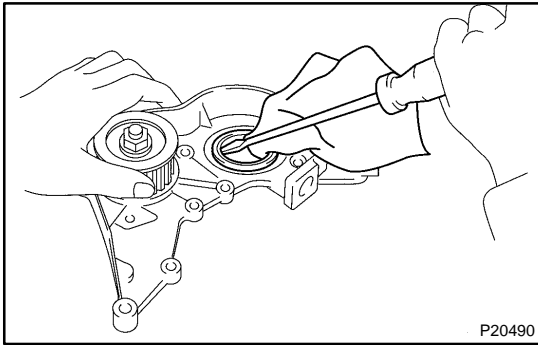
**Maximum out-of-round:**

**0.07 mm (0.0028 in.)**

If the taper and out-of-round is greater than maximum, replace the crankshaft.

## 13. IF NECESSARY, GRIND AND HONE MAIN JOURNALS AND/OR CRANK PINS

- Grind and hone the main journals and/or crank pins to the finished undersized diameter (See procedure in step 2).
- Install new main journal and/or crank pin undersized bearings.



## REPLACEMENT

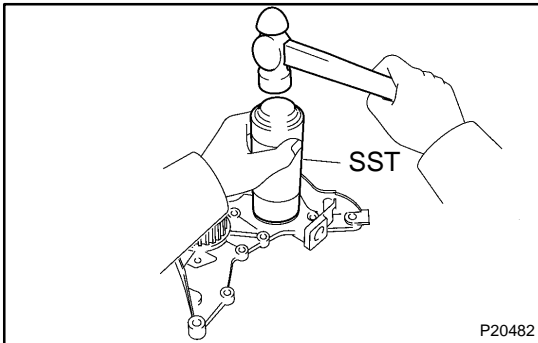
### 1. REPLACE CRANKSHAFT FRONT OIL SEAL

#### HINT:

There are 2 methods to replace the oil seal which are as follows:

If oil pump is removed from cylinder block

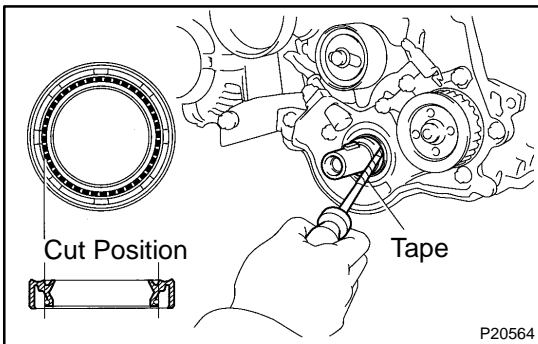
- (a) Using a screwdriver, pry out the oil seal.



- (b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump case edge.

SST 09309-37010

- (c) Apply MP grease to the oil seal lip.



If oil pump is installed to the cylinder block

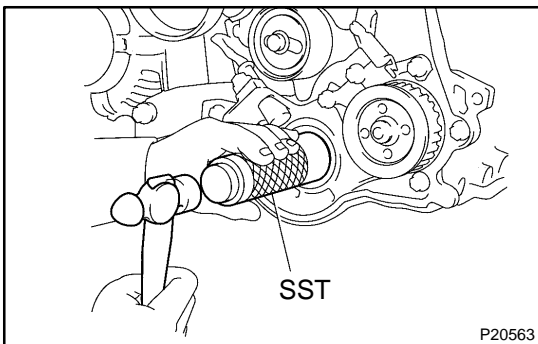
- (d) Using a knife, cut off the oil seal lip.

- (e) Using a screwdriver, pry out the oil seal.

#### NOTICE:

**Be careful not to damage the crankshaft.**

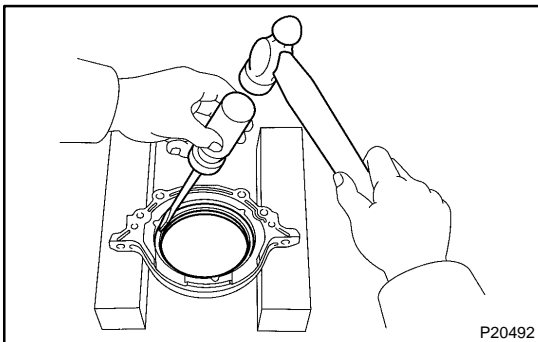
**Tape the screwdriver tip.**



- (f) Apply MP grease to a new oil seal lip.

- (g) Using SST and a hammer, tap in the oil seal until its surface is flush with the oil pump case edge.

SST 09309-37010



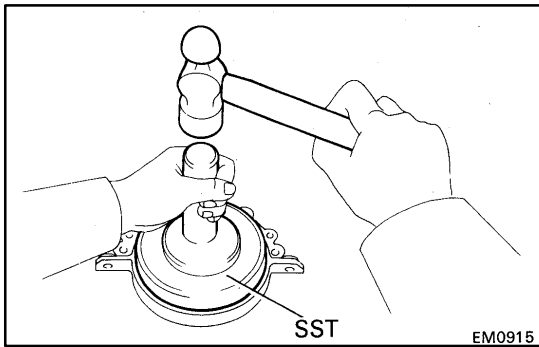
### 2. REPLACE CRANKSHAFT REAR OIL SEAL

#### HINT:

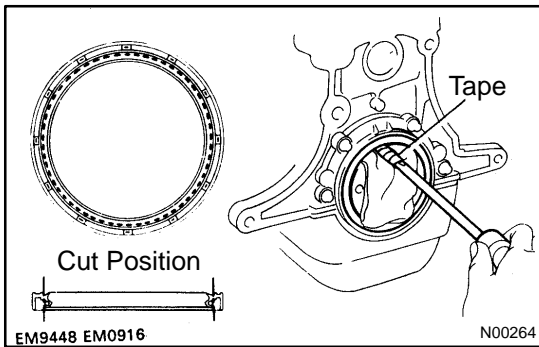
There are 2 methods to replace the oil seal which are as follows:

If rear oil retainer is removed from cylinder block

- (a) Using a screwdriver and hammer, tap out the oil seal.



- (b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the rear oil seal edge.  
SST 09223-15030, 09550-10012 (09552-10010)
- (c) Apply MP grease to the oil seal lip.

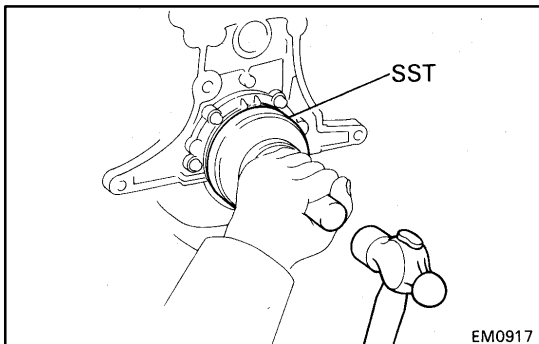


If rear oil seal retainer is installed to cylinder block

- (d) Using a knife, cut off the oil seal lip.
- (e) Using a screwdriver, pry out the oil seal.

**NOTICE:**

**Be careful not to damage the crankshaft.  
Tape the screwdriver tip.**

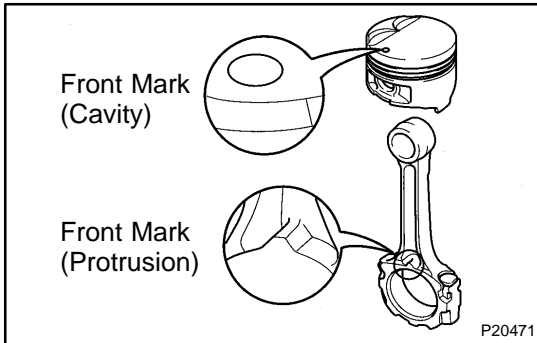


- (f) Apply MP grease to a new oil seal lip.
- (g) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.  
SST 09223-15030, 09550-10012 (09552-10010)

# REASSEMBLY

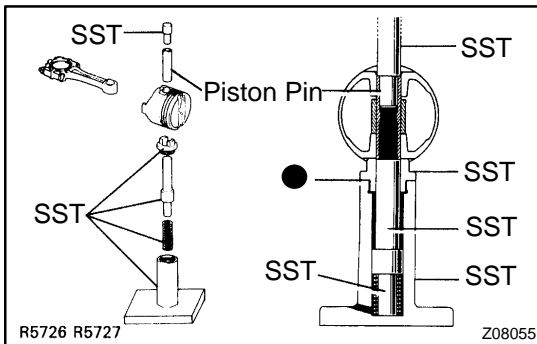
## HINT:

- Thoroughly clean all parts to be assembled.
- Before installing the parts, apply new engine oil to all sliding and rotating surfaces.
- Replace all gaskets, O-rings and oil seals with new parts.

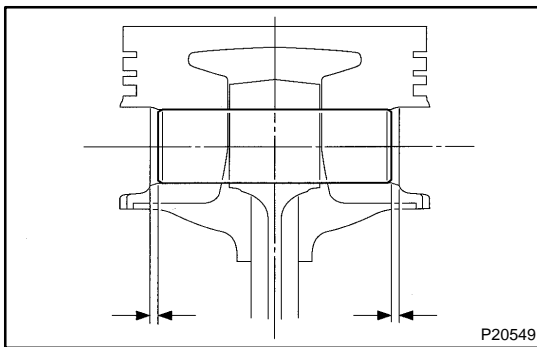


## 1. ASSEMBLE PISTON AND CONNECTING ROD

- (a) Coat the piston pin and pin holes of the piston with engine oil.
- (b) Align the cavity on the piston with the protrusion on the connecting rod.



- (c) Using SST, press in the piston pin.  
SST 09221-25025 (09221-00020, 09221-00030, 09221-00130, 09221-00140, 09221-00150)



- (d) After installing the piston pin, check that when the connecting rod is aligned with the center of the piston the space between the piston and each end of the piston pin are equal on the left and right sides.

## HINT:

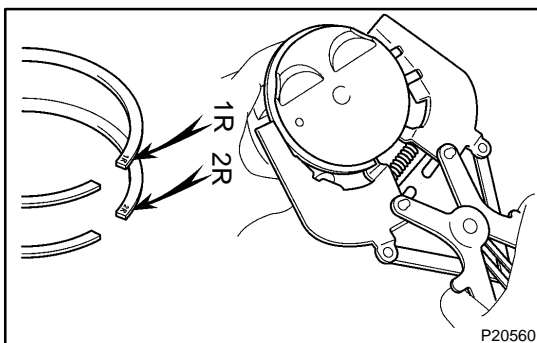
If the piston pin is off-center due to insufficient insertion pressure on the piston pin, place a washer at the position indicated by ● in the illustration for (c). Then, while checking that the space is equal at the ends of the piston pin on the left and right sides, press in the washer.

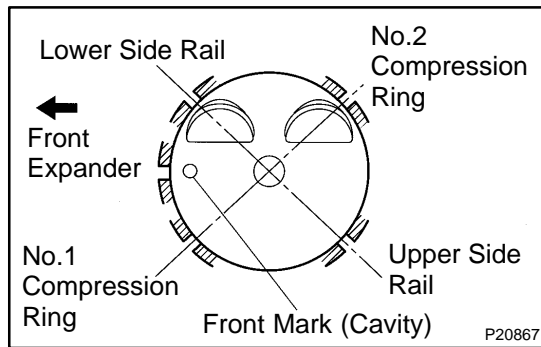
## 2. INSTALL PISTON RINGS

- (a) Install the oil ring expander and 2 side rails by hand.
- (b) Using a piston ring expander, install the 2 compression rings with the code mark facing upward.

### Code Mark:

No.1	1R
No.2	2R

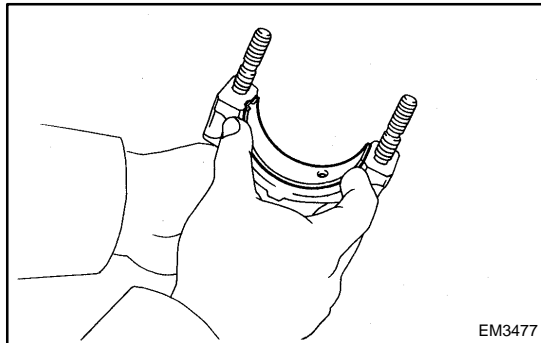




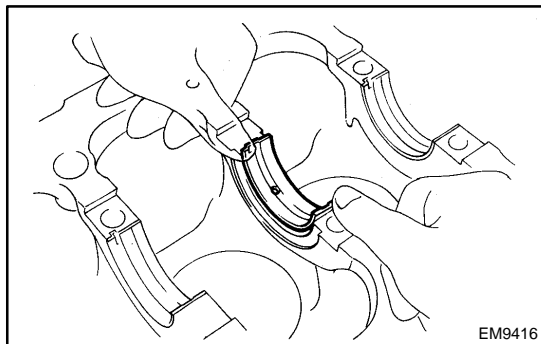
- (c) Position the piston rings so that the ring ends are as shown.

**NOTICE:**

**Do not align the end gaps.**

**3. INSTALL BEARINGS**

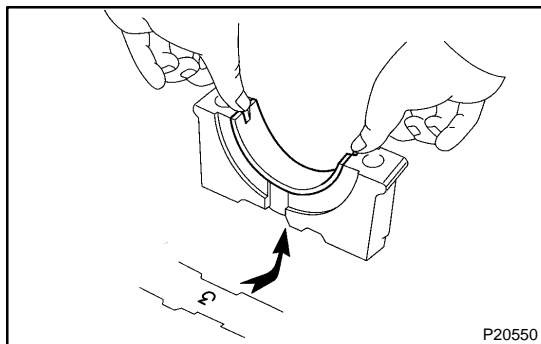
- (a) Align the bearing claw with the groove of the connecting rod or connecting cap.  
(b) Install the bearings in the connecting rod and connecting rod cap.

**4. INSTALL MAIN BEARINGS**

- (a) Align the bearing claw with the claw groove of the cylinder block, and push in the 5 upper bearings.

**NOTICE:**

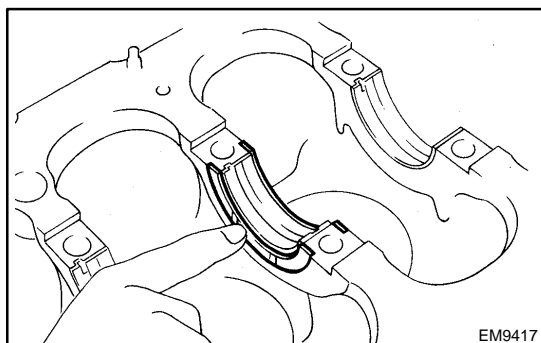
**Install the bearing with the oil hole in the cylinder block.**



- (b) Align the bearing claw with the claw groove of the main bearing cap, and push in the 5 lower bearings.

**HINT:**

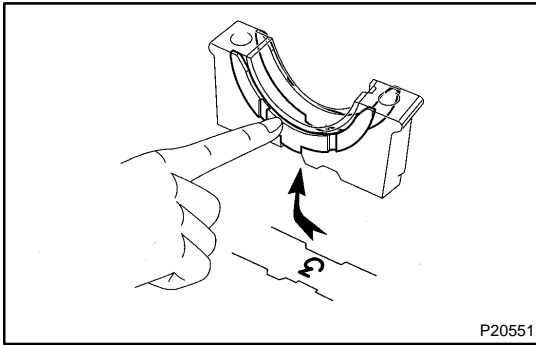
A number is marked on each main bearing cap to indicate the illustration position.

**5. INSTALL UPPER THRUST WASHERS**

Install the 2 thrust washers under the No.3 journal position with the oil grooves facing outward.

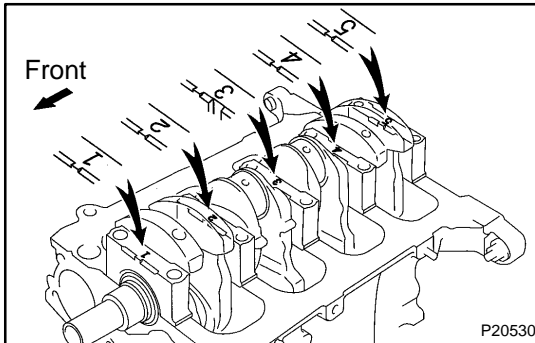
**6. PLACE CRANKSHAFT ON CYLINDER BLOCK**





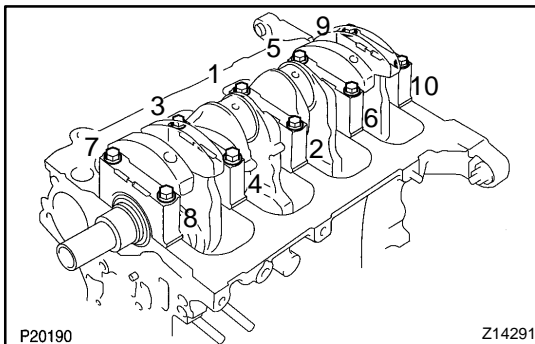
## 7. INSTALL MAIN BEARING CAPS AND LOWER THRUST WASHERS

- (a) Install the 2 thrust washers on the No.3 bearing cap with the oil grooves facing outward.



- (b) Install the 5 main bearing caps in their proper locations.  
HINT:

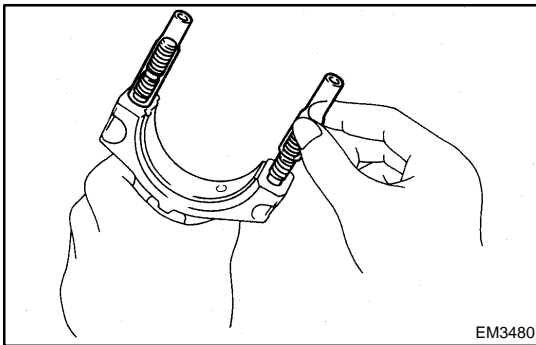
Each bearing cap has a number and front mark.



- (c) Apply a light coat of engine oil on the threads and under the heads of the main bearing caps.  
(d) Install and uniformly tighten the 10 bolts of the main bearing caps, in several passes, in the sequence shown.

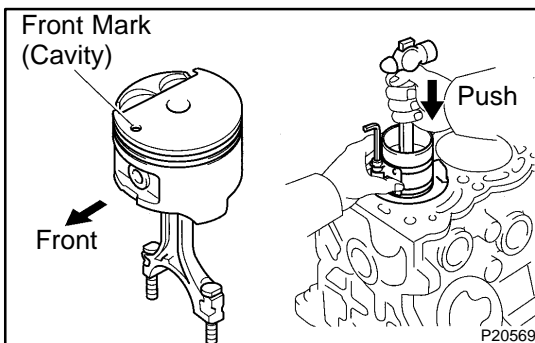
**Torque: 58 N·m (580 kgf-cm, 42 ft·lbf)**

- (e) Check that the crankshaft turns smoothly.  
(f) Check the crankshaft thrust clearance (See page [EM-70](#) ).

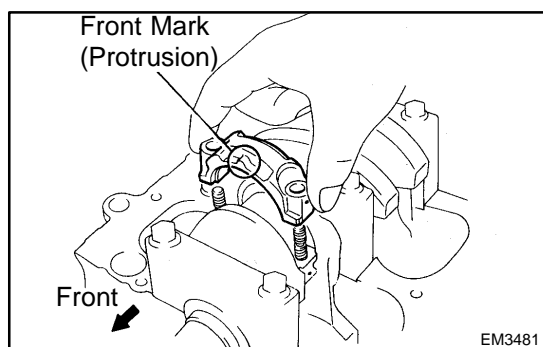


## 8. INSTALL PISTON AND CONNECTING ROD ASSEMBLIES

- (a) Cover the connecting rod bolts with a short piece of hose to protect the crankshaft from damage.

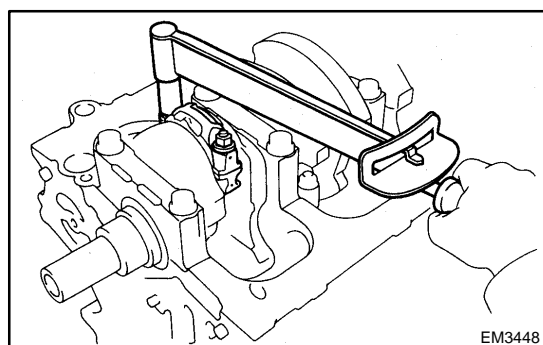


- (b) Using a piston ring compressor, push the correctly numbered piston and connecting rod assemblies into each cylinder with the front mark of the piston facing forward.



### 9. INSTALL CONNECTING ROD CAPS

- (a) Match the numbered connecting rod cap with the numbered connecting rod.
- (b) Install the connecting rod cap with the front mark facing forward.



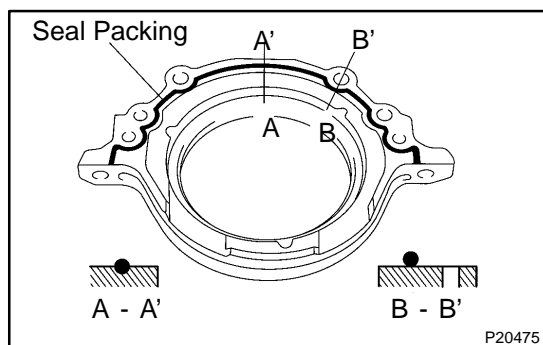
- (c) Apply a light coat of engine oil on the threads and under the nuts of the connecting rod cap.
- (d) Install and alternately tighten the nuts of the connecting rod cap in several passes.

**Torque: 40 N·m (400 kgf-cm, 29 ft-lbf)**

- (e) Check that the crankshaft turns smoothly.
- (f) Check the connecting rod thrust clearance (See page [EM-70](#)).

### 10. INSTALL REAR OIL SEAL RETAINER

- (a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the rear oil seal retainer and cylinder block.
  - Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
  - Thoroughly clean all components to remove all the loose material.
  - Using a non-residue solvent, clean both sealing surfaces.



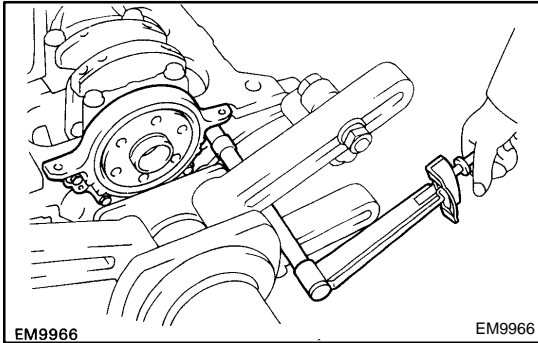
- (b) Apply seal packing to the rear oil seal retainer as shown in the illustration.

**Seal packing:**

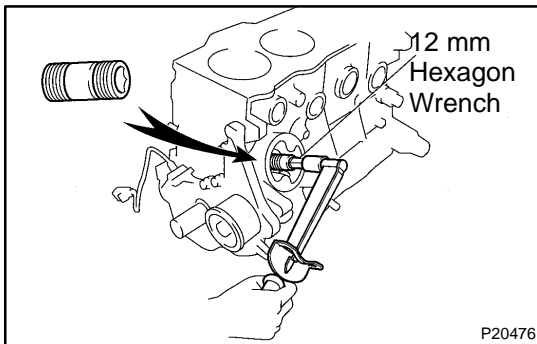
**Part No. 08826-00080 or equivalent**

- Install a nozzle that has been cut to a 2 - 3 mm (0.08 - 0.12 in.) opening.
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.

- Immediately remove nozzle from the tube and reinstall cap.



- (c) Install the oil seal retainer with the 4 bolts.  
**Torque: 7.5 N·m (75 kgf·cm, 65 in.-lbf)**

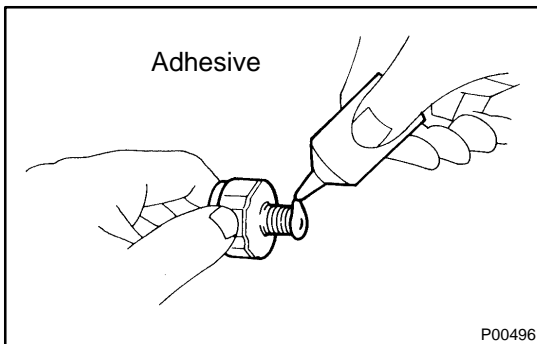


#### 11. INSTALL OIL FILTER UNION

Using a 12 mm hexagon wrench, install the oil filter union.

**Torque: 25 N·m (250 kgf·cm, 18 ft-lbf)**

#### 12. INSTALL OIL PUMP AND PRESSURE REGULATOR VALVE



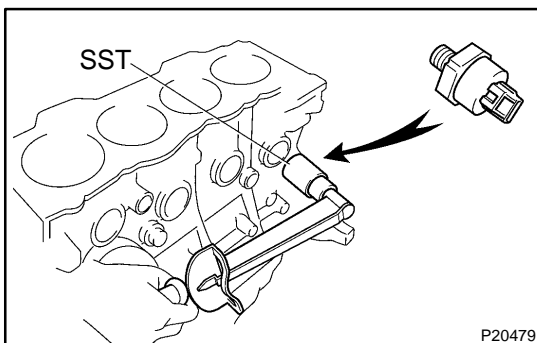
#### 13. INSTALL OIL PRESSURE SWITCH

- (a) Clean the switch threads and cylinder block switch holes of any sealer, oil or foreign materials. Remove any oil with kerosene or gasoline.

- (b) Apply adhesive to 2 or 3 threads of the switch end.

**Adhesive:**

**Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent**

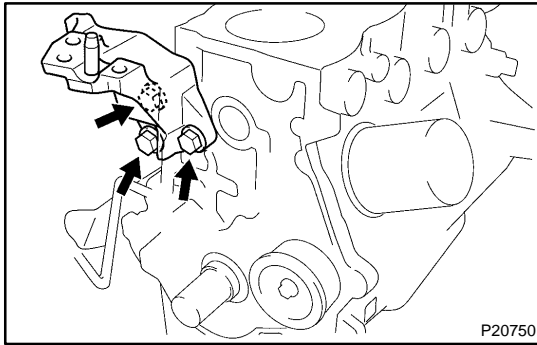


- (c) Using SST, install the oil pressure switch.

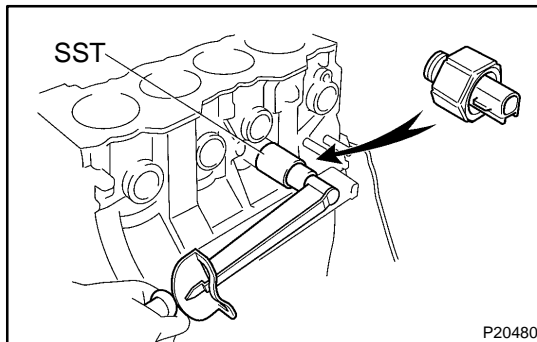
SST 09816-30010

**Torque: 13 N·m (130 kgf·cm, 9 ft-lbf)**

#### 14. INSTALL OIL FILTER (See page [LU-1](#))

**15. INSTALL RH ENGINE MOUNTING BRACKET**

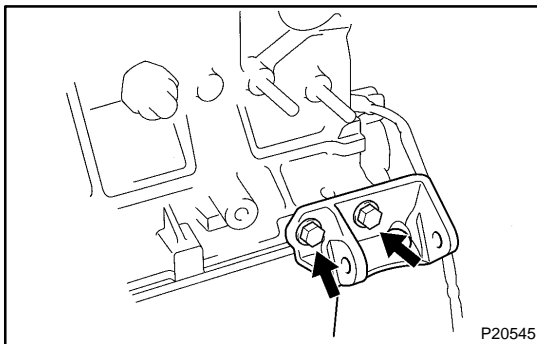
Torque: 58 N·m (590 kgf-cm, 43 ft-lbf)

**16. INSTALL KNOCK SENSOR**

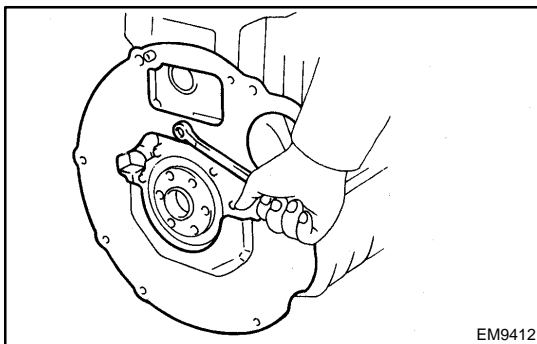
Using SST, install the knock sensor.

SST 09816-30010

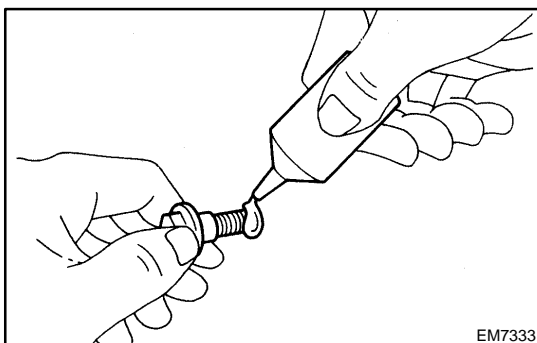
Torque: 45 N·m (450 kgf-cm, 33 ft-lbf)

**17. INSTALL GENERATOR BRACKET**

Torque: 24 N·m (240 kgf-cm, 18 ft-lbf)

**18. INSTALL WATER PUMP WITH WATER INLET PIPE****19. INSTALL OIL DIPSTICK GUIDE AND GENERATOR ADJUSTING BAR****20. INSTALL CYLINDER HEAD****21. INSTALL TIMING BELT AND PULLEYS****22. REMOVE ENGINE STAND****23. INSTALL REAR END PLATE**

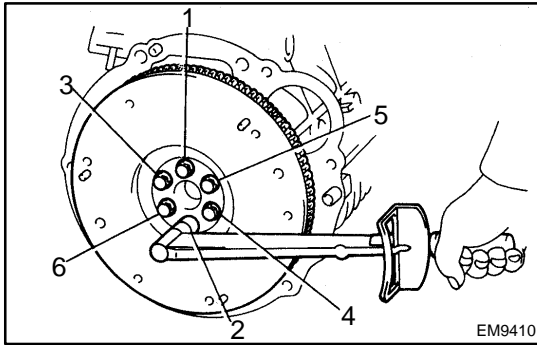
Torque: 10 N·m (100 kgf-cm, 7 ft-lbf)

**24. M/T:  
INSTALL FLYWHEEL**

- (a) Apply adhesive to 2 or 3 threads of new mounting bolt end.

**Adhesive:**

**Part No. 08833-00070, THREE BOND 1324 or equivalent**



- (b) Install the flywheel on the crankshaft.
- (c) Install and uniformly tighten the mounting bolts, in several passes, in the sequence shown.

**Torque: 90 N·m (900 kgf-cm, 65 ft-lbf)**

**25. A/T:**

**INSTALL DRIVE PLATE (See step 24)**

**26. M/T:**

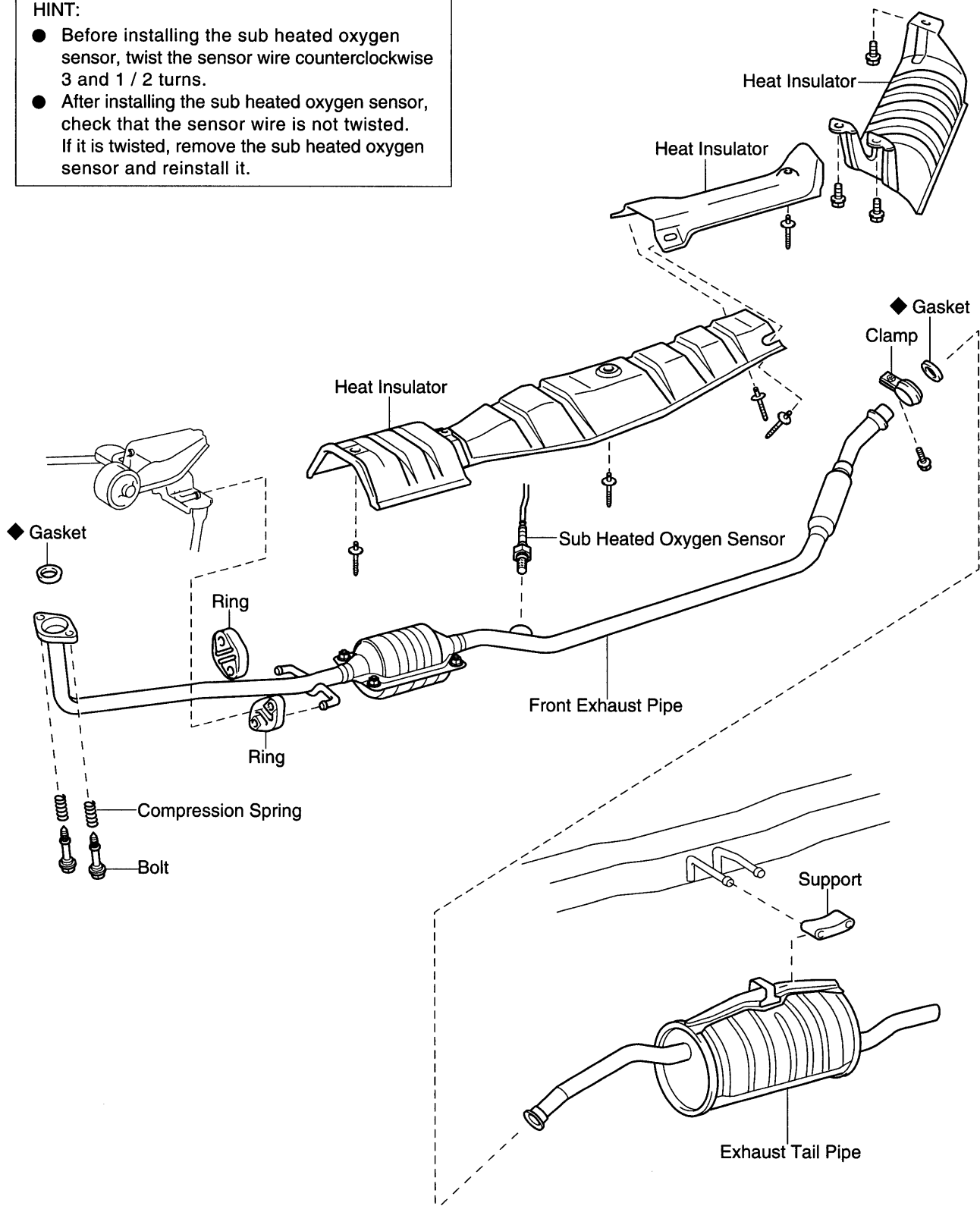
**INSTALL CLUTCH DISC AND COVER**

# EXHAUST SYSTEM COMPONENTS

EM10C-01

## HINT:

- Before installing the sub heated oxygen sensor, twist the sensor wire counterclockwise 3 and 1 / 2 turns.
- After installing the sub heated oxygen sensor, check that the sensor wire is not twisted. If it is twisted, remove the sub heated oxygen sensor and reinstall it.



◆ Non-reusable part

Y P20258

# EMISSION CONTROL SYSTEM

EC079-03

## PURPOSE

The emission control systems are installed to reduce the amount of HC, CO and NOx exhausted from the engine ((3) and (4)), to prevent the atmospheric release of blow-by gas-containing HC (1) and evaporated fuel containing HC being released from the fuel tank (2).

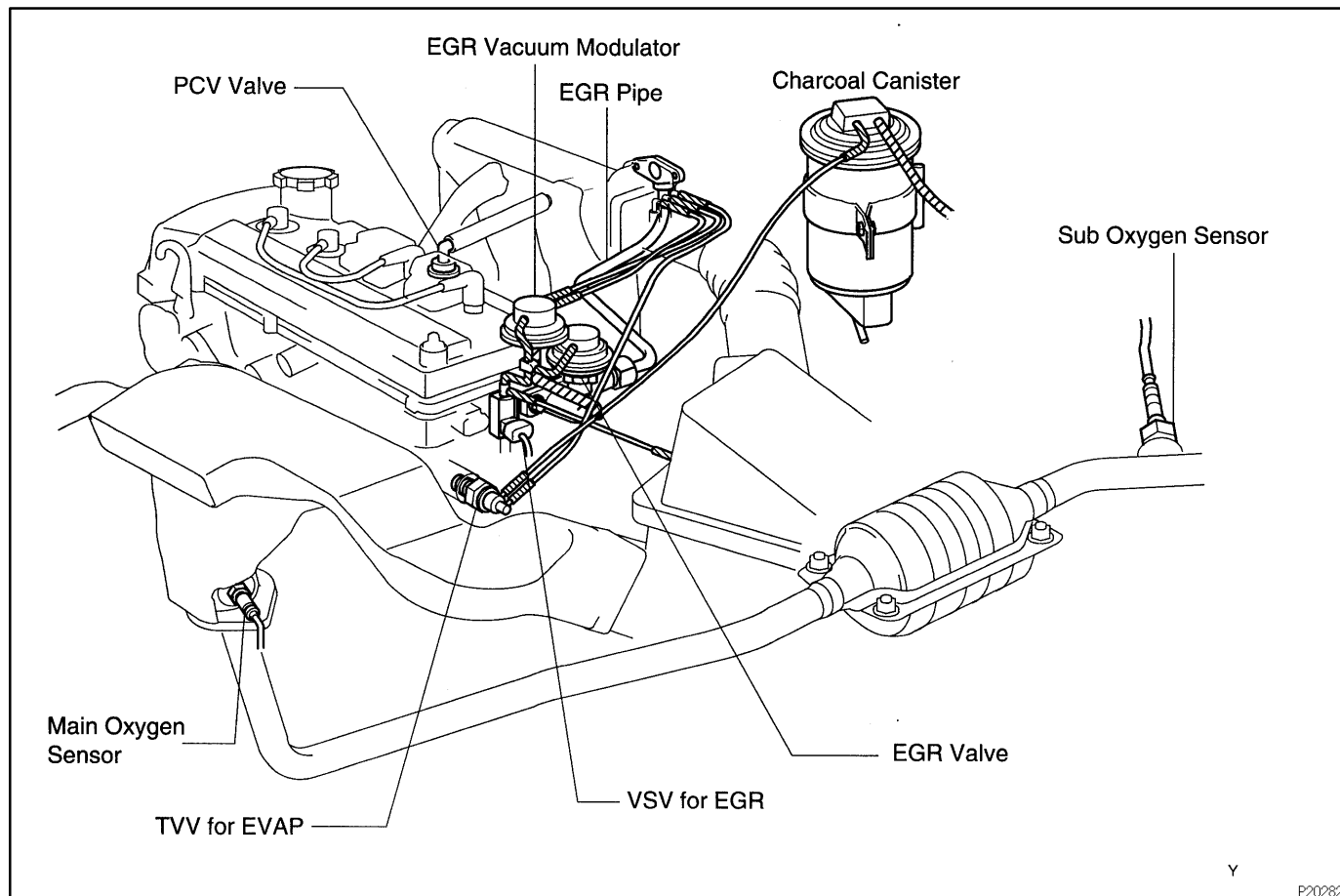
The function of each system is shown in the following table.

System	Abbreviation	Function
(1) Positive Crankcase Ventilation	PCV	Reduces HC
(2) Evaporative Emission Control	EVAP	Reduces evaporated HC
(3) Exhaust Gas Recirculation	TWC	Reduces NOx
(3) Three-Way Catalytic Converter	SFI	Reduces HC, CO and NOx
(4) Sequential Multiport Fuel Injection *		Injects a precisely timed, optimum amount of fuel for reduced exhaust emissions

Remark: \* For inspection and repair of the SFI system, refer to the SFI section this manual.

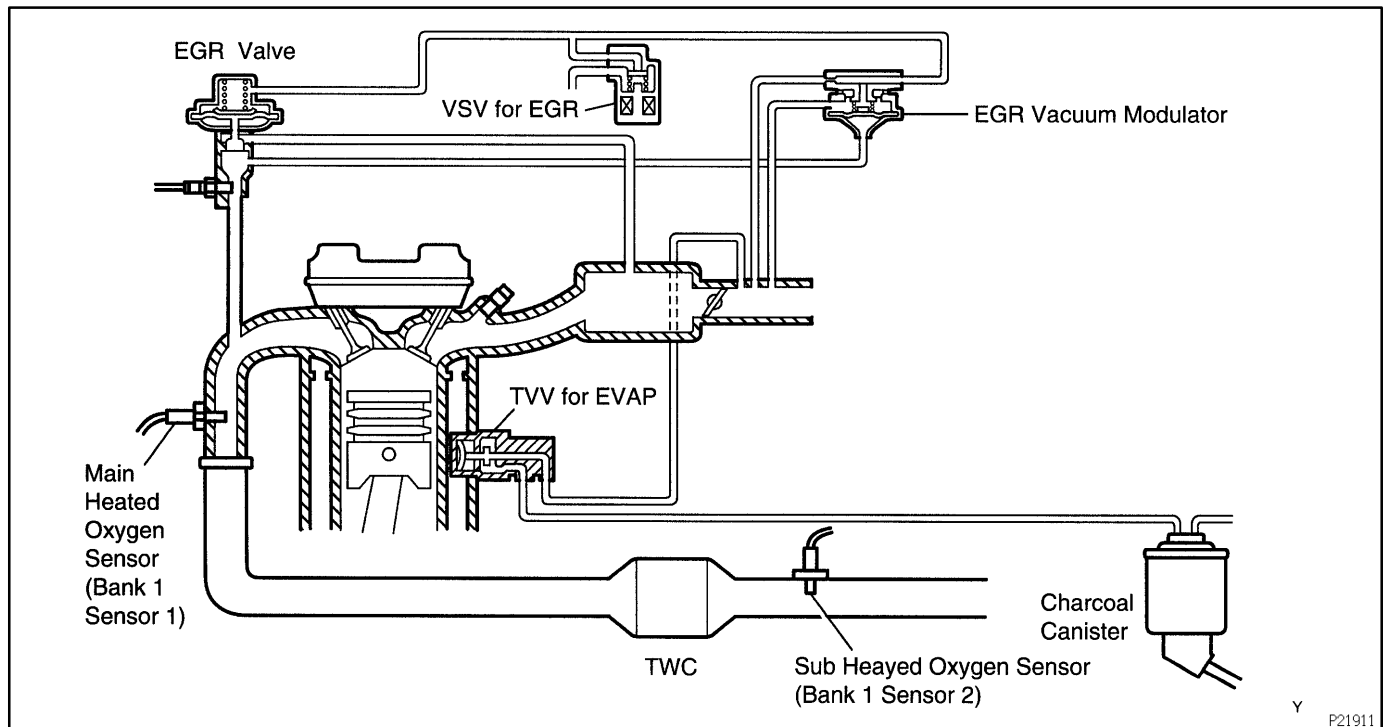
# PARTS LAYOUT AND SCHEMATIC DRAWING LOCATION

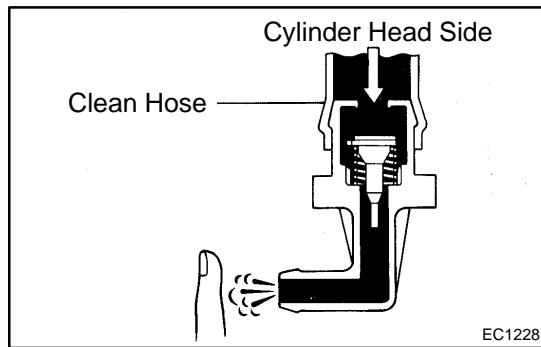
EC07E-05





## DRAWING





## POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM INSPECTION

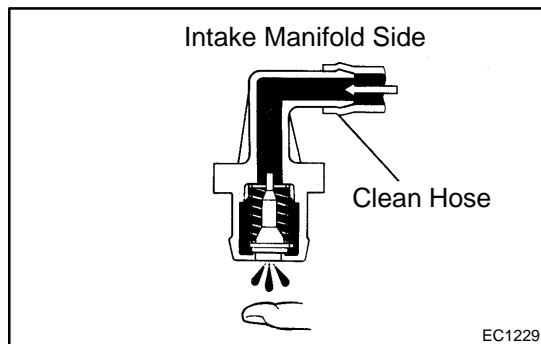
EC07D-03

1. REMOVE PCV VALVE
2. ATTACH CLEAN HOSE TO PCV VALVE
3. BLOW AIR FROM CYLINDER HEAD SIDE

Check that air passes through easily.

### NOTICE:

- Do not suck air through the valve.
- Petroleum substances inside the valve are harmful.

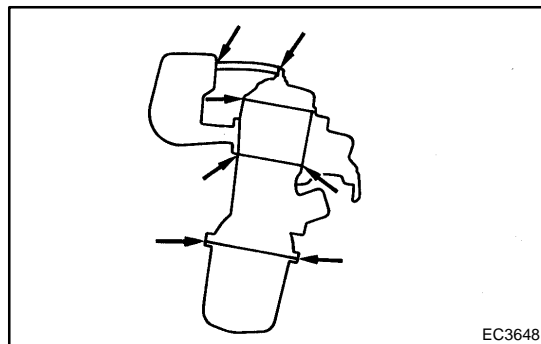


4. BLOW AIR FROM INTAKE MANIFOLD SIDE

Check that air passes through with difficulty.

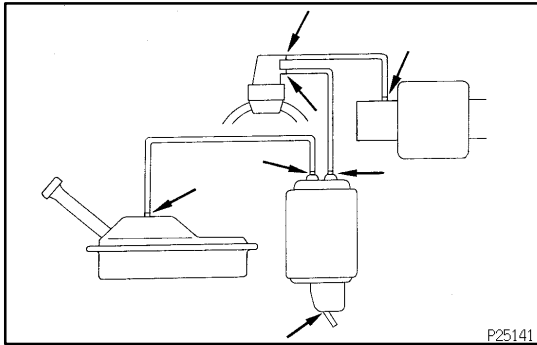
If the PCV valve fails either of the checks, replace it.

5. REINSTALL PCV VALVE



6. VISUALLY INSPECT HOSES, CONNECTIONS AND GASKETS

Check for cracks, leaks or damage.



## EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM INSPECTION

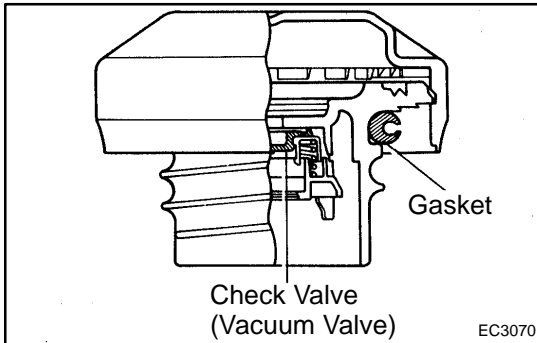
EC0JN-01

### 1. VISUALLY INSPECT LINES AND CONNECTIONS

Look for loosen connections, sharp bends or damage.

### 2. VISUALLY INSPECT FUEL TANK

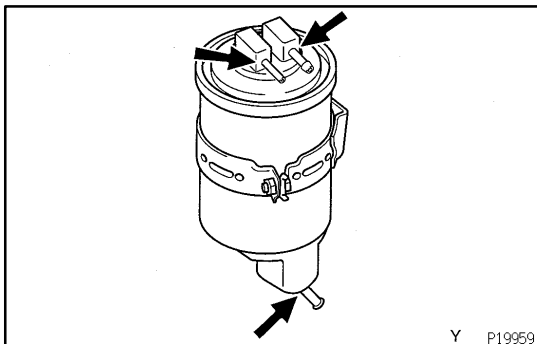
Look for deformation, cracks or fuel leakage.



### 3. VISUALLY INSPECT FUEL TANK CAP

Check if the cap and or gasket are deformed or damaged.

If necessary, repair or replace the cap.

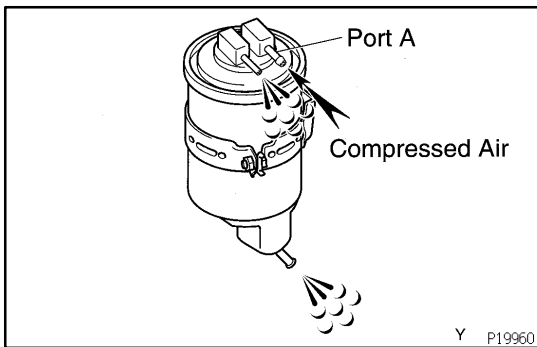


### 4. REMOVE CHARCOAL CANISTER

### 5. REMOVE CAP FROM CHARCOAL CANISTER

### 6. VISUALLY INSPECT CHARCOAL CANISTER

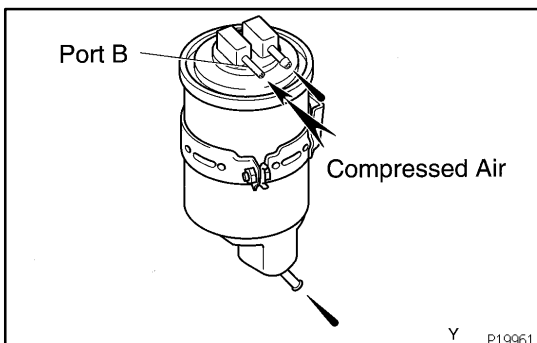
Look for cracks or damage.



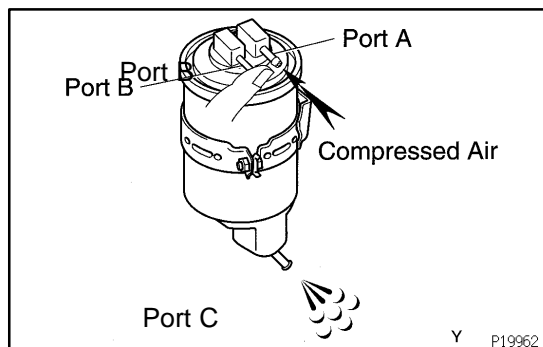
### 7. INSPECT FOR CLOGGED FILTER AND STUCK CHECK VALVE

- (a) Using low pressure compressed air 4.71 kPa (48 gf/cm<sup>2</sup>, 0.68 psi), blow into port A and check that air flows from the other ports.

If operation is not as specified, replace the charcoal canister.



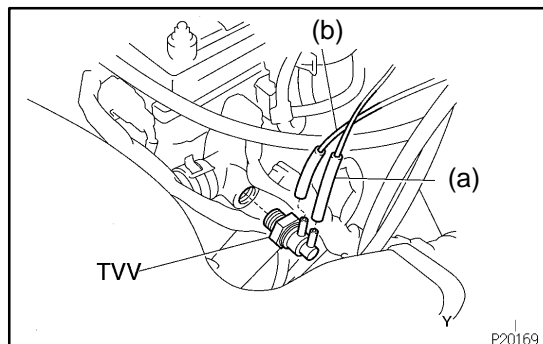
- (b) Blow air 4.71 kPa (48 gf/cm<sup>2</sup>, 0.68 psi) into port B and check that air does not flow from the other ports.



- (c) Clean the filter by blowing 294 kPa (3 kgf/cm<sup>2</sup>, 43 psi) of compressed air into port A while holding port B closed.

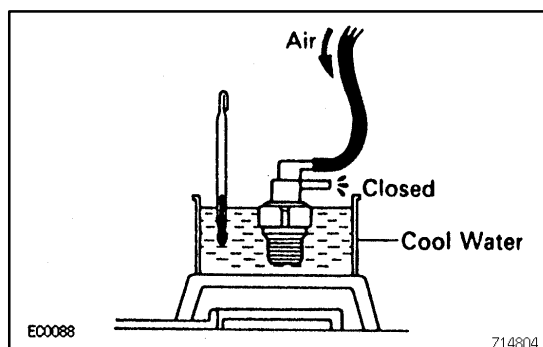
**NOTICE:**

- Do not attempt to wash the canister.
  - No activated carbon should come out.
8. REINSTALL CAP TO CHARCOAL CANISTER
  9. REINSTALL CHARCOAL CANISTER
  10. DRAIN ENGINE COOLANT



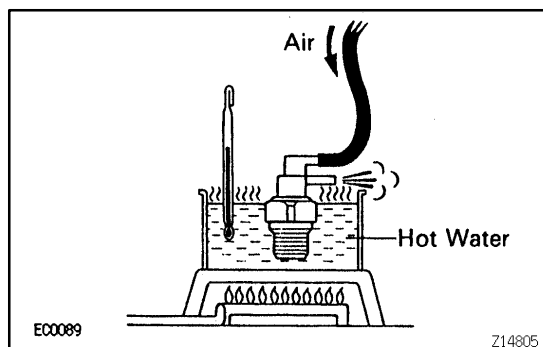
**11. REMOVE TVV FROM WATER INLET AND OUTLET HOUSING**

- (a) Disconnect the vacuum hose from the throttle body.
- (b) Disconnect the vacuum hose from the charcoal canister.
- (c) Remove the TVV.



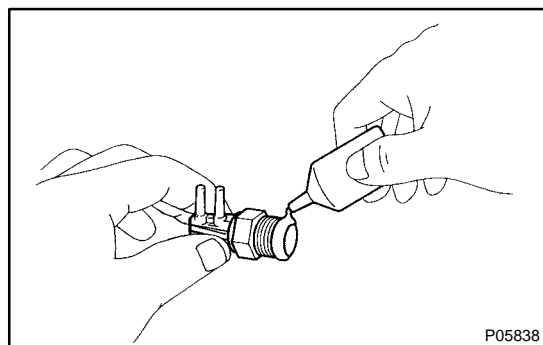
**12. VISUALLY INSPECT TVV OPERATION**

- (a) Cool the TVV to below 50°C (122°F) with cool water.
- (b) Blow air into the upper port and check that the TVV is closed.



- (c) Cool the TVV to above 65°C (149°F) with hot water.
- (d) Blow air into the upper port and check that the TVV is open.

If operation is not as specified, replace the TVV.

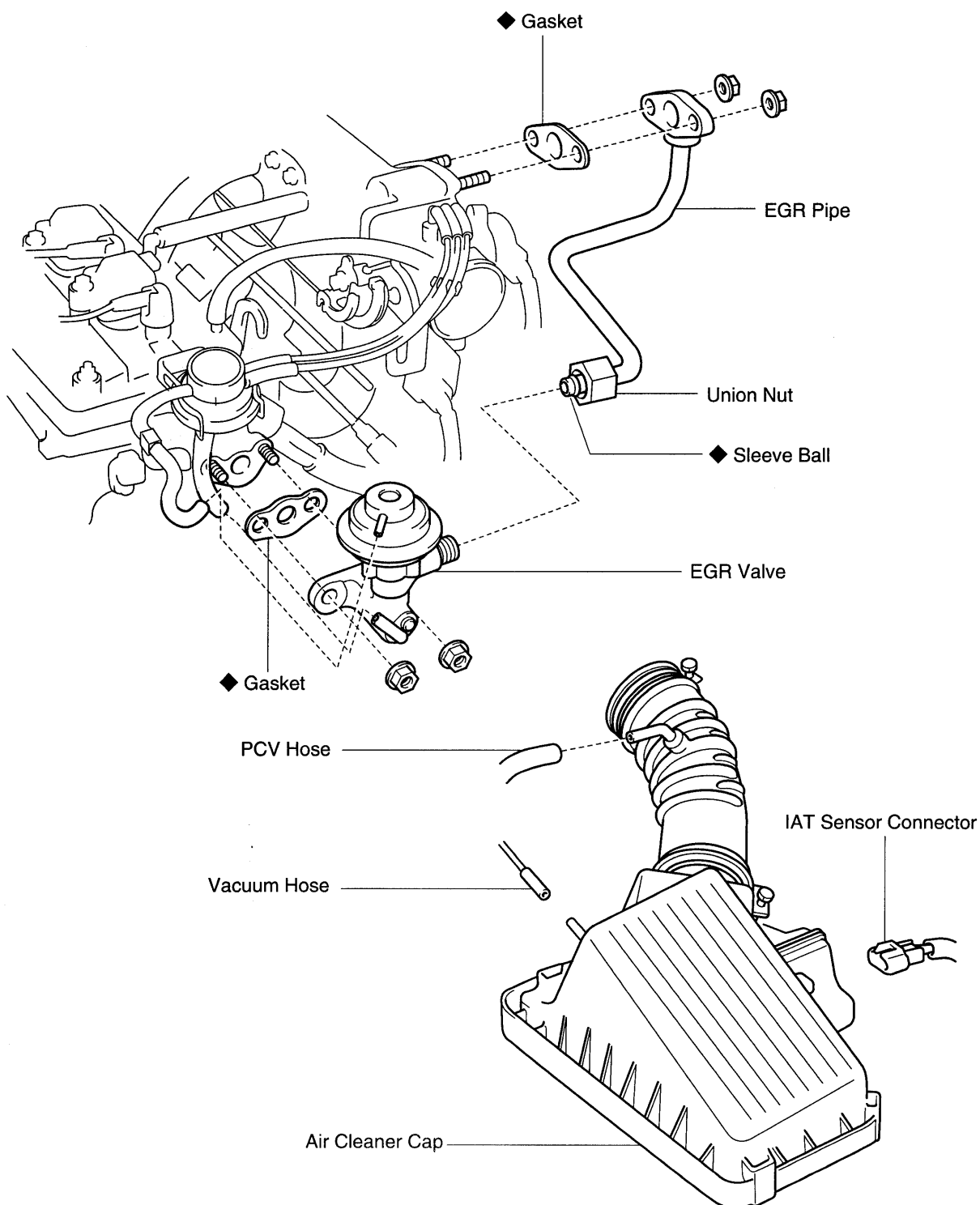


**13. REINSTALL TVV**

- (a) Apply sealant to the thread of the TVV and reinstall it.  
**Sealant:**  
**Part No. 08833-00070, THREE BOND 1324 or equivalent**  
**Torque: 35 N·m (350 kgf·cm, 26 ft·lbf)**
  - (b) Reconnect 2 vacuum hoses.
- 14. REFILL WITH ENGINE COOLANT**

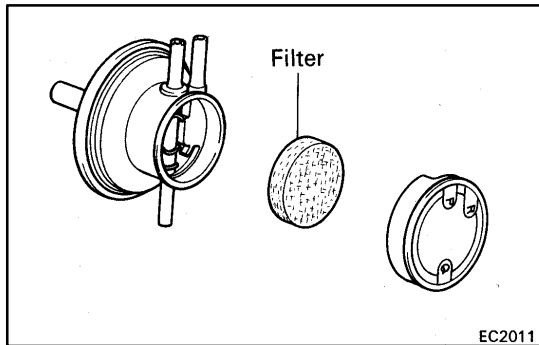
# EXHAUST GAS RECIRCULATION (EGR) SYSTEM COMPONENTS

EC0JO-01



◆ Non-reusable part

Y P20170



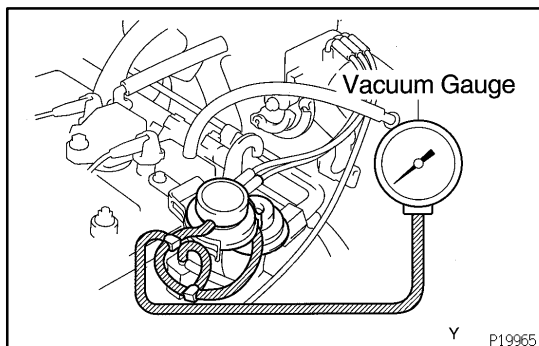
## INSPECTION

### 1. INSPECT AND CLEAN FILTER IN EGR VACUUM MODULATOR

- Remove the cap and filter.
- Check the filter for contamination or damage.
- Using compressed air, clean the filter.
- Reinstall the filter and cap.

#### HINT:

Install the filter with the coarser surface facing the atmospheric side (outward).



### 2. INSTALL VACUUM GAUGE

Using 3 - way connector, connect a vacuum gauge to the EGR valve vacuum hose as shown in the illustration.

### 3. INSPECT SEATING OF EGR VALVE

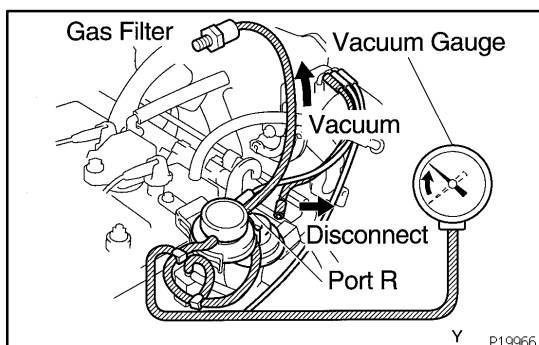
Start the engine and check that the engine starts and runs at idle.

### 4. INSPECT OPERATION VSV WITH COLD ENGINE

- The engine coolant temperature should be below 45°C (113°F).
- Check that the vacuum gauge indicates zero at 2,500 rpm.

### 5. INSPECT OPERATION OF VSV AND EGR VACUUM MODULATOR WITH HOT ENGINE

- Warm up the engine to above 60°C (140°F).
- Check that the vacuum gauge indicates low vacuum at 2,500 rpm.
- Check that the vacuum gauge indicates zero at idle.



- Disconnect the vacuum hose from port R of the EGR vacuum modulator and connect port R directly to the intake manifold with another hose.
- Check that the vacuum gauge indicates high vacuum at 2,500 rpm.

#### HINT:

As a large amount of exhaust gas enters, the will misfire slightly.

### 6. REMOVE VACUUM GAUGE

Remove the vacuum gauge and reconnect the vacuum hoses to the proper locations.

**7. INSPECT EGR VALVE**

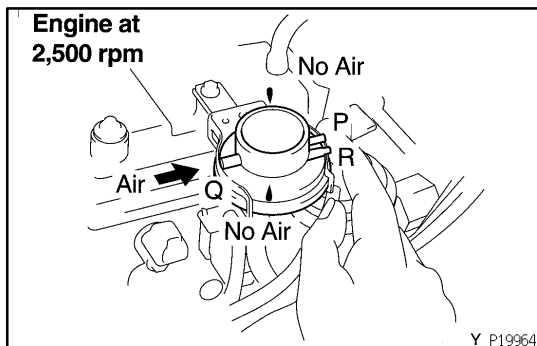
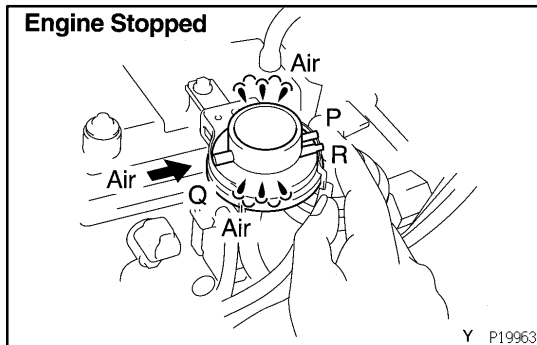
- Disconnect the vacuum hose from the EGR valve.
- Apply vacuum directly to the EGR valve with the engine idling.
- Check that the engine runs rough or dies.
- Reconnect the vacuum hoses to the proper locations.

**HINT:**

As exhaust gas is increasingly recirculated, the engine will start to misfire.

**8. VSV ISPECTION (See page MF-42 )****9. CHECK EGR VACUUM MODULATOR OPERATION**

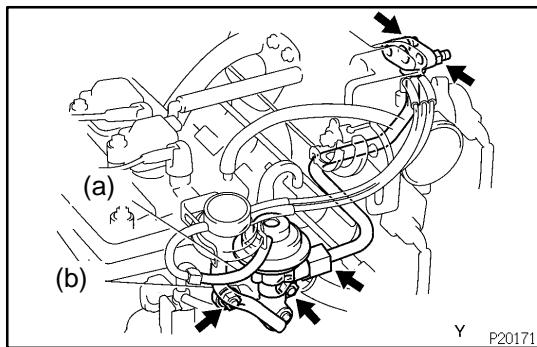
- Disconnect the vacuum hoses from ports P, Q and R of the EGR vacuum modulator.
- Block ports P and R with your finger.
- Blow air into port Q, and check that the air passes through to the air filter freely.



- Start the engine and maintain speed at 2,500 rpm.
- Repeat the above test. Check that there is a strong resistance to air flow.

If operation is not as specified, replace the EGR vacuum modulator.

- Reconnect the vacuum hoses to the proper locations.

**10. REMOVE AIR CLEANER CAP****11. REMOVE EGR VALVE**

- Disconnect the vacuum hose from the EGR valve.
- Disconnect the EGR hose from the vacuum modulator.
- Loosen the union nut.
- Remove the 4 nuts, EGR valve, pipe sleeve ball and the 2 gaskets.

**12. INSPECT EGR VALVE**

Check for sticking and heavy carbon deposits.

If a problem is found, replace the valve.

**13. REINSTALL EGR VALVE**

- Install a new gasket and the EGR valve with the 2 nuts.  
**Torque: 30 N·m (300kgf·cm, 22ft·lbf)**
- Install a new gasket, the EGR pipe, new sleeve ball with the 2 nuts and union nut.

**Torque:**

**Nut: 30 N·m (300kgf·cm, 22ft·lbf)**

**Union nut: 40 N·m (400kgf·cm, 30ft·lbf)**

- Connect the vacuum hoses to the EGR valve.
- Connect the EGR hose to the vacuum modulator.

**14. REINSTALL AIR CLEANER CAP**

## THREE-WAY CATALYTIC CONVERTER (TWC) SYSTEM INSPECTION

EC07B-04

1. CHECK CONNECTION FOR LOOSENESS OR DAMAGE
2. CHECK CLAMPS FOR WEAKNESS, CRACKS OR DAMAGE
3. CHECK FOR DENTS OR DAMAGE

If any part of the protector is damaged or dented to the extent that it touches the TWC, repair or replace it.

4. CHECK HEAT INSULATOR FOR DAMAGE
5. CHECK FOR ADEQUATE CLEARANCE BETWEEN TWC AND HEAT INSULATOR



## REPLACEMENT

REMOVE FRONT EXHAUST PIPE (See page [EM-92](#) )

# MFI SYSTEM

## PRECAUTION

SF1PQ-02

### 1. BEFORE WORKING ON FUEL SYSTEM, DISCONNECT NEGATIVE (-) TERMINAL CABLE FROM BATTERY

#### HINT:

Any diagnostic trouble code retained by the computer will be erased when the negative (-) terminal cable is disconnected. Therefore, if necessary, read the diagnosis before disconnecting the negative (-) terminal cable from the battery.

### 2. DO NOT SMOKE OR WORK NEAR AN OPEN FLAME WHEN WORKING ON THE FUEL SYSTEM

### 3. KEEP GASOLINE AWAY FROM RUBBER OR LEATHER PARTS

### 4. MAINTENANCE PRECAUTIONS

#### (a) In event of engine misfire, the following precautions should be taken.

- (1) Check proper connection to battery terminals, etc.
- (2) Handle high-tension cords carefully.
- (3) After repair work, check that the ignition coil terminals and all other ignition system lines are reconnected securely.
- (4) When cleaning the engine compartment, be especially careful to protect the electrical system from water.

#### (b) Precautions when handling the oxygen sensor.

- (1) Do not allow the oxygen sensor to drop or hit against an object.
- (2) Do not allow the sensor to come into contact with water.

### 5. IF VEHICLE IS EQUIPPED WITH MOBILE RADIO SYSTEM (HAM, CB, ETC.)

If the vehicle is equipped with a mobile communication system, refer to the precaution in the IN section.

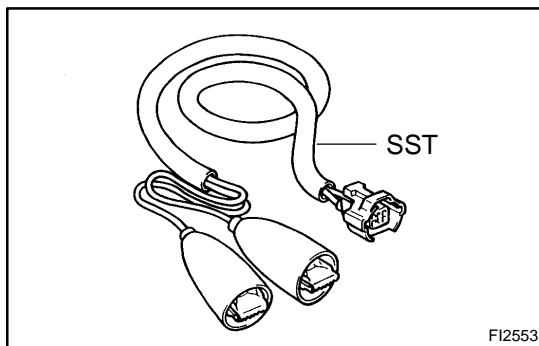
### 6. AIR INDUCTION SYSTEM

- (a) Separation of the engine oil dipstick, oil filler cap, PCV hose, etc. may cause the engine out of tune.
- (b) Disconnection, looseness or cracks in the parts of the air induction system between the throttle body and cylinder head will cause air suction and cause the engine out of tune.

### 7. ELECTRONIC CONTROL SYSTEM

- (a) Before removing MFI wiring connectors, terminals, etc., first disconnect the power by either turning the ignition switch to LOCK or disconnecting the negative (-) terminal cable from the battery.

- (b) When installing the battery, be especially careful not to incorrectly connect the positive (+) and negative (-) cables.
- (c) Do not permit parts to receive a severe impact during removal or installation. Handle all MFI parts carefully, especially the ECM.
- (d) Do not be careless during troubleshooting as there are numerous transistor circuits and contact with terminals can cause further trouble.
- (e) Do not open the ECM cover.
- (f) When inspecting during rainy weather, take care to prevent the entry of water. Also, when washing the engine compartment, prevent water from getting on the MFI parts and wiring connectors.
- (g) Parts should be replaced as an assembly.
- (h) Care is required when pulling out and inserting wiring connectors.
- (i) Release the lock and pull out the connector, pulling on the connectors.
- (j) Fully insert the connector and check that it is locked.

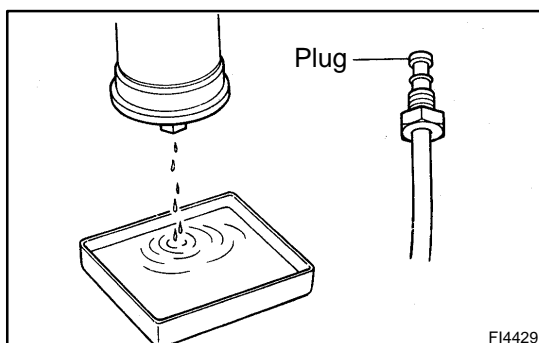


- (k) When inspecting a connector with a volt/ohmmeter.
- (l) Carefully take off the water-proofing rubber if it is a water-proof type connector.
- (m) Insert the tester probe into the connector from the wiring side when checking the continuity, amperage or voltage.
- (n) Do not apply unnecessary force to the terminal.
- (o) After checking, install the water-proofing rubber securely on the connector.
- (p) Use SST for inspecting or testing the injector or its wiring connector.

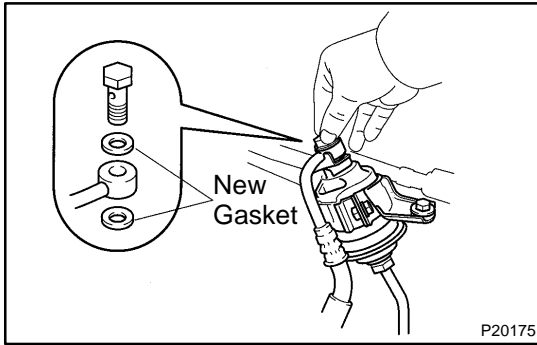
SST 09842-30070

## 8. FUEL SYSTEM

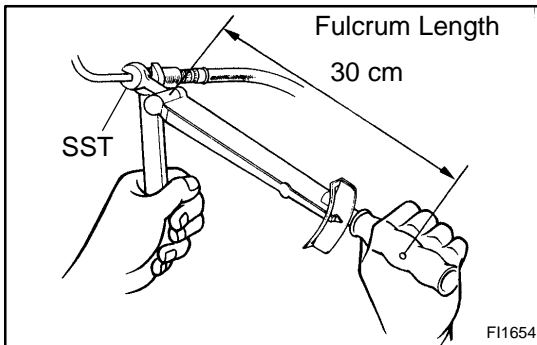
- (a) When disconnecting the high fuel pressure line, a large amount of gasoline will spill out, so observe these procedures:
  - (1) Disconnect the fuel pump connector.
  - (2) Start the engine. After the engine has stopped on its own, turn the ignition switch.



- (3) Put a container under the connection.
- (4) Slowly loosen the connection.
- (5) Disconnect the connection.
- (6) Plug the connection with a rubber plug.
- (7) Reconnect the fuel pump connector.



- (b) When connecting the union bolt on the high pressure pipe union, observe these procedures:
- (1) Always use 2 new gaskets.
  - (2) Tighten the union bolt by hand.
  - (3) Tighten the union bolt to the specified torque.
- Torque: 29.0 N·m (290 kgf·cm, 22 ft·lbf)**



- (c) When connecting the flare nut on the high pressure pipe union, observe these procedures:
- (1) Apply a light coat of engine oil to the flare nut, and tighten the flare nut by hand.
  - (2) Using SST, tighten the flare nut to specified torque.
- SST 09631-22020

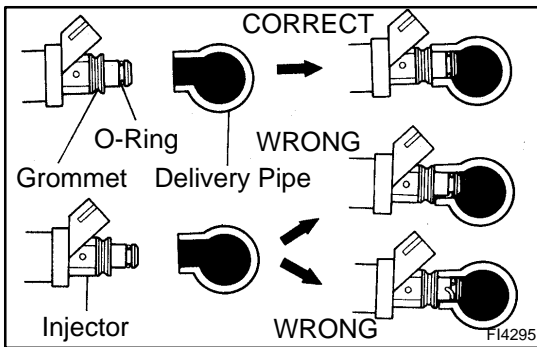
**NOTICE:**

**Do not rotate the fuel pipe, when tightening the flare nut.**

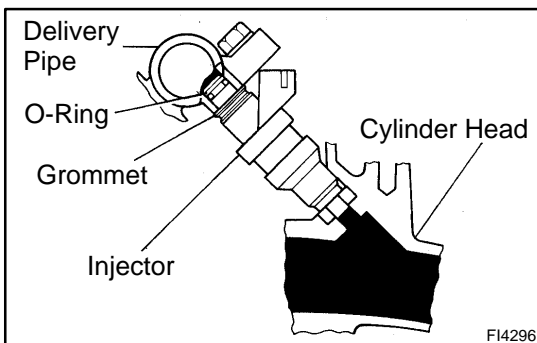
**Torque: 30 N·m (300 kgf·cm, 23 ft·lbf)**

**HINT:**

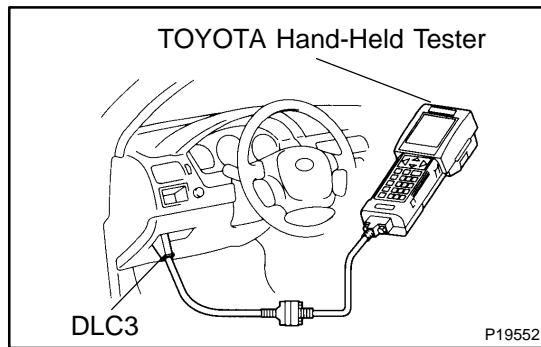
Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).



- (d) Observe these precautions when removing and installing the injectors.
- (1) Never reuse the O-ring.
  - (2) When placing a new O-ring on the injector, take care not to damage it in any way.
  - (3) Coat a new O-ring with spindle oil or gasoline before installing-never use engine, gear or brake oil.



- (e) Install the injector in the delivery pipe and cylinder head as shown in the illustration.

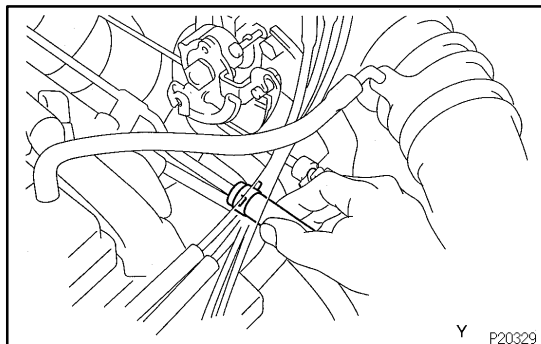


- (f) Check that there are no fuel leaks after performing maintenance anywhere on the fuel system.
- (1) Remove the fuse cover on the instrument panel.
  - (2) Connect the TOYOTA hand-held tester to the DLC3.
  - (3) Turn the ignition switch ON and TOYOTA hand-held tester main switch ON.

**NOTICE:****Do not start the engine.**

- (4) Select the active test mode on the TOYOTA hand-held tester.
- (5) Please refer to the TOYOTA hand-held tester operator's manual for further details.

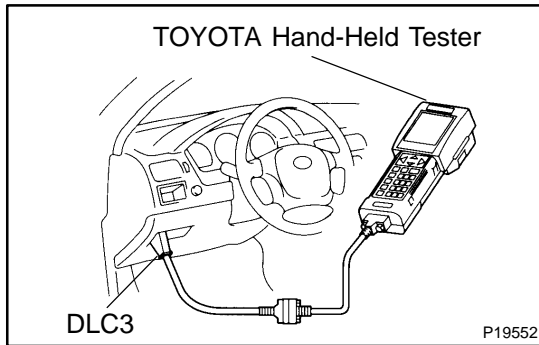
If you have no TOYOTA hand-held tester, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector (See page [MF-5](#) ).



- (6) Pinch the fuel return hose.
- (7) The pressure in the high pressure line will rise to approx. 392 kPa (4 kgf/cm<sup>2</sup>, 57 psi). In this state. Check to see that there are no leaks from any part of the fuel system.

**NOTICE:****Always pinch the hose. Avoid bending as it may cause the hose to crack.**

- (8) Turn the ignition switch to LOCK.
- (9) Disconnect the TOYOTA hand-held tester from the DLC3.
- (10) Install the fuse cover on the instrument panel.



## FUEL PUMP

### ON-VEHICLE INSPECTION

SF1PR-02

#### 1. CHECK FUEL PUMP OPERATION

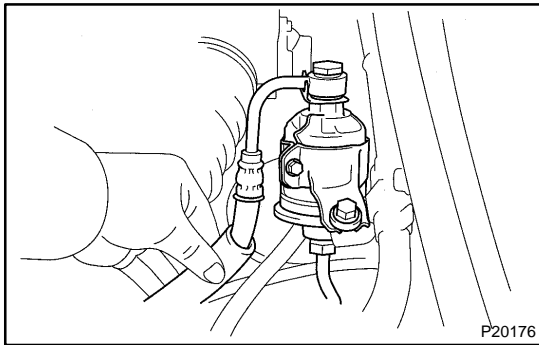
- Remove the fuse cover on the instrument panel.
- Connect the TOYOTA hand-held tester to the DLC3.
- Turn the ignition switch ON and TOYOTA hand-held tester main switch ON.

#### NOTICE:

**Do not start the engine.**

- Select the active test mode on the TOYOTA hand-held tester.
- Please refer to the TOYOTA hand-held tester operator's manual for further details.

If you have no TOYOTA hand-held tester, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector (See step 6).



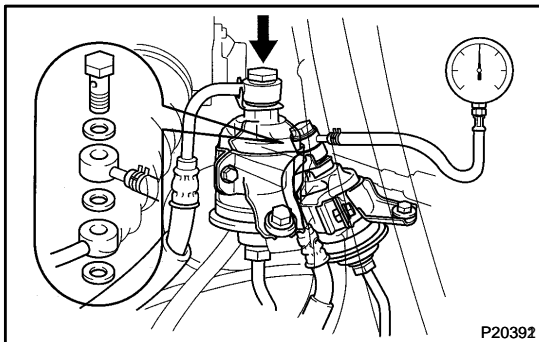
- Check that there is pressure in the fuel inlet hose from the fuel filter.

#### HINT:

If there is fuel pressure, you will hear the sound of fuel flowing. If there is no pressure, check the fusible link, H-fuse, fuses, EFI main relay, circuit opening relay, fuel pump, ECM and wiring connections.

#### 2. CHECK FUEL PRESSURE

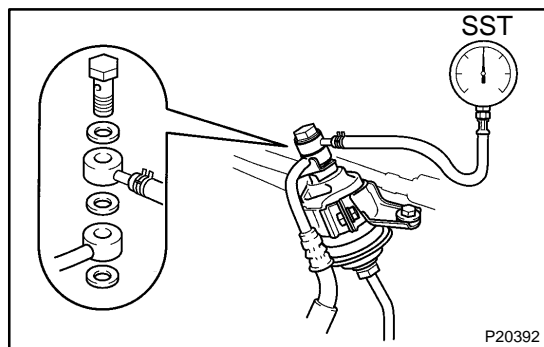
- Check the battery positive voltage is above 11 V.
- Disconnect the negative (-) terminal cable from the battery.



- Remove the union bolt and 2 gaskets, and disconnect the fuel inlet hose from the fuel filter outlet.

#### CAUTION:

**Put a shop towel under the fuel filter. Slowly loosen the union bolt.**

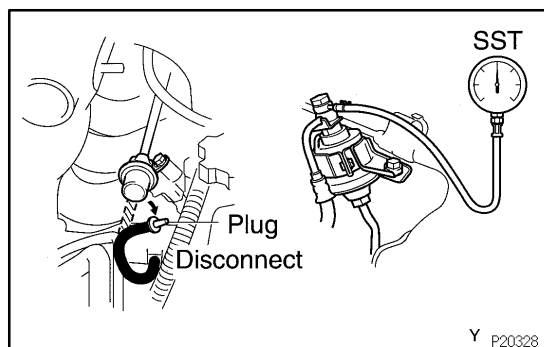


- (d) Install the fuel inlet hose and SST (pressure gauge) to the fuel filter outlet with the 3 gaskets and union bolt.  
SST 09268-45012
- Torque: 29.0 N·m (290 kgf·cm, 22 ft·lbf)**
- (e) Wipe off any splattered gasoline.
- (f) Reconnect the negative (-) terminal cable to the battery.
- (g) Connect the TOYOTA hand-held tester to the DLC3 (See step 1 check fuel pump operation (a) to (f)).
- (h) Turn the ignition switch ON.
- (i) Measure the fuel pressure.

**Fuel pressure:****281 - 287 kPa****(2.87 - 2.93 kgf/cm<sup>2</sup>, 40.8 - 41.7 psi)**

If pressure is high, replace the fuel pressure regulator.

- (j) If pressure is low, check these parts:
  - Fuel hoses and connection
  - Fuel pump
  - Fuel filter
  - Fuel pressure regulator
- (k) Remove the TOYOTA hand-held tester from the DLC3.
- (l) Reinstall the fuse cover on instrument panel.
- (m) Start the engine.
- (n) Disconnect the vacuum sensing hose from the fuel pressure regulator.
- (o) Measure the fuel pressure at idle.

**Fuel pressure:****281 - 287 kPa (2.87 - 2.93 kgf/cm<sup>2</sup>, 40.8 - 41.7 psi)**

- (p) Reconnect the vacuum sensing hose to the fuel pressure regulator plug the hose end.
- (q) Measure the fuel pressure at idle.

**Fuel pressure:****226 - 265 kPa (2.3 - 2.6 kgf/cm<sup>2</sup>, 33 - 37 psi)**

If pressure is not as specified, check the vacuum sensing hose and fuel pressure regulator.

- (r) Stop the engine.
- (s) Check that the fuel pressure remains as specified for 5 minutes after the engine has stopped.

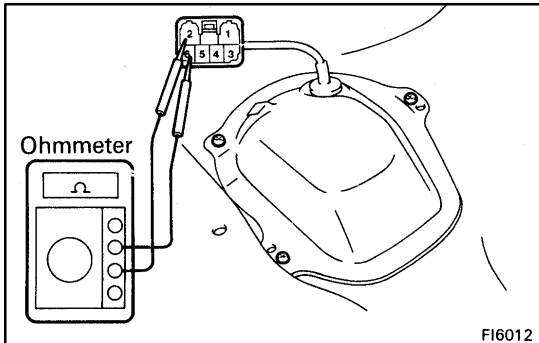
**Fuel pressure:****147 kPa (1.5 kgf/cm<sup>2</sup>, 21 psi) or more**

If pressure is not as specified, check the fuel pump, pressure regulator and/or injector.

- (t) After checking fuel pressure, disconnect the negative (-) terminal cable from the battery and carefully remove the SST to prevent gasoline from splashing.  
SST 09268-45012
- (u) Connect the fuel inlet hose to the fuel filter with 2 new gaskets and the union bolt.

**Torque: 29 N·m (290 kgf·cm, 22 ft·lbf)**

- (v) Check for fuel leakage (See page [MF-1](#) ).
- 3. REMOVE REAR SEAT CUSHION**
- 4. DISCONNECT FUEL PUMP AND SENDER GAUGE CONNECTOR**

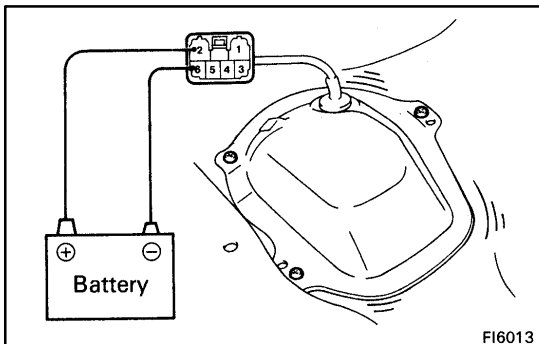


**5. INSPECT FUEL PUMP RESISTANCE**

Using an ohmmeter, measure the resistance between terminals 2 and 6.

**Resistance: 0.2 - 3.0  $\Omega$  at 20°C (68°F)**

If the resistance is not as specified, replace the fuel pump.



**6. INSPECT FUEL PUMP OPERATION**

Connect the positive (+) lead from the battery to terminal 2 of the connector, and the negative (-) lead to terminal 6. Check that the fuel pump operates.

**NOTICE:**

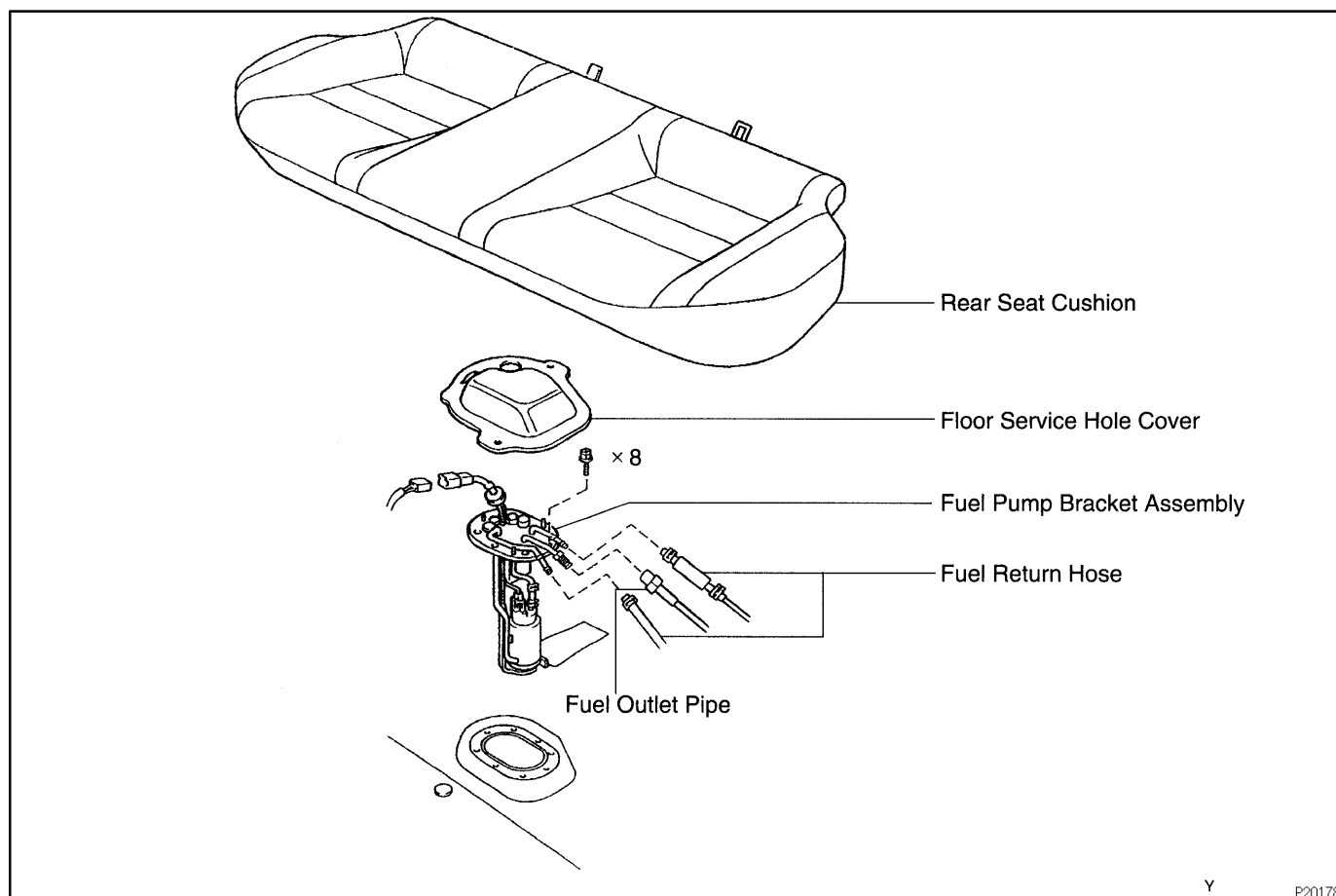
- These tests must be performed quickly (within 10 seconds) to prevent the coil from burning out.
- Keep the fuel pump as far away from the battery as possible.
- Always perform switching at the battery side.

If operation is not as specified, replace the fuel pump or lead wire.

- 7. RECONNECT FUEL PUMP AND SENDER GAUGE CONNECTOR**
- 8. REINSTALL REAR SEAT CUSHION**



## COMPONENTS



## REMOVAL

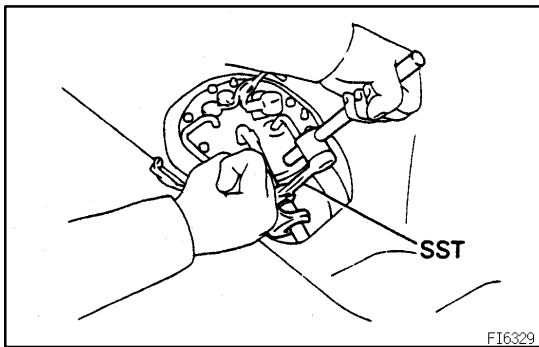
### CAUTION:

Do not smoke or work near an open flame when working on the fuel pump.

1. REMOVE REAR SEAT CUSHION
2. REMOVE FLOOR SERVICE HOLE COVER
3. DISCONNECT FUEL PUMP AND SENDER GAUGE CONNECTOR

### HINT:

At the time of installation, please refer to the following items. Check for fuel leakage (See page [MF-1](#) ).



4. REMOVE FUEL PUMP BRACKET ASSEMBLY FROM FUEL TANK

### CAUTION:

Remove the fuel filler cap to prevent the fuel from flowing out.

- (a) Using SST, disconnect the outlet pipe from the pump bracket.

### HINT:

At the time of installation, please refer to the following items. Using SST.

SST 09631-22020

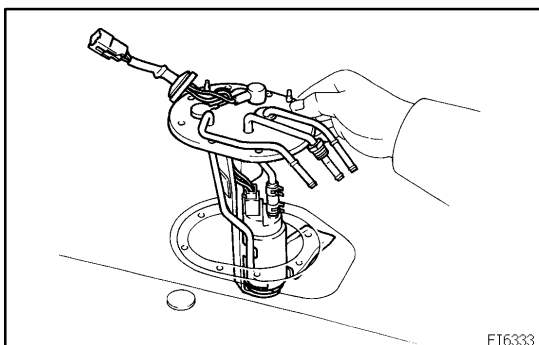
**Torque: 29 N·m (290 kgf·cm, 22 ft·lbf) for use with SST (See page [MF-1](#) )**

- (b) Remove the 8 bolts.

**Torque: 3.4 N·m (35 kgf·cm, 31 in.-lbf)**

### HINT:

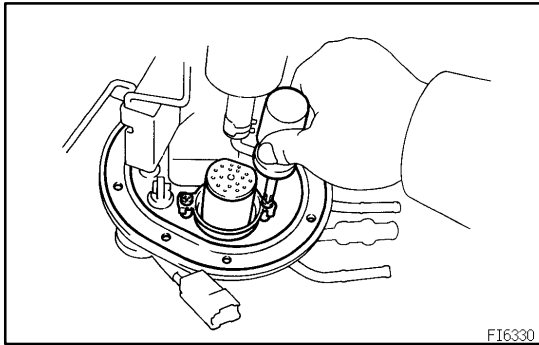
At the time of installation, please refer to the following items. Check for fuel leakage (See page [MF-1](#) ).



- (c) Disconnect the return hoses from the pump bracket.
- (d) Pull out the pump bracket assembly.

### NOTICE:

- Do not damage the fuel pump filter.
- Be careful that the arm of the sender gauge should not bent.



## DISASSEMBLY

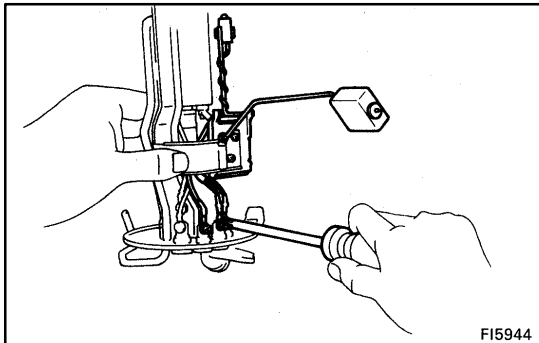
### 1. REMOVE FUEL CUTOFF VALVE FROM FUEL PUMP BRACKET

Remove the 2 screws, retainer, fuel cut-off valve and gasket.

HINT:

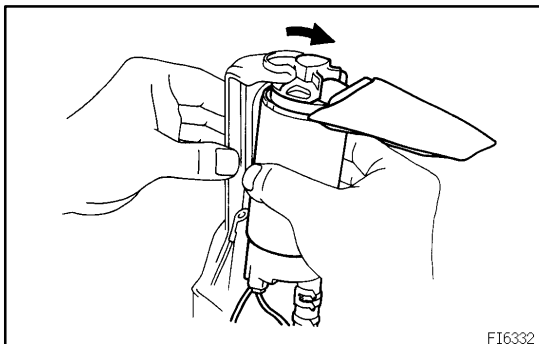
At the time of installation, please refer to the following items.  
Install a new gasket.

**Torque: 1.5 N·m (15 kgf·cm, 13 in·lbf)**



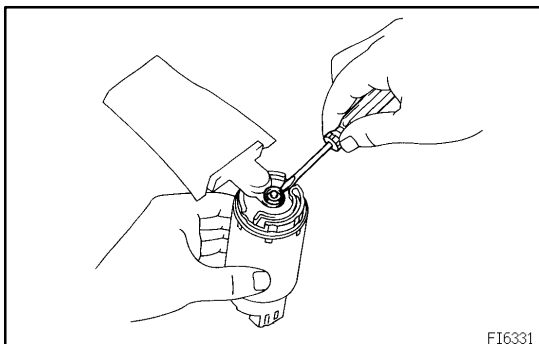
### 2. REMOVE FUEL SENDER GAUGE FROM FUEL PUMP BRACKET

- (a) Remove the screw and disconnect the lead wire from the pump bracket.
- (b) Disconnect the 3 lead wires.
- (c) Remove the 2 screws and sender gauge.



### 3. REMOVE FUEL PUMP FROM FUEL PUMP BRACKET

- (a) Pull out the lower side of the fuel pump from the pump bracket.
- (b) Disconnect the connector from the fuel pump.
- (c) Disconnect the fuel hose from the fuel pump, and remove the fuel pump.
- (d) Remove the rubber cushion from the fuel pump.



### 4. REMOVE FUEL PUMP FILTER FROM FUEL PUMP

- (a) Using a small screwdriver, remove the clip.

HINT:

At the time of installation, please refer to the following items.  
Install the pump filter with a new clip.

- (b) Pull out the pump filter.

## REASSEMBLY

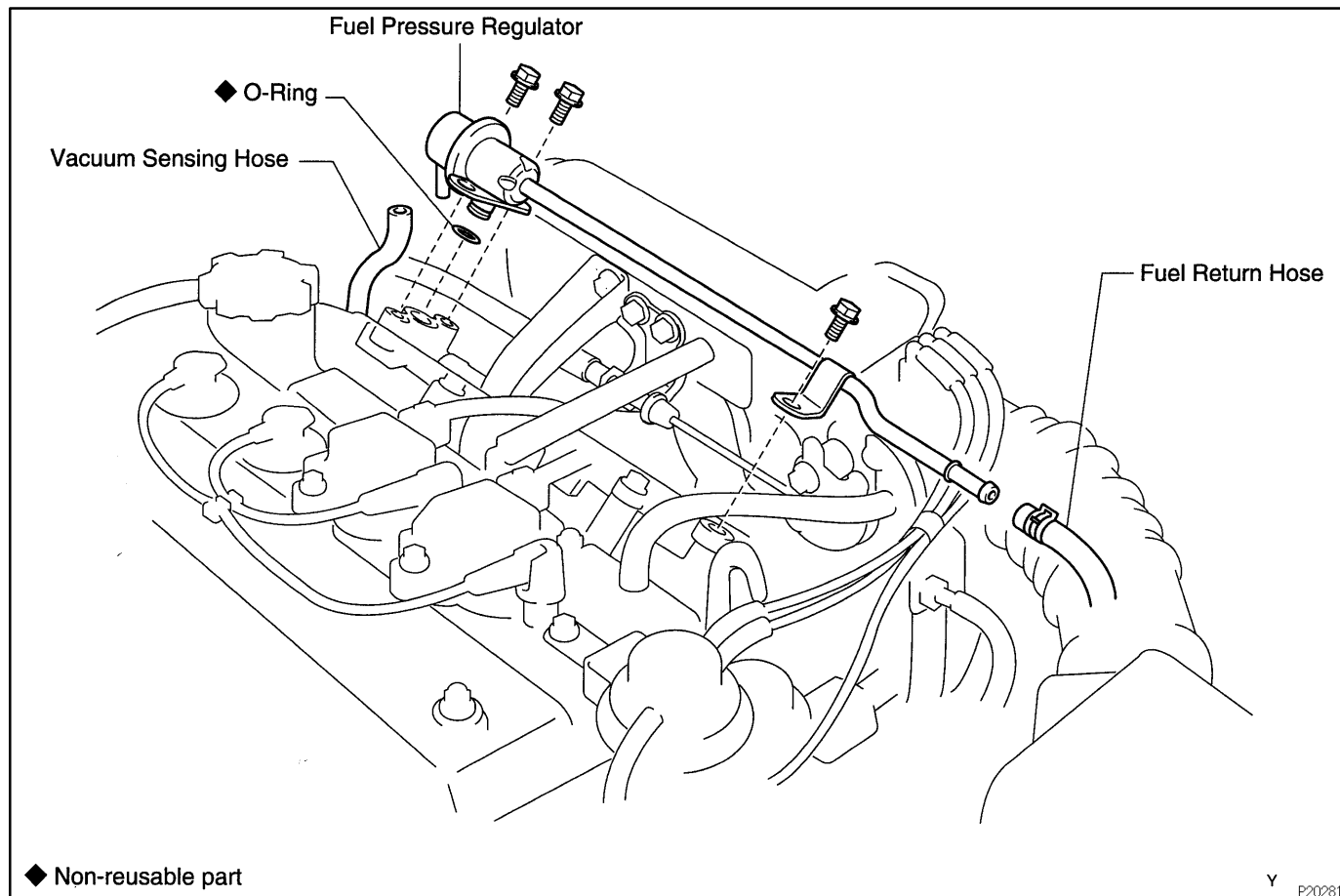
Reassembly is in the reverse order of disassembly (See page [MF-10](#) ).

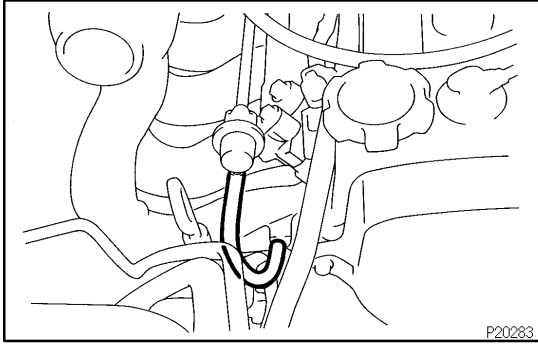
## INSTALLATION

Installation is in the reverse order of removal (See page [MF-9](#)).

# FUEL PRESSURE REGULATOR COMPONENTS

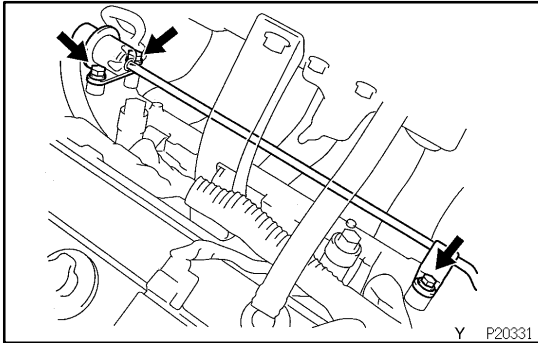
SF0WX-05



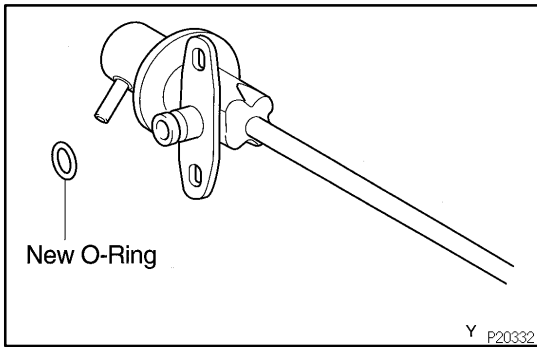


## REMOVAL

1. **DISCONNECT VACUUM SENSING HOSE FROM FUEL PRESSURE REGULATOR**
2. **DISCONNECT FUEL RETURN HOSE FROM FUEL PRESSURE REGULATOR**



3. **REMOVE FUEL PRESSURE REGULATOR**
  - (a) Remove the 3 bolts, and pull out the pressure regulator.
  - (b) Remove the O-ring from the pressure regulator.



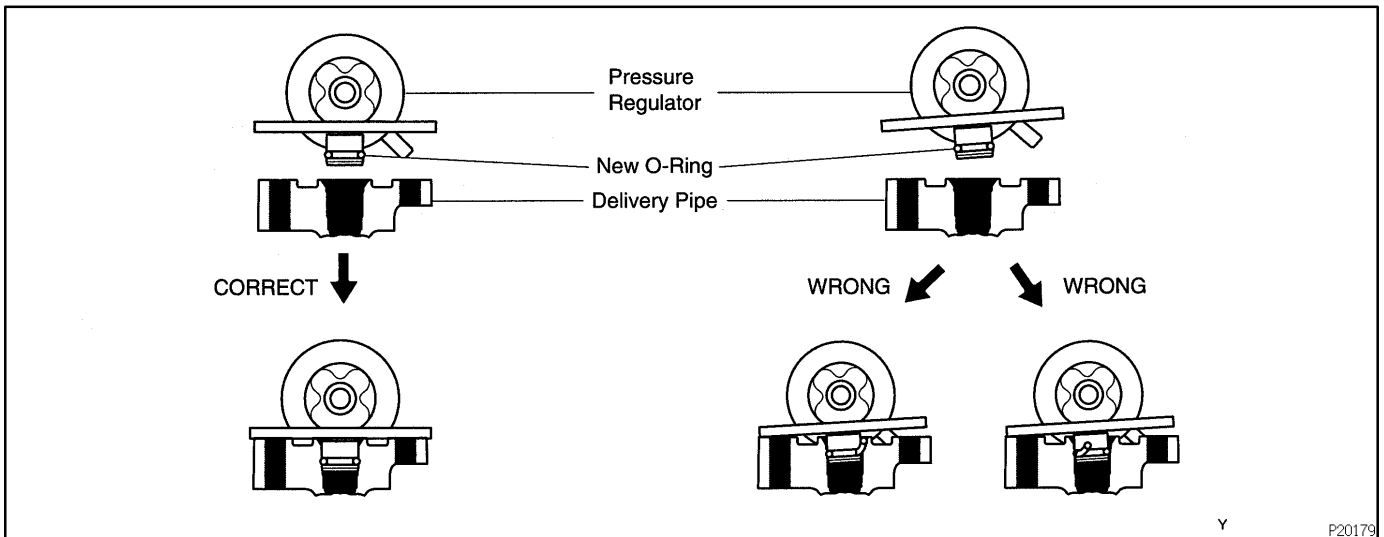
## INSTALLATION

### 1. INSTALL FUEL PRESSURE REGULATOR

- Apply a light coat of gasoline to a new O-ring, and install it to the pressure regulator.
- Attach the pressure regulator to the delivery pipe.
- Check that the pressure regulator rotates smoothly.

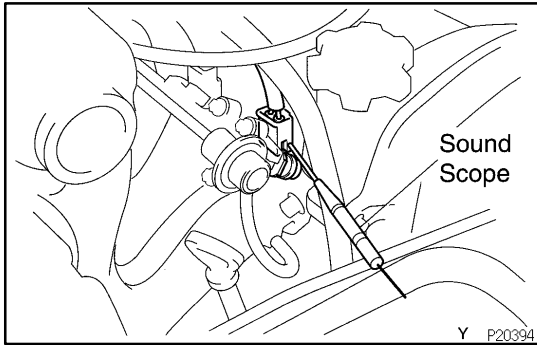
#### NOTICE:

If it does not rotate smoothly, the O-ring may be pinched, so remove the pressure regulator and perform again steps (b) and (c) above.



- Install the pressure regulator with the 3 bolts.  
**Torque: 8.0 N·m (80kgf·cm, 69 in.-lbf)**
- CONNECT FUEL RETURN HOSE TO FUEL PRESSURE REGULATOR**
  - CONNECT VACUUM SENSING HOSE TO FUEL PRESSURE REGULATOR**
  - CHECK FOR FUEL LEAKS (See page [MF-1](#))**





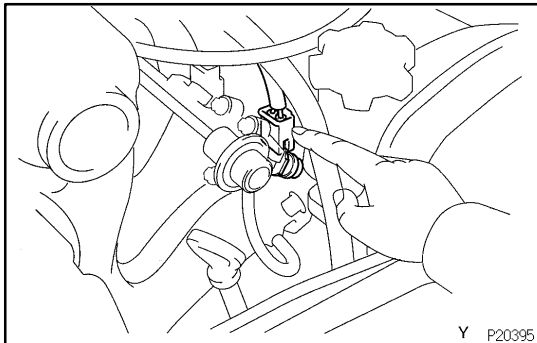
## INJECTOR ON-VEHICLE INSPECTION

SF0X0-03

### 1. INSPECT INJECTOR OPERATION

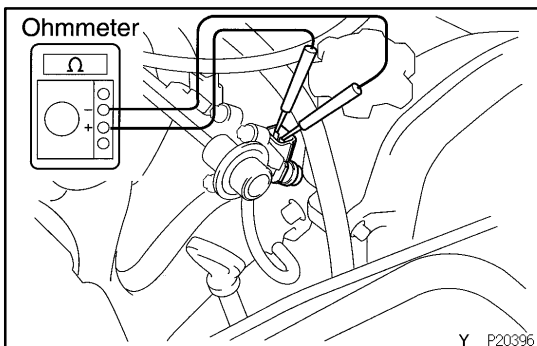
Check operation sound from each injector.

- (1) With the engine running or cranking, use a sound scope to check that there is a normal operating noise in proportion to engine speed.



- (2) If you have no sound scope, you can check the injector transmission operation with your finger.

If no sound or unusual sound is heard, check the wiring connector, injector or injection signal from the ECM.



### 2. INSPECT INJECTOR RESISTANCE

- (a) Disconnect the injector connector.
- (b) Using an ohmmeter, measure the resistance between the terminals.

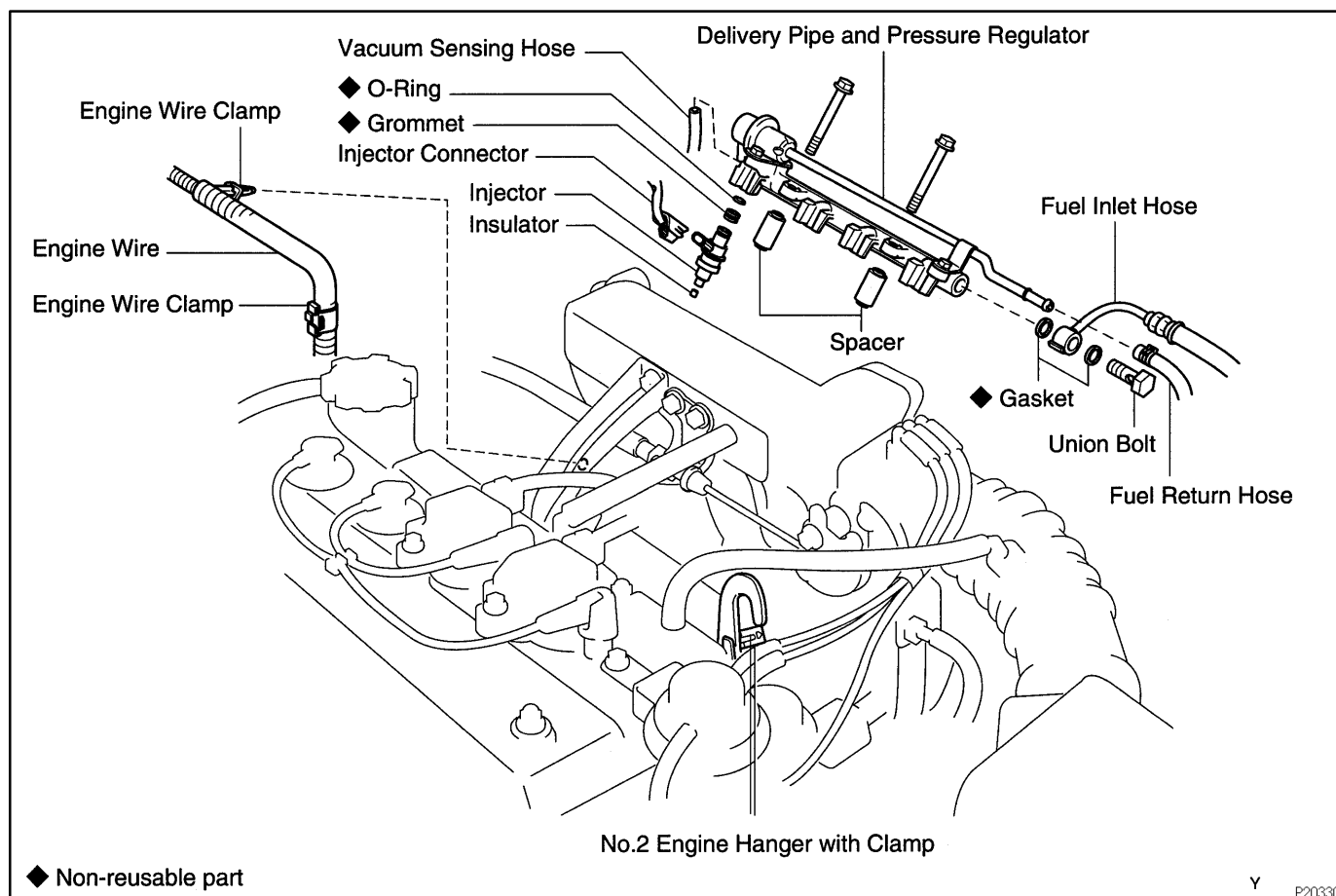
**Resistance:**

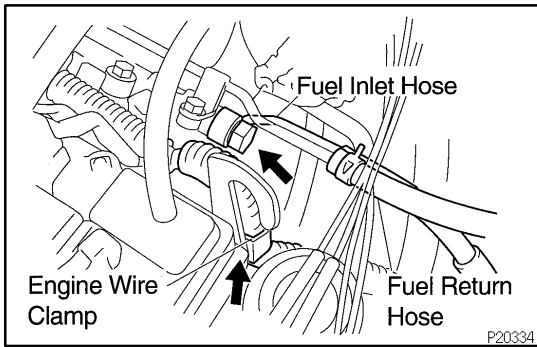
**13.4 - 14.2  $\Omega$  at 20°C (68°F)**

If the resistance is not as specified, replace the injector.

- (c) Reconnect the injector connector.

# COMPONENTS





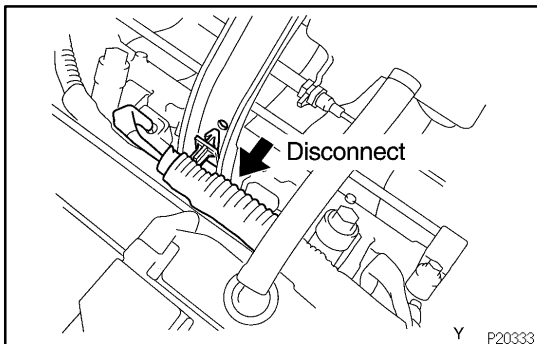
## REMOVAL

1. **DISCONNECT VACUUM SENSING HOSE FROM FUEL PRESSURE REGULATOR**
2. **DISCONNECT FUEL RETURN HOSE FROM FUEL RETURN PIPE**

### NOTICE:

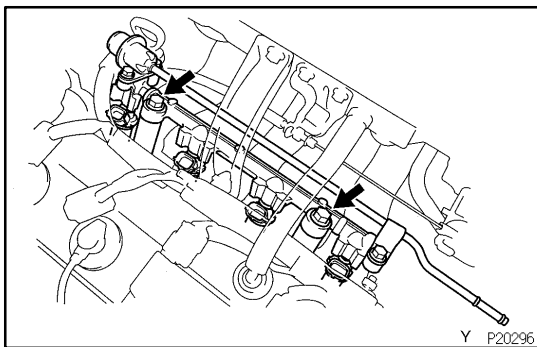
**Catch leaking in a container.**

3. **DISCONNECT FUEL INLET HOSE FROM DELIVERY PIPE**
  - (a) Disconnect the engine wire clamp from the No. 2 engine hanger.
  - (b) Remove the union bolt, 2 gaskets and inlet hose.



### 4. **DISCONNECT ENGINE WIRE**

- (a) Disconnect the engine wire from the surge tank stay.
- (b) Disconnect the 4 injector connectors.



### 5. **REMOVE DELIVERY PIPE WITH INJECTORS**

- (a) Remove the 2 bolts and delivery pipe together with the 4 injectors.

### NOTICE:

**Be careful not to drop the injectors when removing the delivery pipe.**

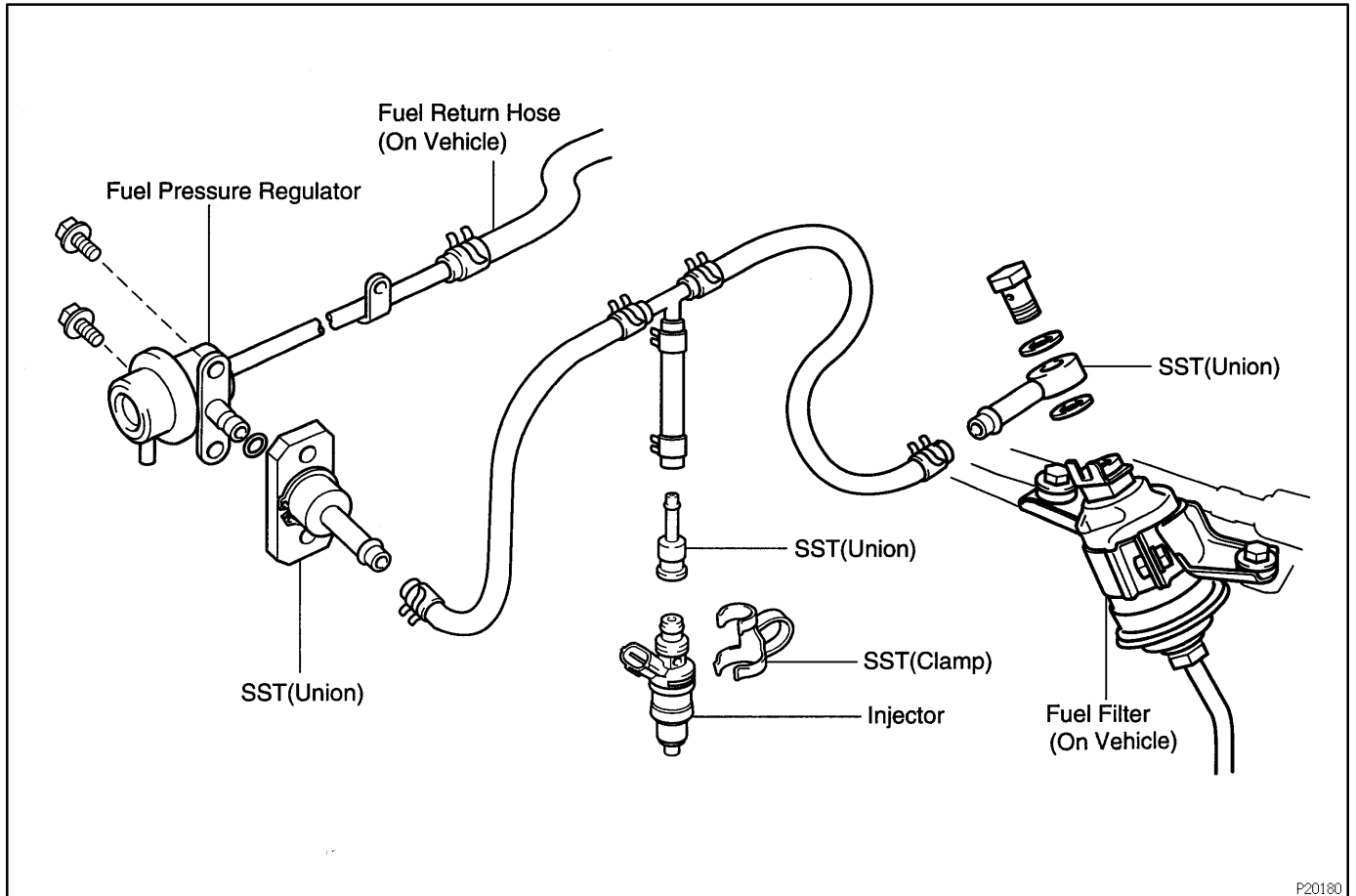
- (b) Pull out the 4 injectors from the delivery pipe.
- (c) Remove the 2 spacers and 4 insulators from the cylinder head.
- (d) Remove the O-ring and grommet from each injector.

# INSPECTION

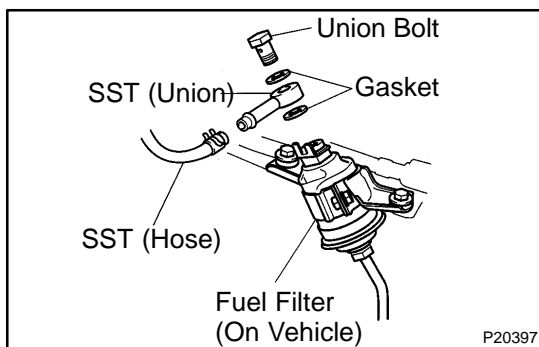
## 1. INSPECT INJECTOR INJECTION

### CAUTION:

Keep injector clean of sparks during the test.

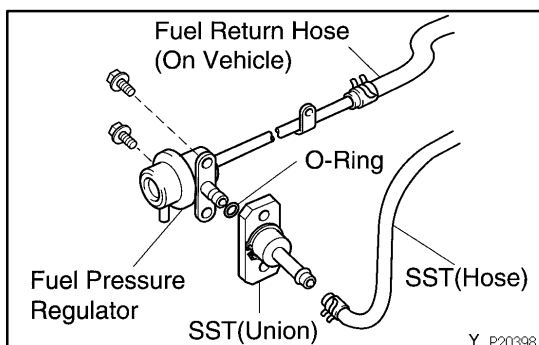


P20180



P20397

- Remove the union bolt and 2 gaskets, and disconnect the fuel inlet hose from the fuel filter outlet.
- Connect SST (union and hose) to the fuel filter outlet with 2 gaskets and union bolts.  
SST 09268-41046 (90405-09015)  
**Torque: 29 N·m (290 kgf-cm, 22 ft-lbf)**
- Remove the pressure regulator from the delivery pipe (See page [MF-14](#) ).
- Install a O-ring to the fuel inlet of pressure regulator.



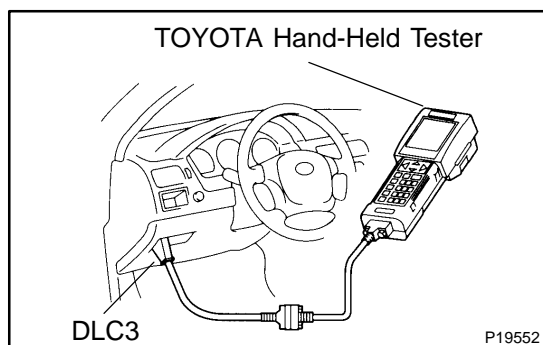
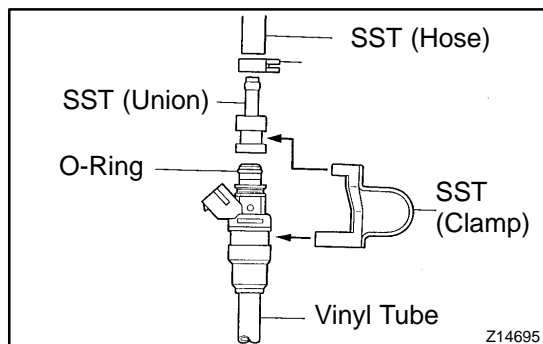
Y P20398

- Connect SST (hose) to the fuel inlet of the pressure regulator with SST (union) and the 2 bolts.  
SST 09268-41046 (09268-41091)  
**Torque: 8.0 N·m (80 kgf-cm, 69 ft-lbf)**
- Connect the fuel return hose to the fuel outlet of the pressure regulator.

### CAUTION:

Install a suitable vinyl hose onto the injector to prevent gasoline from splashing out.

- Remove the fuse cover on the instrument panel.



- (h) Install the grommet and a O-ring to the injector.
- (i) Connect SST (union and hose) to the injector, and hold the injector and union with SST (clamp).  
SST 09368-41046
- (j) Put the injector into the graduated cylinder.

**CAUTION:**

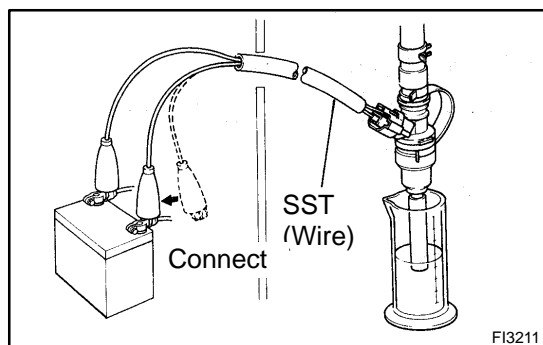
**Install a suitable vinyl hose onto the injector to prevent gasoline from splashing out.**

- (k) Remove the fuse cover on the instrument panel.
- (l) Connect the TOYOTA hand-held tester to the DLC3.
- (m) Turn the ignition switch ON and TOYOTA hand-held tester main switch ON.

**NOTICE:**

**Do not start the engine.**

- (n) Select the active test mode on the TOYOTA hand-held tester.
- (o) Please refer to the TOYOTA hand-held tester operator's manual for further details.
- (p) If you have no TOYOTA hand-held tester, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector (See page MF-5).



- (q) Connect SST (wire) to the injector and battery for 15 seconds, and measure the injection volume with a graduated cylinder. Test each injector 2 or 3 times.  
SST 09842-30070

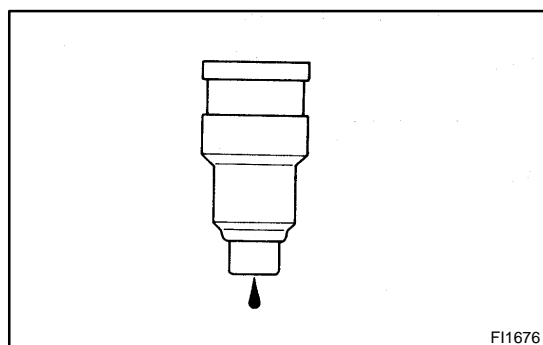
**Volume:**

**39 - 49 cm<sup>3</sup> (2.4 - 3.0 cu in.) per 15 sec.**

**Difference between each injector:**

**5 cm<sup>3</sup> (0.3 cu in.) or less**

If the injection volume is not as specified, replace the injector.

**2. INSPECT LEAKAGE**

- (a) In the condition above, disconnect the tester probes of SST (wire) from the battery and check the fuel leakage from the injector.

SST 09842-30070

**Fuel drop:**

**1 drop or less per 3 minutes**

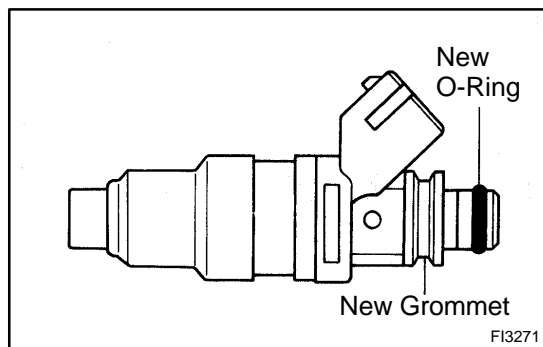
- (b) Disconnect the negative (-) terminal cable from the battery.
- (c) Remove the SST.

SST 09268-41046, 09842-30070, 09843-18020

- (d) Reinstall the pressure regulator to the delivery pipe (See page [MF-15](#) ).
- (e) Reconnect the fuel inlet hose to the fuel filter outlet with 2 new gaskets and the union bolt.

**Torque: 29 N·m (290 kgf·cm, 22 ft·lbf)**

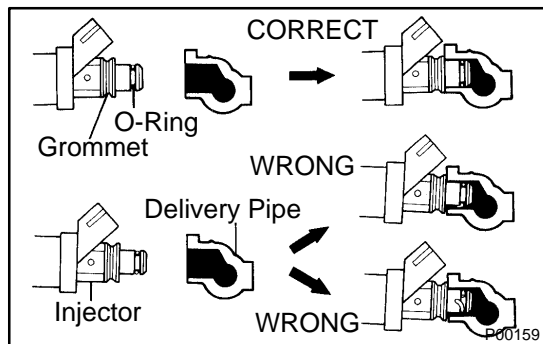
- (f) Turn the ignition switch OFF.
- (g) Disconnect the TOYOTA hand- held tester from the DLC3.
- (h) Reinstall the fuse cover on the instrument panel.



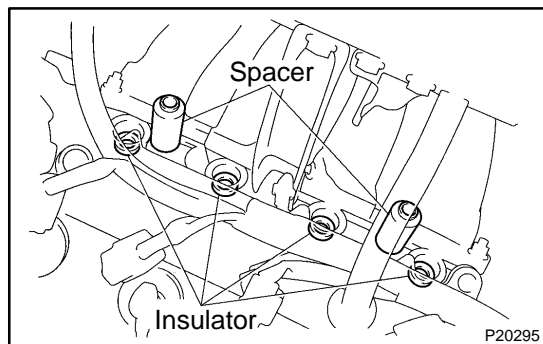
## INSTALLATION

### 1. INSTALL INJECTORS AND DELIVERY PIPE

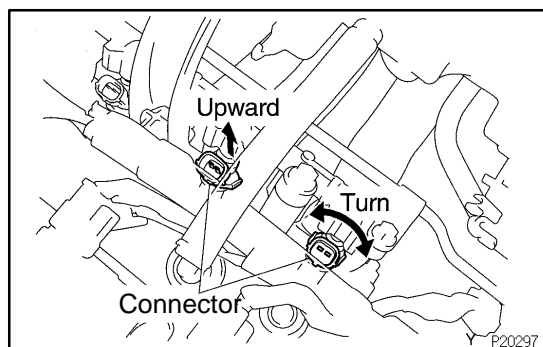
- Install a new grommet to the injector.
- Apply a light coat of gasoline to an O-ring, and install it to the injector.



- While turning the injector left and right, install it to the delivery pipe. Install the 4 injectors.



- Place the 2 spacers and 4 insulators in position on the cylinder head.
- Place the injectors together with the delivery pipe on the cylinder head.



- Check that the injectors rotate smoothly.

#### HINT:

If the injectors do not rotate smoothly, the probable cause is incorrect installation of O-rings. Replace the O-rings.

- Position the injector connector upward.
- Install the 2 bolts.

**Torque: 19 N·m (190 kgf·cm, 14 ft·lbf)**

### 2. CONNECT ENGINE WIRE

- Connect the 4 injector connectors.
- Connect the engine wire to the surge tank stay.

### 3. CONNECT FUEL INLET HOSE TO DELIVERY PIPE

- Install 2 new gaskets and the inlet hose with the union bolt.

**Torque: 30 N·m (300 kgf·cm, 23 ft·lbf)**

- Connect the engine wire clamp to the No.2 engine hanger.

### 4. CONNECT FUEL RETURN HOSE TO FUEL RETURN PIPE

### 5. CONNECT VACUUM SENSING HOSE TO FUEL PRESSURE REGULATOR

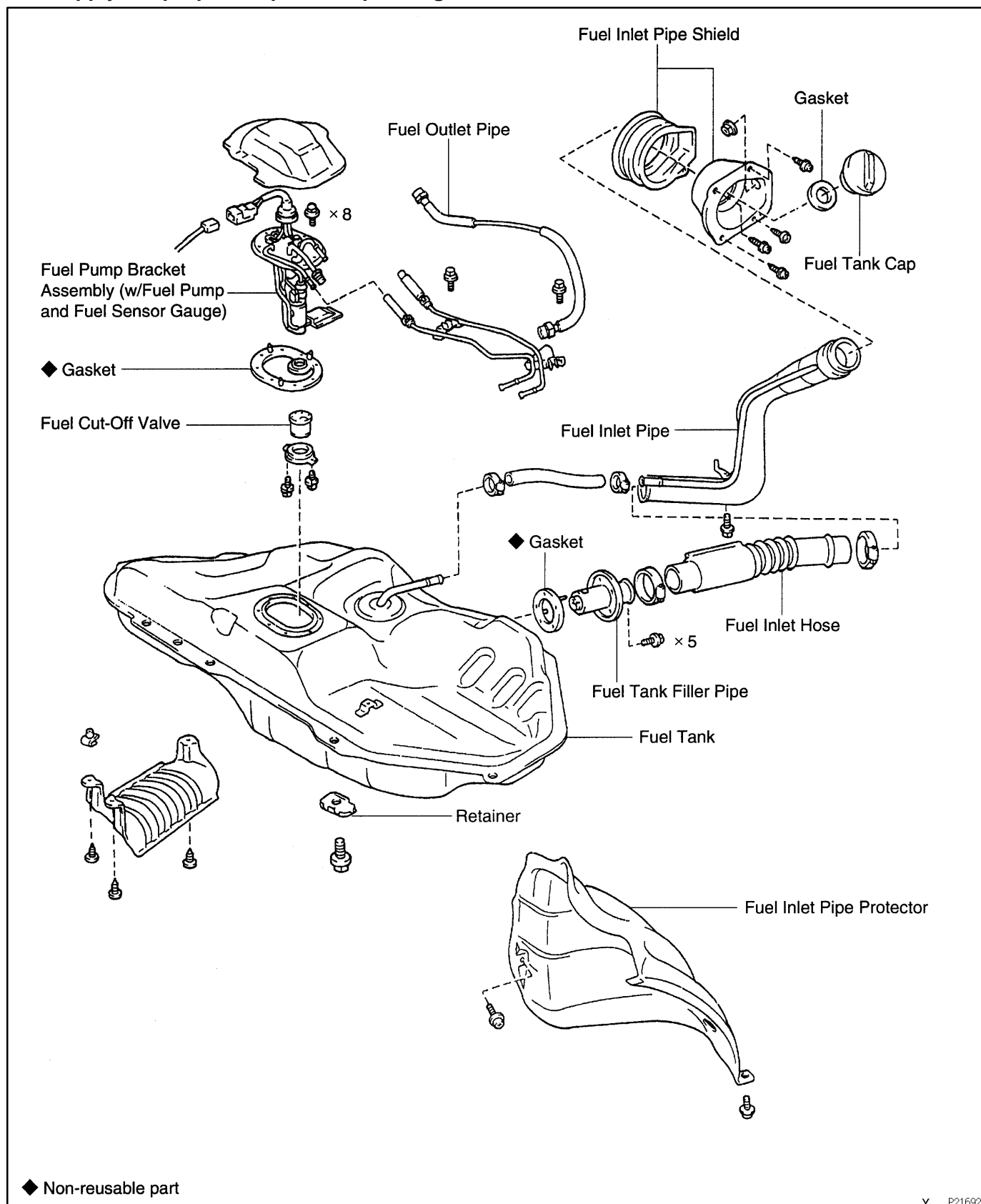
**6. CHECK FOR FUEL LEAKS (See page [MF-1](#) )**

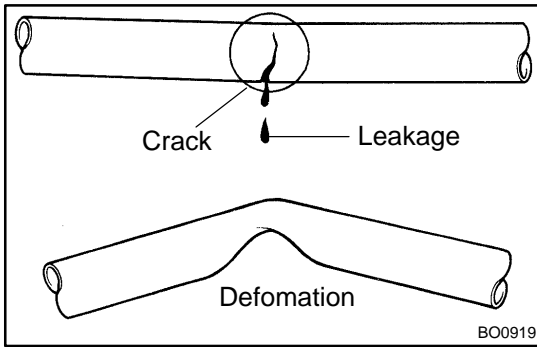


# FUEL TANK AND LINE COMPONENTS

## CAUTION:

- Always use new gaskets when replacing the fuel tank or components parts.
- Apply the proper torque to all parts tightened.



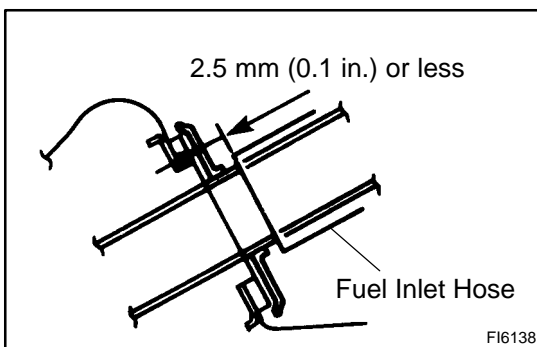
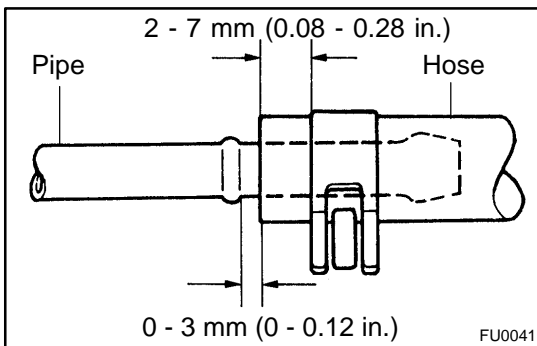
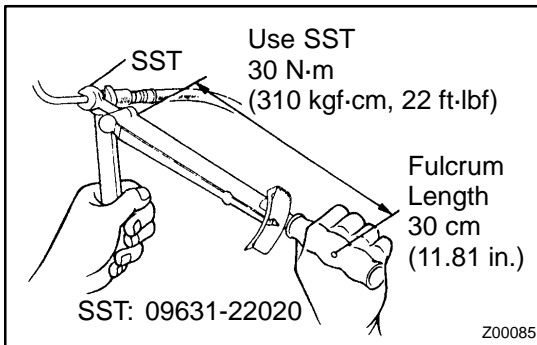


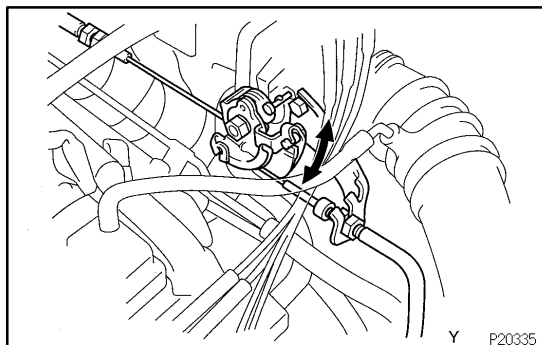
## INSPECTION

### INSPECT FUEL TANK AND LINE

- Check the fuel lines for cracks or leakage, and all connections for deformation.
- Check the fuel tank vapor vent system hoses and connections for looseness, sharp bends or damage.
- Check the fuel tank for deformation, cracks, fuel leakage or tank band looseness.
- Check the filler neck for damage or fuel leakage.
- Hose and the tube connections are as shown in the illustration.
- Make sure the hose clamps do not interfere with the tank, tubes, hoses and other parts.

If a problem is found, repair or replace the parts as necessary.



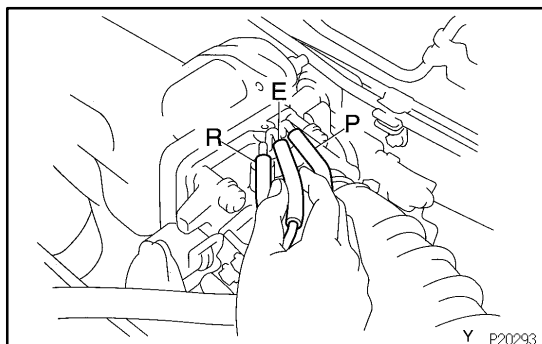


## THROTTLE BODY ON-VEHICLE INSPECTION

SF1PW-01

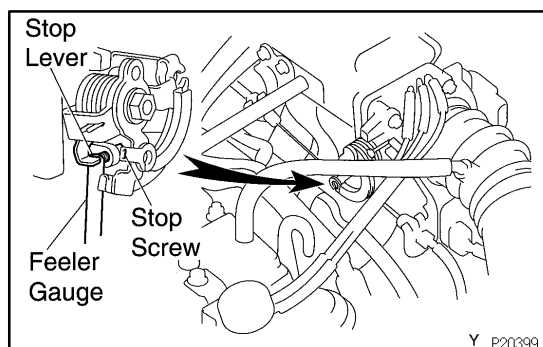
### 1. INSPECT THROTTLE BODY

- (a) Check that the throttle linkage moves smoothly.



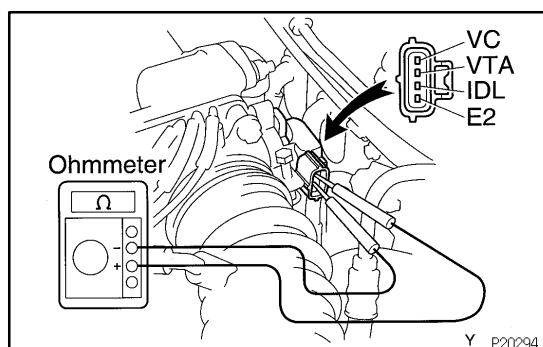
- (b) Check the vacuum at port.  
 (1) Start the engine.  
 (2) Check the vacuum with your finger.

Port name	At idle	Other than idle
P	No vacuum	Vacuum
E	No vacuum	Vacuum
R	No vacuum	No vacuum



### 2. INSPECT THROTTLE POSITION SENSOR

- (a) A/T:  
 Disconnect the throttle cable from the linkage.  
 (b) Disconnect the sensor connector.  
 (c) Insert feeler gauge between the throttle stop screw and stop lever.

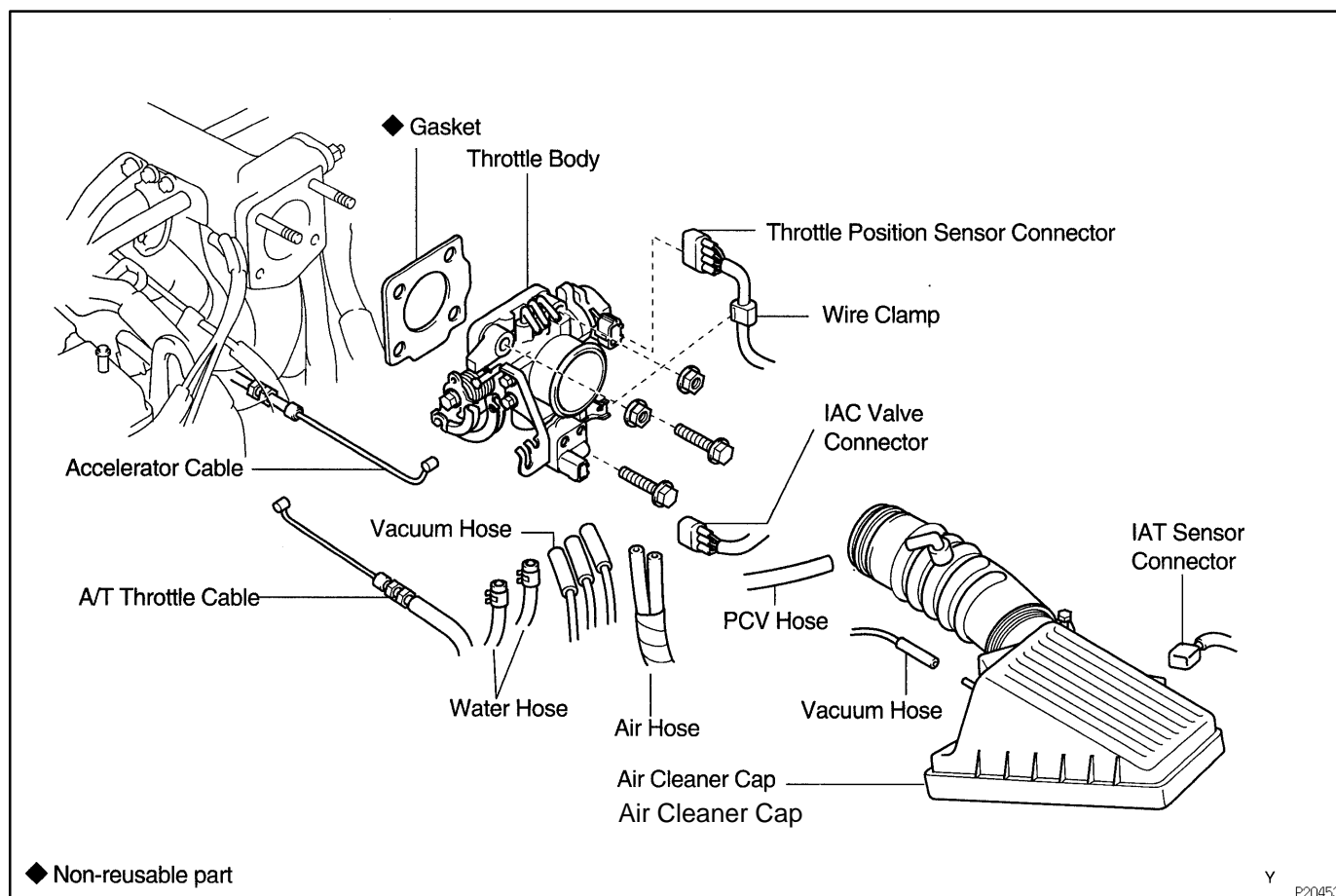


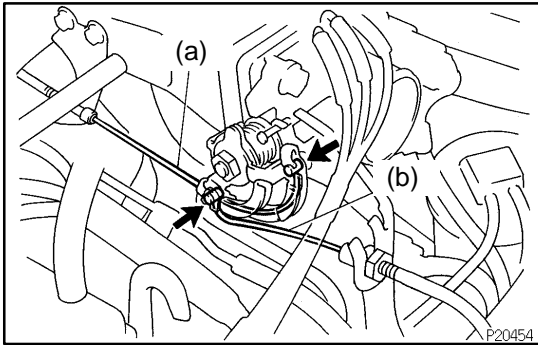
- (d) Using an ohmmeter, measure the resistance between each terminal.

Clearance between lever and stop screw	Between terminals	Resistance
0 mm (0 in.)	VTA - E2	0.2 - 5.7 kΩ
0.50 mm (0.020 in.)	IDL - E2	2.3 kΩ or less
0.70 mm (0.028 in.)	IDL - E2	Infinity
Throttle valve fully opened	VTA - E2	2.0 - 10.2 kΩ
-	VC - E2	2.5 - 5.9 kΩ

- (e) Reconnect the sensor connector.  
 (f) A/T:  
 Reconnect the throttle cable.

# COMPONENTS

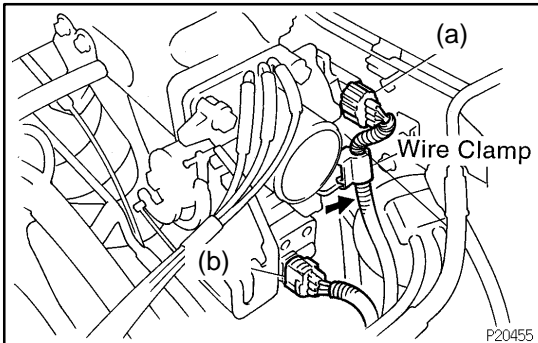




## REMOVAL

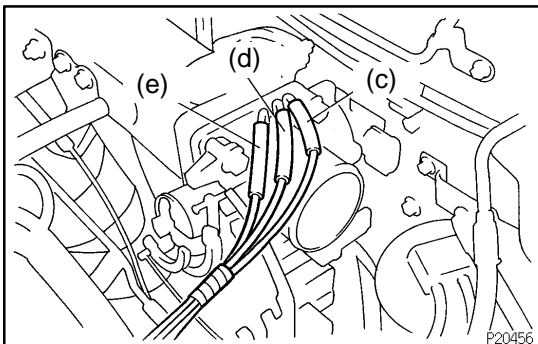
1. DRAIN ENGINE COOLANT
2. REMOVE AIR CLEANER CAP
3. DISCONNECT CONTROL CABLES FROM THROTTLE BODY

- (a) Disconnect the accelerator cable
- (b) Disconnect the A/T throttle cable.

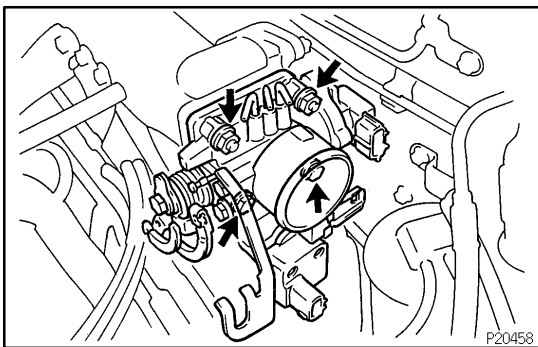


## 4. REMOVE THROTTLE BODY

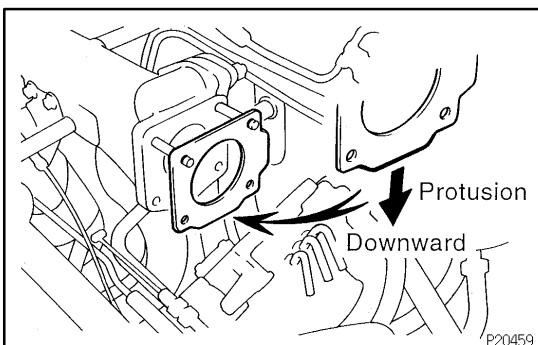
- (a) Disconnect the throttle position sensor connector and wire clamp.
- (b) Disconnect the IAC valve connector.



- (c) Disconnect the vacuum hose (from upper port of TVV of EVAP) from port "P" of throttle body.
- (d) Disconnect the vacuum hose (from port "P" of EGR vacuum modulator) from port "E" of throttle body.
- (e) Disconnect the vacuum hose (from port "R" of EGR vacuum modulator) from port "R" of throttle body.



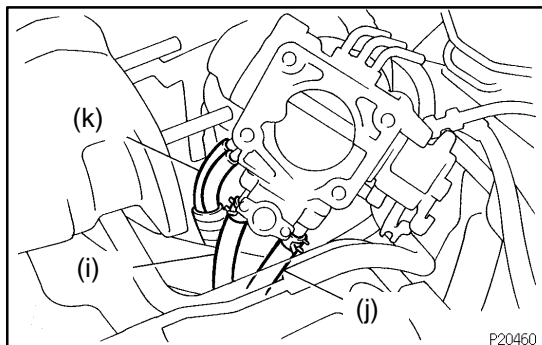
- (f) Remove the 2 nuts and 2 bolts.  
**Torque: 19.5 N·m (195 kgf·cm, 14 ft·lbf)**



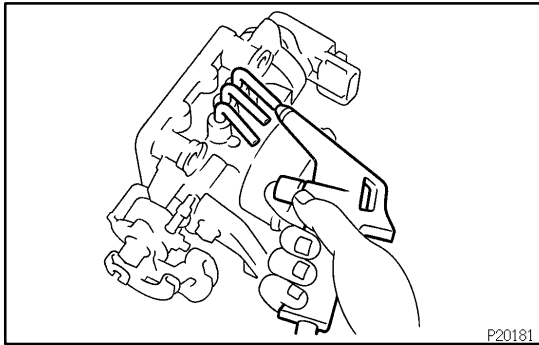
- (g) Disconnect the throttle body from the intake manifold.
- (h) Remove the gasket.

### HINT:

At the time of installation, please refer to the following items. Attach a new gasket to the intake manifold, facing the protrusion downward.



- (i) Disconnect water bypass hose (from water bypass pipe).
- (j) Disconnect the water bypass hose (from water outlet).
- (k) Disconnect the air hoses (from PS air control valve).



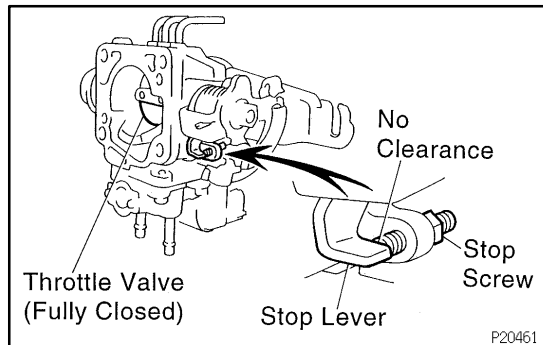
## INSPECTION

### 1. CLEAN THROTTLE BODY

- Wash and clean the cast part with a soft brush and carburetor cleaner.
- Using compressed air, blow all passages and apertures in the throttle body.

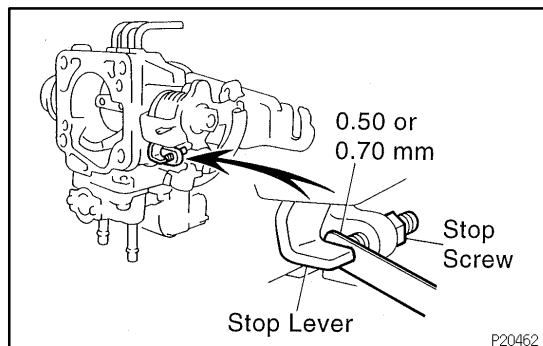
#### NOTICE:

To prevent deterioration, do not clean the throttle position sensor.



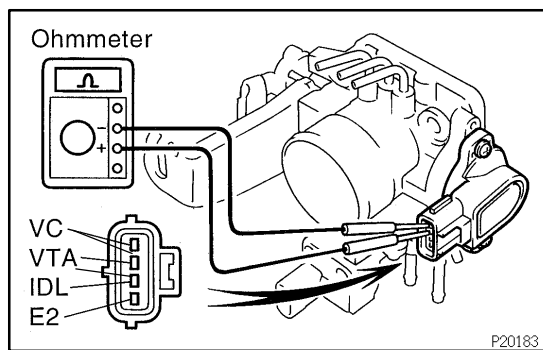
### 2. INSPECT THROTTLE VALVE

Check that there is no clearance between the throttle stop screw and throttle lever when the throttle valve is fully closed.



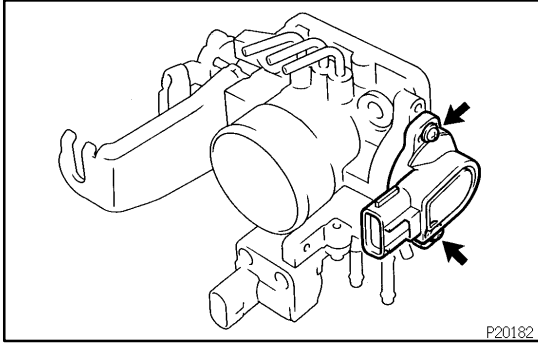
### 3. INSPECT THROTTLE POSITION SENSOR

- Insert a 0.050 mm (0.020 in.) or 0.70 mm (0.028 in.) feeler gauge between the throttle stop screw and stop lever.



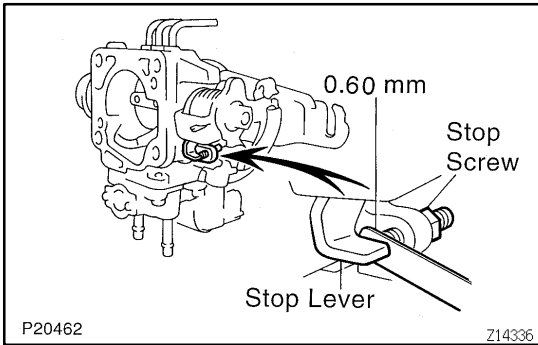
- Using an ohmmeter, measure the resistance between each terminal.

Clearance between lever and stop screw	Between terminals	Resistance
0 mm (0 in.)	VTA - E2	0.2 - 5.7 k $\Omega$
0.50 mm (0.020 in.)	IDL - E2	2.3 k $\Omega$ or less
0.70 mm (0.028 in.)	IDL - E2	Infinity
Throttle valve fully open	VTA - E2	2.0 - 10.2 k $\Omega$
-	VC - E2	2.5 - 5.9 k $\Omega$

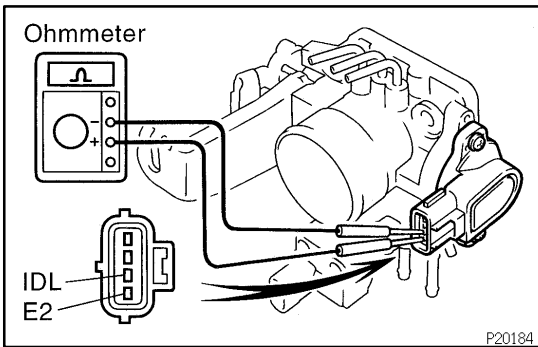


**4. IF NECESSARY, ADJUST THROTTLE POSITION SENSOR**

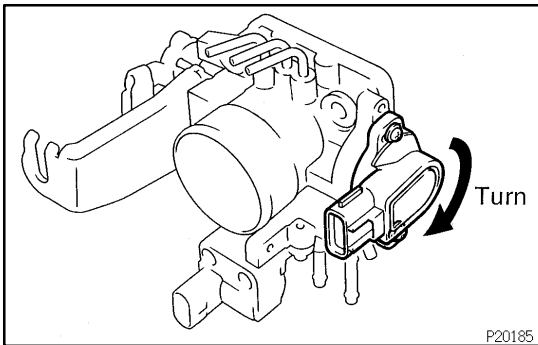
- (a) Loosen the 2 set screws of the sensor.



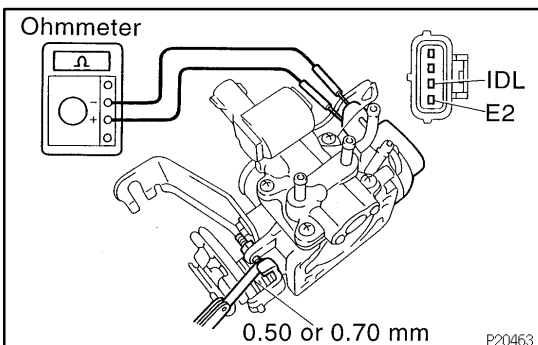
- (b) Insert a 0.60 mm (0.024 in.) feeler gauge between the throttle stop screw and stop lever.



- (c) Connect the tester probe of an ohmmeter to the terminals IDL and E2 of the sensor.



- (d) Gradually turn the sensor clockwise until the ohmmeter deflects, and secure it with the 2 set screws.



- (e) Recheck the continuity between terminals IDL and E2.

Clearance between lever and stop screw	Continuity (IDL - E2)
0.50 mm (0.020 in.)	Continuity
0.70 mm (0.028 in.)	No continuity



## INSTALLATION

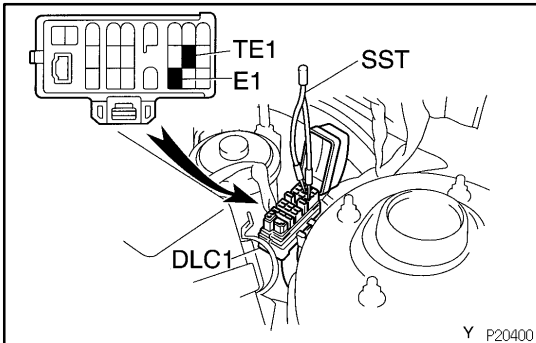
Installation is in the reverse order of removal (See page [MF-28](#) ).

# IDLE AIR CONTROL (IAC) VALVE ON-VEHICLE INSPECTION

SF199-02

## 1. INSPECT IAC VALVE OPERATION

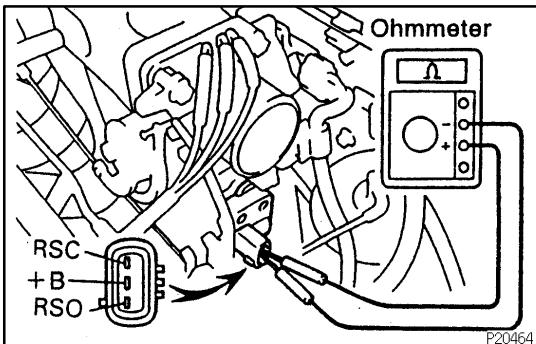
- (a) Initial conditions:
  - Engine at normal operating temperature
  - Idle speed set correctly
  - Transmission in neutral position



- (b) Using SST, connect terminals TE1 and E1 of the DLC1.  
SST 09843-18020
- (c) After engine rpm is kept at 900 - 1,300 rpm for 5 seconds, check that it returns to idle speed.

If the rpm operation is not as specified, check the IAC valve, wiring and ECM.

- (d) Remove the SST from the DLC1.  
SST 09843-18020



## 2. INSPECT IAC VALVE RESISTANCE

### NOTICE:

"Cold" and "Hot" in the following sentences express the temperature of the coils themselves. "Cold" is from -10°C (14°F) to 50°C (122°F) and "Hot" is from 50°C (122°F) to 100°C (212°F).

- (a) Disconnect the IAC valve connector.
- (b) Using an ohmmeter, measure the resistance between terminal +B and other terminals (RSC, RSO).

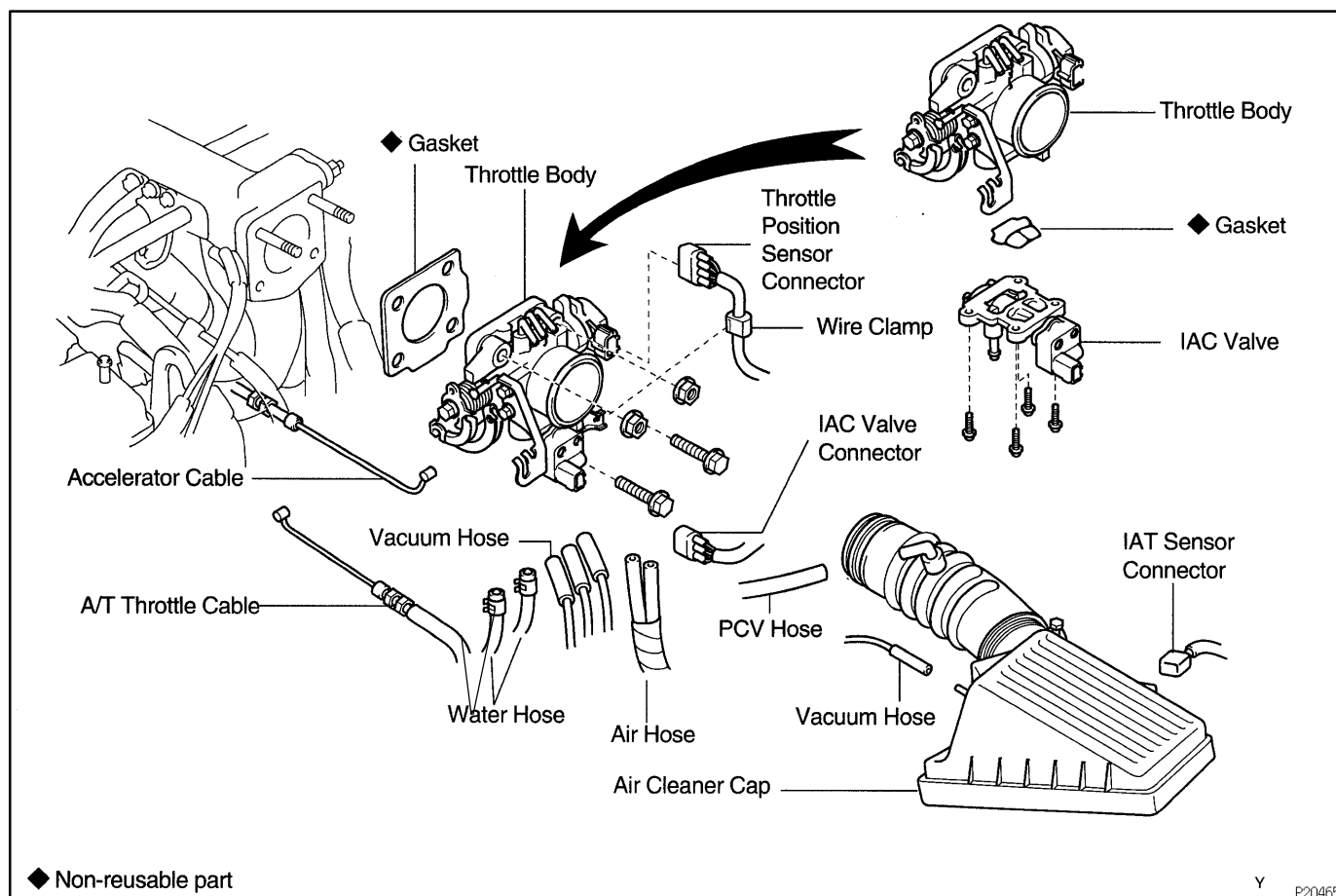
### Resistance:

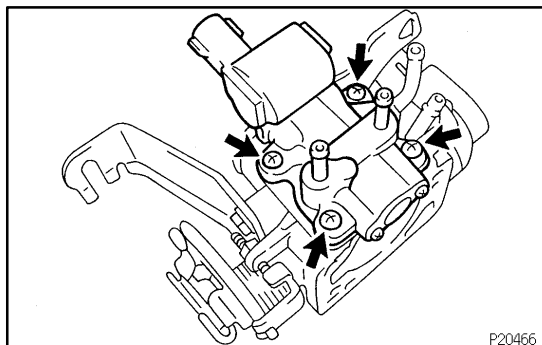
Cold	17.0 - 24.5 Ω
Hot	21.5 - 28.5 Ω

If resistance is not as specified, replace the IAC valve.

- (c) Reconnect the IAC valve connector.

# COMPONENTS





## REMOVAL

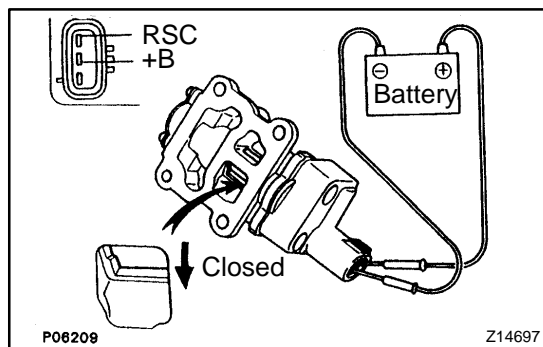
1. **REMOVAL THROTTLE BODY (See page [MF-28](#) )**

2. **REMOVE IAC VALVE**

Remove the 4 screws, IAC valve and gasket.

HINT:

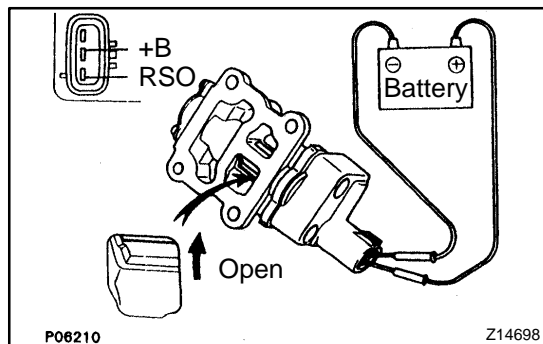
At the time of installation, please refer to the following items.  
Use a new gasket.



## INSPECTION

### INSPECT IAC VALVE OPERATION

- (a) Connect the positive (+) lead from the battery to terminal +B and negative (-) lead to terminal RSC, and check that the valve is closed.

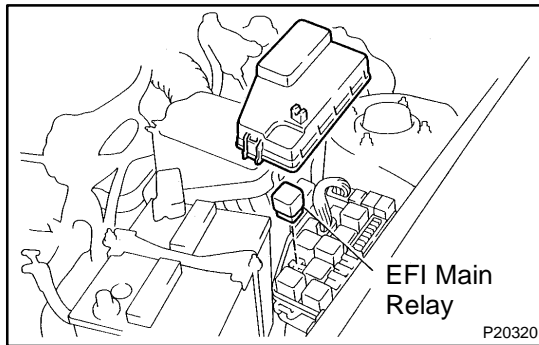


- (b) Connect the positive (+) lead from the battery to terminal +B and negative (-) lead to terminal RSO, and check that the valve is open.

If operation is not as specified, replace the IAC valve.

## INSTALLATION

Installation is in reverse order of removal (See page [MF-35](#)).

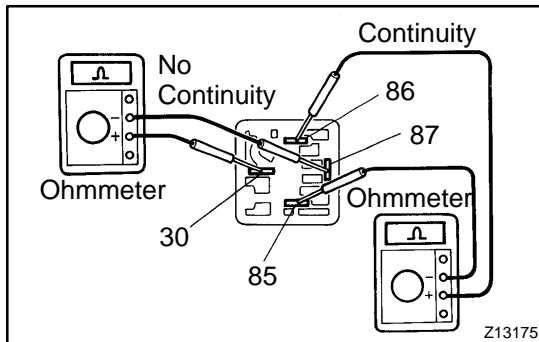


## EFI MAIN RELAY INSPECTION

SF0XI-04

### 1. REMOVE EFI MAIN RELAY (Marking: EFI MAIN)

LOCATION: In the engine compartment relay box.



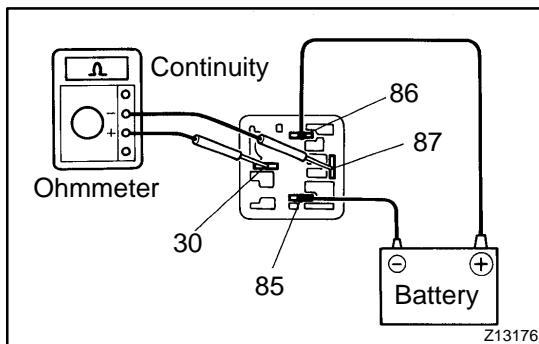
### 2. INSPECT EFI MAIN RELAY CONTINUITY

- (a) Using an ohmmeter, check that there is continuity between terminals 86 and 85.

If there is no continuity, replace the relay.

- (b) Check that there is no continuity between terminals 87 and 30.

If there is continuity, replace the relay.



### 3. INSPECT EFI MAIN RELAY OPERATION

- (a) Apply battery voltage across terminals 86 and 85.

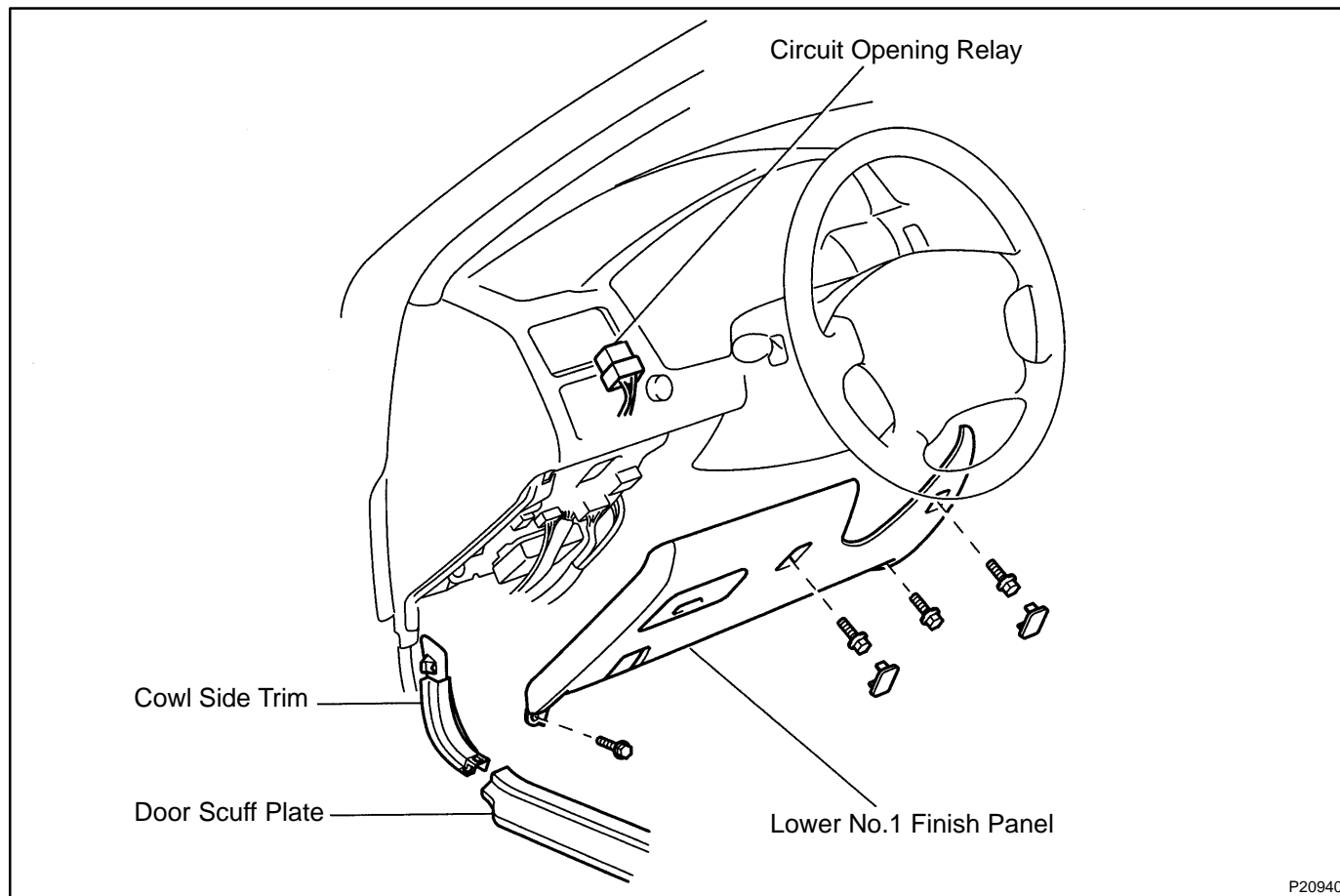
- (b) Using an ohmmeter, check that there is continuity between terminals 87 and 30.

If there is no continuity, replace the relay.

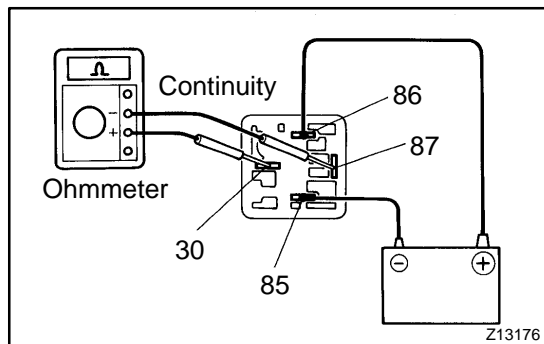
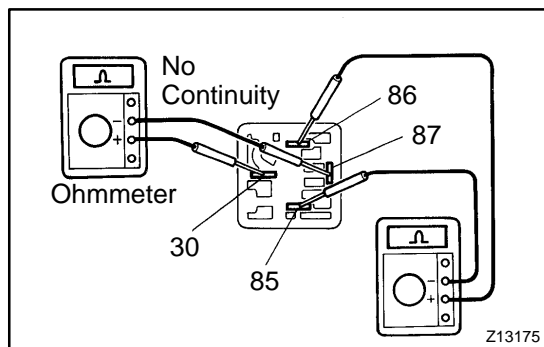
### 4. REINSTALL EFI MAIN RELAY

## CIRCUIT OPENING RELAY COMPONENTS

SF0XJ-01







## INSPECTION

### 1. REMOVE CIRCUIT OPENING RELAY

### 2. INSPECT CIRCUIT OPENING RELAY CONTINUITY

- (a) Using an ohmmeter, check that there is continuity between terminals 86 and 85.

If there is no continuity, replace the relay.

- (b) Check that there is no continuity between terminals 87 and 30.

If there is continuity, replace the relay.

### 3. INSPECT CIRCUIT OPENING RELAY OPERATION

- (a) Apply battery voltage across terminals 86 and 85.

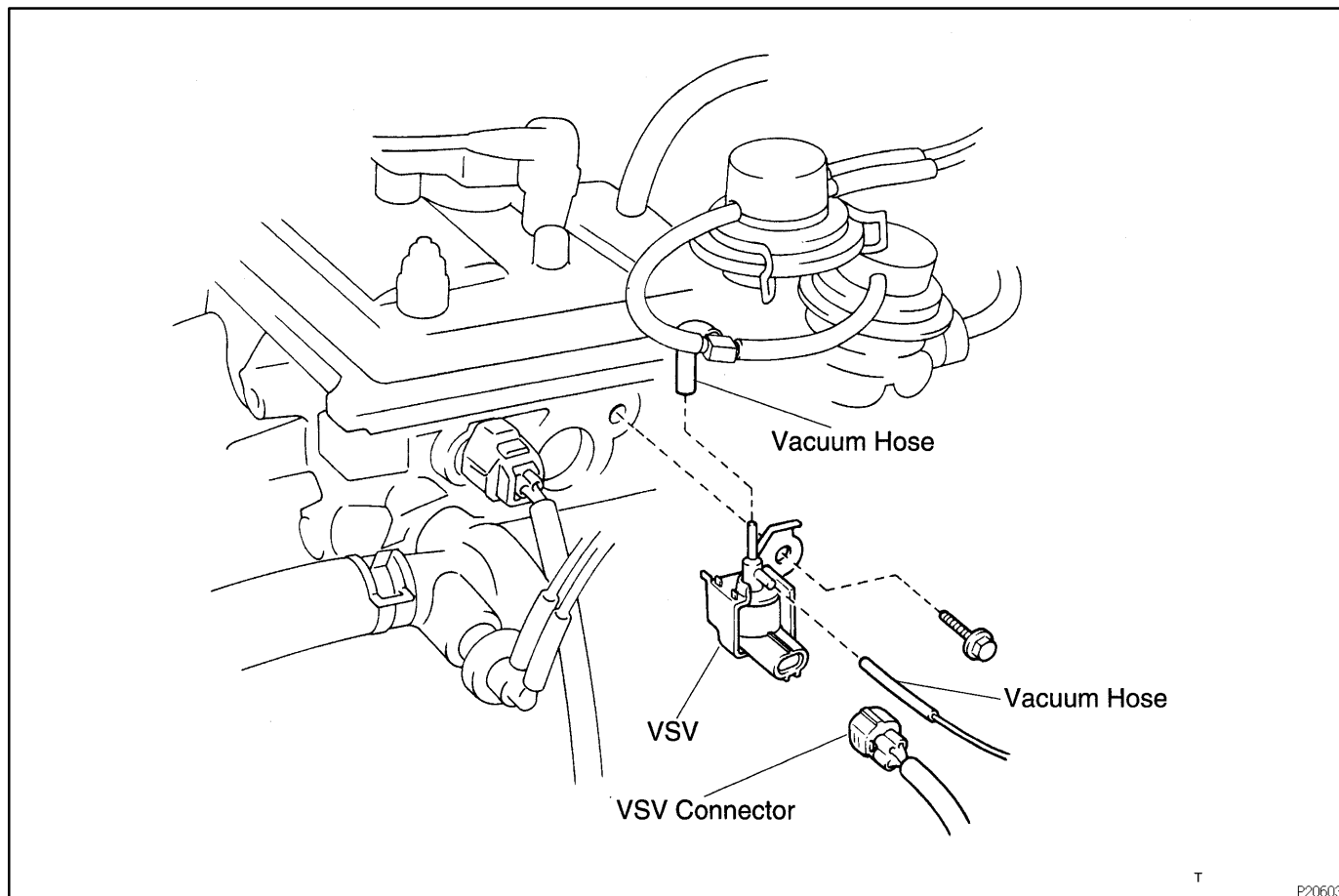
- (b) Using an ohmmeter, check that there is continuity between terminals 87 and 30.

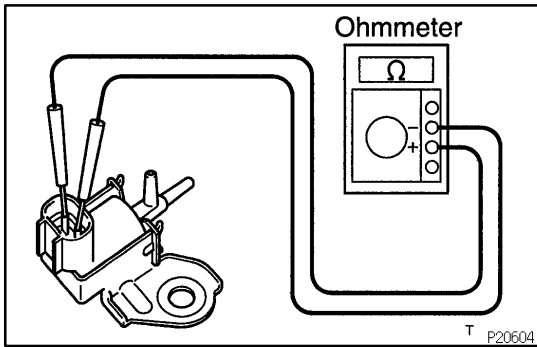
If there is no continuity, replace the relay.

### 4. REINSTALL CIRCUIT OPENING RELAY

## VSV FOR EVAPORATIVE EMISSION (EVAP) COMPONENTS

SFOXL-03





## INSPECTION

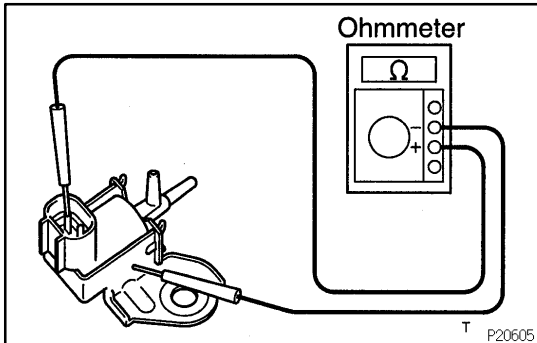
### 1. REMOVE VSV

### 2. INSPECT VSV FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the terminals.

**Resistance: 33 - 39  $\Omega$  at 20°C (68°F)**

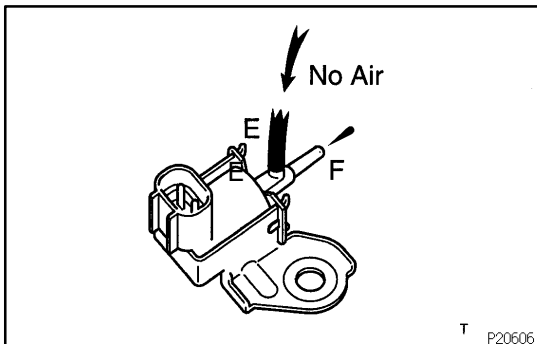
If there is no continuity, replace the VSV.



### 3. INSPECT VSV FOR GROUND

Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.

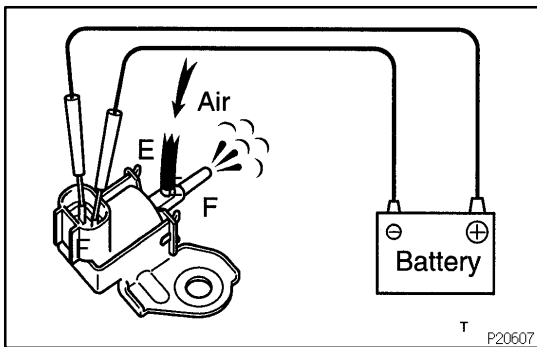


### 4. INSPECT VSV OPERATION

(a) Check that air does not flow from ports E to F.

#### NOTICE:

**Never apply more than 60 kPa (0.61 kgf/cm<sup>2</sup>, 8.7 psi) of pressure compressed air to the VSV.**



(b) Apply battery positive voltage across the terminals.

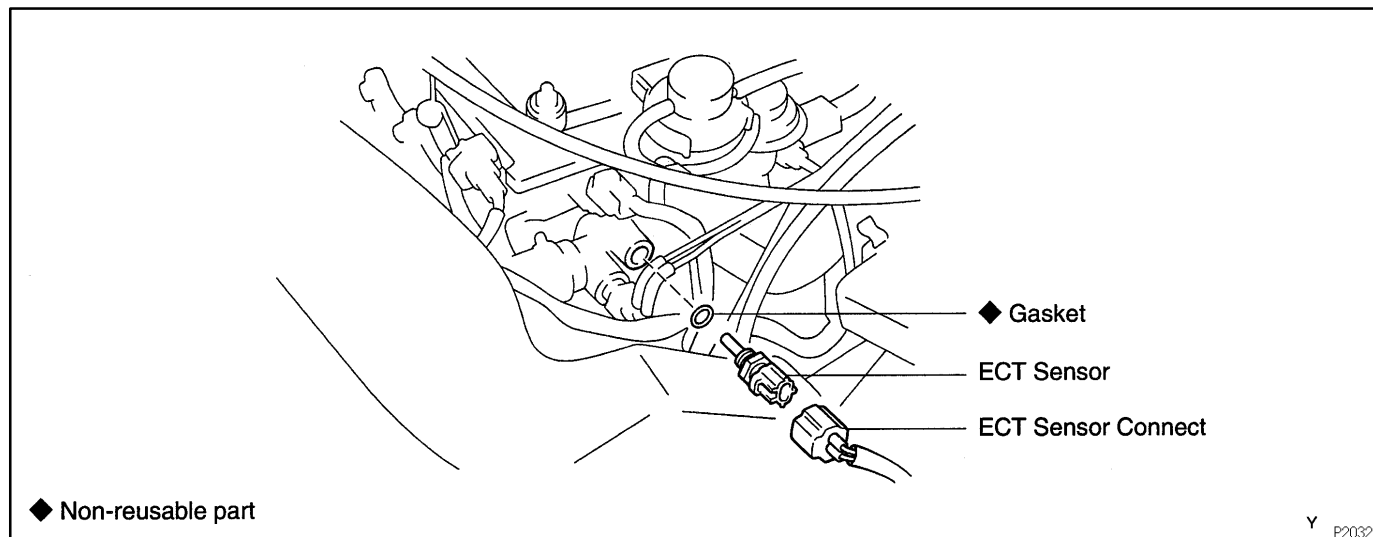
(c) Check that air flows from ports E to F.

If operation is not as specified, replace the VSV.

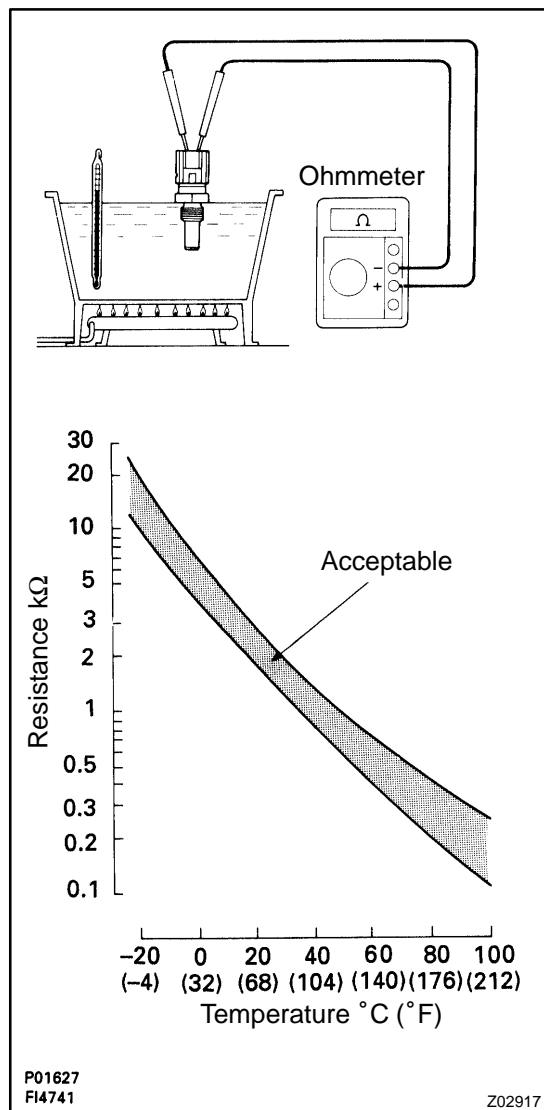
### 5. REINSTALL VSV

# ENGINE COOLANT TEMPERATURE (ECT) SENSOR COMPONENTS

SFOXP-05



Y P20325



## INSPECTION

1. DRAIN ENGINE COOLANT
2. REMOVE ECT SENSOR
3. INSPECT ECT SENSOR

Using an ohmmeter, measure the resistance between the terminals.

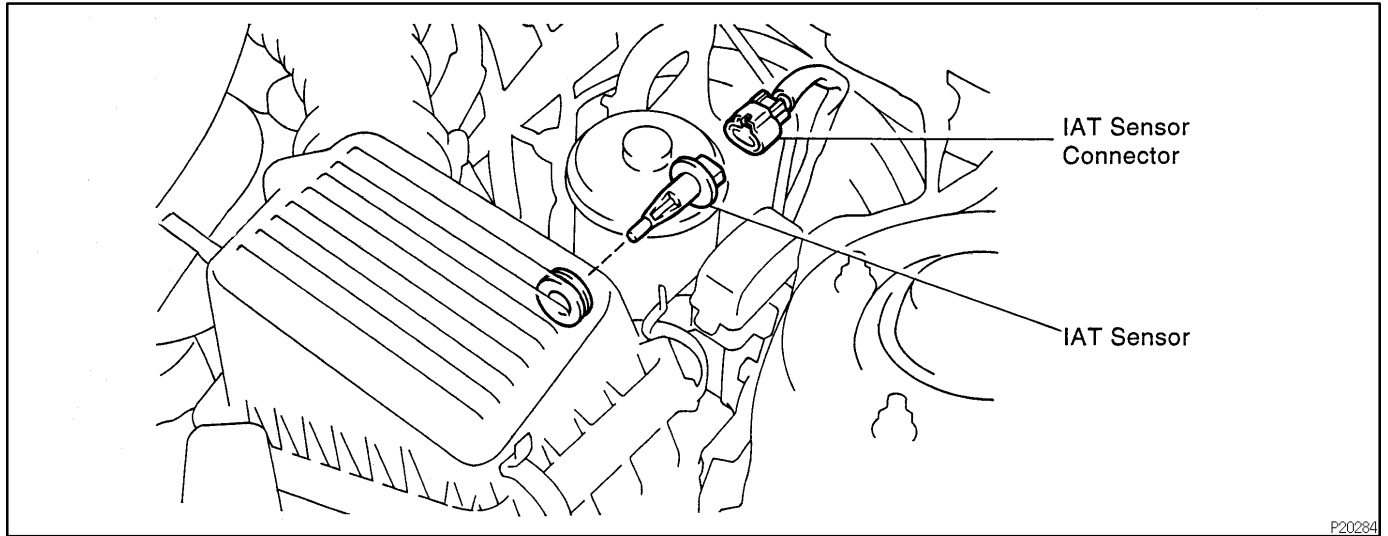
**Resistance: Refer to the graph**

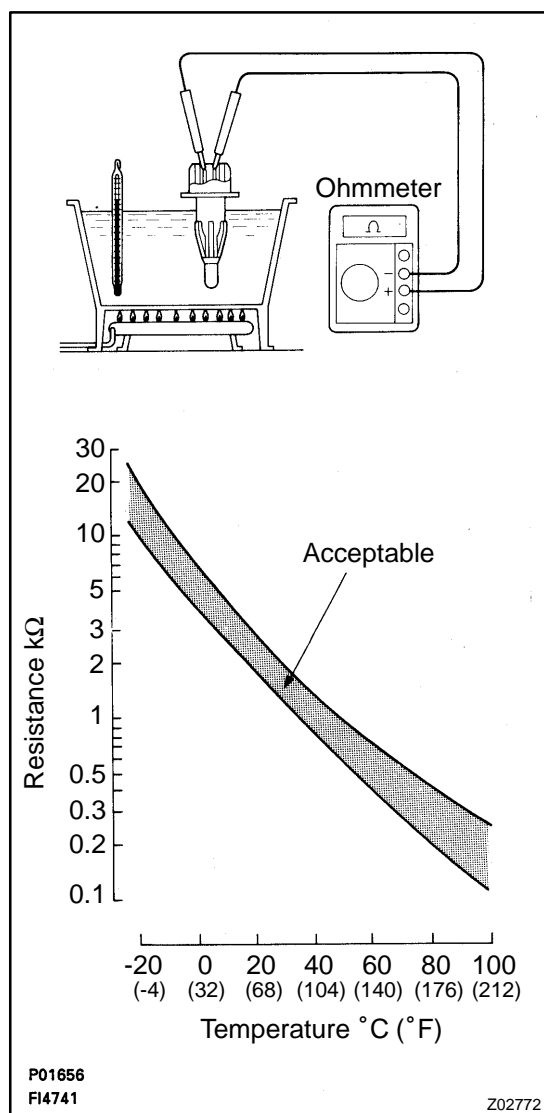
If the resistance is not as specified, replace the ECT sensor.

4. REINSTALL ECT SENSOR
5. REFILL WITH ENGINE COOLANT

# INTAKE AIR TEMPERATURE (IAT) SENSOR COMPONENTS

SFOXR-03





## INSPECTION

1. REMOVE IAT SENSOR
2. INSPECT IAT SENSOR

Using an ohmmeter, measure the resistance between the terminals.

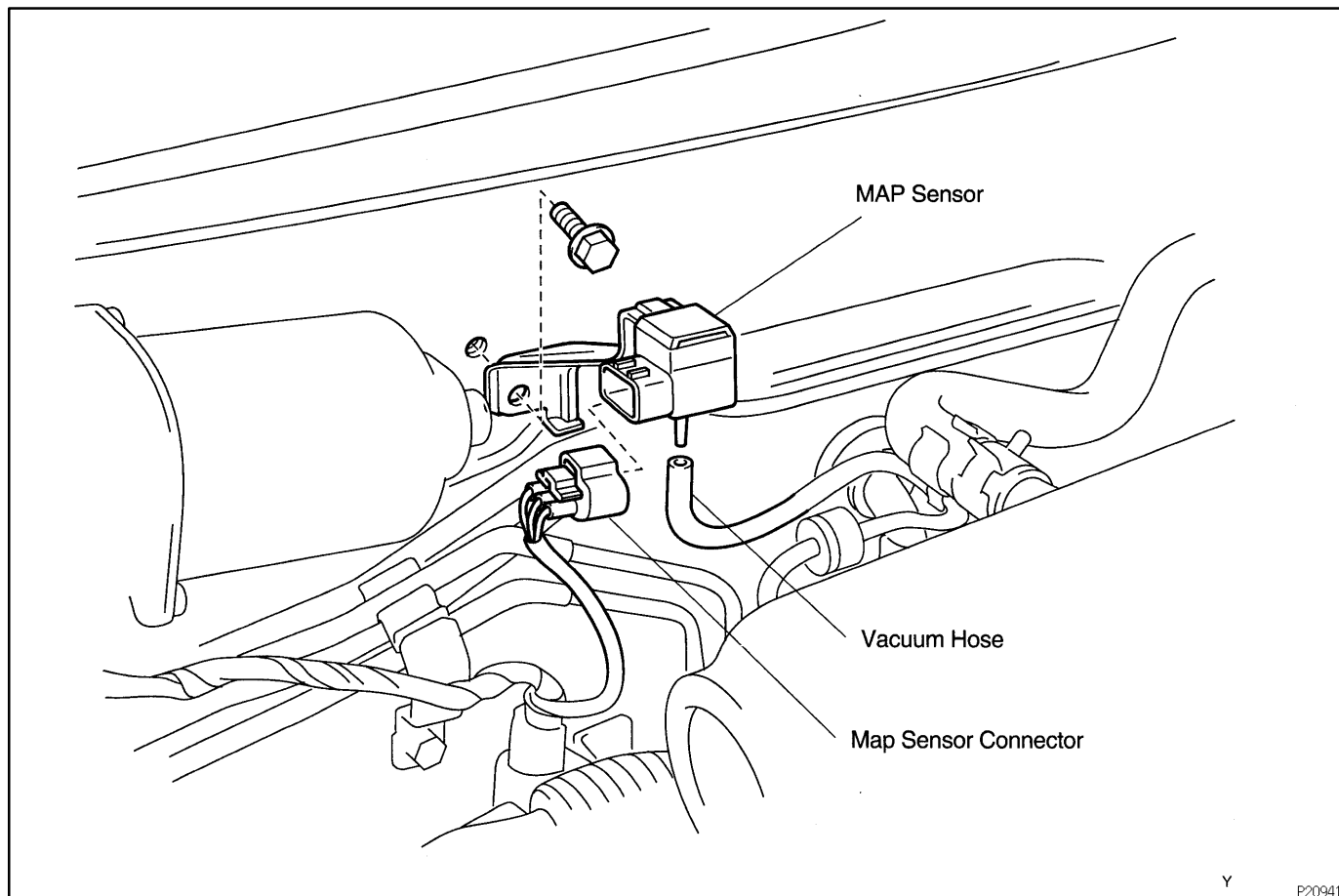
**Resistance: Refer to the graph**

If the resistance is not as specified, replace the sensor.

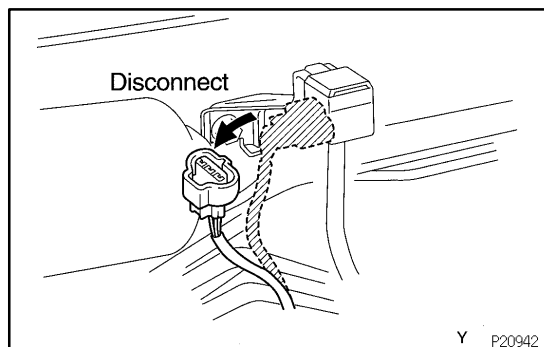
3. REINSTALL IAT SENSOR

# MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR COMPONENTS

SF0WO-03



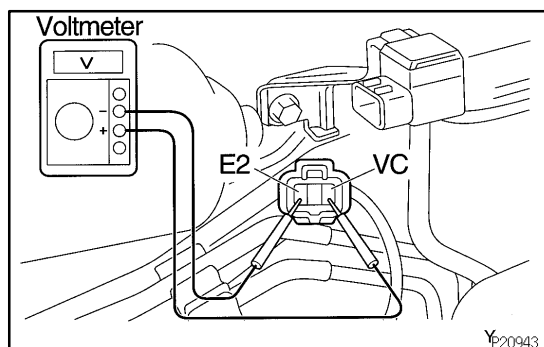




## INSPECTION

### 1. INSPECT POWER SOURCE VOLTAGE OF MAP SENSOR

- Disconnect the MAP sensor connector.
- Turn the ignition switch ON.



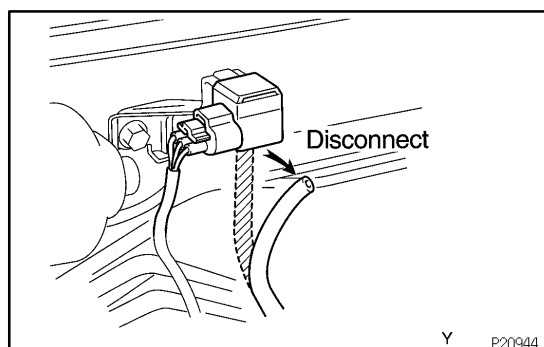
- Using a voltmeter, measure the voltage between connector terminals VC and E2 of the wiring harness side.

**Voltage: 4.5 - 5.5 V**

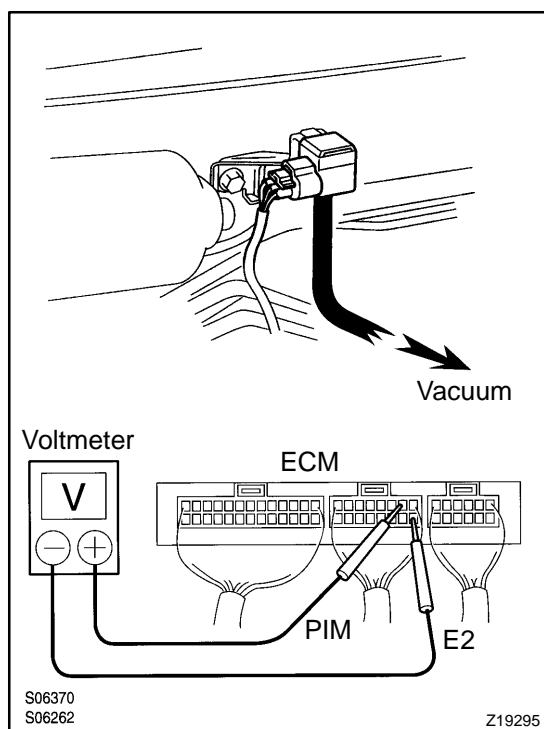
- Turn the ignition switch to LOCK.
- Reconnect the MAP sensor connector.

### 2. INSPECT POWER OUTPUT OF MAP SENSOR

- Turn the ignition switch ON.



- Disconnect the vacuum hose from the MAP sensor.



- Connect a voltmeter to terminals PIM and E2 of the ECM, and measure the output voltage under ambient atmospheric pressure.
- Apply vacuum to the MAP sensor in 13.3 kPa (100 mmHg, 3.94 in.Hg) segments to 66.7 kPa (500 mmHg, 19.69 in.Hg).
- Measure the voltage drop from step (c) above for each segment.

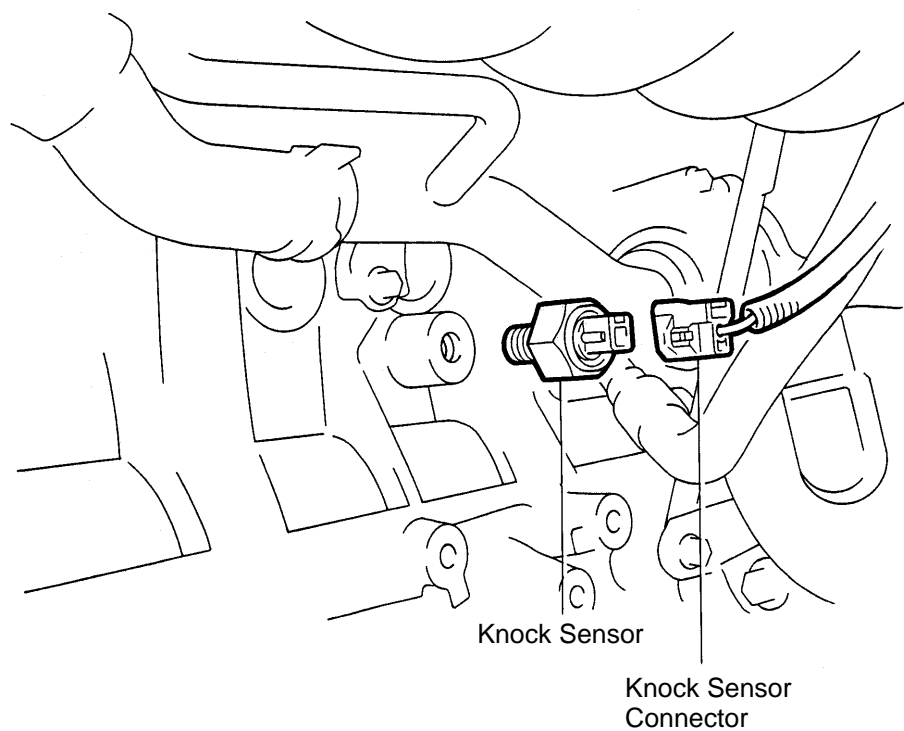
#### Voltage Drop:

Applied Vacuum kPa (mmHg) (in.Hg)	13.3 (100) (3.94)	26.7 (200) (7.87)	40.0 (300) (11.81)	53.5 (400) (15.75)	66.7 (500) (19.69)
Voltage drop V	0.3 - 0.5	0.7 - 0.9	1.1 - 1.3	1.5 - 1.7	1.9 - 2.1

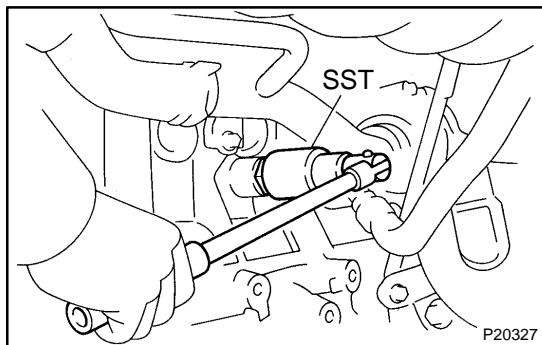
- Reconnect the vacuum hose to the MAP sensor.

## KNOCK SENSOR COMPONENTS

SF0WM-03



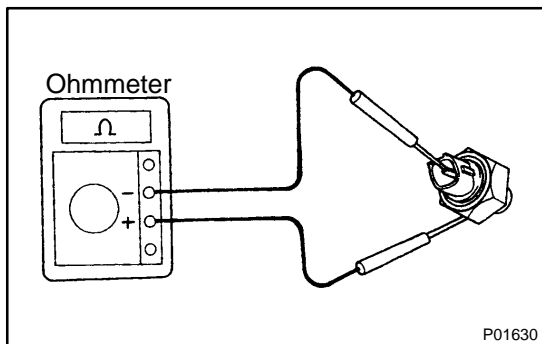
P20326



## INSPECTION

### 1. REMOVE KNOCK SENSOR

- (a) Disconnect the knock sensor connector.
- (b) Using SST, remove the knock sensor.  
SST 09816-30010



### 2. INSPECT KNOCK SENSOR

Using an ohmmeter, check that there is no continuity between the terminal and body.

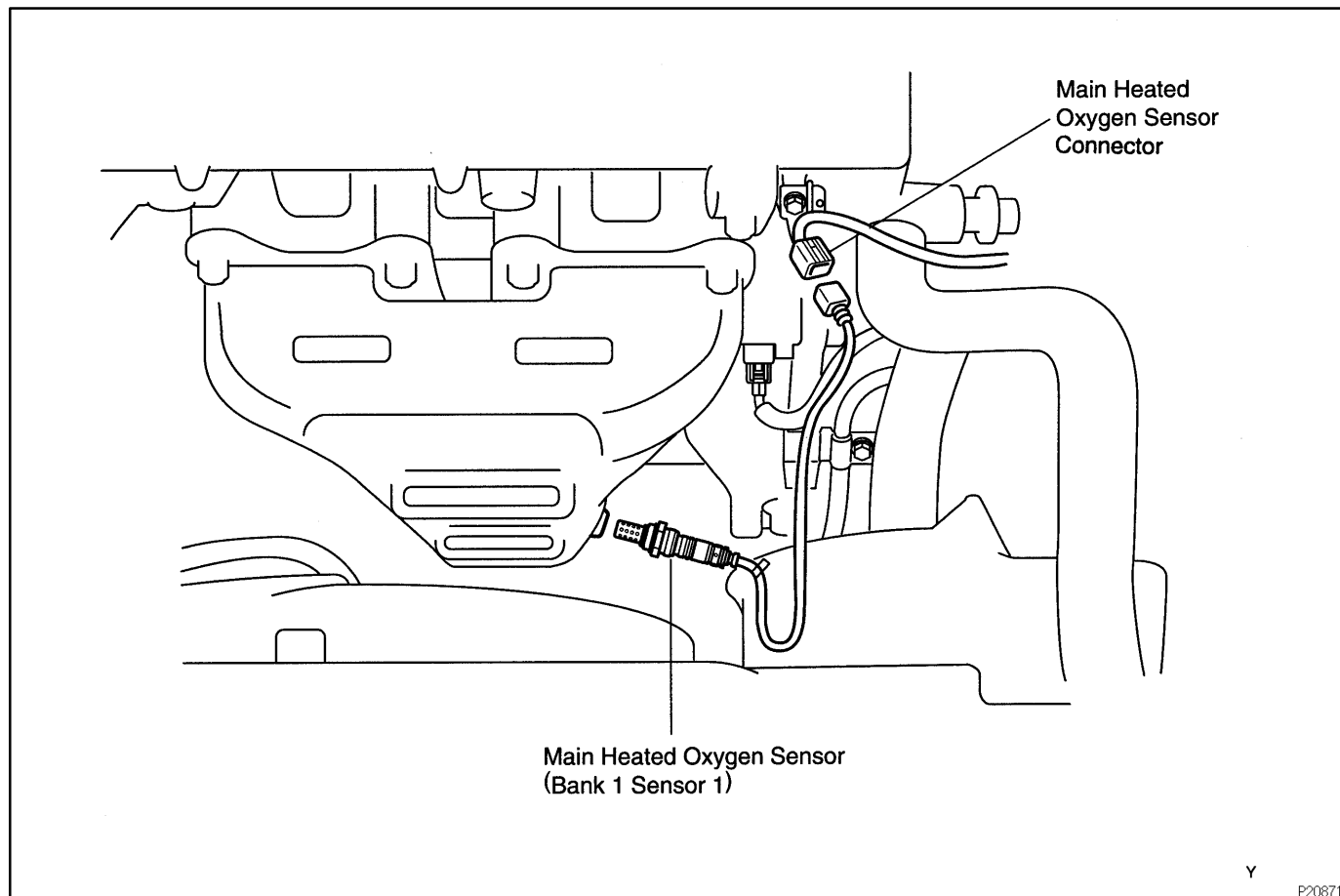
If there is continuity, replace the sensor.

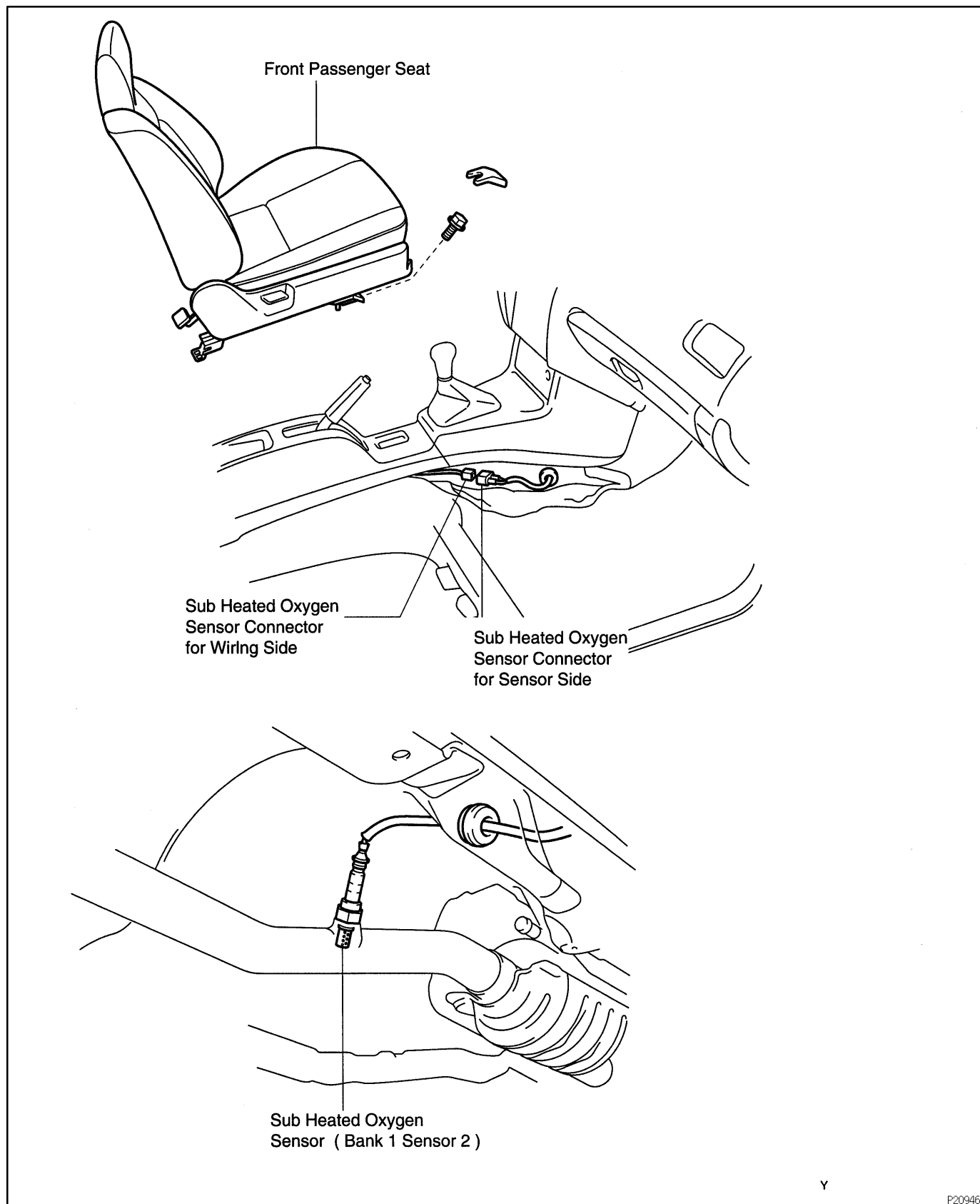
### 3. REINSTALL KNOCK SENSOR

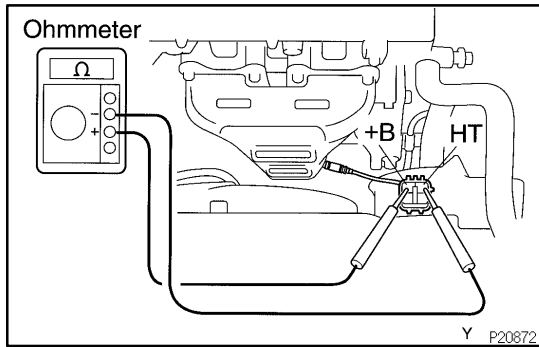
**Torque: 45 N·m (450 kgf·cm, 33 ft·lbf)**

## HEATED OXYGEN SENSOR COMPONENTS

SF0WK-03







## INSPECTION

### 1. INSPECT HEATER RESISTANCE OF MAIN HEATED OXYGEN SENSOR (BANK 1 SENSOR 1)

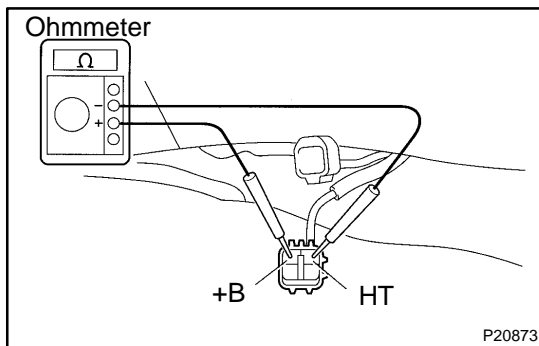
- Disconnect the oxygen sensor connectors.
- Using an ohmmeter, measure the resistance between the terminals +B and HT.

**Resistance: 11 - 16  $\Omega$  at 20°C (68°F)**

If the resistance is not as specified, replace the sensor.

**Torque: 44 N·m (440 kgf·cm, 32 ft·lbf)**

- Reconnect the oxygen sensor connectors.



### 2. INSPECT HEATER RESISTANCE OF SUB HEATED OXYGEN SENSOR (BANK 1 SENSOR 2)

- Remove the passenger's seat.
- Take out the console box side of the floor carpet.
- Disconnect the oxygen sensor connector.
- Using an ohmmeter, measure the resistance between the terminals +B and HT.

**Resistance: 11 - 16  $\Omega$  at 20°C (68°F)**

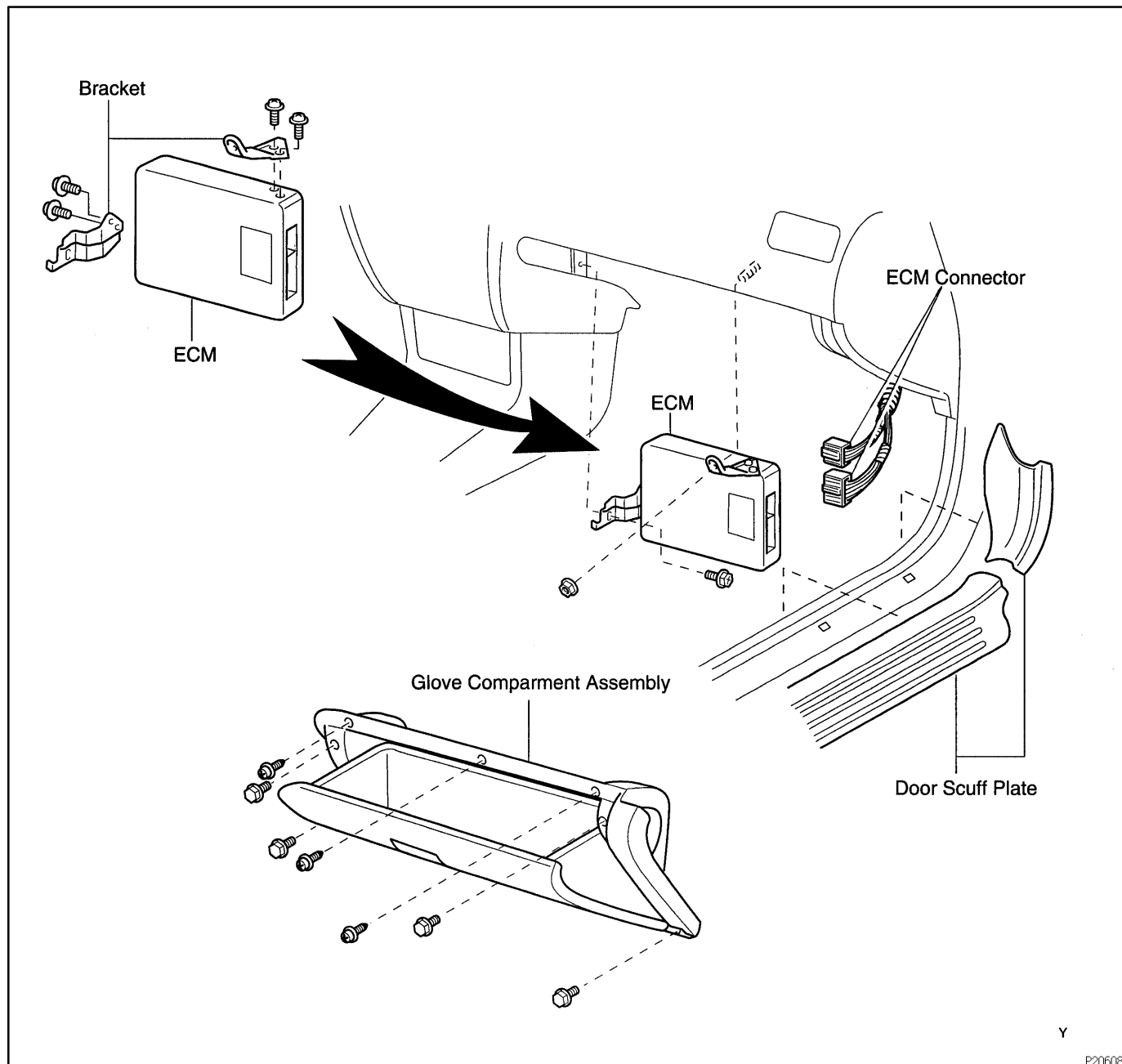
If the resistance is not as specified, replace the sensor.

**Torque: 44 N·m (440 kgf·cm, 32 ft·lbf)**

- Reconnect the oxygen sensor connectors.
- Reinstall the floor carpet.
- Reinstall the passenger's seat.

# ENGINE CONTROL MODULE (ECM) COMPONENTS

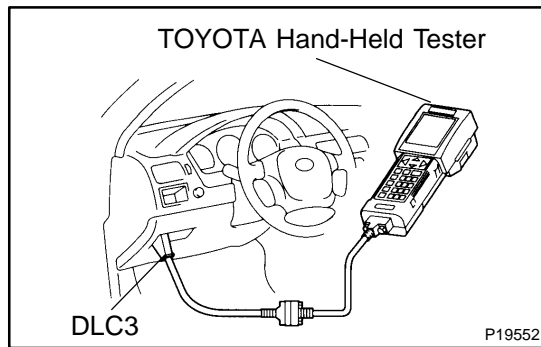
SF0W1-05



## INSPECTION

1. REMOVE ECM
2. INSPECT ECM (See page [DI-17](#) )
3. REINSTALL ECM





## FUEL CUT RPM INSPECTION

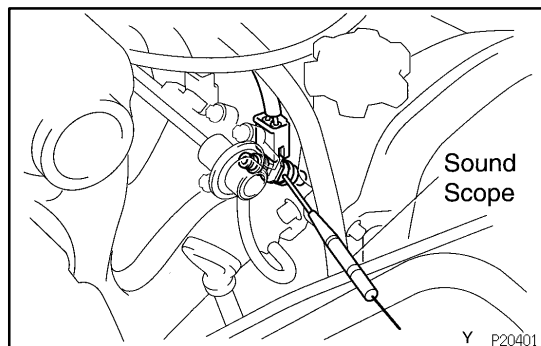
SF0WH-03

### 1. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

### 2. CONNECT TOYOTA HAND-HELD TESTER OR OBDII SCAN TOOL

- Remove the fuse cover on the instrument panel.
- Connect the TOYOTA hand-held tester or OBDII scan tool to the DLC3.
- Please refer to the TOYOTA hand-held tester or OBDII scan tool operator's manual for further details.



### 3. INSPECT FUEL CUT OFF PRM

- Increase the engine speed to at least 2,500 rpm.
- Use a sound scope to check for injector operating noise.
- Check that when the throttle lever is released, injector operation noise stops momentarily and then resumes.

HINT:

Measure with the A/C OFF.

**Fuel return rpm: 900 rpm**

### 4. DISCONNECT TOYOTA HAND-HELD TESTER OR OBDII SCAN TOOL

# COOLANT INSPECTION

CO0HQ-03

## 1. CHECK ENGINE COOLANT LEVEL AT RADIATOR RESERVOIR

The engine coolant level should be between the "LOW" and "FULL" lines.

If low, check for leaks and add engine coolant up to the "FULL" line, "when the engine is cold."

## 2. CHECK ENGINE COOLANT QUALITY

- (a) Remove the radiator cap.

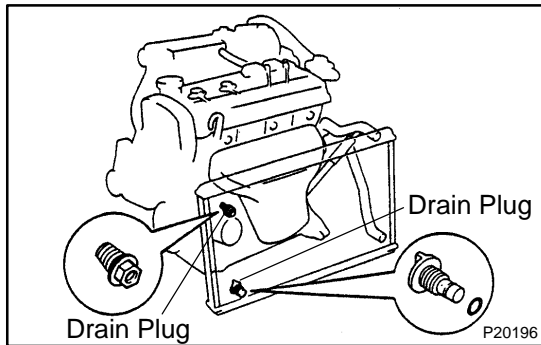
### CAUTION:

**To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.**

- (b) There should not be any excessive deposits of rust or scale around the radiator cap or radiator filler hole, and the coolant should be free from oil.

If excessively dirty, replace the coolant.

- (c) Reinstall the radiator cap.



## REPLACEMENT

### 1. DRAIN ENGINE COOLANT

- (a) Remove the radiator cap.

#### CAUTION:

**To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.**

- (b) Loosen the radiator drain plug (on the right side of the radiator lower tank) and engine drain plug (on the left front of the cylinder block), and drain the coolant.
- (c) Close the drain plugs.

**Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)**

### 2. FILL ENGINE COOLANT

- (a) Slowly fill the system with coolant.
- Use a good brand of ethylene-glycol base coolant and mix it according to the manufacturer's directions.
  - Using coolant which includes more than 50 % ethylene-glycol (but not more than 70 %) is recommended.

#### NOTICE:

- Do not use an alcohol type coolant.
- The coolant should be mixed with demineralized water or distilled water.

#### Capacity (w/ Heater):

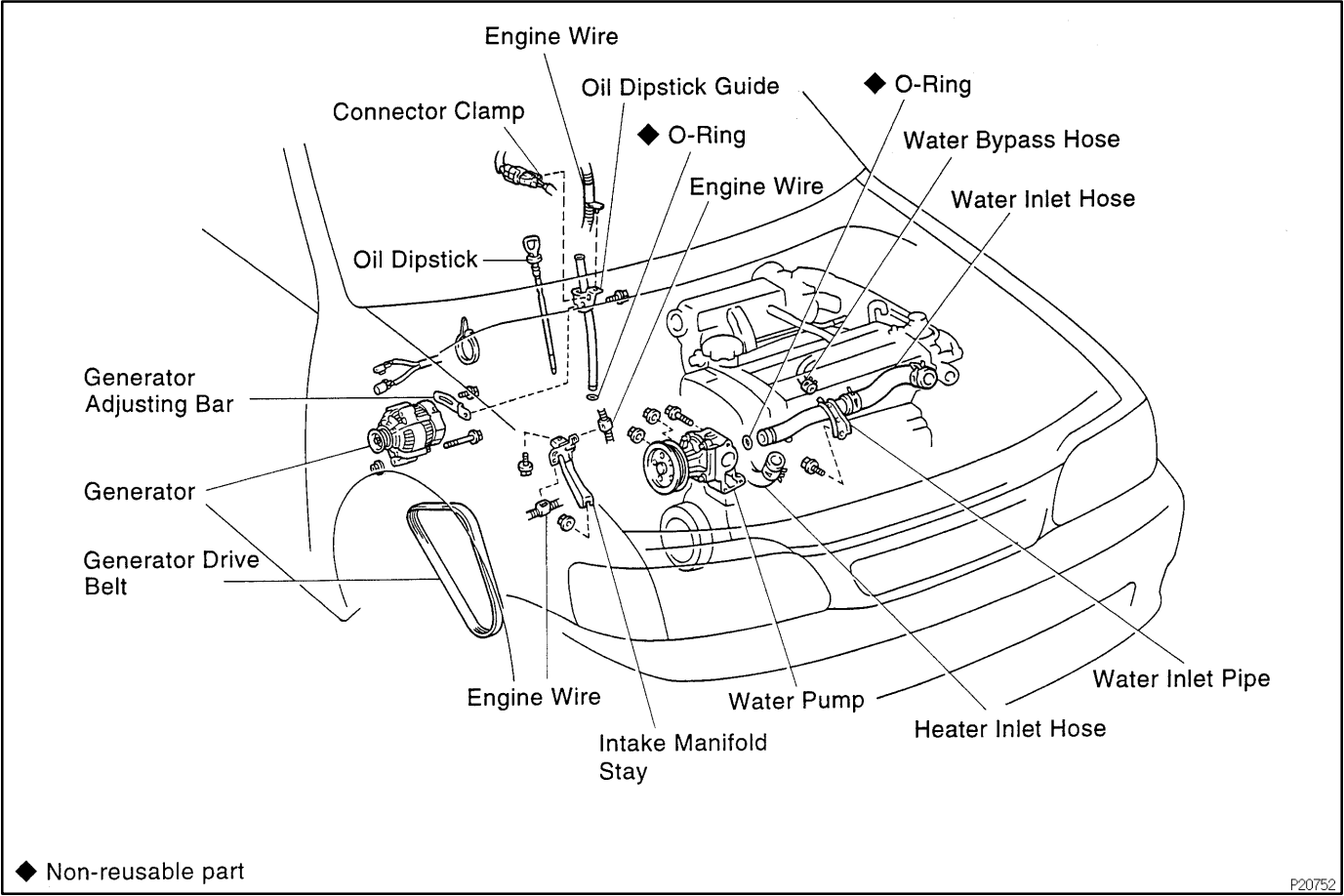
M/T	4.9 liters (5.2 US qts, 4.3 Imp. qts)
A/T	5.3 liters (5.6 US qts, 4.7 Imp. qts)

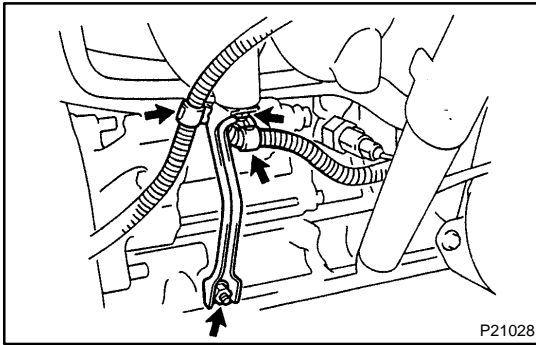
- (b) Install the radiator cap.
- (c) Start the engine, and bleed the cooling system.
- (d) Refill the radiator reservoir with coolant until it reaches the "FULL" line.

### 3. CHECK ENGINE COOLANT FOR LEAKS

# WATER PUMP COMPONENTS

COOHS-03





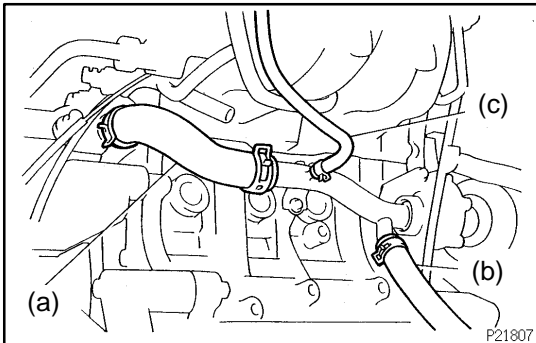
## REMOVAL

### 1. DRAIN ENGINE COOLANT

### 2. REMOVE GENERATOR

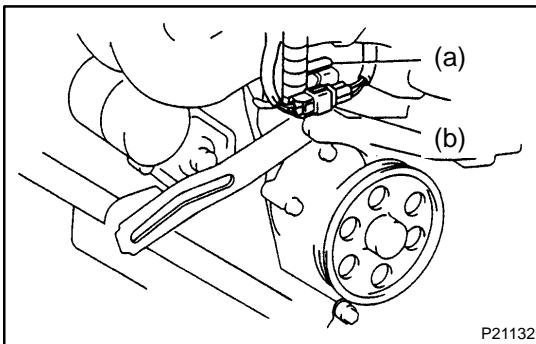
### 3. REMOVE INTAKE MANIFOLD STAY

- (a) Disconnect the engine wire clamps from the intake manifold stay.
- (b) Remove the bolt, nut and intake manifold stay.



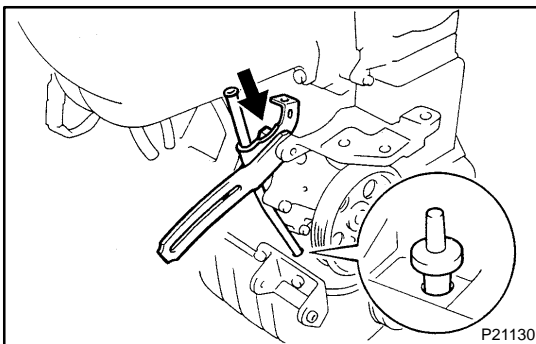
### 4. REMOVE WATER INLET PIPE

- (a) Disconnect the water inlet hose.
- (b) Disconnect the heater inlet hose.
- (c) Disconnect the water bypass hose.
- (d) Remove the bolt, water inlet pipe and O-ring.

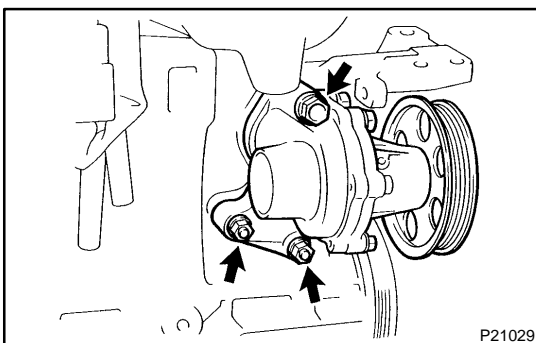


### 5. REMOVE OIL DIPSTICK GUIDE AND GENERATOR ADJUSTING BAR

- (a) Disconnect the engine wire clamp.
- (b) Disconnect the connector clamp for crankshaft position sensor.

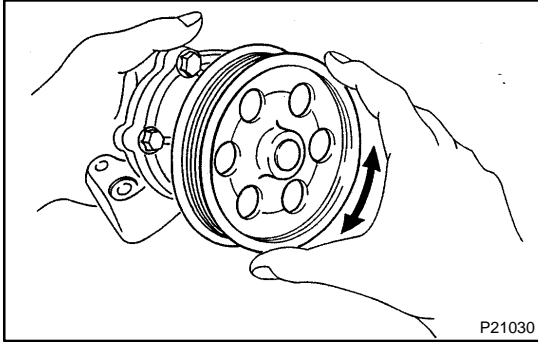


- (c) Remove the oil dipstick.
- (d) Remove the mounting bolt of the dipstick guide clamp and generator adjusting bar.
- (e) Pull out the dipstick guide. Plug the guide installation hole of the oil pump.
- (f) Remove the O-ring from the dipstick guide.



### 6. REMOVE WATER PUMP

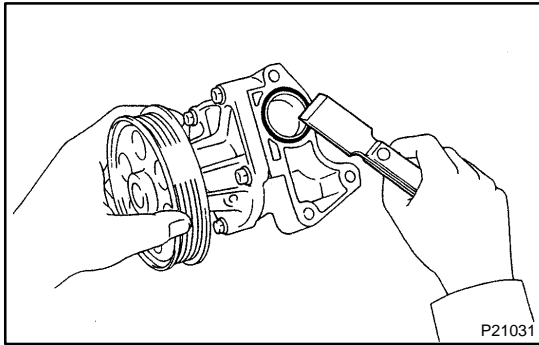
Remove the bolt, 2 nuts and water pump.



## INSPECTION

### INSPECT WATER PUMP

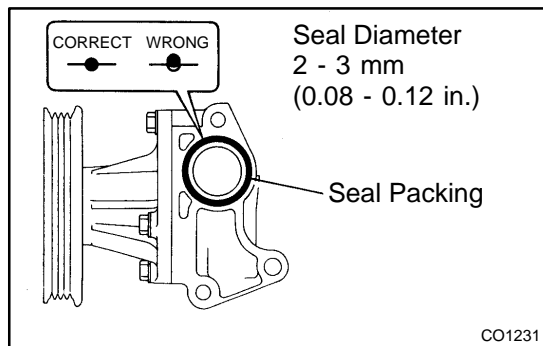
- (a) Visually check the water hole for coolant leakage. If leakage is found, replace the water pump.
- (b) Turn the pulley, and check that the water pump bearing moves smoothly and quietly. If necessary, replace the water pump.



## INSTALLATION

### 1. INSTALL WATER PUMP

- (a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the water pump and cylinder block.
  - Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the contact surfaces and sealing groove.
  - Thoroughly clean all components to remove all the loose material.
  - Using a non-residue solvent, clean both sealing surfaces.



- (b) Apply seal packing to the water pump groove.

#### Seal packing:

**Part No. 08826-00100, THREE BOND 1282B or equivalent**

- Install a nozzle that has been cut to a 2 - 3 mm (0.08 - 0.12 in.) opening.

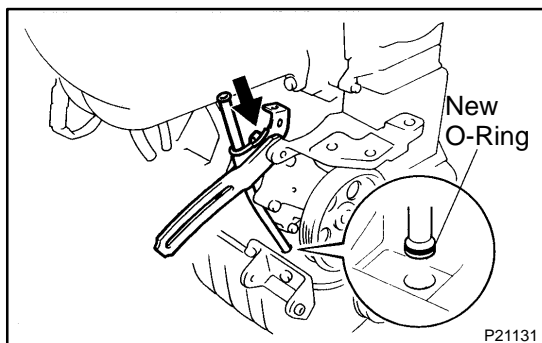
#### HINT:

Avoid applying an excessive amount to the surface.

- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.
- Do not pour in any coolant until at least 2 hours after installation is completed.

- (c) Install the water pump with the bolt and 2 nuts.

**Torque: 17.5 N·m (175 kgf·cm, 14 ft·lbf)**

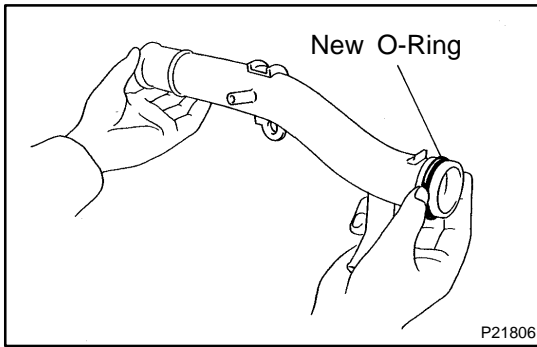


### 2. INSTALL OIL DIPSTICK GUIDE AND GENERATOR ADJUSTING BAR

- (a) Install a new O-ring to the dipstick guide.
- (b) Apply soapy water to the O-ring.
- (c) Push in the dipstick guide, and install it with the mounting bolt of the generator adjusting bar and dipstick guide clamp.

**Torque: 18.5 N·m (185 kgf·cm, 14 ft·lbf)**

- (d) Install the oil dipstick.



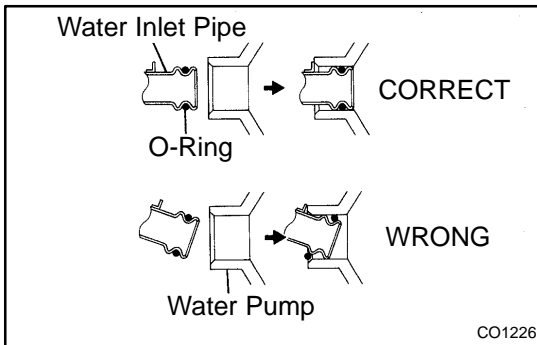
(e) Connect the connector clamp for crankshaft position sensor.

(f) Connect the engine wire clamp.

### 3. INSTALL WATER INLET PIPE

(a) Install a new O-ring to the water inlet pipe.

(b) Apply a little soap and water to the O-ring.



(c) Insert the water inlet pipe to the water pump.

#### NOTICE:

**Installing the water inlet pipe at an angle or twisting it during installation will cause pinching or tearing of the O-ring.**

(d) Install the water inlet pipe with the bolt.

**Torque: 7.5 N·m (75 kgf·cm, 65 in.-lbf)**

(e) Connect the water inlet hose.

(f) Connect the heater inlet hose.

(g) Connect the water bypass hose

### 4. INSTALL INTAKE MANIFOLD STAY

(a) Install the intake manifold stay with the bolt and nut.

**Torque: 20 N·m (200 kgf·cm, 15 ft-lbf)**

(b) Connect the engine wire clamps to the intake manifold stay.

### 5. INSTALL GENERATOR

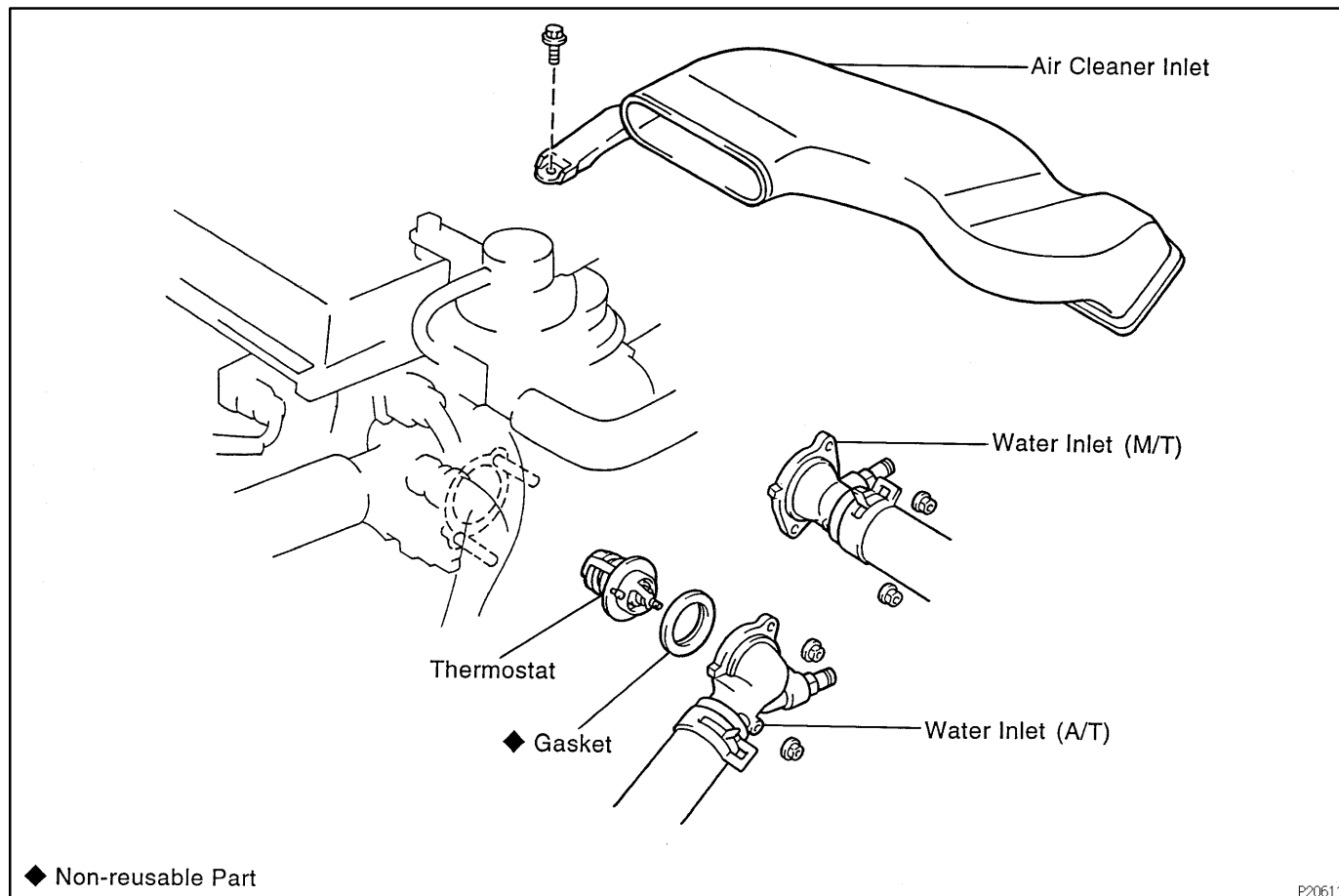
### 6. REFILL WITH ENGINE COOLANT

### 7. START ENGINE AND CHECK FOR LEAKS



# THERMOSTAT COMPONENTS

CO0HW-04



## REMOVAL

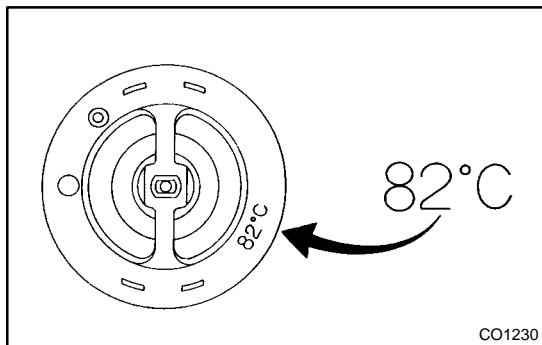
### NOTICE:

**Do not remove the thermostat unless absolutely necessary.**

### HINT:

Removal of the thermostat would have an adverse effect, causing a lowering of cooling efficiency.

- 1. REMOVE AIR CLEANER INLET**
- 2. DRAIN ENGINE COOLANT**
- 3. REMOVE WATER INLET AND THERMOSTAT**
  - (a) Remove the 2 nuts, water inlet and thermostat from the water inlet housing.
  - (b) Remove the gasket from the thermostat.

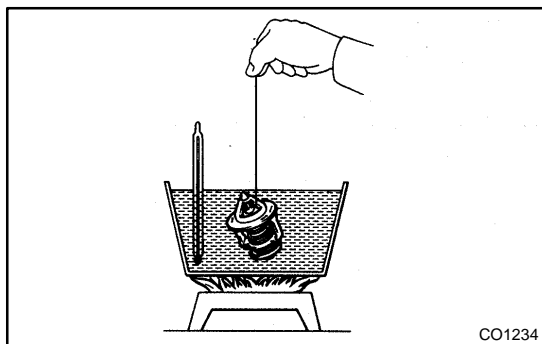


## INSPECTION

### INSPECT THERMOSTAT

#### HINT:

The thermostat is numbered with the valve opening temperature.

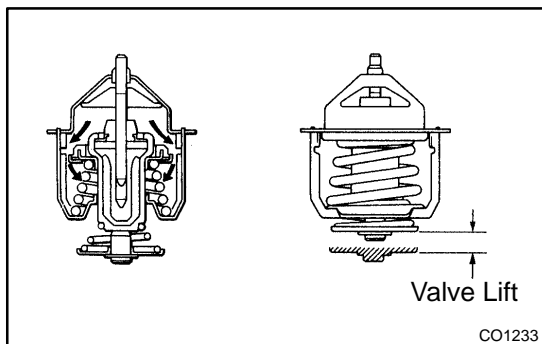


(a) Immerse the thermostat in water, and gradually heat the water.

(b) Check the valve opening temperature.

**Valve opening temperature: 80 - 84°C (176 - 183°F)**

If the valve opening temperature is not as specified, replace the thermostat.



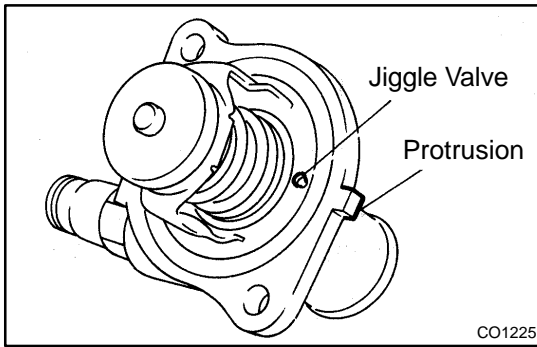
(c) Check the valve lift.

**Valve lift: 8 mm (0.31 in.) or more at 95°C (203°F)**

If the valve lift is not as specified, replace the thermostat.

(d) Check that the valve is fully closed when the thermostat is at low temperatures (below 40°C (104°F)).

If not closed, replace the thermostat.



## INSTALLATION

### 1. PLACE THERMOSTAT IN WATER INLET

- (a) Place a new gasket onto the thermostat.
- (b) Align the thermostat jiggle valve with the protrusion of the water inlet, and insert the thermostat in the water inlet.

### 2. INSTALL WATER INLET

Install the water inlet with the 2 nuts.

**Torque: 5.0 N·m (50 kgf·cm, 43 in.-lbf)**

### 3. INSTALL AIR CLEANER INLET

### 4. REFILL WITH ENGINE COOLANT

### 5. START ENGINE AND CHECK FOR LEAKS

# RADIATOR

## ON-VEHICLE CLEANING

CO010-01

### CLEAN RADIATOR

Using water or a steam cleaner, remove any mud or dirt from the radiator core.

**NOTICE:**

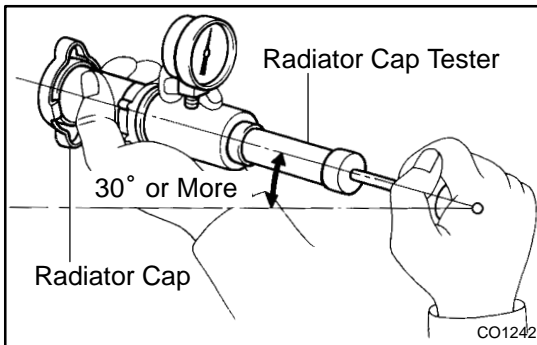
**If using a high pressure type cleaner, be careful not to deform the fins of the radiator core. (i.e. Maintain a distance between the cleaner nozzle and radiator core.)**

## ON-VEHICLE INSPECTION

### 1. REMOVE RADIATOR CAP

#### CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



### 2. INSPECT RADIATOR CAP

#### NOTICE:

- If the radiator cap has contaminations, always rinse it with water.
- Before using a radiator cap tester, wet the relief valve and pressure valve with engine coolant or water.
- When performing steps (a) and (b) below, keep the tester at an angle of over 30° above the horizontal.

- (a) Using a radiator cap tester, slowly pump the tester and check that air is coming from the vacuum valve.

**Pump speed: 1 push/3 seconds or more**

#### NOTICE:

**Push the pump at a constant speed.**

If air is not coming from the vacuum valve, replace the radiator cap.

- (b) Pump the tester and measure the relief valve opening pressure.

**Pump speed: 1 push within 1 second**

#### NOTICE:

**This pump speed is for the first pump only (in order to close the vacuum valve). After this, the pump speed can be reduced.**

**Standard opening pressure:**

**74 - 103 kPa (0.75 - 1.05 kgf/cm<sup>2</sup>, 10.7 - 14.9 psi)**

#### HINT:

Use the tester's maximum reading as the opening pressure. If the opening pressure is less than minimum, replace the radiator cap.

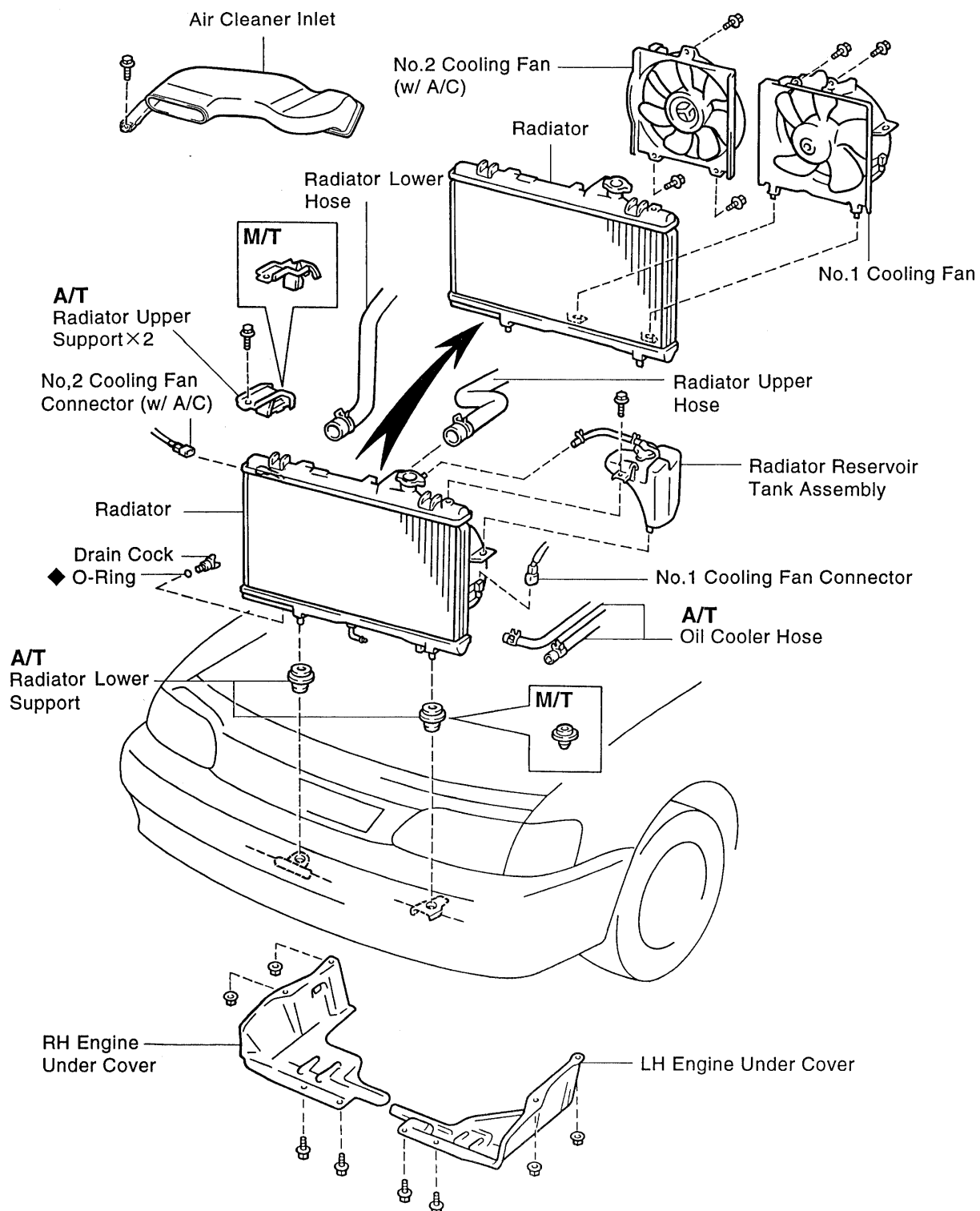
### 3. INSPECT COOLING SYSTEM FOR LEAKS

- (a) Fill the radiator with coolant and attach a radiator cap tester.
- (b) Warm up the engine.
- (c) Pump it to 118 kPa (1.2 kgf/cm<sup>2</sup>, 17.1 psi), and check that the pressure does not drop.

If the pressure drops, check the hoses, radiator or water pump for leaks. If no external leaks are found, check the heater core, cylinder block and head.

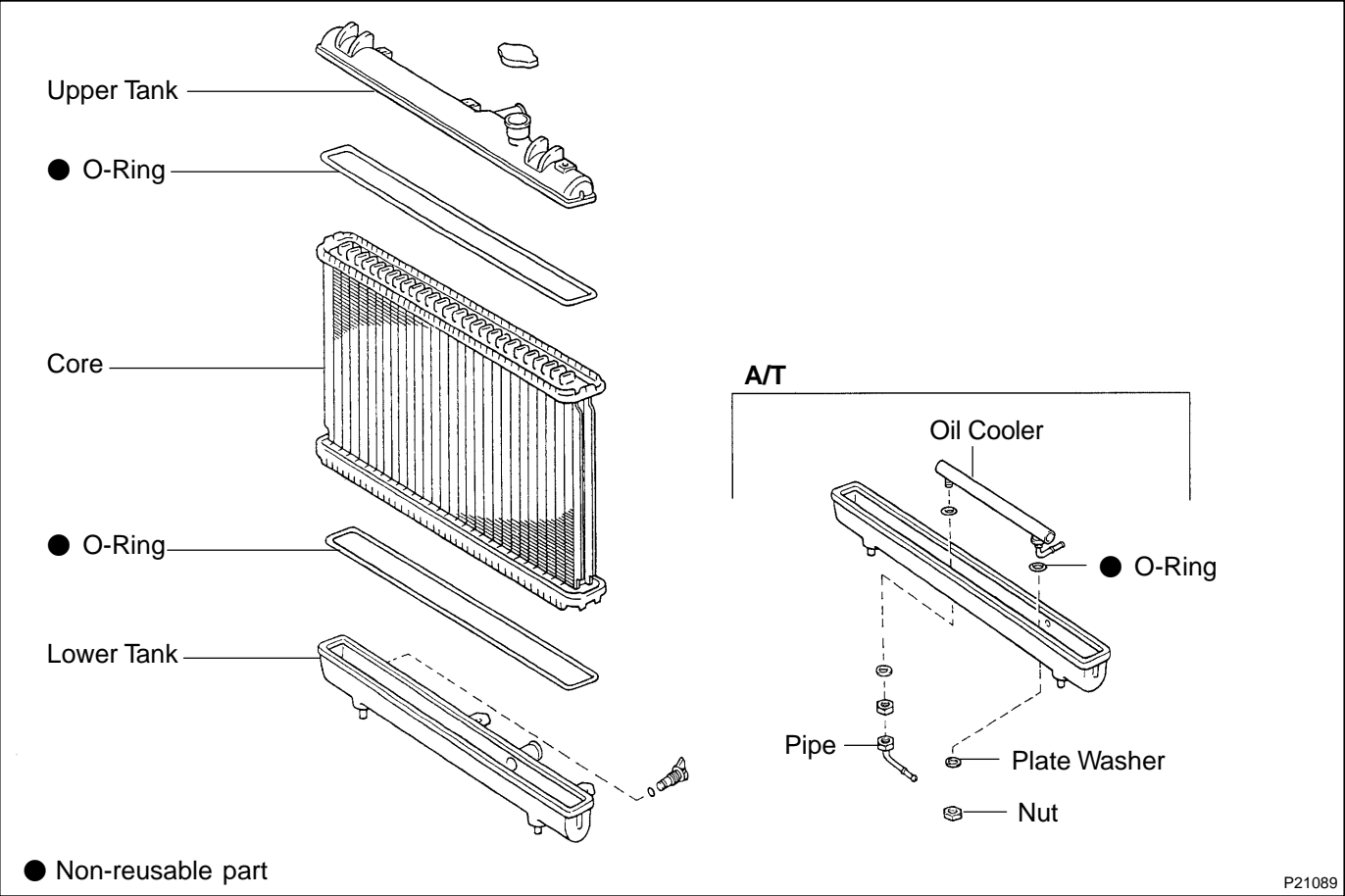
### 4. REINSTALL RADIATOR CAP

## COMPONENTS

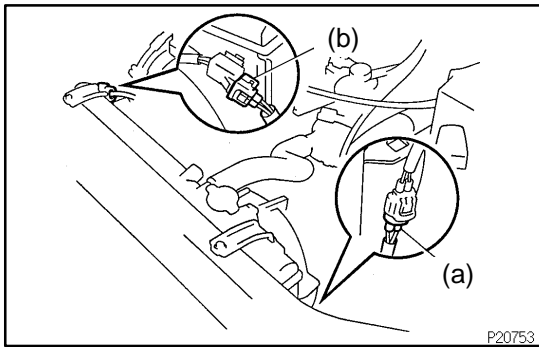


◆ Non-reusable part

P20811



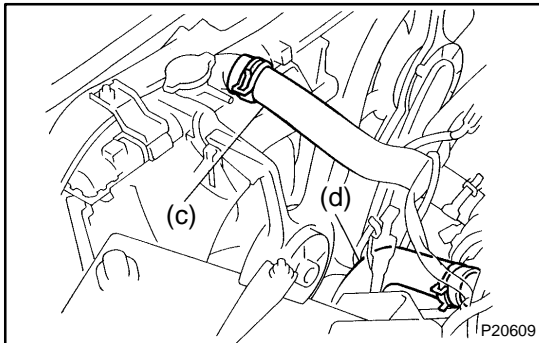




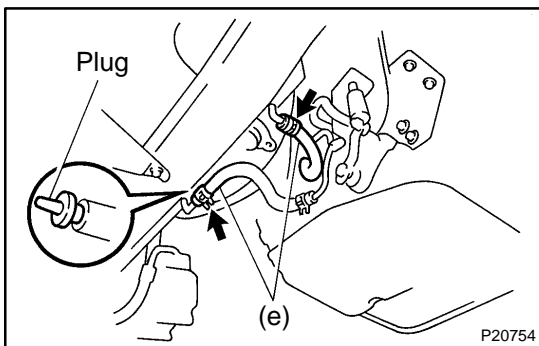
## REMOVAL

1. REMOVE ENGINE UNDER COVERS
2. DRAIN ENGINE COOLANT
3. REMOVE RADIATOR RESERVOIR TANK ASSEMBLY
4. REMOVE RADIATOR ASSEMBLY

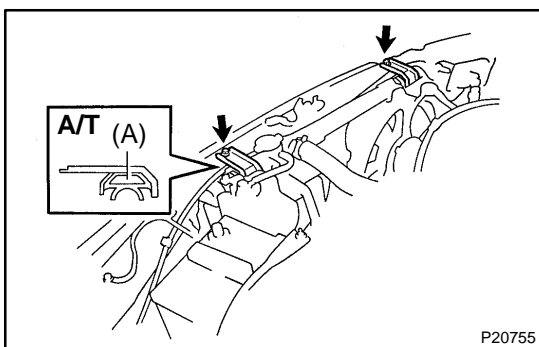
- (a) Disconnect the No.1 cooling fan connector.
- (b) w/ A/C:  
Disconnect the No.2 cooling fan connector.



- (c) Disconnect the radiator upper hose from the radiator.
- (d) Disconnect the radiator lower hose from the water inlet.

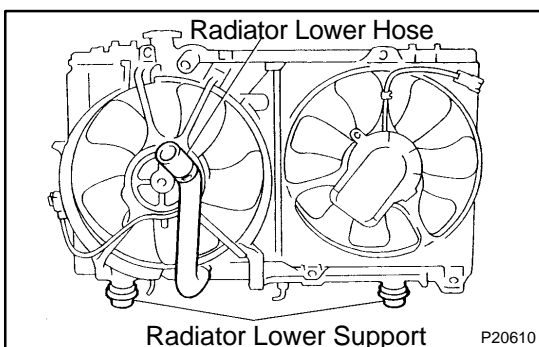


- (e) Disconnect the 2 A/T oil cooler hoses from the radiator.
- HINT:  
Plug the hose to prevent oil from escaping.

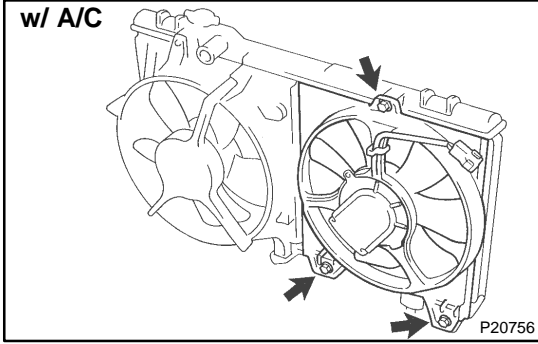


- (f) Remove the 2 bolts and 2 upper radiator supports.
- Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)**

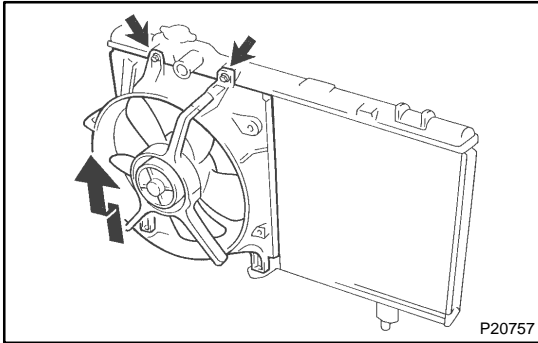
- HINT:  
(A/T only):  
After installation, check that the rubber cushion (A) of the support is not depressed.
- (g) Remove the radiator assembly.



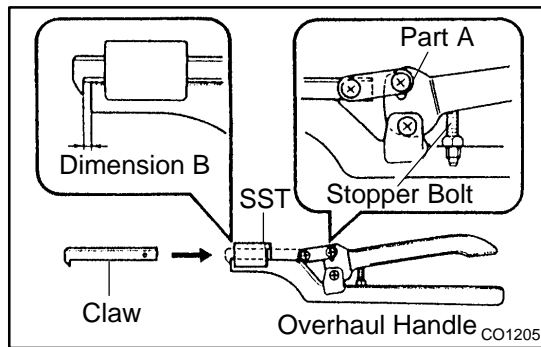
- (h) Remove the 2 radiator lower supports and the lower radiator hose.

**w/ A/C****5. w/ A/C:****REMOVE NO.2 COOLING FAN FROM RADIATOR**

Remove the 3 bolts and cooling fan.

**6. REMOVE NO.1 COOLING FAN FROM RADIATOR**

Remove the 2 bolts and cooling fan.



## DISASSEMBLY

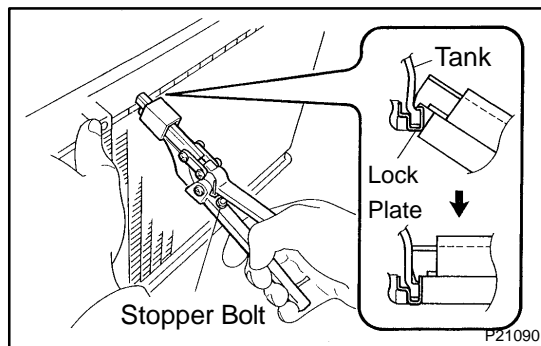
### 1. ASSEMBLE SST

SST 09230-01010

- Install the claw to the overhaul handle, inserting it in the hole in part A as shown in the diagram.
- While gripping the handle, adjust the stopper bolt so that dimension B is as shown in the diagram is 0.2 - 0.5 mm (0.008 - 0.020 in.).

### NOTICE:

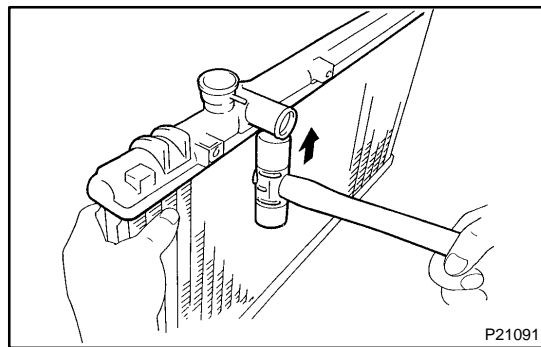
If this adjustment is not performed, the claw may be damaged.



### 2. UNCAULK LOCK PLATES

Using SST to release the caulking, squeeze the handle until stopped by the stopper bolt.

SST 09230-01010



### 3. REMOVE TANKS AND O-RINGS

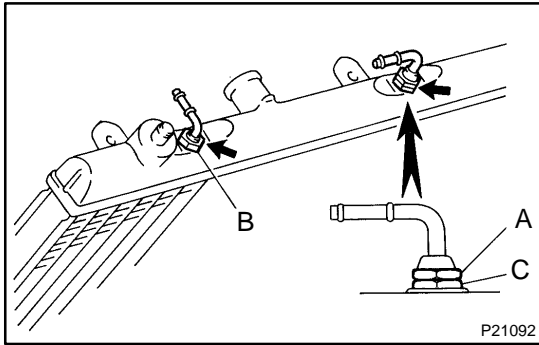
Lightly tap the radiator hose inlet (or outlet) with a soft-faced hammer, and remove the tank.

Remove the O-ring.

### 4. A/T:

#### REMOVE OIL COOLER FROM LOWER TANK

- Remove the 2 nuts, spring washers, plate washers and oil cooler.
- Remove the O-ring from the oil cooler.



## REASSEMBLY

### 1. A/T:

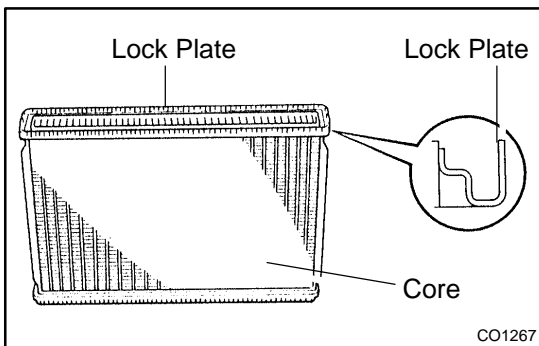
#### INSTALL OIL COOLER TO LOWER TANK

- Clean the O-ring contact surface of the lower tank and oil cooler.
- Install new O rings to the oil cooler.
- Install the oil cooler with the O-rings to the lower tank.
- Install the plate washers, spring washers and nuts.

#### Torque:

**Nut A: 15 N·m (150 kgf·cm, 11 ft·lbf)**

**Nut B and C: 8.5 N·m (85 kgf·cm, 75 in·lbf)**

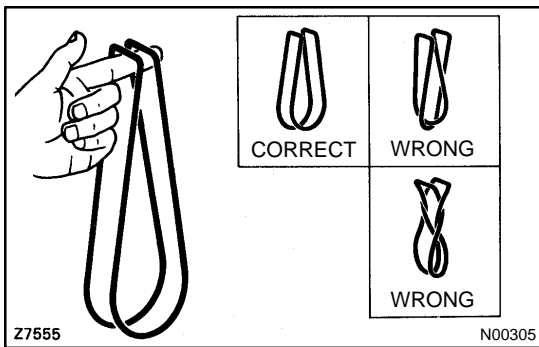


### 2. INSPECT LOCK PLATE

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 any deformation with pliers or like object. Water leakage will result if the bottom of the lock plate groove is damaged or deformed. Therefore, repair or replace if necessary.

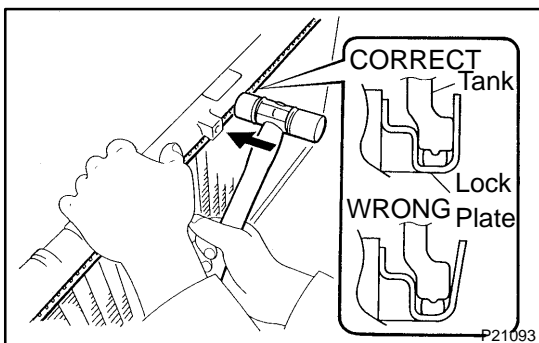


### 3. INSTALL NEW O-RINGS AND TANKS

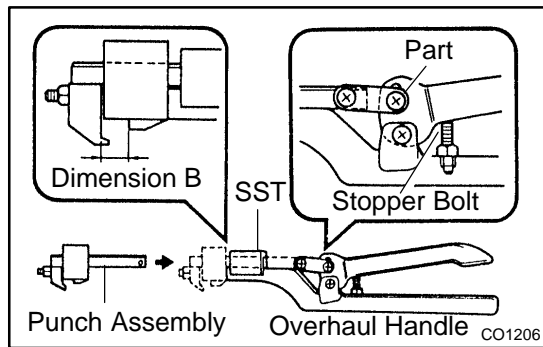
- After checking that there are no foreign objects in the lock plate groove, install a new O-ring without twisting it.

#### HINT:

When cleaning the lock plate groove, lightly rub it with sand paper without scratching it.

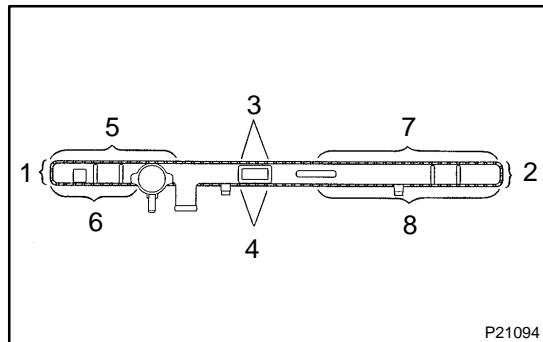


- Install the tank without damaging the O-ring.
- Tap the lock plate with a soft-faced hammer so that there is no gap between it and the tank.

**4. ASSEMBLE SST**

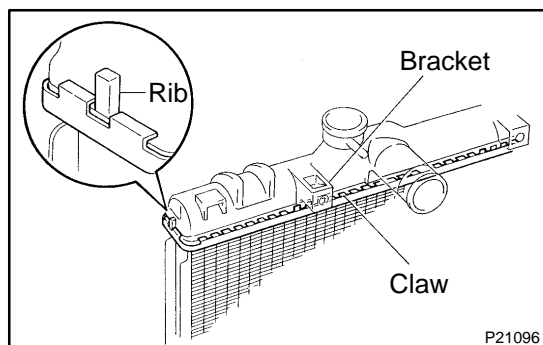
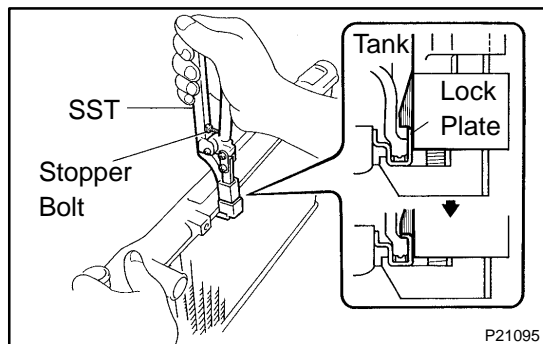
SST 09230-01010

- (a) Install the punch assembly to the overhaul handle, inserting it in the hole in part A as shown in the illustration.
- (b) While gripping the handle, adjust the stopper bolt so that dimension B shown in the diagram is 7.7 mm (0.30 in.)

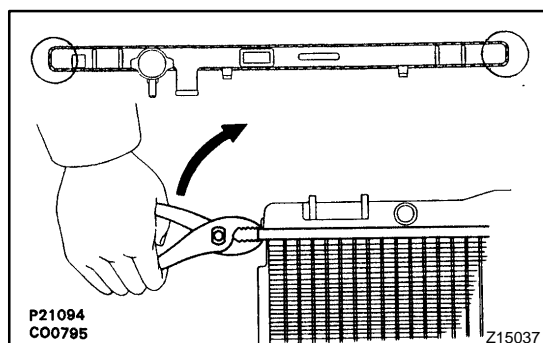
**5. CAULK LOCK PLATE**

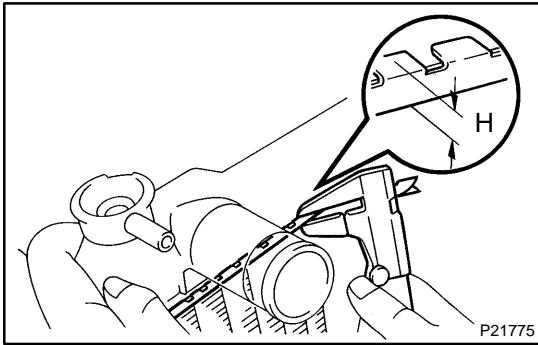
- (a) Lightly press SST against the lock plate in the order shown in the illustration. After repeating this a few times, fully caulk the lock plate by squeezing the handle until stopped by the stopper plate.

SST 09230-01010

**HINT:**

- Do not stake the areas protruding around the ports, bracket or tank ribs.
- The oil cooler (A/T only) and the points attowed in the illustration cannot be staked with the SST. Use a plier or like object and be careful not to damage the core plates.

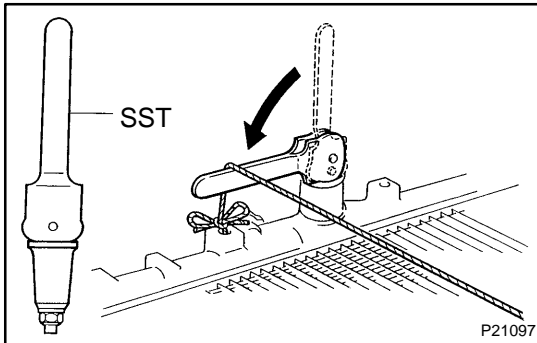




- (b) Check the lock plate height (H) after completing the caulking.

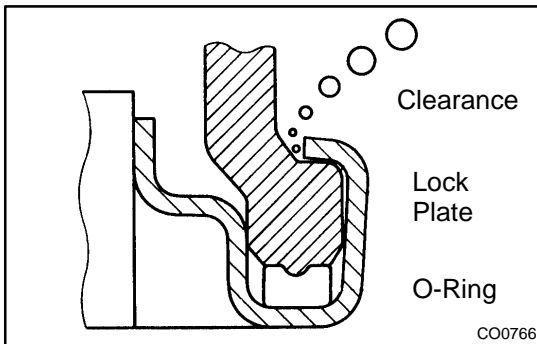
**Plate height: 7.75 - 8.25 mm (0.305 - 0.325 in.)**

If not within the specified height, adjust the stopper bolt of the handle again and perform the caulking again.



## 6. INSPECT FOR WATER LEAKS

- Tighten the drain plug.
- Plug the inlet and outlet pipes of the radiator with SST.  
SST 09230-01010
- Using a radiator cap tester, apply pressure to the radiator.  
**Test pressure: 177 kPa (1.8 kgf/cm<sup>2</sup>, 26 psi)**



- (d) Inspect for leaks.

### HINT:

On radiators with resin tanks, there is a 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 performing the water leak test, first move radiator around in the water until all air bubbles disappear.

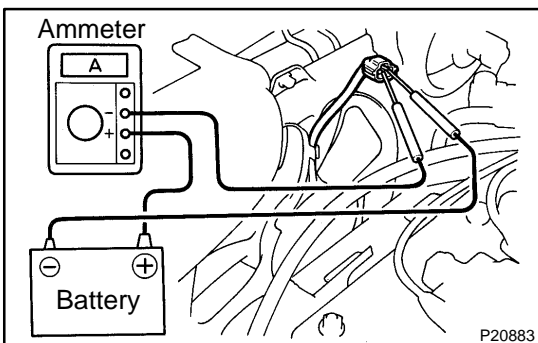
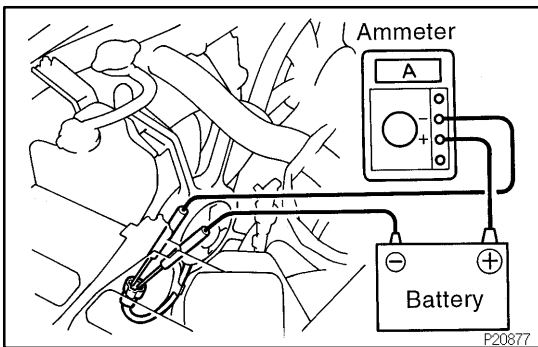
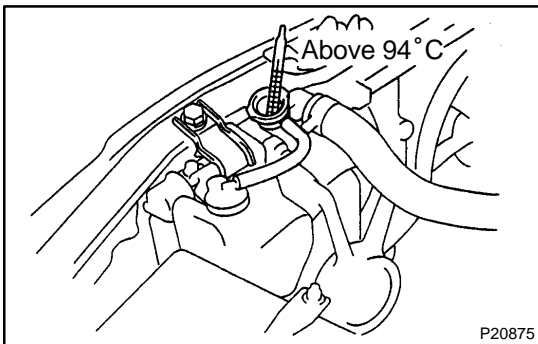
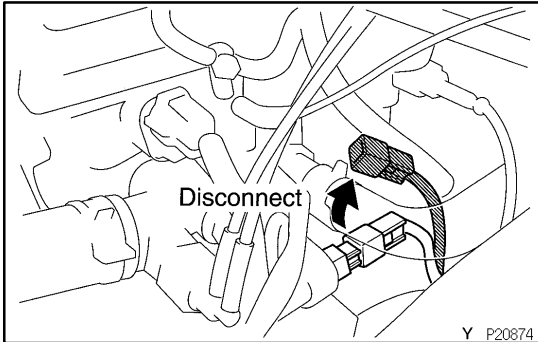
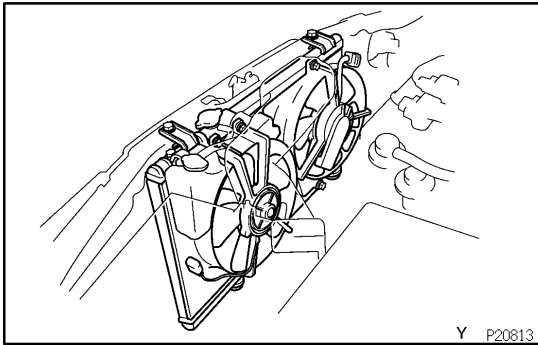
## 7. PAINT LOCK PLATES

### HINT:

If the water leak test checks out okay, allow the radiator to completely dry and then paint the lock plates.

## INSTALLATION

Installation is in the reverse order of removal (See page [CO-16](#) ).



## ELECTRIC COOLING FAN ON-VEHICLE INSPECTION

COOY5-02

### 1. CHECK COOLING FAN OPERATION WITH LOW TEMPERATURE (Below 83°C (181°F))

- Turn the ignition switch ON.
- Check that the cooling fan stops.

If not, check the cooling fan relay and ECT switch, and check for a separated connector or severed wire between the cooling fan relay and ECT switch.

- Disconnect the ECT switch connector.
- Check that the cooling fan rotates.

If not, check the engine main relay, cooling fan relay, cooling fan, fuses, and check for short circuit between the cooling fan relay and ECT switch.

- Reconnect the ECT switch connector.

### 2. CHECK COOLING FAN OPERATION WITH HIGH TEMPERATURE (Above 94°C (201°F))

- Start the engine, and raise coolant temperature to above 94°C (201°F).
  - Check that the cooling fan rotates.
- If not, replace the ECT switch.

### 3. INSPECT NO.1 COOLING FAN

- Disconnect the cooling fan connector.
- Connect battery and ammeter.
- Check that the cooling fan rotates smoothly, and check the reading on the ammeter.

**Standard amperage:**

M/T	5.7 - 7.7 A
A/T	8.6 - 11.6 A

- Reconnect the cooling fan connector.

### 4. INSPECT NO.2 COOLING FAN

- Disconnect the cooling fan connector.
- Connect battery and ammeter.
- Check that the cooling fan rotates smoothly, and check the reading on the ammeter.

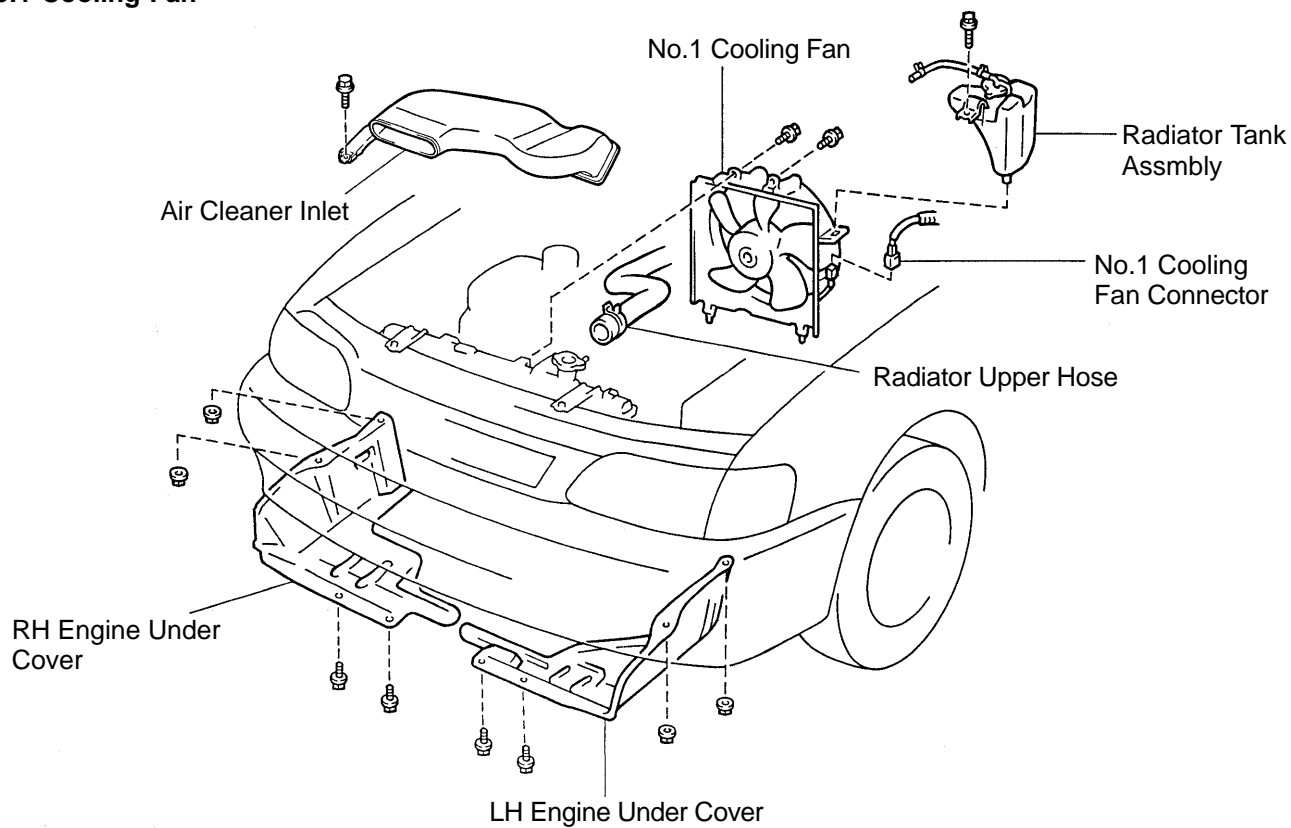
**Standard amperage: 6.4 - 7.4 A**

- Reconnect the cooling fan connector.

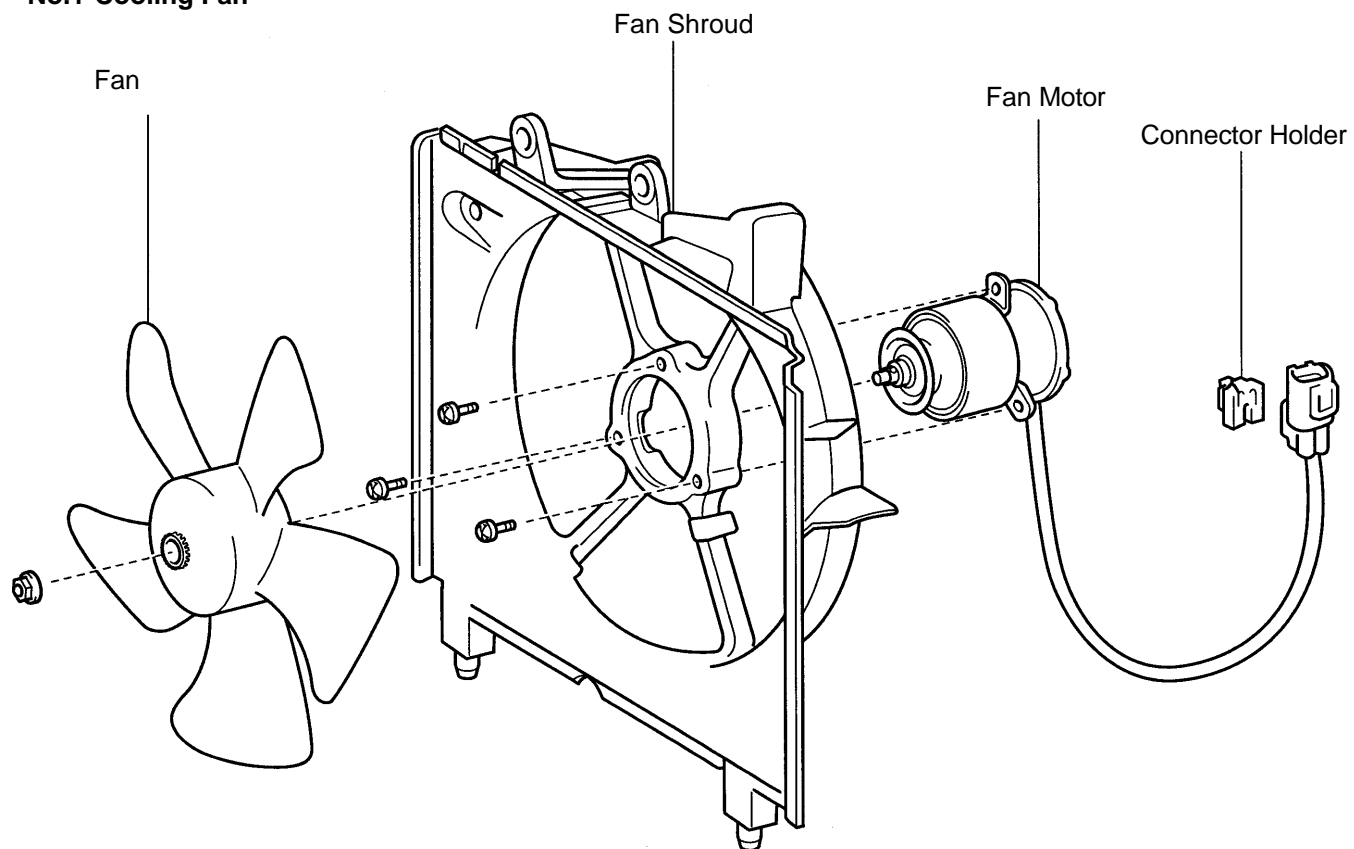


## COMPONENTS

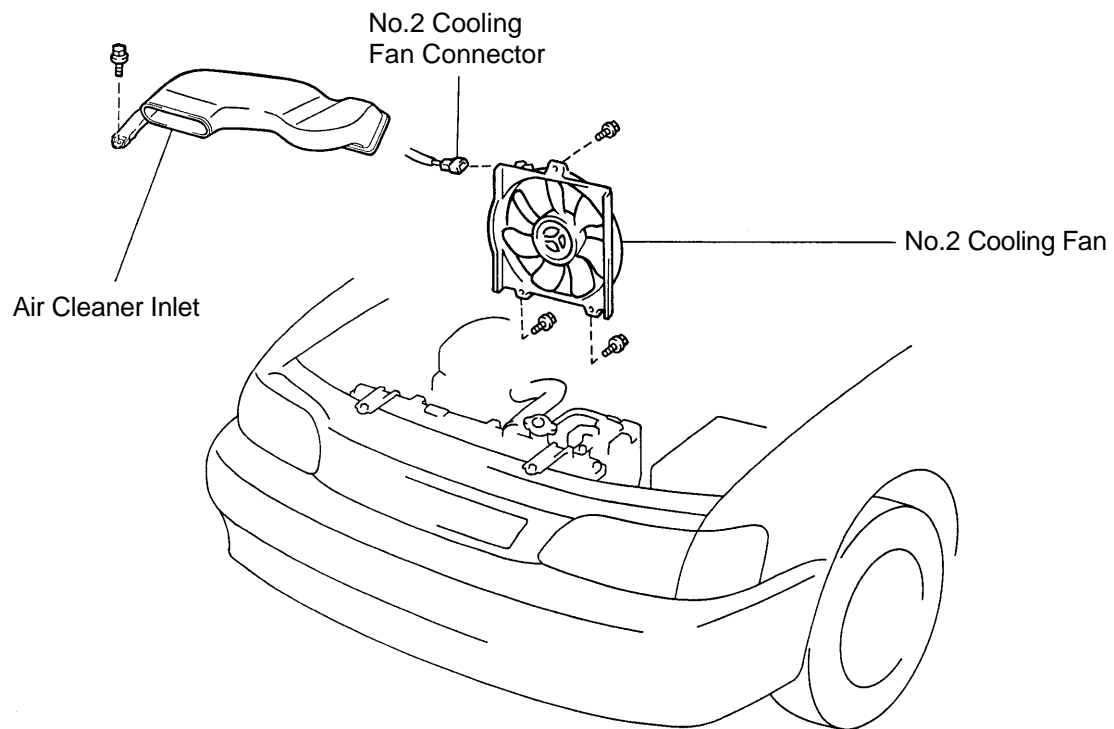
### No.1 Cooling Fan



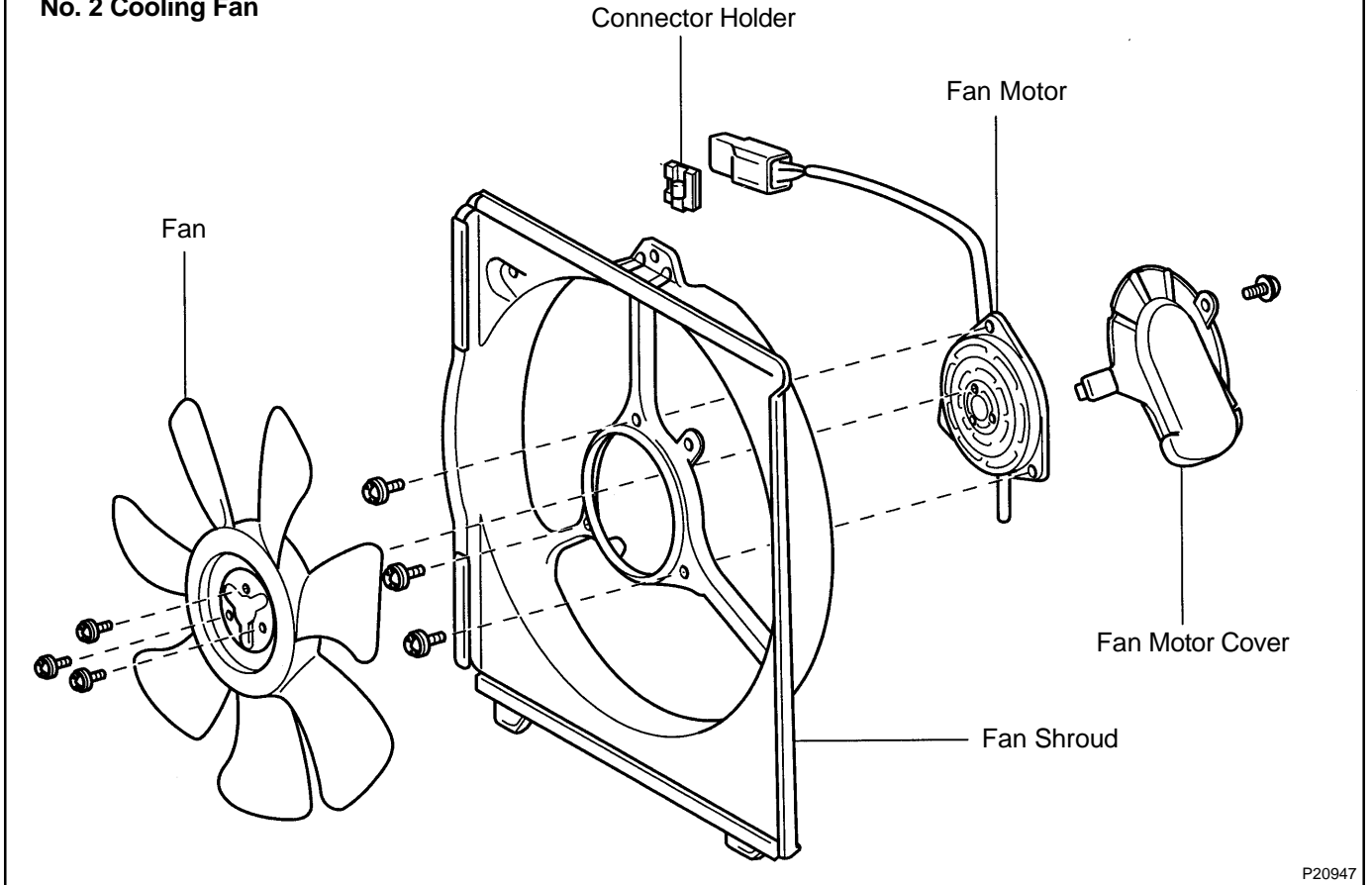
P20876

**No.1 Cooling Fan**

P20878

**No.2 Cooling Fan**

P20882

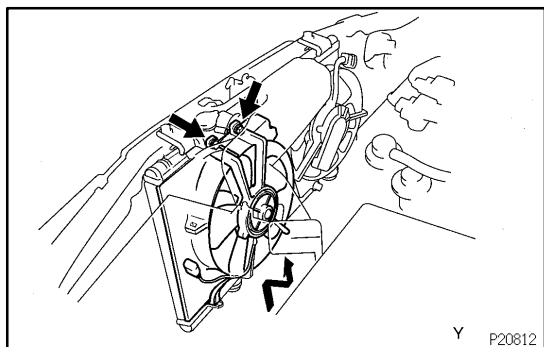
**No. 2 Cooling Fan**

## REMOVAL

### 1. REMOVE NO.1 COOLING FAN

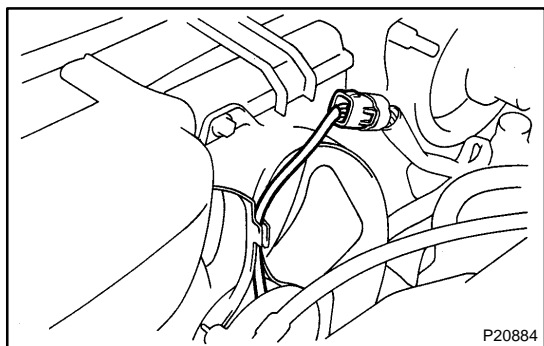
- (a) Remove the engine under covers.
- (b) Drain the engine coolant.
- (c) Remove the air cleaner inlet.
- (d) Remove the reservoir tank assembly.
- (e) Remove the No.1 cooling fan.
  - (1) Disconnect the upper radiator hose from the radiator.
  - (2) Disconnect the cooling fan connector.
  - (3) Remove the 2 bolts and cooling fan.

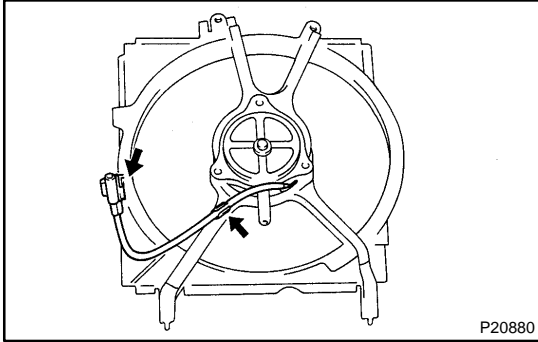
**Torque: 7.0 N·m (70 kgf·cm, 61 in.-lbf)**



### 2. REMOVE NO.2 COOLING FAN

- (a) Disconnect the cooling fan connector.
  - (b) Remove the 3 bolts and cooling fan.
- Torque: 7.0 N·m (70 kgf·cm, 61 in.-lbf)**

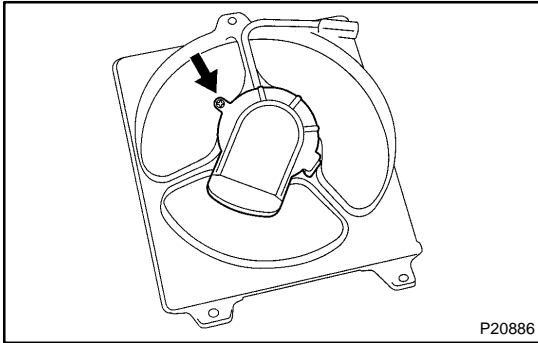




## DISASSEMBLY

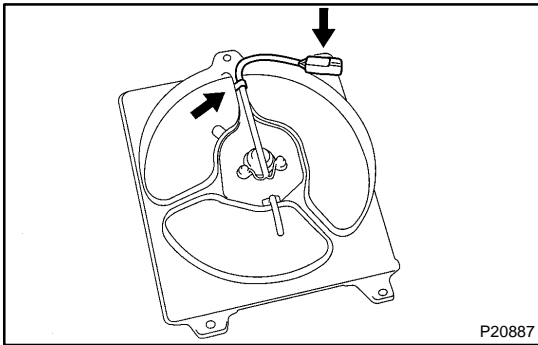
### 1. DISASSEMBLE NO.1 COOLING FAN

- (a) Remove the nut and fan.
- (b) Remove the fan motor.
  - (1) Disconnect the wire and connector holder from the fan shroud.
  - (2) Remove the 3 screws and fan motor.



### 2. DISASSEMBLE NO.2 COOLING FAN

- (a) Remove the 3 screws and fan.
- (b) Remove the screw and fan motor cover.



- (c) Remove the fan motor.
  - (1) Disconnect the wire and connector from the fan shroud.
  - (2) Remove the 3 screws and fan motor.

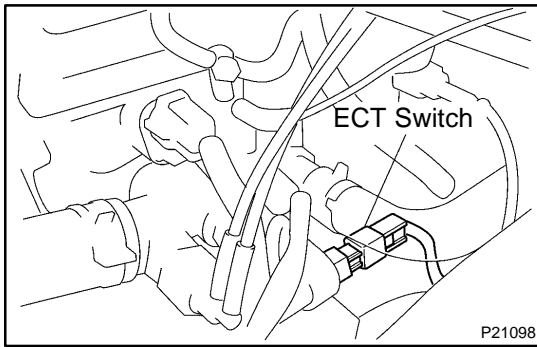
## REASSEMBLY

Reassembly is in the reverse order of disassembly (See page [CO-29](#) ).

## INSTALLATION

Installation is in the reverse order of removal (See page [CO-28](#) ).

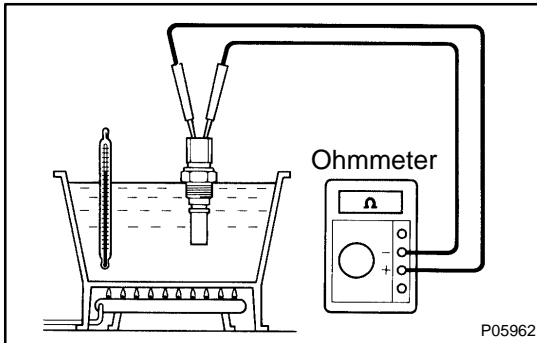




## ENGINE COOLANT TEMPERATURE (ECT) SWITCH INSPECTION

CO01D-04

1. DRAIN ENGINE COOLANT
2. REMOVE ECT SWITCH



### 3. INSPECT ECT SWITCH

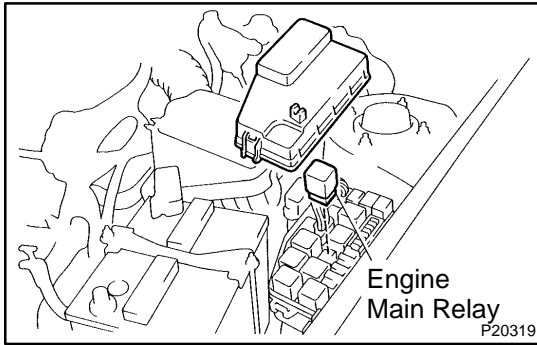
- (a) Using an ohmmeter, check that there is no continuity between the terminals when the coolant temperature is above 94°C (201°F).

If there is continuity, replace the switch.

- (b) Using an ohmmeter, check that there is continuity between the terminals when the coolant temperature is below 83°C (181°F).

If there is no continuity, replace the switch.

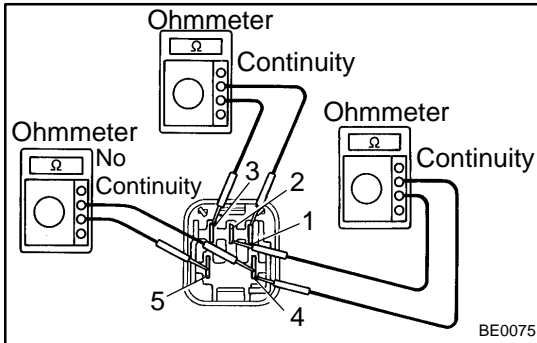
4. REINSTALL ECT SWITCH
5. REFILL WITH ENGINE COOLANT
6. START ENGINE AND CHECK FOR COOLANT LEAKS



## ENGINE MAIN RELAY INSPECTION

COOIE-05

1. REMOVE RELAY BOX COVER
2. REMOVE ENGINE MAIN RELAY (Marking: EG MAIN)



### 3. INSPECT ENGINE MAIN RELAY

- (a) Inspect the relay continuity

- (1) Using an ohmmeter, check that there is continuity between terminals 1 and 3.

If there is no continuity, replace the relay.

- (2) Check that there is no continuity between terminals 2 and 4.
- (3) Check that there is no continuity between terminals 4 and 5.

If there is continuity, replace the relay.

- (b) Inspect the relay operation

- (1) Apply battery positive voltage across terminals 1 and 3.

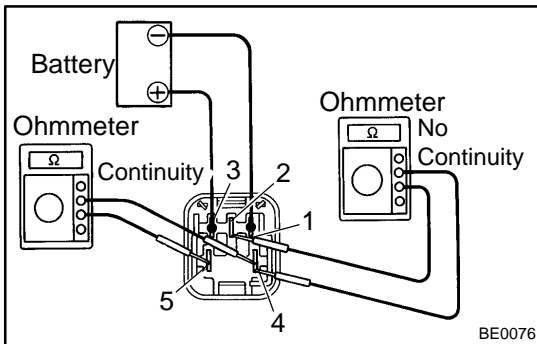
- (2) Using an ohmmeter, check that there is no continuity between terminals 4 and 5.

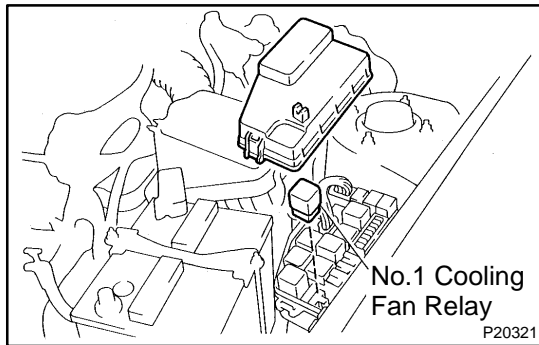
If there is no continuity, replace the relay.

- (3) Check that there is no continuity between terminals 2 and 4.

If there is continuity, replace the relay.

### 4. REINSTALL ENGINE MAIN RELAY



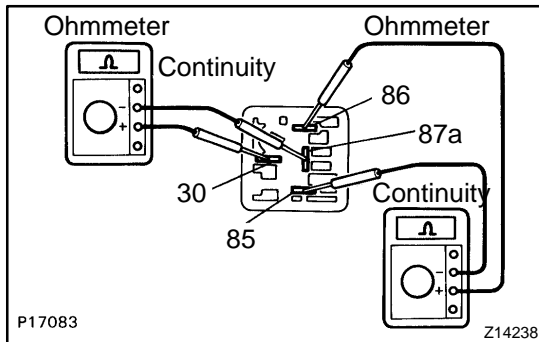


## COOLING FAN RELAY INSPECTION

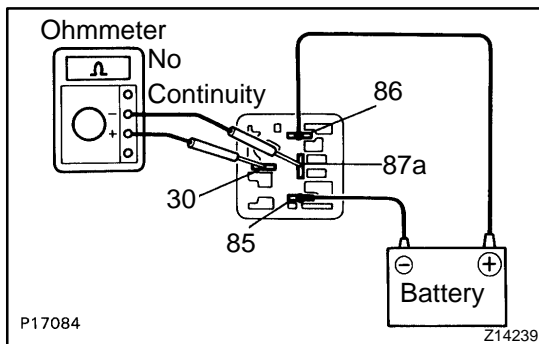
COOIF-05

### 1. INSPECT NO.1 COOLING FAN RELAY

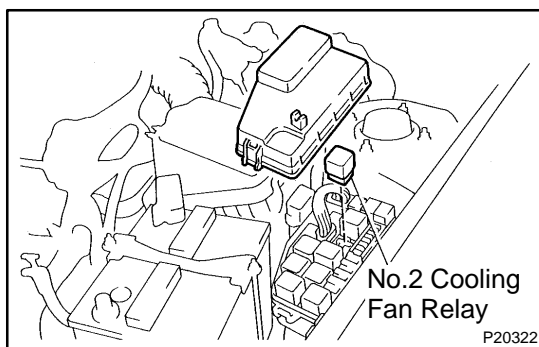
- Remove the relay box cover.
- Remove the No.1 cooling fan relay (Marking: FAN NO.1).



- Inspect the No.1 cooling fan relay continuity.
  - Using an ohmmeter, check that there is continuity between terminals 85 and 86.
 If there is no continuity, replace the relay.
  - Check that there is continuity between terminals 30 and 87a.
 If there is no continuity, replace the relay.



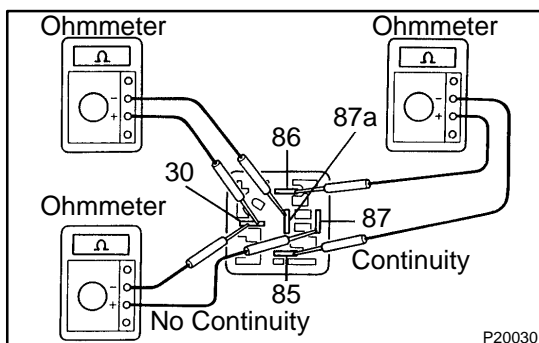
- Inspect the No.1 cooling fan relay operation.
  - Apply battery voltage across terminals 85 and 86.
  - Using an ohmmeter, check that there is no continuity between terminals 30 and 87a.
 If there is continuity, replace the relay.
- Reinstall the No.1 cooling fan relay.



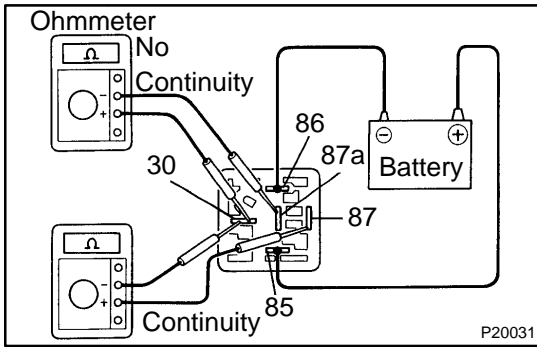
### 2. w/ A/C:

#### INSPECT NO.2 COOLING FAN RELAY

- Remove the relay box cover.
- Remove the No.2 cooling fan relay (Marking: FAN NO.2).



- Inspect the No.2 cooling fan relay continuity.
  - Using an ohmmeter, check that there is continuity between terminals 85 and 86.
 If there is no continuity, replace the relay.
  - Check that there is continuity between terminals 30 and 87a.
 If there is no continuity, replace the relay.
  - Check that there is no continuity between terminals 30 and 87.
 If there is continuity, replace the relay.



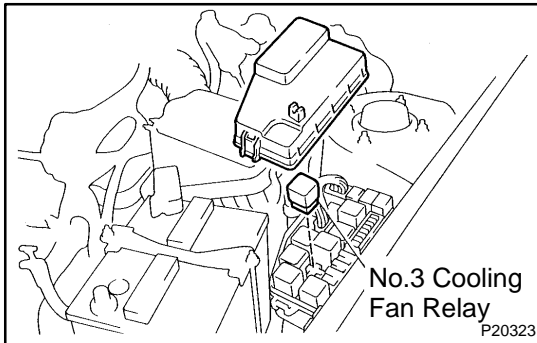
- (d) Inspect the No.2 cooling fan relay operation.
- (1) Apply battery voltage across terminals 85 and 86.
  - (2) Using an ohmmeter, check that there is no continuity between terminals 30 and 87.

If there is continuity, replace the relay.

- (3) Using an ohmmeter, check that there is continuity between terminals 30 and 87.

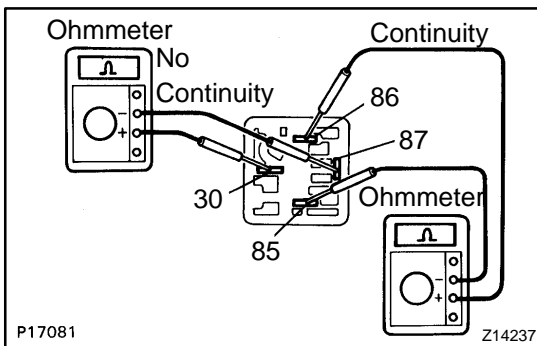
If there is no continuity, replace the relay.

- (e) Reinstall the No.2 cooling fan relay.



### 3. INSPECT NO.3 COOLING FAN RELAY

- (a) Remove the relay box cover.
- (b) Remove the No.3 cooling fan relay. (Marking: FAN NO.3)

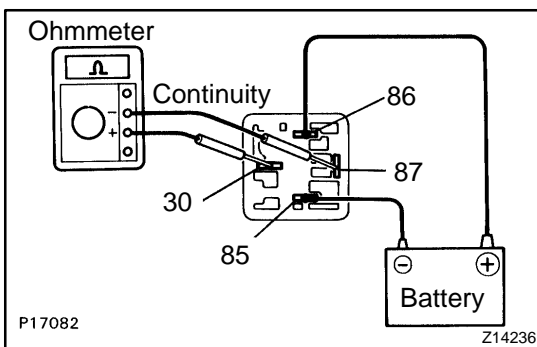


- (c) Inspect the No.3 cooling fan relay continuity.
- (1) Using an ohmmeter, check that there is continuity between terminals 85 and 86.

If there is no continuity, replace the relay.

- (2) Check that there is no continuity between terminals 30 and 87.

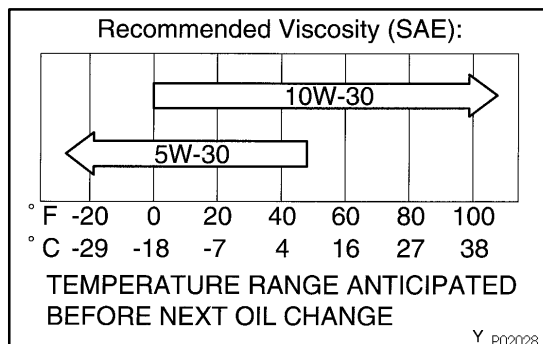
If there is continuity, replace the relay.



- (d) Inspect the No.3 cooling fan relay operation.
- (1) Apply battery positive voltage across terminals 85 and 86.
  - (2) Using an ohmmeter, check that there is continuity between terminals 30 and 87.

If there is no continuity, replace the relay.

- (e) Reinstall the No.3 cooling fan relay.



## OIL AND FILTER INSPECTION

LU08A-06

### 1. CHECK ENGINE OIL QUALITY

Check the oil for deterioration, entry of water, discoloring or thinning.

If the oil quality is visibly poor, replace it.

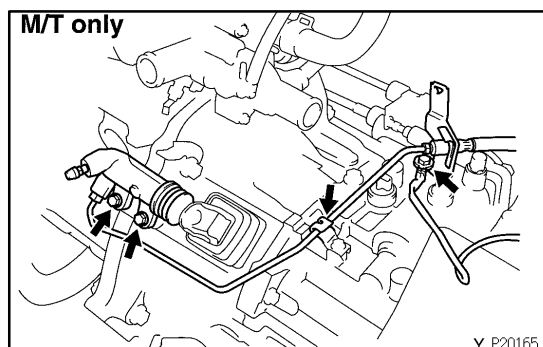
#### Oil grade:

**API grade or SH Energy-Conserving II or ILSAC multi-grade engine oil. Recommended viscosity is as shown in the illustration, with SAE 5W-30 being the preferred engine oil.**

### 2. CHECK ENGINE OIL LEVEL

The oil level should be between the "L" and "F" marks on the dipstick.

If low, check for leakage and add oil up to the "F" mark.



### 3. REMOVE OIL PRESSURE SWITCH AND INSTALL OIL PRESSURE GAUGE

(a) Remove the bolt and air intake connector.

(b) M/T only

Remove the 3 bolts, release cylinder and tube from the transaxle.

(c) Remove the oil pressure switch.

(d) Install the oil pressure gauge.

### 4. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

### 5. CHECK OIL PRESSURE

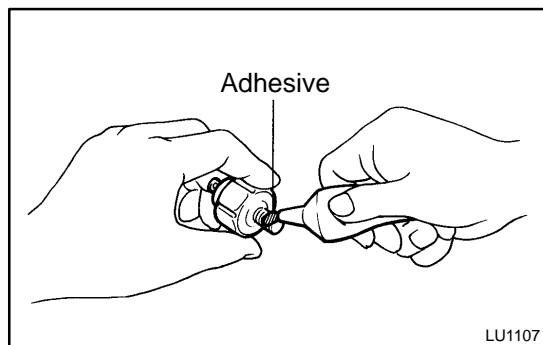
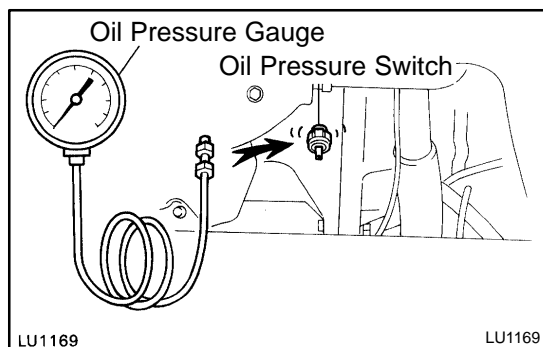
#### Oil pressure:

**At idle speed**

**29 kPa (0.3 kgf/cm<sup>2</sup>, 4.3 psi) or more**

**At 3,000 rpm**

**245 - 490 kPa (2.5 - 5.0 kgf/cm<sup>2</sup>, 36 - 71 psi)**



### 6. REMOVE OIL PRESSURE GAUGE AND REINSTALL OIL PRESSURE SWITCH

(a) Remove the oil pressure gauge.

(b) Apply adhesive to 2 or 3 threads of the oil pressure switch.

#### Adhesive:

**Part No. 08833-00080, THREE BOND 1344,**

**LOCTITE 242 or equivalent**

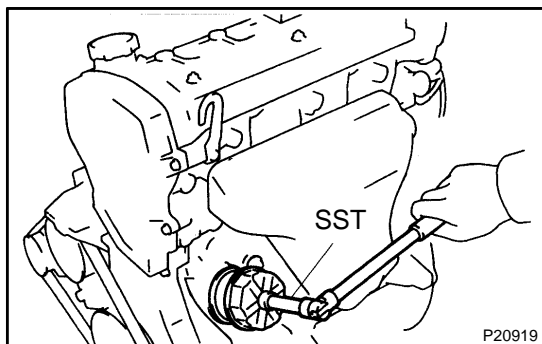
(c) Reinstall the oil pressure switch.

- (d) M/T only  
Install the release cylinder and tube with the 3 bolts.  
**Torque: 12 N·m (120 kgf-cm, 9 ft-lbf)**
  - (e) Install the air intake connector with the bolt.
- 7. START ENGINE AND CHECK FOR LEAKS**

## REPLACEMENT

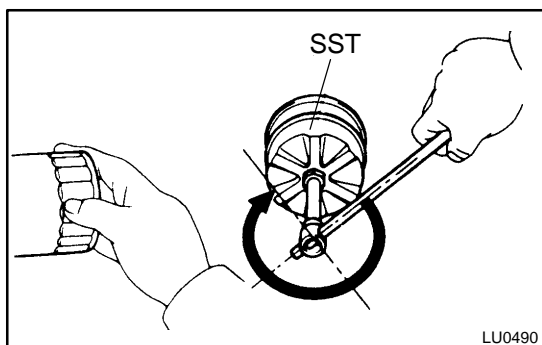
### CAUTION:

- Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer. Adequate means of skin protection and washing facilities should be provided.
- Care should be taken, therefore, when changing engine oil, to minimize the frequency and length of time your skin is exposed to used engine oil. Protective clothing and gloves, that cannot be penetrated by oil, should be worn. Wash your skin thoroughly with soap and water, or use waterless hand cleaner, to remove any used engine oil. Do not use gasoline, thinners, or solvents.
- In order to preserve the environment, used oil must be disposed of only at designated disposal sites.



### 1. DRAIN ENGINE OIL

- (a) Remove the oil filler cap.
- (b) Remove the oil drain plug and drain the oil into a container.



### 2. REPLACE OIL FILTER

- (a) Using SST, remove the oil filter.  
SST 09228-06501
- (b) Clean the filter contact surface on the filter mounting.
- (c) Lubricate the filter rubber gasket with engine oil.
- (d) Tighten filter until the gasket contacts seat of the filter mounting. Then using SST, give it an additional 3/4 turn to seat the filter.  
SST 09228-06501

### 3. FILL WITH ENGINE OIL

- (a) Clean and install the oil drain plug with a new gasket.  
**Torque: 25 N·m (250 kgf-cm, 18 ft-lbf)**
- (b) Fill the engine with new oil.

**Oil grade: See step 1 in oil pressure check**

**Oil capacity:**

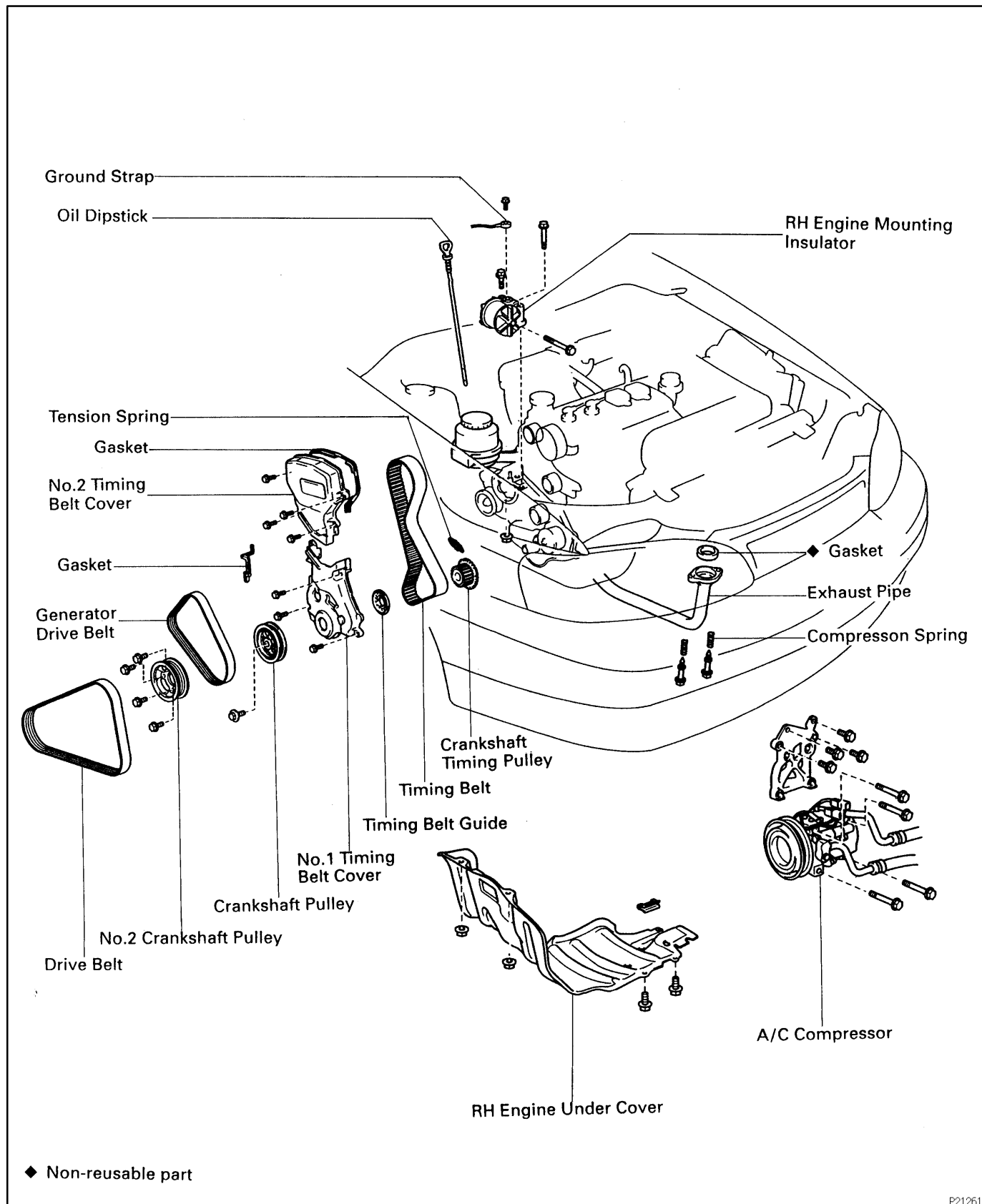
Drain and refill	w/ Oil filter change	2.8 liters (3.0 US qts, 2.5 Imp. qts)
	w/o Oil filter change	2.6 liters (2.7 US qts, 2.3 Imp. qts)
Dry fill		3.7 liters (3.9 US qts, 3.3 Imp. qts)

4. **START ENGINE AND CHECK FOR LEAKS**
5. **CHECK ENGINE OIL LEVEL**

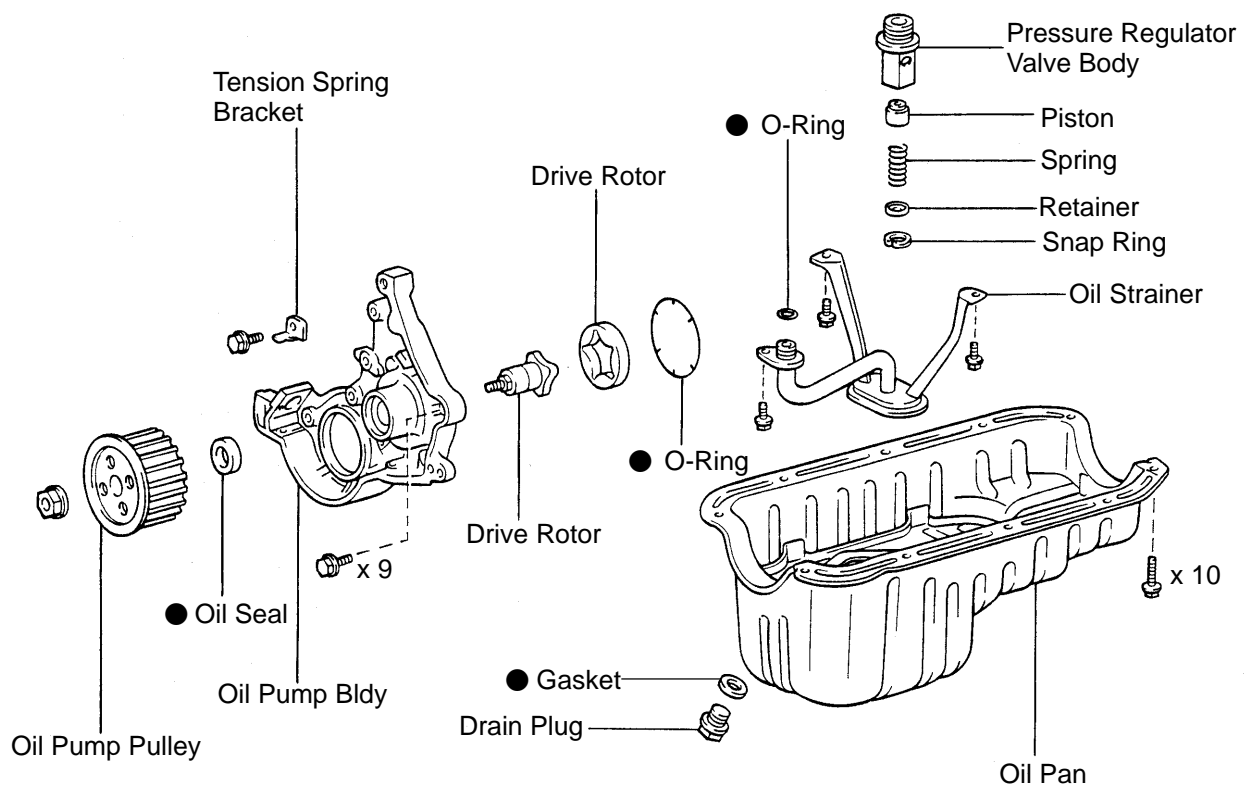


# OIL PUMP COMPONENTS

LU08C-06



P21261



● Non-reusable part

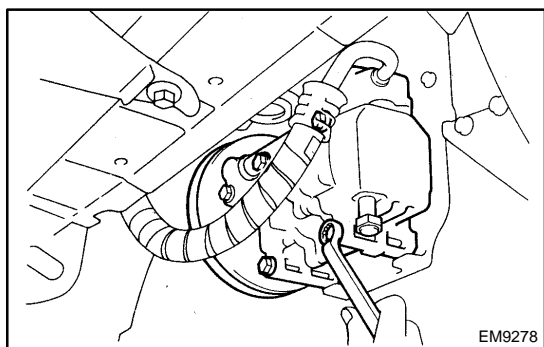
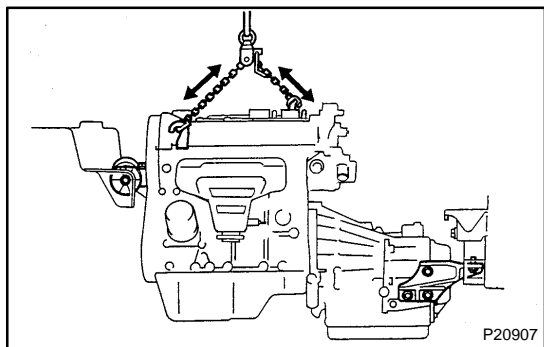
P21171

## REMOVAL

### HINT:

When repairing the oil pump, the oil pan and strainer should be removed and cleaned.

1. **REMOVE HOOD**
2. **REMOVE OIL DIPSTICK**
3. **DRAIN ENGINE OIL**
4. **REMOVE TIMING BELT (See page EM-12 )**
5. **SUSPEND ENGINE WITH ENGINE SLING DEVICE**
6. **REMOVE CRANKSHAFT TIMING PULLEY(See page EM-12 )**

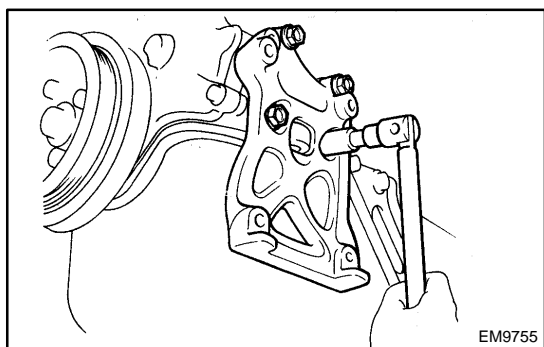


7. **w/ A/C:**  
**REMOVE A/C COMPRESSOR AND MOUNTING BRACKET**

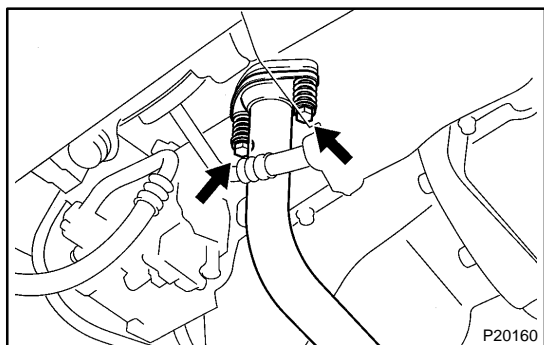
- (a) Disconnect the compressor connector.
- (b) Remove the 4 compressor mounting bolts.

### HINT:

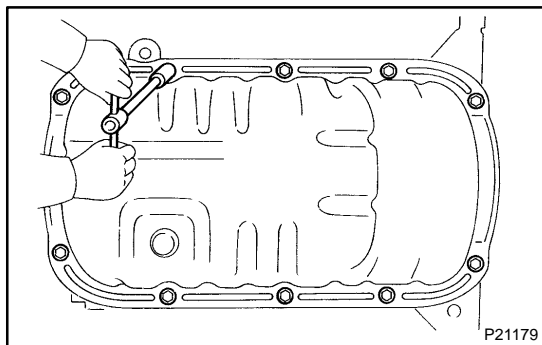
Put a side compressor, and suspend it.



- (c) Remove the 4 bolts and compressor mounting bracket.

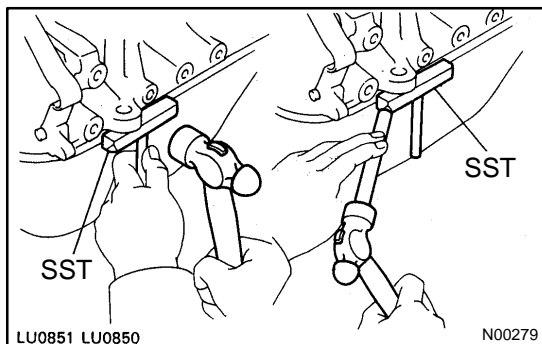


8. **DISCONNECT FRONT EXHAUST PIPE**
- (a) Remove the 2 bolts and the 2 compressor springs.
- (b) Disconnect the exhaust pipe.



## 9. REMOVE OIL PAN

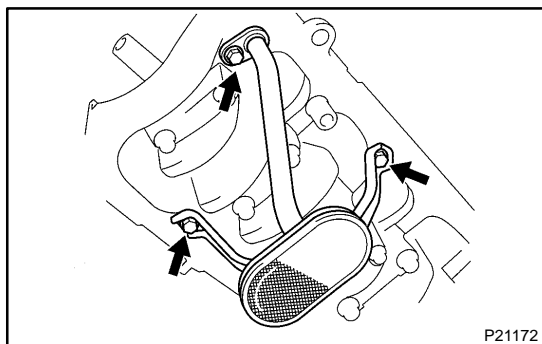
- (a) Remove the 10 bolts.



- (b) Insert the SST blade between the cylinder block and oil pan, cut off applied sealer and then remove the oil pan.  
SST 09032-00100

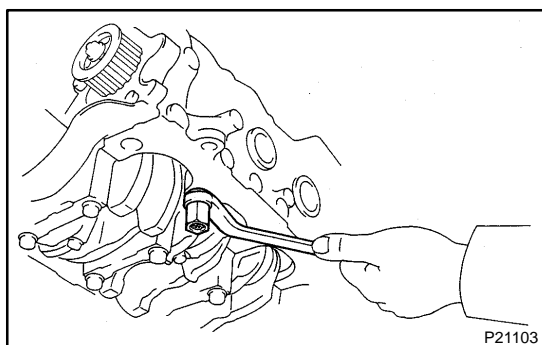
### NOTICE:

- Do not use SST for the oil pump body side and rear oil seal retainer.
- Be careful not to damage the oil pan flange.

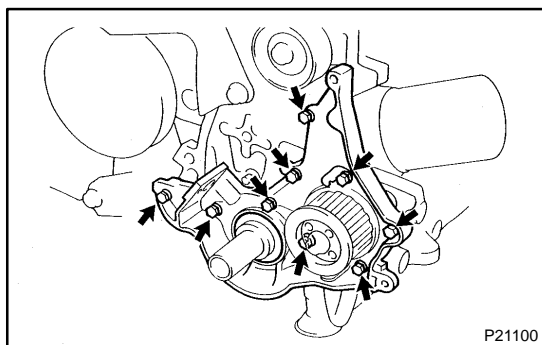


## 10. REMOVE OIL STRAINER

Remove the 3 bolts and oil strainer with the O-ring.



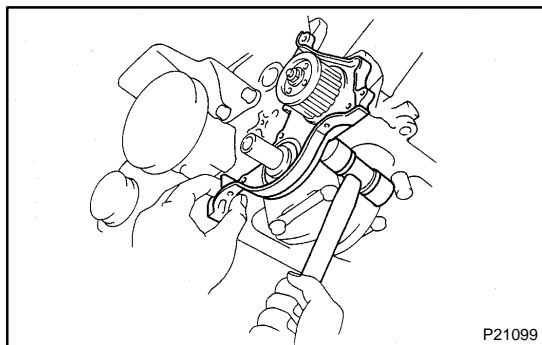
## 11. REMOVE PRESSURE REGULATOR VALVE



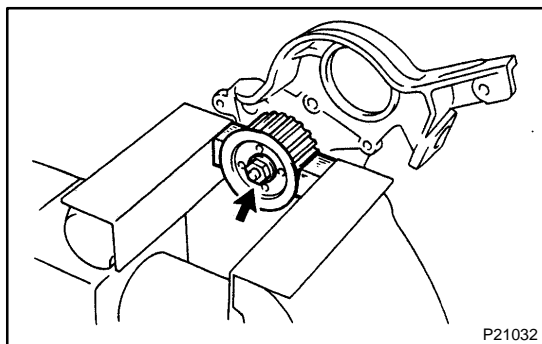
## 12. REMOVE OIL PUMP AND OIL PUMP PULLEY

- (a) Remove the 9 bolts and tension spring bracket.

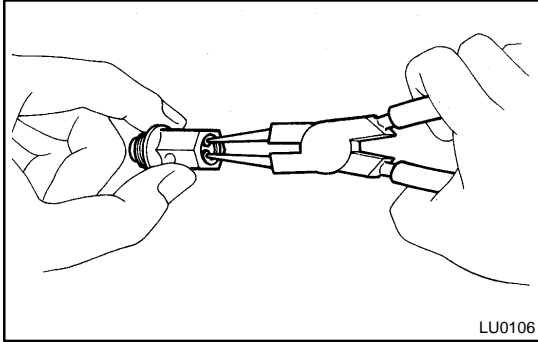
## LUBRICATION - OIL PUMP



- (b) Using a soft-faced hammer, carefully tap off the oil pump.
- (c) Remove the oil pump body and O-ring.



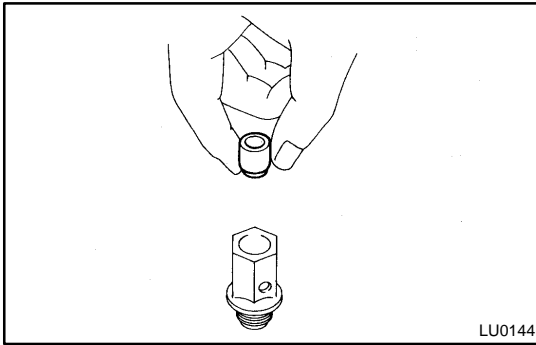
- (d) Using a vise, remove the nut and oil pump pulley.



## DISASSEMBLY

### REMOVE PRESSURE REGULATOR VALVE

- (a) Using snap ring pliers, remove the snap ring.
- (b) Remove the retainer, spring and pressure regulator valve piston.

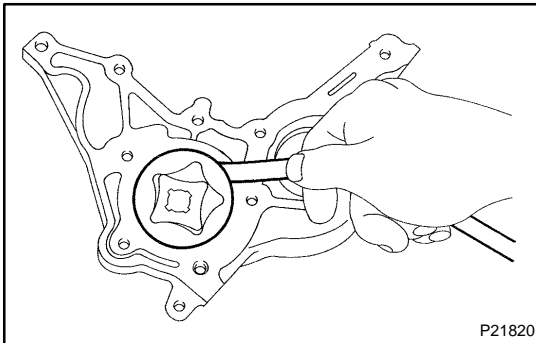


## INSPECTION

### 1. INSPECT PRESSURE REGULATOR VALVE

Coat the valve piston with engine oil and check that it falls smoothly into the valve hole by its own weight.

If necessary, replace the valve.



### 2. INSPECT ROTOR BODY CLEARANCE

Using a feeler gauge, measure the clearance between the driven rotor and pump body.

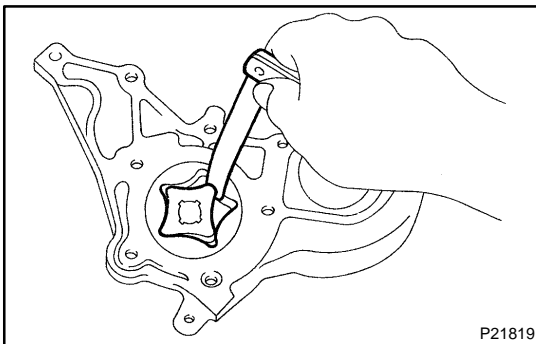
**Standard clearance:**

**0.10 - 0.16 mm (0.0039 - 0.0063 in.)**

**Maximum clearance:**

**0.20 mm (0.0079 in.)**

If the clearance is greater than maximum, replace the oil pump rotor set and/or pump body.



### 3. INSPECT TIP CLEARANCE

Using a feeler gauge, measure the clearance between both rotor tips.

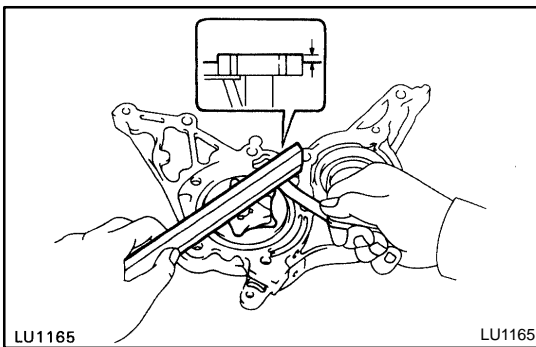
**Standard clearance:**

**0.03 - 0.14 mm (0.0012 - 0.0055 in.)**

**Maximum clearance:**

**0.20 mm (0.0079 in.)**

If the clearance is greater than maximum, replace the oil pump rotor set.



### 4. INSPECT SIDE CLEARANCE

Using a feeler gauge and flat block, measure the side clearance as shown.

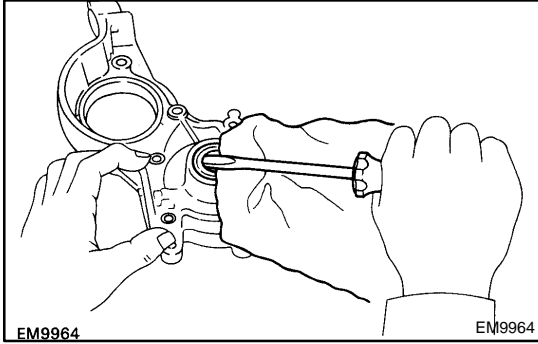
**Standard clearance:**

**2.91 - 2.97 mm (0.1145 - 0.1169 in.)**

**Minimum clearance:**

**2.90 mm (0.1142 in.)**

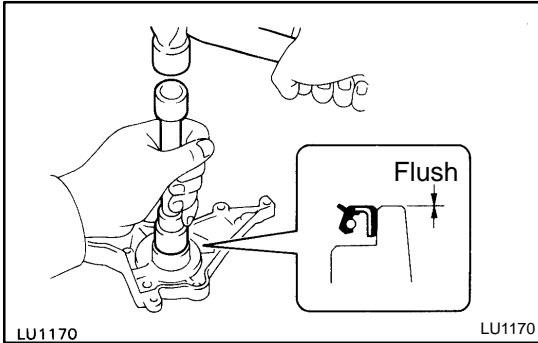
If the clearance is greater than maximum, replace the oil pump rotor set and/or pump body.



## REPLACEMENT

### 1. REMOVE OIL SEAL

Using a screwdriver, pry out the oil seal.



### 2. INSTALL OIL SEAL

- (a) Using a socket wrench and hammer, tap in a new oil seal until its surface is flush with the oil pump body edge.
- (b) Apply MP grease to the oil seal lip.

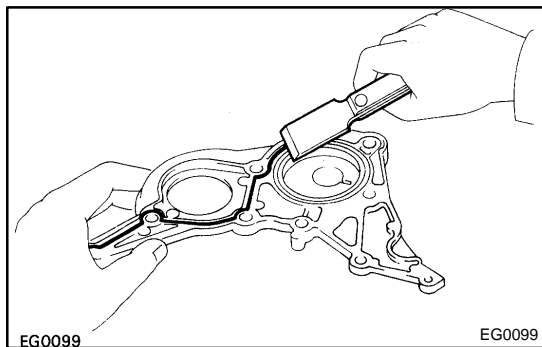
### 3. REPLACE CRANKSHAFT FRONT OIL SEAL (See page [EM-83](#) )



## REASSEMBLY

### INSTALL PRESSURE REGULATOR VALVE

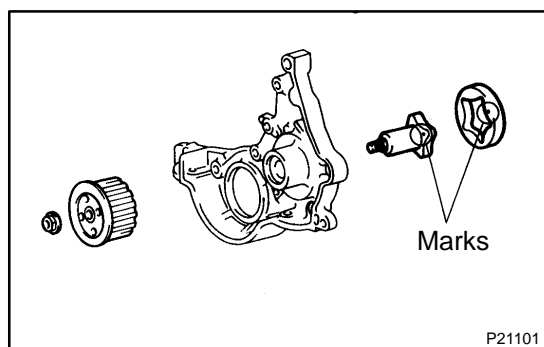
- (a) Insert the pressure regulator valve piston, spring and retainer.
- (b) Using snap ring pliers, install the snap ring.



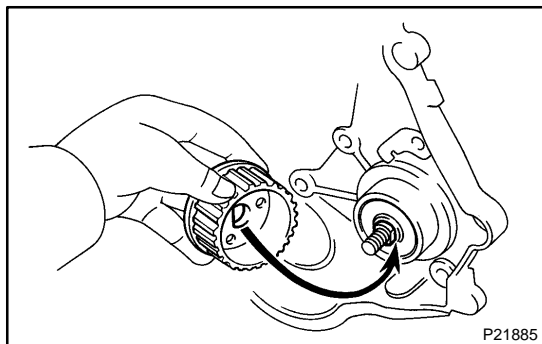
## INSTALLATION

### 1. INSTALL OIL PUMP

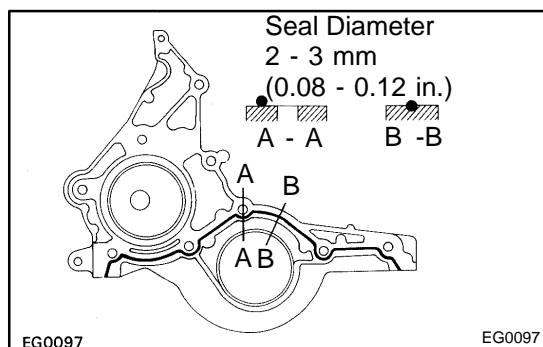
- (a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the oil pump and cylinder block.
  - Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the contact surfaces and sealing grooves.
  - Thoroughly clean all components to remove all the loose material.
  - Using a non-residue solvent, clean both sealing surfaces.



- (b) Place the driven rotors into the pump body with the marks facing the front.



- (c) Align the pulley and oil pump drive shaft.
- (d) Using a vise, install the oil pump pulley and nut.  
**Torque: 37 N·m (370 kgf-cm, 27 ft-lbf)**



- (e) Apply seal packing to the oil pump as shown in the illustration.

#### Seal packing:

#### Part No. 08826-00080 or equivalent

- Install a nozzle that has been cut to a 2 - 3 mm (0.08 - 0.12 in.) opening.

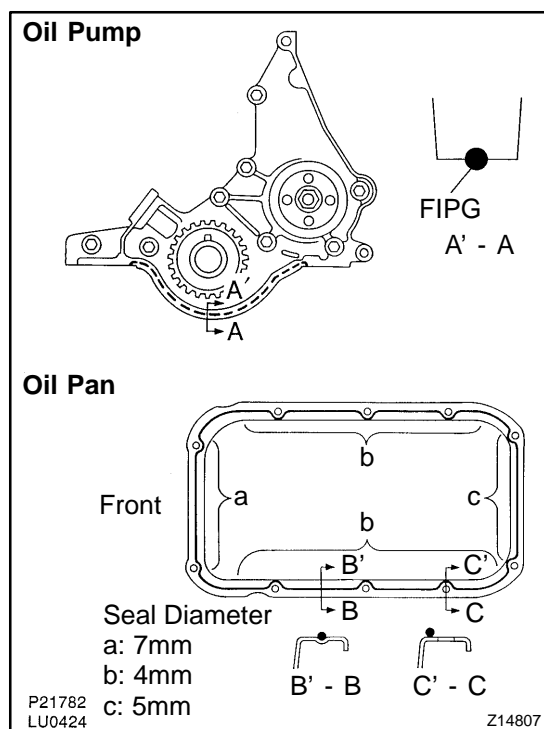
#### HINT:

Avoid applying an excessive amount to the surface.

- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
  - Immediately remove nozzle from the tube and reinstall cap.
- (f) Place a new O-ring into the cylinder block side groove.
- (g) Install the oil pump and tension spring bracket with the 9 bolts.
- Torque: 7.5 N·m (75 kgf-cm, 65 in.-lbf)**
- 2. INSTALL PRESSURE REGULATOR VALVE**
- Torque: 30 N·m (300 kgf-cm, 22 ft-lbf)**
- 3. INSTALL OIL STRAINER**
- (a) Apply a little engine oil to a new O-ring.
- (b) Install the O-ring to the oil strainer.
- (c) Install the oil strainer with the 3 bolts.
- Torque: 10 N·m (100 kgf-cm, 7 ft-lbf)**
- 4. INSTALL OIL PAN**
- (a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the oil pan, oil pump, rear oil seal retainer and cylinder block.
- Using a razor blade and gasket scraper, remove all the packing (FIPG) material from the contact surfaces.
  - Thoroughly clean all components to remove all the loose material.
  - Using a non-residue solvent, clean both sealing surfaces.

**NOTICE:**

**Do not use a solvent which will affect the painted surfaces.**



- (b) Apply seal packing to the oil pump, rear oil seal retainer and oil pan as shown in the illustration.

**Seal packing:**

**Part No. 08826-00080 or equivalent**

**Seal diameter:**

**7 mm ( 0.28 in.) for a**

**4 mm ( 0.16 in.) for b**

**5 mm ( 0.17 in.) for c**

- Install a nozzle that has been cut to a 4 mm ( 0.16 in.) or 7 mm (0.28 in.) or 5 mm (0.17 in.) opening.

**HINT:**

Avoid applying an excess amount to the surface.

- Parts must be assembled within 15 minutes of application. Otherwise, the material must be removed and reapplied.
  - Immediately remove nozzle from tube and reinstall cap after use.
- (c) Install the oil pan with the 10 bolts.
- Torque: 13 N·m (130 kgf-cm, 10 ft-lbf)**
- 5. CONNECT FRONT EXHAUST PIPE**

- (a) Place a new gasket on the exhaust pipe.
- (b) Connect the exhaust pipe to the exhaust manifold with 2 compression springs and 2 bolts.  
**Torque: 62 N·m (630 kgf-cm, 46 ft-lbf)**
- 6. **w/ A/C:**  
**INSTALL A/C COMPRESSOR AND MOUNTING BRACKET**
  - (a) Install the compressor mounting bracket with the 4 bolts.  
**Torque: 27 N·m (270 kgf-cm, 20 ft-lbf)**
  - (b) Install the A/C compressor to the bracket with the 4 bolts.  
**Torque: 25 N·m (250 kgf-cm, 18 ft-lbf)**
  - (c) Connect the A/C compressor connector.
- 7. **INSTALL CRANKSHAFT TIMING PULLEY (See page [EM-17](#) )**
- 8. **INSTALL TIMING BELT (See page [EM-17](#) )**
- 9. **INSTALL OIL DIPSTICK**
- 10. **FILL WITH ENGINE OIL**
- 11. **START ENGINE AND CHECK FOR LEAKS**
- 12. **CHECK ENGINE OIL LEVEL**
- 13. **INSTALL HOOD**

# IGNITION SYSTEM ON-VEHICLE INSPECTION

IG08E-06

## NOTICE:

"Cold" and "Hot" in following sentences express the temperature of the coils themselves. "Cold" is from -10°C (14°F) to 50°C (122°F) and "Hot" is from 50°C (122°F) to 100°C (212°F).

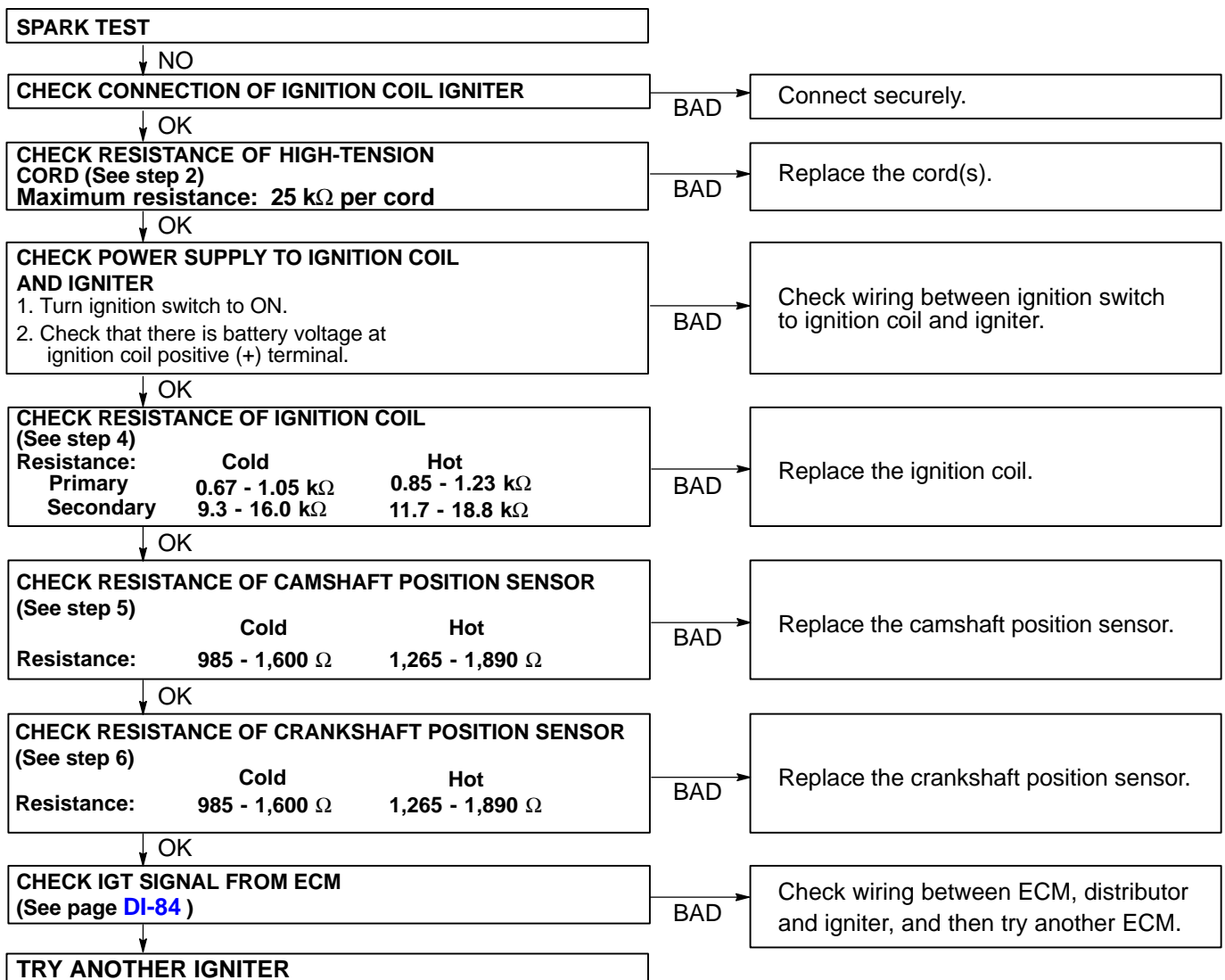
## 1. INSPECT SPARK TEST

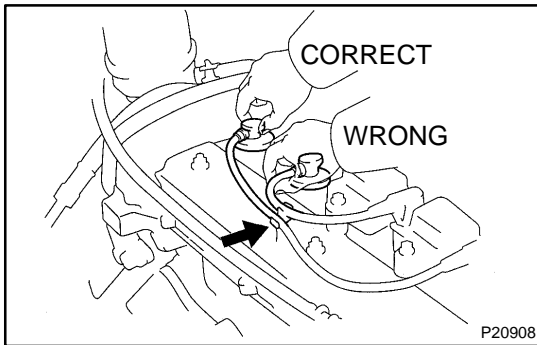
Check that the spark occurs.

- (1) Disconnect the high-tension cord from the spark plug.
- (2) Remove the spark plugs.
- (3) Install the spark plugs to the high-tension cord.
- (4) Ground the spark plug.
- (5) See if spark occurs while engine is being cranked.

## NOTICE:

To prevent gasoline from being injected from injectors during this test, crank the engine for no more than 5 - 10 seconds at time. If the spark does not occur, do the test as follows:





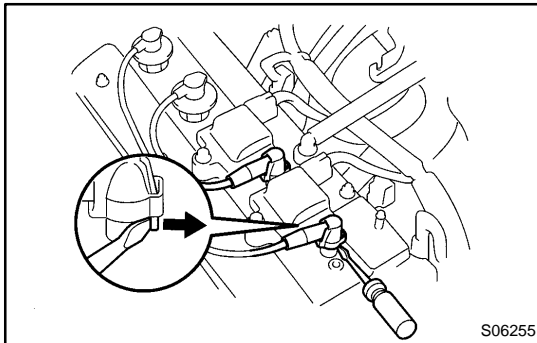
## 2. INSPECT HIGH-TENSION CORDS

- (a) Disconnect the high-tension cords from the spark plugs.
- (1) Disconnect the high-tension cords at the rubber boot. Do not pull on the cords.

### NOTICE:

**Pulling on or bending the cords may damage the conductor inside.**

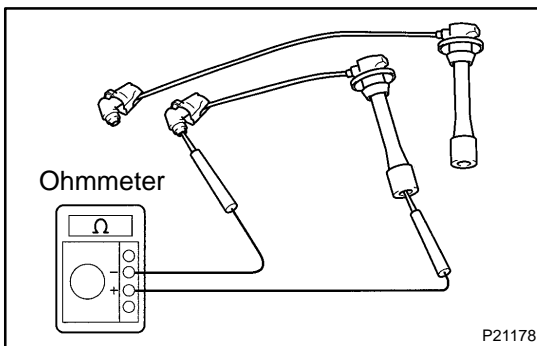
- (2) Disconnect the high-tension cords from the clamp.



- (b) Disconnect the high-tension cords from the ignition coils.
- (1) Using a screwdriver, lift up the lock claw and disconnect the holder from the ignition coils.
  - (2) Disconnect the high-tension cord at the grommet.
  - (3) Do not pull on the cord.

### NOTICE:

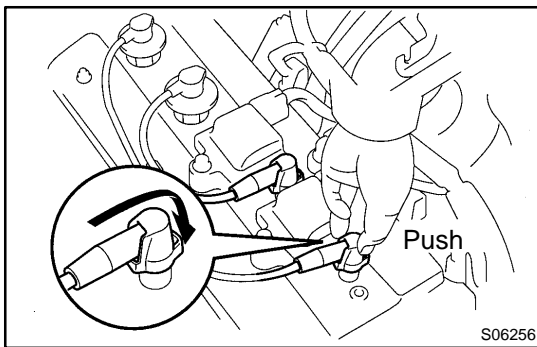
**Pulling on or bending the cords may damage the conductor inside. Do not wipe any of the oil from the grommet after the high-tension cord is disconnected.**



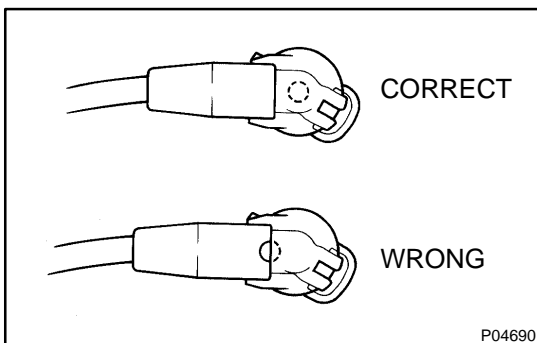
- (c) Reconnect the high-tension cords to the ignition coils.

**Maximum resistance: 25 kΩ per cord**

If the resistance is greater than maximum, check the terminals. If necessary, replace the high-tension cord.



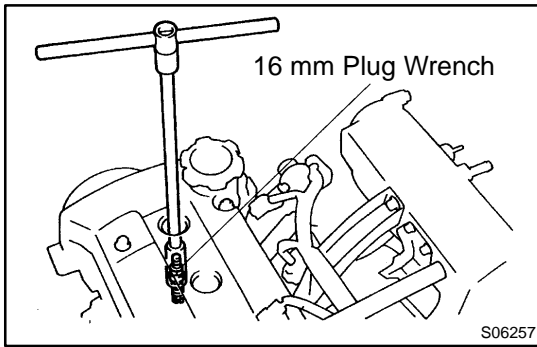
- (d) Reinstall the high-tension cords.
- (1) Assemble the holder and grommet.
  - (2) Align the spline of the ignition coil with the spline of the holder, and push in the cord.



### NOTICE:

**Check that the holder is correctly installed to the grommet and distributor cap as shown in the illustration.**

- (3) Check that the lock claw of the holder is engaged by lightly pulling the holder.
  - (4) Connect the high-tension cords to the clamp.
- (e) Reconnect high-tension cords to spark plugs.



### 3. INSPECT SPARK PLUGS

- (a) Disconnect high-tension cords from spark plugs.
- (b) Using a 16 mm plug wrench, remove the spark plug.



- (c) Using a spark plug cleaner or wire brush, clean the spark plug.

If the electrode has traces of wet carbon, allow it to dry and then clean with a spark plug cleaner.

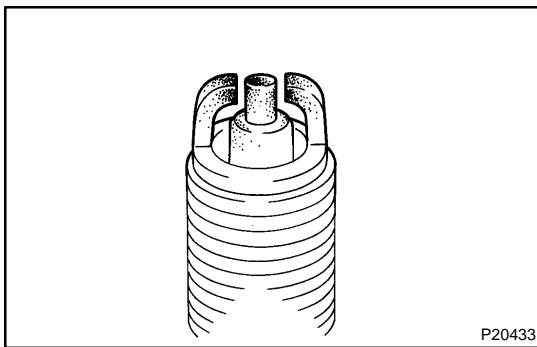
**Air pressure:**

**Below 588 kPa (6 kgf/cm<sup>2</sup>, 85 psi)**

**Duration: 20 seconds or less**

**HINT:**

If there are traces of oil, remove it with gasoline before using the spark plug cleaner.

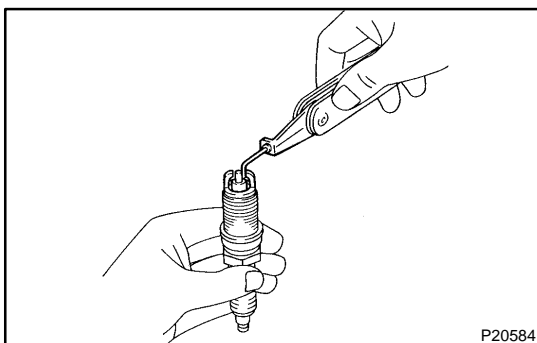


- (d) Visually check the spark plug for thread damage and insulator damage.

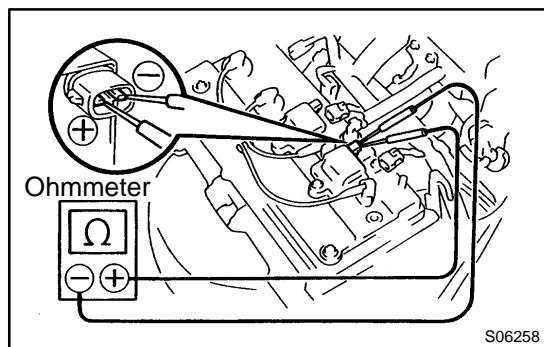
If abnormal, replace the spark plug.

**Recommended spark plug:**

DENSO	K16TR11
NGK	BKR5EKB11



- (e) Inspect the electrode gap.  
**Correct electrode gap: 1.1 mm (0.043 in.)**
- (f) Using a 16 mm plug wrench, remove the spark plug.  
**Torque: 18 N·m (180 kgf·cm, 13 ft·lbf)**
- (g) Reconnect the high-tension cords from the ignition coils.



#### 4. INSPECT IGNITION COILS WITH IGNITER

- Disconnect the high-tension cords from the ignition coil.
- Disconnect ignition coils connector.
- Inspect the primary coil resistance.

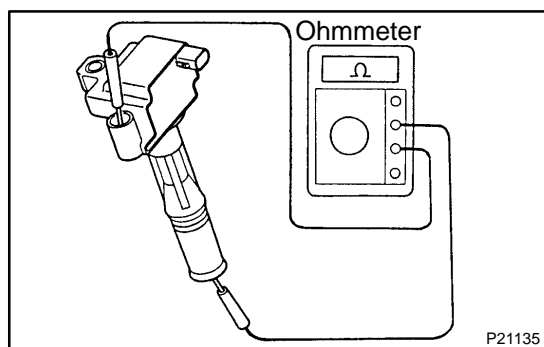
Using an ohmmeter, measure the resistance between the positive (+) and negative (-) terminals.

##### Primary coil resistance :

Cold	0.67 - 1.05 $\Omega$
Hot	0.85 - 1.23 $\Omega$

If the resistance is not as specified, replace the ignition coil.

- Remove ignition coils.



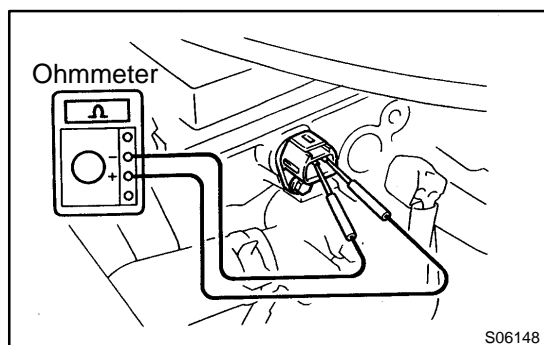
- Inspect the secondary coil resistance.  
Using an ohmmeter, measure the resistance between the positive (+) and high-tension terminal.

##### Secondary coil resistance :

Cold	9.3 - 16.0 k $\Omega$
Hot	11.7 - 18.8 k $\Omega$

If the resistance is not as specified, replace the ignition coil.

- Reinstall ignition coils
- Reconnect ignition coil connectors.
- Reconnect high-tension cords from ignition coils.



#### 5. INSPECT CAMSHAFT POSITION SENSOR

- Disconnect camshaft position sensor connector.
- Inspect camshaft position sensor resistance.  
Using an ohmmeter, measure the resistance between terminals.

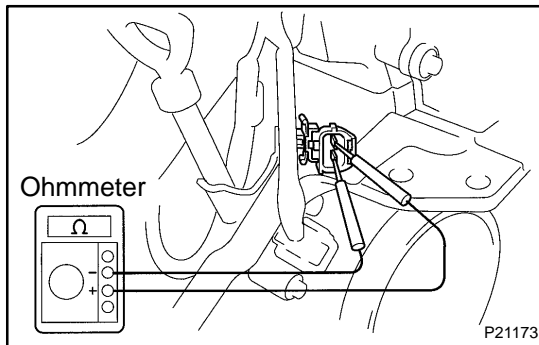
##### Resistance:

Cold	985 - 1,600 $\Omega$
Hot	1,265 - 1,890 $\Omega$



If the resistance is not as specified, replace the camshaft position sensor.

- (c) Reconnect camshaft position sensor connector.



## 6. INSPECT CRANKSHAFT POSITION SENSOR

- (a) Disconnect crankshaft position sensor connector.

- (b) Inspect crankshaft position sensor resistance.

Using an ohmmeter, measure the resistance between terminals.

### Resistance:

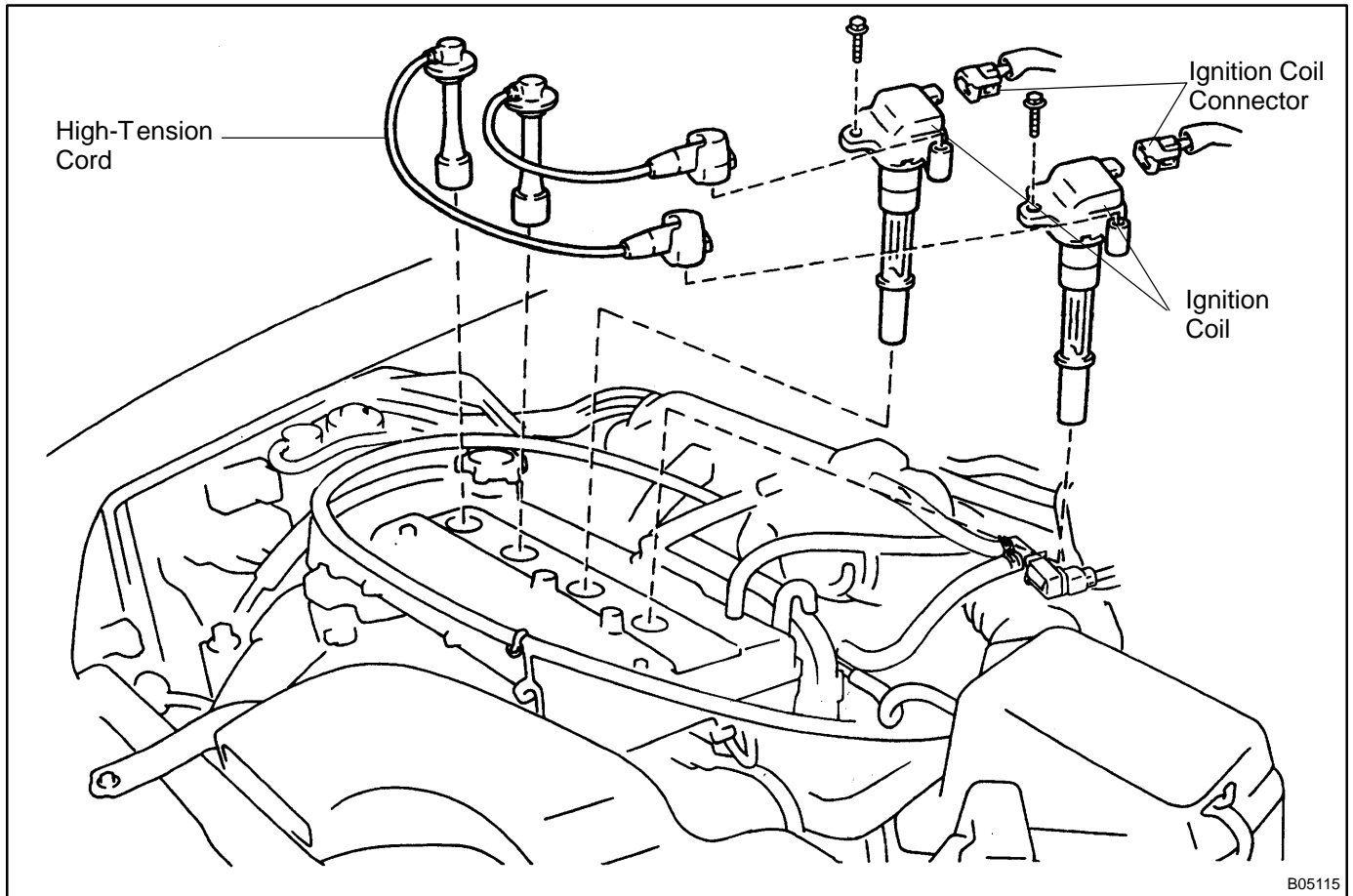
Cold	985 - 1,600 $\Omega$
Hot	1,265 - 1,890 $\Omega$

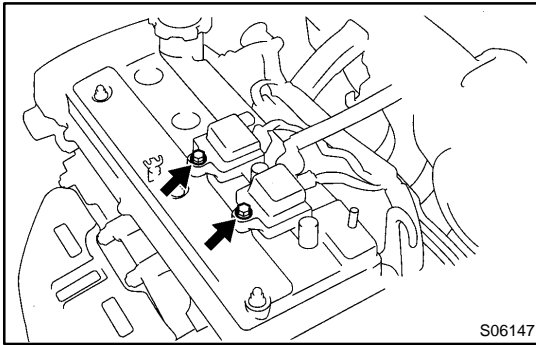
If the resistance is not as specified, replace the crankshaft position sensor.

- (c) Connect crankshaft position sensor connector.

## IGNITION COIL COMPONENTS

IG08F-01





## REMOVAL

1. **DISCONNECT HIGH-TENSION CORDS FROM IGNITION COILS (See page [IG-1](#) )**

2. **REMOVE IGNITION COILS**

- (a) Disconnect the 2 connectors from the ignition coils.
- (b) Remove the 2 bolts and 2 ignition coils from cylinder head.

**Torque: 8.5 N·m (85 kgf·cm, 70 in.-lbf)**

**HINT:**

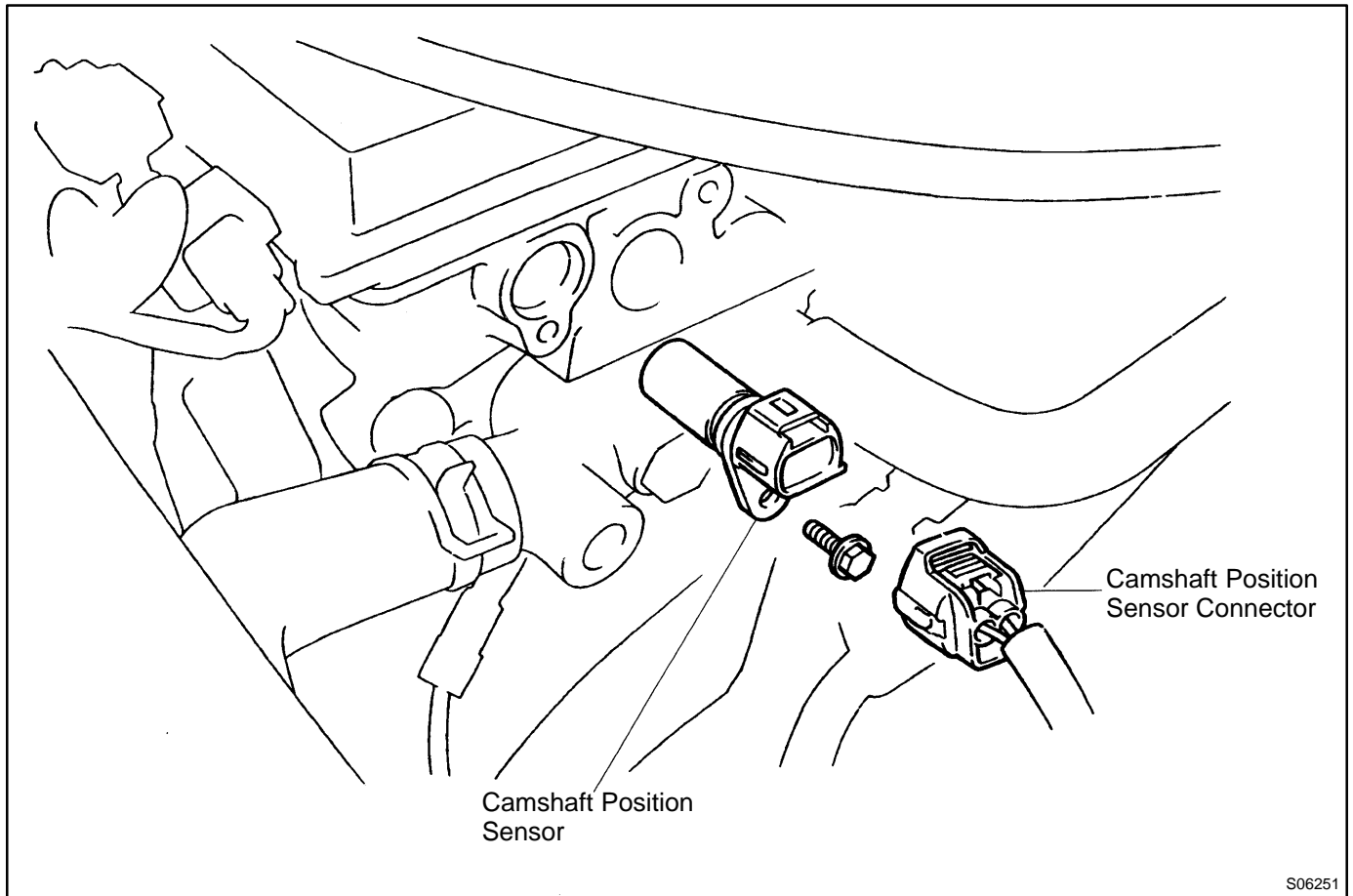
Arrange the ignition coils in correct order.

## INSTALLATION

Installation is in the reverse order of removal (See page [IG-7](#) ).

## CAMSHAFT POSITION SENSOR COMPONENTS

IG08I-01



## REMOVAL

### REMOVE CAMSHAFT POSITION SENSOR

- (a) Disconnect the camshaft position sensor connector.
- (b) Remove the bolt and camshaft position sensor.

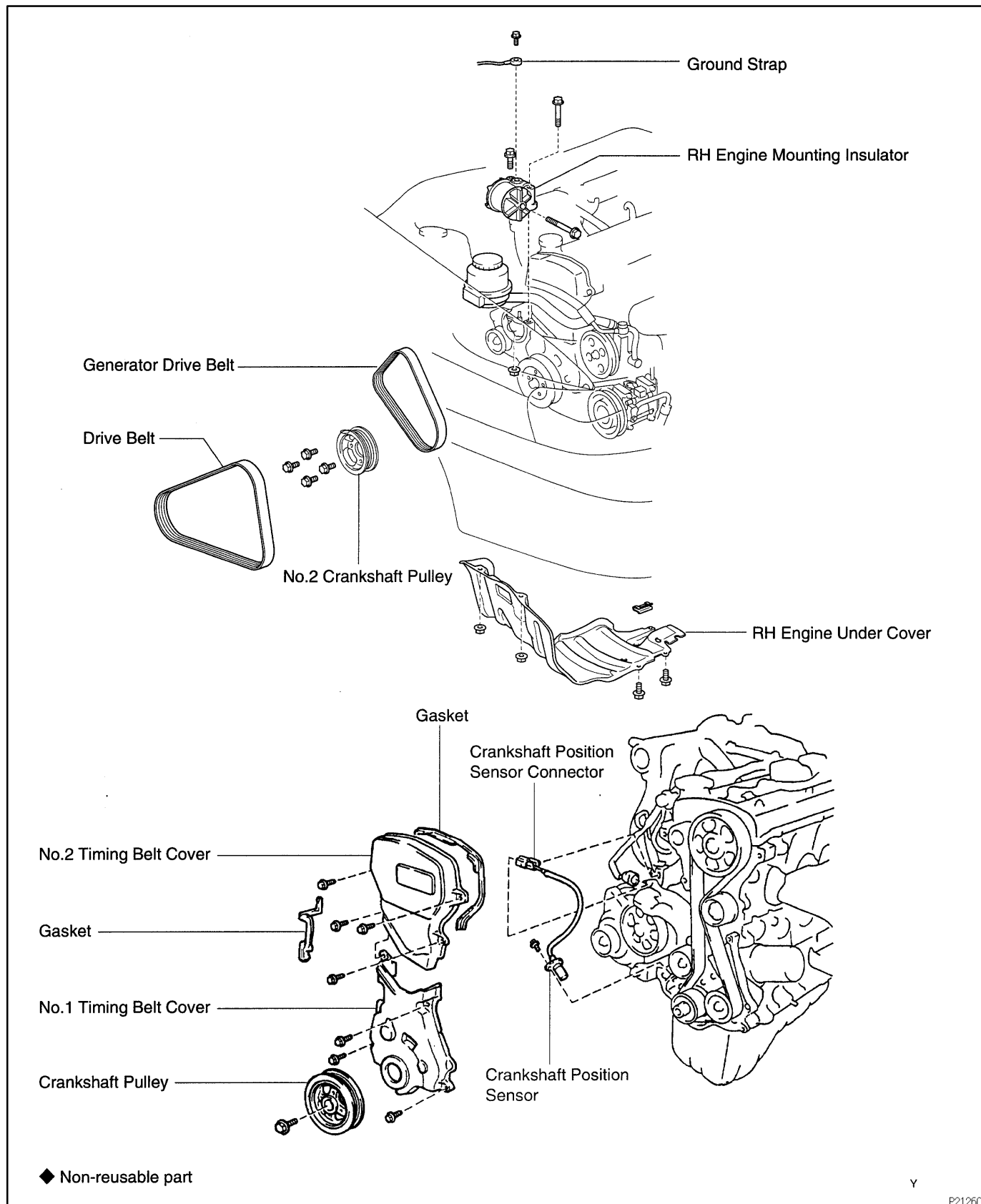
**Torque: 8 N·m (80 kgf·cm, 69 in.-lbf)**

## INSTALLATION

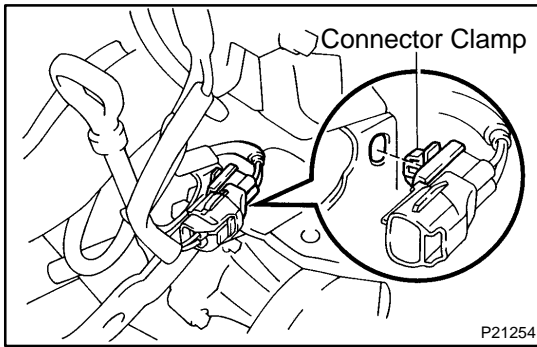
Installation is in the reverse order of removal (See page [IG-10](#) ).

# CRANKSHAFT POSITION SENSOR COMPONENTS

IG08L-05

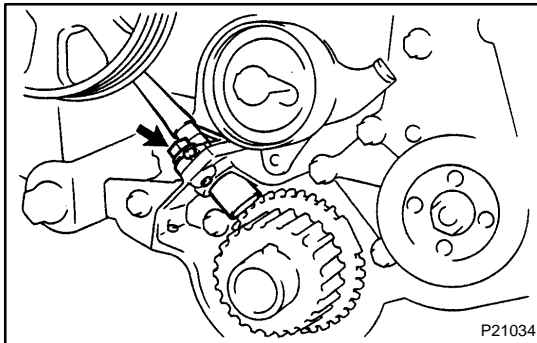






## REMOVAL

1. DISCONNECT CRANKSHAFT POSITION SENSOR CONNECTOR AND CLAMP
2. REMOVE RH ENGINE UNDER COVER
3. REMOVE NO.2 TIMING BELT COVER (See page [EM-12](#))



4. REMOVE CRANKSHAFT POSITION SENSOR

Remove the bolt and disconnect the crankshaft position sensor.

**Torque: 8 N·m (80 kgf·cm, 69 in.·lbf)**

## INSTALLATION

Installation is in the reverse order of removal (See page [IG-13](#) ).

# STARTING SYSTEM

## ON-VEHICLE INSPECTION

ST07Z-01

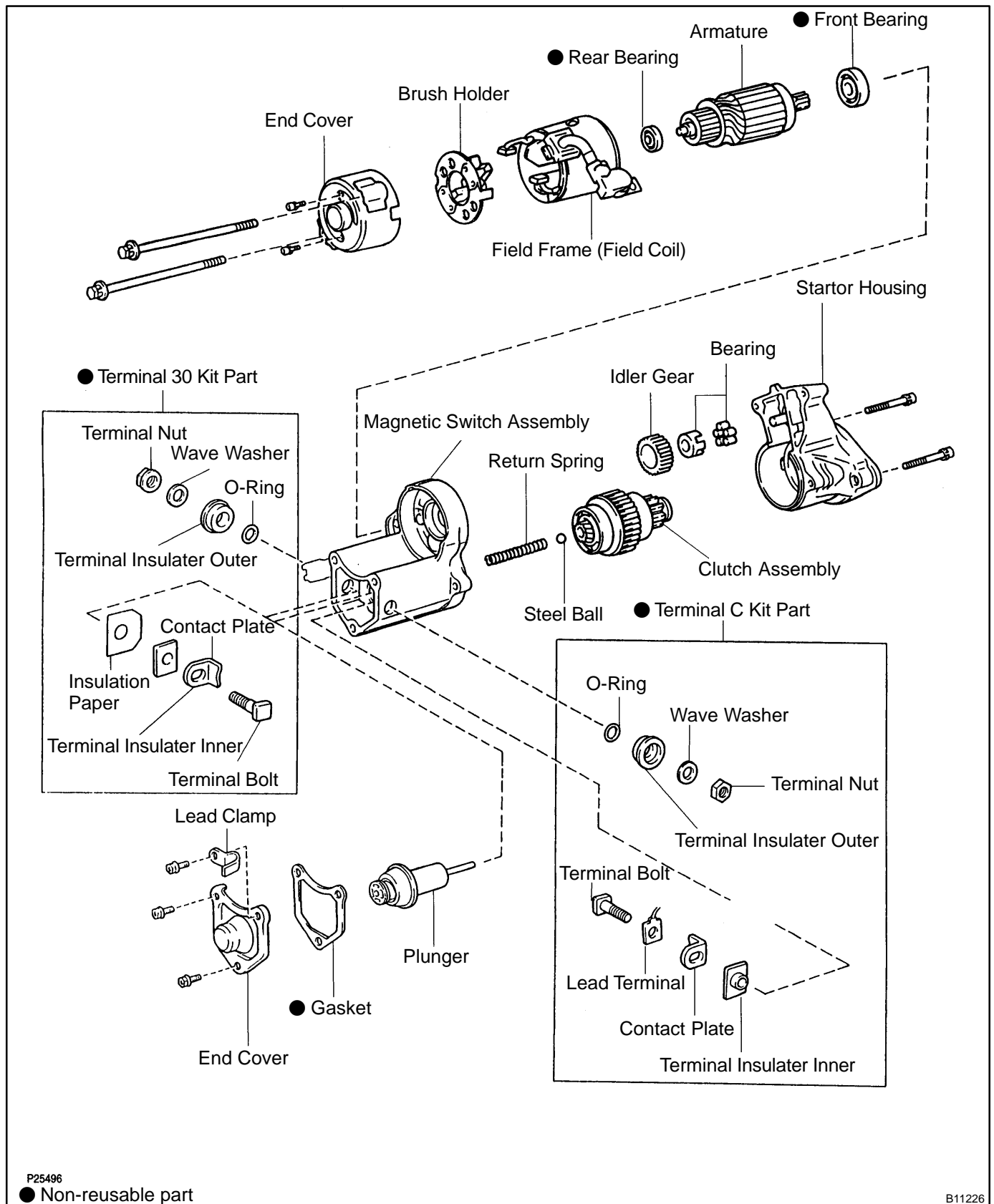
**NOTICE:**

Before changing the starter, check the following items again:

- Connector connection
- Accessory installation, e.g.: theft deterrent system

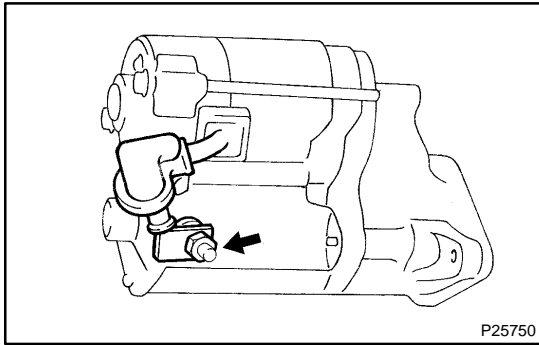
# STARTER (Reduction Type) COMPONENTS

ST0N2-01



## REMOVAL

REMOVE STARTER (See page [ST-16](#) ).

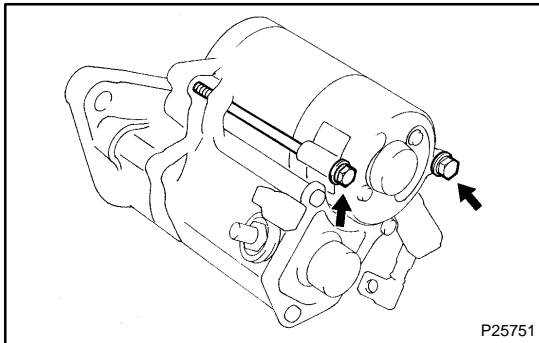


## DISASSEMBLY

### 1. REMOVE FIELD FRAME AND ARMATURE

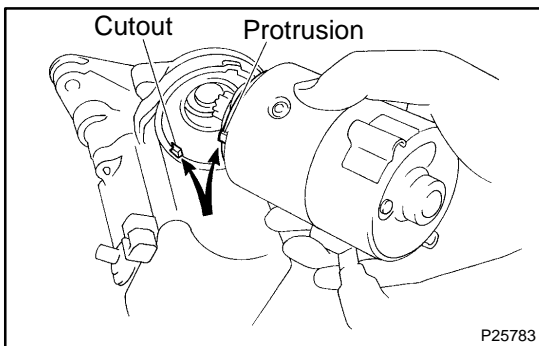
- (a) Remove the nut, and disconnect the lead wire from the magnetic switch terminal.

**Torque: 5.9 N·m (60 kgf·cm, 52 in.-lbf)**



- (b) Remove the 2 through bolts.

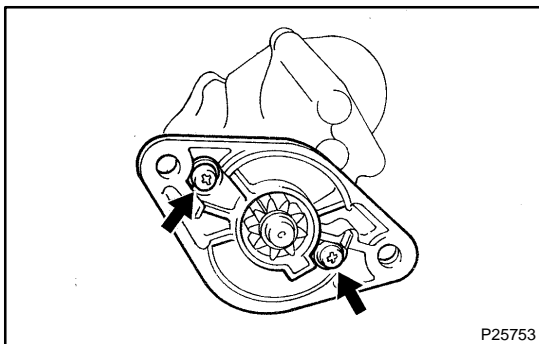
**Torque: 9.3 N·m (95 kgf·cm, 82 in.-lbf)**



- (c) Pull out the field frame together with the armature.

**HINT:**

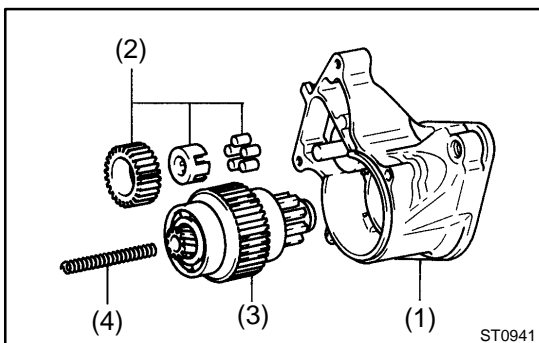
Align the protrusion of the field frame with the groove of the magnetic switch.



### 2. REMOVE STARTER HOUSING, CLUTCH ASSEMBLY AND GEAR

- (a) Remove the 2 screws.

**Torque: 9.3 N·m (95 kgf·cm, 82 in.-lbf)**

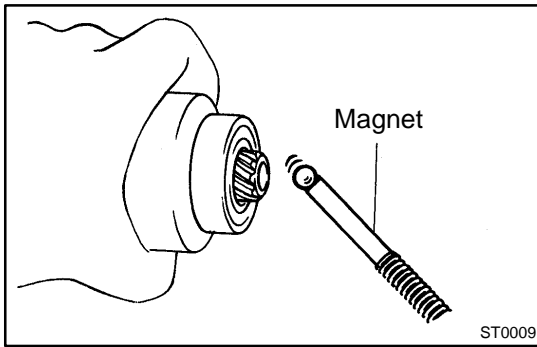


- (b) Remove these parts from the magnetic switch:

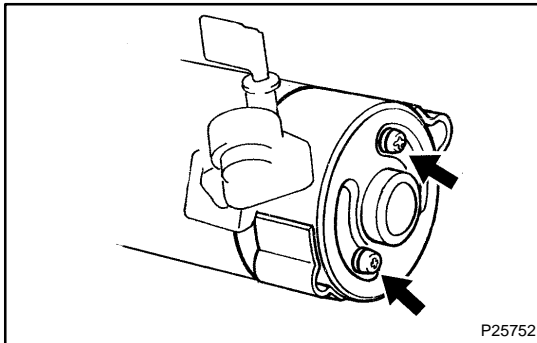
- (1) Starter housing
- (2) Idler gear and bearing
- (3) Clutch assembly
- (4) Return spring

**HINT:**

Insert the return spring in to the magnetic switch hole.

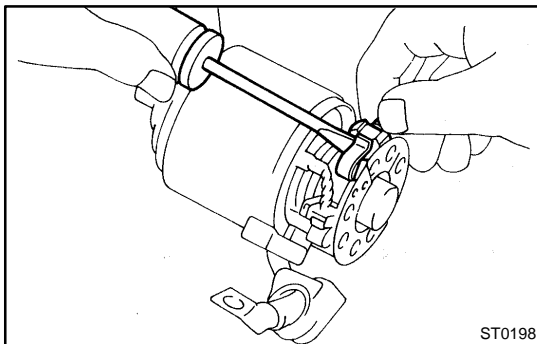
**3. REMOVE STEEL BALL**

Using a magnetic finger, remove the steel ball from the clutch shaft hole.

**4. REMOVE BRUSHES AND BRUSH HOLDER**

(a) Remove the 2 screws and end cover from the field frame.

**Torque: 1.5 N·m (15 kgf·cm, 13 in.-lbf)**

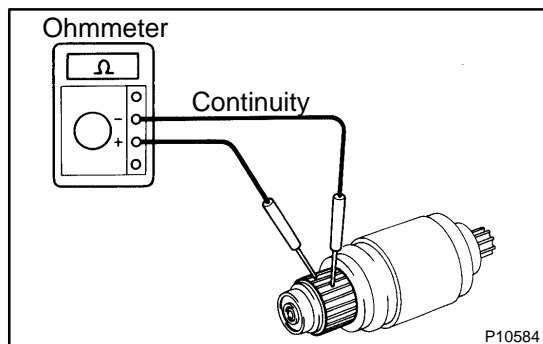


(b) Using a screwdriver, hold the spring back and disconnect the brush from the brush holder. Disconnect the 4 brushes, and remove the brush holder.

**NOTICE:**

**Check that the positive (+) lead wire are not grounded.**

**5. REMOVE ARMATURE FROM FIELD FRAME**

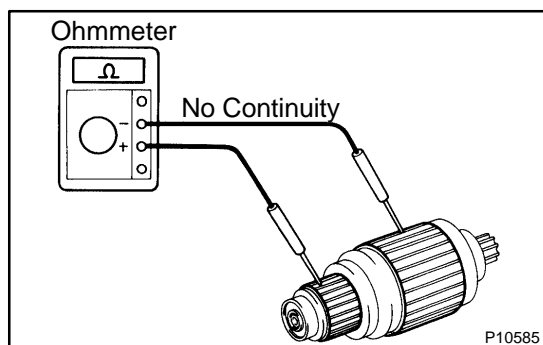


## INSPECTION

### 1. INSPECT COMMUTATOR FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the segments of the commutator.

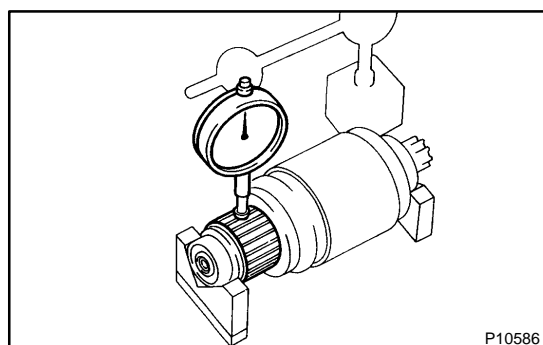
If there is no continuity between any segment, replace the armature.



### 2. INSPECT COMMUTATOR FOR GROUND

Using an ohmmeter, check that there is continuity between the segments of the commutator.

If there is no continuity between any segment, replace the armature.



### 3. INSPECT COMMUTATOR FOR DIRTY AND BURNT SURFACE

If the surface is dirty or burnt, correct it with sandpaper (No.400) or on a lathe.

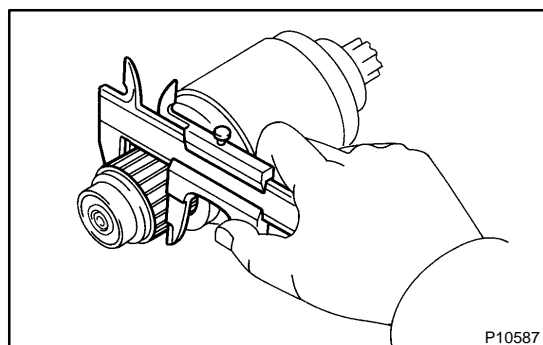
### 4. INSPECT COMMUTATOR CIRCLE RUNOUT

(a) Place the commutator on V-blocks.

(b) Using a dial gauge, measure the circle runout.

**Maximum circle runout: 0.05 mm (0.0020 in.)**

If the circle runout is greater than maximum, correct it on a lathe.



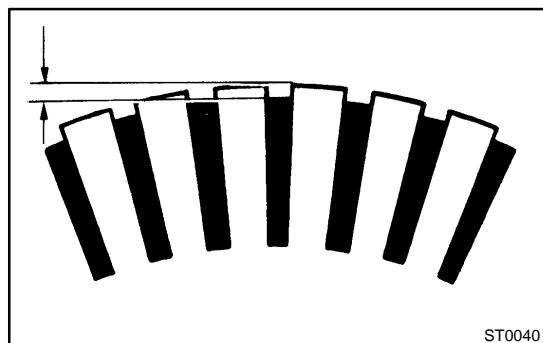
### 5. INSPECT COMMUTATOR DIAMETER

Using a vernier caliper, measure the commutator diameter.

**Standard diameter: 30.0 mm (1.181 in.)**

**Minimum undercut depth: 29.0 mm (1.412 in.)**

If the diameter is less than minimum, replace the armature.



### 6. INSPECT UNDERCUT DEPTH

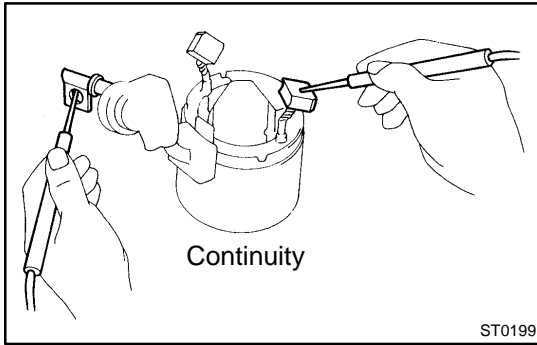
Check that the undercut depth is clean and free of foreign materials. Smooth out the edge.

**Standard undercut depth: 0.6 mm (0.24 in.)**

**Minimum undercut depth: 0.2 mm (0.008 in.)**

If the undercut depth is less than minimum, correct it with a hacksaw blade.

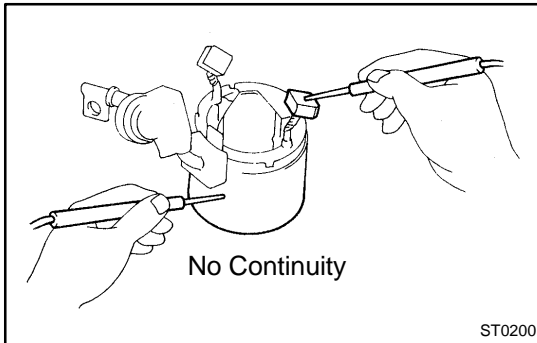




### 7. INSPECT FIELD COIL FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the lead wire and field coil brush lead.

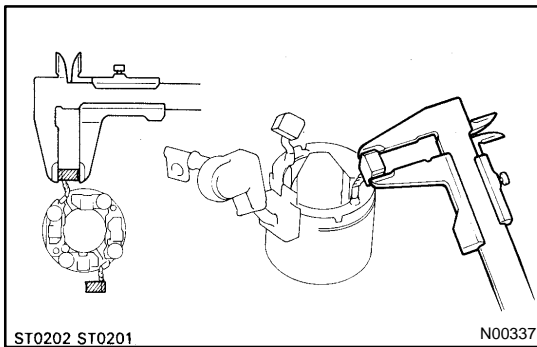
If there is no continuity, replace the field frame.



### 8. INSPECT FIELD COIL FOR GROUND

Using an ohmmeter, check that there is no continuity between the field coil end and field frame.

If there is continuity, replace the field frame.



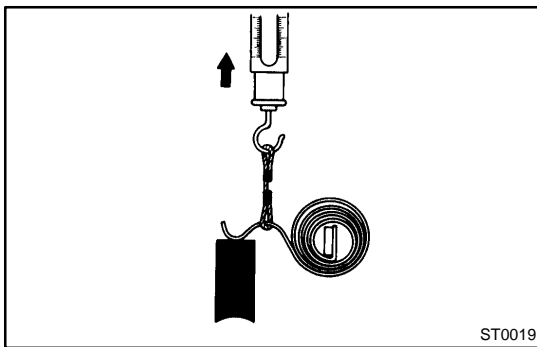
### 9. INSPECT BRUSH LENGTH

Using a vernier caliper, measure the brush length.

**Standard length: 13.5 mm (0.531 in.)**

**Minimum length: 8.5 mm (0.334 in.)**

If the length is less than minimum, replace the brush holder and field frame.



### 10. INSPECT BRUSH SPRING LOAD

Take the pull scale reading the instant the brush spring separates from the brush.

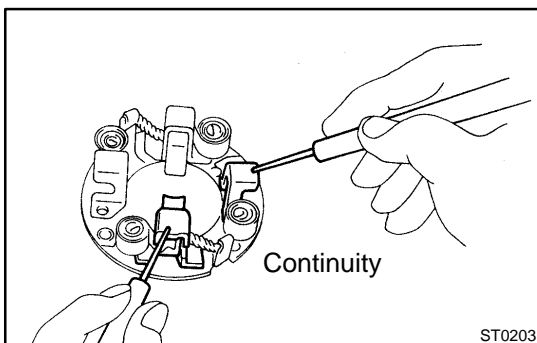
**Standard spring installed load:**

**17.6 - 23.5 N (1.79 - 2.39 kgf, 4.0 - 5.3 lbf)**

**Minimum spring installed load:**

**11.8 N (1.2 kgf, 2.6 lbf)**

If the installed load is not as specified, replace the brush springs.



### 11. INSPECT BRUSH HOLDER INSULATION

Using an ohmmeter, check that there is no continuity between the positive (+) and negative (-) brush holders.

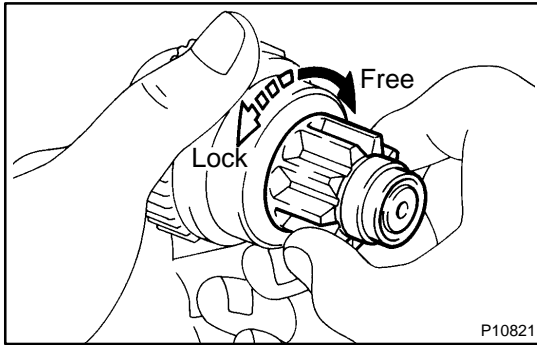
If there is continuity, repair or replace the brush holder.

### 12. INSPECT GEAR TEETH

Check the gear teeth on the pinion gear, idle gear and the clutch assembly for wear or damage.

If damaged, replace the gear or clutch assembly.

If damaged, also check the drive plate ring gear for wear or damage.

**13. INSPECT CLUTCH PINION GEAR**

Rotate the pinion gear clockwise, and check that it turns freely. Try to rotate the pinion gear counterclockwise and check that it locks.

If necessary, replace the clutch assembly.

**14. INSPECT REAR BEARING**

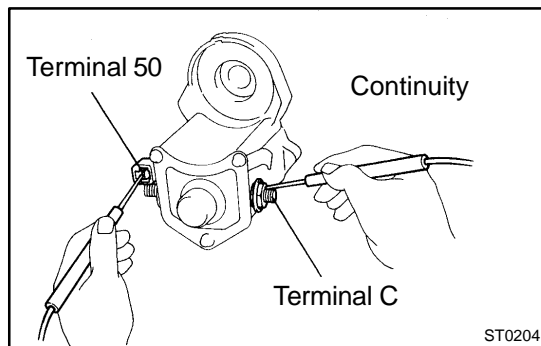
Turn each bearing by hand while applying inward force.

If resistance is felt or the bearing sticks, replace the bearing.

**15. INSPECT FRONT BEARING**

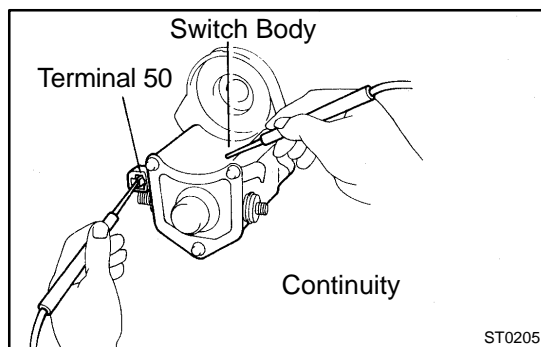
Turn each bearing by hand while applying inward force.

If resistance is felt or the bearing sticks, replace the bearing.

**16. DO PULL-IN COIL OPEN CIRCUIT TEST**

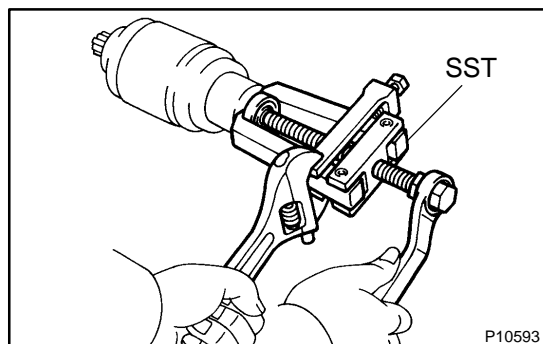
Using an ohmmeter, check that there is continuity between terminals 50 and C.

If there is no continuity, check and replace the magnetic switch.

**17. DO HOLD-IN COIL OPEN CIRCUIT TEST**

Using an ohmmeter, check that there is continuity between terminal 50 and the switch body.

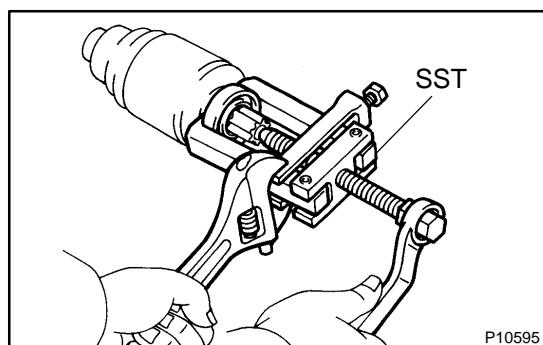
If there is no continuity, check and replace the magnetic switch.



## REPLACEMENT

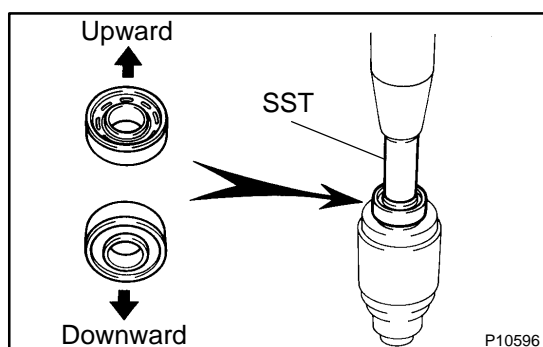
### 1. REPLACE FRONT BEARING

- (a) Using SST, remove the bearing.  
SST 09286-4601 1
- (b) Using a press, press in a new rear bearing.



### 2. REPLACE REAR BEARING

- (a) Using SST, remove the bearing.  
SST 09286-4601 1



- (b) Using SST and a press, press in a new bearing.

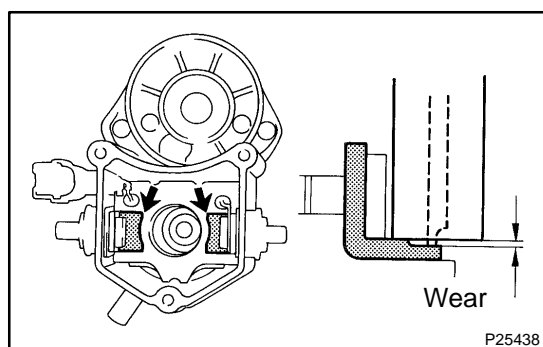
#### NOTICE:

**Be careful of the bearing installation direction.**

SST 09820-00030

### 3. REPLACE MAGNETIC SWITCH TERMINAL KIT PARTS

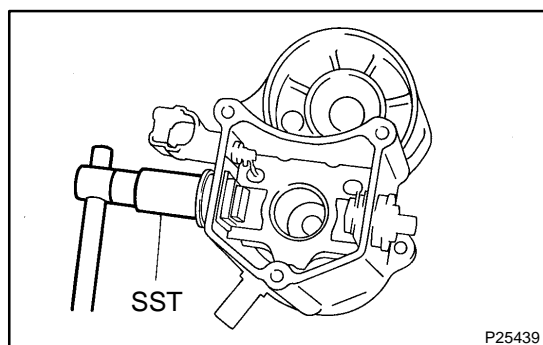
- (a) Remove the magnetic switch end the cover.  
Remove the 3 bolts, lead clamp, end cover, gasket and plunger.



- (b) Inspect the contact plate for wear.  
Using vernier calipers, measure the contact plate for depth of wear.

**Maximum wear: 0.9 mm (0.035 in.)**

If the depth of wear is greater than the maximum, replace the contact plate.

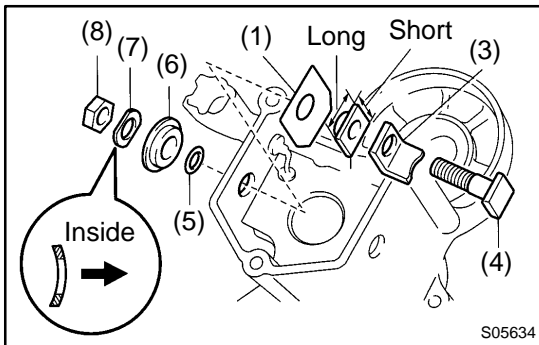


- (c) Remove the terminal kit parts.
  - (1) Using SST, loosen the terminal nuts.  
SST 09810-38140

#### (2) Terminal C:

Remove the terminal nut, wave washer, terminal insulator (outside), O-ring, terminal bolt, contact plate and terminal insulator (inside).

- (3) Terminal 30:  
Remove the terminal nut, wave washer, terminal insulator (outside), O-ring, terminal bolt, contact plate, terminal insulator (inside) and insulation paper.

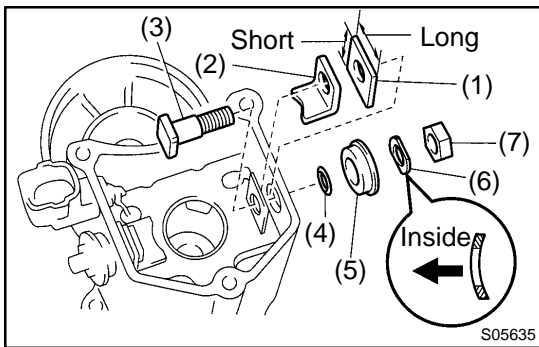


- (d) Temporarily install these new terminal 30 kit parts.

- (1) Insulation paper
- (2) Terminal insulator (inside)
- (3) Contact plate
- (4) Terminal bolt
- (5) O-ring
- (6) Terminal insulator (outside)
- (7) Wave washer
- (8) Terminal nut

**NOTICE:**

**Be careful to install the terminal insulators (inside) and wave washer in the correct direction.**

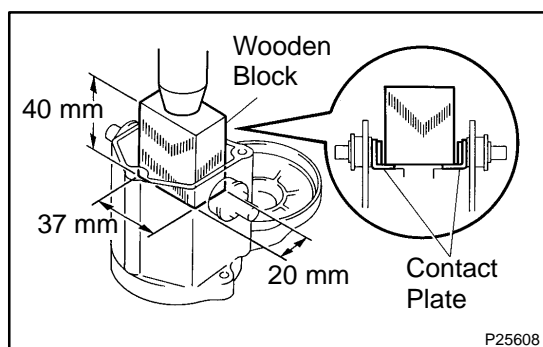


- (e) Temporarily install these new terminal C kit parts.

- (1) Terminal insulator (inside)
- (2) Contact plate
- (3) Terminal bolt
- (4) O-ring
- (5) Terminal insulator (outside)
- (6) Wave washer
- (7) Terminal nut

**NOTICE:**

**Be careful to install the terminal insulators (inside) and wave washer in the correct direction.**



- (f) Temporarily tighten the terminal nuts.
- (g) Tighten the terminal nut.
  - (1) Put a wood block on the contact plate and press it down with a hand press.

**Dimensions of wood block:**

**20 x 37 x 40 mm (0.97 x 1.46 x 1.57 in.)**

**Press force:**

**981 N (100 kgf, 221 lbf)**

**NOTICE:**

- Check the diameter of the hand press ram. Then calculate the gauge pressure of the press when 981 N (100 kgf, 221 lbf) of force is applied.

$$(\text{kgf/cm}^2) = \frac{100 \text{ kgf}}{\left( \frac{\text{Ram diameter (cm)}}{2} \right)^2 \times 3.14 (\pi)}$$

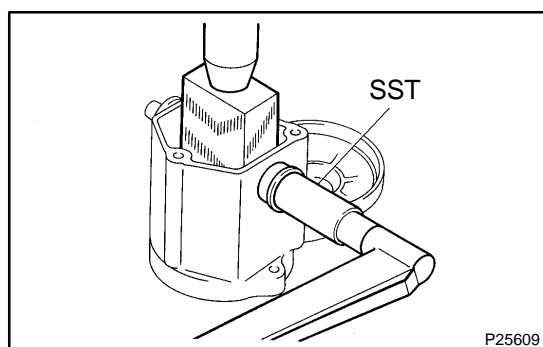
$$(\text{psi}) = \frac{221 \text{ lbf}}{\left( \frac{\text{Ram diameter (in.)}}{2} \right)^2 \times 3.14 (\pi)}$$

$$(\text{kPa}) = (\text{kgf/cm}^2) \times 98.1$$

$$(\text{kPa}) = (\text{psi}) \times 6.9$$

V06796

- If the contact plate is not pressed down with the specified pressure, the contact plate may tilt due to coil deformation or the tightening of the nut.



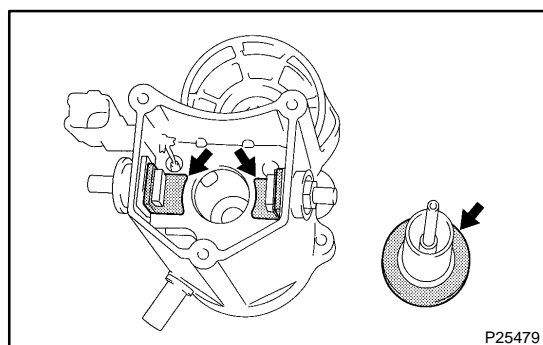
- (2) Using SST, tighten the nut to the specified torque.

SST 09810-38140

**Torque: 17 N·m (173 kgf-cm, 12 ft-lbf)**

**NOTICE:**

If the nut is over tightened, it may cause cracks on the inside of the insulator.



- (h) Clean the contact surfaces of the contact plate and plunger.  
Clean the contact surfaces of the remaining contact plate and plunger with a dry shop rag.
- (i) Reinstall the magnetic switch end cover.  
Install the plunger, new gasket, end cover and lead clamp with 3 bolts.

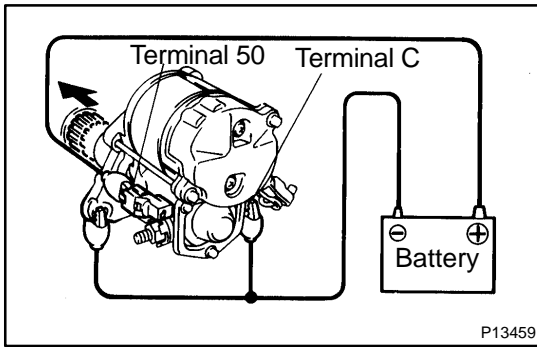
**Torque: 3.6 N·m (36 kgf-cm, 32 in.-lbf)**

## REASSEMBLY

Ressembly is in the reverse order of disassembly (See page [ST-4](#) ).

HINT:

Use high-temperature grease to lubricate the bearings, gears, return spring and steel ball when assembling the starter.



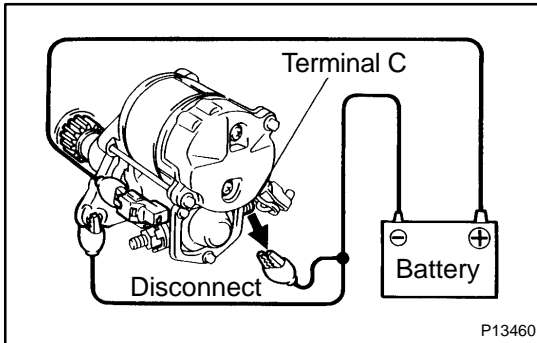
## TEST

### NOTICE:

These tests must be performed within 3 to 5 seconds to avoid burning out the coil.

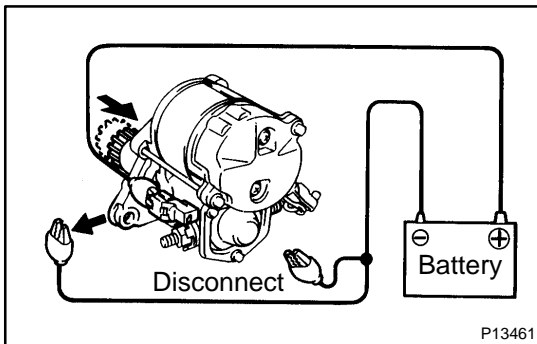
#### 1. DO HOLD-IN TEST

- Disconnect the field coil lead wire from terminal C.
- Connect the battery to the magnetic switch as shown. Check that the clutch pinion gear moves outward.



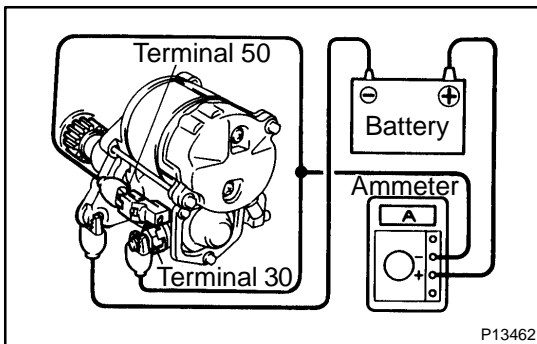
#### 2. DO HOLD-IN TEST

With battery connected as above with the clutch pinion gear out, disconnect the negative (-) lead from terminal C. Check that the pinion gear remains out.



#### 3. INSPECT CLUTCH PINION GEAR RETURN

Disconnect the negative (-) lead from the switch body. Check that the clutch pinion gear returns inward.



#### 4. DO NO-LOAD PERFORMANCE TEST

- Connect the battery and ammeter to the starter as shown.
- Check that the starter rotates smoothly and steadily with the pinion gear moving out. Check that the ammeter the current specified in the respective repair manual.

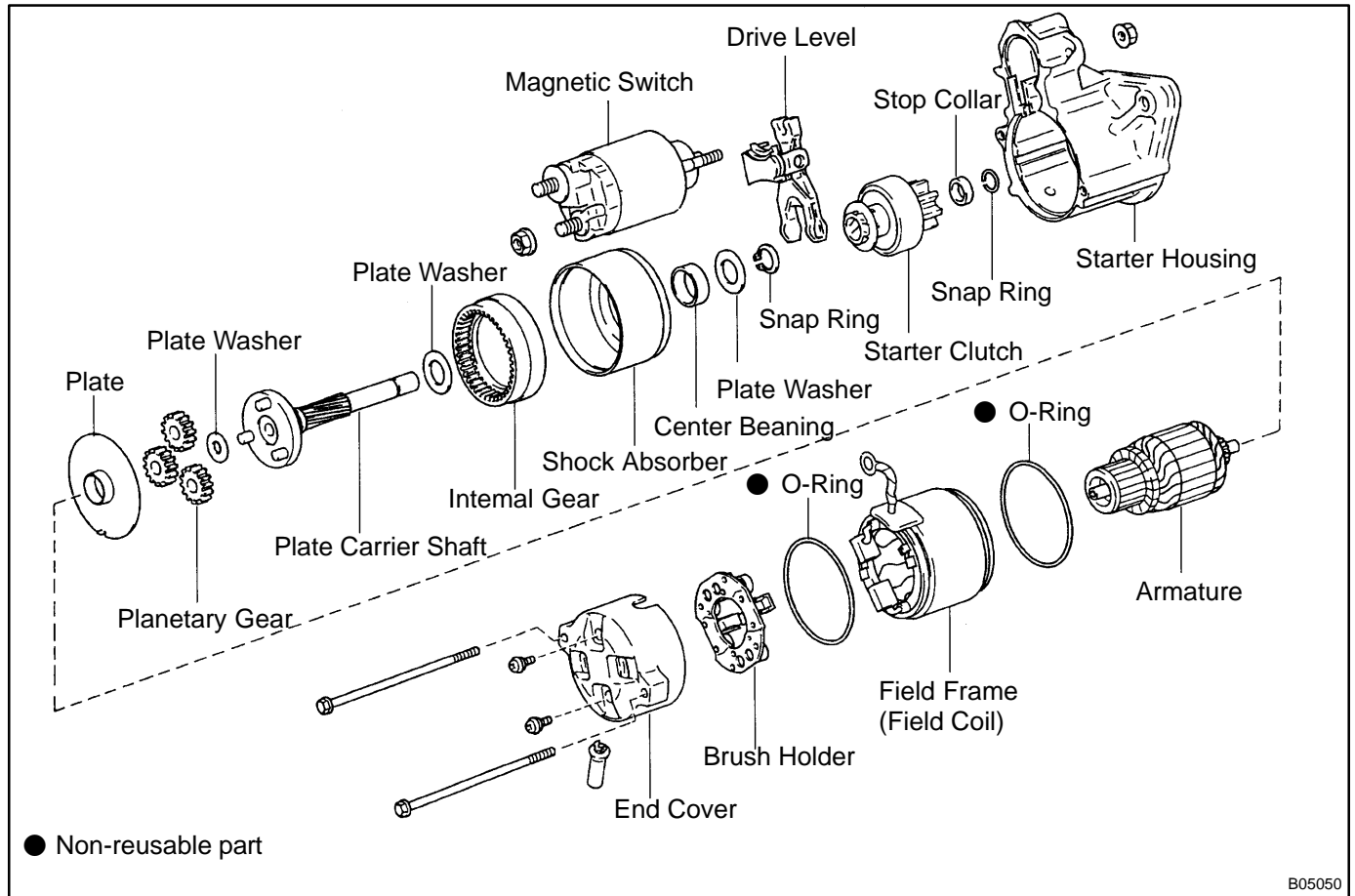
## INSTALLATION

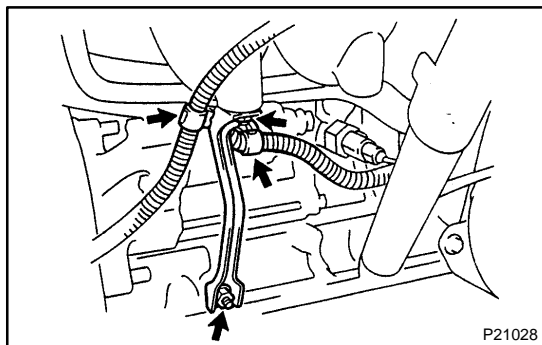
Installation is in the reverse order of removal (See page [ST-3](#)).



# STARTER (Planetary Type) COMPONENTS

ST0MW-01





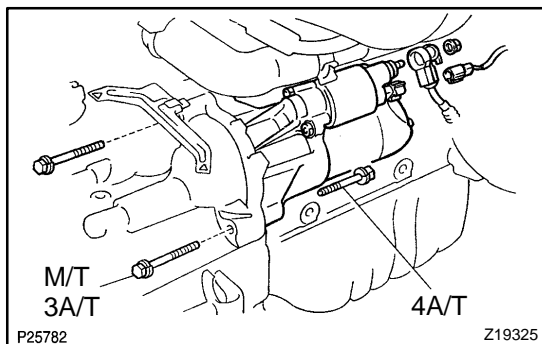
## REMOVAL

### 1. REMOVE AIR CLEANER HOSE

### 2. REMOVE INTAKE MANIFOLD STAY

- (a) Disconnect the engine wire clamps from intake manifold stay.
- (b) Remove the bolt, nut and intake manifold stay.

**Torque: 17.5 N·m (175 kgf-cm, 13 ft-lbf)**



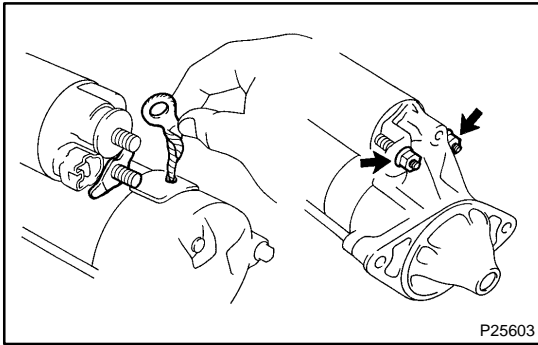
### 3. REMOVE STARTER

- (a) Disconnect the starter connector.
- (b) Remove the nut, and disconnect the starter wire.

**Torque: 8.8 N·m (90 kgf-cm, 78 in.-lbf)**

- (c) Remove the 2 bolts, wire clamp and starter.

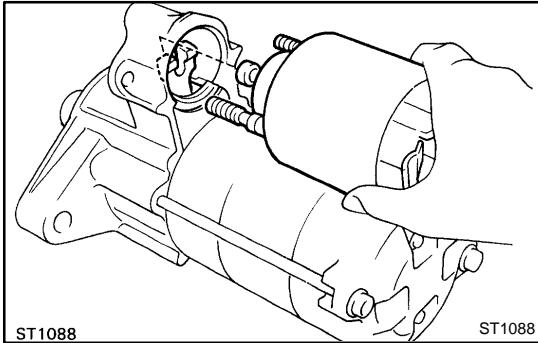
**Torque: 37 N·m (370 kgf-cm, 27 ft-lbf)**



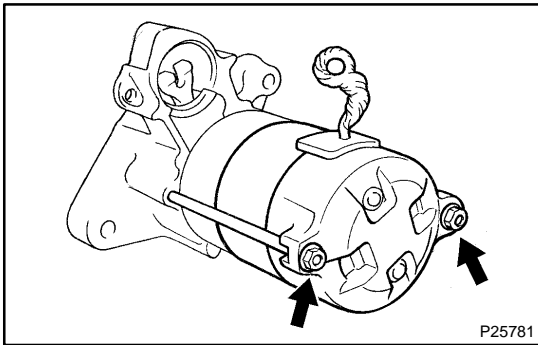
## DISASSEMBLY

### 1. REMOVE MAGNETIC SWITCH

- Remove the nut, and disconnect the lead wire from the magnetic switch terminal.
- Loosen the 2 nuts holding the magnetic switch to the starter housing.

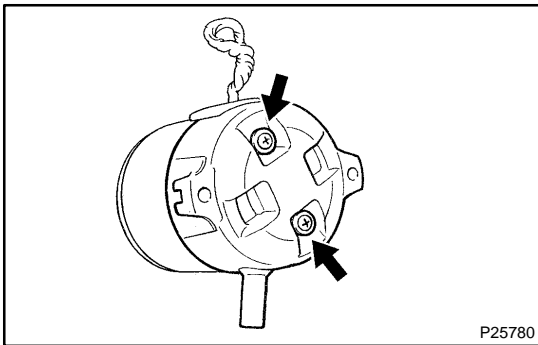


- Pull the magnetic switch and while lifting the front part of the magnetic switch, release the plunger hook from the drive lever, then release the magnetic switch.



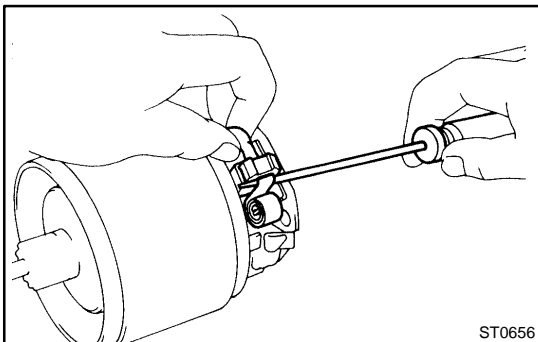
### 2. REMOVE FIELD FRAME AND ARMATURE

- Remove the 2 through bolts.
- Pull out the field frame together with the armature.
- Remove the O-ring from the field frame.



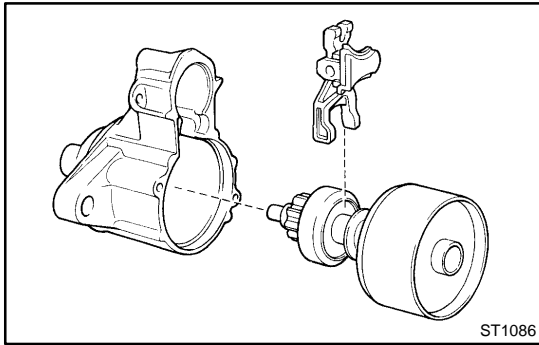
### 3. REMOVE BRUSH HOLDER

- Remove the 2 screws and end cover from the field frame.
- Remove the O-ring from the field frame.

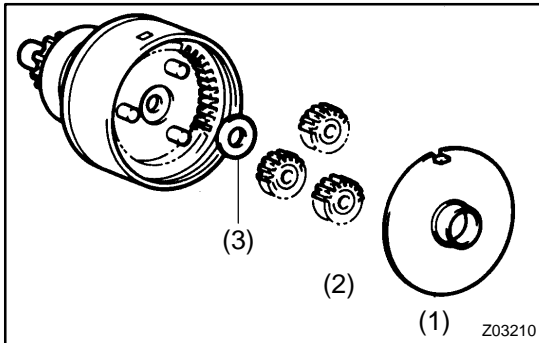


- Using a screwdriver, hold the spring back and disconnect the brush holder. Disconnect the 4 brushes, and remove the brush holder.

### 4. REMOVE ARMATURE FROM FIELD FRAME



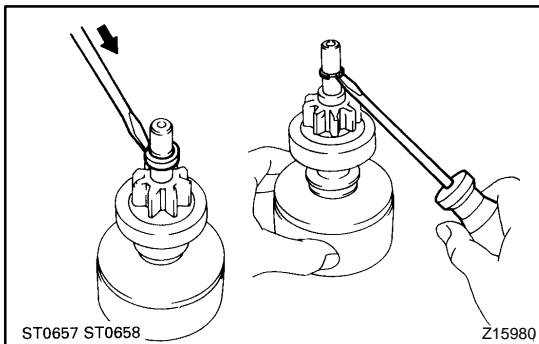
**5. REMOVE DRIVE LEVER AND STARTER CLUTCH WITH SHOCK ABSORBER FROM STARTER HOUSING**



**6. REMOVE PLANETARY GEARS**

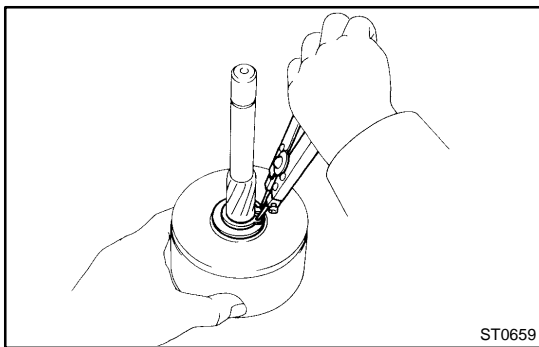
Remove these parts from the shock absorber:

- (1) Plate
- (2) 3 planetary gears
- (3) Plate washer



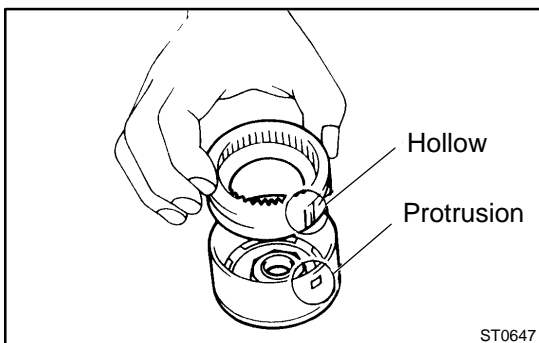
**7. REMOVE STARTER CLUTCH**

- (a) Using a screwdriver, tap in the stop collar towards the starter clutch.
- (b) Using a screwdriver, pry off the snap ring.
- (c) Remove the rear collar from the starter clutch.

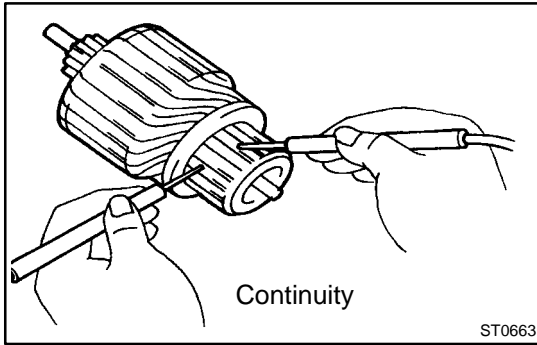


**8. REMOVE PLANET CARRIER SHAFT AND INTERNAL GEAR**

- (a) Using snap ring pliers, remove the snap ring and plate washer.
- (b) Remove the planet carrier shaft and plate washer.



- (c) Align the hollow of the internal gear with the protrusion inside the shock absorber, and remove the internal gear.

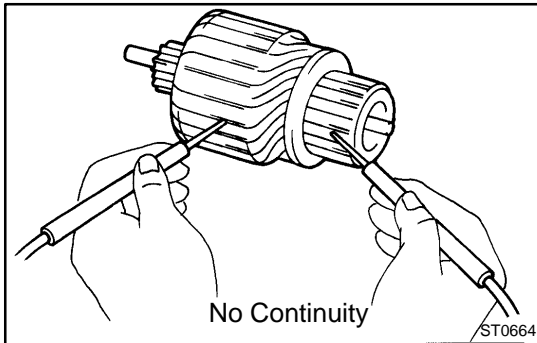


## INSPECTION

### 1. INSPECT ARMATURE COIL

- (a) Check the commutator for open circuit.  
Using an ohmmeter, check that there is continuity between the segments of the commutator.

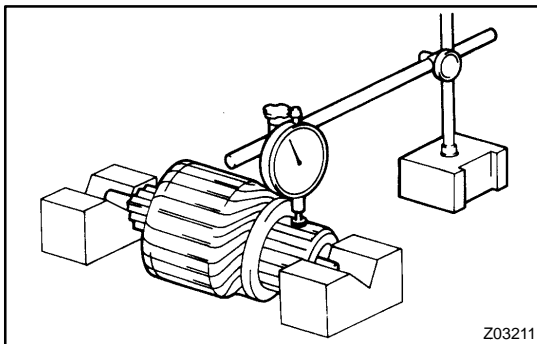
If there is no continuity between any segment, replace the armature.



- (b) Check the commutator for ground.  
Using an ohmmeter, check that there is no continuity between the commutator and armature coil core.

If there is continuity, replace the armature.

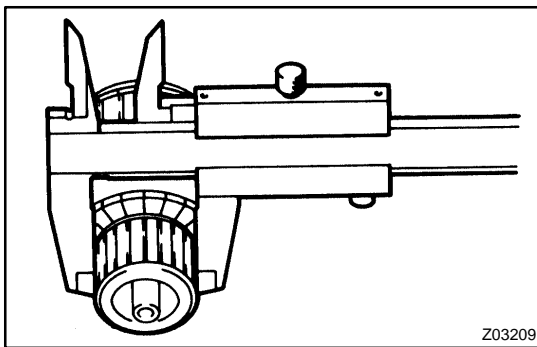
- (c) Check the commutator for dirty and burnt surface.  
If the surface is dirty or burn, correct with sandpaper (No.400) or a lathe.



- (d) Check for the commutator circle runout.  
(1) Place the commutator on V-blocks.  
(2) Using a dial gauge, measure the circle runout.

**Maximum circle runout: 0.05 mm (0.0020 in.)**

If the circle runout is greater than maximum, correct it on a lathe.

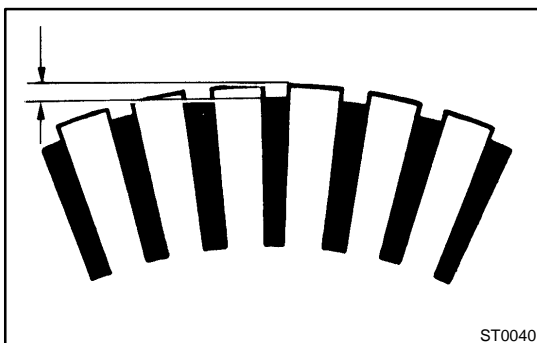


- (e) Using vernier calipers, measure the commutator diameter.

**Standard diameter: 28.0 mm (1.102 in.)**

**Minimum diameter: 27.0 mm (1.063 in.)**

If the diameter is less than minimum, replace the armature.

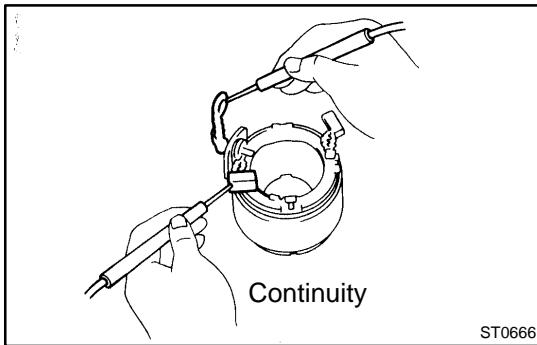


- (f) Check that the undercut depth is clean and free of foreign materials. Smooth out the edge.

**Standard undercut depth: 0.6 mm (0.024 in.)**

**Minimum undercut depth: 0.2 mm (0.008 in.)**

If the undercut depth is less than minimum, correct it with a hacksaw blade.

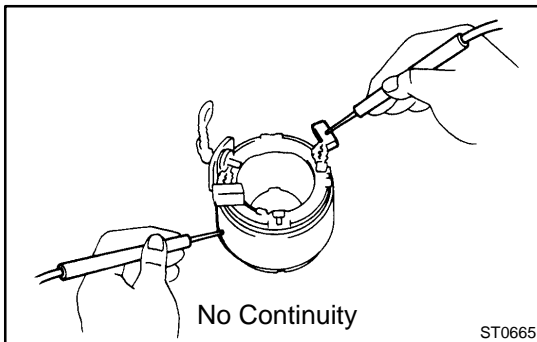


## 2. INSPECT FIELD COIL

- (a) Check the field coil for open circuit.

Using an ohmmeter, check that there is continuity between the lead wire and field coil brush lead.

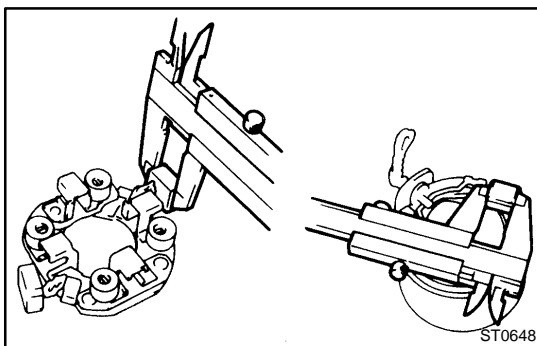
If there is no continuity, replace the field frame.



- (b) Check the field coil for ground.

Using an ohmmeter, check that there is no continuity between the field coil end and field frame.

If there is continuity, repair or replace the field frame.



## 3. INSPECT BRUSHES

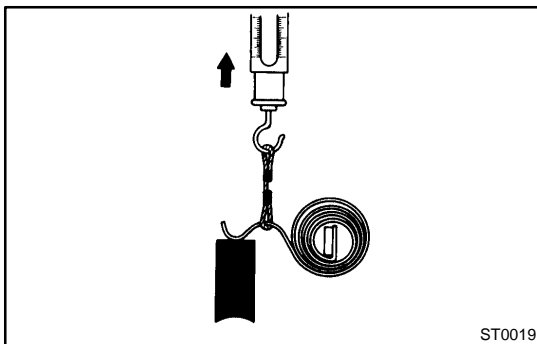
Check the brush length.

Using vernier calipers, measure the brush length.

**Standard length: 14.0 mm (0.551 in.)**

**Minimum length: 9.0 mm (0.354 in.)**

If the length is less than minimum, replace the brush (field frame side) or brush holder, and dress with an emery cloth.



## 4. INSPECT BRUSH SPRINGS

Check the brush spring load.

Take the pull scale reading the instant the brush spring separates from the brush.

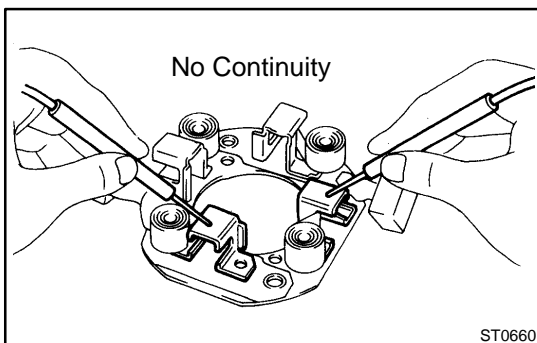
**Spring installed load:**

**13.7 - 17.6 N (1.4 - 1.8 kgf, 3.1 - 4.0 lbf)**

**Minimum spring installed load:**

**8.8 N (0.9 kgf, 2.0 lbf)**

If the installed load is not as specified, replace the brush springs.



## 5. INSPECT BRUSH HOLDER

Check the brush holder insulation.

Using an ohmmeter, check that there is no continuity between the positive (+) and negative (-) brush holders.

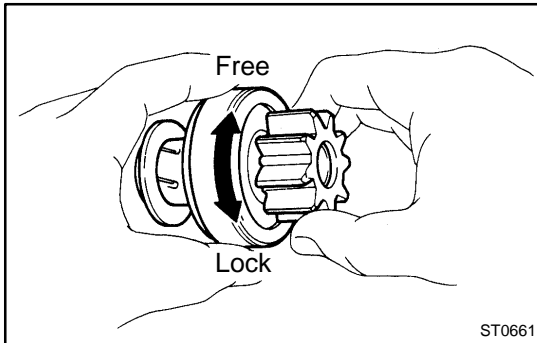
If there is continuity, repair or replace the brush holder.

**6. INSPECT CLUTCH AND GEAR**

- (a) Check the gear teeth on the planetary gear, internal gear and starter clutch for wear or damage.

If the gear is damaged, replace it.

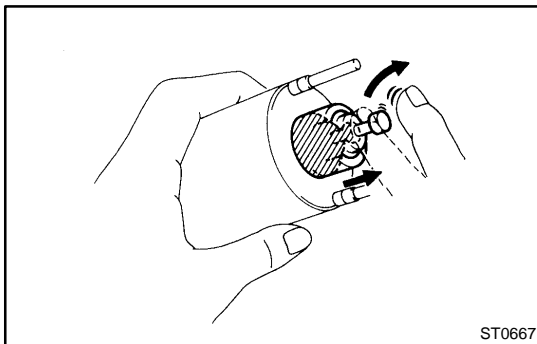
If the starter clutch teeth are damaged, replace the starter clutch and also inspect the flywheel ring gear for wear or damage.



- (b) Check the starter clutch.

Rotate the clutch pinion gear clockwise and check that it turns freely. Try to rotate the clutch pinion gear counter-clockwise and check that it locks.

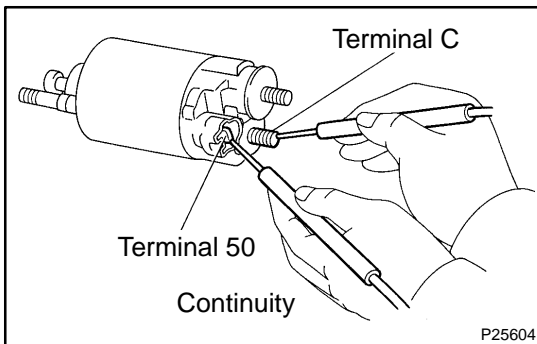
If necessary, replace the starter clutch.

**7. INSPECT MAGNETIC SWITCH**

- (a) Check the plunger.

Push in the plunger and replace it. Check that it returns quickly to its original position.

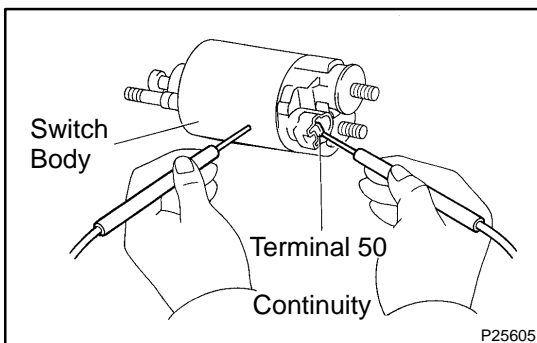
If necessary, replace the magnetic switch.



- (b) Check the pull-in coil for open circuit.

Using an ohmmeter, check that there is continuity between terminals 50 and C.

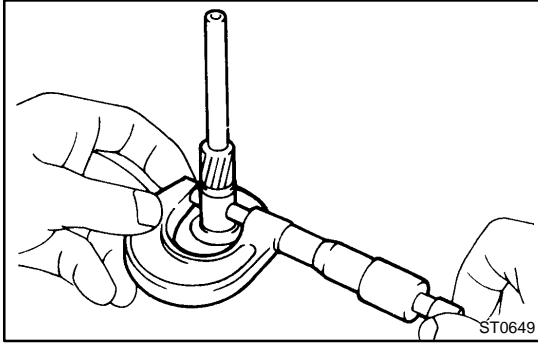
If there is no continuity, replace the magnetic switch.



- (c) Check the hold-in coil for open circuit.

Using an ohmmeter, check that there is continuity between terminal 50 and the switch body.

If there is no continuity, replace the magnetic switch.

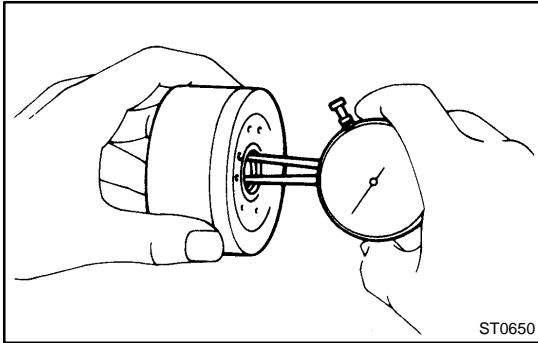
**8. INSPECT BEARINGS**

- (a) Check the planet carrier shaft.

Using a micrometer, measure the outer diameter of the surface in contact with the center bearing of the planet carrier shaft.

**Standard shaft diameter:**

**14.035 - 15.000 mm (0.5526 - 0.5906 in.)**



- (b) Check the center bearing.

- (1) Using a caliper gauge, measure the inside diameter of the center bearing.

**Center bearing inside diameter:**

**15.000 - 15.035 mm (0.5906 - 0.5919 in.)**

- (2) Subtract the planet carrier shaft diameter from the bearing inside diameter measurement.

**Standard center bearing oil clearance:**

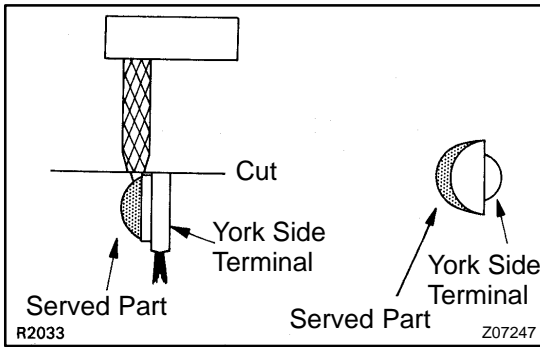
**0.03 mm (0.0012 in.)**

**Maximum center bearing oil clearance:**

**0.1 mm (0.004 in.)**

If the clearance is greater than maximum, replace the planet carrier shaft and center bearing.





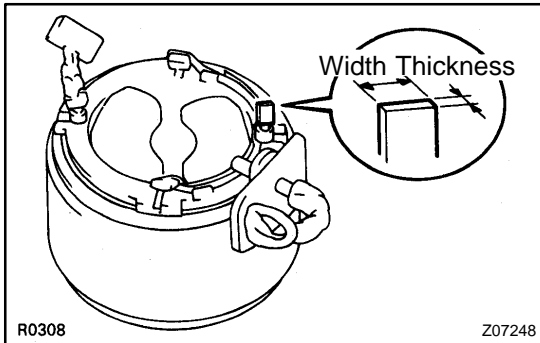
## REPLACEMENT

### 1. REPLACE BRUSHES

#### HINT:

Only the 2 brushes of the positive (+) side (york side) are exchangeable, negative (-) side brush must be changed in the body with the brush holder.

- Cut the brush lead wire at the terminal side.
- Shave welded mark of the brush lead wire with sandpaper etc., and correct the terminal to the specified.

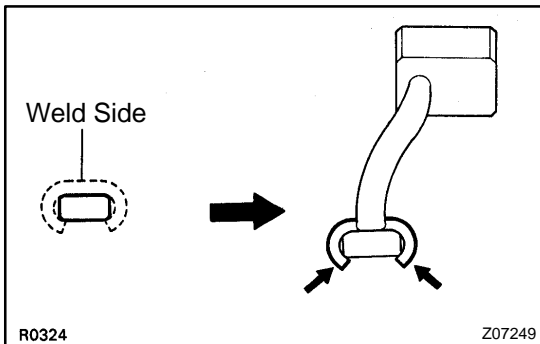


#### NOTICE:

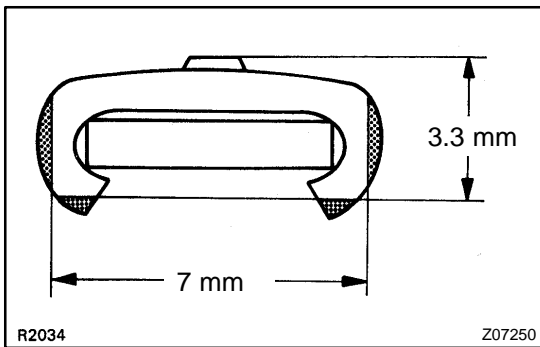
Part to be shaved is so narrow that you should take care not to harm the field coil.

**Specified width: 5.0 mm (0.197 in.)**

**Specified thickness: 1.5 - 1.7 mm (0.059 - 0.067 in.)**



- Press the plate of the supply brush on the welded side of the terminal lead wire.

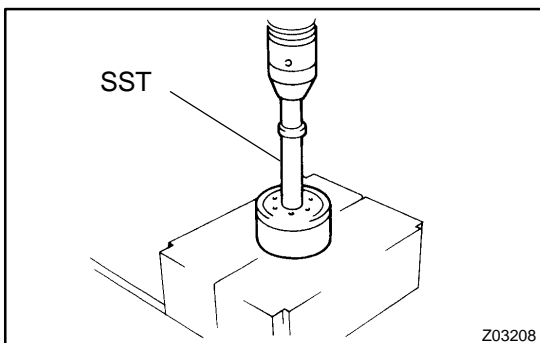


- Solder the pressed part, and shave to the specified measures with the sandpaper etc.

**Specified width: 7.0 mm (0.276 in.)**

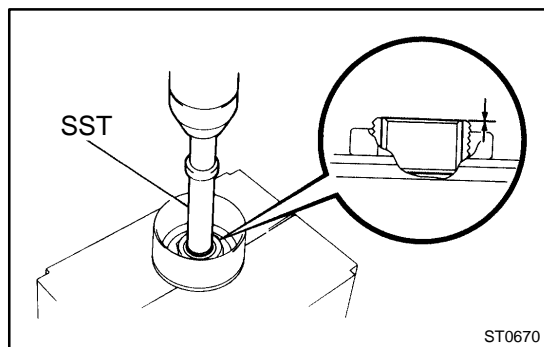
**Specified thickness: 3.3 mm (0.130 in.)**

- Heat the soldered part well, and flow the solder inside the plate, take care not to flow it into the inside lead wire.
- Take care not to flow the solder into field.

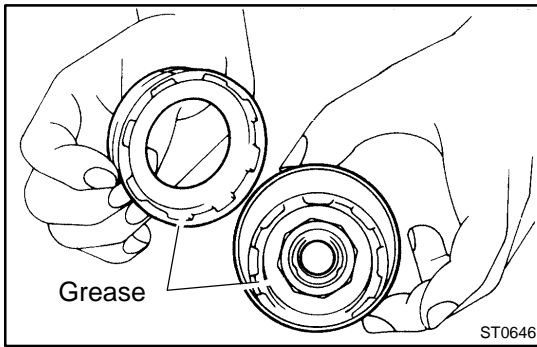


### 2. REPLACE CENTER BEARING

- Using SST and press, press out the center bearing.  
SST 09221-25026 (09221-00090)



- (b) Using SST and a press in a new center bearing to the position shown in the illustration.  
SST 09221-25026 (09221-00090)



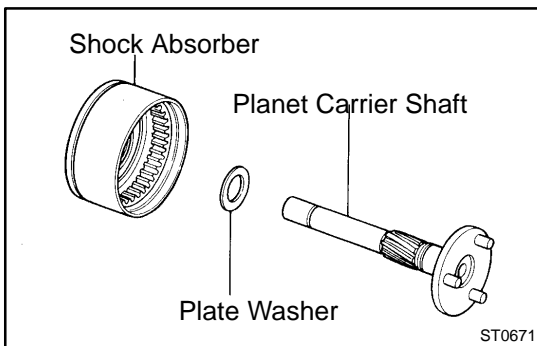
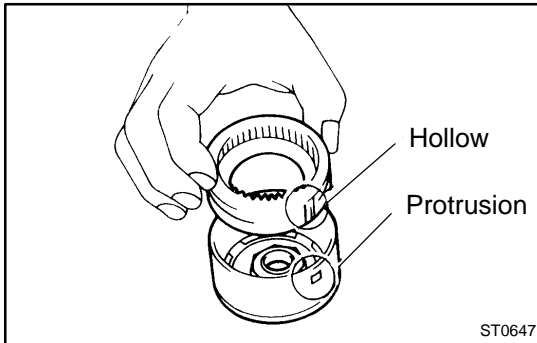
## REASSEMBLY

### HINT:

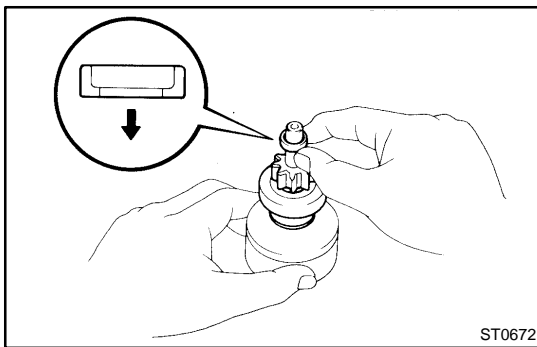
Use high temperature-resistant grease to lubricate the bearings and sliding parts when assembling the starter.

### 1. INSTALL INTERNAL GEAR AND PLANET CARRIER SHAFT

- (a) Apply grease to the internal gear touching the shock absorber and planetary gears.
- (b) Align the hollow of the internal gear with the protrusion inside the shock absorber.
- (c) Insert and turn the internal gear so that it interlocks with the shock absorber.

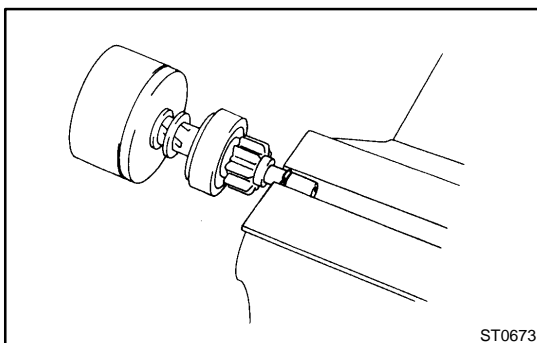


- (d) Apply turbine oil to the center bearing.
- (e) Apply grease to the plate washer, and install it to the planet carrier shaft.
- (f) Install the planet carrier shaft to the shock absorber.
- (g) Using snap ring pliers, install the plate washer and snap ring.

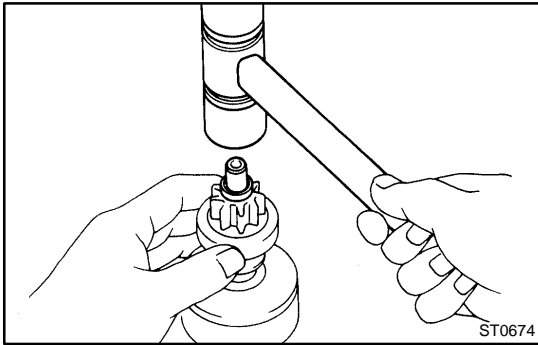


### 2. INSTALL STARTER CLUTCH

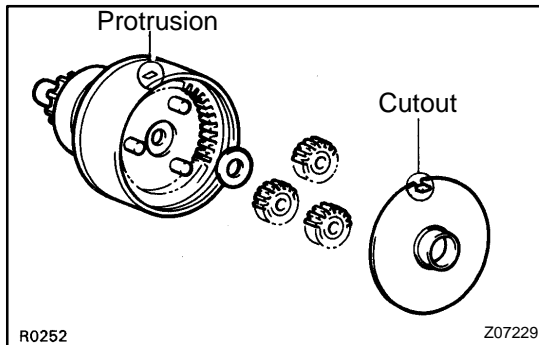
- (a) Apply grease to the bushing and spline of the starter clutch stop collar.
- (b) Place the starter clutch and stop collar on the planet carrier shaft.



- (c) Apply grease to the snap ring, and install it to the planet carrier shaft groove.
- (d) Using a vise, compress the snap ring.

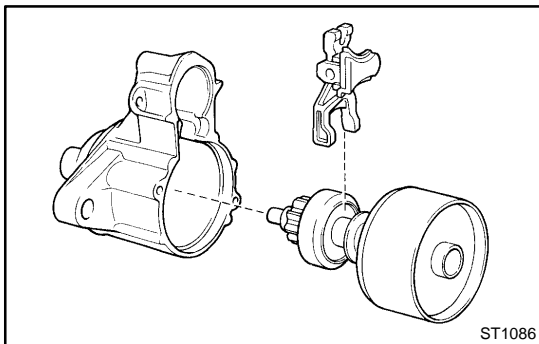


- (e) Hold the starter clutch, tap the planet carrier shaft and install the stop collar onto the snap ring with a plastic-faced hammer.



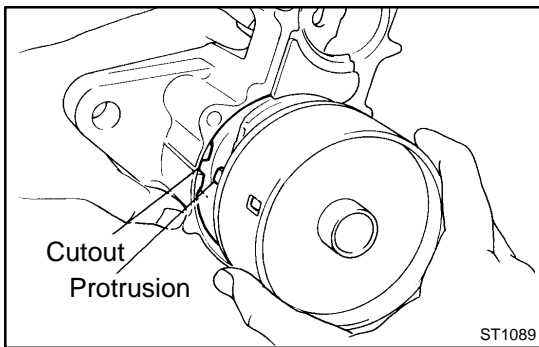
### 3. INSTALL PLANETARY GEARS

- Apply grease to the planetary gears and flange pin parts of the planet carrier shaft.
- Install the plate washer and 3 planetary gears.
- Align the cutout of the plate with the protrusion inside the shock absorber, and install the plate.



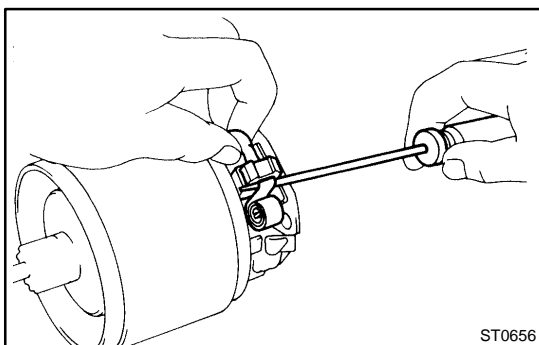
### 4. INSTALL DRIVE LEVER AND STARTER CLUTCH WITH SHOCK ABSORBER

- Apply turbine oil to the bearing of the starter drive housing.
- Apply grease to the drive lever touching the starter pivot part of the drive lever.
- Install the drive lever to the starter clutch.



- (d) Align the protrusion of the shock absorber with the cutout of the drive housing and install them.

### 5. PLACE ARMATURE INTO FIELD FRAME



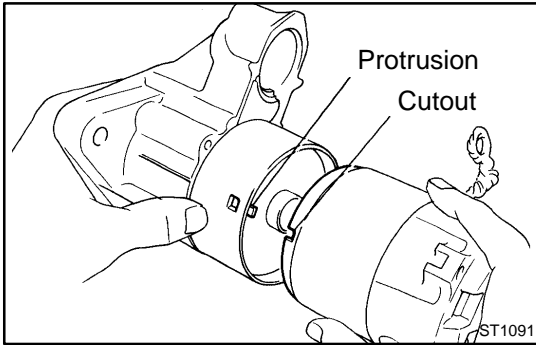
### 6. INSTALL BRUSH HOLDER

- Place the brush holder in position on the armature.
- Using a screwdriver, hold the brush spring back, and connect the brush into the brush holder. Connect the 4 brushes.

#### NOTICE:

**Check that positive (+) lead wires are not grounded.**

- Install a new O-ring to the groove of the field frame.
- Apply turbine oil to the bearing of the end cover.



- (e) Install the end cover to the field frame with 2 screws.

**Torque: 1.5 N·m (15 kgf·cm, 13 in.-lbf)**

**7. INSTALL FIELD FRAME AND ARMATURE ASSEMBLY**

- (a) Install a new O-ring to the groove of the field frame.  
(b) Align the cutout of the field frame with the protrusion of the shock absorber.  
(c) Install the field frame and armature assembly with the 2 through bolts.

**Torque: 5.9 N·m (60 kgf·cm, 52 in.-lbf)**

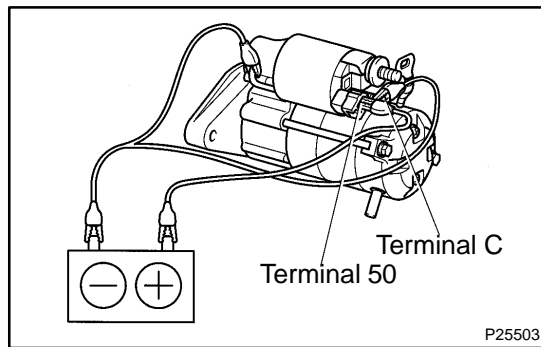
**8. INSTALL MAGNETIC SWITCH**

- (a) Install the plunger cover to the magnetic switch.  
(b) Hang the plunger of the magnetic switch to the drive lever from the upper side.  
(c) Install the magnetic switch with the 2 nuts.

**Torque: 8.3 N·m (85 kgf·cm, 73 in.-lbf)**

- (d) Connect the lead wire to the terminal, and install the nut.

**Torque: 9.8 N·m (100 kgf·cm, 87 in.-lbf)**



## TEST

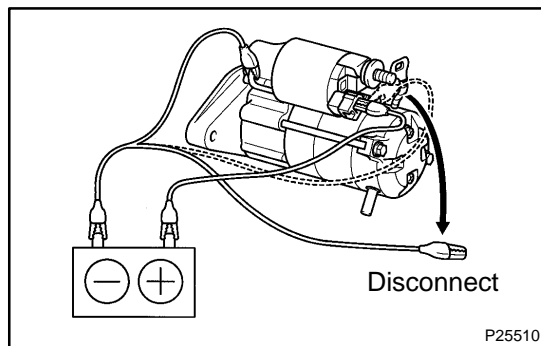
### NOTICE:

**These tests must be performed within 3 to 5 seconds to avoid burning out the coil.**

#### 1. DO PULL-IN TEST

- Disconnect the field coil lead from terminal C.
- Connect the battery to the magnetic switch as shown. Check that the clutch pinion gear moves outward.

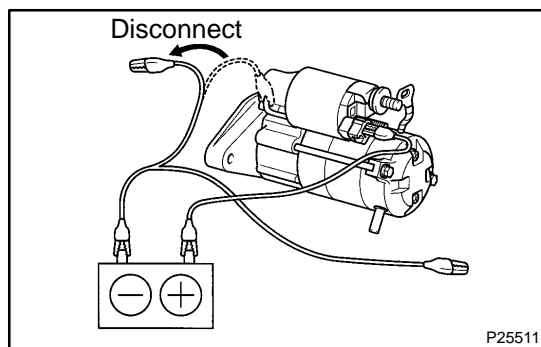
If the clutch pinion gear does not move, replace the magnetic switch.



#### 2. DO HOLD-IN TEST

While connected as above with the clutch pinion gear out, disconnect the negative (-) lead from terminal C. Check that the clutch pinion gear remains out.

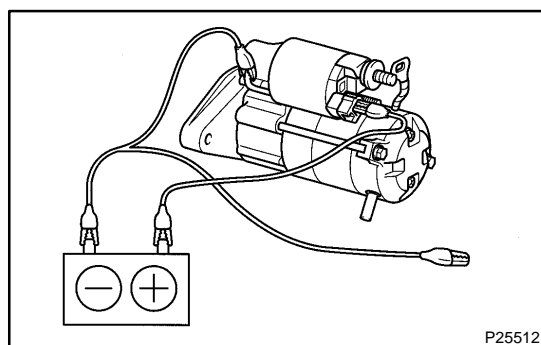
If the clutch pinion gear returns inward, replace the magnetic switch.



#### 3. INSPECT CLUTCH PINION GEAR RETURN

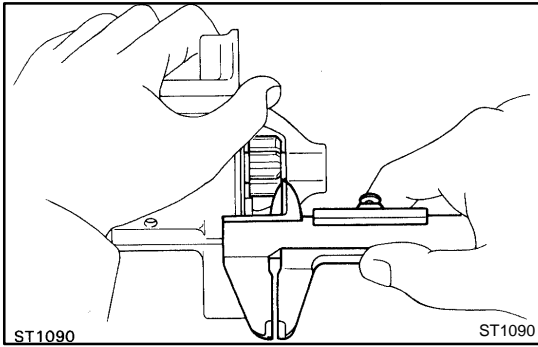
Disconnect the negative (-) lead from the switch body. Check that the clutch pinion gear returns inward.

If the clutch pinion gear does not return, replace the magnetic switch.



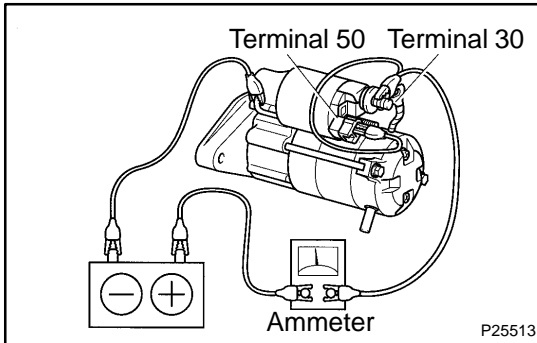
#### 4. INSPECT CLUTCH PINION GEAR CLEARANCE

- Connect the battery to the magnetic switch as shown.



- (b) Move the pinion gear toward the armature to remove slack and measure the clearance between the pinion gear end and stop collar.

**Standard clearance: 1 - 5 mm (0.04 - 0.20 in.)**



##### 5. DO NO-LOAD PERFORMANCE TEST

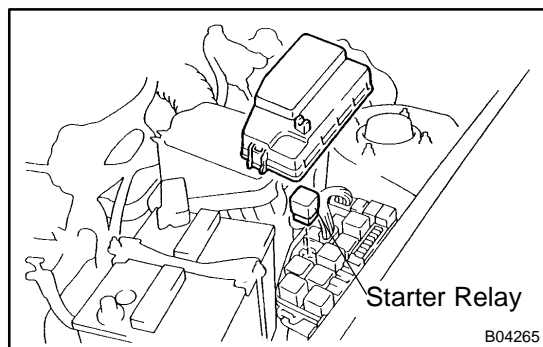
- (a) Connect the field coil lead to terminal C. Make sure the lead is not grounded.
- (b) Connect the battery and ammeter to the starter as shown.
- (c) Check that the starter rotates smoothly and steadily with the clutch pinion gear moving out. Check that the ammeter reads the specified current.

**Specified current: At 11.5 V: 90 A or less**

## INSTALLATION

Installation is in the reverse order of removal (See page [ST-16](#)).

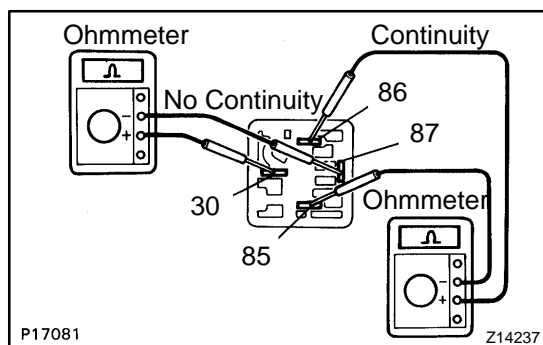




## STARTER RELAY INSPECTION

ST088-10

1. REMOVE RELAY BOX COVER
2. REMOVE STARTER RELAY (Marking: "ST")



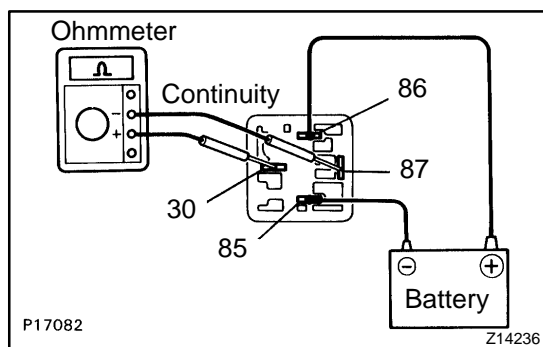
### 3. INSPECT RELAY CONTINUITY

- (a) Using an ohmmeter, check that there is continuity between terminals 85 and 86.

If there is no continuity, replace the relay.

- (b) Check that there is no continuity between terminals 30 and 87.

If there is continuity, replace the relay.



### 4. INSPECT RELAY OPERATION

- (a) Apply battery voltage across terminals 85 and 86.

- (b) Using an ohmmeter, check that there is continuity between terminals 30 and 86.

If there is no continuity, replace the relay.

### 5. REINSTALL STARTER RELAY

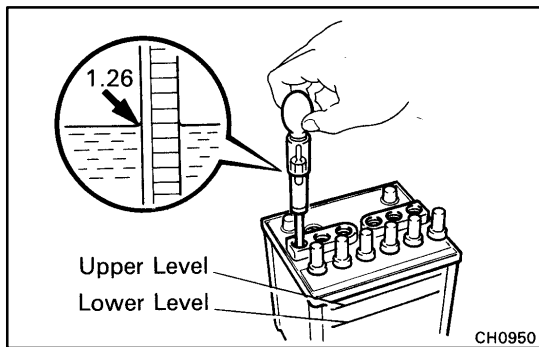
### 6. REINSTALL RELAY BOX COVER

# CHARGING SYSTEM

CH065-01

## PRECAUTION

- Check that the battery cables are connected to the correct terminals.
- Disconnect the battery cables when the battery is given a quick charge.
- Do not perform tests with a high voltage insulation resistance tester.
- Never disconnect the battery while the engine is running.



## ON-VEHICLE INSPECTION

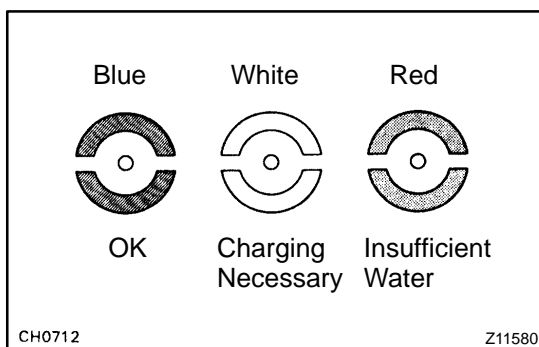
### 1. CHECK BATTERY SPECIFIC GRAVITY AND ELECTROLYTE LEVEL

- Check the electrolyte quantity of each cell. If insufficient, refill with distilled (or purified) water.
- Check the specific gravity of each cell.

**Standard specific gravity:**

**1.27 - 1.29 at 20°C (68°F)**

If the specific gravity is less than specification, charge the battery.



HINT:

Check the indicator as shown in illustration.

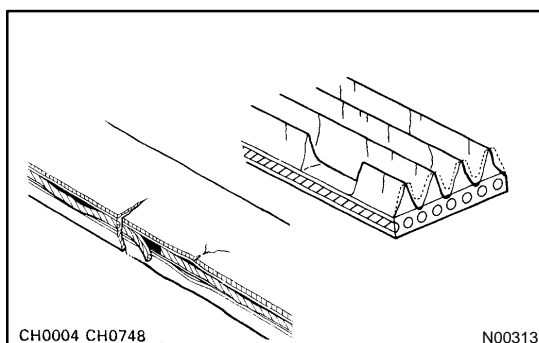
### 2. CHECK BATTERY TERMINALS, FUSIBLE LINK AND FUSES

- Check that the battery terminals are not loose or corroded.

If the terminals are corroded, clean the terminals.

- Check the fusible link and fuses for continuity.

Fusible link	MAIN 2.0A
H-fuse	ALT 100A
	AM1 50A
Fuse	AM2 15A
	GAUGE 15A
	IGN 7.5A
	ALT-S 7.5A



### 3. INSPECT DRIVE BELT

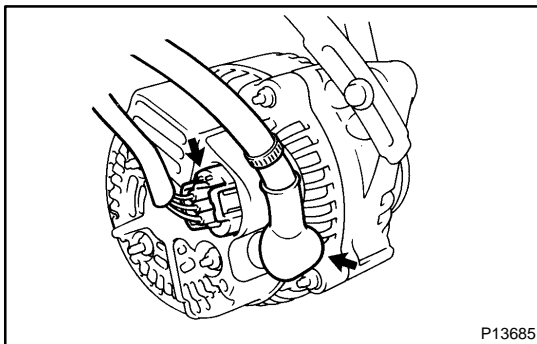
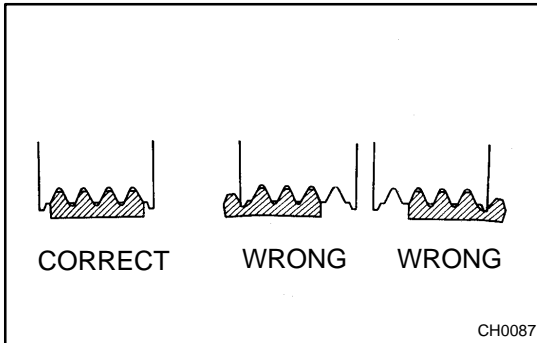
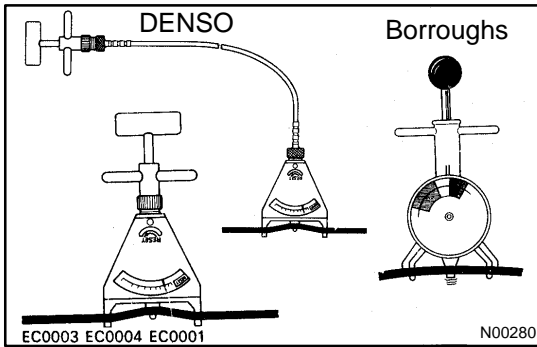
- Visually check the drive belt for excessive wear, frayed cords etc.

If any defect is found, replace the drive belt.

HINT:

Cracks on the rib side of a drive belt are considered acceptable.

If the drive belt has chunks missing from the ribs, it should be replaced.



- (b) Using a belt tension gauge, check the drive belt tension.  
Belt tension gauge:  
DENSO BTG-20 (95506-00020)  
Borroughs No. BT-33-73F

**Drive belt tension:**

New belt	160 ± 20 lbf
Used belt	100 ± 20 lbf

If the belt tension is not as specified, adjust it.

**HINT:**

- "New belt" refers to a belt which has been used less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing a belt, check that it fits properly in the ribbed groove.
- Check by hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.
- After installing a new belt, run the engine for about 5 minutes and recheck the belt tension.

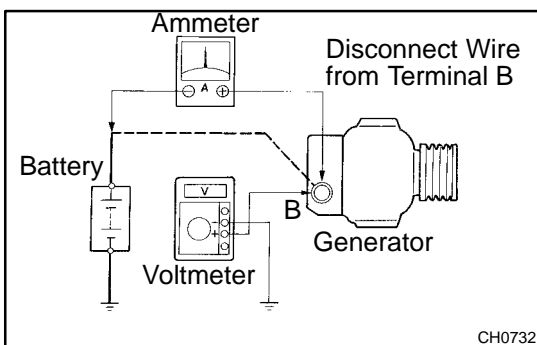
**4. VISUALLY CHECK GENERATOR WIRING AND LISTEN FOR ABNORMAL NOISES**

- (a) Check that the wiring is in good condition.  
(b) Check that there is no abnormal noise from the generator while the engine is running.

**5. INSPECT CHARGE WARNING LIGHT CIRCUIT**

- (a) Warm up the engine and then turn it off.  
(b) Turn off all accessories.  
(c) Turn the ignition switch "ON". Check that the charge warning light is lit.  
(d) Start the engine. Check that the light goes off.

If the light does not go off as specified, troubleshoot the charge light circuit.



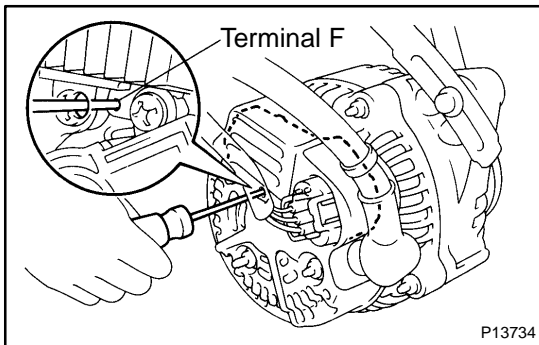
**6. INSPECT CHARGING CIRCUIT WITHOUT LOAD**

**HINT:**

If a battery/generator tester is available, connect the tester to the charging circuit as per manufacturer's instructions.

- (a) If a tester is not available, connect a voltmeter and ammeter to the charging circuit as follows:
- Disconnect the wire from terminal B of the generator and connect it to the negative (-) tester probe of the ammeter.

- Connect the positive (+) tester probe of the ammeter to terminal B of the generator.
- Connect the positive (+) tester probe of the voltmeter to terminal B of the generator.
- Ground the negative (-) tester probe of the voltmeter.



- (b) Check the charging circuit as follows:  
With the engine running from idling to 2,000 rpm, check the reading on the ammeter and voltmeter.

**Standard amperage: 10 A or less**

**Standard voltage:**

at 25°C (77°F)	13.9 - 15.1 V
at 115°C (239°F)	13.5 - 14.3 V

If the voltmeter reading is greater than standard voltage, replace the voltage regulator.

If the voltmeter reading is less than standard voltage, check the voltage regulator and generator as follows:

- With terminal F grounded, start the engine and check the voltmeter reading of terminal B.
- If the voltmeter reading is greater than standard voltage, replace the voltage regulator.
- If the voltmeter reading is less than standard voltage, check the generator.

## 7. INSPECT CHARGING CIRCUIT WITH LOAD

- (a) With the engine running at 2,000 rpm, turn on the high beam headlights and place the heater blower switch at "HI".
- (b) Check the reading on the ammeter.

**Standard amperage: 30 A or more**

If the ammeter reading is less than the standard amperage, repair the generator.

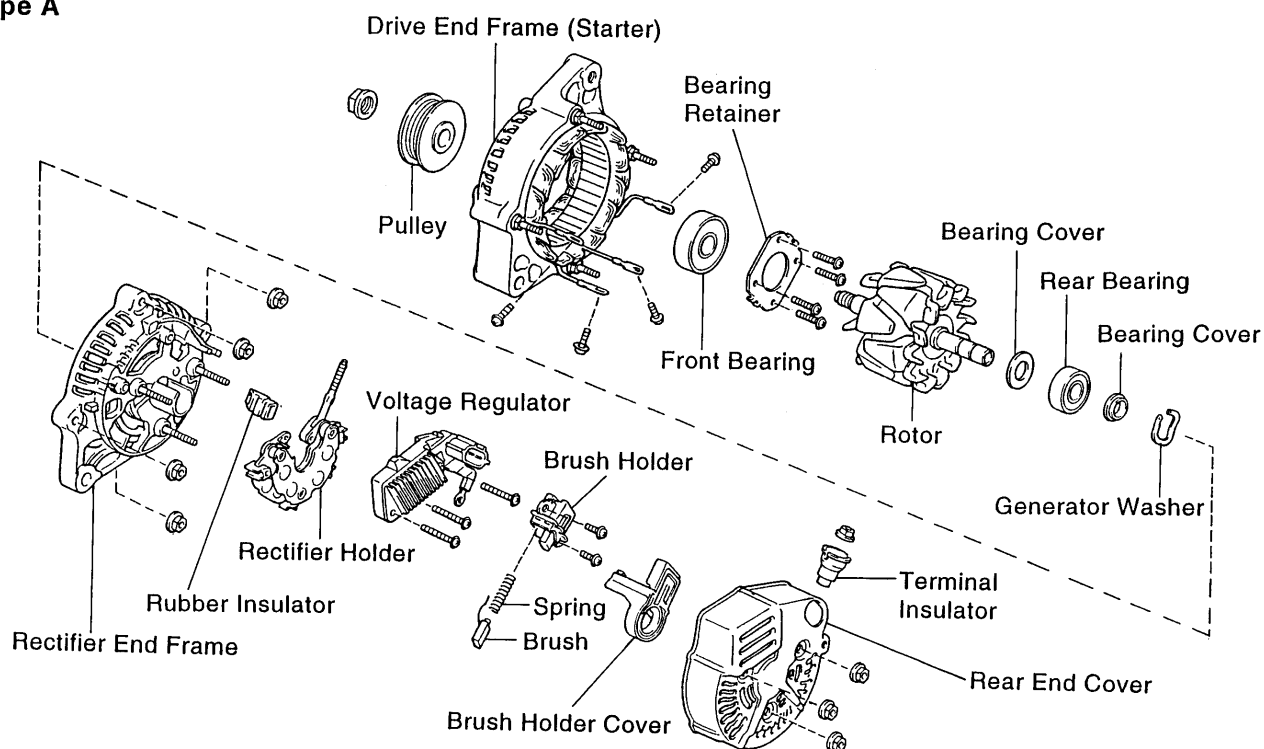
**HINT:**

If the battery is fully charged, the indication will sometimes be less than standard amperage.

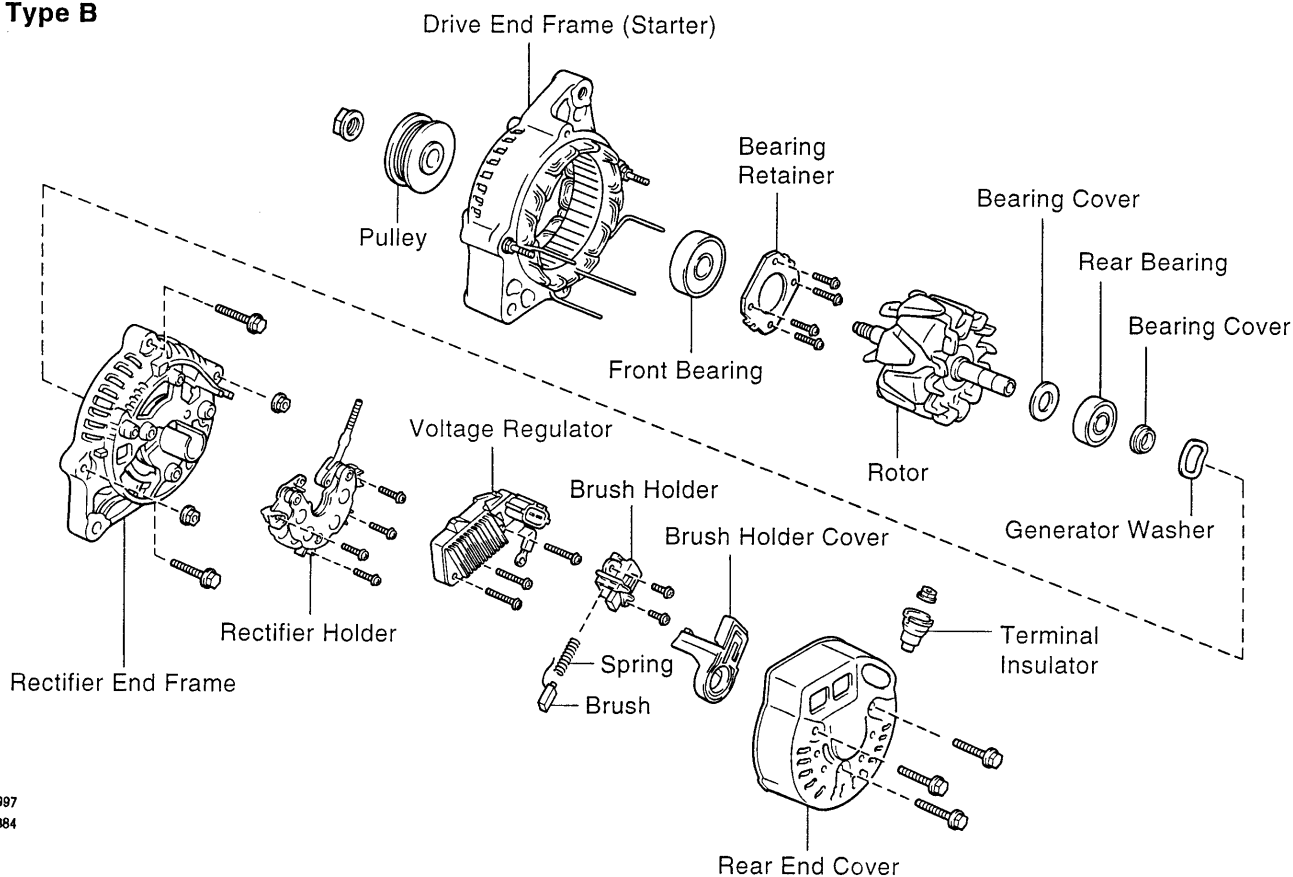
# GENERATOR COMPONENTS

CH0H8-01

Type A

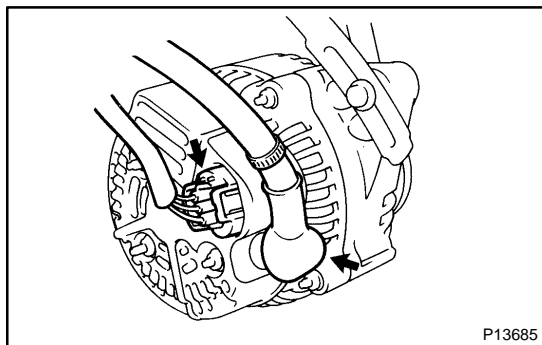


Type B



P20997  
P21884

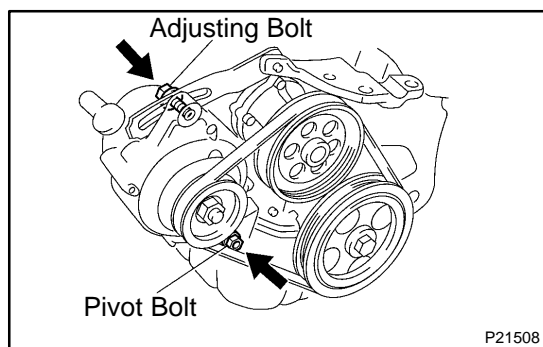
Z14916



## REMOVAL

### 1. DISCONNECT CONNECTOR AND WIRE FROM GENERATOR

- Disconnect the connector from the generator.
- Remove the connector cover and nut, and disconnect the wire from the generator.



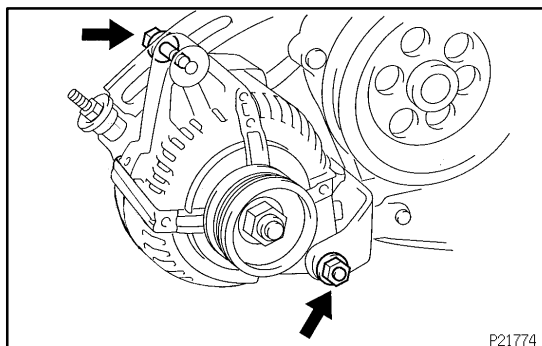
### 2. REMOVE DRIVE BELT

Loosen the pivot bolt and adjusting bolt, and remove the drive belt.

**Torque:**

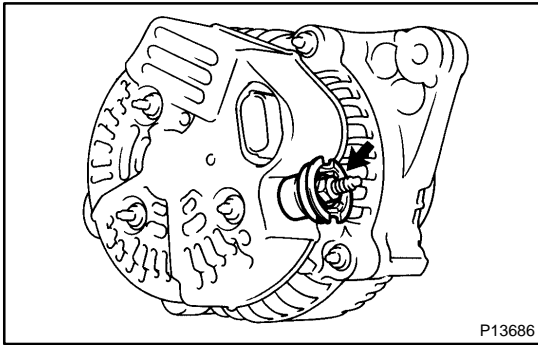
**Pivot bolt: 41 N·m (420 kgf·cm, 30 ft·lbf)**

**Adjusting bolt: 12 N·m (120 kgf·cm, 9 ft·lbf)**



### 3. REMOVE GENERATOR

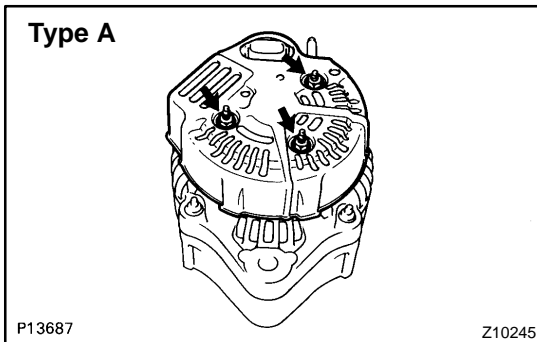
- Remove the pivot bolt, nut and adjusting bolt.
- Remove the generator.



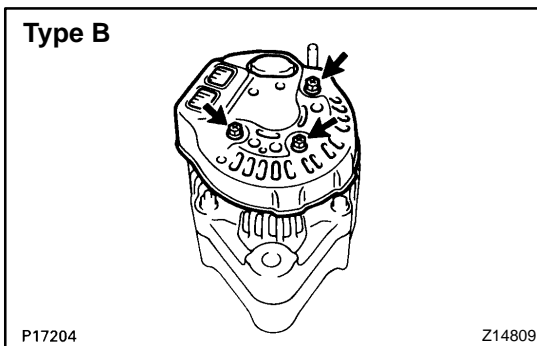
## DISASSEMBLY

### 1. REMOVE REAR END COVER

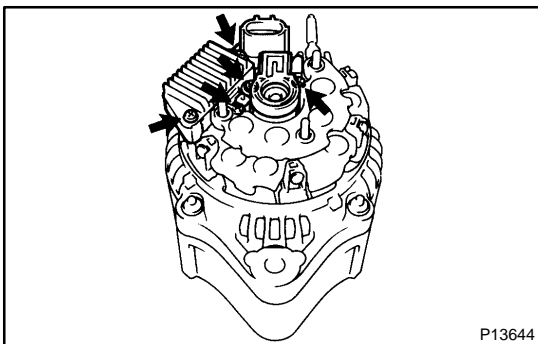
- (a) Remove the nut and terminal insulator.



- (b) Type A:  
Remove the 3 nuts and end cover.

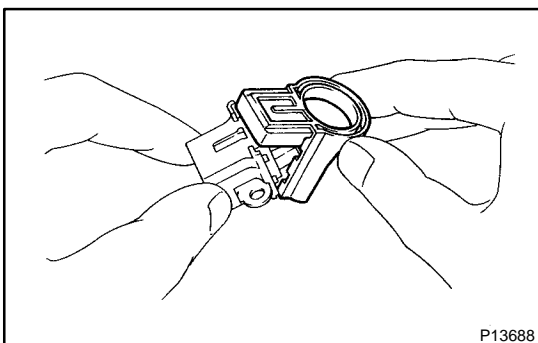


- (c) Type B:  
Remove the 3 bolts and end cover.



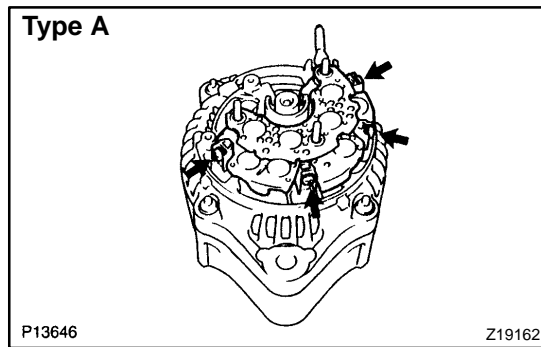
### 2. REMOVE BRUSH HOLDER AND VOLTAGE REGULATOR

- (a) Remove the 5 screws, brush holder and voltage regulator.

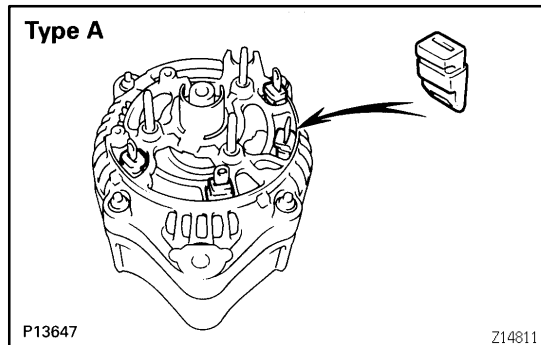


- (b) Remove the brush holder cover from the brush holder.

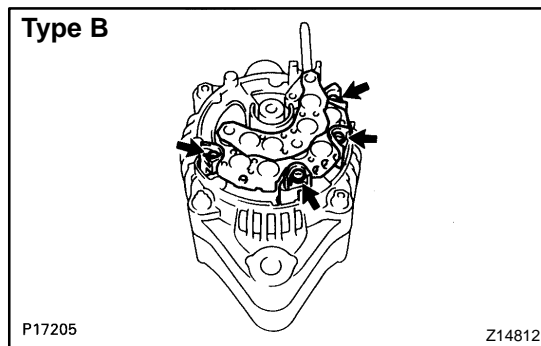


**3. Type A****REMOVE RECTIFIER HOLDER**

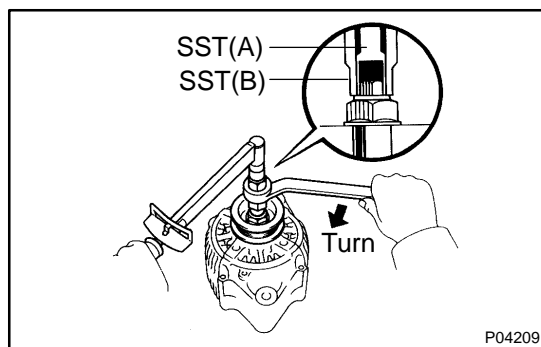
- (a) Remove the 4 screws and rectifier holder.



- (b) Remove the 4 rubber insulators.

**4. Type B:****REMOVE RECTIFIER HOLDER**

- (a) Remove the 4 screws.  
 (b) Using needle-nose pliers, straighten the stator lead wire.  
 (c) Remove the rectifier holder.

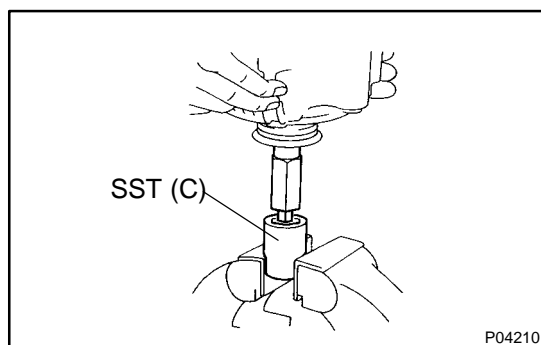
**5. REMOVE PULLEY**

- (a) Hold SST (A) with a torque wrench, and tighten SST (B) clockwise to the specified torque.

SST 09820-63010

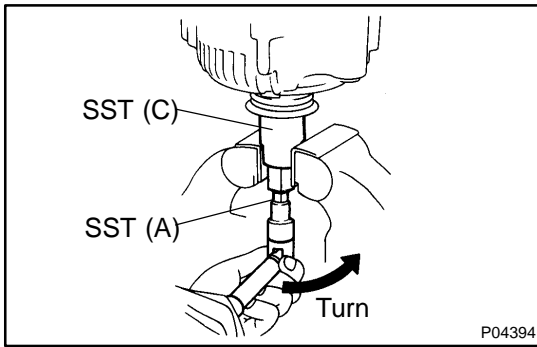
**Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)**

- (b) Check that SST (A) is secured to the rotor shaft.



- (c) Mount SST (C) in a vise.

- (d) Insert SST (B) into SST (C), and attach the pulley nut to SST (C).

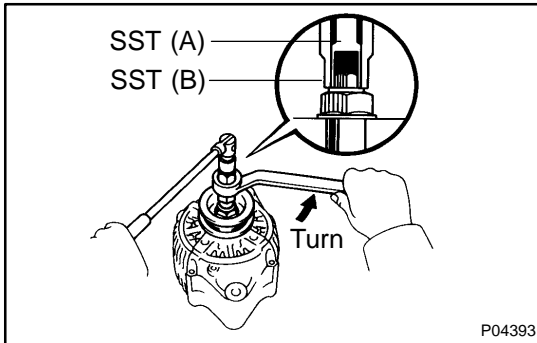


- (e) To loosen the pulley nut, turn SST (A) in the direction shown in the illustration.

**NOTICE:**

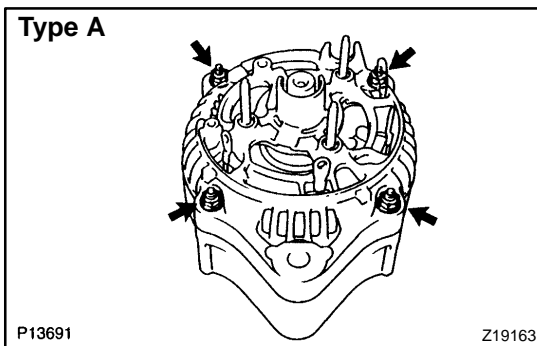
**To prevent damage to the rotor shaft, do not loosen the pulley nut more than one-half of a turn.**

- (f) Remove the generator from SST (C).



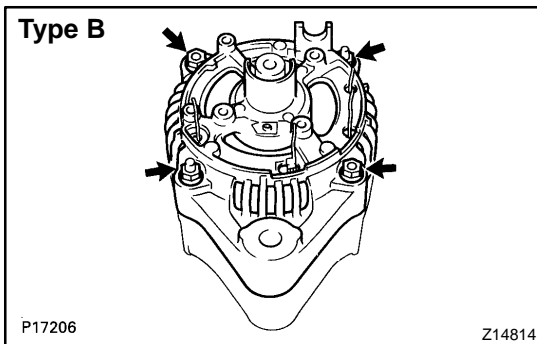
- (g) Turn SST (B), and remove SST (A and B).

- (h) Remove the pulley nut and pulley.

**6. REMOVE RECTIFIER END FRAME**

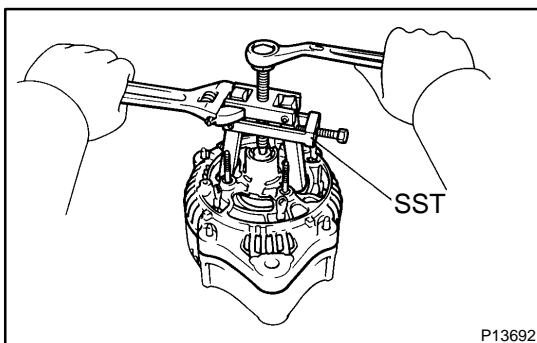
- (a) Type A

Remove the 4 nuts.



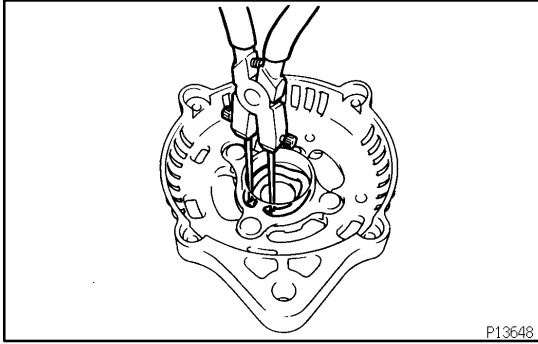
- (b) Type B:

Remove the 2 nuts, 2 bolts.



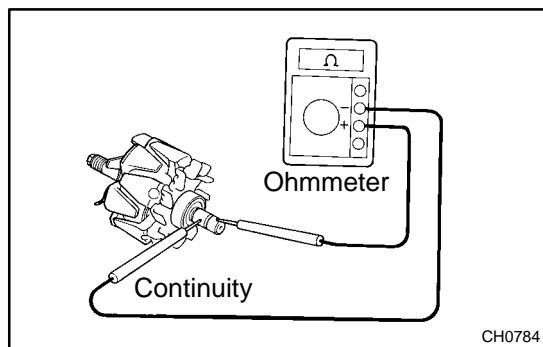
- (c) Using SST, remove the rectifier end frame.

SST 09286-4601 1



- (d) Using snap ring pliers, remove the generator washer from the rectifier end frame.

**7. REMOVE ROTOR FROM DRIVE END FRAME**



## INSPECTION

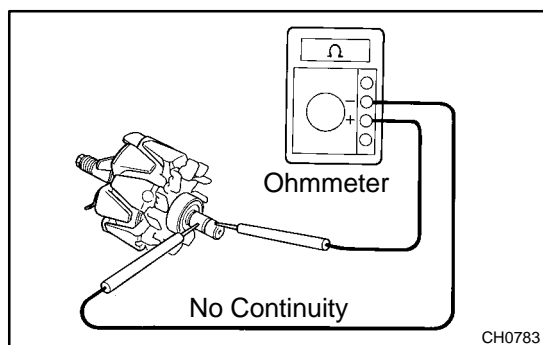
### 1. INSPECT ROTOR

- (a) Check the rotor for open circuit.

Using an ohmmeter, check that there is continuity between the slip rings.

Type A:	2.2 - 2.4 $\Omega$ at 20°C (68°F)
Type B:	2.8 - 3.0 $\Omega$ at 20°C (68°F)

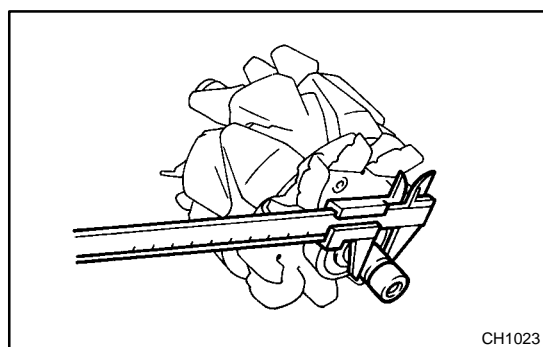
If there is no continuity, replace the rotor.



- (b) Check the rotor for ground.

Using an ohmmeter, check that there is no continuity between the slip ring and rotor.

If there is continuity, replace the rotor.



- (c) Check that the slip rings are not rough or scored.

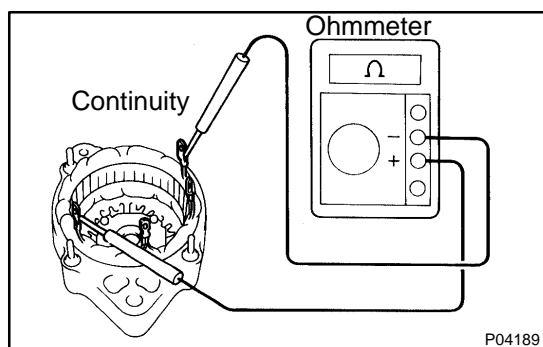
If rough or scored, replace the rotor.

- (d) Using vernier calipers, measure the slip ring diameter.

**Standard diameter: 14.2 - 14.4 mm (0.559 - 0.567 in.)**

**Minimum diameter: 12.8 mm (0.504 in.)**

If the diameter is less than minimum, replace the rotor.

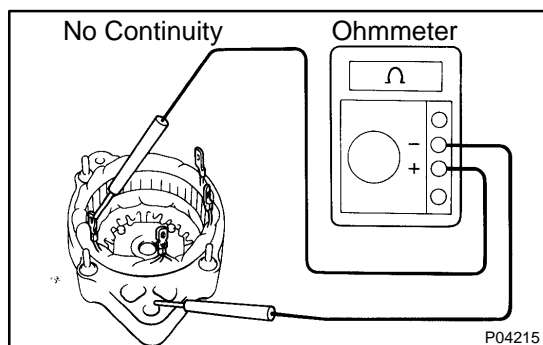


### 2. INSPECT STATOR (DRIVE END FRAME)

- (a) Check the stator for open circuit.

Using an ohmmeter, check that there is continuity between the coil leads.

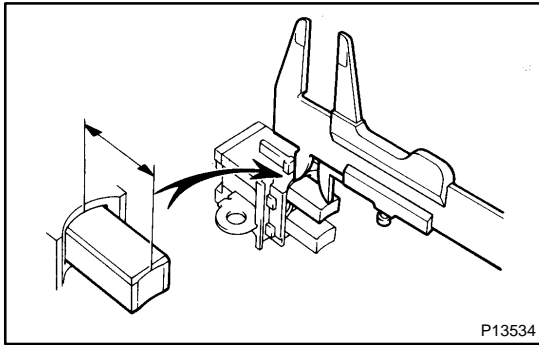
If there is no continuity, replace the drive end frame assembly.



- (b) Check the stator for ground.

Using an ohmmeter, check that there is no continuity between the coil lead and drive end frame.

If there is continuity, replace the drive end frame assembly.



### 3. INSPECT BRUSHES

Using vernier calipers, measure the exposed brush length.

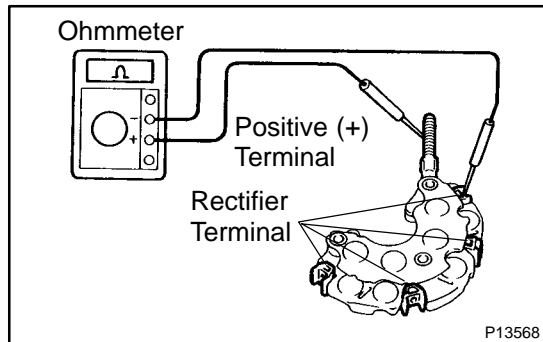
**Standard exposed length:**

**10.5 mm (0.413 in.)**

**Minimum exposed length:**

**1.5 mm (0.059 in.)**

If the exposed length is less than minimum, replace the brushes (Type A) or brush holder assembly (Type B).



### 4. INSPECT RECTIFIERS (RECTIFIER HOLDER)

(a) Check the positive rectifier.

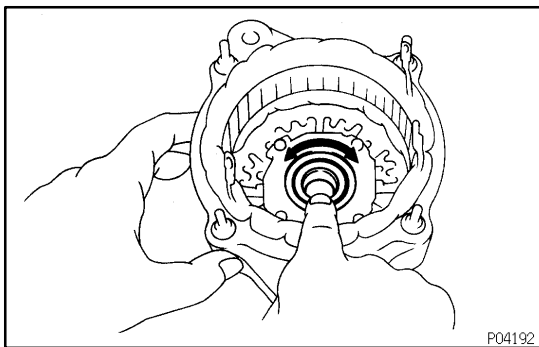
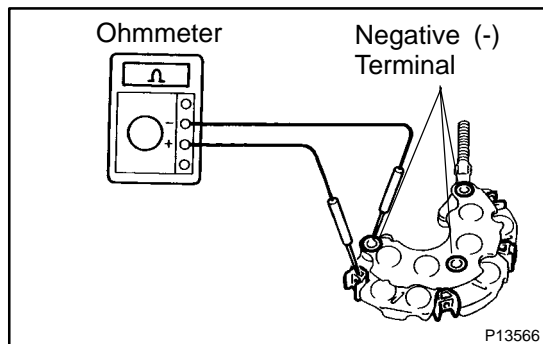
- (1) Using an ohmmeter, connect one tester probe to the positive (+) terminal and the other to each rectifier terminal.
- (2) Reverse the polarity of the tester probes and repeat step (a).
- (3) Check that one shows continuity and the other shows no continuity.

If continuity is not as specified, replace the rectifier holder.

(b) Check the negative (-) rectifier.

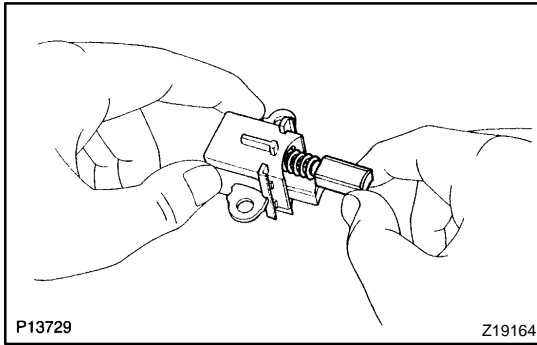
- (1) Using an ohmmeter, connect one tester probe to each negative (-) terminal and the other to each rectifier terminal.
- (2) Reverse the polarity of the tester probes and repeat step (a).
- (3) Check that one shows continuity and the other shows no continuity.

If continuity is not as specified, replace the rectifier holder.



### 5. INSPECT BEARING

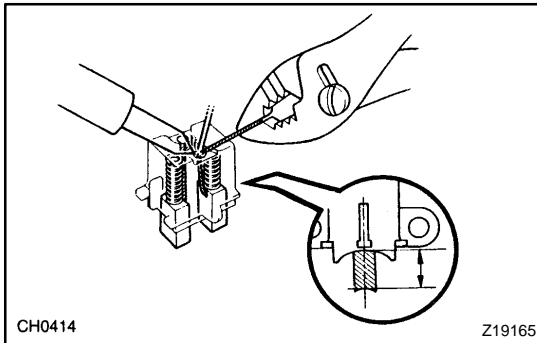
Check the bearing is not rough or worn.



## REPLACEMENT

### 1. REPLACE BRUSHES

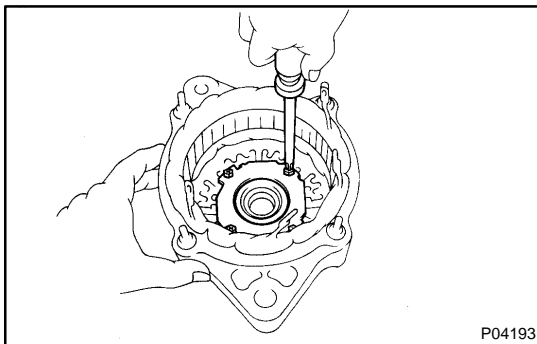
- (a) Unsolder and remove the brush and spring.
- (b) Run the wire of a new brush through the spring and the hole in the brush holder, and insert the spring and brush into the brush holder.



- (c) Solder the brush wire to the brush holder at the specified exposed length.

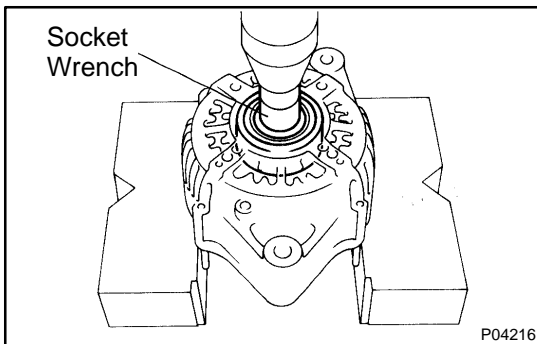
**Exposed length: 10.5 mm (0.413374 - 0.453 in.)**

- (d) Check that the brush moves smoothly in the brush holder.
- (e) Cut off the excess wire.
- (f) Apply insulation paint to the soldered area.

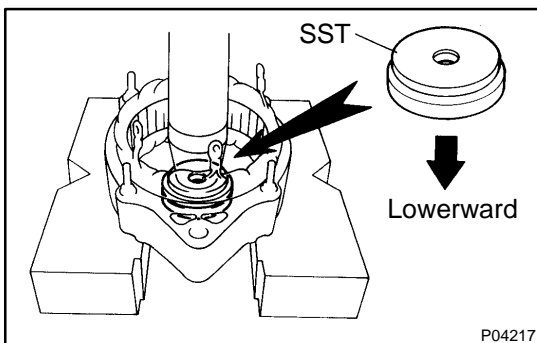


### 2. REPLACE FRONT BEARING

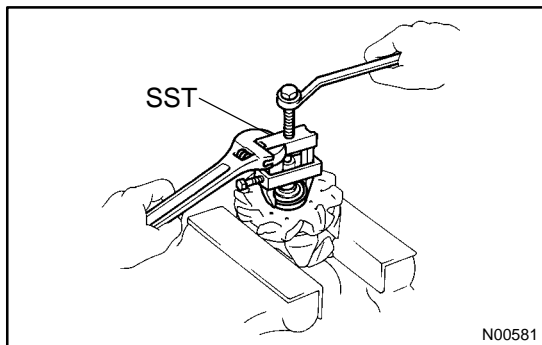
- (a) Remove the 4 screws, bearing retainer and bearing.



- (b) Using a socket wrench and press, press out the bearing.



- (c) Using SST and a press, press in a new bearing.  
SST 09950-60010 (09951-00460)
- (d) Install the bearing retainer with the 4 screws.  
**Torque: 2.6 N·m (27 kgf·cm, 23 in.-lbf)**



### 3. REPLACE REAR BEARING

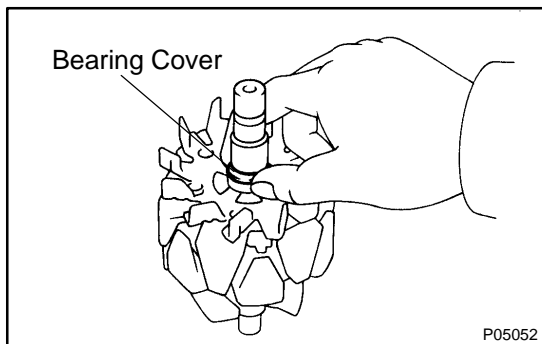
- (a) Using SST, remove the bearing cover (outside) and bearing.

SST 09820-00021

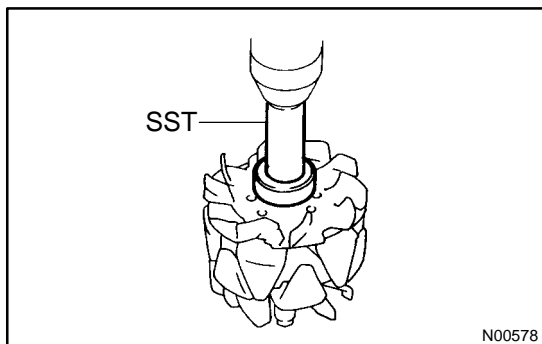
#### NOTICE:

**Be careful not to damage the fan.**

- (b) Remove the bearing cover (inside).

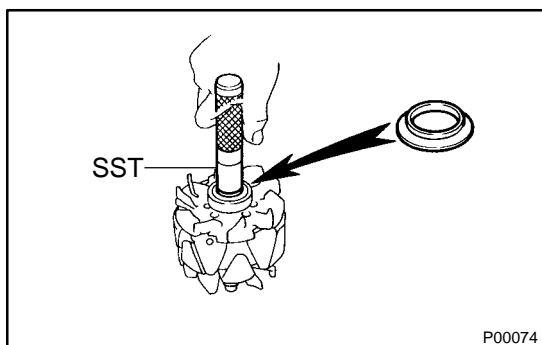


- (c) Place the bearing cover (inside) on the rotor.



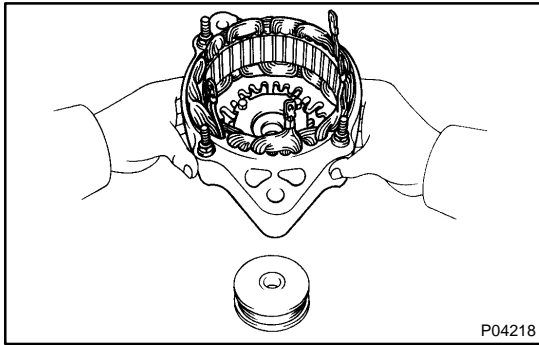
- (d) Using SST and a press, press in a new bearing.

SST 09820-00030



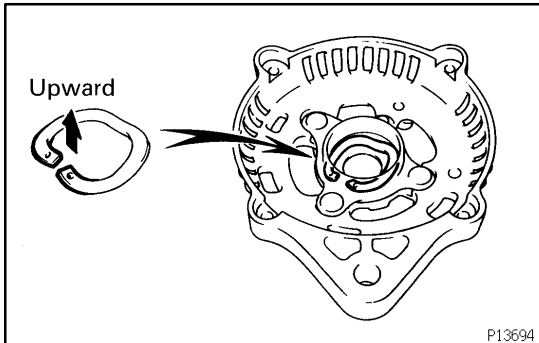
- (e) Using SST, push in the bearing cover (outside).

SST 09285-76010



## REASSEMBLY

1. PLACE RECTIFIER END FRAME ON PULLEY
2. INSTALL ROTOR TO DRIVE END FRAME

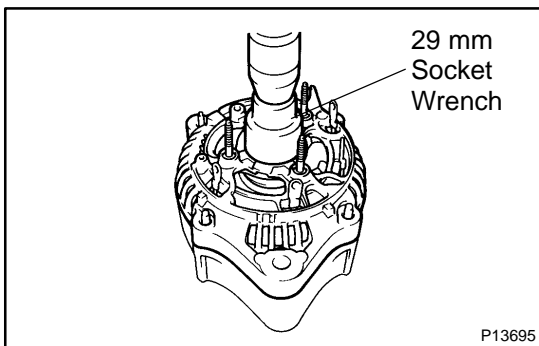


### 3. INSTALL RECTIFIER END FRAME

- (a) Install the generator washer to the rectifier end frame.

#### NOTICE:

Be careful of the generator washer installation direction.



- (b) Using a 29 mm socket wrench and press, slowly press in the rectifier end frame.

- (c) Type A

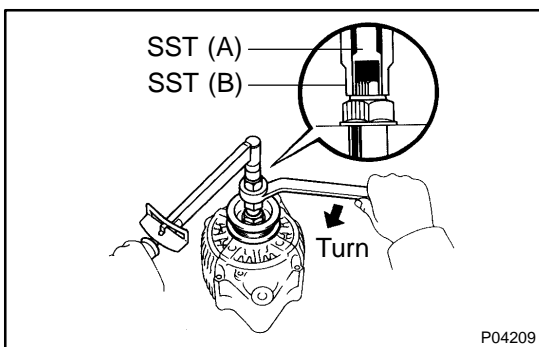
Install the 4 nuts.

**Torque: 4.5 N·m (46 kgf·cm, 40 in.-lbf)**

- (d) Type B:

Install the 2 nuts and 2 bolts.

**Torque: 4.5 N·m (46 kgf·cm, 40 in.-lbf)**



### 4. INSTALL PULLEY

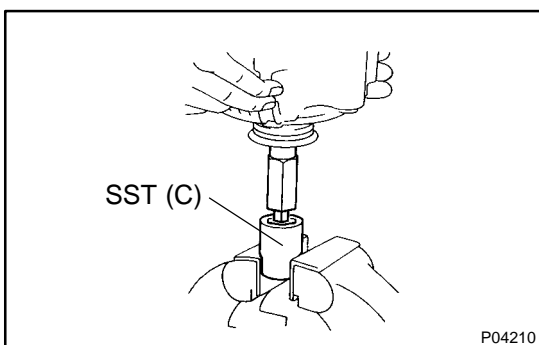
- (a) Install the pulley to the rotor shaft by tightening the pulley nut by hand.

- (b) Hold SST (A) with a torque wrench, and tighten SST (B) clockwise to the specified torque.

SST 09820-63010

**Torque: 39 N·m (400 kgf·cm, 29 ft-lbf)**

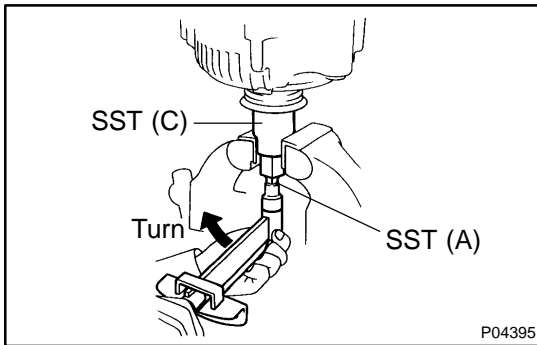
- (c) Check that SST (A) is secured to the pulley shaft.



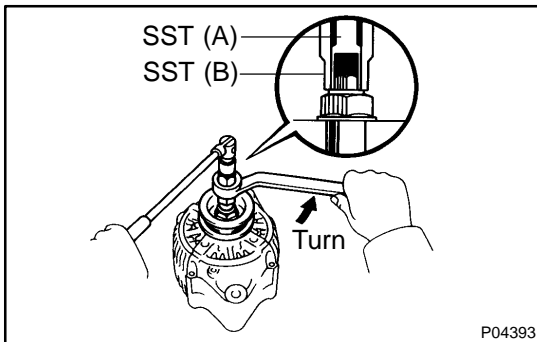
- (d) Mount SST (C) in a vise.

- (e) Insert SST (B) into SST (C), and attach the pulley nut to SST (C).

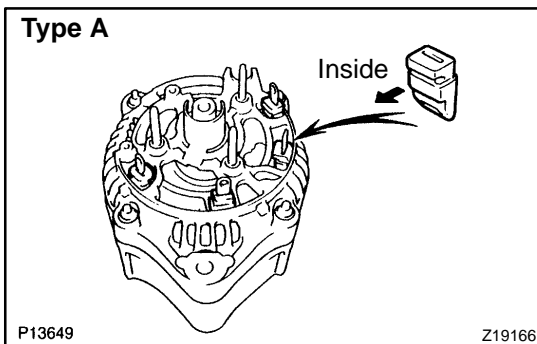




- (f) To torque the pulley nut, turn SST (A) in the direction shown in the illustration.  
**Torque: 110 N·m (1,125 kgf·cm, 81 ft·lbf)**  
 (g) Remove the generator from SST (C).



- (h) Turn SST (B), and remove SST (A and B).

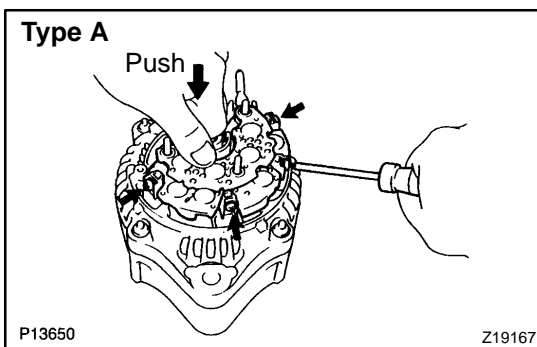


#### 5. Type A INSTALL RECTIFIER HOLDER

- (a) Install the 4 rubber insulators on the lead wires.

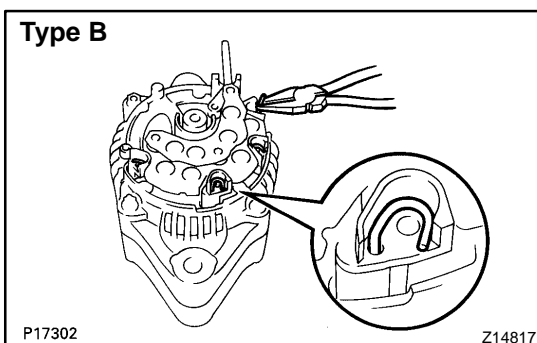
#### NOTICE:

Be careful of the rubber insulators installation direction.



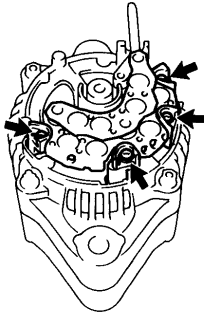
- (b) Install the rectifier holder while pushing it with the 4 screws.

**Torque: 1.96 N·m (20 kgf·cm, 17 in.-lbf)**



#### 6. Type B: INSTALL RECTIFIER HOLDER

- (a) Install the rectifier holder.  
 (b) Bend the 4 stator lead wires as shown in the illustration.

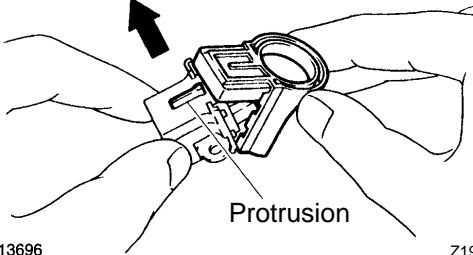
**Type B**

P17205

Z14818

- (c) Install the 4 screws.  
**Torque: 1.96 N·m (20 kgf·cm, 17 in.-lbf)**

Upward



P13696

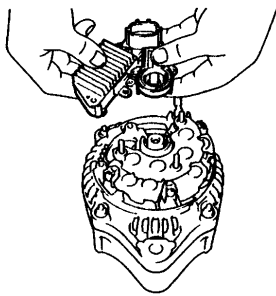
Z19168

**7. INSTALL VOLTAGE REGULATOR AND BRUSH HOLDER**

- (a) Install the brush holder cover to the brush holder.

**NOTICE:**

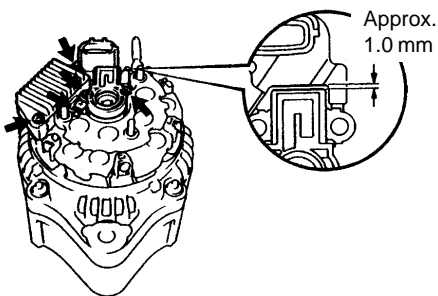
**Be careful of the holder installation direction.**



P13697

Z19169

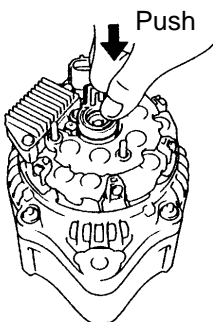
- (b) Place the voltage regulator together with the brush holder horizontally on the rectifier end frame.



P13651

Z19170

- (c) Install the 5 screws until there is a clearance of approx. 1.0 mm (0.04 in.) between the brush holder and voltage regulator.

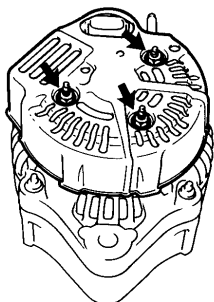


P13652

Z19171

- (d) Fit the brush holder cover.

Type A



P13687

Z10245

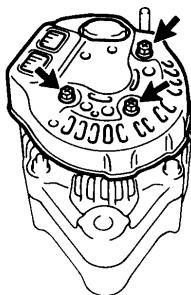
**8. INSTALL REAR END COVER**

(a) Type A:

Install the end cover with the 3 nuts.

**Torque: 4.4 N·m (45 kgf·cm, 40 in.-lbf)**

Type B



P17204

Z14809

(b) Type B:

Install the end cover with the 3 bolts.

**Torque: 4.4 N·m (45 kgf·cm, 40 in.-lbf)**

(c) Install the terminal insulator with the nut.

**Torque: 4.1 N·m (42 kgf·cm, 36 in.-lbf)****9. CHECK THAT ROTOR ROTATES SMOOTHLY**

## INSTALLATION

Installation is in the reverse order of removal (See page [CH-6](#)).

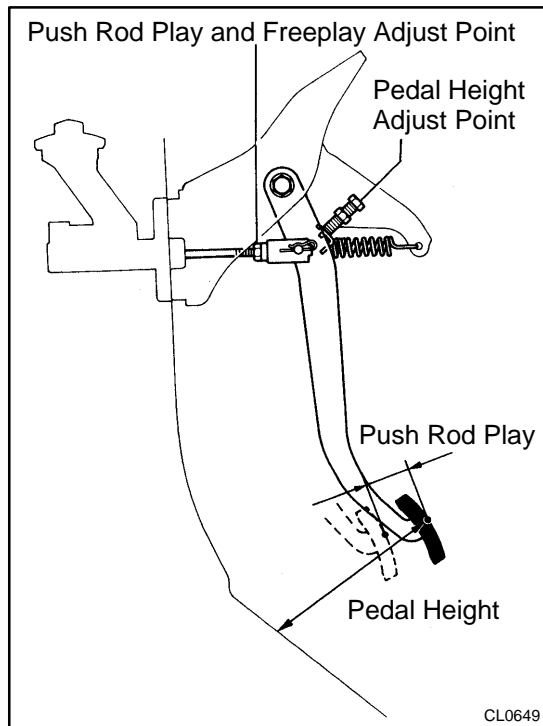
# TROUBLESHOOTING

## PROBLEM SYMPTOMS TABLE

CL050-03

Use the table below to help you 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.

Symptom	Suspect Area	See page
Clutch grabs/chatters	1. Engine mounting (Loosen) 2. Clutch disc (Runout is excessive) 3. Clutch disc (Oily) 4. Clutch disc (Worn out) 5. Clutch disc torsion rubber (Damaged) 6. Clutch disc (Glazed) 7. Diaphragm spring (Out of tip alignment)	- <a href="#">CL-14</a> <a href="#">CL-14</a> <a href="#">CL-14</a> <a href="#">CL-14</a> <a href="#">CL-14</a> <a href="#">CL-14</a>
Clutch pedal spongy	1. Clutch line (Air in line) 2. Master cylinder cup (Damaged) 3. Release cylinder cup (Damaged)	- <a href="#">CL-4</a> <a href="#">CL-9</a>
Clutch noisy	1. Release bearing (Worn, dirty, or damaged) 2. Input shaft bearing (Worn or damaged) 3. Clutch disc torsion rubber (Damaged)	<a href="#">CL-14</a> - <a href="#">CL-14</a>
Clutch slips	1. Clutch pedal (Free play out of adjustment) 2. Clutch disc (Oily) 3. Clutch disc (Worn out) 4. Diaphragm spring (Damaged) 5. Pressure plate (Distortion) 6. Flywheel (Distortion)	<a href="#">CL-2</a> <a href="#">CL-14</a> <a href="#">CL-14</a> <a href="#">CL-14</a> <a href="#">CL-14</a> -
Clutch does not disengage	1. Clutch pedal (Free play out of adjustment) 2. Clutch line (Air in line) 3. Master cylinder cup (Damaged) 4. Release cylinder cup (Damaged) 5. Input shaft bearing (Worn or damaged) 6. Clutch disc (Out of true) 7. Clutch disc (Runout is excessive) 8. Clutch disc (Lining broken) 9. Clutch disc (Dirty or burned) 10. Clutch disc (Oily) 11. Clutch disc (Lack of spline grease) 12. Diaphragm spring (Damaged) 13. Diaphragm spring (Out of tip alignment) 14. Pressure plate (Distortion)	<a href="#">CL-2</a> - <a href="#">CL-4</a> <a href="#">CL-9</a> - <a href="#">CL-14</a> <a href="#">CL-14</a> <a href="#">CL-14</a> <a href="#">CL-14</a> <a href="#">CL-14</a> <a href="#">CL-14</a> <a href="#">CL-17</a> <a href="#">CL-14</a> <a href="#">CL-17</a> <a href="#">CL-14</a>



## CLUTCH PEDAL INSPECTION

CL05P-04

### 1. CHECK THAT PEDAL HEIGHT IS CORRECT

**Pedal height from dash panel:**

**143.0 - 151.0 mm (5.629 - 5.944 in.)**

### 2. IF NECESSARY, ADJUST PEDAL HEIGHT

Loosen the lock nut and turn the stopper bolt until the height is correct. Tighten the lock nut.

### 3. CHECK PEDAL FREEPLAY AND PUSH ROD PLAY

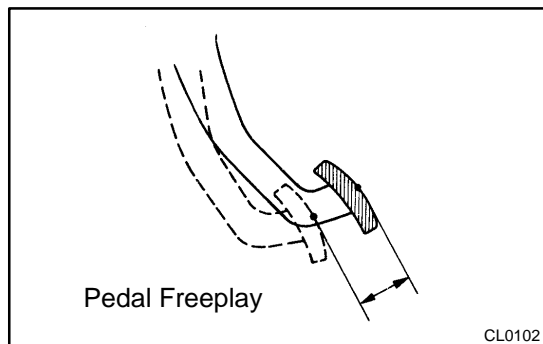
Push in on the pedal until the beginning of clutch resistance is felt.

**Pedal freeplay: 5.0 - 15.0 mm (0.196 - 0.591 in.)**

Gently push on the pedal until the resistance begins to increase.

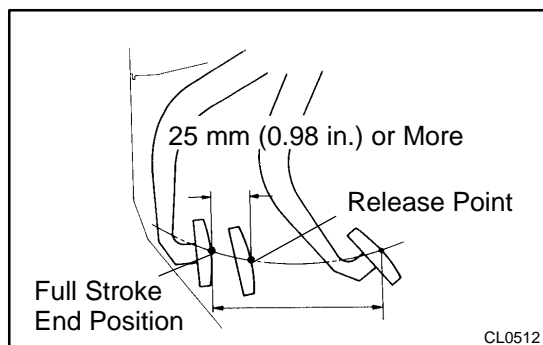
**Push rod play at pedal top:**

**1.0-5.0 mm (0.039-0.196 in.)**



### 4. IF NECESSARY, ADJUST PEDAL FREEPLAY AND PUSH ROD PLAY

- Loosen the lock nut and turn the push rod until the freeplay and push rod play are correct.
- Tighten the lock nut.
- After adjusting the pedal freeplay, check the pedal height.
- Connect the air duct and install the lower finish panel.



### 5. CHECK CLUTCH RELEASE POINT

- Pull the parking brake lever and install wheel stopper.
- Start and idle the engine.
- Without depressing the clutch pedal, slowly shift the shift lever into reverse position until the gears contact.
- Gradually depress the clutch pedal and measure the stroke distance from the point that the gear noise stops (release point) up to the full stroke end position.

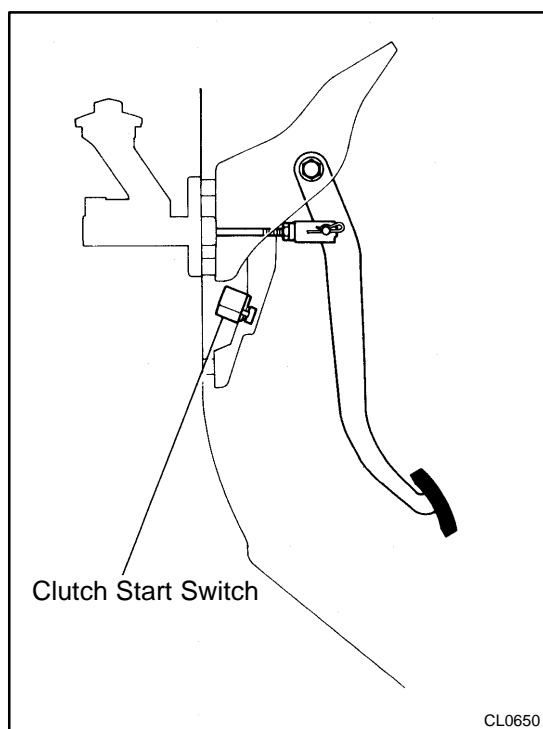
**Standard distance:**

**25 mm (0.98 in.) or more**

**(From pedal stroke end position to release point)**

If the distance is not as specified, perform the following operations.

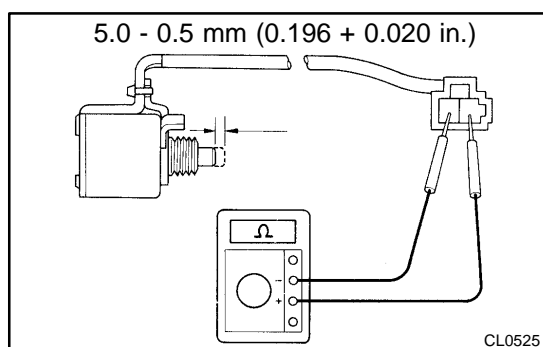
- Inspect pedal height.
- Inspect push rod play and pedal freeplay.
- Bleed the clutch line.
- Inspect the clutch cover and disc.



## 6. CHECK CLUTCH START SYSTEM

- Check that the engine does not start when the clutch pedal is released.
- Check that the engine starts when the clutch pedal is fully depressed.

If necessary, adjust or replace the clutch start switch.



## 7. CHECK CONTINUITY OF CLUTCH START SWITCH

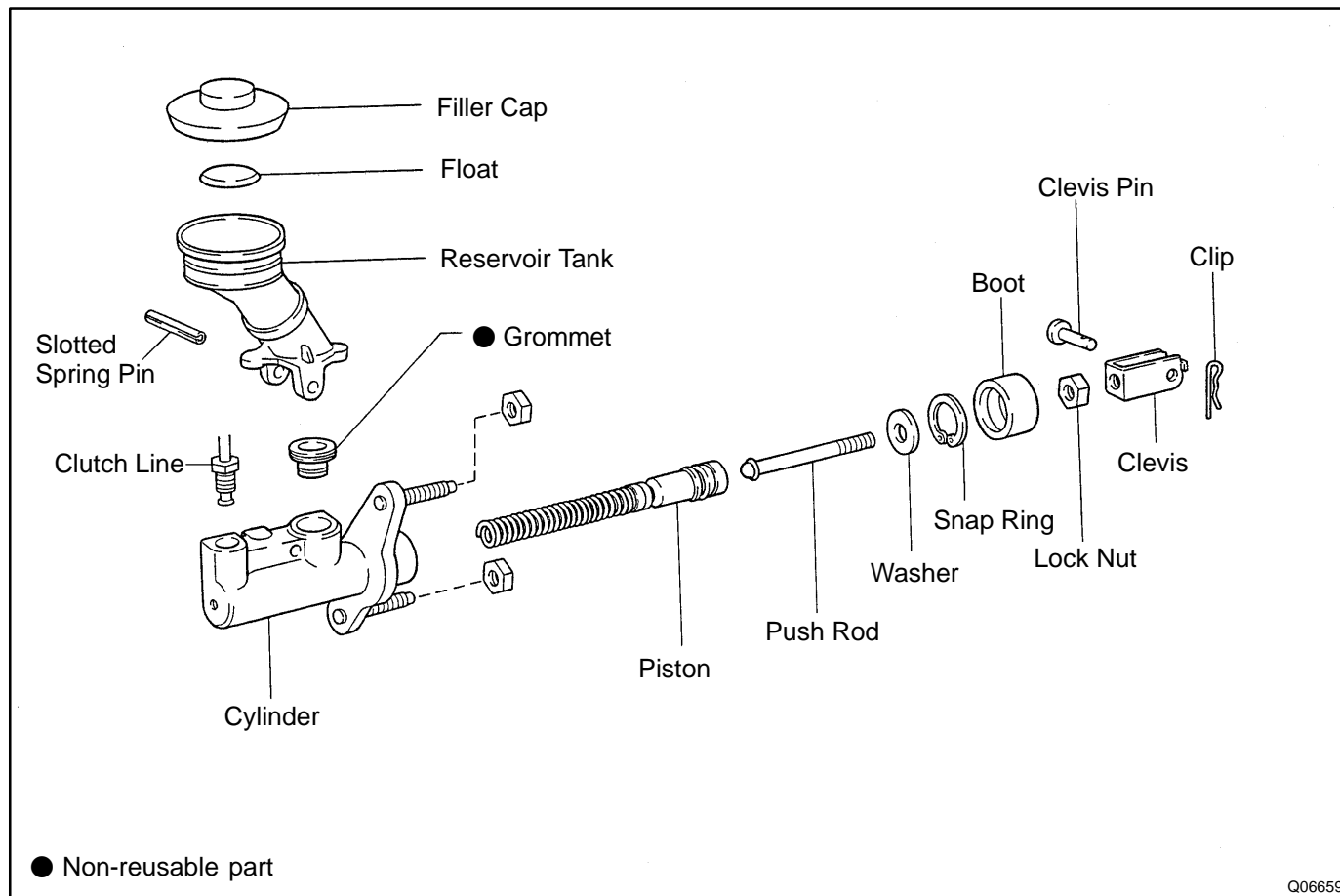
Check the continuity between terminals when the switch is ON and OFF.

Switch position	Condition
ON (pushed)	Continuity
OFF (free)	No continuity

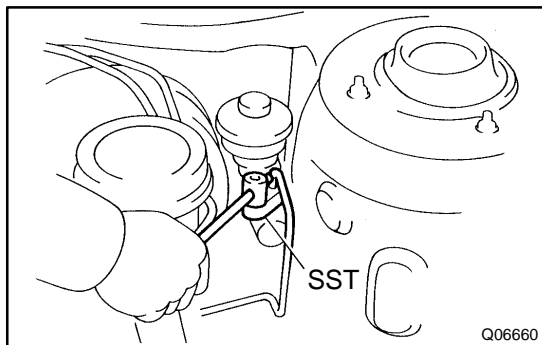
If continuity is not as specified, replace the switch.

# CLUTCH MASTER CYLINDER COMPONENTS

CL05Q-04







## REMOVAL

1. **DRAW OUT FLUID WITH SYRINGE**

2. **DISCONNECT CLUTCH LINE**

Using SST, disconnect the line. Use a container to catch the fluid.

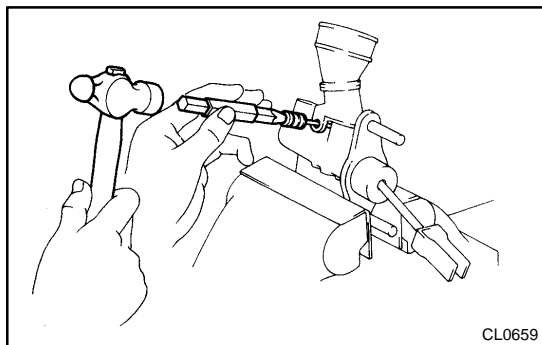
SST 09023-00100

**Torque: 15 N·m (155 kgf-cm, 11 ft-lbf)**

3. **REMOVE CLIP AND CLEVIS PIN**

4. **REMOVE 2 MOUNTING NUTS AND PULL OUT MASTER CYLINDER**

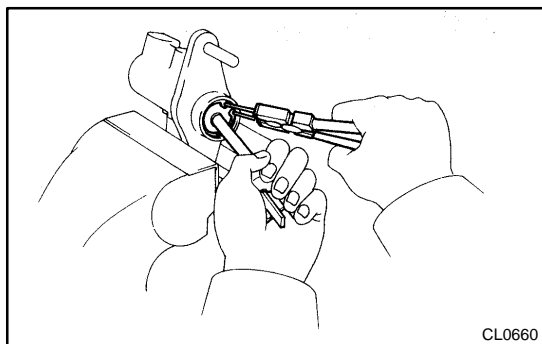
**Torque: 12 N·m (120 kgf-cm, 9 ft-lbf)**



## DISASSEMBLY

### 1. REMOVE RESERVOIR TANK

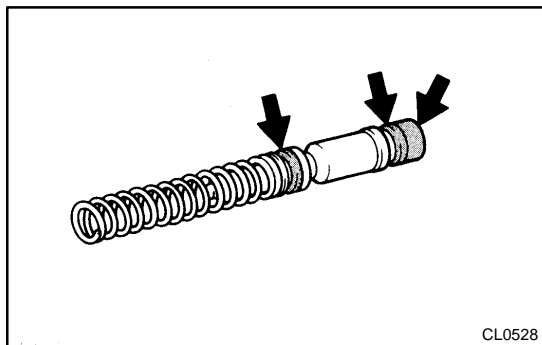
- (a) Using a pin punch and hammer, drive out the slotted spring pin.
- (b) Remove the reservoir tank and grommet.



### 2. REMOVE PUSH ROD

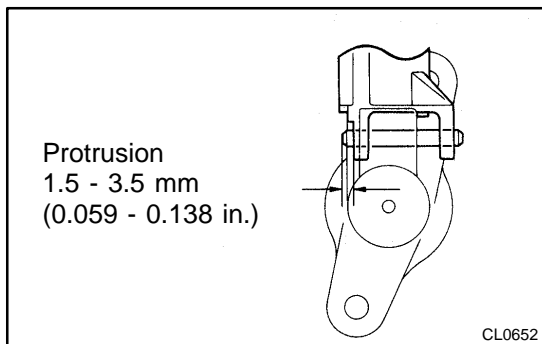
Pull off the boot, and using snap ring pliers, remove the snap ring.

### 3. REMOVE PISTON



## REASSEMBLY

1. COAT PARTS WITH LITHIUM SOAP BASE GLYCOL GREASE, AS SHOWN
2. INSERT PISTON INTO CYLINDER
3. INSTALL PUSH ROD ASSEMBLY WITH SNAP RING



## 4. INSTALL RESERVOIR TANK

- (a) Install the reservoir tank and a new grommet.
- (b) Using a pin punch and hammer, drive in the slotted spring pin.

## INSTALLATION

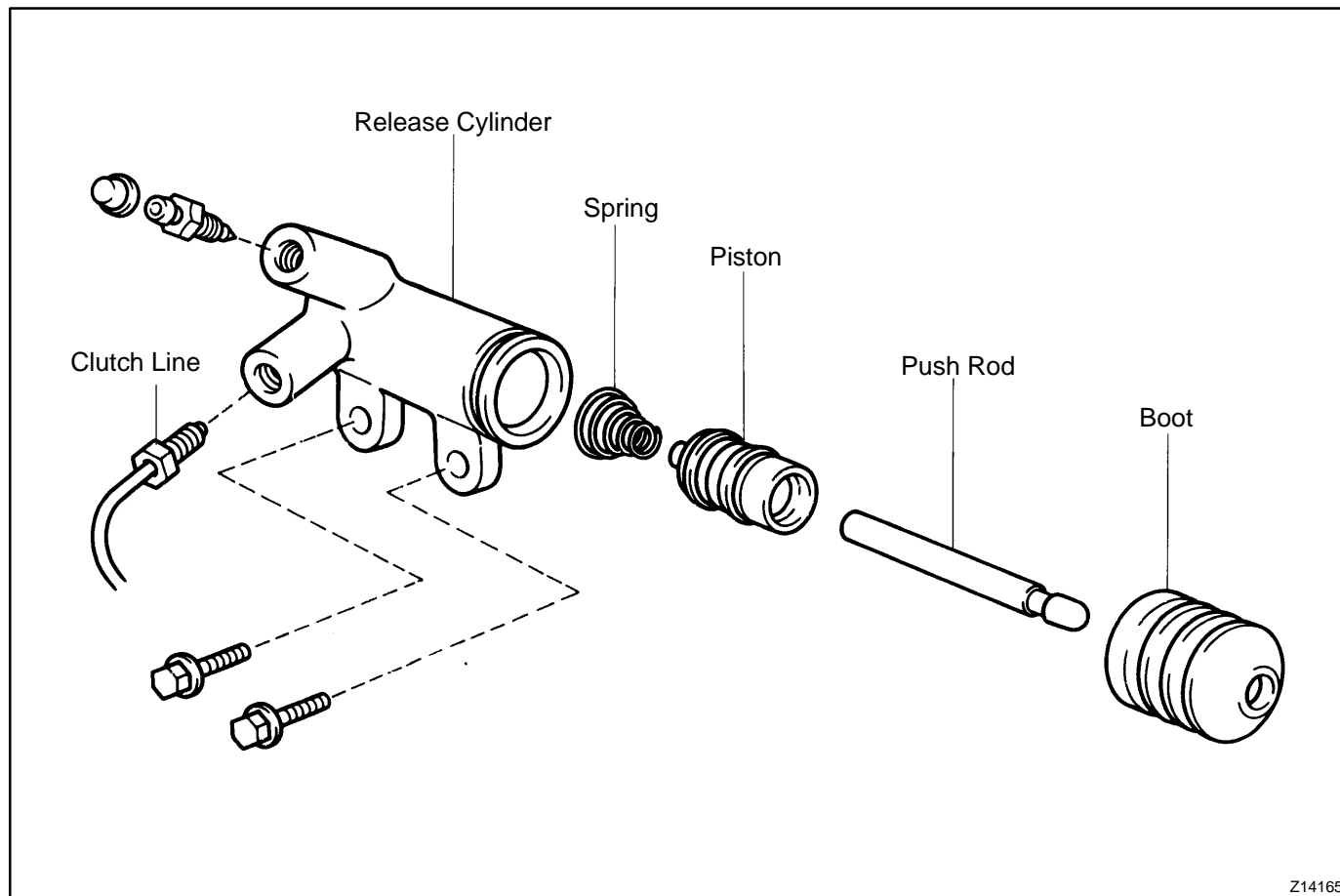
Installation is in the reverse order of removal (See page [CL-5](#)).

HINT:

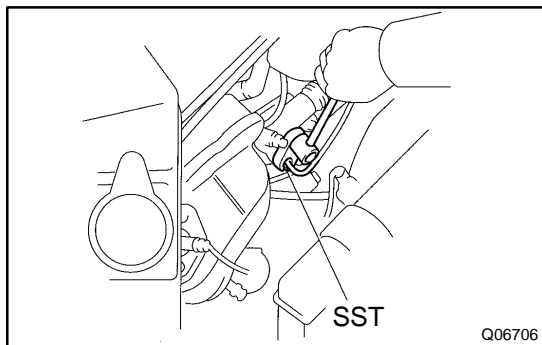
After installation, bleed system and adjust clutch pedal.

# CLUTCH RELEASE CYLINDER COMPONENTS

CLO5V-03



Z14165



## REMOVAL

### 1. DISCONNECT CLUTCH LINE

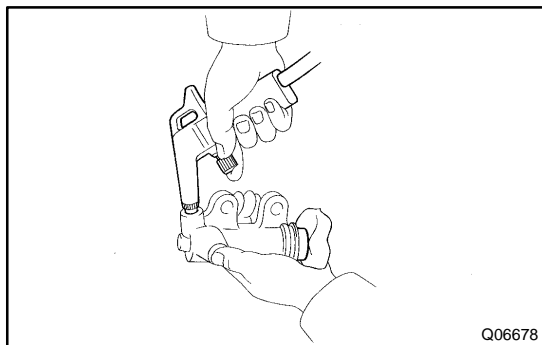
Using SST, disconnect the line. Use a container to catch the fluid.

SST 09023-00100

Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)

### 2. REMOVE 2 BOLTS AND PULL OUT RELEASE CYLINDER

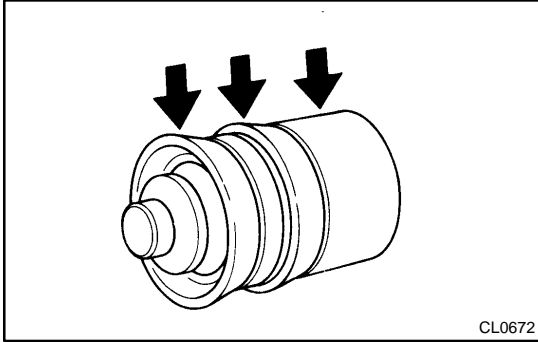
Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)



## DISASSEMBLY

1. **PULL OUT BOOT WITH PUSH ROD**
2. **REMOVE PISTON**

Using compressed air, remove the piston with the spring from the cylinder.



## REASSEMBLY

1. COAT PISTON WITH LITHIUM SOAP BASE GLYCOL GREASE, AS SHOWN
2. INSTALL PISTON WITH SPRING INTO CYLINDER
3. INSTALL BOOT WITH PUSH ROD TO CYLINDER



## INSTALLATION

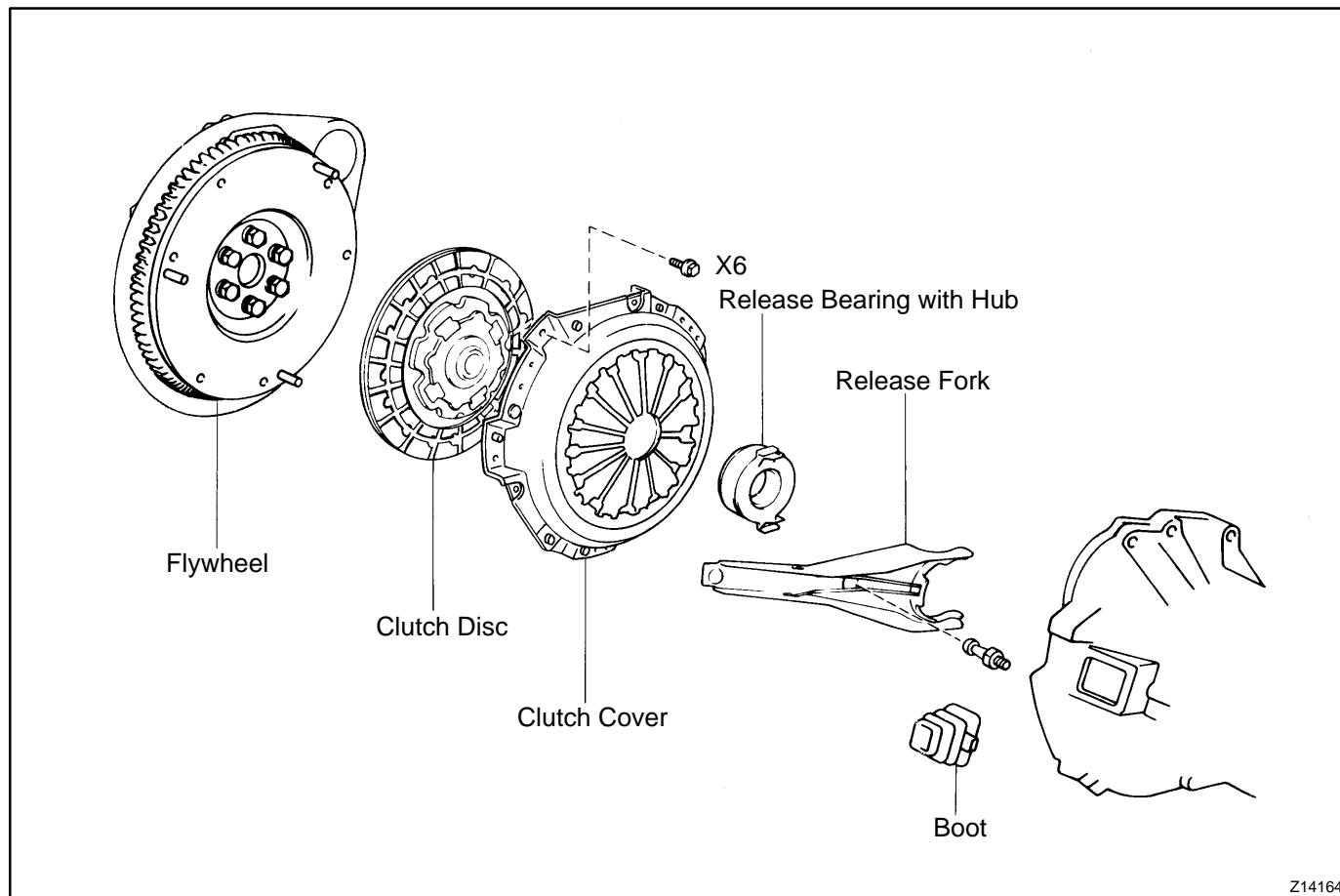
Installation is in the reverse order of removal (See page [CL-10](#)).

HINT:

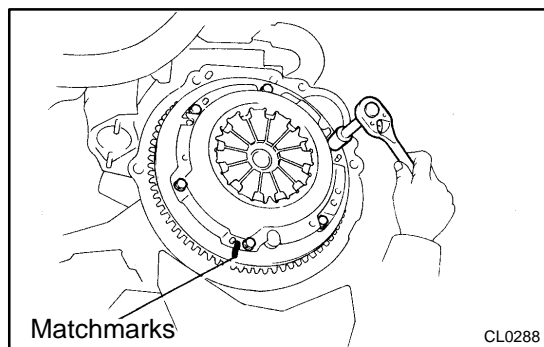
After installation, bleed clutch system.

## CLUTCH UNIT COMPONENTS

CL060-03



Z14164

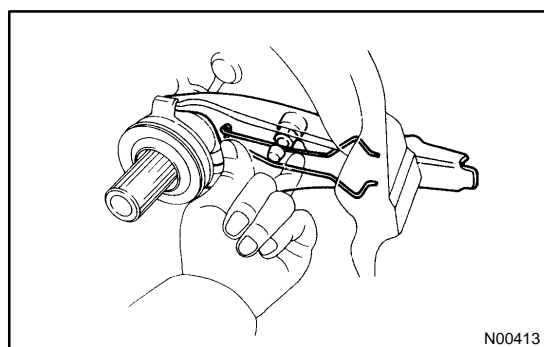


## REMOVAL

1. **REMOVE TRANSAXLE FROM ENGINE**  
(See page [MX-4](#) )
2. **REMOVE CLUTCH COVER AND DISC**
  - (a) Place matchmarks on the flywheel and clutch cover.
  - (b) Loosen each set bolt one turn at a time until spring tension is released.
  - (c) Remove the set bolts, and pull off the clutch cover with the clutch disc.

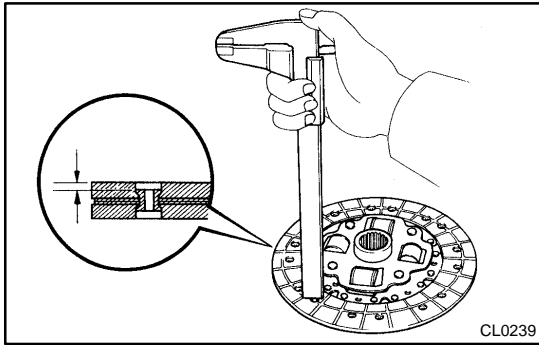
### NOTICE:

**Do not drop the clutch disc.**



3. **REMOVE RELEASE BEARING AND FORK FROM TRANSAXLE**

Remove the release bearing together with the fork and then separate them.



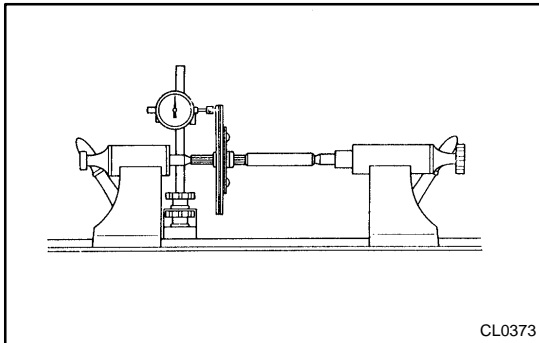
## INSPECTION

### 1. INSPECT CLUTCH DISC FOR WEAR OR DAMAGE

Using calipers, measure the rivet head depth.

**Minimum rivet depth: 0.3 mm (0.012 in.)**

If necessary, replace the clutch disc.

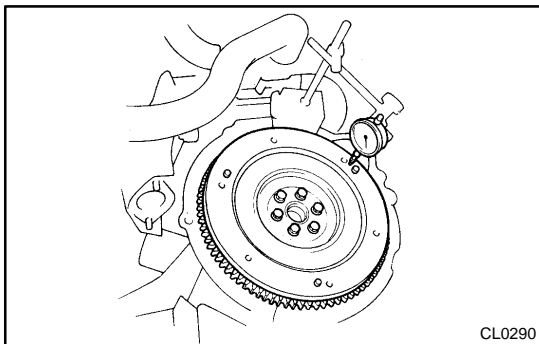


### 2. INSPECT CLUTCH DISC RUNOUT

Using a dial indicator, check the disc runout.

**Maximum runout: 0.8 mm (0.031 in.)**

If necessary, replace the clutch disc.

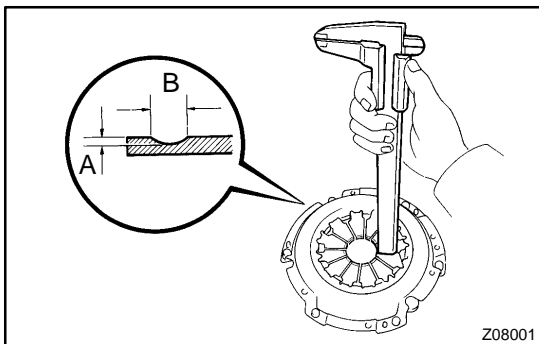


### 3. INSPECT FLYWHEEL RUNOUT

Using a dial indicator, check the flywheel runout.

**Maximum runout: 0.1 mm (0.004 in.)**

If necessary, replace the flywheel.



### 4. INSPECT DIAPHRAGM SPRING FOR WEAR

Using calipers, measure the diaphragm spring for depth and width of wear.

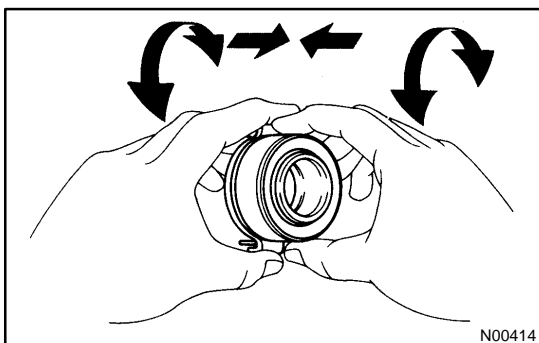
**Maximum depth:**

**A: 0.6 mm (0.024 in.)**

**Maximum width:**

**B: 5.0 mm (0.197 in.)**

If necessary, replace the clutch cover.



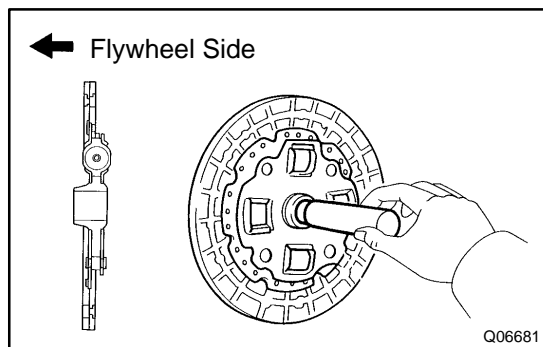
### 5. INSPECT RELEASE BEARING

Turn the bearing by hand while applying force in the axial direction.

**HINT:**

The bearing is permanently lubricated and requires no cleaning or lubrication.

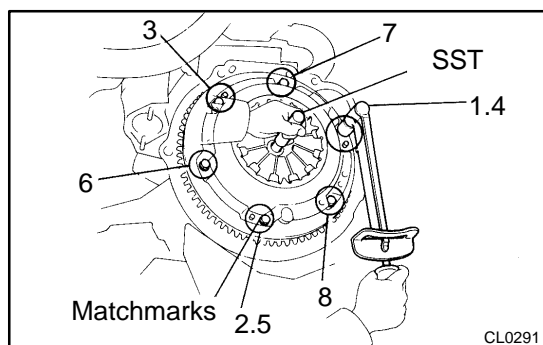
If necessary, replace the release bearing.



## INSTALLATION

### 1. INSTALL CLUTCH DISC AND CLUTCH COVER ON FLYWHEEL

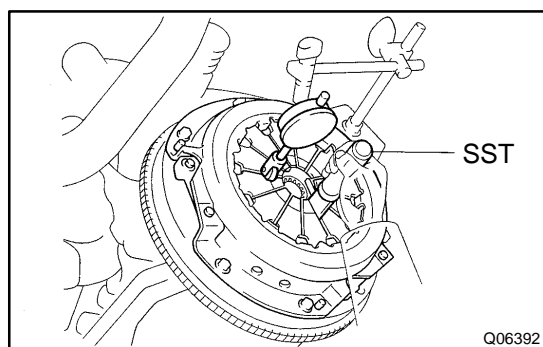
- (a) Insert SST in the clutch disc, and then set them.  
SST 09301-00210



- (b) Align the matchmark on the clutch cover and flywheel.  
(c) Torque the bolts on the clutch cover in the order shown.  
**Torque: 19 N·m (195 kgf-cm, 14 ft-lbf)**

#### HINT:

Temporarily tighten the No.1 and No.2 bolts.



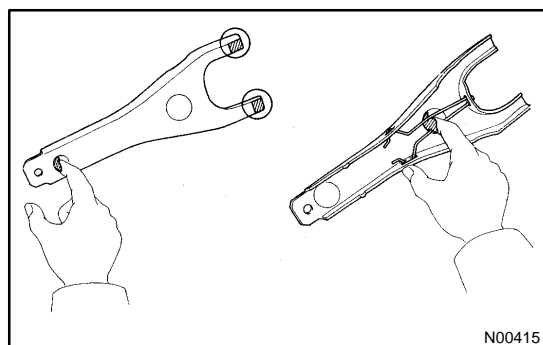
### 2. CHECK DIAPHRAGM SPRING TIP ALIGNMENT

Using a dial indicator with roller instrument, check the diaphragm spring tip alignment.

**Maximum non-alignment: 0.5 mm (0.020 in.)**

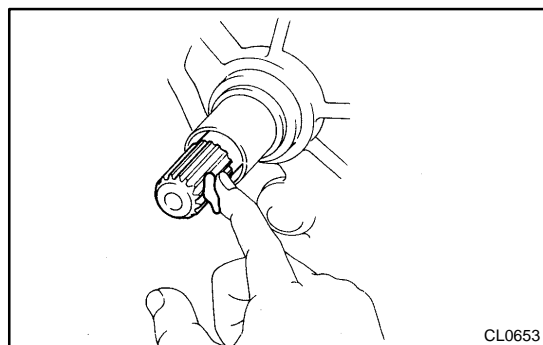
If alignment is not as specified, using SST, adjust the diaphragm spring tip alignment.

SST 09333-00013



### 3. APPLY MOLYBDENUM DISULPHIDE LITHIUM BASE GREASE (NLGI NO.2)

- (a) Apply release hub grease to these parts:
- Release fork and hub contact point
  - Release fork and push rod contact point
  - Release fork pivot point



- (b) Apply clutch spline grease.  
Clutch disc spline

#### HINT:

Recommended grease part number 08887-01706 (100 g).

### 4. INSTALL RELEASE BEARING AND FORK TO TRANSAXLE

Install the bearing to the release fork, and then install them to the transaxle.

### 5. INSTALL TRANSAXLE TO ENGINE (See page [MX-6](#))

# MANUAL TRANSAXLE SYSTEM

MX03N-01

## PRECAUTION

When working with FIPG material, you must observe the following items.

- Using a razor blade and gasket scraper, remove all the old FIPG material from the gasket surfaces.
- Thoroughly clean all components to remove all the loose material.
- Clean both sealing surfaces with a non-residue solvent.
- Apply FIPG in an approx. 1 mm (0.04 in.) wide bead along the sealing surface.
- Parts must be assembled within 10 minutes of application. Otherwise, the FIPG material must be removed and reapplied.

# TROUBLESHOOTING

## PROBLEM SYMPTOMS TABLE

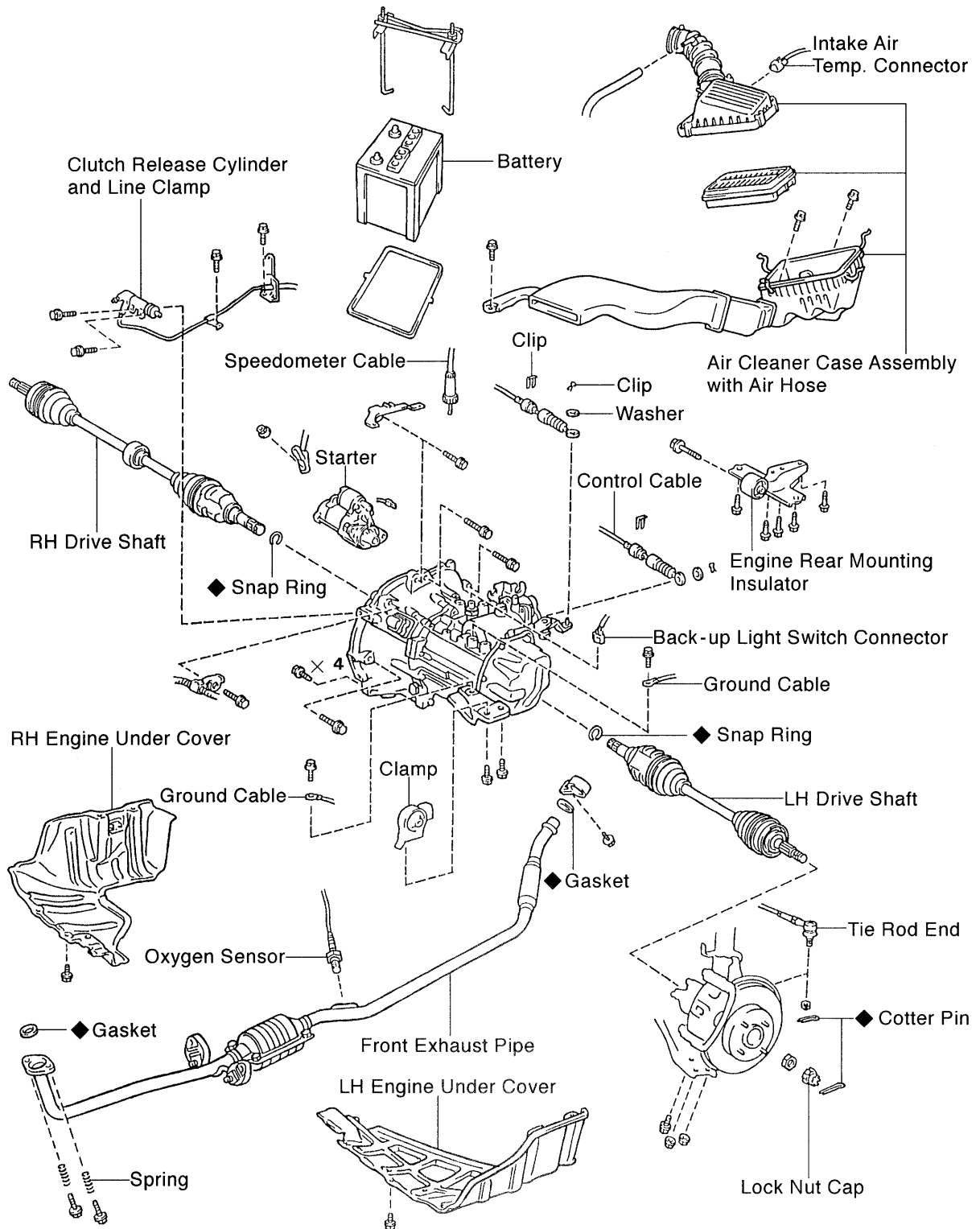
MX07D-03

Use the table below to help you 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.

Symptom	Suspect Area	See page
Noise	15.Oil (Level low) 16.Oil (Wrong) 17.Gear (Worn or damaged) 18.Bearing (Worn or damaged)	<a href="#">MX-4</a> <a href="#">MX-4</a> <a href="#">MX-7</a> <a href="#">MX-7</a>
Oil leakage	1. Oil (Level too high) 2. Gasket (Damaged) 3. Oil seal (Worn or damaged) 4. O-Ring (Worn or damaged)	<a href="#">MX-4</a> <a href="#">MX-7</a> <a href="#">MX-7</a> <a href="#">MX-7</a>
Hard to shift or will not shift	1. Control cable (Faulty) 2. Synchronizer ring (Worn or damaged)  3. Shift key spring (Damaged)	<a href="#">MX-40</a> <a href="#">MX-20</a> <a href="#">MX-27</a>  <a href="#">MX-20</a> <a href="#">MX-27</a>
Jumps out of gear	1. Locking ball spring (Damaged) 2. Shift fork (Worn) 3. Gear (Worn or damaged) 4. Bearing (Worn or damaged)	<a href="#">MX-7</a> <a href="#">MX-7</a> <a href="#">MX-7</a> <a href="#">MX-7</a>

# MANUAL TRANSAXLE UNIT COMPONENTS

MX07E-04



◆ Non-reusable part

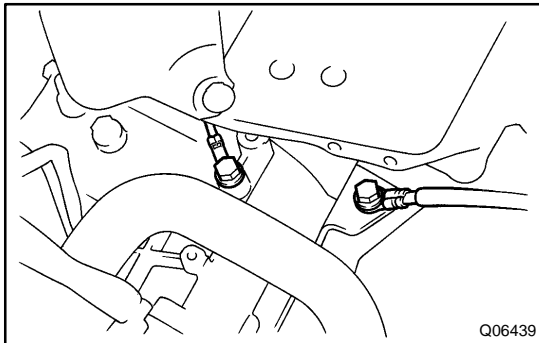
008157



## REMOVAL

1. REMOVE BATTERY AND AIR CLEANER CASE ASSEMBLY WITH AIR HOSE
2. REMOVE CLUTCH RELEASE CYLINDER AND LINE CLAMP

- (a) Remove the 2 bolts and release cylinder.
- (b) Remove the 2 bolts and release cylinder line clamp.  
Torque: 12 N·m (120 kgf-cm, 9 ft-lbf)



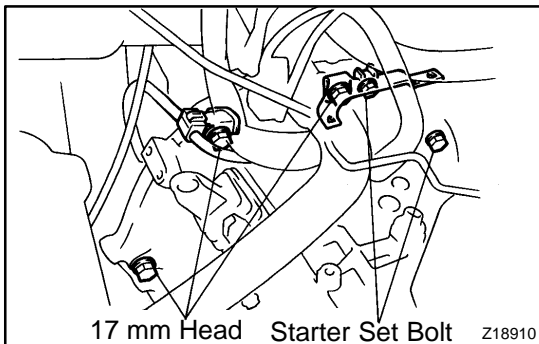
3. DISCONNECT GROUND CABLE

Remove the 2 bolts and disconnect the 2 ground cables from the transaxle side and engine left mounting bracket side.

4. DISCONNECT BACK-UP LIGHT SWITCH CONNECTOR

5. DISCONNECT CONTROL CABLE

- (a) Remove the 2 clips and washers.
- (b) Remove the 2 clips from the cables.



6. REMOVE STARTER SET BOLT

Remove the 2 set bolts of the starter from the transaxle upper side.

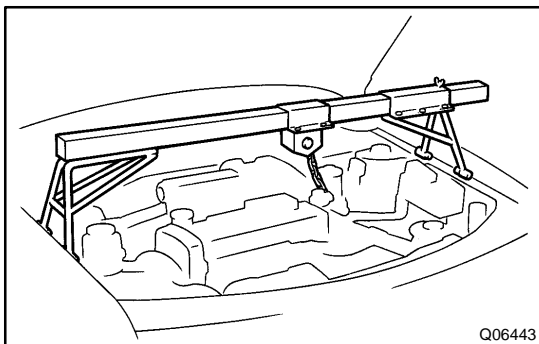
Torque: 39 N·m (400 kgf-cm, 29 ft-lbf)

7. REMOVE TRANSAXLE MOUNTING BOLT

Remove the 3 bolts of transaxle case upper side.

Torque:

17 mm head: 64 N·m (650 kgf-cm, 47 ft-lbf)



8. INSTALL ENGINE SUPPORT FIXTURE

9. REMOVE FRONT WHEEL

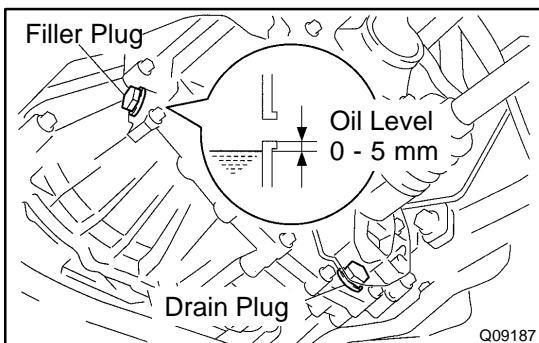
Torque: 103 N·m (1,050 kgf-cm, 76 ft-lbf)

10. RAISE VEHICLE

NOTICE:

Make sure that the vehicle is securely supported.

11. REMOVE LH AND RH ENGINE UNDER COVERS



12. DRAIN TRANSAXLE OIL

Oil grade: API GL-4 or GL-5

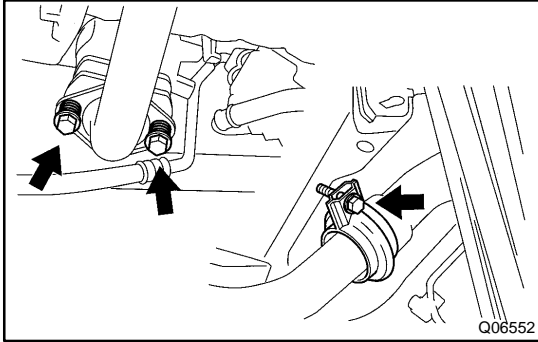
Viscosity: SAE 75W-90

Capacity: 1.9 liters (2.0 US qts, 1.7 Imp. qts)

Torque: 39 N·m (400 kgf-cm, 29 ft-lbf)

13. REMOVE LH AND RH DRIVE SHAFTS

(See page SA-17 )

**14. REMOVE FRONT EXHAUST PIPE**

- (a) Disconnect the oxygen sensor.
- (b) Remove the 2 bolts, springs and gasket.  
**Torque: 62 N·m (630 kgf·cm, 46 ft·lbf)**
- (c) Remove the bolt, clamp and gasket.  
**Torque: 19 N·m (190 kgf·cm, 14 ft·lbf)**
- (d) Disconnect the 2 rings and remove the exhaust front pipe.

**15. REMOVE STARTER**

Disconnect the connector and wire and remove the starter.

**16. DISCONNECT SPEEDOMETER CABLE****17. REMOVE ENGINE REAR MOUNTING INSULATOR**

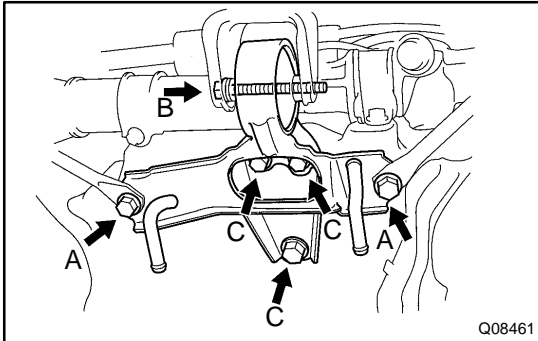
Remove the 6 bolts and insulator.

**Torque:**

**Bolt A: 78 N·m (800 kgf·cm, 58 ft·lbf)**

**Bolt B: 64 N·m (650 kgf·cm, 47 ft·lbf)**

**Bolt C: 90 N·m (920 kgf·cm, 67 ft·lbf)**

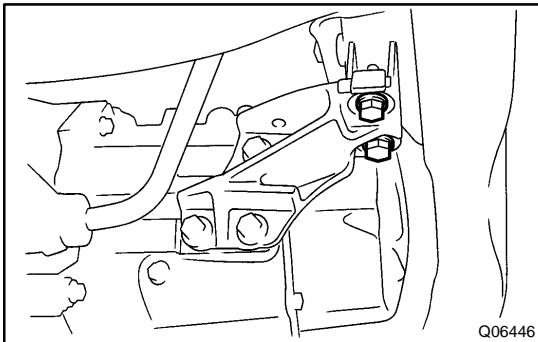
**18. DISCONNECT ENGINE LEFT MOUNTING BRACKET FROM ENGINE LEFT MOUNTING INSULATOR**

Remove the 2 bolts.

**Torque: 48 N·m (490 kgf·cm, 36 ft·lbf)**

**19. JACK UP TRANSAXLE SLIGHTLY**

Using a transmission jack, support the transaxle.

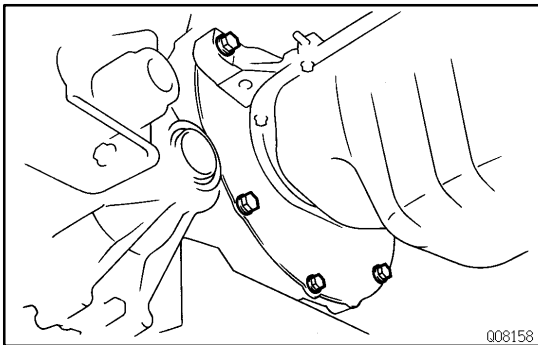
**20. REMOVE TRANSAXLE LOWER SIDE MOUNTING BOLT**

Remove the 4 bolts.

**Torque:**

**14 mm head: 46 N·m (470 kgf·cm, 34 ft·lbf)**

**10 mm head: 7.4 N·m (75 kgf·cm, 65 in·lbf)**

**21. REMOVE TRANSAXLE**

Lower the engine left side and remove the transaxle from the engine.

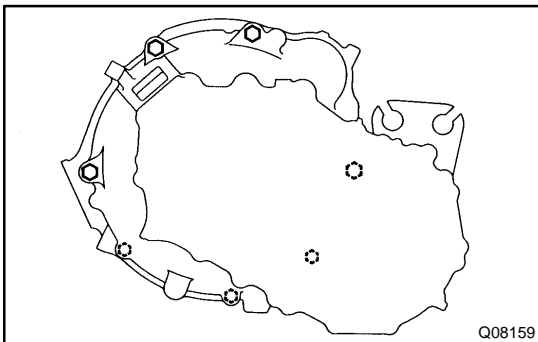
**HINT:**

- Align the input shaft with the clutch disc and install the transaxle to the engine.
- Install and torque the 7 bolts.

**Torque:**

**Upper side mounting bolts: (See step 7)**

**Lower side mounting bolts: (See step 20)**



## INSTALLATION

**Installation is in the reverse order of removal.**

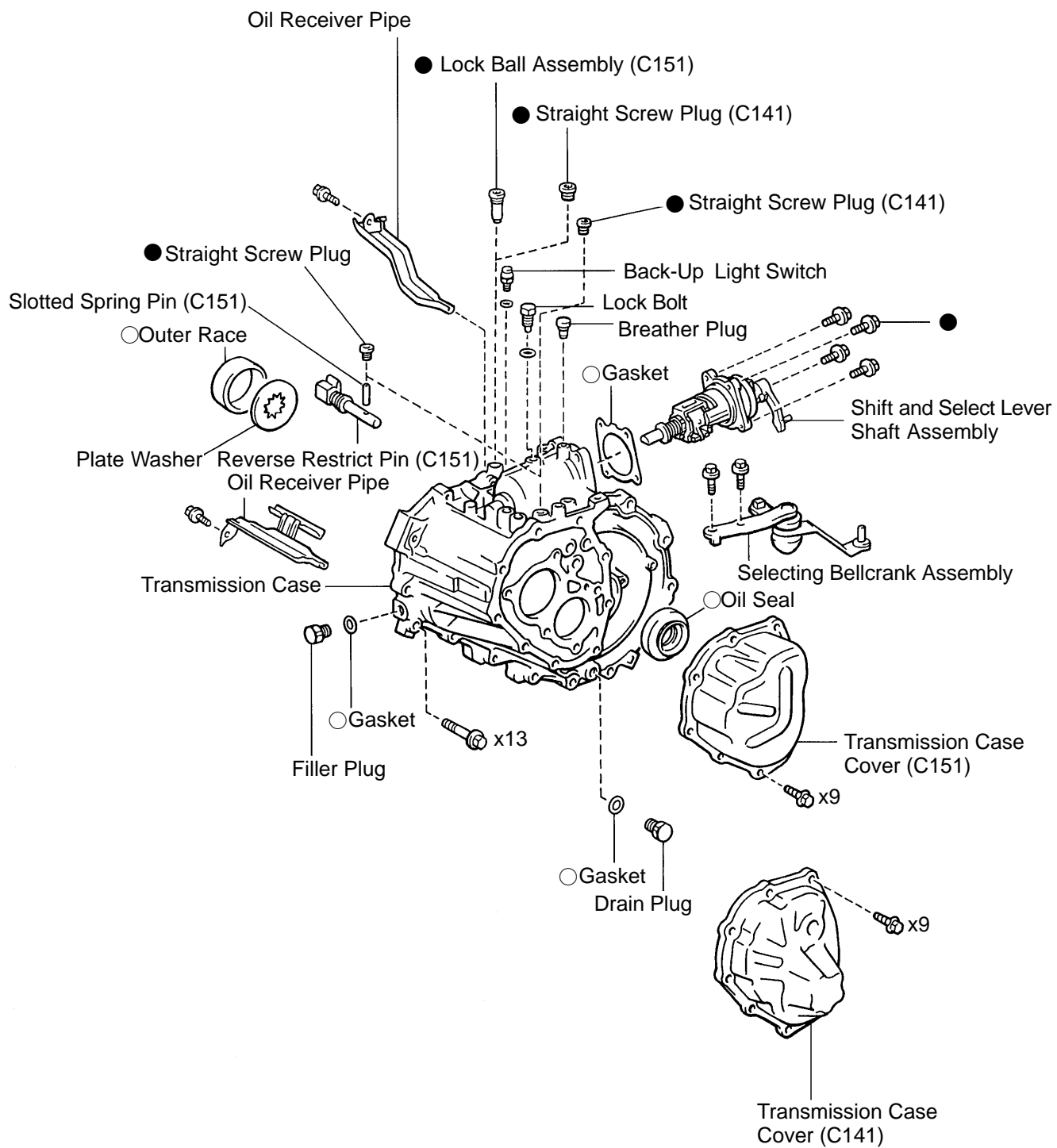
HINT:

After installation, check and inspect items as follows.

- Front wheel alignment (See page [SA-4](#) ).
- Do the road test.

## MX07Z-04

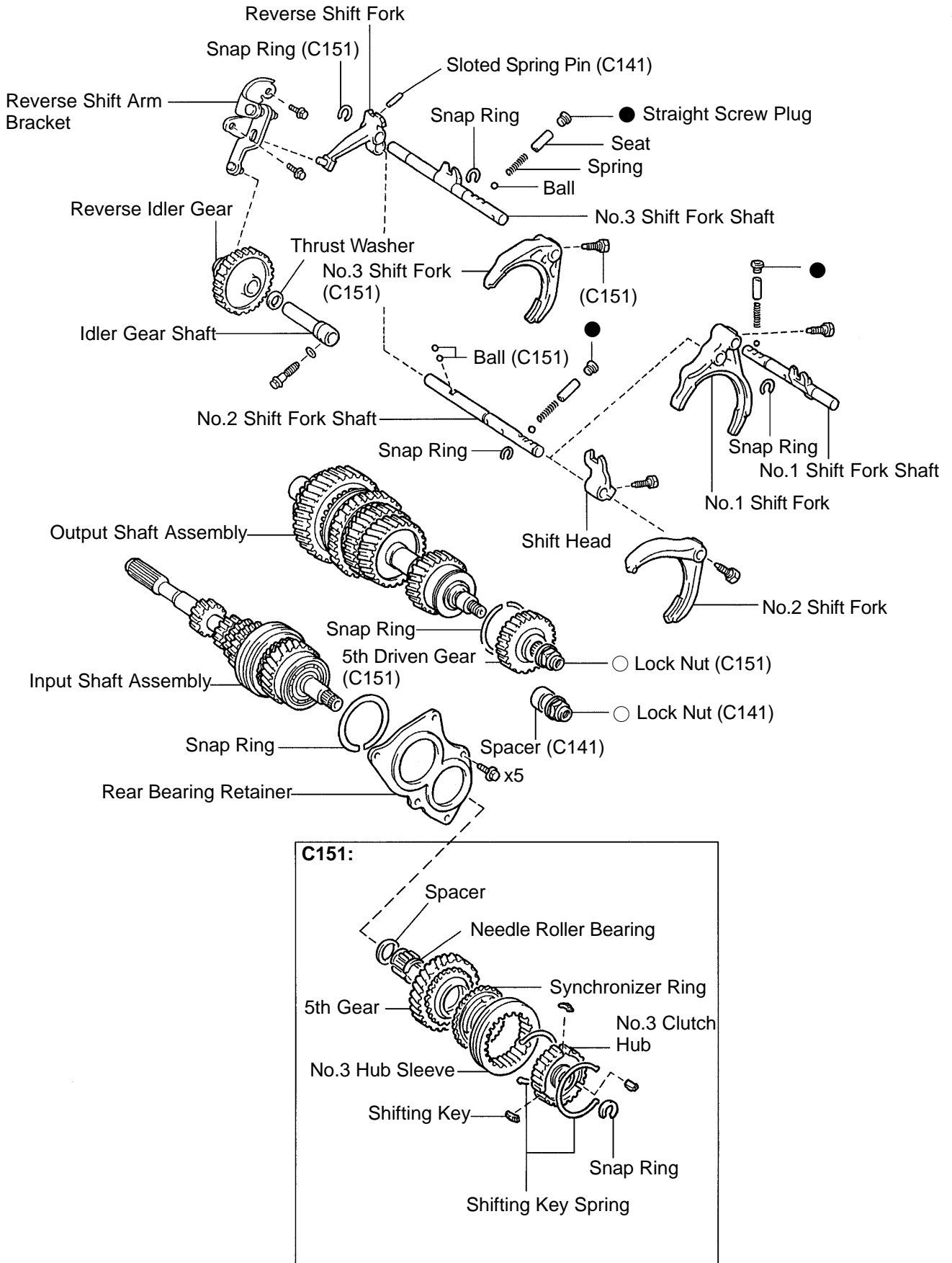




○ Non-reusable part

● Precoated part

Z18912



○ Non-reusable part  
● Precoated part

Q10103

## DISASSEMBLY

### 1. REMOVE RELEASE FORK AND BEARING

HINT:

Apply molybdenum disulphide lithium base grease  
(See page [CL-17](#) ).

### 2. REMOVE SPEEDOMETER DRIVEN GEAR

Remove the driven gear lock plate set bolt and driven gear.

**Torque: 11 N·m (115 kgf·cm, 8 ft·lbf)**

### 3. REMOVE BACK-UP LIGHT SWITCH

**Torque: 40 N·m (410 kgf·cm, 30 ft·lbf)**

### 4. REMOVE CONTROL LEVER HOUSING SUPPORT BRACKET

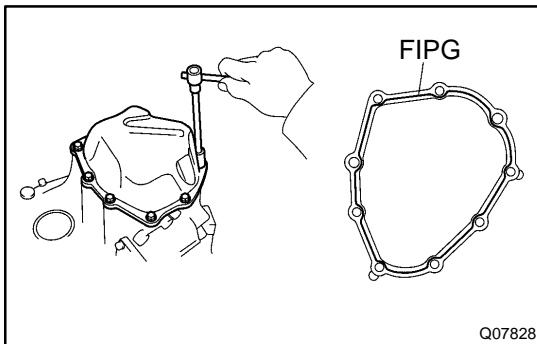
Remove the 3 bolts and bracket.

**Torque: 11 N·m (115 kgf·cm, 8 ft·lbf)**

### 5. REMOVE SELECTING BELLCRANK ASSEMBLY

Remove the 2 bolts and selecting bellcrank assembly.

**Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)**



### 6. REMOVE TRANSMISSION CASE COVER

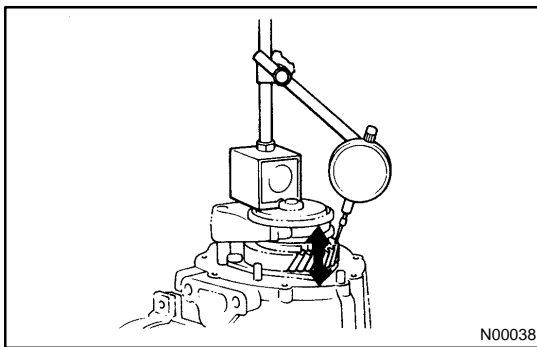
(a) Remove the 9 bolts.

**Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)**

(b) Carefully tap the projection of the transmission case cover with a brass bar and hammer and remove the cover.

**FIPG:**

**Part No. 08826-00090, THREE BOND 1281 or equivalent**



### 7. C151:

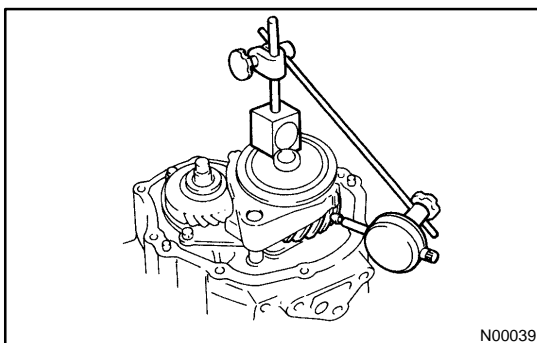
#### INSPECT 5TH GEAR THRUST CLEARANCE

Using a dial indicator, measure the thrust clearance.

**Standard clearance:**

**0.10 - 0.57 mm (0.0039 - 0.0224 in.)**

**Maximum clearance: 0.65 mm (0.0256 in.)**



### 8. C151:

#### INSPECT 5TH GEAR RADIAL CLEARANCE

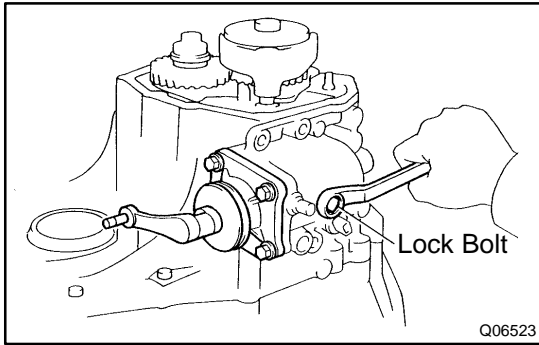
Using a dial indicator, measure the radial clearance.

**Standard clearance:**

**0.015 - 0.058 mm (0.0006 - 0.0023 in.)**

**Maximum clearance: 0.070 mm (0.0028 in.)**

If the clearance exceeds the maximum, replace the gear, needle roller bearing or shaft.



## 9. REMOVE SHIFT AND SELECT LEVER SHAFT ASSEMBLY

- (a) Remove the lock bolt.

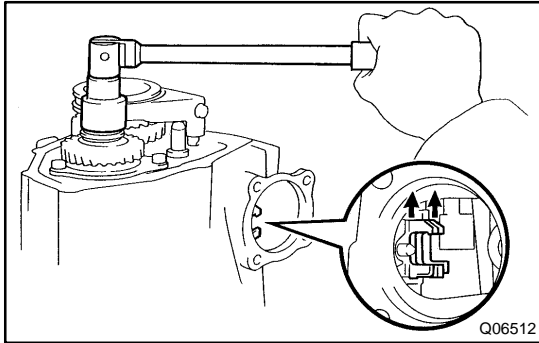
**Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)**

- (b) Remove the 4 bolts and pull out the shift and select lever shaft assembly with the gasket.

**Sealant:**

**Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent**

**Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)**



## 10. REMOVE LOCK NUT

- (a) Engage the gear double meshing.

- (b) Using a hammer and chisel, loosen the staked part of the nut.

- (c) Remove the lock nut.

**Torque: 118 N·m (1,200 kgf·cm, 87 ft·lbf)**

- (d) C141:

Remove the spacer.

- (e) Disengage the gear double meshing.

## 11. C151:

### REMOVE NO.3 HUB SLEEVE AND NO.3 SHIFT FORK

- (a) Remove the bolt from the No.3 shift fork.

**Torque: 16 N·m (160 kgf·cm, 12 ft·lbf)**

- (b) Remove the No.3 hub sleeve and shift fork.

## 12. C151:

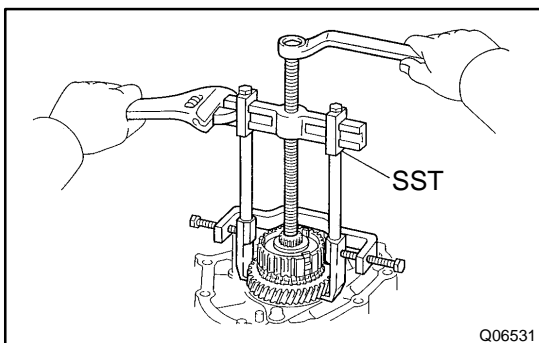
### REMOVE NO.3 CLUTCH HUB AND 5TH GEAR

- (a) Using 2 screwdrivers and a hammer, tap out the snap ring.

**HINT:**

Select a snap ring that will allow minimum axial play.

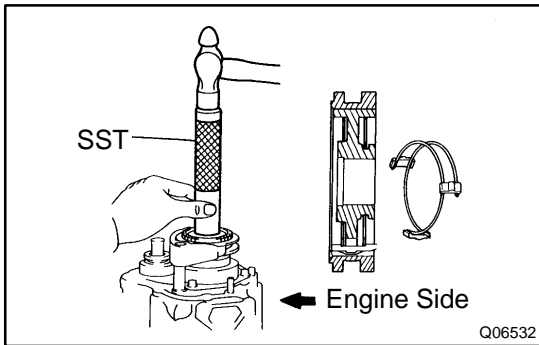
Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
A	2.25 (0.0886)	E	2.49 (0.0980)
B	2.31 (0.0909)	F	2.55 (0.1004)
C	2.37 (0.0933)	G	2.61 (0.1028)
D	2.43 (0.0957)	-	-



- (b) Using SST, remove the 5th gear, No.3 clutch hub, synchronizer ring, needle roller bearings and spacer.

**SST 09950-40010**



**HINT:**

- Install the No.3 clutch hub and shifting keys to the hub sleeve.
- Install the shifting key springs under the shifting keys.

**NOTICE:**

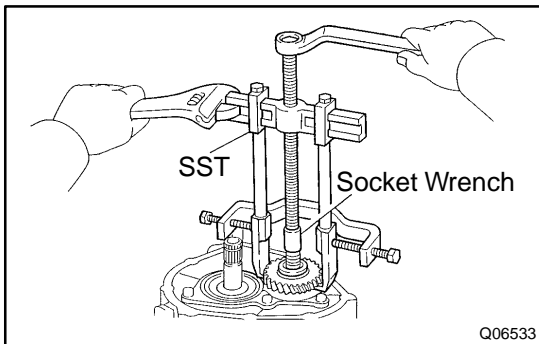
At the time of reassembly, position the key springs so that their end gaps are not in line.

- Support the tip of the input shaft with a spacer or such to raise the transaxle assembly.
- Using SST and a hammer, drive in the No.3 hub sleeve assembly with the No.3 shift fork.

SST 09612-2201 1

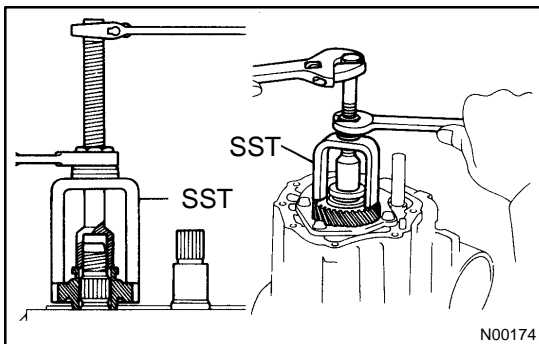
**NOTICE:**

At the time of reassembly, align the synchronizer ring slots with the shifting keys.

**13. C151:****REMOVE 5TH DRIVEN GEAR**

Using SST and a socket wrench, remove the 5th driven gear.

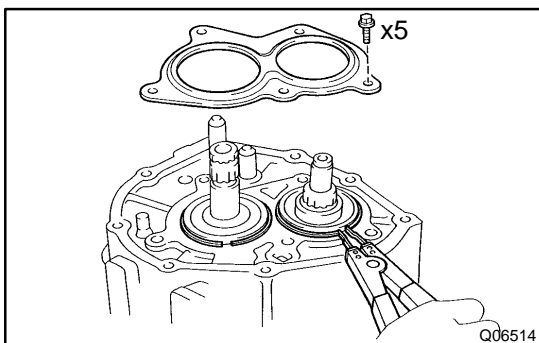
SST 09950-40010

**HINT:**

At the time of reassembly, please refer to the following item.

Using SST, install the 5th driven gear.

SST 09309-12020

**14. REMOVE REAR BEARING RETAINER**

Remove the 5 bolts and retainer.

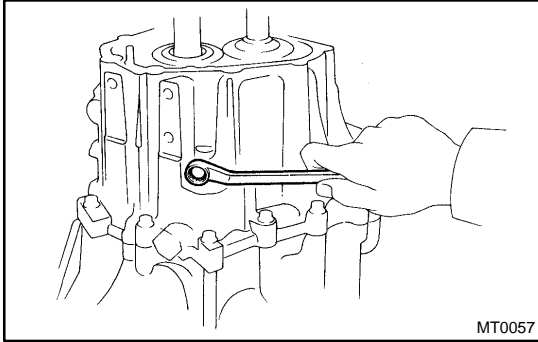
**Torque: 27 N·m (280 kgf-cm, 20 ft-lbf)**

**15. REMOVE BEARING SNAP RING**

Using a snap ring expander, remove the 2 snap rings.

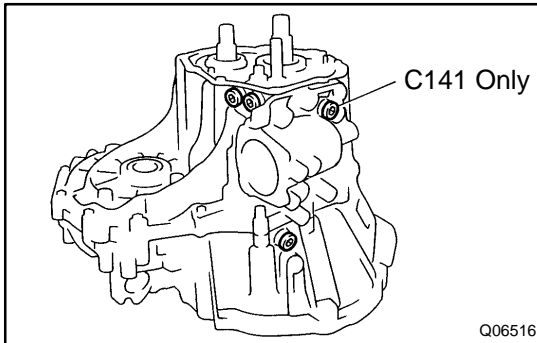
**HINT:**

If it is difficult to remove and install the snap rings, pull up the shafts.



- 16. REMOVE REVERSE IDLER GEAR SHAFT LOCK BOLT**  
Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)
- 17. REMOVE SNAP RING FROM NO.2 SHIFT FORK SHAFT**

Using 2 screwdrivers and a hammer, remove the snap ring.



- 18. REMOVE STRAIGHT SCREW PLUG, SEAT, SPRING AND BALL**

(a) Using a hexagon wrench, remove the 4 plugs.

**Sealant:**

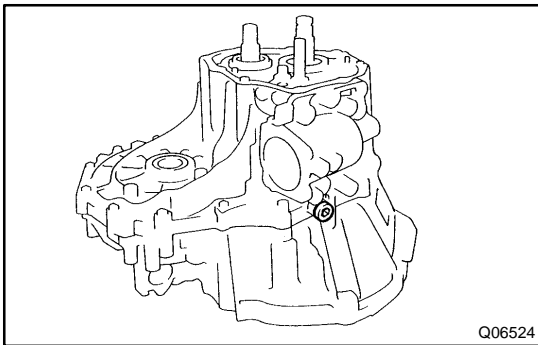
**Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent**

**Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)**

C141 Plug, As Shown:

**Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)**

(b) Using a magnetic finger, remove the 3 seats, springs and balls.



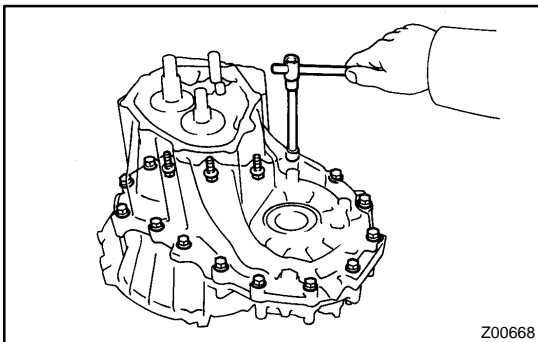
- 19. REMOVE STRAIGHT SCREW PLUG (C141) OR LOCK BALL ASSEMBLY (C151)**

Using a hexagon wrench, remove the straight screw plug (C141) or lock ball assembly (C151).

**Sealant:**

**Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent**

**Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)**

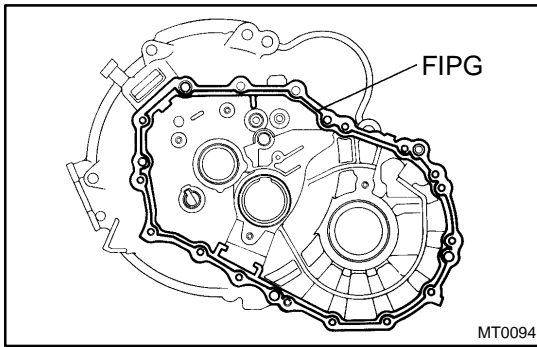


- 20. REMOVE TRANSMISSION CASE**

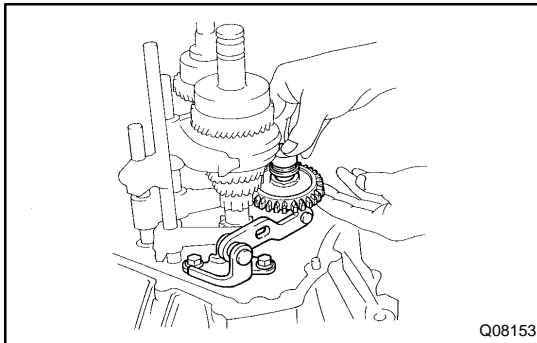
(a) Remove the 16 bolts.

**Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)**

(b) Carefully tap the transmission case with a plastic hammer and remove it.

**FIPG:**

**Part No. 08826-00090, THREE BOND 1281 or equivalent**

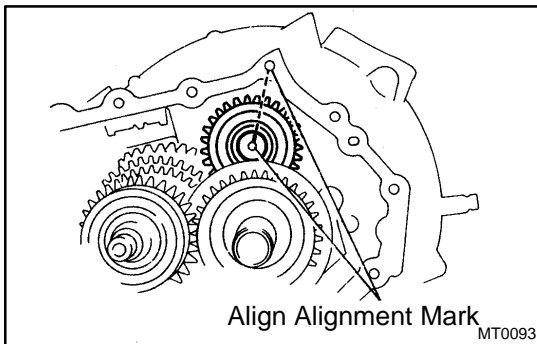


**21. REMOVE REVERSE IDLER GEAR, THRUST WASHER AND SHAFT**

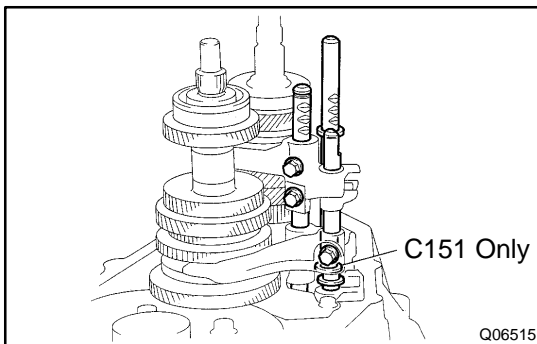
**22. REMOVE REVERSE SHIFT ARM BRACKET**

Remove the 2 bolts and bracket.

**Torque: 17 N·m (175 kgf-cm, 13 ft-lbf)**

**HINT:**

Install the reverse idler gear, thrust washer and shaft, as shown.

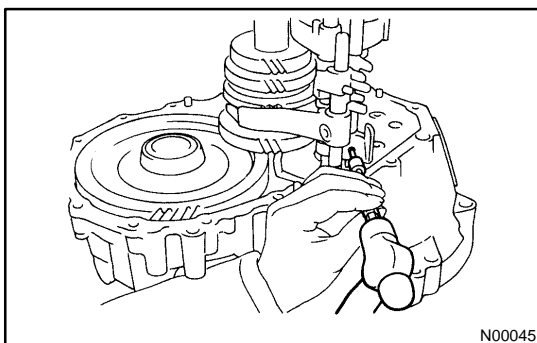


**23. REMOVE SHIFT FORK AND SHIFT FORK SHAFT**

(a) Using 2 screwdrivers and a hammer, tap out the 3 (C151) or 2 (C141) snap rings.

(b) Remove the 3 set bolts.

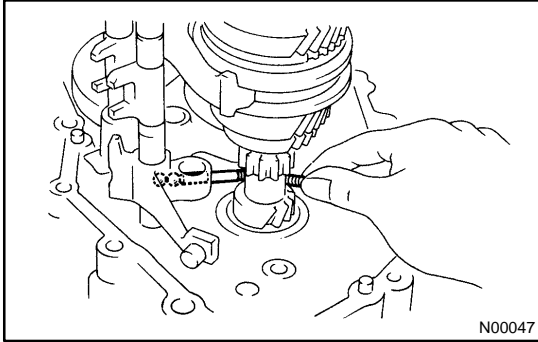
**Torque: 16 N·m (160 kgf-cm, 12 ft-lbf)**



(c) **C141:**

Using a pin punch and hammer, remove the slotted spring pin from the reverse shift fork.

(d) Remove the No.2 shift fork shaft and shift head.



- (e) C151:  
Using a magnetic finger, remove the 2 balls from the reverse shift fork.
- (f) Remove the No.3 shift fork shaft and reverse shift fork.
- (g) Pull out the No.1 shift fork shaft.
- (h) Remove the No.1 and No.2 shift forks.

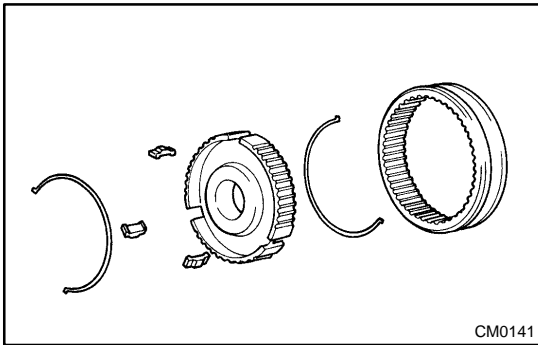
**24. REMOVE INPUT AND OUTPUT SHAFTS TOGETHER FROM TRANSAXLE CASE**

**25. REMOVE DIFFERENTIAL CASE ASSEMBLY**

**HINT:**

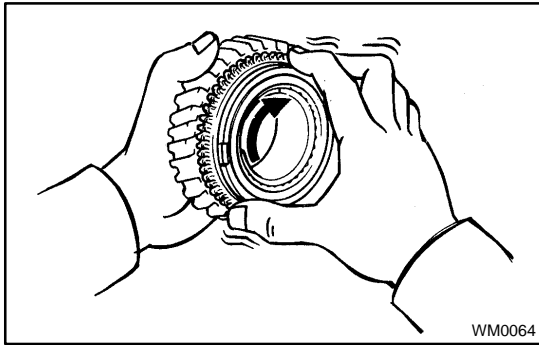
Before reassembly, inspect the differential side bearing preload.

**26. REMOVE MAGNET FROM TRANSAXLE CASE**



**27. REMOVE NO.3 HUB SLEEVE, SHIFTING KEY AND SPRING FROM NO.3 CLUTCH HUB**

Using a screwdriver, remove the 3 shifting keys and 2 springs from the No.3 clutch hub.



## INSPECTION

### 1. C151:

#### INSPECT 5TH GEAR SYNCHRONIZER RING

- Check for wear or damage.
- Check the braking effect of the synchronizer ring. Turn the synchronizer ring in one direction while pushing it to the gear cone. Check that the ring locks.

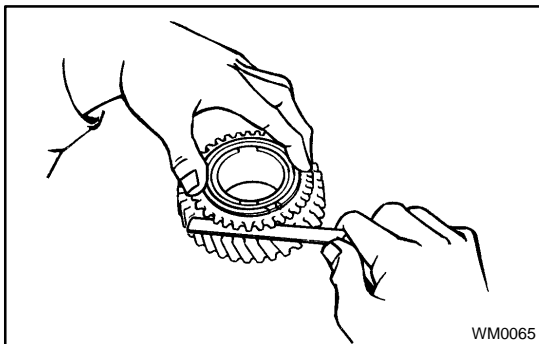
If the braking effect is insufficient, apply a small amount of fine lapping compound between the synchronizer ring and gear cone.

- Lightly rub the synchronizer ring and gear cone together.

#### NOTICE:

**Ensure the fine lapping compound is completely washed off after rubbing.**

- Check again the braking effect of the synchronizer ring.



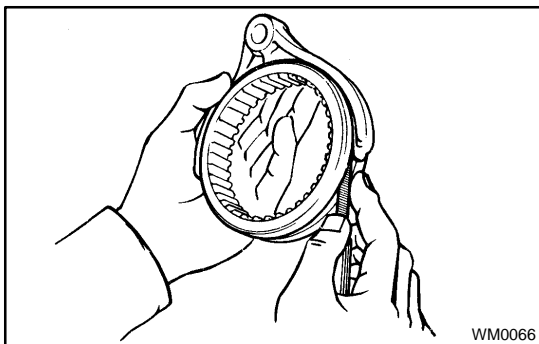
- Using a feeler gauge, measure the clearance between the synchronizer ring back and gear spline end.

**Minimum clearance: 0.6 mm (0.024 in.)**

If the clearance is less than the minimum, replace the synchronizer ring, and apply a small amount of the fine lapping compound on gear cone.

#### NOTICE:

**Ensure the fine lapping compound is completely washed off after rubbing.**



### 2. C151:

#### INSPECT SHIFT FORK AND HUB SLEEVE CLEARANCE

Using a feeler gauge, measure the clearance between the hub sleeve and shift fork.

**Maximum clearance: 1.0 mm (0.039 in.)**

If the clearance exceeds the maximum, replace the shift fork or hub sleeve.

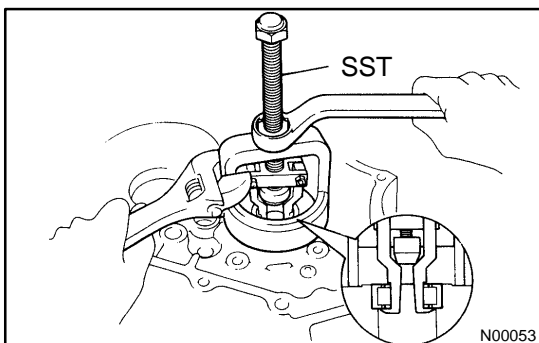
### 3. REMOVE TRANSAXLE CASE RECEIVER

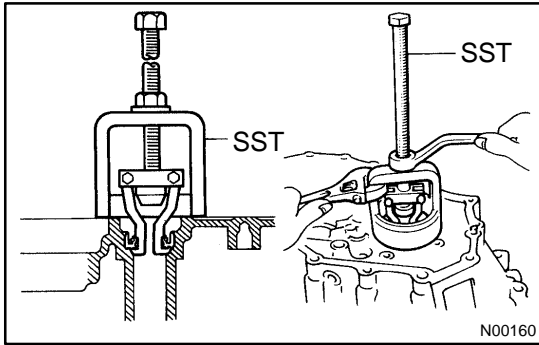
Remove the bolt and transaxle case receiver.

### 4. IF NECESSARY, REPLACE INPUT SHAFT FRONT BEARING AND OIL SEAL

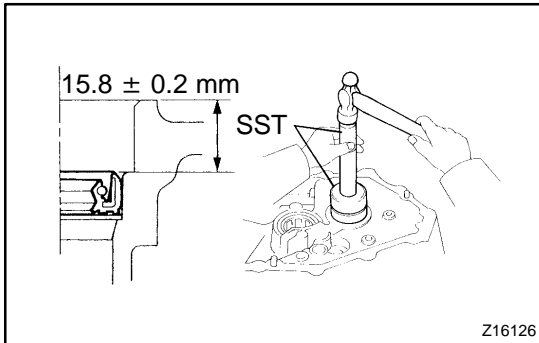
- Using SST, remove the bearing.

SST 09612-65014





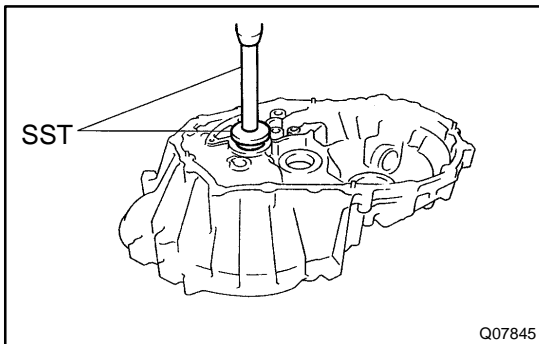
- (b) Using SST, remove the oil seal.  
SST 09612-65014



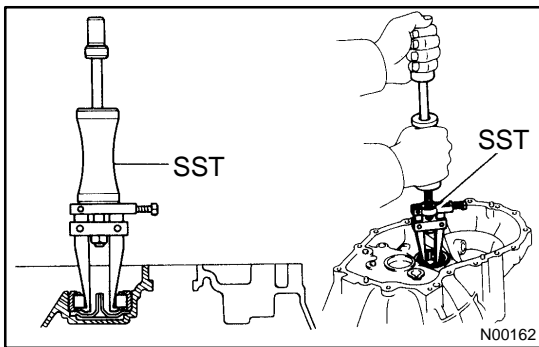
- (c) Using SST and a hammer, install a new oil seal.  
SST 09950-60010 (09951-00360), 09950-70010 (09951-07150)

**Drive in depth: 15.8 ± 0.2 mm (0.622 ± 0.008 in.)**

- (d) Coat the lip of the oil seal with MP grease.

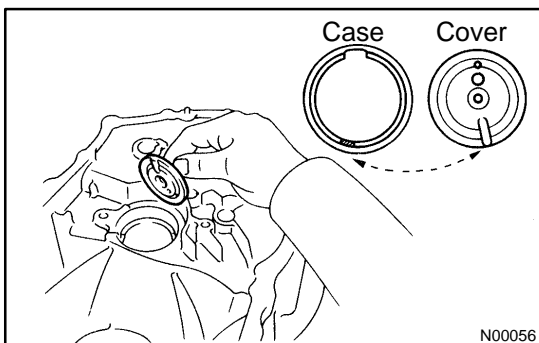


- (e) Using SST and a press, install a new bearing.  
SST 09950-60010 (09951-00460), 09950-70010 (09951-07150)



#### 5. IF NECESSARY, REPLACE OUTPUT SHAFT FRONT BEARING AND OUTPUT SHAFT COVER

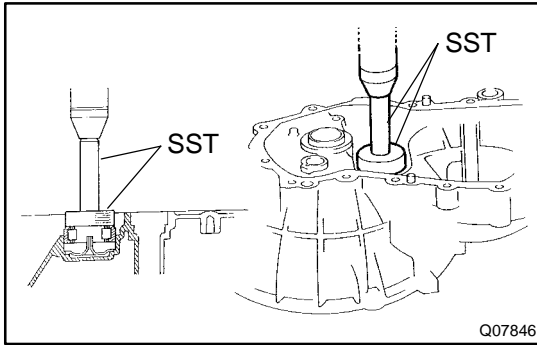
- (a) Remove the bolt and bearing lock plate.  
(b) Using SST, remove the bearing.  
SST 09308-00010  
(c) Remove the output shaft cover.



- (d) Install the output shaft cover.

**HINT:**

Install the output shaft cover projection into the case side hollow.



- (e) Using SST and a press, install a new bearing.  
SST 09950-60010 (09951-00620), 09950-70010 (09951-07150)

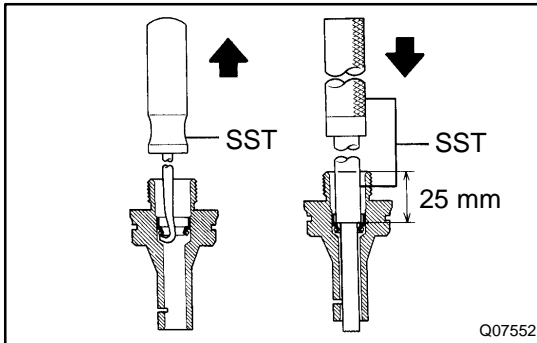
- (f) Install the bearing lock plate and torque the bolt.

**Torque: 11 N·m (115 kgf·cm, 8 ft·lbf)**

#### 6. INSTALL TRANSAXLE CASE RECEIVER

Install the transaxle case receiver and torque the bolt.

**Torque: 11 N·m (115 kgf·cm, 8 ft·lbf)**



#### 7. IF NECESSARY, REPLACE SPEEDOMETER DRIVEN GEAR OIL SEAL

- (a) Using SST, remove the oil seal.

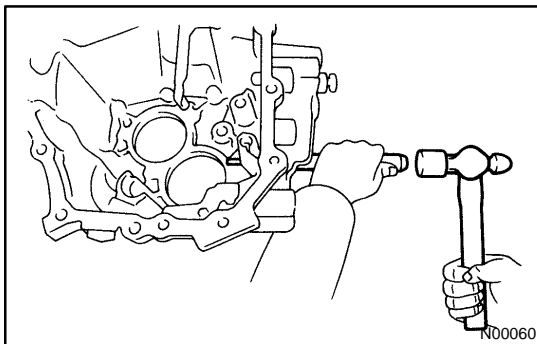
SST 09921-00010

- (b) Using SST, install a new oil seal.

SST 09201-10000 (09201-01080), 09950-70010 (09951-07150)

**Drive in depth: 25 mm (0.98 in.)**

- (c) Coat the lip of oil seal with MP grease.

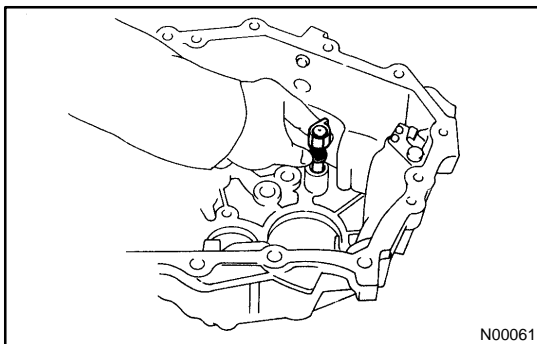


#### 8. C151:

#### IF NECESSARY, REPLACE REVERSE RESTRICT PIN

- (a) Using a hexagon wrench, remove the straight screw plug.

- (b) Using a pin punch and hammer, remove the slotted spring pin.



- (c) Replace the reverse restrict pin.

- (d) Using a pin punch and hammer, install the slotted spring pin.

- (e) Apply sealant to the plug threads.

**Sealant:**

**Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent**

- (f) Using a hexagon wrench, install the straight screw plug.

**Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)**

## REASSEMBLY

**Reassembly is in the reverse order of disassembly.**

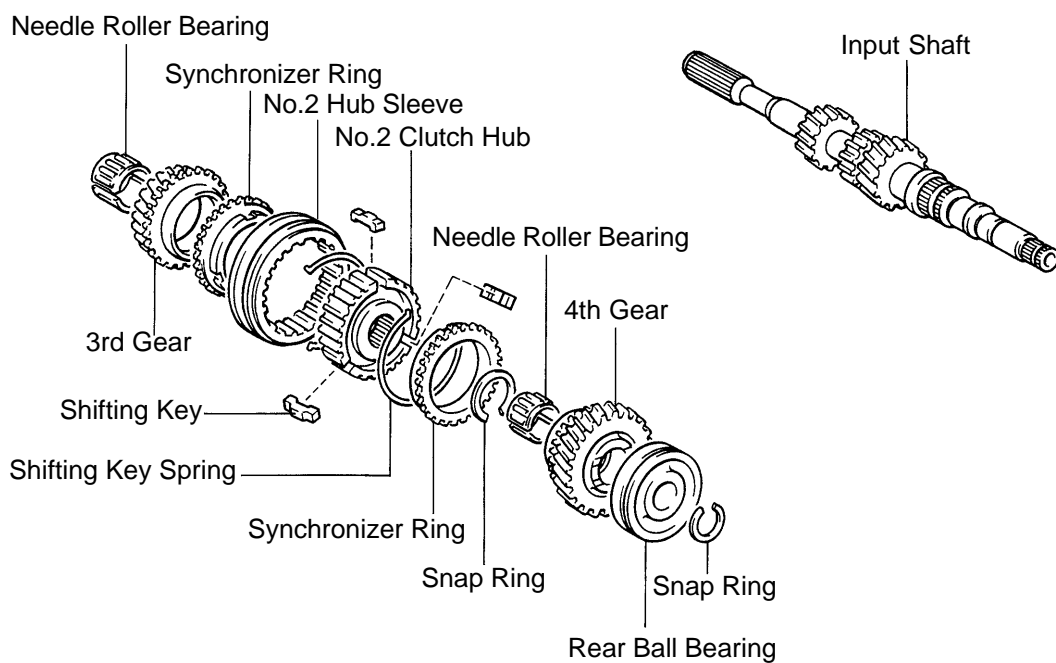
**HINT:**

Coat all of the sliding and rotating surfaces with gear oil before reassembly.

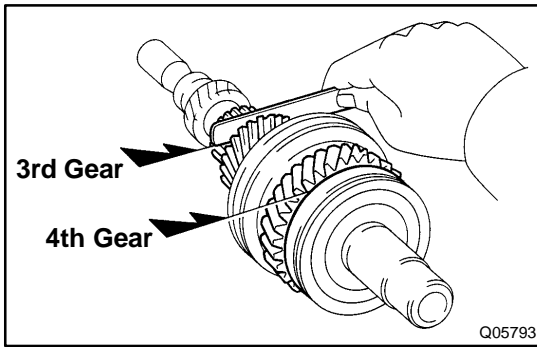


# INPUT SHAFT COMPONENTS

MX07L-01



Q06510



## DISASSEMBLY

### 1. INSPECT 3RD AND 4TH GEARS THRUST CLEARANCE

Using a feeler gauge, measure the thrust clearance.

**Standard clearance:**

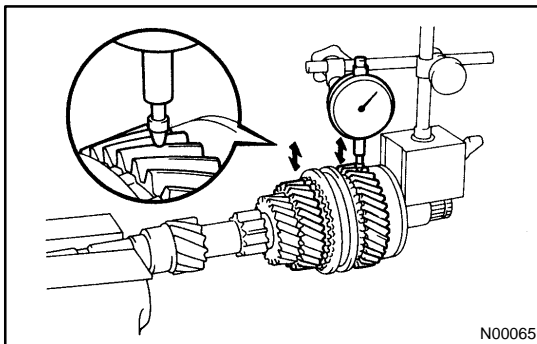
3rd gear: 0.10 - 0.35 mm (0.0039 - 0.0138 in.)

4th gear: 0.10 - 0.55 mm (0.0039 - 0.0217 in.)

**Maximum clearance:**

3rd gear: 0.40 mm (0.0157 in.)

4th gear: 0.60 mm (0.0236 in.)



### 2. INSPECT 3RD AND 4TH GEARS RADIAL CLEARANCE

Using a dial indicator, measure the radial clearance between the gear and shaft.

**Standard clearance:**

0.015 - 0.058 mm (0.0006 - 0.0023 in.)

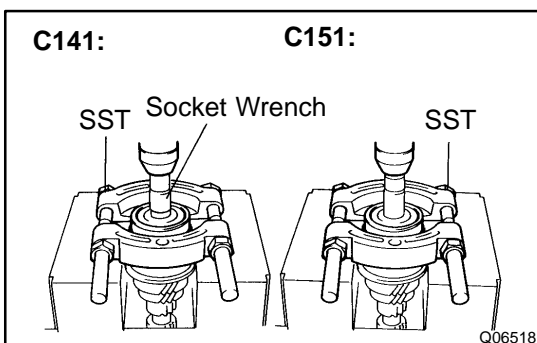
**Maximum clearance:**

0.070 mm (0.0028 in.)

If the clearance exceeds the maximum, replace the gear, needle roller bearing or shaft.

### 3. REMOVE SNAP RING

Using 2 screwdrivers and a hammer, remove the snap ring.



### 4. REMOVE REAR BALL BEARING, 4TH GEAR, NEEDLE ROLLER BEARING, SPACER AND SYNCHRONIZER RING FROM INPUT SHAFT

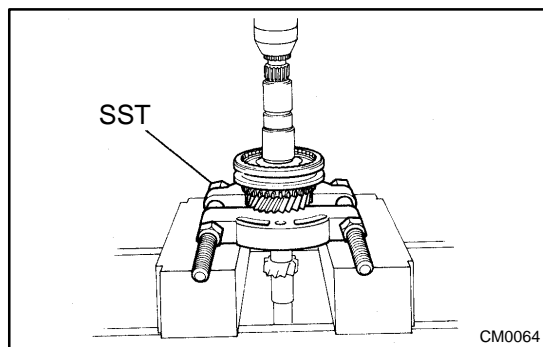
(a) Using SST, a socket wrench (C141 only) and press, remove the rear ball bearing.

SST 09950-00020

(b) Remove the 4th gear, needle roller bearings, spacer and synchronizer ring.

### 5. REMOVE SNAP RING

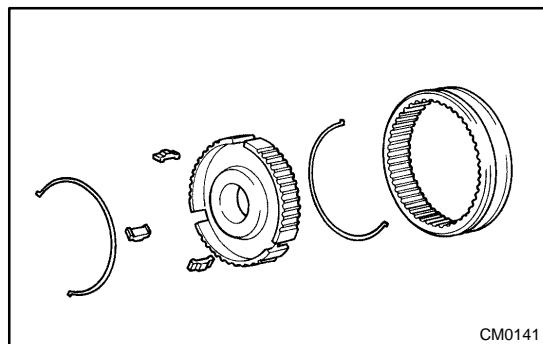
Using 2 screwdrivers and a hammer, remove the snap ring.



**6. REMOVE NO.2 HUB SLEEVE ASSEMBLY, 3RD GEAR, SYNCHRONIZER RING AND NEEDLE ROLLER BEARING**

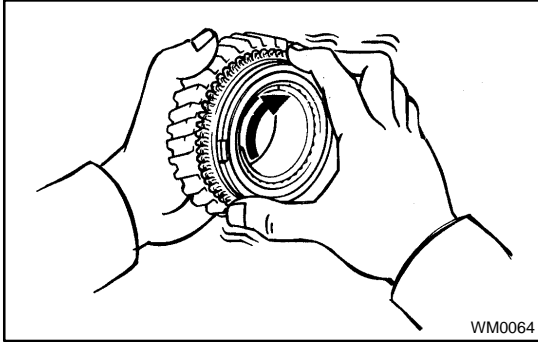
Using SST and a press, remove the No.2 hub sleeve assembly, 3rd gear, synchronizer ring and needle roller bearings.

SST 09950-00020



**7. REMOVE NO.2 HUB SLEEVE, SHIFTING KEY AND SPRING FROM NO.2 CLUTCH HUB**

Using a screwdriver, remove the 3 shifting keys and 2 springs from the No.2 clutch hub.



## INSPECTION

### 1. INSPECT SYNCHRONIZER RING

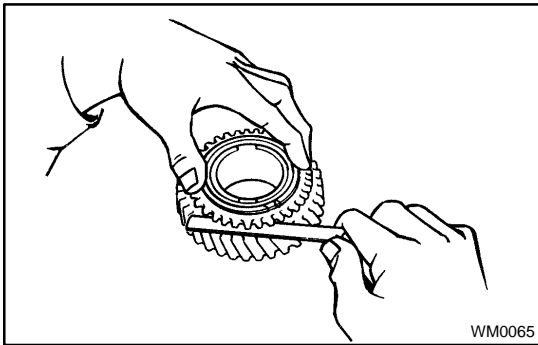
- (a) Check for wear or damage.
- (b) Check the braking effect of the synchronizer ring. Turn the synchronizer ring in one direction while pushing it to the gear cone. Check that the ring locks.

If the braking effect is insufficient, apply a small amount of fine lapping compound between the synchronizer ring and gear cone. Lightly rub the synchronizer ring and gear cone together.

#### NOTICE:

**Ensure the fine lapping compound is completely washed off after rubbing.**

- (c) Check again the braking effect of the synchronizer ring.



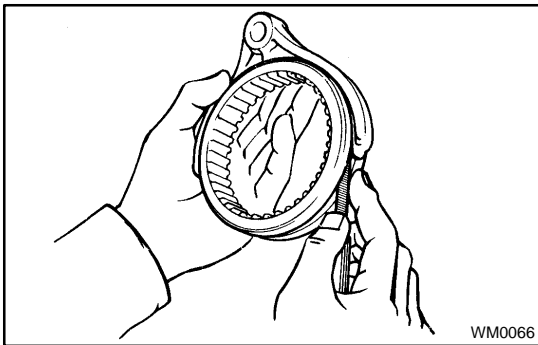
- (d) Using a feeler gauge, measure the clearance between the synchronizer ring back and gear spline end.

**Minimum clearance: 0.6 mm (0.024 in.)**

If the clearance is less than the minimum, replace the synchronizer ring, and apply a small amount of the fine lapping compound on gear cone.

#### NOTICE:

**Ensure the fine lapping compound is completely washed off after rubbing.**

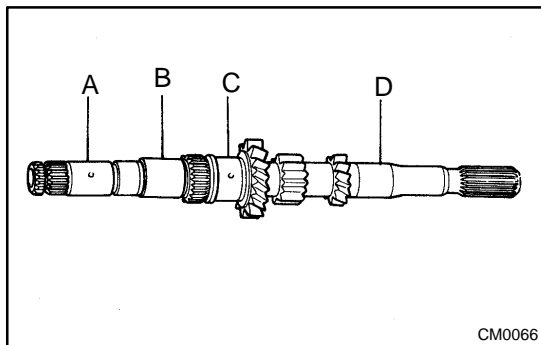


### 2. INSPECT SHIFT FORK AND HUB SLEEVE CLEARANCE

Using a feeler gauge, measure the clearance between the hub sleeve and shift fork.

**Maximum clearance: 1.0 mm (0.039 in.)**

If the clearance exceeds the maximum, replace the shift fork or hub sleeve.



### 3. INSPECT INPUT SHAFT

- (a) Check the input shaft for wear or damage.
- (b) Using a micrometer, measure the outer diameter of the input shaft journal surface.

**Minimum outer diameter:**

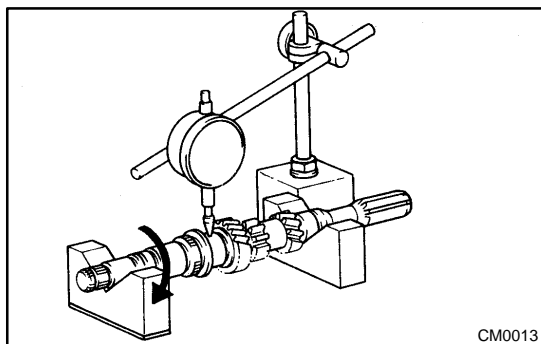
**Part A (C151): 24.870 mm (0.9791 in.)**

**Part B: 28.970 mm (1.1405 in.)**

**Part C: 30.970 mm (1.2193 in.)**

**Part D: 24.970 mm (0.9831 in.)**

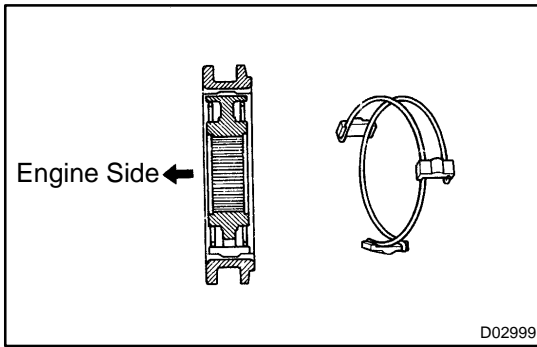
If the outer diameter is less than the minimum, replace the input shaft.



- (c) Using a dial indicator, check the shaft runout.

**Maximum runout: 0.05 mm (0.0020 in.)**

If the runout exceeds the maximum, replace the input shaft.



## REASSEMBLY

### HINT:

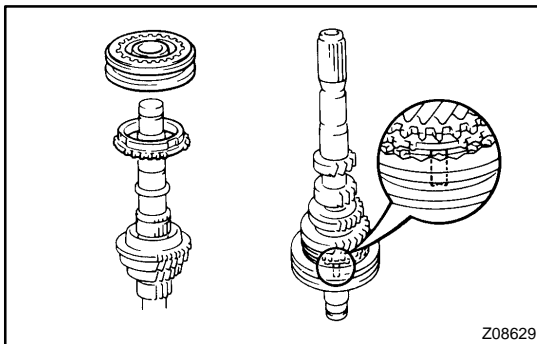
Coat all of the sliding and rotating surfaces with gear oil before reassembly.

### 1. INSTALL NO.2 CLUTCH HUB INTO HUB SLEEVE

- Install the clutch hub and shifting keys to the hub sleeve.
- Install the shifting key springs under the shifting keys.

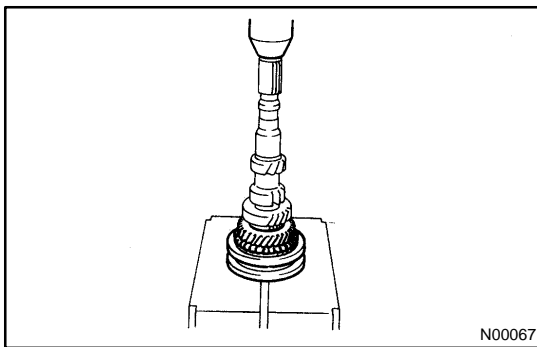
### NOTICE:

Position the key springs so that their end gaps are not in line.

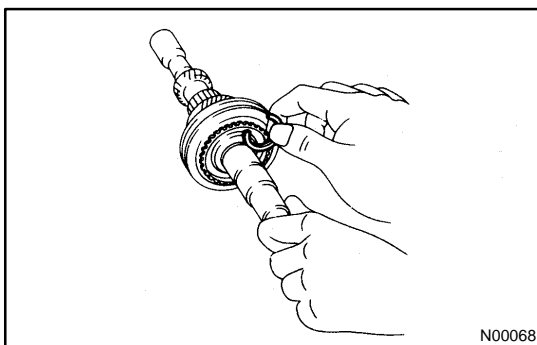


### 2. INSTALL 3RD GEAR, NEEDLE ROLLER BEARING, SYNCHRONIZER RING AND NO.2 HUB SLEEVE ASSEMBLY TO INPUT SHAFT

- Apply gear oil to the needle roller bearings.
- Place the synchronizer ring on the gear and align the ring slots with the shifting keys.



- Using a press, install the 3rd gear and No.2 hub sleeve assembly.



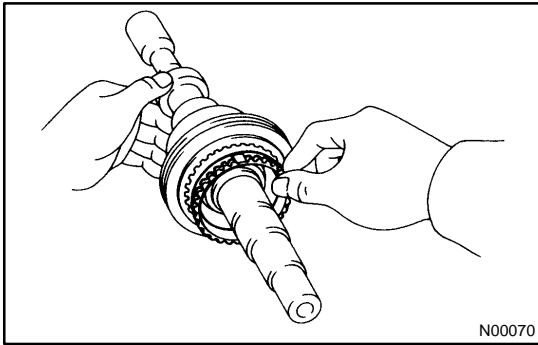
### 3. INSTALL SNAP RING

- Select a snap ring that allows the minimum axial play.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
0	2.30 (0.0906)	3	2.48 (0.0976)
1	2.36 (0.0929)	4	2.54 (0.1000)
2	2.42 (0.0953)	5	2.60 (0.1024)

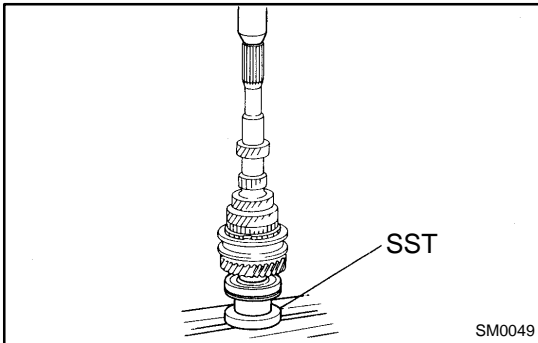
- Using a screwdriver and hammer, install the snap ring.

### 4. INSPECT 3RD GEAR THRUST CLEARANCE (See page [MX-21](#) )

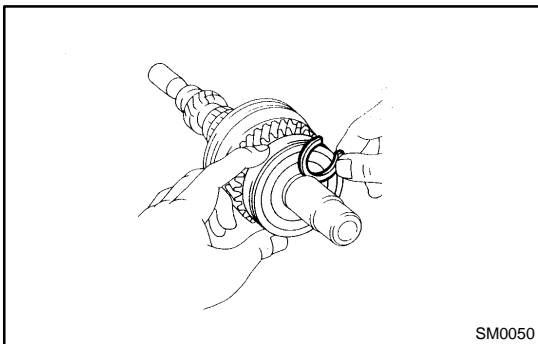


**5. INSTALL SYNCHRONIZER RING, NEEDLE ROLLER BEARING, SPACER, 4TH GEAR AND REAR BALL BEARING**

- (a) Apply gear oil to the needle roller bearings.
- (b) Place the synchronizer ring on the gear and align the ring slots with the shifting keys.



- (c) Using SST and a press, install the rear ball bearing.  
SST 09608-00071



**6. INSTALL SNAP RING**

- (a) Select a snap ring that allows the minimum axial play.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
A	2.29 (0.0902)	D	2.47 (0.0972)
B	2.35 (0.0925)	E	2.53 (0.0996)
C	2.41 (0.0949)	F	2.59 (0.1020)

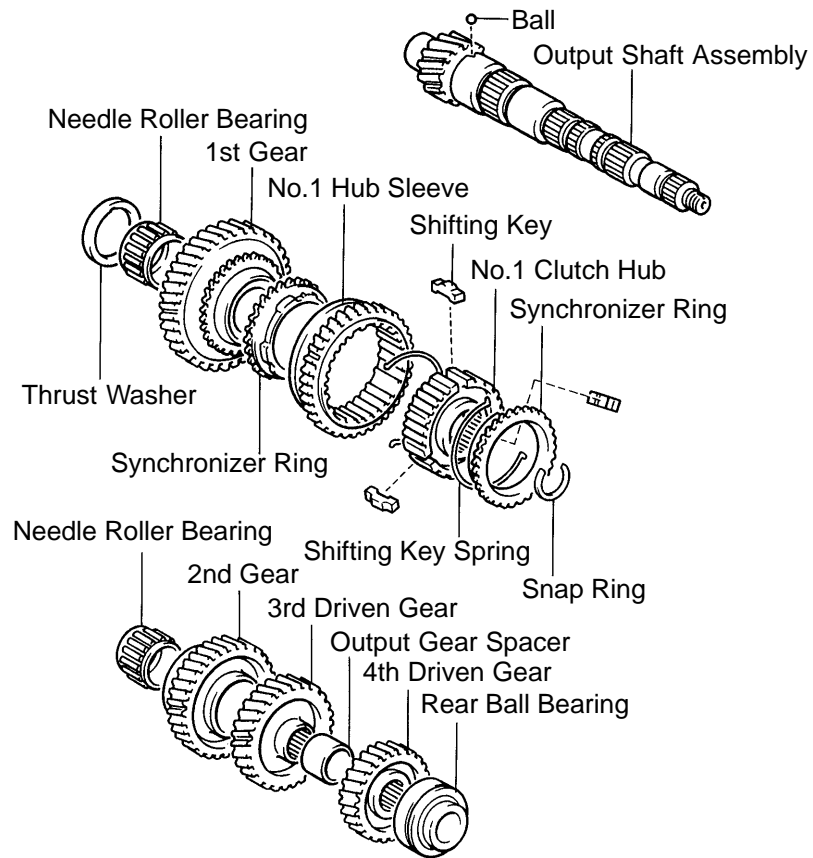
- (b) Using a screwdriver and hammer, install the snap ring.

**7. INSPECT 4TH GEAR THRUST CLEARANCE**

(See page [MX-21](#) )

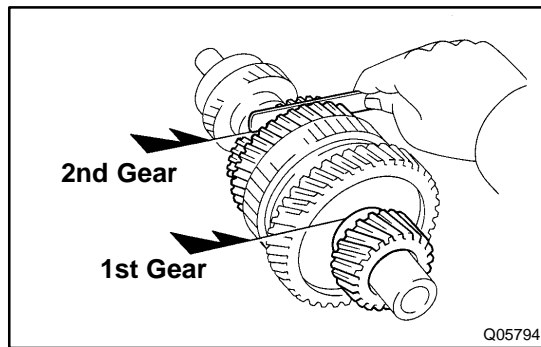
# OUTPUT SHAFT COMPONENTS

MX07P-01



Q06509





## DISASSEMBLY

### 1. INSPECT 1ST AND 2ND GEARS THRUST CLEARANCE

Using a feeler gauge, measure the thrust clearance.

**Standard clearance:**

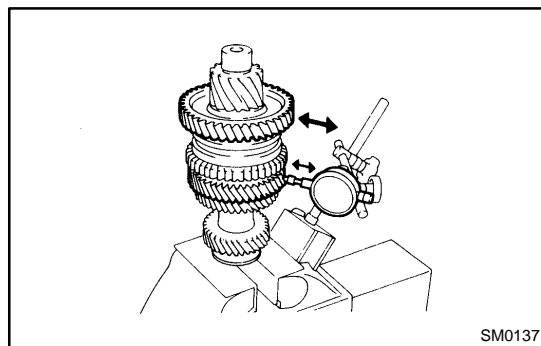
1st gear: 0.10 - 0.40 mm (0.0039 - 0.0157 in.)

2nd gear: 0.10 - 0.45 mm (0.0039 - 0.0177 in.)

**Maximum clearance:**

1st gear: 0.45 mm (0.0177 in.)

2nd gear: 0.50 mm (0.0197 in.)



### 2. INSPECT 1ST AND 2ND GEARS RADIAL CLEARANCE

Using a dial indicator, measure the radial clearance between the gear and shaft.

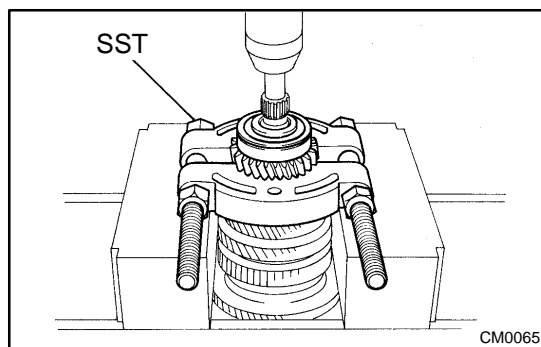
**Standard clearance:**

0.015 - 0.058 mm (0.0006 - 0.0023 in.)

**Maximum clearance:**

0.070 mm (0.0028 in.)

If the clearance exceeds the maximum, replace the gear, needle roller bearing or shaft.

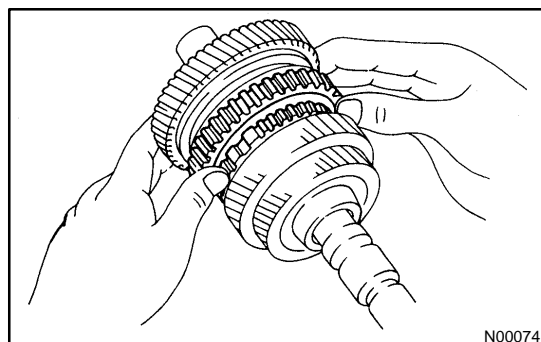


### 3. REMOVE REAR BALL BEARING, 4TH DRIVEN GEAR AND OUTPUT GEAR SPACER FROM OUTPUT SHAFT

- (a) Using SST and a press, remove the rear ball bearing and 4th driven gear.

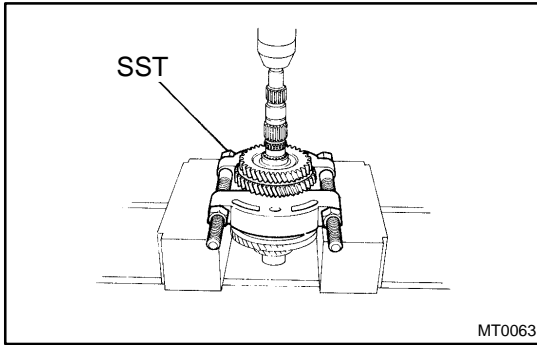
SST 09950-00020

- (b) Remove the output gear spacer.



### 4. REMOVE 3RD DRIVEN GEAR, 2ND GEAR, NEEDLE ROLLER BEARING AND SYNCHRONIZER RING

- (a) Shift the No.1 hub sleeve into the 1st gear.



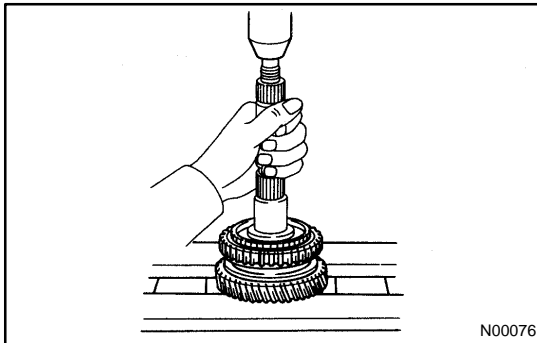
- (b) Using SST and a press, remove the 3rd driven gear and 2nd gear.

SST 09950-00020

- (c) Remove the needle roller bearing and synchronizer ring.

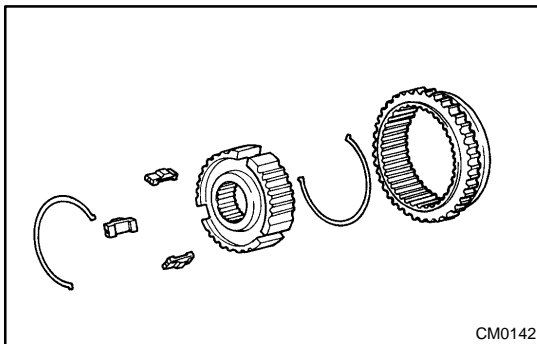
### 5. REMOVE SNAP RING

Using 2 screwdrivers and a hammer, remove the snap ring.



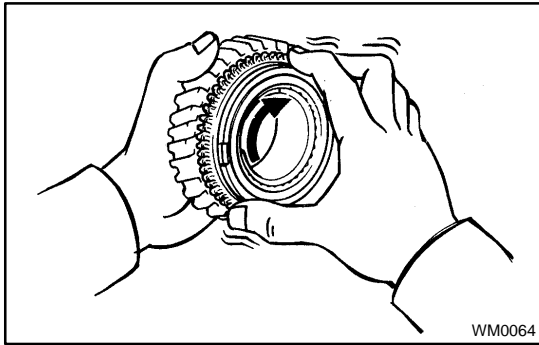
### 6. REMOVE NO.1 HUB SLEEVE ASSEMBLY, 1ST GEAR, SYNCHRONIZER RING, NEEDLE ROLLER BEARING, THRUST WASHER AND BALL

- (a) Using a press, remove the No.1 hub sleeve assembly, 1st gear and synchronizer ring.
- (b) Remove the needle roller bearing, thrust washer and ball.



### 7. REMOVE NO.1 HUB SLEEVE, SHIFTING KEY AND SPRING FROM NO.1 CLUTCH HUB

Using a screwdriver, remove the 3 shifting keys and 2 springs from the No.1 clutch hub.



## INSPECTION

### 1. INSPECT SYNCHRONIZER RING

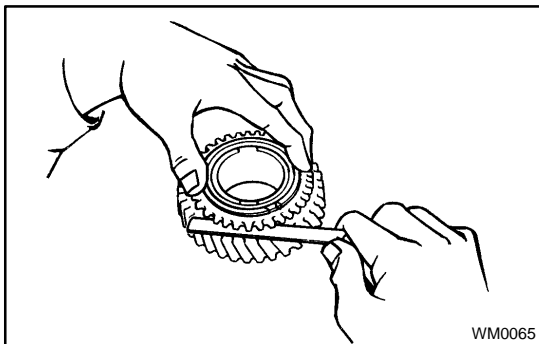
- Check for wear or damage.
- Check the braking effect of the synchronizer ring. Turn the synchronizer ring in one direction while pushing it to the gear cone. Check that the ring locks.

If the braking effect is insufficient, apply a small amount of fine lapping compound between the synchronizer ring and gear cone. Lightly rub the synchronizer ring and gear cone together.

#### NOTICE:

**Ensure the fine lapping compound is completely washed off after rubbing.**

- Check again the braking effect of the synchronizer ring.



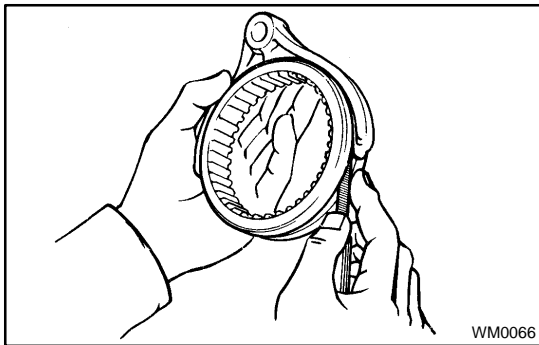
- Using a feeler gauge, measure the clearance between the synchronizer ring back and gear spline end.

**Minimum clearance: 0.6 mm (0.024 in.)**

If the clearance is less than the minimum, replace the synchronizer ring, and apply a small amount of the fine lapping compound on gear cone.

#### NOTICE:

**Ensure the fine lapping compound is completely washed off after rubbing.**

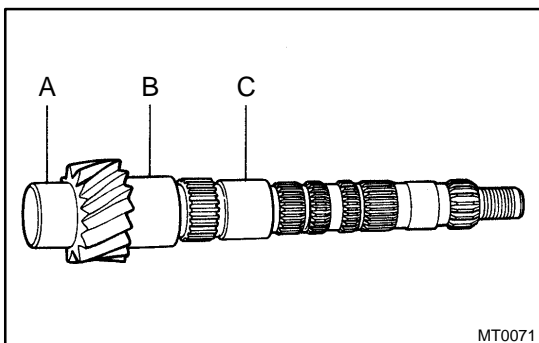


### 2. INSPECT SHIFT FORK AND HUB SLEEVE CLEARANCE

Using a feeler gauge, measure the clearance between the hub sleeve and shift fork.

**Maximum clearance: 1.0 mm (0.039 in.)**

If the clearance exceeds the maximum, replace the shift fork or hub sleeve.



### 3. INSPECT OUTPUT SHAFT

- Check the output shaft for wear or damage.
- Using a micrometer, measure the outer diameter of the output shaft journal surface.

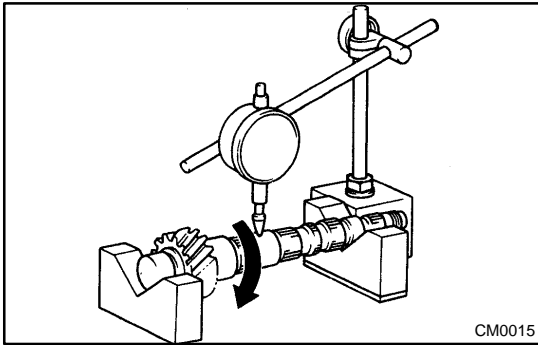
**Minimum outer diameter:**

**Part A: 32.970 mm (1.2980 in.)**

**Part B: 37.970 mm (1.4949 in.)**

**Part C: 31.970 mm (1.2587 in.)**

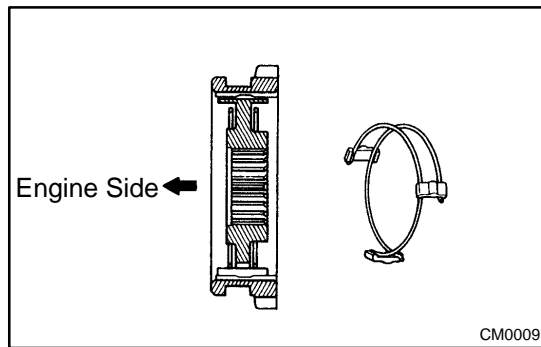
If the outer diameter is less than the minimum, replace the output shaft.



(c) Using a dial indicator, check the shaft runout.

**Maximum runout: 0.05 mm (0.0020 in.)**

If the runout exceeds the maximum, replace the output shaft.



## REASSEMBLY

### HINT:

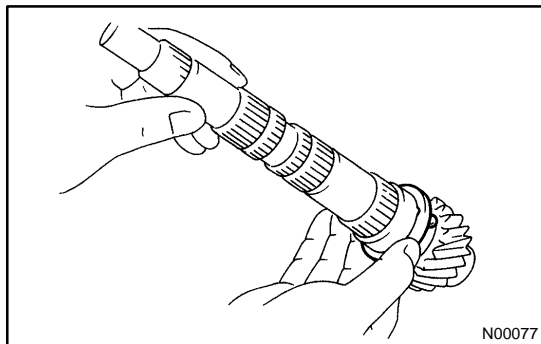
Coat all of the sliding and rotating surfaces with gear oil before assembly.

### 1. INSTALL NO.1 CLUTCH HUB INTO HUB SLEEVE

- Install the No.1 clutch hub and shifting keys to the No.1 hub sleeve.
- Install the shifting key springs under the shifting keys.

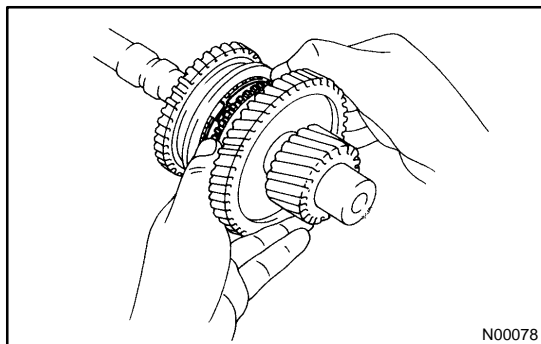
### NOTICE:

Position the key springs so that their end gaps are not in line.

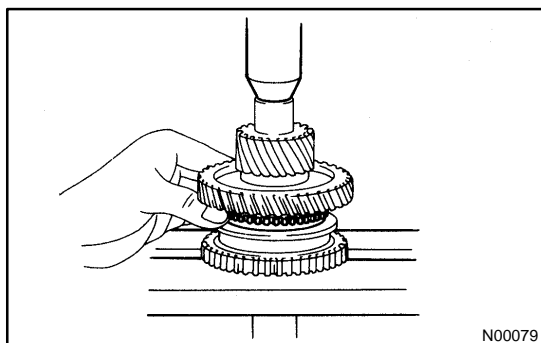


### 2. INSTALL BALL, THRUST WASHER, 1ST GEAR, NEEDLE ROLLER BEARING, SYNCHRONIZER RING AND NO.1 HUB SLEEVE ASSEMBLY TO OUTPUT SHAFT

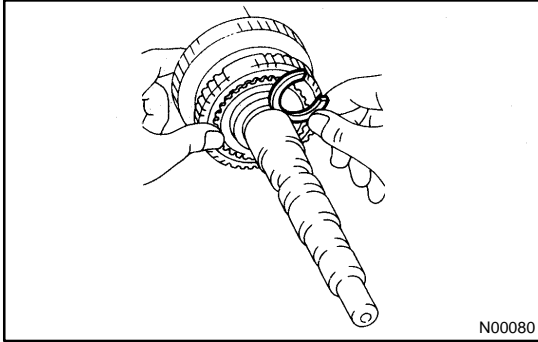
- Install the ball to the shaft.
- Fit the thrust washer groove securely over the locking ball when installing the thrust on the shaft.
- Apply gear oil to the needle roller bearing.



- Place the synchronizer ring on the gear and align the ring slots with the shifting keys.



- Using a press, install the 1st gear and No.1 hub sleeve.



### 3. INSTALL SNAP RING

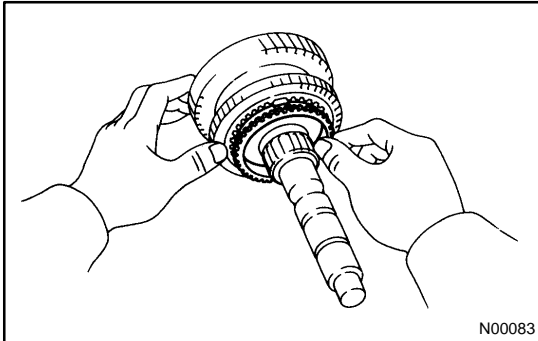
- (a) Select a snap ring that allows the minimum axial play.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
A	2.50 (0.0984)	D	2.68 (0.1055)
B	2.56 (0.1008)	E	2.74 (0.1079)
C	2.62 (0.1031)	F	2.80 (0.1102)

- (b) Using a screwdriver and hammer, install the snap ring.

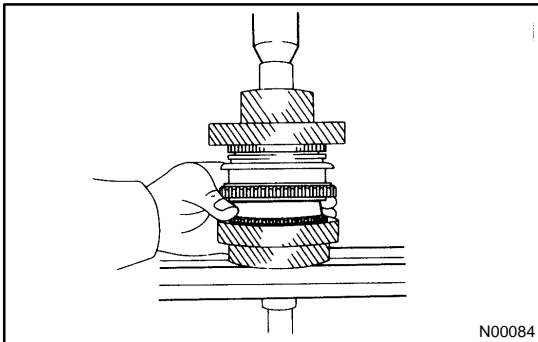
### 4. INSPECT 1ST GEAR THRUST CLEARANCE

(See page [MX-28](#))



### 5. INSTALL SYNCHRONIZER RING, 2ND GEAR, NEEDLE ROLLER BEARING AND 3RD DRIVEN GEAR

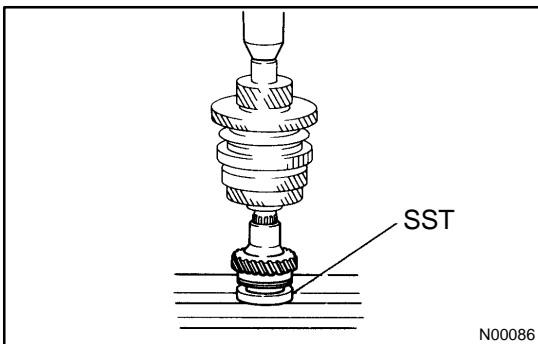
- (a) Place the synchronizer ring on the gear and align the ring slots with the shifting keys.  
 (b) Apply gear oil to the needle roller bearing.  
 (c) Install the 2nd gear.



- (d) Using a press, install the 3rd driven gear.

### 6. INSPECT 2ND GEAR THRUST CLEARANCE

(See page [MX-28](#))



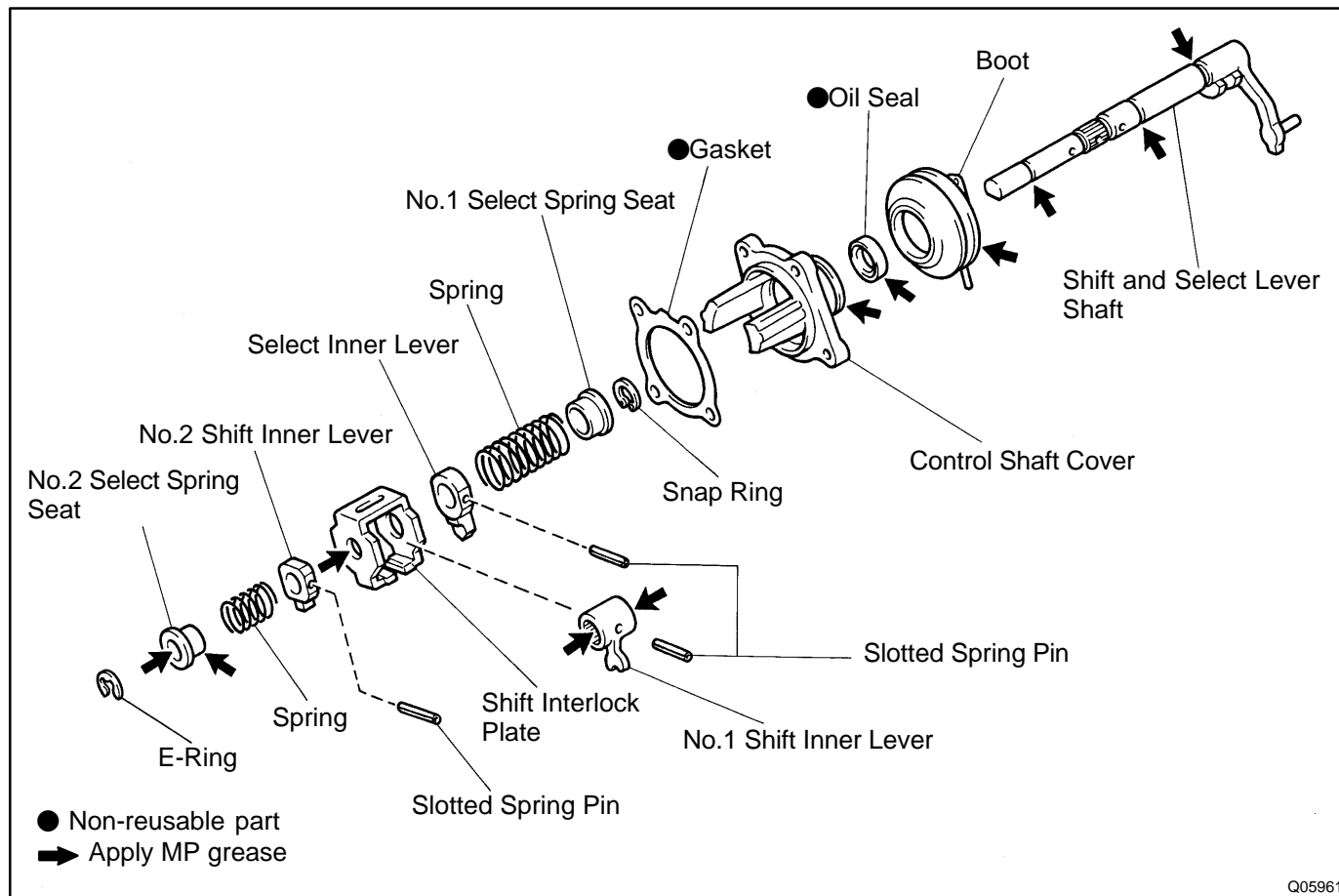
### 7. INSTALL OUTPUT GEAR SPACER, 4TH DRIVEN GEAR AND REAR BALL BEARING

- (a) Install the output gear spacer.  
 (b) Using SST and a press, install the 4th driven gear and rear ball bearing.

SST 09608-00071

# SHIFT AND SELECT LEVER SHAFT COMPONENTS

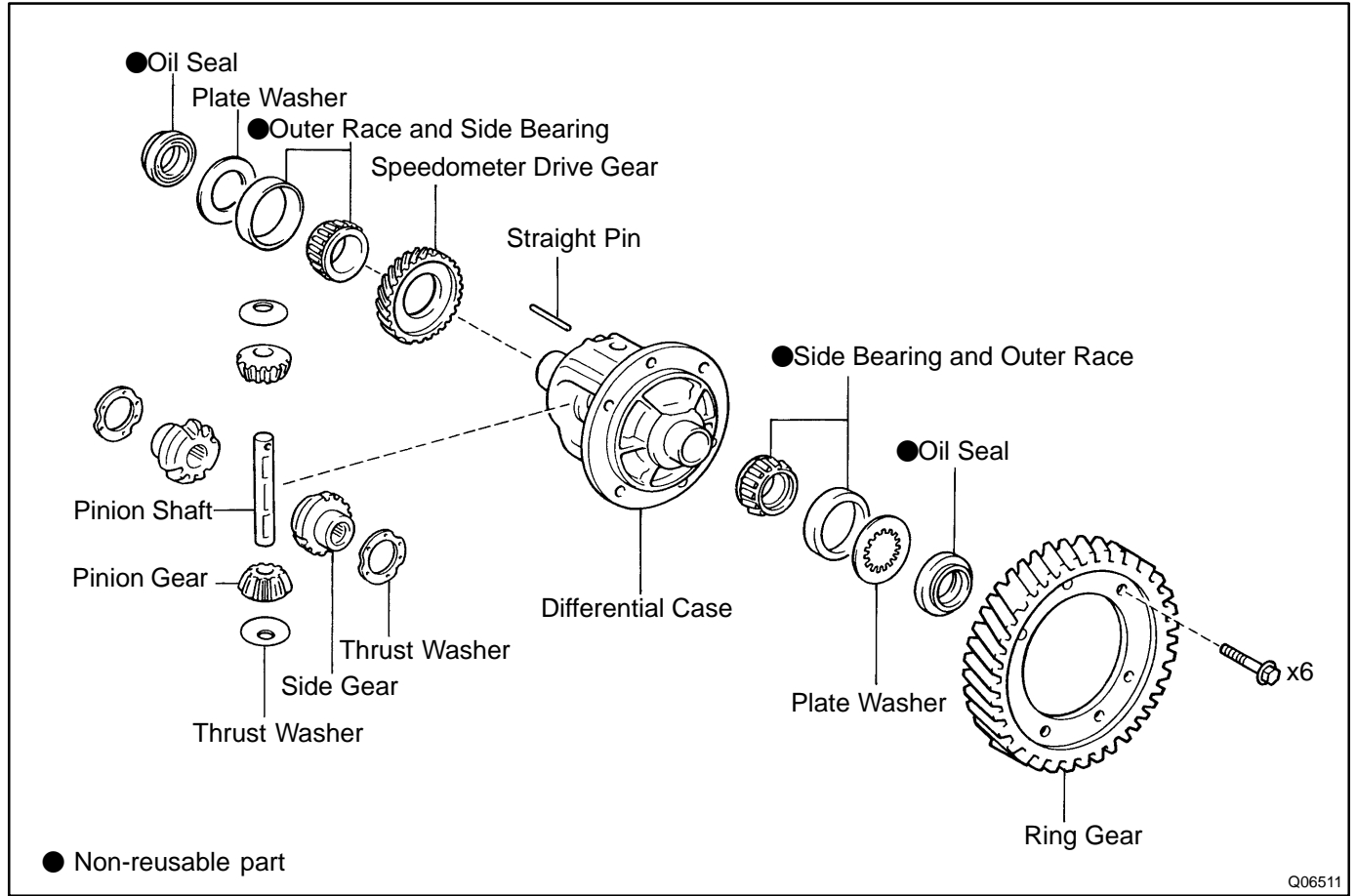
MX07T-01



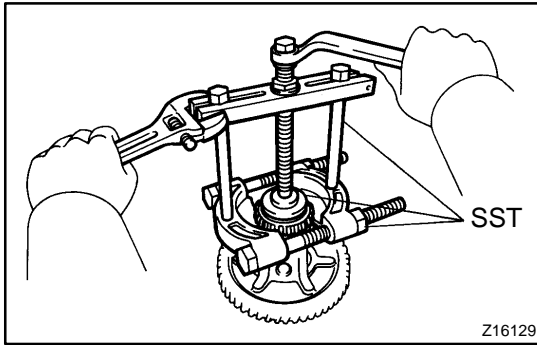
Q05961

# DIFFERENTIAL CASE COMPONENTS

MX07U-03



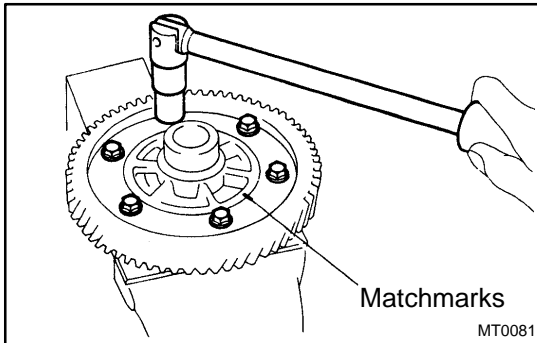




## DISASSEMBLY

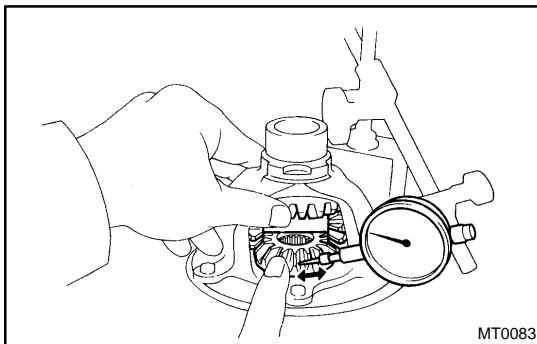
### 1. REMOVE SIDE BEARING FROM DIFFERENTIAL CASE

- (a) Using SST, remove the bearings from both sides of the case.  
SST 09950-00020, 09950-00030, 09950-60010 (09951-00360)
- (b) Remove the speedometer drive gear from the RH side.



### 2. REMOVE RING GEAR

- (a) Place matchmarks on the ring gear and case.
- (b) Remove the 6 bolts.
- (c) Using a plastic hammer, remove the ring gear from the case.



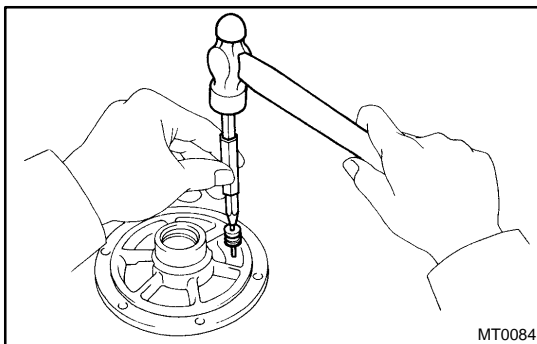
### 3. INSPECT SIDE GEAR BACKLASH

Using a dial indicator, measure the backlash of one side gear while holding one pinion toward the case.

**Standard backlash:**

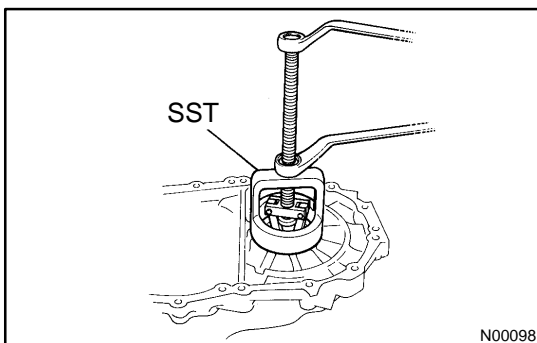
**0.05 - 0.20 mm (0.0020 - 0.0079 in.)**

If the backlash is not within the specification, install the correct thrust washer to the side gears.



### 4. DISASSEMBLE DIFFERENTIAL CASE

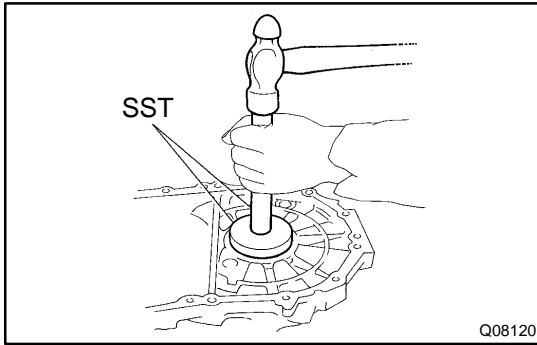
- (a) Using a pin punch and hammer, remove the pinion shaft straight pin.
- (b) Remove the pinion shaft from the case.
- (c) Remove the 2 pinion gears and side gears with the 4 thrust washers from each gear.



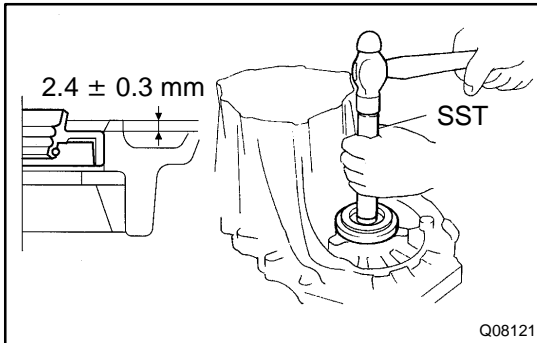
### 5. Transmission Case Side:

#### IF NECESSARY, REPLACE OIL SEAL AND SIDE BEARING OUTER RACE

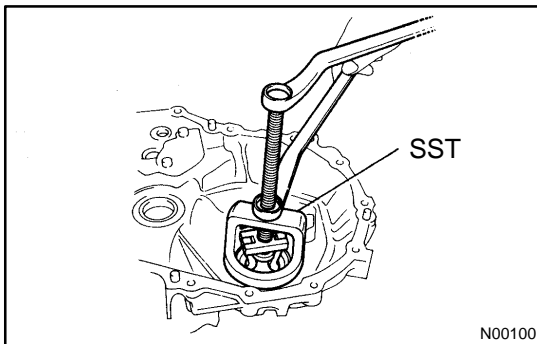
- (a) Using a screwdriver and hammer, remove the oil seal.
- (b) Using SST, remove the outer race and plate washer.  
SST 09612-65014
- (c) Place the plate washer into the case.



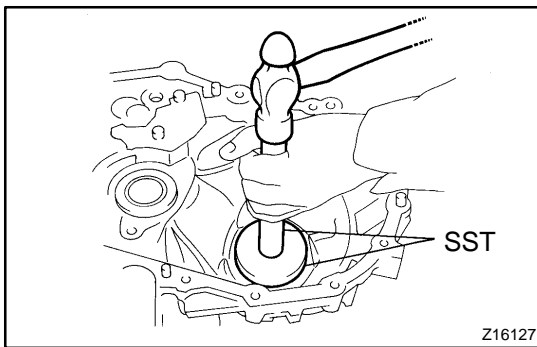
- (d) Using SST and a hammer, install a new outer race.  
SST 09950-60020 (09951-00710), 09950-70010 (09951-07150)



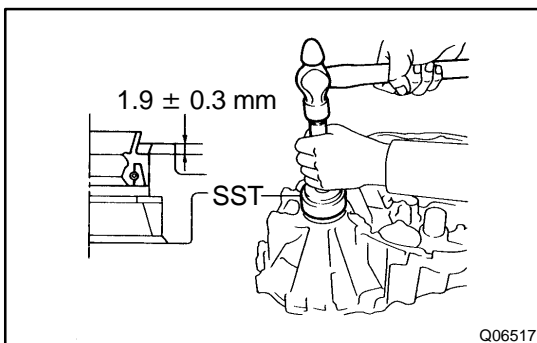
- (e) Using SST and a hammer, install a new oil seal.  
SST 09350-32014 (09351-32111, 09351-32130)  
**Drive in depth:  $2.4 \pm 0.3$  mm ( $0.094 \pm 0.012$  in.)**  
(f) Coat the lip of the oil seal with MP grease.



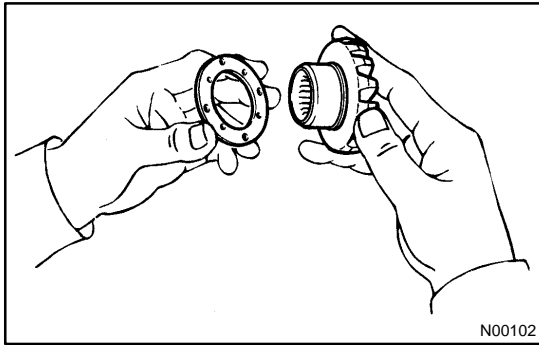
- 6. Transaxle Case Side:  
IF NECESSARY, REPLACE OIL SEAL AND SIDE BEARING OUTER RACE**  
(a) Using a screwdriver and hammer, remove the oil seal.  
(b) Using SST, remove the outer race and plate washer.  
SST 09612-65014  
(c) Place the plate washer into the case.



- (d) Using SST and a hammer, install a new outer race.  
SST 09950-60020 (09951-00680), 09950-70010 (09951-07150)



- (e) Using SST and a hammer, install a new oil seal.  
SST 09350-32014 (09351-32130, 09351-32150)  
**Drive in depth:  $1.9 \pm 0.3$  mm ( $0.075 \pm 0.012$  in.)**  
(f) Coat the lip of the oil seal with MP grease.



## REASSEMBLY

### 1. ASSEMBLE DIFFERENTIAL CASE

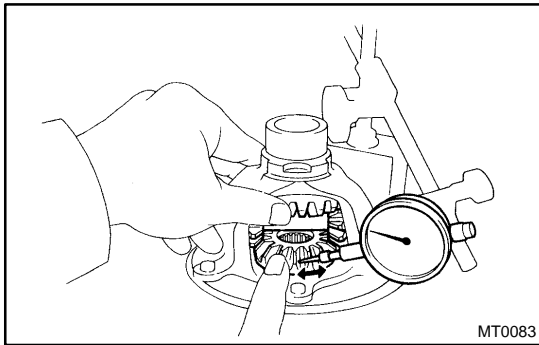
- (a) Install the correct thrust washers and side gears. Refer to the table below, select thrust washers which will ensure that the backlash is within the specification. Try to select washers of the same size for both sides.

**Standard backlash:**

**0.05 - 0.20 mm (0.0020 - 0.0079 in.)**

Thickness mm (in.)	Thickness mm (in.)
1.50 (0.0591)	1.65 (0.0650)
1.55 (0.0610)	1.70 (0.0669)
1.60 (0.0630)	1.75 (0.0689)

- (b) Install the thrust washers and side gears in the differential case.  
 (c) Install the pinion shaft.



- (d) Using a dial indicator, check the side gear backlash. Measure the side gear backlash while holding one pinion gear toward the case.

**Standard backlash:**

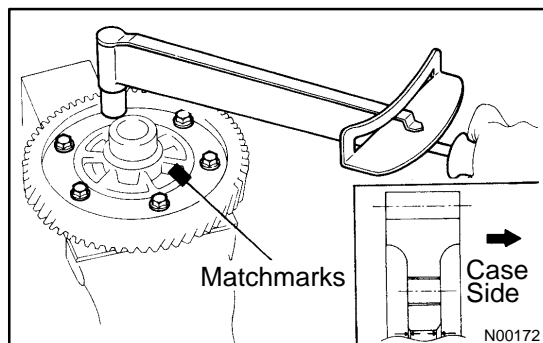
**0.05 - 0.20 mm (0.0020 - 0.0079 in.)**

If the backlash is not within the specification, install a thrust washer of different thickness.

- (e) Using a pin punch and hammer, install the straight pin through the case and hole in the pinion shaft.  
 (f) Stake the differential case.

### 2. INSTALL RING GEAR ON DIFFERENTIAL CASE

- (a) Clean the contact surface of the differential case.  
 (b) Heat the ring gear in boiling water.  
 (c) Carefully remove the ring gear from the water.  
 (d) After the moisture on the ring gear has completely evaporated, quickly install the ring gear to the differential case.

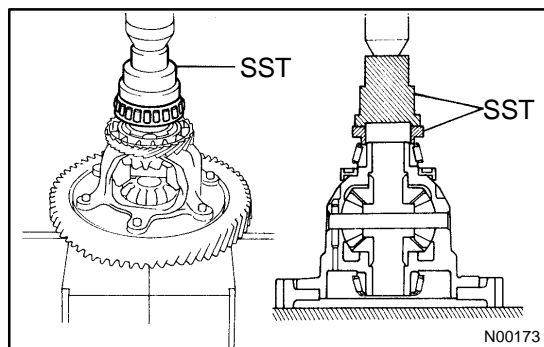


#### HINT:

Align the matchmarks on the differential case and contact the ring gear.

- (e) Install the 6 set bolts. Tighten each set bolt uniformly, at a time in succession. Torque the bolts.

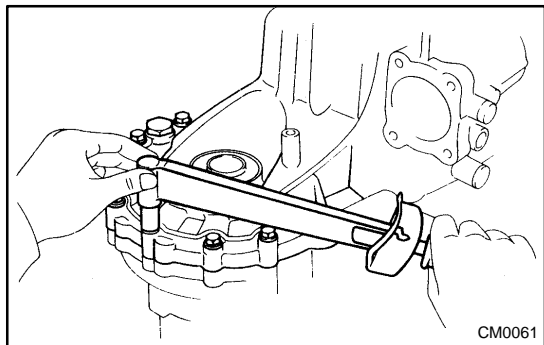
**Torque: 124 N·m (1,260 kgf·cm, 91 ft·lbf)**



### 3. INSTALL SIDE BEARING

- Install the speedometer drive gear to the RH side.
- Using SST and a press, install new side bearings to the both sides of the case.

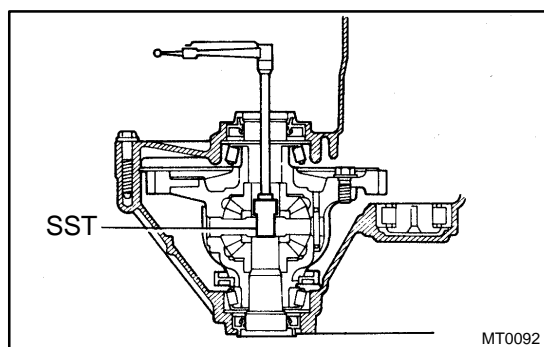
SST 09350-32014 (09351-32090, 09351-32120)



### 4. INSPECT DIFFERENTIAL SIDE BEARING PRELOAD

- Install the differential case assembly to the transaxle case.
- Install the transmission case.
- Install and torque the case bolts.

**Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)**



- Using SST and a torque wrench, measure the preload.  
SST 09564-3201 1

**Preload (at starting):**

**New bearing**

**0.8 - 1.6 N·m (8 - 16 kgf·cm, 6.9 - 13.9 in.·lbf)**

**Reused bearing**

**0.5 - 1.0 N·m (5 - 10 kgf·cm, 4.3 - 8.7 in.·lbf)**

If the preload is not within the specification, remove the transmission case side outer race of the side bearing with SST (See page [MX-36](#) ).

- Select another shim.

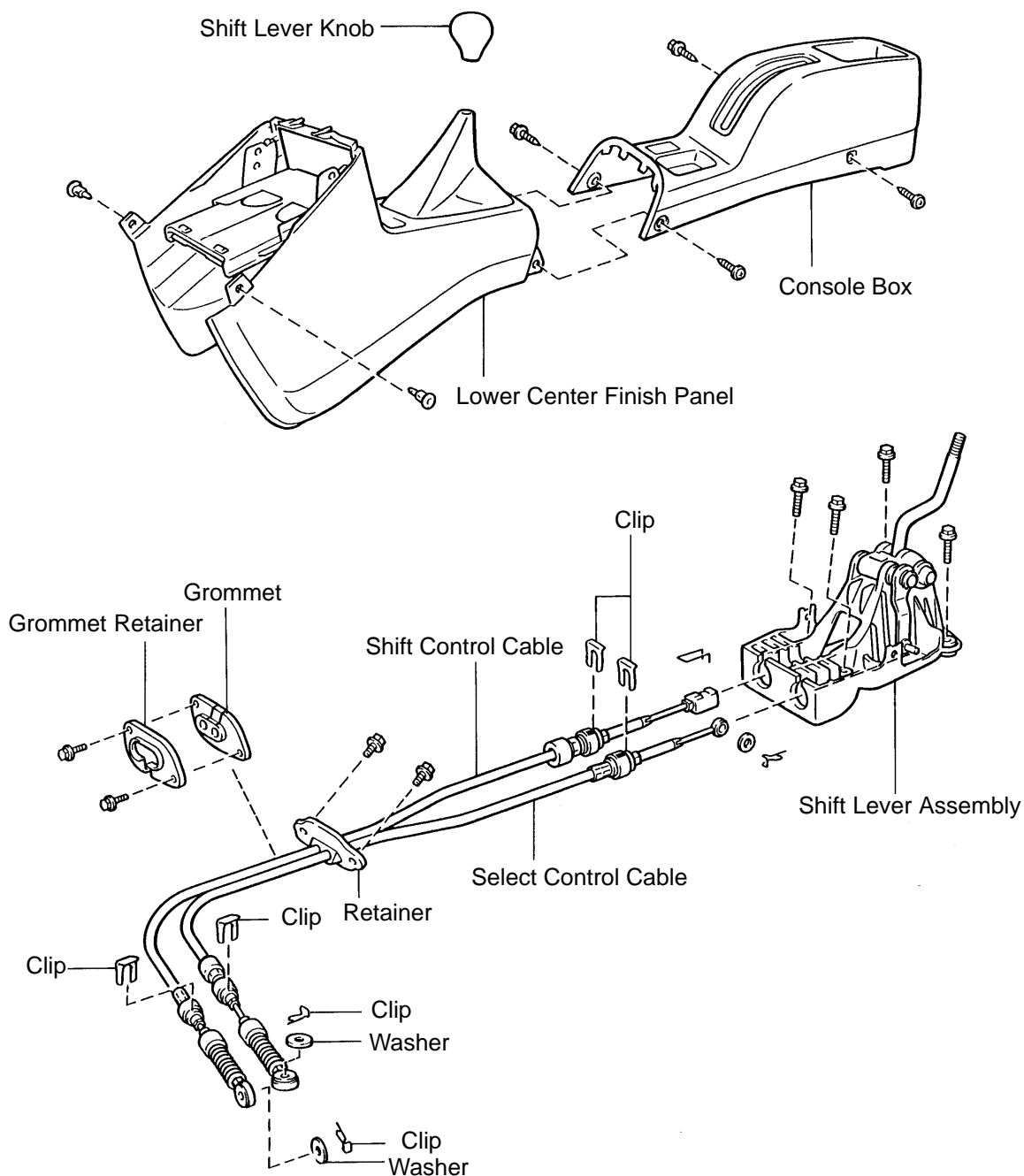
**HINT:**

The preload will change by approx. 0.3 - 0.4 N·m (3 - 4 kgf·cm, 2.6 - 3.5 in.·lbf) corresponding to a change of 0.05 mm in shim thickness.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
A	2.10 (0.0827)	L	2.60 (0.1024)
B	2.15 (0.0846)	M	2.65 (0.1043)
C	2.20 (0.0866)	N	2.70 (0.1063)
D	2.25 (0.0886)	P	2.75 (0.1083)
E	2.30 (0.0906)	Q	2.80 (0.1102)
F	2.35 (0.0925)	R	2.85 (0.1122)
G	2.40 (0.0945)	S	2.90 (0.1142)
H	2.45 (0.0965)	T	2.95 (0.1161)
J	2.50 (0.0984)	U	3.00 (0.1181)
K	2.55 (0.1004)	-	-

# SHIFT LEVER AND CONTROL CABLE COMPONENTS

MX07X-03

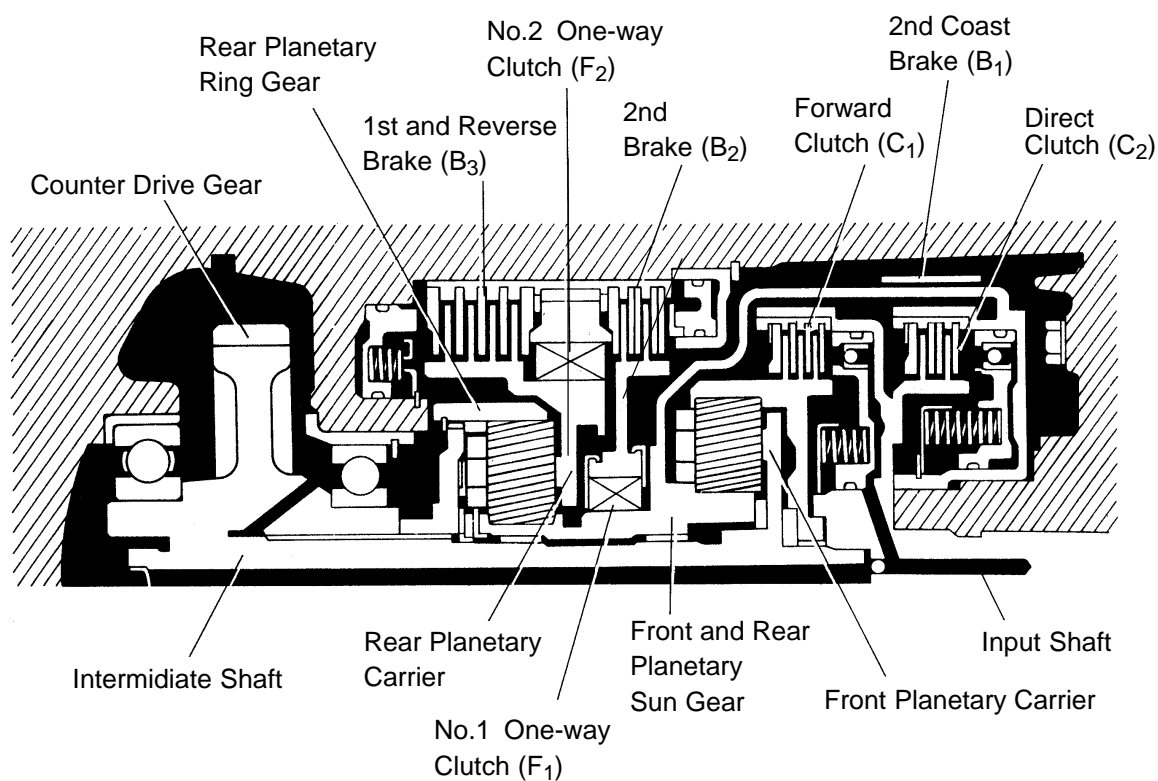


D02991

# AUTOMATIC TRANSAXLE SYSTEM (A132L)

## OPERATION

AX08C-03



●....Operating

Shift lever Position	Gear position	C <sub>1</sub>	C <sub>2</sub>	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	F <sub>1</sub>	F <sub>2</sub>
P	Parking							
R	Reverse		●			●		
N	Neutral							
D	1st	●						●
	2nd	●			●		●	
	3rd	●	●		●			
2	1st	●						●
	2nd	●		●	●		●	
L	1st	●				●		●
	2nd*	●		●	●		●	

\*: Down-shift in L position, 2nd gear only, no up-shift.

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## TROUBLESHOOTING

### 1. GENERAL INFORMATION

- (a) Troubles occurring with the automatic transaxle can be caused by either the engine or the transaxle itself. These two areas should be checked before proceeding with troubleshooting.
- (b) Troubleshooting should begin with the simplest operation, working up in order of difficulty, but first determine whether the trouble lies within the engine or transaxle.
- (c) Proceed with the inspection as follows:

#### PRELIMINARY CHECK

- (a) Check the tire inflation.
- (b) Check the idle speed.
- (c) Check the fluid level and fluid condition.
- (d) Check the throttle cable mark.
- (e) Check the shift linkage.
- (f) Check the park/neutral position switch.



#### STALL TEST

Check the engine and the torque converter clutch.



#### TIME LAG TEST

Check the automatic transaxle (each clutch, brake and gear) for wear.



#### HYDRAULIC TEST

Measure the line pressure and make a basic check of fluid circuit.

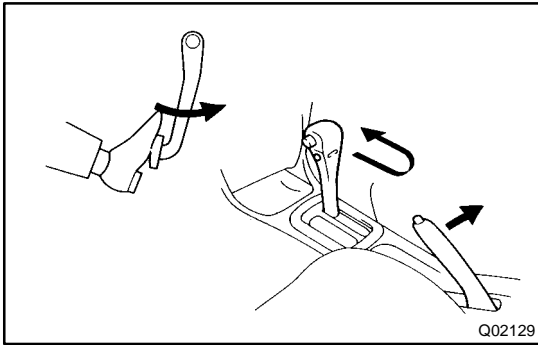


#### ROAD TEST

Check if trouble lies within automatic transaxle. If noise or vibration occurs, the possible cause could be with the compressor, engine, drive shaft and tires, etc.



**MATRIX CHART** (See page [AX-10](#))



## 2. PRELIMINARY CHECK

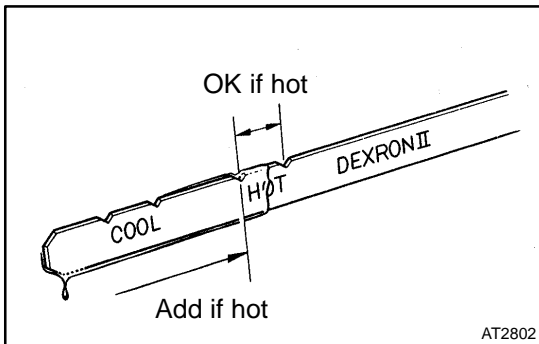
(a) Check the fluid level.

HINT:

The vehicle must have been driven so that the engine and transaxle are at normal operating temperature.

**ATF temperature: 70 - 80 °C (158 - 176 °F)**

- (1) Park the vehicle on the level surface and set the parking brake.
- (2) With the engine idling, shift the selector into each gear from the P to L position and return to the P position.
- (3) Pull out the transaxle dipstick and wipe it clean.
- (4) Push it back fully into the pipe.



- (5) Pull it out and check that the fluid level is in the HOT range. If the level is at the low side of the hot range, add new fluid.

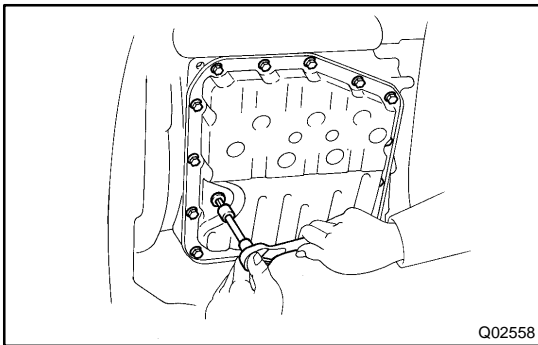
**Fluid type: ATF DEXRON®II**

**NOTICE:**

**Do not overfill.**

(b) Check the fluid condition.

If the fluid smells burnt or is black, replace it.



(c) Replace the ATF.

**NOTICE:**

**Do not overfill.**

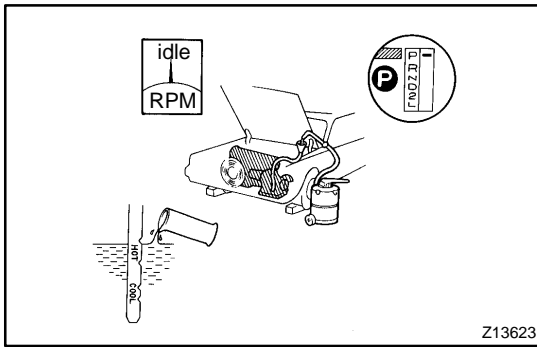
- (1) Using a hexagon wrench, remove the drain plug and drain the fluid.
- (2) Using a hexagon wrench, install the drain plug securely.
- (3) Add new fluid through the filler pipe.

**Fluid type: ATF DEXRON®II**

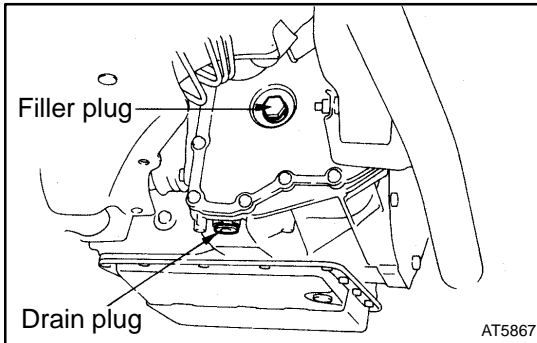
**Dry fill: 5.5 liters (5.8 US qts, 4.8 Imp.qts)**

**Drain and refill: 2.5 liters (2.6 US qts, 2.2 Imp.qts)**

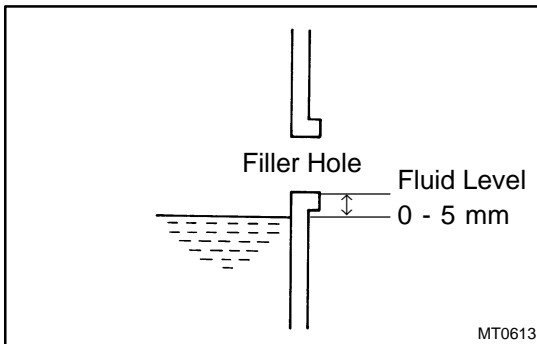




- (4) Start the engine and shift the selector into all positions from the P position through the L position and then shift it into the P position.
- (5) With the engine idling, check the fluid level. Add the fluid up to the COOL level on the dipstick.
- (6) Check the fluid level at the normal operating temperature 70 - 80 °C (158 - 176 °F) and add as necessary.

**NOTICE:****Do not overfill.**

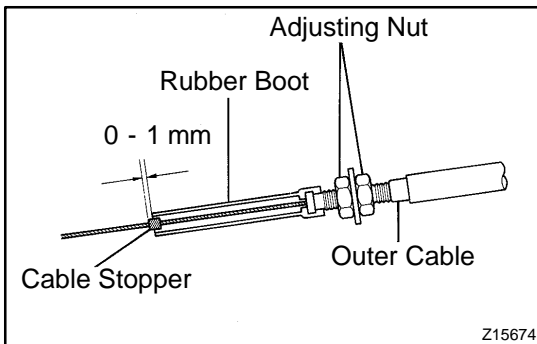
- (d) If necessary, replace the differential fluid.
  - (1) Using a hexagon wrench, remove the drain plug and drain the fluid.
  - (2) Using a hexagon wrench, install the drain plug securely.
  - (3) Remove the filler plug.
  - (4) Add new fluid until it begins to run out of the filler hole.

**Fluid type: ATF D-II or DEXRON®III (DEXRON®II)****Capacity: 1.4 liters (1.5 US qts, 1.2 Imp.qts)**

- (e) Check the differential fluid level. Remove the filler plug and check the differential fluid level.
- (f) Inspect and adjust the throttle cable.
  - (1) Depress the accelerator pedal all the way and check that the throttle valve opens fully.

**HINT:**

If the throttle valve does not open fully, adjust the accelerator link.

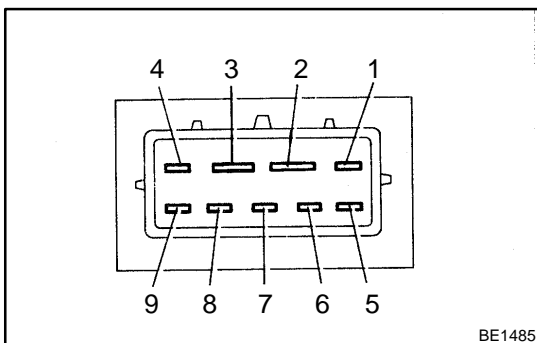


- (2) Fully depress the accelerator.
- (3) Loosen the adjustment nuts.
- (4) Adjust the outer cable so that the distance between the end of the boot and the stopper on the cable is the standard.

**Standard boot and cable stopper distance:**

**0 - 1 mm (0 - 0.04 in.)**

- (5) Tighten the adjusting nuts.
- (6) Recheck the adjustment.

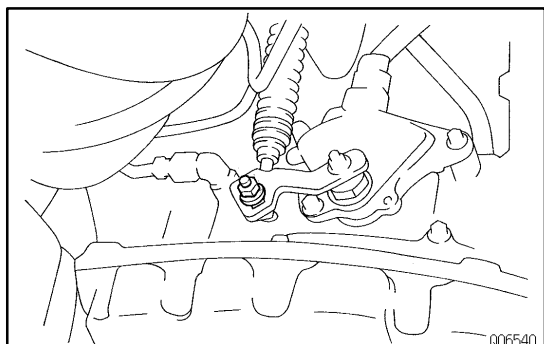


- (g) Inspect the park/neutral position switch.
  - (1) Remove the park/neutral position switch (See page [AX-15](#)).

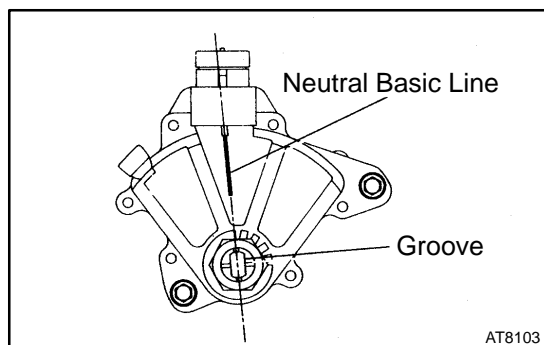
- (2) Using an ohmmeter, check continuity between each terminal shown below when the shift lever is put in each position.

Position \ Terminal	2	3	6	1	5	7	8	9	4
P	○—○		○—○						
R			○—○		○				
N	○—○		○—○			○			
D			○—○				○		
2			○—○					○	
L			○—○						○

V06762



- (h) Adjust the shift control cable.
- (1) Remove the engine under cover.
  - (2) Loosen the nut on the control shaft lever.
  - (3) Push the control shaft lever fully toward the right side of the vehicle.
  - (4) Return the lever 2 notches to the NEUTRAL position.
  - (5) Set the shift lever to the N position.
  - (6) While holding the lever lightly toward the "R" position side, tighten the swivel nut.



- (i) Adjust the park/neutral position switch.  
If the engine will start with the shift selector in any position other than the N or P position, adjustment is required.

- (1) Loosen the park/neutral position switch bolts and set the shift selector to the N position.
- (2) Align the groove with neutral basic line.
- (3) Hold the switch in the position and tighten the bolts.

**Torque: 5.4 N·m (55 kgf·cm, 48 in.-lbf)**

- (j) Inspect the idle speed.

**Idle speed:**

**750 ± 50 rpm (In the N position and A/C OFF)**

### 3. MEASURE STALL TEST

The object of this test is to check the overall performance of the transaxle and the engine by measuring the maximum engine speeds in the D and R positions.

#### NOTICE:

- Do the test at normal operating fluid temperature 50 - 80°C (122 - 176 °F).
- Do not continuously run this test longer than 5 seconds.
  - (1) Check the front and rear wheels.
  - (2) Connect the tachometer to the engine.
  - (3) Fully apply the parking brake.

- (4) Keep your left foot pressing firmly on the brake pedal.
- (5) Start the engine.
- (6) Shift it into the D position. Press all the way down on the accelerator pedal with your right foot. Quickly read the stall speed at this time.

**Stall speed: 2,300 ± 200 rpm**

- (7) Do the same test in the R position.

**Stall speed: 2,300 ± 200 rpm**

#### EVALUATION

Problem	Possible cause
(a) Stall speed low in D and R positions.	<input type="checkbox"/> Engine output may be insufficient <input type="checkbox"/> Stator one-way clutch is not operating properly
(b) Stall speed high in D position.	<input type="checkbox"/> Line pressure too low <input type="checkbox"/> Forward clutch slipping <input type="checkbox"/> No.2 one-way clutch not operating properly
(c) Stall speed high in R position.	<input type="checkbox"/> Line pressure too low <input type="checkbox"/> Direct clutch slipping <input type="checkbox"/> 1st and reverse brake slipping
(d) Stall speed high in D and R positions.	<input type="checkbox"/> Line pressure too low <input type="checkbox"/> Improper fluid level

#### 4. MEASURE TIME LAG TEST

When the shift lever is shifted while the engine is idling, there will be a certain time elapse or lag before the shock can be felt. This is used for checking the condition of the forward clutch, direct clutch and 1st and reverse brake.

##### NOTICE:

- **Do the test at normal operating fluid temperature 50 - 80 °C (122 - 176°F).**
- **Make sure to allow 1 minute interval tests.**
- **Make 3 measurements and take the average value.**

- (1) Fully apply the parking brake.
- (2) Start the engine and check the idle speed.

**Idling speed: 750 ± 50 rpm (In N position and A/C OFF)**

- (3) Shift the shift lever from the N to D position. Using a stop watch, measure the time it takes from shifting the lever to the shock is felt.

**Time lag: Less than 1.2 seconds**

- (4) In the same way, measure the time lag for N → R.

**Time lag: Less than 1.5 seconds**

**EVALUATION (If N → D time lag are longer than than specified):**

Problem	Possible cause
N → D time lag is longer	<input type="checkbox"/> Line pressure too low <input type="checkbox"/> Forward clutch worn <input type="checkbox"/> Direct clutch worn <input type="checkbox"/> 1st and reverse brake worn

## 5. HYDRAULIC TEST

(a) Measure the line pressure.

- (1) Warm up the transaxle fluid.
- (2) Remove the transaxle case test plug and mount SST (See page [AX-25](#) ).

SST 09992-00094 (09992-00150, 09992-00270)

### NOTICE:

**Do the test at normal operating fluid temperature 50 - 80 °C (122 - 176 °F).**

- (3) Fully apply the parking brake and check the 4 wheels.
- (4) Start the engine and check the idle speed.
- (5) Shift into the D position, step down strongly on the brake pedal with your left foot and while manipulating the accelerator pedal with the right foot, measure the line pressure at the engine speeds specified in the table.
- (6) In the same manner, do the test in the R position.

### Specified line pressure:

D position	Idling	363 - 422 kPa (3.7 - 4.3 kgf/cm <sup>2</sup> , 53 - 61 psi)
	Stall	902 - 1,049 kPa (9.2 - 10.7 kgf/cm <sup>2</sup> , 131 - 152 psi)
R position	Idling	530 - 706 kPa (5.4 - 7.2 kgf/cm <sup>2</sup> , 77 - 102 psi)
	Stall	1,412 - 1,647 kPa (14.4 - 16.8 kgf/cm <sup>2</sup> , 205 - 239 psi)

- (7) If the measured pressures are not up to specified values, recheck the throttle cable adjustment and retest it (see step 2).

### EVALUATION

Problem	Possible cause
If the measured values at all positions are higher.	<input type="radio"/> Throttle cable out of adjustment <input type="radio"/> Throttle valve defective <input type="radio"/> Regulator valve defective
If the measured values at all positions are lower.	<input type="radio"/> Throttle cable out of adjustment <input type="radio"/> Throttle valve defective <input type="radio"/> Regulator valve defective <input type="radio"/> Oil pump defective
If pressure is low in the D position only.	<input type="radio"/> D position circuit fluid leakage <input type="radio"/> Forward clutch defective
If pressure is low in the R position only.	<input type="radio"/> R position circuit fluid leakage <input type="radio"/> Direct clutch defective <input type="radio"/> 1st and reverse brake defective

(b) Measure the governor pressure.

- (1) Warm up the transaxle fluid.
- (2) Remove the transaxle case test plug and mount SST (See page [AX-25](#) ).

SST 09992-00094 (09992-00230, 09992-00270)

### NOTICE:

**Do the test at normal operating fluid temperature 50 - 80 °C (122 - 176 °F).**

- (3) Check the parking brake to see that it is not applied.
- (4) Start the engine.
- (5) Shift into the D position and measure the governor pressures at the speeds specified in the table.

**EVALUATION**

Problem	Possible cause
If governor pressure defect.	<input type="radio"/> Line pressure defect <input type="radio"/> Fluid leakage in governor pressure circuit <input type="radio"/> Governor valve operation defect
Vehicle speed (Reference)	Governor pressure
30 km/h (19 mph)	59 - 137 kPa (0.6 - 1.4 kgf/cm <sup>2</sup> , 9 - 20 psi)
60 km/h (37 mph)	186 - 365 kPa (1.9 - 2.7 kgf/cm <sup>2</sup> , 27 - 38 psi)
90 km/h (56 mph)	353 - 431 kPa (3.6 - 4.4 kgf/cm <sup>2</sup> , 51 - 63 psi)

**6. ROAD TEST****NOTICE:**

**Do this test at normal fluid temperature 50 - 80 °C (122 - 176 °F).**

**(a) D position test.**

Shift into the D position and while driving with the accelerator pedal held constant at the throttle valve fully open, check on the following points:

- (1) Check to see that the 1→2 and 2→3 up-shifts take place and also that the shift points conform to those shown in the automatic shift schedule (See page [SS-28](#) ).

**EVALUATION**

Problem	Possible cause
If there is no 1 - 2 up-shift.	<input type="radio"/> Governor valve is defective <input type="radio"/> 1 - 2 shift valve is stuck
If there is no 2 - 3 up-shift.	<input type="radio"/> 1 - 2 shift valve is stuck
If the shift point is defective.	<input type="radio"/> Throttle cable out of adjustment <input type="radio"/> Throttle valve, 1 - 2 shift valve, 2 - 3 shift valve, etc. are defective

- (2) In the same way, check the shock and slip at 1 → 2 and 2 → 3 up-shifts.

**EVALUATION**

Problem	Possible cause
If the shock is severe.	<input type="radio"/> Line pressure is too high <input type="radio"/> Accumulator is defective <input type="radio"/> Check ball is defective

- (3) Run in the 3rd gear of the D position, check the abnormal noise and vibration.

**HINT:**

Check for the cause of abnormal noise and vibration must be made with extreme care as they could also be due to imbalance in the drive shaft, differential, tires and torque converter clutch, etc.

- (4) While running in the 3rd gear of the D position, check that the possible kick-down vehicle speed limits for the 3 → 1 and 3 → 2 kick-down conform to those indicated in the automatic shift schedule (See page [SS-28](#) ).

**EVALUATION**

Problem	Possible cause
If the possible kick-down vehicle speed limit is defective.	<input type="radio"/> Throttle cable out of adjustment <input type="radio"/> Throttle valve, 1 - 2 shift valve, 2 - 3 shift valve, etc. are defective

- (5) Check the abnormal shock and slip at kick-down.

- (6) While running at about 60 km/h (37 mph) in the 3rd gear of the D position, release your foot from the accelerator pedal and shift into the L position. Then check if the 2 → 1 down-shift point conforms to that indicated in the automatic shift schedule (See page [SS-28](#) ).

**(b) Inspect the lock-up mechanism.**

- (1) Drive in the D position at a steady speed (Lock-up ON) of about 65 km/h (40 mph).  
 (2) Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

If there is a big jump in engine RPM, there is no lock-up.

(c) 2 position test.

- (1) While running in the 2nd gear of the 2 position, release the accelerator pedal and check the engine braking effect.

**EVALUATION**

Problem	Possible cause
If there is no engine braking effect.	○ 2nd coast brake is defective.

- (2) Check the abnormal noise during acceleration and deceleration.

- (3) Check the shock during up-shift and down-shift.

(d) L position test.

- (1) While running in the L position, check that there is no up-shift to 2nd gear.

- (2) While running in the L position, release the accelerator pedal and check the engine braking effect.

**EVALUATION**

Problem	Possible cause
If there is no engine braking effect.	○ 1st coast brake is defective.

- (3) Check for abnormal noise during acceleration and deceleration.

(e) R position test.

Shift into the R position and, while running at full throttle, check for slipping.

(f) P position test.

Stop the vehicle on a gradient (more than 5°) and, after shifting into the P position, release the parking brake. Then check to see that the parking lock pawl prevents the vehicle from moving.

## PROBLEM SYMPTOMS TABLE

Use the table below to help you 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.

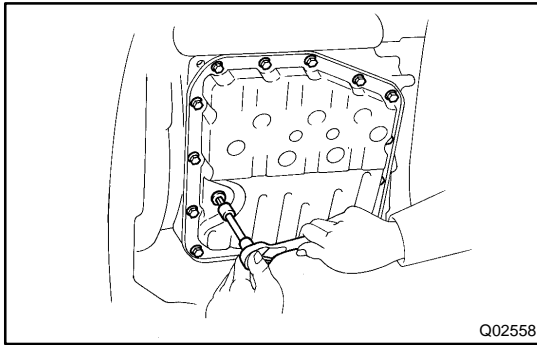
Symptom	Suspect Area	See page
Does not move in any forward position	5. Governor valve 6. Forward clutch (C <sub>1</sub> ) 7. No.2 one-way clutch (F <sub>2</sub> ) 8. 1st & reverse brake (B <sub>3</sub> ) 9. 2nd coast brake (B <sub>1</sub> ) 10.No.1 one-way clutch (F <sub>1</sub> ) 11.Direct clutch (C <sub>2</sub> )	<a href="#">AX-17</a> ● ● ● ● ● ●
Does not move in reverse position	1. 2nd coast brake (B <sub>1</sub> ) 2. Front planetary gear 3. Rear planetary gear 4. 1 - 2 shift valve 5. 2 - 3 shift valve 6. Direct clutch (C <sub>2</sub> ) 7. 1st and reverse brake (B <sub>3</sub> )	● ● ● ● ● ● ●
Does not move in any forward position or reverse position	1. Parking lock pawl 2. Manual valve 3. Front planetary gear 4. Rear planetary gear 5. Torque converter clutch	● ● ● ● <a href="#">AX-30</a>
No-up shift (1st → 2nd)	1. 1 - 2 shift valve 2. 2nd brake (B <sub>2</sub> ) 3. No.1 one-way clutch (F <sub>1</sub> )	● ● ●
No-up shift (2nd → 3rd)	1. 2 - 3 shift valve 2. Direct clutch (C <sub>2</sub> )	● ●
No-down shift (3rd → 2nd)	1. Throttle valve 2. 2 - 3 shift valve	● ●
No-down shift (2nd → 1st)	1. Throttle valve 2. 1 - 2 shift valve	● ●
Shift point too high or too low	1. Governor valve 2. 1 - 2 shift valve 3. 2 - 3 shift valve	● ● ●
Harsh engagement (N → R)	1. Direct clutch (C <sub>2</sub> ) 2. 1st & reverse brake (B <sub>3</sub> )	● ●
Harsh engagement (N → D)	1. Forward clutch (C <sub>1</sub> ) 2. C <sub>1</sub> accumulator	● ●
Harsh engagement (N → L)	1. Low coast modulator valve 2. Forward clutch (C <sub>1</sub> ) 3. C <sub>1</sub> accumulator 4. 1st & reverse brake (B <sub>3</sub> )	● ● ● ●
Harsh engagement (1st → 2nd "D" position)	1. B <sub>2</sub> accumulator 2. 2nd brake (B <sub>2</sub> )	● ●
Harsh engagement (1st → 2nd "2" position)	1. 2nd coast modulator valve 2. B <sub>2</sub> accumulator 3. 2nd brake (B <sub>2</sub> )	● ● ●
Harsh engagement (1st → 2nd → 3rd)	Throttle modulator valve	●
Harsh engagement (2nd → 3rd)	Direct clutch (C <sub>2</sub> )	●
Harsh engagement (3rd → 2nd)	1. 2nd coast modulator valve 2. Primary regulator valve	● ●

## AUTOMATIC TRANSAXLE (A132L) - AUTOMATIC TRANSAXLE SYSTEM (A132L)

Symptom	Suspect Area	See page
Slip (Forward & Reverse)	1. Torque converter clutch 2. Pressure relief valve 3. Oil strainer	AX-30 ● AX-12
Slip ("R" position)	Direct clutch (C <sub>2</sub> )	●
Slip (1st)	1. Forward clutch (C <sub>1</sub> ) 2. No.2 one-way clutch (F <sub>2</sub> )	● ●
Slip (2nd)	1. Forward clutch (C <sub>1</sub> ) 2. 2nd brake (B <sub>2</sub> ) 3. No.1 one-way clutch (F <sub>1</sub> )	● ● ●
Slip (3rd)	1. Forward clutch (C <sub>1</sub> ) 2. Direct clutch (C <sub>2</sub> ) 3. 2nd brake (B <sub>2</sub> )	● ● ●
No engine braking (1st "L" position)	1st & reverse brake (B <sub>3</sub> )	●
No engine braking (2nd "2" position)	2nd coast brake (B <sub>1</sub> )	●
No kick-down	1. 1 - 2 shift valve 2. 2 - 3 shift valve	● ●
Poor acceleration	Torque converter clutch	AX-30
No lock-up	1. Lock-up relay 2. Lock-up signal valve 3. Torque converter clutch	● ● AX-30

● : Refer to A131L, A132L Automatic Transaxle Repair Manual (Pub. No. RM386U).





## VALVE BODY ASSEMBLY ON-VEHICLE REPAIR

AX0RJ-02

### 1. DRAIN TRANSAXLE FLUID

Using a hexagon wrench, remove the drain plug and drain the fluid into the suitable container.

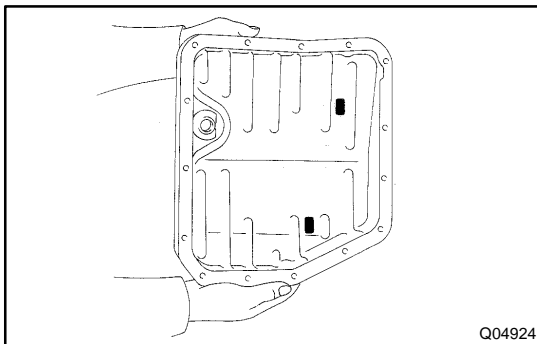
**Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)**

### 2. REMOVE OIL PAN AND GASKET

#### NOTICE:

Some fluid will remain in the oil pan. Remove the oil pan bolts, and carefully remove the oil pan assembly. Discard the gasket.

**Torque: 4.9 N·m (50 kgf·cm, 43 in.-lbf)**

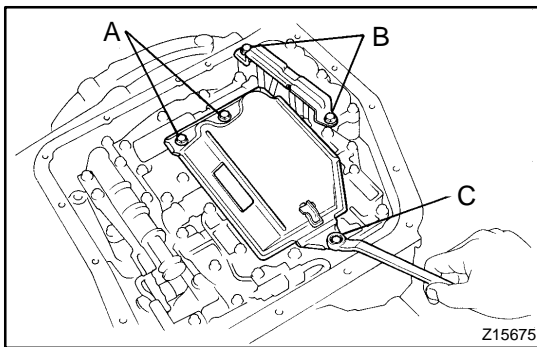


### 3. EXAMINE PARTICLES IN PAN

Remove the magnets and use them to collect any steel chips. Look at the chips on the magnet carefully to anticipate what type of wear you will find in the transaxle.

Steel (magnetic) ..... bearing, gear and plate wear

Brass (non-magnetic) ..... bushing wear



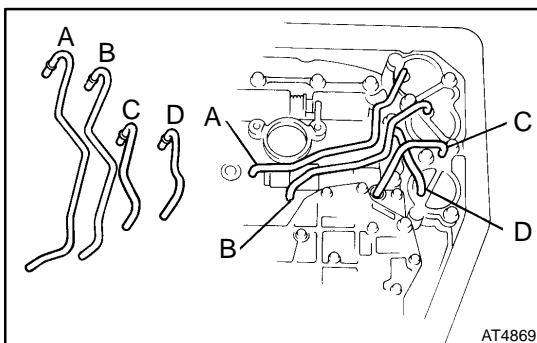
### 4. REMOVE OIL STRAINER

Remove the 3 bolts and the oil strainer.

#### NOTICE:

Be careful as some oil will come out of the strainer.

**Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)**



### 5. REMOVE OIL PIPES

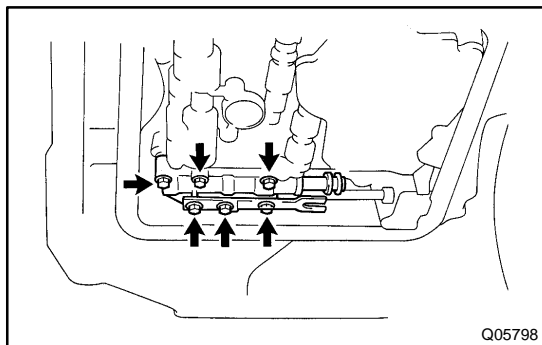
(a) Remove the 2 bolts and pipe bracket.

**Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)**

(b) Pry up the both pipe ends with a large screwdriver and remove the 4 pipes.

#### NOTICE:

Be careful not to bend or damage the pipes.

**6. REMOVE MANUAL DETENT SPRING**

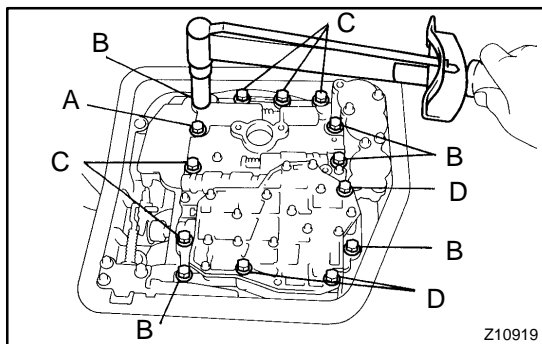
Torque: 10 N·m (100 kgf-cm, 7 ft-lbf)

**HINT:**

Check that the manual valve lever is in contact with the center of the roller at the tip of the detent spring.

**7. REMOVE MANUAL VALVE AND MANUAL VALVE BODY**

Torque: 10 N·m (100 kgf-cm, 7 ft-lbf)

**8. REMOVE VALVE BODY**

(a) Remove the 14 bolts.

**Bolt Length:**

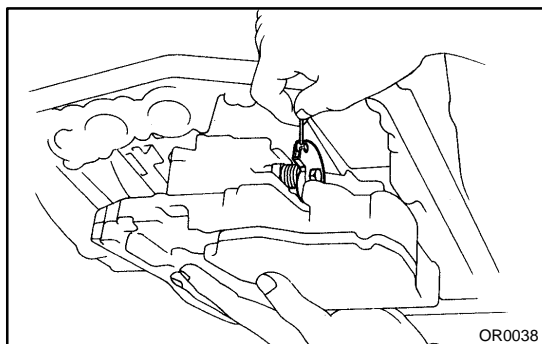
A: 20 mm (0.79 in.)

B: 25 mm (0.98 in.)

C: 36 mm (1.47 in.)

D: 50 mm (1.97 in.)

Torque: 10 N·m (100 kgf-cm, 7 ft-lbf)

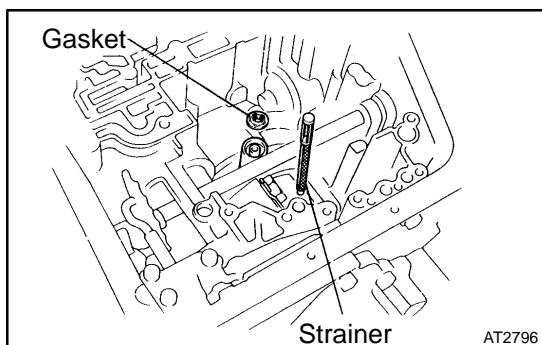


(b) Disconnect the throttle cable.

**NOTICE:**

Be careful not to entangle the kick-down switch and solenoid wire.

(c) Remove the valve body.

**9. REMOVE SECOND BRAKE APPLY GASKET AND GOVERNOR OIL STRAINER****HINT:**

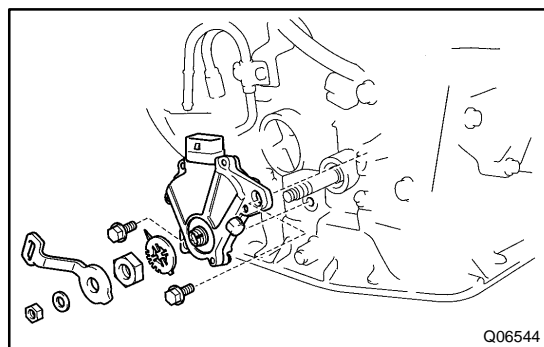
Replace the used gasket with a new one.

## INSTALLATION

**Installation is in the reverse order of the previous steps.**

HINT:

After installation, fill ATF and check the fluid level (See page [AX-2](#) ).



## THROTTLE CABLE ON-VEHICLE REPAIR

AX0RL-01

### 1. DISCONNECT THROTTLE CABLE FROM ENGINE

Disconnect the cable from the throttle linkage.

### 2. REMOVE PARK/NEUTRAL POSITION SWITCH

- (a) Disconnect the transaxle control cable from the transaxle control shaft lever.

**Torque: 12 N·m (120 kgf-cm, 9 ft-lbf)**

- (b) Remove the nut and transaxle control shaft lever.

**Torque: 13 N·m (130 kgf-cm, 9 ft-lbf)**

- (c) Using a screwdriver, pry off the nut stopper.

- (d) Remove the nut and nut stopper.

**Torque: 6.9 N·m (70 kgf-cm, 61 in.-lbf)**

- (e) Remove the 2 bolts and park/neutral position switch.

**Torque: 5.4 N·m (55 kgf-cm, 48 in.-lbf)**

### 3. REMOVE VALVE BODY (See page [AX-12](#))

### 4. REMOVE THROTTLE CABLE

- (a) Remove the retaining bolt and plate.

- (b) Pull out the cable from the transaxle case.

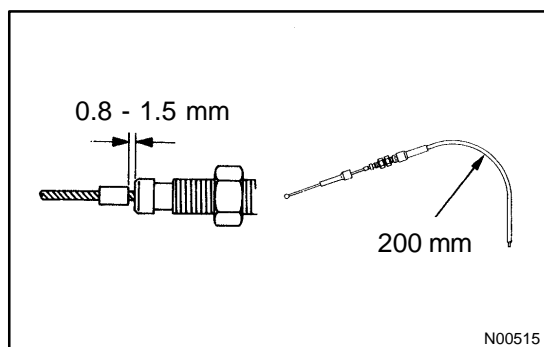
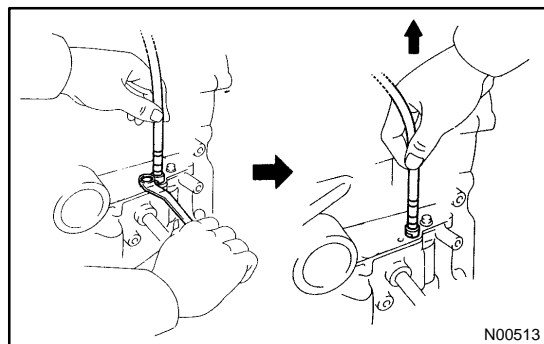
HINT:

New cables does not have a cable stopper staked.

- (c) Bend the cable so that there is a radius of about 200 mm (7.87 in.).

- (d) Pull the inner cable lightly until a slight resistance is felt, and hold it there.

- (e) Stake the stoppe, 0.8-1.5 mm (0.031-0.059 in.) from the end of outer cable.

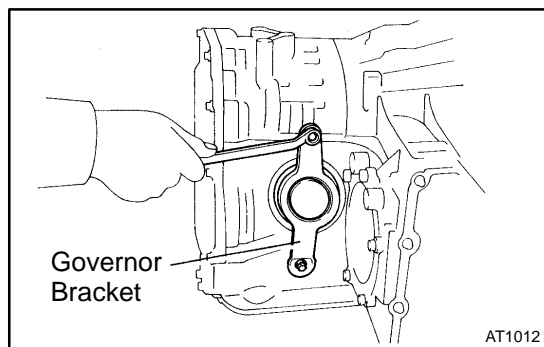


## INSTALLATION

**Installation is in the reverse order of the previous steps.**

HINT:

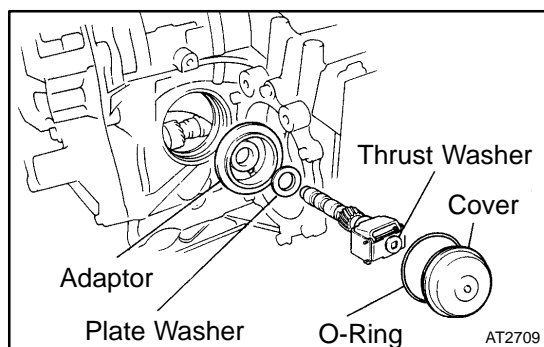
- After installation, adjust the throttle cable (See page [AX-2](#) ).
- Test drive the vehicle.



## GOVERNOR VALVE ON-VEHICLE REPAIR

AXORN-01

1. REMOVE TRANSAXLE DUST COVER
2. DISCONNECT LH DRIVE SHAFT  
(See page [SA-18](#) )
3. REMOVE GOVERNOR BRACKET



4. REMOVE GOVERNOR COVER WITH O-RING
- HINT:

Replace the used O-ring with a new one.

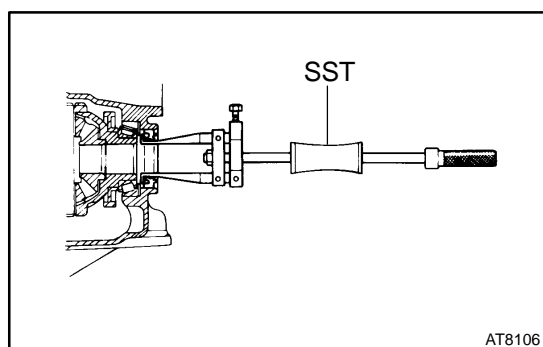
5. REMOVE GOVERNOR BODY WITH THRUST WASHER
6. REMOVE PLATE WASHER
7. REMOVE GOVERNOR BODY ADAPTOR

## INSTALLATION

**Installation is in the leverse order of the previous step.**

HINT:

After installation, fill AFT and check fluid level (See page [AX-2](#) ).



## DIFFERENTIAL OIL SEAL ON-VEHICLE REPAIR

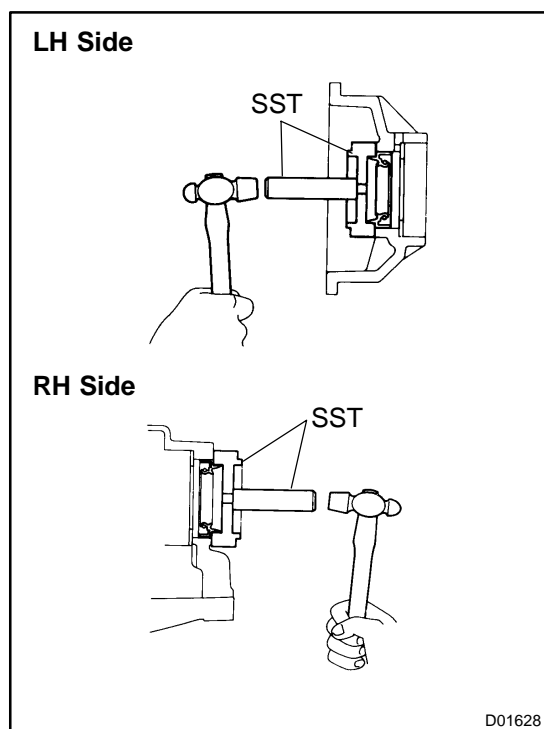
AX0RP-01

1. REMOVE ENGINE UNDER COVER
2. REMOVE LH AND RH DRIVE SHAFTS  
(See page [SA-18](#) )
3. REMOVE SIDE OIL SEAL

Using SST, drive out the oil seals on both sides.

SST 09308-00010





## INSTALLATION

### 1. INSTALL SIDE OIL SEAL

- (a) Using SST, drive in a new oil seal until its surface is flush with the case surface.

SST 09350-32014 (09351-32150, 09351-32130)

**Oil seal drive in depth:  $0 \pm 0.5$  mm ( $0 \pm 0.020$  in.)**

- (b) Coat the lip of the oil seal with MP grease.

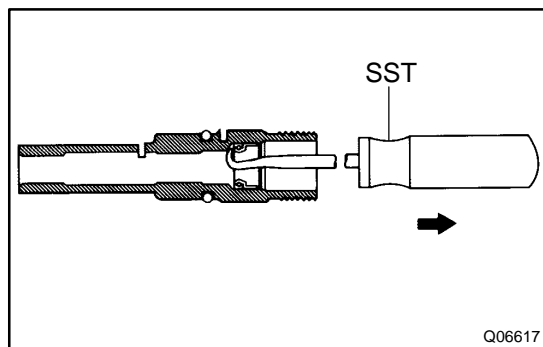
### 2. INSTALL LH AND RH DRIVE SHAFTS

(See page [SA-18](#))

### 3. INSTALL ENGINE UNDER COVER

### 4. FILL AND CHECK FLUID LEVEL

(See page [AX-2](#))



## SPEEDOMETER DRIVEN GEAR OIL SEAL

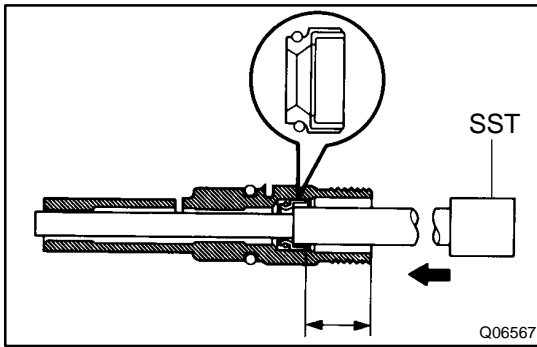
### ON-VEHICLE REPAIR

AX0RR-01

#### REMOVE SPEEDOMETER DRIVEN GEAR OIL SEAL

Using SST, pull out the oil seal.

SST 09921-00010



## INSTALLATION

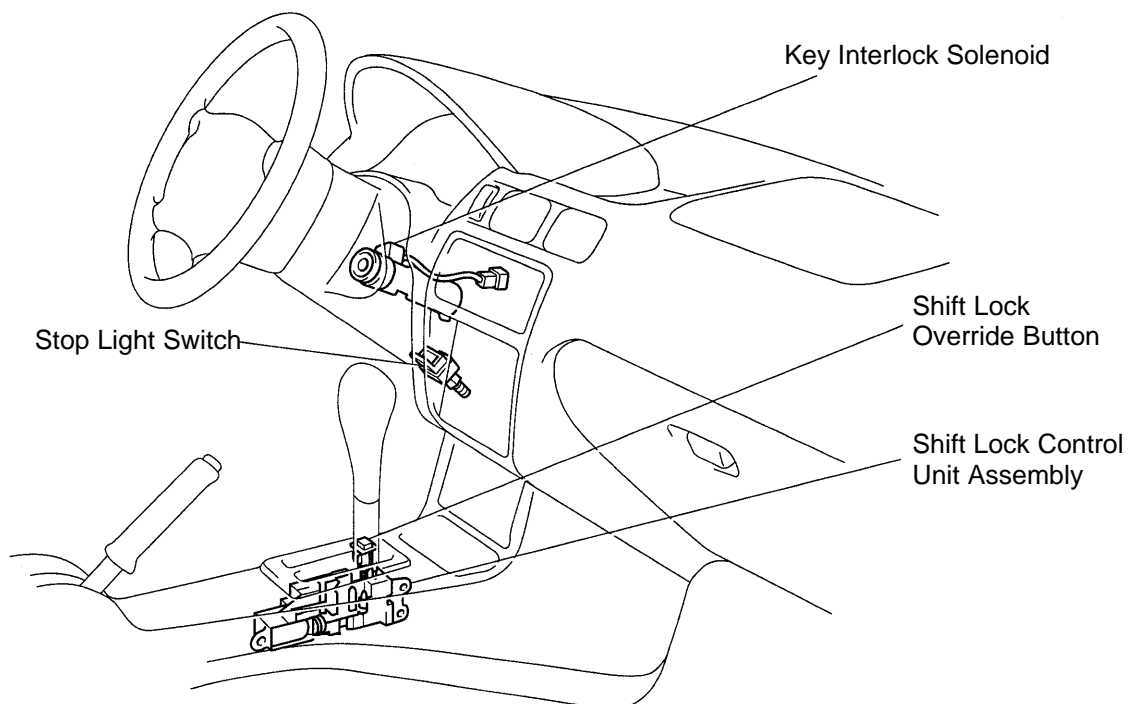
### INSTALL SPEEDOMETER DRIVEN GEAR OIL SEAL

SST 09201-10000 (09201-01080)

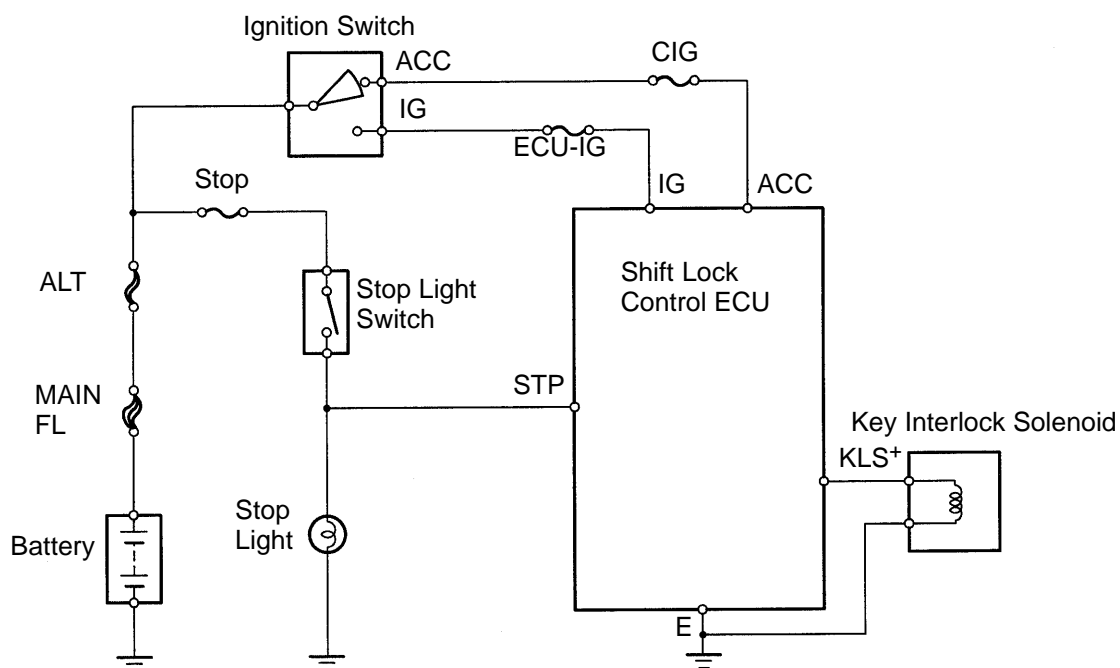
Driven in depth: 19 mm (0.75 in.)

# SHIFT LOCK SYSTEM LOCATION

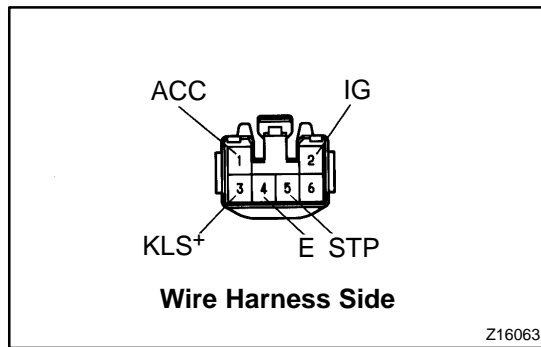
AX08K-01



## WIRING DIAGRAM



D01644



## INSPECTION

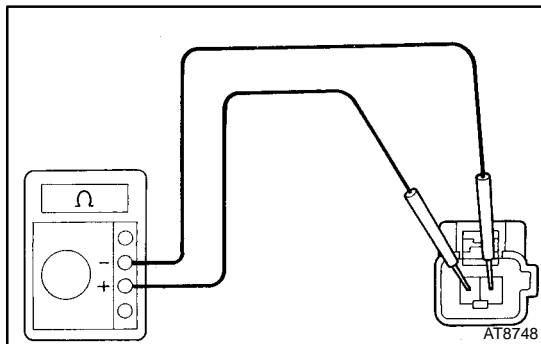
### 1. INSPECT SHIFT LOCK CONTROL ECU

Using a voltmeter, measure the voltage at each terminal.

HINT:

Do not disconnect the ECU connector.

Terminal	Measuring Condition	Voltage (V)
ACC - E	Ignition Switch ACC	10 - 14
IG - E	Ignition Switch ON	10 - 14
STP - E	Depress brake pedal	10 - 14
KLS <sup>+</sup> - E	1 Ignition switch ACC and P position	0
	2 Ignition switch ACC and except P position	10 - 14
	3 (After approx 1 second)	6 - 9

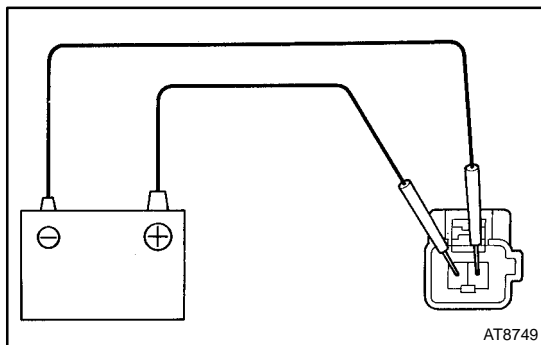


### 2. INSPECT KEY INTERLOCK SOLENOID

- Disconnect the solenoid connector.
- Using an ohmmeter, measure the resistance between terminals.

**Standard resistance: 12.5 - 16.5  $\Omega$**

If resistance value is not as specified, replace the solenoid.

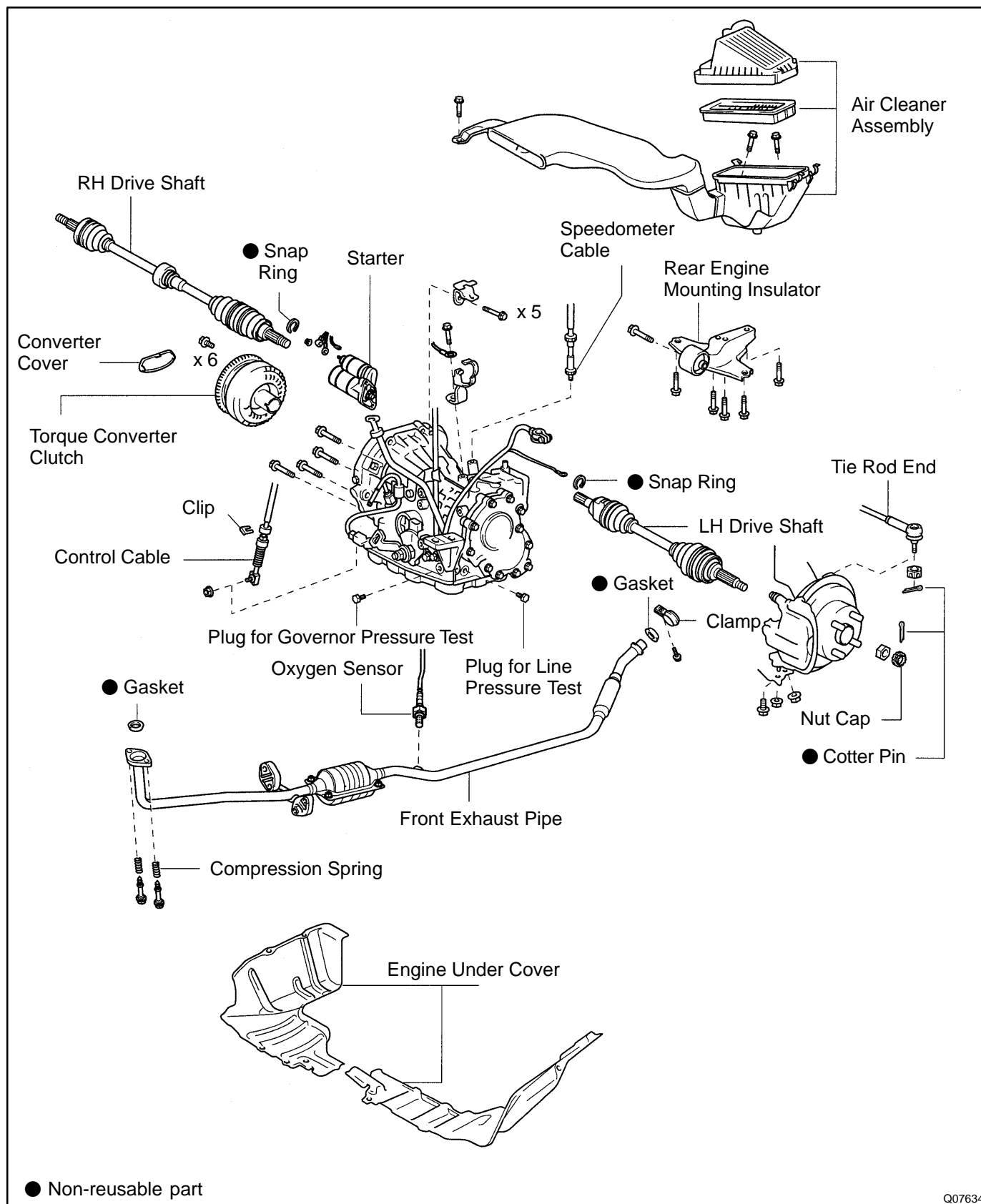


- Apply battery positive voltage between terminals. Check that the solenoid can be heard operating.

If the solenoid does not operate, replace the solenoid.

# AUTOMATIC TRANSAXLE UNIT COMPONENTS

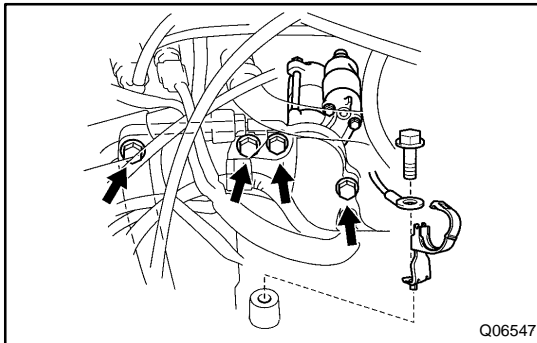
AX08M-03



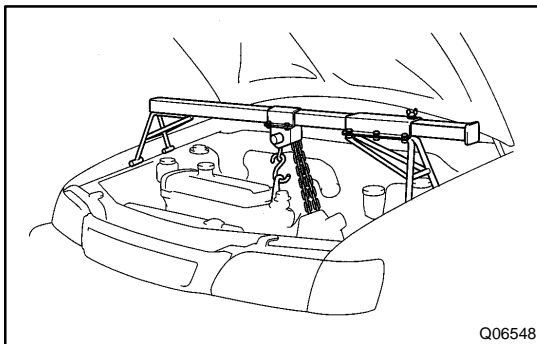
Q07634

## REMOVAL

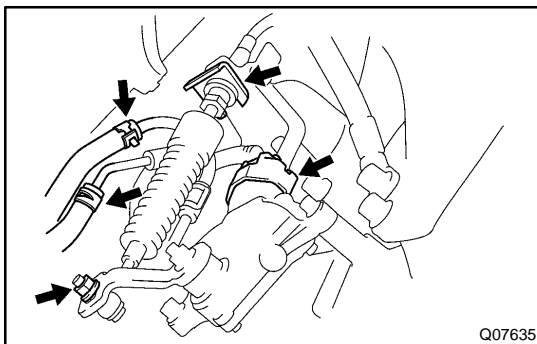
1. REMOVE BATTERY
2. REMOVE AIR CLEANER ASSEMBLY
3. REMOVE THROTTLE CABLE



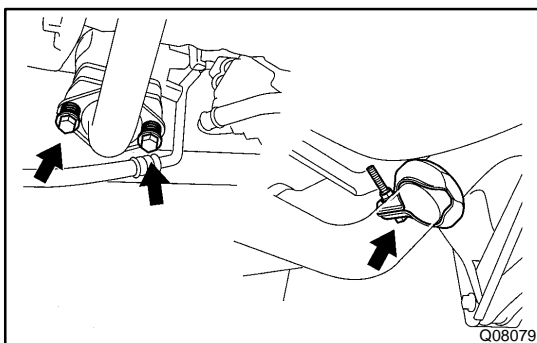
4. REMOVE UPPER SIDE MOUNTING BOLTS  
Torque: 64 N·m (650 kgf-cm, 47 ft-lbf)
5. REMOVE STARTER
  - (a) Disconnect the cable and connector.
  - (b) Remove the starter with the 2 bolts.  
Torque: 39 N·m (400 kgf-cm, 29 ft-lbf)
6. REMOVE GROUND CABLES AND BRACKET



7. INSTALL ENGINE SUPPORT FIXTURE
8. RAISE VEHICLE
9. REMOVE ENGINE UNDER COVER
10. REMOVE LH AND RH DRIVE SHAFTS  
(See page SA-18 )
11. DISCONNECT SPEEDOMETER CABLE



12. DISCONNECT CONTROL CABLE
  - (a) Remove the clip from the control cable.
  - (b) Disconnect the control cable from the lever.  
Torque: 12 N·m (120 kgf-cm, 9 ft-lbf)
13. DISCONNECT PARK/NEUTRAL POSITION SWITCH CONNECTOR
14. DISCONNECT OIL COOLER HOSE FROM PIPE

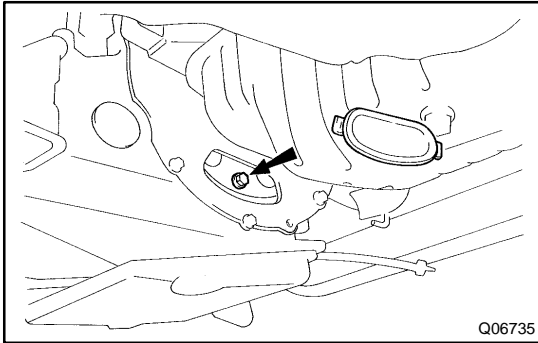


15. REMOVE FRONT EXHAUST PIPE
  - (a) Disconnect the oxygen sensor.  
Torque: 44 N·m (450 kgf-cm, 32 ft-lbf)
  - (b) Remove the bolts and springs from the exhaust manifold and front exhaust pipe.  
Torque: 62 N·m (630 kgf-cm, 46 ft-lbf)
  - (c) Remove the clamp.  
Torque: 19 N·m (190 kgf-cm, 14 ft-lbf)

(d) Remove the front exhaust pipe and gaskets.

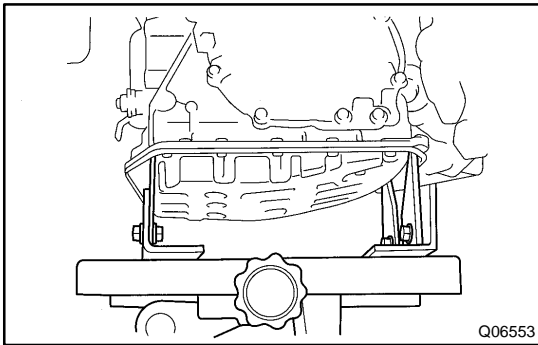
HINT:

Replace the used gaskets with new ones.

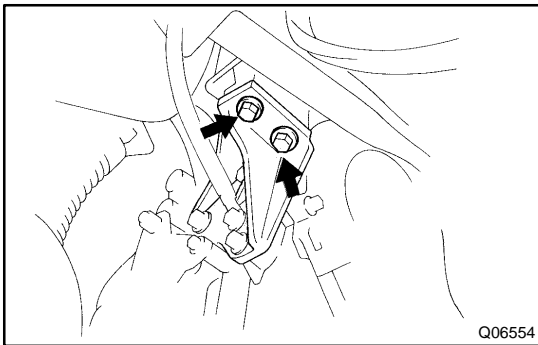


#### 16. REMOVE TORQUE CONVERTER CLUTCH MOUNTING BOLTS

- (a) Remove the converter cover.
- (b) Turn the crankshaft to gain access and remove the 6 bolts with holding the crankshaft pulley set bolt with a wrench.  
**Torque: 27 N·m (280 kgf·cm, 20 ft·lbf)**



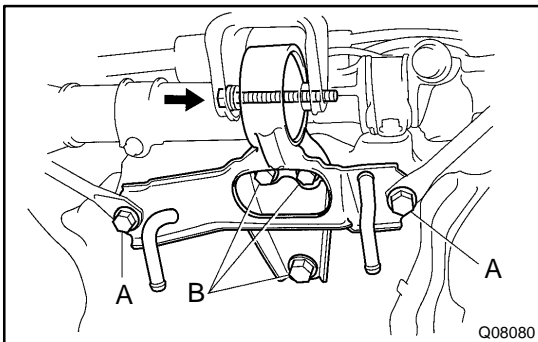
#### 17. SUPPORT TRANSAXLE WITH A TRANSMISSION JACK



#### 18. DISCONNECT LH ENGINE MOUNTING BRACKET

Remove the 2 mounting bolts.

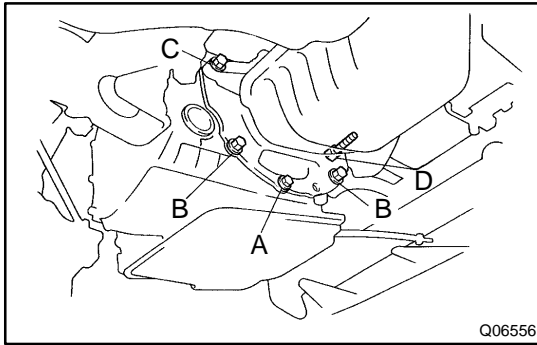
**Torque: 49 N·m (490 kgf·cm, 36 ft·lbf)**

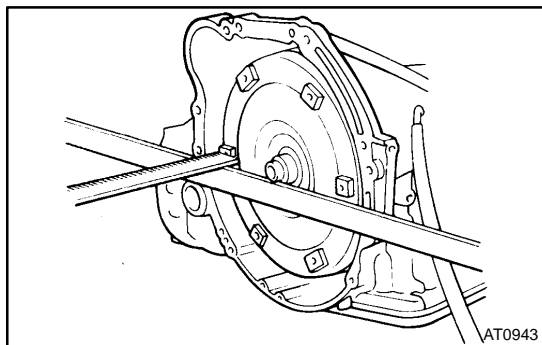


#### 19. REMOVE ENGINE REAR MOUNTING

- (a) Remove the rear mounting insulator through bolt.  
**Torque: 65 N·m (650 kgf·cm, 48 ft·lbf)**
- (b) Remove the 5 bolts and rear mounting insulator.  
**Torque:**  
**Bolt A: 80 N·m (800 kgf·cm, 59 ft·lbf)**  
**Bolt B: 92 N·m (920 kgf·cm, 69 ft·lbf)**



**20. REMOVE TRANSAXLE MOUNTING BOLT****Torque:****Bolt A: 7.4 N·m (75 kgf·cm, 65 in.-lbf)****Bolt B: 25 N·m (250 kgf·cm, 18 ft·lbf)****Bolt C: 46 N·m (470 kgf·cm, 34 ft·lbf)****Bolt D: 64 N·m (650 kgf·cm, 47 ft·lbf)**



## INSTALLATION

### 1. INSTALL CHECK TORQUE CONVERTER

Using calipers and a straight edge, measure the distance from the installed surface to the front surface of the transaxle housing.

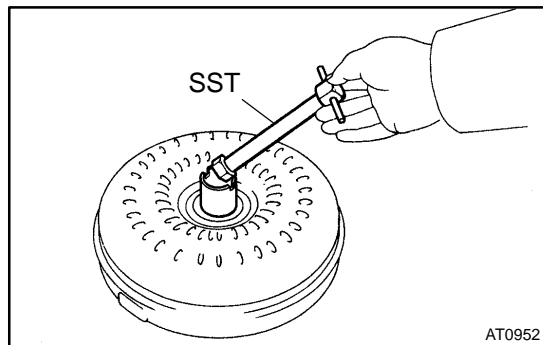
**Correct distance: More than 13.0 mm (0.512 in.)**

### 2. INSTALL TRANSAXLE

Installation is in reverse order of removal.

HINT:

- After installation, adjust the shift cable and park/neutral position switch (See page [AX-2](#) ).
- Fill ATF and check fluid level (See page [AX-2](#) ).
- Test drive the vehicle.

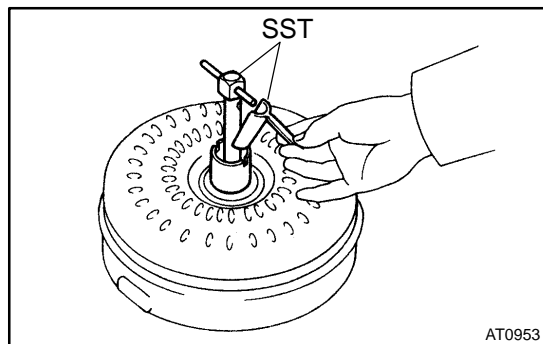


## TORQUE CONVERTER CLUTCH AND DRIVE PLATE INSPECTION

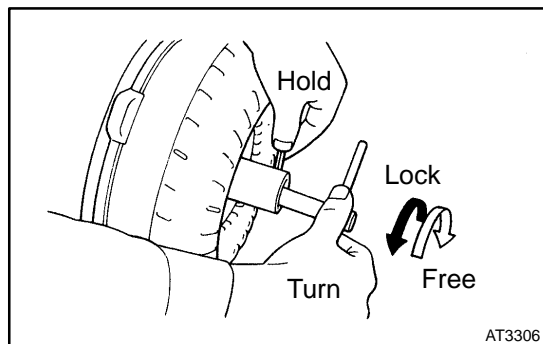
AXORT-01

### 1. INSPECT ONE-WAY CLUTCH

- (a) Install SST in the inner race of the one-way clutch.  
SST 09350-32014 (09351-32010)

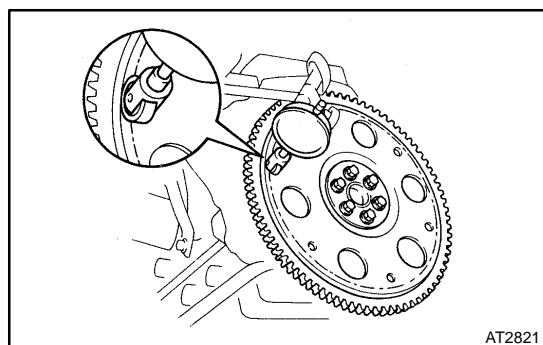


- (b) Install SST so that it fits in the notch of the converter clutch hub and outer race of the one-way clutch.  
SST 09350-32014 (09351-32020)



- (c) With the torque converter clutch held upright, inspect the clutch locks when turned counterclockwise, and rotates freely and smoothly clockwise.

If necessary, clean the converter and retest the clutch. Replace the converter clutch if the clutch still fails the test.



### 2. MEASURE DRIVE PLATE RUNOUT AND INSPECT RING GEAR

Set up a dial indicator, measure the drive plate runout.

**Maximum runout: 0.20 mm (0.0079 in.)**

If the runout is not within the specification, replace the drive plate. If installing a new drive plate, note the orientation of spacers and tighten the bolts.

**Torque: 88 N·m (900 kgf·cm, 65 ft·lbf)**

### 3. MEASURE TORQUE CONVERTER CLUTCH SLEEVE RUNOUT

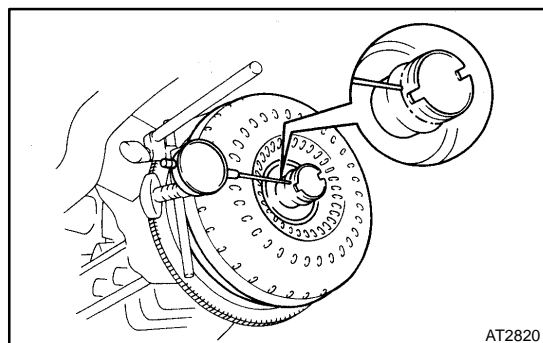
Temporarily mount the torque converter clutch to the drive plate. Set up a dial indicator, measure the torque converter clutch sleeve runout.

**Maximum runout: 0.30 mm (0.0018 in.)**

If the runout is not within the specification, try to correct by reorienting the installation of the converter.

**HINT:**

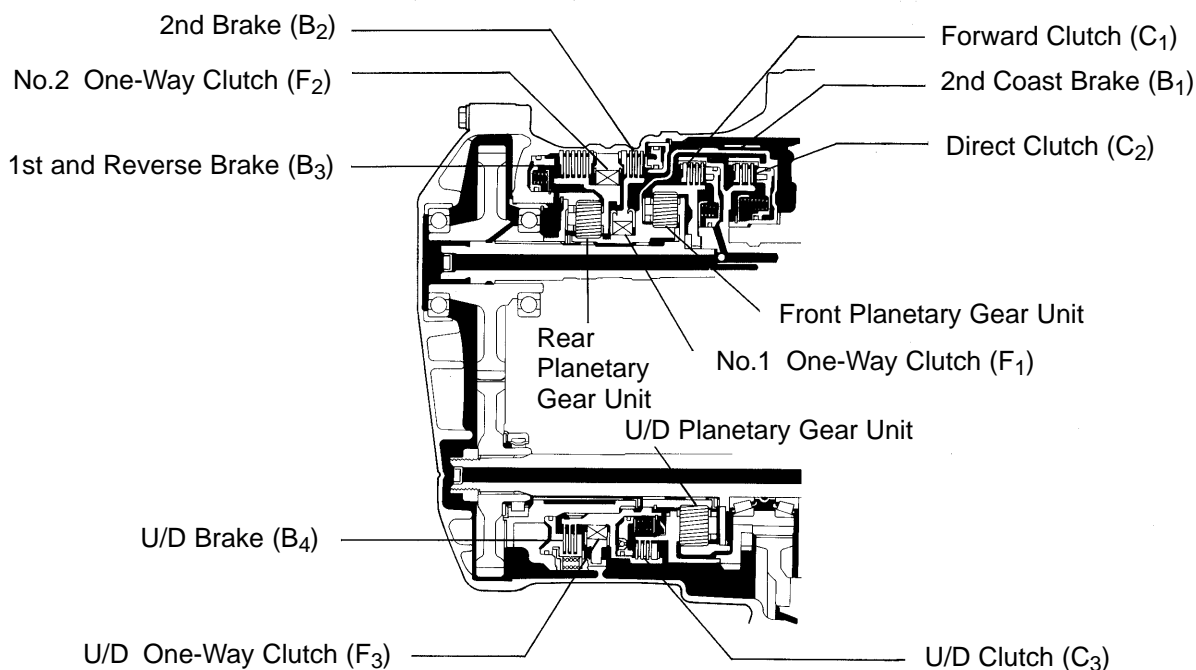
Mark the position of the converter clutch to ensure the correct installation.



# AUTOMATIC TRANSAXLE SYSTEM (A242L)

## OPERATION

AX07W-05



AT8498

○ ... Operating

Shift Lever Position	Gear	Shift Solenoid Valve No.1	Shift Solenoid Valve No.2	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>	F <sub>1</sub>	F <sub>2</sub>	F <sub>3</sub>
P	Park	ON	OFF							●			
R	Reverse	ON	OFF		●				●	●			
N	Neutral	ON	OFF							●			
D	1st	ON	OFF	●						●		●	●
	2nd	ON	ON	●				●		●	●		●
	3rd	OFF	ON	●	●			●		●			●
	O/D	OFF	OFF	●	●	●		●					
2	1st	ON	OFF	●						●		●	●
	2nd	ON	ON	●			●	●		●	●		●
	3rd*	OFF	ON	●	●			●		●			●
L	1st	ON	OFF	●					●	●			●
	2nd*	ON	ON	●			●	●		●	●	●	●

● : Operating

\*: Down-shift only in the 3rd gear for the 2 position and 2nd gear for the L position - no up-shift

D09118

## TROUBLESHOOTING

### 1. GENERAL INFORMATION

- (a) Troubles occurring with the automatic transaxle can be caused by either the engine or the transaxle itself. These 2 areas should be checked before proceeding with troubleshooting.
- (b) Troubleshooting should begin with the simplest operation, working up in order of difficulty degree but first determine whether the trouble lies within the engine or the transaxle.
- (c) Proceed with the inspection as follows:

#### PRELIMINARY CHECK

- (a) Check the tire inflation.
- (b) Check the idle speed.
- (c) Check the fluid level and fluid condition.
- (d) Check the throttle cable mark.
- (e) Check the shift linkage.
- (f) Check the park/neutral position switch.



#### STALL TEST

Check the engine and the torque converter clutch.



#### TIME LAG TEST

Check the automatic transaxle (each clutch, brake and gear) for wear.



#### HYDRAULIC TEST

Measure the line pressure and make a basic check of fluid circuit.

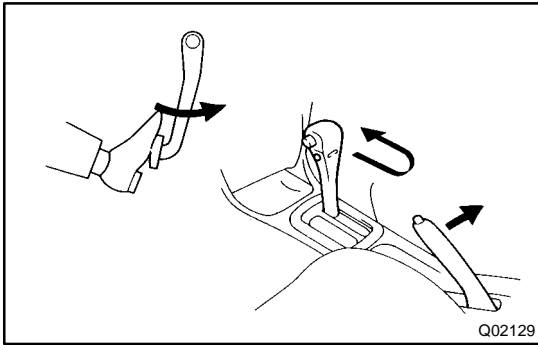


#### ROAD TEST

Check if trouble lies within automatic transaxle. If noise or vibration occurs, the possible cause could be with the compressor, engine, and drive shaft tires, etc.



**MATRIC CHART** (See page [AX-13](#))



## 2. PRELIMINARY CHECK

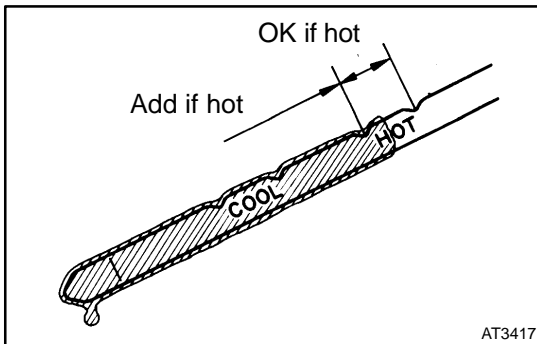
(a) Check the fluid level.

HINT:

The vehicle must have been driven so that the engine and trans-axle are at normal operating.

**ATF temperature: 70 - 80 °C (158 - 176 °F)**

- (1) Park the vehicle on the level surface and set the parking brake.
- (2) With the engine idling, shift the selector into each gear from the P position to the L position and return to the P position.
- (3) Pull out the transaxle dipstick and wipe it clean.
- (4) Push it back fully into the pipe.



- (5) Pull it out and check that the fluid level is in the HOT range. If the level is at the low side of the hot range, add new fluid.

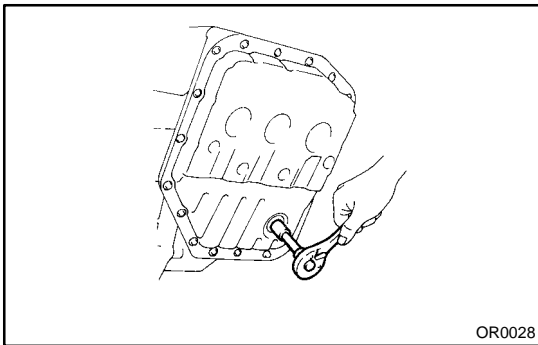
**Fluid type: ATF DEXRON®II**

**NOTICE:**

**Do not overfill.**

- (b) Check the fluid condition.

If the fluid smells burnt or is black, replace it.



- (c) Replace the ATF.

**NOTICE:**

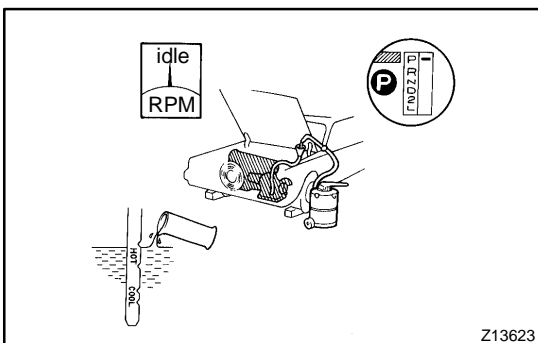
**Do not overfill.**

- (1) Remove the drain plug and drain the fluid.
- (2) Install the drain plug securely.
- (3) Add new fluid through the filler pipe.

**Fluid type: ATF DEXRON®II**

**Dry fill: 7.2 liters (7.6 US qts, 6.3 Imp.qts)**

**Drain and refill: 3.1 liters (3.3 US qts, 2.7 Imp.qts)**



- (4) Start the engine and shift the selector into all positions from the P position through the L position and then shift it into the P position.
- (5) With the engine idling, check the fluid level. Add the fluid up to the COOL level on the dipstick.
- (6) Check the fluid level at the normal operating temperature 70 - 80 °C (158 - 176 °F) and add as necessary.

**NOTICE:****Do not overfill.**

(d) Inspect and adjust the throttle cable.

- (1) Depress the accelerator pedal all the way and check that the throttle valve opens fully.

**HINT:**

If the throttle valve does not open fully, adjust the accelerator link.

- (2) Fully depress the accelerator.

- (3) Loosen the adjustment nuts.

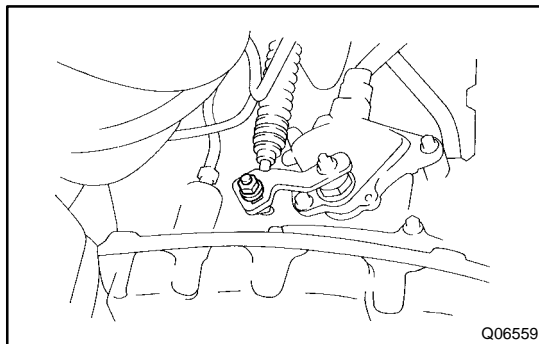
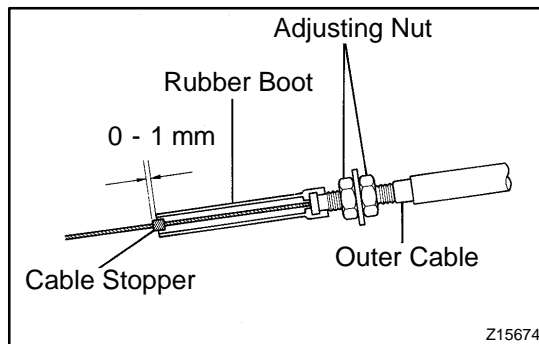
- (4) Adjust the outer cable so that the distance between the end of the boot and the stopper on the cable is the standard.

**Standard boot and cable stopper distance:**

**0 - 1 mm (0 - 0.04 in.)**

- (5) Tighten the adjusting nuts.

- (6) Recheck the adjustment.



(e) Adjust the shift control cable.

When shifting the shift lever from the N position to other positions, check that the lever can be shifted smoothly and accurately to each position and that the position indicator correctly indicates the position.

- (1) Remove the engine under cover.
- (2) Loosen the nut on the control shaft lever.
- (3) Push the control shaft lever fully toward the right side of the vehicle.
- (4) Return the lever 2 notches to the NEUTRAL position.
- (5) Set the shift lever to the N position.
- (6) While holding the lever lightly toward the "R" position side, tighten the swivel nut.

**Torque: 12 N·m (120 kgf-cm, 9 ft-lbf)**

(f) Adjust the park/neutral position switch.

If the engine will start with the shift selector in any position other than the N or P position, adjustment is required.

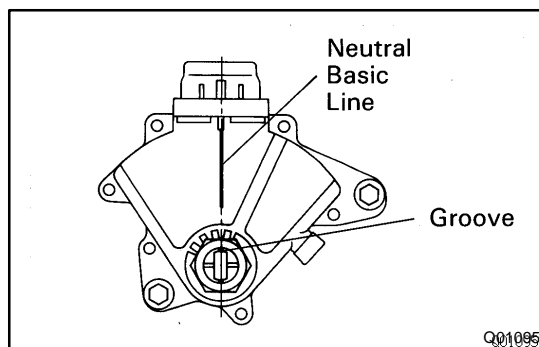
- (1) Loosen the park/neutral position switch bolts and set the shift selector to the N position.
- (2) Align the groove with neutral basic line.
- (3) Hold the switch in the position and tighten the bolts.

**Torque: 5.4 N·m (55 kgf-cm, 48 in.-lbf)**

(g) Inspect the idle speed.

**Idle speed:**

**750 ± 50 rpm (In the N position and A/C OFF)**



### 3. MEASURE STALL TEST

The object of this test is to check the overall performance of the transaxle and the engine by measuring the maximum engine speeds in the D and R positions.

**NOTICE:**

- **Do the test at normal operating ATF temperature 50 - 80 °C (122 - 176 °F).**
- **Do not continuously run this test longer than 5 seconds.**
  - (1) Chock the 4 wheels.
  - (2) Fully apply the parking brake.
  - (3) Connect the tachometer to the engine.
  - (4) Start the engine and check the idle speed.
  - (5) Keep your left foot pressing firmly on the brake pedal.
  - (6) Shift it into the D position. Press all the way down on the accelerator pedal. Quickly read the stall speed RPM at this time.

**Stall speed: 2,300 ± 200 rpm**

- (7) Do the same test in the R position.

**Stall speed: 2,300 ± 200 rpm**

**EVALUATION**

Problem	Possible cause
(a) Stall speed low in D and R positions.	<ul style="list-style-type: none"> <li>● Engine output may be insufficient</li> <li>● Stator one-way clutch is not operating properly</li> </ul>
(b) Stall speed high in D position.	<ul style="list-style-type: none"> <li>● Line pressure too low</li> <li>● Forward clutch slipping</li> <li>● No.2 one-way clutch not operating properly</li> <li>● U/D one-way clutch not operating properly</li> </ul>
(c) Stall speed high in R position.	<ul style="list-style-type: none"> <li>● Line pressure too low</li> <li>● Direct clutch slipping</li> <li>● 1st and reverse brake slipping</li> <li>● U/D brake slipping</li> </ul>
(d) Stall speed high in D and R positions.	<ul style="list-style-type: none"> <li>● Line pressure too low</li> <li>● Improper fluid level</li> <li>● U/D brake slipping</li> </ul>

### 4. MEASURE TIME LAG TEST

When the shift lever is shifted while the engine is idling, there will be a certain lapse of time or lag before the shock can be felt. This is used for checking the condition of the U/D direct clutch, forward clutch, direct clutch and 1st and reverse brake.

**NOTICE:**

- **Do the test at normal operating ATF temperature 50 - 80 °C (122 - 176 °F).**
- **Make sure to allow 1 minute interval between the tests.**
- **Take three measurements and take the average value.**

- (1) Fully apply the parking brake.
- (2) Start the engine and check the idle speed.

**Idling speed: 750 ± 50 rpm (In N position and A/C OFF)**

- (3) Shift the shift lever from the N to D position. Using a stop watch, measure the time it takes from shifting the lever to the shock is felt.

**Time lag: Less than 1.2 seconds**

- (4) In the same way, measure the time lag for N → R.

**Time lag: Less than 1.5 seconds**



**EVALUATION (If N → D or N → R time lag is longer than the specified):**

Problem	Possible cause
N → D time lag is longer	<ul style="list-style-type: none"> <li>● Line pressure too low</li> <li>● Forward clutch worn</li> </ul>
N → R time lag is longer	<ul style="list-style-type: none"> <li>● Line pressure too low</li> <li>● Direct clutch worn</li> <li>● 1st and reverse brake worn</li> </ul>

**5. HYDRAULIC TEST**

(a) Measure the line pressure.

- (1) Warm up the ATF.
  - (2) Remove the transaxle case test plug and mount SST (See page [AX-29](#) ).
- SST 09992-00094 (09992-00150, 09992-00270)

**NOTICE:**

- Do the test at normal operating ATF temperature 50 - 80°C (122 - 176 °F).
  - The line pressure test should always be carried out in pairs. One should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.
- (3) Chock the 4 wheels.
  - (4) Fully apply the parking brake.
  - (5) Start the engine and check the idle speed.
  - (6) Keep your left foot pressing firmly on the brake pedal and shift into the D position.
  - (7) Measure the line pressure when the engine is idling.
  - (8) Fully depress the accelerator pedal. Quickly read the highest line pressure when the engine speed reaches the stall speed.

**NOTICE:**

**Release the accelerator pedal and stop the test if the wheels begin to rotate before the engine speed reaches the specified stall speed.**

- (9) In the same way, do the test in the R position.

**Specified line pressure:**

D position	Idling	373 - 422 kPa (3.8 - 4.3 kgf/cm <sup>2</sup> , 54 - 61 psi)
	Stall	902 - 1,049 kPa (9.2 - 10.7 kgf/cm <sup>2</sup> , 131 - 152 psi)
R position	Idling	549 - 706 kPa (5.6 - 7.2 kgf/cm <sup>2</sup> , 80 - 102 psi)
	Stall	1,638 - 1,902 kPa (16.7 - 19.4 kgf/cm <sup>2</sup> , 238 - 276 psi)

- (10) If the measured pressures are not up to specified values, recheck the throttle cable adjustment and retest it.

## EVALUATION

Problem	Possible cause
If the measured values at all positions are higher.	<ul style="list-style-type: none"> <li>● Throttle cable out of adjustment</li> <li>● Throttle valve defective</li> <li>● Regulator valve defective</li> </ul>
If the measured values at all positions are lower.	<ul style="list-style-type: none"> <li>● Throttle cable out of adjustment</li> <li>● Throttle valve defective</li> <li>● Regulator valve defective</li> <li>● Oil pump defective</li> <li>● U/D one-way clutch not operating properly</li> </ul>
If pressure is low in the D position only.	<ul style="list-style-type: none"> <li>● D position circuit fluid leakage</li> <li>● Forward clutch defective</li> <li>● U/D one-way clutch not operating properly</li> </ul>
If pressure is low in the R position only.	<ul style="list-style-type: none"> <li>● R position circuit fluid leakage</li> <li>● Direct clutch defective</li> <li>● 1st and reverse brake defective</li> <li>● U/D one-way clutch not operating properly</li> </ul>

(b) Measure the governor pressure.

- (1) Warm up the ATF.
- (2) Remove the transaxle case test plug and mount SST (See page [AX-29](#) ).  
SST 09992-00094 (09992-00111, 09992-00270)

### NOTICE:

- Do the test at normal operating fluid temperature 50 - 80 °C (122 - 176 °F).
  - Check that the throttle cable is adjusted within the specifications.
  - Check that the tire pressures are adjusted according to the specifications.
- (3) Check the parking brake to see that it is not applied.
  - (4) Start the engine.
  - (5) Shift into the D position and measure the governor pressures at the speeds specified in the table.

## EVALUATION

Problem	Possible cause
If governor pressure is defective.	<ul style="list-style-type: none"> <li>● Line pressure defective</li> <li>● Fluid leakage in governor pressure circuit</li> <li>● Governor valve operation defective</li> </ul>
Vehicle speed (Reference)	Governor pressure
30 km/h (19 mph)	59 - 137 kPa (0.6 - 1.4 kgf/cm <sup>2</sup> , 9 - 20 psi)
60 km/h (37 mph)	196 - 275 kPa (2.0 - 2.8 kgf/cm <sup>2</sup> , 28 - 40 psi)
90 km/h (56 mph)	363 - 441 kPa (3.7 - 4.5 kgf/cm <sup>2</sup> , 53 - 64 psi)

## 6. ROAD TEST

### NOTICE:

Do this test at normal operating ATF temperature 50 - 80 °C (122 - 176 °F).

(a) D position test.

Shift into the D position and while driving with the accelerator pedal held constantly at the throttle valve fully open, check on the following points:

- (1) 1 → 2, 2 → 3 and 3 → O/D up-shifts should take place, and shift points should conform to those shown in the automatic shift schedule (See page [SS-30](#) ).

**EVALUATION**

Problem	Possible cause
If there is no 1 - 2 up-shift.	<ul style="list-style-type: none"> <li>●Governor valve is defective</li> <li>●1 - 2 shift valve is stuck</li> </ul>
If there is no 2 - 3 up-shift.	<ul style="list-style-type: none"> <li>●1 - 2 shift valve is stuck</li> </ul>
If there is no 3 - O/D up-shift (throttle valve operating less than 86%).	<ul style="list-style-type: none"> <li>●3 - O/D shift valve is stuck</li> <li>●Solenoid valve or circuit defective</li> </ul>
If the shift point is defective.	<ul style="list-style-type: none"> <li>●Throttle cable out of adjustment</li> <li>●Throttle valve, 1 - 2 shift valve, 2 - 3 shift valve, 3 - O/D shift valve etc. are defective</li> </ul>

(2) In the same way, check the shock and slip at 1 → 2, 2 → 3 and 3 → O/D up-shifts.

**EVALUATION**

Problem	Possible cause
If the shock is severe.	<ul style="list-style-type: none"> <li>●Line pressure is too high</li> <li>●Accumulator is defective</li> <li>●Check ball is defective</li> </ul>

(3) Run in the 3rd gear or O/D of the D position, check the abnormal noise and vibration.

**HINT:**

Check for the cause of abnormal noise and vibration must be made with extreme care as they could also be due to unbalance in the drive shaft, differential, tires and torque converter clutch, etc.

(4) While running in the 3rd gear or O/D of the D position, check that the possible kick-down vehicle speed limits for the 3 → 1, 3 → 2 and O/D → 2 kick-down conform to those indicated in the automatic shift schedule (See page [SS-30](#) ).

**EVALUATION**

Problem	Possible cause
If the possible kick-down vehicle speed limit is defective.	<ul style="list-style-type: none"> <li>●Throttle cable out of adjustment</li> <li>●Throttle valve, 1 - 2 shift valve, 2 - 3 shift valve, 3 - O/D shift valve etc. are defective</li> </ul>

(5) Check the abnormal shock and slip at kick-down.

(6) While running at about 60 km/h (37 mph) in the O/D of the D position, release your foot from the accelerator pedal and shift into the L position. Then check if the 2 → 1 down-shift point conforms to that indicated in the automatic shift schedule (See page [SS-30](#) ).

(b) Inspect the lock-up mechanism.

(1) Drive in the D position at a steady speed (Lock-up ON) of about 70 km/h (43 mph).

(2) Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

If there is a big jump in engine RPM, there is no lock-up.

(c) 2 position test.

(1) While running in the 2nd gear of the 2 position, release the accelerator pedal and check the engine braking effect.

**EVALUATION**

Problem	Possible cause
If there is no engine braking effect.	<ul style="list-style-type: none"> <li>●2nd coast brake is defective.</li> </ul>

(2) Check the abnormal noise during acceleration and deceleration.

(3) Check the shock during up-shift and down-shift.

(d) L position test.

(1) While running in the L position, check that there is no up-shift to 2nd gear.

(2) While running in the L position, release the accelerator pedal and check the engine braking effect.

**EVALUATION**

Problem	Possible cause
If there is no engine braking effect.	● 1st & reverse brake is defective.

(3) Check for abnormal noise during acceleration and deceleration.

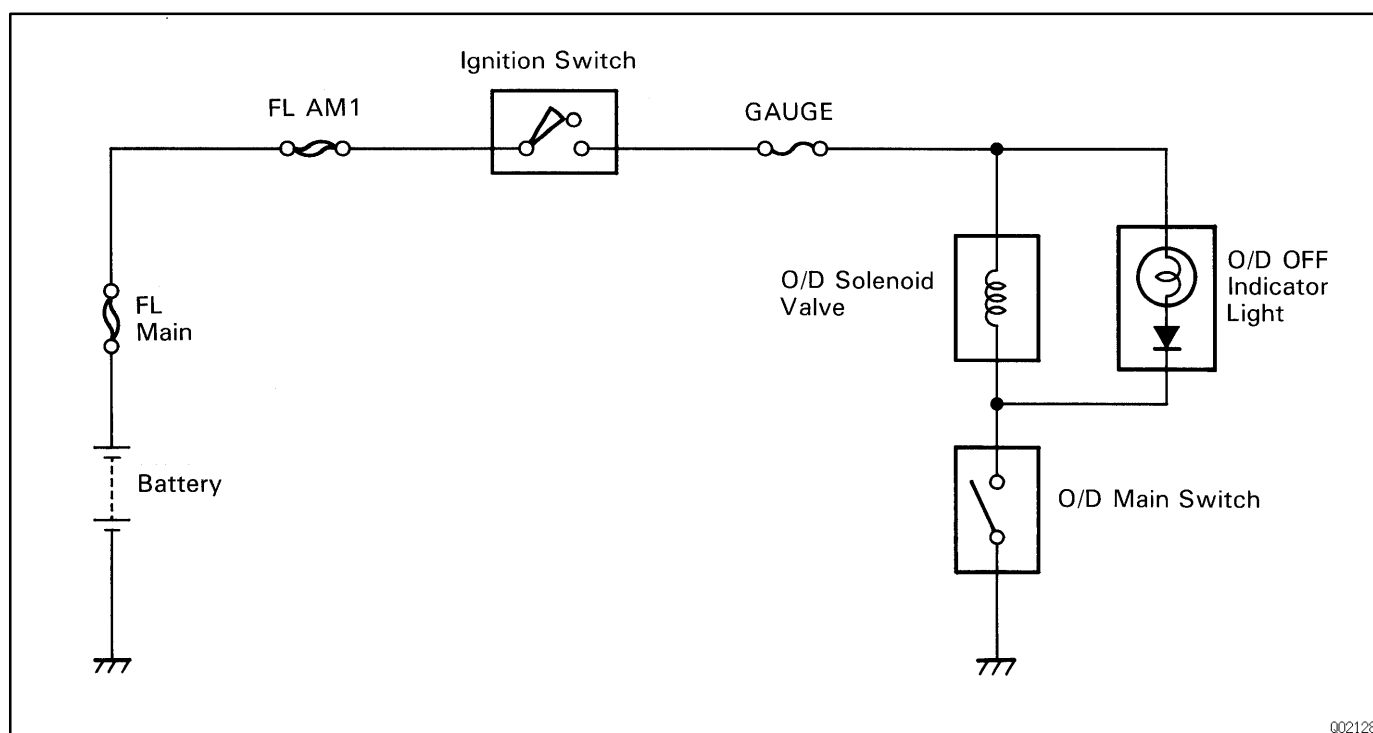
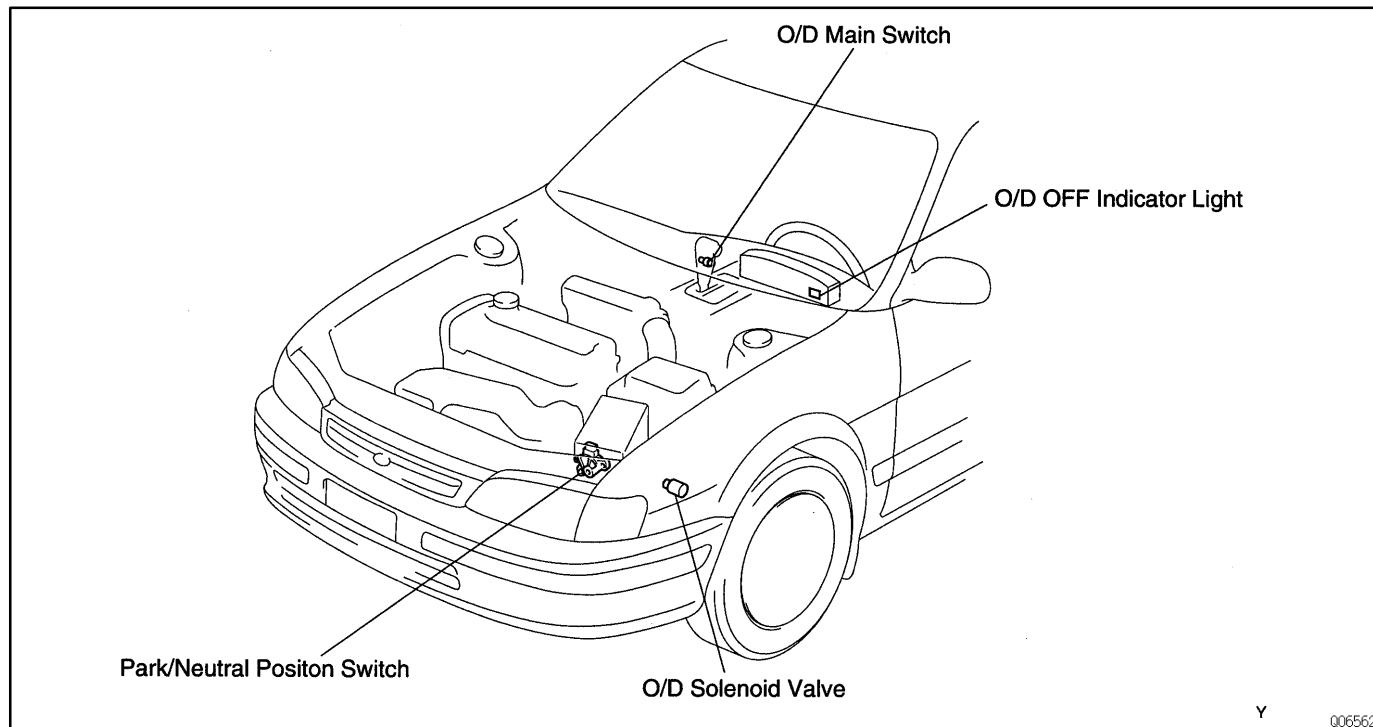
(e) R position test.

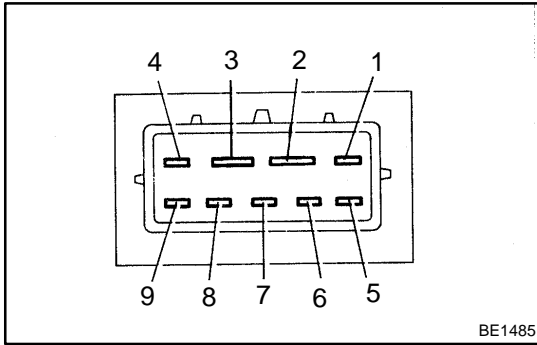
Shift into the R position and, while running at full throttle, check for slipping.

(f) P position test.

Stop the vehicle on a gradient (more than  $5^{\circ}$ ) and, after shifting into the P position, release the parking brake. Then check that the parking lock pawl prevents the vehicle from moving.

## 7. ELECTRIC CONTROL SYSTEM



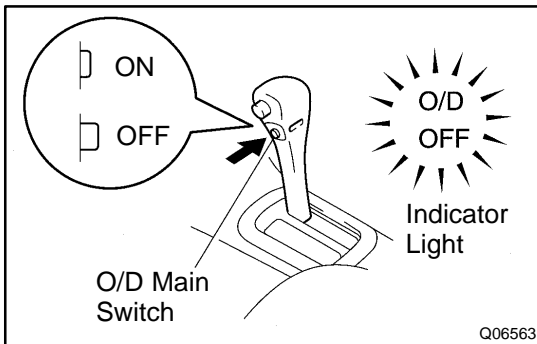


- (a) Inspect the Park/Neutral position switch.
- (1) Remove the park/neutral position switch (See page AX-19).
  - (2) Using an ohmmeter, check continuity between each terminal shown below when the shift lever is put in each position.

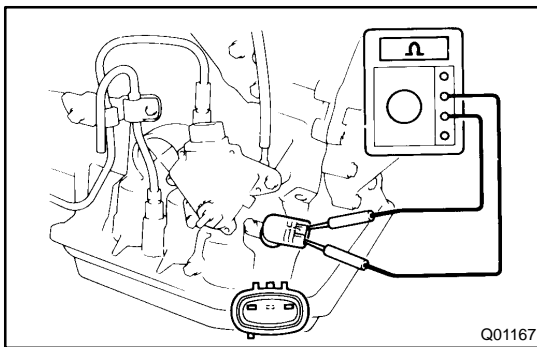
Terminal Position	2	3	6	1	5	7	8	9	4
P	○—○		○—○						
R			○—○		○				
N	○—○		○—○			○			
D			○—○				○		
2			○—○					○	
L			○—○						○

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If the continuity is not as specified, replace the switch.



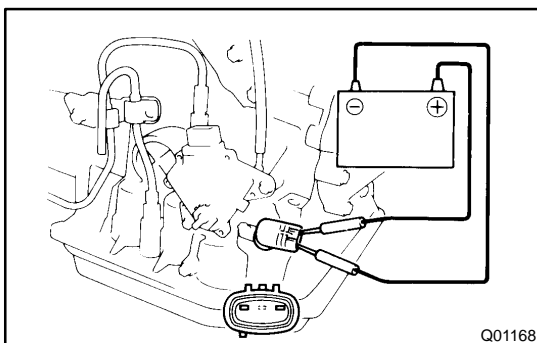
- (b) Inspect the O/D OFF indicator light.
- (1) Turn the ignition switch ON.
  - (2) The O/D OFF indicator light will come on when the O/D main switch is in OFF position.
  - (3) The O/D OFF indicator light will go on when the O/D main switch is placed at ON.



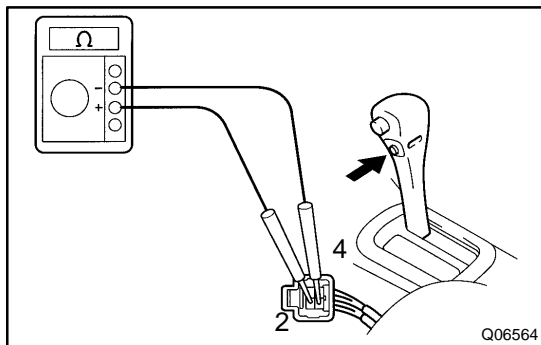
- (c) Inspect the O/D solenoid valve.
- (1) Disconnect the solenoid connector.
  - (2) Using an ohmmeter, measure the resistance between terminals 1 and 3.

**Resistance: 11 - 15  $\Omega$**

If the resistance is not as specified, replace the solenoid.



- (3) Apply battery positive voltage between terminals 1 and 3. At this time, confirm that a solenoid operation sound is heard.
- If the operation is not as specified, replace the solenoid.
- (4) Connect the solenoid connector.



(d) Inspect the O/D main switch.

- (1) Remove the center console box.
- (2) Using an ohmmeter, check that the continuity of the terminals 2 and 4 for each switch position.

Switch position	Tester connection	Specified condition
ON	2 - 4	No continuity
OFF	2 - 4	Continuity

If the continuity is not as specified, replace the switch.

- (3) Install the center console box.

## PROBLEM SYMPTOMS TABLE

Use the table below to help you 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.

### ON-VEHICLE:

Symptom	Suspect Area	See page
Does not move in any forward position	4. Forward clutch (C <sub>1</sub> ) 5. No.2 one-way clutch (F <sub>2</sub> ) 6. 1st & reverse brake (B <sub>3</sub> ) 7. 2nd brake (B <sub>2</sub> ) 8. 2nd coast brake (B <sub>1</sub> ) 9. Direct clutch (C <sub>2</sub> )	● ● ● ● ● ●
Does not move in reverse position	1. 2nd coast brake (B <sub>1</sub> ) 2. Front planetary gear 3. Rear planetary gear 4. 1 - 2 shift valve 5. 2 - 3 shift valve 6. Direct clutch (C <sub>2</sub> ) 7. U/D clutch (C <sub>3</sub> ) 8. 1st and reverse brake (B <sub>3</sub> )	● ● ● ● ● ● ● ●
Does not move in any forward position or reverse position	1. Parking lock pawl 2. Manual valve 3. U/D one-way clutch (F <sub>3</sub> ) 4. U/D clutch (C <sub>3</sub> ) 5. U/D brake (B <sub>0</sub> ) 6. Front planetary gear 7. Rear planetary gear 8. U/D planetary gear 9. Torque converter clutch	● ● ● ● ● ● ● ● <a href="#">AX-34</a>
No-up shift (1st → 2nd)	1. 1 - 2 shift valve 2. 2nd brake (B <sub>2</sub> ) 3. No.1 one-way clutch (F <sub>1</sub> )	● ● ●
No-up shift (2nd → 3rd)	1. 2 - 3 shift valve 2. Direct clutch (C <sub>2</sub> )	● ●
No-up shift (3rd → O/D)	1. U/D brake (B <sub>0</sub> ) 2. 3 - 4 shift valve	● ●
No-down shift (O/D → 3rd)	3 - 4 shift valve	●
No-down shift (3rd → 2nd)	2 - 3 shift valve	●
No-down shift (2nd → 1st)	1. 1 - 2 shift valve 2. 2nd coast brake (B <sub>1</sub> )	● ●
Shift point too high or too low	1. Governor valve 2. 1 - 2 shift valve 3. 2 - 3 shift valve 4. 3 - 4 shift valve	<a href="#">AX-21</a> ● ● ●
Up-shifts 3rd → O/D with O/D main switch "OFF"	Electric control system	<a href="#">AX-2</a>
Harsh engagement (N → R)	1. Direct clutch (C <sub>2</sub> ) 2. 1st & reverse brake (B <sub>3</sub> ) 3. Accumulator control valve	● ● ●
Harsh engagement (N → D)	1. Forward clutch (C <sub>1</sub> ) 2. C <sub>1</sub> accumulator	● ●
Harsh engagement (N → L)	Low coast modulator valve	●

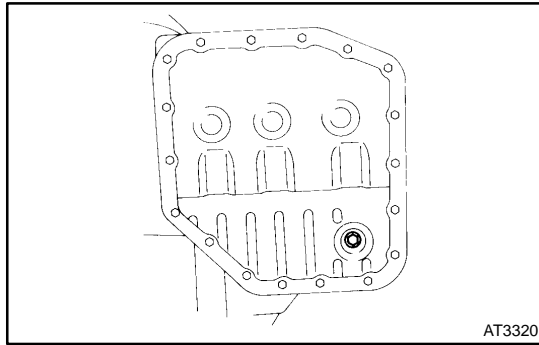


Harsh engagement (1st → 2nd "D" position)	1. B <sub>2</sub> accumulator 2. 1st and reverse brake (B <sub>3</sub> )	● ●
Harsh engagement (1st → 2nd "2" position)	2nd coast modulator valve	●
Harsh engagement (1st → 2nd → 3rd)	1. Accumulator control valve 2. Throttle modulator valve	● ●
Harsh engagement (1st → 2nd → 3rd → O/D)	Accumulator control valve	●
Harsh engagement (2nd → 3rd)	1. 2nd coast brake (B <sub>1</sub> ) 2. C <sub>2</sub> accumulator	● ●
Harsh engagement (3rd → O/D)	1. U/D clutch (C <sub>3</sub> ) 2. U/D brake (B <sub>4</sub> ) 3. U/D planetary gear 4. B <sub>4</sub> accumulator	● ● ● ●
Harsh engagement (O/D → 3rd)	1. B <sub>4</sub> accumulator 2. C <sub>3</sub> accumulator	● ●
Harsh engagement (3rd → 2nd)	1. B <sub>4</sub> accumulator 2. C <sub>3</sub> accumulator 3. 2nd coast modulator valve 4. B <sub>2</sub> accumulator 5. 1st and reverse brake	● ● ● ● ●
No lock-up	1. Lock-up relay valve 2. Torque converter clutch	● AX-34
No lock-up OFF	1. Lock-up relay valve 2. Torque converter clutch	● AX-34
Slip or shudder (Forward & Reverse After warm-up)	1. Torque converter clutch 2. U/D one-way clutch (F <sub>3</sub> ) 3. U/D clutch (C <sub>3</sub> )	AX-34 ● ●
Slip or shudder (Forward & Reverse Directly after E/G start)	1. Torque converter clutch 2. Pressure relief valve 3. Oil strainer	AX-34 ● AX-16
Slip or shudder (“R” position)	1. Direct clutch (C <sub>2</sub> ) 2. U/D clutch (C <sub>3</sub> ) 3. 1st and reverse brake	● ● ●
Slip or shudder (1st)	1. Forward clutch (C <sub>1</sub> ) 2. No.2 one-way clutch (F <sub>2</sub> )	● ●
Slip or shudder (2nd)	1. C <sub>2</sub> accumulator 2. 2nd brake (B <sub>2</sub> ) 3. No.1 one-way clutch (F <sub>1</sub> )	● ● ●
Slip or shudder (2nd → 3rd Up-shift)	Direct clutch (C <sub>2</sub> )	●
Slip or shudder (3rd)	Direct clutch (C <sub>2</sub> )	●
Slip or shudder (O/D)	U/D brake (B <sub>4</sub> )	●
No engine braking (1st → 3rd)	U/D clutch (C <sub>3</sub> )	●
No engine braking (1st)	1. Low coast modulator valve 2. 1st and reverse brake	● ●
No engine braking (2nd)	1. 2nd coast brake (B <sub>1</sub> ) 2. 2nd coast modulator valve	● ●

**OFF-VEHICLE:**

Symptom	Suspect Area	See page
Large shock during lock-up	Torque converter clutch	<a href="#">AX-34</a>
E/G stalls when starting off and stopping	Torque converter clutch	<a href="#">AX-34</a>
Poor acceleration (All-positions)	Torque converter clutch	<a href="#">AX-34</a>
Poor acceleration (O/D)	1. U/D clutch (C <sub>3</sub> ) 2. U/D planetary gear	● ●
Poor acceleration (Other than O/D)	1. U/D brake (B <sub>4</sub> ) 2. U/D planetary gear	● ●
Poor acceleration (Other than 2nd)	1. 2nd coast brake (B <sub>1</sub> ) 2. 2nd brake (B <sub>2</sub> )	● ●
Poor acceleration (1st and 2nd)	Direct clutch (C <sub>2</sub> )	●
Poor acceleration (1st and "R")	1st and reverse brake (B <sub>3</sub> )	●
Poor acceleration (“R”)	Forward clutch (C <sub>1</sub> )	●

●: Refer to A242L Automatic Transaxle Repair Manual (Pub. No. RM431U).



## VALVE BODY ASSEMBLY ON-VEHICLE REPAIR

AX0RX-01

### 1. DRAIN ATF

Remove the drain plug and drain the ATF into the suitable container.

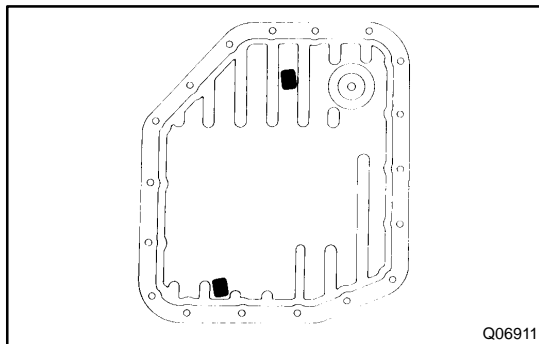
**Torque: 17 N·m (175 kgf-cm, 13 ft-lbf)**

### 2. REMOVE OIL PAN AND GASKET

#### NOTICE:

Some fluid will remain in the oil pan. Remove the oil pan bolts and carefully remove the oil pan assembly. Discard the gasket.

**Torque: 4.9 N·m (50 kgf-cm, 43 in.-lbf)**

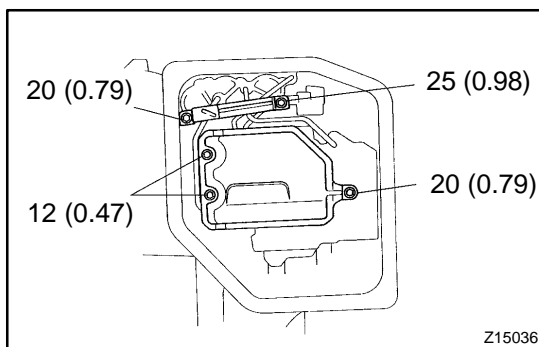


### 3. EXAMINE PARTICLES IN PAN

Remove the magnets and use them to collect any steel chips. Look at the chips on the magnet carefully to anticipate what type of wear you will find in the transaxle.

Steel (magnetic) ..... bearing, gear and plate wear

Brass (non-magnetic) ..... bushing wear



### 4. REMOVE OIL STRAINER AND APPLY PIPE BRACKET

(a) Remove the 3 bolts and oil strainer.

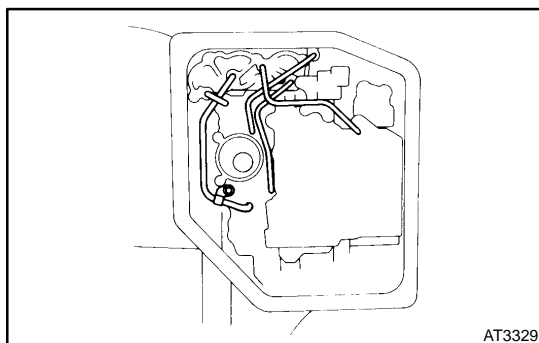
#### NOTICE:

Be careful as some oil will come out of the strainer.

**Torque: 10 N·m (100 kgf-cm, 7 ft-lbf)**

(b) Remove the 2 bolts and apply pipe bracket.

**Torque: 10 N·m (100 kgf-cm, 7 ft-lbf)**



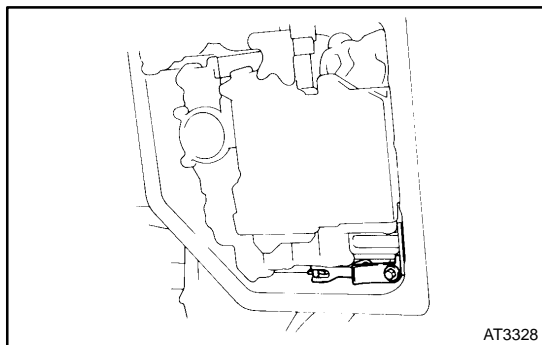
### 5. REMOVE OIL PIPES

(a) Remove the clamp bolt.

(b) Pry up the both pipe ends with a large screwdriver and remove the 4 pipes.

#### NOTICE:

Be careful not to bend or damage the pipes.

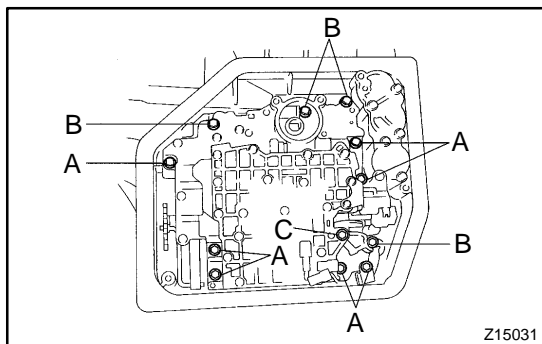
**6. REMOVE MANUAL DETENT SPRING**

Remove the bolt and detent spring.

**Torque: 10 N·m (100 kgf-cm, 7 ft-lbf)**

**HINT:**

Check that the manual valve lever is in contact with the center of the roller at the tip of the detent spring.

**7. DISCONNECT SOLENOID CONNECTOR****8. REMOVE VALVE BODY**

(a) Remove the 12 bolts.

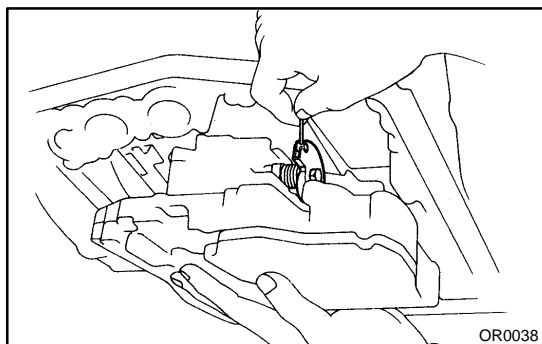
**Bolt length:**

**A: 20 mm (0.79 in.)**

**B: 30 mm (1.18 in.)**

**C: 55 mm (2.17 in.)**

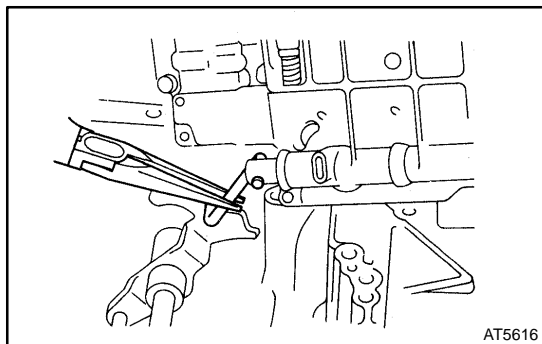
**Torque: 10 N·m (100 kgf-cm, 7 ft-lbf)**



(b) Disconnect the throttle cable.

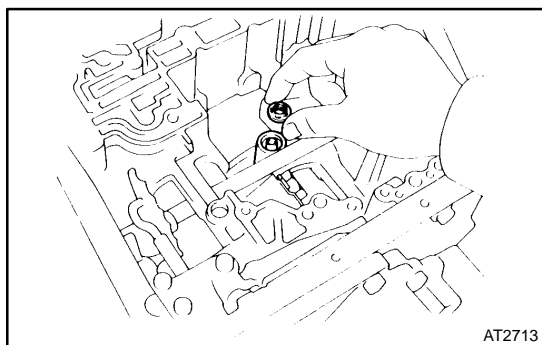
**NOTICE:**

**Be careful not to entangle the kick-down switch and solenoid wire.**



(c) Disconnect the manual valve connecting rod.

(d) Remove the valve body.

**9. REMOVE 2ND BRAKE APPLY GASKET**

**HINT:**

Replace the used gasket with a new one.

## INSTALLATION

**Installation is in the reverse order of the previous steps.**

HINT:

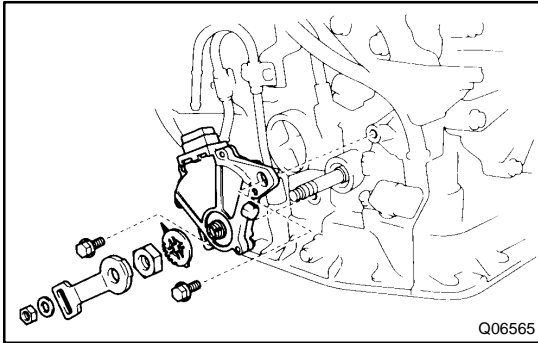
After installation, fill AFT and check the fluid level (See page [AX-27](#) ).

# THROTTLE CABLE ON-VEHICLE REPAIR

AX0RZ-01

## 1. DISCONNECT THROTTLE CABLE FROM ENGINE

Disconnect the cable from the throttle linkage.



## 2. REMOVE PARK/NEUTRAL POSITION SWITCH

- (a) Disconnect the transaxle control cable from the transaxle control shaft lever.

**Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)**

- (b) Remove the nut and transaxle control shaft lever.

**Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)**

- (c) Using a screwdriver, pry off the nut stopper.

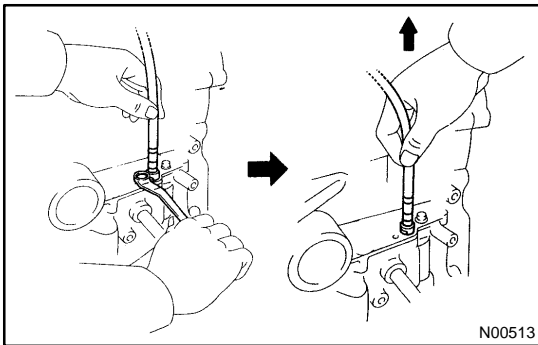
- (d) Remove the nut and nut stopper.

**Torque: 6.9 N·m (70 kgf·cm, 61 in·lbf)**

- (e) Remove the 2 bolts and park/neutral position switch.

**Torque: 5.4 N·m (55 kgf·cm, 48 in·lbf)**

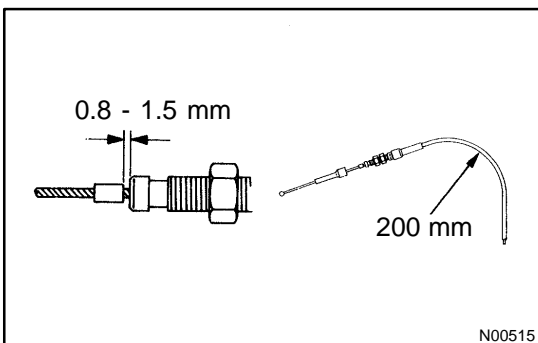
## 3. REMOVE VALVE BODY (See page [AX-16](#))



## 4. REMOVE THROTTLE CABLE

- (a) Remove the retaining bolt and plate.

- (b) Pull out the cable from the transaxle case.



### HINT:

New cable does not have a staked cable stopper

- (c) Bend the cable so that there is a radius of about 200 mm (7.87 in.).

- (d) Pull the inner cable lightly until a slight resistance is felt, and hold it there.

- (e) Stake the stopper so that the distance from the end of outer cable to the stopper is 0.8 - 1.5 mm (0.031 - 0.059 in.).

## INSTALLATION

**Installation is in the reverse order of the previous steps.**

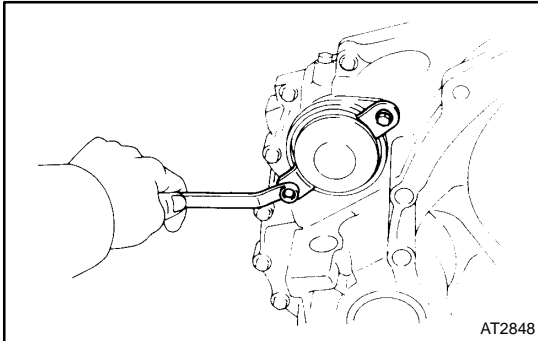
HINT:

- After installation, adjust the throttle cable (See page [AX-2](#) ).
- Test drive the vehicle.

## GOVERNOR VALVE ON-VEHICLE REPAIR

AX0S1-01

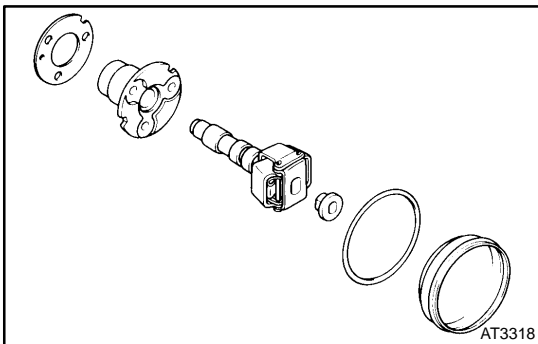
### 1. DISCONNECT SPEEDOMETER CABLE



### 2. REMOVE GOVERNOR COVER WITH O-RING

HINT:

Replace the used O-ring with a new one.



### 3. REMOVE GOVERNOR BODY WITH THRUST WASHER

### 4. REMOVE GOVERNOR BODY ADAPTOR

### 5. REMOVE GASKET

HINT:

Replace the used gasket with a new one.



## INSTALLATION

**Installation is in the reverse order of the previous steps.**

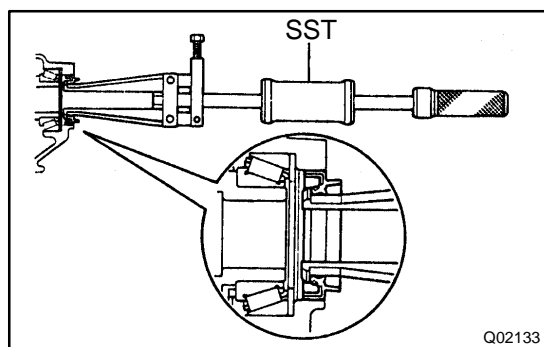
HINT:

After installation, fill AFT and check fluid level.

## DIFFERENTIAL OIL SEAL ON-VEHICLE REPAIR

AX0S3-01

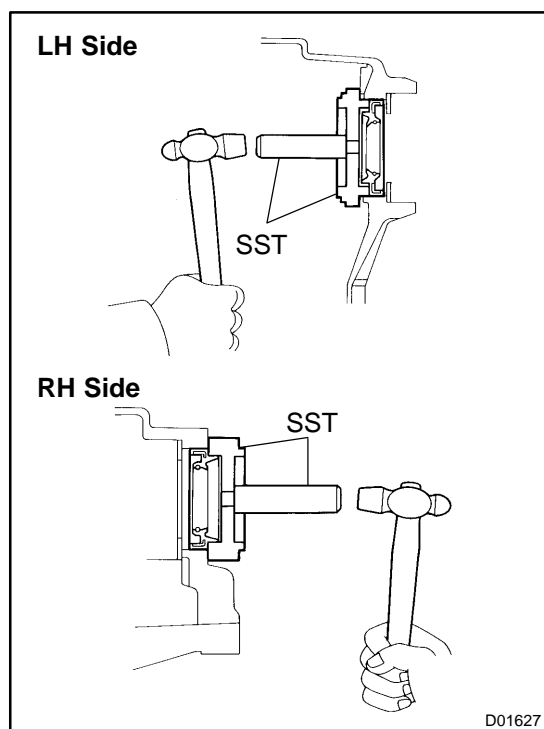
1. DRAIN TRANSAXLE FLUID
2. REMOVE ENGINE UNDER COVER
3. REMOVE LH AND RH DRIVE SHAFTS  
(See page [SA-18](#))



### 4. REMOVE SIDE OIL SEAL

Using SST, drive out the oil seals on both sides.

SST 09308-00010



## INSTALLATION

### 1. INSTALL SIDE OIL SEALS

- (a) Using SST, drive in a new oil seal until its surface is flush with the case surface.

SST 09350-32014 (09351-32150, 09351-32130)

**Oil seal drive in depth:**

**LH side:  $5.3 \pm 0.5$  mm ( $0.209 \pm 0.020$  in.)**

**RH side:  $3.1 \pm 0.5$  mm ( $0.122 \pm 0.020$  in.)**

- (b) Coat the lip of the oil seal with MP grease.

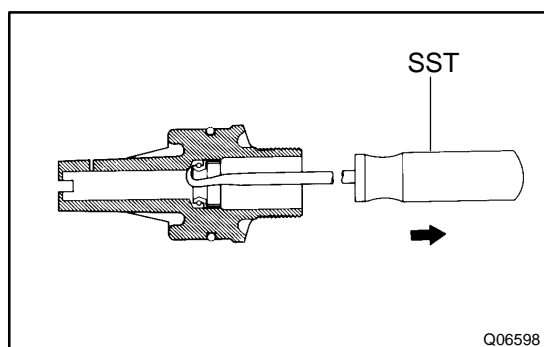
### 2. INSTALL LH AND RH DRIVE SHAFTS

(See page [SA-23](#) )

### 3. INSTALL ENGINE UNDER COVER

### 4. FILL AND CHECK FLUID LEVEL

(See page [AX-2](#) )



## SPEEDOMETER DRIVEN GEAR OIL SEAL

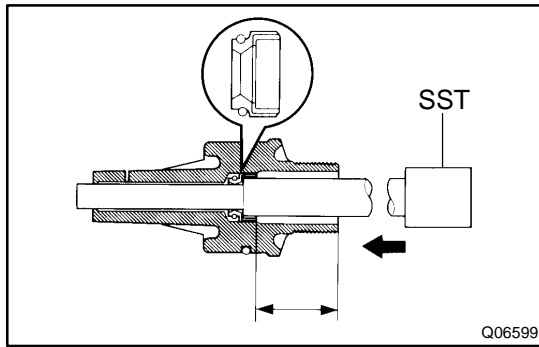
### ON-VEHICLE REPAIR

AX05S-01

#### REMOVE SPEEDOMETER DRIVEN GEAR OIL SEAL

Using SST, pull out the oil seal.

SST 09921-00010



## INSTALLATION

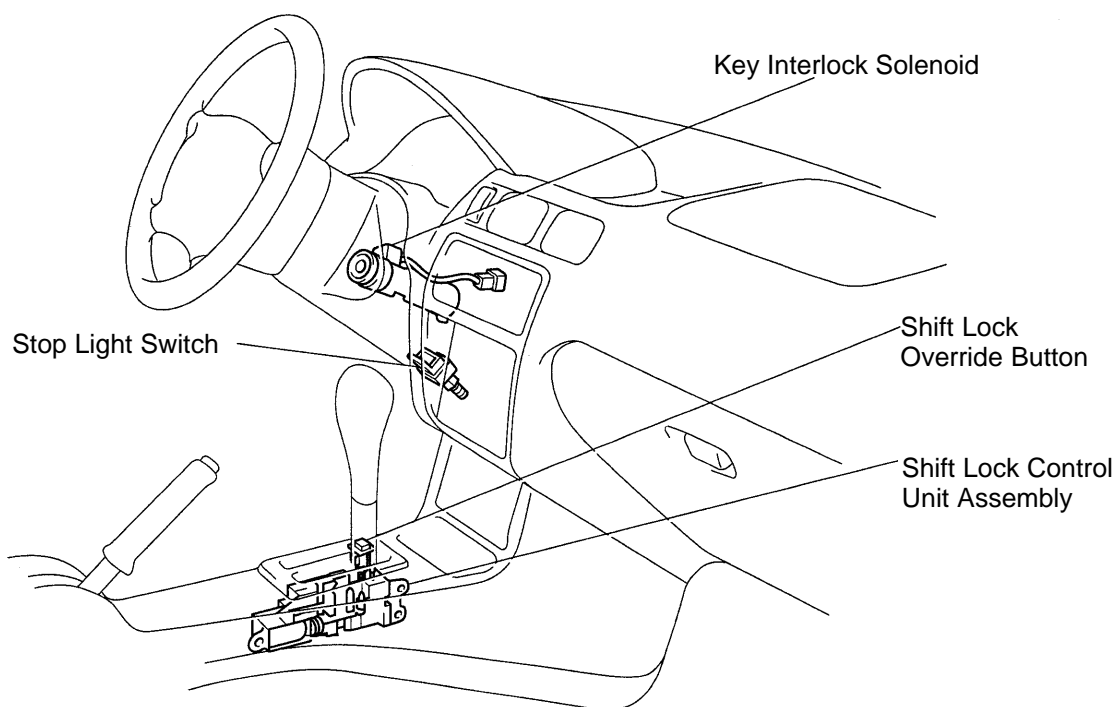
### INSTALL SPEEDOMETER DRIVEN GEAR OIL SEAL

SST 09201-10000 (09201-01080)

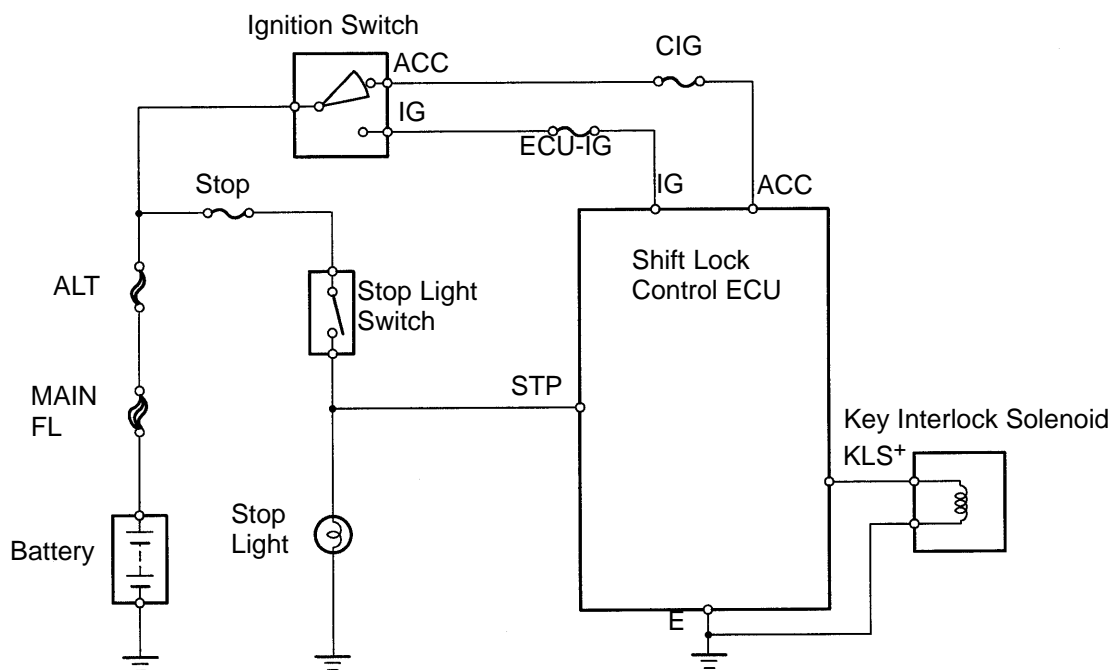
Drive in depth: 25 mm (0.98 in.)

# SHIFT LOCK SYSTEM LOCATION

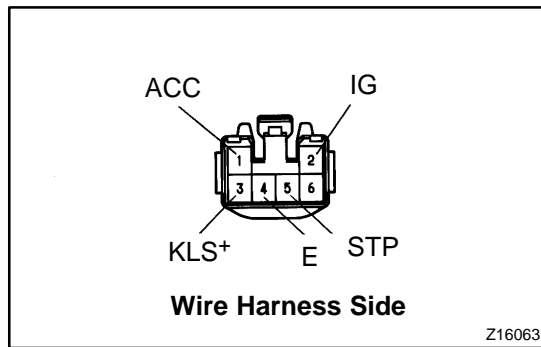
AX084-01



## WIRING DIAGRAM



D01645



## INSPECTION

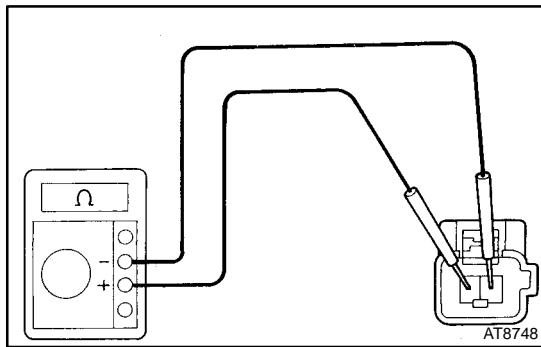
### 1. INSPECT SHIFT LOCK CONTROL ECU

Using a voltmeter, measure the voltage at each terminal.

HINT:

Do not disconnect the ECU connector.

Terminal	Measuring Condition	Voltage (V)
ACC - E	Ignition switch ACC	10 - 14
IG - E	Ignition switch ON	10 - 14
STP - E	Depressing brake pedal	10 - 14
KLS <sup>+</sup> - E	1 Ignition switch ACC and P position	0
	2 Ignition switch ACC and except P position	10 - 14
	3 (After approx 1 second)	6 - 9

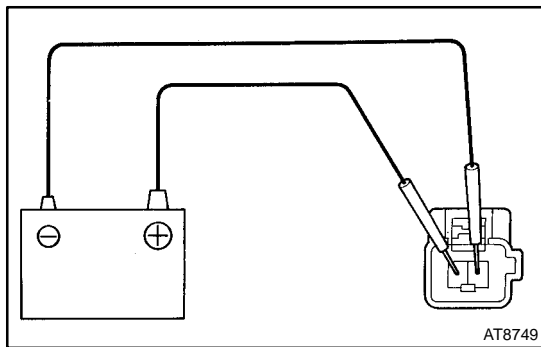


### 2. INSPECT KEY INTERLOCK SOLENOID

- Disconnect the solenoid connector.
- Using an ohmmeter, measure the resistance between terminals.

**Standard resistance: 12.5 - 16.5  $\Omega$**

If the resistance is not as specified, replace the solenoid.

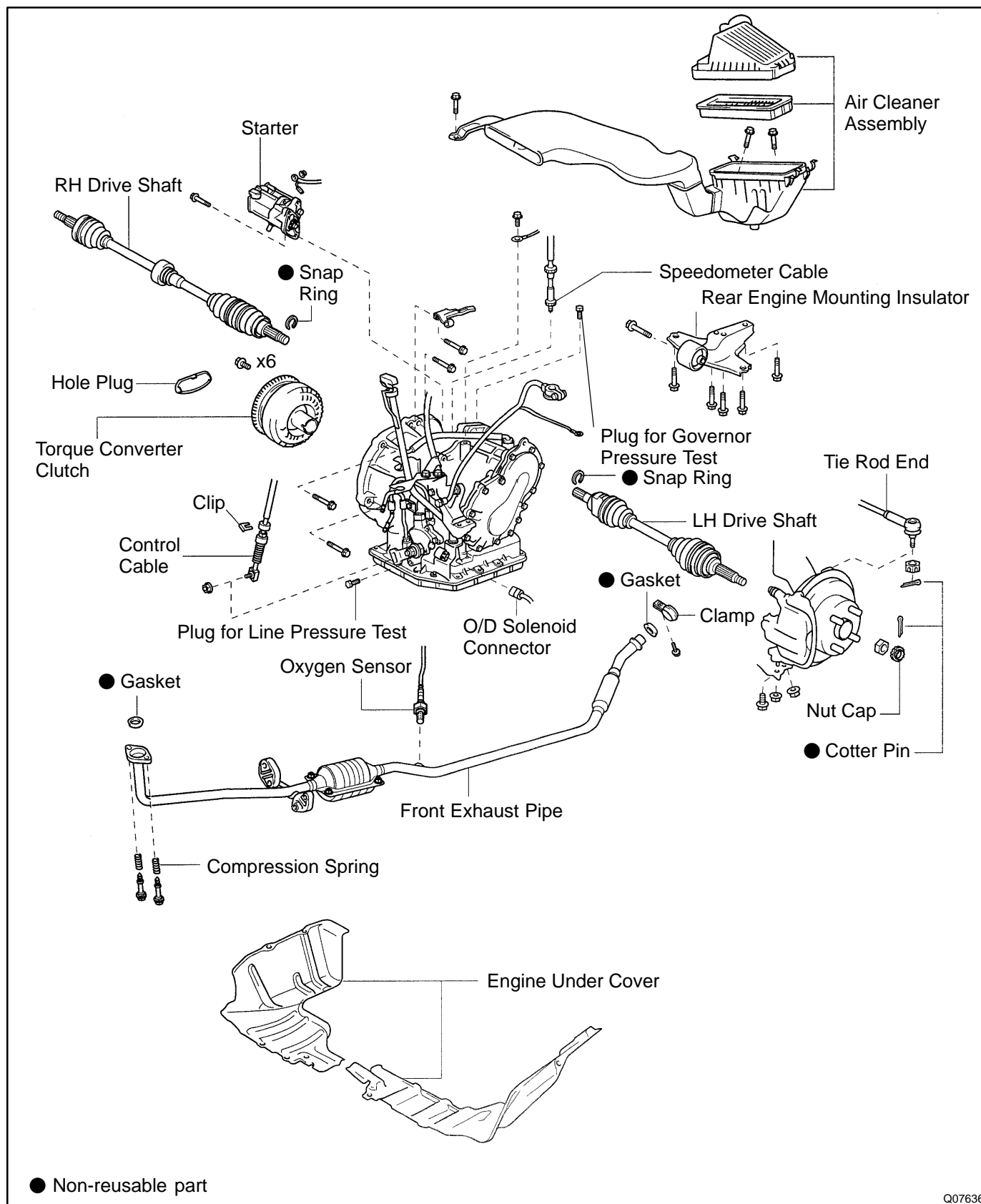


- Apply battery positive voltage between terminals. Check that the solenoid operation sound is heard.

If the operation is not as specified, replace the solenoid.

# AUTOMATIC TRANSAXLE UNIT COMPONENTS

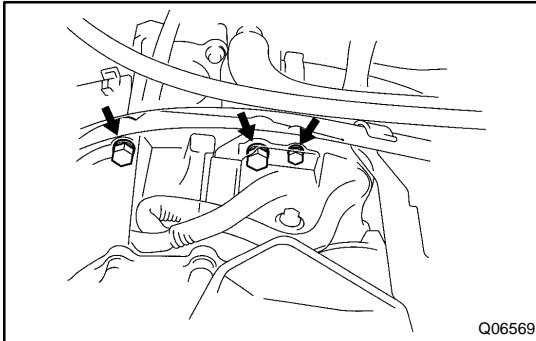
AX086-04





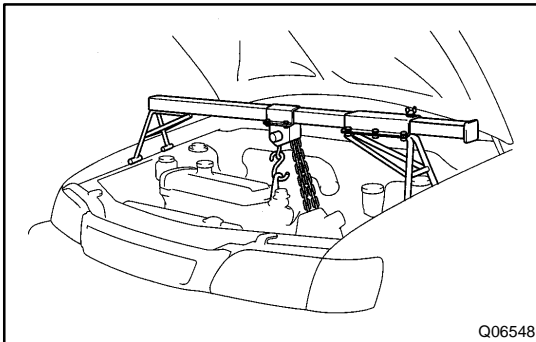
## REMOVAL

1. REMOVE BATTERY
2. REMOVE AIR CLEANER ASSEMBLY
3. REMOVE THROTTLE CABLE
4. REMOVE GROUND CABLES

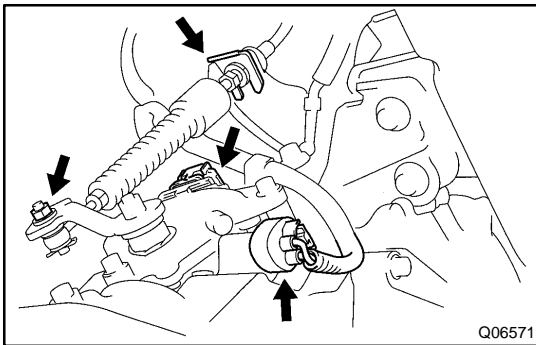


### 5. REMOVE UPPER SIDE MOUNTING BOLTS

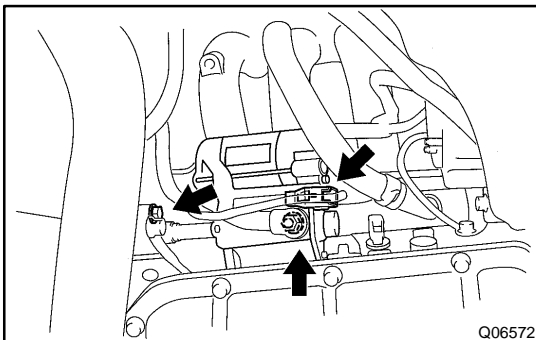
- (a) Remove the 2 upper side mounting bolts.  
**Torque: 64 N·m (650 kgf-cm, 47 ft-lbf)**
- (b) Remove the upper side starter bolt.  
**Torque: 39 N·m (400 kgf-cm, 29 ft-lbf)**



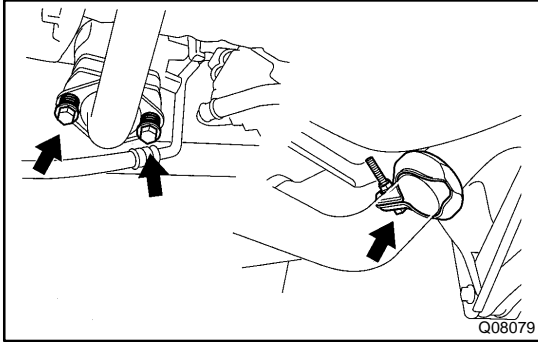
6. INSTALL ENGINE SUPPORT FIXTURE
7. RAISE VEHICLE
8. REMOVE UNDER COVER
9. REMOVE LH AND RH DRIVE SHAFTS  
(See page [SA-18](#) )
10. DISCONNECT SPEEDOMETER CABLE



11. DISCONNECT CONTROL CABLE
  - (a) Remove the clip from the control cable.
  - (b) Disconnect the control cable from the lever.  
**Torque: 12 N·m (120 kgf-cm, 9 ft-lbf)**
12. DISCONNECT PARK/NEUTRAL POSITION SWITCH CONNECTOR
13. DISCONNECT O/D SOLENOID CONNECTOR
14. DISCONNECT OIL COOLER HOSE FROM PIPE



15. REMOVE STARTER
  - (a) Disconnect the cable and connector.
  - (b) Remove the starter with the bolt.  
**Torque: 39 N·m (400 kgf-cm, 29 ft-lbf)**

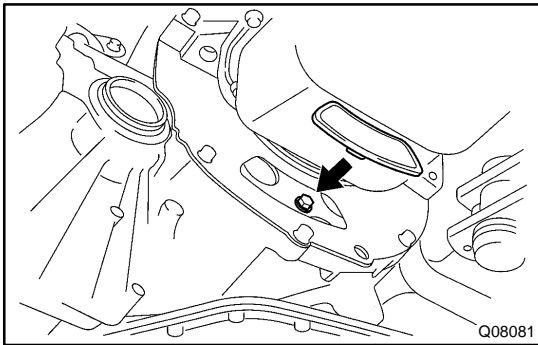


## 16. REMOVE FRONT EXHAUST PIPE

- Disconnect the oxygen sensor.  
**Torque: 44 N·m (450 kgf-cm, 32 ft-lbf)**
- Remove the bolts and springs from the exhaust manifold and front exhaust pipe.  
**Torque: 62 N·m (630 kgf-cm, 46 ft-lbf)**
- Remove the clamp.  
**Torque: 19 N·m (190 kgf-cm, 14 ft-lbf)**
- Remove the front exhaust pipe and gaskets.

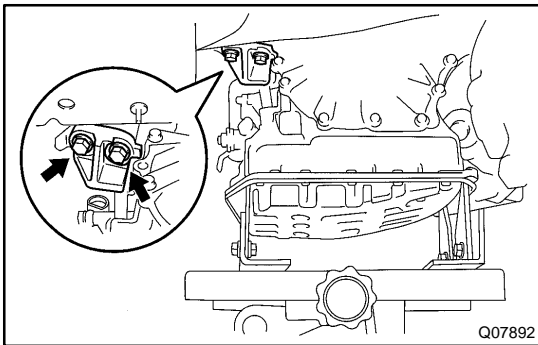
**HINT:**

Replace the used gaskets with new ones.



## 17. REMOVE TORQUE CONVERTER CLUTCH MOUNTING BOLTS

- Remove the converter cover.
- Turn the crankshaft to gain access and remove the 6 bolts with holding the crankshaft pulley set bolt a wrench.  
**Torque: 27 N·m (280 kgf-cm, 20 ft-lbf)**

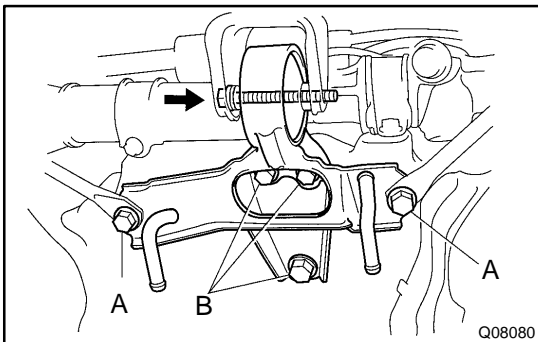


## 18. SUPPORT TRANSAXLE WITH A TRANSMISSION JACK

### 19. DISCONNECT LH ENGINE MOUNTING BRACKET

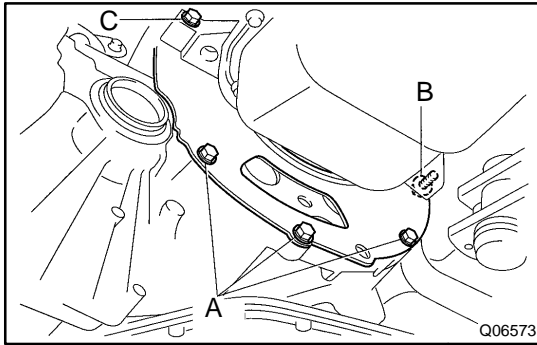
Remove the 2 mounting bolts.

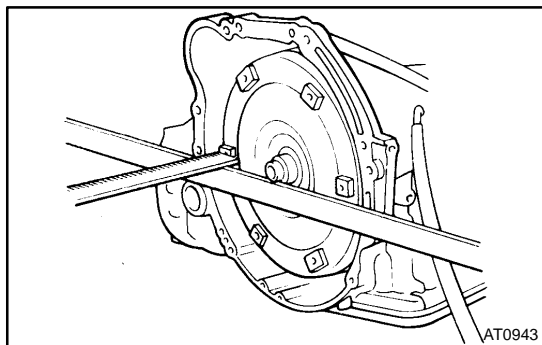
**Torque: 49 N·m (490 kgf-cm, 36 ft-lbf)**



## 20. REMOVE ENGINE REAR MOUNTING

- Remove the rear mounting insulator through bolt.  
**Torque: 65 N·m (650 kgf-cm, 48 ft-lbf)**
- Remove the 5 bolts and rear mounting insulator.  
**Torque:**  
**Bolt A: 80 N·m (800 kgf-cm, 59 in-lbf)**  
**Bolt B: 92 N·m (920 kgf-cm, 69 ft-lbf)**

**21. REMOVE TRANSAXLE MOUNTING BOLT****Torque:****Bolt A: 7.4 N·m (75 kgf·cm, 65 in·lbf)****Bolt B: 64 N·m (650 kgf·cm, 47 ft·lbf)****Bolt C: 46 N·m (470 kgf·cm, 34 ft·lbf)**



## INSTALLATION

### 1. TORQUE CONVERTER CLUTCH

Using calipers and a straight edge, measure the distance from the installed surface to the front surface of the transaxle housing.

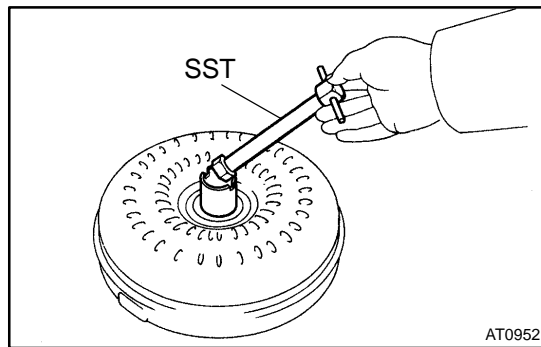
**Correct distance: More than 13.0 mm (0.512 in.)**

### 2. TRANSAXLE INSTALLATION

Installation is in the reverse order of removal.

HINT:

- After installation, adjust the shift cable and park/neutral position switch (See page [AX-2](#) ).
- Fill ATF and check fluid level (See page [AX-2](#) ).
- Test drive the vehicle.

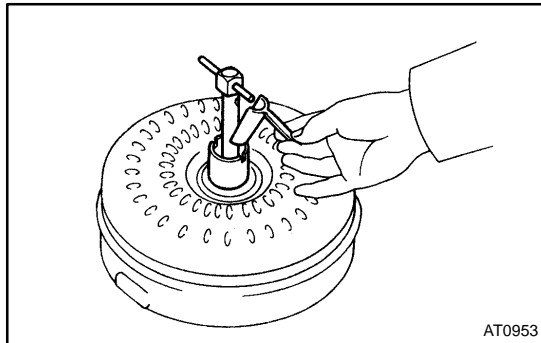


## TORQUE CONVERTER CLUTCH AND DRIVE PLATE INSPECTION

AX057-01

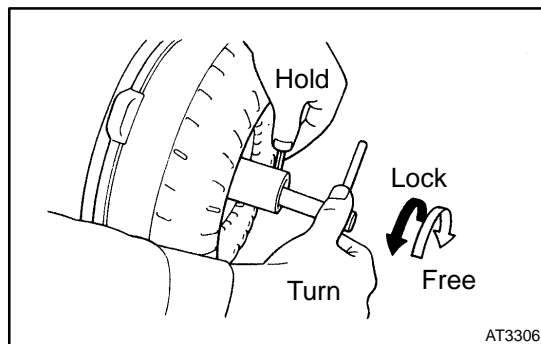
### 1. INSPECT ONE-WAY CLUTCH

- (a) Install SST in the inner race of the one-way clutch.  
SST 09350-32014 (09351-32010)
- (b) Install SST so that it fits in the notch of the converter clutch hub and outer race of the one-way clutch.  
SST 09350-32014 (09351-32020)



- (c) With the torque converter clutch held upright, inspect the clutch locks when turned counterclockwise, and rotates freely and smoothly clockwise.

If necessary, clean the converter and retest the clutch. Replace the converter clutch if the clutch still fails the test.



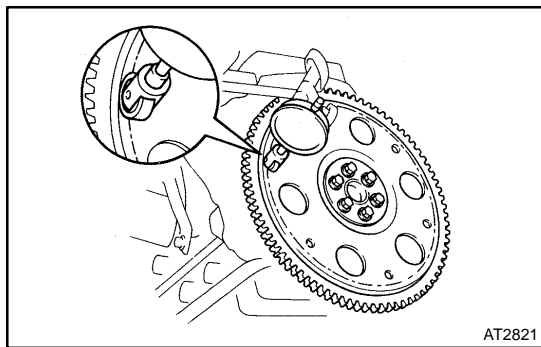
### 2. MEASURE DRIVE PLATE RUNOUT AND INSPECT RING GEAR

Set up a dial indicator, and measure the drive plate runout.

**Maximum runout: 0.20 mm (0.0079 in.)**

If the runout is not within the specification, replace the drive plate.

**Torque: 88 N·m (900 kgf·cm, 65 ft·lbf)**



### 3. MEASURE TORQUE CONVERTER CLUTCH SLEEVE RUNOUT

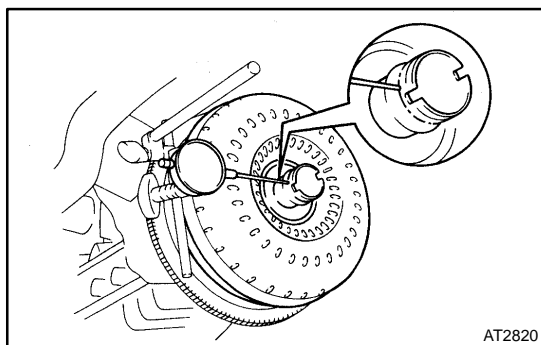
Temporarily mount the torque converter clutch to the drive plate. Set up a dial indicator.

**Maximum runout: 0.30 mm (0.0118 in.)**

If the runout is not within the specification, try to correct by reorienting the installation of the converter.

**HINT:**

Mark the position of the converter clutch to ensure the correct installation.



# TROUBLESHOOTING

## PROBLEM SYMPTOMS TABLE

SA10Z-04

Use the table to help you find the cause of the problem. The numbers indicate the priority of the likely case of the problem. Check each part in order. If necessary, replace these parts.

Symptom	Suspect Area	See page
Wander/pulls	1. Tire (Worn or improperly inflated) 2. Wheel alignment (Incorrect) 3. Steering linkage (Loosen or worn) 4. Hub bearings (Worn) 5. Steering gear (Out of adjustment or broken) 6. Suspension parts (Worn)	<a href="#">SA-2</a> <a href="#">SA-4</a> <a href="#">SA-8</a> - <a href="#">SA-10</a> <a href="#">SA-39</a> <a href="#">SR-34</a> <a href="#">SR-46</a> -
Bottoming	1. Vehicle (Overloaded) 2. Spring (Weak) 3. Shock absorber (Worn)	- <a href="#">SA-24</a> <a href="#">SA-44</a> <a href="#">SA-24</a> <a href="#">SA-44</a>
Sways/pitches	1. Tire (Worn or improperly inflated) 2. Stabilizer bar (Rear axle beam) 3. Shock absorber (Worn)	<a href="#">SA-2</a> <a href="#">SA-54</a> <a href="#">SA-24</a> <a href="#">SA-44</a>
Front wheel shimmy	1. Tire (Worn or improperly inflated) 2. Wheels (Out of balance) 3. Shock absorber (Worn) 4. Wheel alignment (Incorrect) 5. Ball joint (Worn) 6. Hub bearing (Worn) 7. Steering linkage (Loosen or worn) 8. Steering gear (Out of adjustment or broken)	<a href="#">SA-2</a> <a href="#">SA-2</a> <a href="#">SA-24</a> <a href="#">SA-4</a> <a href="#">SA-34</a> <a href="#">SA-10</a> - <a href="#">SR-34</a> <a href="#">SR-46</a>
Abnormal tire wear	1. Tire (Worn or improperly inflated) 2. Wheel alignment (Incorrect) 3. Suspension parts (Worn) 4. Shock absorber (Worn)	<a href="#">SA-2</a> <a href="#">SA-4</a> <a href="#">SA-8</a> - <a href="#">SA-24</a> <a href="#">SA-44</a>

# TIRE AND WHEEL INSPECTION

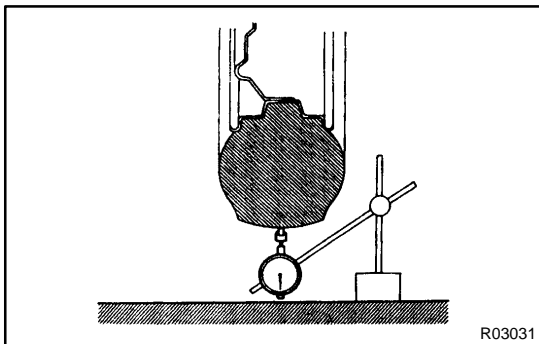
SA110-03

## 1. INSPECT TIRE

- (a) Check the tires for wear and for the proper inflation pressure.

### Cold inflation pressure

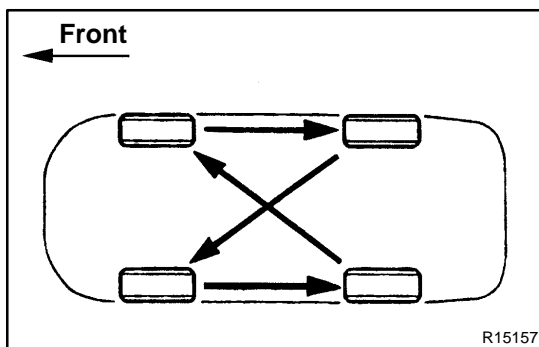
Tire size	Front kPa (kgf/cm <sup>2</sup> , psi)	Rear kPa (kgf/cm <sup>2</sup> , psi)
155SR13 AS	240 (2.4, 34)	225 (2.25, 32)



R03031

- (b) Check the tire runout.

**Tire runout: 1.4 mm (0.055 in.) or less**

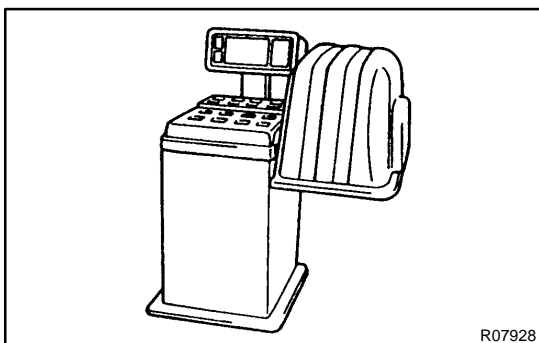


R15157

## 2. ROTATING TIRES

HINT:

See the illustration for where to rotate each tire.

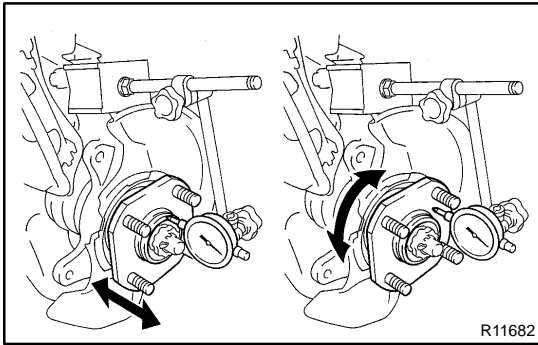


R07928

## 3. INSPECT WHEEL BALANCE

- (a) Check and adjust the Off-the-car balance.  
 (b) If necessary, check and adjust the On-the-car balance.

**Unbalance after adjustment: 8.0 g (0.018 lb) or less**

**4. CHECK WHEEL BEARING LOOSENESS**

- (a) Check the backlash in bearing shaft direction.

**Maximum: 0.05 mm (0.0020 in.)**

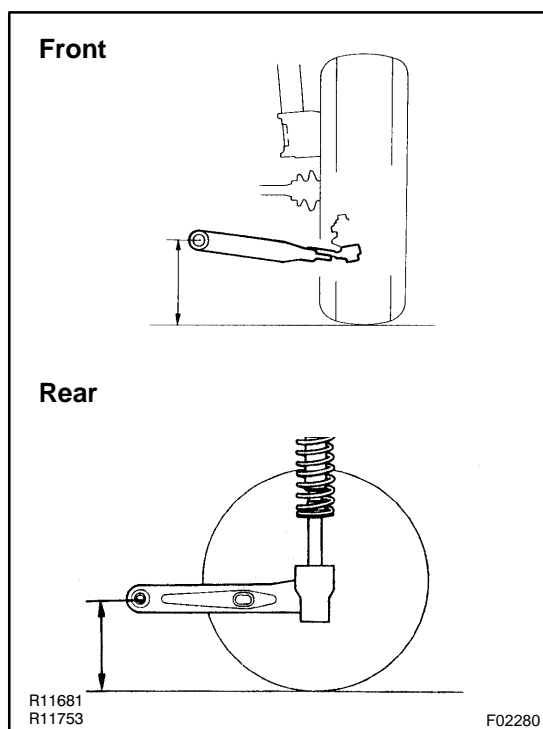
- (b) Check the axle hub deviation.

**Maximum: 0.05 mm (0.0020 in.)**

**5. CHECK FRONT SUSPENSION FOR LOOSENESS****6. CHECK STEERING LINKAGE FOR LOOSENESS****7. CHECK BALL JOINT FOR LOOSENESS****8. CHECK SHOCK ABSORBER WORKS PROPERLY**

- Check for oil leaks
- Check mounting bushings for wear
- Bounce front and rear of the vehicle





## FRONT WHEEL ALIGNMENT INSPECTION

SA23E-01

### 1. MEASURE VEHICLE HEIGHT

Tire size	Front	Rear
155SR13	187.9 mm (7.40 in.)	253.2 mm (9.97 in.)

Front measuring point:

Measure from the ground to the center of the lower suspension arm front mounting bolt.

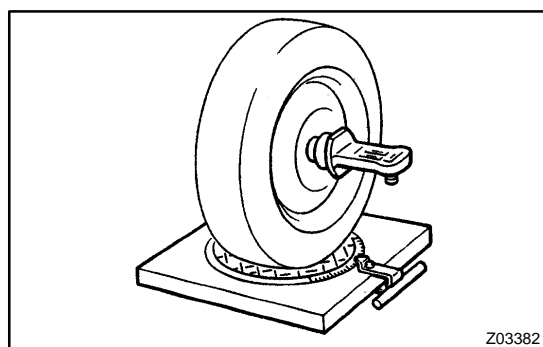
Rear measuring point:

Measure from the ground to the center of the axle beam mounting bolt.

#### NOTICE:

**Before inspecting the wheel alignment, adjust the vehicle height to the specification.**

If the vehicle height is not the specification, try to adjust it by pushing down on or lifting the body.



### 2. INSTALL CAMBER-CASTER-KINGPIN GAUGE OR ONTO WHEEL ALIGNMENT TESTER

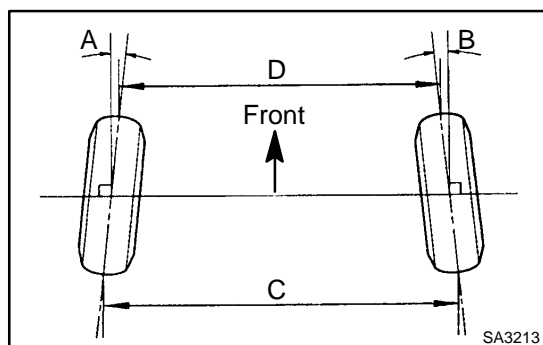
Follow the specific instruction of the equipment manufacturer.

### 3. INSPECT CAMBER, CASTER AND STEERING AXIS INCLINATION

Camber		$-0^{\circ}20' \pm 45'$
	Left-right error	$45' (0.75^{\circ})$ or less
Caster		$1^{\circ}20' \pm 45'$
	Left-right error	$45' (0.75^{\circ})$ or less
Steering axis inclination		$12^{\circ}10' \pm 45'$
	Left-right error	$45' (0.75^{\circ})$ or less

#### HINT:

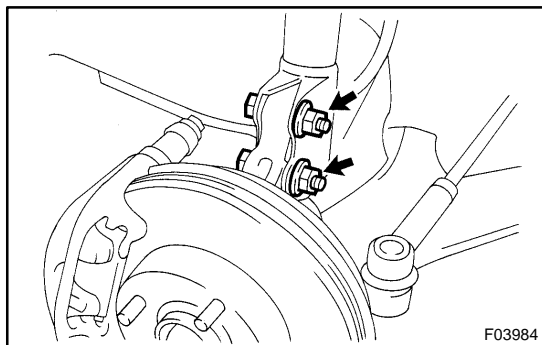
If the caster and steering axis inclination are not within the specification, after the camber has been correctly adjusted, recheck the suspension parts for damaged and/or worn out parts.



### 4. INSPECT TOE-IN

Toe-in (total)	$A + B: 0.1^{\circ} \pm 0.2^{\circ}$
	$C - D: 1 \pm 2 \text{ mm } (0.04 \pm 0.08 \text{ in.})$

If the toe-in is not within the specification, adjust by the tie rod end.

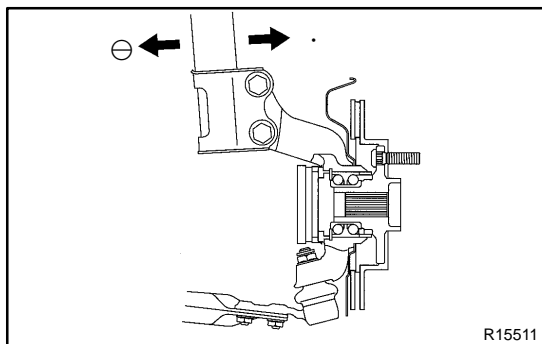


## 5. ADJUST CAMBER

### NOTICE:

**After the camber has been adjusted, inspect the toe-in.**

- Remove the front wheels.
- Remove the 2 nuts on the lower side of the shock absorber.
- Coat the threads of the nuts with engine oil.



- Temporarily install the 2 nuts.
- Adjust the camber by pushing or pulling the lower side of the shock absorber in the direction in which the camber adjustment is required.

**Adjusting value:  $0^{\circ}06' - 0^{\circ}30'$**

- Tighten the nuts.

**Torque: 245 N·m (2,500 kgf·cm, 181 ft·lbf)**

- Install the front wheels.

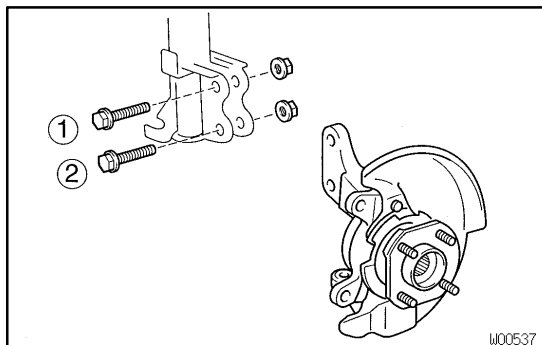
**Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)**

- Check the camber.

Camber	$-0^{\circ}20' \pm 45'$
Left-right error	$45' (0.75^{\circ})$ or less

### HINT:

- Try to adjust the camber to the center value.
- Adjusting value for the set bolts is  $6' - 30' (0.1^{\circ} - 0.5^{\circ})$ .



If the camber is not within the specification, using the table below, estimate of how much additional camber adjustment will be required, and select the camber adjusting bolt.

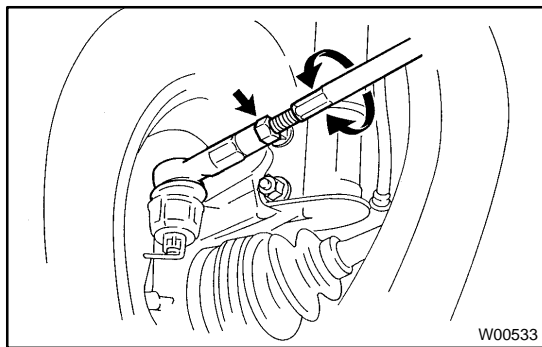
Bolt	Set Bolt		Adjusting Bolt					
	90105-15001		90105-15004		90105-15005		90105-15006	
	1 Dot		2 Dots		3 Dots		4 Dots	
Adjusting Value	11		•11		•11•		•11•	
	1	2	1	2	1	2	1	2
15'	●			●				
30'	●					●		
45'	●							●
1°00'			●					●
1°15'					●			●
1°30'							●	●

F01195

- (i) Follow the above mentioned steps again. Between step (b) and (c), exchange 1 or 2 selected bolts.

HINT:

When exchanging the 2 bolts, exchange 1 bolt for each time.



## 6. ADJUST TOE-IN

- Remove the boot clamps.
- Loosen the tie rod end lock nuts.
- Turn the left and right rack ends an equal amount to adjust the toe-in.

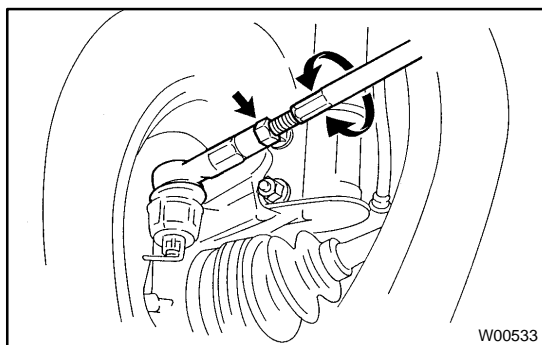
Toe-in (total)	A + B: $0.1^\circ \pm 0.2^\circ$ C - D: $1 \pm 2 \text{ mm (} 0.04 \pm 0.08 \text{ in.)}$
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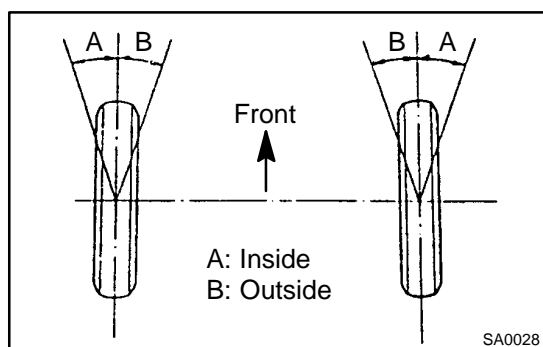
HINT:

- Try to adjust the toe-in to the center value.
- Make sure that the lengths of the left and right rack ends are the same.  
**Tie rod end length difference: 1.5 mm (0.059 in.) or less**
- Torque the tie rod end lock nuts.  
**Torque: 47 N·m (480 kgf·cm, 35 ft·lbf)**
- Place the boots on the seat and install the clamps to them.

HINT:

Make sure that the boots are not twisted.





## 7. INSPECT WHEEL ANGLE

Turn the steering wheel fully, and measure the turning angle.

Inside wheel	$35^{\circ}55' \pm 2^{\circ}$
Reference: Outside wheel	$32^{\circ}10'$

If the wheel angles differ from the standard specifications, inspect the toe-in.

# REAR WHEEL ALIGNMENT INSPECTION

SA112-04

## 1. MEASURE VEHICLE HEIGHT (See page SA-4 )

### NOTICE:

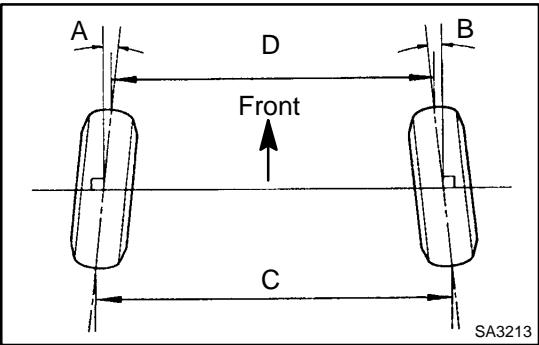
Before inspecting the weel alignment, adjust the vehicle height to the specitication.

## 2. INSPECT CAMBER

Camber	-0 °30' ± 45'
Left-right error	45' (0.75 °) or less

### HINT:

Camber is not adjustable, if the measurement is not within the specification, inspect and replace the suspension parts as necessary.



## 3. INSPECT TOE-IN

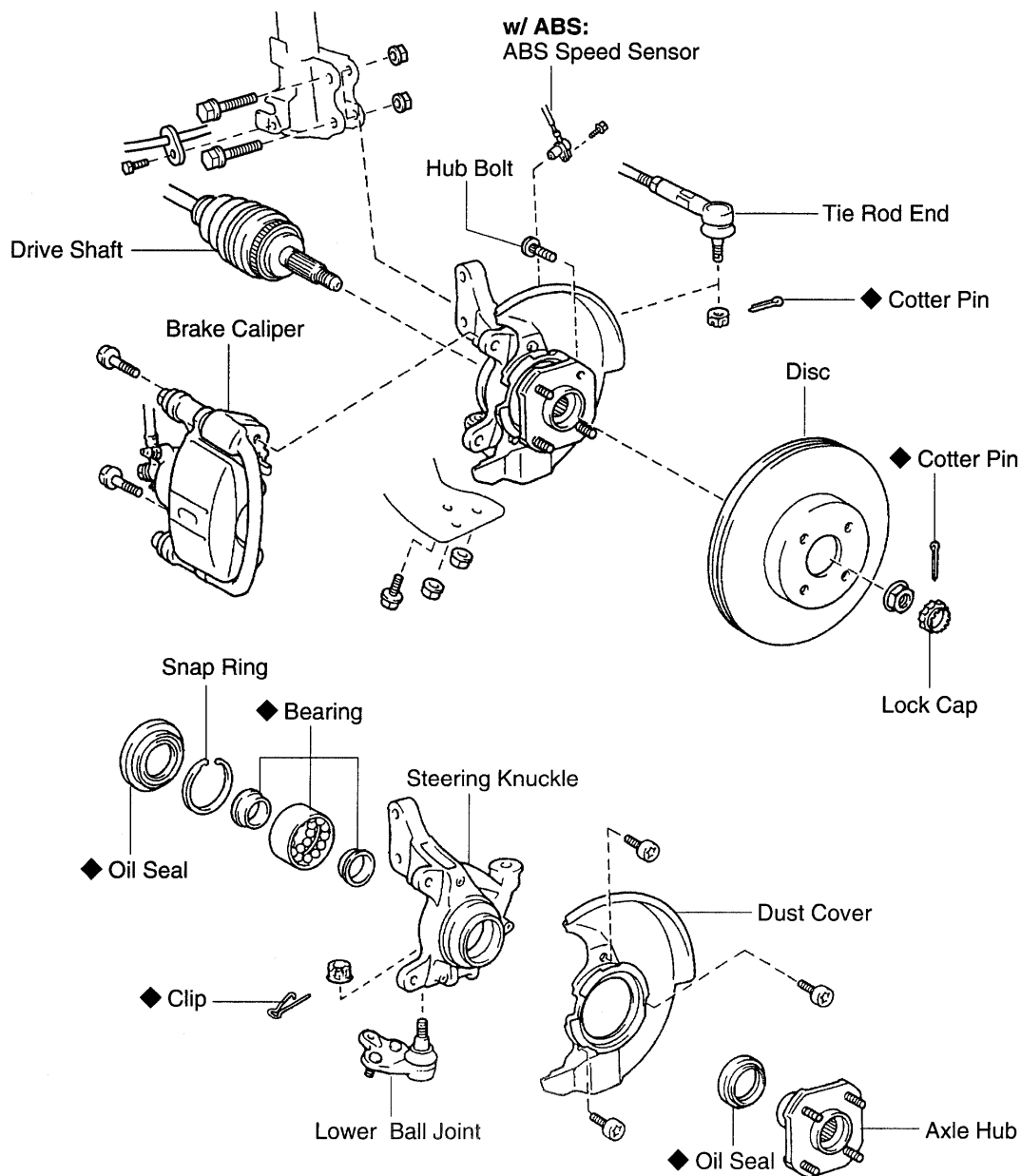
Toe-in (total)	A + B: 0.3 ° ± 0.3 ° C - D: 3 ± 3 mm (0.12 ± 0.12 in.)
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### HINT:

Toe-in is not adjustable, if the measurement is not within the specification, inspect and replace the suspension parts as necessary.

# FRONT AXLE HUB COMPONENTS

SA113-04

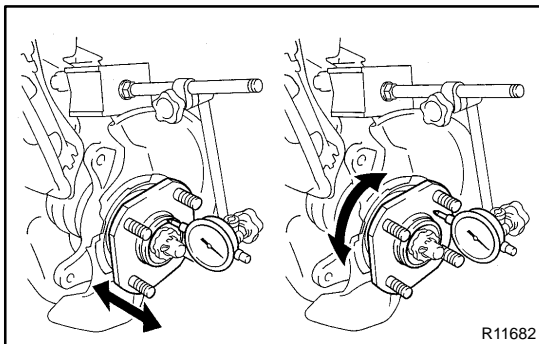


◆ Non-reusable part

Y R15515

## REMOVAL

1. **REMOVE FRONT WHEEL**  
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)
2. **w/ ABS**  
**REMOVE BOLT AND ABS SPEED SENSOR**  
Torque: 7.8 N·m (80 kgf·cm, 69 in·lbf)
3. **REMOVE FRONT BRAKE CALIPER AND DISC**
  - (a) Remove the 2 bolts and brake caliper from the steering knuckle.  
Torque: 88 N·m (900 kgf·cm, 65 in·lbf)
  - (b) Support the brake caliper securely.
  - (c) Remove the disc.



4. **CHECK BACKLASH IN BEARING SHAFT DIRECTION**  
Using a dial indicator, check the backlash near the center of the axle hub, and check the backlash in the bearing shaft direction.

**Maximum: 0.05 mm (0.0020 in.)**

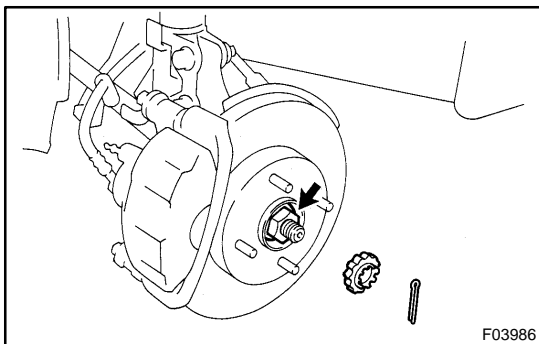
If the backlash exceeds the maximum, replace the bearing.

5. **CHECK AXLE HUB DEVIATION**

Using a dial indicator, check the deviation at the surface of the axle hub outside the hub bolt.

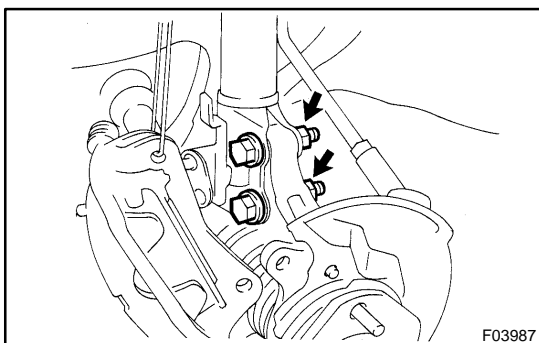
**Maximum: 0.05 mm (0.0020 in.)**

If the deviation exceeds the maximum, replace the axle hub.



6. **REMOVE DRIVE SHAFT LOCK NUT**

- (a) Install the brake disc and caliper.
- (b) Remove the cotter pin and lock cap.
- (c) With applying the brakes, remove the nut.  
Torque: 216 N·m (2,200 kgf·cm, 159 ft·lbf)
- (d) Remove the brake caliper and disc.

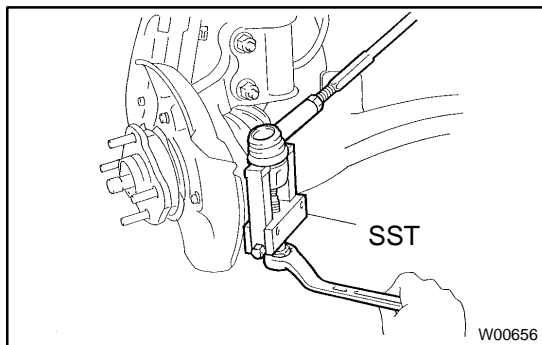


7. **LOOSEN 2 NUTS ON LOWER SIDE OF SHOCK ABSORBER**

Torque: 245 N·m (2,500 kgf·cm, 181 ft·lbf)

### HINT:

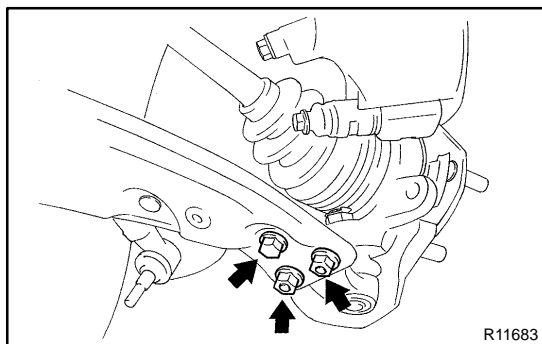
- Do not remove the 2 bolts.
- Coat the nut's thread with engine oil.



## 8. DISCONNECT TIE ROD END FROM STEERING KNUCKLE

- (a) Remove the cotter pin and nut.  
**Torque: 49 N·m (500 kgf-cm, 36 ft-lbf)**
- (b) Using SST, disconnect the tie rod end from the steering knuckle.

SST 09628-6201 1



## 9. DISCONNECT LOWER BALL JOINT FROM LOWER SUSPENSION ARM

Remove the 2 nuts and bolt.

**Torque: 80 N·m (820 kgf-cm, 59 ft-lbf)**

## 10. REMOVE STEERING KNUCKLE WITH AXLE HUB

- (a) Remove the 2 nuts and bolts on lower side of the shock absorber.
- (b) Remove the steering knuckle with the axle hub.

### NOTICE:

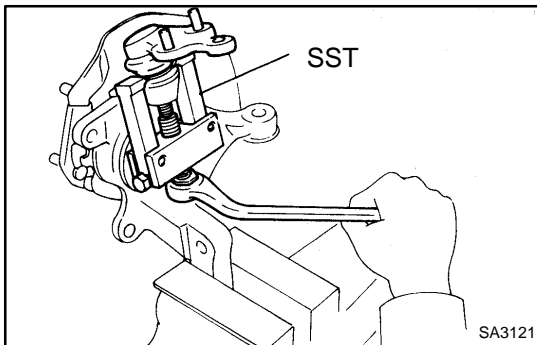
**Be careful not to damage the oil seal with the drive shaft.**



## DISASSEMBLY

### 1. REMOVE LOWER BALL JOINT

- (a) Remove the clip and nut.



- (b) Using SST, remove the lower ball joint.

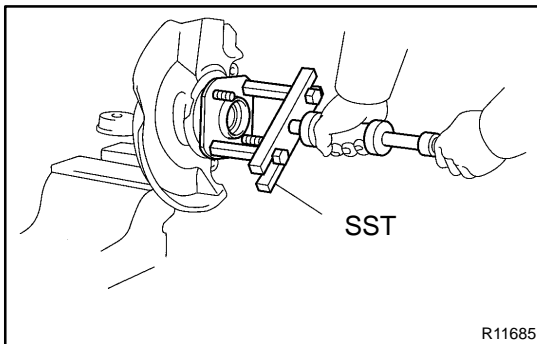
SST 09628-6201 1

### 2. REMOVE INNER OIL SEAL

Using a screwdriver, remove the inner oil seal.

### 3. REMOVE DUST COVER SET BOLTS

Using a torx wrench (T30), remove the 3 bolts.

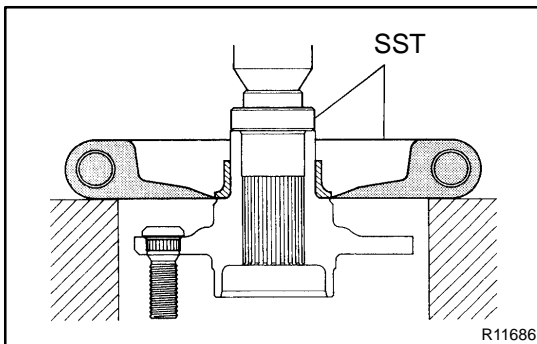


### 4. REMOVE AXLE HUB AND DUST COVER

- (a) Using SST, remove the axle hub from the steering knuckle.

SST 09520-00031

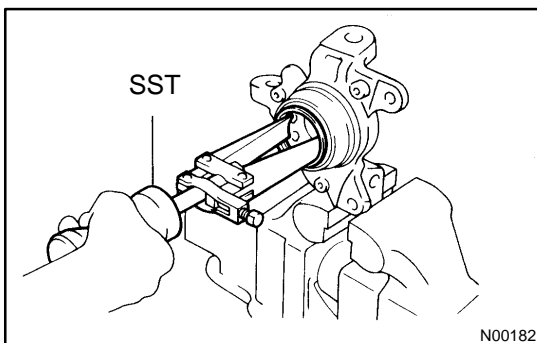
- (b) Remove the dust cover.



### 5. REMOVE INNER RACE (OUTSIDE) FROM AXLE HUB

Using SST and a press, remove the inner race from the axle hub.

SST 09631-12040, 09950-00020



### 6. REMOVE OUTER OIL SEAL

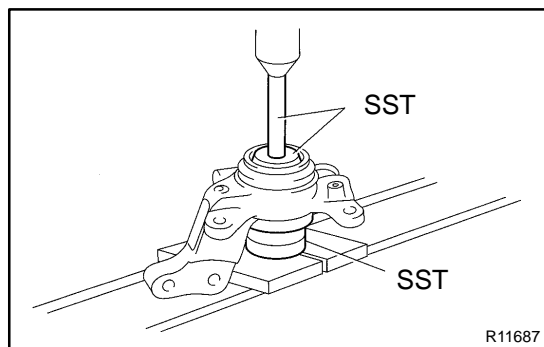
Using SST, remove the outer oil seal.

SST 09308-00010

### 7. REMOVE BEARING FROM STEERING KNUCKLE

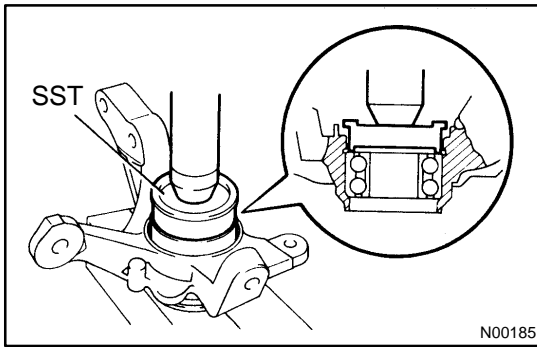
- (a) Using snap ring pliers, remove the snap ring.

- (b) Place the inner race on the outside of the bearing.



- (c) Using SST and a press, remove the bearing from the steering knuckle.

SST 09223-15020, 09950-60010 (09951-00650),  
09950-70010 (09951-07150)



## REASSEMBLY

### 1. INSTALL BEARING

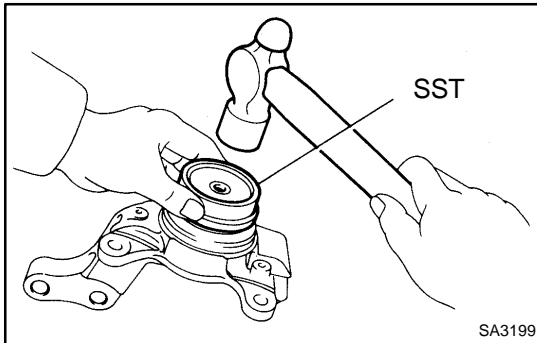
- (a) Using SST and a press, install a new bearing to the steering knuckle.

SST 09608-10010

#### NOTICE:

**If the inner race and balls come loose from the bearing outer race, be sure to install them on the same side as before.**

- (b) Using snap ring pliers, install the snap ring.



### 2. INSTALL OUTER OIL SEAL

- (a) Using SST and a hammer, install a new outer oil seal.

SST 09608-10010

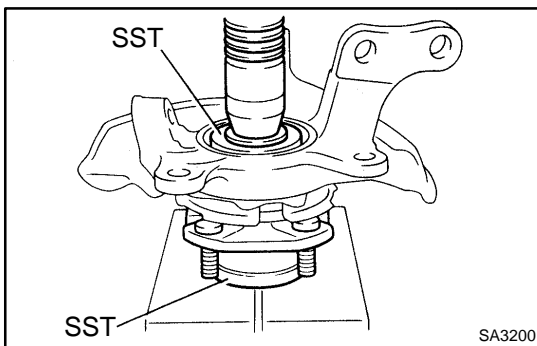
- (b) Coat the oil seal lip with MP grease.

### 3. INSTALL DUST COVER

- (a) Place the dust cover on the steering knuckle.

- (b) Using a torx wrench (T30), tighten the 3 bolts.

**Torque: 8.3 N·m (85 kgf·cm, 74 in.-lbf)**



### 4. INSTALL AXLE HUB

Using SST and a press, install the axle hub.

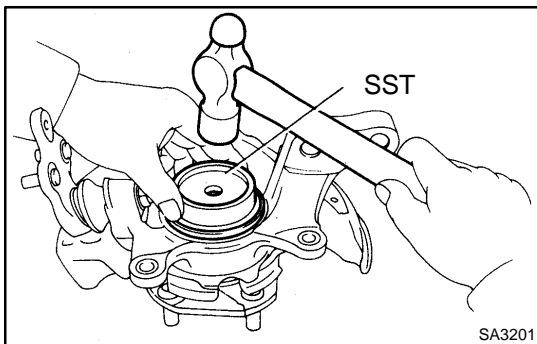
SST 09608-10010, 09950-60010 (09951-00610)

### 5. INSTALL LOWER BALL JOINT

- (a) Install the lower ball joint and tighten the nut.

**Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)**

- (b) Install a new clip.



### 6. INSTALL INNER OIL SEAL

- (a) Using SST and a hammer, install a new inner oil seal.

SST 09608-10010

- (b) Coat the oil seal lip with MP grease.

## INSTALLATION

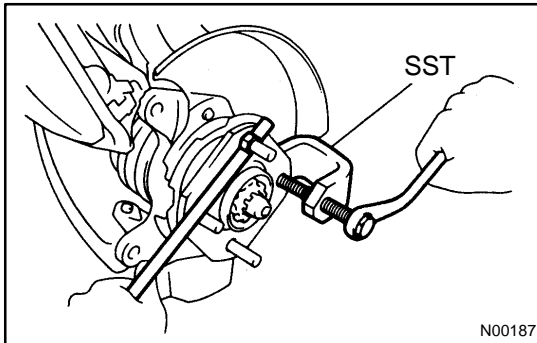
Installation is in the reverse order of removal (See page [SA-10](#) ).

HINT:

After installation, check ABS speed sensor signal (See page [DI-1 11](#) and [SA-4](#) ).

## FRONT WHEEL HUB BOLT REPLACEMENT

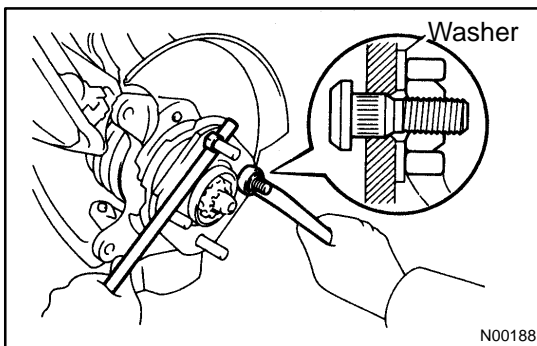
1. REMOVE FRONT WHEEL
2. REMOVE BRAKE CALIPER AND DISC  
(See page [SA-10](#) )



### 3. REMOVE HUB BOLT

Using SST, remove the hub bolt.

SST 09628-1001 1



### 4. INSTALL HUB BOLT

Install washer and nut to the hub bolt, as shown in the illustration, and install the hub bolt with torquing the nut.

### 5. INSTALL DISC AND BRAKE CALIPER (See page [SA-10](#) )

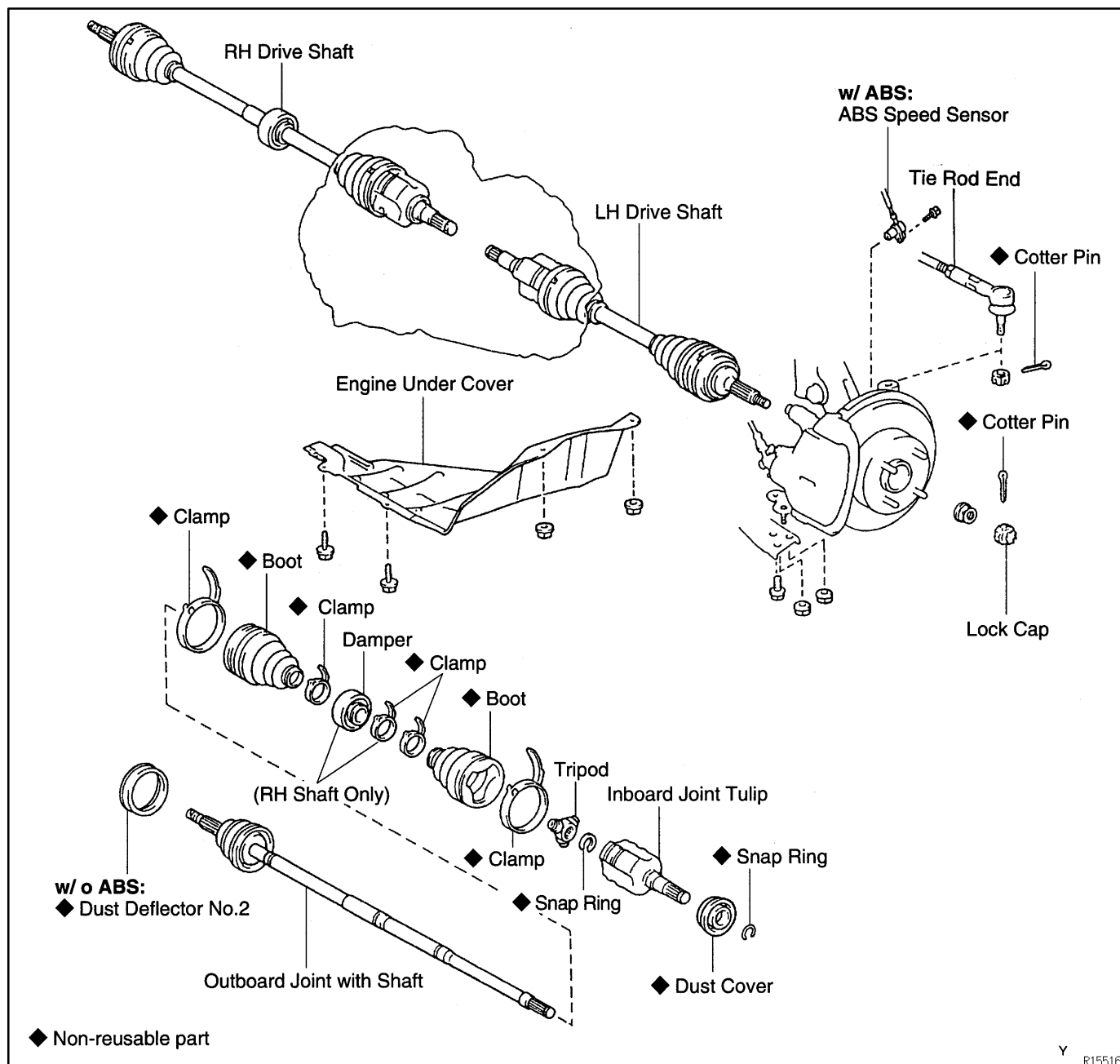
Torque: 88 N·m (900 kgf·cm, 65 ft·lbf)

### 6. INSTALL FRONT WHEEL

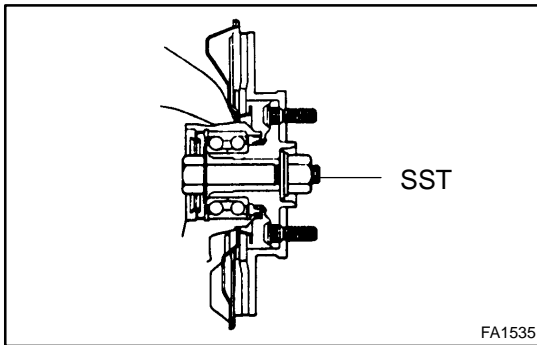
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

# FRONT DRIVE SHAFT COMPONENTS

SA127-03



Y R15516



## REMOVAL

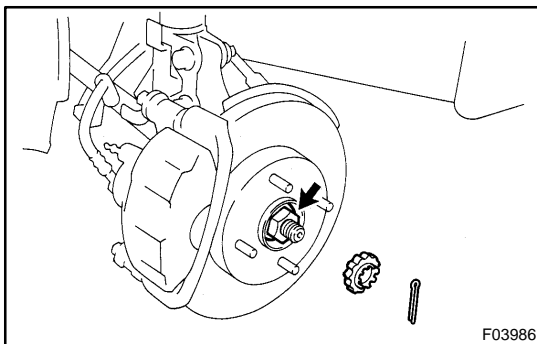
### NOTICE:

- The hub bearing could be damaged if it is subjected to the vehicle weight, such as when moving the vehicle with the drive shaft removed. Therefore, if it is absolutely necessary to place the vehicle weight on the hub bearing, first support it with SST.  
SST 09608-16042 (09608-02021, 09608-02041)

- **w/ ABS:**

After disconnecting the drive shaft from the axle hub, work carefully so as not to damage the sensor rotor serrations on the drive shaft.

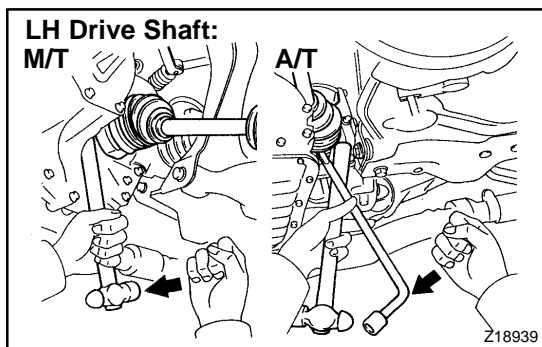
1. **REMOVE FRONT WHEEL**  
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)
2. **M/T:**  
**REMOVE LH ENGINE UNDER COVER**
3. **DRAIN TRANSAXLE OIL (M/T) OR ATF (A/T)**
4. **w/ ABS:**  
**REMOVE BOLT AND ABS SPEED SENSOR**  
Torque: 7.8 N·m (80 kgf·cm, 69 in·lbf)



5. **REMOVE DRIVE SHAFT LOCK NUT**
  - (a) Remove the cotter pin and lock cap.
  - (b) While applying the brakes, remove the nut.  
Torque: 216 N·m (2,200 kgf·cm, 159 ft·lbf)
6. **DISCONNECT TIE ROD END FROM STEERING KNUCKLE** (See page [SA-10](#))
7. **DISCONNECT LOWER BALL JOINT FROM LOWER SUSPENSION ARM** (See page [SA-10](#))
8. **DISCONNECT DRIVE SHAFT FROM AXLE HUB**

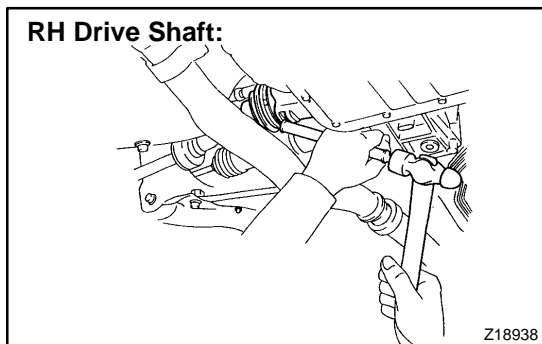
### NOTICE:

Be careful not to damage the drive shaft boot and inner oil seal.



**9. LH drive shaft:**  
**REMOVE DRIVE SHAFT**

- (a) M/T:  
Using a hammer, remove the drive shaft.
- (b) A/T:  
Using a hammer and hub nut wrench or an equivalent, remove the drive shaft.



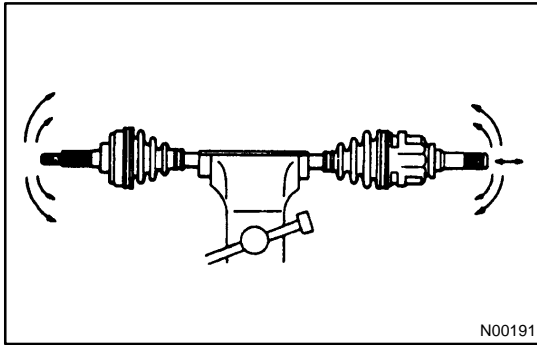
**10. RH drive shaft:**  
**REMOVE DRIVE SHAFT**

Using a brass bar and hammer, remove the drive shaft.

**11. REMOVE SNAP RING**

Using a screwdriver, remove the snap ring from the inboard joint shaft.





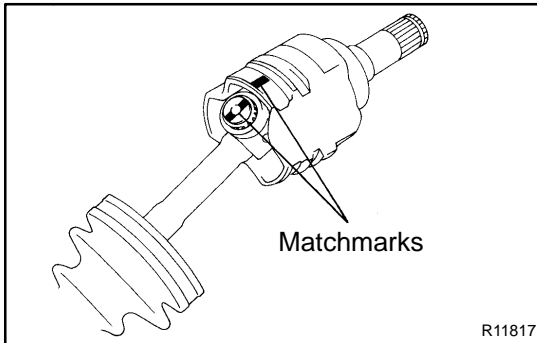
## DISASSEMBLY

### 1. CHECK DRIVE SHAFT

- Check to see that there is no play in the outboard joint.
- Check to see that the inboard joint slides smoothly in the thrust direction.
- Check to see that there is no remarkable play in the radial direction of the inboard joint.

### 2. REMOVE INBOARD JOINT TULIP

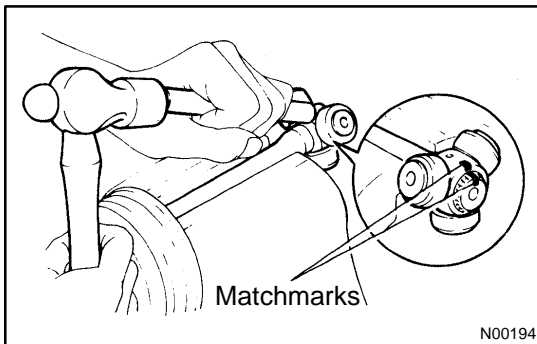
- Using a screwdriver, remove the 2 boot clamps.



- Place matchmarks on the inboard joint tulip and tripod.
- Remove the inboard joint tulip from the drive shaft.

### 3. REMOVE TRIPOD

- Using a snap ring expander, remove the snap ring.



- Place matchmarks on the shaft and tripod.
- Using a brass bar and hammer, remove the tripod joint from the drive shaft.

### 4. REMOVE INBOARD JOINT BOOT AND 2 BOOT CLAMPS

### 5. RH DRIVE SHAFT:

#### REMOVE DYNAMIC DAMPER

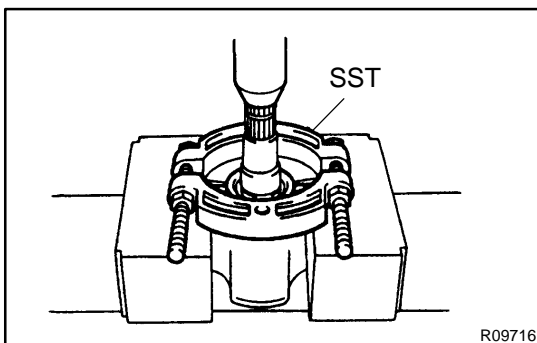
- Using a screwdriver, remove the damper clamp.
- Remove the damper from the drive shaft.

### 6. REMOVE OUTBOARD JOINT BOOT

- Using a screwdriver, remove the 2 boot clamps.
- Remove the boot and 2 boot clamp from the outboard joint.

#### NOTICE:

Do not disassemble the outboard joint.



### 7. REMOVE DUST COVER

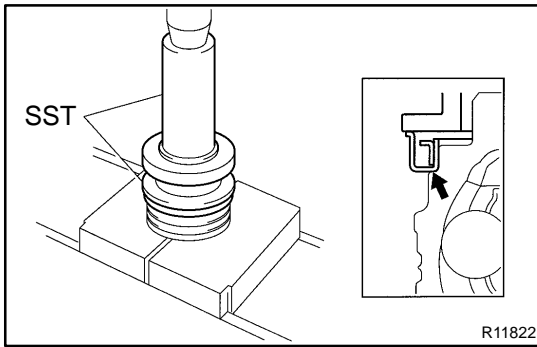
Using SST and a press, remove the dust cover from the inboard joint tulip.

SST 09950-00020

### 8. w/o ABS:

#### REMOVE NO.2 DUST DEFLECTOR

- Mount the outboard joint in a soft jaw vise.
- Using a screwdriver, remove the No.2 dust deflector.



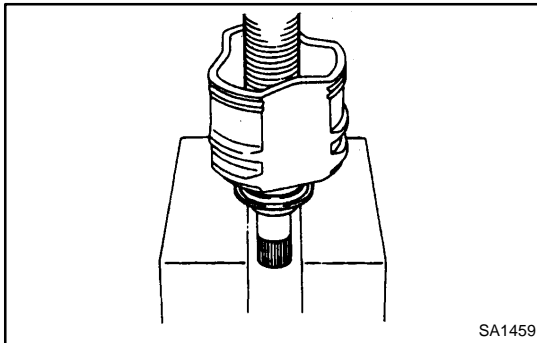
## REASSEMBLY

### 1. w/o ABS:

#### INSTALL DUST DEFLECTOR NO.2

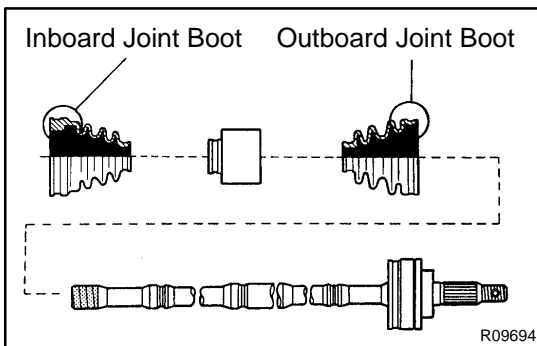
Using SST and a press, install a new dust deflector No.2.

SST 09309-36010, 09316-20011



### 2. INSTALL DUST COVER

Using a press, install a new dust cover to the inboard joint tulip.



### 3. TEMPORARILY INSTALL BOOTS, CLAMPS AND DAMPER (RH DRIVE SHAFT)

#### HINT:

Before installing the boots, wrap vinyl tape around the spline of the drive shaft to prevent damaging the boot.

- Temporarily install a new outboard joint boot.
- RH drive shaft:  
Temporarily install the damper.
- Temporarily install a new inboard joint boot.

### 4. INSTALL TRIPOD

- Place the beveled side of the tripod axial spline toward the outboard joint.
- Align the matchmarks before removal.
- Using a brass bar and hammer, tap in the tripod to the drive joint shaft.

#### NOTICE:

**Do not tap the roller.**

- Using a snap ring expander, install a new snap ring.

### 5. INSTALL BOOT TO OUTBOARD JOINT

Before assembling the boot, pack the outboard joint and boot with grease in the boot kit.

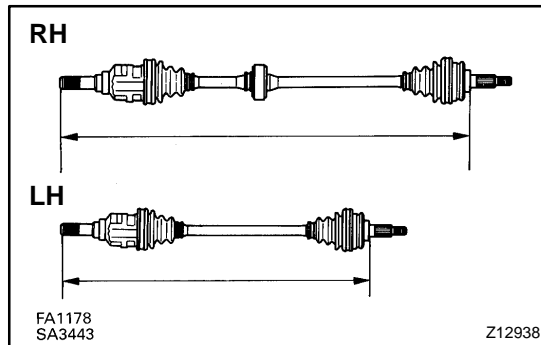
**Grease capacity: 65 - 75 g (2.3 - 2.6 oz.)**

### 6. INSTALL INBOARD JOINT TO FRONT DRIVE SHAFT

- Pack the inboard tulip and boot with grease in the boot kit.  
**Grease capacity: 112 - 122 g (4.0 - 4.3 oz.)**
- Align the matchmarks as they were placed before disassembly.
- Install the inboard joint tulip to the drive shaft.
- Temporarily install the boot to the inboard joint shaft.

**7. ASSEMBLE BOOT CLAMPS TO BOTH BOOTS**

- (a) Make sure the boot are on the shaft groove.

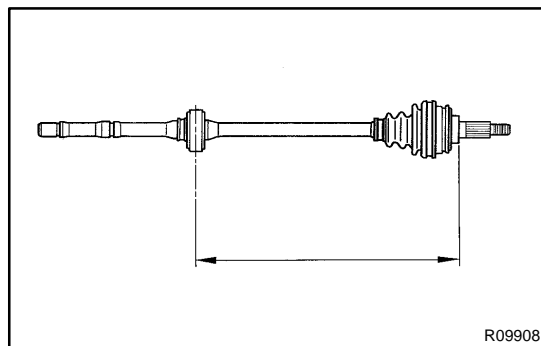


- (b) Set the drive shaft length to the standard.

**Standard length**

RH	$785.1 \pm 5.0$ mm (30.909 $\pm$ 0.197 in.)
LH	$544.9 \pm 5.0$ mm (21.421 $\pm$ 0.197 in.)

- (c) Place the 4 new boot clamps to the boots.  
 (d) Bend the band, and lock it with a screwdriver.

**8. RH DRIVE SHAFT:****ASSEMBLE DYNAMIC DAMPER CLAMP**

- (a) Be sure the damper is on the shaft groove.  
 (b) Set the distance, as shown.  
**Distance:  $361.4 \pm 5.0$  mm (14.335  $\pm$  0.197 in.)**  
 (c) Place a new damper clamp to the damper.  
 (d) Bend the band and lock it in the same procedure for the boot clamp assembly.

**9. INSTALL SNAP RING**

Using a snap ring expander, install a new snap ring to the in-board joint shaft.

**10. CHECK DRIVE SHAFT (See page SA-20 )**

## INSTALLATION

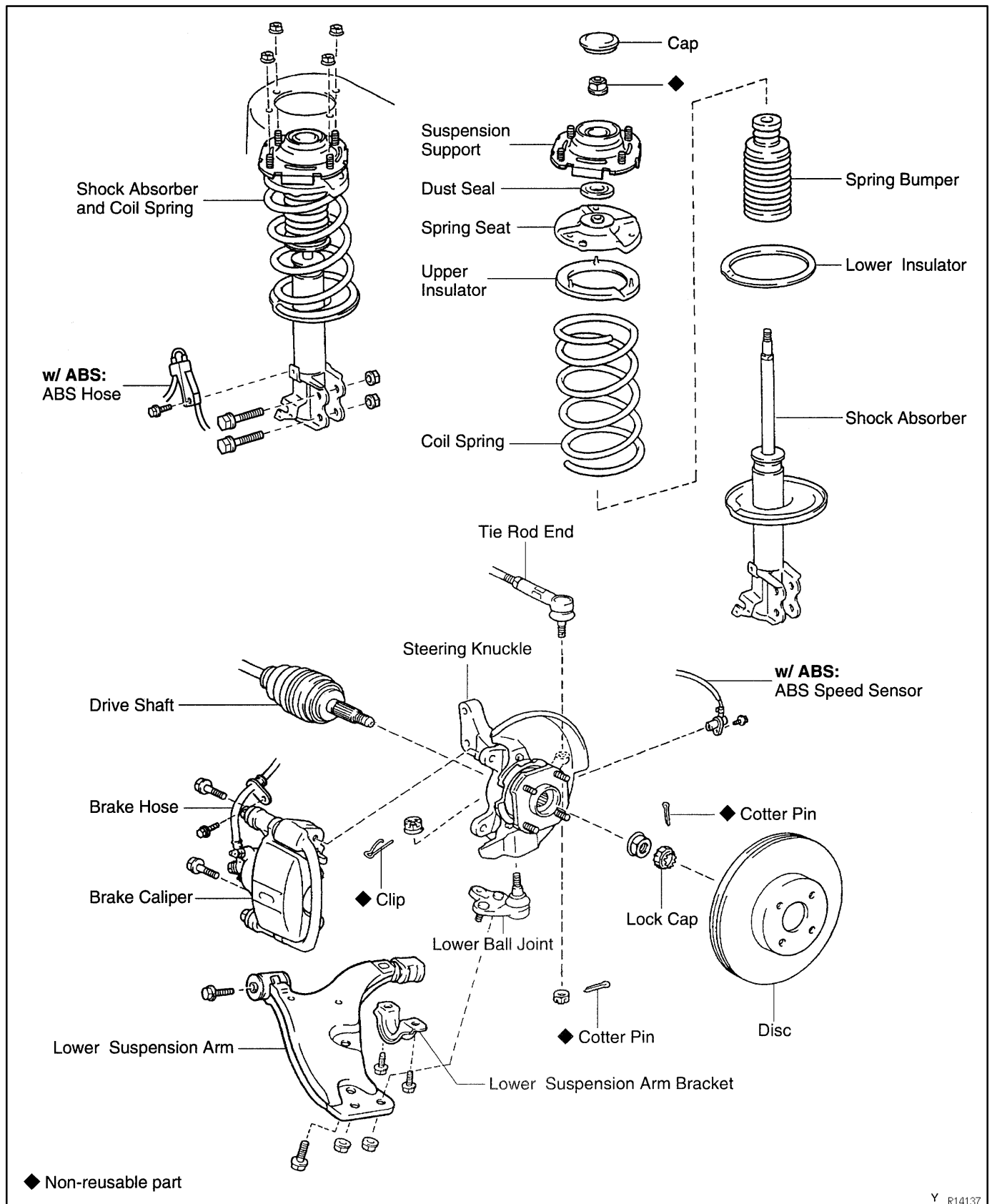
Installation is in the reverse order of removal (See page [SA-18](#) ).

HINT:

After installation, check ABS speed sensor signal and front wheel alignment (See page [DI-1 11](#) and [SA-4](#) ).

# FRONT SHOCK ABSORBER COMPONENTS

SA119-05



Y R14137

## REMOVAL

### 1. REMOVE FRONT WHEEL

**Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)**

### 2. REMOVE FLEXIBLE HOSE

Remove the bolt and disconnect the flexible hose from the shock absorber.

**Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)**

### 3. w/ ABS:

#### **DISCONNECT ABS SPEED SENSOR WIRE HARNESS**

Remove the bolt and disconnect the ABS speed sensor wire harness from the shock absorber.

**Torque: 5.4 N·m (55 kgf·cm, 48 in·lbf)**

### 4. DISCONNECT SHOCK ABSORBER FROM STEERING KNUCKLE

Remove the 2 nuts and bolts and disconnect the shock absorber from steering knuckle,

**Torque: 245 N·m (2,500 kgf·cm, 181 ft·lbf)**

HINT:

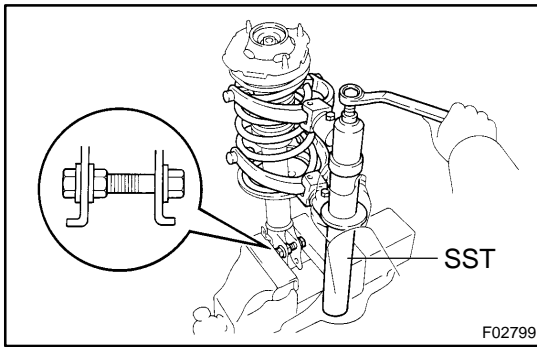
Coat the nut's threads with engine oil.

### 5. REMOVE SHOCK ABSORBER AND COIL SPRING

(a) Remove the 3/4 nuts on the upper side of the shock absorber.

**Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)**

(b) Remove the shock absorber with the coil spring.



## DISASSEMBLY

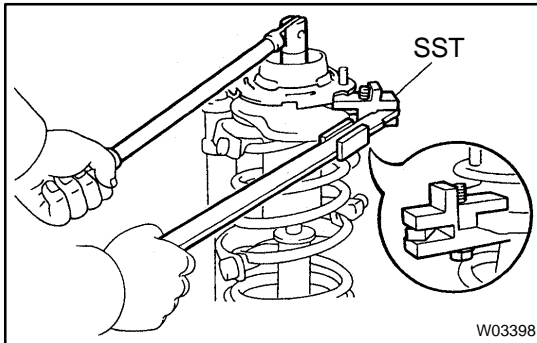
### REMOVE COIL SPRING

- (a) Using SST, compress the coil spring.  
SST 09727-30021

#### NOTICE:

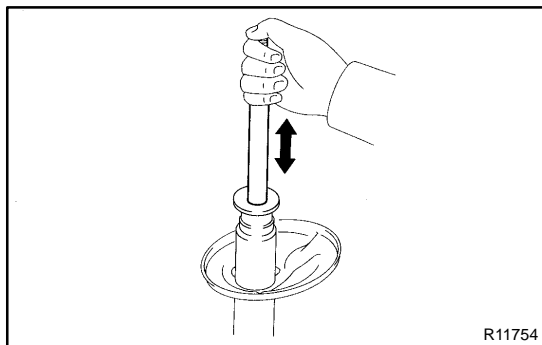
**Do not use an impact wrench. It will damage the SST.**

- (b) Install 2 nuts and bolt to the bracket at the lower part of the shock absorber and secure it in a vise.



- (c) Using SST, to hold the spring seat, remove the nut.  
SST 09729-22031

- (d) Remove these parts:
- Suspension support.
  - Dust seal.
  - Spring seat.
  - Upper insulator.
  - Coil spring.
  - Spring bumper.
  - Lower insulator.



## INSPECTION

### INSPECT SHOCK ABSORBER

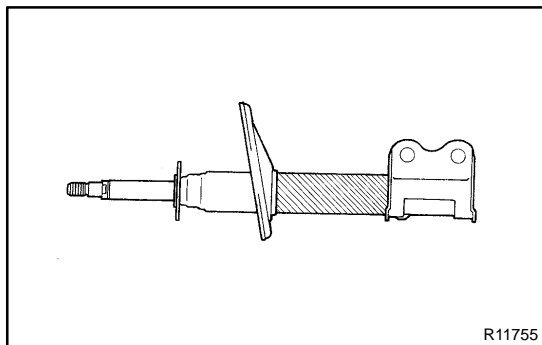
Compress and extend the shock absorber rod and check that there is no abnormal resistance or unusual operation sound.

If there is any abnormality, replace the shock absorber with a new one.

### NOTICE:

**When disposing of the shock absorber, use the following procedure.**





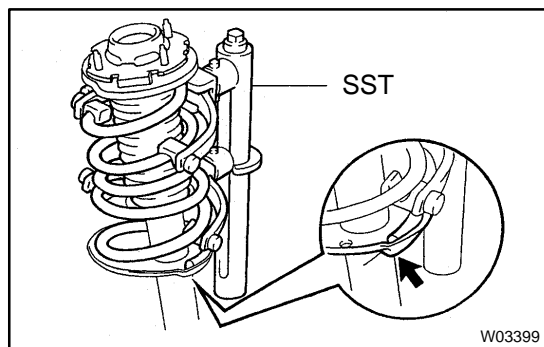
## DISPOSAL

1. FULLY EXTEND SHOCK ABSORBER ROD
2. DRILL HOLE TO REMOVE GAS FROM CYLINDER

Using a drill, make a hole in the cylinder, as shown to remove the gas inside.

### CAUTION:

The gas coming out is harmless, but be careful of chips which may fly up when drilling.



## REASSEMBLY

1. **INSTALL LOWER INSULATOR ONTO SHOCK ABSORBER**
2. **INSTALL COIL SPRING AND SUSPENSION SUPPORT**

(a) Using SST, compress the coil spring.

SST 09727-30021

### NOTICE:

**Do not use an impact wrench. It will damage the SST.**

(b) Install the spring bumper to the piston rod.

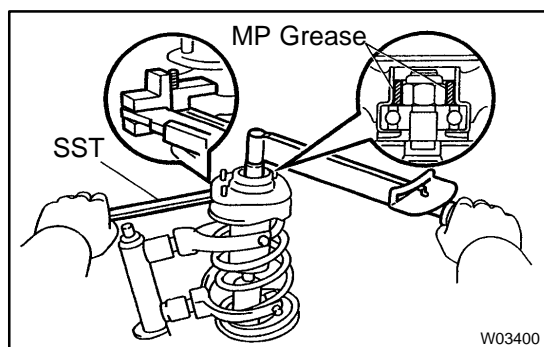
(c) Install the coil spring to the shock absorber.

### HINT:

Fit the lower end of the coil spring into the gap of the spring seat of shock absorber.

(d) Install the spring seat with the upper insulator.

(e) Install the dust seal and suspension support.



(f) Using SST, to hold the spring seat, install a new nut.

SST 09729-22031

**Torque: 47 N·m (475 kgf-cm, 39 ft-lbf)**

(g) Remove the SST.

(h) Pack the suspension support with MP grease.

(i) Install the cap.

## INSTALLATION

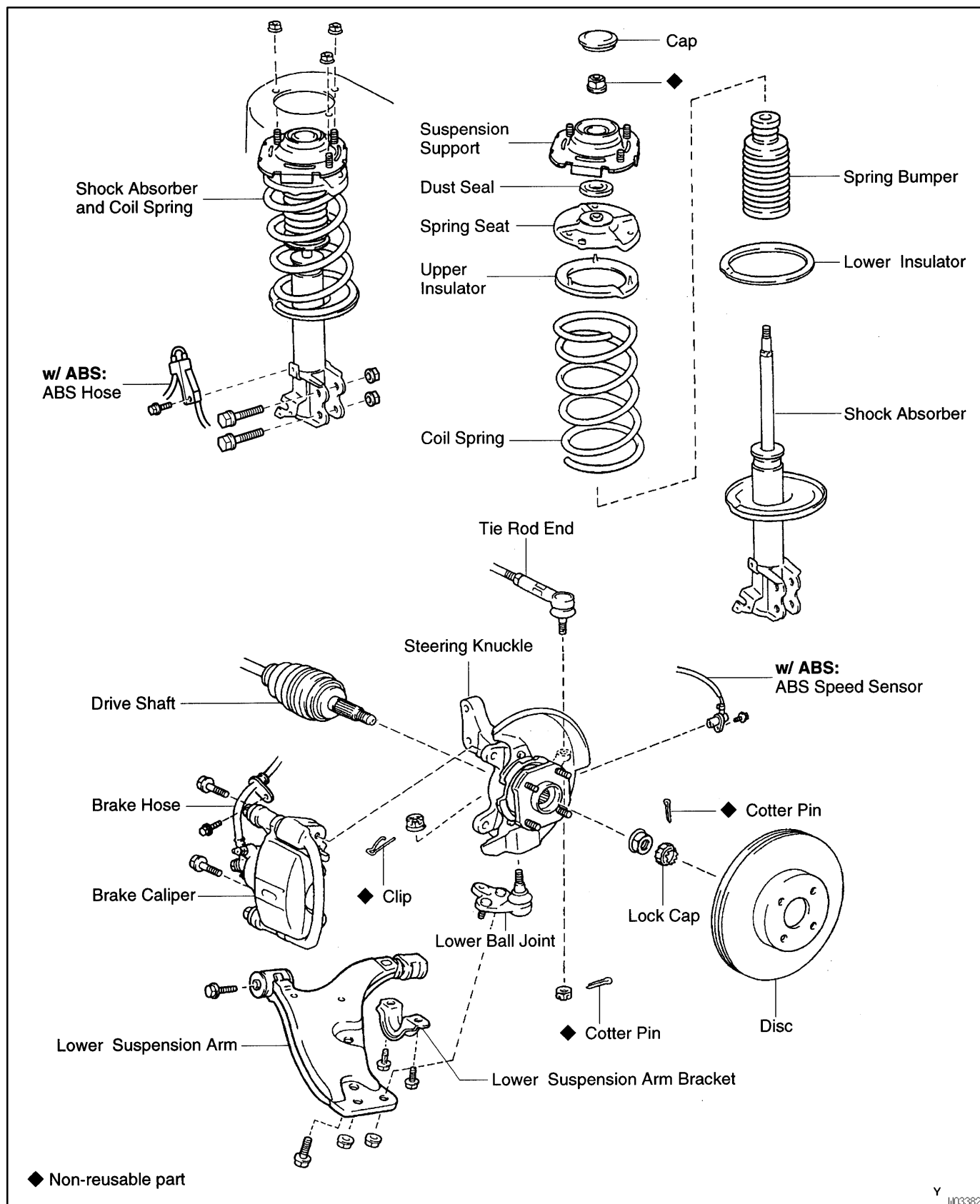
Installation is in the reverse order of removal (See page [SA-25](#) ).

HINT:

After installation, check front wheel alignment (See page [SA-2](#) ).

# FRONT LOWER SUSPENSION ARM COMPONENTS

SA11G-04

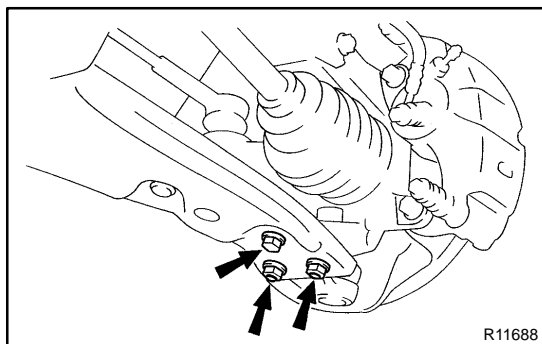


Y W03382

## REMOVAL

### 1. REMOVE FRONT WHEEL

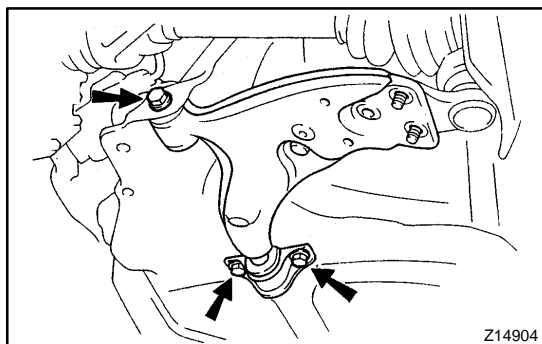
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)



### 2. DISCONNECT LOWER SUSPENSION ARM FROM LOWER BALL JOINT

Remove the 2 nuts and bolt.

Torque: 80 N·m (820 kgf·cm, 59 ft·lbf)



### 3. REMOVE LOWER SUSPENSION ARM

Remove the 3 bolts, lower suspension arm.

Torque:

A: 142 N·m (1,450 kgf·cm, 105 ft·lbf)

B: 74 N·m (750 kgf·cm, 55 ft·lbf)

HINT:

After stabilizing the suspension, torque the bolts.

## INSTALLATION

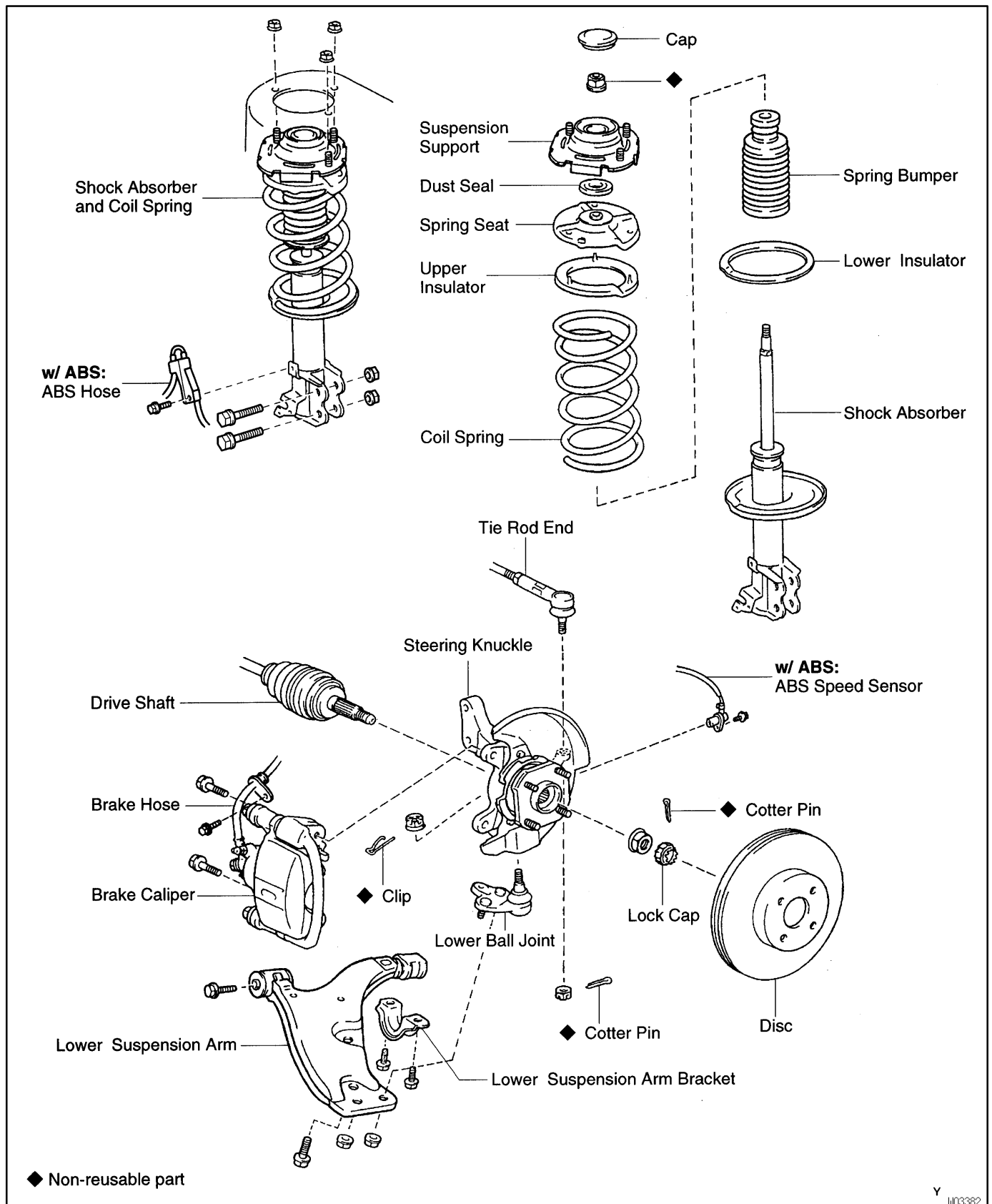
Installation is in the reverse order of removal (See page [SA-32](#) ).

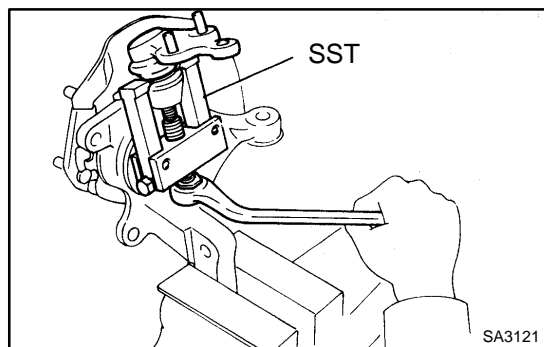
HINT:

After installation, check front wheel alignment (See page [SA-4](#) ).

# FRONT LOWER BALL JOINT COMPONENTS

SA11J-05

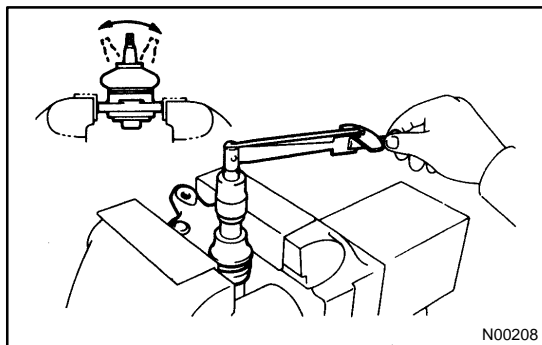




## REMOVAL

1. **REMOVE STEERING KNUCKLE WITH AXLE HUB**  
(See page [SA-10](#) )
2. **REMOVE LOWER BALL JOINT**
  - (a) Remove the clip and nut.  
**Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)**
  - (b) Using SST, remove the lower ball joint.  
SST 09628-6201 1





## INSPECTION

### INSPECT LOWER BALL JOINT FOR ROTATION CONDITION

- (a) As shown flip the ball joint stud back and forth 5 times, before installing the nut.
- (b) Using a torque wrench, turn the nut continuously one turn per 2 - 4 seconds and take the torque reading on the 5th turn.

#### Turning torque:

**0.78 - 2.45 N·m (8 - 25 kgf·cm, 7.0 - 22.0 in.-lbf)**

# BRAKE SYSTEM

BR0R8-01

## PRECAUTION

- Care must be taken to replace each part properly as it could affect the performance of the brake system and result in a driving hazard. Replace the parts with parts having the same part number or equivalent.
- It is very important to keep parts and the area clean when repairing the brake system.
- If the vehicle is equipped with a mobile communication system, refer to the precaution in the IN section.

# TROUBLESHOOTING

## PROBLEM SYMPTOMS TABLE

BR0R9-06

Use the table below to help you 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.

Symptom	Suspect Area	See page
Lower pedal or spongy pedal	1. Brake system (Fluid leaks) 2. Brake system (Air in) 3. Piston seals (Worn or damaged) 4. Rear brake shoe clearance (Out of adjustment) 5. Master cylinder (Faulty) 6. Booster push rod (Out of adjustment)	<a href="#">DI-145</a> <a href="#">BR-4</a> <a href="#">BR-23</a> <a href="#">BR-33</a> <a href="#">BR-9</a> <a href="#">BR-18</a>
Brake drag	1. Brake pedal freeplay (Minimal) 2. Parking brake lever travel (Out of adjustment) 3. Parking brake wire (Sticking) 4. Rear brake shoe clearance (Out of adjustment) 5. Pad or lining (Cracked or distorted) 6. Piston (Stuck) 7. Piston (Frozen) 8. Anchor or return spring (Faulty) 9. Booster push rod (Out of adjustment) 10. Booster system (Vacuum leaks) 11. Master cylinder (Faulty)	<a href="#">BR-6</a> <a href="#">BR-8</a> - <a href="#">BR-33</a> <a href="#">BR-20</a> <a href="#">BR-29</a> <a href="#">BR-23</a> <a href="#">BR-23</a> <a href="#">BR-29</a> <a href="#">BR-16</a> <a href="#">BR-16</a> <a href="#">BR-9</a>
Brake pull	1. Piston (Stuck) 2. Pad or lining (Oily) 3. Piston (Frozen) 4. Disc (Scored) 5. Pad or lining (Cracked or distorted)	<a href="#">BR-23</a> <a href="#">BR-20</a> <a href="#">BR-29</a> <a href="#">BR-23</a> <a href="#">BR-23</a> <a href="#">BR-20</a> <a href="#">BR-29</a>
Hard pedal but brake inefficient	1. Brake system (Fluid leaks) 2. Brake system (Air in) 3. Pad or lining (Worn) 4. Pad or lining (Cracked or distorted) 5. Rear brake shoe clearance (Out of adjustment) 6. Pad or lining (Oily) 7. Pad or lining (Glazed) 8. Disc (Scored) 9. Booster push rod (Out of adjustment) 10. Booster system (Vacuum leaks)	<a href="#">DI-145</a> <a href="#">BR-4</a> <a href="#">BR-20</a> <a href="#">BR-29</a> <a href="#">BR-20</a> <a href="#">BR-29</a> <a href="#">BR-33</a> <a href="#">BR-20</a> <a href="#">BR-29</a> <a href="#">BR-20</a> <a href="#">BR-29</a> <a href="#">BR-23</a> <a href="#">BR-16</a> <a href="#">BR-9</a>

## BRAKE - TROUBLESHOOTING

Symptom	Suspect Area	See page
Noise from brake	1. Pad or lining (Cracked or distorted)	<a href="#">BR-20</a>
		<a href="#">BR-29</a>
	2. Installation bolt (Loosen)	<a href="#">BR-23</a>
	3. Disc (Scored)	<a href="#">BR-23</a>
	4. Pad support plate (Loosen)	<a href="#">BR-23</a>
	5. Sliding pin (Worn)	<a href="#">BR-23</a>
	6. Pad or lining (Dirty)	<a href="#">BR-20</a>
		<a href="#">BR-29</a>
	7. Pad or lining (Glazed)	<a href="#">BR-23</a>
		<a href="#">BR-29</a>
	8. Anchor or return spring (Faulty)	<a href="#">BR-29</a>
	9. Anti-squeal shim (Damage)	<a href="#">BR-20</a>
	10. Hold-down spring (Damage)	<a href="#">BR-29</a>

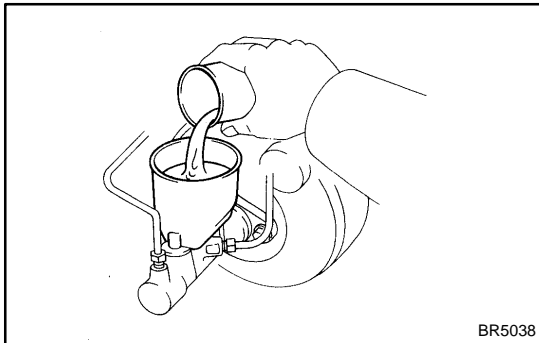
# BRAKE FLUID BLEEDING

## HINT:

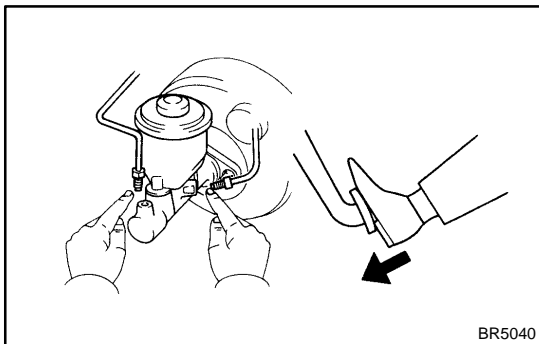
If any work is done on the brake system or air in the brake lines is suspected, bleed the system of air.

## NOTICE:

**Do not let brake fluid remain on a painted surface. Wash it off immediately.**



1. **FILL BRAKE RESERVOIR WITH BRAKE FLUID**  
Fluid: SAEJ1703 or FMVSS No.116 DOT3

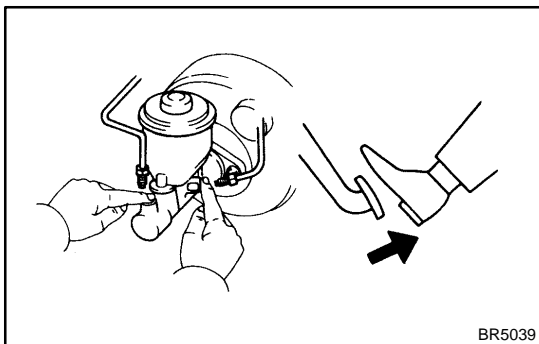


2. **BLEED MASTER CYLINDER**

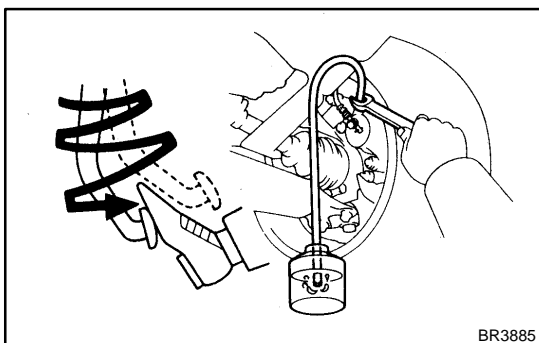
## HINT:

If the master cylinder has been disassembled or the reservoir becomes empty, bleed the master cylinder.

- (a) Disconnect the brake lines from the master cylinder.
- (b) Slowly depress the brake pedal and hold it.



- (c) Block off the outer holes with your finger and release the brake pedal.
- (d) Repeat (b) and (c) 3 or 4 times.



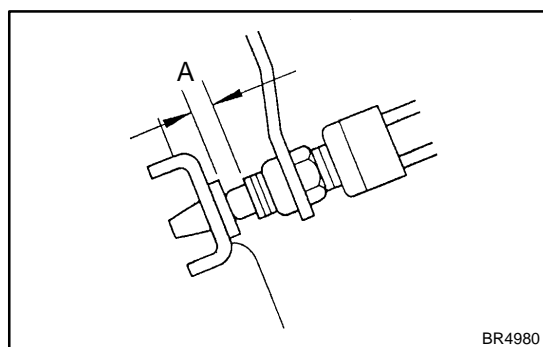
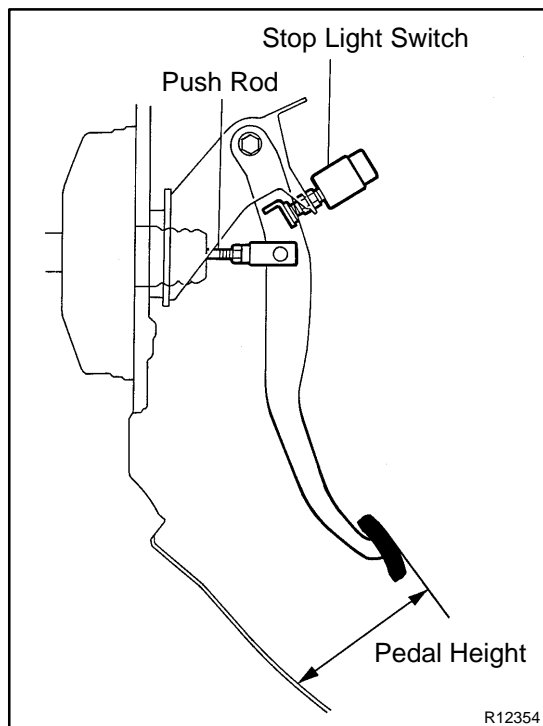
3. **BLEED BRAKE LINE**

- (a) Connect the vinyl tube to the brake caliper.
- (b) Depress the brake pedal several times, then loosen the bleeder plug with the pedal held down.
- (c) At the point when fluid stops coming out, tighten the bleeder plug, then release the brake pedal.
- (d) Repeat (b) and (c) until all the air in the fluid has been bled out.
- (e) Repeat the above procedure to bleed the air out of the brake line for each wheel.

**4. CHECK FLUID LEVEL IN RESERVOIR**

Check the fluid level and add fluid if necessary.

**Fluid: SAEJ1703 or FMVSS No.116 DOT3**



## BRAKE PEDAL ON-VEHICLE INSPECTION

BR1DT-01

### 1. CHECK PEDAL HEIGHT

Pedal height from asphalt sheet:

**EZ Grade:**

**143.0 - 153.0 mm (5.630 - 6.024 in.)**

**Except EZ Grade:**

**140.0 - 150.0 mm (5.512 - 5.906 in.)**

If the pedal height is incorrect, adjust it.

### 2. IF NECESSARY, ADJUST PEDAL HEIGHT

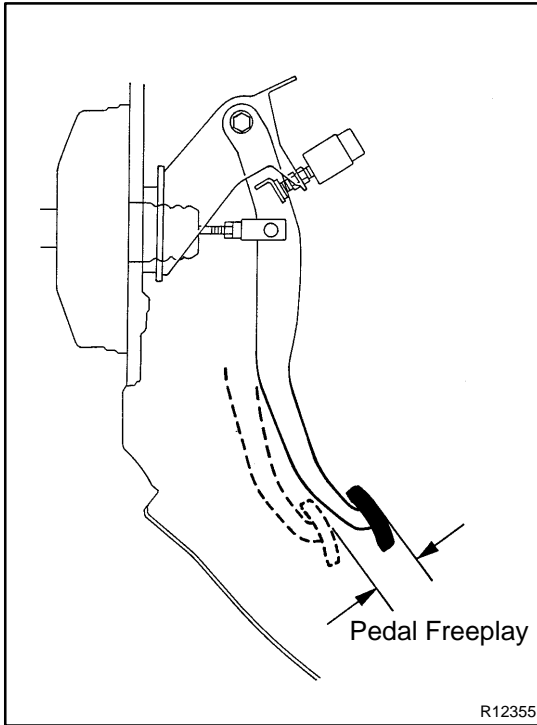
- Disconnect the connector from the stop light switch.
- Loosen the stop light switch lock nut and remove the stop light switch.
- Loosen the push rod lock nut.
- Adjust the pedal height by turning the pedal push rod.
- Tighten the push rod lock nut.
- Install the stop light switch and turn it until it lightly contacts the pedal stopper.
- Turn the stop light switch back one turn.
- Check the clearance (A) between stop light switch and pedal.

**Clearance: 0.5 - 2.4 mm (0.020 - 0.094 in.)**

- Tighten the stop light switch lock nut.
- Connect the connector to the stop light switch.
- Check the stop lights come on when the brake pedal is depressed, and go off when the brake pedal is released.
- After adjusting the pedal height, check the pedal freeplay.

#### HINT:

If clearance (A) between the stop light switch and the brake pedal stopper has been adjusted correctly, the pedal freeplay will meet the specifications.

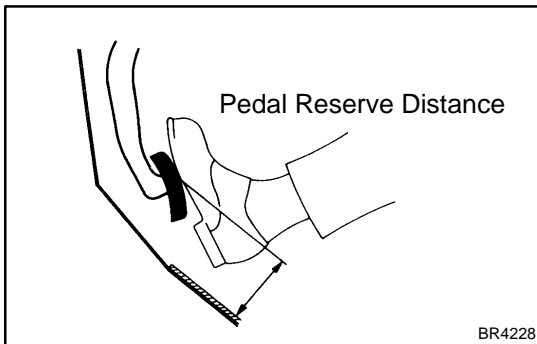


### 3. CHECK PEDAL FREEPLAY

- Stop the engine and depress the brake pedal several times until there is no more vacuum left in the booster.
- Push in the pedal by hand until the resistance begins to be felt, then measure the distance, as shown.

**Pedal freeplay: 1 - 6 mm (0.04 - 0.24 in.)**

If incorrect, check the stop light switch clearance. If the clearance is OK, then troubleshoot the brake system.



### 4. CHECK PEDAL RESERVE DISTANCE

- Release the parking brake.
- With the engine running, depress the pedal and measure the pedal reserve distance.

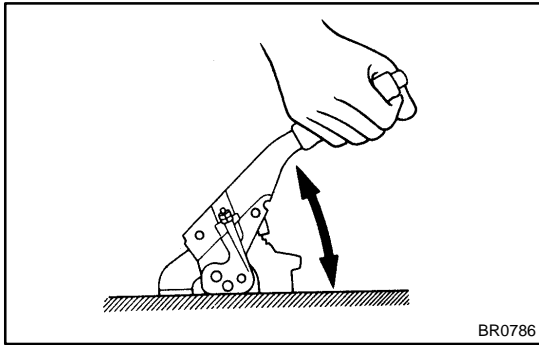
**Pedal reserve distance from asphalt sheet at 490 N (50 kgf, 110.2 lbf):**

**w/o ABS: More than 60 mm (2.36 in.)**

**w/ ABS: More than 55 mm (2.17 in.)**

If the reserve distance is incorrect, troubleshoot the brake system.





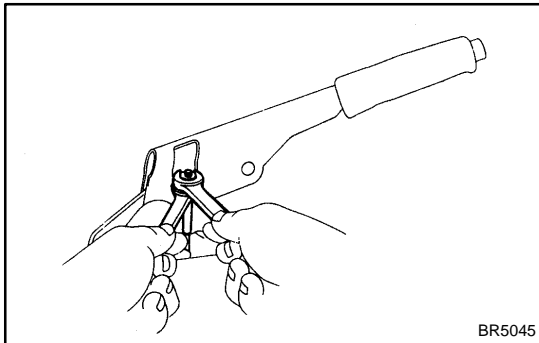
## PARKING BRAKE LEVER ON-VEHICLE INSPECTION

BR0RC-06

### 1. CHECK PARKING BRAKE LEVER TRAVEL

Pull the parking brake lever all the way up, and count the number of clicks.

**Parking brake lever travel at 196 N (20 kgf, 44.1 lbf):  
5 - 8 clicks**



### 2. IF NECESSARY, ADJUST PARKING BRAKE

#### HINT:

Before adjusting the parking brake, make sure that the rear brake shoe clearance has been adjusted.

For shoe clearance adjustment, see step 2 on page [BR-33](#).

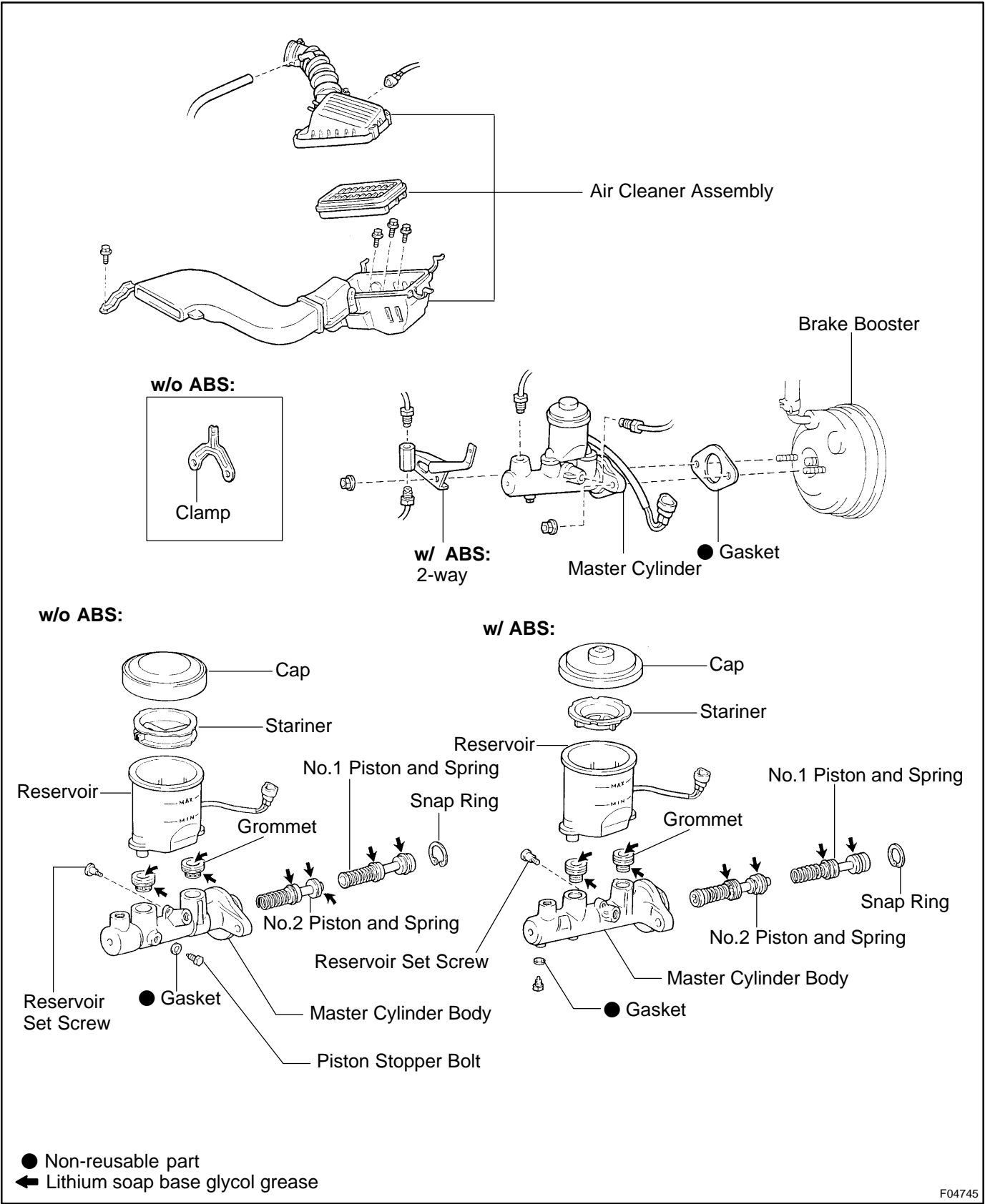
- Remove the console box.
- Loosen the lock nut and turn the adjusting nut until the lever travel is correct.
- Tighten the lock nut.

**Torque: 5.4 N·m (55 kgf·cm, 48 in.-lbf)**

- Install the console box.

# BRAKE MASTER CYLINDER COMPONENTS

BR0RD-06



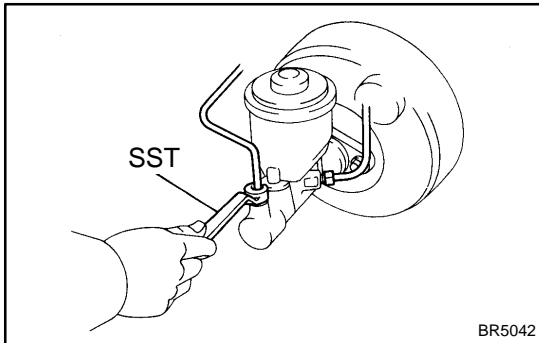
F04745

## REMOVAL

1. REMOVE AIR CLEANER ASSEMBLY
2. DISCONNECT LEVEL WARNING SWITCH CONNECTOR
3. DRAW OUT FLUID WITH SYRINGE

### NOTICE:

Do not let brake fluid remain on a painted surface. Wash it off immediately.

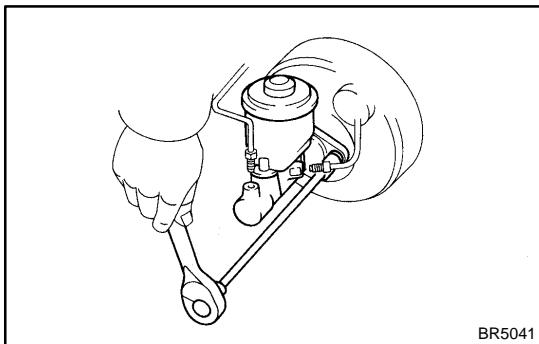


### 4. DISCONNECT BRAKE LINES

Using SST, disconnect the brake lines from the master cylinder.

SST 09751-3601 1

**Torque: 15 N·m (155 kgf-cm, 11 ft-lbf)**



### 5. REMOVE MASTER CYLINDER

#### (a) w/o ABS:

Remove the 2 mounting nuts, clamp and pull out the master cylinder and gasket.

**Torque: 13 N·m (130 kgf-cm, 9 ft-lbf)**

#### (b) w/ ABS:

Remove the 2 mounting nuts, 2-way and pull out the master cylinder and gasket.

**Torque: 13 N·m (130 kgf-cm, 9 ft-lbf)**

## DISASSEMBLY

### 1. REMOVE RESERVOIR

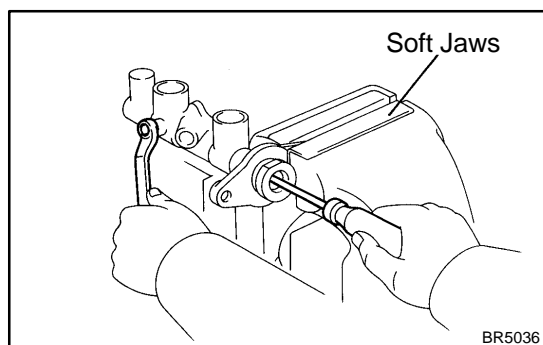
- (a) Remove the set screw and pull out the reservoir.

**Torque: 1.7 N·m (17.5 kgf·cm, 15.2 in.-lbf)**

- (b) Remove the cap and strainer from the reservoir.

### 2. REMOVE 2 GROMMETS

### 3. PLACE CYLINDER IN VISE



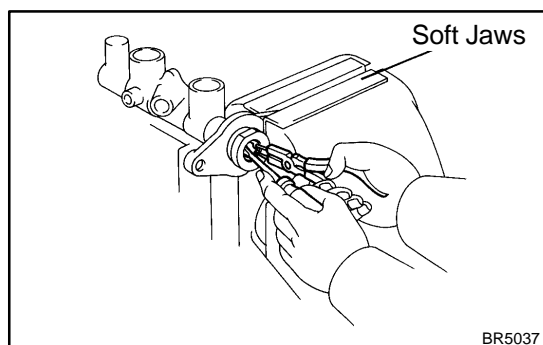
### 4. REMOVE PISTON STOPPER BOLT

Using a screwdriver, push the pistons in all the way and remove the piston stopper bolt and gasket.

HINT:

Tape the screwdriver tip before use.

**Torque: 10 N·m (100 kgf·cm, 7 ft-lbf)**



### 5. REMOVE PISTONS

- (a) Push in the piston with a screwdriver and remove the snap ring with snap ring pliers.

- (b) Remove the No.1 piston and spring by hand, pulling straight out, not at an angle.

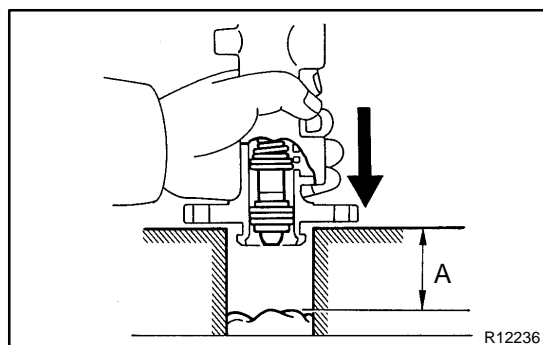
**NOTICE:**

- If pulled out and installed at an angle, there is a possibility that the cylinder bore could be damaged.
- Be careful not to damage the rubber lips on the pistons.

- (c) Place a rag and 2 wooden blocks on the work table and lightly tap the cylinder flange against the block edges until the No.2 piston drops out of the cylinder.

HINT:

Make sure the distance (A) from the rag to the top of the blocks is at least 100 mm (3.94 in.).



## INSPECTION

### HINT:

Clean the disassembled parts with compressed air.

- 1. INSPECT CYLINDER BORE FOR RUST OR SCORING**
- 2. INSPECT CYLINDER FOR WEAR OR DAMAGE**

If necessary, clean or replace the cylinder.

## REASSEMBLY

Reassembly is in the reverse order of disassembly (See page [BR-11](#)).

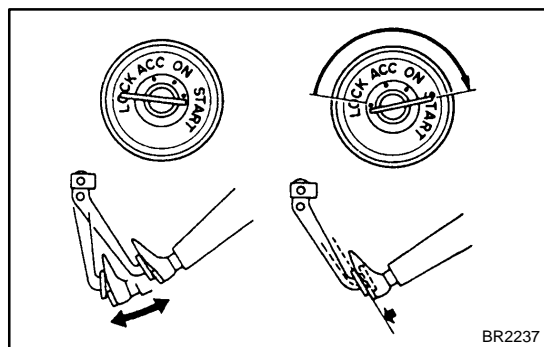
### NOTICE:

Apply lithium soap base glycol grease to the rubber parts indicated by arrows (See page [BR-9](#)).

## INSTALLATION

Installation is in the reverse order of removal (See page [BR-10](#) ).

1. BEFORE INSTALLATION, ADJUST LENGTH OF BRAKE BOOSTER PUSH ROD (See page [BR-18](#) )
2. AFTER INSTALLATION, FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM (See page [BR-4](#) )
3. CHECK FOR LEAKS, CHECK AND ADJUST BRAKE PEDAL (See page [BR-6](#) )

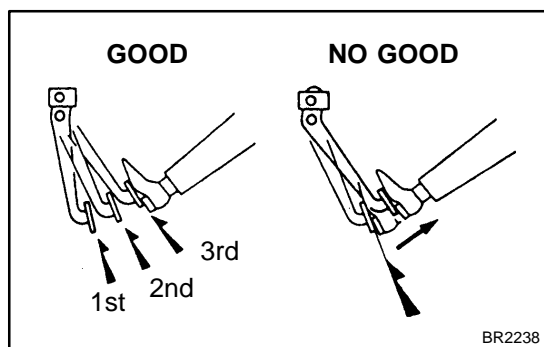


## BRAKE BOOSTER ASSEMBLY ON-VEHICLE INSPECTION

BR0RJ-01

### 1. OPERATING CHECK

- (a) Depress the brake pedal several times with the engine off and check that there is no change in the pedal reserve distance.
- (b) Depress the brake pedal and start the engine. If the pedal goes down slightly, operation is normal.



### 2. AIR TIGHTNESS CHECK

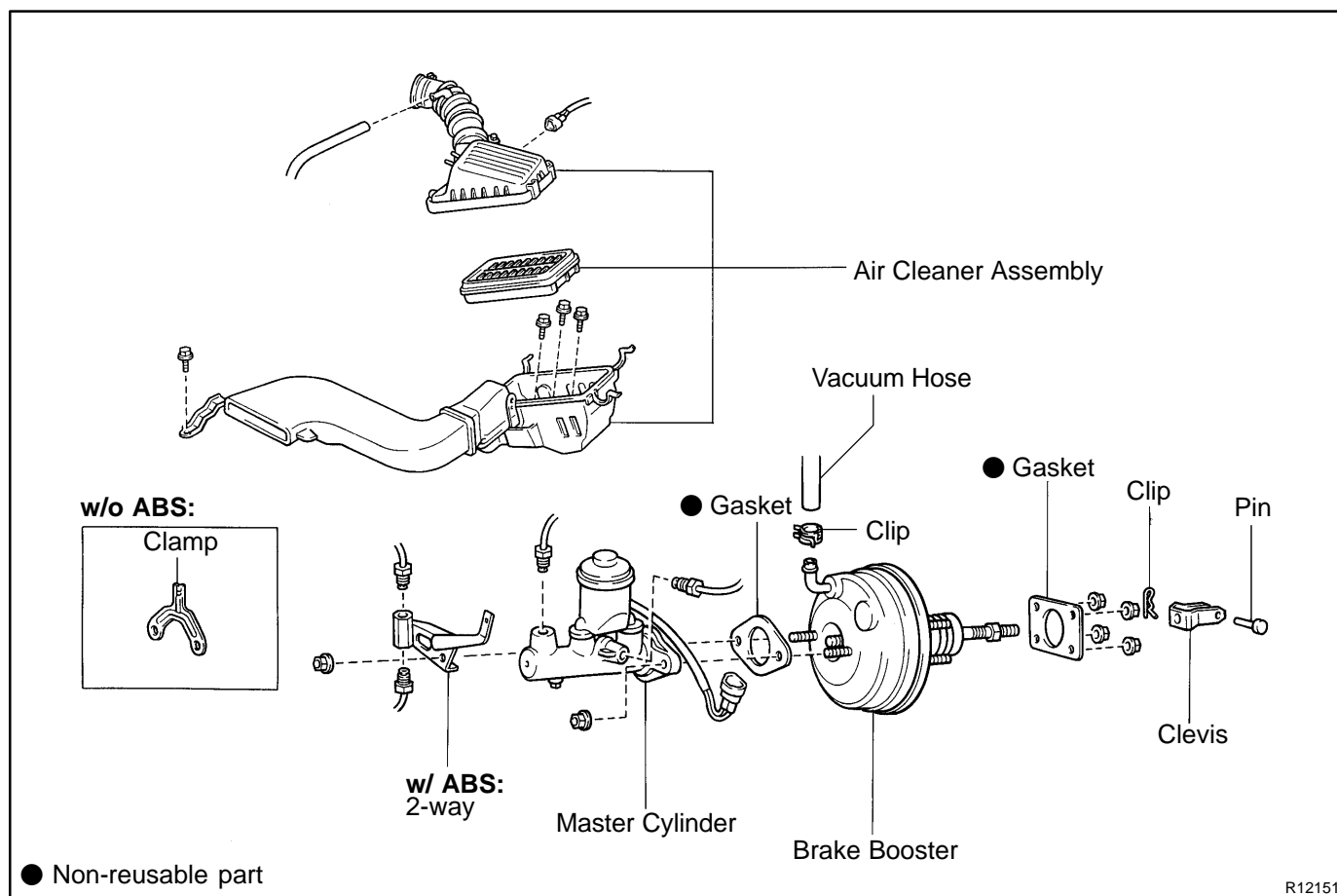
- (a) Start the engine and stop it after 1 or 2 minutes. Depress the brake pedal several times slowly.

If the pedal goes down farthest the 1st time, but gradually rises after the 2nd or 3rd time, the booster is air tight.

- (b) Depress the brake pedal while the engine is running, and stop the engine with the pedal depressed. If there is no change in the pedal reserve travel after holding the pedal for 30 seconds, the booster is air tight.



# COMPONENTS



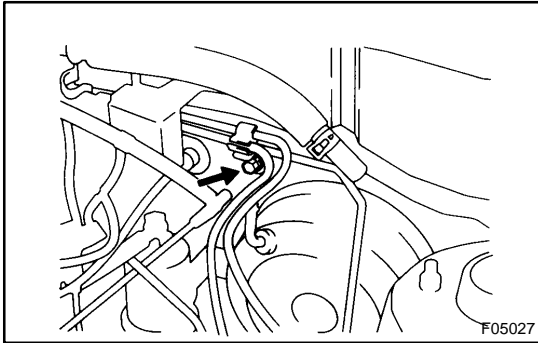
R12151

## REMOVAL

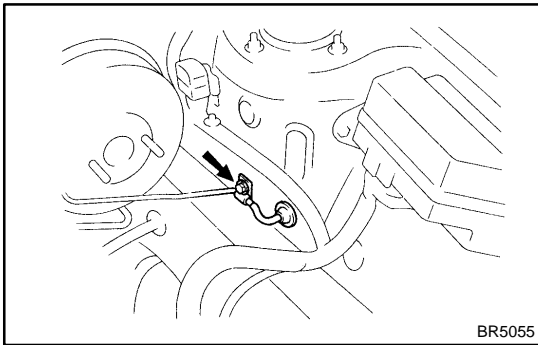
1. REMOVE MASTER CYLINDER (See page [BR-10](#) )
2. DISCONNECT VACUUM HOSE FROM BRAKE BOOSTER
3. REMOVE PEDAL RETURN SPRING
4. REMOVE CLIP AND CLEVIS PIN

### 5. REMOVE BRAKE BOOSTER

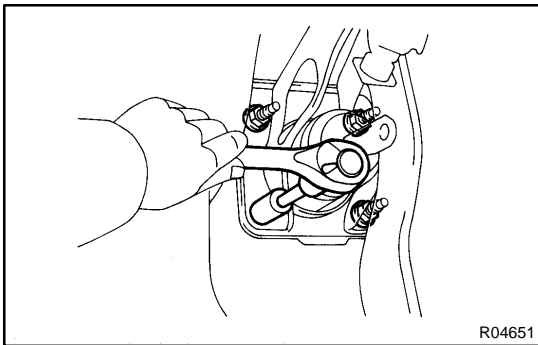
- (a) Remove the No.1 brake line clamp.



- (b) Remove the No.2 brake line clamp.



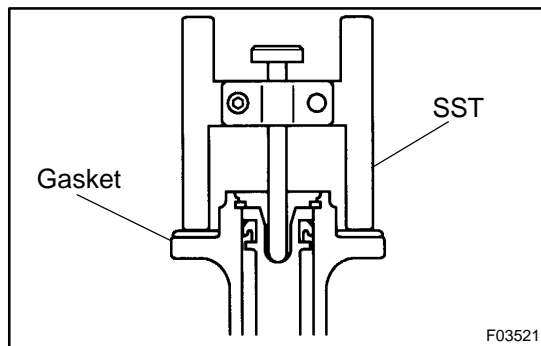
- (c) Remove the 4 nuts and clevis.  
(d) Pull out the brake booster and gasket.



## INSTALLATION

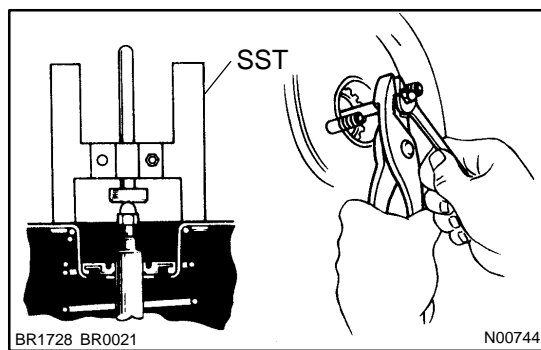
### 1. INSTALL BRAKE BOOSTER

- Install the booster and a new gasket.
- Install the clevis to the operating rod.
- Install and torque the booster installation nuts.  
**Torque: 14 N·m (145 kgf-cm, 10 ft-lbf)**
- Insert the clevis pin into the clevis and brake pedal, and install the clip to the clevis pin.
- Install the pedal return spring.
- Install the No.1 brake line clamp to the body.
- Install the No.2 brake line clamp to the body.



### 2. ADJUST LENGTH OF BOOSTER PUSH ROD

- Install the gasket on the master cylinder.
- Set SST on the gasket, and lower the pin until its tip slightly touches the piston.  
SST 09737-00010



- Turn SST upside down, and set it on the booster.  
SST 09737-00010
- Measure the clearance between the booster push rod and pin head (SST).  
**Clearance: 0 mm (0 in.)**
- Adjust the booster push rod length until the push rod slightly touches the pin head.

#### HINT:

When loosening the push rod nut, depress the brake pedal enough so that the push rod sticks out.

### 3. INSTALL MASTER CYLINDER

### 4. CONNECT VACUUM HOSE TO BRAKE BOOSTER

### 5. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM (See page [BR-4](#))

### 6. CHECK FOR LEAKS

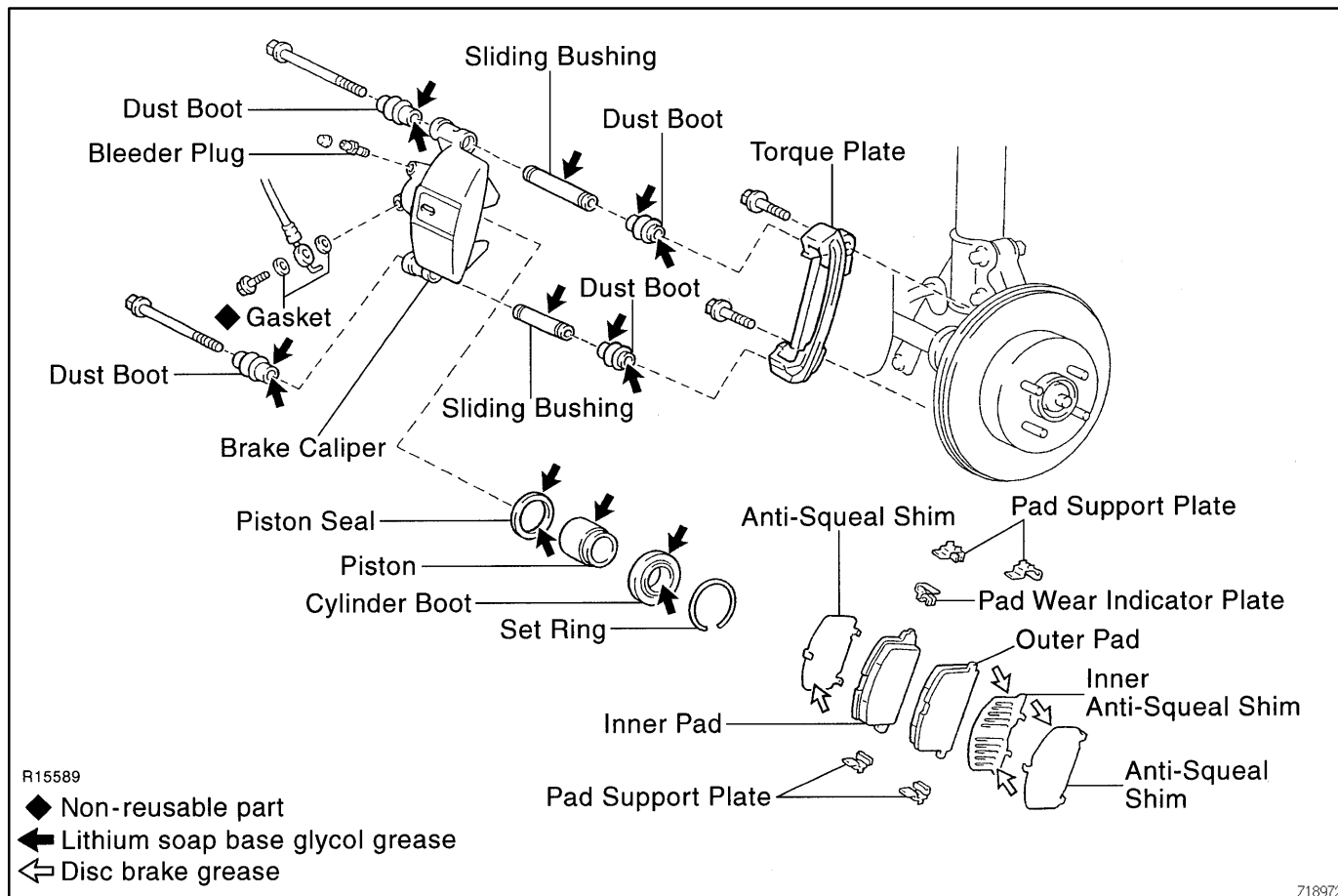
**7. CHECK AND ADJUST BRAKE PEDAL****(See page [BR-6](#) )**

Check and adjust the brake pedal, then tighten the clevis lock nut.

**Torque: 25 N·m (260 kgf-cm, 19 ft-lbf)****8. DO OPERATIONAL CHECK****(See page [BR-15](#) )**

# FRONT BRAKE PAD COMPONENTS

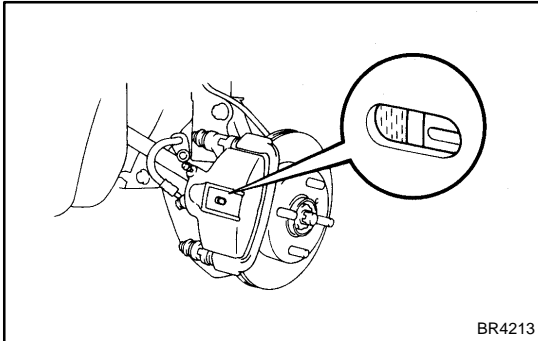
BR0RN-05



## REPLACEMENT

### 1. REMOVE FRONT WHEEL

Remove the wheel and temporarily fasten the disc with hub nuts.

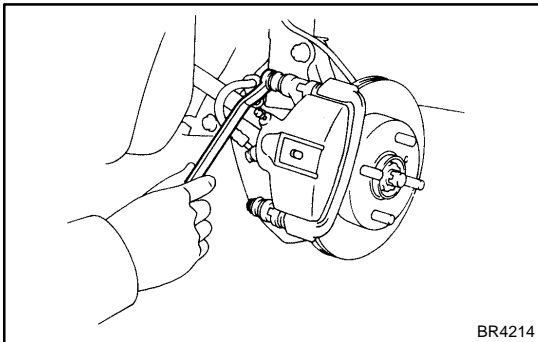


BR4213

### 2. INSPECT PAD LINING THICKNESS

Check the pad thickness through the caliper inspection hole and replace the pads if they are not within the specification.

**Minimum thickness: 1.0 mm (0.039 in.)**



BR4214

### 3. REMOVE CALIPER

- Remove the 2 installation bolts from the torque plate.
- Remove the caliper and suspend it securely.

**HINT:**

Do not disconnect the flexible hose.

### 4. REMOVE THESE PARTS:

- 2 brake pads
- 3 anti-squeal shims
- Pad wear indicator plate
- 4 pad support plates

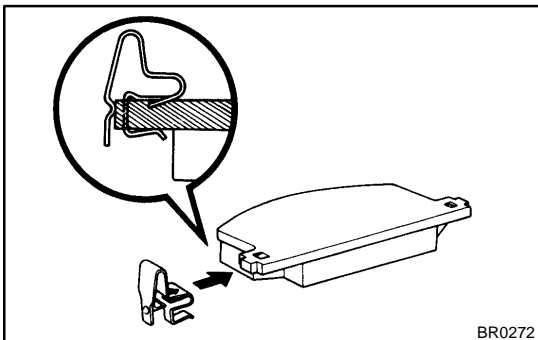
**NOTICE:**

The support plates can be used again provided that they have sufficient rebound, no deformation, cracks or wear, and have had all rust, dirt and foreign particles cleaned off.

### 5. CHECK DISC THICKNESS AND RUNOUT

(See page [BR-26](#) )

### 6. INSTALL 4 PAD SUPPORT PLATES



BR0272

### 7. INSTALL NEW PADS

**NOTICE:**

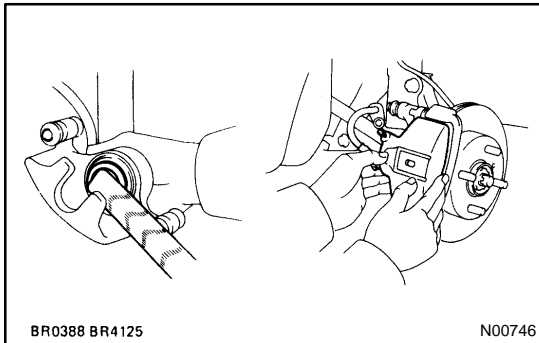
When replacing worn pads, the anti-squeal shims and wear indicator plates must be replaced together with the pads.

- Install a pad wear indicator plate on the inner pad.
- Apply disc brake grease to the anti-squeal shims (See page [BR-23](#) ).
- Install the 2 anti-squeal shims on the outer pad.
- Install the anti-squeal shim on the inner pad

- (e) Install inner pad with the pad wear indicator plate facing upward.
- (f) Install outer pad.

**NOTICE:**

**There should be no oil or grease adhering to the friction surfaces of the pads or the disc.**

**8. INSTALL CALIPER**

- (a) Draw out a small amount of brake fluid from the reservoir.
- (b) Press in the piston with a hammer handle or an equivalent.

**HINT:**

If the piston is difficult to push in, loosen the bleeder plug and push in the piston while letting some brake fluid escape.

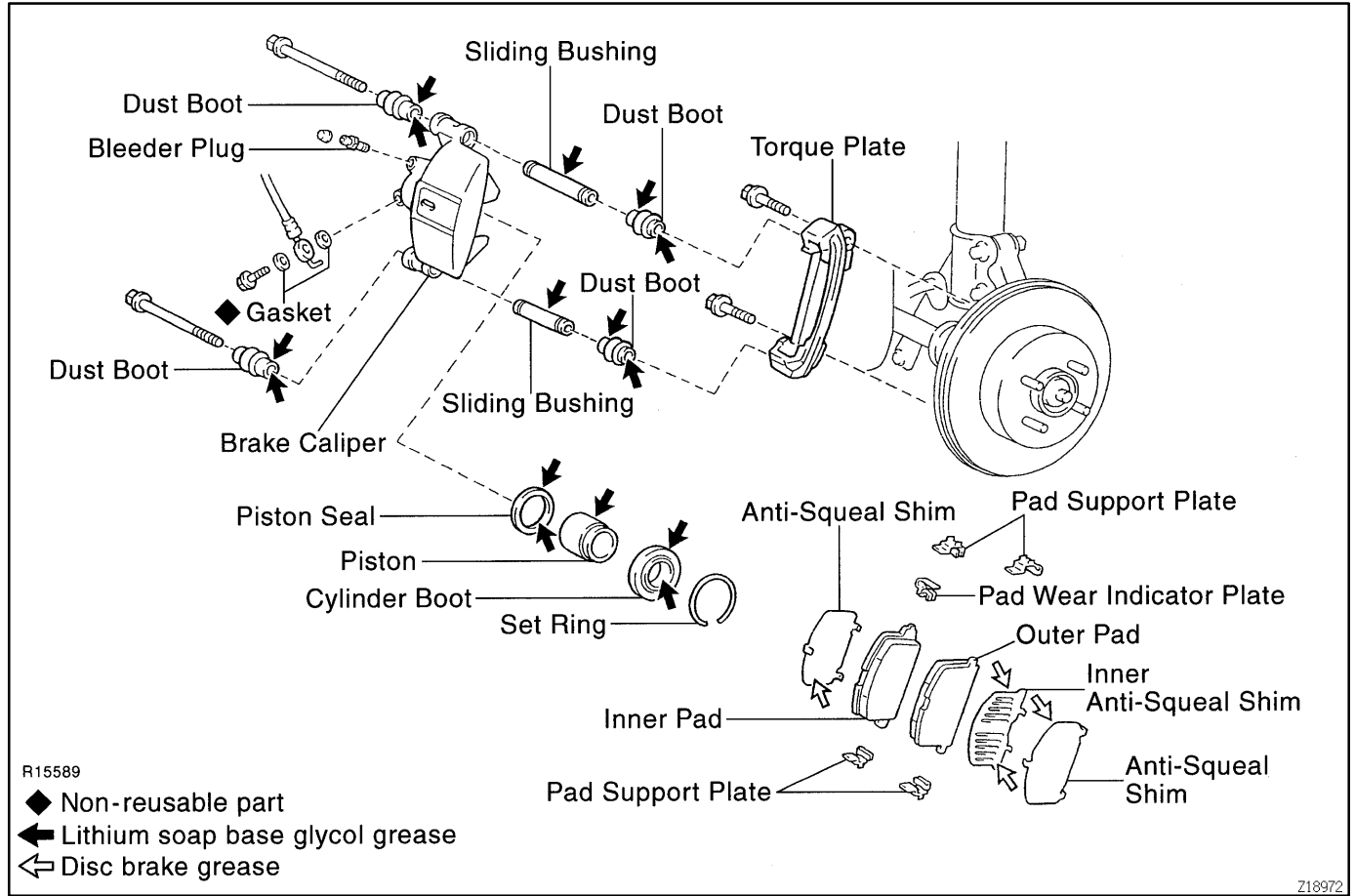
- (c) Install the caliper.
- (d) Install and torque the 2 installation bolts.

**Torque: 25 N·m (255 kgf-cm, 18 ft-lbf)**

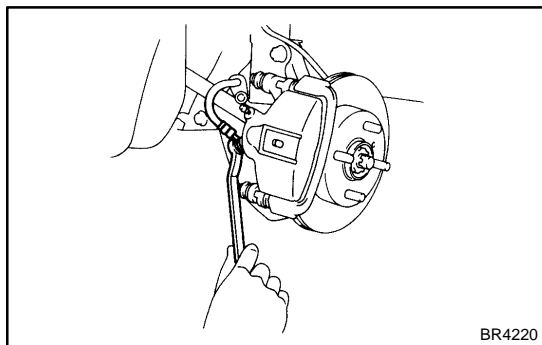
**9. INSTALL FRONT WHEEL****10. CHECK THAT FLUID LEVEL IS AT MAX LINE**

# FRONT BRAKE CALIPER COMPONENTS

BR0RP-06







## REMOVAL

### 1. DISCONNECT FLEXIBLE HOSE

- (a) Remove the union bolt and 2 gaskets from the caliper, then disconnect the flexible hose from the caliper.

**Torque: 30 N·m (310 kgf-cm, 22 ft-lbf)**

#### HINT:

Install the flexible hose lock securely in the lock hole in the caliper.

- (b) Use a container to catch the brake fluid as it drains out.

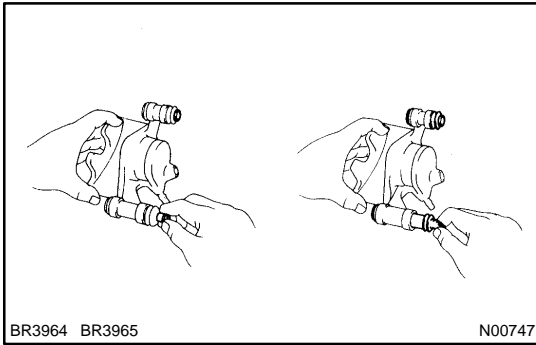
### 2. REMOVE CALIPER

Remove the 2 installation bolts, and caliper.

**Torque: 25 N·m (255 kgf-cm, 18 ft-lbf)**

### 3. REMOVE THESE PARTS:

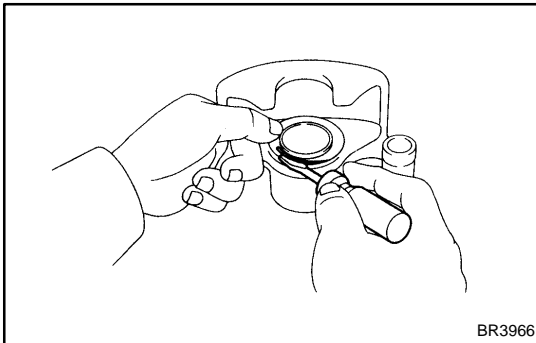
- (a) 2 brake pads with anti-squeal shims.  
(b) 4 pad support plates.



## DISASSEMBLY

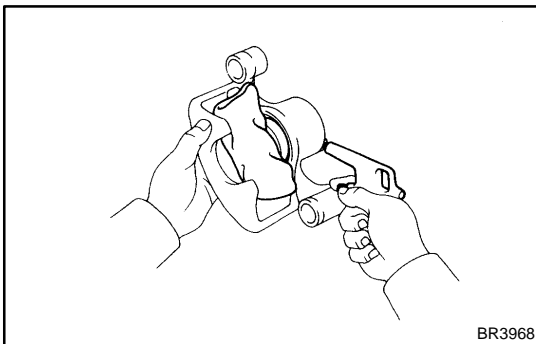
### 1. REMOVE THESE PARTS:

- (a) 2 sliding bushings.
- (b) 4 dust boots.



### 2. REMOVE CYLINDER BOOT SET RING AND CYLINDER BOOT

Using a screwdriver, remove the cylinder boot set ring and cylinder boot from the caliper.

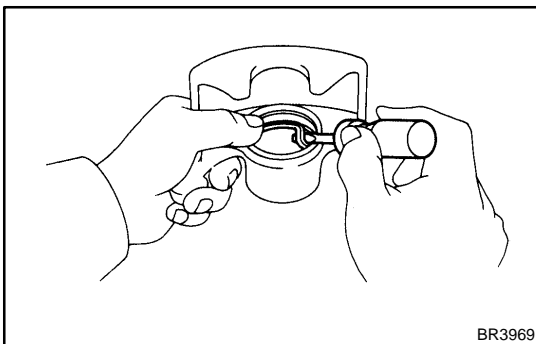


### 3. REMOVE PISTON

- (a) Place a piece of cloth or similar, between the piston and the caliper.
- (b) Use compressed air to remove the piston from the cylinder.

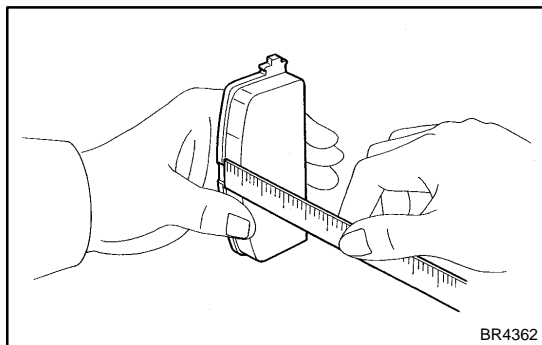
#### CAUTION:

**Do not place your fingers in front of the piston when using compressed air.**



### 4. REMOVE PISTON SEAL

Using a screwdriver, remove the piston seal from the cylinder.



## INSPECTION

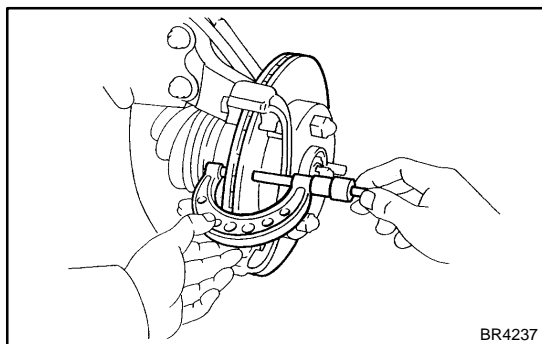
### 1. MEASURE PAD LINING THICKNESS

Using a ruler, measure the pad lining thickness.

**Standard thickness: 10.0 mm (0.394 in.)**

**Minimum thickness: 1.0 mm (0.039 in.)**

Replace the pad if the pad's thickness is at the minimum thickness or less, or if the pad has severe and uneven wear.



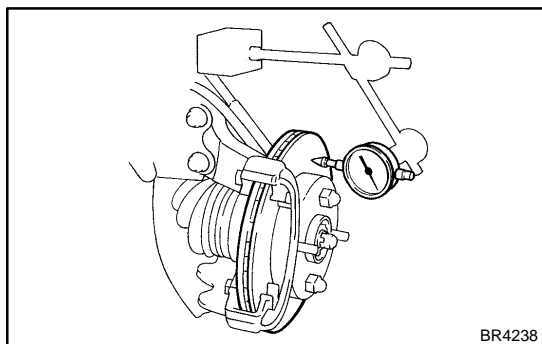
### 2. MEASURE DISC THICKNESS

Using a micrometer, measure the disc thickness.

**Standard thickness: 18.0 mm (0.709 in.)**

**Minimum thickness: 17.0 mm (0.689 in.)**

Replace the disc if the disc's thickness is at the minimum thickness or less. Replace the disc or grind it on a lathe if it is badly scored or worn unevenly.

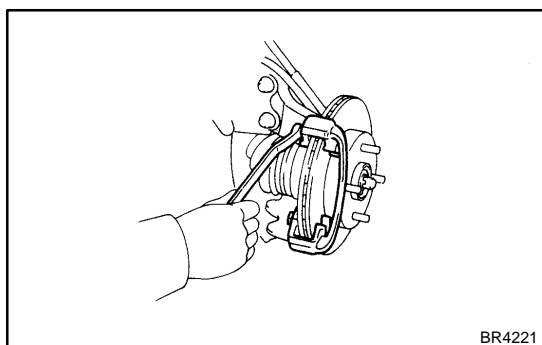


### 3. MEASURE DISC RUNOUT

Using a dial indicator, measure disc runout 10 mm (0.39 in.) away from the outer.

**Maximum disc runout: 0.07 mm (0.0028 in.)**

If the disc's runout is the maximum value or greater, check the bearing play is in the axial direction and check the axle hub runout (See page [SA-10](#)). If the bearing play and axle hub runout are not abnormal, adjust the disc runout or grind it on a "On-car" brake lathe.



### 4. IF NECESSARY, ADJUST DISC RUNOUT

- (a) Remove the torque plate from the knuckle.
- (b) Remove the hub nuts and the disc. Reinstall the disc in the position turned 1/4 from its original position on the hub. Install and torque the hub nuts.

**Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)**

Remeasure the disc runout. Make a note of the runout and the disc's position on the hub.

- (c) Repeat (b) until the disc has been installed on the 2 remaining hub positions.
- (d) If the minimum runout recorded in (b) and (c) is less than 0.07 mm (0.0028 in.), install the disc in that position.
- (e) If the minimum runout recorded in (b) and (c) is greater than 0.07 mm (0.0028 in.), replace the disc and repeat step 3.
- (f) Install the torque plate and tighten the 2 bolts.

**Torque: 88 N·m (900 kgf·cm, 65 ft·lbf)**

## REASSEMBLY

Reassembly is in the reverse order of disassembly (See page [BR-25](#) ).

### NOTICE:

Apply lithium soap base glycol grease to the parts indicated by arrows (See page [BR-23](#) ).

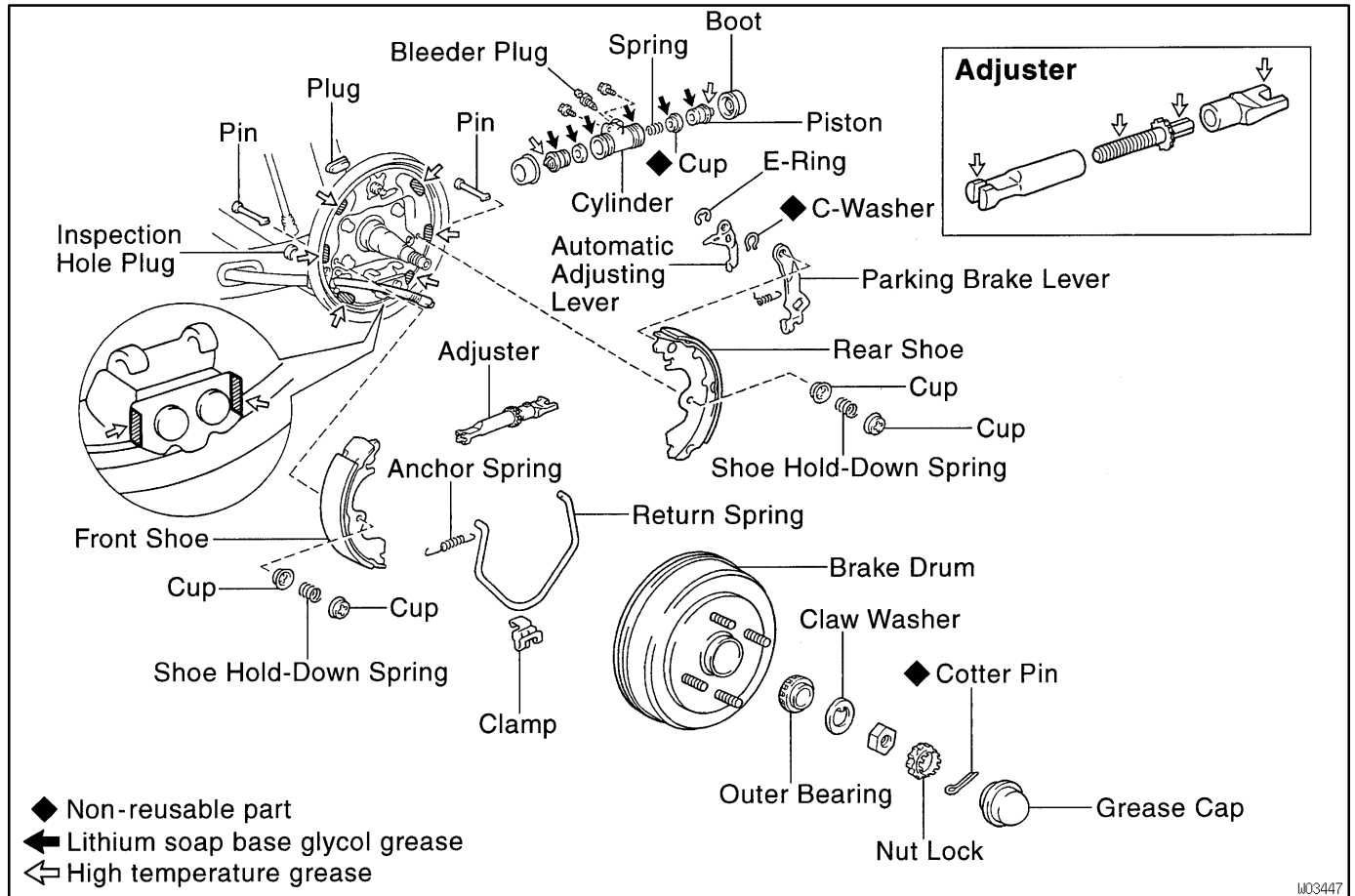
## INSTALLATION

Installation is in the reverse order of removal (See page [BR-24](#) ).

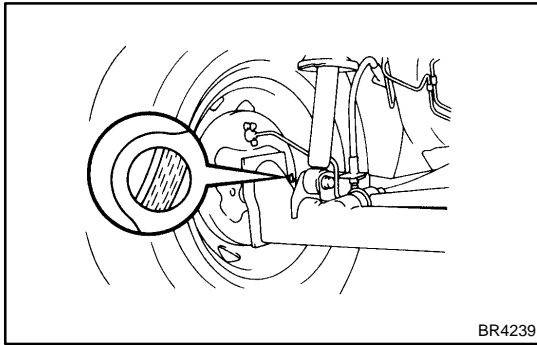
1. AFTER INSTALLATION, FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM (See page [BR-4](#) )
2. CHECK FOR LEAKS

# REAR DRUM BRAKE COMPONENTS

BR0RV-04



W03447



## REMOVAL

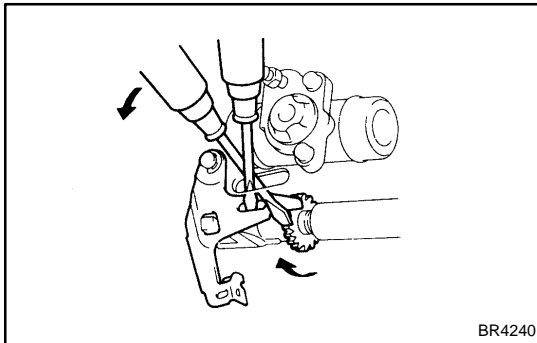
### 1. INSPECT SHOE LINING THICKNESS

Remove the inspection hole plug, and check the shoe lining thickness through the hole.

If less than minimum, replace the shoes.

**Minimum thickness: 1.0 mm (0.039 in.)**

### 2. REMOVE REAR WHEEL

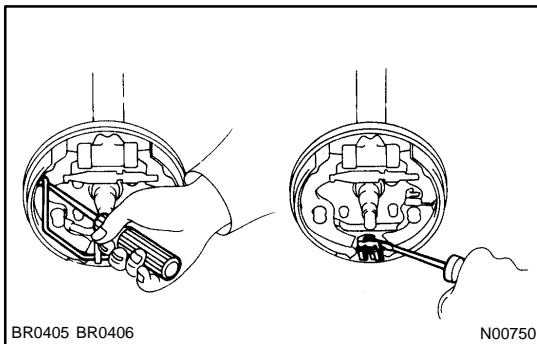


### 3. REMOVE BRAKE DRUM (See page SA-39 )

HINT:

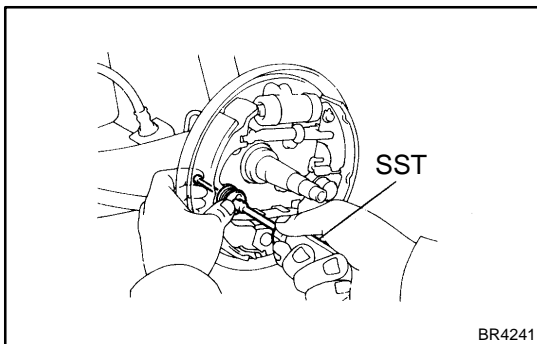
If the brake drum cannot be removed easily, do the following steps.

- Insert a screwdriver through the hole in the backing plate, and hold the automatic adjusting lever away from the adjuster.
- Using another screwdriver, reduce the brake shoe adjuster by turning the adjusting wheel.



### 4. REMOVE FRONT SHOE

- Using, remove the return spring and calmp.



- Using SST, remove the shoe hold-down spring, cups and pin.

SST 09718-00010

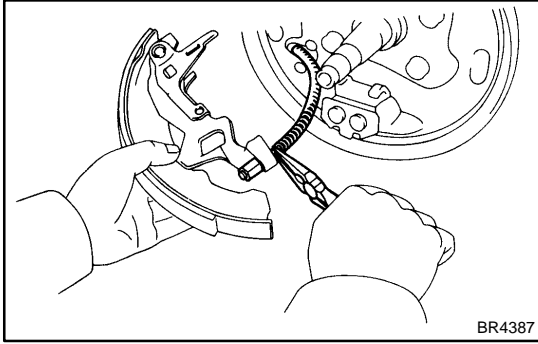
- Disconnect the anchor spring from the front shoe and remove the front shoe.
- Remove the anchor spring from the rear shoe.

### 5. REMOVE REAR SHOE

- Using SST, remove the shoe hold-down spring, cups and pin.

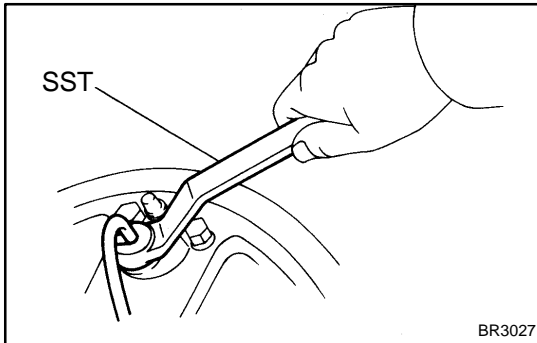
SST 09718-00010

- Using pliers, remove the adjusting lever spring.
- Remove the adjuster.



- (d) Using pliers, disconnect the parking brake cable from the parking brake lever and remove the rear shoe.
- 6. REMOVE AUTOMATIC ADJUSTING LEVER AND PARKING BRAKE LEVER**

- (a) Remove the E-ring.
- (b) Remove the automatic adjusting lever.
- (c) Remove the C-washer.
- (d) Remove the parking brake lever.



**7. REMOVE WHEEL CYLINDER**

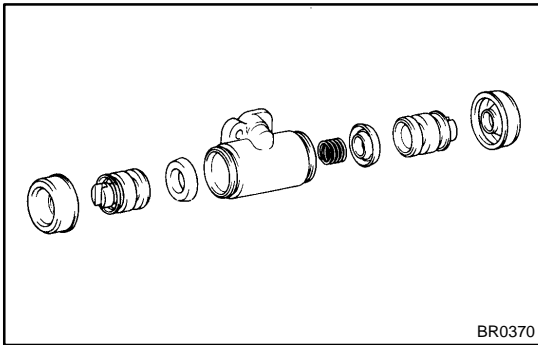
- (a) Using SST, disconnect the brake line. Use a container to catch the brake fluid.

SST 09751-3601 1

**Torque: 15 N·m (155 kgf-cm, 11 ft-lbf)**

- (b) Remove the 2 bolts and the wheel cylinder.

**Torque: 10 N·m (100 kgf-cm, 7 ft-lbf)**



**8. DISASSEMBLE WHEEL CYLINDER**

Remove the these parts from the wheel cylinder.

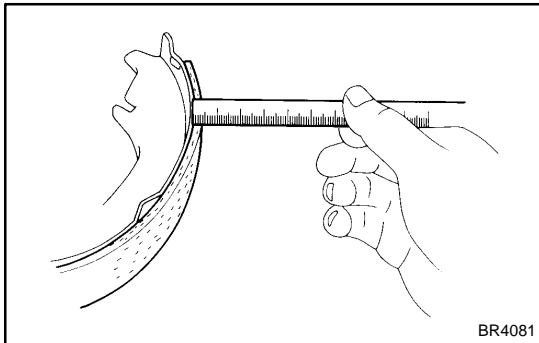
- 2 boots
- 2 pistons
- 2 piston cups
- Spring



## INSPECTION

### 1. INSPECT DISASSEMBLED PARTS

Inspect the disassembled parts for wear, rust or damage.



### 2. MEASURE BRAKE SHOE LINING THICKNESS

Using a ruler, measure the shoe lining thickness.

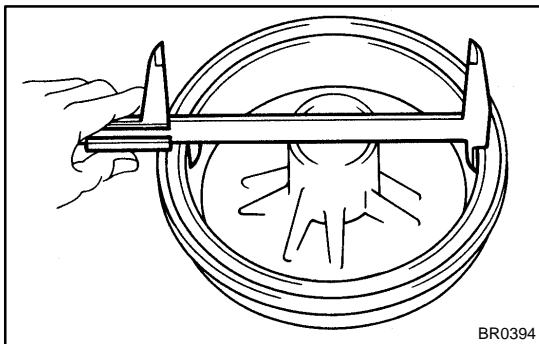
**Standard thickness: 4.0 mm (0.157 in.)**

**Minimum thickness: 1.0 mm (0.039 in.)**

If the thickness is less than the minimum or shoe lining shows signs of uneven wear, replace the brake shoes.

**HINT:**

If a brake shoes needs replacing, the brake shoes must be replaced as a set



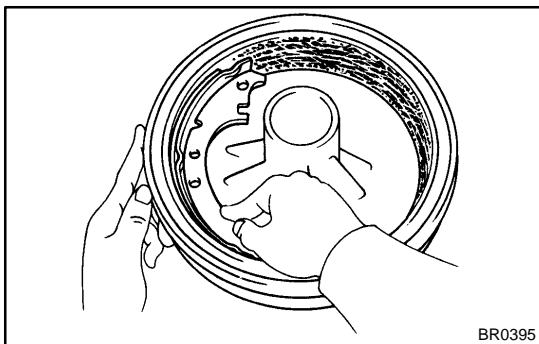
### 3. MEASURE BRAKE DRUM INSIDE DIAMETER

Using a vernier calipers, measure the inside diameter of the drum.

**Standard inside diameter: 180.0 mm (7.087 in.)**

**Maximum inside diameter: 181.0 mm (7.126 in.)**

If the drum is scored or worn, the brake drum may be lathed to the maximum inside diameter.



### 4. INSPECT REAR BRAKE LINING AND DRUM FOR PROPER CONTACT

If the contact between the brake lining and drum is improper, repair the lining with a brake shoe grinder, or replace the brake shoe assembly.

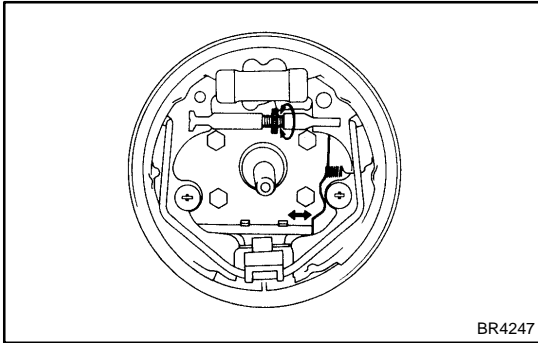
## INSTALLATION

Installation is in the reverse order of removal (See page [BR-30](#) ).

1. AFTER INSTALLATION, FILL BRAKE RESERVOIR WITH BRAKE FLUID, BRAKE SYSTEM

### NOTICE:

Apply lithium soap base glycol grease and high temperature grease to the parts indicated by the arrows (See page [BR-29](#) ).

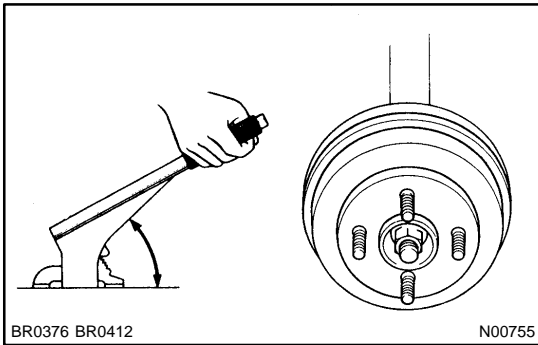


2. CHECK OPERATION OF AUTOMATIC ADJUSTING MECHANISM

- (a) Move the parking brake lever of the rear shoe back and forth. Check that the adjuster turns.

If the adjuster does not turn, check for incorrect installation of the rear brake.

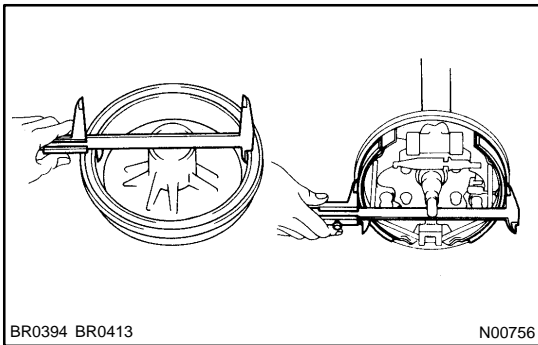
- (b) Adjust the adjuster length to the as short as possible.



- (c) Install the brake drum.
- (d) Pull the parking brake lever all the way up until a clicking sound can no longer be heard.

3. CHECK CLEARANCE BETWEEN BRAKE SHOES AND DRUM

- (a) Remove the brake drum (See page [SA-39](#) ).



- (b) Measure the brake drum inside diameter and diameter of the brake shoes. Check that the difference between the diameters is the correct shoe clearance.

**Shoe clearance: 0.6 mm (0.024 in.)**

If incorrect, check the parking brake system.

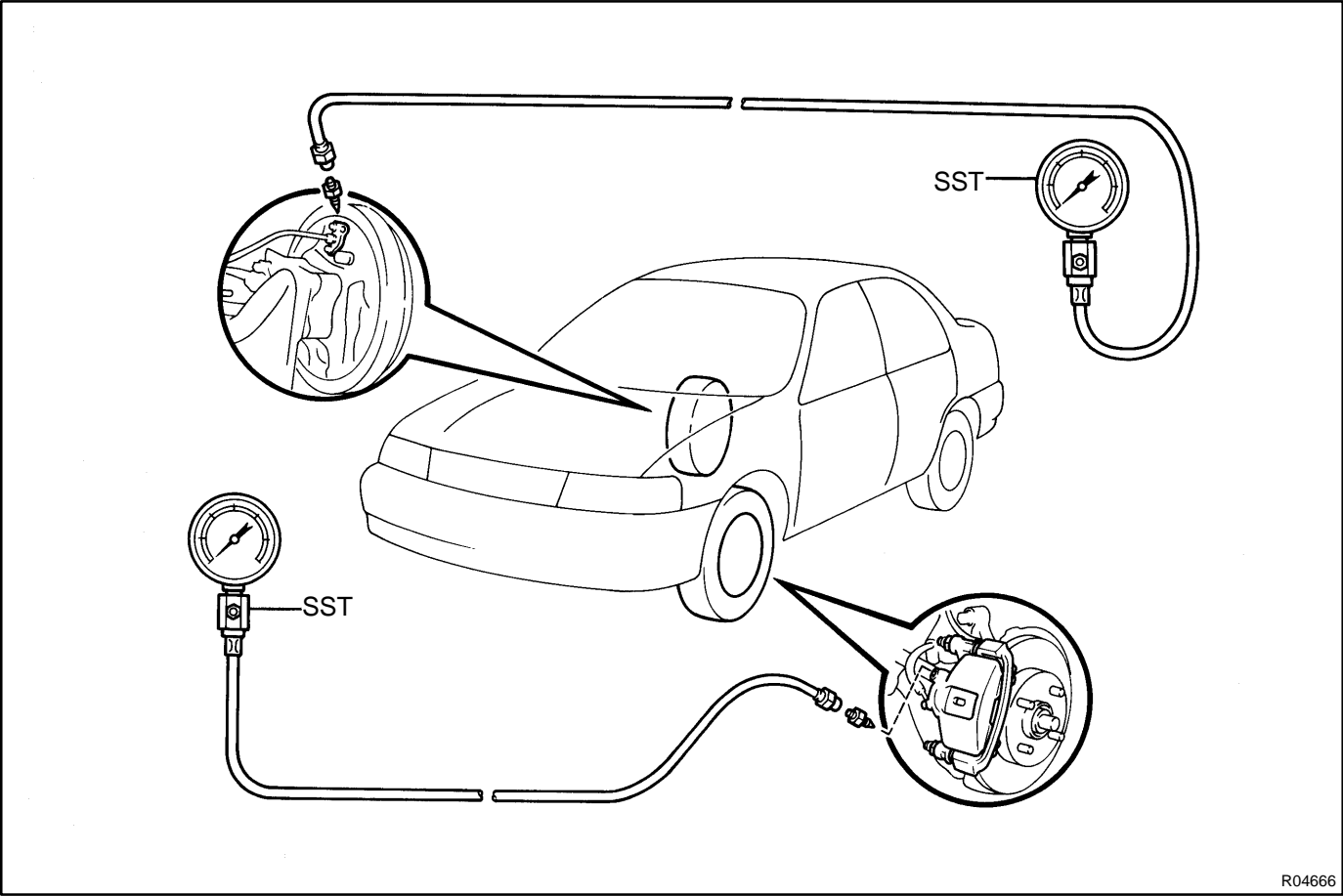
- (c) Install the brake drum (See page [SA-42](#) ).

# PROPORTIONING VALVE (P VALVE)

## ON-VEHICLE INSPECTION

BR0RZ-06

- 1. INSTALL LSPV GAUGE (SST)  
SST 09709-29018



R04666

- 2. BLEED AIR FROM FLUID PRESSURE GAUGE
- 3. RAISE FRONT BRAKE CALIPER PRESSURE AND CHECK REAR WHEEL CYLINDER PRESSURE  
w/o ABS

Front brake caliper pressure	Rear wheel cylinder pressure
2,452 kPa (25 kgf/cm <sup>2</sup> , 356 psi)	2,452 kPa (25 kgf/cm <sup>2</sup> , 356 psi)
7,845 kPa (80 kgf/cm <sup>2</sup> , 1,138 psi)	3,805 kPa (38.8 kgf/cm <sup>2</sup> , 552 psi)

w/ ABS

Front brake caliper pressure	Rear wheel cylinder pressure
2,942 kPa (30 kgf/cm <sup>2</sup> , 427 psi)	2,942 kPa (30 kgf/cm <sup>2</sup> , 427 psi)
7,845 kPa (80 kgf/cm <sup>2</sup> , 1,138 psi)	4,168 kPa (42.5 kgf/cm <sup>2</sup> , 604 psi)

When inspecting the fluid pressure, inspect the left front and right rear together, and the right front and left rear together.

If the rear wheel cylinder pressure is incorrect, replace the P valve assembly.

- 4. BLEED BRAKE SYSTEM (See page BR-4 )
- 5. CHECK FOR LEAKS

# ABS ACTUATOR ON-VEHICLE INSPECTION

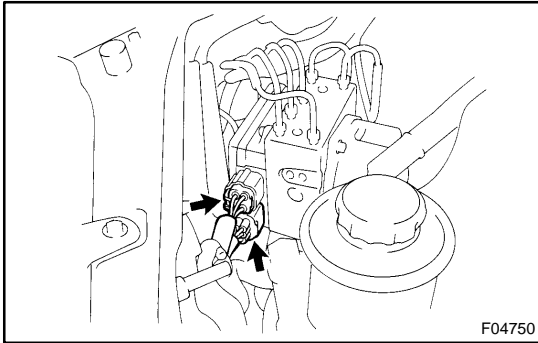
BR1DU-01

## 1. INSPECT BATTERY POSITIVE VOLTAGE

Battery positive voltage: 10 - 14 V

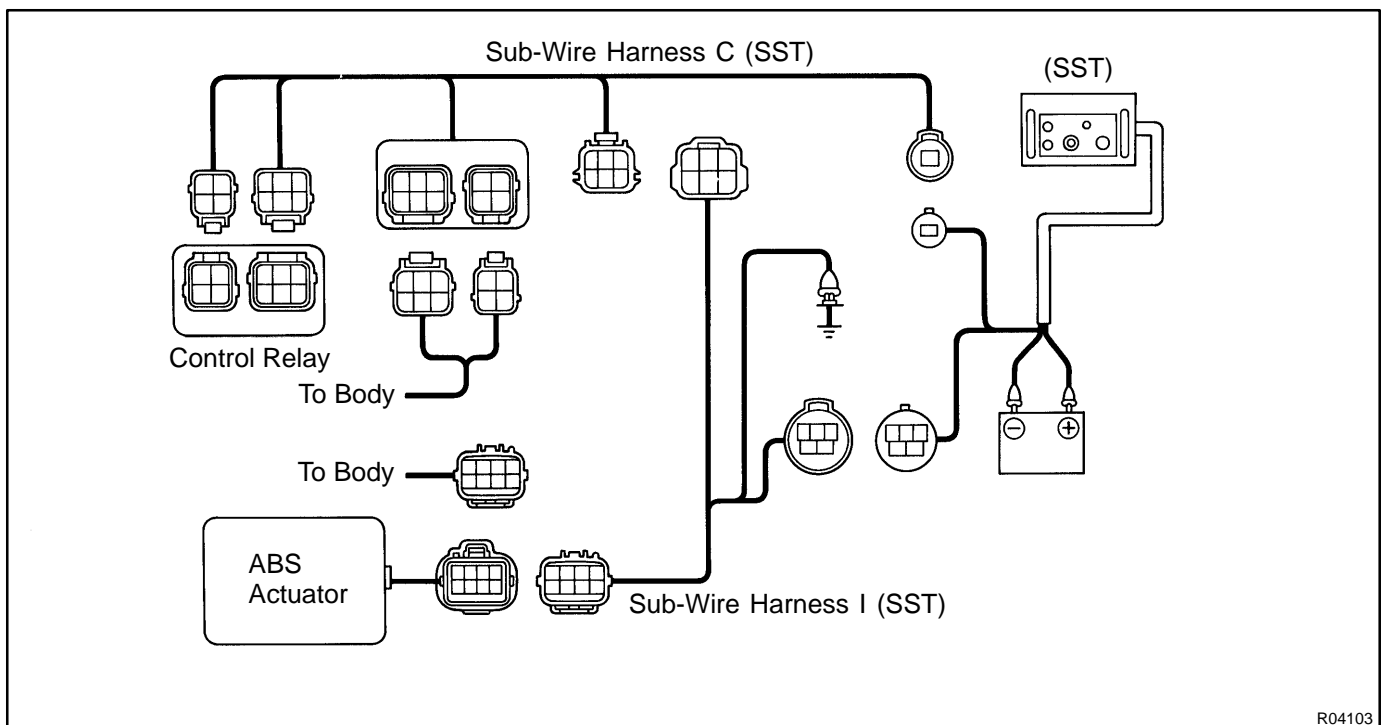
## 2. DISCONNECT CONNECTORS

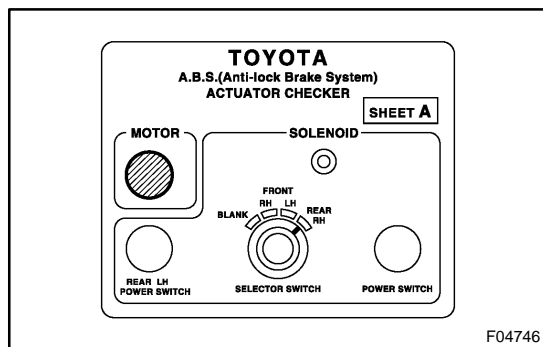
- Disconnect the 2 connectors from the control relay.
- Disconnect the connector from the actuator.



## 3. CONNECT ACTUATOR CHECKER (SST) TO ACTUATOR

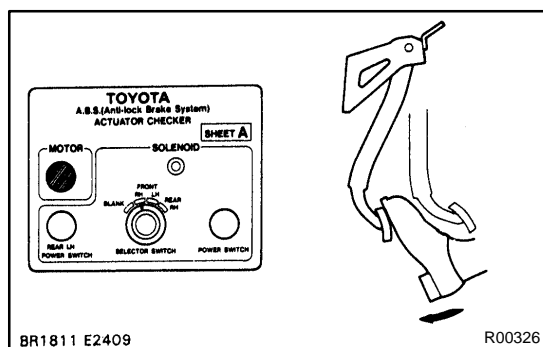
- Connect the actuator checker (SST) to the actuator, control relay and body side wire harnesses through the sub-wire harnesses C and I (SST), as shown.  
SST 09990-00150, 09990-00200, 09990-00300
- Connect the red cable of the checker to the battery positive (+) terminal and black cable to the negative (-) terminal. Connect the black cable of the sub-wire harnesses to the battery negative (-) terminal or body ground.
- Place the "SHEET A" (SST) on the actuator checker.  
SST 09990-00163



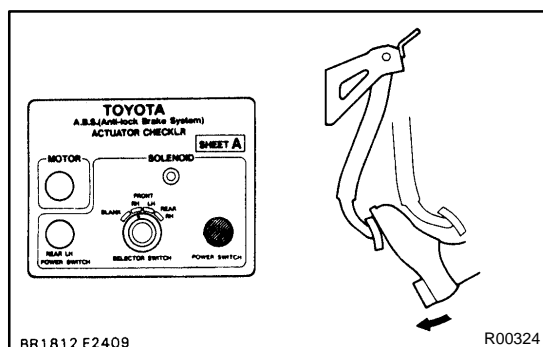


#### 4. INSPECT BRAKE ACTUATOR OPERATION

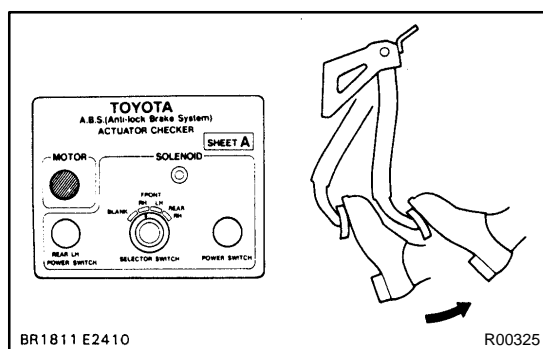
- Start the engine, and run it at idle.
- Turn the selector switch of the actuator checker to "FRONT RH" position.
- Push and hold in the MOTOR switch for a few seconds. Make sure that you can hear the motor running.
- Depress the brake pedal and hold it for about 15 seconds, and check that the brake pedal dose not go down.



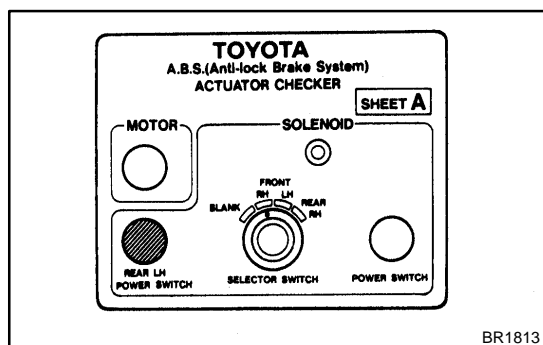
- With your foot still applied onto the brake pedal, push the MOTOR switch and check the brake pedal does not pulsate.



- Depress the brake pedal and hold it. As you hold the pedal down, push and hold in the POWER SWITCH for a few seconds. Check the pedal does not go down.
- With your foot still applied onto the brake pedal, release the POWER SWITCH and check that the pedal goes down.



- With your foot still applied on the brake pedal, push the MOTOR switch and check the brake pedal returns.
- Release the brake pedal.



#### 5. INSPECT FOR OHTER WHEELS

- Turn the selector switch to "FRONT LH" position.
  - Repeat (c) to (i) of step 4, check the actuator operation as before.
  - Similarly, inspect "REAR RH" and "REAR LH" position.
- HINT:

When inspecting "REAR LH" position, push the REAR LH switch instead of the POWER SWITCH, and you can inspect in any selector switch position.

**6. PUSH MOTOR SWITCH**

- (a) Push and hold in the MOTOR switch for a few seconds.
- (b) Stop the engine.

**7. DISCONNECT ACTUATOR CHECKER (SST)**

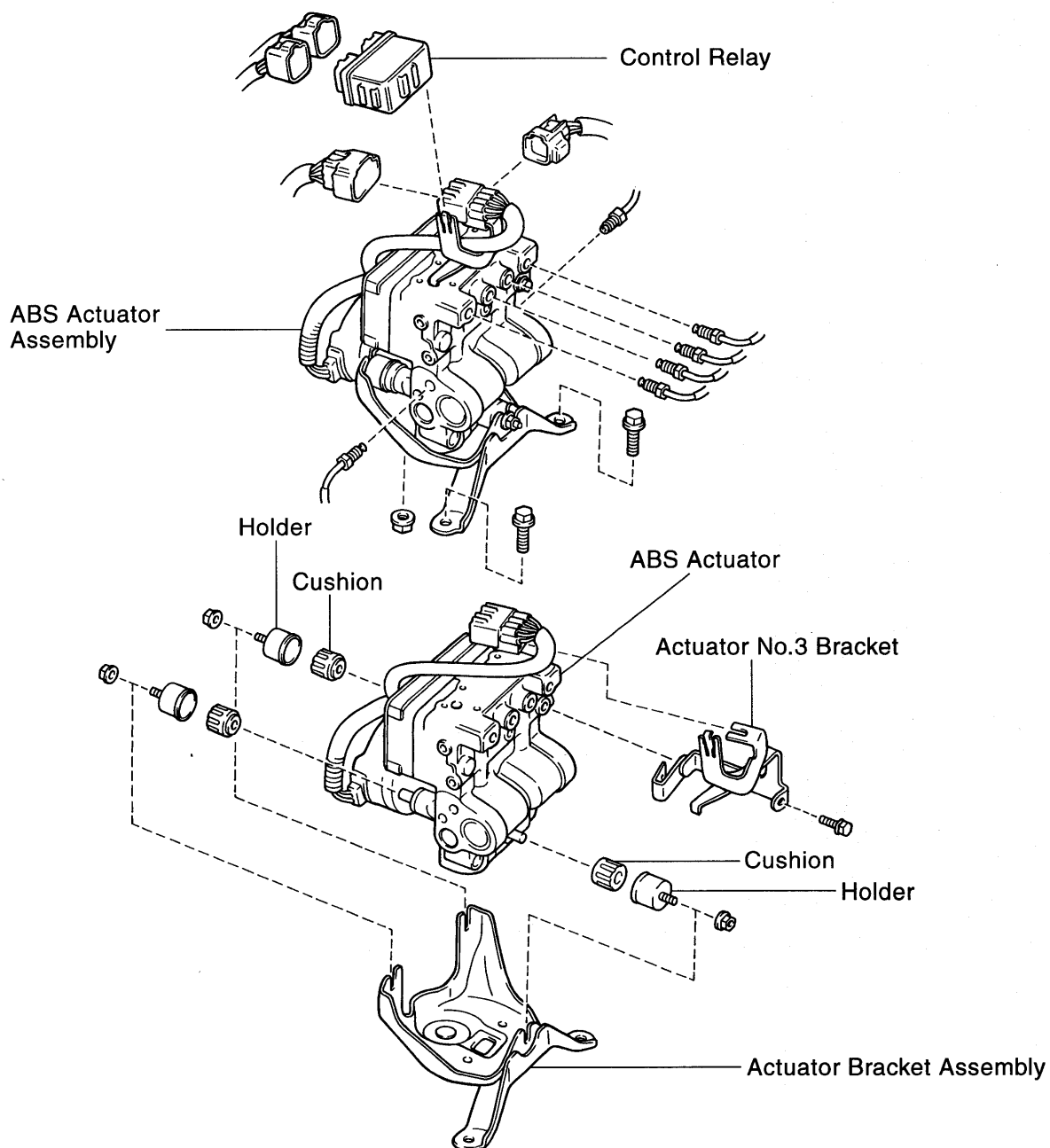
Remove the "SHEET A" (SST) and disconnect the actuator checker (SST) and sub-wire harness (SST) from the actuator, control relay and body side wire harness.

**8. CONNECT CONNECTORS**

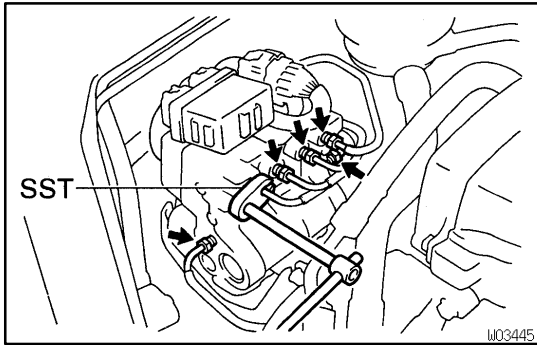
- (a) Connect the connector to the actuator.
- (b) Connect the 2 connectors to the control relay.

**9. CLEAR DTC (See page [DI-1 11](#))**

# COMPONENTS



W03448



## REMOVAL

### 1. DISCONNECT CONNECTORS

- Disconnect the 2 connectors from the control relay.
- Disconnect the 2 connectors from the ABS actuator.
- Remove the control relay from the clamp.

### 2. DISCONNECT BRAKE LINES

Using SST, disconnect the 6 brake lines from the ABS actuator assembly.

SST 09023-00100

**Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)**

### 3. REMOVE ABS ACTUATOR ASSEMBLY

- Remove the RH front fender liner.
- Remove the 2 bolts, nut and ABS actuator assembly.

**Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)**

### 4. REMOVE ABS ACTUATOR

- Remove the bolt and No.3 bracket from the ABS actuator assembly.

**Torque: 19 N·m (195 kgf·cm, 14 in·lbf)**

- Remove the 3 nuts and actuator from the bracket assembly.

**Torque: 5.4 N·m (55 kgf·cm, 48 in·lbf)**

- Remove the 3 holders and cushions from the ABS actuator.



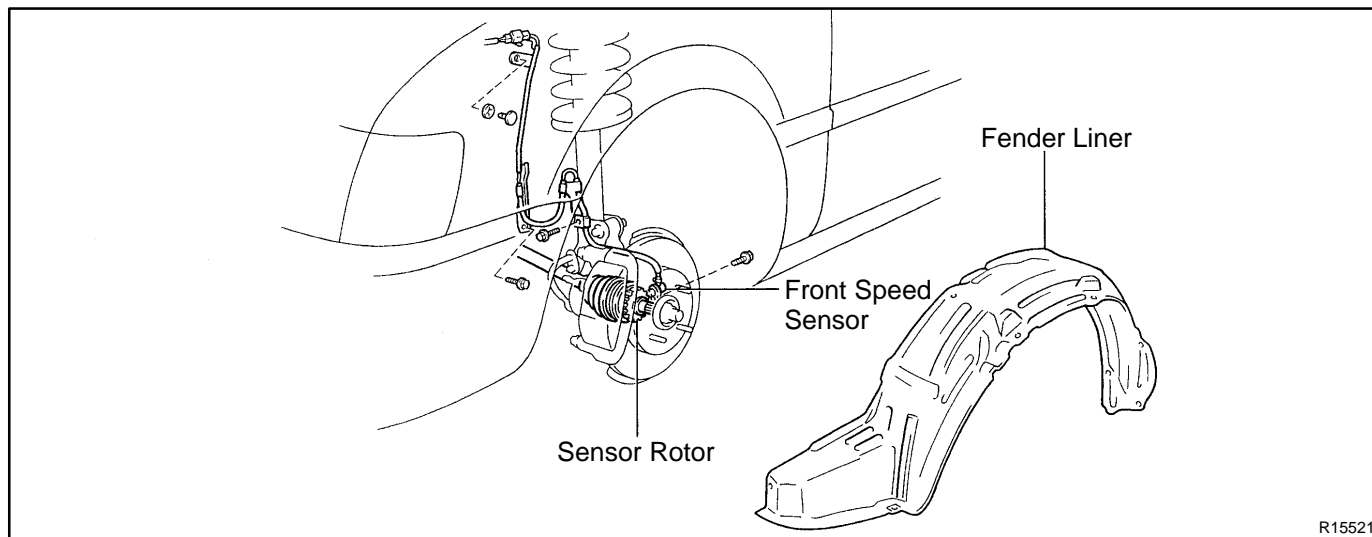
## INSTALLATION

Installation is in the reverse order of removal (See page [BR-39](#) ).

**AFTER INSTALLATION, FILL BRAKE RESERVOIR WITH BRAKE FLUID, BLEED BRAKE SYSTEM (See page [BR-4](#) ) AND CHECK FOR LEAKS**

## FRONT SPEED SENSOR COMPONENTS

BR0S4-05

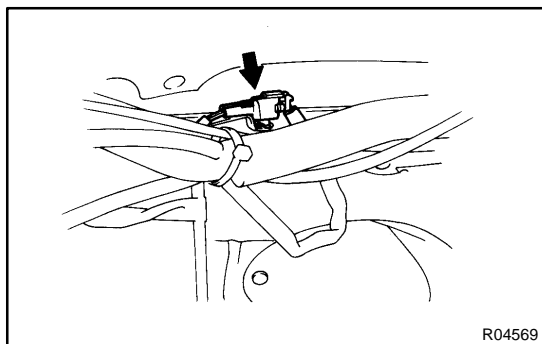


R15521

## REMOVAL

### 1. DISCONNECT SPEED SENSOR CONNECTOR

- (a) Remove the fender liner.

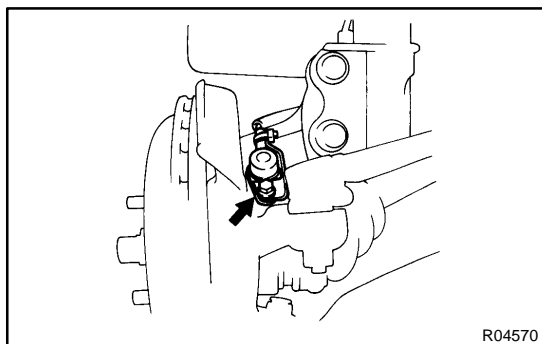


- (b) Disconnect the speed sensor connector.

### 2. REMOVE SPEED SENSOR

- (a) Remove the 2 clamp bolts and a clip holding the sensor harness to the body and shock absorber.

**Torque: 5.0 N·m (51 kgf·cm, 44 in.-lbf)**



- (b) Remove the bolt and speed sensor from the steering knuckle.

**Torque: 8.0 N·m (82 kgf·cm, 71 in.-lbf)**

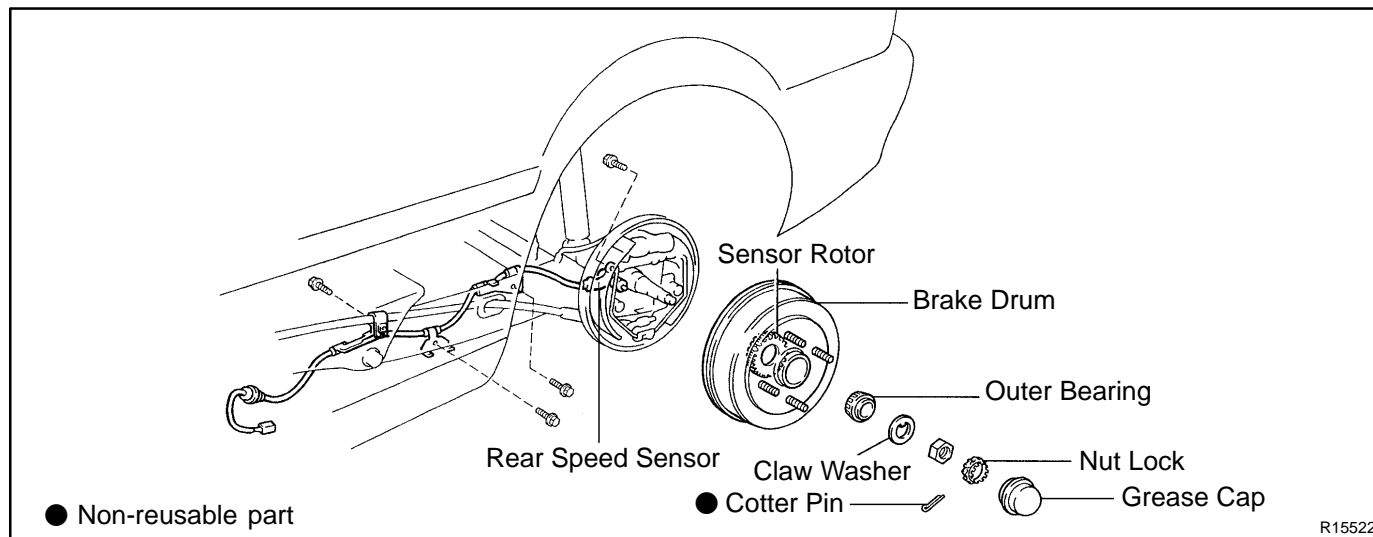
## INSTALLATION

Installation is in the reverse order of removal (See page [BR-42](#) ).

AFTER INSTALLATION, CHECK SPEED SENSOR SIGNAL (See page [DI-1 11](#))

## REAR SPEED SENSOR COMPONENTS

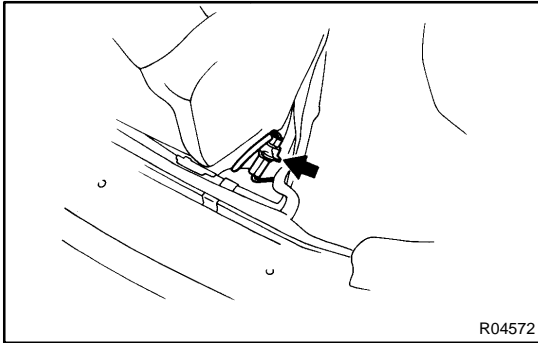
BR057-06



## REMOVAL

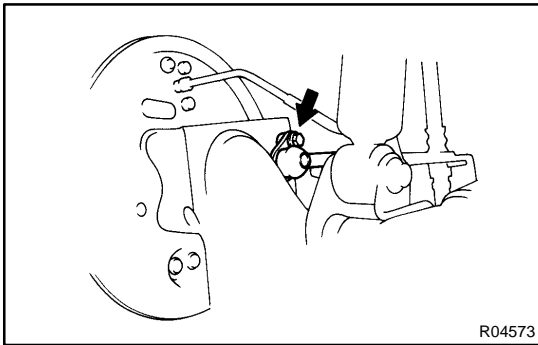
### 1. DISCONNECT SPEED SENSOR CONNECTOR

- (a) Remove the rear seat cushion.



- (b) Disconnect the speed sensor connector, and pull out the sensor wire harness with the grommet.
- (c) Remove the 3 clamp bolts holding the sensor wire harness to the suspension arm.

**Torque: 5.0 N·m (51 kgf·cm, 44 in.-lbf)**



### 2. REMOVE SPEED SENSOR

Remove the bolt and speed sensor from the axle beam.

**Torque: 8.0 N·m (82 kgf·cm, 71 in.-lbf)**

## INSTALLATION

Installation is in the reverse order of removal (See page [BR-45](#) ).

**AFTER INSTALLATION, CHECK SPEED SENSOR SIGNAL (See page [DI-1 11](#))**

# STEERING SYSTEM

SR05M-03

## PRECAUTION

- Care must be taken to replace parts properly because they could affect the performance of the steering system and result in a driving hazard.
- The TERCEL is equipped with SRS (Supplemental Restraint System) such as the driver airbag and front passenger airbag. Failure to carry out service operation in the correct sequence could cause the SRS to unexpectedly deployed during servicing, possibly leading to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notices in the RS section.



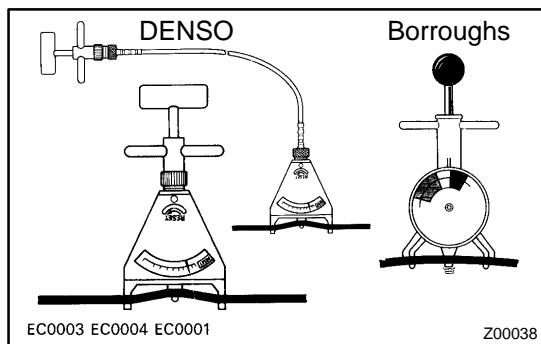
# TROUBLESHOOTING

## PROBLEM SYMPTOMS TABLE

SR05N-06

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in the order shown. If necessary, repair or replace these parts.

Symptom	Suspect Area	See page
Hard steering	1. Tires (Improperly inflated) 2. Power steering fluid level (Low) 3. Drive belt (Loose) 4. Front wheel alignment (Incorrect) 5. Steering system joints (Worn) 6. Suspension arm ball joints (Worn) 7. Steering column (Binding) 8. Power steering gear	<a href="#">SA-2</a> <a href="#">SR-6</a> <a href="#">SR-3</a> <a href="#">SA-4</a> - <a href="#">SA-36</a> - <a href="#">SR-46</a>
Poor return	1. Tires (Improperly inflated) 2. Front wheel alignment (Incorrect) 3. Steering column (Binding) 4. Power steering gear	<a href="#">SA-2</a> <a href="#">SA-4</a> - <a href="#">SR-46</a>
Excessive play	1. Steering system joints (Worn) 2. Suspension arm ball joints (Worn) 3. Intermediate shaft, Sliding yoke (Worn) 4. Front wheel bearing (Worn) 5. Power steering gear	- <a href="#">SA-36</a> - <a href="#">SA-10</a> <a href="#">SR-46</a>
Abnormal noise	1. Power steering fluid level (Low) 2. Steering system joints (Worn) 3. Power steering gear	<a href="#">SR-6</a> - <a href="#">SR-46</a>



## DRIVE BELT INSPECTION

SR1F5-01

### 1. CHECK DRIVE BELT TENSION

Using a belt tension gauge, measure the belt tension.

**Belt tension gauge:**

**DENSO BTG-20 (95506-00020) or**

**Borroughs No. BT-33-73F**

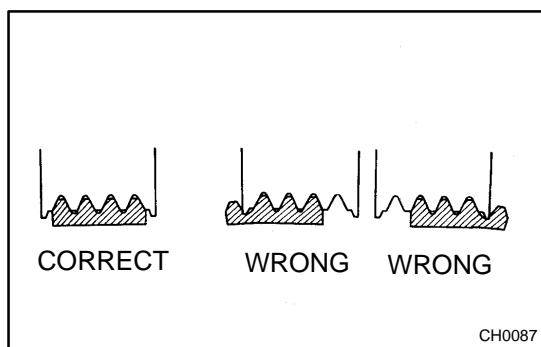
**Drive belt tension:**

**New belt: 140 - 180 lbf**

**Used belt: 80 - 120 lbf**

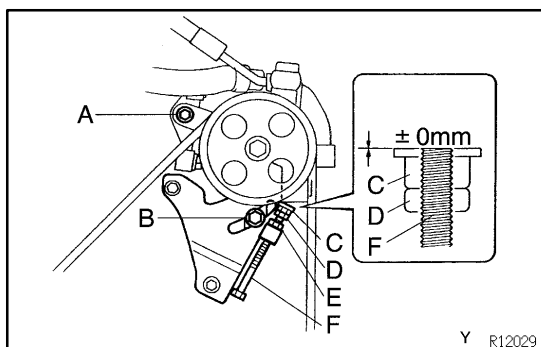
#### NOTICE:

After installing the belt, check that it fits properly in the ribbed grooves.



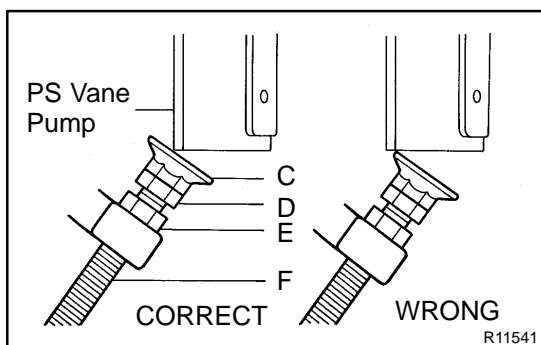
#### HINT:

- "New belt" refers to a belt which has been used less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.



### 2. VEHICLES WITH BELT TENSION ADJUSTING BOLT: ADJUST DRIVE BELT TENSION

- (a) Loosen the bolts A and B.
- (b) Loosen the lock nuts D and E.
- (c) Adjust adjusting bolt F so that its protrusion above nut C is  $\pm 0$  mm (0 in.).
- (d) Fix nut C using lock nut D.



- (e) Push up the PS pump body so that there is no free play in the belt. Turn adjusting bolt F to obtain the play in the correct belt tension as specified above.

#### NOTICE:

Ensure that the pump body and nut C are positioned correctly, as shown before turning bolt F to adjust the belt tension.

- (f) Torque the bolt A.

**Torque: 43 N·m (440 kgf-cm, 32 ft-lbf)**

(g) Torque the bolt B.

**Torque: 43 N·m (440 kgf-cm, 32 ft-lbf)**

(h) Loosen adjusting bolt F by 4 or 5 turns.

**NOTICE:**

**Check that there is a gap of 5 mm (0.20 in.) or more between the tip of nut C and the pump body.**

(i) Fix adjusting bolt F with lock nut E.

(j) Recheck the belt tension.

## POWER STEERING FLUID BLEEDING

SR05P-15

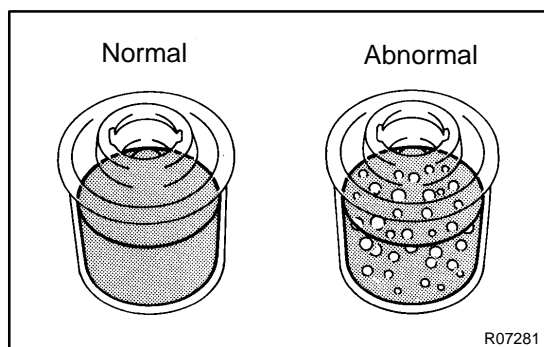
1. **CHECK FLUID LEVEL** (See page [SR-6](#))
2. **JACK UP FRONT OF VEHICLE AND SUPPORT IT WITH STANDS**
3. **TURN STEERING WHEEL**

With the engine stopped, turn the wheel slowly from lock to lock several times.

4. **LOWER VEHICLE**
5. **START ENGINE**

Run the engine at idle for a few minutes.

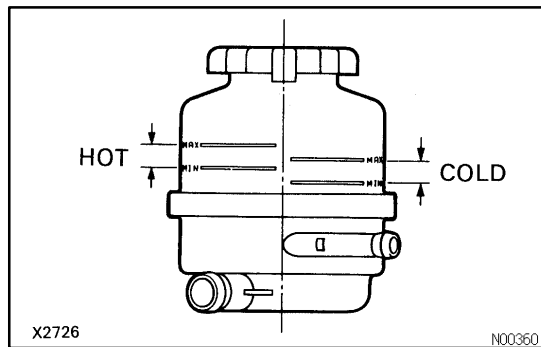
6. **TURN STEERING WHEEL**
  - (a) With the engine idling, turn the wheel to left or right full lock position and keep it there for 2-3 seconds, then turn the wheel to the opposite full lock position and keep it there for 2-3 seconds.
  - (b) Repeat (a) several times.
7. **STOP ENGINE**



8. **CHECK FOR FOAMING OR EMULSIFICATION**

If the system has to be bled twice specifically because of foaming or emulsification, check for fluid leaks in the system.

9. **CHECK FLUID LEVEL** (See page [SR-6](#))



## INSPECTION

### 1. CHECK FLUID LEVEL

- Keep the vehicle level.
- With the engine stopped, check the fluid level in the oil reservoir.

If necessary, add fluid.

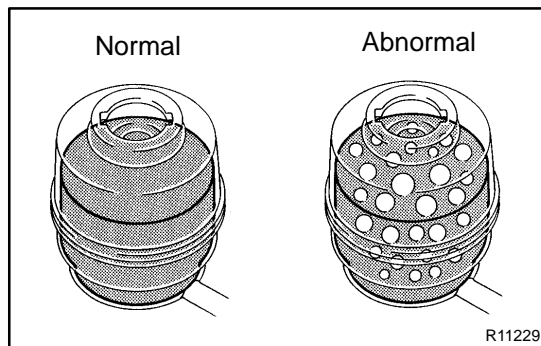
**Fluid: ATF DEXRON® II or III**

#### HINT:

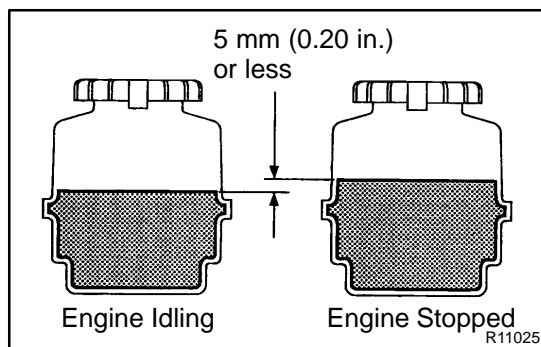
Check that the fluid level is within the HOT LEVEL range on the reservoir cap dipstick. If the fluid is cold, check that it is within the COLD LEVEL range.

- Start the engine and run it at idle.
- Turn the steering wheel from lock to lock several times to boost fluid temperature.

**Fluid temperature: 80°C (176°F)**



- Check for foaming or emulsification. If there is foaming or emulsification, bleed power steering system. (See page [SR-5](#))



- With the engine idling, measure the fluid level in the oil reservoir.
- Stop the engine.
- Wait a few minutes and remeasure the fluid level in the oil reservoir.

**Maximum fluid level rise: 5 mm (0.20 in.)**

If a problem is found, bleed power steering system.

(See page [SR-5](#))

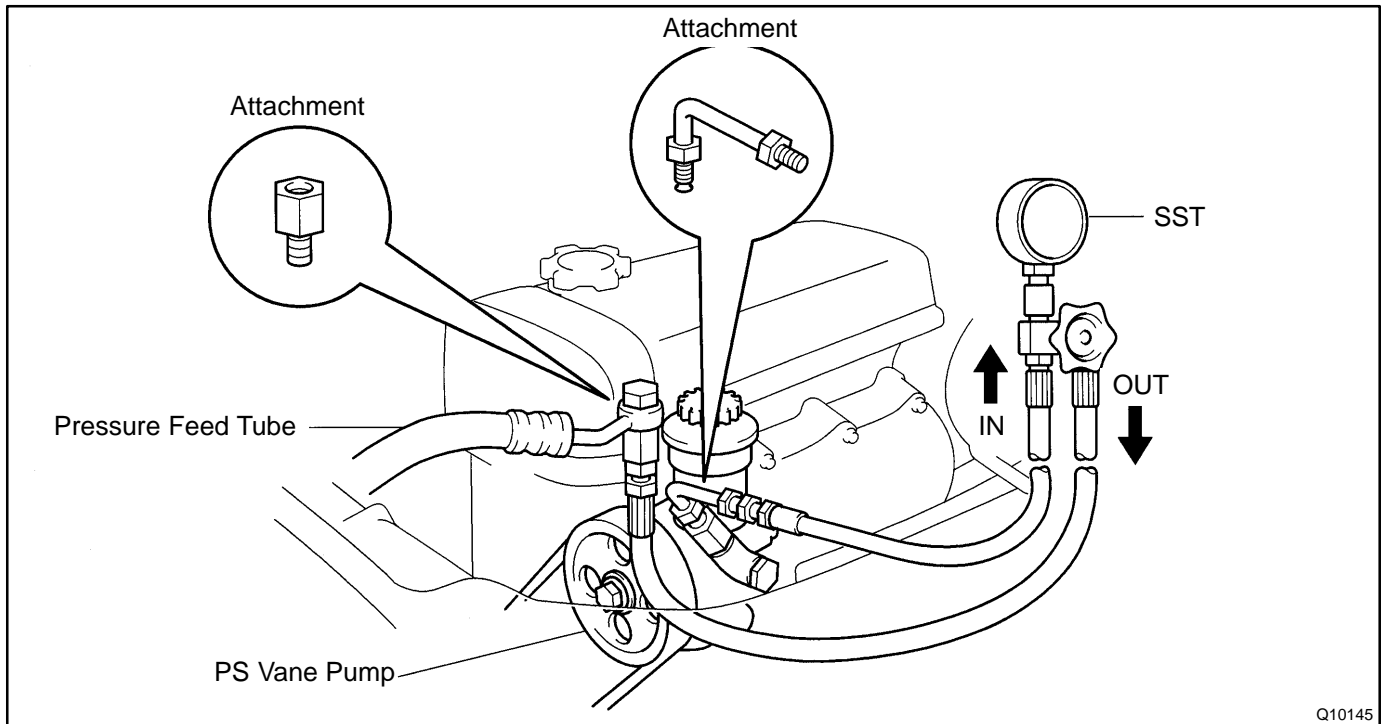
- Check the fluid level.

**2. CHECK STEERING FLUID PRESSURE**

- (a) Disconnect the pressure feed tube from the PS vane pump. (See page [SR-24](#) )
- (b) Connect SST, as shown in the illustration below.  
SST 09640-10010 (09641-01010, 09641-01030, 09641-01060)

**NOTICE:**

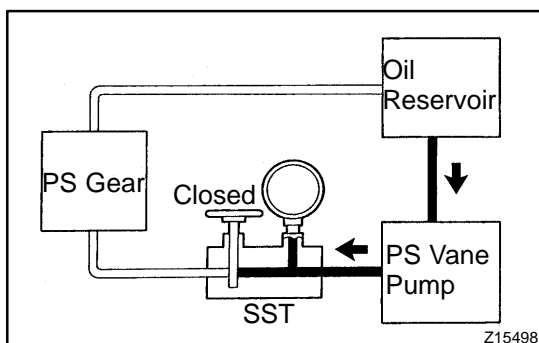
**Check that the valve of the SST is in the open position.**



Q10145

- (c) Bleed the power steering system.
- (d) Start the engine and run it at idle.
- (e) Turn the steering wheel from lock to lock several times to boost fluid temperature.

**Fluid temperature: 80 °C (176 °F)**

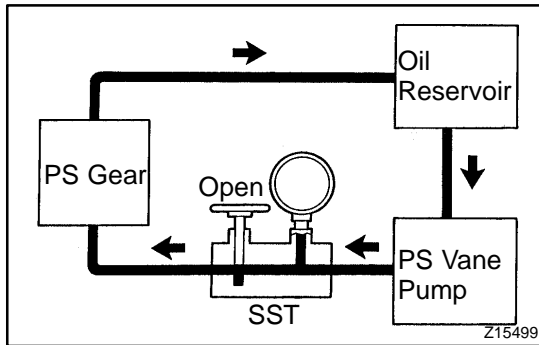


Z15498

- (f) With the engine idling, close the valve of the SST and observe the reading on the SST.  
**Minimum fluid pressure:**  
**6,374 kPa (65 kgf/cm<sup>2</sup>, 925 psi)**

**NOTICE:**

- Do not keep the valve closed for more than 10 seconds.
- Do not let the fluid temperature become too high.

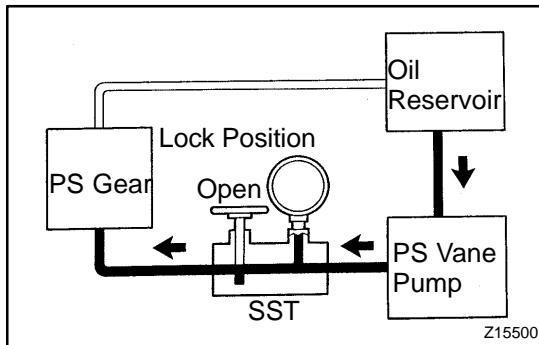


- (g) With the engine idling, open the valve fully.
- (h) Measure the fluid pressure at engine speeds of 1,000 rpm and 3,000 rpm.

**Difference fluid pressure:**  
**490 kPa (5 kgf/cm<sup>2</sup>, 71 psi) or less**

**NOTICE:**

**Do not turn the steering wheel.**



- (i) With the engine idling and valve fully opened, turn the steering wheel to full lock position.

**Minimum fluid pressure:**  
**6,374 kPa (65 kgf/cm<sup>2</sup>, 925 psi)**

**NOTICE:**

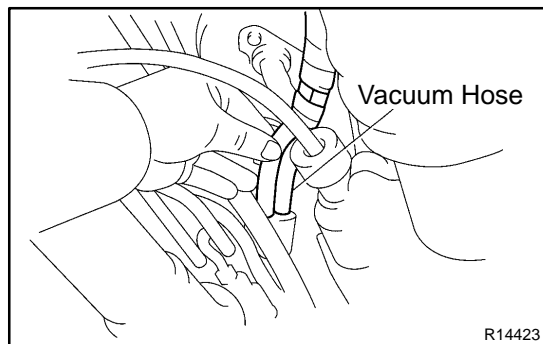
- **Do not maintain lock position for more than 10 seconds.**
- **Do not let the fluid temperature become too high.**

- (j) Disconnect the SST.
- (k) Connect the pressure feed tube (See page [SR-33](#)).
- (l) Bleed the power steering system.

# AIR CONTROL VALVE INSPECTION

SROKE-01

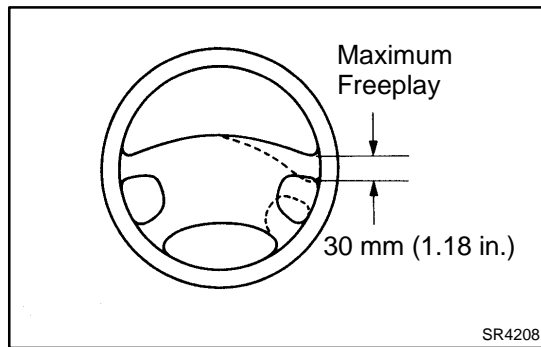
## 1. TURN AIR CONDITIONING SWITCH OFF



## 2. CHECK IDLE-UP

- (a) Start the engine and run it at idle.
- (b) Fully turn the steering wheel.
- (c) Check that the engine rpm decreases when the vacuum hose is pinched.
- (d) Check that the engine rpm increases when the hose is released.





## STEERING WHEEL INSPECTION

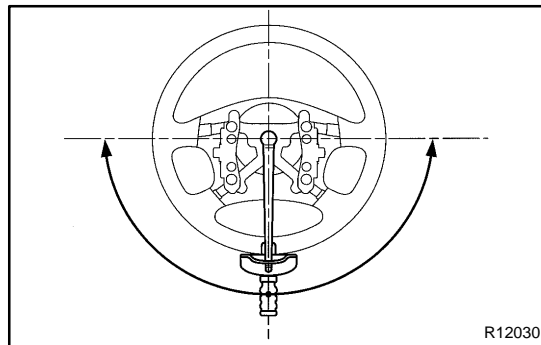
SR05R-11

### 1. CHECK STEERING WHEEL FREEPLAY

With the vehicle stopped and tires pointed straight ahead, rock the steering wheel gently back and forth with light finger pressure.

Freeplay should not exceed the maximum.

**Maximum freeplay: 30 mm (1.18 in.)**



### 2. CHECK STEERING EFFORT

- Center the steering wheel.
- Remove the steering wheel pad (See page [SR-13](#)).
- Start the engine and run it at idle.
- Measure the steering effort in both directions.

**Reference: 7.8 N·m (80 kgf·cm, 69 in.-lbf)**

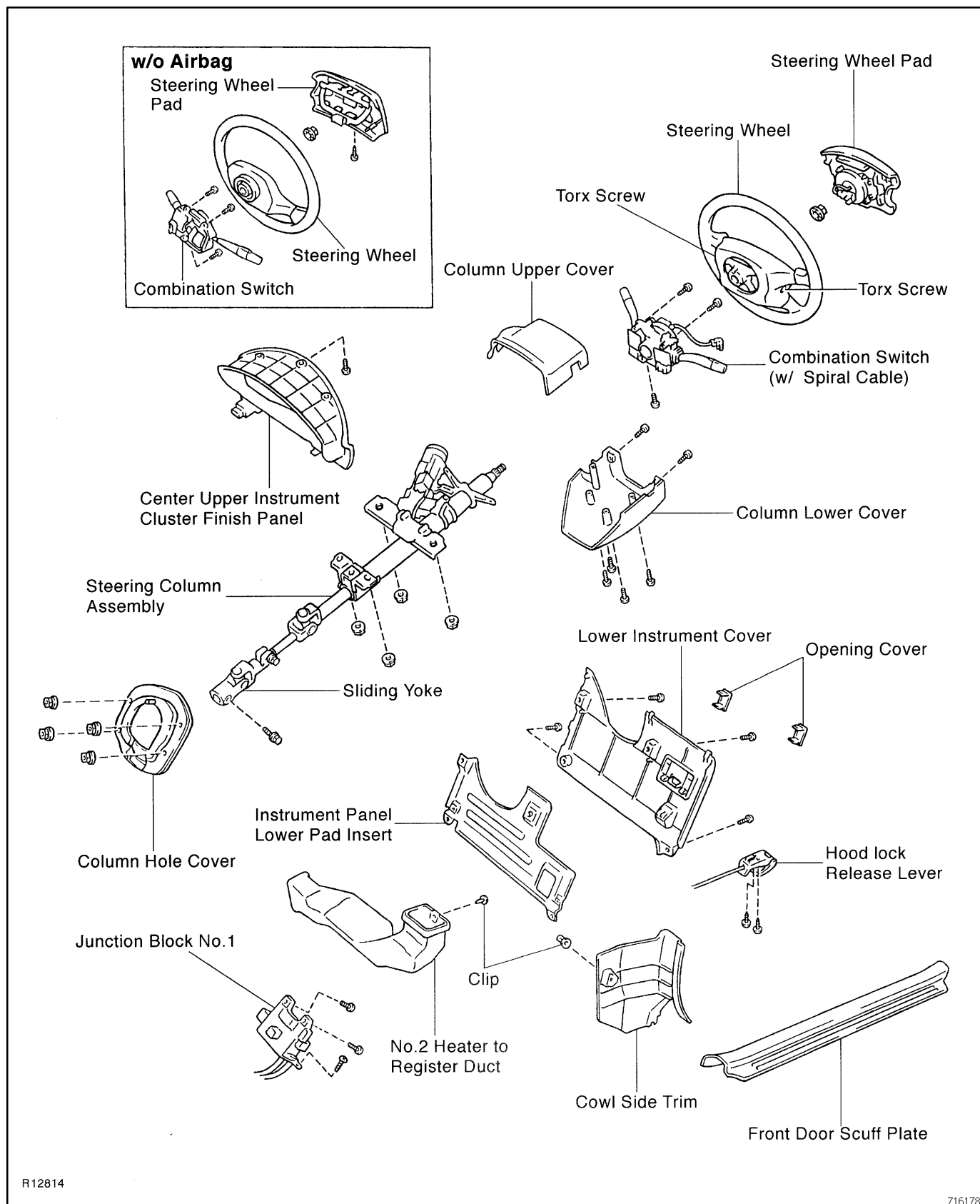
#### HINT:

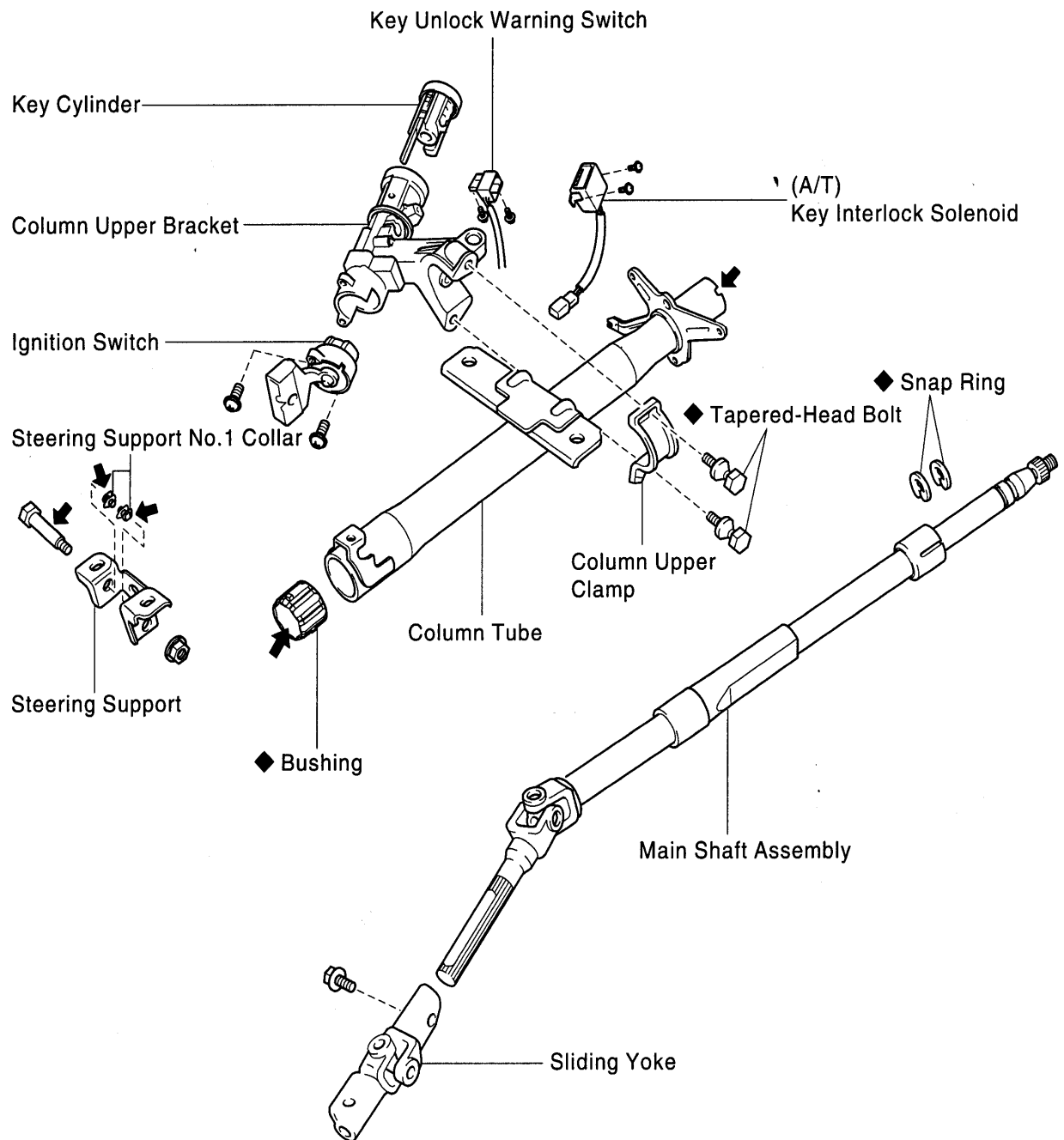
Be sure to consider the tire type, pressure and contact surface before making your diagnosis.

- Torque the steering wheel set nut.  
**Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)**
- Install the steering wheel pad (See page [SR-20](#)).

# NON-TILT STEERING COLUMN COMPONENTS

SR17Z-02





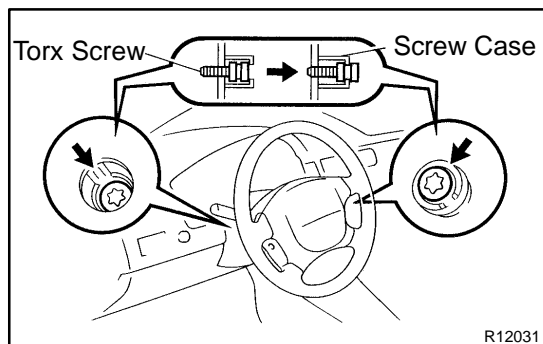
R12815

◆ Non-reusable part

◀ Molybdenum disulphide lithium base grease

Y

Z16187



## REMOVAL

### 1. w/ Airbag:

#### REMOVE STEERING WHEEL PAD

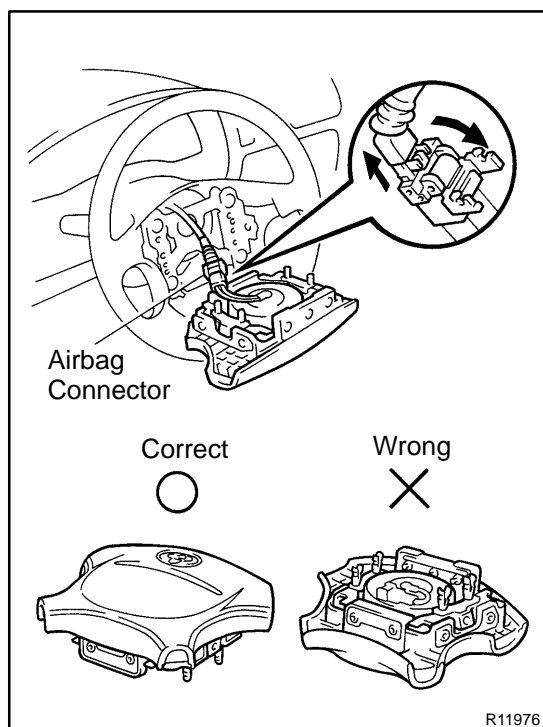
#### NOTICE:

- If the airbag connector is disconnected with the ignition switch at ON or ACC, DTCs will be recorded.
- Never use airbag parts from another vehicle. When replacing parts, replace with new ones.

- (a) Place the front wheels facing straight ahead.
- (b) Using a torx socket wrench, loosen the 2 torx screws.

#### HINT:

Loosen the 2 screws until the groove along the screw circumference catches on the screw case.



- (c) Pull the wheel pad from the steering wheel and disconnect the airbag connector.

#### CAUTION:

- When storing the wheel pad, keep the upper surface of the pad facing upward.
- Never disassemble the wheel pad.

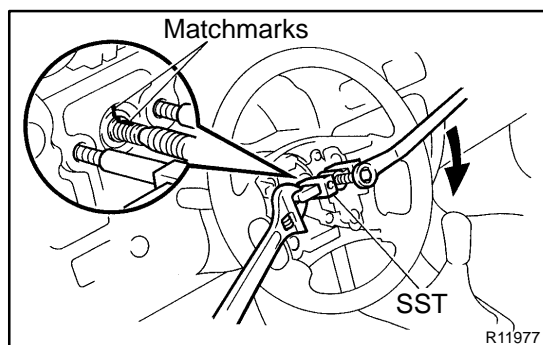
#### NOTICE:

When removing the wheel pad, take care not to pull the airbag wire harness.

### 2. w/o Airbag:

#### REMOVE STEERING WHEEL PAD

- (a) Remove the screw.
- (b) Remove the 3 clips.



### 3. REMOVE STEERING WHEEL

- (a) Disconnect the connector.
- (b) Remove the steering wheel set nut.
- (c) Place matchmarks on the steering wheel and main shaft assembly.
- (d) Using SST, remove the wheel.

SST 09950-50010 (09951-05010, 09952-05010, 09953-05020, 09954-05020)

**4. REMOVE CENTER UPPER INSTRUMENT CLUSTER FINISH PANEL**

- (a) Remove the screw.
- (b) Remove the 3 clips.

**5. REMOVE UPPER AND LOWER COLUMN COVERS**

Remove the 6 screws.

**6. REMOVE FRONT DOOR SCUFF PLATE AND COWL SIDE TRIM**

Remove the clip and trim.

**7. REMOVE LOWER INSTRUMENT COVER AND INSTRUMENT PANEL LOWER PAD INSERT**

- (a) Remove the 2 opening covers from the instrument cover.
- (b) Remove the 2 screws and disconnect the hood lock release lever from the instrument cover.
- (c) Remove the 4 panel cover set bolts.
- (d) Remove the lower pad insert from the instrument cover.

**8. REMOVE NO.2 HEATER TO REGISTER DUCT**

- (a) Disconnect the junction block No.1 with the 3 screws.
- (b) Remove the clip.

**9. REMOVE COMBINATION SWITCH WITH SPIRAL CABLE**

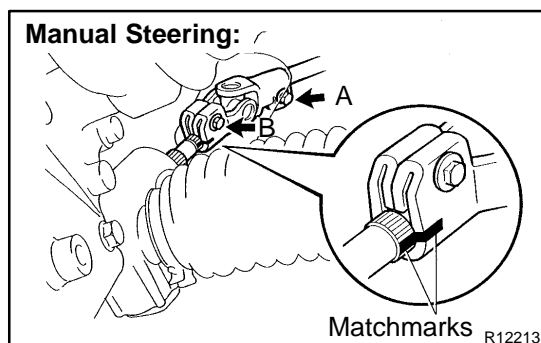
- (a) Disconnect the 3 connectors.
- (b) w/ Airbag:  
Disconnect the airbag connector.
- (c) w/ Airbag:  
Remove the 3 screws.

**10. REMOVE SPIRAL CABLE (See page [BE-14](#) )****NOTICE:**

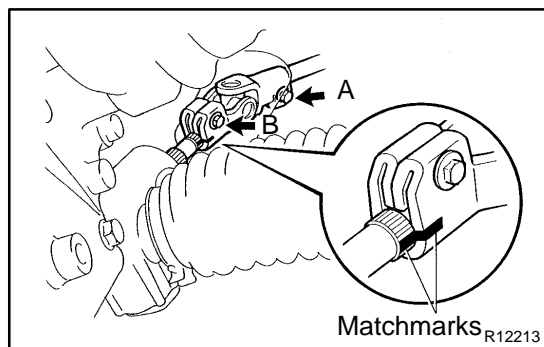
**Do not disassemble the cable or apply oil to it.**

**11. REMOVE COLUMN HOLE COVER**

Remove the 4 nuts.

**12. DISCONNECT SLIDING YOKE**

- (a) Place matchmarks on the yoke and steering pinion shaft/control valve shaft.
- (b) Loosen bolt A and remove bolt B.

**13. REMOVE STEERING COLUMN ASSEMBLY**

- (a) Disconnect the connector.
- (b) Remove the 4 column assembly set nuts.

## DISASSEMBLY

### NOTICE:

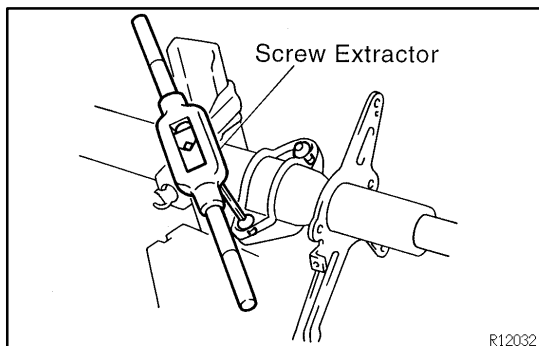
When using a vise, do not overtighten it.

#### 1. REMOVE SLIDING YOKE

Remove the bolt.

#### 2. REMOVE COLUMN UPPER BRACKET AND COLUMN UPPER CLAMP

- (a) Using a centering punch, mark the center of the 2 tapered-head bolts.
- (b) Using a 3 - 4 mm (0.12 - 0.16 in.) drill, drill into the 2 bolts.



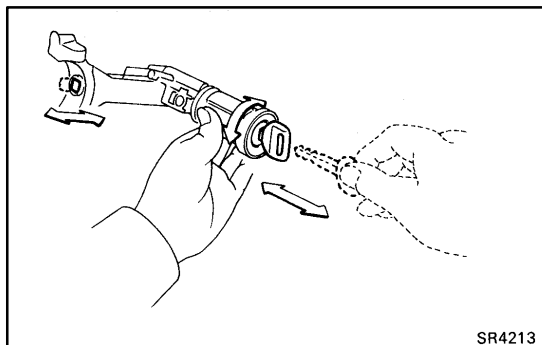
- (c) Using a screw extractor, remove the 2 bolts.

#### 3. REMOVE MAIN SHAFT ASSEMBLY AND MAIN SHAFT BUSHING

- (a) Using snap ring expander, remove the snap ring from the shaft assembly.
- (b) Using a plastic hammer, tap out the shaft assembly from the column tube.
- (c) Using snap ring expander, remove the snap ring from the shaft assembly.

#### 4. REMOVE STEERING SUPPORT

- (a) Remove the set bolt and nut.
- (b) Remove the 2 steering support No.1 collars.



SR4213

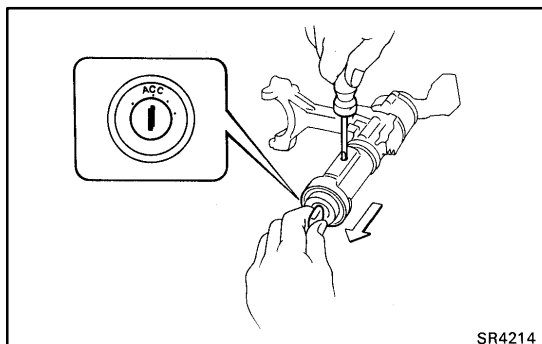
## INSPECTION

### NOTICE:

When using a vise do not overtighten it.

#### 1. INSPECT STEERING LOCK OPERATION

Check that the steering lock mechanism operates properly.



SR4214

#### 2. IF NECESSARY, REPLACE KEY CYLINDER

- Place the ignition key at the ACC position.
- Push down the stop pin with a thin rod, and pull out the key cylinder.
- Install a new cylinder.

### HINT:

Make sure the ignition key is at the ACC position.

#### 3. INSPECT IGNITION SWITCH (See page BE-1 1)

#### 4. IF NECESSARY, REPLACE IGNITION SWITCH

- Remove the 2 screws.
- Install a new ignition switch with the 2 screws.

#### 5. INSPECT KEY UNLOCK WARNING SWITCH (See page BE-1 1)

#### 6. IF NECESSARY, REPLACE KEY UNLOCK WARNING SWITCH

- Remove the 2 screws.
- Install a new switch with the 2 screws.

#### 7. A/T:

#### INSPECT KEY INTERLOCK SOLENOID

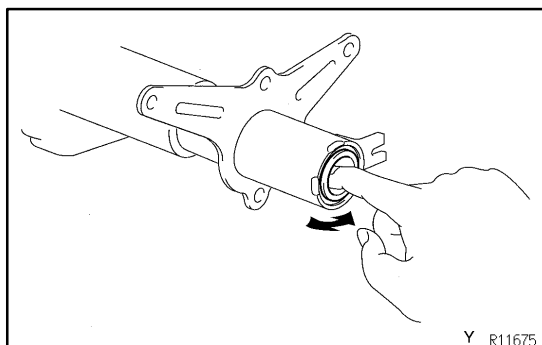
A132L A/T: (See page AX-24)

A242L A/T: (See page AX-28)

#### 8. A/T:

#### IF NECESSARY, REPLACE KEY INTERLOCK SOLENOID

- Remove the 2 screws.
- Install a new solenoid with the 2 screws.



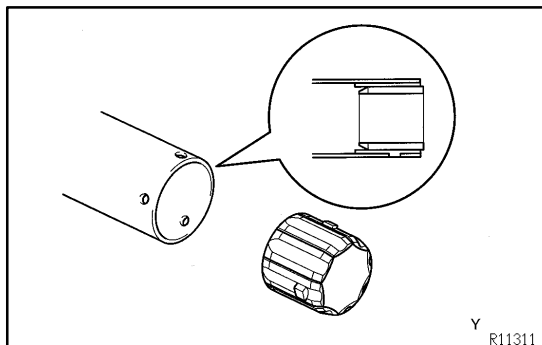
Y R11675

#### 9. INSPECT BEARING

Check the bearing rotation condition and check for abnormal noise.

If the bearing is worn or damaged, replace the column tube.



**10. IF NECESSARY, REPLACE BUSHING**

- (a) Using a screwdriver, depress the projections on the bushing to release the bushing, then remove the bushing from the column tube.
- (b) Coat the inside of new bushing with molybdenum disulfide lithium base grease.
- (c) Align the projections on the bushing with the holes in the column tube. Install the bushing until the projections are firmly engaged in the holes in the column tube.

## REASSEMBLY

### NOTICE:

**When using a vise, do not overtighten it.**

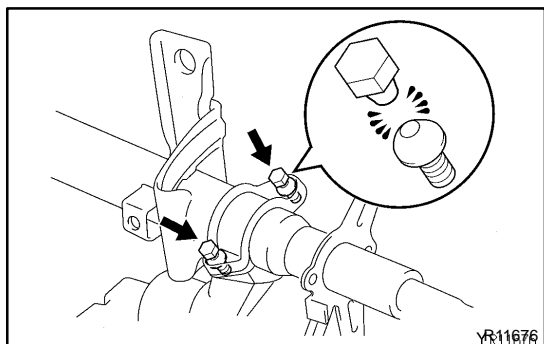
#### 1. INSTALL STEERING SUPPORT

- (a) Install the 2 steering support No.1 collars.
- (b) Torque the set bolt and nut.

**Torque: 5.4 N·m (55 kgf·cm, 48 ft·lbf)**

#### 2. INSTALL MAIN SHAFT ASSEMBLY

- (a) Using snap ring expander, install a new snap ring to the shaft assembly.
- (b) Install the shaft assembly to the column tube.
- (c) Using snap ring expander, install a new snap ring to the shaft assembly.



#### 3. INSTALL COLUMN UPPER BRACKET AND COLUMN UPPER CLAMP

Tighten the 2 new tapered-head bolts until the bolts head break off.

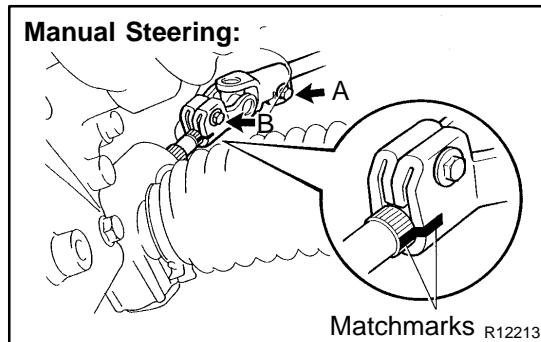
#### 4. INSTALL SLIDING YOKE

Temporarily tighten the bolt.

## INSTALLATION

### 1. INSTALL STEERING COLUMN ASSEMBLY

- (a) Torque the 4 column assembly set nuts.  
**Torque: 25 N·m (260 kgf-cm, 19 ft-lbf)**
- (b) Connect the connector.



### 2. CONNECT SLIDING YOKE

- (a) Align the matchmarks on the sliding yoke and steering pinion shaft/control valve shaft.
- (b) Torque the bolt B.  
**Torque: 25 N·m (260 kgf-cm, 19 ft-lbf)**
- (c) Torque the bolt A.  
**Torque: 25 N·m (260 kgf-cm, 19 ft-lbf)**

### 3. INSTALL COLUMN HOLE COVER

- Torque the 4 nuts.  
**Torque: 4.9 N·m (50 kgf-cm, 43 in.-lbf)**

### 4. w/ Airbag:

**INSTALL SPIRAL CABLE (See page [BE-14](#))**

### 5. INSTALL COMBINATION SWITCH WITH SPIRAL CABLE

- (a) Tighten the 3 screws.
- (b) w/ Airbag:  
Connect the airbag connector.
- (c) Connect the 3 connectors.

### 6. INSTALL NO.2 HEATER TO REGISTER DUCT

- (a) Install the clip.
- (b) Connect the junction block No.1 with the 3 screws.

### 7. INSTALL LOWER INSTRUMENT COVER AND INSTRUMENT PANEL LOWER PAD INSERT

- (a) Install the pad insert to cover.
- (b) Tighten the 4 panel set bolts.
- (c) Connect the hood lock release lever with the 2 screws.
- (d) Install the 2 opening covers.

### 8. INSTALL FRONT DOOR SCUFF PLATE AND COWL SIDE TRIM

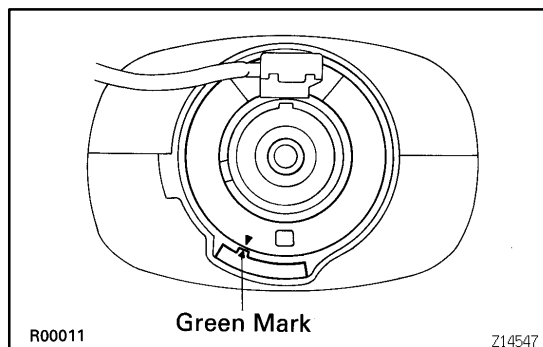
Install the clip and trim.

### 9. INSTALL UPPER AND LOWER COLUMN COVERS

Tighten the 6 screws.

### 10. INSTALL CENTER UPPER INSTRUMENT CLUSTER FINISH PANEL

- (a) Connect the connector.
- (b) Tighten screw.



### 11. CENTER SPIRAL CABLE

- Check that the front wheels are facing straight ahead.
- Turn the cable counterclockwise by hand until it becomes harder to turn the cable.
- Then rotate the cable clockwise about 2.5 turns to align the green marks.

#### HINT:

The spiral cable turns clockwise about 2.5 turns to either left or right of the center.

### 12. INSTALL STEERING WHEEL

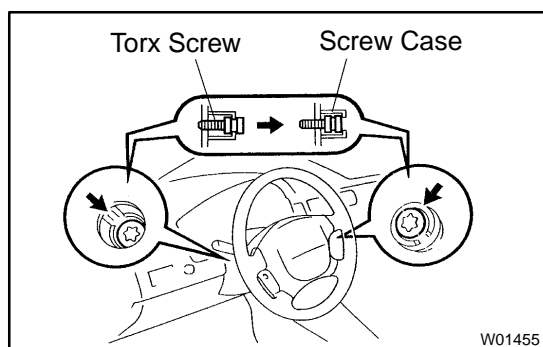
- Align the matchmarks on the steering wheel and main shaft assembly.
- Torque the steering wheel set nut.  
**Torque: 34 N·m (350 kgf-cm, 25 ft-lbf)**
- Connect the connector.

### 13. w/ Airbag:

#### INSTALL STEERING WHEEL PAD

#### NOTICE:

- Make sure the wheel pad is installed with the specified torque.
  - If the wheel pad has been dropped, or there are cracks, dents or other defects in the case or connector, replace the wheel pad with a new one.
  - When installing the wheel pad, take care that the wirings do not interfere with other parts and that they are not pinched between other parts.
- Connect the airbag connector.



- Install the wheel pad after confirming that the circumference groove of the torx screws are caught on the screw case.
- Using a torx socket wrench, torque the 2 screws.

**Torque: 8.8 N·m (90 kgf-cm, 78 in.-lbf)**

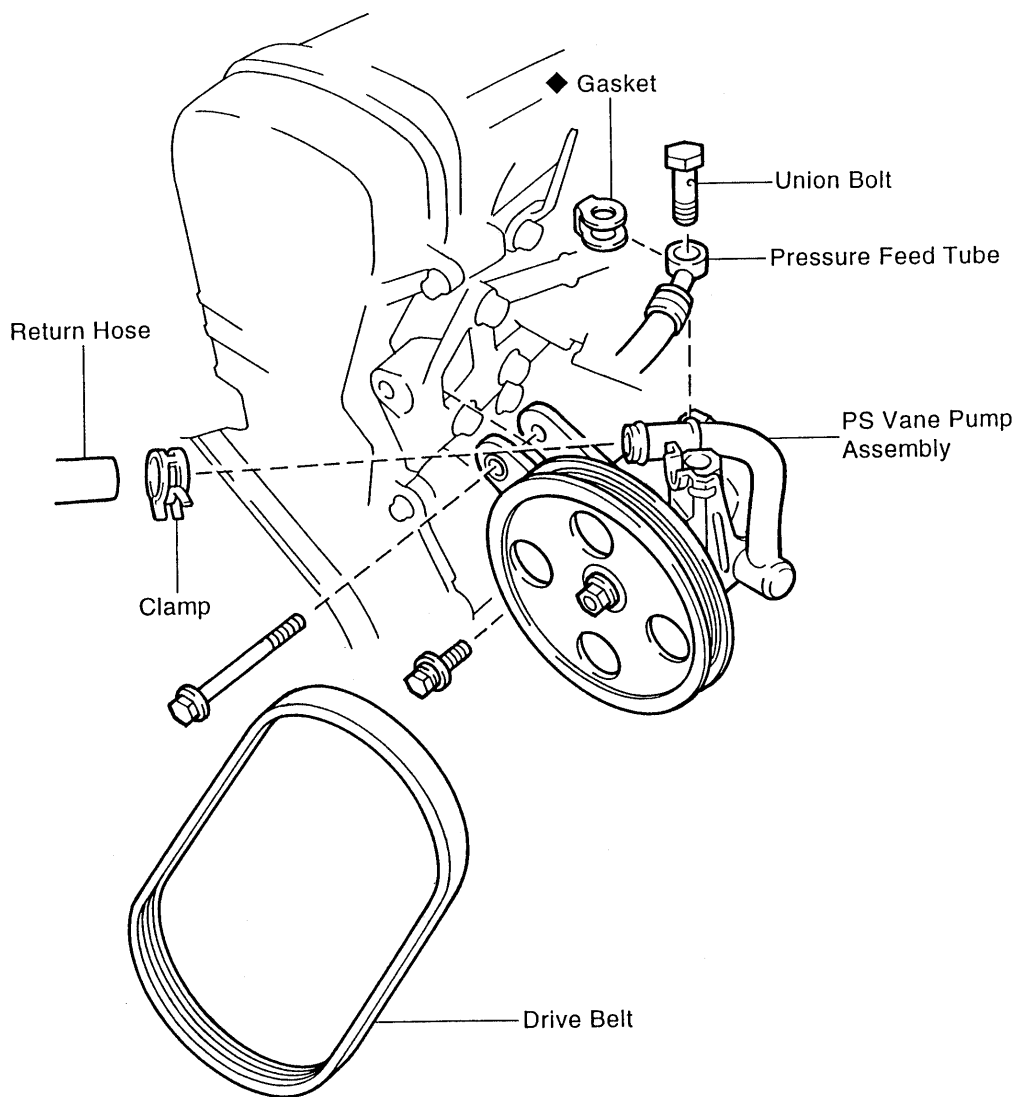
### 14. w/o Airbag:

#### INSTALL STEERING WHEEL PAD

### 15. CHECK STEERING WHEEL CENTER POINT

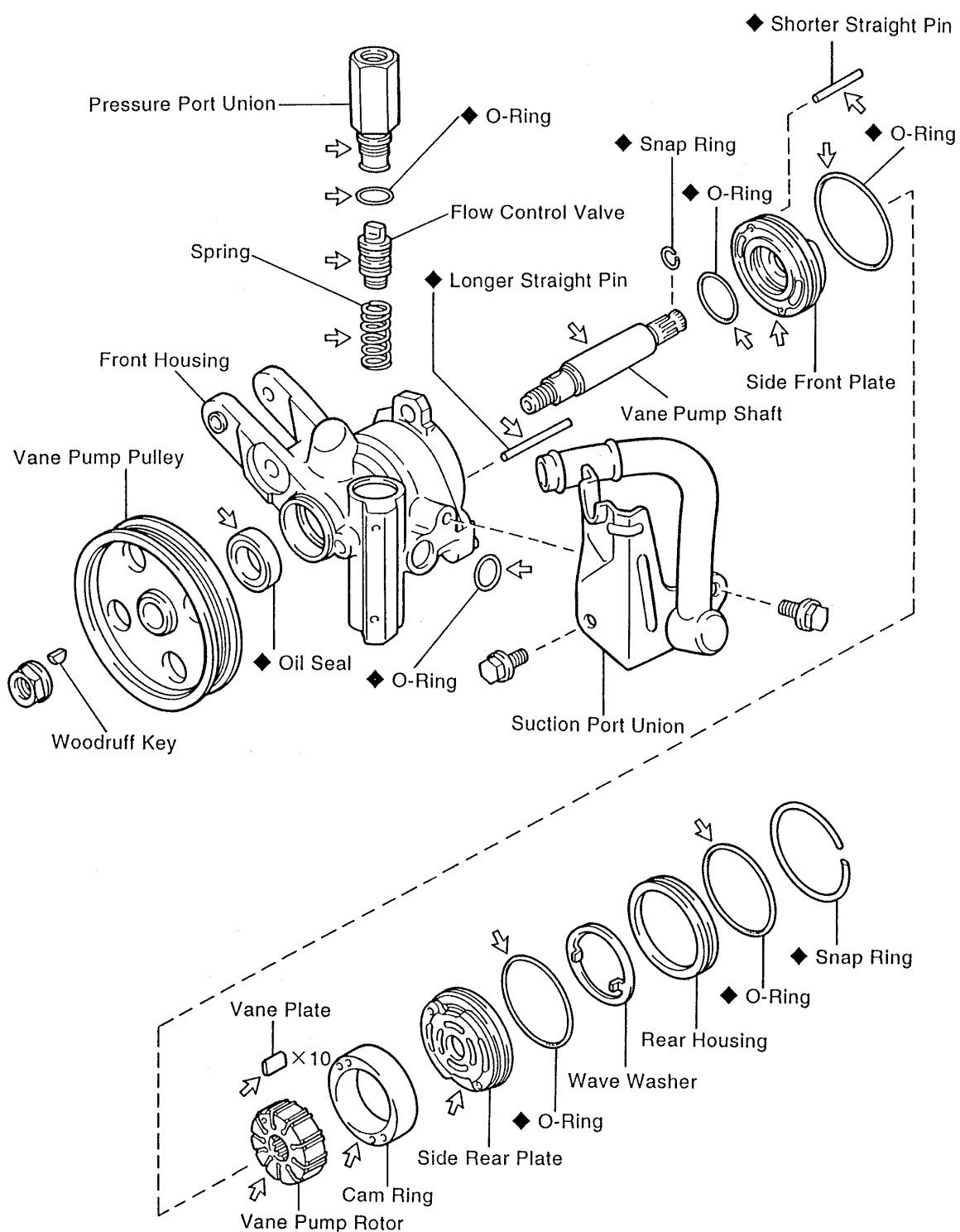
# POWER STEERING VANE PUMP COMPONENTS

SR0KL-03



◆ Non-reusable part

R12356



◆ Non-reusable part

↔ Power Steering Fluid

R12357

## REMOVAL

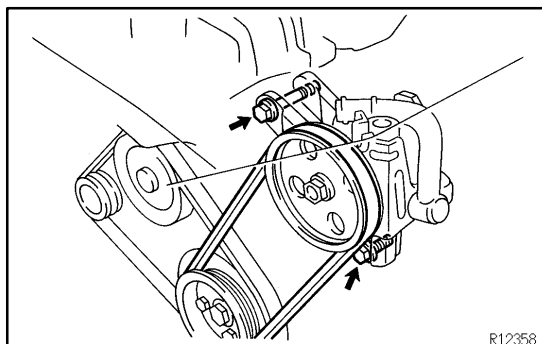
### 1. DISCONNECT RETURN HOSE

#### NOTICE:

Take care not to spill fluid on the drive belt.

### 2. DISCONNECT PRESSURE FEED TUBE

Remove the union bolt and gasket.



### 3. REMOVE DRIVE BELT

Loosen the 2 pump assembly set bolts.

### 4. REMOVE PS VANE PUMP ASSEMBLY

Remove the 2 pump assembly set bolts.

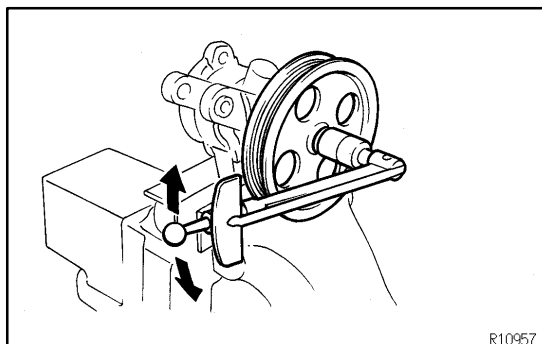
## DISASSEMBLY

### NOTICE:

When using a vise, do not overtighten it.

#### 1. MEASURE PS VANE PUMP ROTATING TORQUE

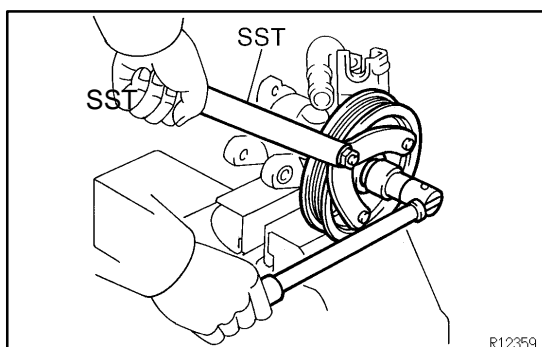
- (a) Check that the pump rotates smoothly without abnormal noise.



- (b) Using a torque wrench, check the pump rotating torque.

**Rotating torque:**

**0.3 N·m (2.8 kgf·cm, 2.4 in.-lbf) or less**



#### 2. REMOVE VANE PUMP PULLEY

Using SST, stop the pulley rotating and remove the nut.

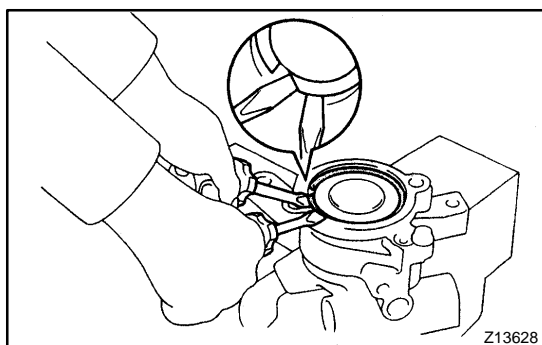
SST 09960-10010 (09962-01000, 09963-01000)

#### 3. REMOVE SUCTION PORT UNION

- (a) Remove the 2 bolts.  
(b) Remove the O-ring from the union.

#### 4. REMOVE PRESSURE PORT UNION, FLOW CONTROL VALVE AND COMPRESSION SPRING

Remove the O-ring from the union.

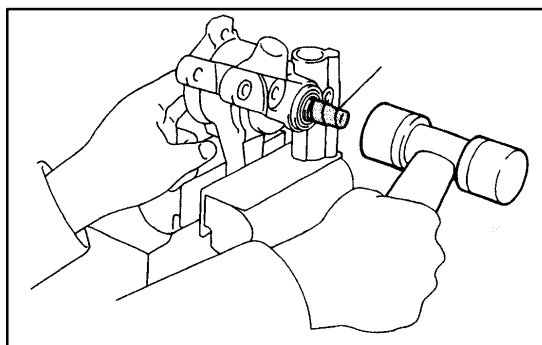


#### 5. REMOVE REAR HOUSING AND WAVE WASHER

- (a) Using 2 screwdrivers, remove the snap ring.

### NOTICE:

Be careful not to damage the front and rear housing.



- (b) Wind vinyl tape on the pump shaft.  
(c) Using a plastic hammer, tap the pump shaft end.

#### 6. REMOVE SIDE REAR PLATE

Remove the O-ring from the rear plate.

#### 7. REMOVE CAM RING, 10 VANE PLATES

### NOTICE:

Be careful not to drop the plate.

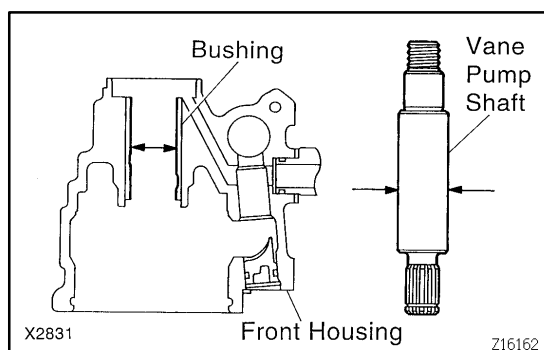
8. REMOVE VANE PUMP SHAFT WITH VANE PUMP ROTOR AND SIDE FRONT PLATE  
9. REMOVE LOWER STRAIGHT PINS



Using pliers, remove the pin from the front housing.

**10. REMOVE ROTOR AND SIDE FRONT PLATE**

- (a) Using snap ring pliers, remove the snap ring from the vane pump shaft.
- (b) Remove the 2 O-rings and shorter straight pin from the plate.



## INSPECTION

### NOTICE:

When using a vise, do not overtighten it.

#### 1. MEASURE OIL CLEARANCE BETWEEN VANE PUMP SHAFT AND BUSHING

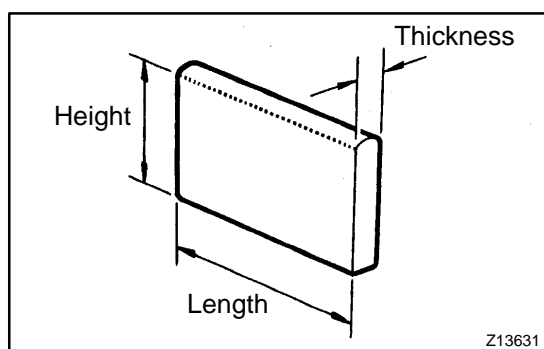
Using a micrometer and a caliper gauge, measure the oil clearance.

**Standard clearance:**

**0.01 - 0.03 mm (0.0004 - 0.0012 in.)**

**Maximum clearance: 0.07 mm (0.0028 in.)**

If it is more than the maximum, replace the front housing and vane pump shaft.



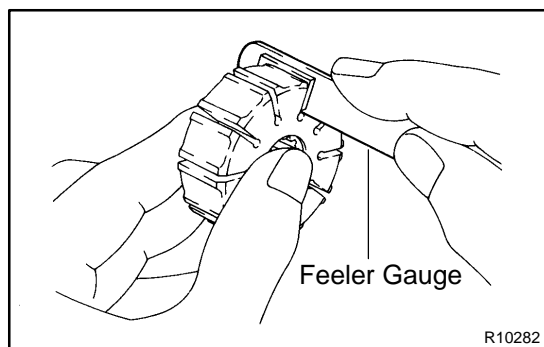
#### 2. INSPECT VANE PUMP ROTOR AND VANE PLATES

- (a) Using a micrometer, measure the height, thickness and length of the 10 plates.

**Minimum height: 8.0 mm (0.315 in.)**

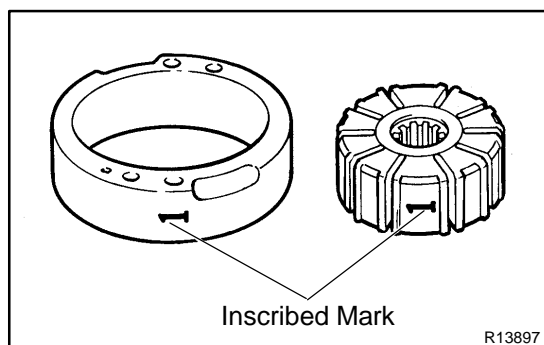
**Minimum thickness: 1.77 mm (0.0697 in.)**

**Minimum length: 14.97 mm (0.5894 in.)**



- (b) Using a feeler gauge, measure the clearance between the rotor groove and plate.

**Maximum clearance: 0.03 mm (0.0012 in.)**



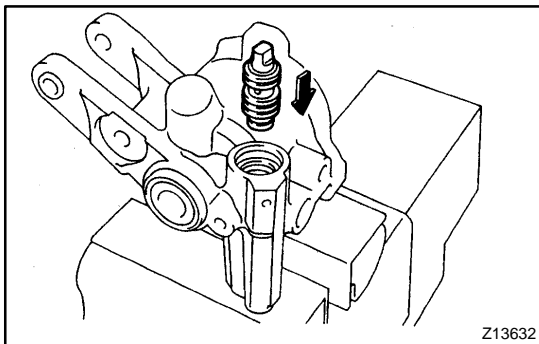
If it is more than the maximum, replace the plate and/or rotor with the one having the same mark stamped on the cam ring.

**Inscribed mark: 1, 2, 3, 4 or None**

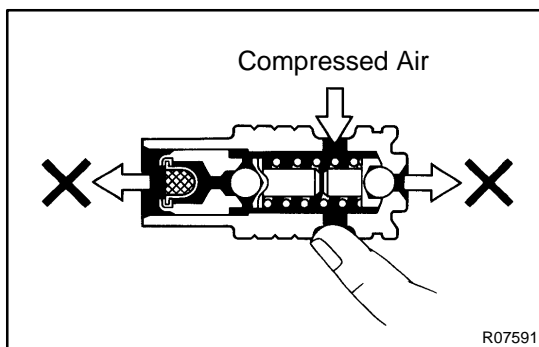
**HINT:**

There are 5 vane plate lengths with the following rotor and cam ring marks:

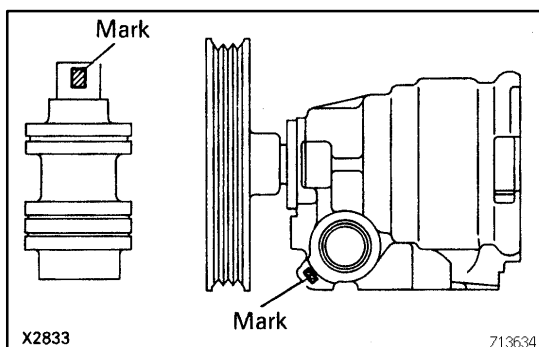
Rotor and cam ring mark	Vane plate part number	Vane plate length mm (in.)
None	44345-12010	14.996 - 14.998 (0.59039 - 0.59047)
1	44345-12020	14.994 - 14.996 (0.59032 - 0.59032)
2	44345-12030	14.992 - 14.994 (0.59024 - 0.59032)
3	44345-12040	14.990 - 14.992 (0.59016 - 0.59024)
4	44345-12050	14.988 - 14.990 (0.59008 - 0.59016)

**3. INSPECT FLOW CONTROL VALVE**

- (a) Coat the valve with power steering fluid and check that it falls smoothly into the valve hole by its own weight.

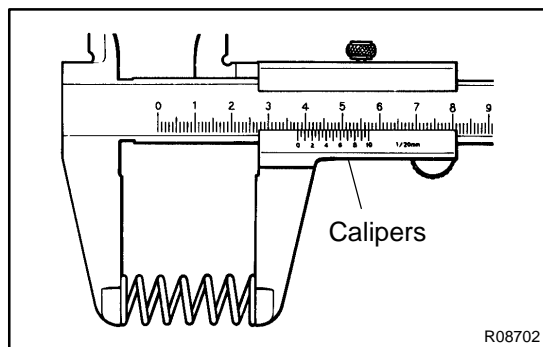


- (b) Check the flow control valve for leakage. Close one of the holes and apply 392 - 490 kPa (4 - 5 kgf/cm<sup>2</sup>, 57 - 71 psi) of compressed air into the opposite side hole, and confirm that air does not come out from the end holes.



If necessary, replace the valve with the one having the same letter as inscribed on the front housing.

**Inscribed mark: A, B, C, D, E or F**

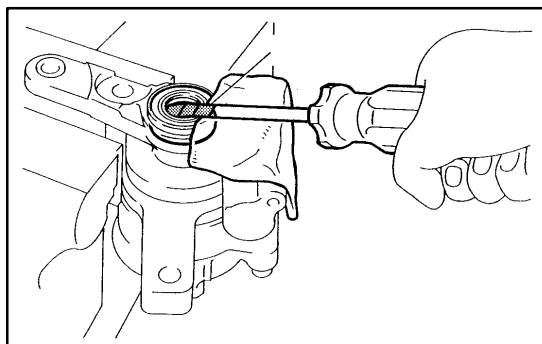


#### 4. INSPECT COMPRESSION SPRING

Using calipers, measure the free length of the spring.

**Minimum length: 36 - 38 mm (1.42 - 1.49 in.)**

If it is not within the specification, replace the spring.

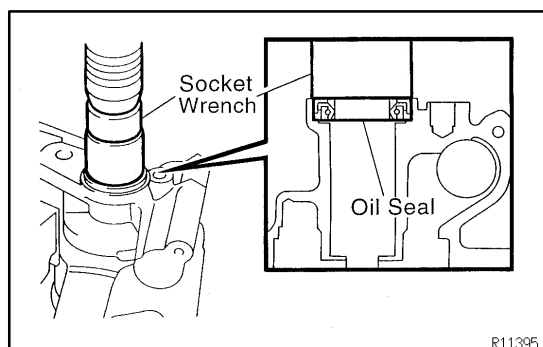


#### 5. IF NECESSARY, REPLACE OIL SEAL

(a) Using a screwdriver, pry out the oil seal.

**NOTICE:**

Place the shop rag, as shown, be careful not to damage the bushing of the front housing.



(b) Coat a new oil seal lip with power steering fluid.

(c) Using a socket wrench (24 mm), press in the oil seal.

**NOTICE:**

Make sure you install the oil seal facing the correct direction.

## REASSEMBLY

### NOTICE:

When using a vise, do not overtighten it.

#### 1. COAT WITH POWER STEERING FLUID

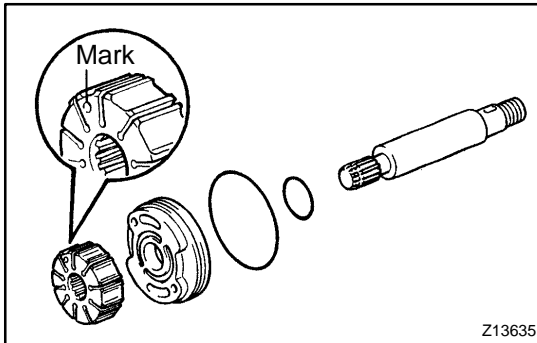
(See page [SR-22](#) )

#### 2. INSTALL LONGER STRAIGHT PIN

Using a plastic hammer, tap in a new pin to the front housing.

### NOTICE:

Be careful not to damage the pin.



#### 3. INSTALL SIDE FRONT PLATE AND VANE PUMP ROTOR

(a) Coat 2 new O-rings with power steering fluid, and install them to the plate.

(b) Install the plate to the vane pump shaft.

### NOTICE:

Make sure you install the plate facing the correct direction.

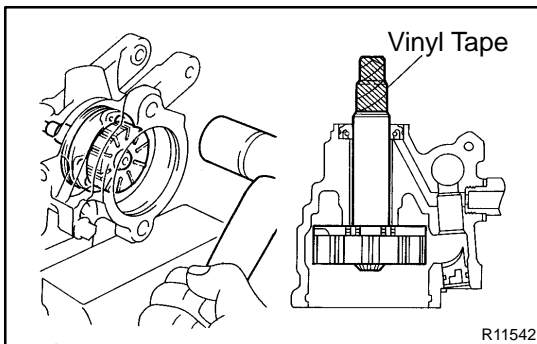
(c) Install the rotor to the pump shaft with the inscribed mark on the rotor facing outward.

(d) Using snap ring pliers, install a new snap ring to the vane pump shaft.

(e) Install a new shorter straight pin to the plate.

### NOTICE:

Be careful not to damage the pin.



#### 4. INSTALL VANE PUMP SHAFT WITH VANE PUMP ROTOR AND SIDE FRONT PLATE

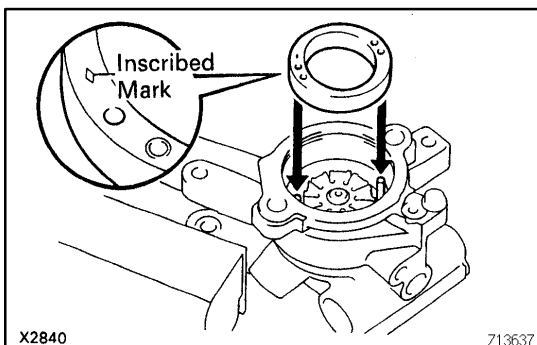
(a) To prevent oil seal lip damage, wind vinyl tape on the pump shaft.

(b) Align the hole of the front plate and longer straight pin.

(c) Tap in the pump shaft with a plastic hammer.

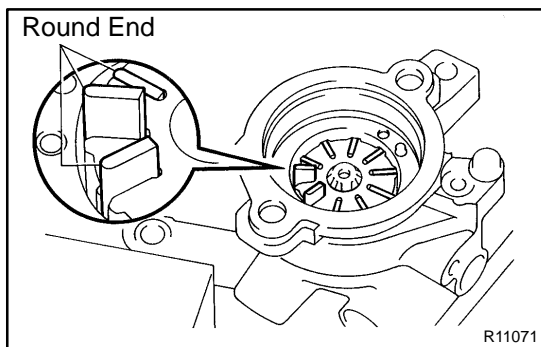
### NOTICE:

Be careful not to damage the oil seal and O-rings.



#### 5. INSTALL CAM RING

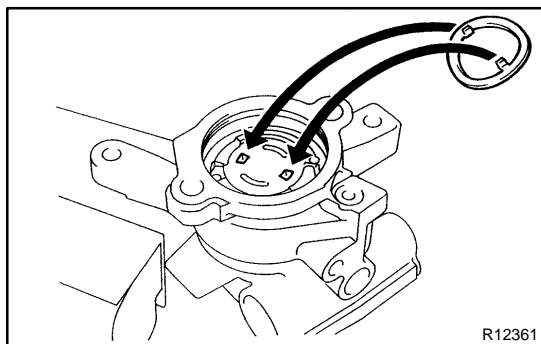
Align the holes of the ring and straight pins, and install the ring with the inscribed mark facing outward.

**6. INSTALL VANE PLATES**

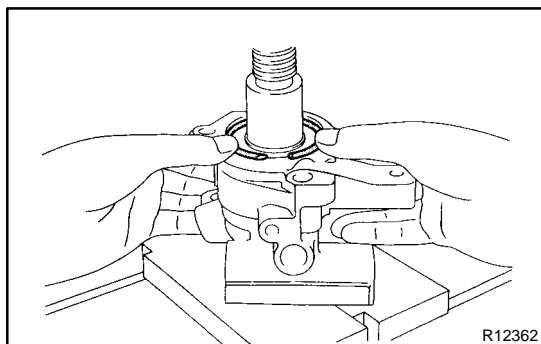
Install the 10 plates with the round end facing outward.

**7. INSTALL SIDE REAR PLATE**

- (a) Coat a new O-ring with power steering fluid, and install it to the plate.
- (b) Align the holes of the plate and straight pins.

**8. INSTALL WAVE WASHER**

Install the washer so that its protrusions fit into the slots in the side rear plate.

**9. INSTALL REAR HOUSING**

- (a) Coat a new O-ring with power steering fluid and install it to the rear housing.
- (b) Install the rear housing and use a press to push down on the wave washer hard enough to compress it.

**NOTICE:**

- Do not apply too much pressure.
- Be careful not to damage the O-ring.

**10. INSTALL SPRING, FLOW CONTROL VALVE AND PRESSURE PORT UNION**

- (a) Install the valve facing the correct direction.  
(See page [SR-22](#) )
- (b) Coat a new O-ring with power steering fluid, and install it to the union.

- (c) Torque the union.

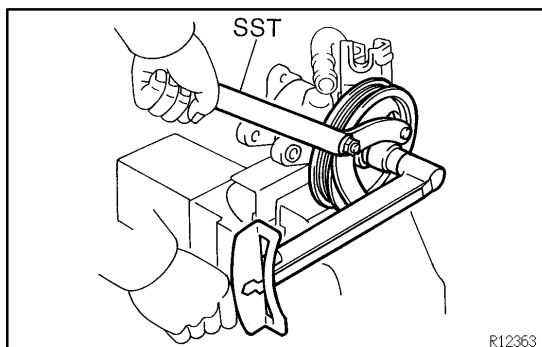
**Torque: 69 N·m (700 kgf-cm, 51 ft-lbf)**

**11. INSTALL SUCTION PORT UNION**

- (a) Coat a new O-ring with power steering fluid, and install it to the union.

- (b) Torque the 2 bolts.

**Torque: 13 N·m (130 kgf-cm, 9 ft-lbf)**

**12. INSTALL VANE PUMP PULLEY**

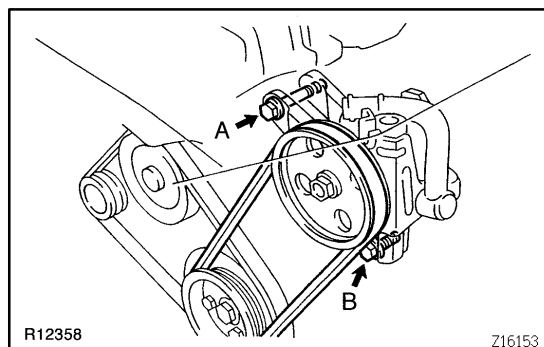
- (a) Install the woodruff key to the vane pump shaft.
- (b) Using SST to stop the pulley rotating, torque the pulley set nut.

SST 09960-10010 (09962-01000, 09963-01000)

**Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)**

**13. MEASURE PS VANE PUMP ROTATING TORQUE**

(See page [SR-25](#) )



## INSTALLATION

### 1. INSTALL PS VANE PUMP ASSEMBLY

Temporarily tighten the 2 bolts (A and B).

### 2. INSTALL DRIVE BELT

(a) Adjust drive belt tension (See page [SR-3](#) ).

(b) Torque the A bolt.

**Torque: 43 N·m (440 kgf-cm, 32 ft-lbf)**

(c) Torque the B bolt.

**Torque: 39 N·m (400 kgf-cm, 30 ft-lbf)**

### 3. CONNECT PRESSURE FEED TUBE

Torque the union bolt over a new gasket.

**Torque: 54 N·m (550 kgf-cm, 40 ft-lbf)**

### 4. CONNECT RETURN HOSE

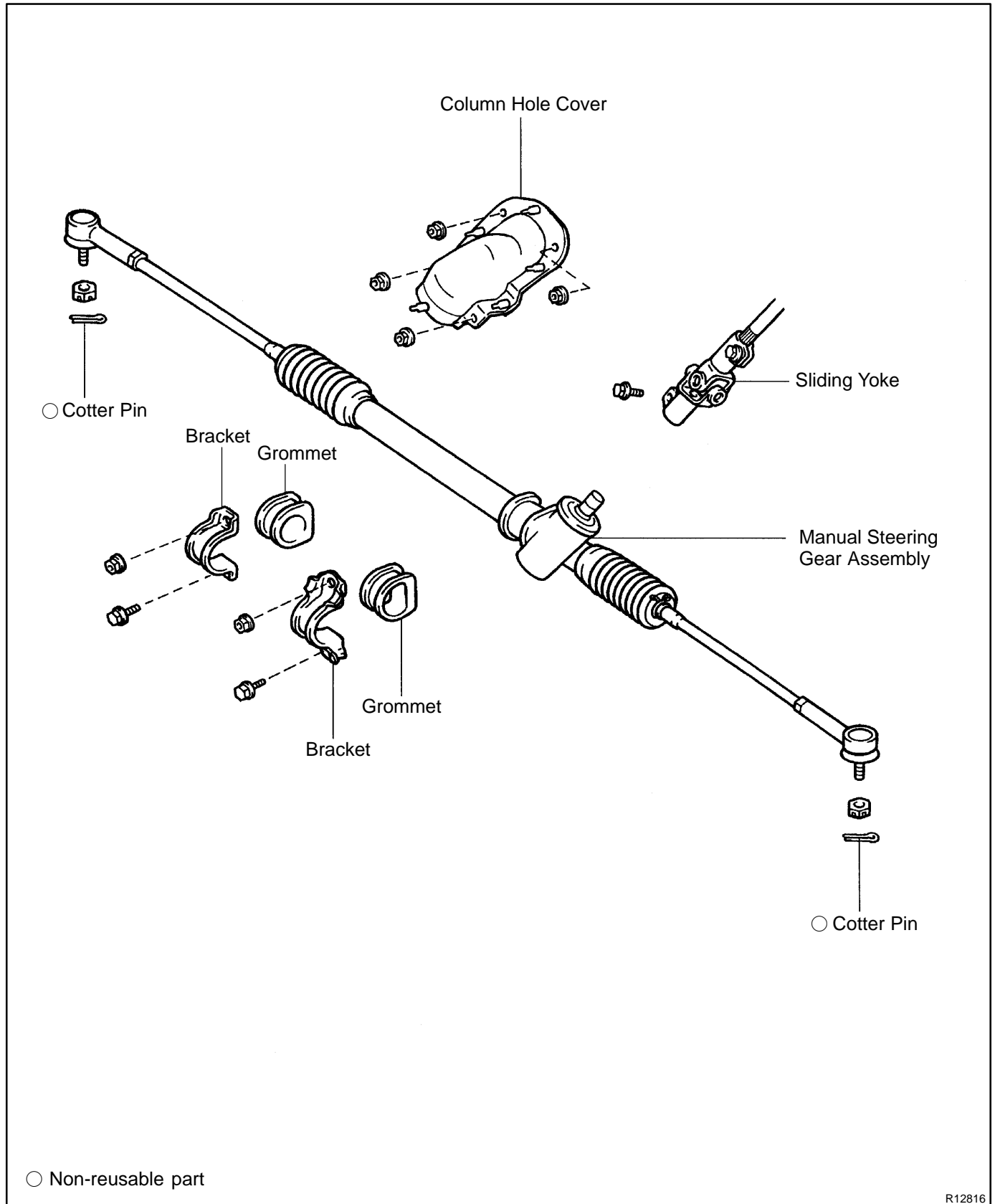
### 5. BLEED POWER STEERING SYSTEM

(See page [SR-5](#) )

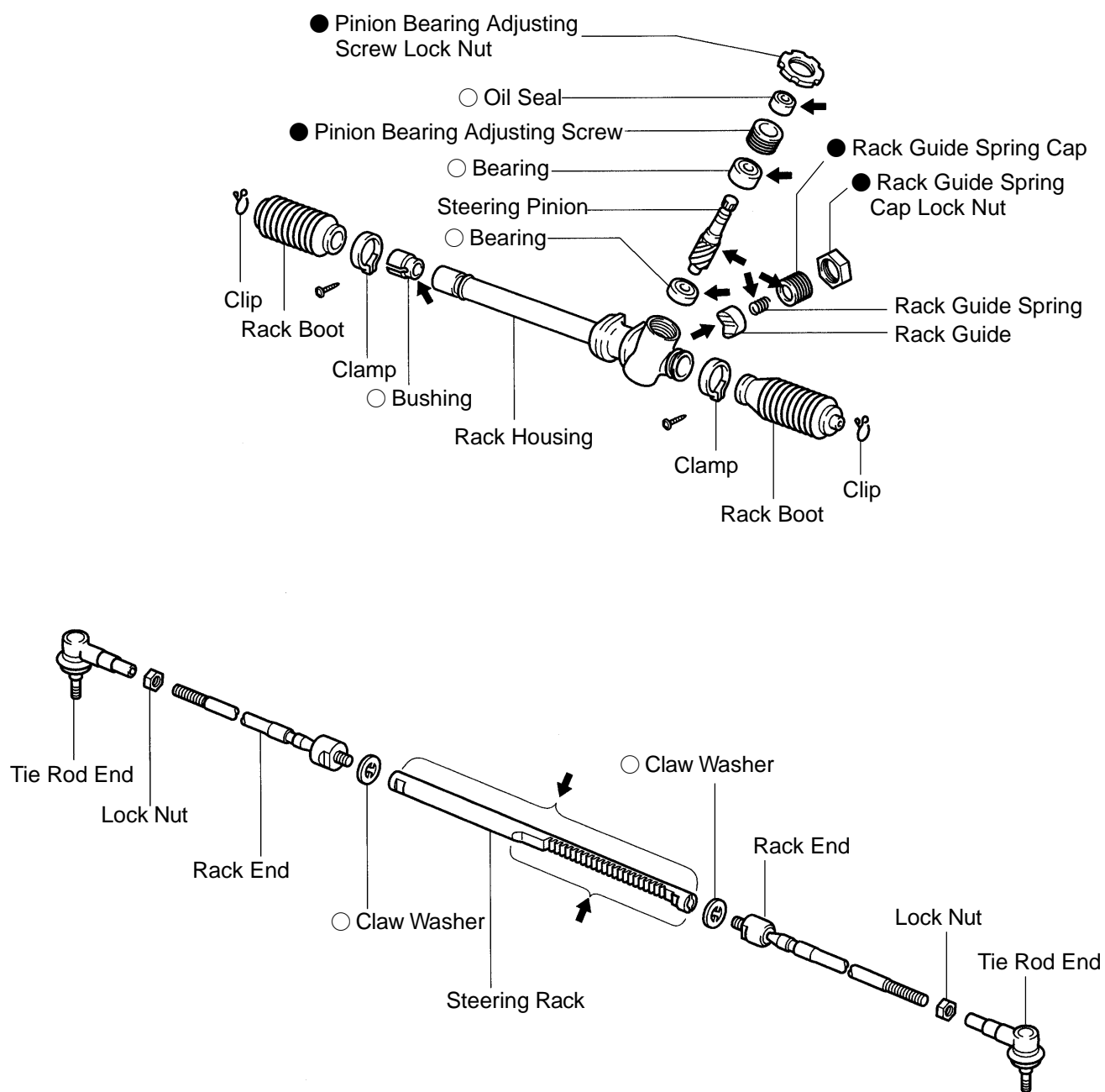


# MANUAL STEERING GEAR COMPONENTS

SR0KR-02



R12816



○ Non-reusable part

● Precoated part

← Molybdenum disulfide lithium base grease

Z19009

## REMOVAL

1. PLACE FRONT WHEELS FACING STRAIGHT AHEAD
2. REMOVE STEERING WHEEL PAD  
(See page [SR-13](#) )
3. REMOVE STEERING WHEEL  
(See page [SR-13](#) )
4. DISCONNECT RH AND LH TIE ROD ENDS  
(See page [SA-10](#) )
5. REMOVE COLUMN HOLE COVER

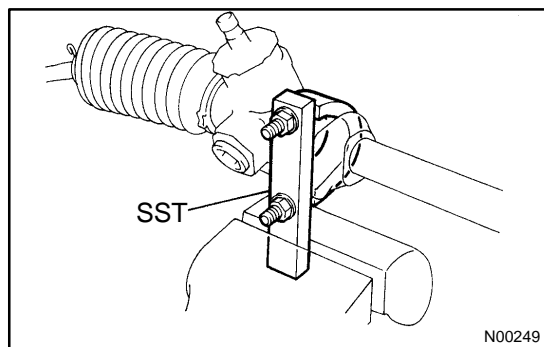
Remove the 4 nuts.

6. DISCONNECT SLIDING YOKE  
(See page [SR-13](#) )
7. REMOVE 2 BRACKETS AND GROMMETS

Remove the 2 bolts and nuts.

8. REMOVE MANUAL STEERING GEAR ASSEMBLY

Remove the gear assembly from the LH side of the vehicle.



## DISASSEMBLY

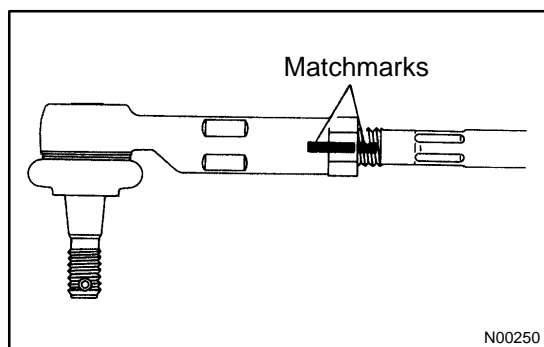
### NOTICE:

When using a vise, do not overtighten it.

#### 1. SECURE MANUAL STEERING GEAR IN VISE

Using SST, secure the gear assembly in a vise.

SST 09612-00012



#### 2. REMOVE RH AND LH TIE ROD ENDS AND LOCK NUTS

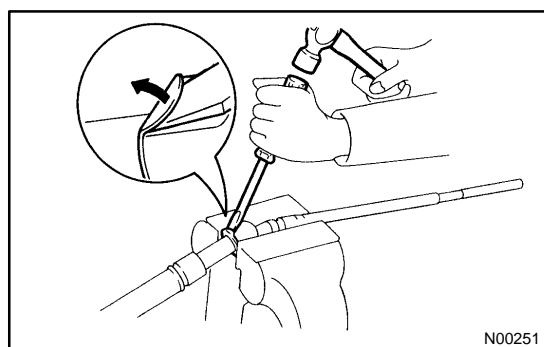
Place matchmarks on the tie rod end and rack end.

#### 3. REMOVE RH AND LH CLIPS, RACK BOOTS AND CLAMPS

Remove the clamp screw from the boot.

### NOTICE:

- Be careful not to damage the boot.
- Mark the RH and LH boots.

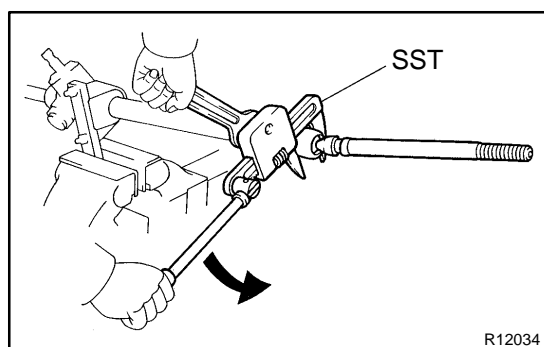


#### 4. REMOVE RH AND LH RACK ENDS AND CLAW WASHERS

(a) Using a screwdriver and hammer, unstake the washer.

### NOTICE:

Avoid any impact on the steering rack.

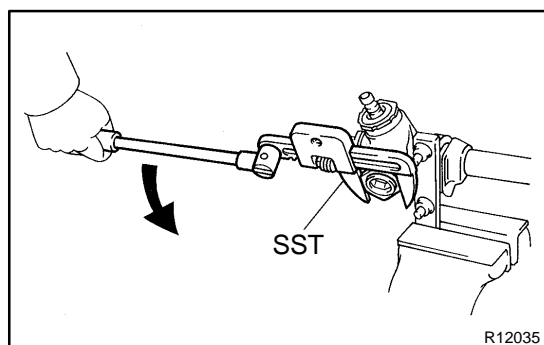


(b) Using a spanner, hold the steering rack steadily and using SST, remove the rack end.

SST 09922-10010

### NOTICE:

- Use SST 09922-10010 in the direction shown in the illustration.
- Mark the RH and LH rack ends.



#### 5. REMOVE RACK GUIDE SPRING CAP LOCK NUT

Using SST, remove the nut.

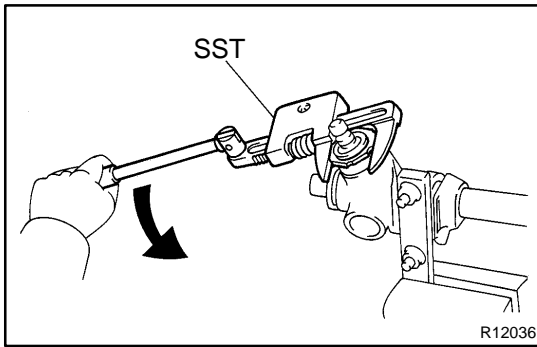
SST 09922-10010

### NOTICE:

Use SST 09922-10010 in the direction shown in the illustration.

#### 6. REMOVE RACK GUIDE SPRING CAP, RACK GUIDE SPRING AND RACK GUIDE

Using a hexagon wrench (19 mm), remove the cap.



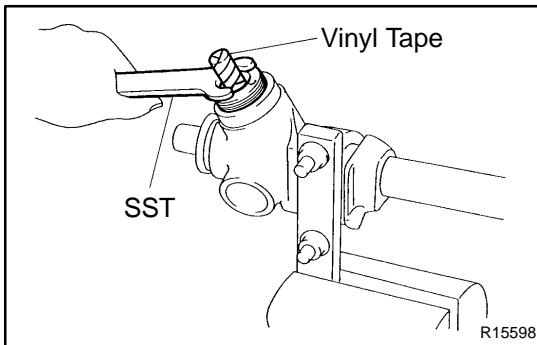
## 7. REMOVE PINION BEARING ADJUSTING SCREW LOCK NUT

Using SST, remove the nut.

SST 09922-10010

### NOTICE:

Use SST 09922-10010 in the direction shown in the illustration.

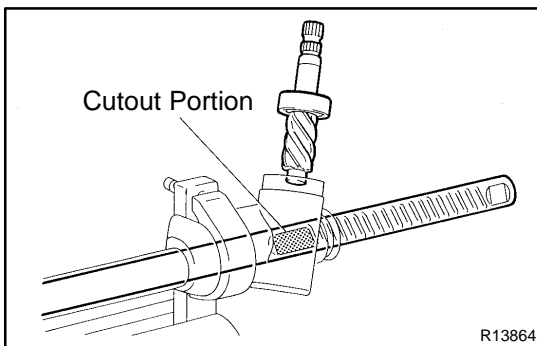


## 8. REMOVE PINION BEARING ADJUSTING SCREW

(a) To prevent oil seal lip damage, wind vinyl tape on the serrated part of the steering pinion.

(b) Using SST, remove the screw.

SST 09612-24014 (09616-10020)



## 9. REMOVE STEERING PINION WITH BEARING

Fully pull the steering rack from the steering pinion side of the rack housing and align the rack cutout portion with the pinion.

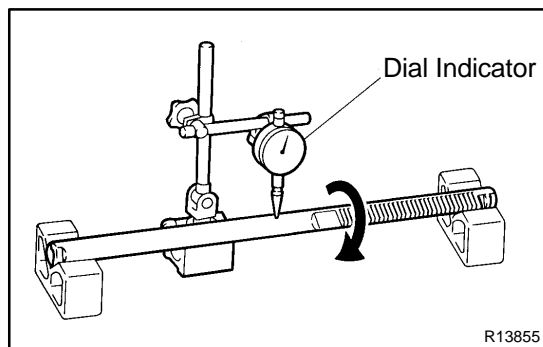
### NOTICE:

Be careful not to damage the serrations.

## 10. REMOVE STEERING RACK

### NOTICE:

To avoid damaging the bushing, remove the rack from the steering pinion housing side of the rack housing without revolving it.



## INSPECTION

### NOTICE:

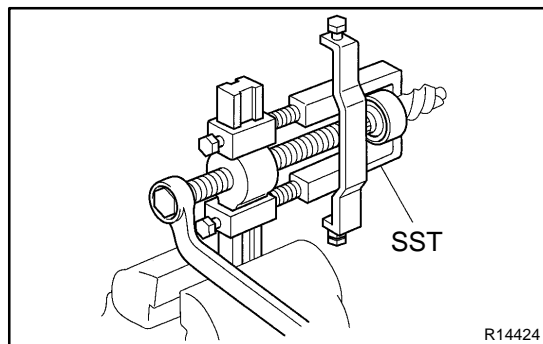
**When using a vise, do not overtighten it.**

#### 1. INSPECT STEERING RACK

- (a) Using a dial indicator, check the rack for runout and for teeth wear and damage.

**Maximum runout: 0.30 mm (0.0118 in.)**

- (b) Check the back surface for wear and damage.



#### 2. IF NECESSARY, REPLACE BEARING

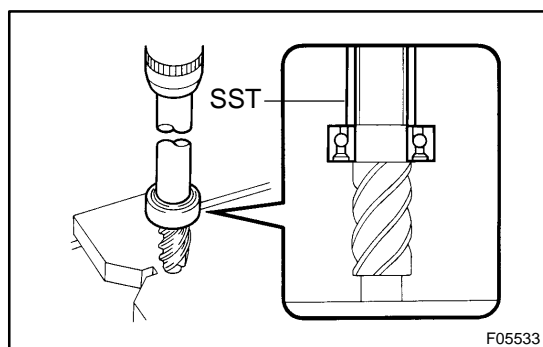
- (a) Using SST, remove the bearing.

SST 09950-40010 (09951-04010, 09952-04010,  
09953-04020, 09954-04010, 09955-04050,  
09957-04010, 09958-04010)

### NOTICE:

**Be careful not to damage the pinion.**

- (b) Coat a new bearing with molybdenum disulfide lithium base grease.

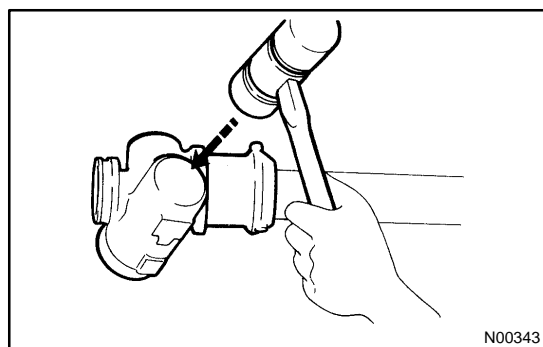


- (c) Using SST, press in the bearing.

SST 09612-24014 (09612-10061)

### NOTICE:

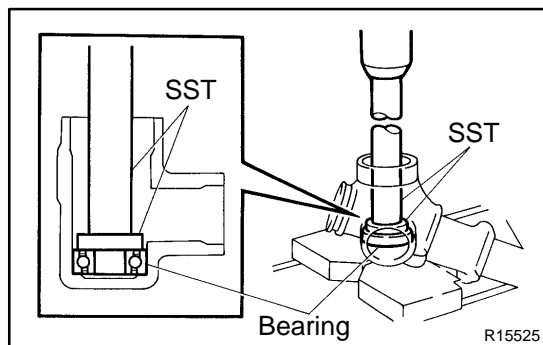
**Make sure to install the bearing facing the correct direction.**



#### 3. IF NECESSARY, REPLACE BEARING

- (a) Heat the rack housing to above 80°C (176°F).

- (b) Using a plastic hammer, tap out the bearing from the rack housing.

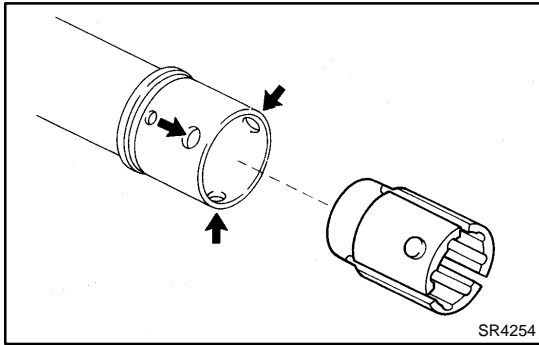


- (c) Heat the rack housing to above 80°C (176°F).

- (d) Coat a new bearing with molybdenum disulfide lithium base grease.

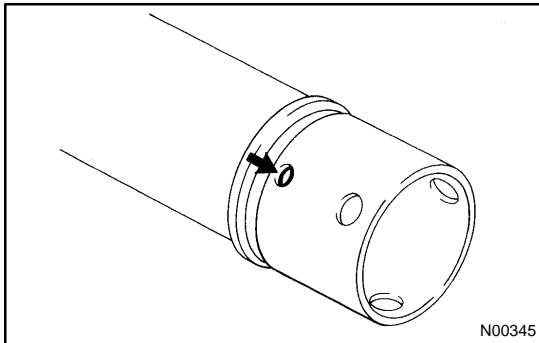
- (e) Using SST, press in the bearing.

SST 09950-60010 (09951-00340),  
09950-70010 (09951-07150)



#### 4. IF NECESSARY, REPLACE BUSHING

- (a) Using a screwdriver, depress the projections on the bushing to release the bushing, then remove the bushing from the rack housing.

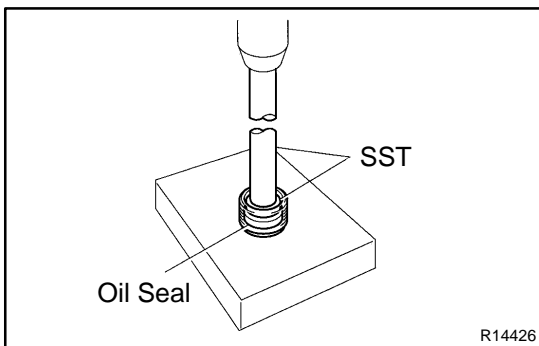


- (b) Ensure that the hole of the rack housing is not clogged with grease.

#### HINT:

If the hole is clogged, the pressure inside the boot will change after it is assembled and the steering wheel is turned.

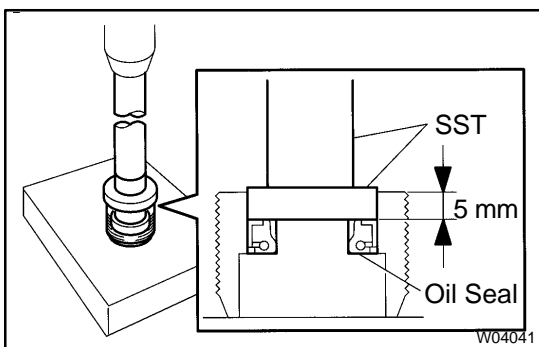
- (c) Coat inside a new bushing with molybdenum disulfide lithium base grease.  
 (d) Install the bushing into the rack housing, making sure to align into the 3 holes.



#### 5. IF NECESSARY, REPLACE OIL SEAL

- (a) Using SST, press out the oil seal from the pinion bearing adjusting screw.

SST 09950-60010 (09951-00240),  
 09950-70010 (09951-07100)



- (b) Coat a new oil seal lip with molybdenum disulfide lithium base grease.

- (c) Using SST, press in the oil seal with it is protruding 5 mm (0.21 in.).

SST 09950-60010 (09951-00240),  
 09950-70010 (09951-07100)

#### NOTICE:

**Make sure to install the oil seal facing the correct direction.**

## REASSEMBLY

### NOTICE:

When using a vise, do not overtighten it.

1. **COAT WITH MOLYBDENUM DISULFIDE LITHIUM BASE GREASE**

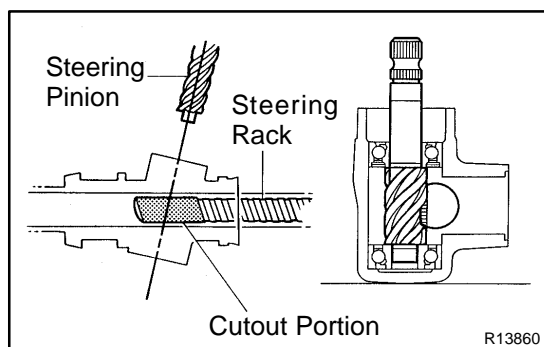
(See page [SR-34](#) )

2. **INSTALL STEERING RACK**

Install the rack into the rack housing.

### NOTICE:

To avoid damaging the bushing, install the rack from the steering pinion side of the rack housing without revolving it.

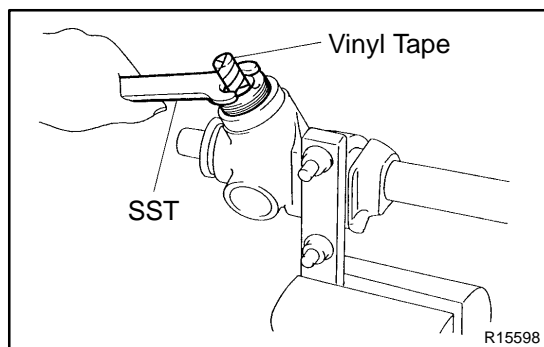


3. **INSTALL STEERING PINION**

- (a) Set the steering rack notched side so that the pinion can be positioned inside.
- (b) Line up the cutout portion of the rack with the pinion.
- (c) Ensure that the pinion end is securely located in the bearing.

### NOTICE:

Do not engage the pinion teeth with the rack teeth.



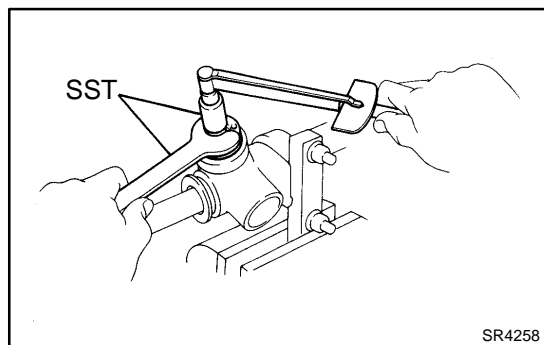
4. **INSTALL PINION BEARING ADJUSTING SCREW**

- (a) To prevent oil seal lip damage, wind vinyl tape on the serrated part of the steering pinion.
- (b) Apply sealant to 2 or 3 threads of the screw.

### Sealant:

**Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent**

- (c) Using SST, temporarily install the screw.  
SST 09612-24014 (09616-10020)



5. **ADJUST PINION PRELOAD**

### NOTICE:

Do not engage the pinion teeth with the rack teeth.

- (a) Using SST and a torque wrench, tighten the pinion bearing adjusting screw until the preload matches the specification.

SST 09612-24014 (09616-10010, 09616-10020)

### Preload (turning):

**0.4 N·m (3.7 kgf·cm, 3.2 in.-lbf)**



- (b) Using SST and a torque wrench, loosen the screw until the preload is within specification.  
SST 09612-24014 (09616-10010, 09616-10020)

**Preload (turning):**

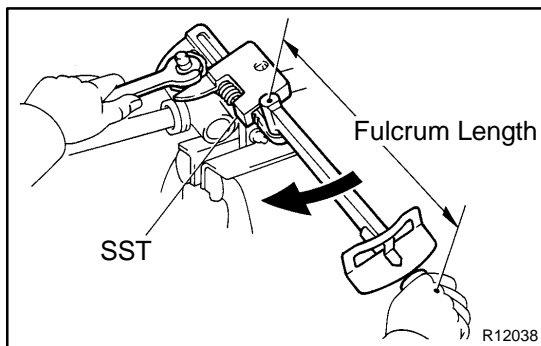
**0.23 - 0.32 N·m (2.3 - 3.3 kgf·cm, 2.0 - 2.9 in.-lbf)**

**6. INSTALL PINION BEARING ADJUSTING SCREW LOCK NUT**

- (a) Apply sealant to 2 or 3 threads of the nut.

**Sealant:**

**Part No.08833-00080, THREE BOND 1344,  
LOCTITE 242 or equivalent**



- (b) Using SST, stop the pinion bearing adjusting screw rotating and using another SST, torque the nut.  
SST 09612-24014 (09616-10020), 09922-10010  
**Torque: 85 N·m (871 kgf·cm, 63 ft-lbf)**

**NOTICE:**

**Use SST 09922-10010 in the direction shown in the illustration.**

**HINT:**

Use a torque wrench with a fulcrum length of 380 mm (14.96 in.).

- (c) Recheck the pinion preload.

**Preload (turning):**

**0.23 - 0.32 N·m (2.3 - 3.3 kgf·cm, 2.0 - 2.9 in.-lbf)**

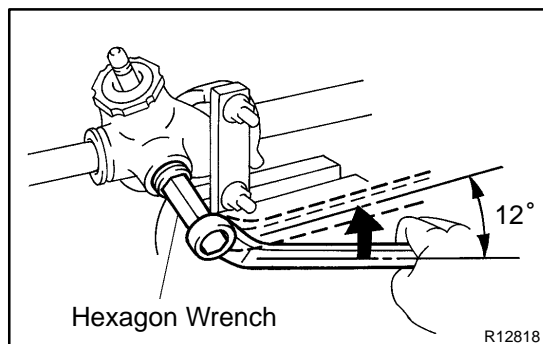
**7. INSTALL RACK GUIDE, RACK GUIDE SPRING AND RACK GUIDE SPRING CAP**

- (a) Apply sealant to 2 or 3 threads of the cap.

**Sealant:**

**Part No.08833-00080, THREE BOND 1344,  
LOCTITE 242 or equivalent**

- (b) Temporarily install the cap.

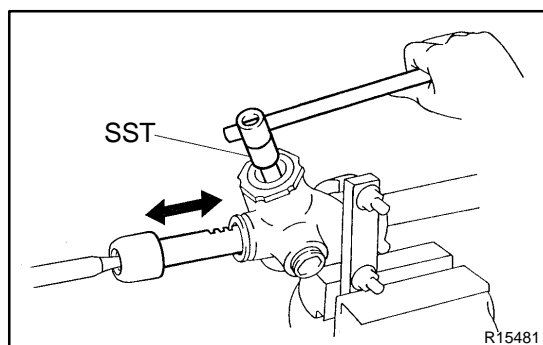


## 8. ADJUST TOTAL PRELOAD

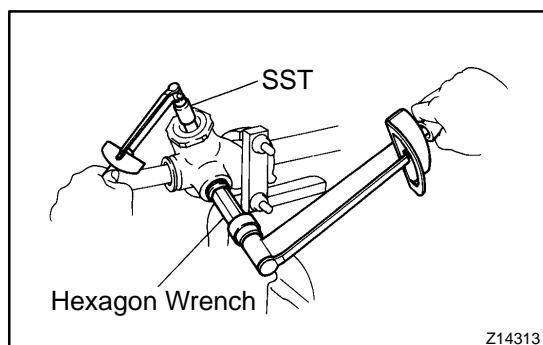
- To prevent the steering rack teeth from damaging the oil seal lip, temporarily install the RH and LH rack ends.
- Using a hexagon wrench (19 mm), torque the rack guide spring cap.

**Torque: 14.7 N·m (150 kgf·cm, 10.8 ft·lbf)**

- Using a hexagon wrench (19 mm), return the cap 12°.



- Using SST, turn the pinion shaft right and left 1 or 2 times.  
SST 09612-24014 (09616-10010)
- Using a hexagon wrench (19 mm), loosen the cap until the rack guide spring is not functioning.

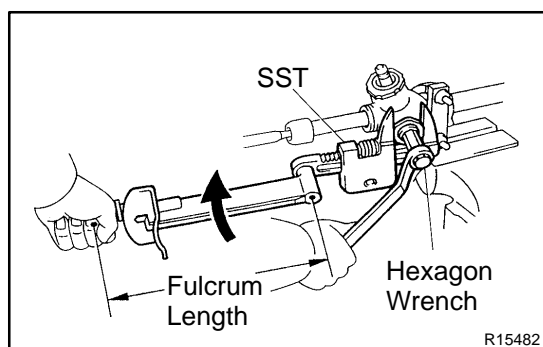


- Using SST, a torque wrench and hexagon wrench (19 mm), tighten the cap until the preload is within specification.

SST 09612-24014 (09616-10010)

**Preload (turning):**

**0.6 - 1.2 N·m (6 - 12 kgf·cm, 5.2 - 10.4 in.-lbf)**



## 9. INSTALL RACK GUIDE SPRING CAP LOCK NUT

- Apply sealant to 2 or 3 threads of the nut.

**Sealant:**

**Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent**

- Using a hexagon wrench (19 mm), hold the rack guide spring cap rotating and using SST, torque the nut.

SST 09922-10010

**Torque: 41 N·m (419 kgf·cm, 30 ft·lbf)**

**NOTICE:**

**Use SST 09922-10010 in the direction shown in the illustration.**

**HINT:**

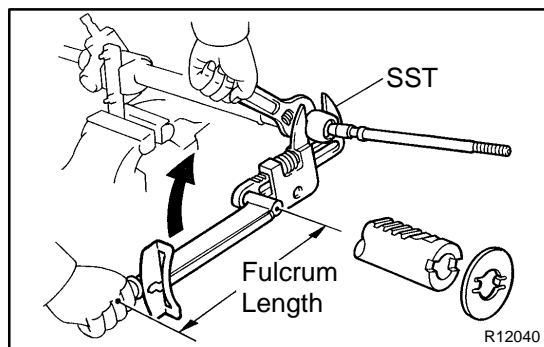
Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).

- Recheck the total preload.

**Preload (turning):**

**0.6 - 1.2 N·m (6 - 12 kgf·cm, 5.2 - 10.4 in.-lbf)**

- Remove the RH and LH rack ends.



## 10. INSTALL RH AND LH CLAW WASHERS AND RACK ENDS

- (a) Install a new washer, and temporarily tighten the rack end.

### HINT:

Align the claws of the washer with the steering rack grooves.

- (b) Using a spanner, hold the steering rack steadily and using SST, torque the rack end.

SST 09922-10010

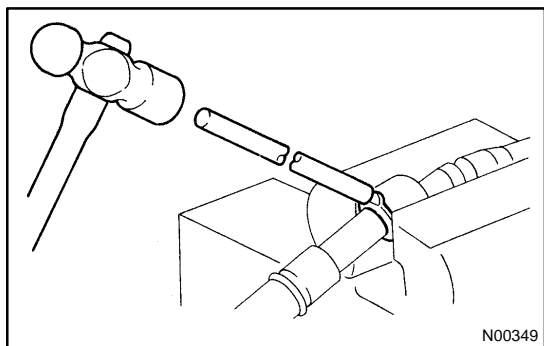
**Torque: 43 N·m (434 kgf-cm, 31 ft-lbf)**

### NOTICE:

Use SST 09922-10010 in the direction shown in the illustration.

### HINT:

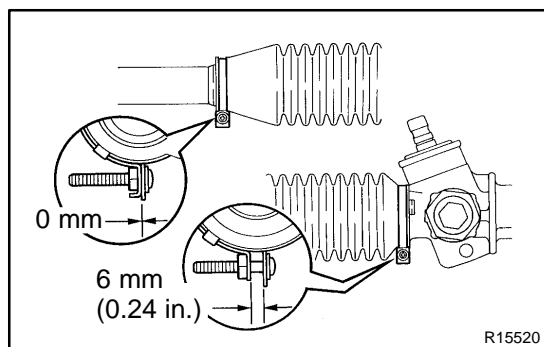
Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).



- (c) Using a brass bar and hammer, stake the washer.

### NOTICE:

Avoid any impact on the rack.



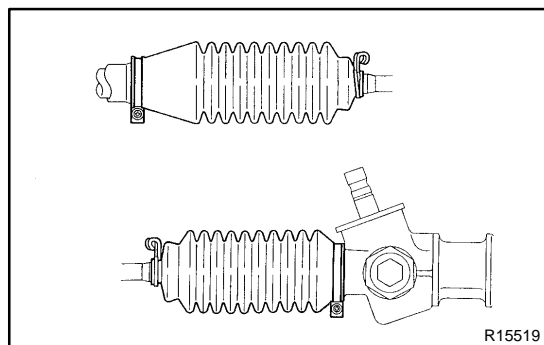
## 11. INSTALL RH AND LH BOOTS, CLAMPS AND CLIPS

- (a) Install the rack boot.

### NOTICE:

Be careful not to damage or twist the boot.

- (b) Install the clamp screw, as shown in the illustration.



- (c) Install the clip.

### HINT:

Face the open ends of the clips outward/upward as shown in the illustration, to avoid damage to the boot.

## 12. INSTALL RH AND LH TIE ROD ENDS AND LOCK NUTS

- (a) Screw the lock nut and tie rod end onto the rack end until the matchmarks are aligned.

- (b) After adjusting toe-in, torque the nut.

(See page [SA-4](#))

**Torque: 47 N·m (480 kgf-cm, 35 ft-lbf)**

## INSTALLATION

### 1. INSTALL MANUAL STEERING GEAR ASSEMBLY

Install the gear assembly from the LH of the vehicle.

### 2. INSTALL 2 GROMMETS AND BRACKETS

Torque the 2 bolts and nuts.

**Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)**

### 3. CONNECT SLIDING YOKE (See page [SR-20](#))

### 4. INSTALL COLUMN HOLE COVER

Torque the 4 nuts.

**Torque: 4.9 N·m (50 kgf·cm, 43 in·lbf)**

### 5. CONNECT RH AND LH TIE ROD ENDS (See page [SA-10](#))

### 6. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

HINT:

Do it with the front of the vehicle jacked up.

### 7. w/ Airbag:

**CENTER SPIRAL CABLE (See page [SR-20](#))**

### 8. INSTALL STEERING WHEEL

(a) Install the wheel at straight-ahead position.

(b) Temporarily tighten the wheel set nut.

(c) Connect the connector.

### 9. CHECK STEERING WHEEL CENTER POINT

### 10. w/ Airbag:

**TORQUE STEERING WHEEL SET NUT**

**Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)**

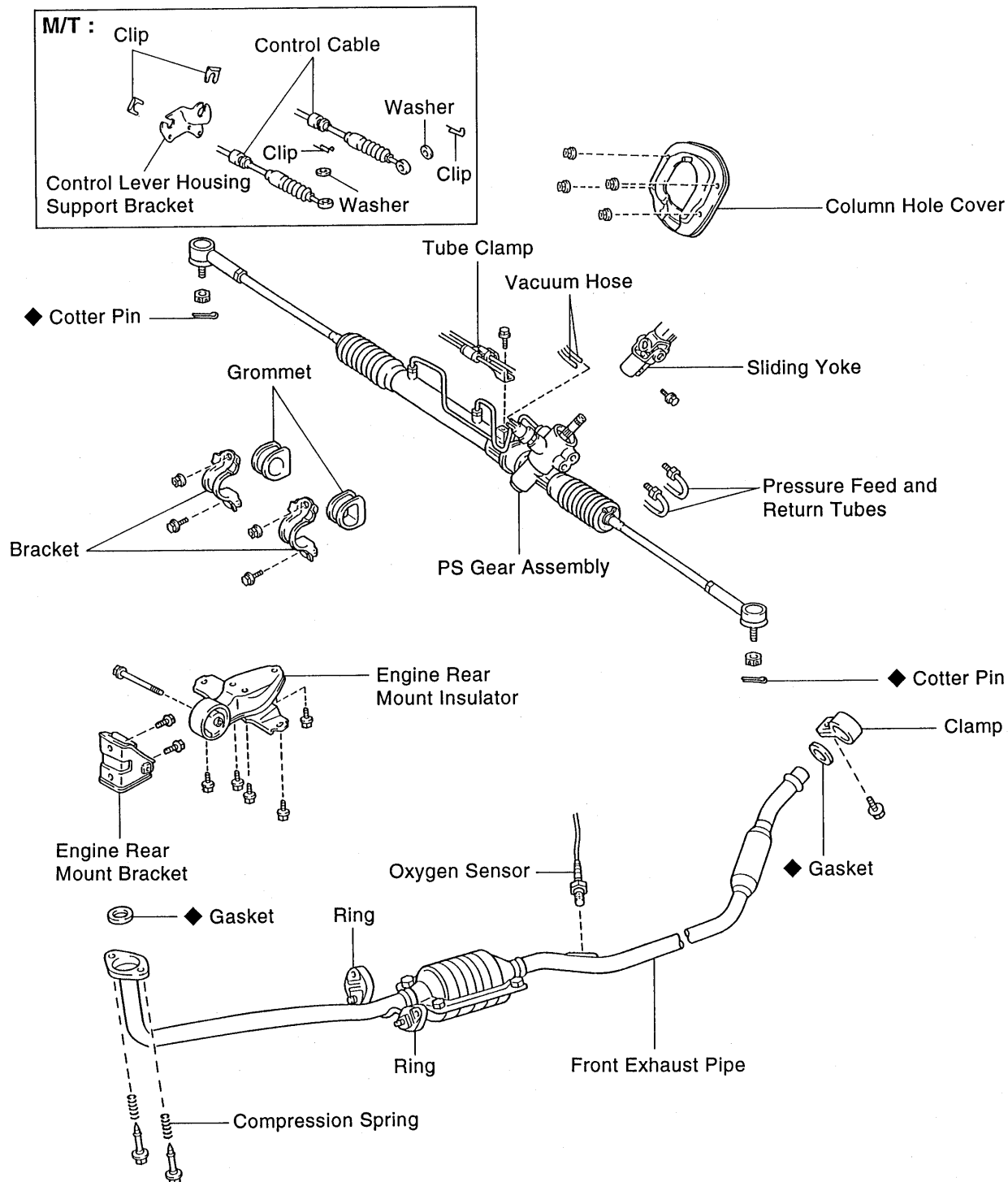
### 11. w/ Airbag:

**INSTALL STEERING WHEEL PAD (See page [SR-20](#))**

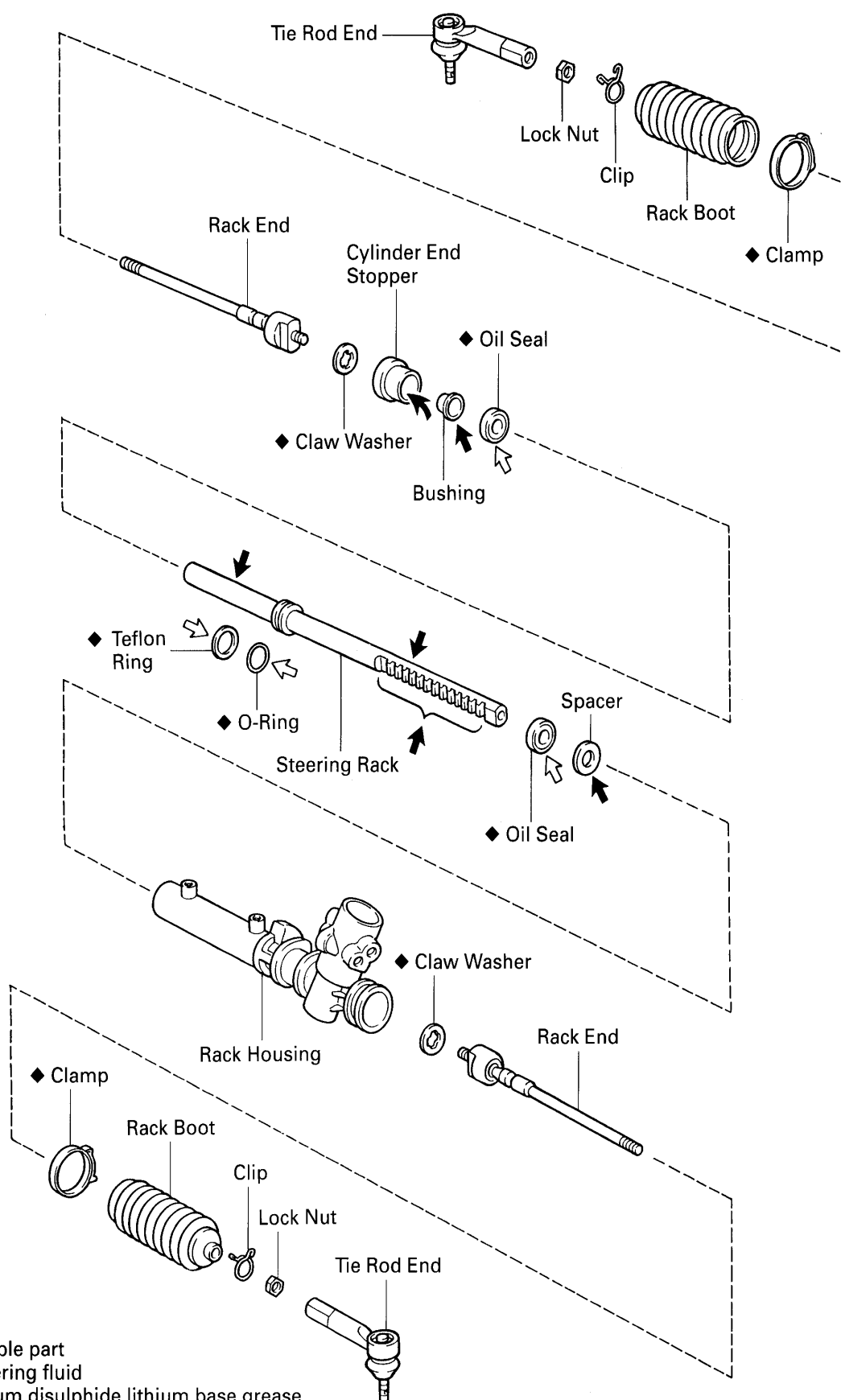
### 12. CHECK FRONT WHEEL ALIGNMENT (See page [SA-4](#))

# POWER STEERING GEAR COMPONENTS

SR0KX-04

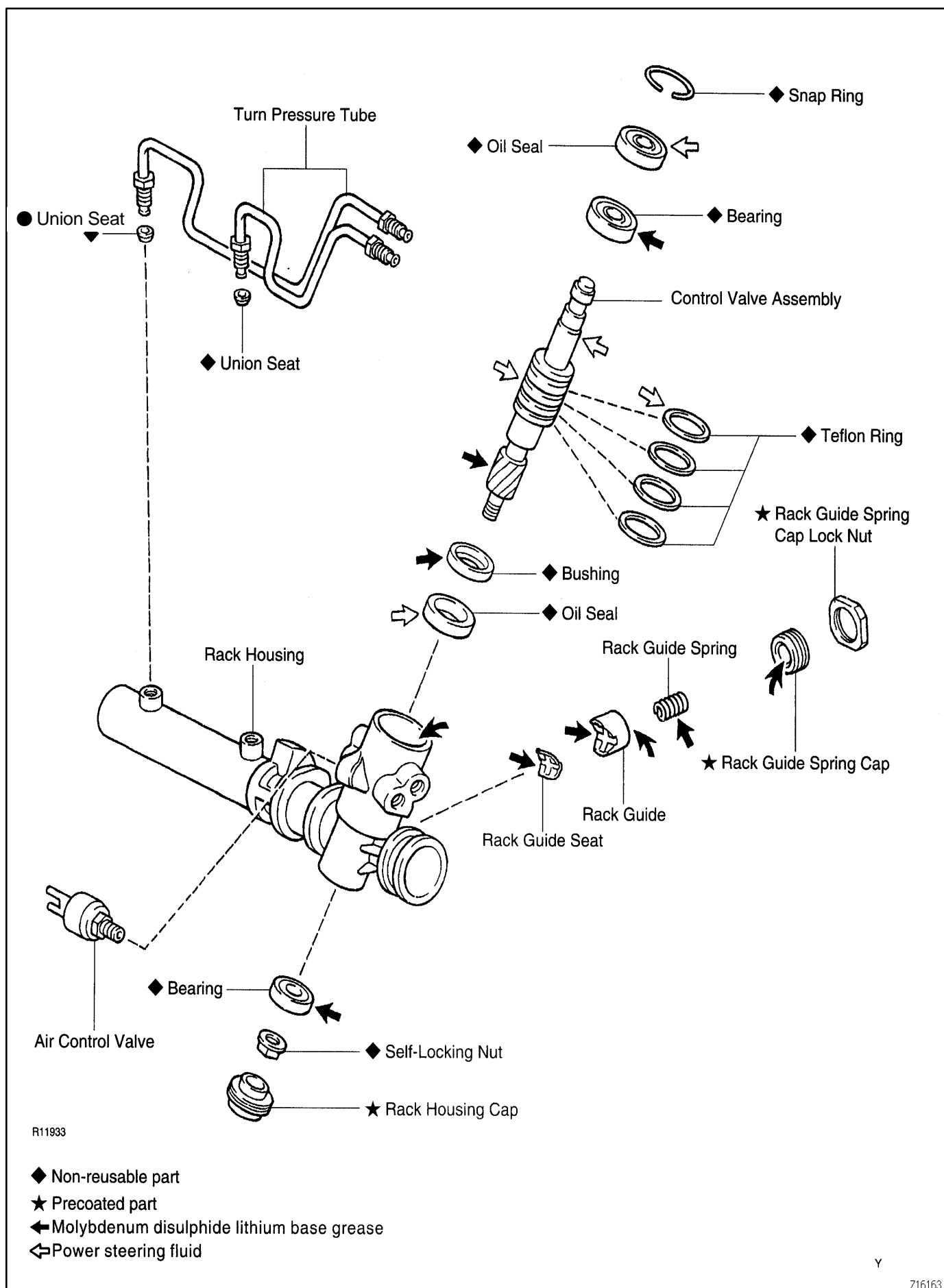


R12817



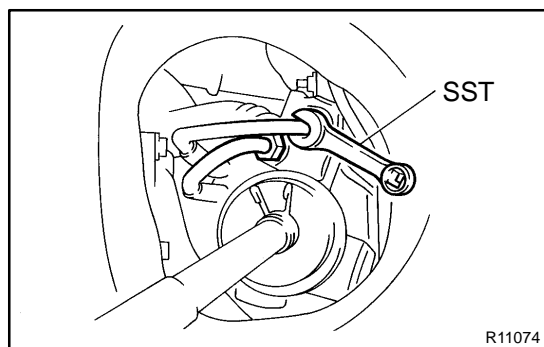
R11172

Z15180



## REMOVAL

1. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
2. **w/ Airbag:**  
**REMOVE STEERING WHEEL PAD (See page SR-13 )**
3. **w/ Airbag:**  
**REMOVE STEERING WHEEL (See page SR-13 )**
4. **DISCONNECT RH AND LH TIE ROD ENDS (See page SA-10 )**
5. **REMOVE COLUMN HOLE COVER**  
Remove the 2 bolts and nut.
6. **DISCONNECT SLIDING YOKE (See page SR-13 )**
7. **REMOVE OXYGEN SENSOR**
8. **REMOVE FRONT EXHAUST PIPE**
  - (a) Remove the 2 bolts, compression springs and gasket.
  - (b) Remove the bolt, clamp and gasket.
  - (c) Disconnect the 2 rings.
9. **REMOVE ENGINE REAR MOUNT INSULATOR**  
Remove the 6 bolts.
10. **REMOVE ENGINE REAR MOUNT BRACKET**  
Remove the 2 bolts.
11. **DISCONNECT 2 VACUUM HOSES**
12. **M/T:**  
**DISCONNECT CONTROL CABLES**
  - (a) Remove the 2 clips and washers.
  - (b) Remove the 2 clips from the cables.
  - (c) Disconnect the 2 cables from the control lever housing support bracket.



### 13. DISCONNECT PRESSURE FEED AND RETURN TUBES

Using SST, disconnect the tube.

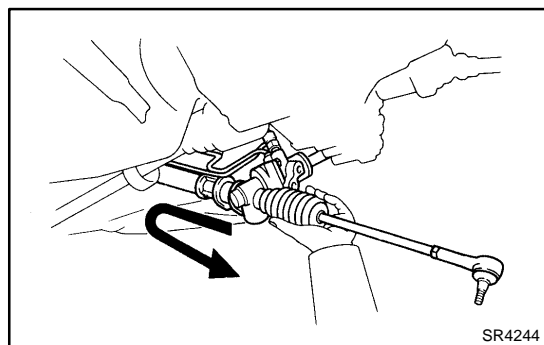
SST 09631-22020

### 14. DISCONNECT TUBE CLAMP

Remove the bolt.

### 15. REMOVE 2 BRACKETS AND GROMMETS

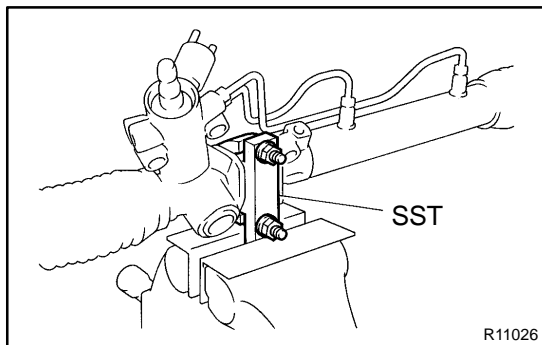
Remove the 2 bolts and nuts.



### 16. REMOVE PS GEAR ASSEMBLY

- (a) Slide the gear assembly to the RH side of the vehicle.
- (b) Slide the gear assembly to the LH side and pull it out.





## DISASSEMBLY

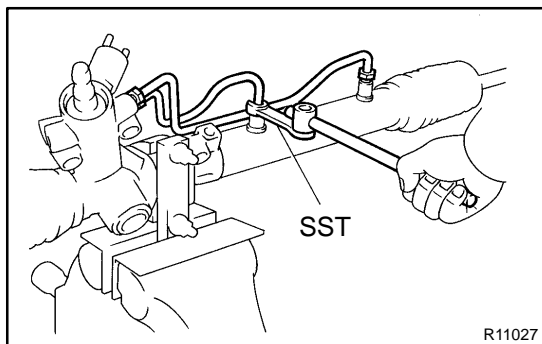
### NOTICE:

When using a vise, do not overtighten it.

#### 1. SECURE PS GEAR ASSEMBLY IN VISE

Using SST, secure the gear assembly in a vise.

SST 09612-00012



#### 2. REMOVE 2 TURN PRESSURE TUBES

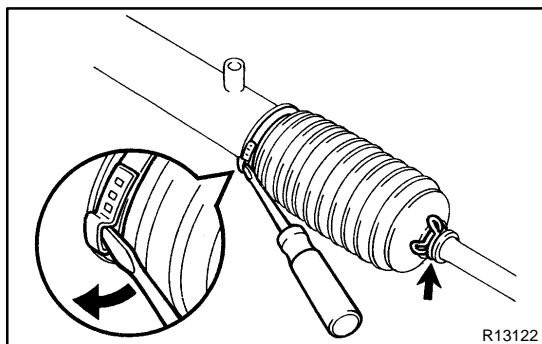
(a) Using SST, remove the tube.

SST 09633-00020

(b) Remove the 2 union seats from the rack housing.

#### 3. REMOVE AIR CONTROL VALVE

#### 4. REMOVE RH AND LH TIE ROD ENDS AND LOCK NUTS (See page [SR-37](#))



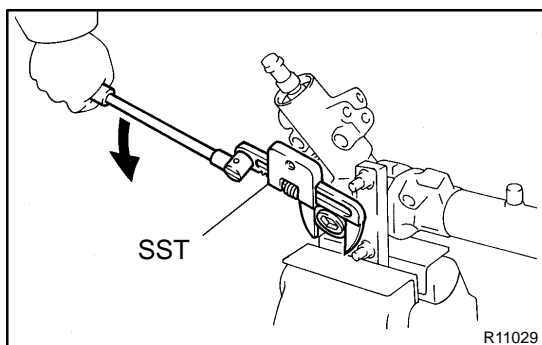
#### 5. REMOVE RH AND LH CLIPS, RACK BOOTS AND CLAMPS

Using a screwdriver, loosen the clamp.

### NOTICE:

- Be careful not to damage the boot.
- Mark the RH and LH boots.

#### 6. REMOVE RH AND LH RACK ENDS AND CLAW WASHERS (See page [SR-37](#))



#### 7. REMOVE RACK GUIDE SPRING CAP LOCK NUT

Using SST, remove the nut.

SST 09922-10010

### NOTICE:

Use SST 09922-10010 in the direction shown in the illustration.

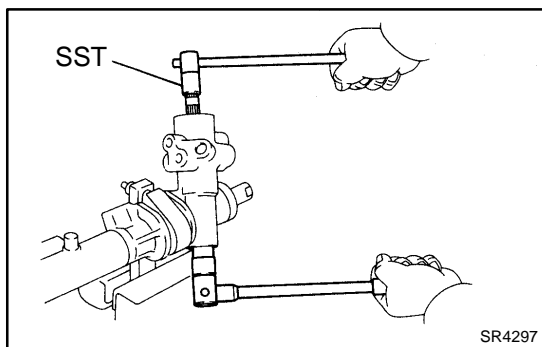
#### 8. REMOVE RACK GUIDE SPRING CAP

Using a hexagon wrench (21 mm), remove the cap.

#### 9. REMOVE RACK GUIDE SPRING, RACK GUIDE AND RACK GUIDE SEAT

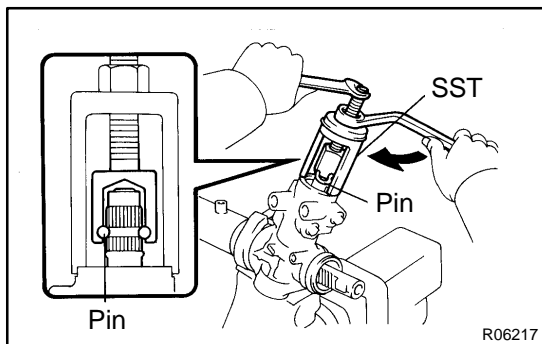
Remove the seat from the guide.

#### 10. REMOVE RACK HOUSING CAP

**11. REMOVE SELF-LOCKING NUT**

Using SST, stop the control valve rotating and remove the nut.

SST 09616-00010

**12. REMOVE CONTROL VALVE ASSEMBLY WITH OIL SEAL AND BEARING**

(a) Using snap ring pliers, remove the snap ring from the rack housing.

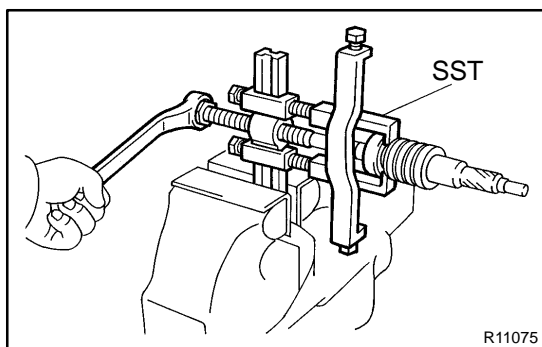
(b) Using SST, remove the valve assembly with the oil seal and bearing.

SST 09613-12010

**NOTICE:**

**Never attempt to tap out the control valve as this would damage it.**

(c) Remove the oil seal from the valve assembly.

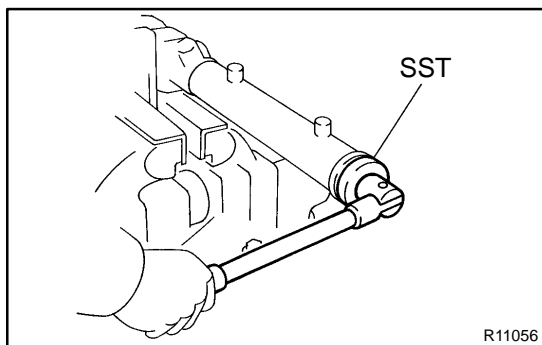


(d) Using SST, remove the bearing from the valve assembly.

SST 09950-40010 (09951-04010, 09952-04010, 09953-04020, 09954-04010, 09955-04050, 09957-04010, 09958-04010)

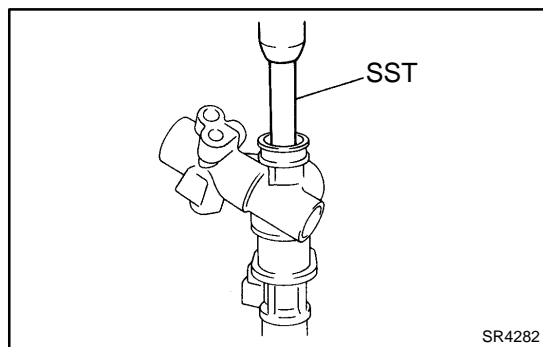
**13. REMOVE BEARING**

Using a brass bar and hammer, tap out the bearing from the rack housing.

**14. REMOVE CYLINDER END STOPPER AND BUSHING**

Using SST, remove the stopper and bushing.

SST 09631-20090

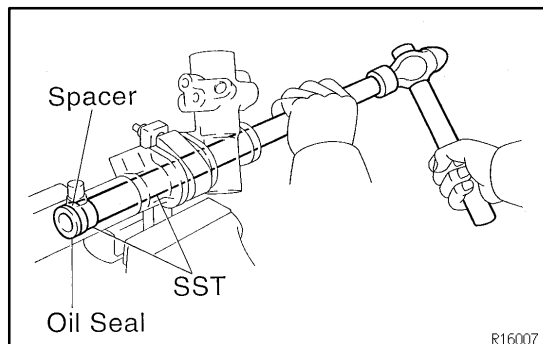
**15. REMOVE STEERING RACK WITH OIL SEAL**

- (a) Using SST, press out the rack with the oil seal.  
SST 09612-24014 (09612-10061)

**NOTICE:**

**Take care not to drop the rack.**

- (b) Remove the oil seal from the rack.

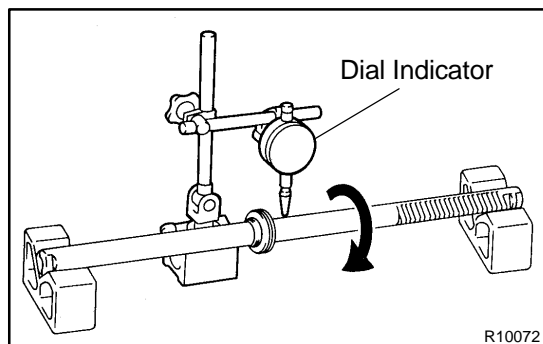
**16. REMOVE SPACER AND OIL SEAL**

Using SST and a hammer, drive out the spacer and oil seal.

SST 09950-60010 (09951-00220),  
09950-70010 (09951-07360)

**NOTICE:**

**Do not damage the rack housing.**



## INSPECTION

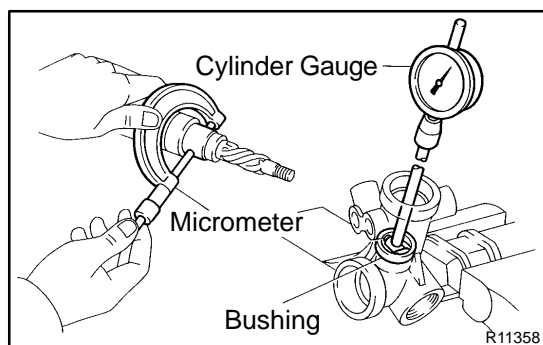
### NOTICE:

When using a vise, do not overtighten it.

#### 1. INSPECT STEERING RACK

Using a dial indicator, check the rack for runout and teeth wear and damage.

**Maximum runout: 0.30 mm (0.0118 in.)**



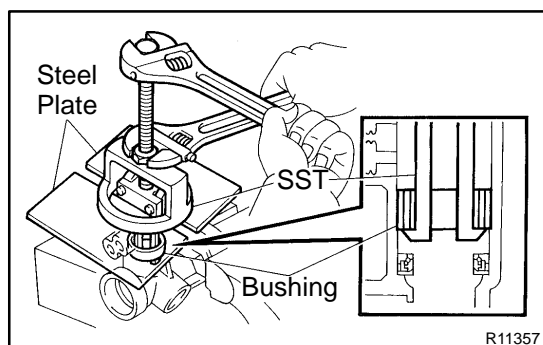
#### 2. MEASURE OIL CLEARANCE BETWEEN CONTROL VALVE ASSEMBLY AND BUSHING

Using a micrometer and a cylinder gauge, measure the oil clearance.

**Standard clearance:**

**0.050 - 0.083 mm (0.00197 - 0.00327 in.)**

**Maximum clearance: 0.125 mm (0.00492 in.)**



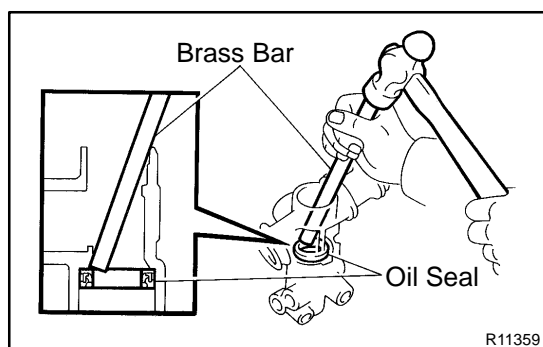
#### 3. IF NECESSARY, REPLACE BUSHING AND OIL SEAL

- (a) Using SST and 2 steel plates, remove the bushing from the rack housing.

SST 09612-65014 (09612-01030)

### NOTICE:

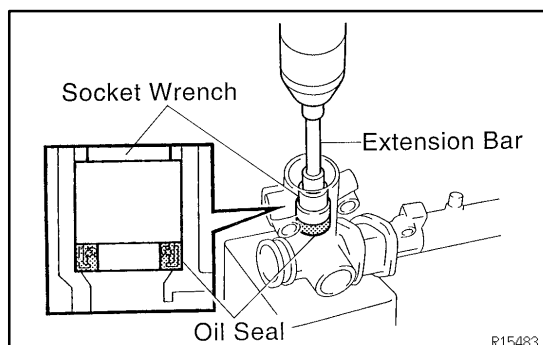
- As shown, from the opposite side of SST confirm that its claw is firmly caught on the bushing.
- Be careful not to damage the rack housing.



- (b) Using a brass bar and a hammer, remove the oil seal from the rack housing.

### NOTICE:

**Be careful not to damage the rack housing.**

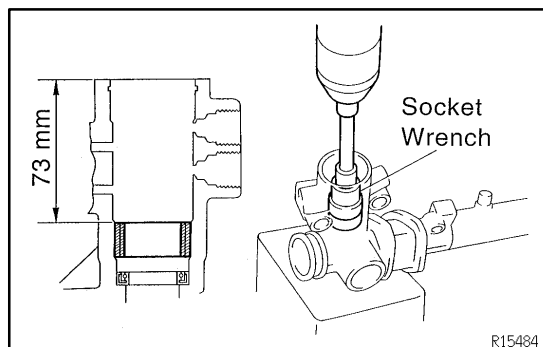


- (c) Coat a new oil seal lip with power steering fluid.

- (d) Using a socket wrench (24 mm), extension bar and hammer, press in the oil seal.

### NOTICE:

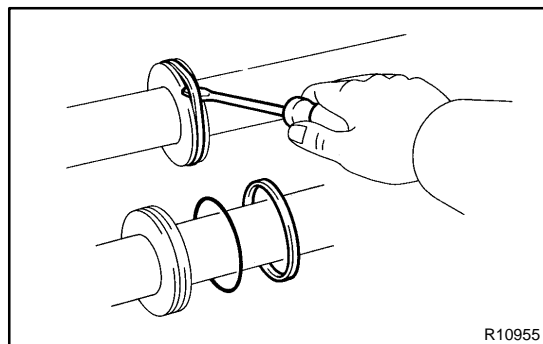
**Make sure to install the oil seal facing the correct direction.**



- (e) Using a socket wrench (24 mm) and an extension bar, carefully press in a new bushing to a depth of 73 mm (2.87 in.).

**NOTICE:**

If the bushing is pushed in too far, it will cause deformation of the rack housing. If it is not pushed in far enough, it will interfere with the control valve assembly. Therefore, always use a press and install the bushing to the proper depth. Then, install the control valve assembly and ensure that it rotates smoothly.



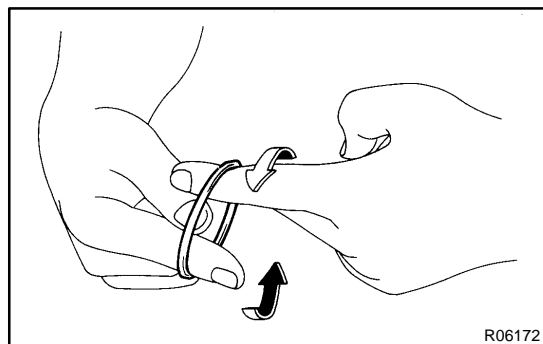
**4. IF NECESSARY, REPLACE TEFLON RING AND O-RING**

- (a) Using a screwdriver, remove the teflon ring and O-ring from the steering rack.

**NOTICE:**

Be careful not to damage the groove for the teflon ring.

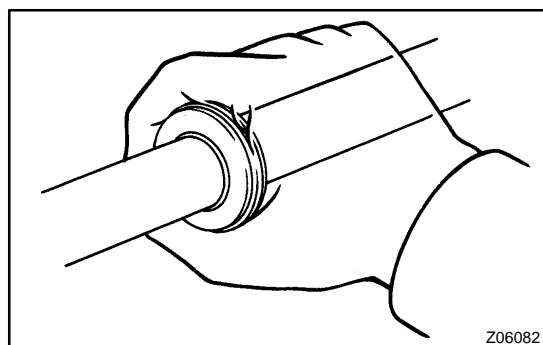
- (b) Coat a new O-ring with power steering fluid and install it.



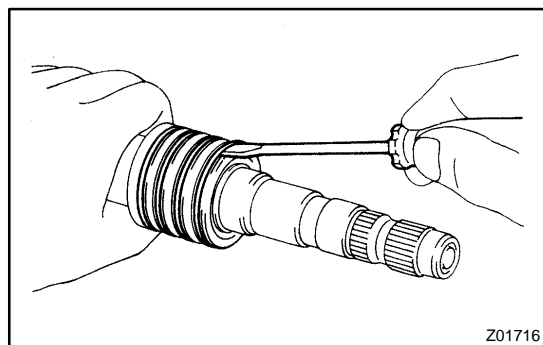
- (c) Expand a new teflon ring with your fingers.

**NOTICE:**

Be careful not to overexpand the ring.



- (d) Coat the ring with power steering fluid.  
 (e) Install the ring to the steering rack and settle it down with your fingers.



**5. IF NECESSARY, REPLACE TEFLON RINGS**

- (a) Using a screwdriver, remove the 4 rings from the control valve assembly.

**NOTICE:**

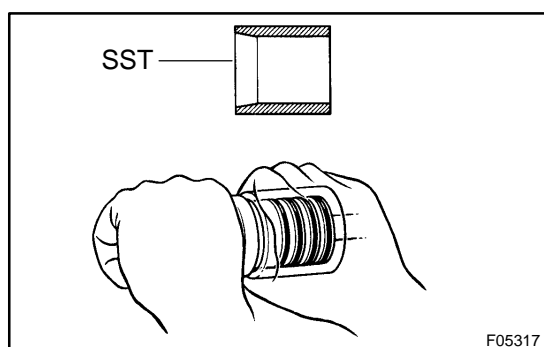
Be careful not to damage the grooves for the ring.

- (b) Expand 4 new teflon rings with your fingers.

**NOTICE:**

Be careful not to overexpand the ring.

- (c) Coat the rings with power steering fluid and install them to the control valve, and settle them down with your fingers.



- (d) Carefully slide the tapered end of SST over the rings until the rings fit to the control valve assembly.

SST 09631-20081

**NOTICE:**

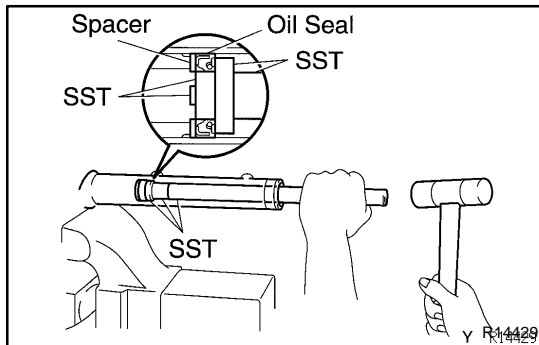
**Be careful not to damage the rings.**

## REASSEMBLY

### NOTICE:

When using a vise, do not overtighten it.

1. **COAT WITH POWER STEERING FLUID OR MOLYBDENUM DISULFIDE LITHIUM BASE GREASE**  
(See page [SR-46](#) )

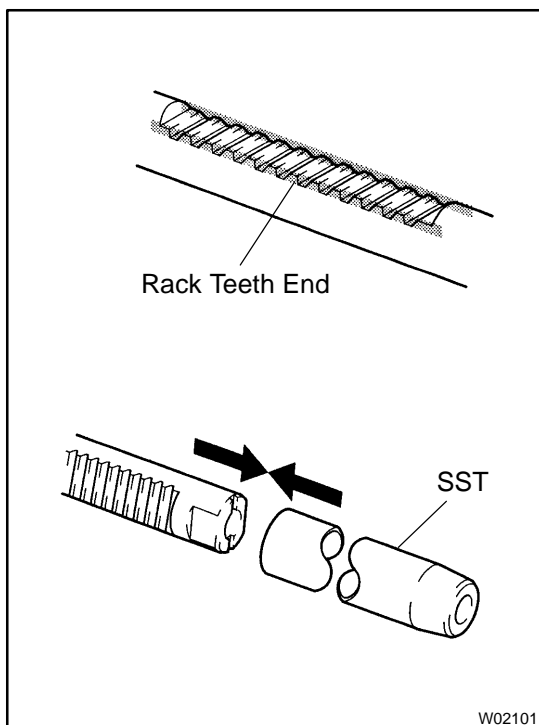


2. **INSTALL OIL SEAL AND SPACER**

- (a) Coat a new oil seal lip with power steering fluid.
- (b) Install the oil seal and spacer to SST, and drive in them with a plastic hammer.  
SST 09950-60010 (09951-00220, 09951-00380, 09952-06010), 09951-70010 (09951-07360)

### NOTICE:

- Make sure to install the oil seal facing the correct direction.
- Take care that the oil seal does not get reversed as you install it.



3. **INSTALL STEERING RACK**

- (a) Install SST to the rack.  
SST 09631-10041

### HINT:

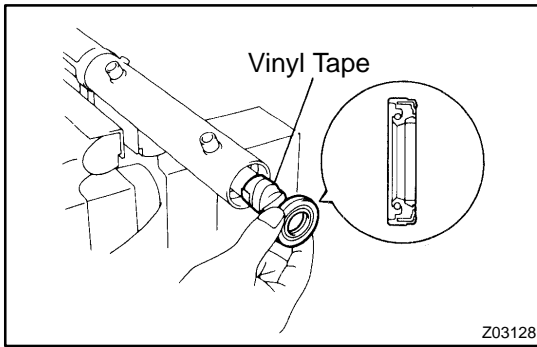
If necessary, scrape the burrs off the rack teeth end and bur-nish.

- (b) Coat SST with power steering fluid.
- (c) Insert the rack into the rack housing.

### NOTICE:

**Be careful not to damage the oil seal.**

- (d) Remove the SST.

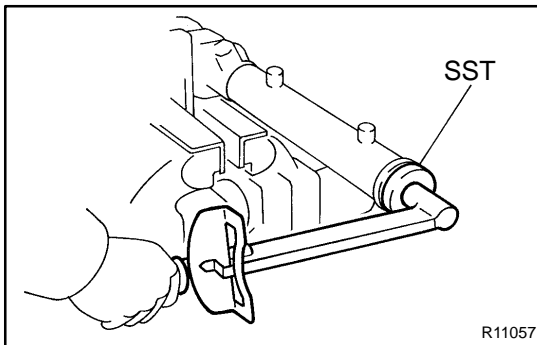


#### 4. INSTALL OIL SEAL

- Coat a new oil seal lip with power steering fluid.
- To prevent oil seal lip damage, wind vinyl tape on the steering rack end, and apply power steering fluid.
- Install the oil seal by pushing it into the rack housing, without tilting.

#### NOTICE:

**Make sure to install the oil seal facing the correct direction.**

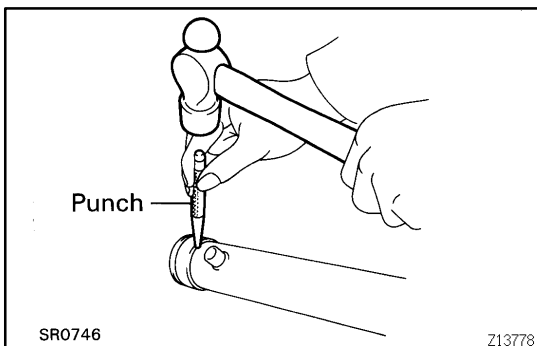


#### 5. INSTALL BUSHING AND CYLINDER END STOPPER

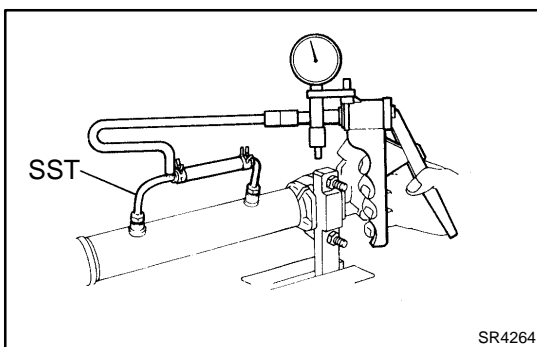
- Install a new bushing to the stopper.
- Using SST, torque the stopper.

SST 09631-20090

**Torque: 59 N·m (600 kgf-cm, 43 ft-lbf)**



- Using a punch and a hammer, stake the stopper and rack housing.



#### 6. AIR TIGHTNESS TEST

- Install SST to the rack housing.  
SST 09631-12071

#### NOTICE:

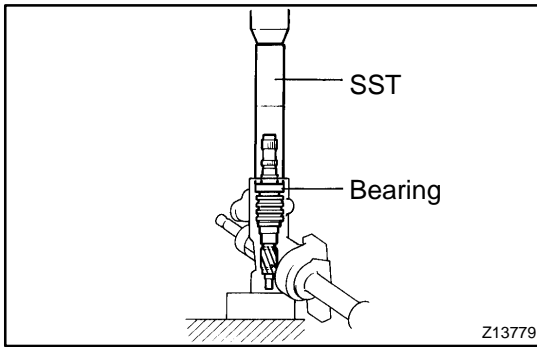
**Do not install union seats.**

- Apply 53 kPa (400 mmHg, 15.75 in.Hg) of vacuum for about 30 seconds.
- Check that there is no change in the vacuum.  
If there is change in the vacuum, check the installation of the oil seals.

#### 7. INSTALL CONTROL VALVE ASSEMBLY

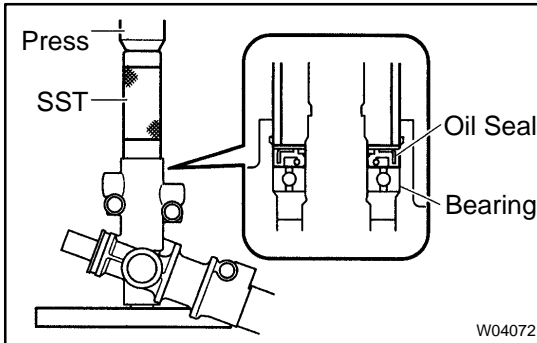
- Coat the teflon rings with power steering fluid.
- Push the valve assembly into the rack housing.



**8. INSTALL BEARING**

Using SST, press in a new bearing.

SST 09612-2201 1

**9. INSTALL OIL SEAL**

(a) Coat a new oil seal lip with power steering fluid.

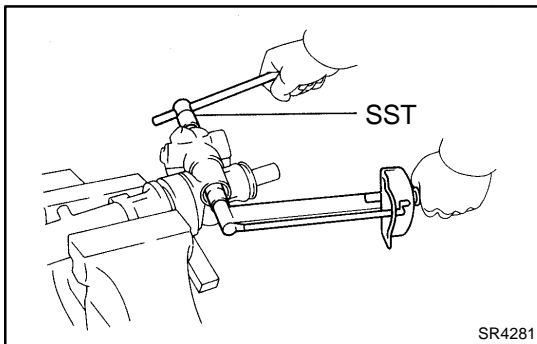
(b) Using SST, press in the oil seal until it contacts the bearing.

SST 09612-2201 1

**NOTICE:**

**Make sure to install the oil seal facing the correct direction.**

(c) Using snap ring pliers, install a new snap ring to the rack housing.

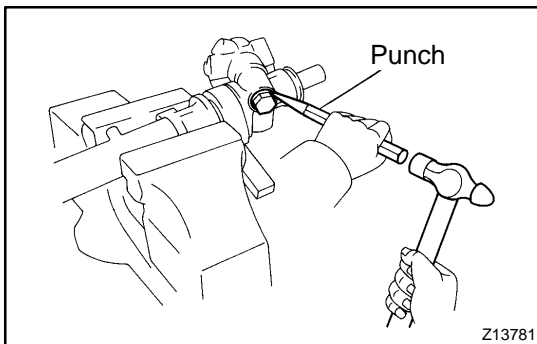
**10. INSTALL SELF-LOCKING NUT**

(a) Coat a new bearing with molybdenum disulfide lithium base grease and install it to the control valve shaft.

(b) Using SST, stop the control valve shaft rotating and torque a new nut.

SST 09616-00010

**Torque: 59 N·m (600 kgf-cm, 43 ft-lbf)**

**11. INSTALL RACK HOUSING CAP**

(a) Apply sealant to 2 or 3 threads of the cap.

**Sealant: Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent**

(b) Torque the cap.

**Torque: 59 N·m (600 kgf-cm, 43 ft-lbf)**

(c) Using a punch and a hammer, stake the cap at 2 places.

**12. INSTALL RACK GUIDE SEAT, RACK GUIDE, RACK GUIDE SPRING, AND RACK GUIDE SPRING CAP**

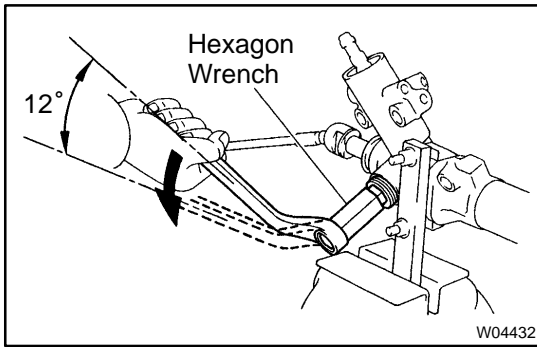
(a) Install the seat to the guide.

(b) Install the guide to the rack housing.

(c) Apply sealant to 2 or 3 threads of the spring cap.

**Sealant: Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent**

(d) Temporarily install the cap.

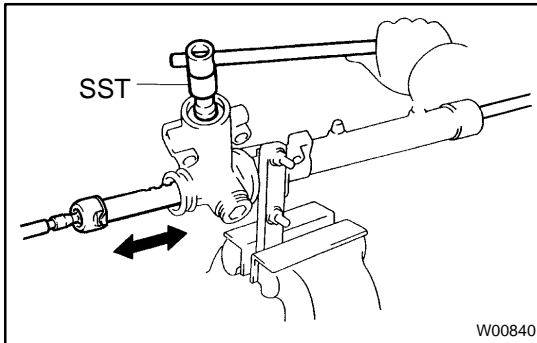


### 13. ADJUST TOTAL PRELOAD

- (a) To prevent the steering rack teeth from damaging the oil seal lip, temporarily install the RH and LH rack ends.
- (b) Using a hexagon wrench (21 mm), torque the rack guide spring cap.

**Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)**

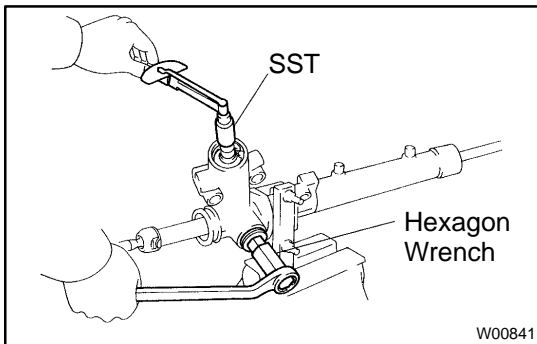
- (c) Using a hexagon wrench (21 mm), return the cap 12°.



- (d) Using SST, turn the control valve shaft right and left 1 or 2 times.

SST 09616-00010

- (e) Using a hexagon wrench (21 mm), loosen the cap until the rack guide spring is not functioning.

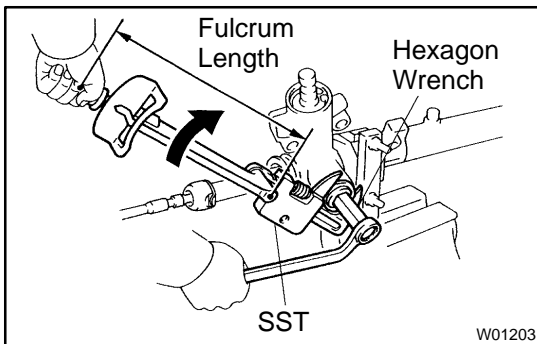


- (f) Using SST, a torque wrench and hexagon wrench (21 mm), tighten the cap until the preload is within the specification.

SST 09616-00010

**Preload (turning):**

**0.8 - 1.4 N·m (8 - 14 kgf·cm, 6.9 - 12.2 in.-lbf)**



### 14. INSTALL RACK GUIDE SPRING CAP LOCK NUT

- (a) Apply sealant to 2 or 3 threads of the nut.

**Sealant: Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent**

- (b) Using a hexagon wrench (21 mm), hold the rack guide spring cap and using SST, torque the nut.

SST 09922-10010

**Torque: 36 N·m (366 kgf·cm, 26 ft·lbf)**

#### NOTICE:

**Use SST 09922-10010 in the direction shown in the illustration.**

#### HINT:

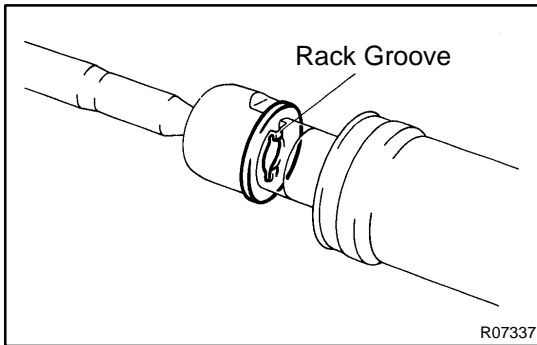
Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).

- (c) Recheck the total preload.

**Preload (turning):**

**0.8 - 1.4 N·m (8 - 14 kgf·cm, 6.9 - 12.2 in.-lbf)**

- (d) Remove the RH and LH rack end.

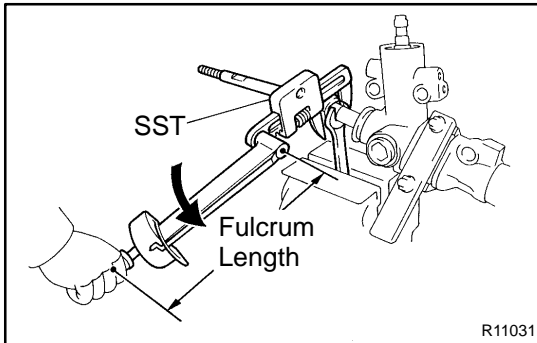


### 15. INSTALL RH AND LH CLAW WASHERS AND RACK ENDS

- (a) Install a new washer, and temporarily tighten the rack end.

**HINT:**

Align the claws of the washer with the steering rack grooves.



- (b) Using a spanner, hold the steering rack steadily and using SST, torque the rack end.

SST 09922-10010

**Torque: 51 N·m (520 kgf-cm, 18 ft-lbf)**

**NOTICE:**

Use SST 09922-10010 in the direction shown in the illustration.

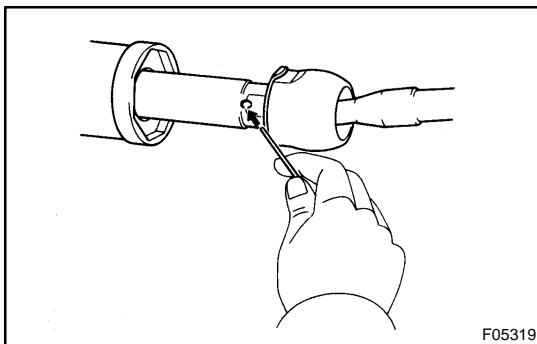
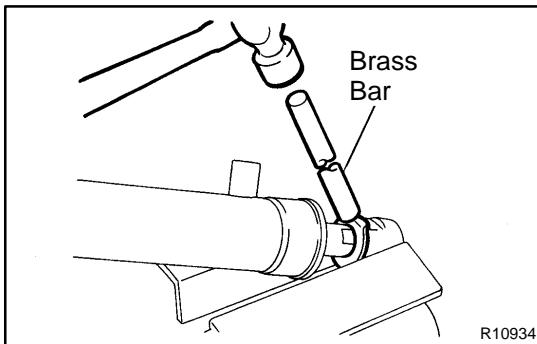
**HINT:**

Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).

- (c) Using a brass bar and a hammer, stake the washer.

**NOTICE:**

Avoid any impact on the rack.



### 16. INSTALL RH AND LH RACK BOOTS, CLAMPS AND CLIPS

- (a) Ensure that the steering rack hole is not clogged with grease.

**HINT:**

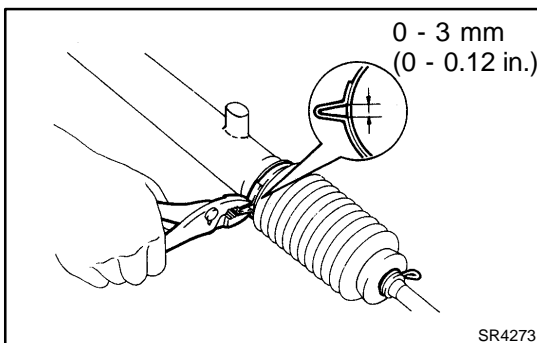
If the hole is clogged, the pressure inside the boot will change after it is assembled and the steering wheel is turned.

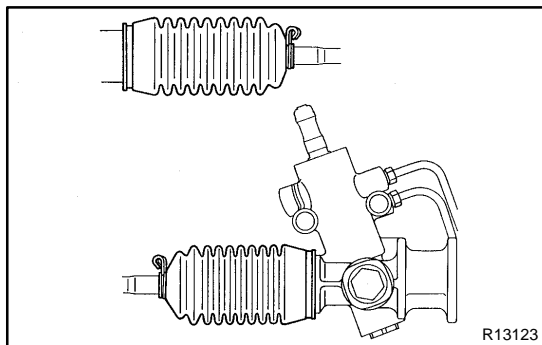
- (b) Install the boot.

**NOTICE:**

Be careful not to damage or twist the boots.

- (c) Tighten a new clamp, as shown in the illustration.





(d) Install the clip.

HINT:

Face the open ends of the clip outward/upward, as shown.

### 17. INSTALL RH AND LH TIE ROD ENDS AND LOCK NUTS

(a) Screw the lock nut and tie rod end onto the rack end until the matchmarks are aligned.

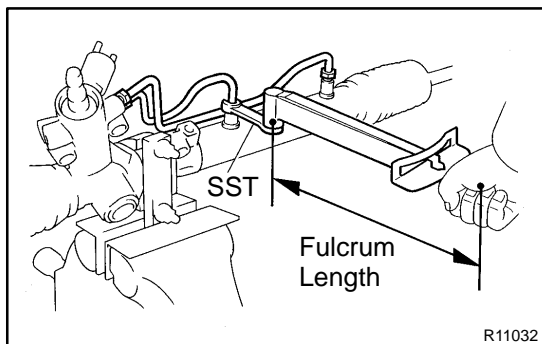
(b) After adjusting toe-in, torque the nut  
(See page [SA-4](#) ).

**Torque: 47 N·m (480 kgf-cm, 35 ft-lbf)**

### 18. INSTALL AIR CONTROL VALVE

Torque the valve.

**Torque: 29 N·m (300 kgf-cm, 22 ft-lbf)**



### 19. INSTALL 2 TURN PRESSURE TUBES

(a) Install 2 new union seats.

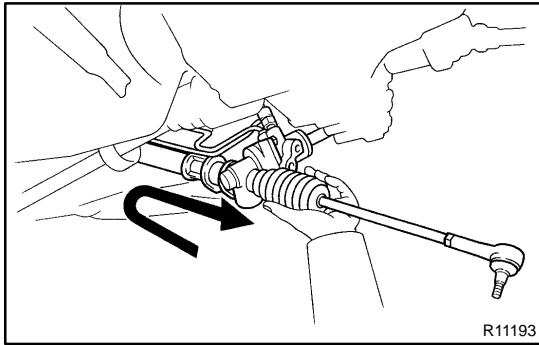
(b) Using SST, install the tube.

SST 09633-00020

**Torque: 20 N·m (203 kgf-cm, 15 ft-lbf)**

HINT:

- Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).
- This torque value is effective in case that SST is parallel to a torque wrench.



## INSTALLATION

### 1. INSTALL PS GEAR ASSEMBLY

Install the gear assembly from the LH of the vehicle.

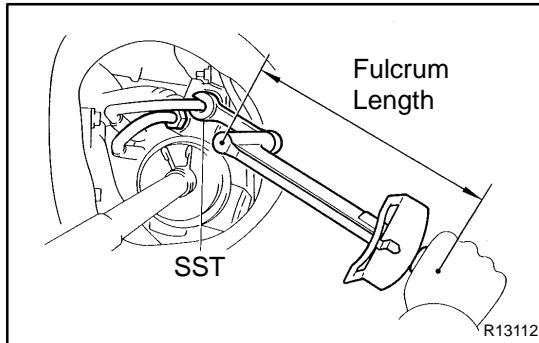
#### NOTICE:

**Do not damage the turn pressure tubes.**

### 2. INSTALL 2 GROMMETS AND BRACKETS

Torque the 2 bolts and nuts.

**Torque: 58 N·m (590 kgf-cm, 43 ft-lbf)**



### 3. CONNECT PRESSURE FEED AND RETURN TUBES

Using SST, connect the tube.

SST 09631-22020

**Torque: 36 N·m (366 kgf-cm, 27 ft-lbf)**

#### HINT:

- Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).
- This torque value is effective in case that SST is parallel to a torque wrench.

### 4. CONNECT TUBE CLAMP

Torque the bolt.

**Torque: 13 N·m (130 kgf-cm, 9 ft-lbf)**

### 5. M/T:

#### CONNECT CONTROL CABLES

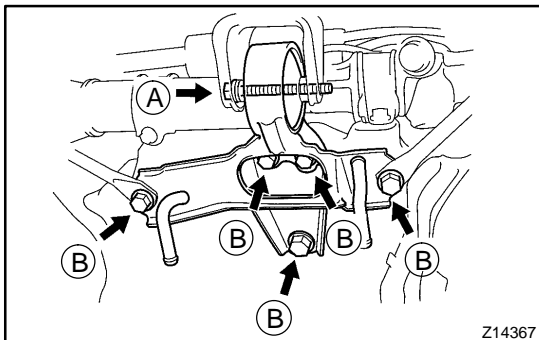
- (a) Connect the 2 cables to the control lever housing.
- (b) Install the 2 clips to the cables.
- (c) Install the 2 clips and washers.

### 6. CONNECT 2 VACUUM HOSES

### 7. INSTALL ENGINE REAR MOUNT BRACKET

Torque the 2 bolts.

**Torque: 48 N·m (490 kgf-cm, 35 ft-lbf)**



### 8. INSTALL ENGINE REAR MOUNT INSULATOR

Torque the 6 bolts.

#### Torque:

**Bolt A: 64 N·m (650 kgf-cm, 47 ft-lbf)**

**Bolt B: 78 N·m (800 kgf-cm, 58 ft-lbf)**

**9. INSTALL FRONT EXHAUST PIPE**

- (a) Connect the 2 rings.
- (b) Install the bolt and clamp over a new gasket.  
**Torque: 19 N·m (190 kgf-cm, 14 ft-lbf)**
- (c) Install the 2 bolts and compression springs over a new gasket.

**Torque: 62 N·m (630 kgf-cm, 46 ft-lbf)**

**10. INSTALL OXYGEN SENSOR**

Install the sensor.

**Torque: 44 N·m (450 kgf-cm, 32 ft-lbf)**

**11. CONNECT SLIDING YOKE (See page [SR-20](#) )****12. INSTALL COLUMN HOLE COVER**

Torque the 2 bolts and nut.

**Torque: 4.9 N·m (50 kgf-cm, 43 in.-lbf)**

**13. CONNECT RH AND LH TIE ROD ENDS  
(See page [SA-10](#) )****14. PLACE FRONT WHEELS FACING STRAIGHT AHEAD**

HINT:

Do it with the front of the vehicle jacked up.

**15. w/ Airbag:**

**CENTER SPIRAL CABLE (See page [SR-20](#) )**

**16. w/ Airbag:**

**INSTALL STEERING WHEEL**

- (a) Install the wheel at straight-ahead position.
- (b) Temporarily tighten the wheel set nut.
- (c) Connect the connector.

**17. BLEED POWER STEERING SYSTEM  
(See page [SR-5](#) )****18. CHECK STEERING WHEEL CENTER POINT****19. w/ Airbag:**

**TORQUE STEERING WHEEL SET NUT**

**Torque: 34 N·m (350 kgf-cm, 25 ft-lbf)**

**20. w/ Airbag:**

**INSTALL STEERING WHEEL PAD (See page [SR-20](#) )**

**21. CHECK FRONT WHEEL ALIGNMENT  
(See page [SA-4](#) )**

# SRS AIRBAG

## PRECAUTION

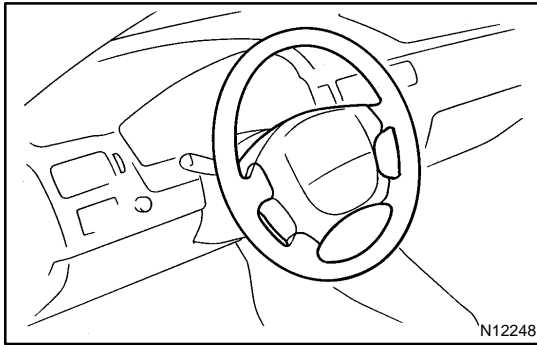
RS02V-04

### NOTICE:

- The TERCEL is equipped with an SRS, which comprises a driver airbag and front passenger airbag. Failure to carry out service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Further, if a mistake is made in servicing the SRS, it is possible the SRS may fail to operate when required. Before performing servicing (including removal or installation of parts, inspection or replacement), be sure to read the following items carefully, then follow the correct procedure described in the repair manual.
- Malfunction symptoms of the SRS are difficult to confirm, so the DTCs become the most important source of information when troubleshooting the SRS, always inspect the DTCs before disconnecting the battery.
- Even in cases of a minor collision where the SRS does not deploy, the steering wheel pad, front passenger airbag assembly and airbag sensor assembly should be inspected.  
(See page [RS-9](#) , [RS-22](#) , [RS-34](#) )
- Never use SRS parts from another vehicle. When replacing parts, replace them with new parts.
- Never disassemble and repair the steering wheel pad, front passenger airbag assembly or airbag sensor assembly in order to reuse it.
- If the steering wheel pad, front passenger airbag assembly or airbag sensor assembly has been dropped, or if there are cracks, dents or other defects in the case, bracket or connector, replace them with new ones.
- Use a volt/ohmmeter with high impedance (10 k $\Omega$ /V minimum) for troubleshooting the system's electrical circuits.
- Information labels are attached to the periphery of the SRS components. Follow the instruction on the notices.
- After work on the SRS is completed, check the SRS warning light. (See page [DI-148](#) )
- If the vehicle is equipped with a mobile communication system, refer to the precaution in the IN section.

### CAUTION:

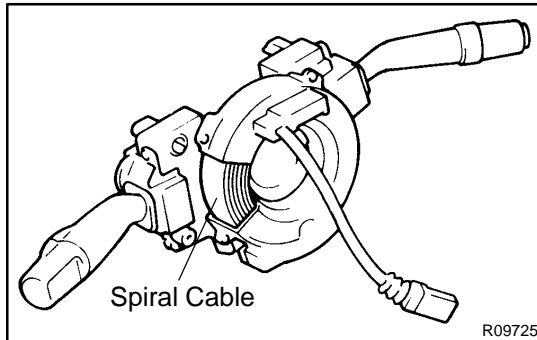
- Work must be started 90 seconds after the ignition switch is turned to the "LOCK" position and the negative (-) terminal cable is disconnected from the battery. (The SRS is equipped with a back-up power source so that if work is started within 90 seconds of disconnecting the negative (-) terminal cable of the battery, the SRS may be deployed.)
- When the negative (-) terminal cable is disconnected from the battery, the memory of the clock and audio system will be canceled. So before starting work, make a record of the contents memorized in the audio memory system. When work is finished, reset the audio systems as before and adjust the clock. To avoid erasing the memory of each memory system, never use a back-up power supply from outside the vehicle.
- Before repairs, remove the airbag sensor if shocks are likely to be applied to the sensor during repairs.
- Do not expose the steering wheel pad, front passenger airbag assembly or airbag sensor assembly directly to hot air or flames.



## OPERATION

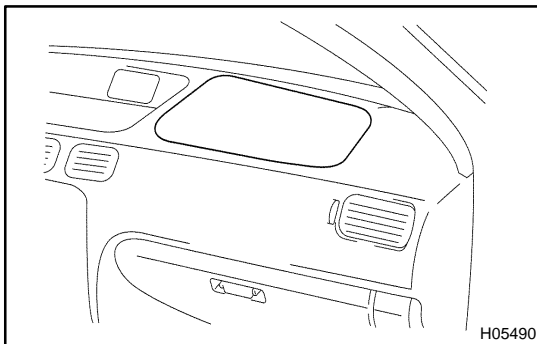
### 1. STEERING WHEEL PAD (with AIRBAG)

The inflator and bag of the SRS are stored in the steering wheel pad and cannot be disassembled. The inflator contains a squib, igniter charge, gas generant, etc., and inflates the bag when instructed by the airbag sensor assembly.



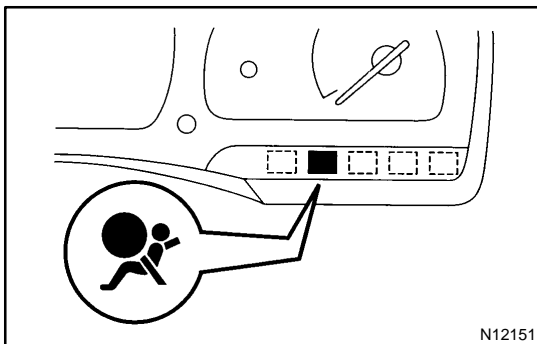
### 2. SPIRAL CABLE (in COMBINATION SWITCH)

A spiral cable is used as an electrical joint from the vehicle body side to the steering wheel.



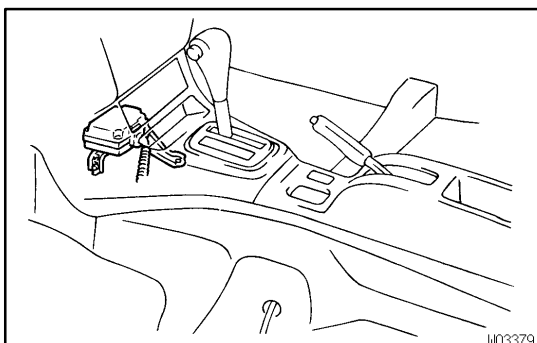
### 3. FRONT PASSENGER AIRBAG ASSEMBLY

The inflator and bag of the SRS are stored in the front passenger airbag assembly and cannot be disassembled. The inflator contains a squib, igniter charge and gas generant, etc., and inflates the bag when instructed by the airbag sensor assembly.



### 4. SRS WARNING LIGHT

The SRS warning light is located on the cluster finish panel. It goes on to alert the driver of trouble in the system when a malfunction is detected in the airbag sensor assembly. In normal operating conditions when the ignition switch is turned to the ACC or ON position, the light goes on for about 6 seconds and then goes off.

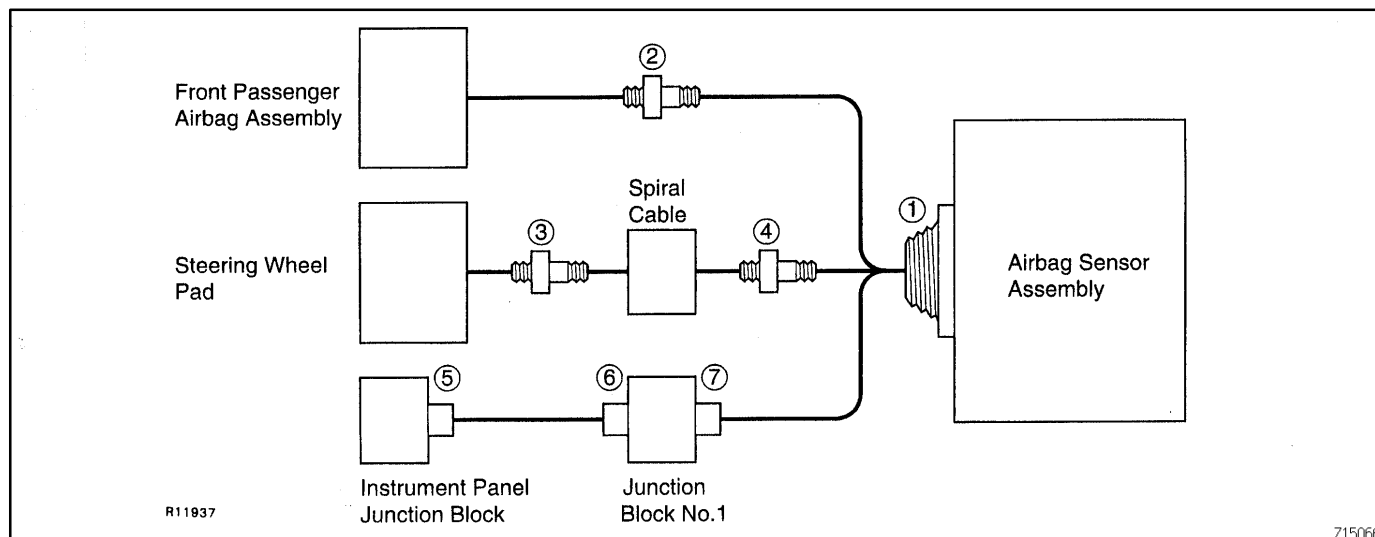


### 5. AIRBAG SENSOR ASSEMBLY

The airbag sensor assembly is mounted on the floor inside the console box. The airbag sensor assembly consists of airbag sensor, safing sensor, diagnosis circuit, ignition control and drive circuit, etc. It receives signals from the airbag sensor and judges whether the SRS must be activated or not.

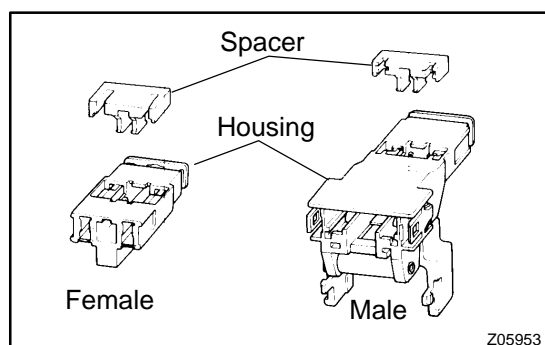


## 6. SRS CONNECTORS



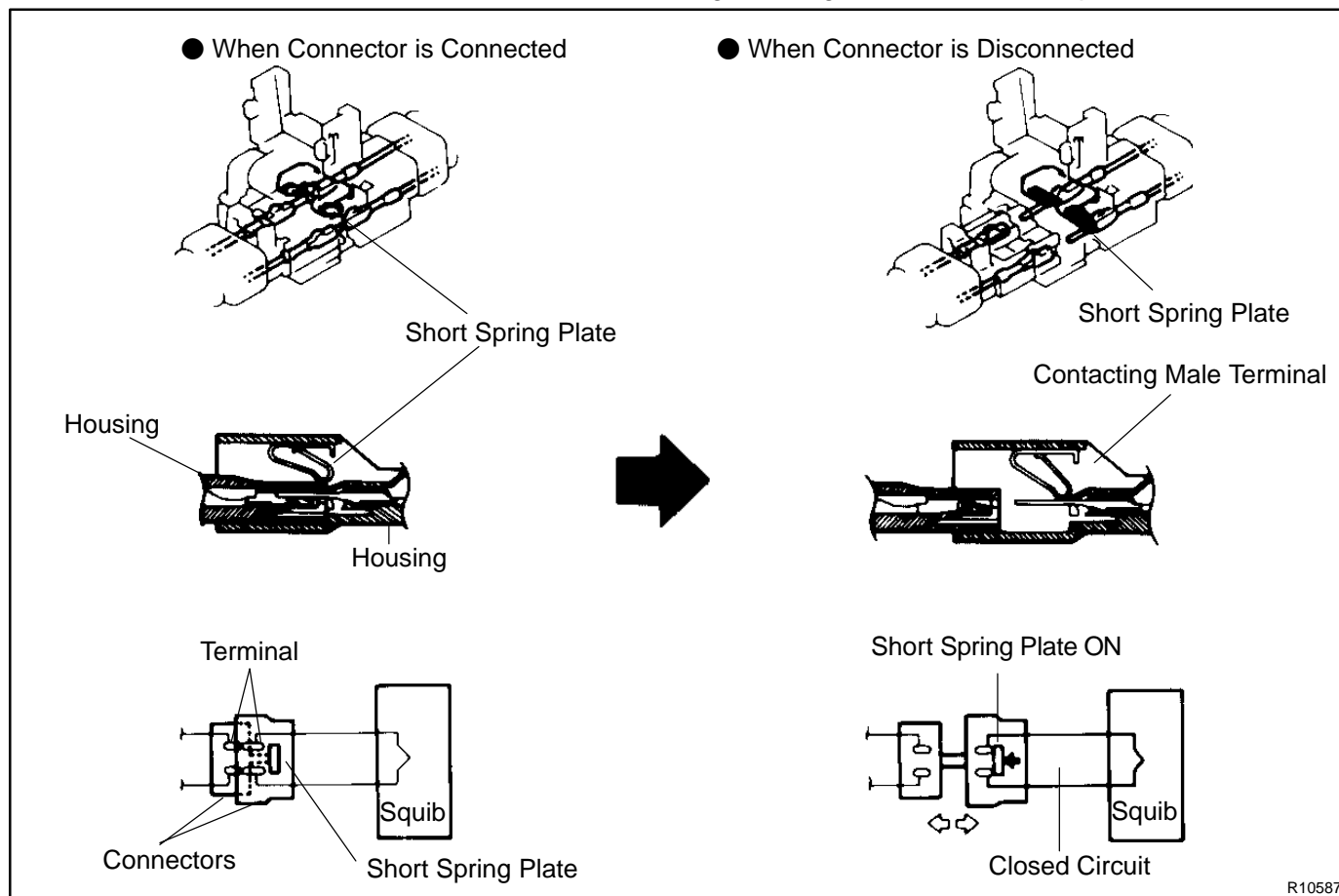
No.	Item	Application
(1)	Terminal Twin-Lock Mechanism	Connectors 1, 2, 3, 4, 5, 6, 7
(2)	Airbag Activation Prevention Mechanism	Connectors 2, 3, 4
(3)	Electrical Connection Check Mechanism	Connectors 1
(4)	Connector Twin-Lock Mechanism	Connectors 2, 3, 4

- (a) All connectors in the SRS are colored in yellow to distinguish them from other connectors. Connectors having special functions and specifically designed for SRS are used in the locations shown above to ensure high reliability. These connectors use durable gold-plated terminals.



- (1) **Terminal Twin-Lock Mechanism**  
Each connector has a two-piece construction consisting of a housing and a spacer. This secures the locking of the terminal by two locking devices (the spacer and the lance) to prevent terminals from coming out.

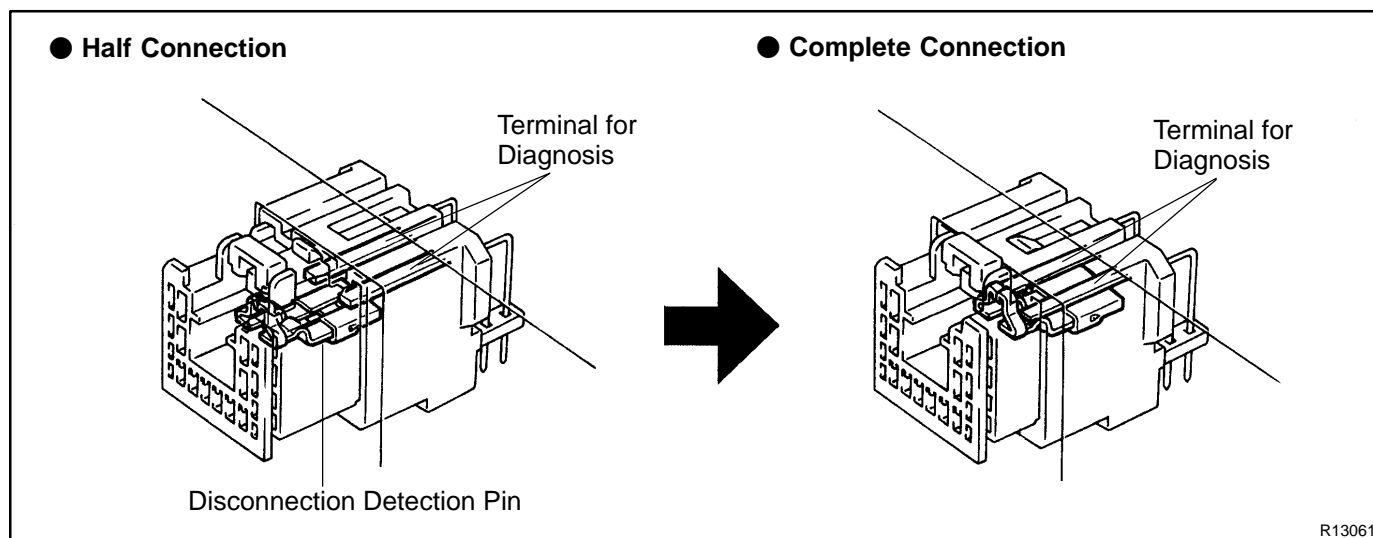
- (2) Airbag Activation Prevention Mechanism  
Each connector contains a short spring plate. When the connector is disconnected, the short spring plate automatically connects the power source and grounding terminals of the squib.



## HINT:

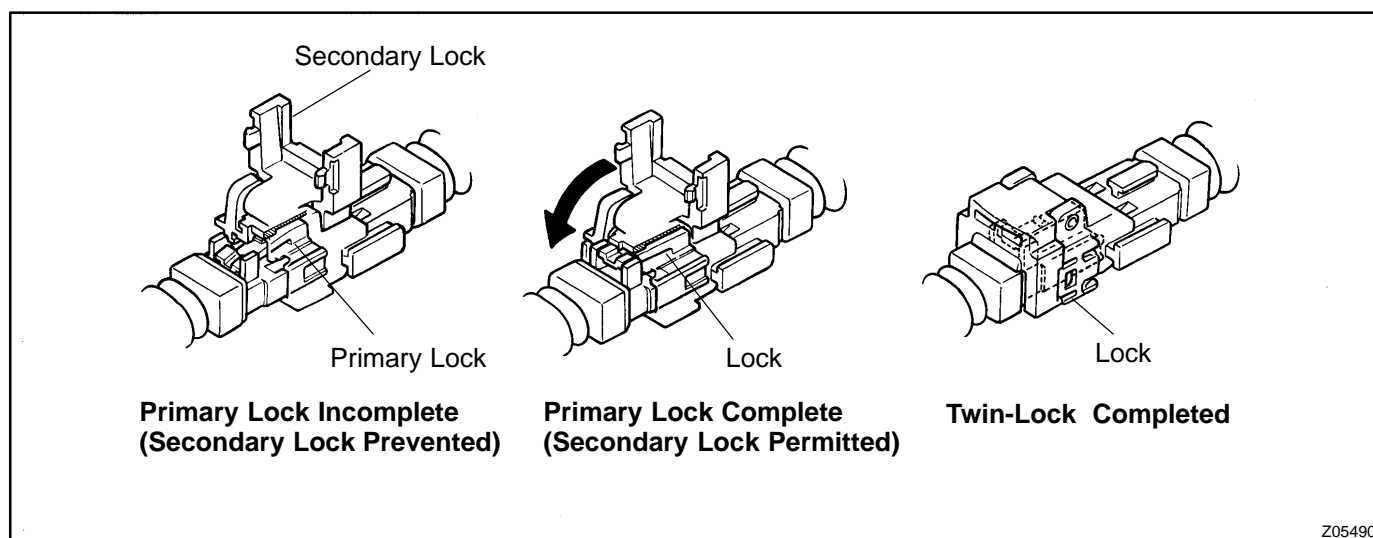
The illustration shows connectors "2", "3" and "4". Connector 1 has short spring plates on the female terminal side.

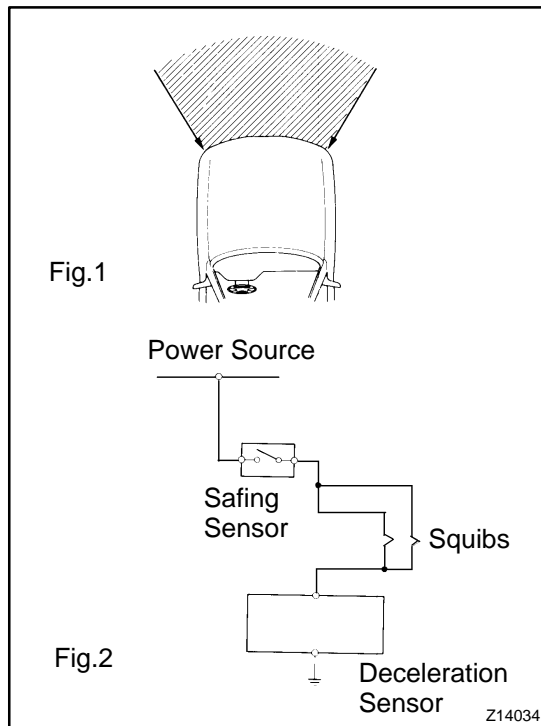
- (3) **Electrical Connection Check Mechanism**  
This mechanism is designed to electrically check if connectors are connected correctly and completely. The electrical connection check mechanism is designed so that the connection detection pin connects with the diagnosis terminals when the connector housing lock is in the locked condition.



- (4) **Connector Twin-Lock Mechanism**  
With this mechanism connectors (male and female connectors) are locked by two locking devices to increase connection reliability.

If the primary lock is incomplete, ribs interfere and prevent the secondary lock.

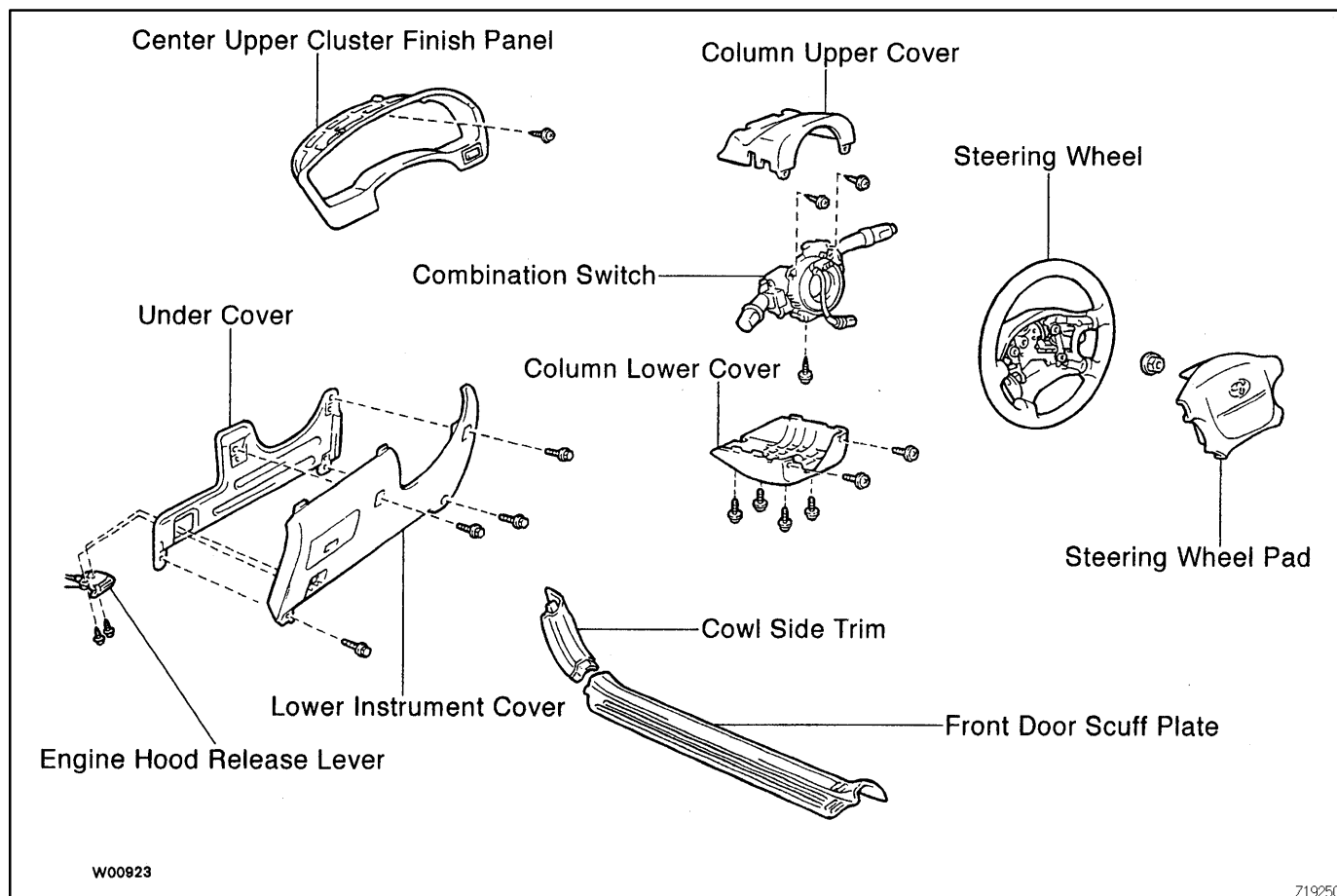




- (b) When the vehicle is involved in a frontal collision in the hatched area (Fig. 1) and the shock is larger than the pre-determined level, the SRS is activated automatically. A safing sensor is designed to go on at a smaller deceleration rate than the airbag sensors. As illustrated in Fig. 2, ignition is caused when a safing sensor and the deceleration sensor go on simultaneously. When a deceleration force acts on the sensors, two squibs in the driver airbag and front passenger airbag ignite and generate gas. The gas discharging into the driver and front passenger airbags rapidly increases the pressure inside the bags breaking open the steering wheel pad and instrument panel door. Bag inflation then ends, and the bags deflate as the gas is discharged through discharge holes at the bag's rear or side.

# STEERING WHEEL PAD AND SPIRAL CABLE COMPONENTS

RS02X-13



## REMOVAL

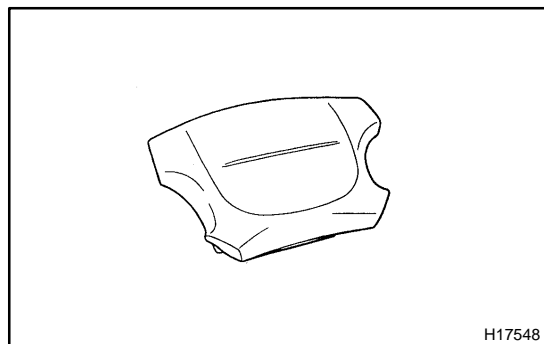
(See page [SR-13](#) )

## INSPECTION

### 1. VEHICLE NOT INVOLVED IN COLLISION

- (a) Do a diagnostic system check (See page [DI-148](#)).
- (b) Do a visual check which includes the following items with the steering wheel pad (with airbag) installed in the vehicle.

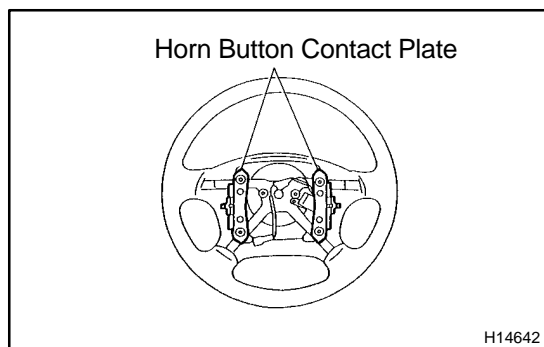
Check for cuts, minute cracks or marked discoloration of the steering wheel pad top surface and grooved portion.



H17548

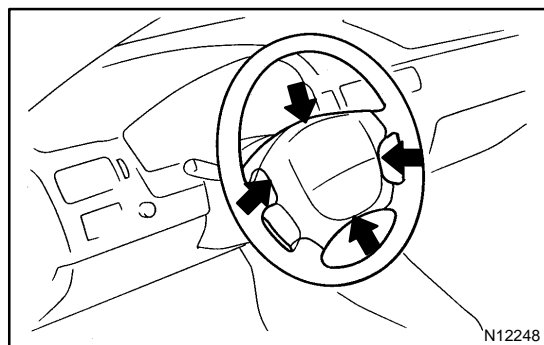
### 2. VEHICLE INVOLVED IN COLLISION AND AIRBAG IS NOT DEPLOYED

- (a) Do a diagnostic system check (See page [DI-148](#)).
- (b) Do a visual check which includes the following items with the steering wheel pad (with airbag) installed in the vehicle.
  - Check for cuts and cracks in, or marked discoloration of the steering wheel pad top surface and grooved portion.
  - Check for cuts and cracks in wire harnesses, and for chipping in connectors.



H14642

- Check for deformation of the horn button contact plate of the steering wheel.



N12248

#### HINT:

- If the horn button contact plate of the steering wheel is deformed, never repair it. Always replace the steering wheel assembly with a new one.
- There should be no interference between the steering wheel pad and the steering wheel, and the clearance should be uniform all the way around when the new steering wheel pad is installed on the steering wheel.

**CAUTION:**

For removal and installation of the steering wheel pad, see page [SR-13](#) and [SR-20](#) , and be sure to follow the correct procedure.

**3. VEHICLE INVOLVED IN COLLISION AND AIRBAG IS DEPLOYED**

- (a) Do diagnostic system check (See page [DI-148](#) ).
- (b) Do a visual check which includes the following items with the steering wheel pad (with airbag) removed from the vehicle.
  - Check for deformation of the horn button contact plate of the steering wheel.
  - Check for damage to the spiral cable connector and wire harness.

**HINT:**

- If the horn button contact plate of the steering wheel is deformed, never repair it. Always replace the steering wheel assembly with a new one.
- There should be no interference between the steering wheel pad and the steering wheel, and the clearance should be uniform all the way around when the new steering wheel pad is installed on the steering wheel.

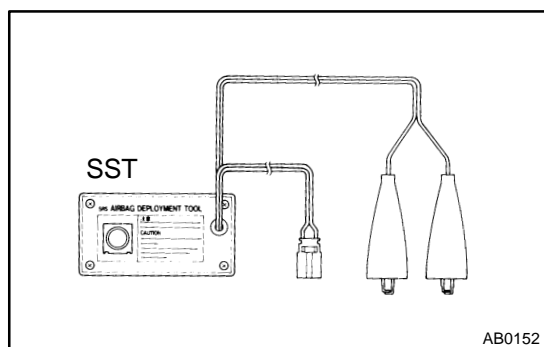


## DISPOSAL

### HINT:

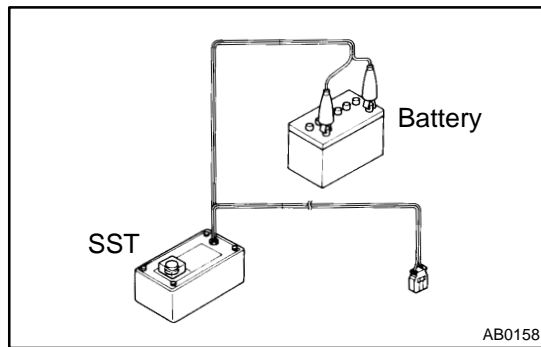
When scrapping vehicle equipped with an SRS or disposing of a steering wheel pad, always first deploy the airbag in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A., INC.

When disposing of a steering wheel pad with an airbag deployed in a collision, follow the same procedure given in step 1-(d) in "DISPOSAL".



### CAUTION:

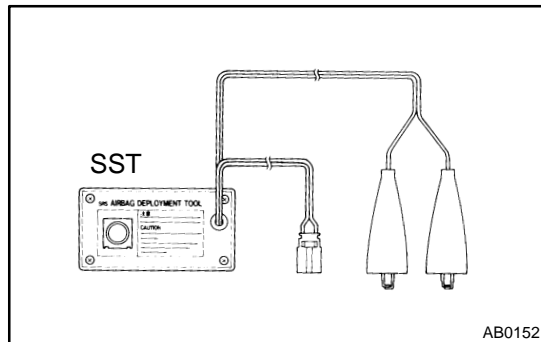
- Never dispose of a steering wheel pad which has an undeployed airbag.
- The airbag produces a sizeable exploding sound when it deploys, so perform the operation out-of-doors and where it will not create a nuisance to nearby residents.
- When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Carry out operation in a place away from electrical noise.  
SST 09082-00700
- When deploying an airbag, do it at least 10 m (33 ft) away from the steering wheel pad.
- The steering wheel pad is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.
- Use gloves and safety glasses when handling a steering wheel pad with a deployed airbag.
- Do not apply water, etc. to a steering wheel pad with a deployed airbag.
- Always wash your hands with water after completing the operation.



## 1. AIRBAG DEPLOYMENT WHEN SCRAPPING VEHICLE

HINT:

Have a battery ready as the power source to deploy the airbag.

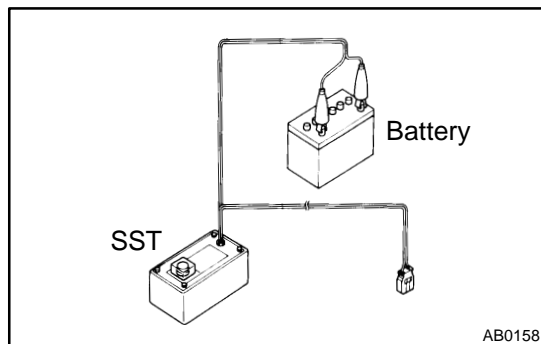


(a) Check functioning of the SST.

**CAUTION:**

When deploying the airbag, always use the specified SST: SRS Airbag Deployment Tool.

SST 09082-00700

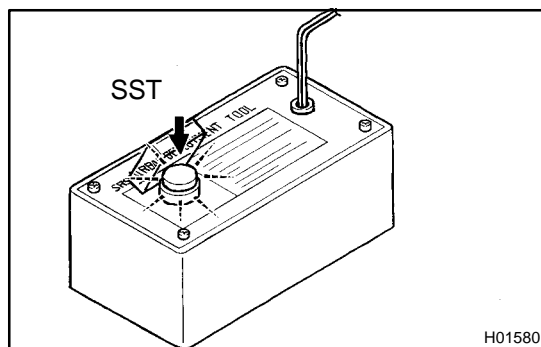


(1) Connect the SST to battery.

Connect the red clip of the SST to the battery positive (+) terminal and the black clip to the battery negative (-) terminal.

HINT:

Do not connect the yellow connector which connects with the SRS.

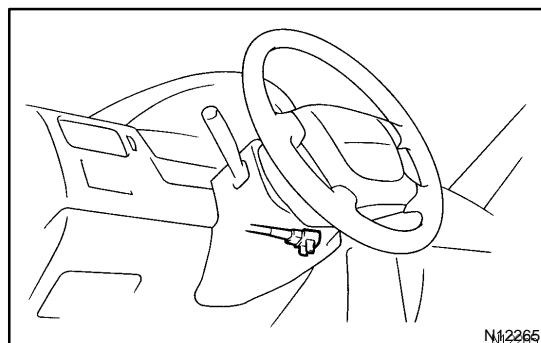


(2) Check functioning of the SST.

Press the SST activation switch, and confirm the LED of the SST activation switch lights up.

**CAUTION:**

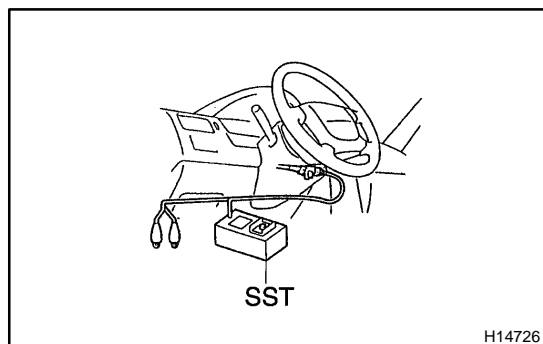
If the LED lights up when the activation switch is not being pressed, SST malfunction is probable, so definitely do not use the SST.



(b) Disconnect the airbag connector.

(1) Remove the No.1 under cover.

(2) Disconnect the airbag connector of the spiral cable.

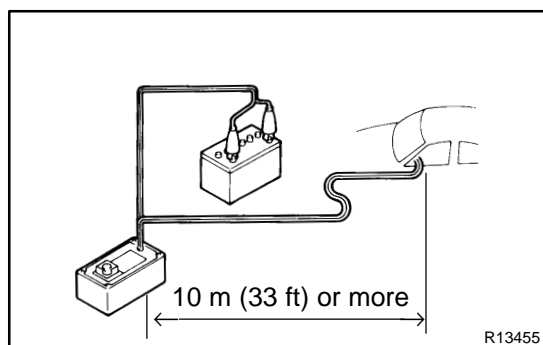


- (c) Install the SST.
- (1) Connect the SST connector to the airbag connector.

SST 09082-00700

**NOTICE:**

**To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.**

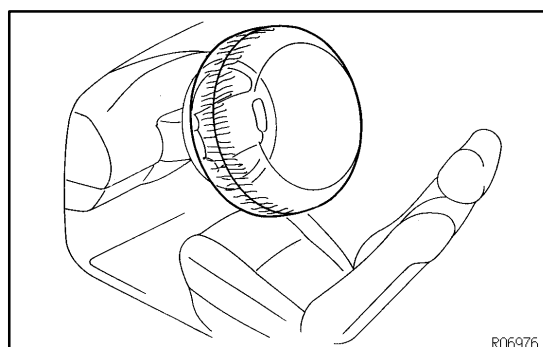


- (2) Move the SST to at least 10 m (33 ft) away from the front of the vehicle.
- (3) Close all the doors and windows of the vehicle.

**NOTICE:**

**Take care not to damage the SST wire harness.**

- (4) Connect the SST red clip to the battery positive (+) terminal and the black clip to the negative (-) terminal.



- (d) Deploy the airbag.
- (1) Confirm that no-one is inside the vehicle or within 10 m (33 ft) of the vehicle.
  - (2) Press the SST activation switch and deploy the airbag.

**HINT:**

The airbag deploys simultaneously as the LED of the SST activation switch lights up.

- (e) Dispose of the steering wheel pad.

**CAUTION:**

- The steering wheel pad is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.
  - Use gloves and safety glasses when handling a steering wheel pad with a deployed airbag.
  - Do not apply water, etc. to a steering wheel pad with a deployed airbag.
  - Always wash your hands with water after completing the operation.
- (f) When scrapping a vehicle, deploy the airbag and scrap the vehicle with the steering wheel pad still installed.
- 2. DEPLOYMENT WHEN DISPOSING OF STEERING WHEEL PAD ONLY**

**NOTICE:**

**When disposing of the steering wheel pad only, never use the customer's vehicle to deploy the airbag.**

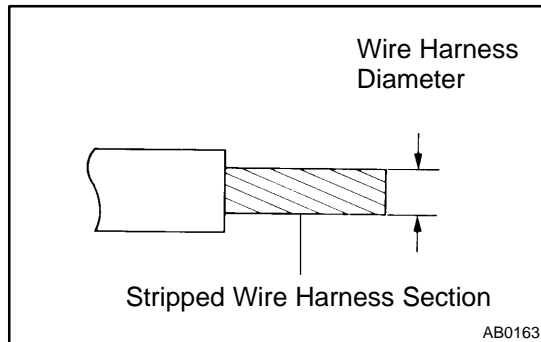
**HINT:**

Have a battery ready as the power source to deploy the airbag.

- (a) Remove the steering wheel pad.

**CAUTION:**

When storing the steering wheel pad, keep the deployment direction facing up.



(b) Fix the steering wheel pad.

- (1) Using a service-purpose wire harness for the vehicle tie down the steering wheel pad to the disc wheel

**Wire harness: Stripped wire harness section 1.25 mm<sup>2</sup> or more (0.0019 in.<sup>2</sup> or more).**

**CAUTION:**

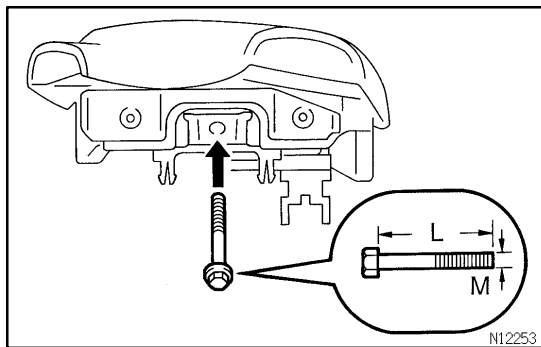
If a wire harness which is too thin or some other thing is used to tie down the steering wheel pad, it may be snapped by the shock when the airbag is deployed. This is highly dangerous. Always use a wire harness for vehicle use which is at least 1.25 mm<sup>2</sup> (0.0019 in.<sup>2</sup>).

**HINT:**

To calculate the square of the stripped wire harness section:

Square = 3.14 X (Diameter)<sup>2</sup> divided by 4

- (2) Remove the connector on the steering wheel pad rear surface from the inflator cover.



- (3) Install the bolts and washers in the 3 bolt holes in the steering wheel pad.

**Bolt:**

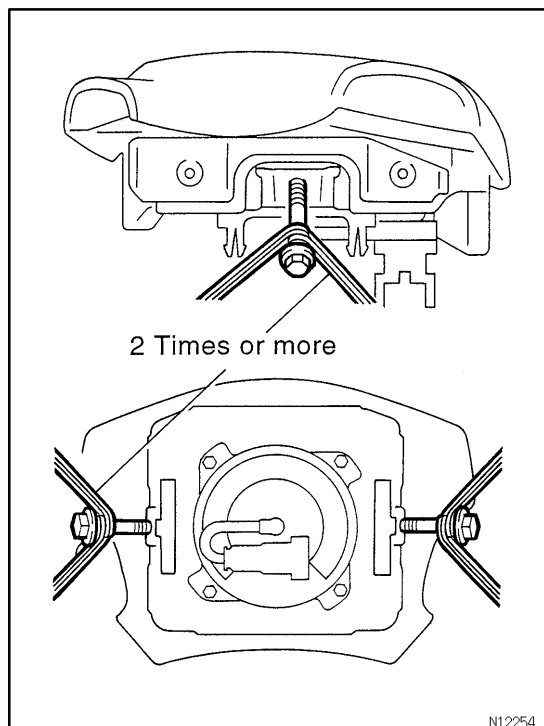
**L: 35.0 mm (1.387 in.)**

**M: 6.0 mm (0.236 in.)**

**Pitch: 1.0 mm (0.039 in.)**

**NOTICE:**

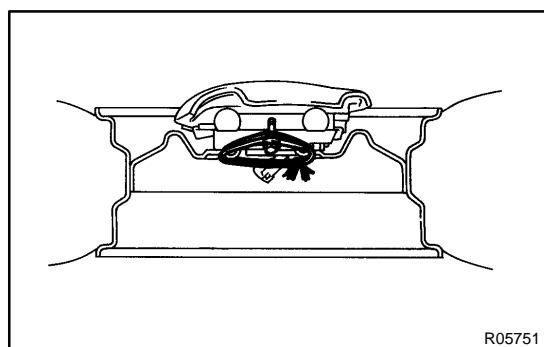
- Tighten the bolts by hand until the bolts become difficult to turn.
- Do not tighten the bolts too much.



- (4) Using 3 wire harness, wrap the wire harness at least 2 times each around the bolts installed on the left and right sides of the steering wheel pad.

**CAUTION:**

- **Tightly wind the wire harness around the bolts so that there is no slack.**
- **If there is slackness in the wire harness, the steering wheel pad may come loose due to the shock when the airbag is deployed. This is highly dangerous.**



- (5) Face the upper surface of the steering wheel pad upward. Separately tie the left and right sides of the steering wheel pad to the disc wheel through the hub nut holes.
- (6) Position the steering wheel pad connector so that it hangs downward through a hub hole in the disc wheel.

**CAUTION:**

- **Make sure that the wire harness is tight. It is very dangerous if looseness in the wire harness results in the steering wheel pad coming free through the shock of the airbag deploying.**
- **Always tie down the steering wheel pad with the pad side facing upward. It is very dangerous if the steering wheel pad is tied down with the metal surface facing to the airbag deploying direction and the steering wheel pad will be thrown into the air.**

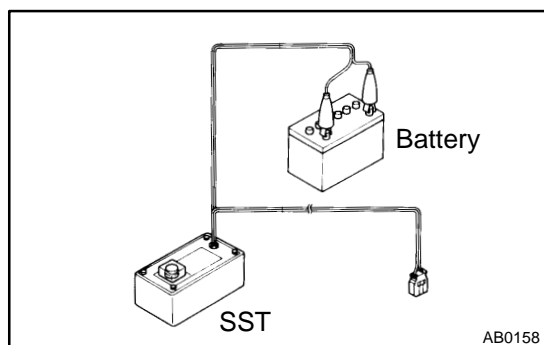
**HINT:**

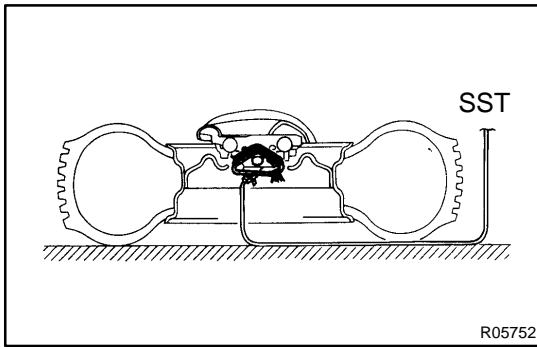
The disc wheel will be marked by airbag deployment, so when disposing of the airbag use a redundant disc wheel.

- (c) Check functioning of the SST.

(See step 1)

SST 09082-00700





(d) Install the SST.

**CAUTION:**

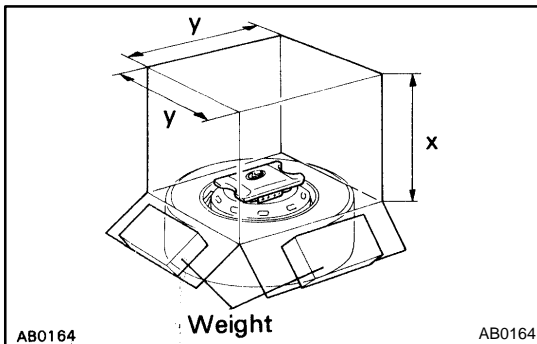
**Place the disc wheel on level ground.**

Connect the SST connector to the steering wheel pad 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, provide some slack for the SST wire harness inside the disc wheel.



(e) Cover the steering wheel pad with cardboard box or tires.

● Covering method using cardboard box:

Cover the steering wheel pad with the cardboard box and weight the cardboard box down in 4 places with at least 190 N (20 kg, 44 lb).

**Size of cardboard box:**

**Must exceed the following dimensions:**

**x= 460 mm (18.11 in.)**

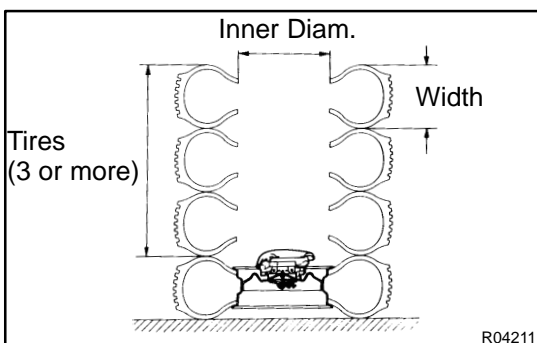
**When dimension y of the cardboard box exceeds the diameter of the disc wheel with tire to which the steering wheel pad is tied -**

**x= 460 mm (18.11 in.) + width of tire**

**y= 650 mm (25.59 in.)**

**NOTICE:**

If a cardboard box smaller than the specified size is used, the cardboard box will be broken by the shock of the airbag deployment.



● Covering method using tires:

Place at least 3 tires without disc wheel on top of the disc wheel with tire to which the steering wheel pad is tied.

**Tire size: Must exceed the following dimensions-**

**Width: 185 mm (7.28 in.)**

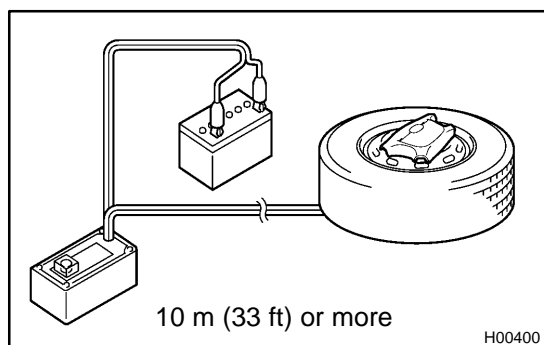
**Inner diameter: 360 mm (14.17 in.)**

**CAUTION:**

**Do not use tires with disc wheels.**

**NOTICE:**

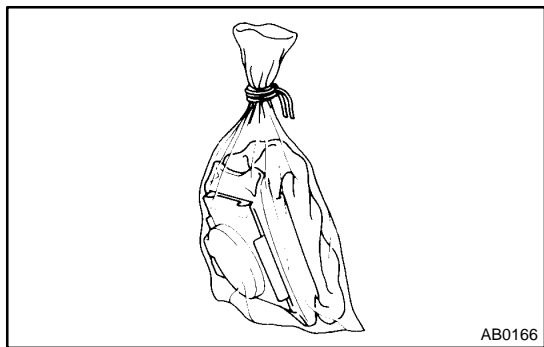
The tires may be marked by the airbag deployment, so use redundant tires.



- (f) Deploy the airbag.
- (1) Connect the SST red clip to the battery positive (+) terminal and the black clip to the battery negative (-) terminal.
  - (2) Confirm that no-one is within 10 m (33 ft) area around the disc wheel to which the steering wheel pad is tied.
  - (3) Press the SST activation switch and deploy the airbag.

**HINT:**

The airbag deploys simultaneously as the LED of the SST activation switch lights up.



- (g) Dispose of the steering wheel pad (with airbag).

**CAUTION:**

- The steering wheel pad is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.
  - Use gloves and safety glasses when handling a steering wheel pad with a deployed airbag.
  - Do not apply water, etc. to a steering wheel pad with deployed airbag.
  - Always wash your hands with water after completing the operation.
- (1) Remove the steering wheel pad from the disc wheel.
  - (2) Place the steering wheel pad in a vinyl bag, tie the end tightly and dispose of it in the same way as other general parts.

## REPLACEMENT

### REPLACEMENT REQUIREMENTS

In the following case, replace the steering wheel pad, steering wheel and spiral cable.

- If the airbag has been deployed.
- If the steering wheel pad and spiral cable has been found to be faulty in troubleshooting.
- If the steering wheel pad, steering wheel and spiral cable has been found to be faulty during the check in item (See page [RS-9](#) ).
- If the steering wheel pad and has been dropped.

### CAUTION:

For remove and installation of the steering wheel pad See page [SR-13](#) , [RS-8](#) and [RS-19](#) , and be sure to follow the correct procedure.

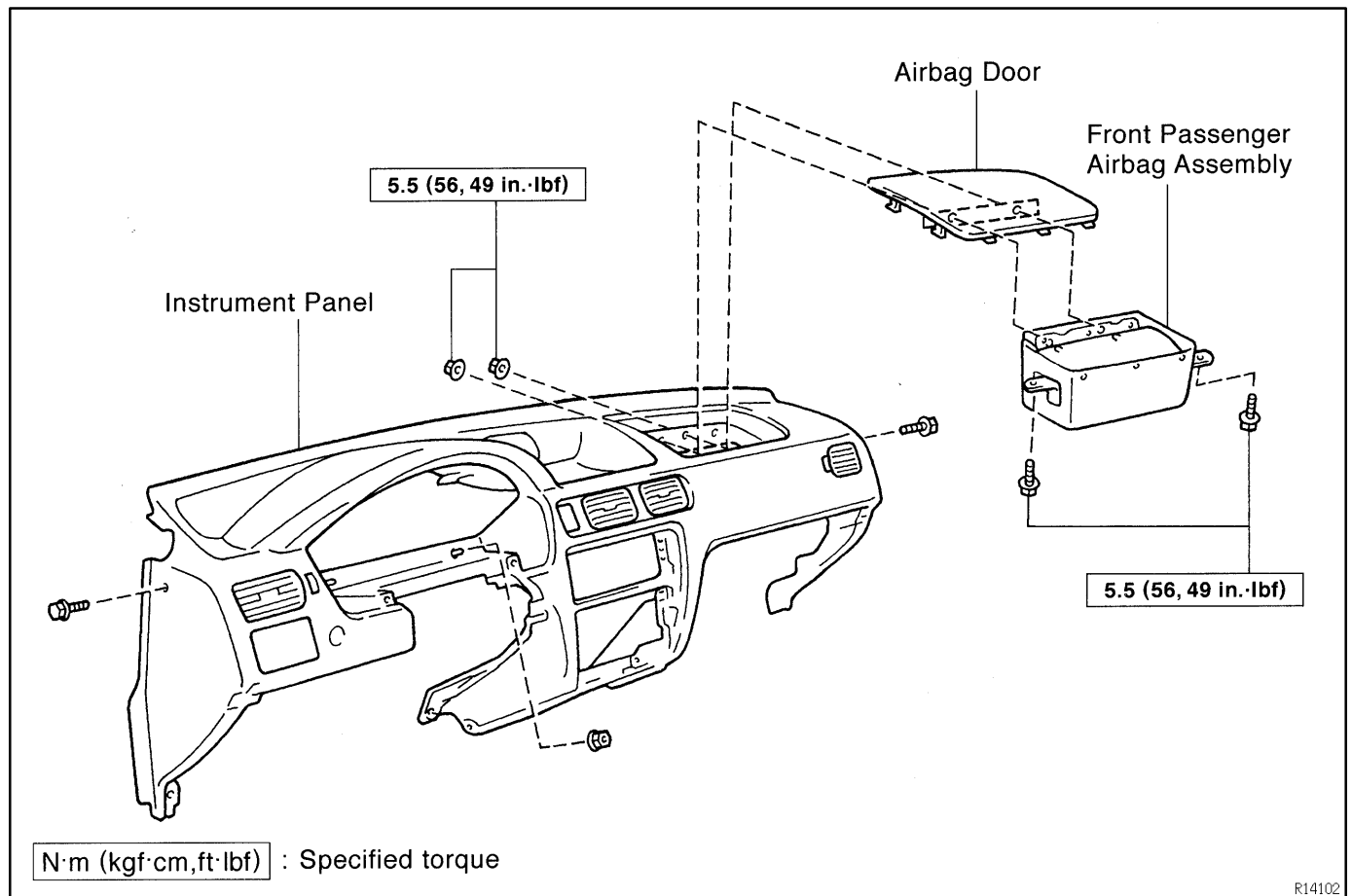


# INSTALLATION

(See page [SR-20](#) )

# FRONT PASSENGER AIRBAG ASSEMBLY COMPONENTS

RS033-12

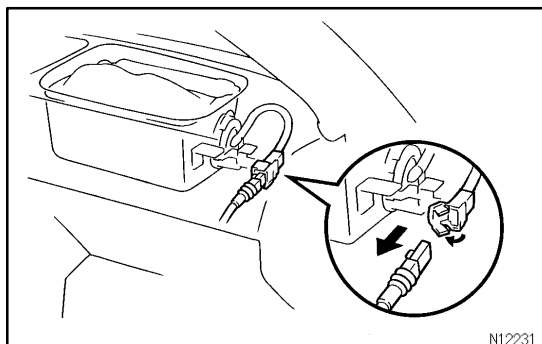


R14102

## REMOVAL

### NOTICE:

- If the wiring connector of the SRS is disconnected with the ignition switch at ON or ACC, diagnostic trouble codes will be recorded.
- Never use airbag parts from another vehicle. When replacing parts, replace with new parts.



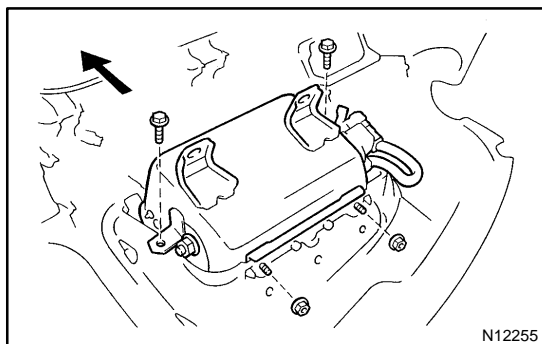
### 1. DISCONNECT AIRBAG CONNECTOR

- (a) Remove the lower center finish panel.  
(See page [BO-38](#) )
- (b) Disconnect the airbag connector.

### NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.

### 2. REMOVE INSTRUMENT PANEL (See page [BO-38](#) )



### 3. REMOVE FRONT PASSENGER AIRBAG ASSEMBLY

- (a) Remove the 2 bolts, 2 nuts and front passenger airbag assembly.
- (b) Remove the airbag door.

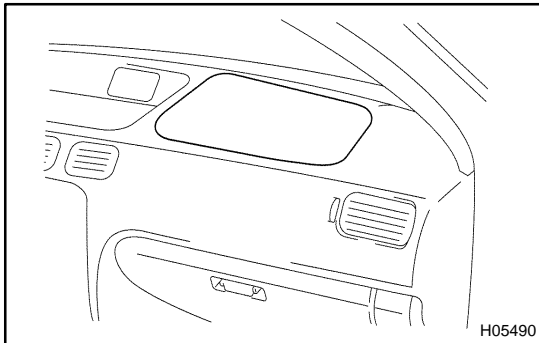
### CAUTION:

- Do not store the front passenger airbag assembly with the airbag deployment side facing down
- Never disassemble the front passenger airbag assembly.

## INSPECTION

### 1. VEHICLE NOT INVOLVED IN COLLISION

- (a) Do a diagnostic system check (See page [DI-148](#) ).

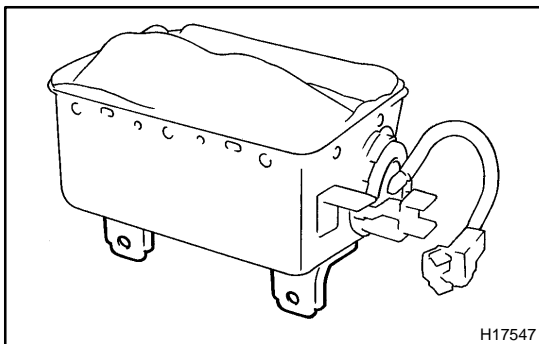


- (b) Do a visual check which includes the following items with the front passenger airbag assembly installed in the vehicle.

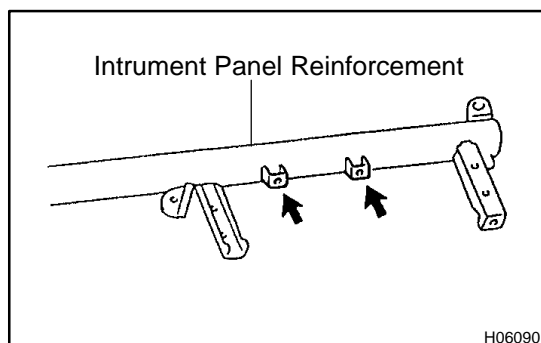
Check for cuts, minute cracks in or marked discoloration of the front passenger airbag door.

### 2. VEHICLE INVOLVED IN COLLISION AND AIRBAG IS NOT DEPLOYED

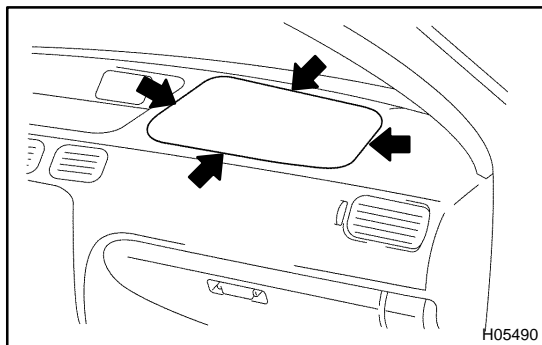
- (a) Do a diagnostic system check (See page [DI-148](#) ).
- (b) Do a visual check which includes the following items with the front passenger airbag assembly removed from the vehicle.



- Check for cuts and cracks in, or marked discoloration of the front passenger airbag door.
- Check for cuts and cracks in wire harnesses, and for chipping in connectors.



- Check for deformation of the instrument panel and instrument panel reinforcement.

**HINT:**

- If the instrument panel or instrument panel reinforcement is deformed, never repair it. Always replace it with a new one.
- There should be no interference between the instrument panel and front passenger airbag door, or the glove compartment door and front passenger airbag door. The clearance should be uniform all the way around when the new airbag assembly is installed on the instrument panel.

**CAUTION:**

**For removal and installation of the front passenger airbag assembly, see page [RS-21](#) and [RS-31](#) , and be sure to follow the correct procedure.**

**3. VEHICLE INVOLVED IN COLLISION AND AIRBAG IS DEPLOYED**

- (a) Do a diagnostic system check (See page [DI-148](#) ).
- (b) Do a visual check which includes the following items with the airbag assembly removed from the vehicle.
  - Check for deformation of the instrument panel, instrument panel reinforcement and glove compartment door.
  - Check for damage to the connector and wire harness.

**HINT:**

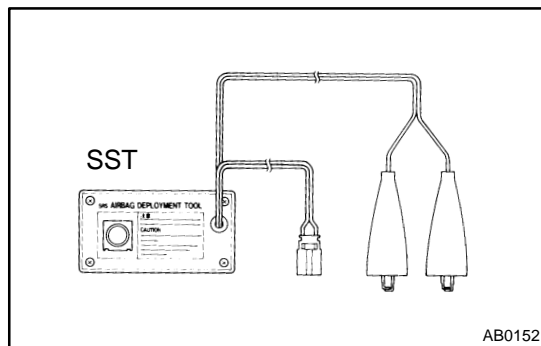
- If the instrument panel or instrument panel reinforcement is deformed, never repair it. Always replace it with a new one.
- There should be no interference between the instrument panel and front passenger airbag door, or the glove compartment and front passenger airbag door. The clearance should be uniform all the way around when the new airbag assembly is installed on the instrument panel.

## DISPOSAL

### HINT:

When an scrapping vehicle equipped with an SRS or disposing of a front passenger airbag assembly, always first deploy the airbag 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.

When disposing of a front passenger airbag assembly with an airbag deployed in a collision, follow the same procedure given in step 1-(e) in "DISPOSAL".

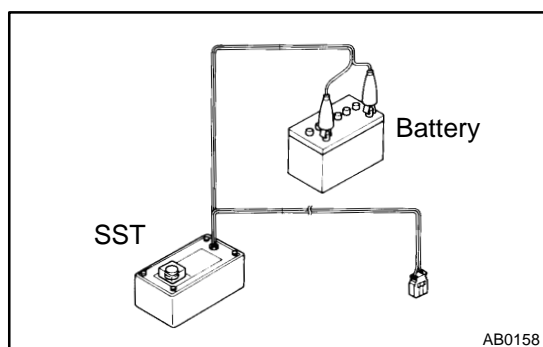


### CAUTION:

- Never dispose of a front passenger airbag assembly which has an undeployed airbag.
- The airbag produces a sizeable exploding sound when it deploys, so perform the operation out-of-doors and where it will not create a nuisance to nearby residents.
- When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Carry out operation in a place away from electrical noise.

SST 09082-00700

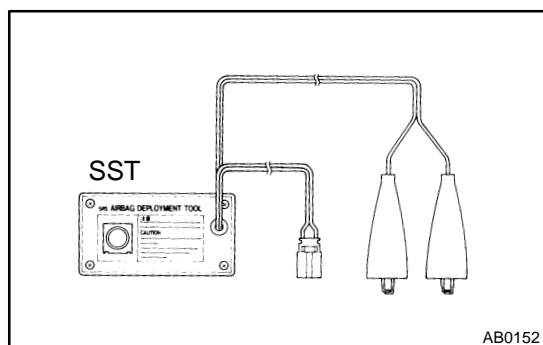
- When deploying an airbag, do it at least 10 m (33 ft) away from the front passenger airbag assembly.
- The front passenger airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.
- Use gloves and safety glasses when handling a front passenger 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.



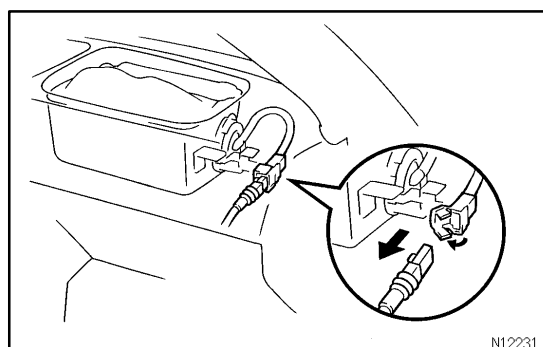
## 1. AIRBAG DEPLOYMENT WHEN SCRAPPING VEHICLE

HINT:

Have a battery ready as the power source to deploy the airbag.



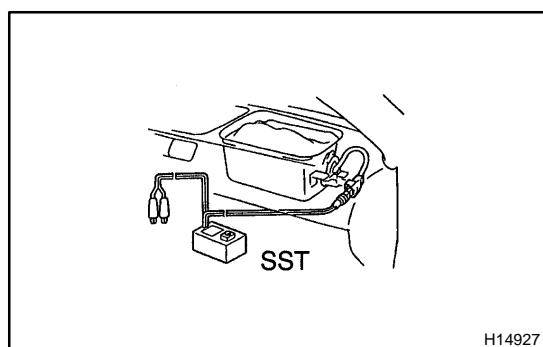
- (a) Check functioning of the SST (See page [RS-11](#)).  
SST 09082-00700



- (b) Disconnect the airbag connector.  
(1) Remove the lower finish panel  
(See page [BO-45](#) ).  
(2) Disconnect the airbag connector.

**NOTICE:**

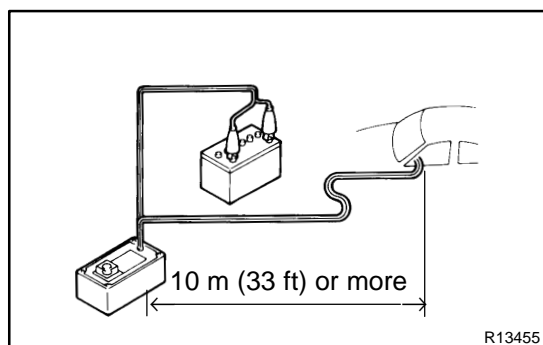
**When handling the airbag connector, take care not to damage the airbag wire harness.**



- (c) Install the SST.  
(1) Connect the SST connector to the airbag connector.  
SST 09082-00700

**NOTICE:**

**To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.**

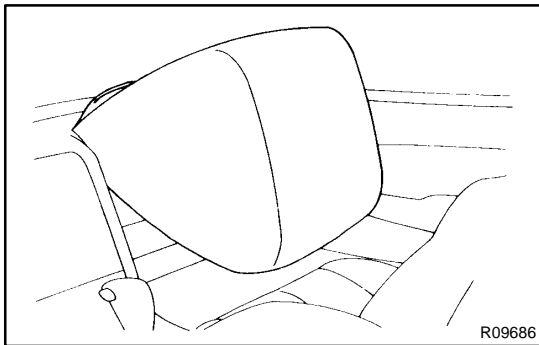


- (2) Move the SST to at least 10 m (33 ft) away from the front of the vehicle.  
(3) Close all the doors and windows of the vehicle.

**NOTICE:**

**Take care not to damage the SST wire harness.**

- (4) Connect the SST red clip to the battery positive (+) terminal and the black clip to the negative (+) terminal.



- (d) Deploy the airbag.
- (1) Confirm that no-one is inside the vehicle or within 10 m (33 ft) of the vehicle.
  - (2) Press the SST activation switch and deploy the airbag.

**HINT:**

The airbag deploys simultaneously as the LED of the SST activation switch lights up.

- (e) Dispose of the front passenger airbag assembly.

**CAUTION:**

- The front passenger airbag assembly is very hot when the airbag is deployed, so leave it alone 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.

When scrapping a vehicle, deploy the airbag and scrap the vehicle with the front passenger airbag assembly still installed.

## 2. DEPLOYMENT WHEN DISPOSING OF FRONT PASSENGER AIRBAG ASSEMBLY ONLY

**NOTICE:**

When disposing of the front passenger airbag assembly only, never use the customers vehicle to deploy the airbag.

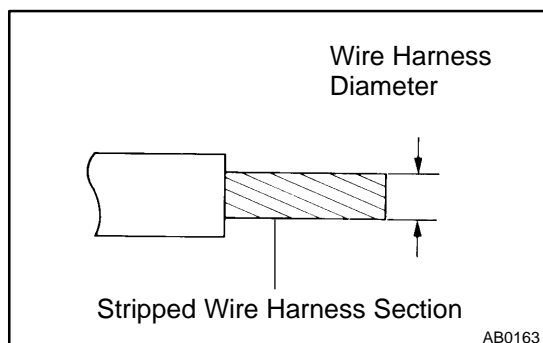
**HINT:**

Have a battery ready as the power source to deploy the airbag.

- (a) Remove the front passenger airbag assembly.

**CAUTION:**

When storing the steering wheel pad, keep the deployment direction facing up.



- (b) Fix the front passenger airbag assembly.
- (1) 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<sup>2</sup> or more (0.0019 in.<sup>2</sup> or more)**

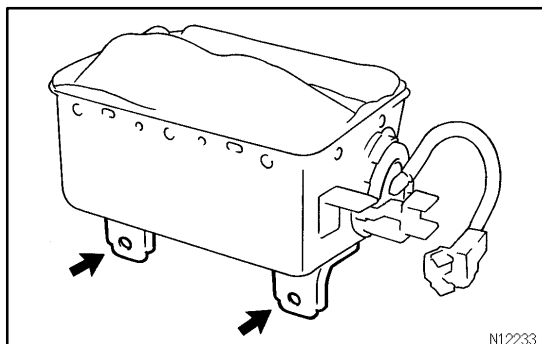


**CAUTION:**

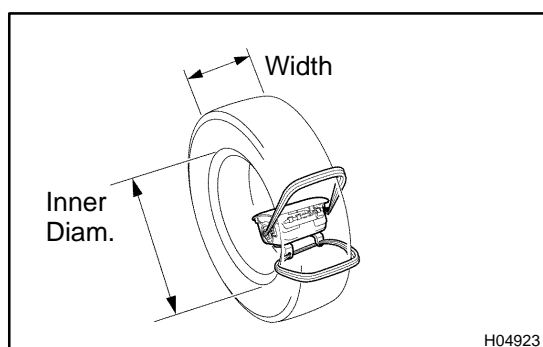
If the front passenger airbag assembly is tied down with too thin wire harness, it may snap. This is highly dangerous. Always use a wire harness for vehicle use which is at least 1.25 mm<sup>2</sup> (0.0019 in.<sup>2</sup>).

**HINT:**

To calculate the square of the stripped wire harness section:  
 Square = 3.14 X (Diameter)<sup>2</sup> divided by 4



- (2) Wrap the wire harness around the tire, passing the wire harness through the installation holes indicated by arrows in the installation.



- (3) 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.)**

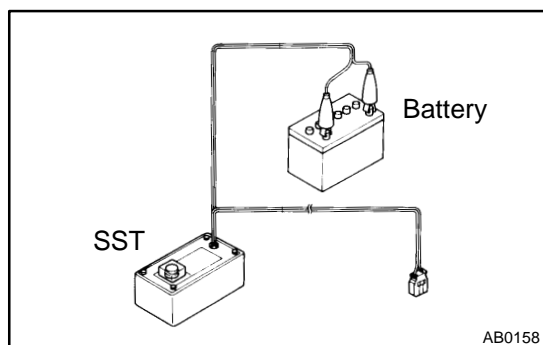
**Inner diameter: 360 mm (14.17 in.)**

**CAUTION:**

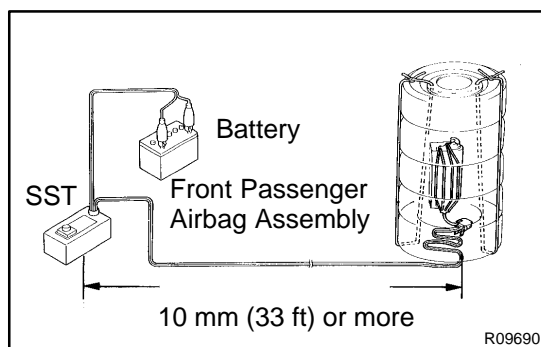
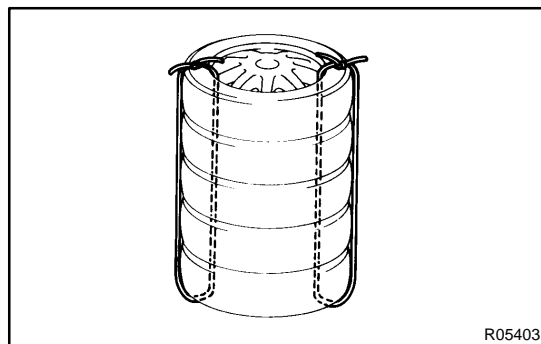
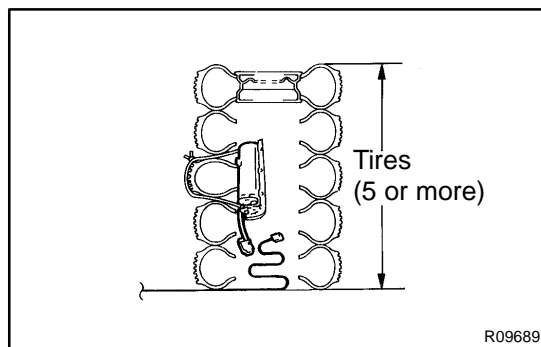
- Make sure that the wire harness is tight. It is very dangerous if a loose wire harness results in the front passenger airbag assembly coming free due to the shock of the airbag deploying.
- Always tie down the front passenger airbag assembly with the airbag door facing inside.

**NOTICE:**

The tire will be marked by the airbag deployment, so when disposing of the airbag use a redundant tire.



- (c) Check functioning of the SST (See page [RS-11](#)).  
 SST 09082-00700



- (d) Install the SST.
- (1) Place at least 2 tires under the tire to which the front passenger airbag assembly is tied.
  - (2) Place at least 2 tires over the tire to which the front passenger airbag assembly is tied. The top tire should have the wheel installed.
  - (3) Tie the tires together with 2 wire harnesses.

**CAUTION:**

**Make sure that the wire harnesses are tight. It is very dangerous if loose wire harnesses result in the tires coming free due to the shock of the airbag deploying.**

**HINT:**

Place the SST connector and wire harness inside tires. Provide at least 1 m (3 ft) of slack for the wire harness.

- (4) Connect the SST connector to the front passenger airbag assembly connector.

SST 09082-00700

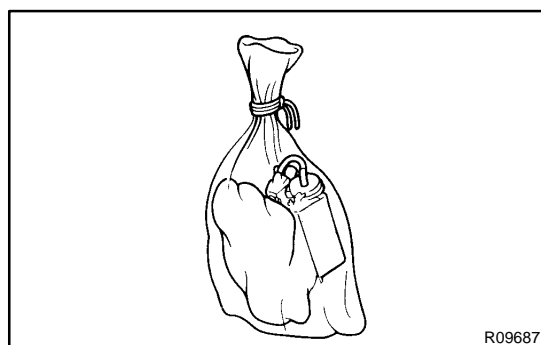
**NOTICE:**

**To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.**

- (e) Deploy the airbag.
- (1) Connect the SST red clip to the battery positive (+) terminal and the black clip to the battery negative (-) terminal.
  - (2) Confirm that no-one is within 10 m (33 ft) of the tires covering the front passenger airbag assembly.
  - (3) Press the SST activation switch and deploy the airbag.

**HINT:**

The airbag deploys simultaneously as the LED of the SST activation switch lights up.



- (f) Dispose of the front passenger airbag assembly.

**CAUTION:**

- The front passenger airbag assembly is very hot when the airbag is deployed, so leave it alone 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 vinyl bag, tie the end tightly and dispose of it in the same way as other general parts.

## REPLACEMENT

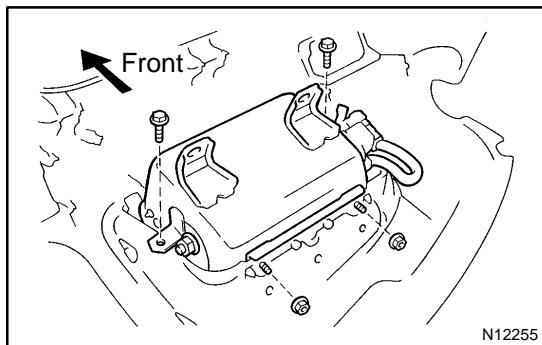
### REPLACEMENT REQUIREMENTS

In the following cases, replace the front passenger airbag assembly, instrument panel and instrument panel reinforcement.

- If the airbag has been deployed.
- If the front passenger airbag assembly has been found to be faulty in troubleshooting.
- If the instrument panel and instrument panel reinforcement has been found to be faulty during the check in item (See page [RS-22](#) ).

### CAUTION:

For removal and installation of the front passenger airbag assembly, see page [RS-21](#) and [RS-31](#) respectively. Be sure to follow the correct procedure.



## INSTALLATION

### 1. INSTALL FRONT PASSENGER AIRBAG ASSEMBLY

Install the airbag door and front passenger airbag assembly to the instrument panel.

#### CAUTION:

Make sure that no foreign objects are trapped between the airbag bag, and within the module.

#### NOTICE:

If the front passenger airbag assembly has been dropped, or there are cracks, dents or other defects in the case or connector, replace the front passenger airbag assembly with a new one.

### 2. INSTALL INSTRUMENT PANEL (See page [BO-38](#))

Install the 2 bolts to instrument panel reinforcement.

Torque: 19 N·m (195 kgf-cm, 14 ft-lbf)

#### NOTICE:

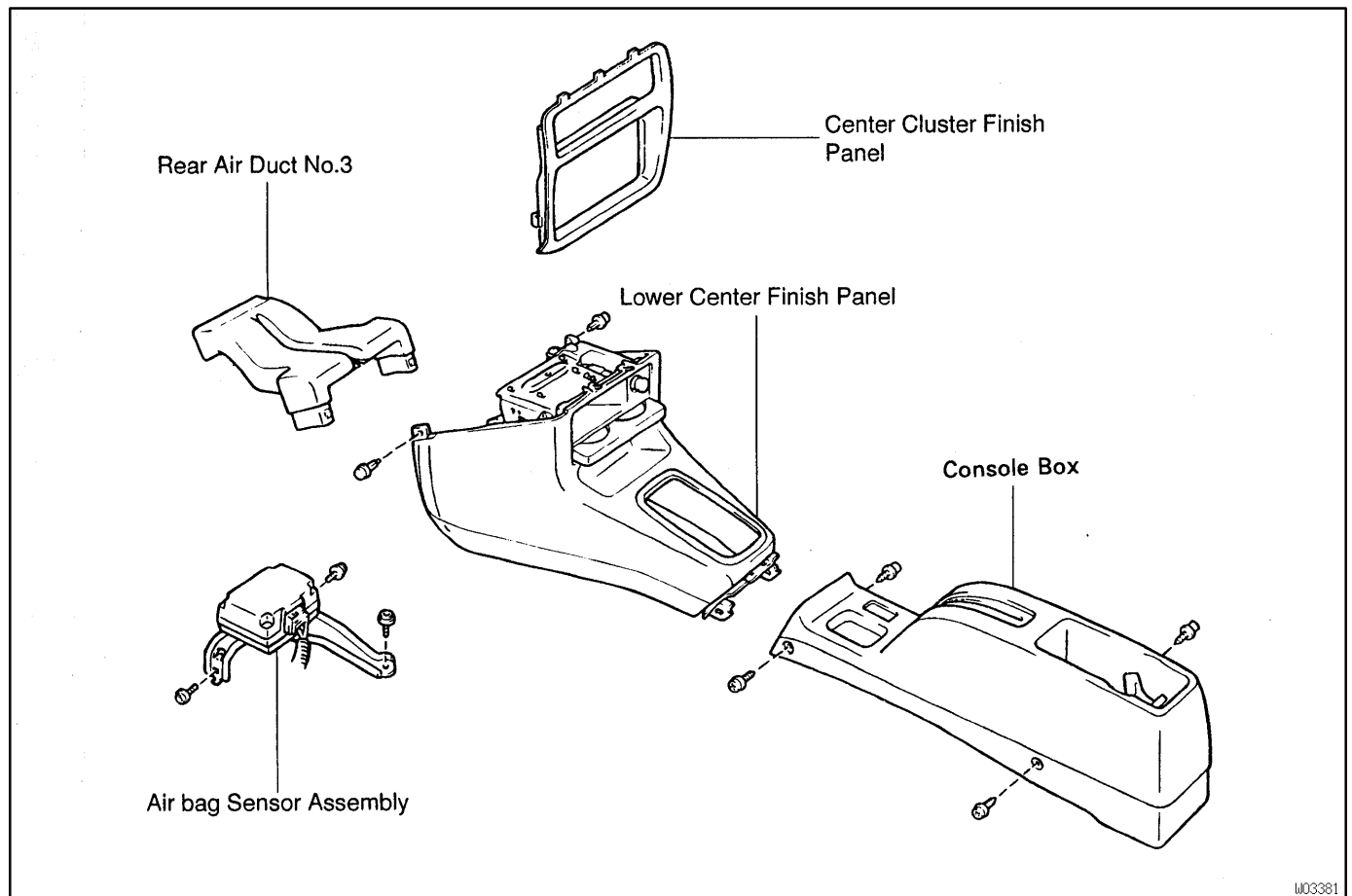
- Make sure the front passenger airbag assembly is installed to the specified torque.
- When installing the instrument panel, take care that the airbag wire harness does not interfere with other parts and is not pinched between other parts.
- When installing the instrument panel box, carefully pull out the airbag wire harness from the glove compartment upper hole.

### 3. CONNECT AIRBAG CONNECTOR

- (a) Connect the airbag connector.
- (b) Install the lower finish panel (See page [BO-45](#)).

# AIRBAG SENSOR ASSEMBLY COMPONENTS

RS039-12



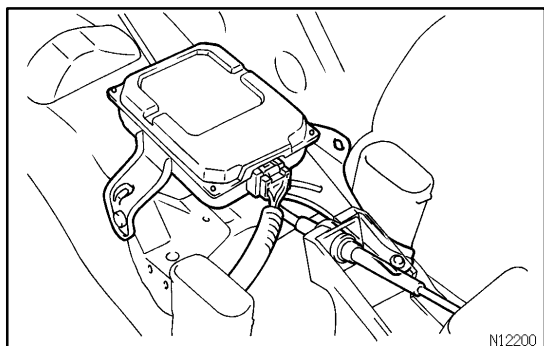
## REMOVAL

### NOTICE:

**Do not open the cover or the case of the ECU and various computers unless absolutely necessary.**

If the IC terminals are touched, the IC may be destroyed by static electricity.

1. **REMOVE THESE PARTS:**
2. **REMOVE CONSOLE BOX**
3. **REMOVE CENTER CLUSTER FINISH PANEL**
4. **REMOVE LOWER CENTER FINISH PANEL**
5. **REMOVE REAR AIR DUCT NO.3**



### 6. REMOVE AIRBAG SENSOR ASSEMBLY

- (a) Disconnect the connectors.

### NOTICE:

**Remove of the connector is done with the sensor assembly installed.**

- (b) Using a torx wrench remove the 3 screws and the airbag sensor assembly.  
Torx wrench: T40 (Part No. 09042-00020 or locally manufactured tool)

## INSPECTION

### 1. VEHICLES NOT INVOLVED IN COLLISION

Do a diagnostic system check. (See page [DI-148](#) )

### 2. VEHICLES INVOLVED IN COLLISION AND SRS IS NOT DEPLOYED

Do a diagnostic system check. (See page [DI-148](#) )

### 3. VEHICLES INVOLVED IN COLLISION AND SRS IS DEPLOYED

Replace the airbag sensor assembly.



## REPLACEMENT

### REPLACEMENT REQUIREMENTS

In the following cases, replace the airbag sensor assembly.

- If the SRS has been deployed in a collision.
- If the airbag sensor assembly has been found to be faulty in troubleshooting.
- If the airbag sensor assembly has been dropped.

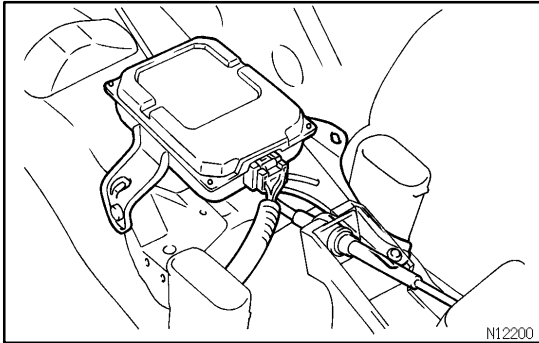
### CAUTION:

For removal and installation of the airbag sensor assembly, see page [RS-33](#) and [RS-36](#) . Be sure to follow the correct procedure.

## INSTALLATION

### NOTICE:

- Never use SRS parts from another vehicle. When replacing parts, replace with new parts.
- Never reuse the airbag sensor assembly involved in a collision when the airbag has deployed.
- Never repair a sensor in order to reuse it.



### 1. INSTALL AIRBAG SENSOR ASSEMBLY

- (a) Using a torx wrench, install the airbag sensor assembly with the 3 screws.

Torx wrench: T40 (Part No. 09042-00020 or locally manufactured tool)

**Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)**

- (b) Connect the connector.

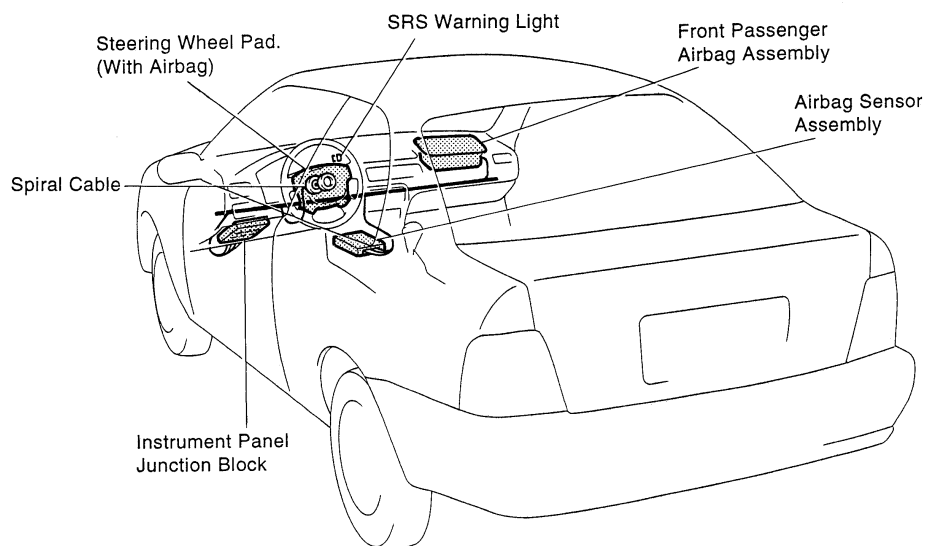
### NOTICE:

- Installation of the connector is done after the sensor assembly has been installed.
- Make sure the sensor assembly is installed to the specified torque.
- If the sensor assembly has been dropped, or there are cracks, dents or other defects in the case, bracket or connector, replace the sensor assembly with a new one.
- When installing the airbag sensor assembly, take care that the SRS wiring does not interfere with other parts and is not pinched between other parts.
- After installation, shake the sensor assembly to check that there is no looseness.

### 2. INSTALL THE REMOVED PARTS

# WIRE HARNESS AND CONNECTOR LOCATION

RS03D-14



N12264

N12264

## INSPECTION

### HINT:

The SRS wire harness is integrated with the cowl wire harness assembly. The wires for the SRS wire harness are encased in a yellow corrugated tube and all the connectors in the system are a standard yellow color.

#### 1. VEHICLES NOT INVOLVED IN COLLISION

Do a diagnostic system check. (See page [DI-148](#) )

#### 2. VEHICLES INVOLVED IN COLLISION

- (a) Do a diagnostic system check. (See page [DI-148](#) )
- (b) Check for breaks in all wires of the SRS wire harness, and for exposed conductors.
- (c) Check to see if the SRS wire harness connectors are cracked or chipped.

## REPLACEMENT

### REPLACEMENT REQUIREMENTS

In the following cases, replace the wire harness or connector.

- If any part of the SRS wire harness or any connector has been found to be faulty in troubleshooting.
- If any part of the SRS wire harness or any connector has been found to be faulty during checking item 2-(b) or (c)

### NOTICE:

**If the wire harness used in the SRS is damaged, replace the whole wire harness assembly.**

**When the connector to the front airbag sensors can be repaired alone (when there is no damaged to the wire harness), use the repair wire specially designed for the purpose.**

# BODY ELECTRICAL SYSTEM

BE0QP-02

## PRECAUTION

Take care to observe the following precautions when performing inspections or removal and replacement of body electrical related parts.

### 1. HEADLIGHT SYSTEM

Halogen bulbs have pressurized gas inside and require special handling. They can burst if scratched or dropped. Hold a bulb only by its plastic or metal case. Don't touch the glass part of a bulb with bare hands.

### 2. SRS (SUPPLEMENTAL RESTRAINT SYSTEM)

The TERCEL is equipped with an SRS (Supplemental Restraint System) such as the driver airbag and front passenger airbag. Failure to carry out service operation in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notices in the RS section.

### 3. AUDIO SYSTEM

- If the negative (-) terminal cable is disconnected from the battery, the preset AM, FM 1 and FM 2 stations stored in memory are erased, so be sure to note the stations and reset them after the terminal is reconnected.
- If the negative (-) terminal cable is disconnected from the battery, the "ANTI-THEFT SYSTEM" will operate when the cable is reconnected, but the radio, tape player and CD player will not operate. Be sure to input the correct ID number so that the radio, tape player and CD player can be operated again.

### 4. MOBILE COMMUNICATION SYSTEM

If the vehicle is equipped with a mobile communication system, refer to precautions in the IN section.

## PROBLEM SYMPTOMS TABLE

The table below will be useful for you in troubleshooting these electrical problems. The most likely causes of the malfunction are shown in the order of their probability. Inspect each part in the order shown, and replace the part when it is found to be faulty.

### USA:

#### HEADLIGHT AND TAILLIGHT SYSTEM

Trouble	Parts name	See page
"Light-on warning system" does not operate.	3. Integration Relay (I/P J/B) 4. DOME Fuse (Engine Room R/B) 5. GAUGE Fuse (I/P J/B) 6. TAIL Fuse (I/P J/B) 7. CIG/RAD Fuse (I/P J/B) 8. Wire Harness 9. Door Courtesy Switch	BE-16 - - - - - BE-38
Only one side headlight does not light up.	1. HEAD Fuse (LH, RH) (Engine Room R/B) 2. Headlight Bulb 3. Wire Harness	- - -
"Lo-Beam" does not light up.	1. Headlight Dimmer Switch 2. Wire Harness	BE-16 -
"Hi-Beam" does not light up.	1. Headlight Dimmer Switch 2. Wire Harness	BE-16 -
"Flash" does not light up.	1. Headlight Dimmer Switch 2. Wire Harness	BE-16 -
Headlight does not light up. (Taillight is normal)	1. Headlight Control Relay (Engine Room R/B) 2. Headlight Dimmer Switch 3. Light Control Switch 4. Headlight Bulb 5. Wire Harness	BE-16 BE-16 BE-16 - -
Headlight does not light up. (Taillight does not light up)	1. Light Control Switch 2. Wire Harness 3. Headlight Bulb	BE-16 - -
Only one side taillight does not light up.	1. Taillight Bulb 2. Wire Harness	- -
Taillight does not light up. (Headlight is normal)	1. TAIL Fuse (I/P J/B) 2. Taillight Control Relay (I/P J/B) 3. Light Control Switch 4. Headlight Bulb 5. Wire Harness	- BE-16 BE-16 - -
Taillight does not light up. (Headlight does not light up)	1. Light Control Switch 2. Headlight Bulb 3. Wire Harness	BE-16 - -

## CANADA: HEADLIGHT AND TAILLIGHT SYSTEM

Trouble	Parts name	See page
"Light-on warning system" does not operate.	1. Integration Relay (I/P J/B) 2. DOME Fuse (Engine Room R/B) 3. GAUGE Fuse (I/P J/B) 4. TAIL Fuse (I/P J/B) 5. CIG/RAD Fuse (I/P J/B) 6. Wire Harness 7. Door Courtesy Switch	<a href="#">BE-16</a> - - - - - <a href="#">BE-38</a>
Only one side headlight does not light up.	1. Headlight Bulb 2. Wire Harness	- -
"Lo-Beam" does not light up. (ALL)	1. Headlight Control Relay (Engine Room R/B) 2. Wire Harness	<a href="#">BE-16</a> -
"Lo-Beam" does not light up. (ONE SIDE)	1. HEAD LH-LWR Fuse (R/B No.5) 2. HEAD RH-LWR Fuse (R/B No.5) 3. Headlight Bulb 4. Wire Harness	- - - -
"Hi-Beam" does not light up. (ALL)	1. DRL Fuse (Engine Room R/B) 2. Headlight Dimmer Switch 3. D.R.L. Main Relay 4. D.R.L. No.4 Relay (R/B No.5) 5. Daytime Resistor 6. Wire Harness	- <a href="#">BE-16</a> <a href="#">BE-16</a> <a href="#">BE-16</a> <a href="#">BE-16</a> -
"Hi-Beam" does not light up. (ONE SIDE)	1. HEAD LH-UPR Fuse (R/B No.5) 2. HEAD RH-UPR Fuse (R/B No.5) 3. Headlight Bulb 4. Wire Harness	- - - -
"Flash" does not light up.	1. DRL Fuse (Engine Room R/B) 2. Headlight Dimmer Switch 3. D.R.L. Main Relay 4. D.R.L. No.4 Relay (R/B No.5) 5. Daytime Resistor 6. Wire Harness	- <a href="#">BE-16</a> <a href="#">BE-16</a> <a href="#">BE-16</a> <a href="#">BE-16</a> -
Headlight does not light up. (Taillight is normal)	1. Headlight Control Relay (Engine Room R/B) 2. D.R.L. Main Relay 3. D.R.L. No.4 Relay (R/B No.5) 4. Daytime Resistor 5. Headlight Dimmer Switch 6. Light Control Switch 7. Headlight Bulb 8. Wire Harness	<a href="#">BE-16</a> <a href="#">BE-16</a> <a href="#">BE-16</a> <a href="#">BE-16</a> <a href="#">BE-16</a> <a href="#">BE-16</a> - -
Headlight does not light up. (Taillight does not light up)	1. D.R.L. Main Relay 2. D.R.L. No.4 Relay (R/B No.5) 3. Daytime Resistor 4. Light Control Switch 5. Headlight Bulb 6. Wire Harness	<a href="#">BE-16</a> <a href="#">BE-16</a> <a href="#">BE-16</a> <a href="#">BE-16</a> - -
Only one side taillight does not light up.	1. Taillight Bulb 2. Wire Harness	- -
Taillight does not light up. (Headlight is normal)	1. TAIL Fuse (I/P J/B) 2. Taillight Control Relay (I/P J/B) 3. Light Control Switch 4. Headlight Bulb 5. Wire Harness	- <a href="#">BE-16</a> <a href="#">BE-16</a> - -



Taillight does not light up. (Headlight does not light up)	1. Light Control Switch 2. Headlight Bulb 3. Wire Harness	BE-16 - -
Headlight does not light up with light control SW in HEAD.	1. Light Control Switch 2. D.R.L. Main Relay 3. D.R.L. No.4 Relay (R/B No.5) 4. Daytime Resistor 5. Wire Harness	BE-16 BE-16 BE-16 BE-16 -
Headlight does not go out with light control SW in OFF.	1. Headlight Control Relay (Engine Room R/B) 2. Wire Harness	BE-16 -
Taillight does not light up with light control SW in TAIL.	1. Taillight Control Relay (I/P J/B) 2. Light Control Switch 3. Wire Harness	BE-16 BE-16 -
Taillight does not go out with light control SW in OFF.	1. Taillight Control Relay (I/P J/B) 2. Light Control Switch 3. Wire Harness	BE-16 BE-16 -
Headlight do not light up with engine running and light control SW in OFF.	1. DOME Fuse (Engine Room R/B) 2. ECU-IG Fuse (I/P J/B) 3. DRL Fuse (Engine Room R/B) 4. D.R.L. Main Relay 5. D.R.L. No.4 Relay (R/B No.5) 6. Daytime Resistor 7. Wire Harness 8. Generator L Terminal 9. Parking Brake Switch 10. Brake Fluid Level Warning Switch	- - - BE-16 BE-16 BE-16 - - BE-38 BE-38

## TURN SIGNAL AND HAZARD WARNING SYSTEM

Trouble	Parts name	See page
"Hazard" and "Turn" do not light up.	1. Hazard Warning Switch 2. Turn Signal Flasher 3. Wire Harness	BE-22 BE-22 -
No of blinks for Hazard. (Turn is abnormal)	1. Bulb 2. Turn Signal Flasher 3. Wire Harness	- BE-22 -
Hazard warning light does not light up. (Turn signal is normal)	1. HAZ-HORN Fuse (Engine Room R/B) 2. Wire Harness	- -
Hazard warning light does not light up in one direction.	1. Hazard Warning Switch 2. Wire Harness	BE-22 -
Turn signal does not light up. (Combination meter, wiper and washer do not operate.)	1. Ignition Switch 2. TURN Fuse (Engine Room R/B) 3. Turn Signal Switch 4. Wire Harness	BE-11 - BE-22 -
Turn signal does not light up. (Combination meter, wiper and washer are normal.)	1. TURN Fuse (Engine Room R/B) 2. Turn Signal Switch 3. Wire Harness	- BE-22 -

**INTERIOR LIGHT SYSTEM**

Trouble	Parts name	See page
Room light does not light up.	1. DOME Fuse (Engine Room R/B)	-
	2. Room Light Switch	<a href="#">BE-24</a>
	3. Door Courtesy Switch	<a href="#">BE-38</a>
	4. Wire Harness	-
	5. Bulb	-
Room light always remains on.	1. Room Light Switch	<a href="#">BE-24</a>
	2. Door Courtesy Switch	<a href="#">BE-38</a>
	3. Wire Harness	-

**BACK-UP LIGHT SYSTEM**

Trouble	Parts name	See page
Back-up Light does not light up.	1. GAUGE Fuse (I/P J/B)	-
	2. Ignition Switch	<a href="#">BE-11</a>
	3. Park/Neutral Position Switch (A/X)	AX-2
	4. Back-up Light Switch (M/X)	AX-2
	5. Wire Harness	<a href="#">BE-26</a>
	6. Bulb	-
Back-up light always remains on.	1. Wire Harness	-
Only one light does not light up.	1. Bulb	-
	2. Wire Harness	-

**STOP LIGHT SYSTEM**

Trouble	Parts name	See page
Stop light does not light up.	1. STOP Fuse (I/P J/B)	-
	2. Stop Light Switch	<a href="#">BE-28</a>
	3. Bulb	-
	4. Wire Harness	-
Stop light always remains on.	1. Stop Light Switch	<a href="#">BE-28</a>
	2. Wire Harness	-
Only one light does not light up.	1. Bulb	-
	2. Wire Harness	-

**WIPER AND WASHER SYSTEM**

Trouble	Parts name	See page
Wiper and washers do not operate.	1. WIPER Fuse (I/P J/B)	-
	2. Wiper Switch	<a href="#">BE-30</a>
	3. Wiper Motor	<a href="#">BE-30</a>
	4. Wire Harness	-
Wipers do not operate in LO, HI or MIST.	1. Wiper Switch	<a href="#">BE-30</a>
	2. Wiper Motor	<a href="#">BE-30</a>
	3. Wire Harness	-
Wipers do not operate in INT.	1. Wiper Switch	<a href="#">BE-30</a>
	2. Wiper Motor	<a href="#">BE-30</a>
	3. Wire Harness	-
Washer motor does not operate.	1. Washer Switch	<a href="#">BE-30</a>
	2. Washer Motor	<a href="#">BE-30</a>
	3. Wire Harness	-
Wipers do not operate when washer switch in ON.	1. Washer Motor	<a href="#">BE-30</a>
	2. Wire Harness	-

Washer fluid does not operate.	1. Washer Hose and Nozzle	-
<ul style="list-style-type: none"> <li>● At wiper switch HI position, the wiper blade is in contact with the body.</li> <li>● When the wiper switch is OFF, the wiper blade does not retract or the retract position is wrong.</li> </ul>	1. *1 Wiper Switch 2. Wire harness	BE-30 -

\*1: Inspect wiper arm and blade set position

### COMBINATION METER (METER, GAUGES AND ILLUMINATION)

Trouble	Parts name	See page
Tachometer, Fuel Gauge and Engine Coolant Temperature Gauge do not operate.	3. GAUGE Fuse (Engine Room R/B) 4. Meter Circuit 5. Wire Harness	- BE-35 -
Speedometer does not operate.	1. Vehicle Speed Sensor 2. Meter Circuit 3. Wire Harness	BE-38 BE-35 -
Tachometer does not operate.	1. Igniter 2. ECM 3. Meter Circuit 4. Wire Harness	- - BE-35 -
Fuel Gauge does not operate or operate abnormally.	1. Fuel Receiver Gauge 2. Fuel Sender Gauge 3. Meter Circuit 4. Wire Harness	BE-38 BE-38 BE-35 -
Engine Coolant Temperature Gauge does not operate or operate abnormally.	1. Engine Coolant Temperature Receiver Gauge 2. Engine Coolant Temperature Sender Gauge 3. Meter Circuit 4. Wire Harness	BE-38 BE-38 BE-35 -
All illumination lights do not light up.	1. TAIL Fuse (I/P J/B) 2. Light Control Rheostat 3. Meter Circuit 4. Wire Harness	- BE-38 BE-35 -
Only one illumination light does not light up.	1. Bulb 2. Meter Circuit	- BE-35

### COMBINATION METER (WARNING LIGHTS)

Trouble	Parts name	See page
Warning lights do not light up. (Except Discharge, SRS and Door Open)	1. Bulb 2. GAUGE Fuse (I/P J/B) 3. Ignition Switch 4. Meter Circuit 5. Wire Harness	- - BE-11 BE-35 -
Brake Warning Light does not light up.	1. Bulb 2. Brake Fluid Level Warning Switch 3. Parking Brake Switch 4. Bulb Check Relay 5. Meter Circuit 6. Wire Harness	- BE-38 BE-38 - BE-35 -
Seat Belt Warning Light does not light up.	1. Bulb 2. Seat Belt Retractor Switch 3. Integration Relay 4. Meter Circuit 5. Wire Harness	- BE-38 BE-38 BE-35 -

## BODY ELECTRICAL - BODY ELECTRICAL SYSTEM

Fuel Level Warning Light does not light up.	1. Bulb 2. Fuel Level Warning Switch 3. Meter Circuit 4. Wire Harness	- <a href="#">BE-38</a> <a href="#">BE-35</a> -
Low Oil Pressure Warning Light does not light up.	1. Bulb 2. Low Oil Pressure Warning Switch 3. Meter Circuit 4. Wire Harness	- <a href="#">BE-38</a> <a href="#">BE-35</a> -
Door Open Warning Light does not light up.	1. Bulb 2. DOME Fuse (Engine Room R/B) 3. Door Courtesy Switch 4. Meter Circuit 5. Wire Harness	- - <a href="#">BE-38</a> <a href="#">BE-35</a> -
Discharge Warning Light does not light up.	1. Bulb 2. IGN Fuse (I/P J/B) 3. Generator 4. Meter Circuit 5. Wire Harness	- - - <a href="#">BE-35</a> -

**COMBINATION METER (INDICATOR LIGHTS)**

Trouble	Parts name	See page
SRS Indicator Light does not light up.	1. Bulb 2. Wire Harness 3. Airbag Sensor Assembly	- - <a href="#">DI-146</a>
ABS Indicator Light does not light up.	1. Bulb 2. Wire Harness 3. ABS ECU	- - <a href="#">DI-109</a>
Malfunction Indicator Light does not light up.	1. Bulb 2. ECM 3. Wire Harness	- - -
O/D OFF Indicator Light does not light up.	1. Bulb 2. O/D Main Switch 3. ECM 4. Meter Circuit 5. Wire Harness	- - - <a href="#">BE-35</a> -
Turn Indicator Light does not light up.	1. Bulb 2. Turn Signal and Hazard Warning System 3. Meter Circuit 4. Wire Harness	- <a href="#">BE-21</a> <a href="#">BE-35</a> -
High Beam Indicator Light does not light up.	1. Bulb 2. Headlight System 3. Meter Circuit 4. Wire Harness	- <a href="#">BE-13</a> <a href="#">BE-35</a> -
Security Indicator Light does not light up.	1. Bulb 2. Theft Deterrent System 3. Meter Circuit 4. Wire Harness	- <a href="#">DI-215</a> <a href="#">BE-35</a> -

**DEFOGGER SYSTEM**

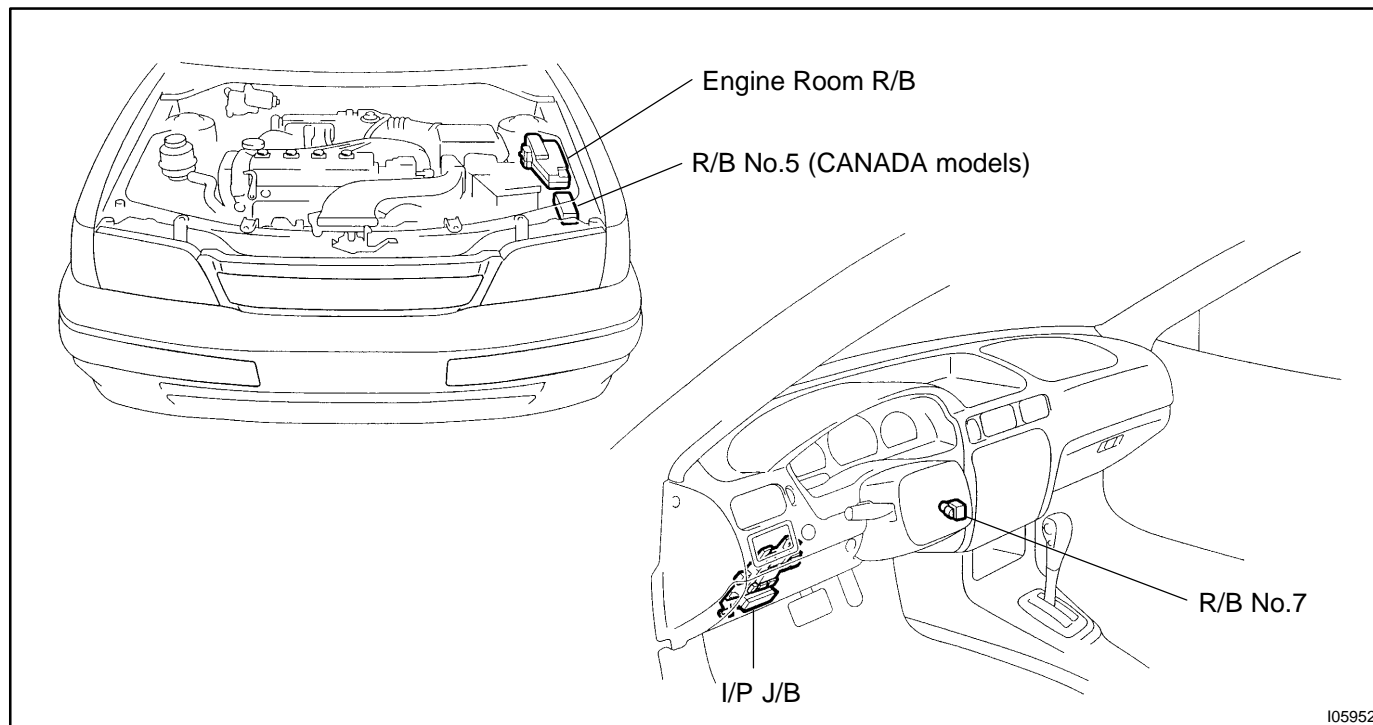
Trouble	Parts name	See page
Rear window defogger does not operate. (w/Timer)	1. DEF M-Fuse (I/P J/B) 2. GAUGE Fuse (I/P J/B) 3. Defogger Switch 4. Defogger Relay 5. Defogger Wire 6. Wire Harness	- - <a href="#">BE-46</a> <a href="#">BE-46</a> <a href="#">BE-46</a> -
Rear window defogger does not operate. (w/o Timer)	1. DEF M-Fuse (I/P J/B) 2. Defogger Switch 3. Defogger Wire 4. Wire Harness	- <a href="#">BE-46</a> <a href="#">BE-46</a> -

**POWER WINDOW CONTROL SYSTEM**

Trouble	Parts name	See page
Power window does not operate. (Door lock does not operate.)	1. POWER M-Fuse (R/B No.7) 2. Wire Harness	- -
Power window does not operate. (Door lock is normal.)	1. GAUGE Fuse (I/P J/B) 2. Ignition Switch 3. POWER M-Fuse (R/B No.7) 4. Power Main Relay (R/B No.7) 5. Power Window Master Switch 6. Wire Harness	- <a href="#">BE-11</a> - <a href="#">BE-49</a> <a href="#">BE-49</a> -
"One Touch Power Window System" does not operate.	1. Power Window Master Switch	<a href="#">BE-49</a>
Only one window glass does not move.	1. Power Window Master Switch 2. Power Window Switch 3. Power Window Motor 4. Wire Harness	<a href="#">BE-49</a> <a href="#">BE-49</a> <a href="#">BE-49</a> -
"Window Lock System" does not operate.	1. Power Window Master Switch	<a href="#">BE-49</a>
"Window Lock Illumination" does not light up.	1. Power Window Master Switch	<a href="#">BE-49</a>

## POWER SOURCE LOCATION

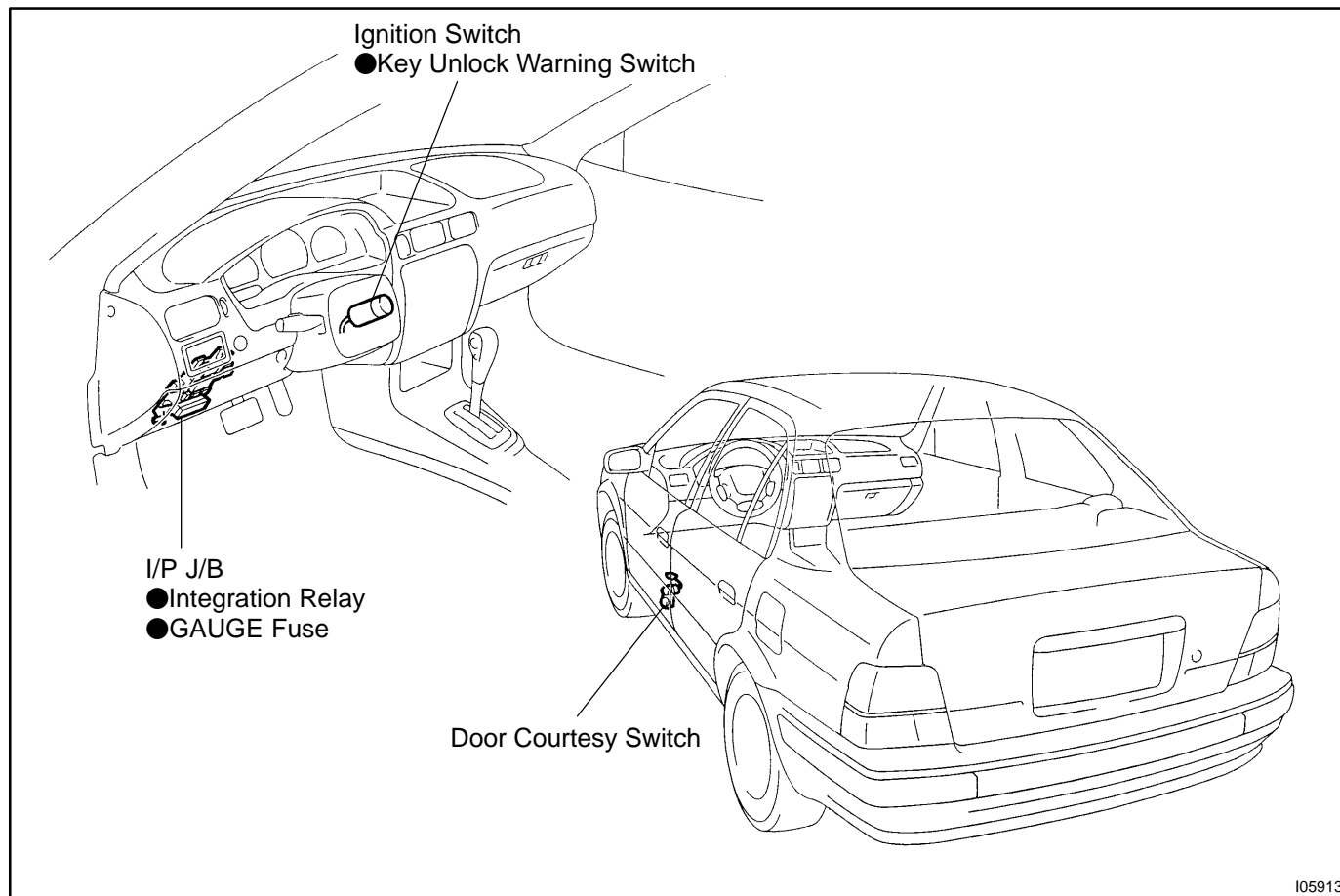
BE0QR-01



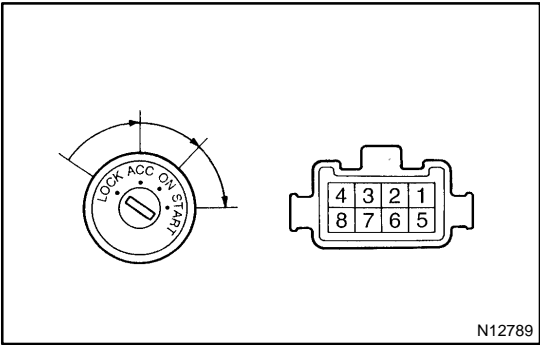
I05952

# IGNITION SWITCH AND KEY UNLOCK WARNING SWITCH LOCATION

BE0QS-01



I05913

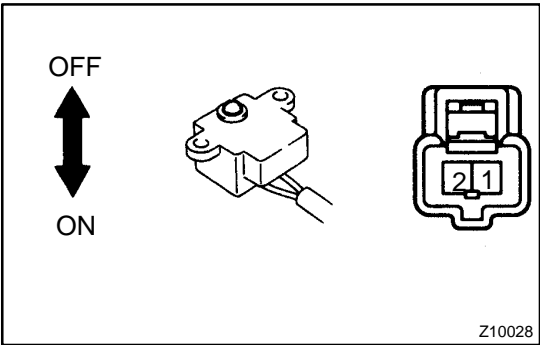


## INSPECTION

### 1. INSPECT IGNITION SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
LOCK	-	No continuity
ACC	2 - 3	Continuity
ON	2 - 3 - 4 6 - 7	Continuity
START	1 - 2 - 4 6 - 7 - 8	Continuity

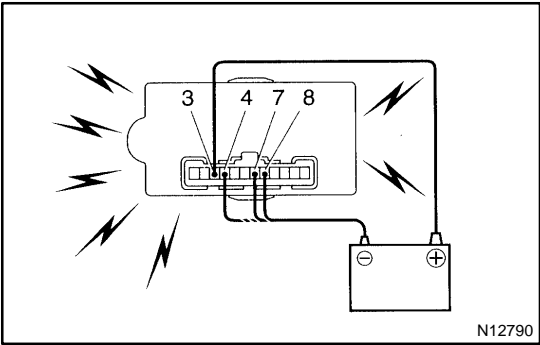
If continuity is not as specified, replace the switch.



### 2. INSPECT KEY UNLOCK WARNING SWITCH CONTINUITY

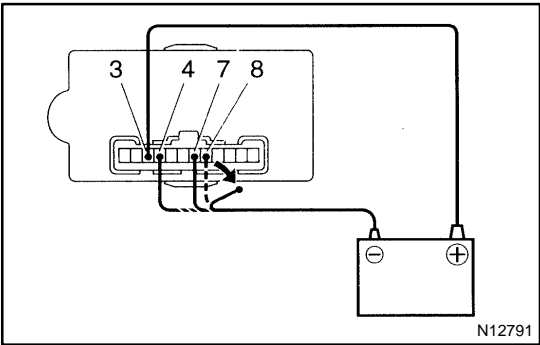
Condition	Tester connection	Specified condition
Switch OFF (Key removed)	-	No continuity
Switch ON (Key set)	1 - 2	Continuity

If continuity is not as specified, replace the switch.

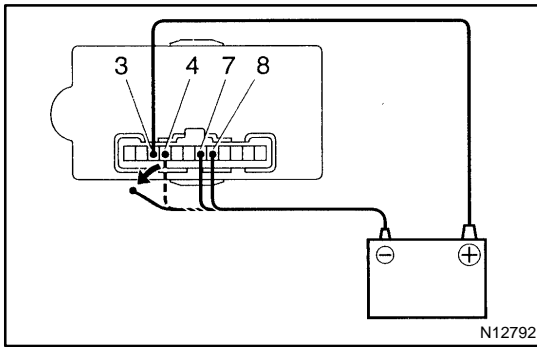


### 3. INSPECT INTEGRATION RELAY OPERATION

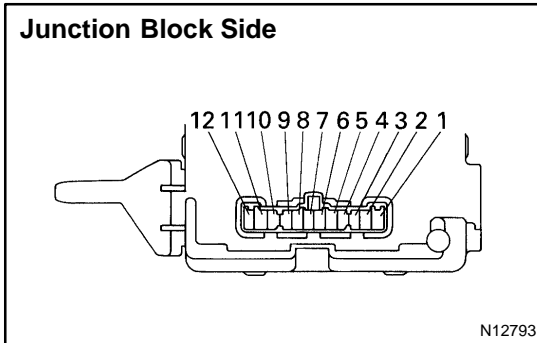
- Connect the positive (+) lead from the battery to terminal 3.
- Connect the negative (-) lead from the battery to terminal 4, 7 and 8.
- Check the chime sounds.
- Disconnect the negative (-) lead from the battery to terminal 8.
- Check that the chime stops sounding.







- (f) Connect the negative (-) lead from the battery to terminal 8.
  - (g) Disconnect the negative (-) lead from the battery to terminal 4.
  - (h) Check that the chime stops sounding.
- If operation is not as specified, replace the relay.



#### 4. INSPECT INTEGRATION RELAY CIRCUIT

Remove the relay from the instrument panel junction block and inspect the connectors on the junction block side.

Tester connection	Condition	Specified condition
4 - Ground	Key unlock warning switch OFF	No continuity
4 - Ground	Key unlock warning switch ON	Continuity
5 - Ground	Buckle switch OFF (Seat belt unfastened)	No continuity
5 - Ground	Buckle switch ON (Seat belt fastened)	Continuity
7 - Ground	Constant	Continuity
8 - Ground	Driver's door courtesy switch OFF	No continuity
8 - Ground	Driver's door courtesy switch ON	Continuity
11 - Ground	Light control switch OFF	No continuity
11 - Ground	Light control switch TAIL or HEAD	Continuity
2 - Ground	Ignition switch LOCK or ACC	No voltage
2 - Ground	Ignition switch ON	Battery positive voltage
3 - Ground	Constant	Battery positive voltage
9 - Ground	Ignition switch LOCK or ACC	No voltage
9 - Ground	Ignition switch ON	Battery positive voltage
12 - Ground	Constant	Battery positive voltage

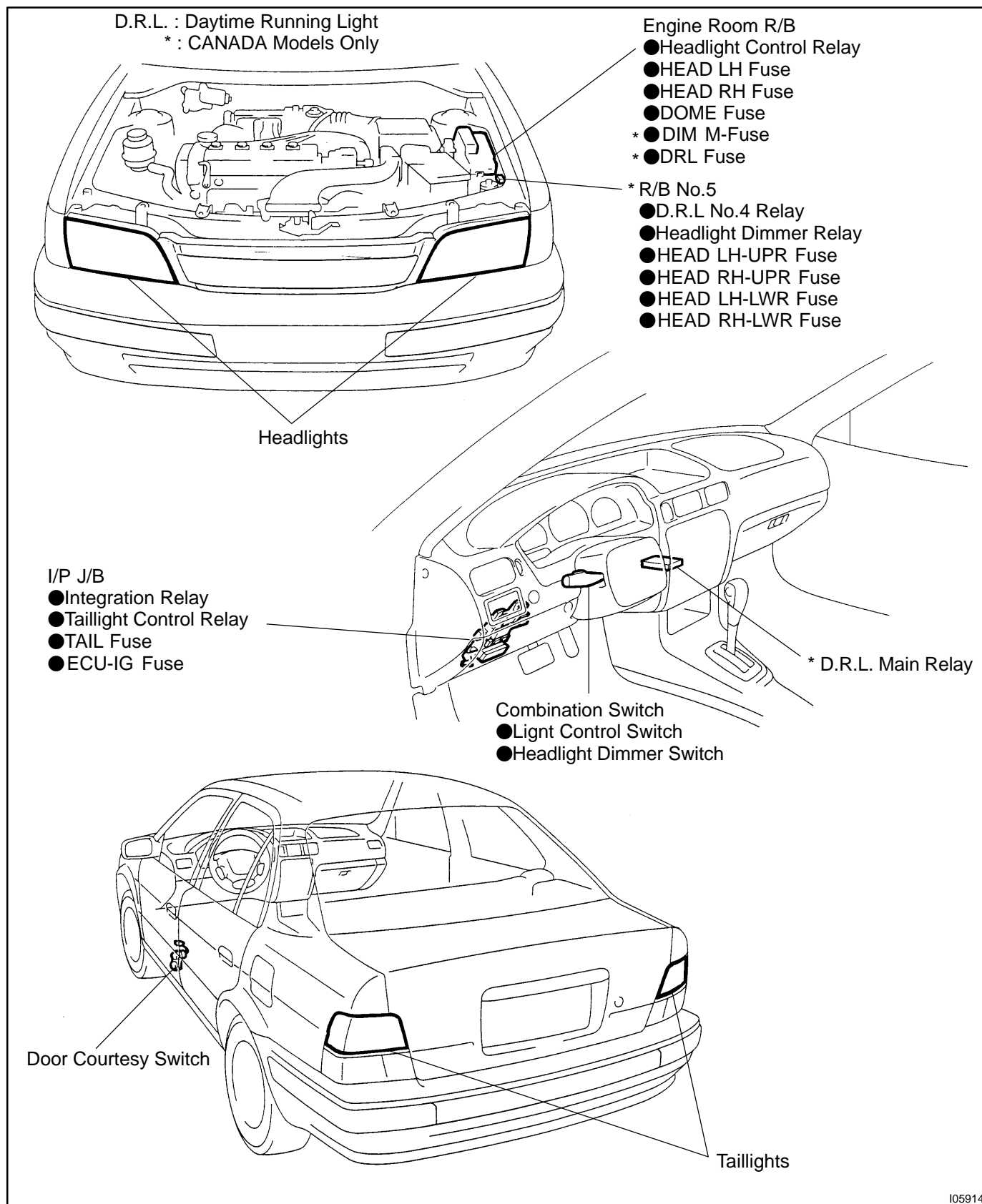
If the circuit is as specified, try replacing the relay with a new one.

If the circuit is not as specified, inspect the circuits connected to other parts.

# HEADLIGHT AND TAILLIGHT SYSTEM

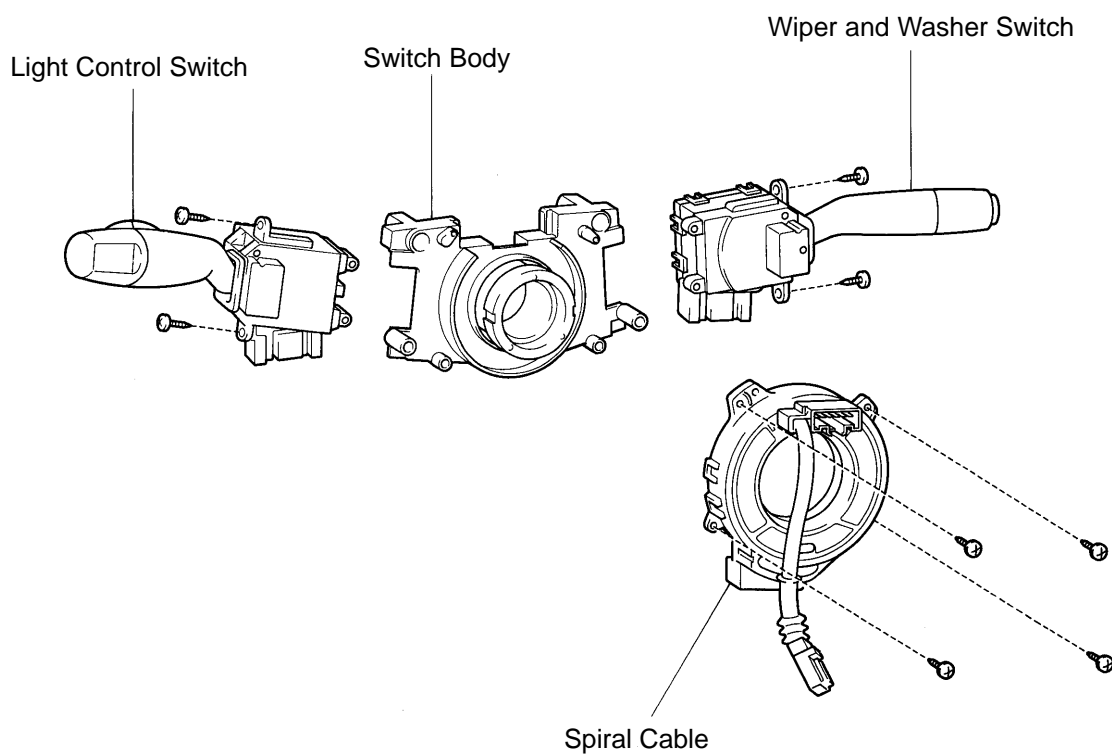
## LOCATION

BE0QU-01

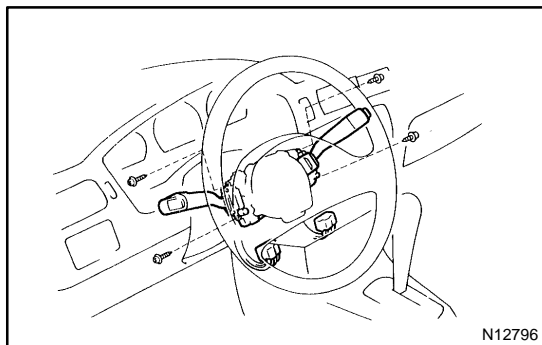


105914

## COMPONENTS

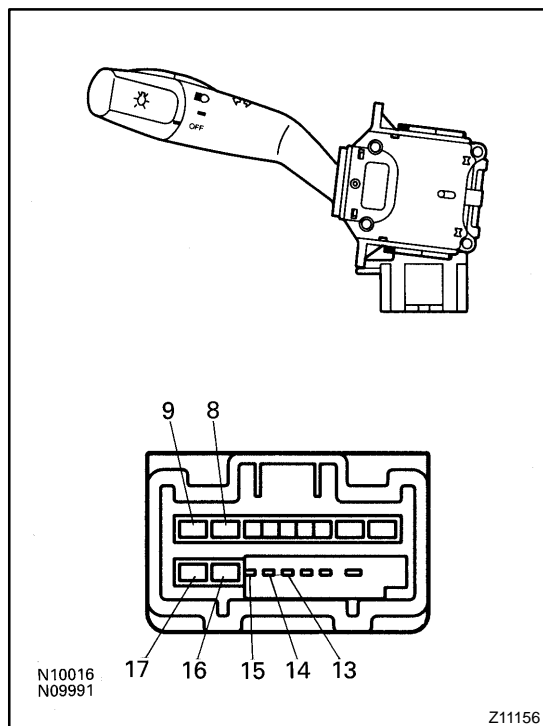


N12366



## REMOVAL

1. **REMOVE UPPER AND LOWER COLUMN COVERS**  
(See page [SR-13](#) )
2. **REMOVE LIGHT CONTROL SWITCH**
  - (a) Disconnect the connector.
  - (b) Remove the 2 screws and the switch .
3. **REMOVE WIPER AND WASHER SWITCH**
  - (a) Disconnect the connector.
  - (b) Remove the 2 screws and the switch .



## INSPECTION

### 1. INSPECT LIGHT CONTROL SWITCH CONTINUITY

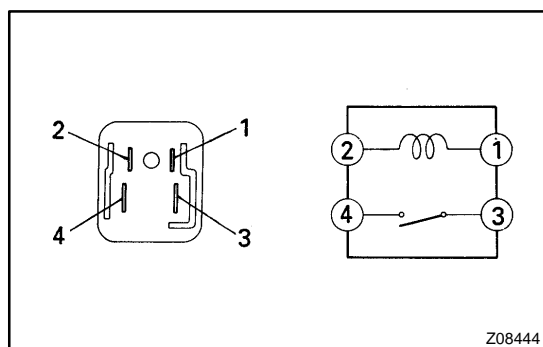
Switch position	Tester connection	Specified condition
OFF	-	No continuity
TAIL	14 - 15	Continuity
HEAD	13 - 14 - 15	Continuity

If continuity is not as specified, replace the switch.

### 2. INSPECT DIMMER SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Flash	8 - 9 - 16	Continuity
Low beam	16 - 17	Continuity
High beam	8 - 16	Continuity

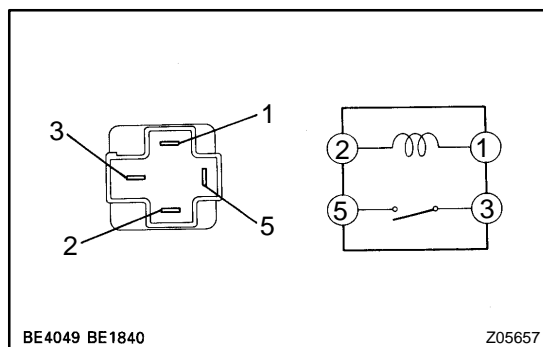
If continuity is not as specified, replace the switch.



### 3. INSPECT HEADLIGHT CONTROL RELAY CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 - 2	Continuity
Apply B+ between terminals 1 and 2.	3 - 4	Continuity

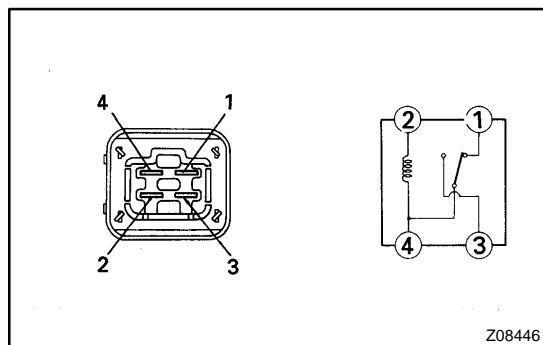
If continuity is not as specified, replace the relay.



### 4. INSPECT TAILLIGHT CONTROL RELAY CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 - 2	Continuity
Apply B+ between terminals 1 and 2.	3 - 5	Continuity

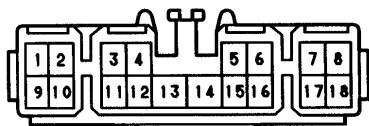
If continuity is not as specified, replace the relay.



### 5. INSPECT HEADLIGHT DIMMER RELAY CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 - 4, 2 - 4	Continuity
Apply B+ between terminals 2 and 4.	2 - 3 - 4	Continuity

If continuity is not as specified, replace the relay.

**Wire Harness Side**

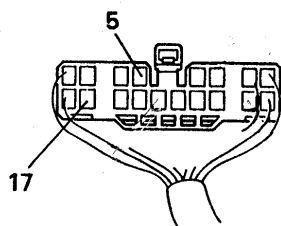
Z08448

**6. INSPECT D.R.L. MAIN RELAY CIRCUIT**

- (a) Disconnect the connector from relay and inspect the connector on wire harness side, as shown.

Tester connection	Condition	Specified condition
7 - Ground	Headlight dimmer switch Low beam or High beam	No continuity
7 - Ground	Headlight dimmer switch Flash	Continuity
8 - Ground	Parking brake switch OFF (Switch pin pushed in)	No continuity
8 - Ground	Parking brake switch ON (Switch pin released)	Continuity
12 - Ground	Constant	Continuity
13 - Ground	Constant	Continuity
16 - Ground	Headlight dimmer switch Low beam	No continuity
16 - Ground	Headlight dimmer switch High beam or Flash	Continuity
2 - Ground 18 - Ground	Ignition switch LOCK or ACC	No voltage
2 - Ground 18 - Ground	Ignition switch ON	Battery positive voltage
4 - Ground	Constant	Battery positive voltage
6 - Ground	Constant	Battery positive voltage
10 - Ground	Constant	Battery positive voltage
11 - Ground	Engine Stop	No voltage
11 - Ground	Engine Running	Battery positive voltage
15 - Ground	Constant	Battery positive voltage

If circuit is as specified, try replacing the relay with a new one.  
If the circuit is not as specified, inspect the circuit connected to other parts.

**From Back Side**

Z09752

- (b) Connect the wire harness side connector to the relay and inspect wire harness side connector from the back side, as shown.

Tester connection	Condition	Specified condition
5 - Ground	Light control switch OFF or TAIL	No continuity
5 - Ground	Light control switch HEAD	Continuity
17 - Ground	* Headlight dimmer switch LO	No voltage
17 - Ground	* Headlight dimmer switch High or Flash	Battery positive voltage

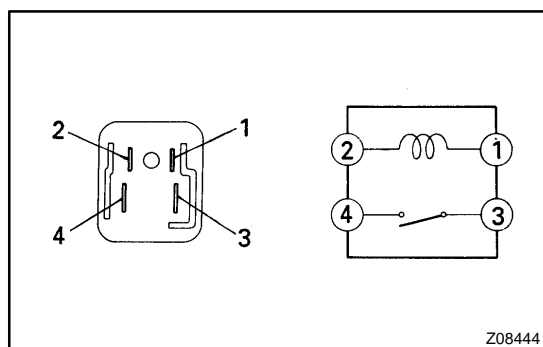
\* With light control switch turned to HEAD

If circuit is as specified, try replacing the relay with a new one. If circuit is not as specified, inspect the circuit connected to other parts.

**7. INSPECT D.R.L. No.4 RELAY CONTINUITY**

Condition	Tester connection	Specified condition
Constant	1 - 2	Continuity
Apply B+ between terminals 1 and 2.	3 - 4	Continuity

If continuity is not as specified, replace the relay.

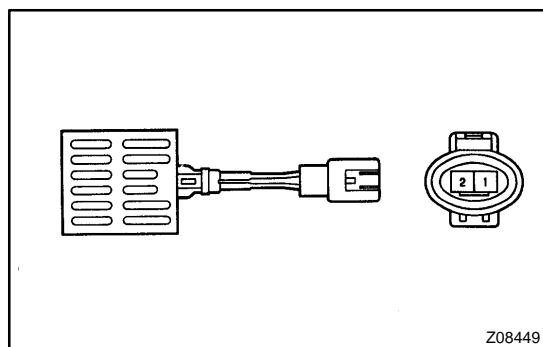


Z08444

**8. INSPECT DAYTIME RESISTOR RESISTANCE**

Condition	Tester connection	Specified condition
Constant	1 - 2	Approx. 337 MΩ

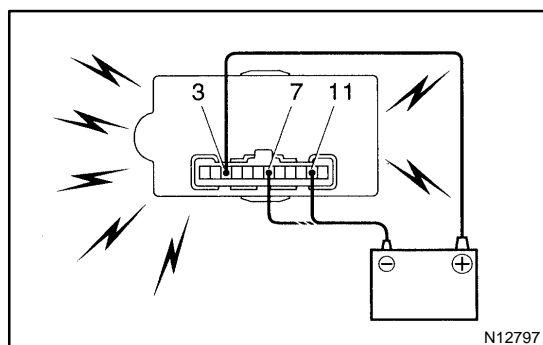
If resistance is not as specified, replace the resistor



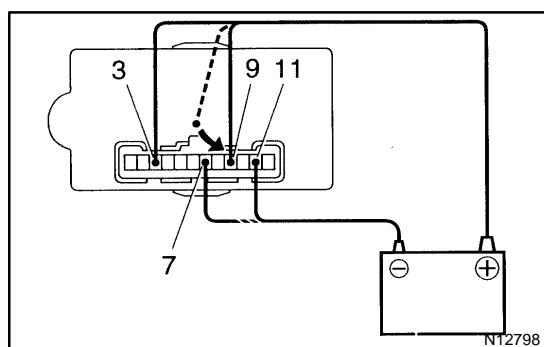
Z08449

**9. INSPECT INTEGRATION RELAY OPERATION**

- Connect the positive (+) lead from the battery to terminal 3.
- Connect the negative (-) lead from the battery to terminals 7 and 11.
- Check that the bulb lights and the chime sounds for 4 - 8 seconds.
- Return to step (a), and operate the chime again.



N12797



(e) Connect the positive (+) lead from the battery to terminal 9.

(f) Check that the chime stops sounding.

HINT:

Check the chime within a period of 4 to 8 seconds.

If operation is not as specified, replace the relay.

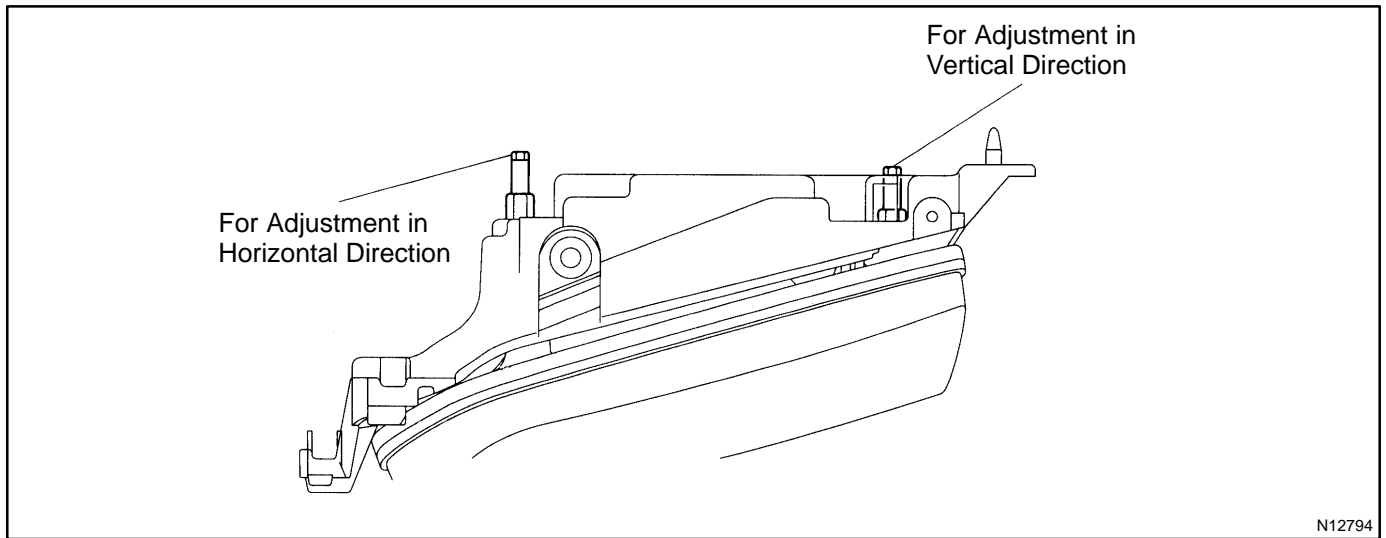
#### 10. INSPECT INTEGRATION RELAY CIRCUIT

(See page [BE-11](#))



## ADJUSTMENT

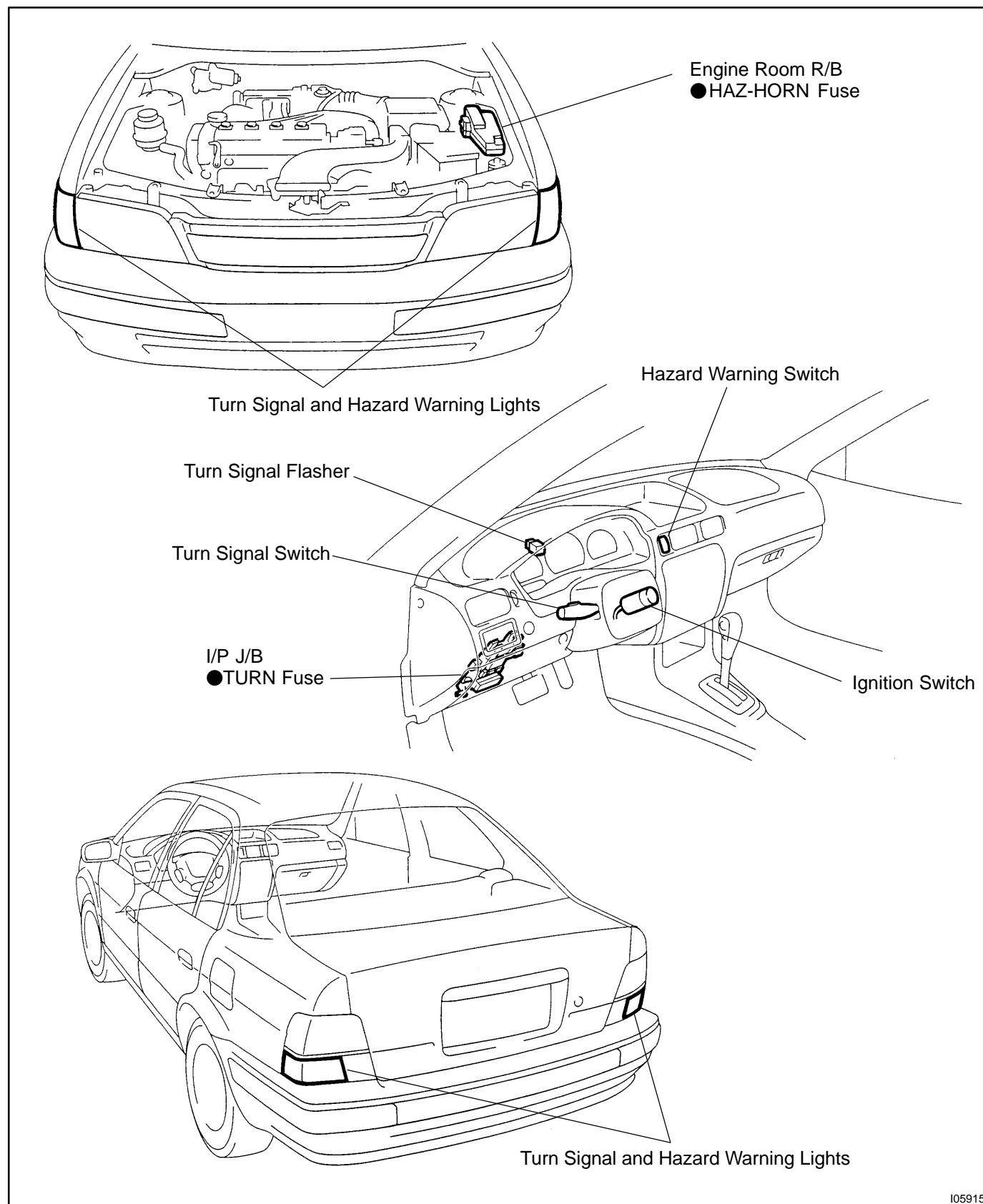
### 1. ADJUST HEADLIGHT AIMING



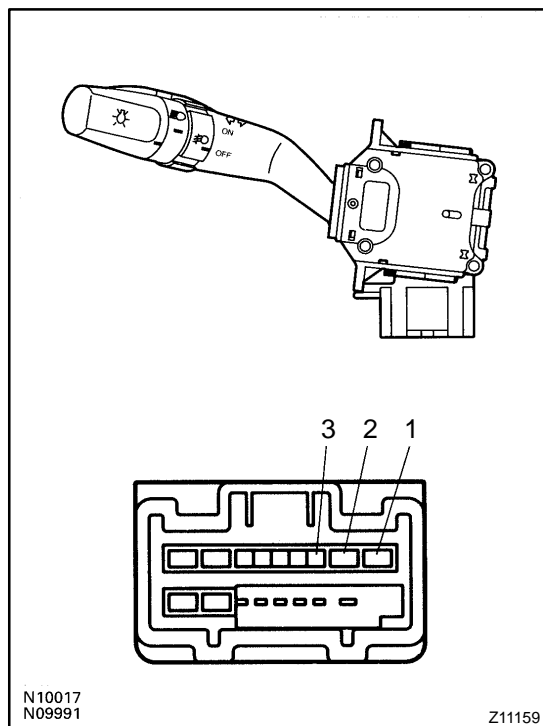
### 2. ADJUST SPIRAL CABLE (See page [SR-13](#))

# TURN SIGNAL AND HAZARD WARNING SYSTEM LOCATION

BE0R0-01



105915

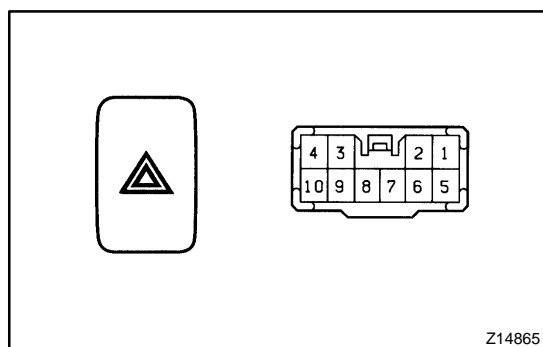


## INSPECTION

### 1. INSPECT TURN SIGNAL SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Left turn	1 - 2	Continuity
Neutral	-	No continuity
Right turn	2 - 3	Continuity

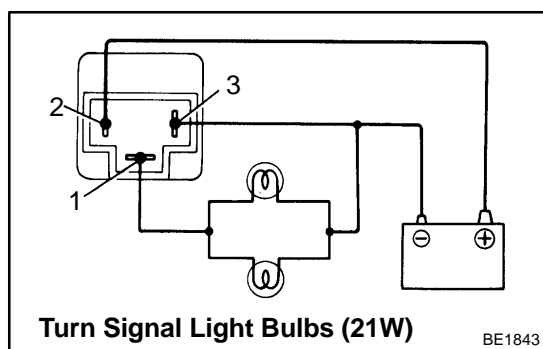
If continuity is not as specified, replace the switch.



### 2. INSPECT HAZARD WARNING SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF	7 - 10	Continuity
ON	4 - 5 - 6 - 9 7 - 8	Continuity
Illumination	2 - 3	Continuity

If continuity is not as specified, replace the switch.



### 3. INSPECT TURN SIGNAL FLASHER OPERATION

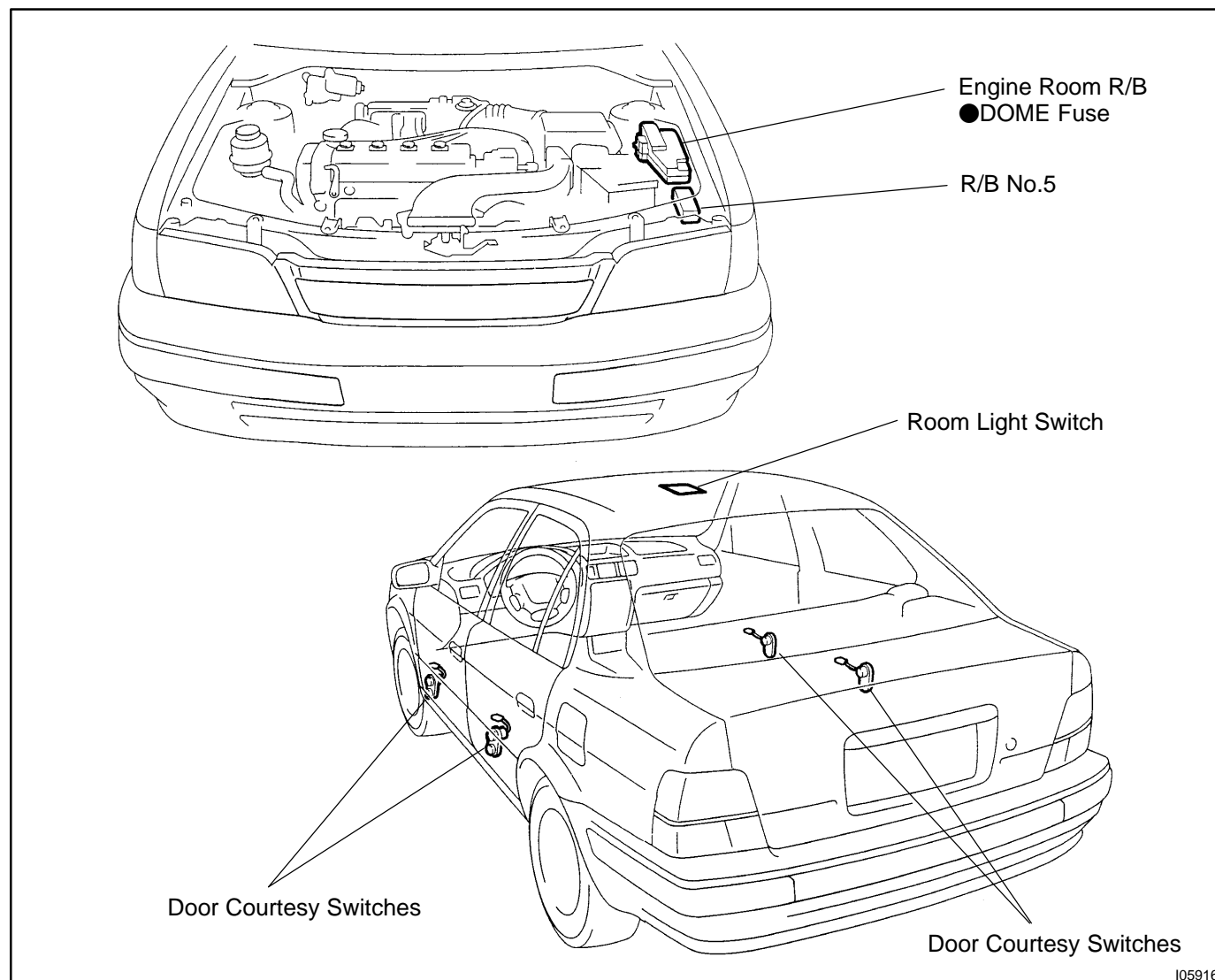
- Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 3.
- Connect the two turn signal light bulbs parallel to each other to terminal 1 and 3, and check that the bulbs flash.

#### HINT:

The turn signal lights should flash 60 to 120 times per minute. If one of the front or rear turn signal lights has an open circuit, the numbers of flashed will be more than 140 per minute. If operation is not as specified, replace the flasher.

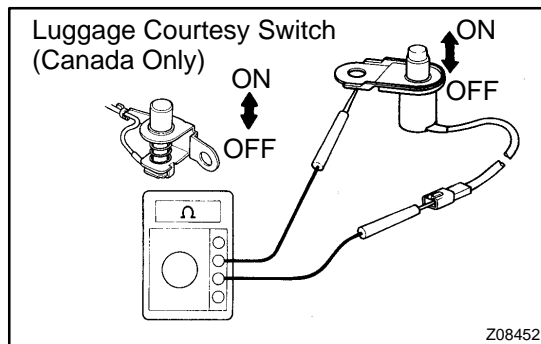
# INTERIOR LIGHT SYSTEM LOCATION

BE0R2-01



## INSPECTION

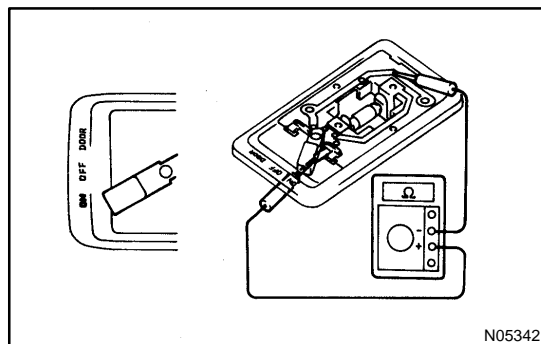
### 1. INSPECT DOOR COURTESY SWITCH CONTINUITY (See page [BE-38](#) )



### 2. INSPECT LUGGAGE DOOR COURTESY SWITCH CONTINUITY

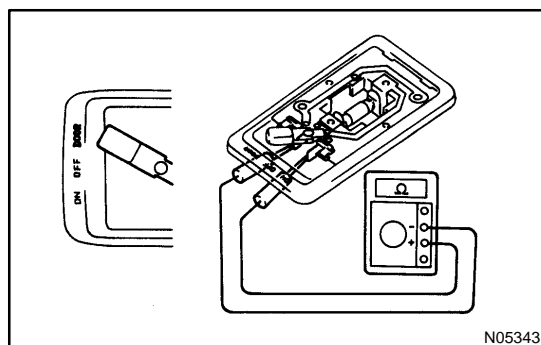
- Check that there is continuity between terminal and the switch body with the switch ON (switch pin released : opened door).
- Check that there is no continuity between terminal and the switch body with the switch OFF (switch pin pushed in : closed door).

If operation is not as specified, replace the switch.



### 3. INSPECT ROOM LIGHT ASSEMBLY CONTINUITY

- Disconnect the connector from room light assembly.
- Turn the room light switch ON, check that there is continuity between terminal 2 and body ground.

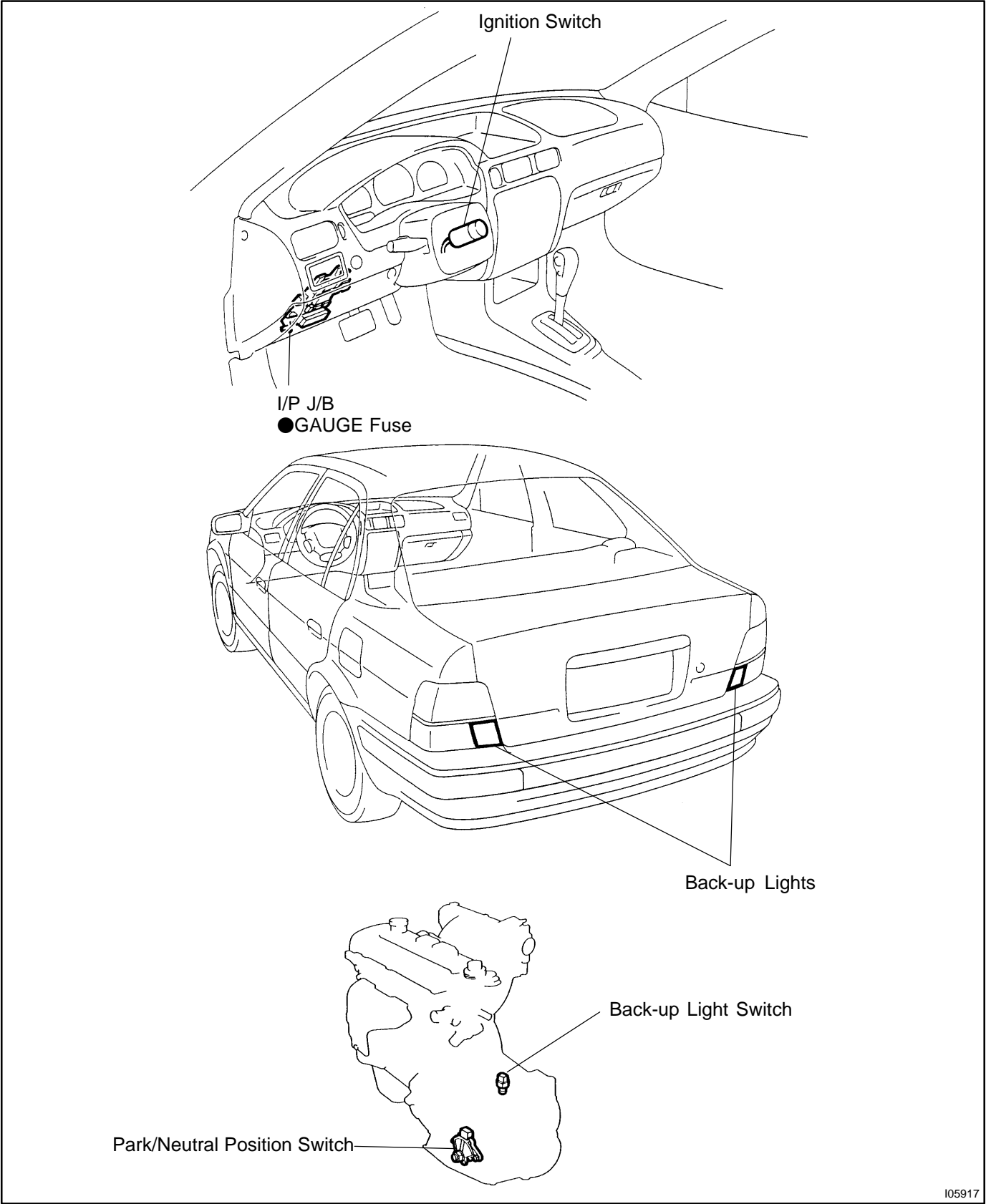


- Turn the room light switch DOOR, check that there is continuity between terminal 1 and 2.

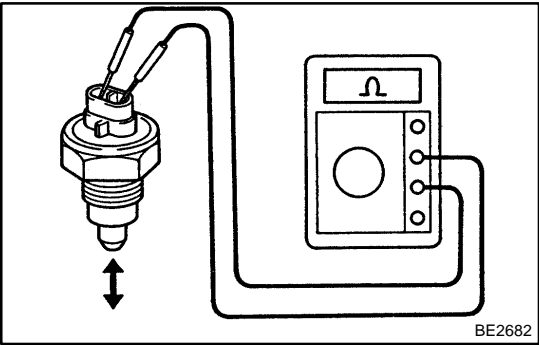
If operation is not as specified, replace the switch.

# BACK-UP LIGHT SYSTEM LOCATION

BE0R4-01



105917



# INSPECTION

## 1. INSPECT BACK-UP LIGHT SWITCH CONTINUITY

Switch position	Specified condition
Push	Continuity
Free	No continuity

If continuity is not as specified, replace the switch.

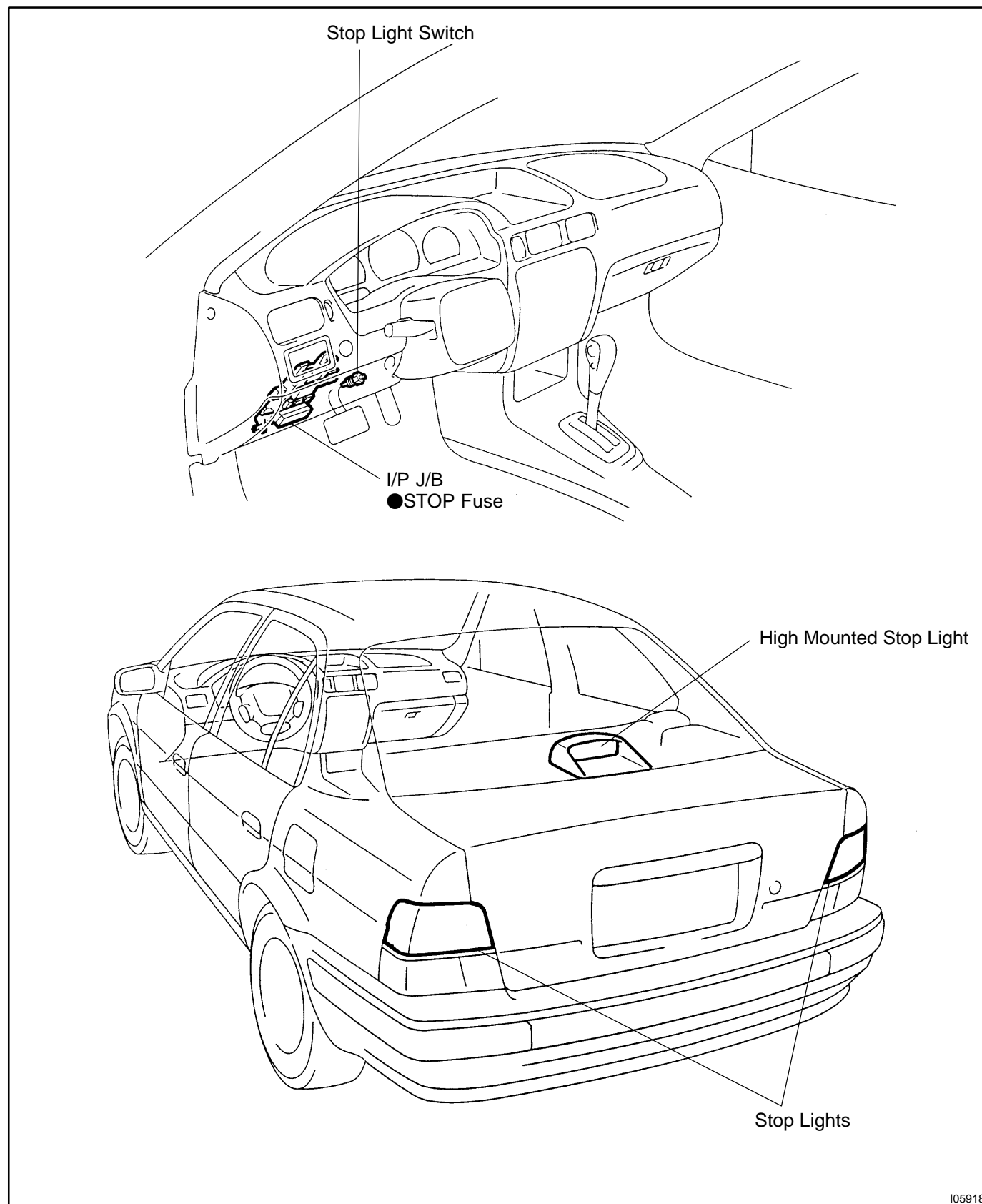
## 2. INSPECT PARK/NEUTRAL POSITION SWITCH CONTINUITY

(A132L: See page [AX-2](#))

(A242L: See page [AX-2](#))

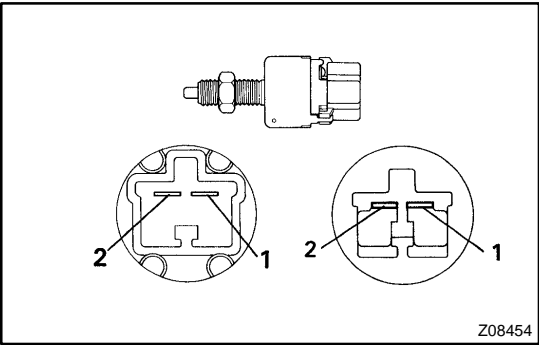
# STOP LIGHT SYSTEM LOCATION

BE0R6-01



105918





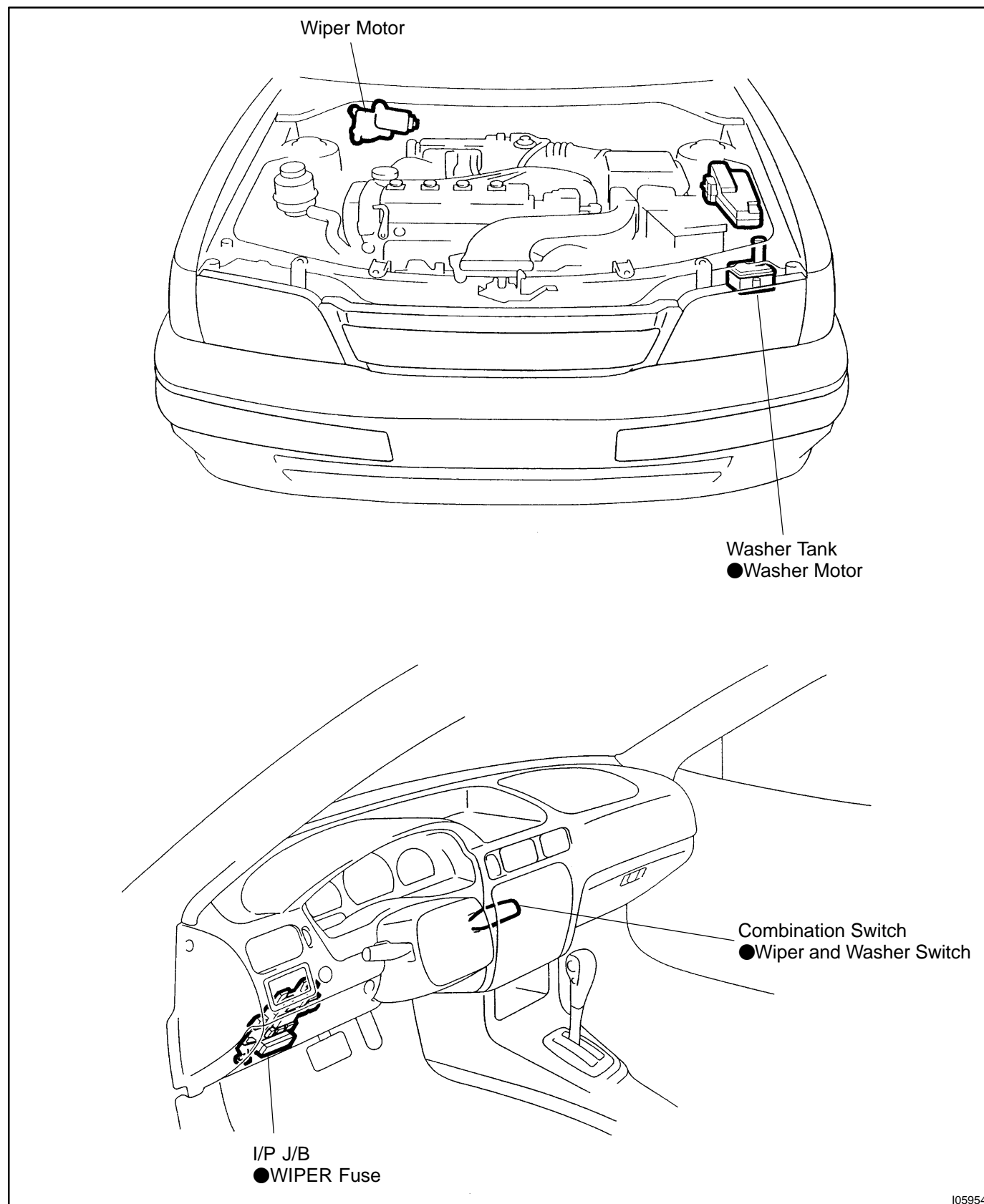
**INSPECTION**  
**INSPECT STOP LIGHT SWITCH CONTINUITY**

Condition	Tester connection	Specified condition
Brake pedal depressed (Switch pin free)	1 - 2	Continuity
Brake pedal released (Switch pin pushed in)	-	No continuity

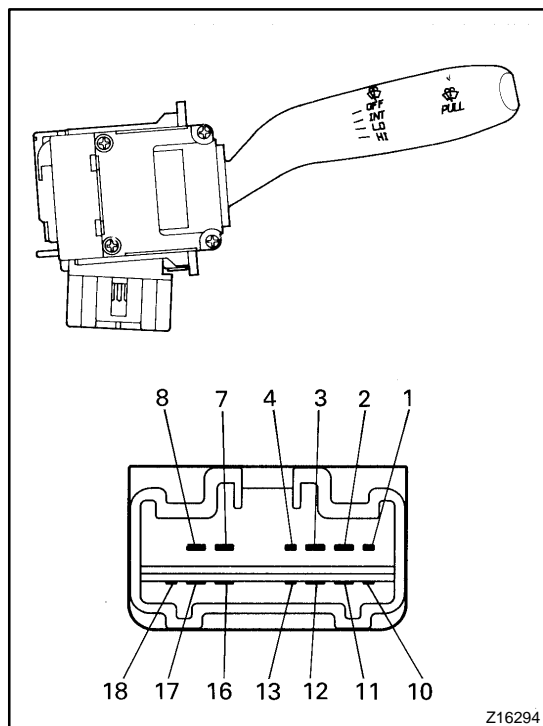
If continuity is not as specified, replace the switch.

# WIPER AND WASHER SYSTEM LOCATION

BE0R8-01



105954

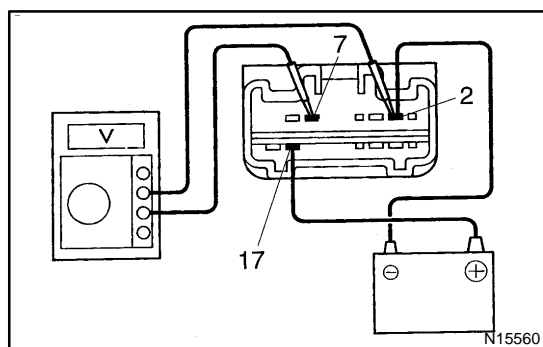


## INSPECTION

### 1. INSPECT WIPER AND WASHER SWITCH CONTINUITY

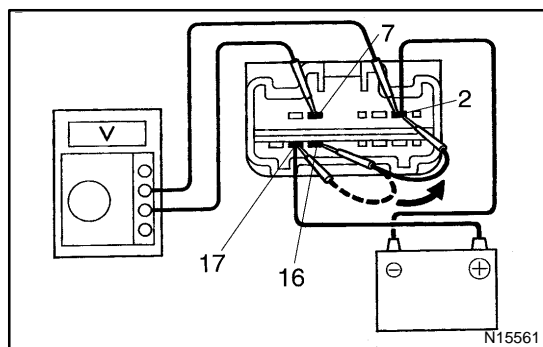
Switch position	Tester connection	Specified condition
Wiper OFF	7 - 16	Continuity
Wiper INT	7 - 16	Continuity
Wiper LO	7 - 17	Continuity
Wiper HI	8 - 17	Continuity
Washer ON	2 - 11	Continuity

If continuity is not as specified, replace the switch.

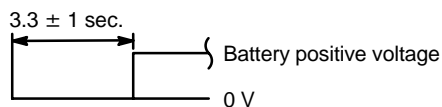


### 2. INSPECT INTERMITTENT OPERATION

- Turn the wiper switch to INT position.
- Connect the positive (+) lead from the battery to terminal 17 and the negative (-) lead to terminal 2.
- Connect the positive (+) lead from the voltmeter to terminal 7 and the negative (-) lead to terminal 2, and check that the meter needle indicates battery positive voltage.



- After connecting terminal 16 to terminal 17, connect 17 to terminal 2. Then, check that the voltage rises from 0 volt to battery positive voltage within time as follows.

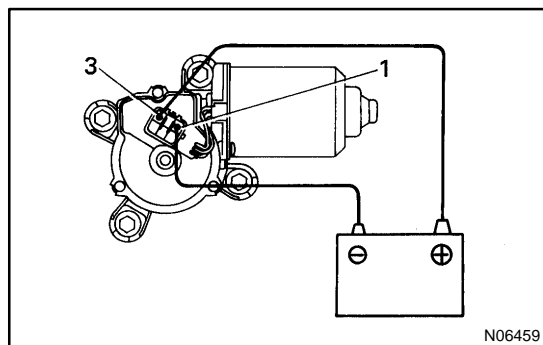


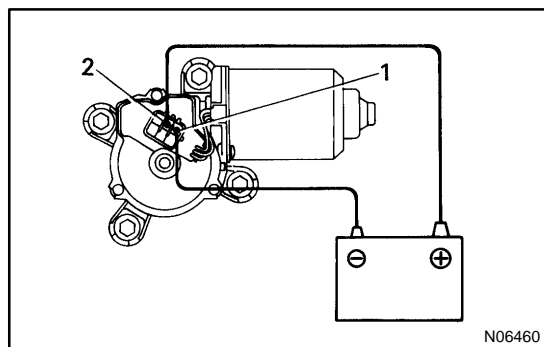
If operation is not as specified, replace the switch.

### 3. INSPECT WIPER MOTOR OPERATION

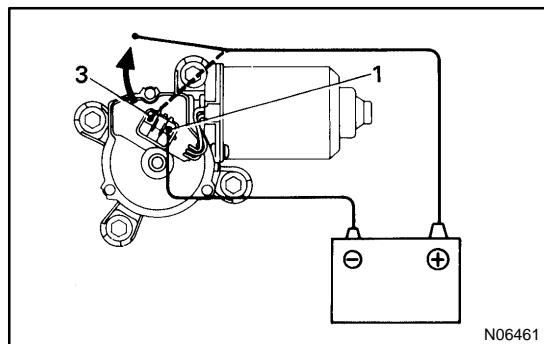
- Inspect the motor operation at low speed. Connect the positive (+) lead from the battery to terminal 3 and the negative (-) lead from the battery to terminal 1, and check that the motor operates at low speed.

If operation is not as specified, replace the motor.

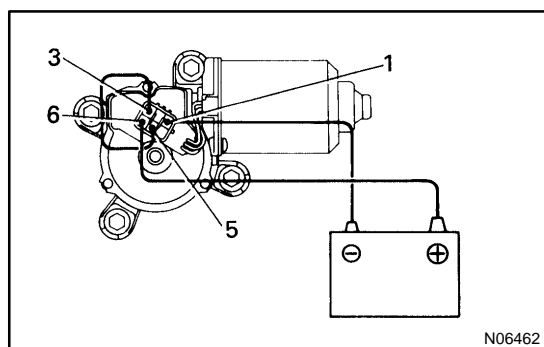




- (b) Inspect the motor operation at high speed.  
Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead from the battery to terminal 1, and check that the motor operates at high speed.  
If operation is not as specified, replace the motor.

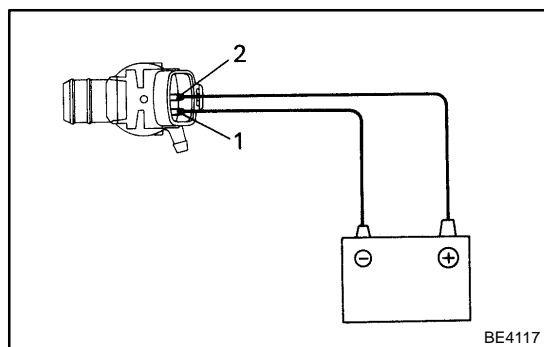


- (c) Inspect the motor operation when stopping it.  
(1) Operate the motor at low speed and stop the motor operation anywhere except at the stop position by disconnecting positive (+) lead from terminal 3.



- (2) Connect terminals 3 and 5.  
(3) Connect the positive (+) lead from the battery to terminal 6 and the negative (-) lead from the battery to terminal 1, and check that the motor stops running at the stop position after the motor operates again.

If operation is not as specified, replace the motor.



#### 4. INSPECT WASHER MOTOR OPERATION

Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 1, and check that the motor operates.

##### NOTICE:

**These tests must be performed quickly (within 20 seconds) to prevent the coil from burning out.**

If operation is not as specified, replace the motor.

# COMBINATION METER

## ON-VEHICLE INSPECTION

BE26P-01

### 1. INSPECT SPEEDOMETER ON-VEHICLE

Using a speedometer tester, inspect the speedometer for allowable indication error and check the operation of the odometer.

**HINT:**

Tire wear and tire over or under inflation will increase the indication error.

If error is excessive, replace the speedometer.

USA (mph)		CANADA (km/h)	
Standard indication	Allowable range	Standard indication	Allowable range
20	18 - 24	20	16 - 26
40	38 - 45	40	38 - 48
60	59 - 67	60	56 - 69
80	79 - 88	80	76 - 90
100	100 - 110	100	96 - 110
		120	114 - 131
		140	134 - 152
		160	152 - 174

### 2. INSPECT TACHOMETER

(a) Connect a tune-up test tachometer, and start the engine.

**NOTICE:**

**Reversing the connection of the tachometer will damage the transistors and diodes inside. When removing or installing the tachometer, be careful not to drop or subject it to heavy shocks.**

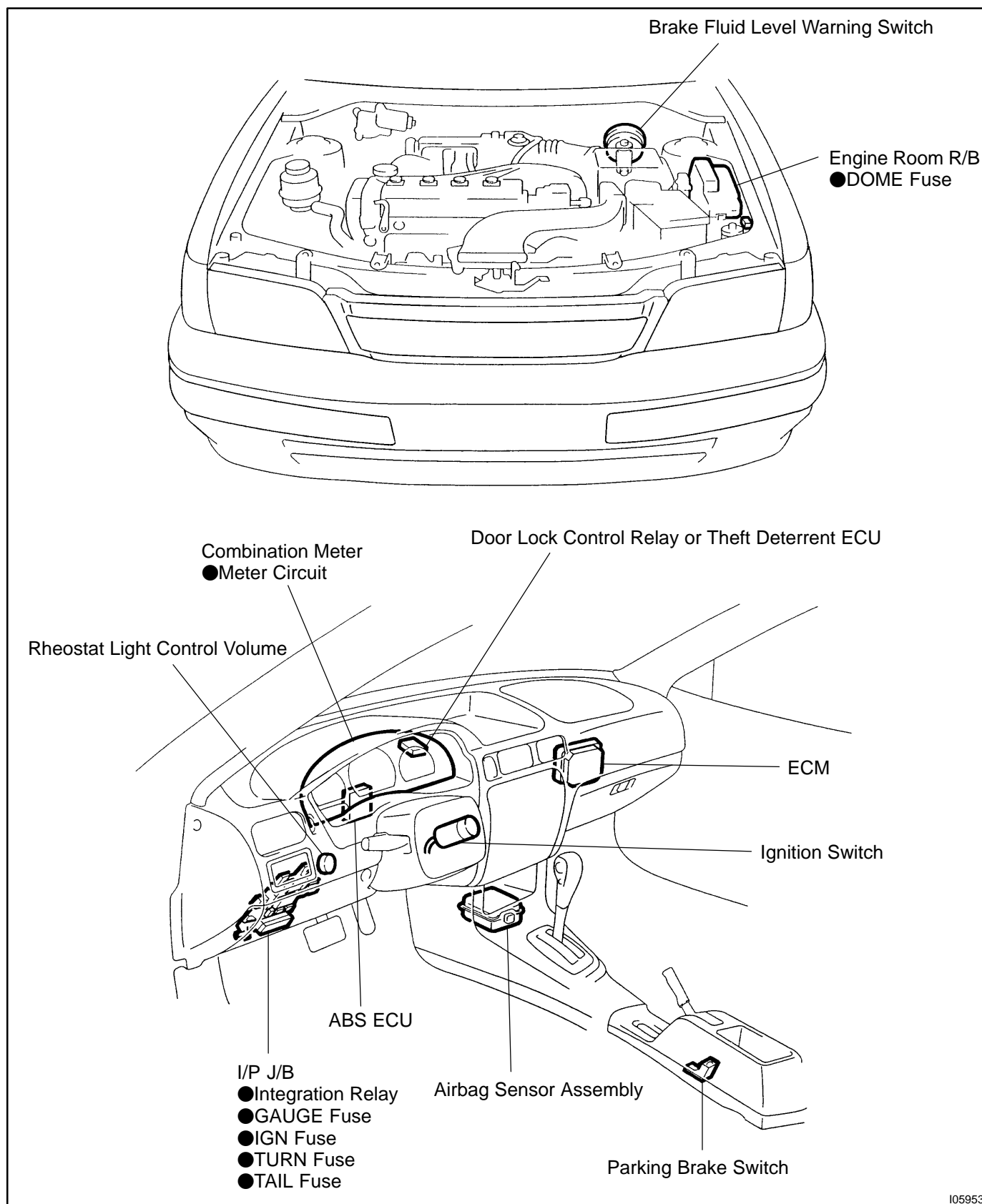
(b) Compare the tester and tachometer indications.

**DC 13.5 V 25°C (68°F)**

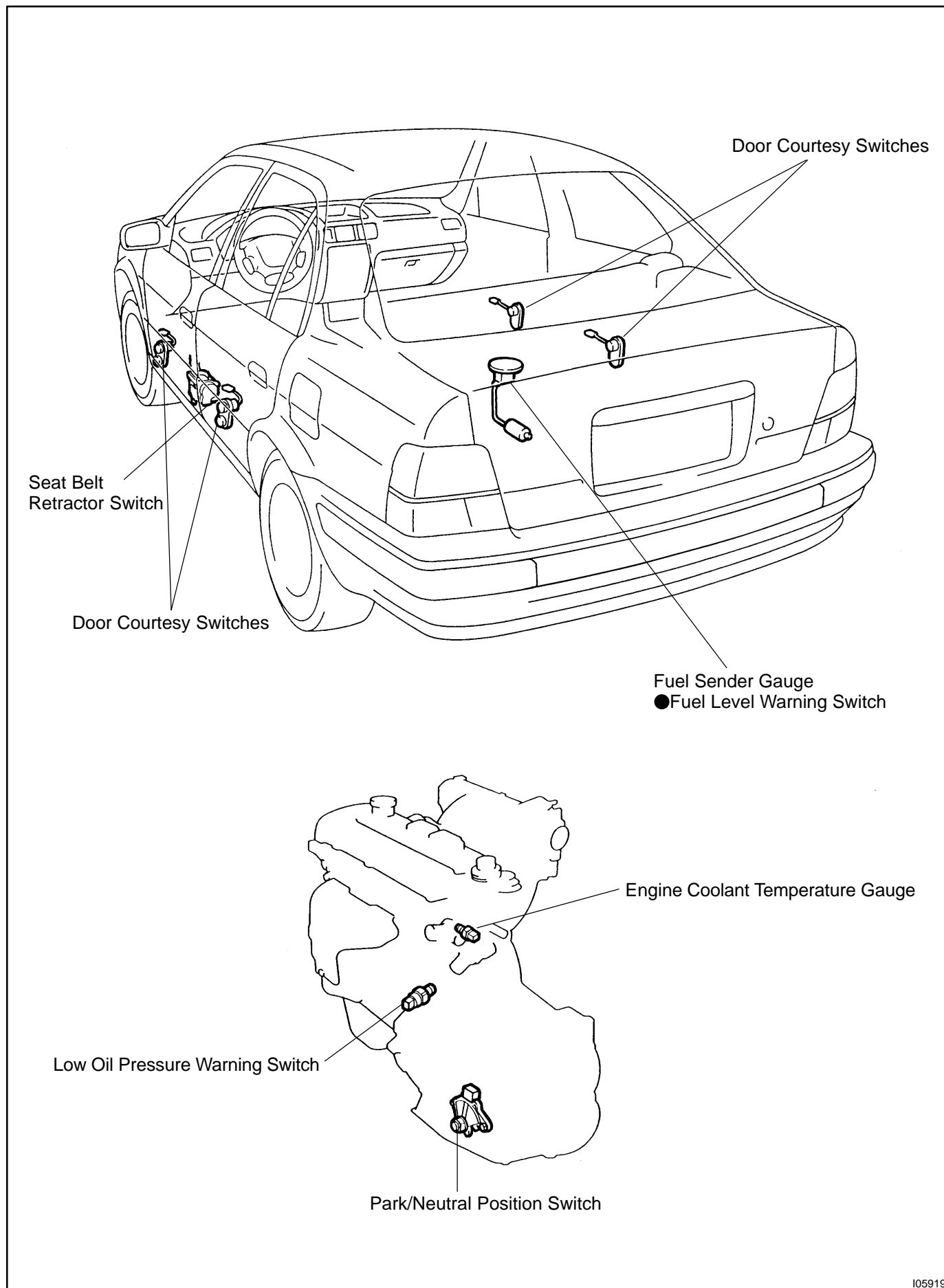
Standard indication (rpm)	Allowable range (rpm)
700	610 - 750
3,000	2,850 - 3,150
5,000	4,850 - 5,150
7,000	6,790 - 7,210

If error is excessive, replace the tachometer.

# LOCATION

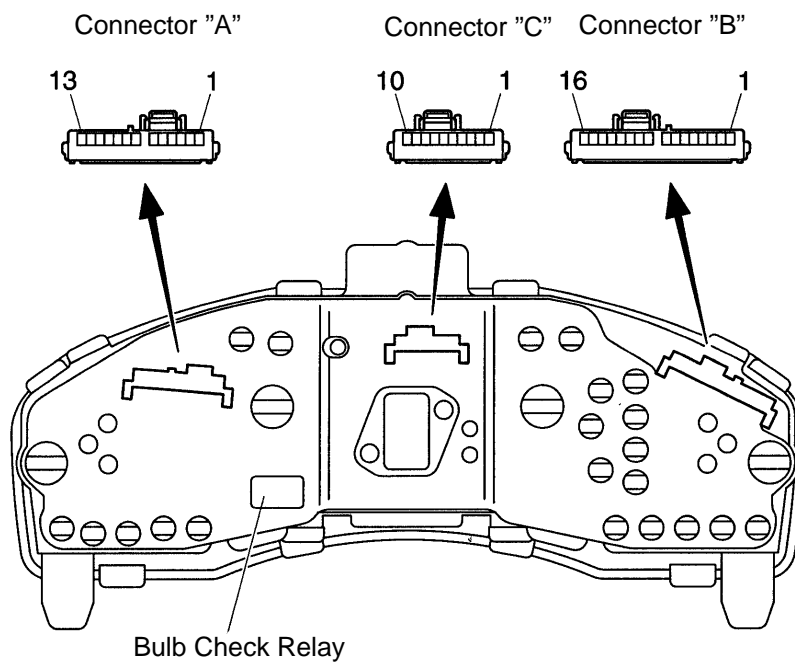


105953

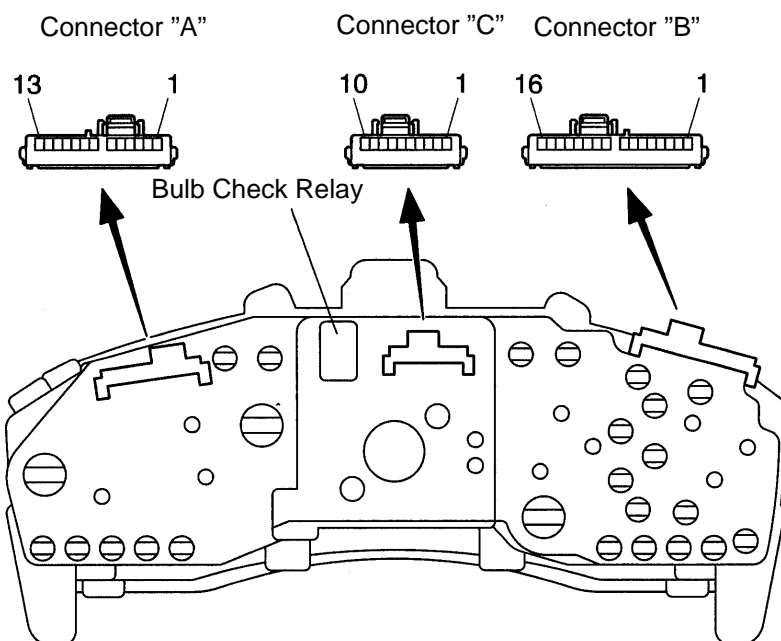


# CIRCUIT

## w/o Tachometer

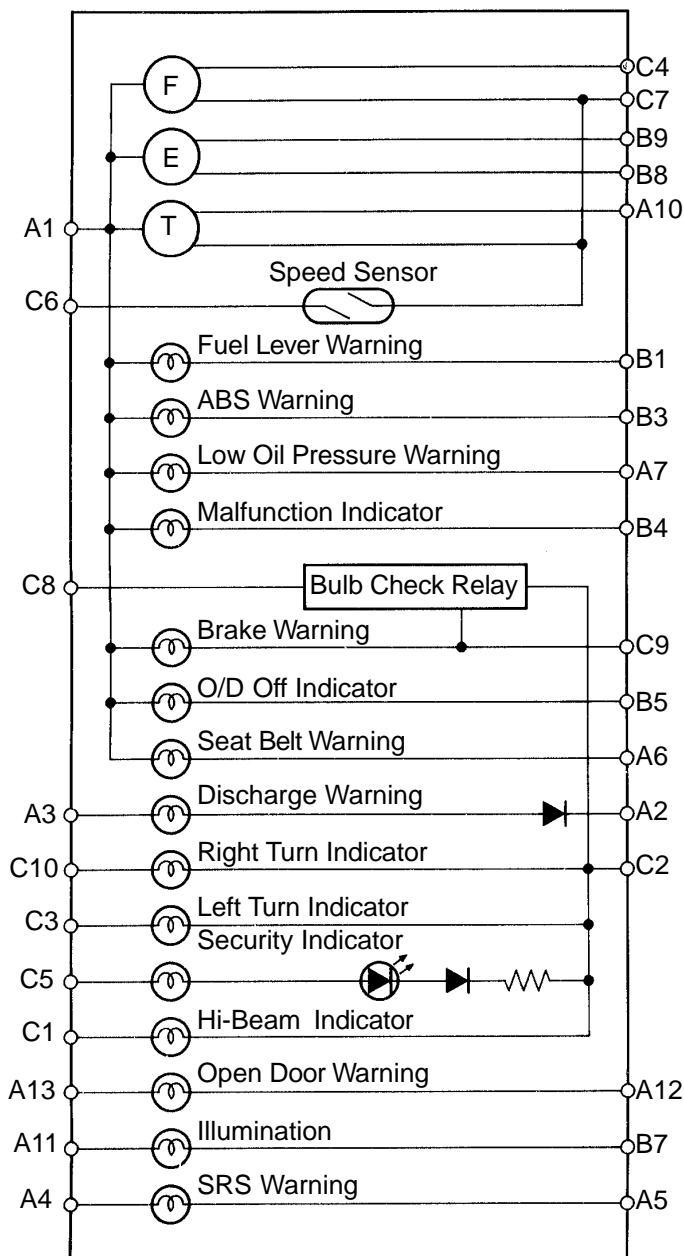


## w/ Tachometer





## Hi-Grade



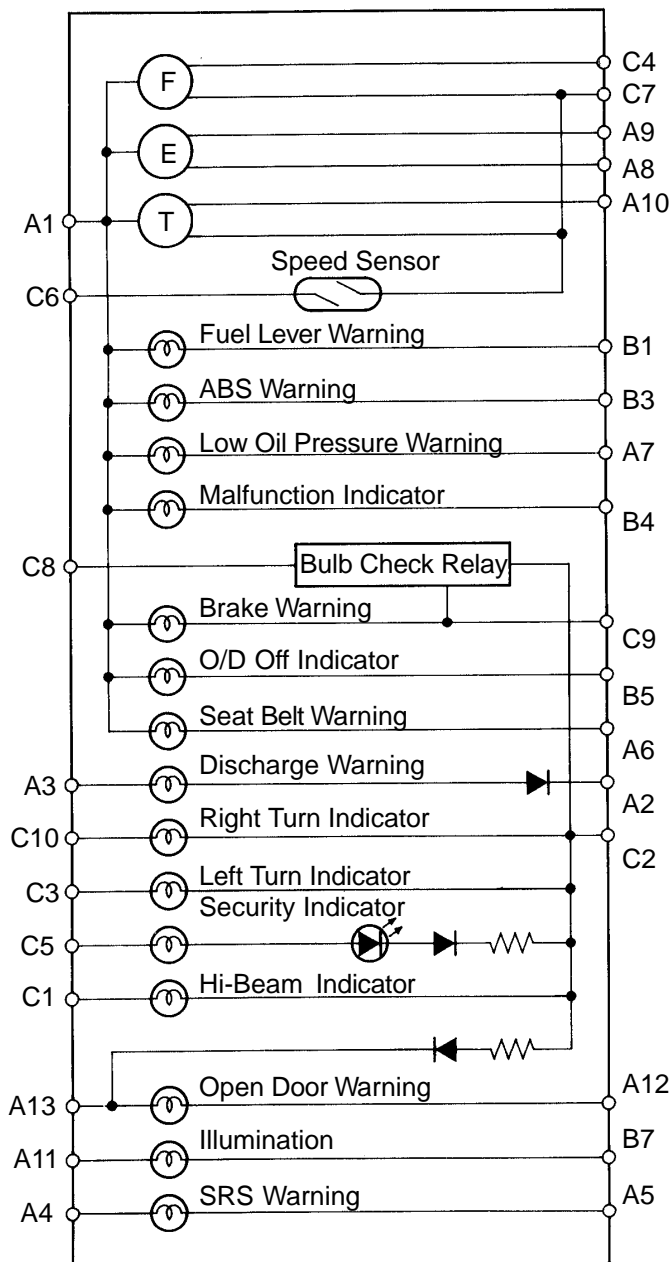
No.	Wiring Connector Side
A	1 GAUGE Fuse
	2 Generator
	3 IGN Fuse
	4 SRS Fuse
	5 Airbag Sensor Assembly
	6 Seat Belt Buckle Switch
	7 Low Oil Pressure Warning Switch
	10 Igniter
	11 TAIL Fuse
	12 Door Courtesy Switch
	13 DOME Fuse
B	1 Fuel Level Warning Switch
	2 Engine Coolant Temperature Sender Gauge
	3 ABS ECU
	4 ECM
	5 O/D Off Switch
	7 Light Control Rheostat
	8 Ground
C	1 Headlight Dimmer Switch
	2 Ground
	3 Turn Signal Switch (Left)
	4 Fuel Sender Gauge
	5 Theft Deterrent ECU
	6 Speed Control Unit
	7 Ground
	8 Starter Relay
	9 Brake Fluid Level Warning Switch and Parking Brake Switch
	10 Turn Signal Switch (Right)

(F) : Fuel Receiver Gauge

(E) : Engine Coolant Temperature Receiver Gauge

(T) : Tachometer

## Lo-Grade

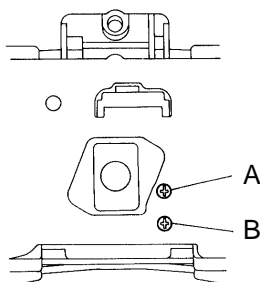
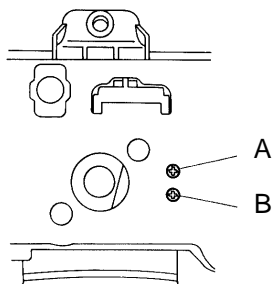


No.	Wiring Connector Side
A	1 GAUGE Fuse
	2 Generator
	3 IGN Fuse
	4 SRS Fuse
	5 Airbag Sensor Assembly
	6 Seat Belt Buckle Switch
	7 Low Oil Pressure Warning Switch
	8 Ground
	9 Engine Coolant Temperature Sender Gauge
	10 Igniter
	11 TAIL Fuse
	12 Door Courtesy Switch
	13 DOME Fuse
B	1 Fuel Level Warning Switch
	3 ABS ECU
	4 ECM
	5 O/D Off Switch
	7 Light Control Rheostat
C	1 Headlight Dimmer Switch
	2 Ground
	3 Turn Signal Switch (Left)
	4 Fuel Sender Gauge
	5 Theft Deterrent ECU
	6 Speed Control Unit
	7 Ground
	8 Starter Relay
	9 Brake Fluid Level Warning Switch and Parking Brake Switch
	10 Turn Signal Switch (Right)

Ⓕ : Fuel Receiver Gauge

Ⓖ : Engine Coolant Temperature Receiver Gauge

Ⓓ : Tachometer

**w/ Tachometer****w/o Tachometer**N12803  
N12541

I22670

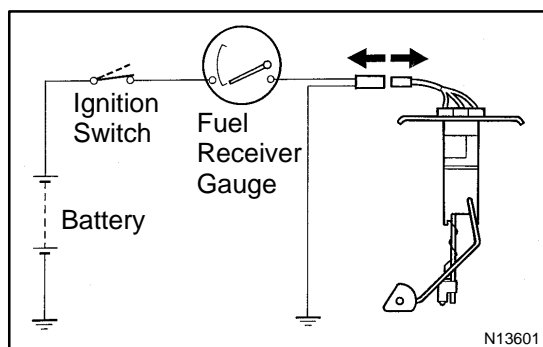
**INSPECTION****1. INSPECT VEHICLE SPEED SENSOR OPERATION**

Check that there is continuity between terminals A and B four times for every revolution of the speedometer shaft.

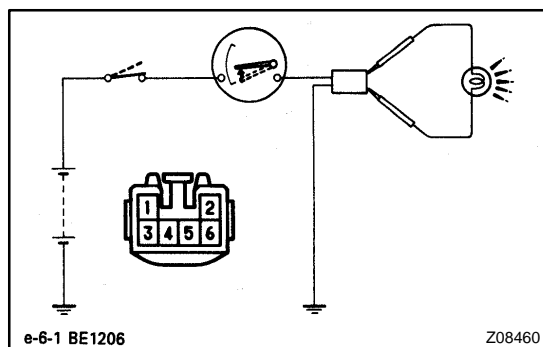
If operation is not as specified, replace the speedometer.

**2. INSPECT FUEL RECEIVER GAUGE OPERATION**

- Disconnect the connector from the sender gauge.
- Turn the ignition switch ON, check that the receiver gauge needle indicates EMPTY.



N13601



e-6-1 BE1206

Z08460

- Connect terminals 5 and 6 on the wire harness side connector through a 3.4 W test bulb.
- Turn the ignition switch ON, check that the bulb lights up and the receiver gauge needle moves towards the full side.

**HINT:**

Because of the silicon oil in the gauge, it will take a short time for needle to stabilize.

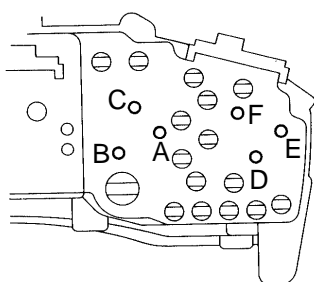
If operation is not as specified, inspect the receiver gauge resistance.

**3. INSPECT FUEL RECEIVER GAUGE RESISTANCE**

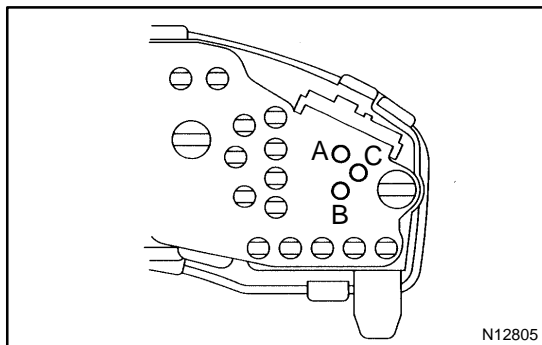
Measure the resistance between terminals.

**w/ Tachometer:**

Between terminals	Resistance ( $\Omega$ )
A - B	Approx. 115.8
A - C	Approx. 177.2
B - C	Approx. 61.4

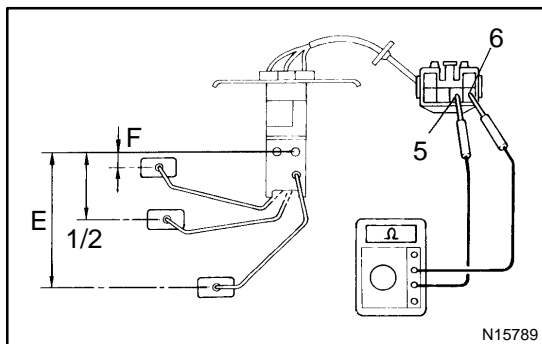


N12804

**w/o Tachometer:**

Between terminals	Resistance ( $\Omega$ )
A - B	Approx. 171.2
A - C	Approx. 272.8
B - C	Approx. 101.6

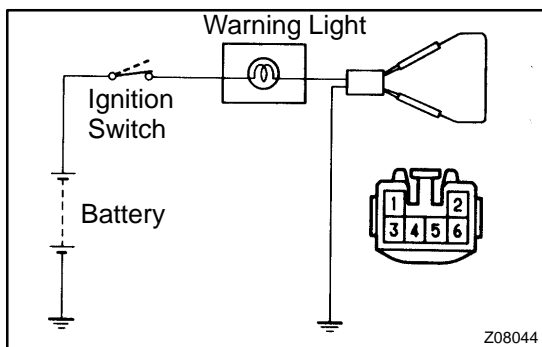
If resistance value is not as specified, replace the receiver gauge.

**4. INSPECT FUEL SENDER GAUGE RESISTANCE**

Measure the resistance between Red Cable and Black Cable.

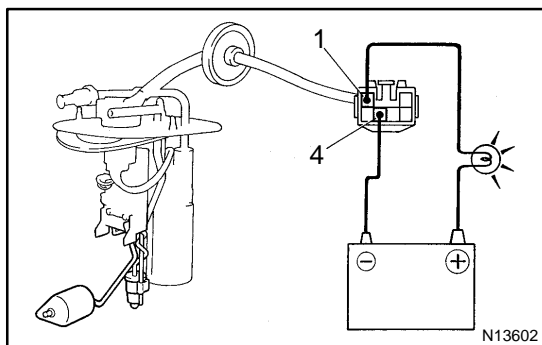
Float position : mm (in.)	Resistance ( $\Omega$ )
F : Approx. $13.0 \pm 3$ ( $0.512 \pm 0.118$ )	$3 \pm 1.0$
1/2 : Approx. 61.0 (2.402)	$29 \pm 4.8$
E : Approx. $124.0 \pm 3$ ( $4.882 \pm 0.118$ )	$110 \pm 7.7$

If resistance value is not as specified, replace the sender gauge.

**5. INSPECT FUEL LEVEL WARNING LIGHT**

- Disconnect the connector from the sender gauge.
- Connect terminals 1 and 3 on the wire harness side connector.
- Turn the ignition switch ON, check that the warning light lights up.

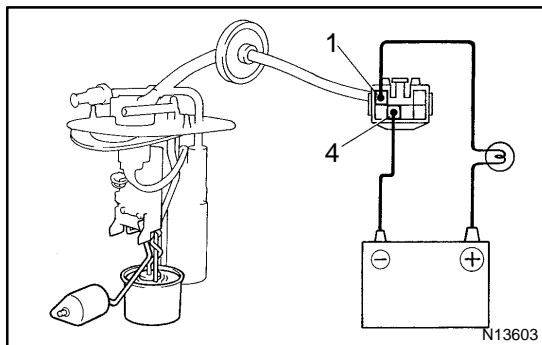
If the warning light does no light up, test the bulb.

**6. INSPECT FUEL LEVEL WARNING SWITCH OPERATION**

- Apply battery positive voltage between terminals and through a 3.4 W test bulb, check that the bulb lights up.

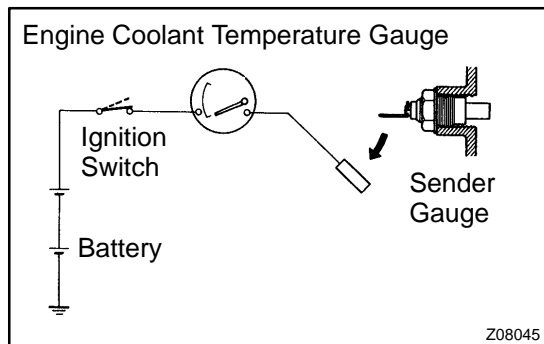
HINT:

It will take a short time for bulb to light up.



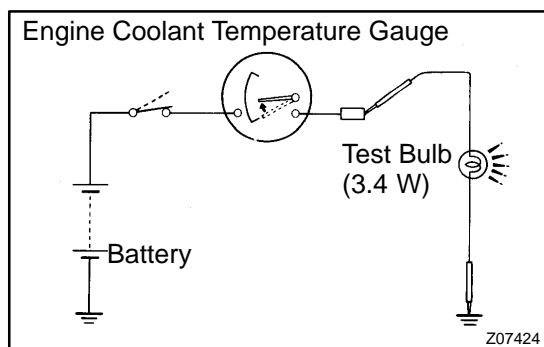
- (b) Submerge the switch in fuel, and check that the bulb goes out.

If operation is not as specified, replace the sender gauge.



## 7. INSPECT RECEIVER ENGINE COOLANT TEMPERATURE GAUGE OPERATION

- (a) Disconnect the connector from the sender gauge.  
(b) Turn the ignition switch ON, and check that the receiver gauge needle indicates COOL.

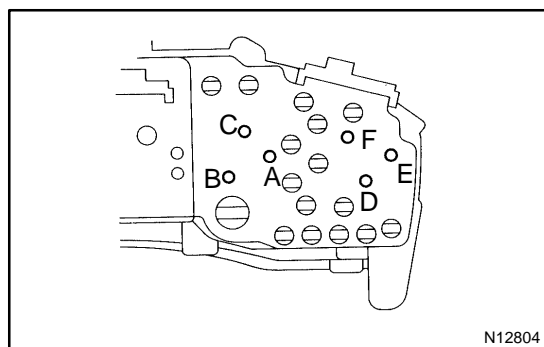


- (c) Ground terminal on the wire harness side connector through a 3.4 W test bulb.

- (d) Turn the ignition switch ON, check that the bulb lights up and the receiver gauge needle moves to the hot side.

If operation is as specified, replace the sender gauge. Then, re-check the system.

If operation is not as specified, measure the receiver gauge resistance.



## 8. INSPECT ENGINE COOLANT TEMPERATURE RECEIVER GAUGE RESISTANCE

Measure the resistance between terminals.

**w/ Tachometer:**

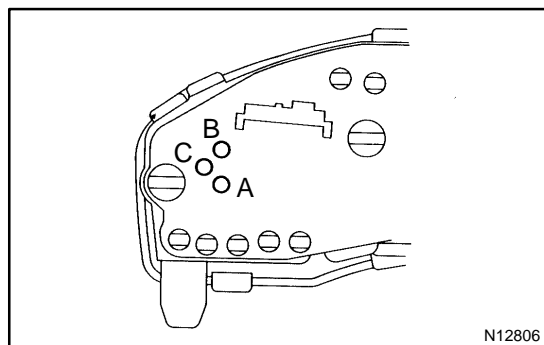
Between terminals	Resistance ( $\Omega$ )
D - E	Approx. 51.0
D - F	Approx. 148.6
E - F	Approx. 199.6

**w/o Tachometer:**

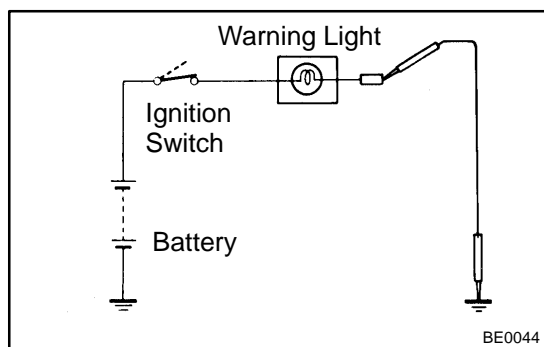
Between terminals	Resistance ( $\Omega$ )
A - B	Approx. 54.0
A - C	Approx. 175.7
B - C	Approx. 229.7

**HINT:**

Connect the test leads so that the current from the ohmmeter can flow according to the above order. This circuit includes the diode.



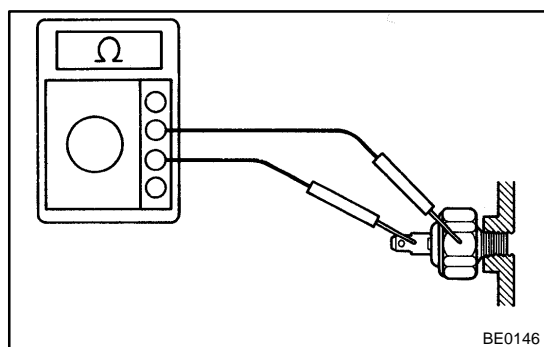
If resistance value is not as specified, replace the receiver gauge.



#### 9. INSPECT LOW OIL PRESSURE WARNING LIGHT

- Disconnect the connector from the warning switch and ground terminal on the wire harness side connector.
- Turn the ignition switch ON, and check that the warning light lights up.

If the warning light does not light up, test the bulb.



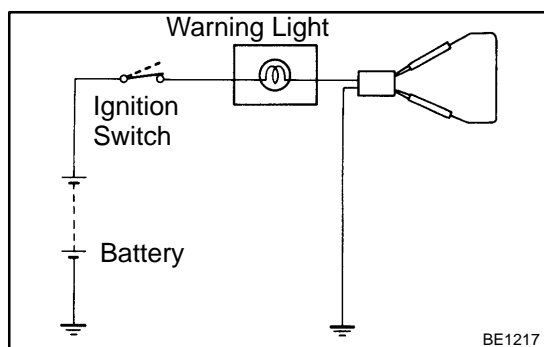
#### 10. INSPECT LOW OIL PRESSURE SWITCH CONTINUITY

- Disconnect the connector from the switch.
- Check that there is continuity between terminal and ground with the engine stopped.
- Check that there is no continuity between terminal and ground with the engine running.

HINT:

Oil pressure should be over 49 kPa (0.5 kgf/cm<sup>2</sup>, 7.1 psi).

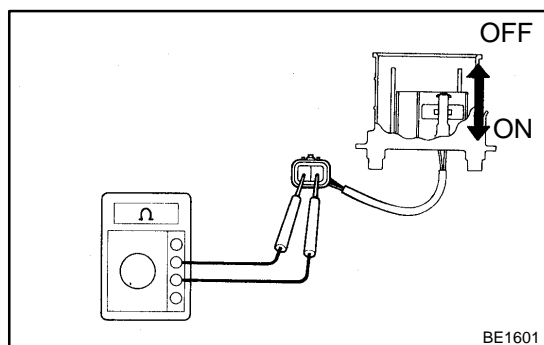
If operation is not as specified, replace the switch.



#### 11. INSPECT BRAKE SYSTEM WARNING LIGHT

- Disconnect the connectors from the level warning switch and parking brake switch.
- Connect terminals on the wire harness side connector of the level warning switch connector.
- Turn the ignition switch ON, and check that the warning light lights up.

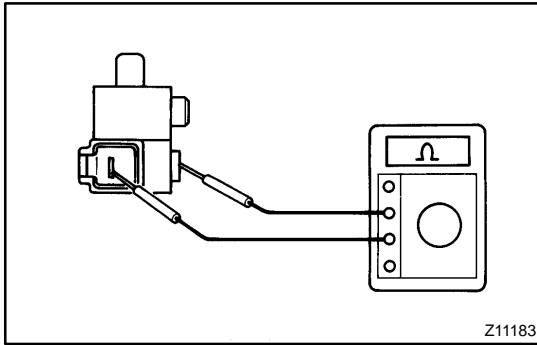
If the warning light does not light up, test the bulb.



#### 12. INSPECT BRAKE FLUID LEVEL WARNING SWITCH CONTINUITY

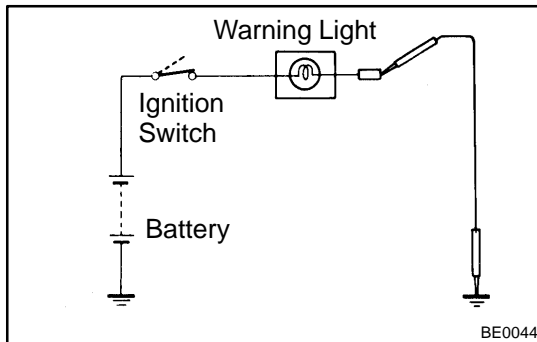
- Check that there is no continuity between terminals with the switch OFF (float up).
- Check that there is continuity between terminals with the switch ON (float down).

If operation is not as specified, replace the switch.

**13. INSPECT PARKING BRAKE SWITCH CONTINUITY**

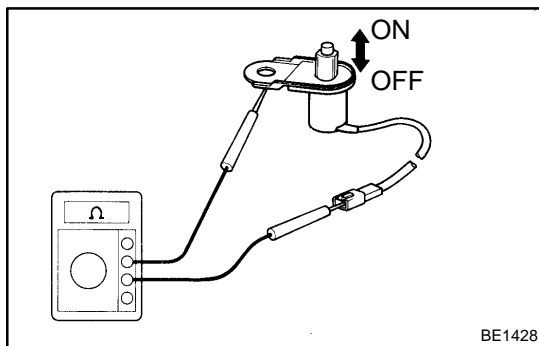
- (a) Check that there is continuity between terminal and switch body with the switch ON (switch pin released).
- (b) Check that there is no continuity between terminal and switch body with the switch OFF (switch pin pushed in).

If operation is not as specified, replace the switch or inspect ground point.

**14. INSPECT OPEN DOOR WARNING LIGHT**

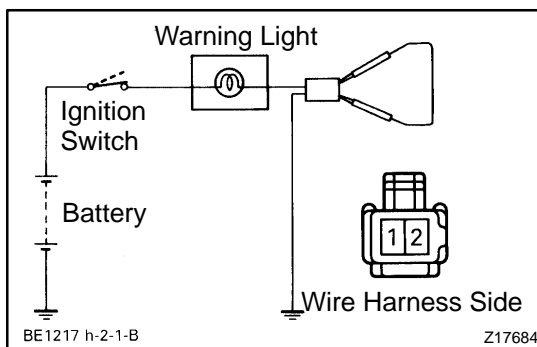
- (a) Disconnect the connectors from the door courtesy switch and ground terminal on the wire harness side connector.
- (b) Turn the ignition switch ON, check that the warning light lights up.

If the warning light does not light up, test the bulb.

**15. INSPECT OPEN DOOR COURTESY SWITCH CONTINUITY**

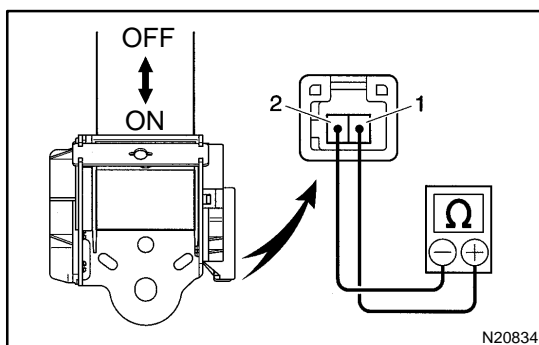
- (a) Check that there is continuity between terminals and the switch body with the switch ON (switch pin released: opened door).
- (b) Check that there is no continuity between terminals and the switch body with the switch OFF (switch pin pushed in: closed doors).

If operation is not as specified, replace the switch.

**16. INSPECT SEAT BELT WARNING LIGHT**

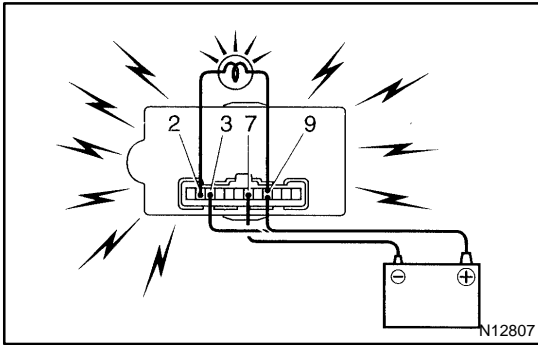
- (a) Disconnect the connector from the driver's seat belt retractor assembly.
- (b) Connect terminals 1 and 2 on the wire harness side connector.
- (c) Turn the ignition switch ON, and check that the warning light lights up.

If the warning light does not light up, test the bulb.

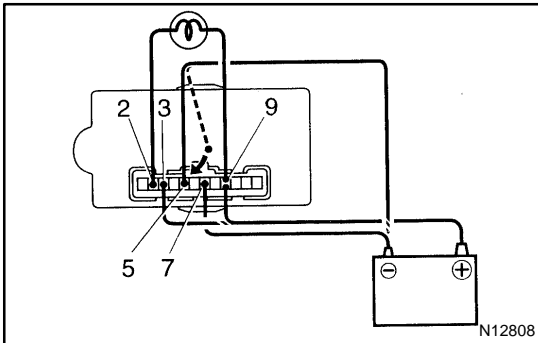
**17. INSPECT SEAT BELT RETRACTOR SWITCH CONTINUITY**

- (a) Check that there is continuity between terminals on the switch side connector with the switch ON (belt downward).
- (b) Check that there is continuity between terminals on the switch side connector with the switch OFF (belt upward).

If continuity is not as specified, replace the retractor assembly.

**18. INSPECT INTEGRATION RELAY OPERATION**

- Connect the positive (+) lead from the battery to terminals 3 and 9.
- Connect the terminal 2 to terminal 9 through the 3.4 W test bulb.
- Connect the negative (-) lead from the battery to terminal 7.
- Check that the bulb lights and the chime sounds for 4 - 8 seconds.



- Return to step (a), and operate the chime again.
- Connect the negative (-) lead from the battery to terminal 3.
- Check that the chime stops sounding.

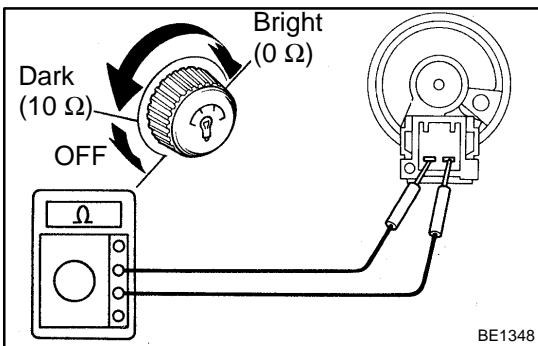
**HINT:**

Check the chime within a period of 4 to 8 seconds.

If operation is not as specified, replace the relay.

**19. INSPECT INTEGRATION RELAY CIRCUIT**

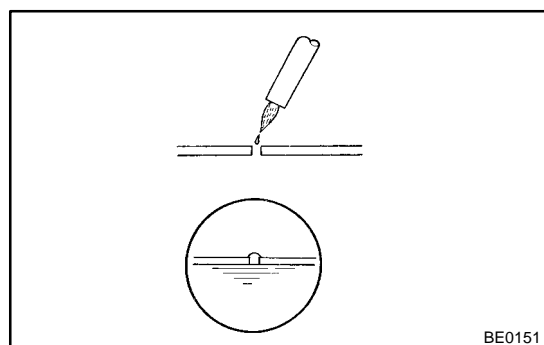
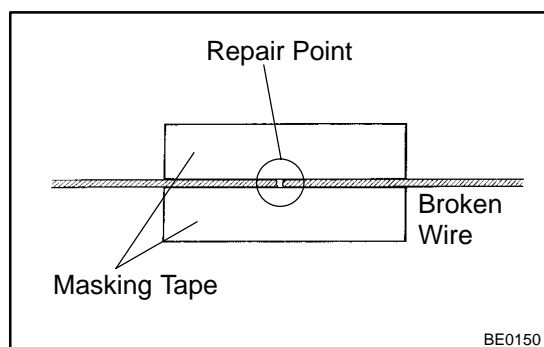
(See page [BE-11](#))

**20. INSPECT LIGHT CONTROL RHEOSTAT**

- Turn the rheostat knob OFF, and check that there is no continuity between terminals. (Rheostat knob turned to fully counterclockwise.)
- Gradually, turn the rheostat knob from the dark side to bright side, and check that the resistance decreases from 10 to 0 Ω. (Rheostat knob turned to clockwise.)

If operation is not as specified, replace the rheostat.





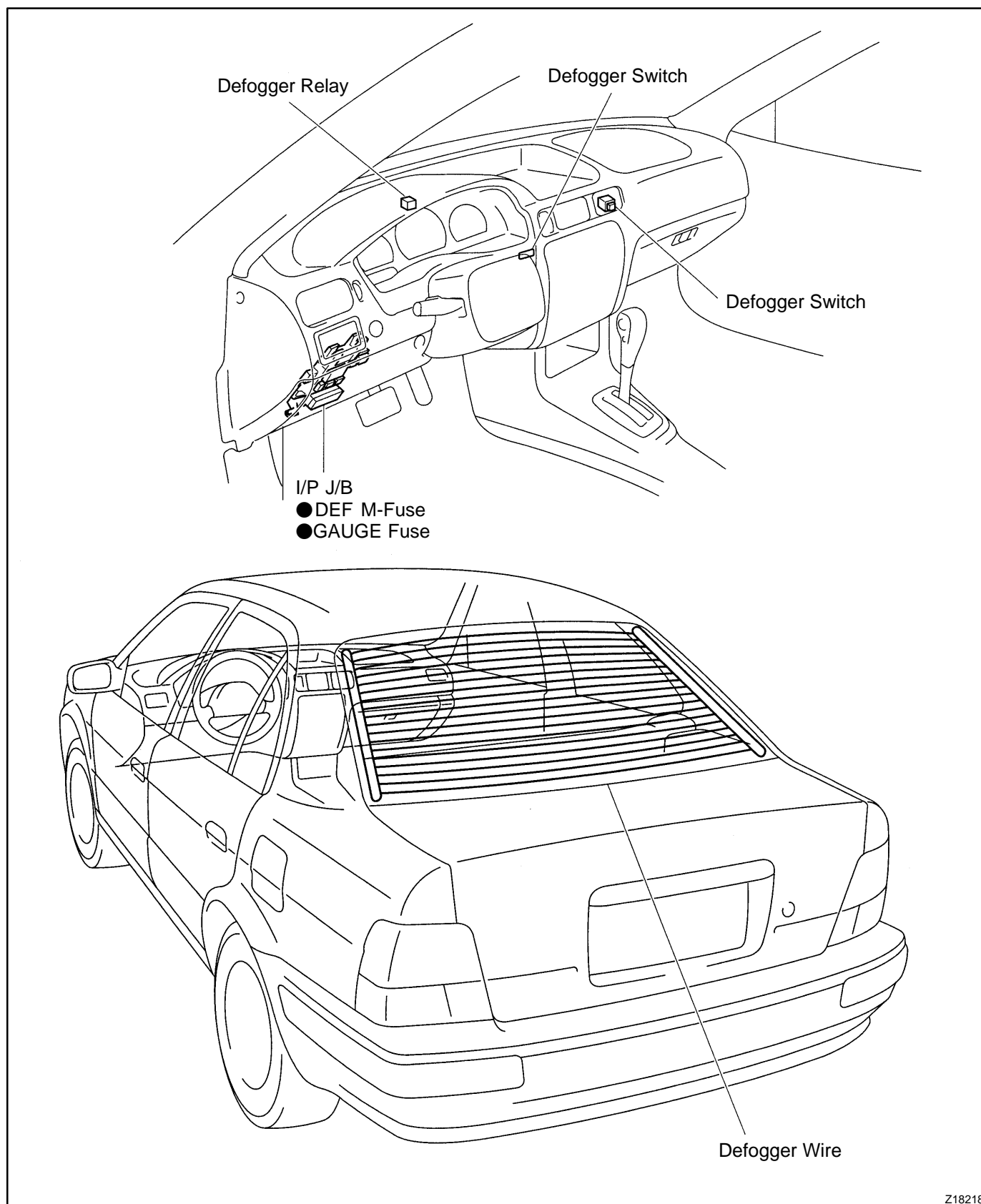
## DEFOGGER SYSTEM ON-VEHICLE REPAIR

BE26R-01

### REPAIR DEFOGGER WIRE

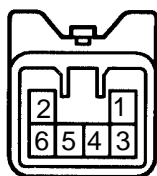
- Clean the broken wire tips with a grease, wax and silicone remover.
- Place the masking tape along both sides of the wire to be repaired.
- Thoroughly mix the repair agent (Dupont paste No. 4817).
- Using a fine tip brush, apply a small amount to the wire.
- After a few minutes, remove the masking tape.
- Do not repair the defogger wire for at least 24 hours.

## LOCATION



Z18218

## Relay Side



Z14866

## INSPECTION

## 1. w/ Timer:

**INSPECT DEFOGGER SWITCH CONTINUITY**

Check that there is continuity between terminals 1 and 3.  
If continuity is not as specified, check the bulb.

2. **INSPECT DEFOGGER TIMER OPERATION**

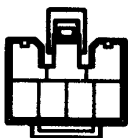
- Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 4.
- Connect the positive (+) lead from the battery to terminal 6 through a 3.4 W tester bulb.
- Push the defogger switch ON, check that the indicator light and test bulb light up for 12 to 18 minutes, then the indicator light and test bulb lights go out.

If operation is not as specified, replace the switch.

3. **INSPECT DEFOGGER TIMER CIRCUIT**

Disconnect the connector from the switch and inspect the connector on the wire harness side, as shown in the chart.

## Wire Harness Side



Z08467

Tester connection	Condition	Specified condition
4 - Ground	Constant	Continuity
2 - Ground	Ignition switch LOCK or ACC	No voltage
2 - Ground	Ignition switch ON	Battery positive voltage
6 - Ground	Ignition switch LOCK or ACC	No voltage
6 - Ground	Ignition switch ON	Battery positive voltage
-	Connect terminals 4 and 6.	Defogger system operation is normal

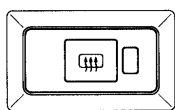
If the circuit is not as specified, replace the switch.

## 4. w/o Timer:

**INSPECT DEFOGGER SWITCH CONTINUITY**

Condition	Tester connection	Specified condition
Switch OFF	2 - 6	No continuity
Switch ON	2 - 4 - 6	Continuity
Illumination circuit	1 - 3	Continuity

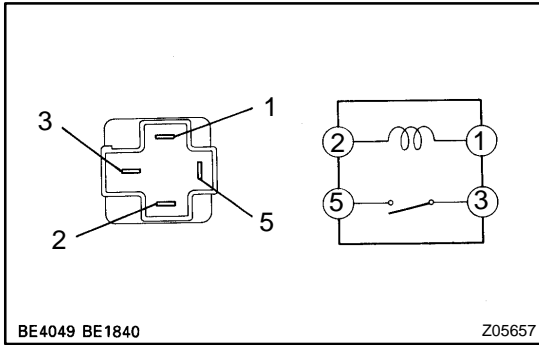
If continuity is not as specified, replace the switch.



ON



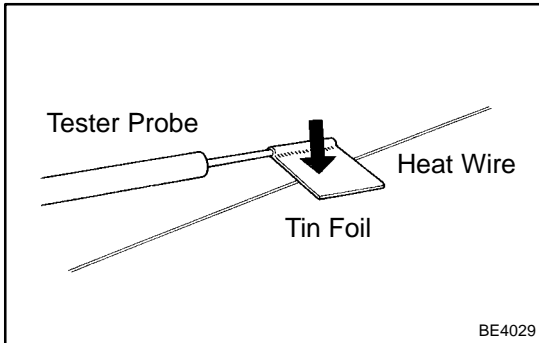
Z14868



## 5. INSPECT DEFOGGER RELAY CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 - 2	Continuity
Apply B+ between terminals 1 and 2.	3 - 5	Continuity

If continuity is not as specified, replace the relay.

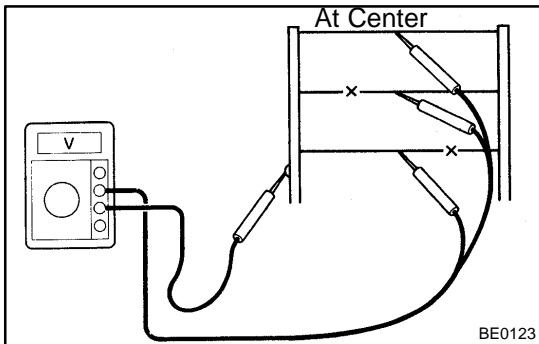


## 6. INSPECT DEFOGGER WIRE

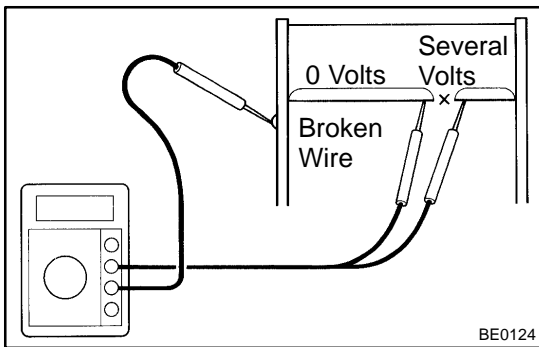
### NOTICE:

When cleaning the glass, use a soft, dry cloth, and wipe the glass in the direction of the wire. Take care not to damage the wires. Do not use detergents or glass cleaners with abrasive ingredients. When measuring voltage, wind a piece of tin foil around the top of the negative probe and press the foil against the wire with your finger, as shown.

- Turn the ignition switch ON.
- Turn the defogger switch ON.
- Inspect the voltage at the center of each heat wire, as shown.



Voltage	Criteria
Approx. 5 V	Okay (No break in wire)
Approx. 10 V or 0 V	Broken wire



### HINT:

If there is approximately 10 V, the wire is broken between the center of the wire and the positive (+) end. If there is no voltage, the wire is broken between the center of the wire and ground.

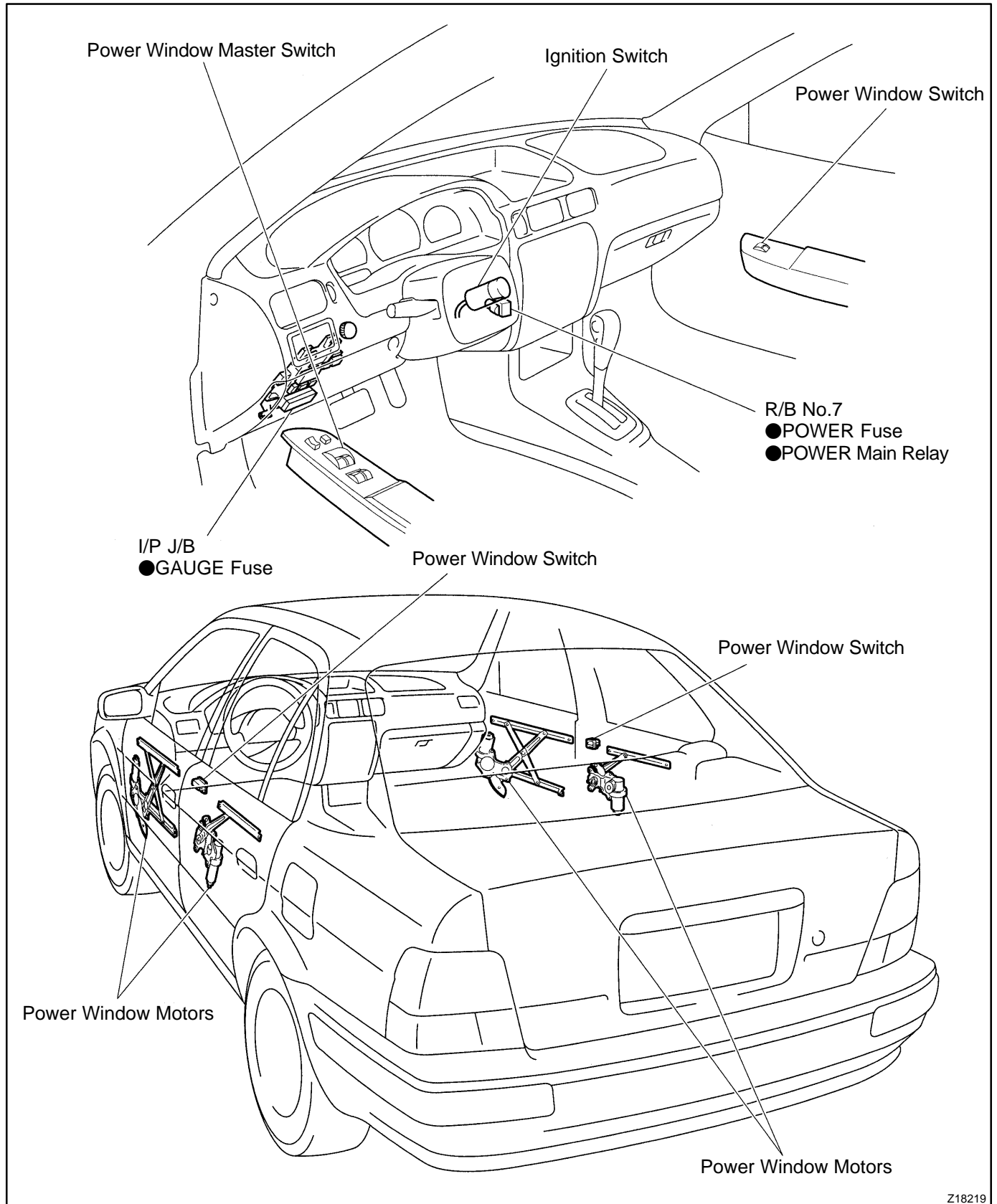
- Place the voltmeter positive (+) lead against the defogger positive (+) terminal.
- Place the voltmeter negative (-) lead with the foil strip against the heat wire at the positive (+) terminal end and slide it toward the negative (-) terminal end.
- The point where the voltmeter deflects from zero to several V is the place where the heat wire is broken.

### HINT:

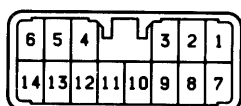
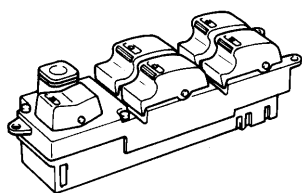
If the heat wire is not broken, the voltmeter indicates 0 V at the positive (+) end of the heat wire but gradually increases to about 12 V as the meter probe is moved to the other end.

# POWER WINDOW CONTROL SYSTEM LOCATION

BEORF-02



Z18219



Z06846

## INSPECTION

### 1. INSPECT POWER WINDOW MASTER SWITCH CONTINUITY

#### Front Driver's Switch (Window unlock and lock):

Switch position	Tester connection	Specified condition
UP	6 - 7 - 8 1 - 2 - 13	Continuity
OFF	1 - 2 - 6 - 13	Continuity
DOWN	1 - 2 - 6 7 - 8 - 13	Continuity

#### Front Passenger's Switch:

Switch position	Tester connection	Specified condition
UP	7 - 8 - 12	Continuity
UP and window lock	1 - 2 - 5 7 - 8 - 12	Continuity
OFF	5 - 12	Continuity
OFF and window lock	1 - 2 - 5 - 12	Continuity
DOWN	5 - 7 - 8	Continuity
DOWN and window lock	1 - 2 - 12 5 - 7 - 8	Continuity

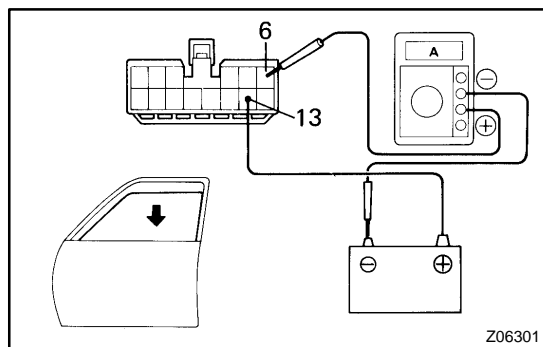
#### Rear Left Switch:

Switch position	Tester connection	Specified condition
UP	7 - 8 - 10	Continuity
UP and window lock	7 - 8 - 10	Continuity
OFF	9 - 10	Continuity
OFF and window lock	1 - 2 - 9	Continuity
DOWN	7 - 8 - 9	Continuity
DOWN and window lock	1 - 2 - 9 - 10	Continuity

#### Rear Right Switch:

Switch position	Tester connection	Specified condition
UP	7 - 8 - 11	Continuity
UP and window lock	1 - 2 - 14 7 - 8 - 11	Continuity
OFF	11 - 14	Continuity
OFF and window lock	1 - 2 - 11 - 14	Continuity
DOWN	7 - 8 - 14	Continuity
DOWN and window lock	1 - 2 - 11 7 - 8 - 14	Continuity

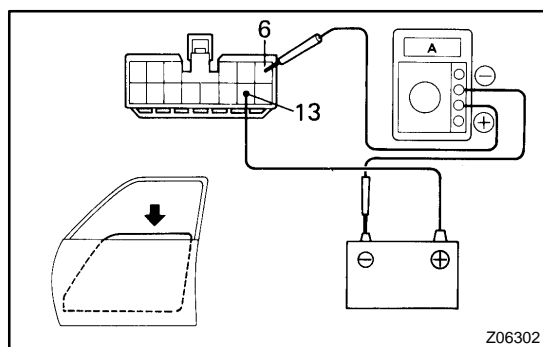
If continuity is not as specified, replace the master switch.



## 2. Using an ammeter:

### INSPECT ONE TOUCH POWER WINDOW SYSTEM

- Disconnect the connector from the master switch.
- Connect the positive (+) lead from the ammeter to terminal 6 on the wire harness side connector and the negative (-) lead to negative terminal of the battery.
- Connect the positive (+) lead from the battery to terminal 13 on the wire harness side connector.

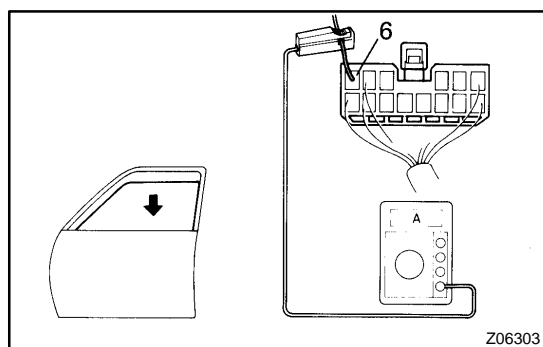


- As the window goes down, check that the current flow is approximately 7 A.
- Check that the current increases up to approximately 14.5 A or more when the window stops going down.

#### HINT:

The circuit breaker opens some 4 - 40 seconds after the window stops going down, so that check must be made before the circuit breaker operates.

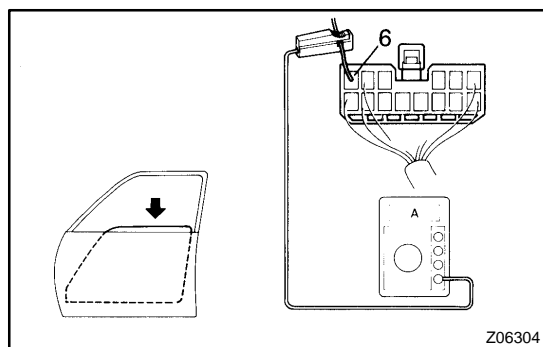
If the operation is as specified, replace the master switch.



## 3. Using an ammeter with a current-measuring probe:

### INSPECT ONE TOUCH POWER WINDOW SYSTEM

- Remove the master switch with connector connected.
- Attach a current-measuring probe to terminal 6 of the wire harness.
- Turn the ignition switch ON and set the power window switch in the down position.
- As the window goes down, check that the current flow is approximately 7 A.

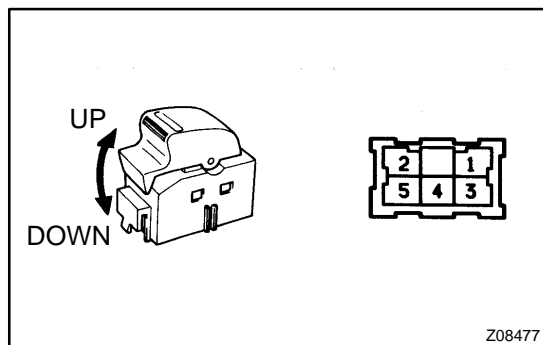


- Check that the current increases up to approximately 14.5 A or more when the window stops going down.

#### HINT:

The circuit breaker opens some 4 - 40 seconds after the window stops going down, so that check must be made before the circuit breaker operates.

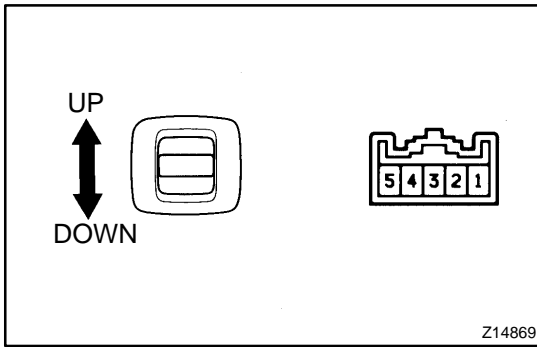
If operation is as specified, replace the master switch.



## 4. INSPECT POWER WINDOW SWITCH CONTINUITY

### Passenger's Door:

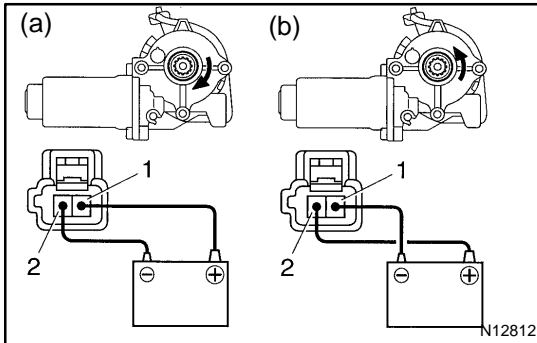
Switch position	Tester connection	Specified condition
UP	1 - 5, 3 - 4	Continuity
OFF	1 - 2, 3 - 4	Continuity
DOWN	1 - 2, 4 - 5	Continuity



**Rear Door:**

Switch position	Tester connection	Specified condition
UP	1 - 2, 3 - 4	Continuity
OFF	1 - 2, 4 - 5	Continuity
DOWN	2 - 3, 4 - 5	Continuity

If continuity is not as specified, replace the switch.

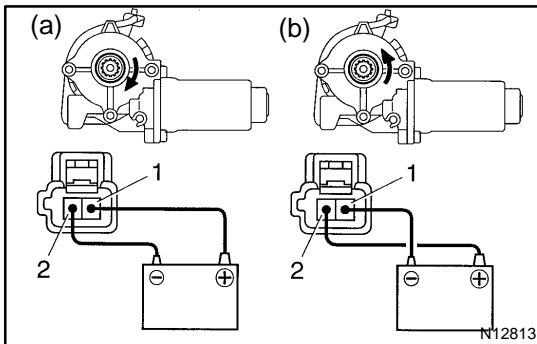


**5. Driver's Door and Rear RH Side:**

**INSPECT POWER WINDOW MOTOR OPERATION**

- Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, and check that the motor turns clockwise.
- Reverse the polarity, and check that the motor turns counterclockwise.

If operation is not as specified, replace the motor.

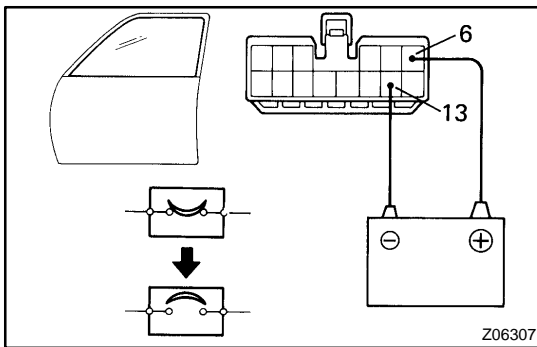


**6. Passenger's Door and Rear LH Side:**

**INSPECT POWER WINDOW MOTOR OPERATION**

- Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, and check that the motor turns clockwise.
- Reverse the polarity, and check that the motor turns counterclockwise.

If operation is not as specified, replace the motor.

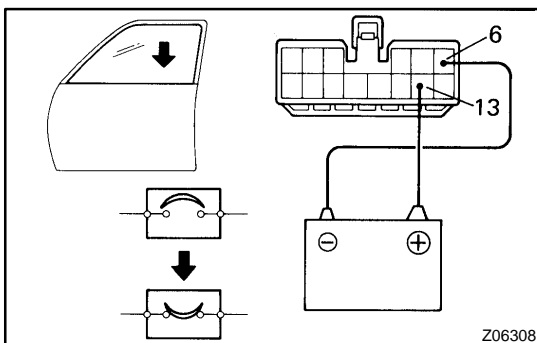


**7. Driver's Door:**

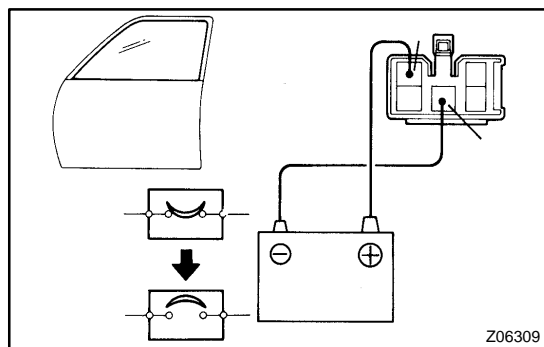
**INSPECT CIRCUIT BREAKER OPERATION**

- Disconnect the connector from the power window switch.
- Connect the positive (+) lead from the battery to terminal 6 and the negative (-) lead to terminal 13 on the wire harness side connector, and raise the window to full closed position.
- Continue to apply voltage, check that there is a circuit breaker operation noise within approximately 4 to 40 seconds.
- Reverse the polarity, check that the window begins to descend within approximately 60 seconds.

If operation is not as specified, replace the motor.





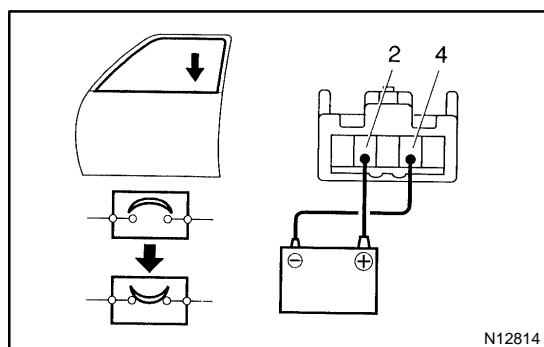
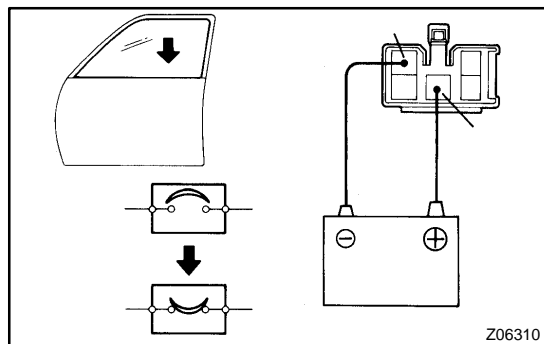


## 8. Passenger's Door:

### INSPECT CIRCUIT BREAKER OPERATION

- Disconnect the connector from the power window switch.
- Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 4 on the wire harness side connector, and raise the window to full closed position.
- Continue to apply voltage, and check that there is a circuit breaker operation noise within approximately 4 to 40 seconds.
- Reverse the polarity, and check that the window begins to descend within approximately 60 seconds.

If operation is not as specified, replace the motor.



## 9. Rear Door:

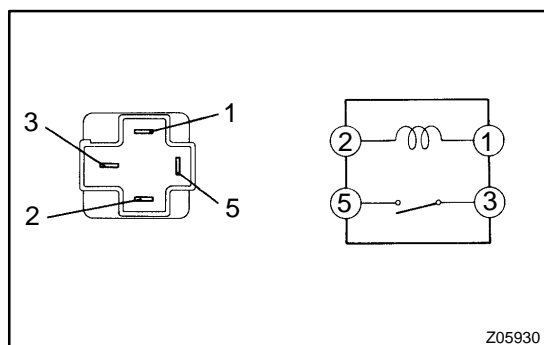
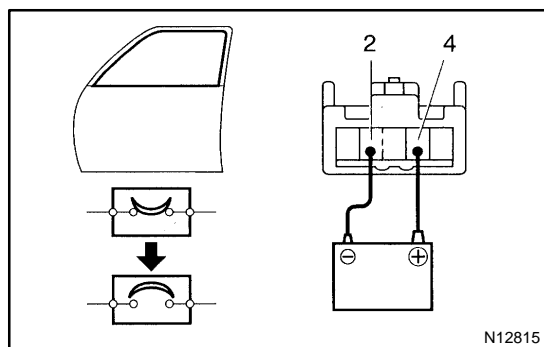
### INSPECT CIRCUIT BREAKER OPERATION

- Disconnect the connector from the power window switch.
- Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 4 on the wire harness side connector, and raise the window to full closed position.

- Continue to apply voltage, check that there is a circuit breaker operation noise within approximately 4 to 40 seconds.

- Reverse the polarity, check that the window begins to descend within approximately 60 seconds.

If operation is not as specified, replace the motor.



## 10. INSPECT POWER MAIN RELAY CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 - 2	Continuity
Apply B+ between terminals 1 and 2.	3 - 5	Continuity

If continuity is not as specified, replace the relay.

# AUDIO SYSTEM DESCRIPTION

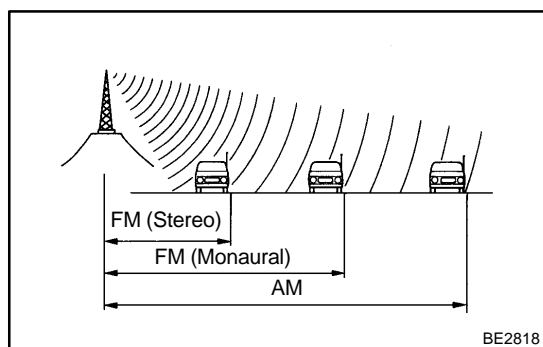
BE10T-01

## 1. RADIO WAVE BAND

The radio wave bands used in radio broadcasting are as follows:

Frequency	30 kHz	300 kHz	3 MHz	30 MHz	300 MHz
Designation	LF	MF	HF	VHF	
Radio wave		AM ↔		FM ↔	
Modulation method	Amplitude modulation			Frequency modulation	

LF: Low frequency MF: Medium Frequency HF: High Frequency VHF: Very High Frequency



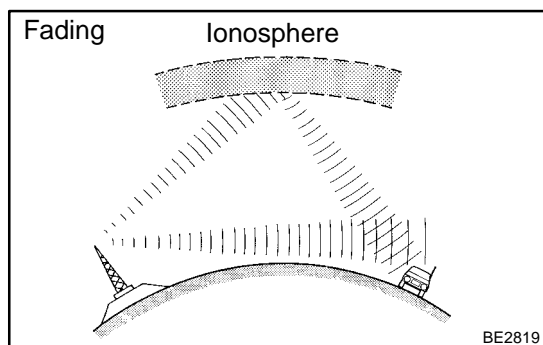
## 2. SERVICE AREA

There are great differences in the size of the service area for AM and FM monaural. Sometimes FM stereo broadcasts cannot be received even though AM comes in very clearly.

Not only does FM stereo have the smallest service area, but it also picks up static and other types of interference ("noise") easily.

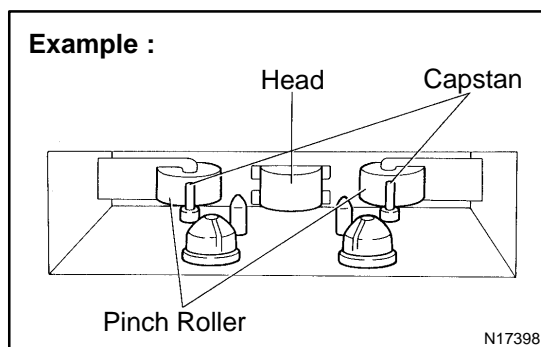
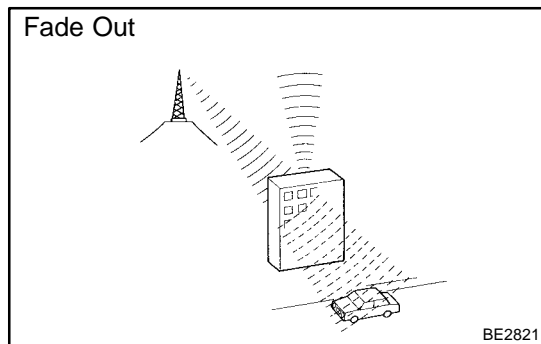
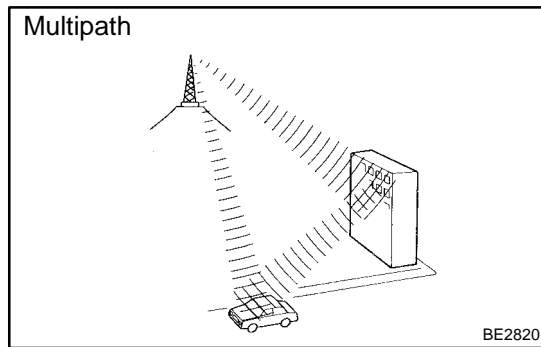
## 3. RECEPTION PROBLEMS

Besides the problem of static, there are also the problems called "fading", "multipath" and "fade out". These problems are caused not by electrical noise but by the nature of the radio waves themselves.



### ● Fading

Besides electrical interference, AM broadcasts are also susceptible to other types of interference, especially at night. This is because AM radio waves bounce off the ionosphere at night. These radio waves then interfere with the signals from the same transmitter that reach the vehicle's antenna directly. This type of interference is called "fading".



- **Multipath**  
One type of interference caused by bouncing of radio waves off obstructions is called "multipath". Multipath occurs when a signal from the broadcast transmitter antenna bounces off buildings and mountains and interferes with the signal that is received directly.
- **Fade Out**  
Because FM radio waves are of higher frequencies than AM radio waves, they bounce off buildings, mountains, and other obstructions. For this reason, FM signals often seem to gradually disappear or fade away as the vehicle goes behind a building or other obstructions. This is called "fade out".

#### 4. **Tape Player/Head Cleaning: MAINTENANCE**

- (a) Raise the cassette door with your finger. Next, using a pencil or similar object, push in the guide.
- (b) Using a cleaning pen or cotton applicator soaked in cleaner, clean the head surface, pinch rollers and capstans.

## TROUBLESHOOTING

### NOTICE:

When replacing the internal mechanism (computer part) of the audio system, be careful that no part of your body or clothing comes in contact with the terminals of the leads from the IC, etc. of the replacement part (spare part).

### HINT:

This inspection procedure is a simple troubleshooting which should be carried out on the vehicle during system operation and is prepared on the assumption of system component troubles (except for the wires and connectors, etc.).

Always inspect the trouble taking the following items into consideration.

- Open or short circuit of the wire harness
- Connector or terminal connection fault

	Problem	No.
Radio	No power coming in.	1
	Power coming in, but radio not operating.	2
	Noise present, but AM - FM not operating.	3
	Either speaker does not work.	4
	Either AM or FM does not work.	5
	Reception poor (Volume faint).	5
	Few preset tuning bands.	5
	Sound quality poor.	6
	Cannot set station select button.	7
	Preset memory disappears.	7
Tape Player	Cassette tape cannot be inserted.	8
	Cassette tape inserts, but no power.	9
	Power coming in, but tape player not operating.	10
	Either speaker does not work.	11
	Sound quality poor (Volume faint).	12
	Tape jammed, malfunction with tape speed or auto-reverse.	13
	APS, SKIP, RPT buttons not operating.	14
Antenna	Cassette tape will not eject.	15
	Antenna does not fully extend or fully retract.	16
	Antenna - related.	17
Noise	Noise produced by vibration or shock while driving.	18
	Noise produced when engine starts.	19

The term "AM" includes LW, MW and the term "FM" includes UKW.

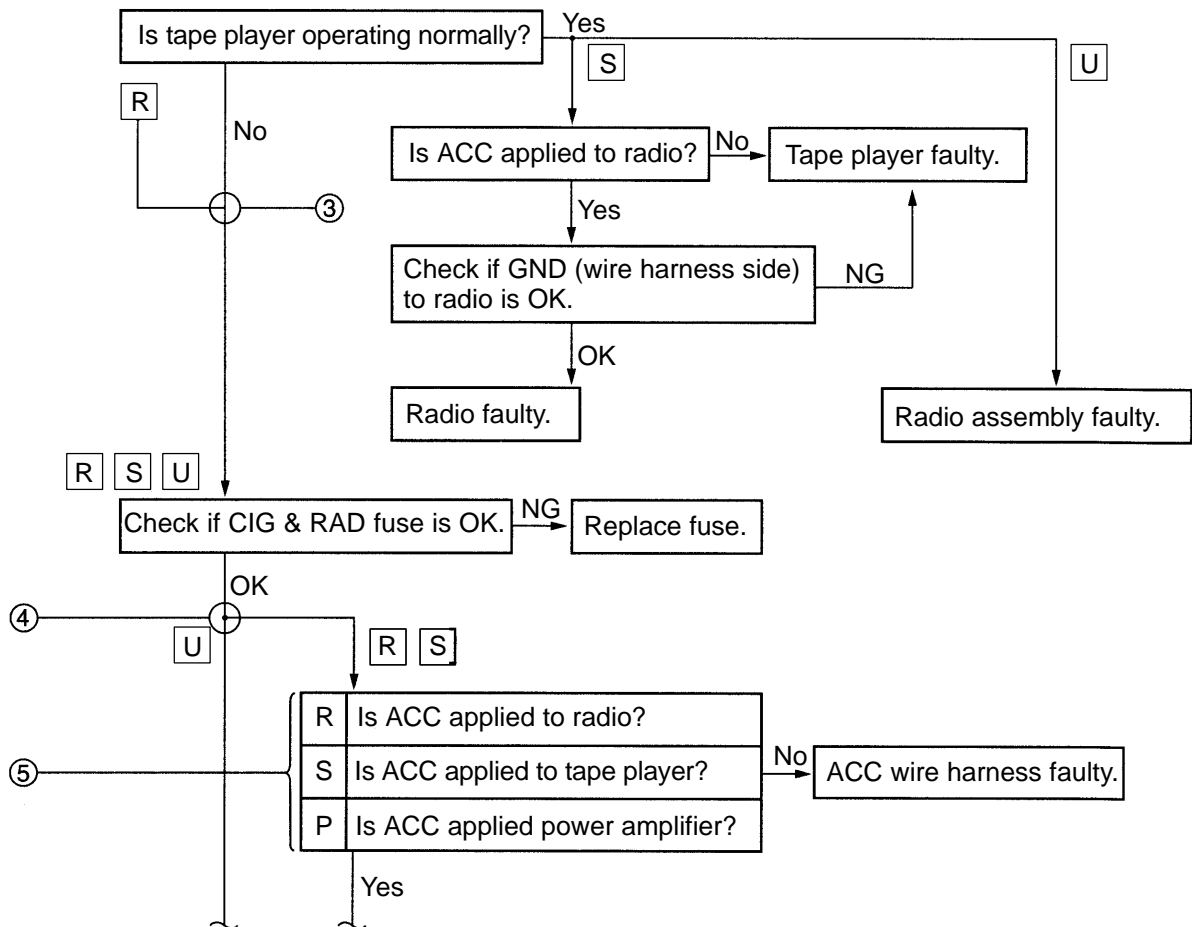
## HOW TO USE DIAGNOSTIC CHART

## Reference:

1	Radio	NO POWER COMING IN
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① - R : Radio      S : Tape Player (Separate)      U : Radio - Tape Player Unit

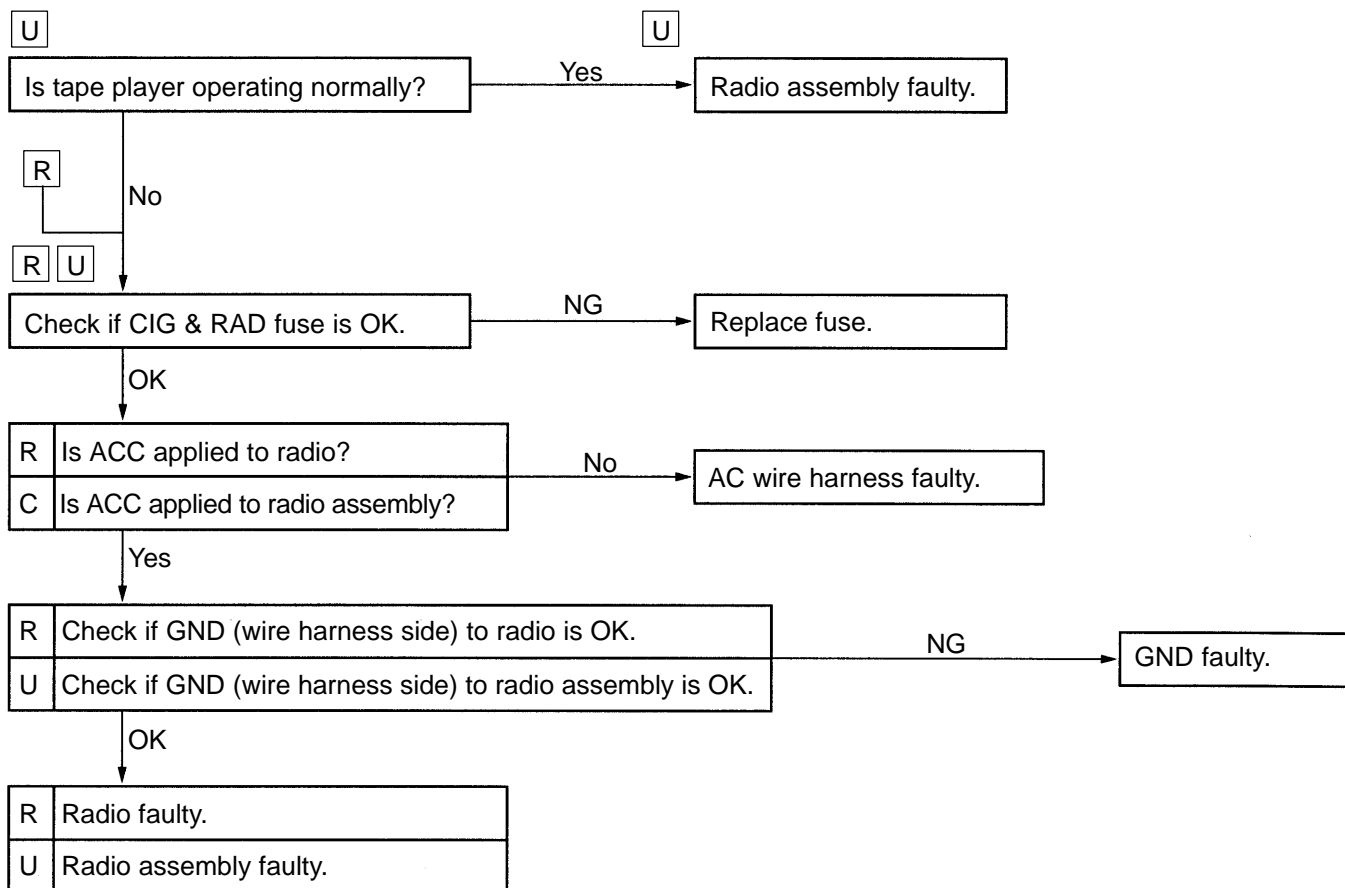
② - S U R



- ① Audio system type and symbol used.  
HINT : Confirm the applicable type of audio system.
- ② Symbol for type of audio system the question applies to.  
HINT : If the audio system type is not applicable, proceed to next question below.
- ③ Junction without black circle.  
HINT : Proceed to next question below.
- ④ Junction with black circle.  
HINT : Proceed to question for applicable audio system type.
- ⑤ HINT : Select question for applicable audio system type.

1	Radio	NO POWER COMING IN
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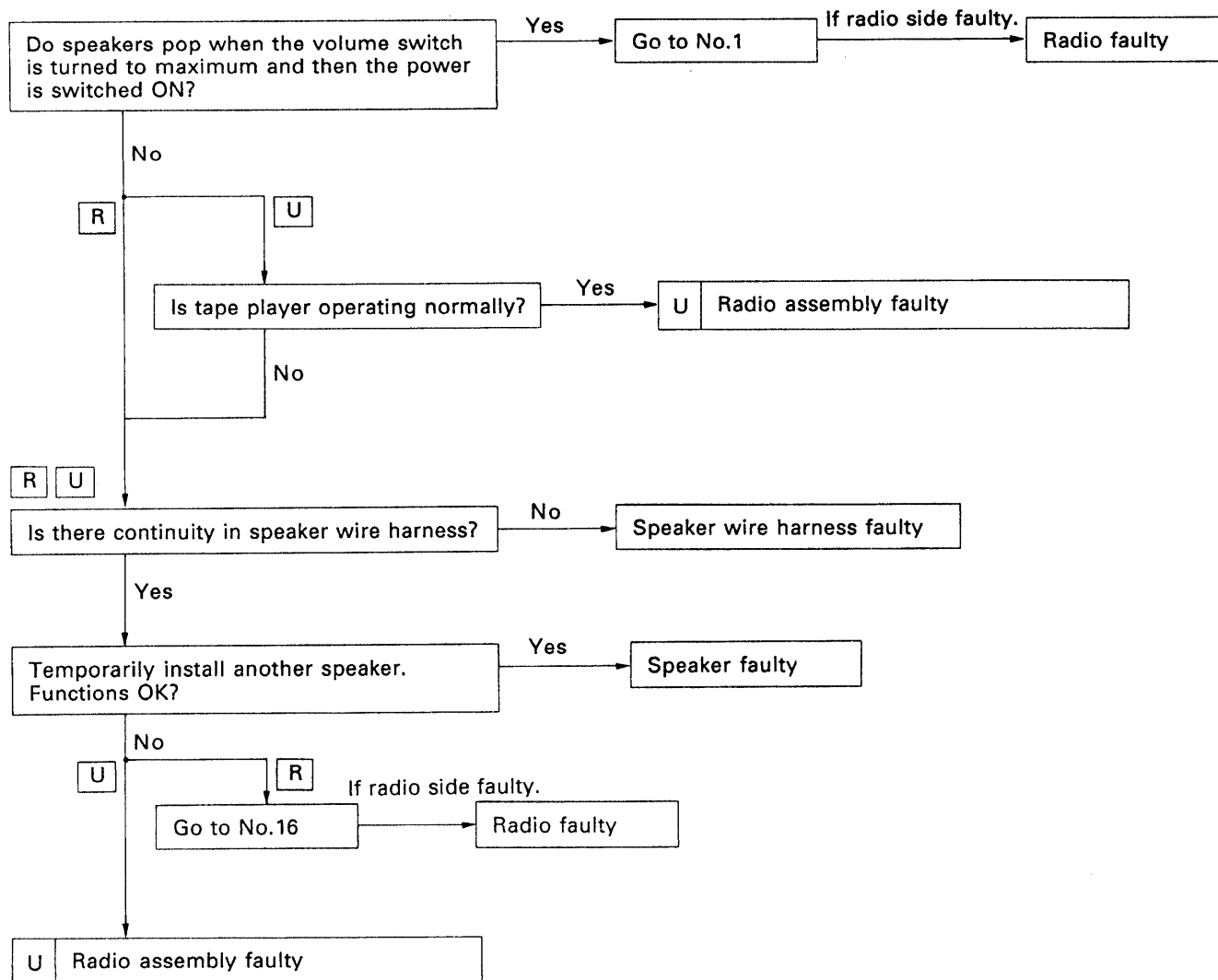
**R** : Radio      **U** : Radio - Tape Player Unit



V08171

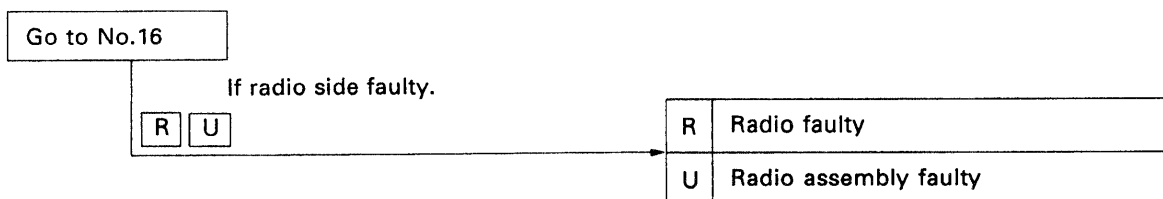
<b>2</b>	<b>Radio</b>	<b>POWER COMING IN, BUT RADIO NOT OPERATING</b>
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**R** : Radio      **U** : Radio – Tape Player Unit



<b>3</b>	<b>Radio</b>	<b>NOISE PRESENT, BUT AM-FM NOT OPERATING</b>
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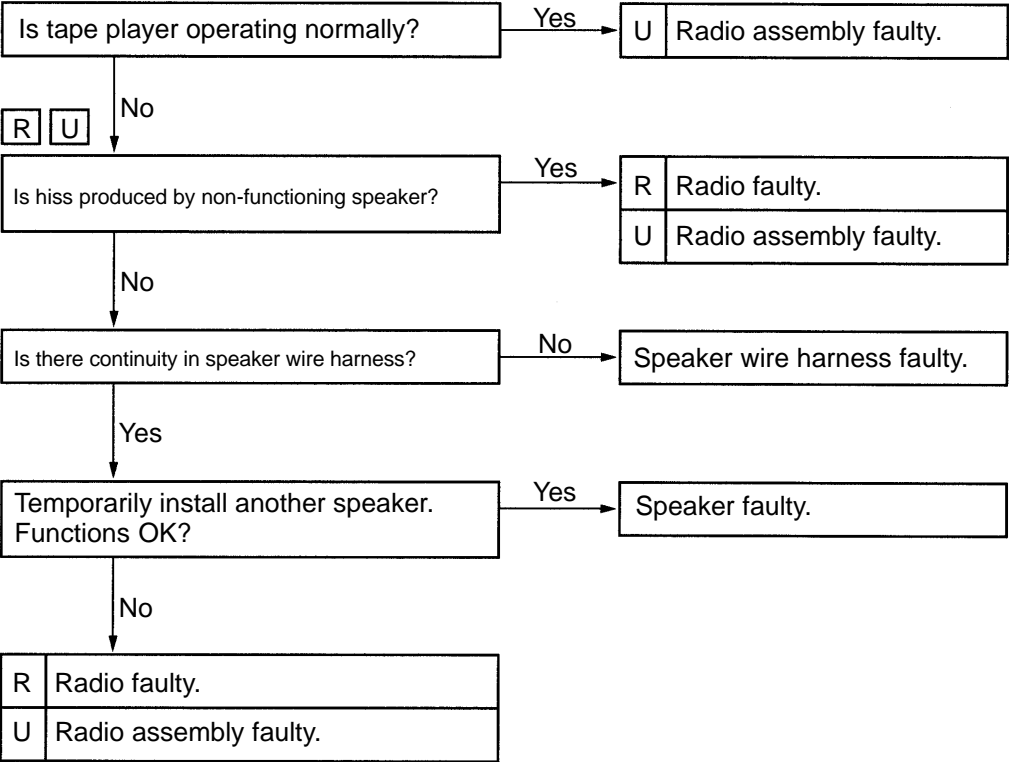
**R** : Radio      **U** : Radio – Tape Player Unit



4	Radio	EITHER SPEAKER DOES NOT WORK
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**R**: Radio      **U**: Radio - Tape Player Unit

**U**

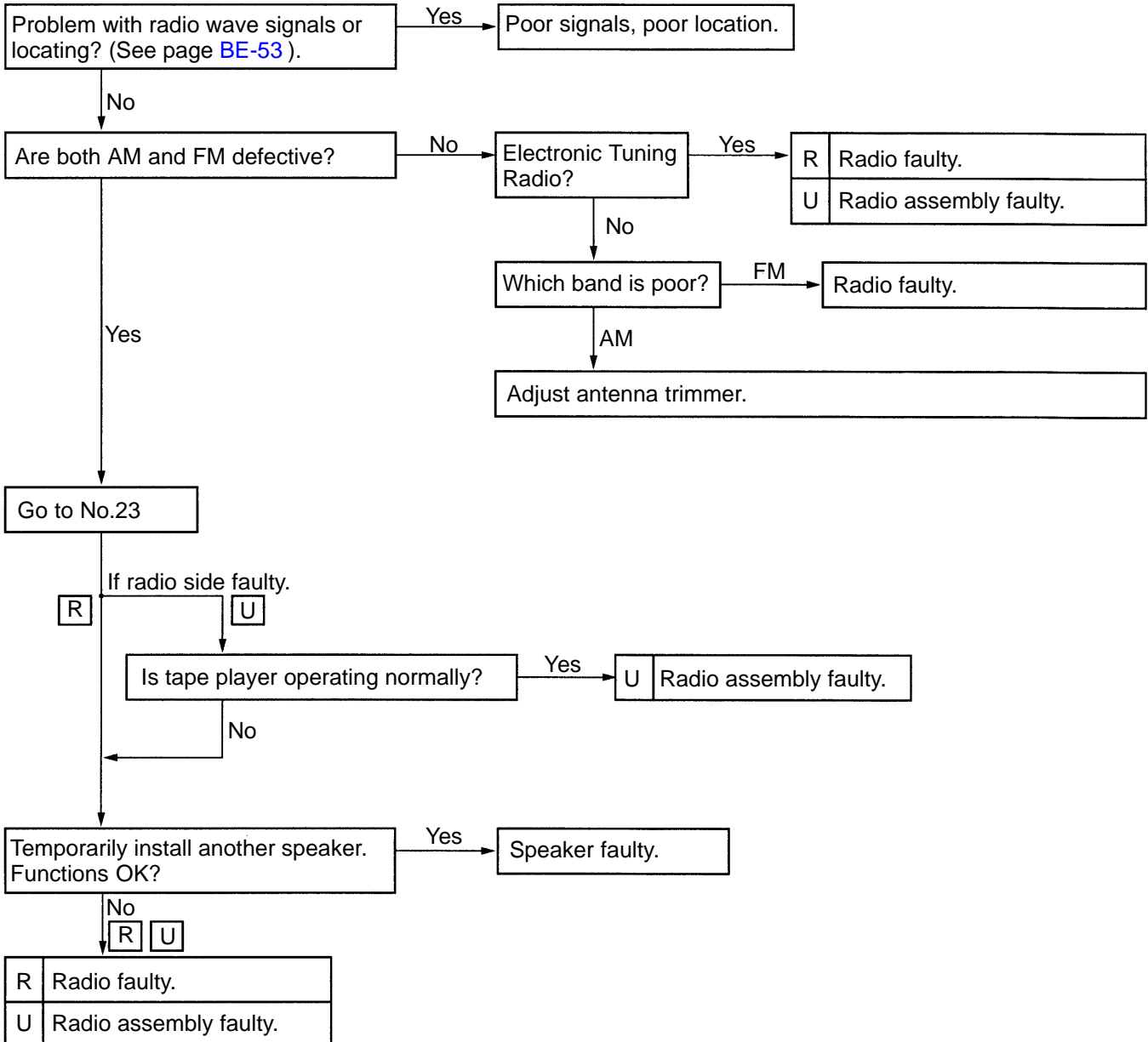


V08173



5	Radio	EITHER AM OR FM DOES NOT WORK, RECEPTION POOR (VOLUME FAINT ), FEW PRESET TUNING BANDS
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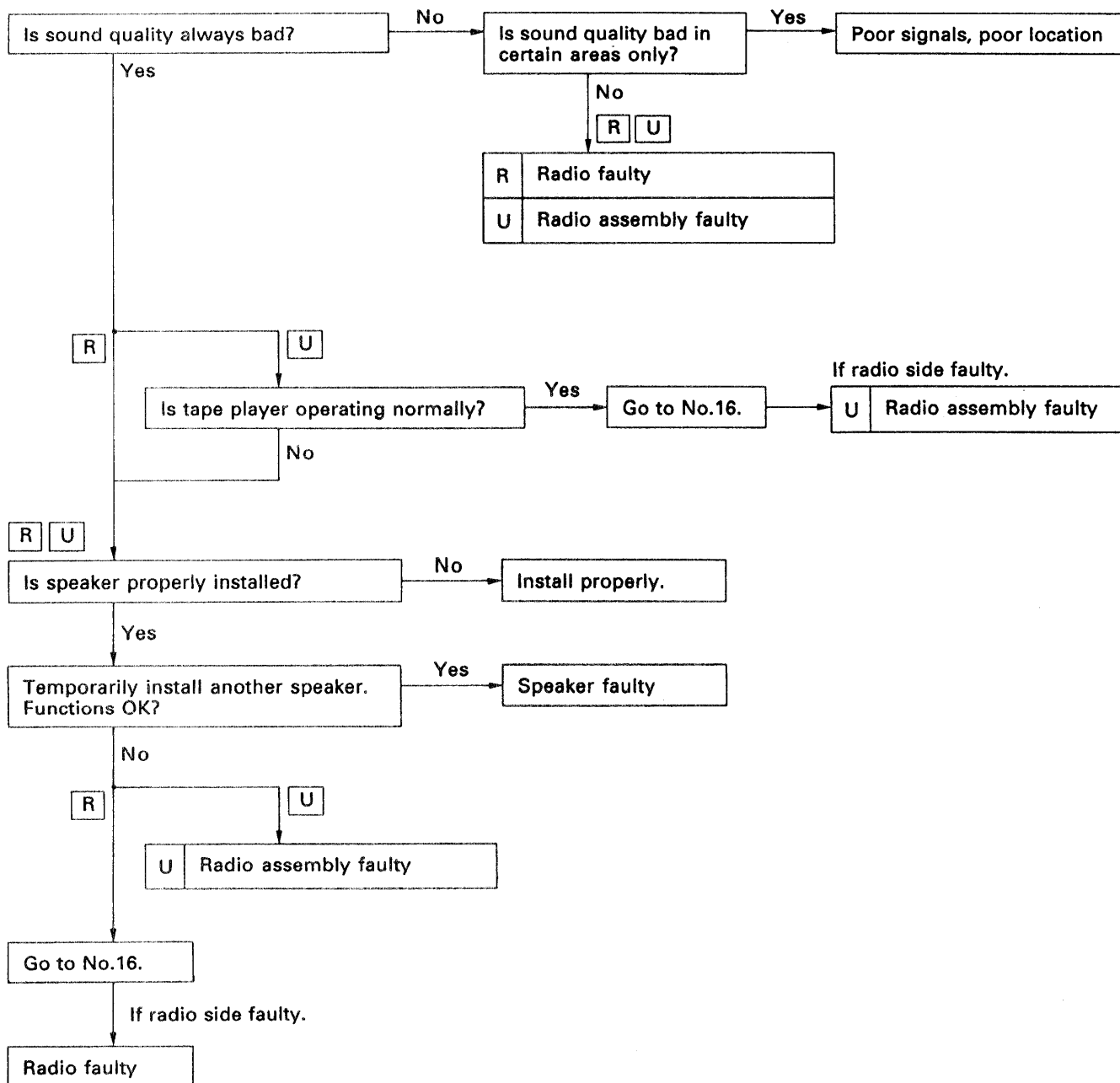
**R** : Radio      **U** : Radio - Tape Player Unit



V08174

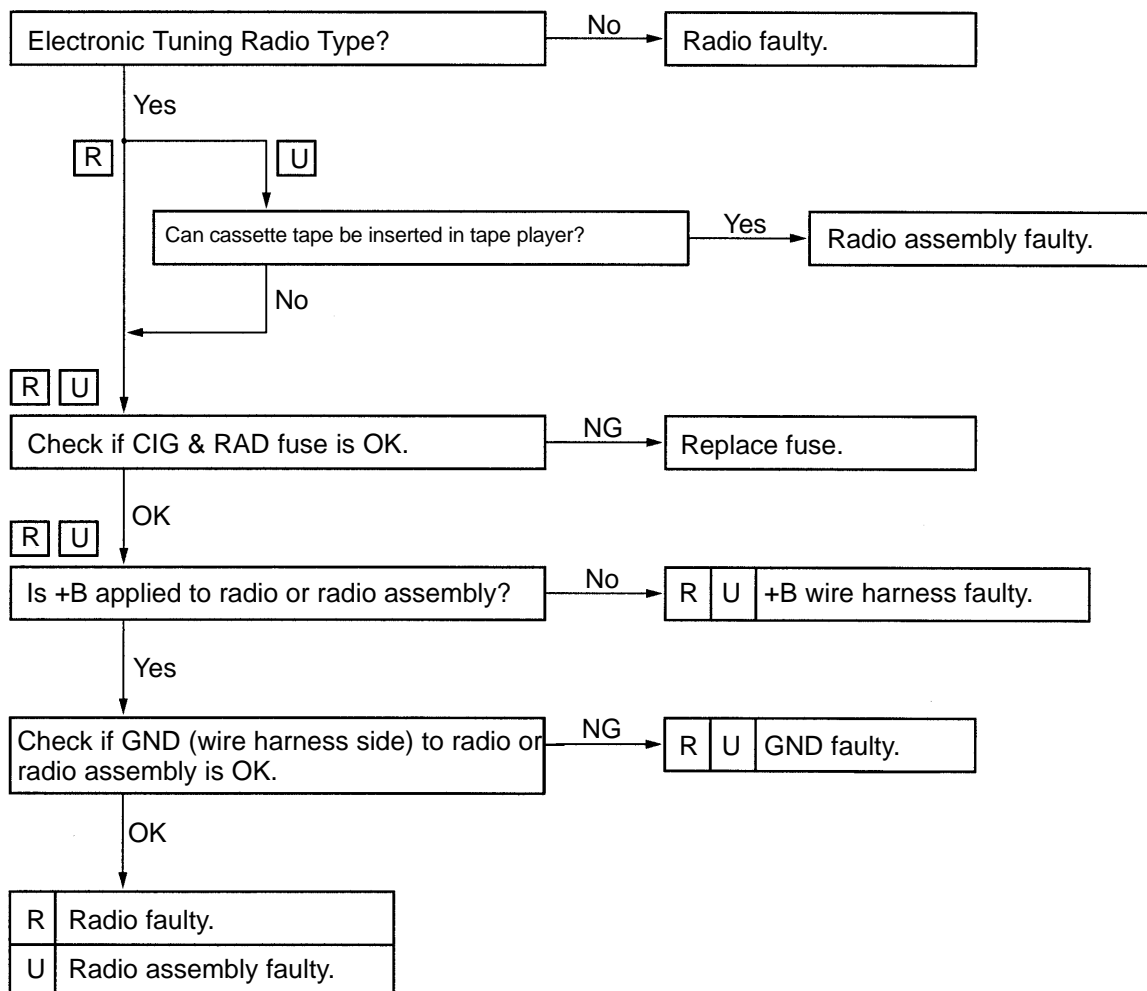
<b>6</b>	<b>Radio</b>	<b>SOUND QUALITY POOR</b>
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**R** : Radio      **U** : Radio – Tape Player Unit



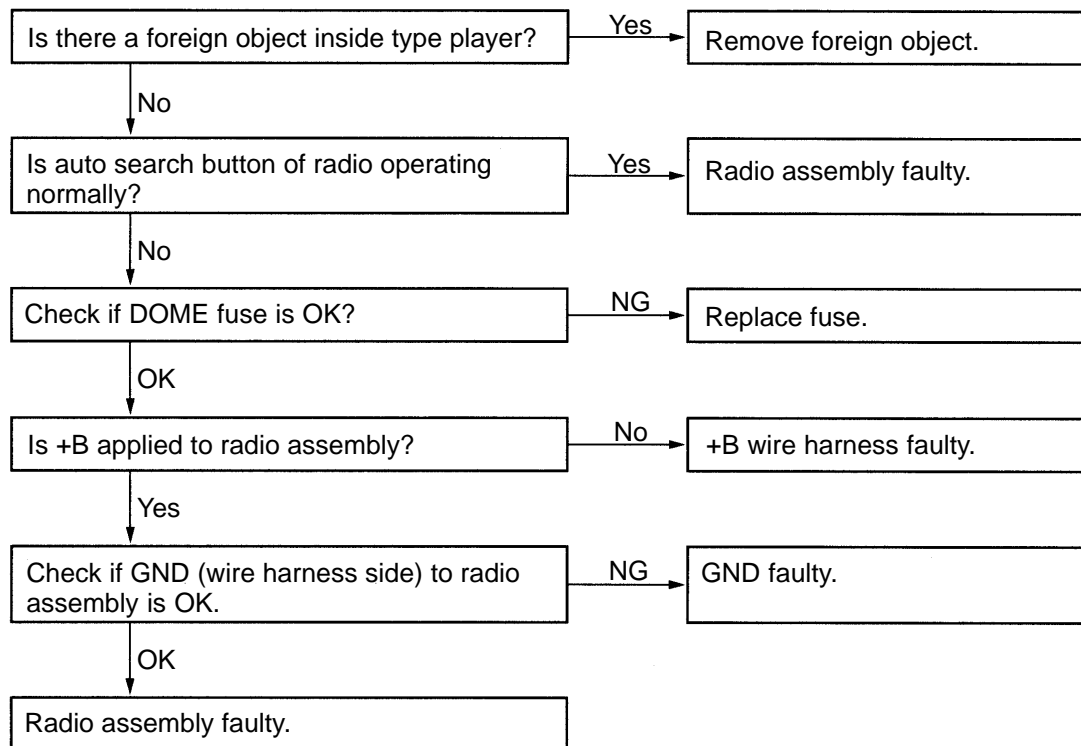
7	Radio	CANNOT SET STATION SELECT BUTTON, PRESET MEMORY DISAPPEARS
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**R** : Radio      **U** : Radio - Tape Player Unit



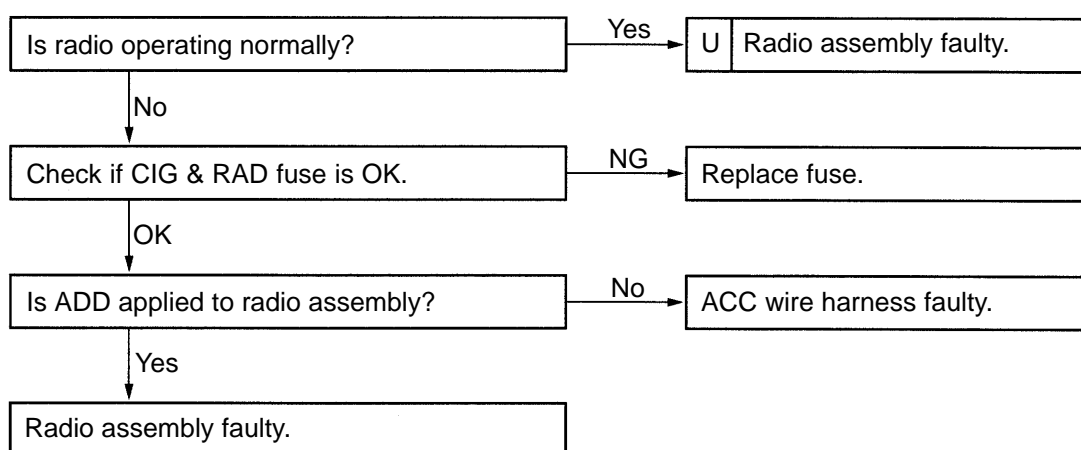
8	Tape Player	CASSETTE TAPE CANNOT BE INSERTED
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**U** : Radio - Tape Player Unit



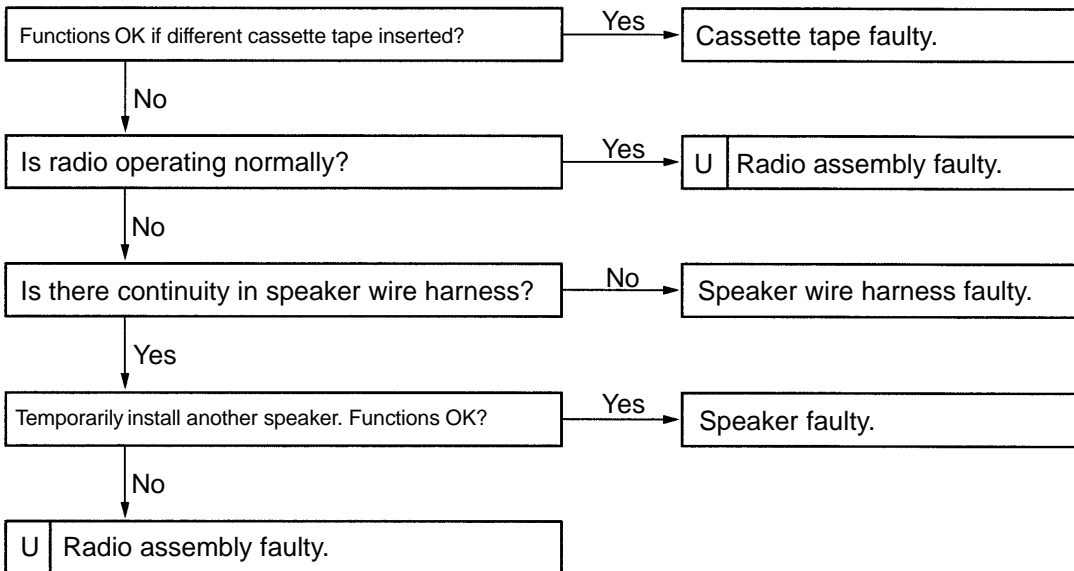
9	Tape Player	CASSETTE TAPE INSERTS, BUT NO POWER
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**U** : Radio - Tape Player Unit



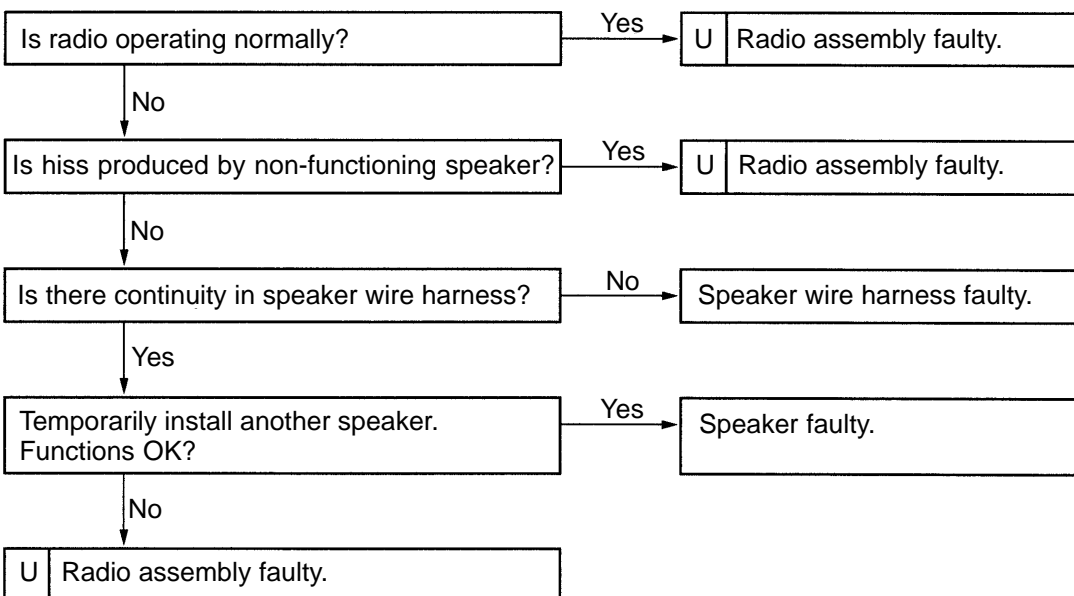
10	Tape Player	POWER COMING IN, BUT TAPE PLAYER NOT OPERATING
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U : Radio - Tape Player Unit



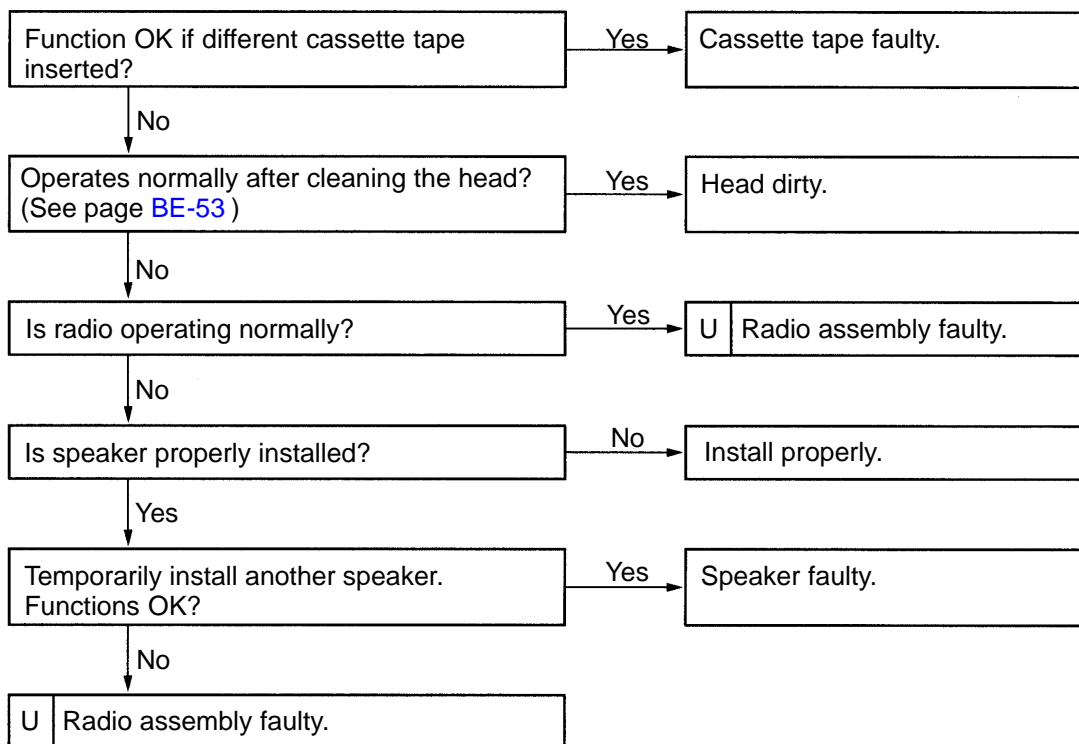
11	Tape Player	EITHER SPEAKER DOES NOT WORK
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U : Radio - Tape Player Unit



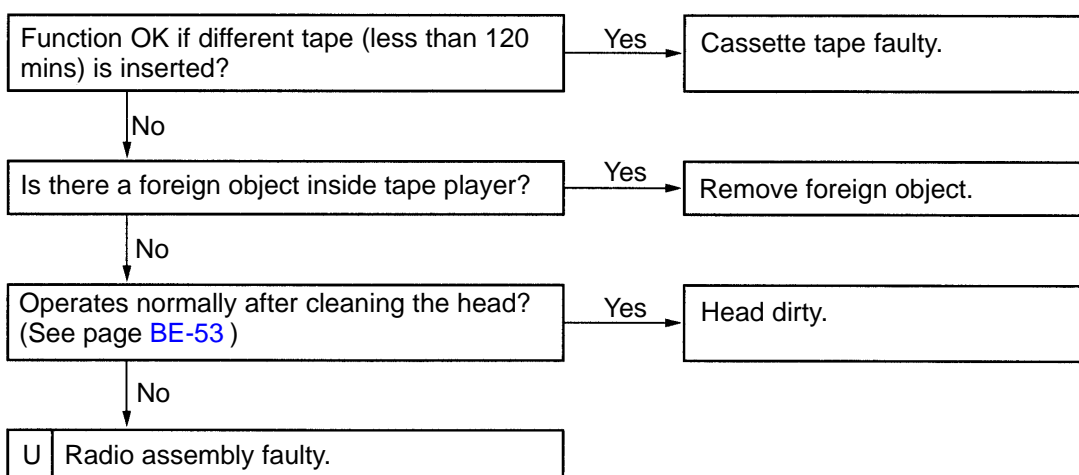
12	<b>Tape Player</b>	<b>SOUND QUALITY POOR (VOLUME FAINT)</b>
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**U** : Radio - Tape Player Unit



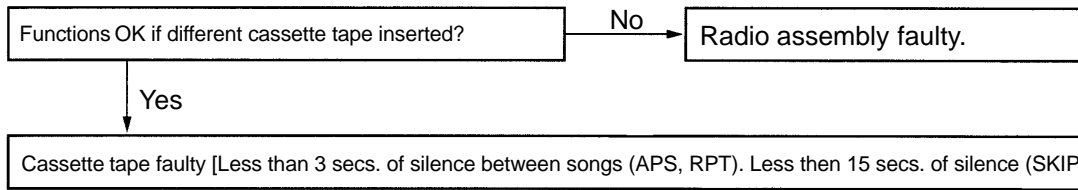
13	<b>Tape Player</b>	<b>TAPE JAMMED, MALFUNCTION WITH TAPE SPEED OR AUTO-REVERSE</b>
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**U** : Radio - Tape Player Unit



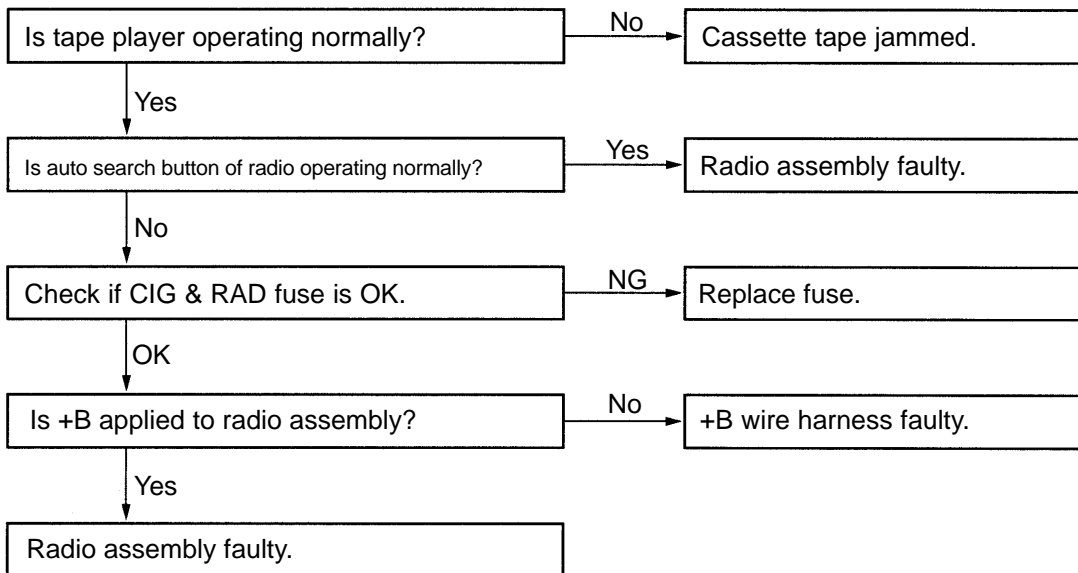
V08179

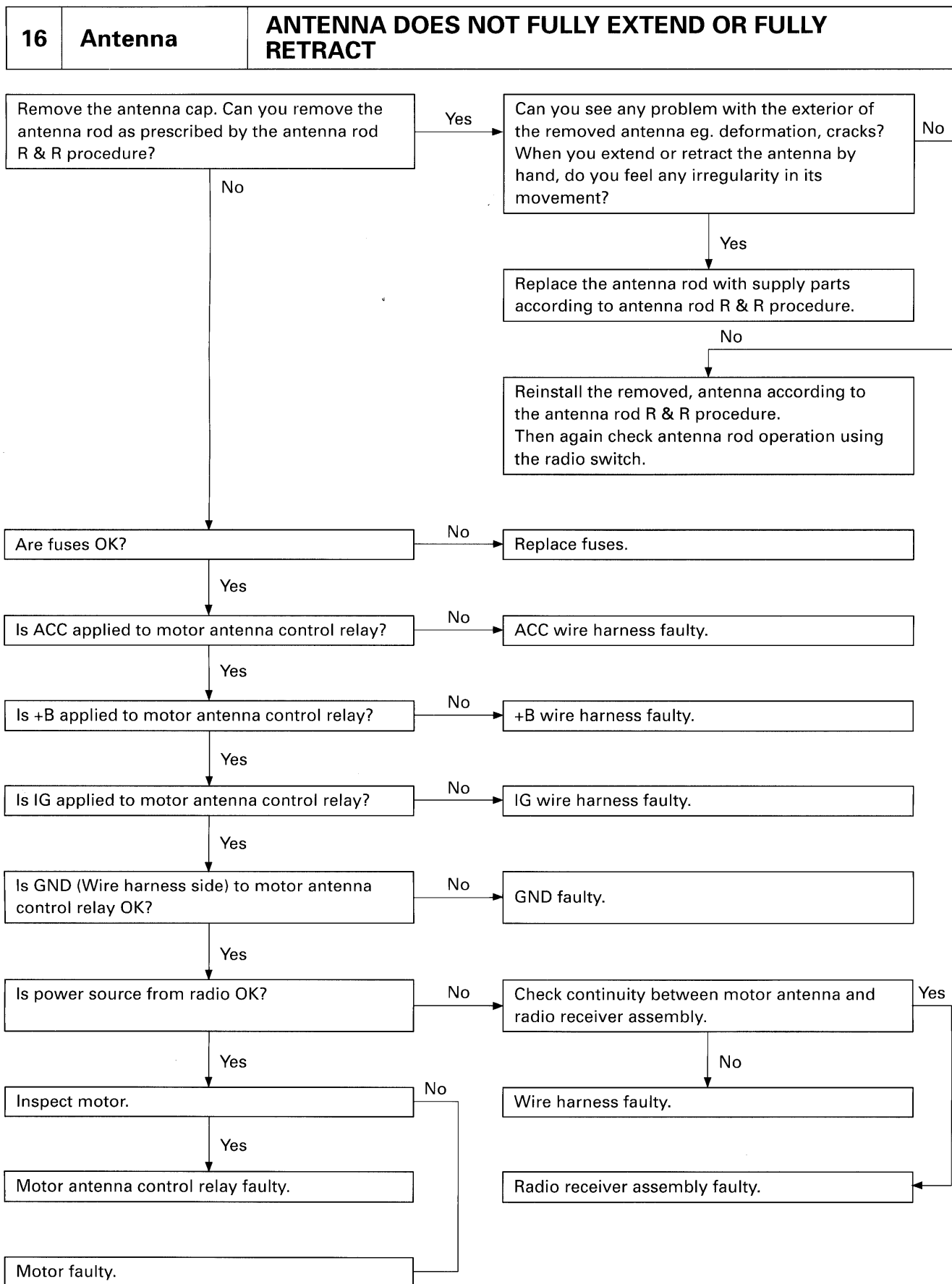
14	Tape Player	APS, SKIP, RPT BUTTONS NOT OPERATING
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15	Tape Player	CASSETTE TAPE WILL NOT EJECT
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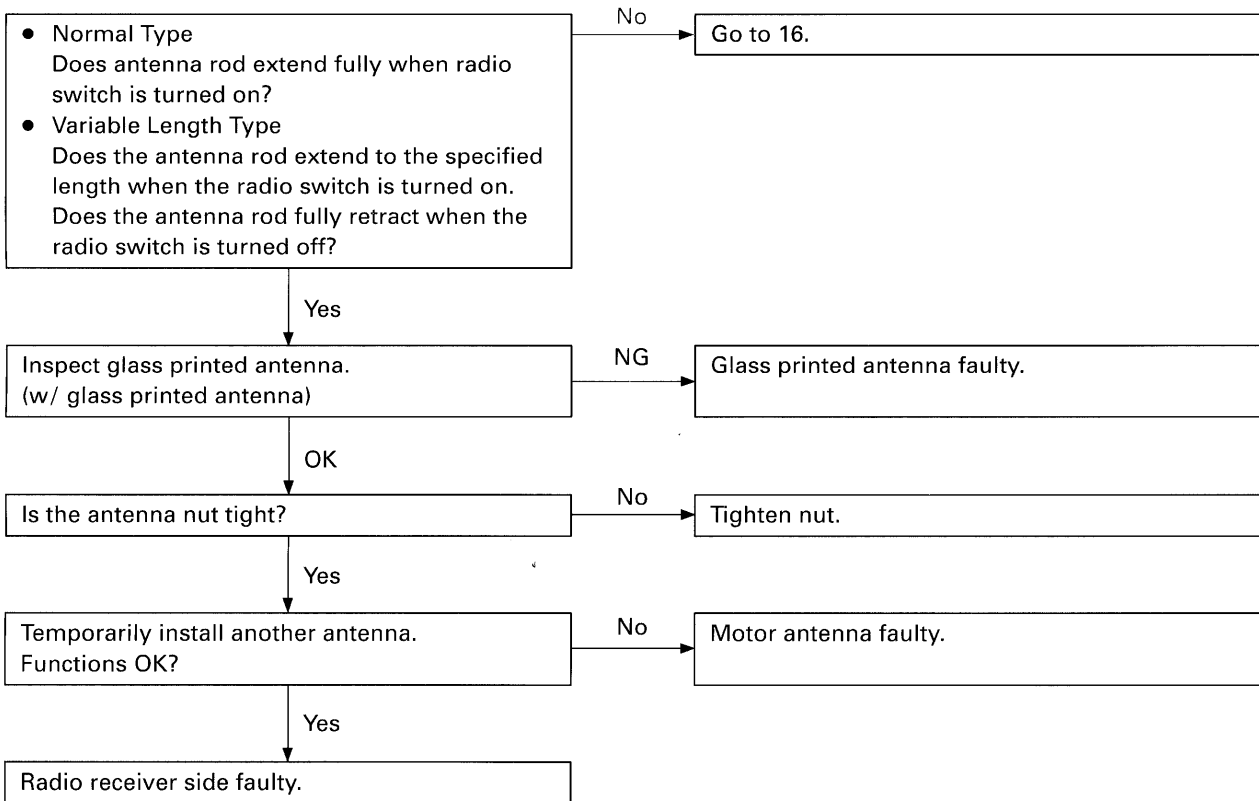
**U** : Radio - Tape Player Unit

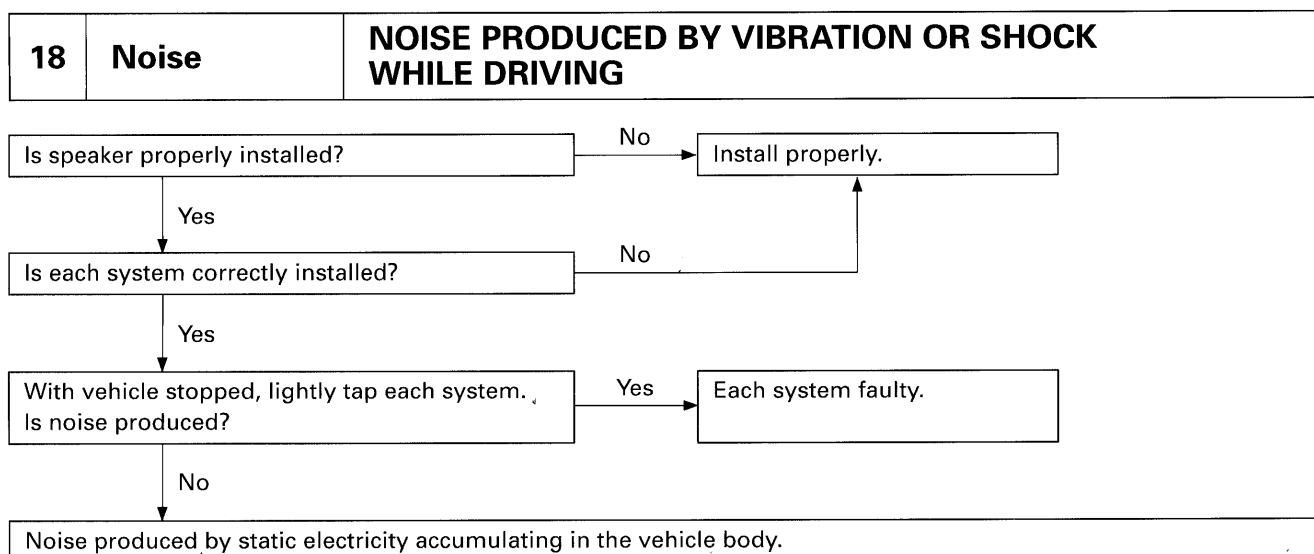


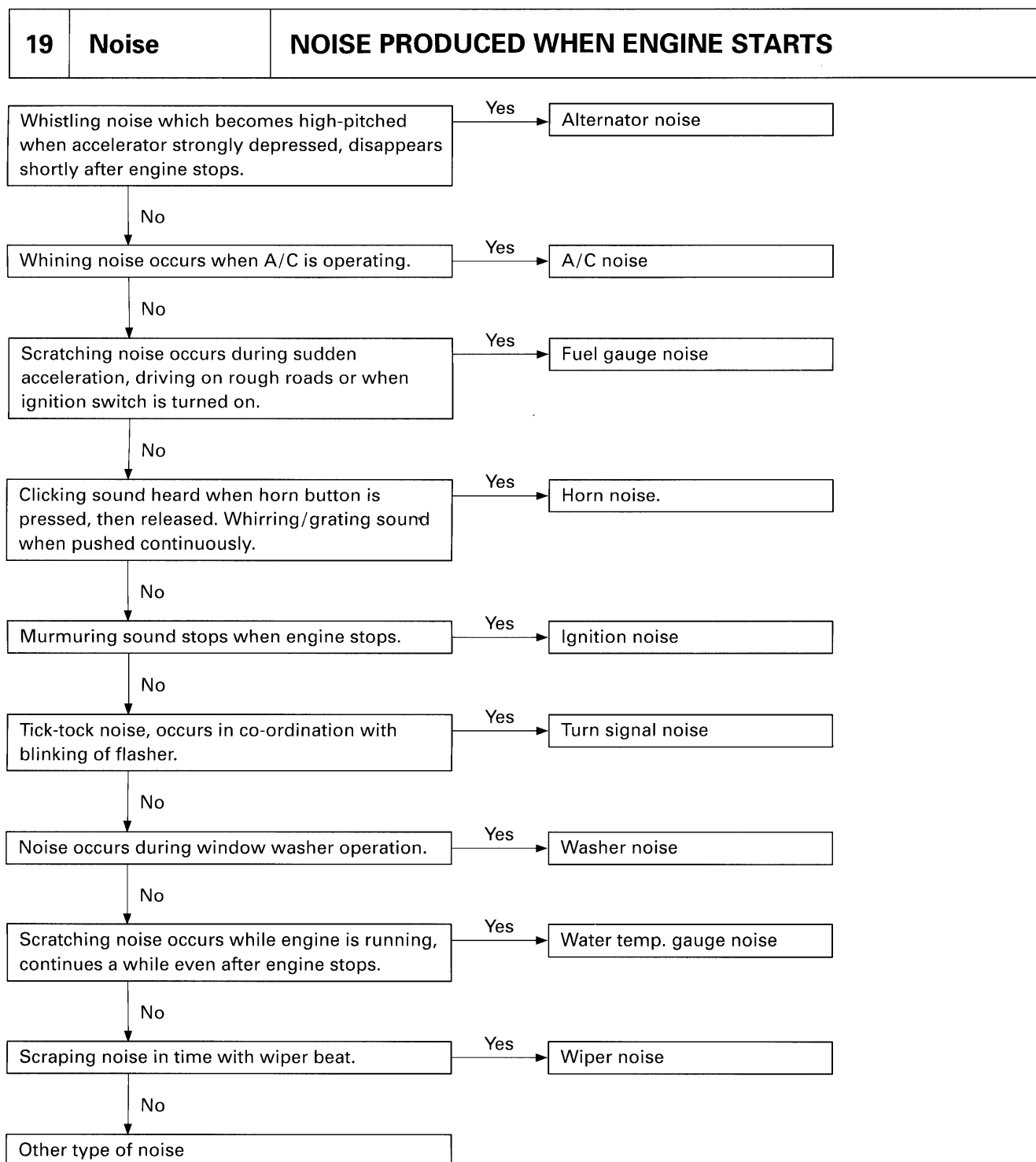


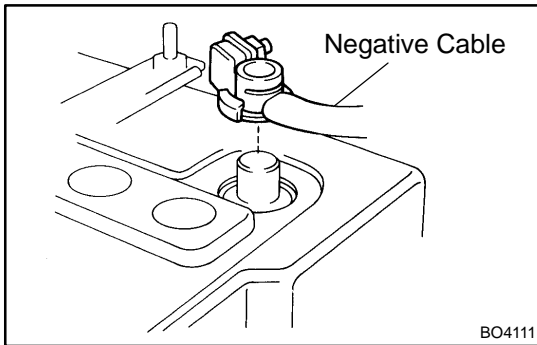


<b>17</b>	<b>Antenna</b>	<b>ANTENNA-RELATED</b>
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## BATTERY PRECAUTION

B033G-01

In order to prevent a short circuit while doing work on the electrical circuit such as disconnecting a connector, first turn off the ignition switch and disconnect the negative (-) terminal cable from the battery before starting work.

### HINT:

When battery voltage is required for operation of a functioning part, connect the cable to the battery when needed, and promptly disconnect it when no longer necessary.

### CAUTION:

- Work must be started after 90 seconds from the time the ignition switch is turned to the "LOCK" position and the negative (-) terminal cable is disconnected from the battery.
- To avoid erasing the memory of each memory system, never use a back-up power supply from outside the vehicle.

## BODY PANEL

B033H-01

### ADJUSTMENT

When removing and installing body panels which have a preload value, after installation refer to the page containing the installation adjustment methods, and make adjustments according to the required specifications.

**HINT:**

When making adjustments, do not completely loosen the bolts and nuts of the part being adjusted. Tighten them appropriately, and move the panels by hand to align them.

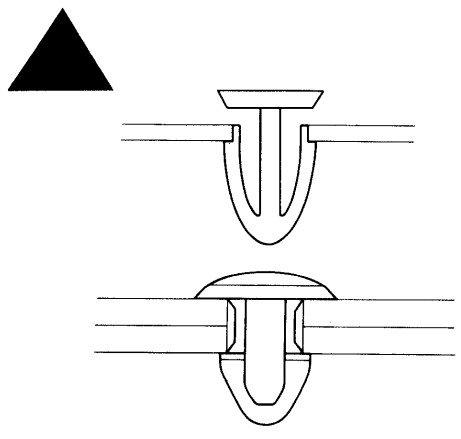
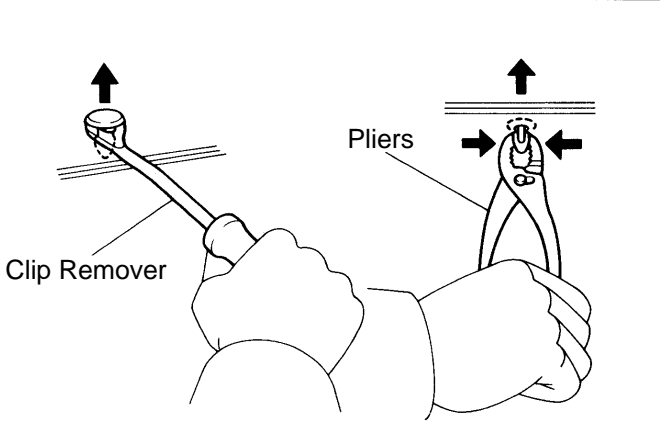
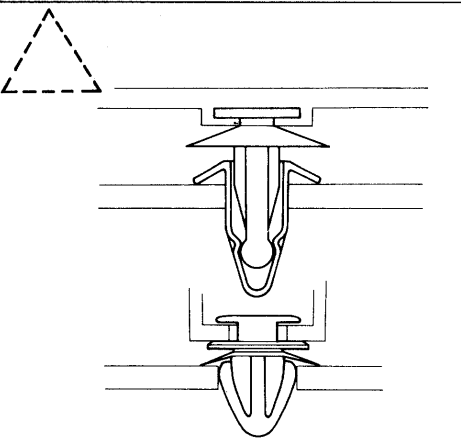
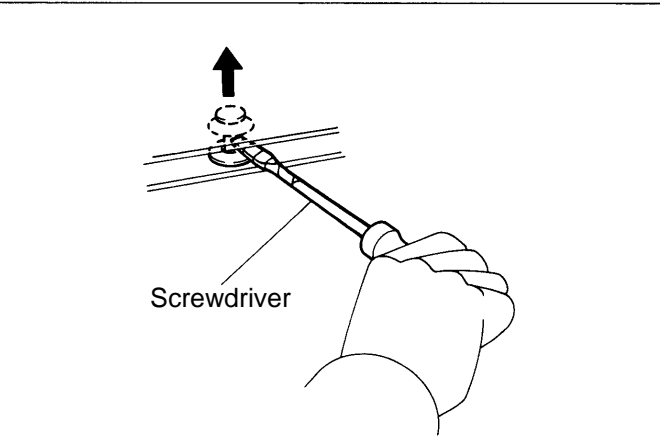
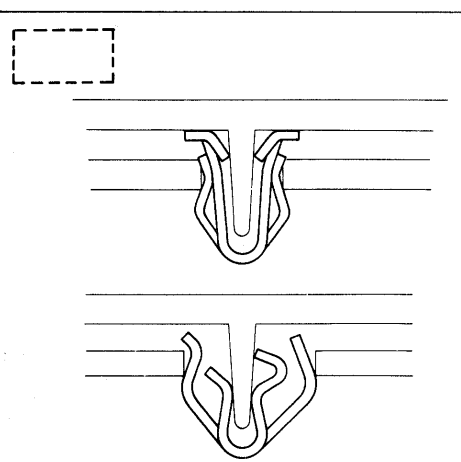
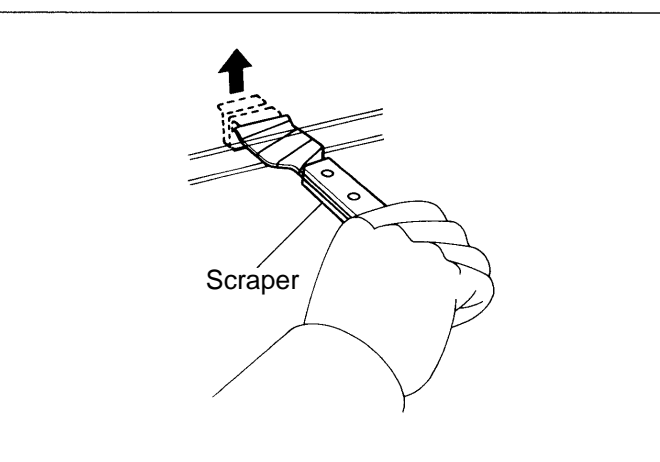
CLIP  
REPLACEMENT

BO1H6-01

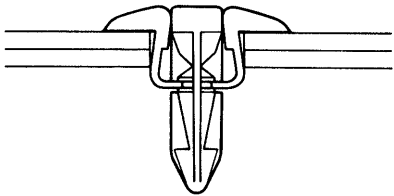
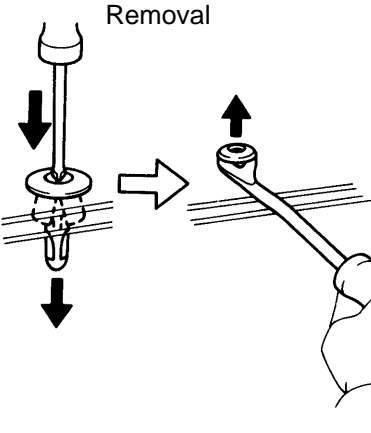
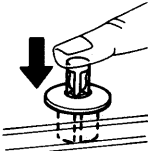
The removal and installation methods of typical clips used in body parts are shown in the table below.

HINT:

If the clip is damaged during the operation, always replace it with a new clip.

Shape (Example)	Removal/Installation
	
	
	

V00005

Shape (Example)	Removal/Installation
	<div><div>Removal</div></div> <div><div>Installation</div></div>

V00012

# SRS AIRBAG

## PRECAUTION

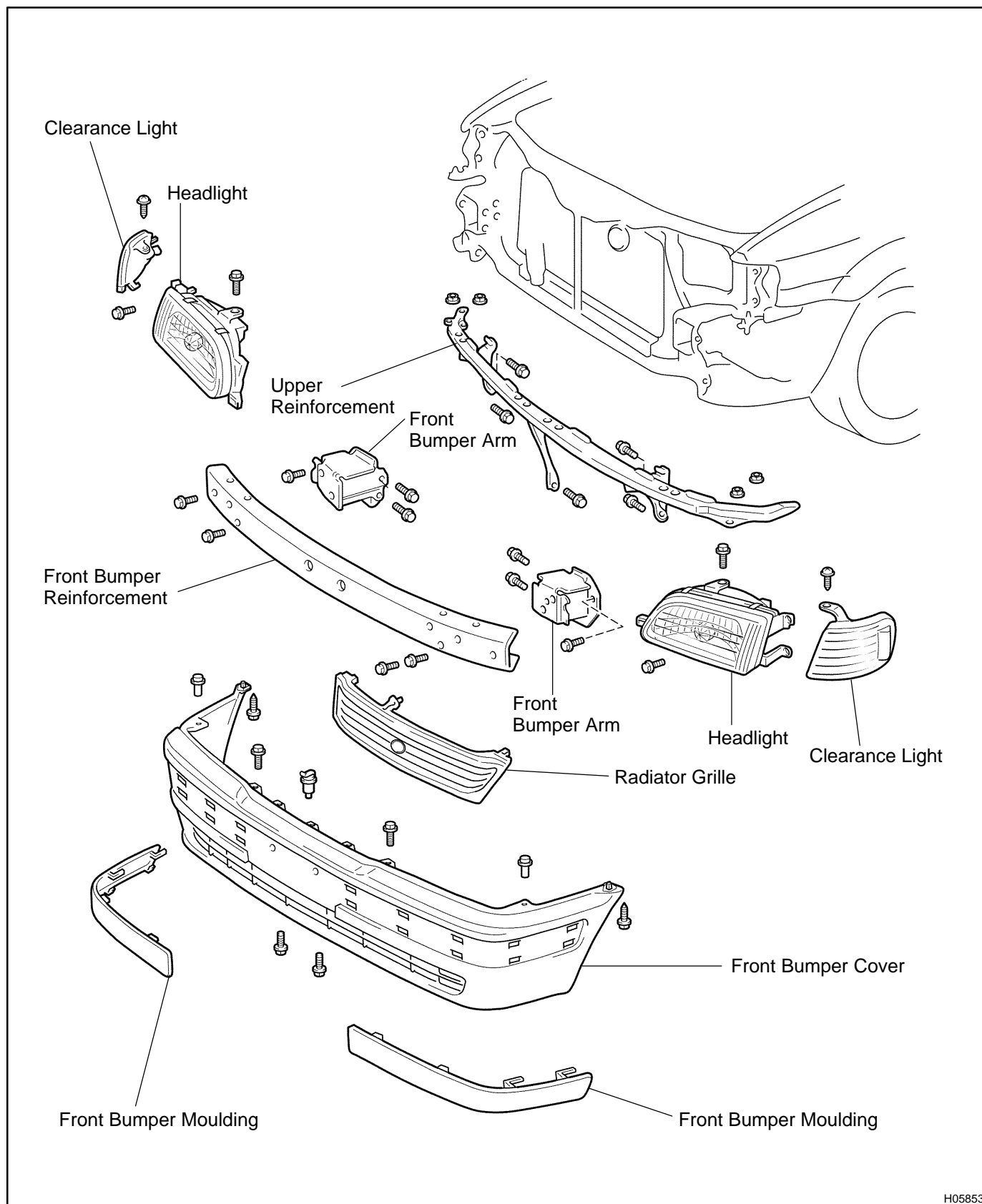
B01H7-01

The TERCEL is equipped with an SRS (Supplemental Restraint System) such as the driver airbag and front passenger airbag. Failure to carry out service operation in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notices in the RS section.



# FRONT BUMPER COMPONENTS

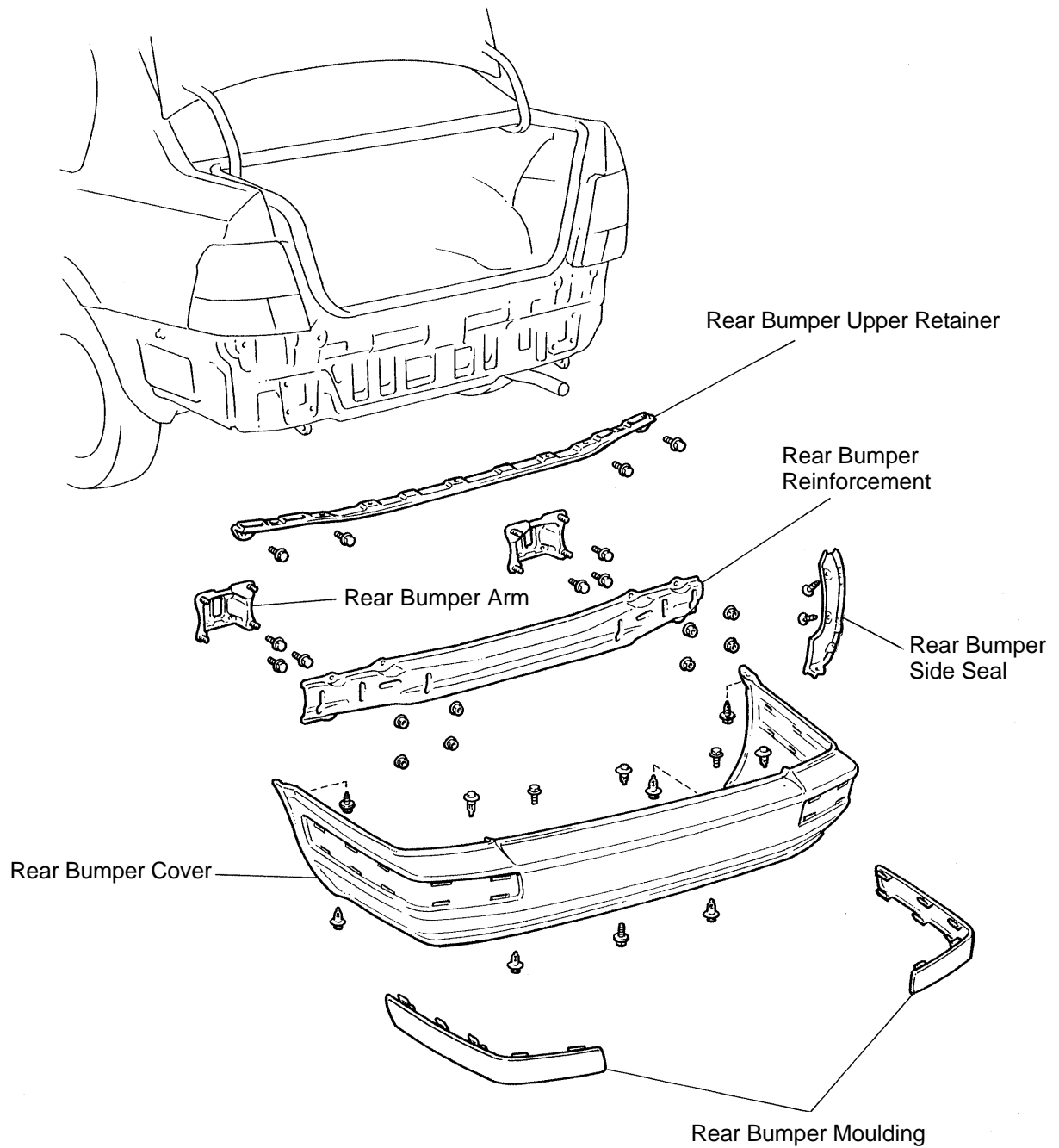
B01H8-03



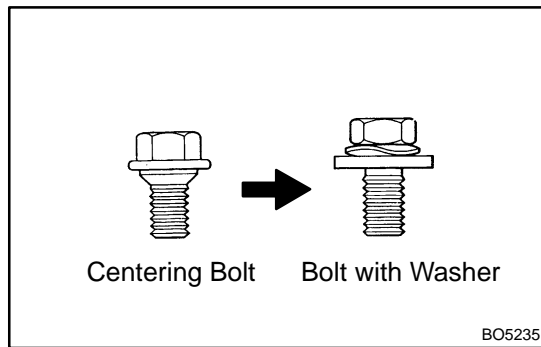
H05853

# REAR BUMPER COMPONENTS

B01H9-04



N12287

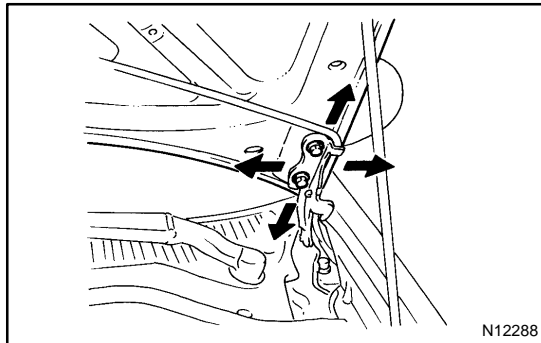


## HOOD ADJUSTMENT

BO1HA-03

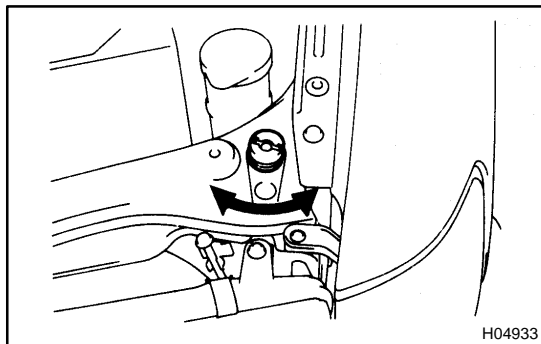
### HINT:

Since the centering bolt is used as the hood hinge and lock set bolt, the hood and lock cannot be adjusted with it on. Substitute the bolt with washer for the centering bolt.



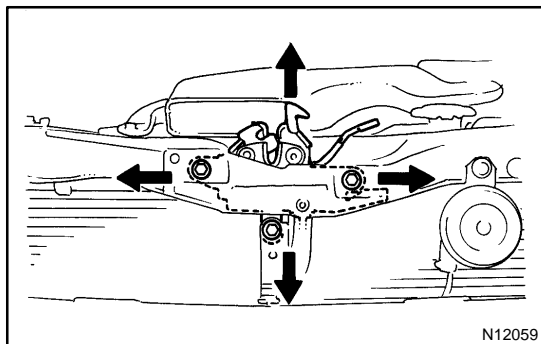
### 1. ADJUST HOOD IN FORWARD/REARWARD AND LEFT/RIGHT DIRECTIONS

Adjust the hood by loosening the hood side hinge bolts.



### 2. ADJUST FRONT EDGE OF HOOD IN VERTICAL DIRECTION

Adjust the hood by turning the cushions.



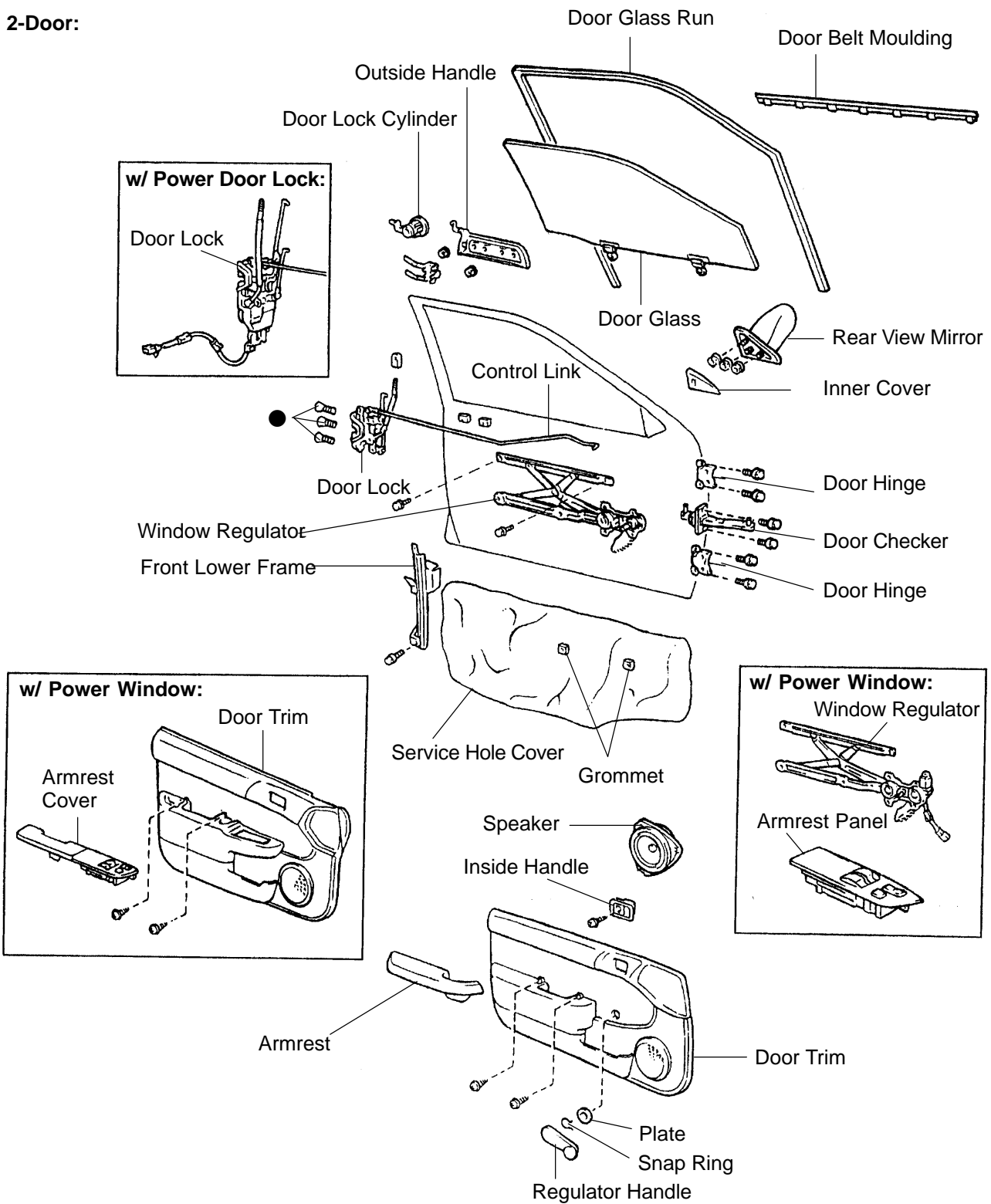
### 3. ADJUST HOOD LOCK

- (a) Remove the radiator grille.
- (b) Adjust the lock by loosening bolts.
- (c) Install the radiator grille.

# FRONT DOOR COMPONENTS

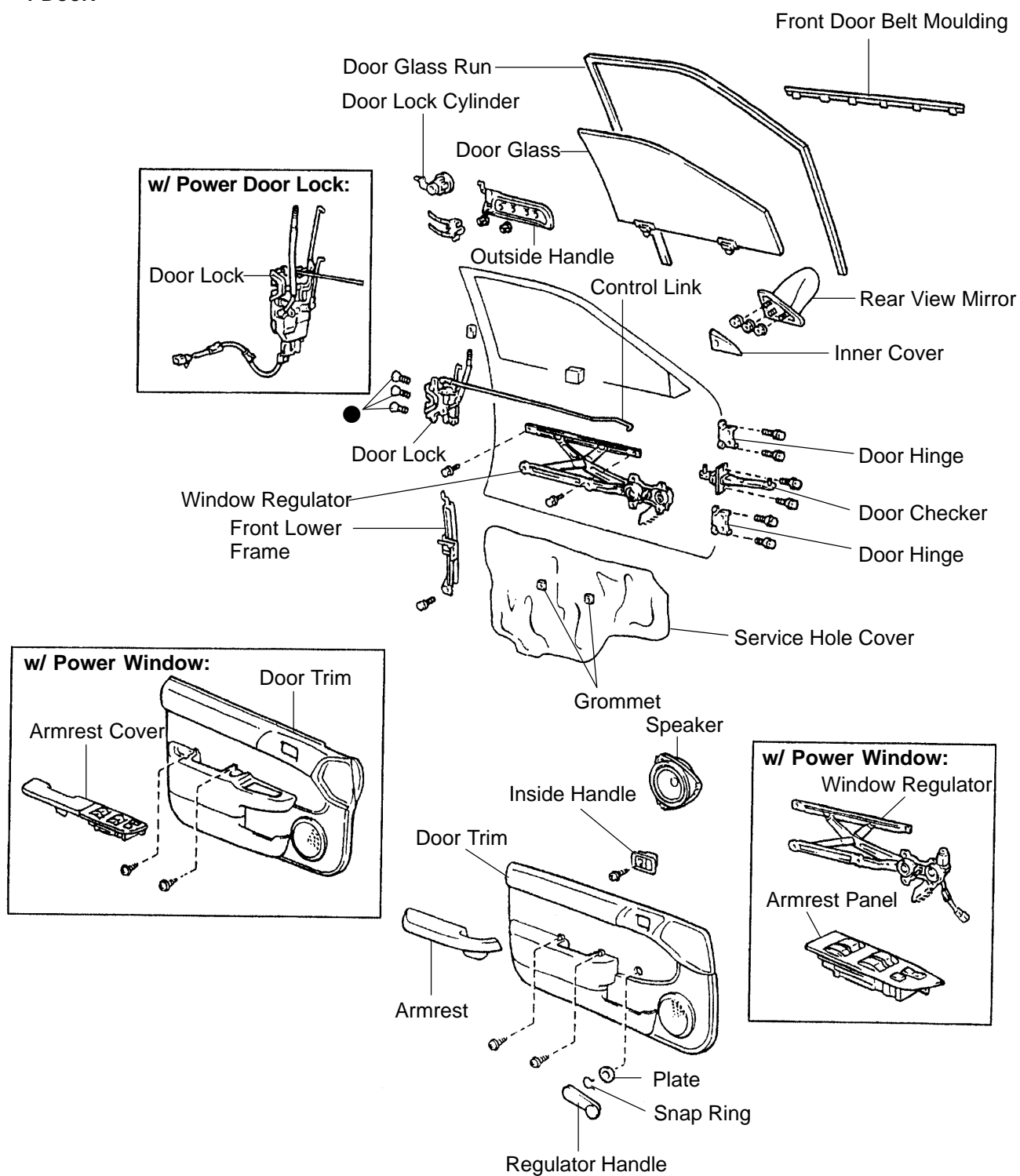
BO1HB-03

2-Door:

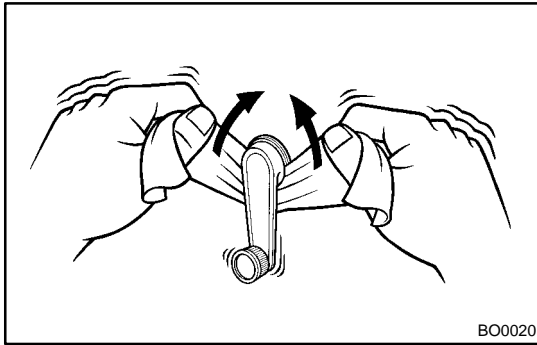


● Precoated part

N15574

**4-Door:**

N15573

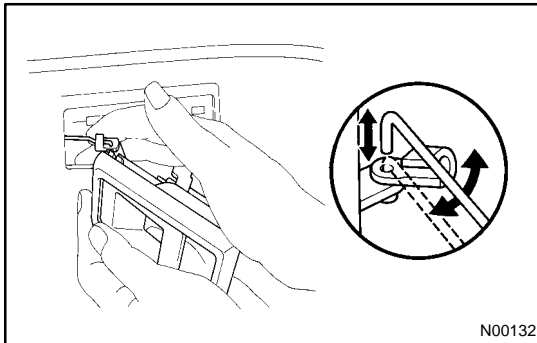


## DISASSEMBLY

### 1. w/o Power Window:

#### REMOVE REGULATOR HANDLE

Pull off the snap ring with a shop rag and remove the regulator handle and plate.

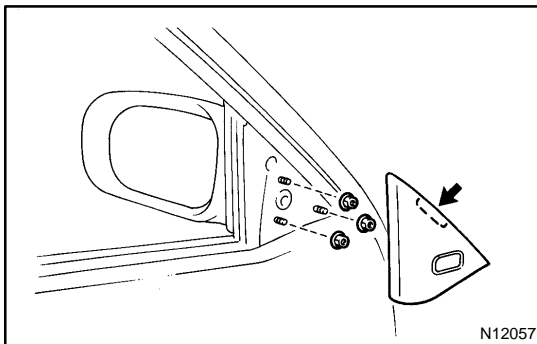


### 2. REMOVE DOOR INSIDE HANDLE

- Remove the screw and slide the inside handle forward.
- Disconnect the inside handle from the control link and remove the inside handle.

### 3. REMOVE OUTSIDE REAR VIEW MIRROR

- w/ Manual Remote Control Mirror:  
Remove the screw and the knob.



- Using a screwdriver, pry off the cover, as shown.

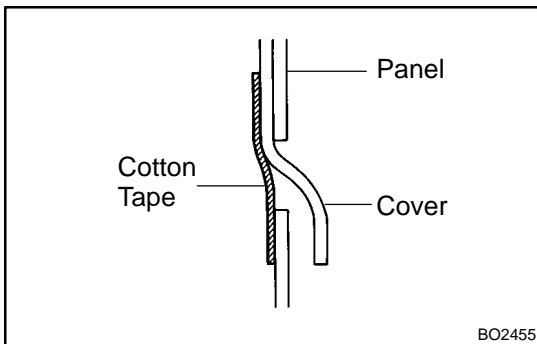
HINT:

Tape the screwdriver tip before use.

**NOTICE:**

**Make sure you pry off the cover from the correct position.**

- Remove the 3 nuts and the mirror.



### 4. w/ Power Window:

#### REMOVE ARMREST PANEL

#### 5. REMOVE ARMREST COVER

### 6. REMOVE DOOR TRIM

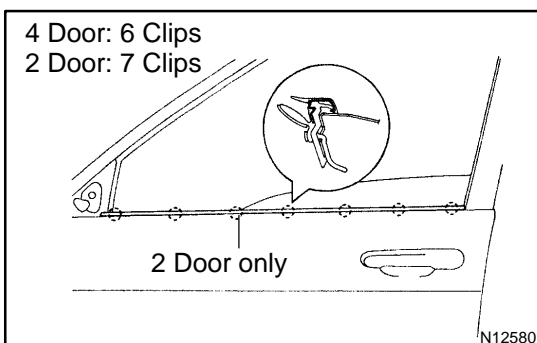
### 7. REMOVE SPEAKER

### 8. REMOVE SERVICE HOLE COVER

Remove the 2 grommets.

HINT:

Bring out the links through the service hole cove.



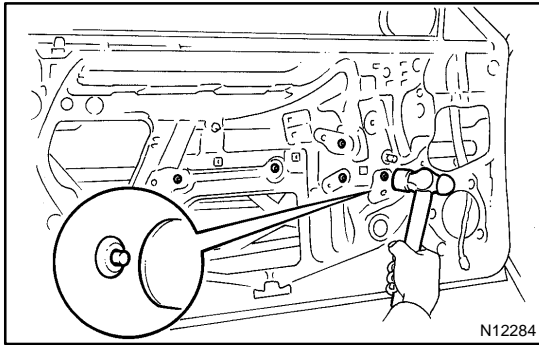
### 9. REMOVE DOOR BELT MOULDING

Pry out the clips from the edge of the weatherstrip and remove the weatherstrip.

### 10. REMOVE DOOR GLASS RUN

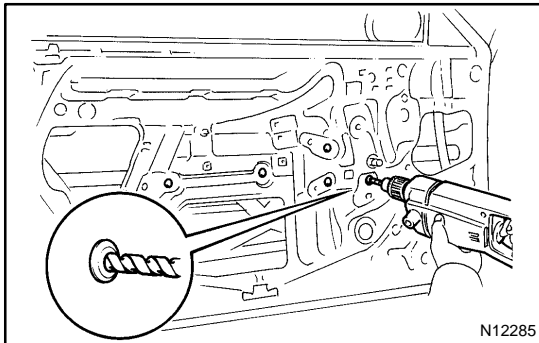
### 11. REMOVE DOOR GLASS

### 12. REMOVE FRONT LOWER FRAME



### 13. REMOVE WINDOW REGULATOR

- (a) Using a hammer, tap out the mandril from the inside to the outside of the vehicle.

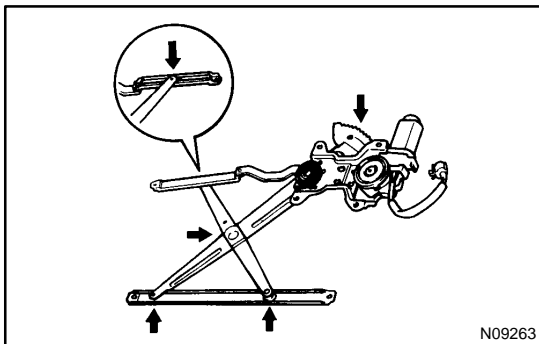


- (b) Using a drill of less than 6.8 mm (0.28 in.), drill out the rivet heads and remove the window regulator.

#### HINT:

Do not drill the door inner hole.

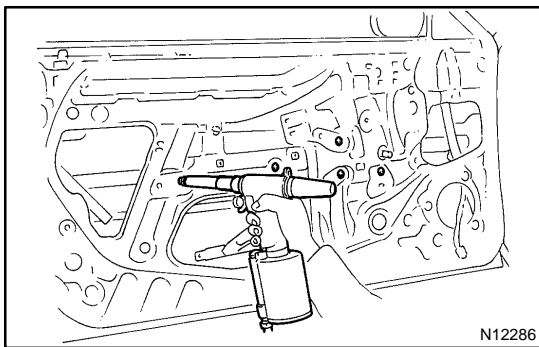
- (c) Remove the regulator through the service hole.  
 (d) Using a vacuum cleaner, remove the drilled rivets and their dust from the inside of the door.



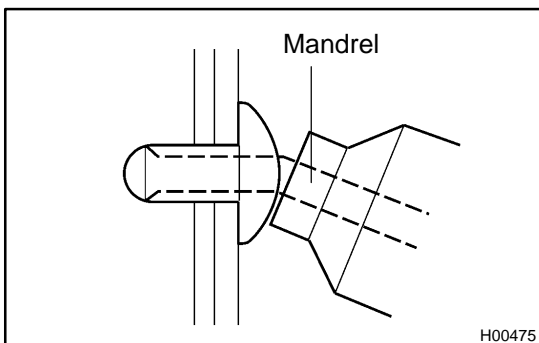
#### HINT:

At the time of reassembly, refer to following pocedures.

- Apply MP grease to the sliding surface and gears of the window regulator.

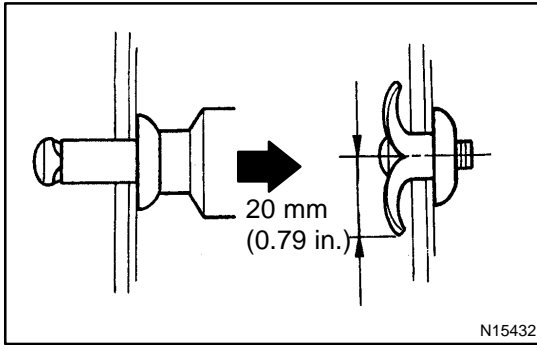


- Using a air riveter, strike rivets into the door frame to install the window regulator the door frame.

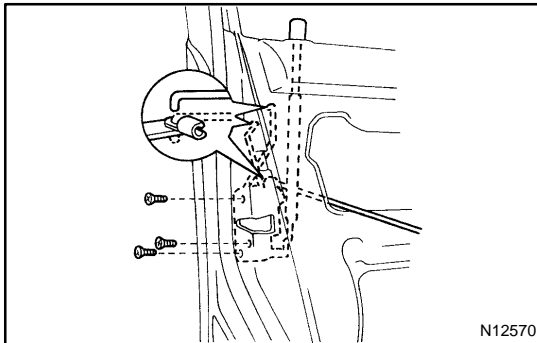


#### NOTICE:

If the rivet is not positioned perpendicularly it will bend the mandrel. When the trigger is then pulled, it may damage the air riveter.

**CAUTION:**

To avoid personal injury and shorting of the wiring when installing (6.4 mm) rivets deep your hands and wire harness out of the (20 mm) radius that caulked (6.4 mm) rivet will cover.

**14. REMOVE DOOR LOCK**

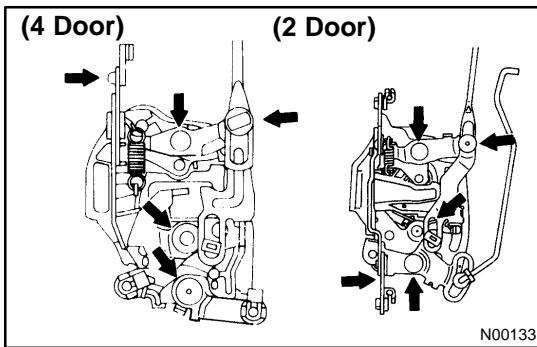
- (a) Remove the door lock control knob from the link.
- (b) Disconnect the 2 links from the outside handle and the door lock cylinder.
- (c) Remove the 3 screws.

**Torque: 5.4 N·m (55 kgf·cm, 48 in.-lbf)**

**HINT:**

At the time of reassembly, refer to following procedures.

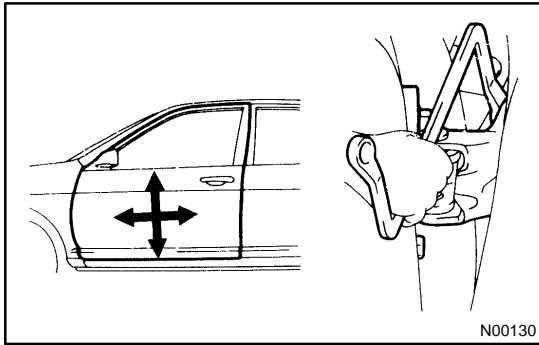
- Apply adhesive to the 3 screws.  
**Part No.08833-00090, THREE BOND 1324 or equivalent.**



- Apply MP grease to the sliding and rotating parts of the door lock.

**15. REMOVE OUTSIDE HANDLE****16. REMOVE DOOR LOCK CYLINDER**



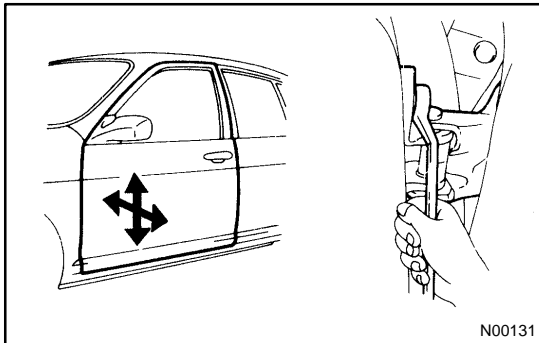


## ADJUSTMENT

### 1. ADJUST DOOR IN FORWARD/REARWARD AND VERTICAL DIRECTIONS

Using SST, adjust the door by loosening the body side hinge bolts.

SST 09812-00010

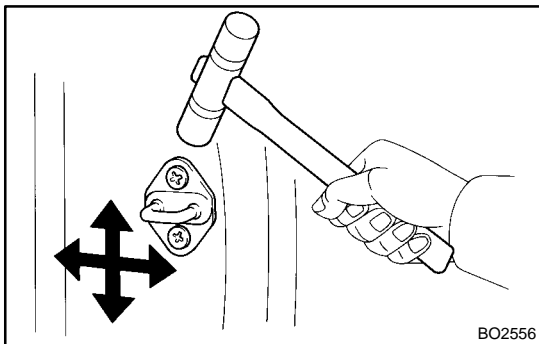


### 2. ADJUST DOOR IN LEFT/RIGHT AND VERTICAL DIRECTIONS

Adjust the door by loosening the door side hinge bolts to adjust.

HINT:

Substitute the bolt with washer for the centering bolt (See page [BO-8](#) ).



### 3. ADJUST DOOR LOCK STRIKER

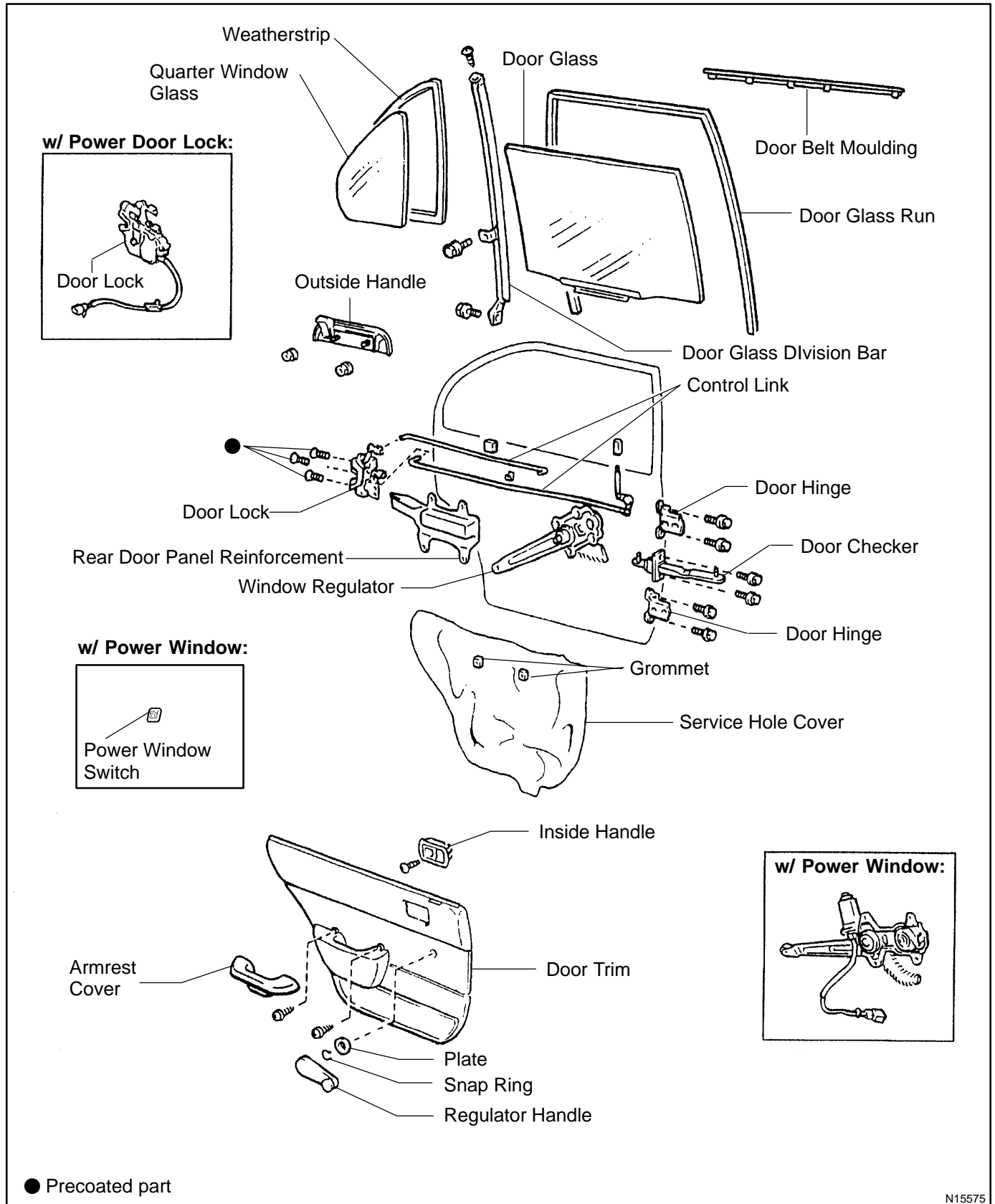
- Check that the door fit and door lock linkages are adjusted correctly.
- Loosen the striker mounting screws to adjust.
- Using a plastic hammer, tap the striker to adjust it.

## REASSEMBLY

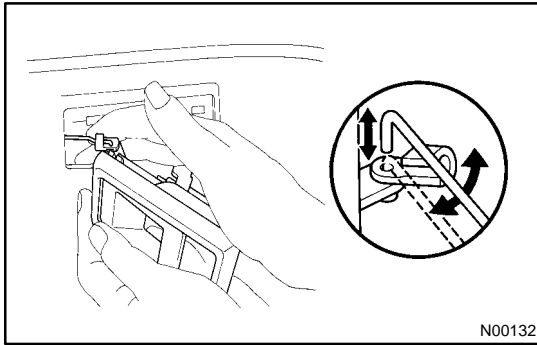
Reassembly is in the reverse order of disassembly procedure (See page [BO-11](#)).

# REAR DOOR COMPONENTS

B01HF-04

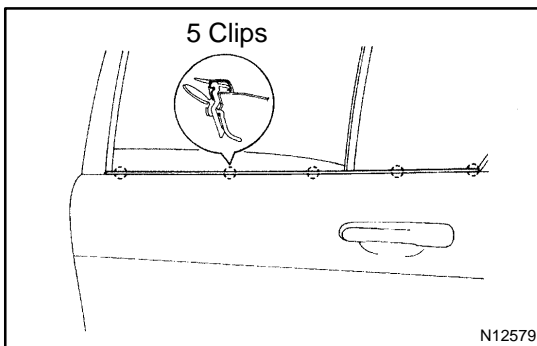


N15575



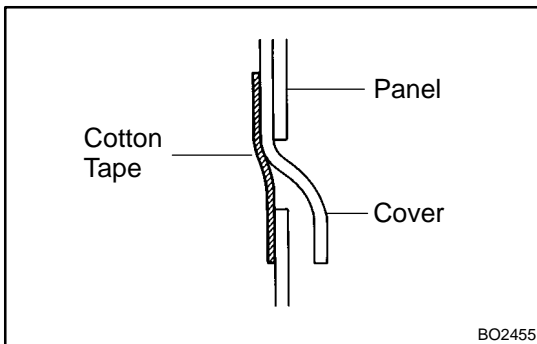
## DISASSEMBLY

1. **w/o Power Window:**  
**REMOVE REGULATOR HANDLE** (See page [BO-11](#))
2. **REMOVE DOOR INSIDE HANDLE**
  - (a) Remove the screw and slide the handle forward.
  - (b) Disconnect the handle from the control link and remove the handle.
3. **REMOVE ARMREST COVER**
4. **REMOVE DOOR TRIM**
5. **REMOVE SPEAKER**



### 6. REMOVE DOOR BELT MOULDING

Pry out the clips from the edge of the weatherstrip and remove it.



### 7. REMOVE SERVICE HOLE COVER

Remove the 2 grommets.

HINT:

Bring out the links through the service hole cover.

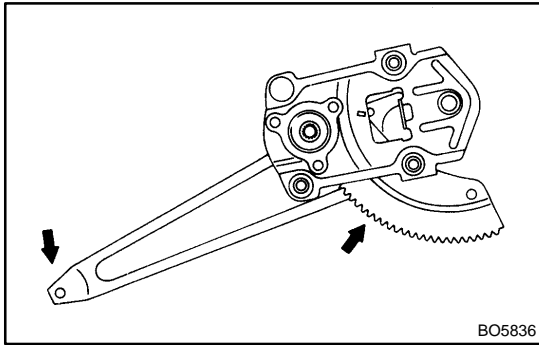
### 8. REMOVE DOOR GLASS AND DOOR GLASS RUN

Disconnect the glass from the regulator arm and remove the glass by pulling it upward.

HINT:

Insert a shop rag inside the panel to prevent scratching the glass.

### 9. REMOVE QUARTER WINDOW GLASS WITH WEATHERSTRIP



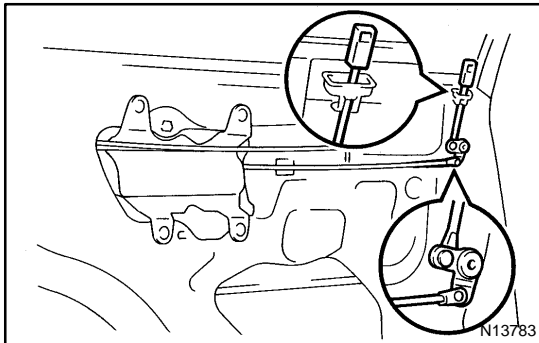
# 10. REMOVE WINDOW REGULATOR (See page [BO-11](#))

## HINT:

Apply MP grease to the sliding surface and gears of the window regulator.

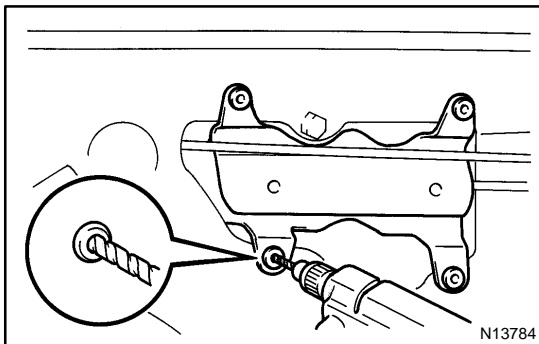
## NOTICE:

Do not apply MP grease to the spring of the window regulator.



# 11. REMOVE REAR DOOR PANEL REINFORCEMENT

- Remove the door lock control knob from the link.
- Remove the clip.
- Remove the link from the clip.

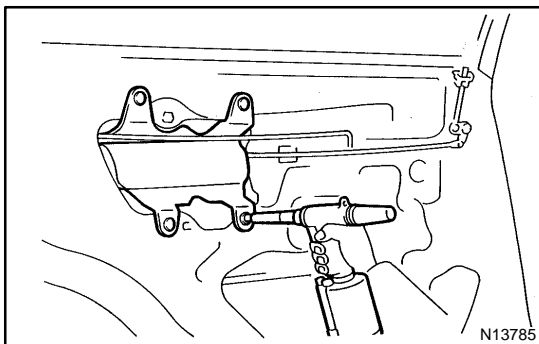


- Using a drill of less than 5.2 mm (1.20 in.), drill out the rivet heads and pull out the rear door panel reinforcement forward from the link.

## HINT:

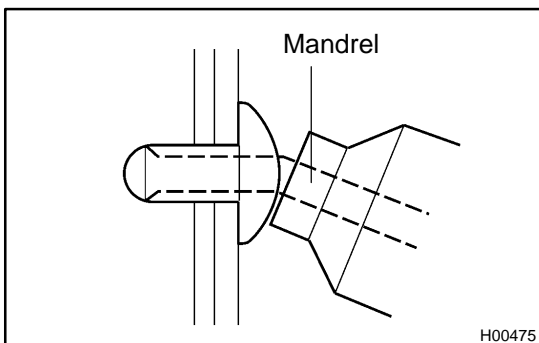
Do not drill the door inner hole.

- Using a vacuum cleaner, remove the drilled rivets and their dust from the inside of the door.



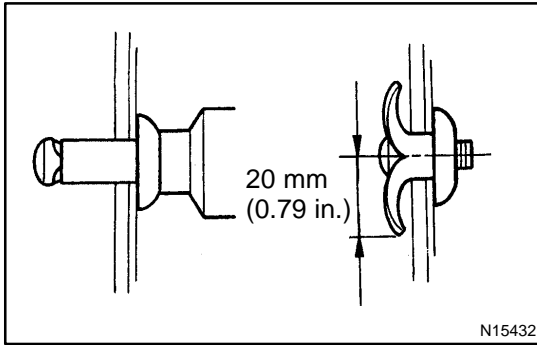
## HINT:

Using an air riveter, strike rivets into the door frame to install the rear door panel reinforcement.

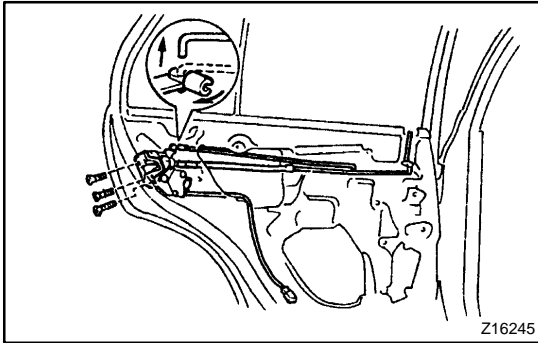


## NOTICE:

If the rivet is not positioned perpendicularly it will bend the mandrel. When the trigger is then pulled, it may damage the air riveter.

**CAUTION:**

To avoid personal injury and shorting of the wiring when installing (6.4 mm) rivets keep your hands and wire harness out of the (20 mm) radius that caulked (6.4 mm) rivet will cover.

**12. REMOVE DOOR LOCK**

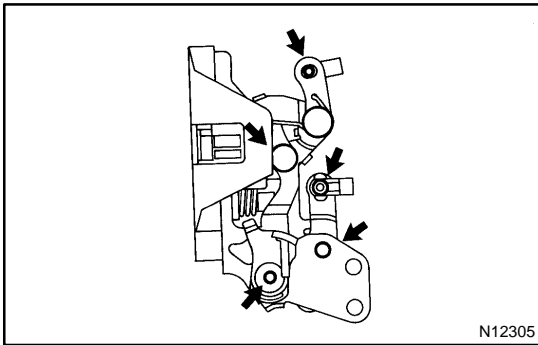
- (a) Disconnect the link from the outside handle.
- (b) Remove the 3 screws.

**Torque: 5.4 N·m (55 kgf·cm, 48 in.-lbf)**

**HINT:**

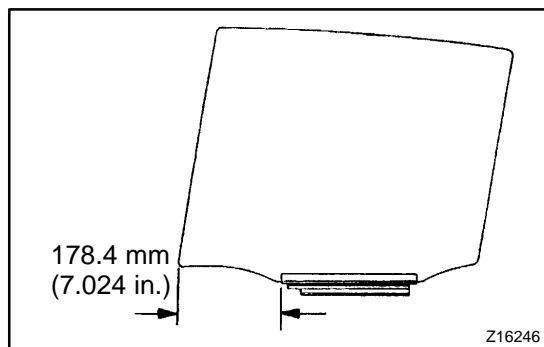
Apply adhesive to the 3 screws.

**Part No.08833-00090, THREE BOND 1324 or equivalent.**

**HINT:**

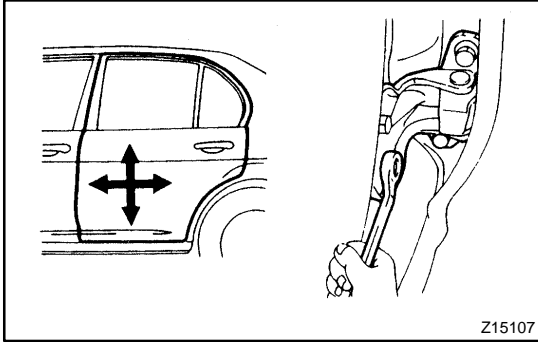
Apply MP grease to the sliding and rotating parts of the door lock.

**13. REMOVE OUTSIDE HANDLE**



## REPLACEMENT

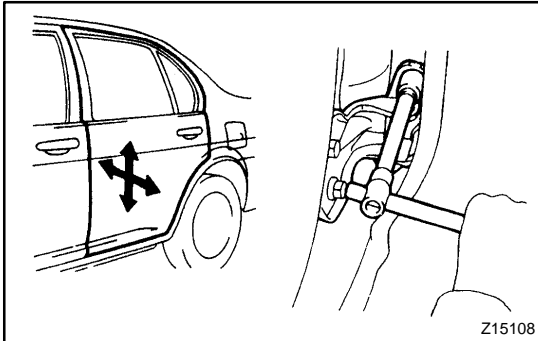
1. REMOVE GLASS CHANNEL WITH SCREWDRIVER OR LIKE OBJECT
2. APPLY SOAPY WATER TO INSIDE OF WEATHERSTRIP
3. INSTALL CHANNEL BY TAPPING IT WITH PLASTIC HAMMER



## ADJUSTMENT

### 1. ADJUST DOOR IN FORWARD/REARWARD AND VERTICAL DIRECTIONS

- (a) Upper Side:  
Loosen the body side hinge nuts to adjust.
- (b) Lower Side:  
Loosen the body side hinge bolts to adjust.



### 2. ADJUST DOOR IN LEFT/RIGHT AND VERTICAL DIRECTIONS

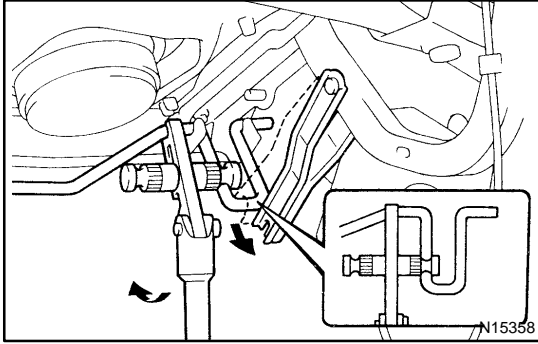
Loosen the door side hinge bolts to adjust.

### 3. ADJUST DOOR LOCK STRIKER (See page [BO-14](#))



## REASSEMBLY

Reassembly is in the reverse order of disassembly procedure (See page [BO-17](#) ).



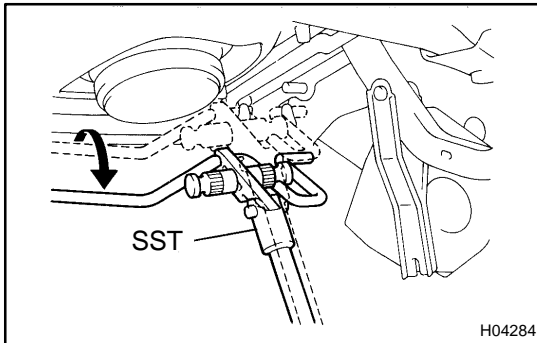
## LUGGAGE COMPARTMENT DOOR REMOVAL

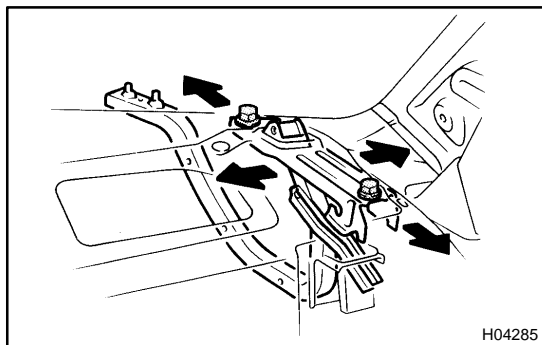
B0330-01

### 1. REMOVE TORSION BAR FROM LUGGAGE COMPARTMENT DOOR HINGE

- (a) Install SST to the torsion bar of the hinge side.  
SST 09804-24010
- (b) Push down on SST, and pull the luggage compartment door hinge from the torsion bar.
- (c) Slowly lift SST, and remove the torsion bar with SST from the torsion bar bracket.
- (d) Remove the torsion bar from the center bracket.
- (e) Do the same for the other side.

### 2. REMOVE LUGGAGE COMPARTMENT DOOR

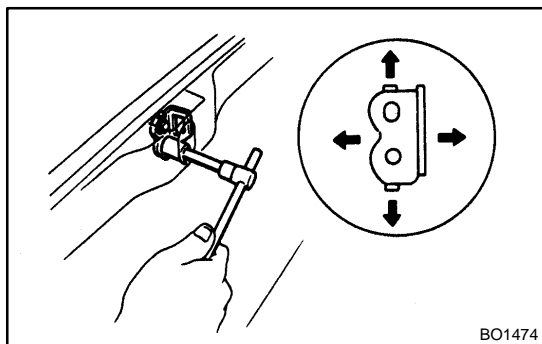




## ADJUSTMENT

### 1. ADJUST LUGGAGE COMPARTMENT DOOR

- For forward/rearward and left/right adjustments, loosen the bolts.
- For vertical adjustment of front end of door, increase or decrease the number of washers.



### 2. ADJUST LOCK AND STRIKER

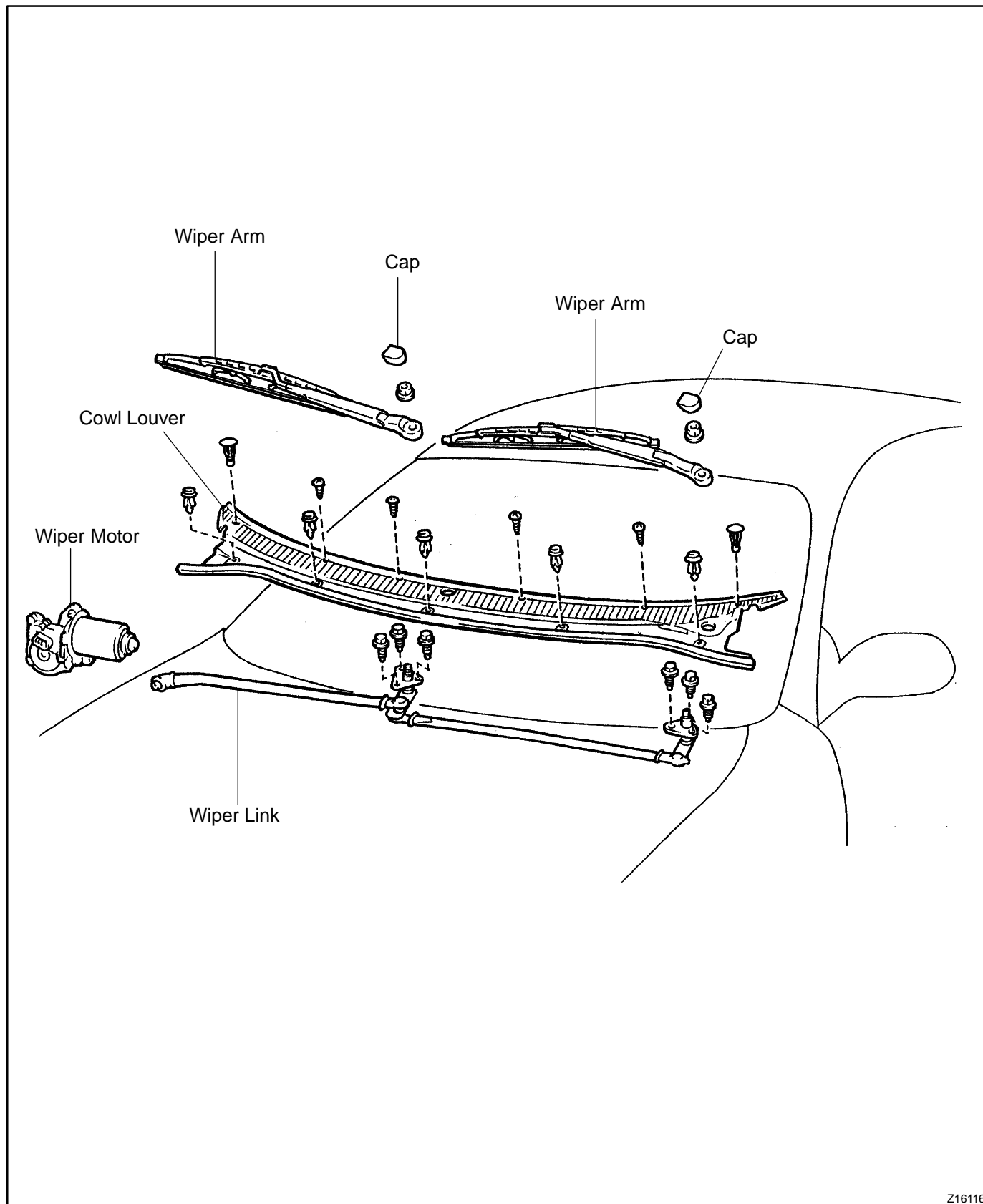
Loosen the mounting bolts to adjust the lock and striker.

## INSTALLATION

Installation is in the reverse order of removal procedure (See page [BO-23](#) ).

# FRONT WIPER AND WASHER COMPONENTS

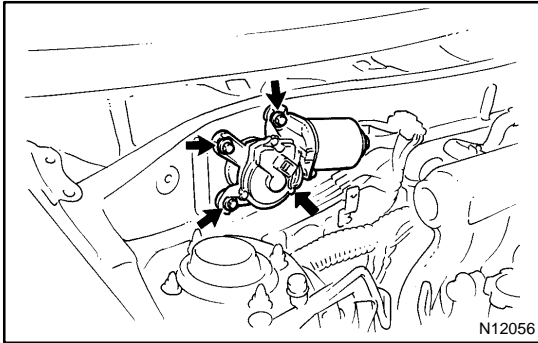
B01HP-02



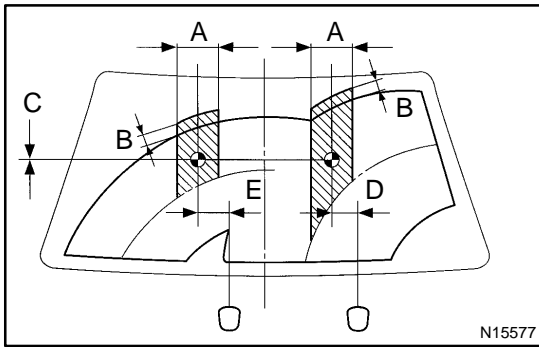
Z16116

## REMOVAL

1. **REMOVE WIPER ARMS**  
Torque: 20 N·m (204 kgf-cm, 15 ft-lbf)
2. **REMOVE COWL LOUVER**



3. **REMOVE WIPER MOTOR**
  - (a) Disconnect the connector, then unfasten the 4 bolts.
  - (b) Connect the claw of the wiper link to the panel.
  - (c) Disconnect the motor from the wiper link and remove it.
4. **REMOVE WIPER LINK**
  - (a) Remove the 6 bolts.
  - (b) Remove the wiper link through the service hole.
5. **REMOVE WIPER LINK**
6. **REMOVE WINDOW WASHER NOZZLE**



## ADJUSTMENT

### 1. INSPECT WASHER NOZZLE

- (a) While operating the washer, check whether the upper point where the washer fluid hits the windshield and the upsurge area are within the range indicated by the hatched line.

**A: Approx. 150 mm (5.91 in.)**

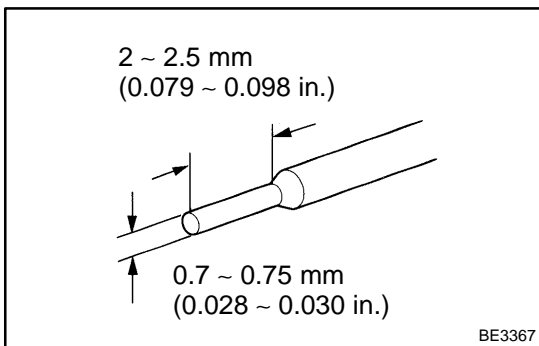
**B: Approx. 50 mm (1.99 in.)**

**C: Approx. 0 - 50 mm (0 - 1.99 in.)**

**D: Approx. 30 mm (1.18 in.)**

**E: Approx. 20 mm (0.79 in.)**

- (b) Check if the lower point where the washer fluid hits the windshield is within the range of the wiping pattern (the area of the glass which is wiped by the wiper blades).



### 2. ADJUST WASHER NOZZLE

Using a tool like that one shown in the illustration, change the direction of the nozzle hole to adjust the point where washer fluid hits the windshield.

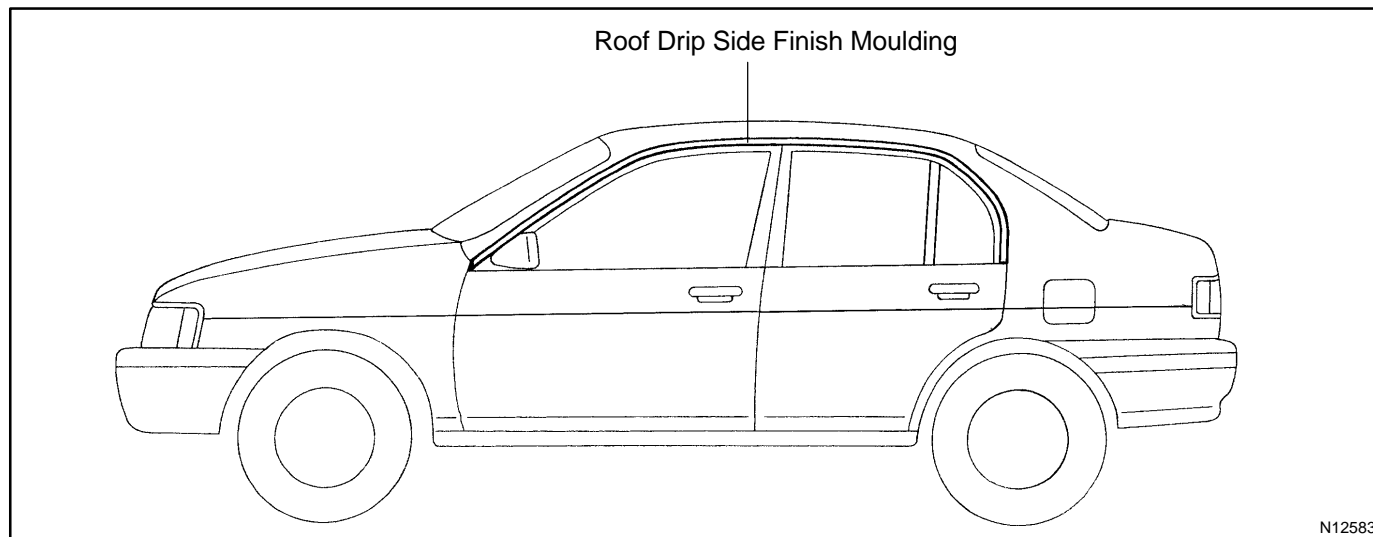
## INSTALLATION

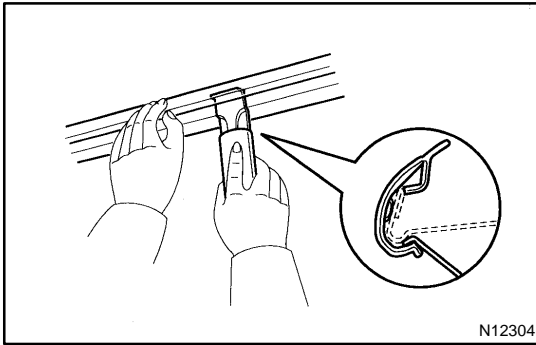
Installation is in the reverse order of removal procedure (See page [BO-27](#) ).



# ROOF DRIP SIDE FINISH MOULDING COMPONENTS

B01HX-02



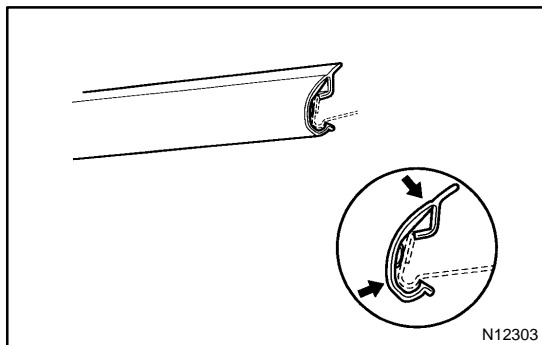


## REMOVAL

### REMOVE ROOF DRIP SIDE FINISH MOULDING

Using SST, pull off the roof drip side finish moulding from front ends.

SST 09806-30010



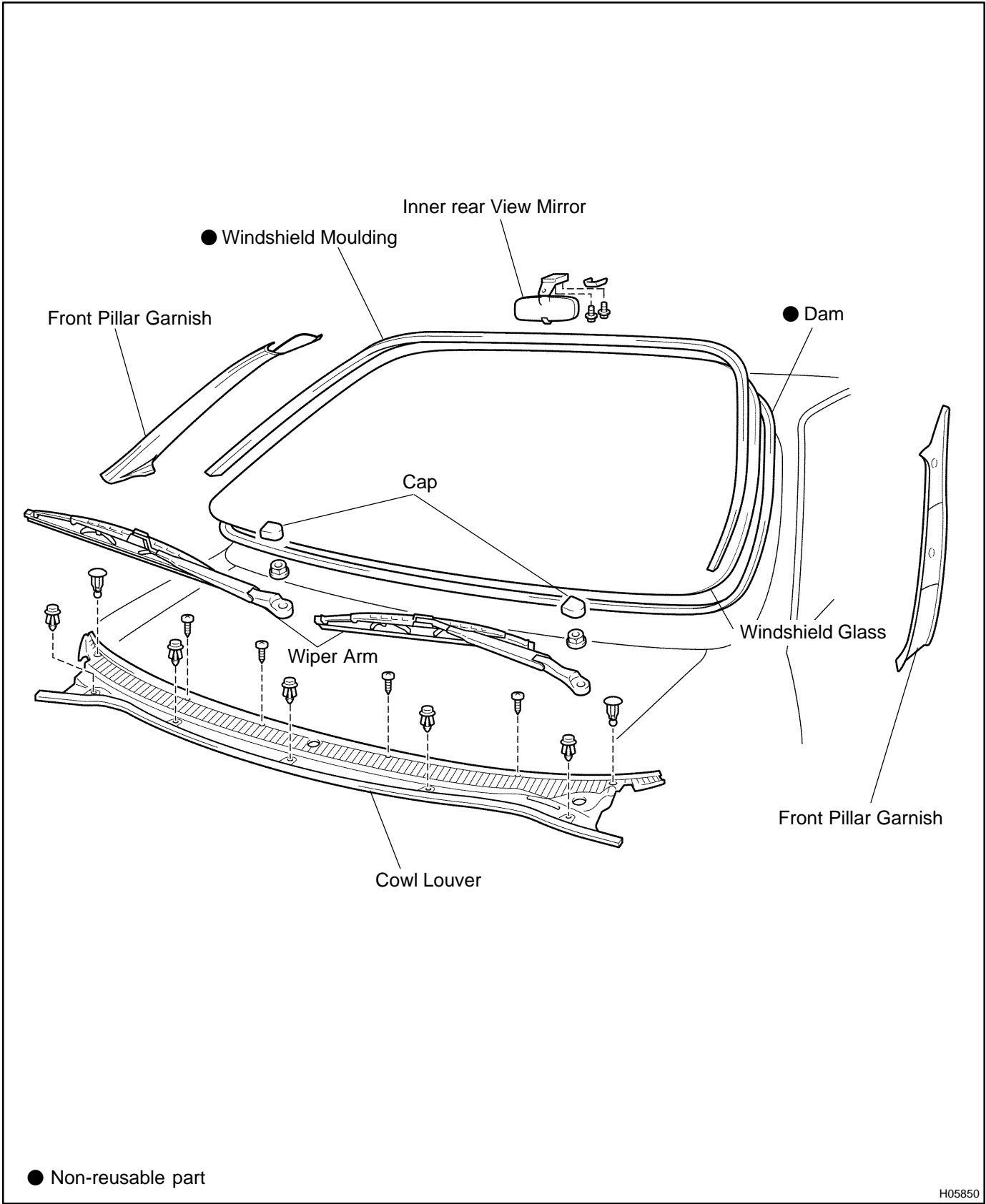
## INSTALLATION

### INSTALL ROOF DRIP SIDE FINISH MOULDING

- (a) Attach the upper edge of the moulding to the body flange.
- (b) Tap on the moulding by hand.

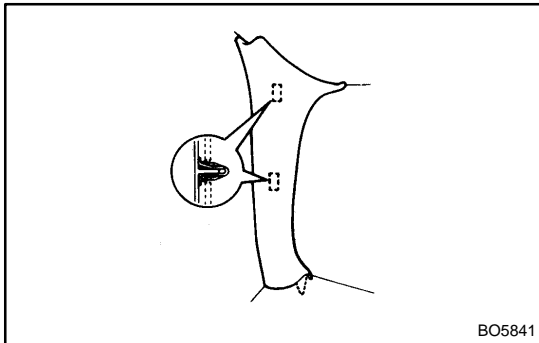
# WINDSHIELD COMPONENTS

BO110-03



## REMOVAL

1. REMOVE WIPER ARMS AND COWL LOUVER (See page [BO-27](#) )

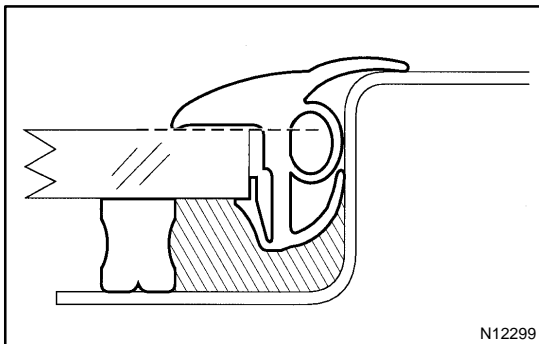


2. REMOVE FRONT PILLAR GARNISHES

Remove the garnishes by pulling.

3. REMOVE INNER REAR VIEW MIRROR

Remove the 2 bolts and the inner rear view mirror.

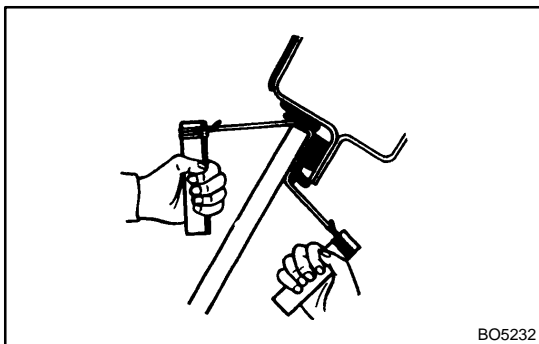


4. REMOVE WINDSHIELD MOULDING

Using a knife, cut off the moulding as shown.

**NOTICE:**

Do not damage the body with the knife.



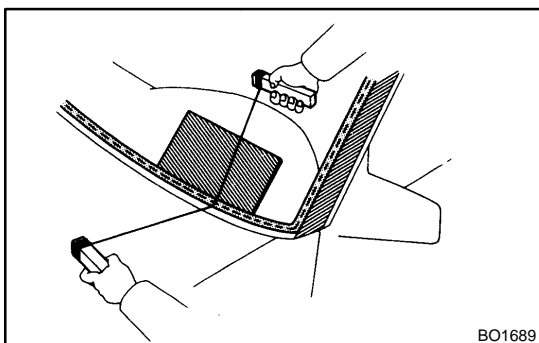
5. REMOVE WINDSHIELD GLASS

- (a) Push piano wire through between the body and glass from the interior.

- (b) Tie both wire ends to wooden blocks or like object.

**HINT:**

Apply adhesive tape to the outer surface to keep the surface from being scratched.



**NOTICE:**

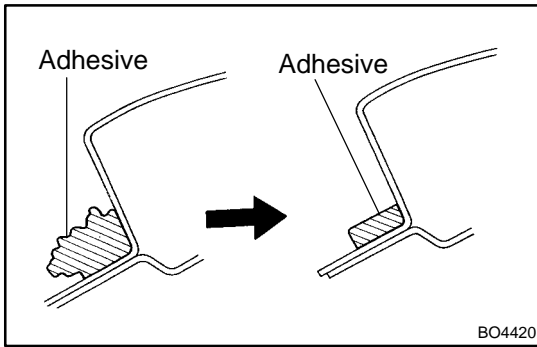
When separating, take care not to damage the paint and interior and exterior ornaments. To prevent scratching the safety pad when removing the windshield, place a plastic sheet between the piano wire and safety pad.

- (c) Cut the adhesive by pulling the piano wire around it.

- (d) Remove the glass.

**NOTICE:**

Leave as much of the adhesive on the body as possible when cutting off the glass.



## INSTALLATION

### 1. CLEAN AND SHAPE CONTACT SURFACE OF BODY

- (a) Using a knife, cut away any rough areas on the body.

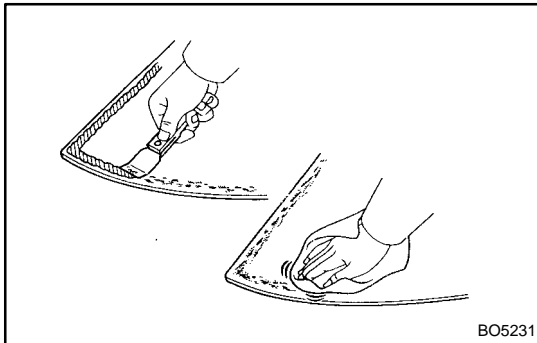
#### HINT:

Leave as much of the urethane on the body as possible.

- (b) Clean the cutting surface of the urethane gum with a piece of shop rag saturated in cleaner.

#### HINT:

Even if all the urethane has been removed, clean the body.



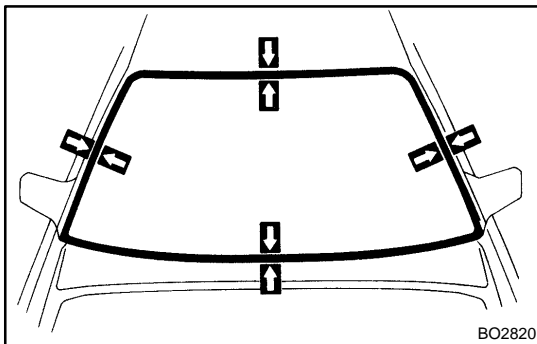
### 2. CLEAN REMOVED GLASS BEFORE INSTALLATION

- (a) Using a scraper, remove the urethane gum sticking to the glass.

- (b) Clean the glass with cleaner.

#### NOTICE:

**Do not touch the glass after cleaning it.**



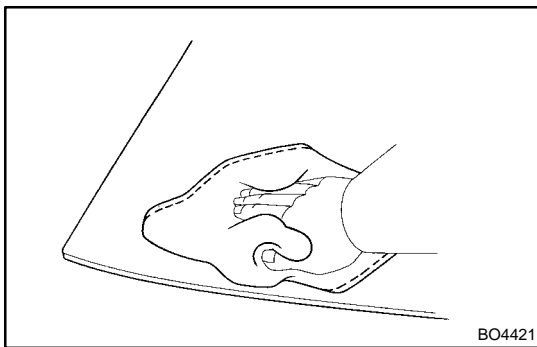
### 3. POSITION GLASS

- (a) Place glass in correct position.

- (b) Check that all contacting parts of the glass rim are perfectly even.

- (c) Place reference marks between the glass and body.

- (d) Remove the glass.

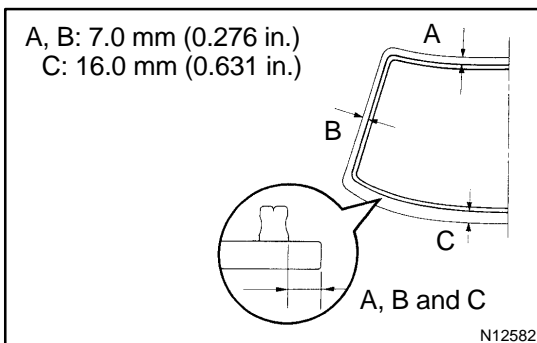


### 4. CLEAN CONTACT SURFACE OF GLASS

Using a cleaner, clean the contact surface which is black-colored area around the entire glass rim.

#### NOTICE:

**Do not touch the glass face after cleaning it.**

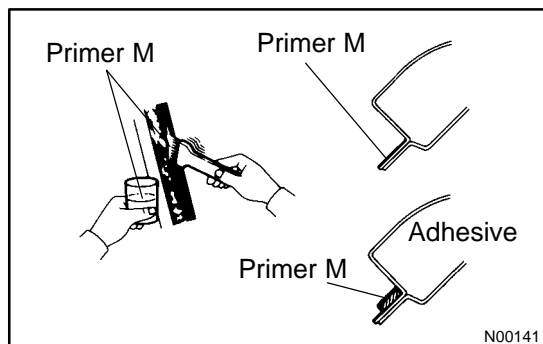


### 5. INSTALL DAM

Install the dam with double-stick tape, as shown in the illustration.

#### NOTICE:

**Do not touch the glass face after cleaning it.**

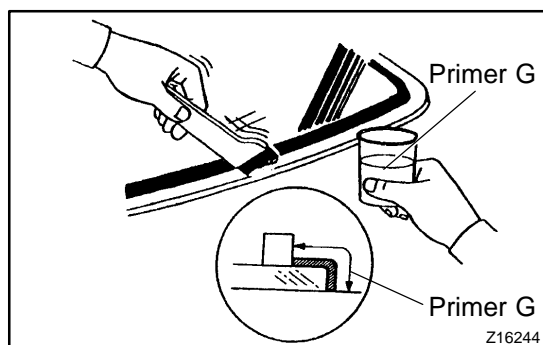


## 6. COAT CONTACT SURFACE OF BODY WITH PRIMER "M"

Using a brush, coat the contact surface on the body with Primer M.

### NOTICE:

- Let the primer coating dry for 3 minutes or more.
- Do not coat Primer M to the adhesive.
- Do not keep any of the opened Primer M for later use.

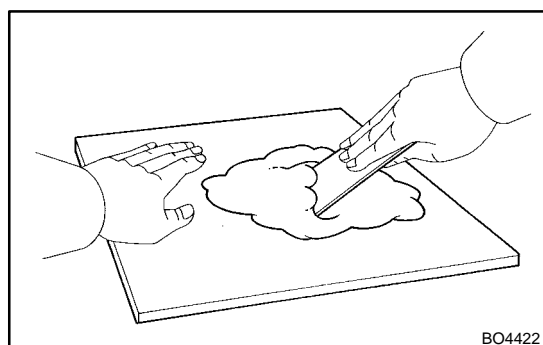


## 7. COAT CONTACT SURFACE OF GLASS WITH PRIMER "G"

- (a) Using a brush or sponge, coat the edge of the glass and the contact surface with Primer G.
- (b) Wipe it off with a clean shop rag before the primer dries.

### NOTICE:

- Let the primer coating dry for 3 minutes or more.
- Do not keep any of the opened Primer G for later use.



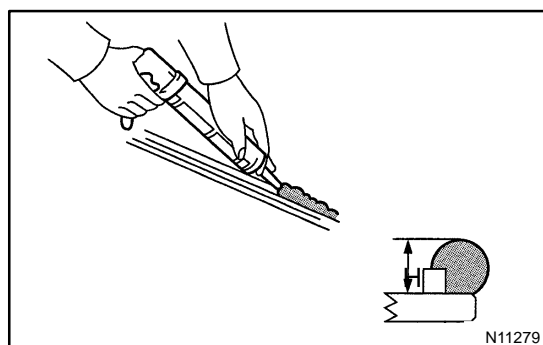
## 8. MIX ADHESIVE COATING

### NOTICE:

- Be sure that installation of the glass is finished within usable time.
  - The mixture should be made in 5 minutes or less.
- (a) Thoroughly clean the glass plate and putty spatula with solvent.
  - (b) Thoroughly mix 500 g (17.64 oz.) of the main agent and 75 g (2.65 oz.) of the hardening agent on a glass plate or like object with a putty spatula.

## 9. APPLY ADHESIVE

- (a) Cut off the tip of the cartridge nozzle to make a hole 5 mm (0.20 in.) in diameter. Fill the cartridge with adhesive.
- (b) Load the cartridge into the sealer gun.



- (c) Coat the glass with adhesive on all contact surfaces along the ridge.

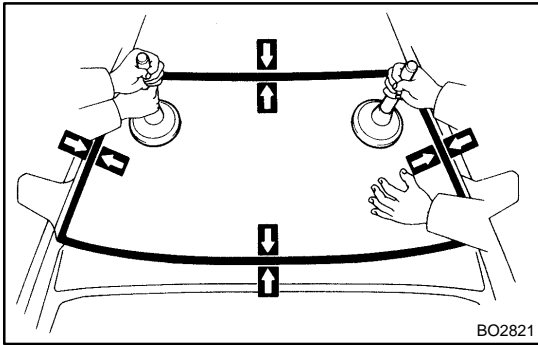
### Adhesive height:

If adhesive remains on body:

H: 3.5 - 5.0 mm (0.138 - 0.197 in.)

If no adhesive remains on body :

H: 8 - 10 mm (0.31 - 0.39 in.)



## 10. INSTALL GLASS

### HINT:

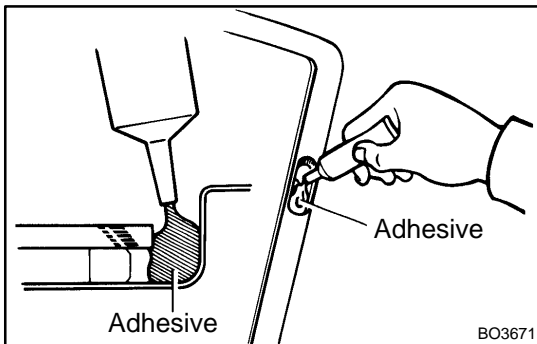
Confirm that the dam is attached the body panel as shown in the illustration.

- Position the glass so that the reference marks are lined up, and press in gently along the rim.
- Using a spatula, apply adhesive on the glass rim.
- Use a spatula to remove any excess or protruding adhesive.
- Fasten glass securely until the adhesive sets.

## 11. INSPECT FOR LEAKS AND REPAIR

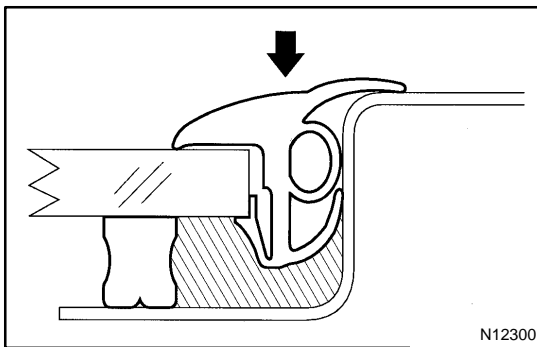
- Perform a leak test after the hardening time has elapsed.
- Seal any leaks with sealant.

**Part No. 08833-00030 or equivalent.**



## 12. INSTALL WINDSHIELD MOULDING

- Using a knife, cut off the adhesive around the moulding installation area.
- Apply adhesive at moulding installation area.



- Place the moulding onto the body and tap it by hand.

## 13. INSTALL COWL LOUVER AND WIPER ARMS (See page [BO-26](#))

## 14. INSTALL INNER REAR VIEW MIRROR

## 15. INSTALL FRONT PILLAR GARNISH

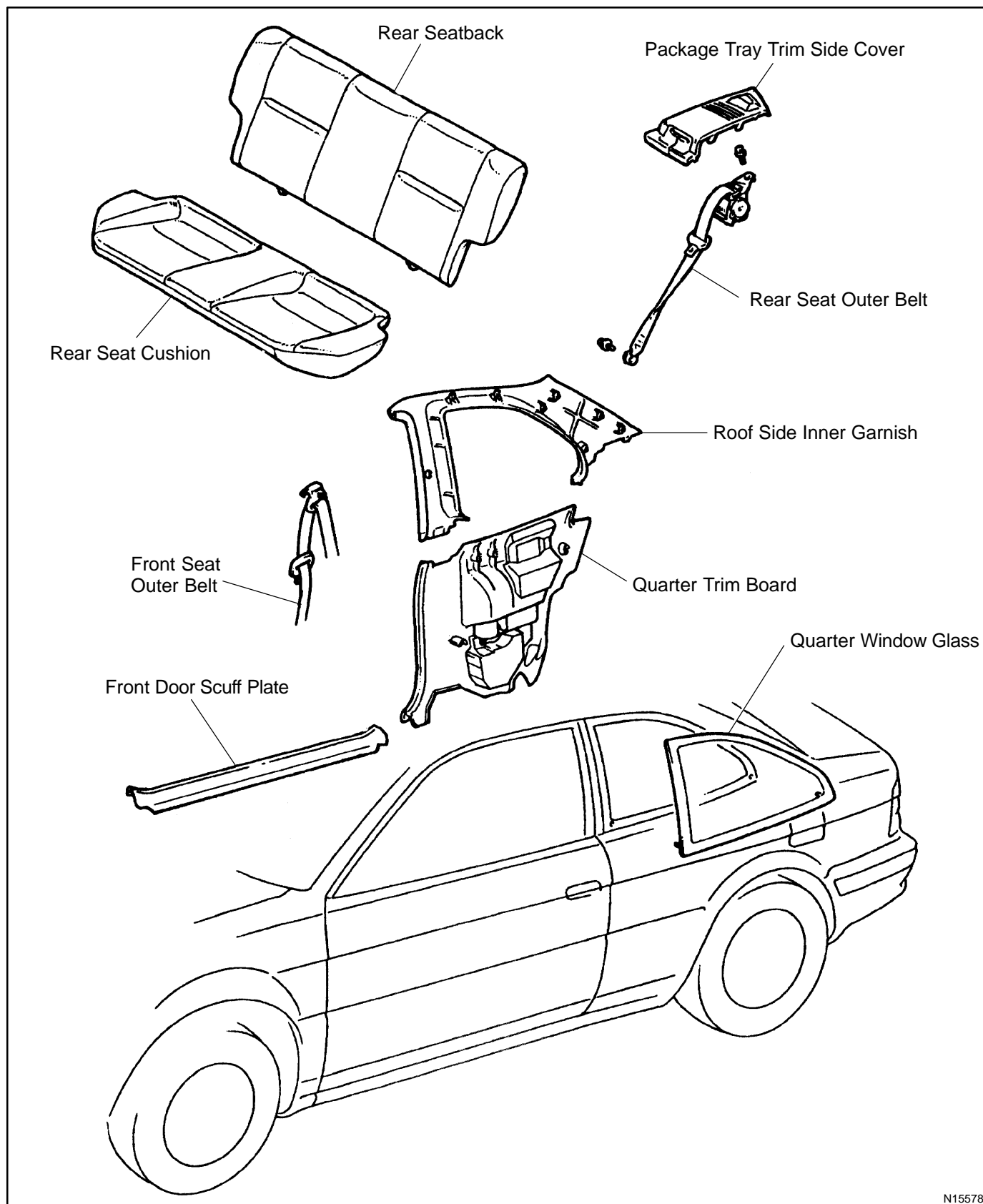
## 16. INSTALL COWL LOUVER

## 17. INSTALL WIPER ARMS

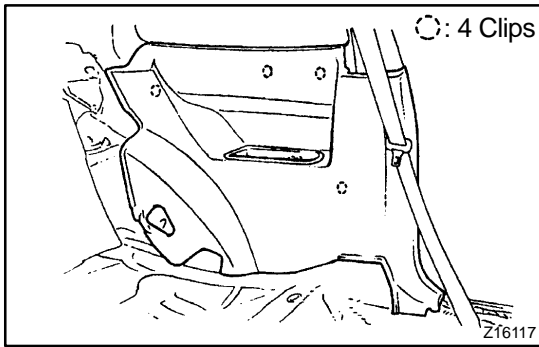


# QUARTER WINDOW GLASS COMPONENTS

B0113-02

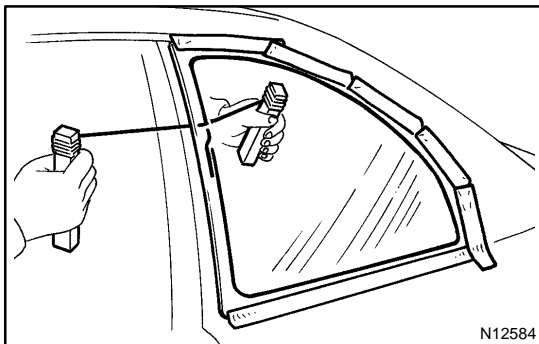
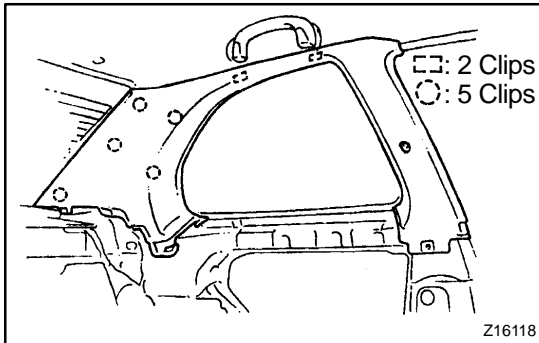


N15578



## REMOVAL

1. REMOVE REAR SEAT CUSHION
2. REMOVE REAR SEATBACK
3. REMOVE FRONT SEAT OUTER BELT
4. REMOVE PACKAGE TRAY TRIM SIDE COVER
5. REMOVE REAR SEAT OUTER BELT
6. REMOVE QUARTER TRIM BOARD
7. REMOVE FRONT DOOR SCUFF PLATE
8. REMOVE ROOF SIDE INNER GARNISH



### 9. REMOVE QUARTER WINDOW GLASS

- (a) Push piano wire through between body and glass from the interior.

- (b) Tie both wire ends to wooden blocks or similar object.

HINT:

Apply adhesive tape to the outer surface to keep the surface from being scratched.

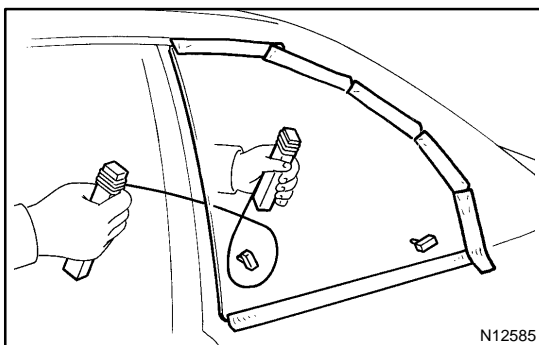
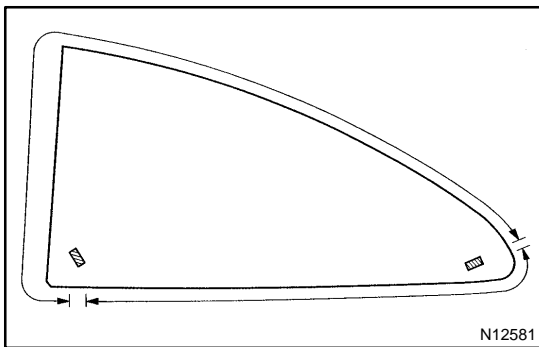
**NOTICE:**

**When separating the glass, take care not to damage the paint and exterior.**

- (c) Cut the adhesive by pulling the piano wire around it.

HINT:

Cut the adhesive areas as shown in the illustration, leaving the adhesive where the pins are.

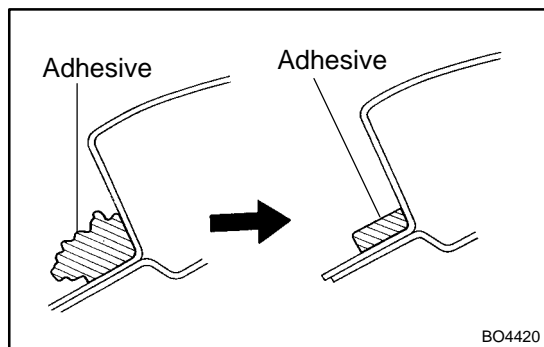


- (d) Using piano wire, as shown in the illustration, cut off the rest of the adhesive.

- (e) Remove the glass.

**NOTICE:**

**Leave as much of the adhesive on the body as possible when cutting off the glass.**



## INSTALLATION

### 1. CLEAN AND SHAPE CONTACT SURFACE OF BODY

- (a) Using a knife, cut away any rough areas on the body.

HINT:

Leave as much of the adhesive on the body as possible.

- (b) Clean the cutting surface of the adhesive with a piece of shop rag saturated in cleaner.

HINT:

Even if all the adhesive has been removed, clean the body.

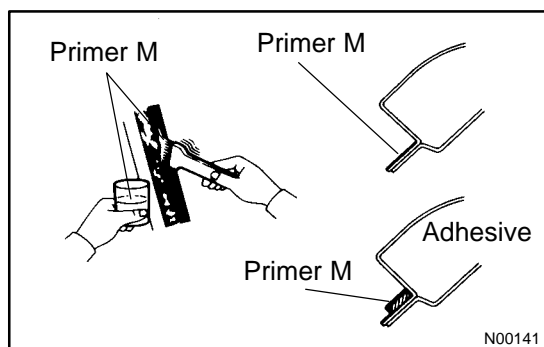
### 2. CLEAN REMOVED GLASS BEFORE INSTALLATION

- (a) Using a scraper, remove the adhesive sticking to the glass.

- (b) Clean the glass with cleaner.

**NOTICE:**

**Do not touch the glass after cleaning it.**

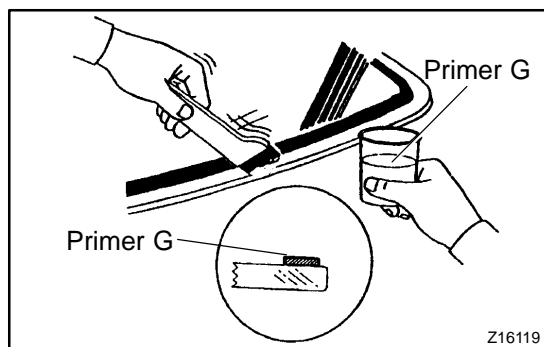


### 3. COAT CONTACT SURFACE OF BODY WITH PRIMER "M"

Using a brush, coat the contact on the body with Primer M.

**NOTICE:**

- Let the primer coating dry for 3 minutes or more.
- Do not coat Primer M to the adhesive.
- Do not keep any of the opened Primer M for later use.



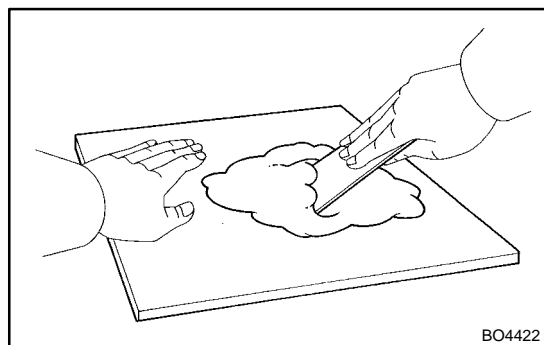
### 4. COAT CONTACT SURFACE OF GLASS WITH PRIMER "G"

- (a) Using a brush or sponge, coat the edge of the glass and the contact surface with Primer G.

- (b) Wipe it off with a clean shop rag before the primer dries.

**NOTICE:**

- Let the primer coating dry for 3 minutes or more.
- Do not keep any of the opened Primer G for later use.



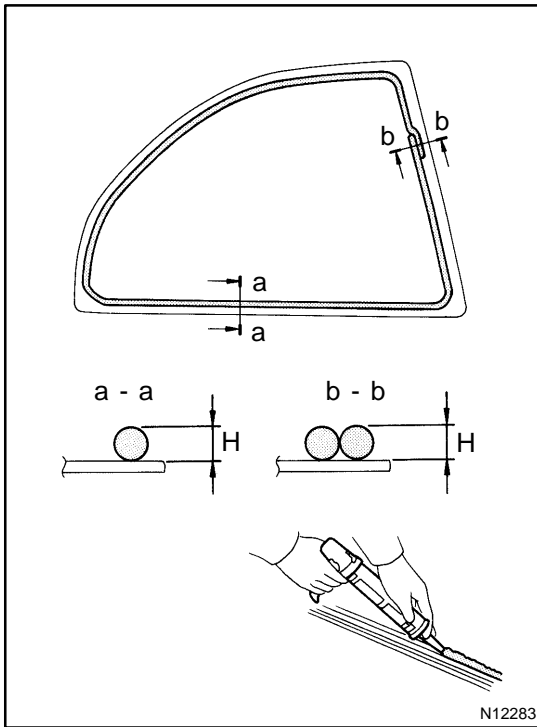
### 5. MIX ADHESIVE COATING

**NOTICE:**

**Be sure that installation of the moulding is finished within the adhesive's usable time.**

- (a) Thoroughly clean the glass plate and putty spatula with solvent.

- (b) Thoroughly mix 500 g (17.64 oz.) of the main agent and 75 g (2.65 oz.) of the hardening agent on a glass plate or similar object with a putty spatula.



## 6. APPLY ADHESIVE

- (a) Cut off the tip of the cartridge nozzle. Fill the cartridge with adhesive.
- (b) Load the cartridge into the sealer gun.
- (c) Coat the glass with adhesive, as shown.

**H: 12 mm (0.47 in.)**

## 7. INSTALL QUARTER WINDOW GLASS

- (a) Install the glass to the body.
- (b) Use adhesive tape to keep the glass tight against the body.

## 8. INSPECT FOR LEAKS AND REPAIR

- (a) Perform a leak test after the hardening time has elapsed.
- (b) Seal any leak with sealant.

**Part No.08833-00030 or equivalent.**

## 9. INSTALL ROOF SIDE INNER GARNISH

## 10. INSTALL FRONT DOOR SCUFF PLATE

## 11. INSTALL QUARTER TRIM BOARD

## 12. INSTALL REAR SEAT OUTER BELT

**Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)**

## 13. INSTALL PACKAGE TRAY TRIM SIDE COVER

## 14. INSTALL FRONT SEAT OUTER BELT

**Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)**

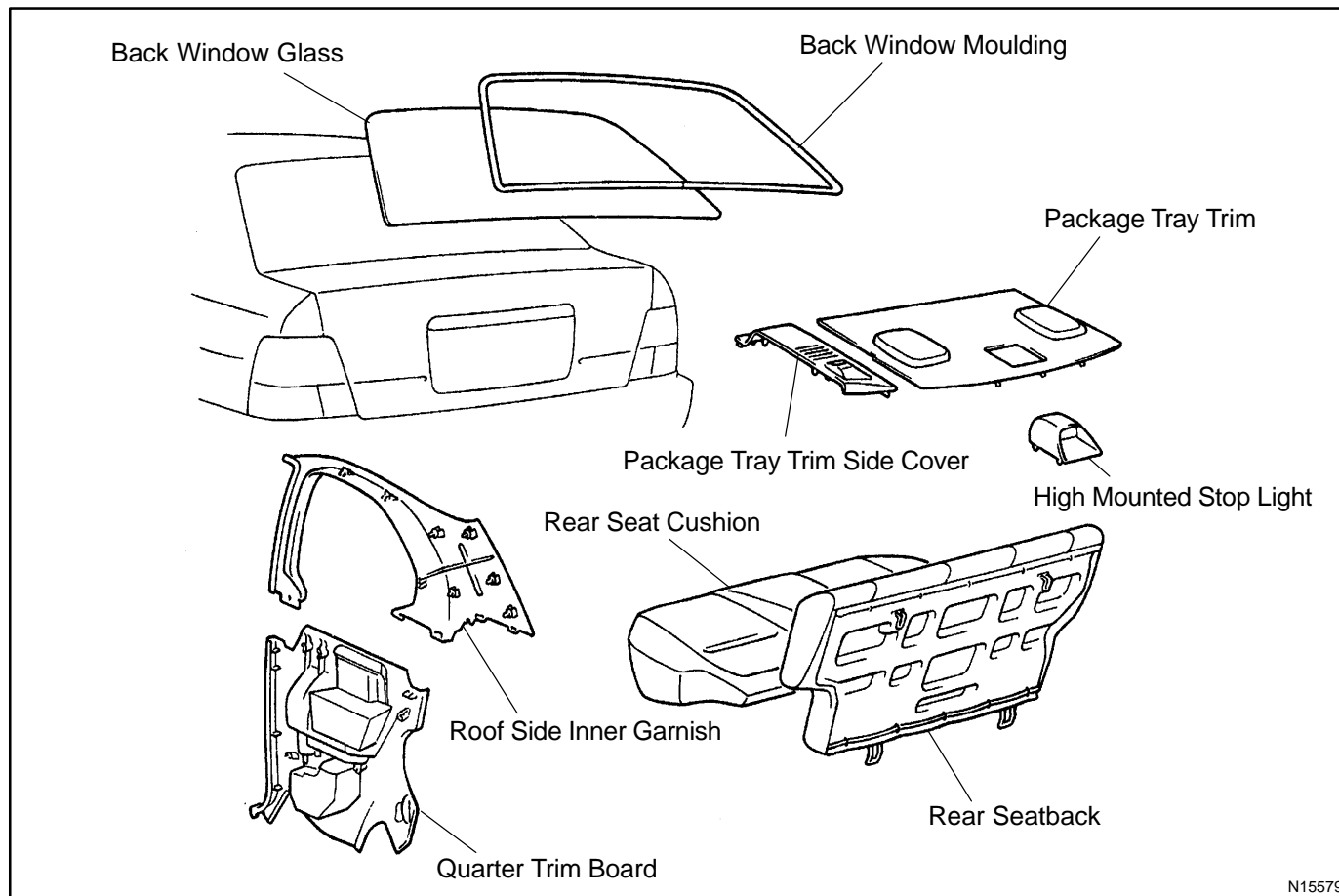
## 15. INSTALL REAR SEAT BECK

**Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)**

## 16. INSTALL REAR SEAT CUSHION

## BACK WINDOW GLASS COMPONENTS

B0344-01



N15579

## REMOVAL

1. DISCONNECT DEFOGGER CONNECTOR
2. REMOVE REAR SEAT CUSHION AND SEATBACK
3. REMOVE REAR SEAT BELT
4. REMOVE FRONT DOOR SCUFF PLATE
5. REMOVE QUARTER TRIM BOARD
6. REMOVE FRONT SEAT BELT
7. REMOVE HIGH MOUNTED STOP LIGHT
8. REMOVE PACKAGE TRAY GARNISH

9. REMOVE BACK WINDOW MOULDING

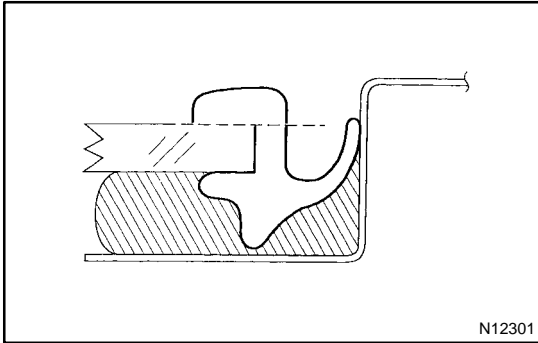
Using a knife, cut off the body.

**NOTICE:**

**Do not damage the body with the knife.**

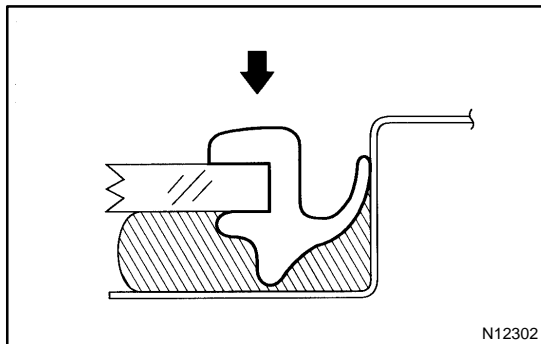
10. REMOVE BACK WINDOW GLASS

Remove the glass in the same manner as windshield (See page [BO-34](#) ).



## INSTALLATION

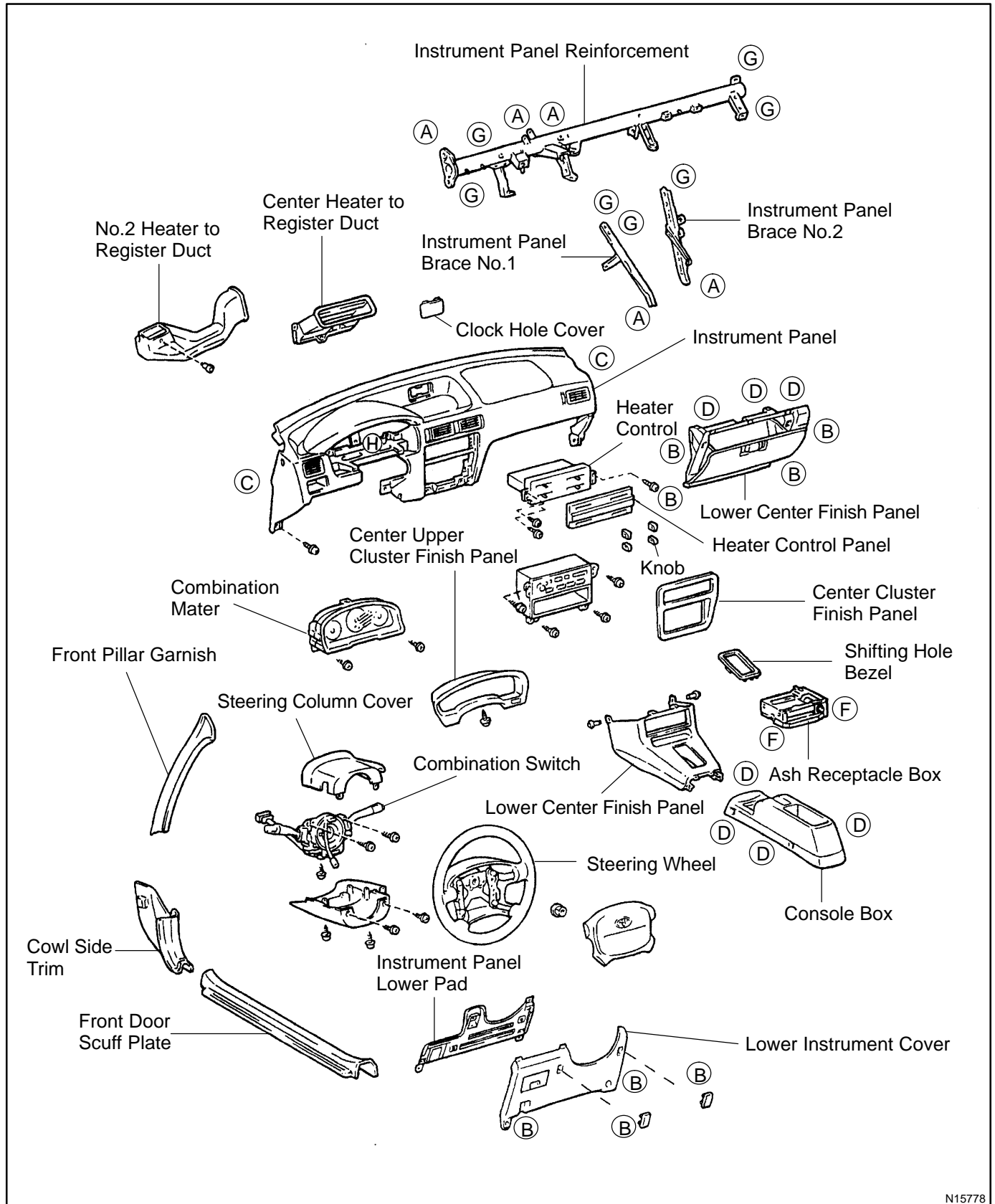
1. CLEAN AND SHAPE CONTACT SURFACE OF BODY (See page [BO-35](#) )
2. CLEAN REMOVED GLASS (See page [BO-35](#) )
3. POSITION GLASS (See page [BO-35](#) )
4. CLEAN CONTACT SURFACE GLASS (See page [BO-35](#) )
5. COAT CONTACT SURFACE OF BODY WITH PRIMER "M" (See page [BO-35](#) )
6. COAT CONTACT SURFACE OF GLASS WITH PRIMER "G" (See page [BO-35](#) )
7. MIX ADHESIVE COATING (See page [BO-35](#) )
8. APPLY ADHESIVE (See page [BO-35](#) )
9. INSTALL GLASS (See page [BO-35](#) )



10. INSTALL BACK WINDOW MOULDING  
Place the moulding onto the body and tap it by hand.
11. INSPECT FOR LEAKS AND REPAIR (See page [BO-35](#) )
12. INSTALL PACKAGE TRAY GARNISH
13. INSTALL HIGH MOUNTED STOP LIGHT
14. INSTALL FRONT SEAT OUTER BELT  
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)
15. INSTALL QUARTER TRIM BOARD
16. INSTALL FRONT DOOR SUCFF PLATE
17. INSTALL REAR SEAT OUTER BELT  
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)
18. INSTALL REAR SEATBACK  
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)
19. INSTALL REAR SEAT CUSHION
20. CONNECT DEFOGGER CONNECTOR

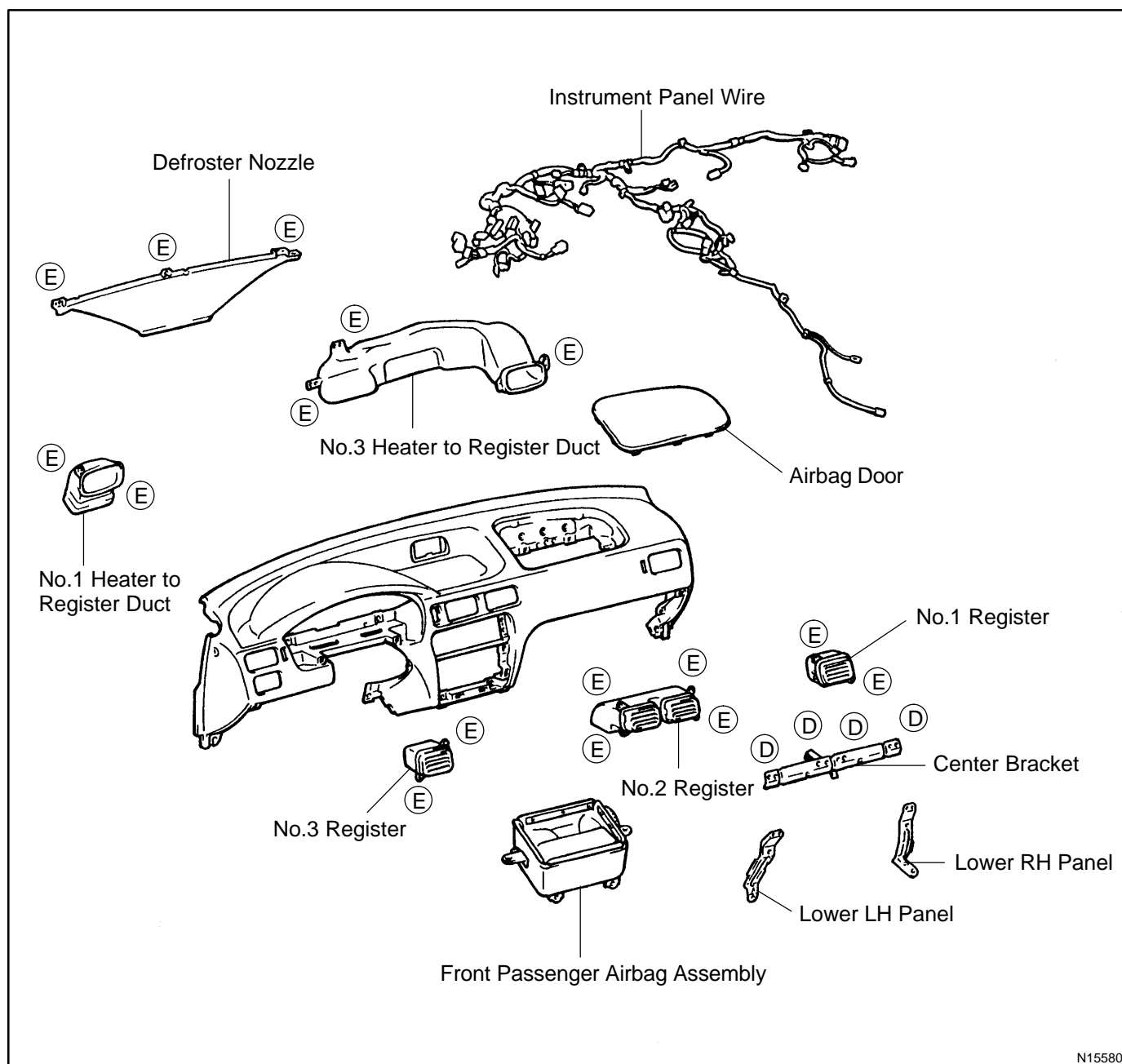
# INSTRUMENT PANEL COMPONENTS

B011C-04



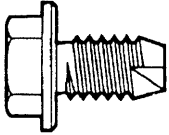
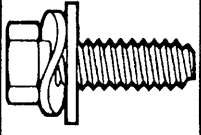
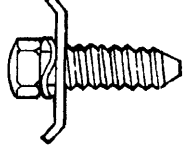
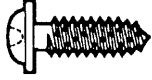
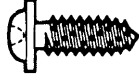



N15778





**HINT:**

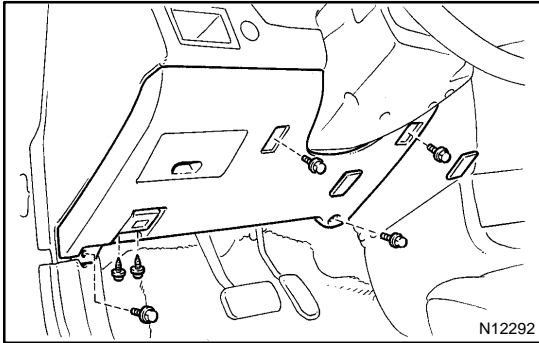
Screw shapes and sizes are indicated in the table below. The codes (A-H) correspond to those indicated on the previous pages.

mm (in.)								
Code	Shape	Size	Code	Shape	Size	Code	Shape	Size
(A)		$\varnothing = 8$ (0.31) L = 15 (0.59)	(B)		$\varnothing = 5$ (0.24) L = 22 (0.87)	(C)		$\varnothing = 6$ (0.24) L = 20 (0.55)
(D)		$\varnothing = 5$ (0.20) L = 16 (0.63)	(E)		$\varnothing = 5$ (0.20) L = 14 (0.55)	(F)		$\varnothing = 5$ (0.20) L = 12 (0.47)
(G)		$\varnothing = 8$ (0.31)	(H)		$\varnothing = 6$ (0.24)			

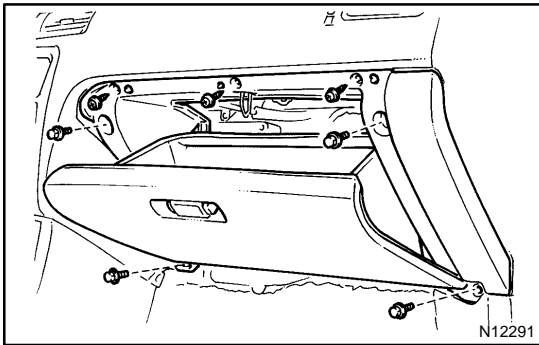
V06938

## REMOVAL

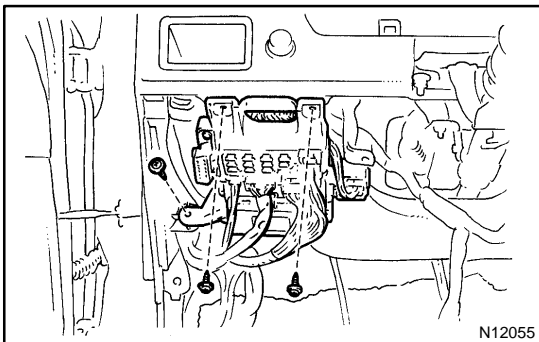
1. REMOVE FRONT PILLAR GARNISHES
2. REMOVE COWL SIDE TRIMS
3. REMOVE FRONT DOOR SCUFF PLATES
4. REMOVE STEERING WHEEL (See page [SR-13](#))



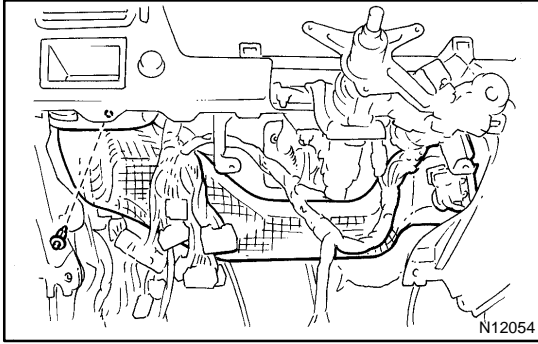
5. REMOVE LOWER INSTRUMENT COVER
  - (a) Remove the 2 screws and the hood lock release lever.
  - (b) Remove the 2 hole covers.
  - (c) Remove the 4 bolts and the lower cover.
6. REMOVE INSTRUMENT PANEL LOWER PAD
7. REMOVE CENTER UPPER CLUSTER FINISH PANEL
8. REMOVE STEERING COLUMN COVERS
9. REMOVE COMBINATION SWITCH
10. REMOVE COMBINATION METER



11. REMOVE LOWER CENTER FINISH PANEL
  - (a) Remove the 4 bolts and 3 screws.
  - (b) Remove the instrument finish panel by pulling.
12. DISCONNECT FRONT PASSENGER AIRBAG CONNECTOR (See page [RS-21](#))
13. REMOVE SHIFTING HOLE BEZEL
14. REMOVE CONSOLE BOX
15. REMOVE LOWER CENTER FINISH PANEL
16. REMOVE CENTER CLUSTER FINISH PANEL
17. REMOVE ASH RECEPTACLE BOX
18. REMOVE RADIO ASSEMBLY
19. REMOVE HEATER CONTROL PANEL (See page [AC-70](#))



20. REMOVE JUNCTION BLOCK NO. 1  
Remove the 3 screws and J/B No. 1.

**21. REMOVE NO. 2 HEATER TO REGISTER DUCT**

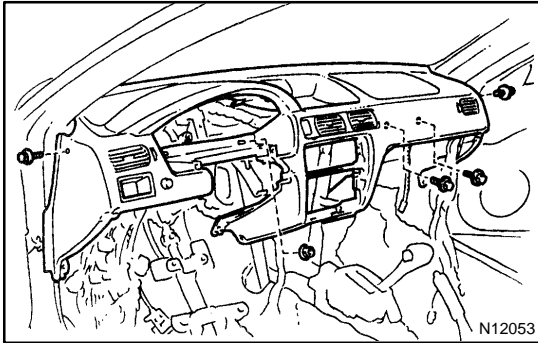
Remove the clip and the duct.

**22. REMOVE CLOCK HOLE COVER**

Using a screwdriver, remove the clock then disconnect the connector.

HINT:

Tape the screwdriver tip before use.

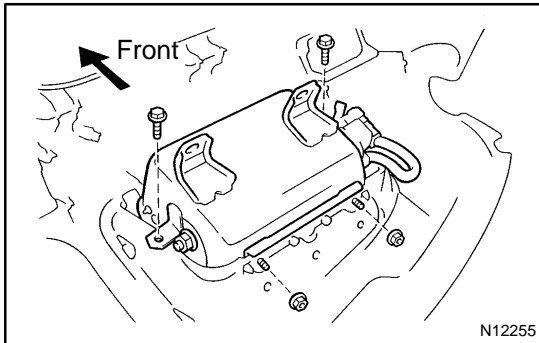
**23. REMOVE INSTRUMENT PANEL**

Remove the 4 bolts, nuts and the instrument panel.

**24. CENTER HEATER TO REGISTER DUCT****25. INSTRUMENT PANEL BRACE NO. 1****26. INSTRUMENT PANEL BRACE NO. 2****27. INSTRUMENT PANEL REINFORCEMENT**

## DISASSEMBLY

1. REMOVE DEFROSTER NOZZLE
2. REMOVE NO. 3 HEATER TO REGISTER DUCT
3. REMOVE NO. 1 HEATER TO REGISTER DUCT
4. REMOVE NO. 1 REGISTER
5. REMOVE NO. 3 REGISTER
6. REMOVE NO. 2 REGISTER



7. REMOVE FRONT PASSENGER AIRBAG ASSEMBLY
  - (a) Remove the 2 bolts, 2 nuts and the front passenger airbag assembly.
  - (b) Remove the airbag door.

### CAUTION:

- Do not store the front passenger airbag assembly with the airbag deployment direction facing down.
- Never disassemble the front passenger airbag assembly.

### NOTICE:

- When installing the instrument panel, take care that the airbag wire harness does not interfere with other parts and is not pinched between other parts.
  - When installing the instrument panel box, carefully pull out the airbag wire harness from the glove compartment upper hole.
8. REMOVE CENTER BRACKET
  9. REMOVE LOWER RH PANEL
  10. REMOVE LOWER LH PANEL
  11. REMOVE INSTRUMENT PANEL WIRE HARNESS

## REASSEMBLY

Reassembly is in the reverse order of disassembly procedure (See page [BO-50](#) ).

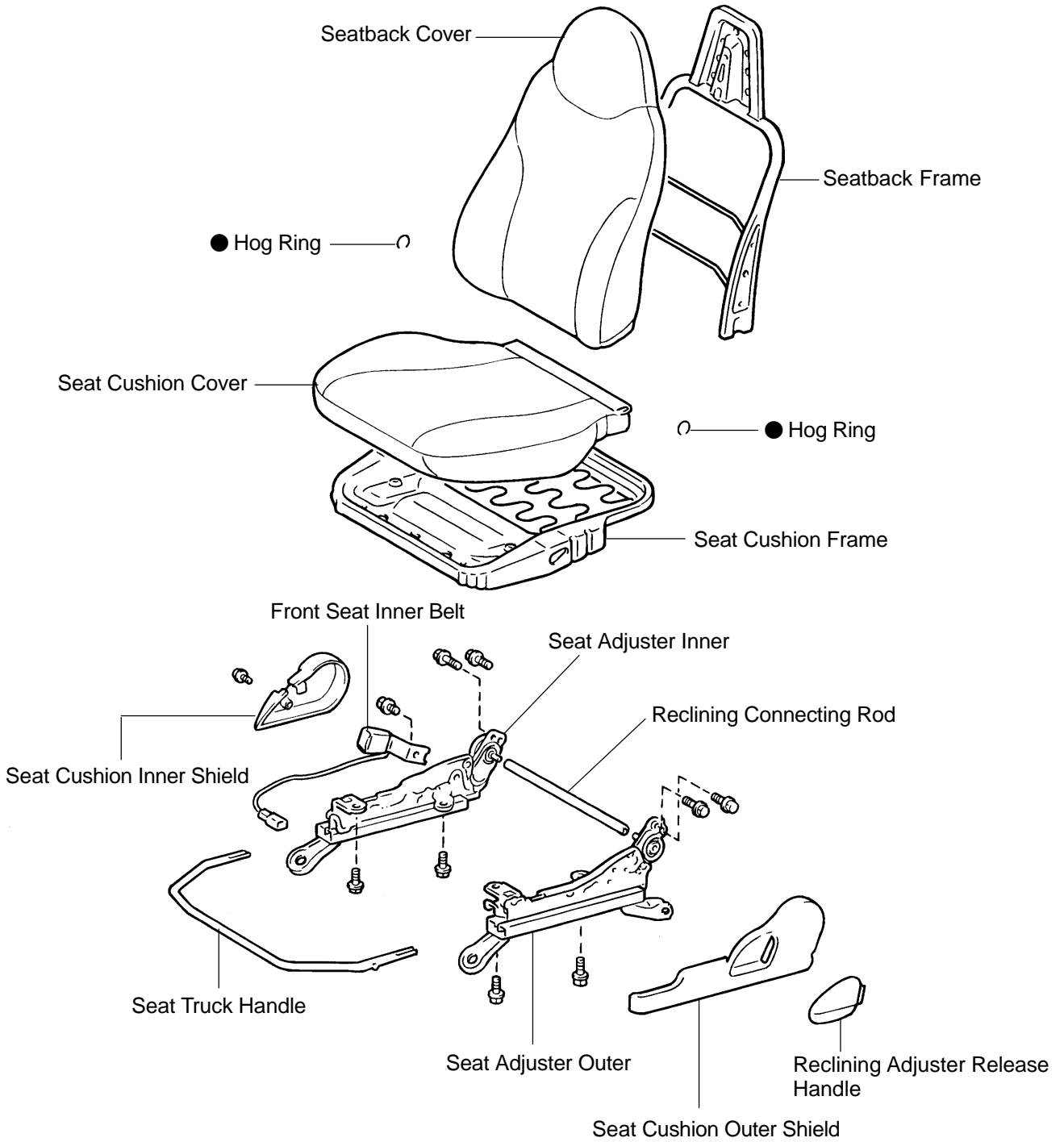
## INSTALLATION

Installation is in the reverse order of removal procedure (See page [BO-48](#) ).

# SEAT COMPONENTS

BO34D-01

## Front Seat

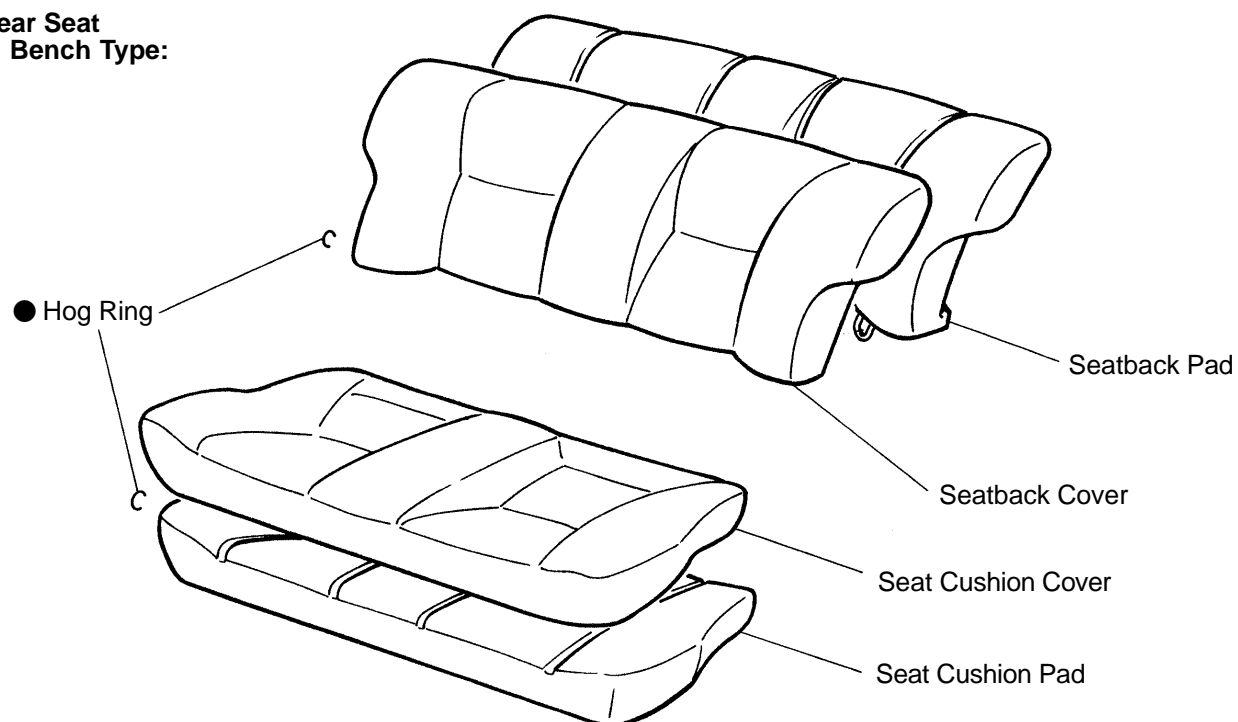


● Non-reusable part

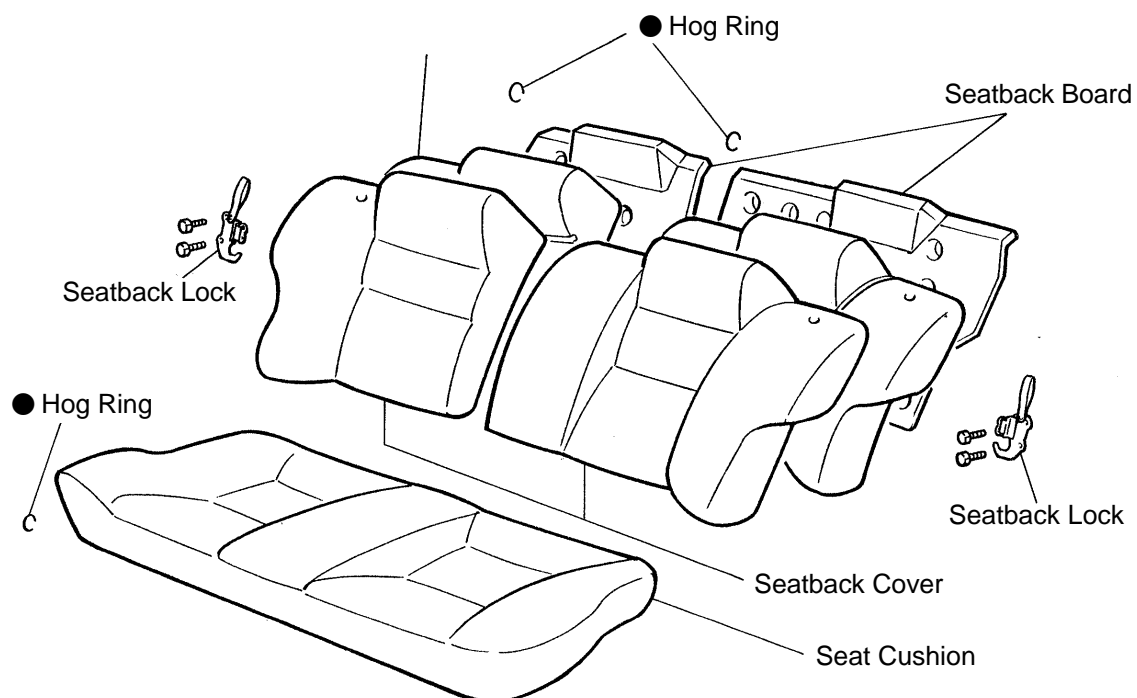
N20165



### Rear Seat Bench Type:



### Separate Type:



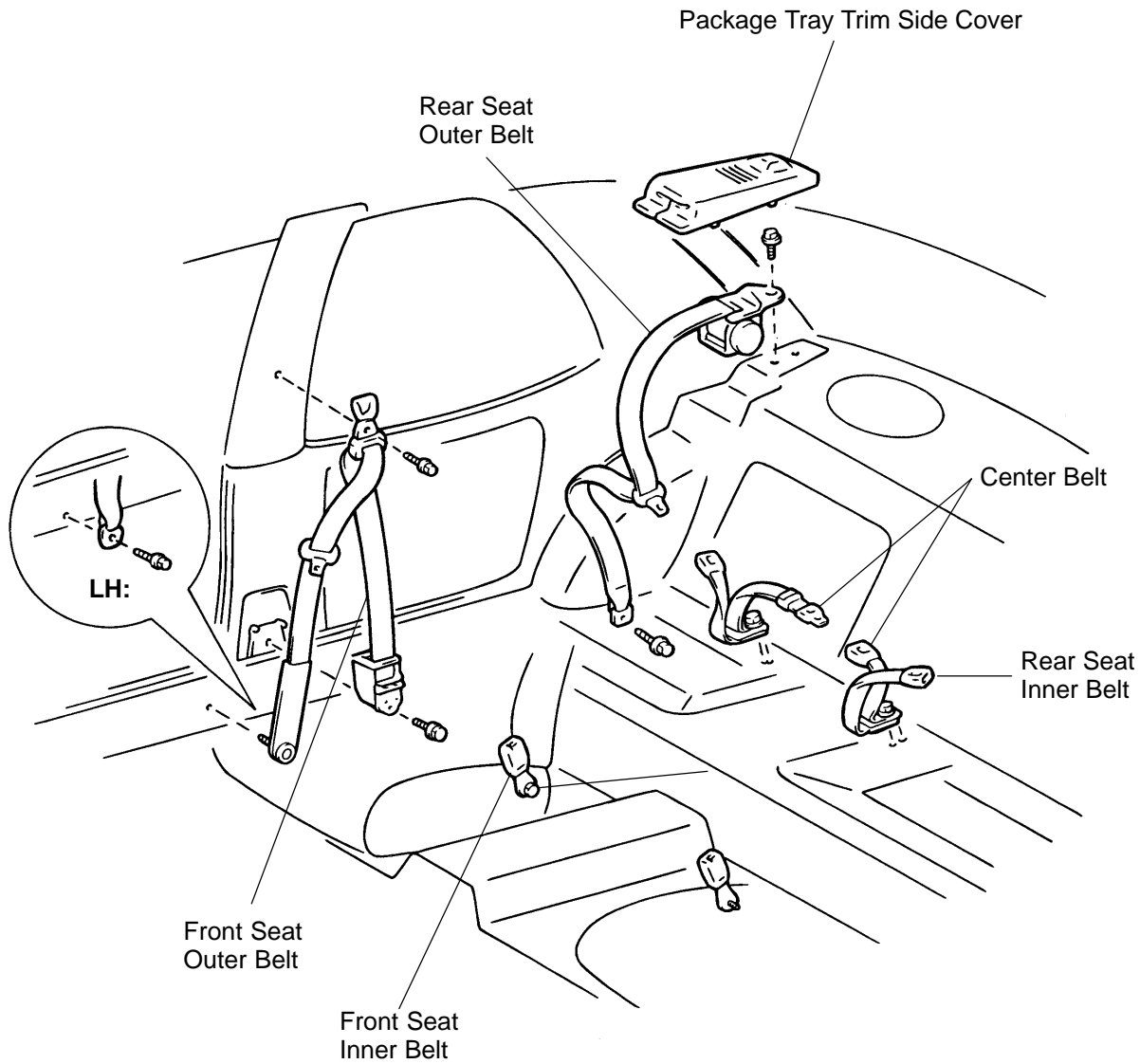
● Non-reusable part

N12506

# SEAT BELT COMPONENTS

BO1J3-03

2 Door:

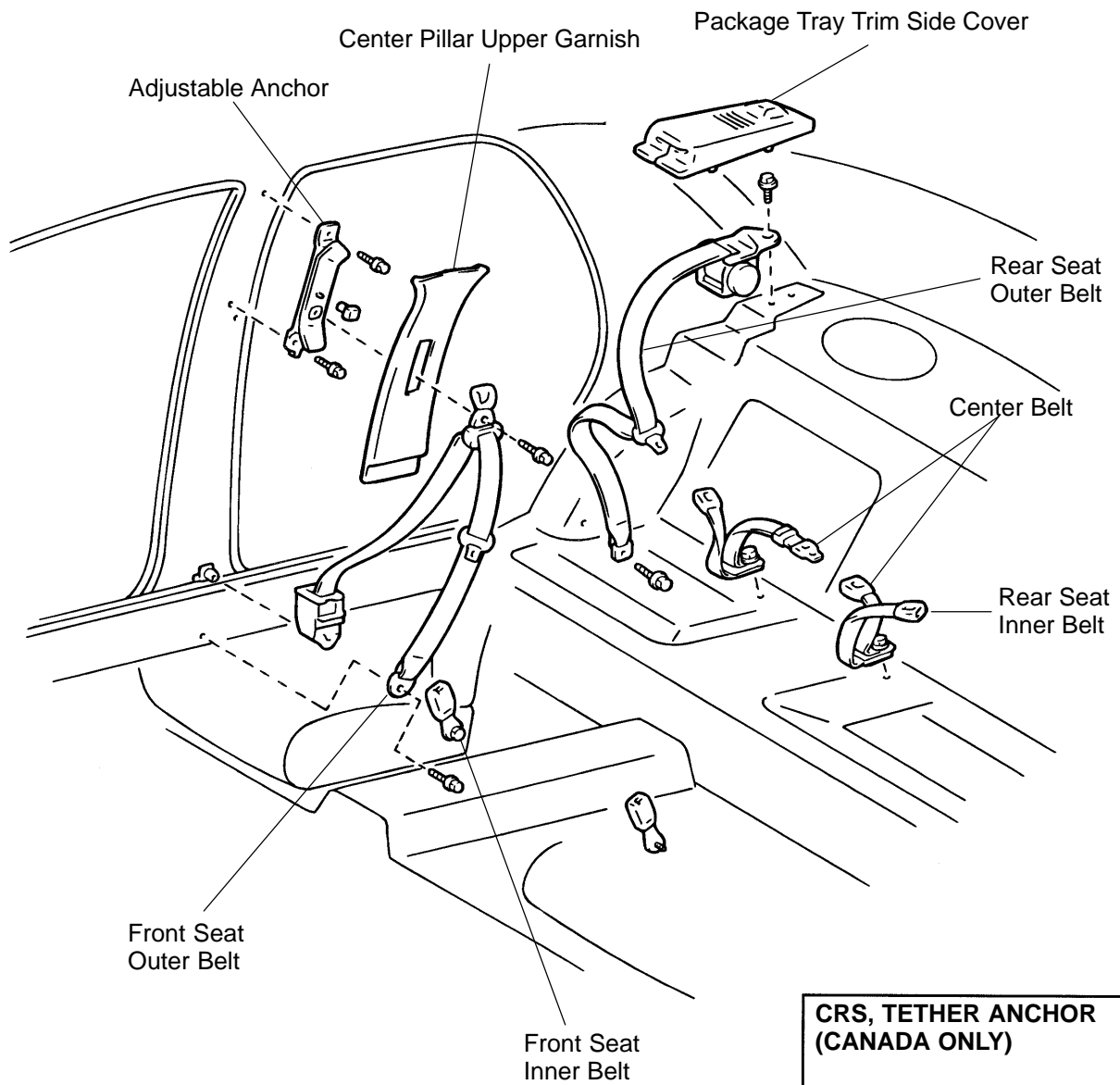


w/ CRS, Tether Anchor:



CRS, Tether Anchor

N20164

**4 Door:**

**CRS, TETHER ANCHOR  
(CANADA ONLY)**



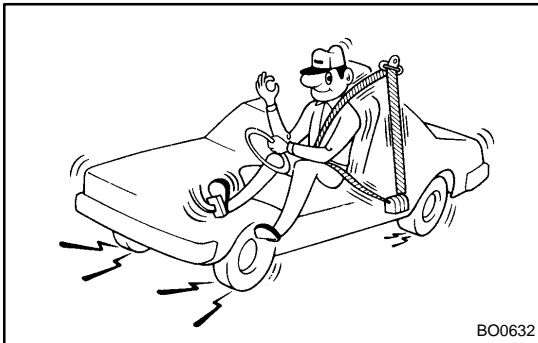
N20163

## INSPECTION

### CAUTION:

Replace the seat belt assembly (outer belt, inner belt, bolts or nuts and sill-bar) if it has been used in a severe impact. The entire assembly should be replaced even if damage is not obvious.

**Emergency Locking Retractor (ELR) and Automatic Locking Retractor (ALR) type**



#### 1. All seat belt:

##### **RUNNING TEST (IN SAFE AREA)**

- (a) Fasten the front seat belts.
- (b) Drive the car at 10 mph (16 km/h) and make a very hard stop.
- (c) Check that the belt is locked and cannot be extended at this time.

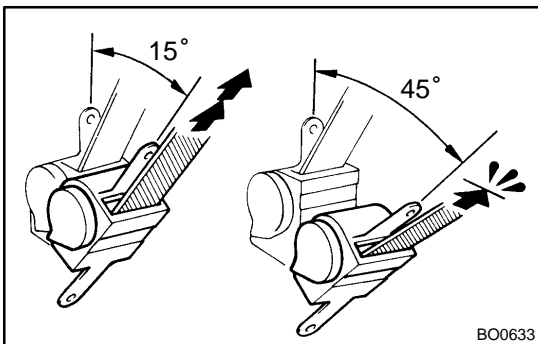
### HINT:

Conduct this test in a safe area. If the belt does not lock, remove the belt mechanism assembly and conduct the following static check. Also, whenever installing a new belt assembly, verify the proper operation before installation.

#### 2. Driver's seat belt (ELR):

##### **STATIC TEST**

- (a) Make sure that the belt locks when pulled out quickly.
- (b) Remove the locking retractor assembly.
- (c) Tilt the retractor slowly.



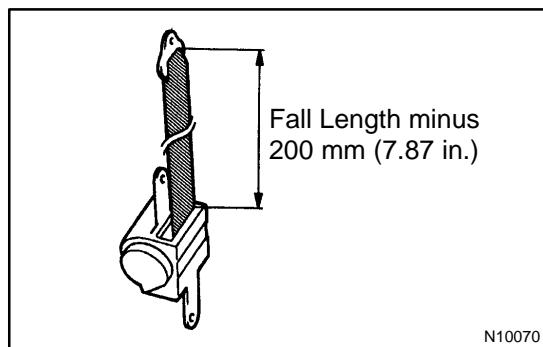
- (d) Make sure that the belt can be pulled out at a tilt of 15 degrees or less, and cannot be pulled out at over 45 degrees of tilt.

If a problem is found, replace the assembly.

#### 3. Except driver's seat belt (ALR/ ELR):

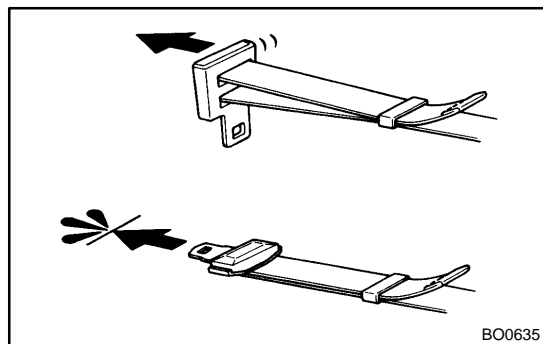
##### **STATIC TEST**

- (a) Make sure that the belt locks when pulled out quickly.
  - (b) Remove the locking retractor assembly.
  - (c) Pull out the whole belt and measure the length of the whole belt. Then retract the belt slightly and pull it out again.
  - (d) Make sure that the belt cannot be extended further.
- If a problem is found, replace the assembly.



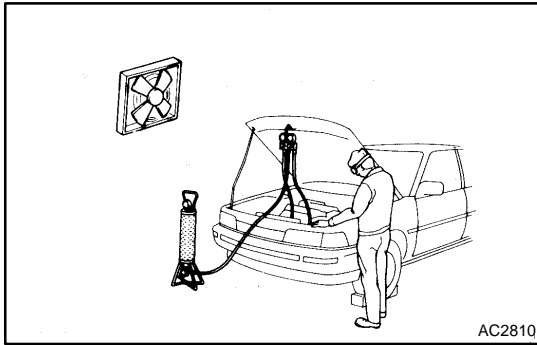
- (e) Retract the whole belt, then pull out the belt until 200 mm (7.87 in.) of belt remains retracted.
- (f) Tilt the retractor slowly.
- (g) Make sure that the belt can be pulled out at a tilt of 15 degrees of tilt.

If a problem is found, replace the assembly.



#### 4. Manual Type: TESTING

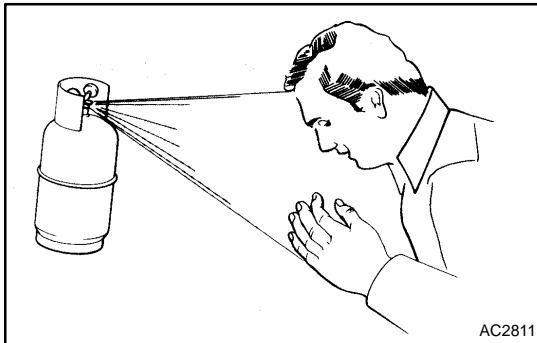
- (a) Adjust the belt to the proper length.
- (b) Apply a firm load to the belt.
- (c) Make sure that the belt does not extend.



## AIR CONDITIONING SYSTEM PRECAUTION

AC1DR-02

1. **DO NOT HANDLE REFRIGERANT IN AN ENCLOSED AREA OR NEAR AN OPEN FLAME**
2. **ALWAYS WEAR EYE PROTECTION**



3. **BE CAREFUL NOT TO GET LIQUID REFRIGERANT IN YOUR EYES OR ON YOUR SKIN**

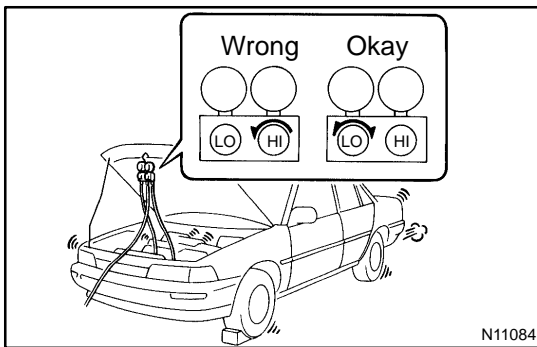
If liquid refrigerant gets in your eyes or on your skin.

- (a) Wash the area with lots of cool water.

### CAUTION:

**Do not rub your eyes or skin.**

- (b) Apply clean petroleum jelly to the skin.
- (c) Go immediately to a physician or hospital for professional treatment.
4. **NEVER HEAT CONTAINER OR EXPOSE IT TO NAKED FLAME**
5. **BE CAREFUL NOT TO DROP CONTAINER AND NOT TO APPLY PHYSICAL SHOCKS TO IT**



6. **DO NOT OPERATE COMPRESSOR WITHOUT ENOUGH REFRIGERANT IN REFRIGERATION SYSTEM**

If there is not enough refrigerant in the refrigerant system oil lubrication will be insufficient and compressor burnout may occur, so that care to avoid this.

7. **DO NOT OPEN PRESSURE MANIFOLD VALVE WHILE COMPRESSOR IS OPERATE**

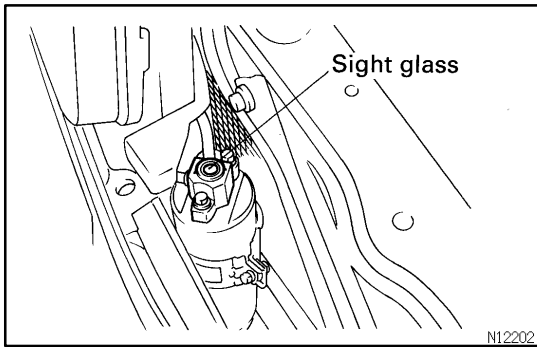
If the high pressure valve is opened, refrigerant flows in the reverse direction and could cause the charging cylinder to rupture, so open and close the only low pressure valve.

8. **BE CAREFUL NOT TO OVERCHARGE SYSTEM WITH REFRIGERANT**

If refrigerant is overcharged, it causes problems such as insufficient cooling, poor fuel economy, engine overheating etc.

**9. SUPPLEMENTAL RESTRAINT SYSTEM (SRS)**

The TERCEL is equipped with as SRS (Supplemental Restraint System) such as the driver and passenger airbag. Failure to carry out service operations the correct sequence could cause the SRS to unexpectedly deployed during servicing, possibly leading to a serious accident. Further, if a mistake is made in servicing the SRS, it is possible the SRS may fail to operate when required. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the following item carefully, then follow the correct procedure described in repair manual.



## ON-VEHICLE INSPECTION

### 1. INSPECT REFRIGERANT VOLUME

Observe the sight glass on the liquid tube.

Test conditions:

- ☐ Running engine at 1,500 rpm
- ☐ Blower speed control switch at "HI" position
- ☐ A/C switch ON
- ☐ Temperature control set at "MAX COOL"
- ☐ Fully open the doors

Item	Symptom	Amount of refrigerant	Remedy
1	Bubbles present in sight glass	Insufficient*	(1) Check for gas leakage with gas leak detector and repair if necessary (2) Add refrigerant until bubbles disappear
2	No bubbles present in sight glass	None, sufficient or too much	Refer item 3 and 4
3	No temperature difference between compressor inlet and outlet	Empty or nearly empty	(1) Check for gas leakage with gas leak detector and repair if necessary (2) Add refrigerant until bubbles disappear
4	Temperature between compressor inlet and outlet is noticeably different	Correct or too much	Refer to item 5 and 6
5	Immediately after air conditioning is turned off, refrigerant in sight glass stays clear	Too much	(1) Discharge refrigerant (2) Evacuate air and charge proper amount of purified refrigerant
6	When air conditioning is turned off, refrigerant foams and then stays clear	Correct	-

\*: Bubbles in the sight glass with ambient temperatures higher than usual can be considered normal if cooling is sufficient.



## 2. INSPECT REFRIGERANT PRESSURE WITH MANIFOLD GAUGE SET

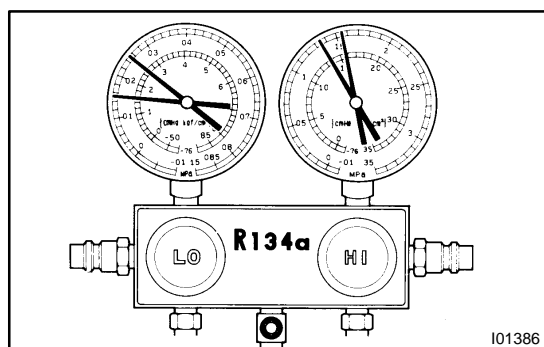
This is a method in which the trouble is located by using a manifold gauge set. Read the manifold gauge pressure when these conditions are established.

Test conditions:

- Temperature at the air inlet with the switch set at RECURC is 30 - 35 °C (86 - 95 °F).
- Engine running at 1,500 rpm.
- Blower speed control switch set at high.
- Temperature control set at max. cool.

HINT:

It should be noted that the gauge indications may vary slightly due to ambient temperature conditions.



(1) Normally functioning refrigeration system.

**Gauge reading:**

**Low pressure side:**

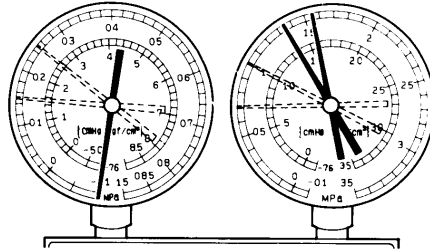
**0.15 - 0.25 MPa (1.5 - 2.5 kgf/cm<sup>2</sup>)**

**High pressure side:**

**1.37 - 1.57 MPa (14 - 16 kgf/cm<sup>2</sup>)**

(2) Moisture present in refrigeration system.

Condition : Periodically cools and then fails to cool

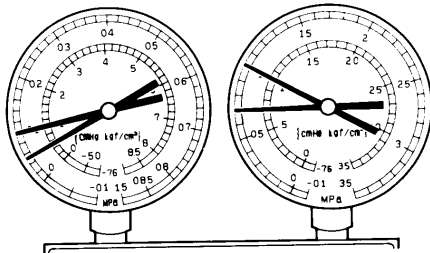


I01387

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
During operation, pressure on low pressure side sometimes become a vacuum and sometime normal	Moisture entered in refrigeration system freezes at expansion valve orifice and temporarily stops cycle, but normal state is restored after a time when the ice melts	<ul style="list-style-type: none"> <li>○Drier in oversaturated state</li> <li>○Moisture in refrigeration system freezes at expansion valve orifice and blocks circulation of refrigerant</li> </ul>	<ul style="list-style-type: none"> <li>(1) Replace condenser</li> <li>(2) Remove moisture in cycle through repeatedly evacuating air</li> <li>(3) Charge proper amount of new refrigerant</li> </ul>

(3) Insufficient cooling

Condition: Insufficient cooling

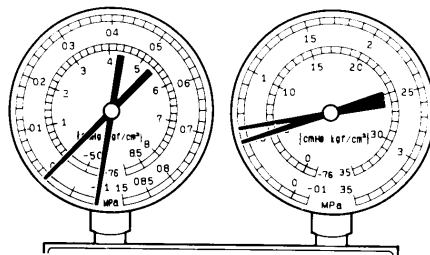


I01388

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
<ul style="list-style-type: none"> <li>○Pressure low on both low and high pressure sides</li> <li>○Bubbles seen in sight glass continuously</li> <li>○Insufficient cooling performance</li> </ul>	Gas leakage at some place in refrigeration system	<ul style="list-style-type: none"> <li>○Insufficient refrigerant in system</li> <li>○Refrigerant leaking</li> </ul>	<ul style="list-style-type: none"> <li>(1) Check for gas leakage with gas leak detector and repair if necessary</li> <li>(2) Charge Proper amount of refrigerant</li> <li>(3) If indicated pressure value is near 0 when connected to gauge, create the vacuum after inspecting and repairing the location of the leak</li> </ul>

## (4) Poor circulation of refrigerant

Condition: Insufficient cooling

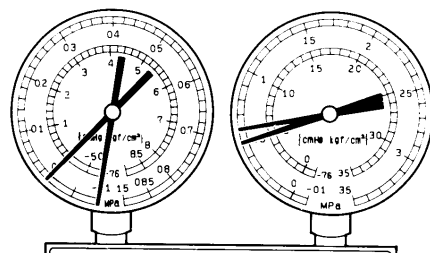


I01389

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
<input type="radio"/> Pressure low in both low and high pressure sides <input type="radio"/> Frost on tube from receiver to unit	Refrigerant flow obstructed by dirt in receiver	Receiver clogged	Replace receiver

## (5) Refrigerant does not circulate

Condition: Does not cool (Cools from time to time in some cases)

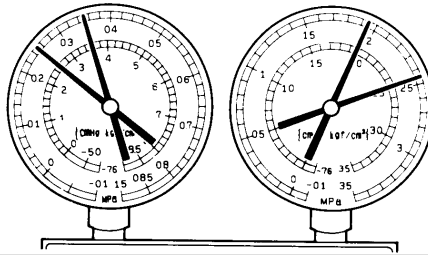


I01449

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
<input type="radio"/> Vacuum indicated on low pressure side, very low pressure indicated on high pressure side <input type="radio"/> Frost or dew seen on piping before and after receiver/ drier or expansion valve	<input type="radio"/> Refrigerant flow obstructed by moisture or dirt in refrigeration system <input type="radio"/> Refrigerant flow obstructed by gas leakage from expansion valve	Refrigerant does not circulate	(1) Check expansion valve (2) Clean out dirt in expansion valve by blowing with air If not able to remove dirt, replace expansion valve (3) Replace receiver (4) Evacuate air and charge new refrigerant to proper amount (5) For gas leakage from expansion valve, replace expansion valve

## (6) Refrigerant overcharged or insufficient cooling of condenser

Condition: Insufficient cooling

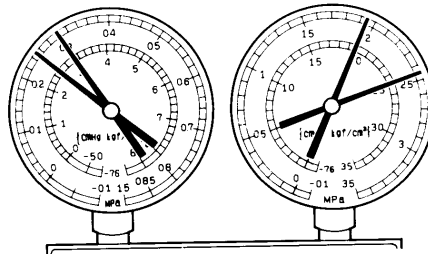


I01390

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
<ul style="list-style-type: none"> <li>○ Pressure too high on both low and high pressure sides</li> <li>○ No air bubbles seen through the sight glass even when the engine rpm is lowered</li> </ul>	<ul style="list-style-type: none"> <li>○ Unable to develop sufficient performance due to excessive refrigerant in system</li> <li>○ Insufficient cooling of condenser</li> </ul>	<ul style="list-style-type: none"> <li>○ Excessive refrigerant in cycle → refrigerant overcharged</li> <li>○ Condenser cooling → condenser fins clogged or condenser fan faulty.</li> </ul>	<ul style="list-style-type: none"> <li>(1) Clean condenser</li> <li>(2) If (1) is normal, check amount of refrigerant</li> </ul> Charge proper amount or refrigerant

## (7) Air present in refrigeration system

Condition: Insufficient cooling



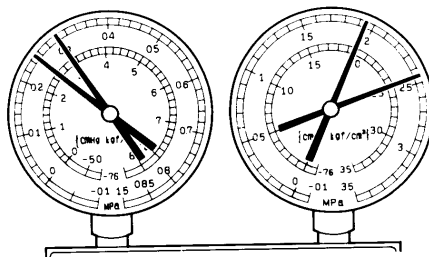
NOTE : These gauge indications are shown when the refrigeration system has been opened and the refrigerant charged without vacuum purging.

I01392

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
<ul style="list-style-type: none"> <li>○ Pressure too high on both low and high pressure sides</li> <li>○ The low pressure piping hot to the touch</li> <li>○ Bubbles seen in sight glass</li> </ul>	Air entered in refrigeration system	<ul style="list-style-type: none"> <li>○ Air present in refrigeration system</li> <li>○ Insufficient vacuum purging</li> </ul>	<ul style="list-style-type: none"> <li>(1) Check compressor oil to see if it is dirty or insufficient</li> <li>(2) Evacuate air and charge new refrigerant</li> </ul>

## (8) Expansion valve improperly

Condition: Insufficient cooling

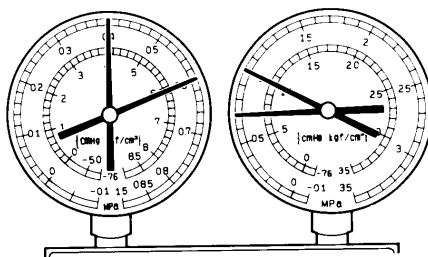


I01450

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
<ul style="list-style-type: none"> <li>○ Pressure too high on both low and high pressure sides</li> <li>○ Frost or large amount of dew on piping on low pressure side</li> </ul>	Trouble in expansion valve or heat sensing tube not installed correctly	<ul style="list-style-type: none"> <li>○ Excessive refrigerant in low pressure piping</li> <li>○ Expansion valve opened too wide</li> </ul>	<ul style="list-style-type: none"> <li>Check expansion valve</li> <li>Replace if defective</li> </ul>

## (9) Defective compression compressor

Condition : Does not cool



I01393

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
<ul style="list-style-type: none"> <li>○ Pressure too high on low and high pressure sides</li> <li>○ Pressure too low on high pressure side</li> </ul>	Internal leak in compressor	<ul style="list-style-type: none"> <li>○ Compression defective</li> <li>○ Valve leaking or broken sliding parts</li> </ul>	Repair or replace compressor

**3. INSPECT IDLE-UP SPEED**

- (a) Warm up engine.
- (b) Inspect idle-up speed when the these conditions are established.

Test conditions:

- ☐ Blower speed control switch HI
- ☐ Electrical load OFF
- ☐ A/C switch ON
- ☐ Put gear shift in neutral

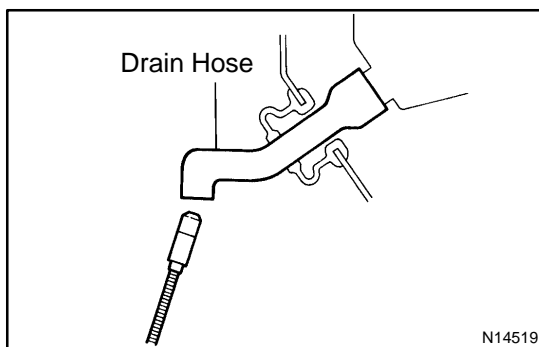
**Standard idle-up speed: 800 - 900 rpm**

If idle speed is not as specified, check the IAC valve and air intake system.

**4. INSPECT FOR LEAKAGE OF REFRIGERANT**

- (a) Perform in these conditions:
  - ☐ Stop engine.
  - ☐ Secure good ventilation (If the gas leak detector may not 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 compressor is OFF: approx. 392 - 588 kPa  
(4 - 6 kgf/cm<sup>2</sup>, 57 - 85 psi)



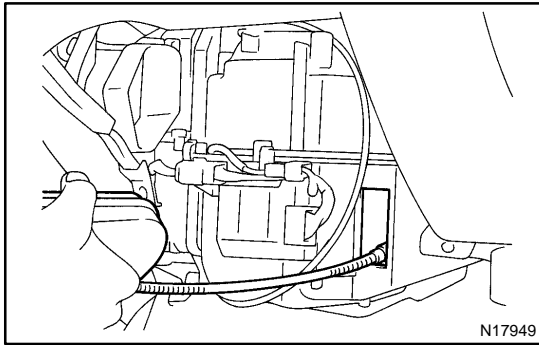
- (b) Bring the gas leak detector close to the drain hose before performing the test.

**HINT:**

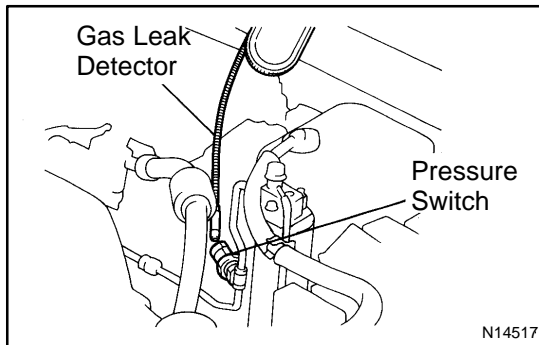
- ☐ After the blower motor has stopped, leave the cooling unit for more than 15 minutes.
- ☐ Expose the gas leak detector sensor under the drain hose.
- ☐ When bring the gas leak detector close to the drain hose, make sure that the gas leak detector does not react to the volatile gases.

If such reaction is unavoidable, the vehicle must be lifted up.

- (c) If gas leak is not detected on the drain hose, remove the power transistor from the cooling unit. Then insert the gas leak detector sensor into the unit and perform the test.
- (d) Disconnect the connector and leave the pressure switch for approx. 20 minutes. Then bring the gas leak detector close to the pressure switch and perform the test.
- (e) Bring the gas leak detector close to the refrigerant lines and perform the test.



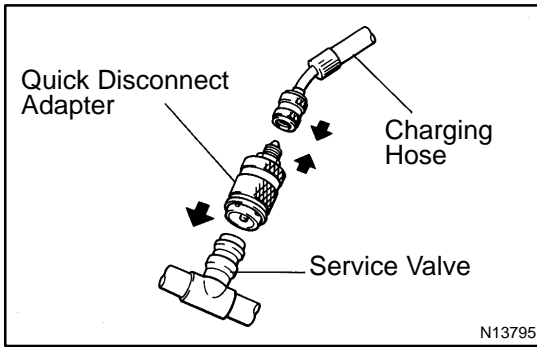
- (f) Disconnect the connector and leave the pressure switch for approximately 20 minutes. Then bring the gas leak detector close to the pressure switch and perform the test.



- (g) Bring the gas leak detector close to the refrigerant lines and perform the test.

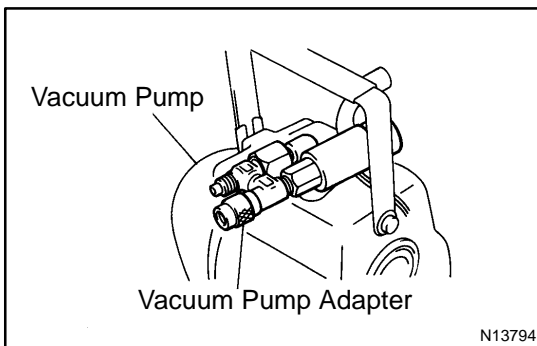
HINT:

Make sure that there is no dirt on joints.

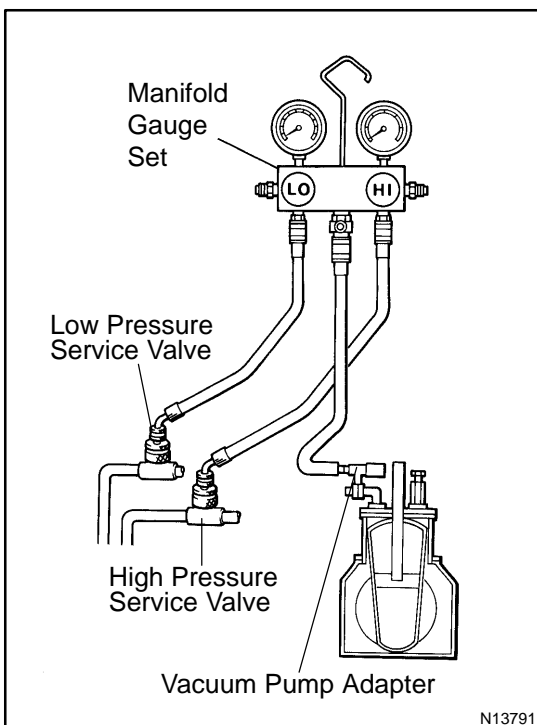


## EVACUATING

1. **CONNECT QUICK DISCONNECT ADAPTER TO CHARGING HOSES**
2. **REMOVE CAPS FROM SERVICE VALVES ON REFRIGERANT LINES**
3. **SET ON MANIFOLD GAUGE SET**
  - (a) Close both hand valves of manifold gauge set.
  - (b) Connect the quick disconnect adapters to the service valves.



4. **EVACUATE AIR FROM REFRIGERATION SYSTEM**
  - (a) Connect the vacuum pump adapter to the vacuum pump.



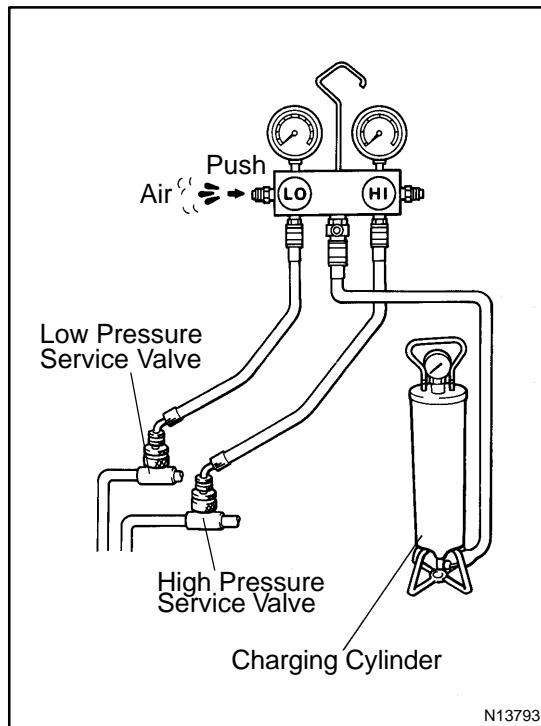
- (b) Connect the center hose of the manifold gauge set to the vacuum pump adapter.
- (c) Open both the high and low hand valves and run the vacuum pump.
- (d) After 10 minutes or more, check that the low pressure gauge indicates 750 mmHg (30 in. Hg) or more.

### HINT:

If the reading is 750 mmHg (30 in. Hg) or more, close both hand valves of manifold gauge set and stop the vacuum pump. Check the system for leaks and repair if necessary.

- (e) Close both the high and low hand valves and stop the vacuum pump.
- (f) Leave the system in this condition for 5 minutes or more and check that there is no gauge indicator.





## CHARGING

### 1. INSTALL CHARGING CYLINDER

#### HINT:

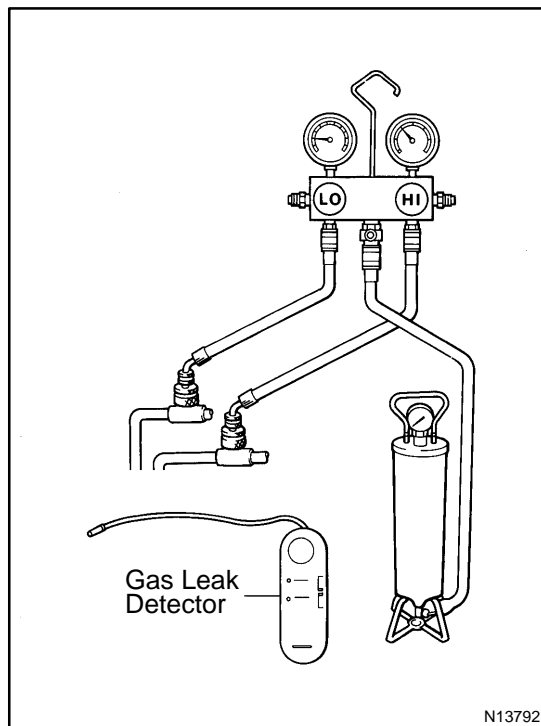
When handling the charging cylinder, always follow the directions given in the instruction manual.

- Charge the proper amount of refrigerant into the charging cylinder.
- Connect the center hose to the charging cylinder.

#### CAUTION:

**Do not open both high and low hand valves of manifold gauge set.**

- Open the valve of charging cylinder.
- Press the valve core on the side of manifold gauge and expel the air inside of the center hose.



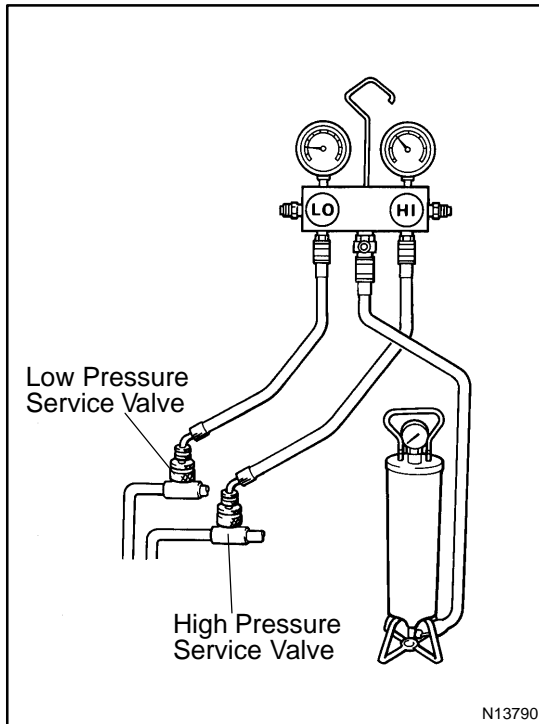
### 2. INSPECT REFRIGERATION SYSTEM FOR LEAKS

- Open the high pressure hand valve and charge refrigerant.
- When the low pressure gauge indicates 98 kPa (1 kgf/cm<sup>2</sup>, 14 psi) close the high pressure hand valve.
- Using a gas leak detector, check the system for leakage. If leak is found, repair the faulty component or connection.

Add evacuate air from refrigeration system (See page [AC-11](#)).

#### CAUTION:

**Use the refrigerant recovery/ recycling machine to recover the refrigerant whenever replacing parts.**



### 3. CHARGE REFRIGERANT INTO REFRIGERANT SYSTEM

If there is no leak after refrigerant leak check, charge the proper amount of refrigerant into the refrigeration system.

#### CAUTION:

- Never run the engine when charging the system through the high pressure side.
- Do not open the low pressure hand valve when the system is being charged with liquid refrigerant.

- (a) Open the high pressure hand valve fully.
- (b) Charge specified amount of refrigerant, then close the high pressure hand valve.

#### HINT:

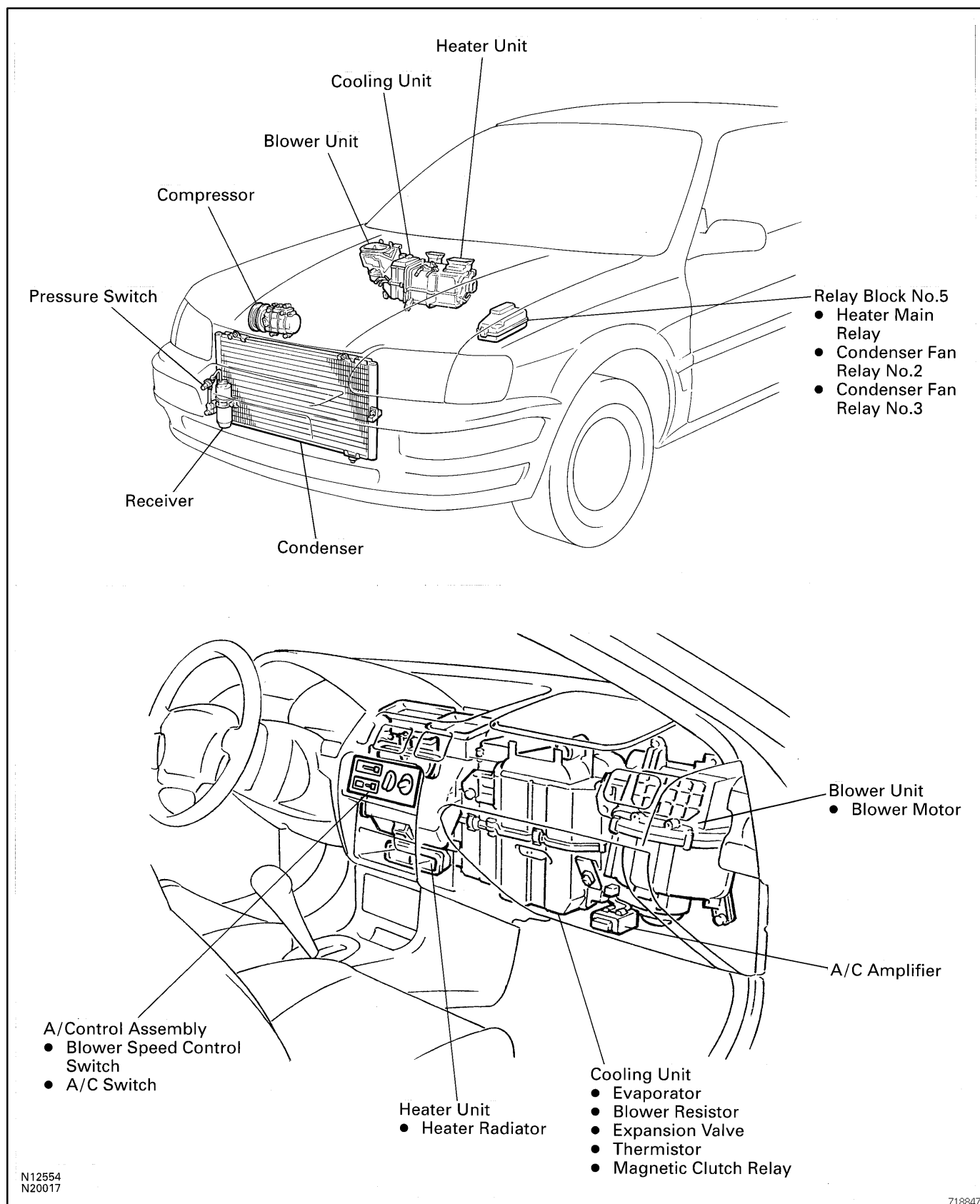
A fully charged system is indicated by the sight glass being free of any bubbles.

### 4. SET OFF MANIFOLD GAUGE SET

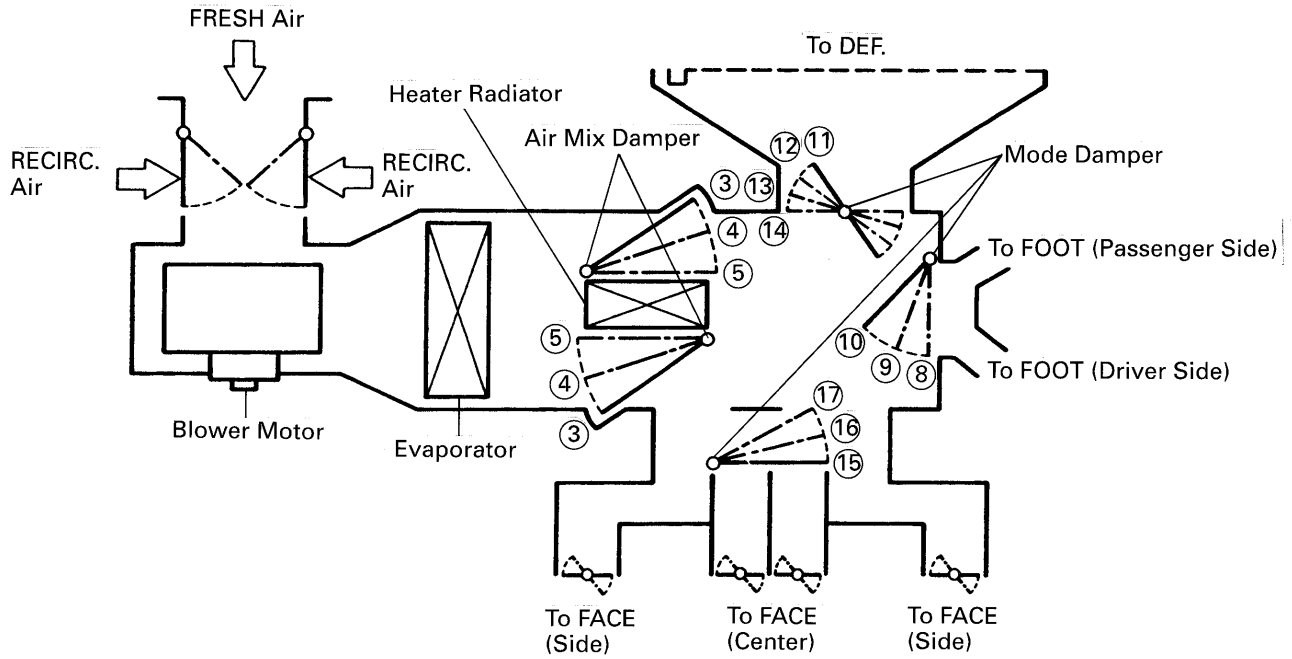
- (a) Close both hand valves of manifold gauge set.
- (b) Disconnect the quick disconnect adapters from the service valves.

### 5. INSTALL CAPS TO SERVICE VALVES ON REFRIGERANT LINES

## LOCATION



# POSITIONING



A/C control lever	A/C control lever position	Damper Position	Air flow vents			
			FACE		Foot	Def.
			Center	Side		
Air inlet control lever	Fresh	①	/	/	/	/
	Recirc.	②				
Temperature control lever	Warm ↔ Cool	③ ↔ ④ ↔ ⑤				
Mode control lever	FACE	⑧ ⑭ ⑰	○	○		
	BI-LEVEL	⑨ ⑭ ⑰	○	○	○	
	FOOT	⑩ ⑬ ⑮		○	○	○
	FOOT/DEF.	⑨ ⑫ ⑮		○	○	○
	DEF.	⑧ ⑪ ⑮		○		○

The size of the circle (○) indicates the proportion of air flow volume.

# TROUBLESHOOTING

## PROBLEM SYMPTOMS TABLE

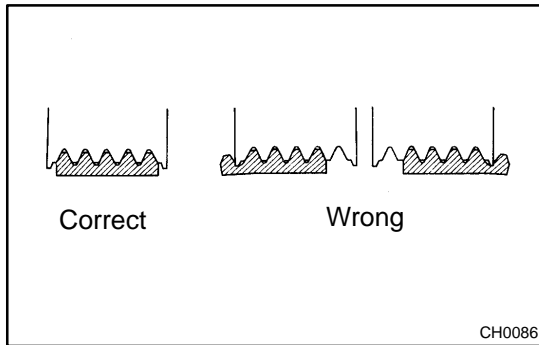
AC1HH-04

Use the table below to help you 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.

Symptom	Suspect Area	See page
No blower operation	2. Heater main relay 3. Blower motor 4. Blower resistor 5. Blower speed control switch	<a href="#">AC-62</a> <a href="#">AC-55</a> <a href="#">AC-56</a> <a href="#">AC-71</a>
No air temperature control	1. Inspect engine coolant volume 2. A/C control lever	- <a href="#">AC-72</a>
No compressor operation	1. Refrigerant volume 2. A/C Fuse 3. Magnetic clutch relay 4. Magnetic clutch 5. Compressor 6. Pressure switch 7. Heater main relay 8. A/C switch 9. Blower speed control switch 10. A/C amplifier 11. Thermistor 12. Wiring and wiring connections	<a href="#">AC-3</a> - <a href="#">AC-63</a> <a href="#">AC-40</a> <a href="#">AC-36</a> <a href="#">AC-59</a> <a href="#">AC-59</a> <a href="#">AC-62</a> <a href="#">AC-71</a> <a href="#">AC-66</a> <a href="#">AC-57</a> -
Compressor operates intermittently	1. Refrigerant volume 2. Refrigerant cooling system 3. Pressure switch 4. A/C amplifier 5. Thermistor 6. Wiring and wiring connections	<a href="#">AC-3</a> - <a href="#">AC-59</a> <a href="#">AC-66</a> <a href="#">AC-57</a> -
No condenser fan operation	1. Condenser fan fuse 2. Engine main relay 3. Cooling fan relay No.1 4. Cooling fan relay No.2 5. Cooling fan relay No.3 6. Magnetic clutch relay 7. Condenser fan motor 8. Pressure switch 9. Water temperature switch 10. A/C amplifier	- <a href="#">CO-33</a> <a href="#">AC-64</a> <a href="#">AC-64</a> <a href="#">AC-64</a> <a href="#">AC-63</a> <a href="#">AC-65</a> <a href="#">AC-59</a> - <a href="#">AC-66</a>
No cool air comes out	1. Refrigerant volume 2. Drive belt 3. Magnetic clutch 4. Compressor 5. Refrigeration control	<a href="#">AC-3</a> <a href="#">AC-18</a> <a href="#">AC-40</a> <a href="#">AC-36</a> -
Cool air comes out intermittently	1. Refrigerant Volume 2. Drive belt 3. A/C amplifier 4. Expansion valve 5. Evaporator 6. Thermistor 7. Wiring and wiring connection	<a href="#">AC-3</a> <a href="#">AC-18</a> <a href="#">AC-66</a> <a href="#">AC-54</a> <a href="#">AC-52</a> <a href="#">AC-57</a> -
Cool air comes out only at high engine rpm	1. Refrigerant volume 2. Drive belt 3. Inspect refrigerant lines	<a href="#">AC-3</a> <a href="#">AC-18</a> -

## AIR CONDITIONING - TROUBLESHOOTING

Insufficient cooling	<ol style="list-style-type: none"> <li>1. Refrigerant volume</li> <li>2. Drive belt</li> <li>3. Refrigerant cooling system</li> <li>4. A/C amplifier</li> <li>5. Refrigerant lines</li> <li>6. Thermistor</li> </ol>	<a href="#">AC-3</a> <a href="#">AC-18</a> - <a href="#">AC-66</a> - <a href="#">AC-57</a>
No engine idle up when A/C switch on	<ol style="list-style-type: none"> <li>1. Idle air control (IAC) valve</li> <li>2. A/C amplifier</li> <li>3. Wiring and wiring connections</li> </ol>	- <a href="#">AC-66</a> -
No warm air comes out	<ol style="list-style-type: none"> <li>1. Engine coolant volume</li> <li>2. A/C control lever adjustment</li> <li>3. Heater radiator</li> </ol>	- <a href="#">AC-73</a> <a href="#">AC-31</a>

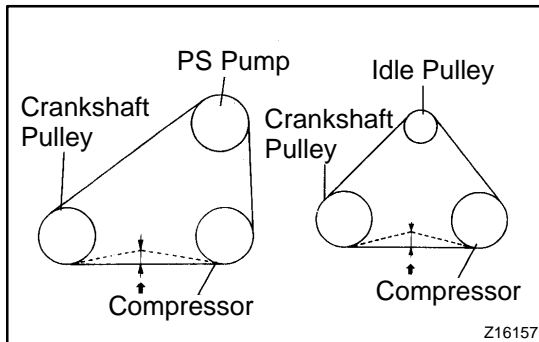


## DRIVE BELT ON-VEHICLE INSPECTION

AC1C5-04

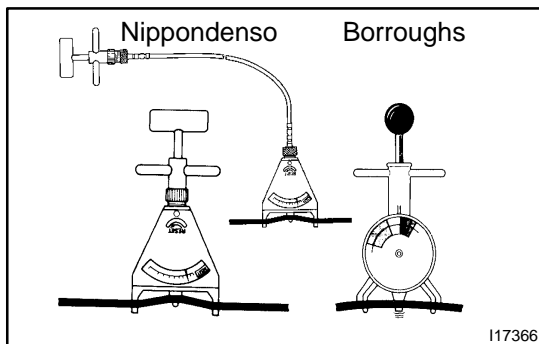
### 1. INSPECT DRIVE BELT'S INSTALLATION CONDITION

Check that the drive belt fits properly in the ribbed grooves.



### 2. INSPECT DRIVE BELT TENSION

Using a belt tension gauge, check the drive belt tension.



**Belt tension gauge:**

**Nippondenso BTG-20 (95506-00020) or Borroughs No. BT-33-73F**

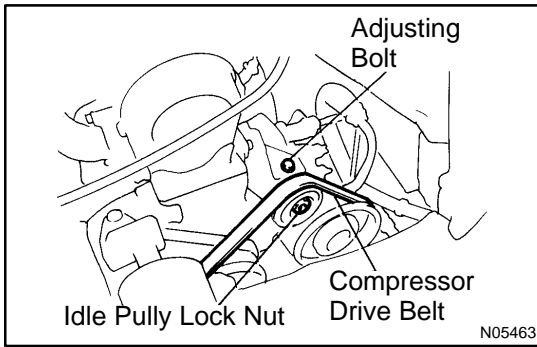
**Drive belt tension:**

**New belt  $160 \pm 25$  lbf**

**Used belt  $100 \pm 20$  lbf**

**HINT:**

- "New belt" refers to a belt which has been used less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing the drive belt, check that it fits properly in the ribbed grooves.

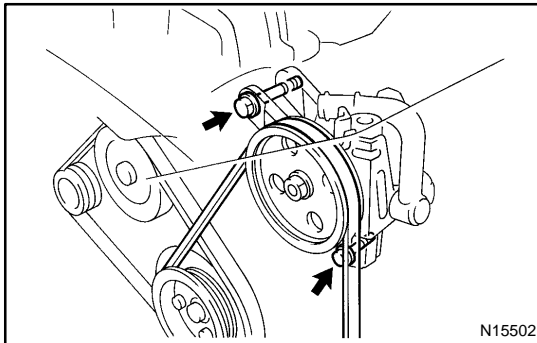


## REMOVAL

### 1. w/o Power Steering:

#### REMOVE DRIVE BELT

- (a) Loosen the idle pully lock nut.  
**Torque: 39 N·m (400 kgf-cm, 29 ft-lbf)**
- (b) Loosen the adjusting bolt and remove drive belt.



### 2. w/ Power Steering:

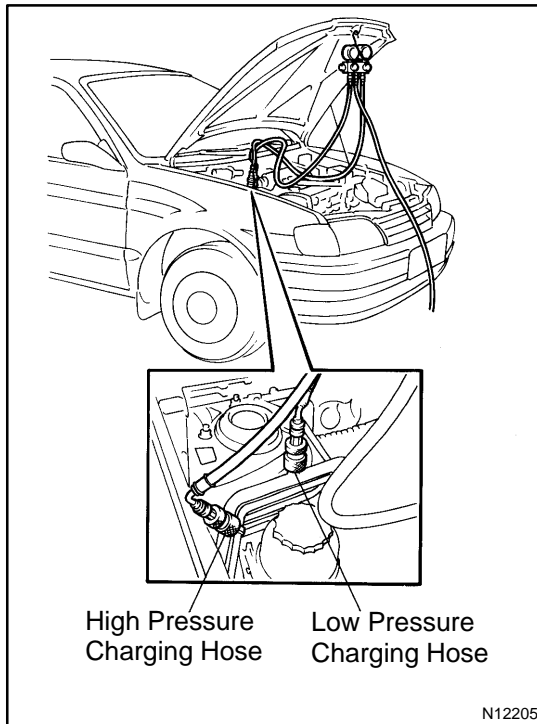
#### REMOVE DRIVE BELT

- (a) Loosen the 2 PS pump set bolts.  
**Torque: 43 N·m (440 kgf-cm, 32 ft-lbf)**
- (b) Loosen the adjusting bolt.
- (c) Remove the belt.



## INSTALLATION

Installation is in the reverse order of removal procedure (See page [AC-19](#) ).



## MANIFOLD GAUGE SET SET ON

AC1DD-01

### 1. CONNECT CHARGE HOSES TO MANIFOLD GAUGE SET

Tighten the nuts by hand.

#### CAUTION:

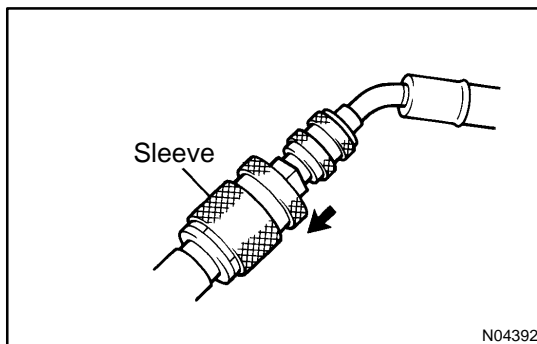
Do not connect the wrong hoses.

### 2. CONNECT QUICK DISCONNECT ADAPTERS TO CHARGING HOSES

Tighten the nuts by hand.

### 3. CLOSE BOTH HAND VALVES OF MANIFOLD GAUGE SET

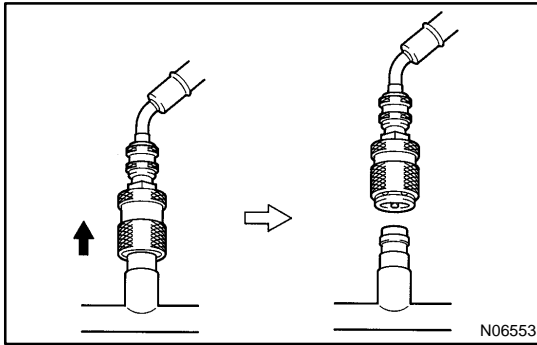
### 4. REMOVE CAPS FROM SERVICE VALVE ON REFRIG- ERANT LINES



### 5. CONNECT QUICK DISCONNECT ADAPTER TO SER- VICE VALVES

#### HINT:

Push the quick disconnect adapter onto the service valve, then slide, the sleeve of the quick disconnect adapter downward to lock it.



## SET OFF

1. CLOSE BOTH HAND VALVES OF MANIFOLD GAUGE SET
2. DISCONNECT QUICK DISCONNECT ADAPTERS FROM SERVICE VALVES ON REFRIGERANT LINE

### HINT:

Slide the sleeve of the quick disconnect adapter upward to unlock the adapter and remove it from the service valve.

3. INSTALL CAPS TO SERVICE VALVES ON REFRIGERANT LINE

# REFRIGERANT LINE

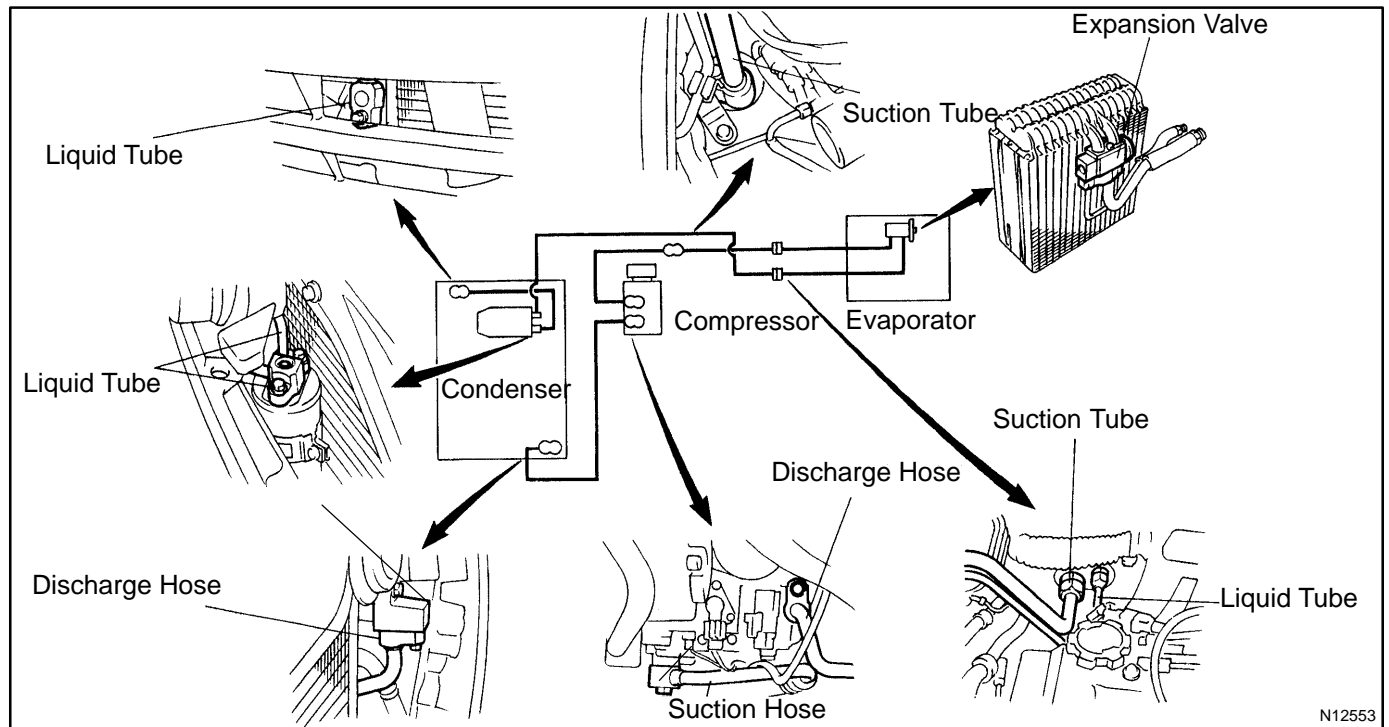
AC1DF-01

## ON-VEHICLE INSPECTION

1. INSPECT HOSE AND TUBE CONNECTIONS FOR LOOSENESS
2. INSPECT HOSES AND TUBES FOR LEAKAGE

Using a gas leak detector, check for leakage of refrigerant.

## LOCATION



## REPLACEMENT

### 1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

### 2. REPLACE FAULTY TUBE OR HOSE

#### NOTICE:

Cap the open fittings immediately to keep moisture or dirt out of the system.

### 3. TORQUE CONNECTIONS TO SPECIFIED TORQUE

#### NOTICE:

Connections should not be torqued tighter than the specified torqued.

Part tightened	N·m	kgf·cm	ft·lbf
Compressor x Suction hose	10	100	7
Compressor x Discharge hose	10	100	7
Condenser x Discharge Hose	5.4	55	48 in.·lbf
Condenser x Liquid tube	5.4	55	48 in.·lbf
Cooling unit x Liquid tube	14	140	10
Cooling unit x Suction tube	32	330	24
Receiver x Liquid tube	5.4	55	48 in.·lbf

### 4. EVACUATE AIR IN REFRIGERATION SYSTEM AND CHARGE WITH REFRIGERANT

Specified amount: 600 ± 50 g (21.16 ± 1.76 oz.)

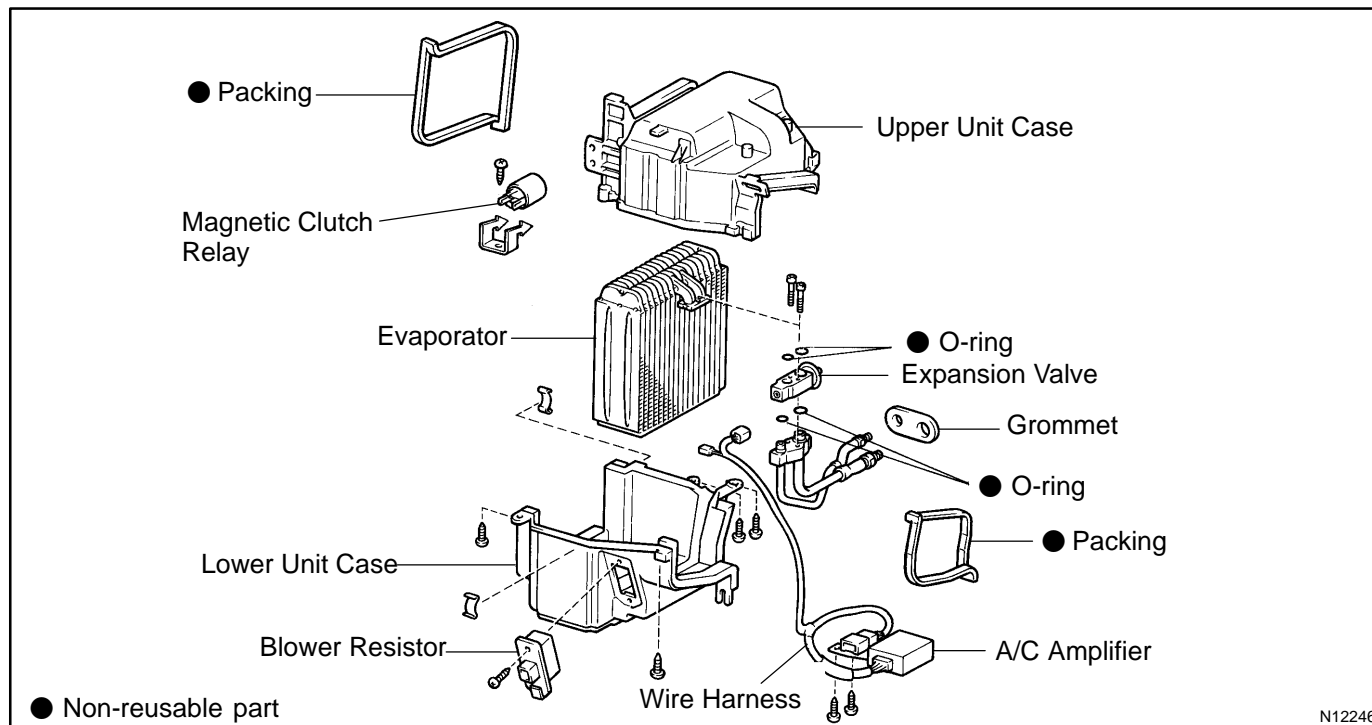
### 5. INSPECT FOR LEAKAGE OF REFRIGERANT

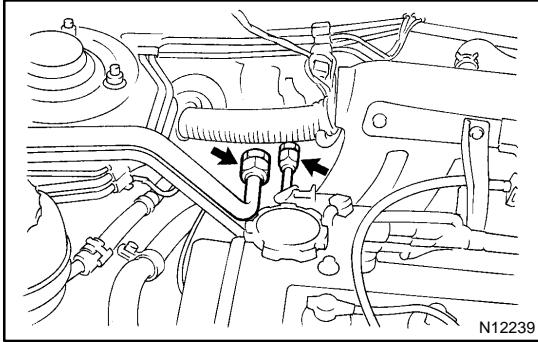
Using a gas leak detector, check for leakage of refrigerant.

### 6. INSPECT AIR CONDITIONING OPERATION

# COOLING UNIT COMPONENTS

AC1C9-03





## REMOVAL

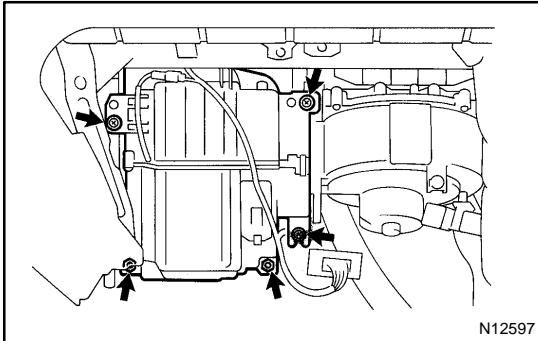
### 1. DISCONNECT REFRIGERANT FROM REFRIGERATION SYSTEM

#### HINT:

Evacuate air from refrigeration system.

Charge system with refrigerant and inspect for leakage of refrigerant.

**Specified amount: 600 ± 50 g (21.16 ± 1.76 oz.)**



### 2. DISCONNECT LIQUID AND SUCTION TUBES

Loosen the 2 nuts and disconnect the both tubes.

#### Torque:

**Liquid tube: 14 N·m (140 kgf-cm, 10 ft-lbf)**

**Suction tube: 32 N·m (330 kgf-cm, 24 ft-lbf)**

#### NOTICE:

**Cap the open fittings immediately to keep moisture or dirt out of the system.**

#### HINT:

Lubricate 2 new O-rings with compressor oil and install the tubes.

### 3. REMOVE GLOVE COMPARTMENT PARTS

(See page [BO-48](#))

### 4. REMOVE COOLING UNIT

- (a) Disconnect the connector.
- (b) Remove the 3 screws, 2 nuts and the cooling unit.



## DISASSEMBLY

1. REMOVE WIRE HARNESS
2. REMOVE MAGNETIC CLUTCH RELAY
3. REMOVE A/C AMPLIFIER
4. REMOVE BLOWER RESISTOR
5. SEPARATE UPPER CASE AND LOWER CASE

- (a) Using a knife, cut off the each packing.
- (b) Remove 2 clips and 2 screws.
- (c) Separate the upper and lower unit case.

6. REMOVE EVAPORATOR

HINT:

If evaporator was replaced, add compressor oil to the compressor.

**Add 40 cc (1.4 fl.oz.)**

**Compressor oil: ND-OIL 8 or equivalent**

7. REMOVE THERMISTOR FROM EVAPORATOR

8. REMOVE EXPANSION VALVE

Using a hexagon wrench, remove the 2 bolts and separate the expansion valve and evaporator.

**Torque: 5.4 N·m (55 kgf·cm, 48 in.-lbf)**

HINT:

Lubricate 4 new O-rings with compressor oil and install them to the tubes.

## REASSEMBLY

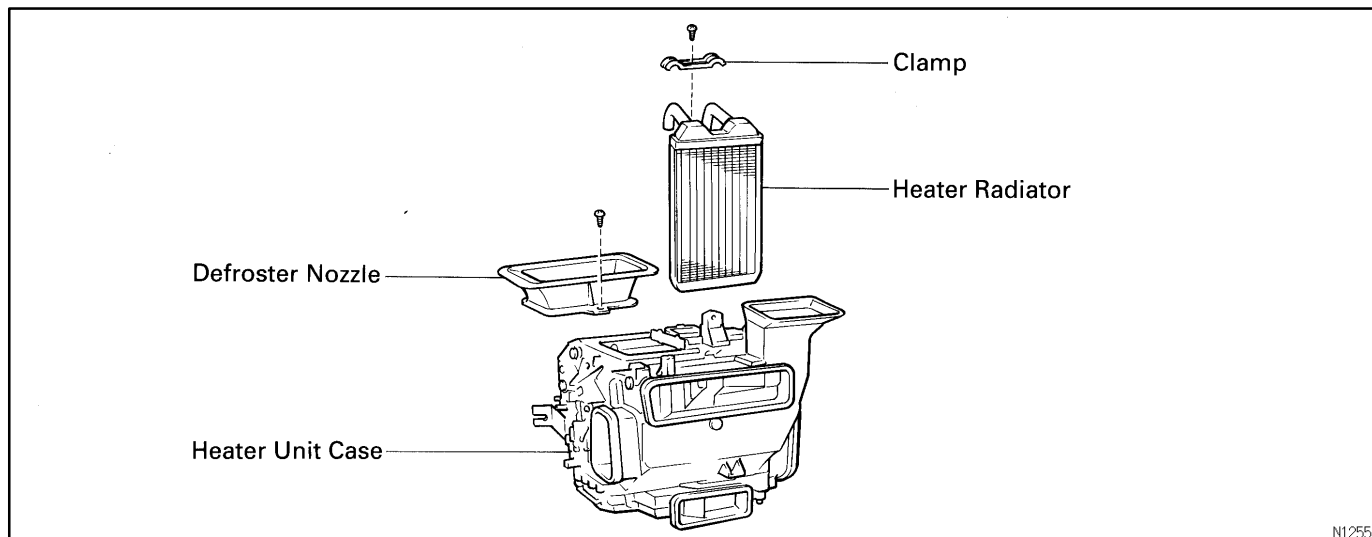
Reassembly is in the reverse order of disassembly procedure (See page [AC-28](#) ).

## INSTALLATION

Installation is in the reverse order of removal procedure (See page [AC-27](#) ).

## HEATER UNIT COMPONENTS

AC1CF-04



## REMOVAL

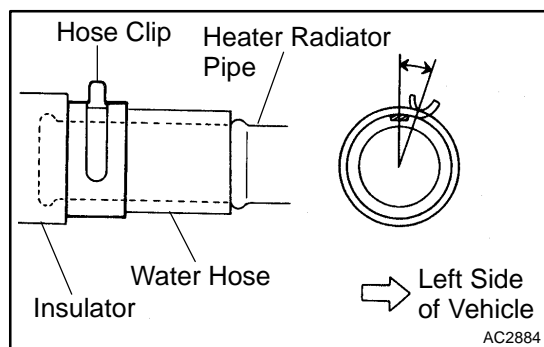
### 1. REMOVE COOLING UNIT

(See page [AC-27](#) )

### 2. DRAIN ENGINE COOLANT FROM RADIATOR

HINT:

It is not necessary to drain out all the coolant.



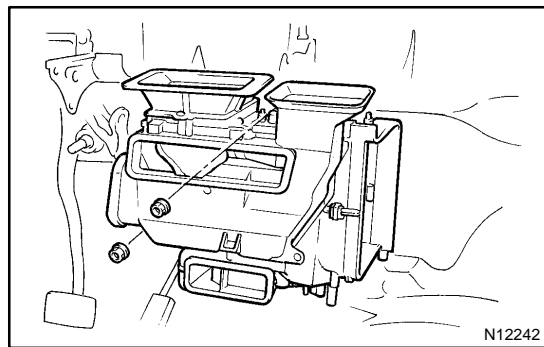
### 3. DISCONNECT WATER HOSES FROM HEATER RADIATOR PIPES

HINT:

- Push the water hose onto the heater radiator pipe as far as the ridge on the pipe.
- Install the hose clip in a position, as shown in the illustration.

### 4. REMOVE PIPE GROMMETS

### 5. REMOVE INSTRUMENT PANEL SAFETY PAD AND REINFORCEMENT (See page [BO-48](#) )



### 6. REMOVE HEATER UNIT

Remove the 2 nuts and the heater unit.

### 7. REMOVE HEATER RADIATOR

- (a) Remove the screw and clamp.
- (b) Pull out the heater radiator.

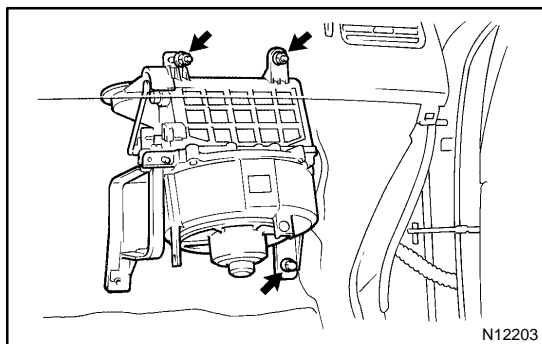
## INSTALLATION

Installation is in the reverse order of removal procedure (See page [AC-32](#) ).

## BLOWER UNIT REMOVAL

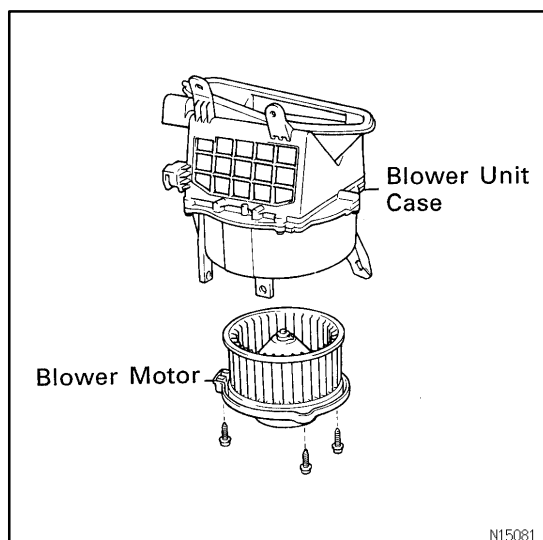
AC3IN-01

### 1. REMOVE COOLING UNIT (See page [AC-27](#) )



### 2. REMOVE BLOWER UNIT

- (a) Disconnect the connector from the blower motor.
- (b) Disconnect the air inlet damper control cable.
- (c) Remove the 2 nut, bolt and the blower unit.



### 3. REMOVE BLOWER MOTOR

Remove the 3 screws and blower motor.

## INSTALLATION

Installation is in the reverse order of removal procedure (See page [AC-34](#) ).



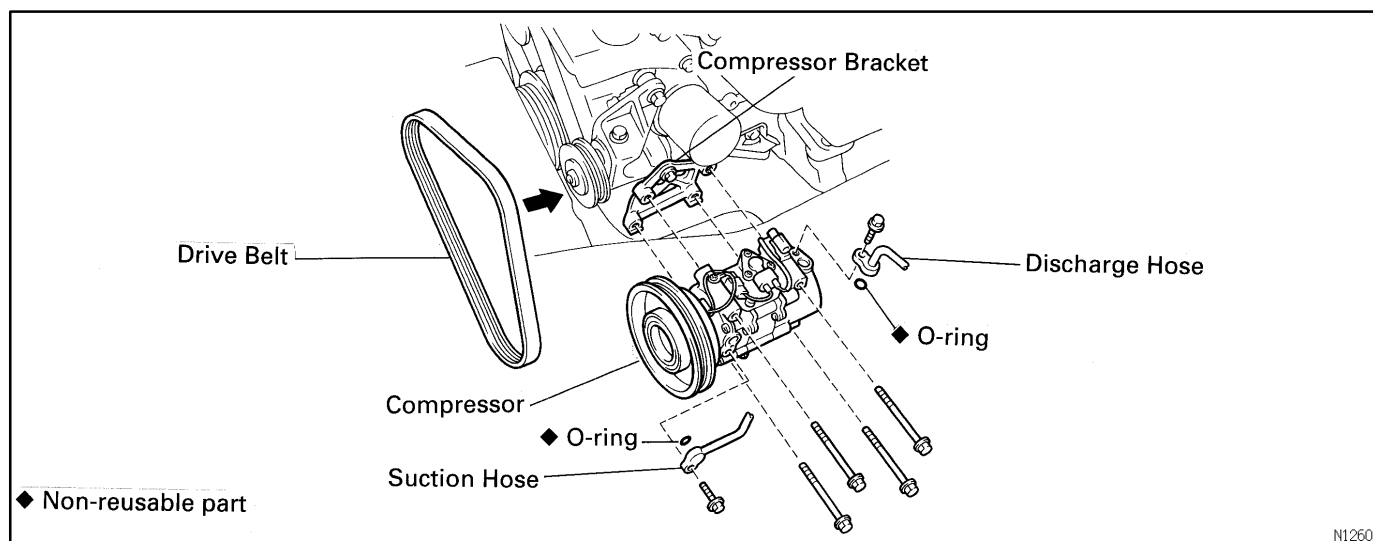
# COMPRESSOR

AC3IO-01

## ON-VEHICLE INSPECTION

1. **INSTALL MANIFOLD GAUGE SET**
2. **RUN ENGINE AT APPROX. 2,000 RPM**
3. **INSPECT COMPRESSOR**
  - (a) High pressure gauge reading is not lower and low pressure gauge reading is not higher than normal.
  - (b) Check that the metallic sound.
  - (c) Check that the leakage from shaft seal.

## COMPONENTS



## REMOVAL

1. RUN ENGINE AT IDLE SPEED WITH A/C ON FOR APPROX. 10 MINUTES
2. STOP ENGINE
3. DISCONNECT NEGATIVE (-) TERMINAL CABLE FROM BATTERY
4. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM
5. REMOVE ENGINE UNDER COVER
6. DISCONNECT CONNECTOR FROM MAGNETIC CLUTCH
7. DISCONNECT 2 HOSES FROM COMPRESSOR SERVICE VALVE

### NOTICE:

Cap the open fitting immediately to keep moisture or dirt out of the system

### 8. REMOVE COMPRESSOR

- (a) Loosen the compressor drive belt.
- (b) Remove the compressor mounting bolts and the compressor.

## INSTALLATION

### 1. INSTALL COMPRESSOR WITH 4 MOUNTING BOLTS

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

### 2. INSTALL DRIVE BELT (See page AC-20)

### 3. CONNECT 2 HOSES TO COMPRESSOR SERVICE VALVES

Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

#### HINT:

Lubricate 2 new O-rings with compressor oil and install the tubes.

### 4. CONNECT MAGNETIC CLUTCH LEAD WIRE TO WIRING HARNESS

### 5. CONNECT NEGATIVE (-) TERMINAL CABLE TO BATTERY

### 6. EVACUATE AIR FROM REFRIGERATION SYSTEM AND CHARGE SYSTEM WITH REFRIGERANT

Specified amount:

600 ± 50 g (21.73 ± 1.76 oz.)

### 7. INSPECT FOR LEAKAGE OF REFRIGERANT

Using a gas leak detector, check for leakage of refrigerant.

If there is leakage, check the tightening torque at the joints.

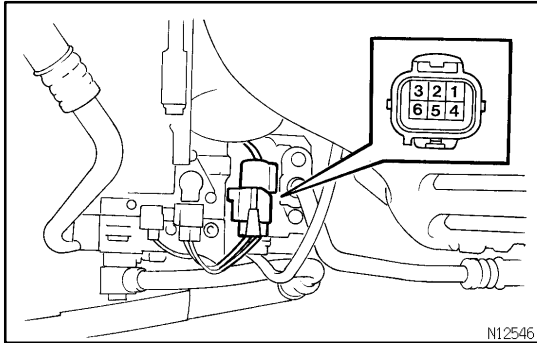
### 8. INSPECT A/C OPERATION

## MAGNETIC CLUTCH ON-VEHICLE INSPECTION

AC2WO-02

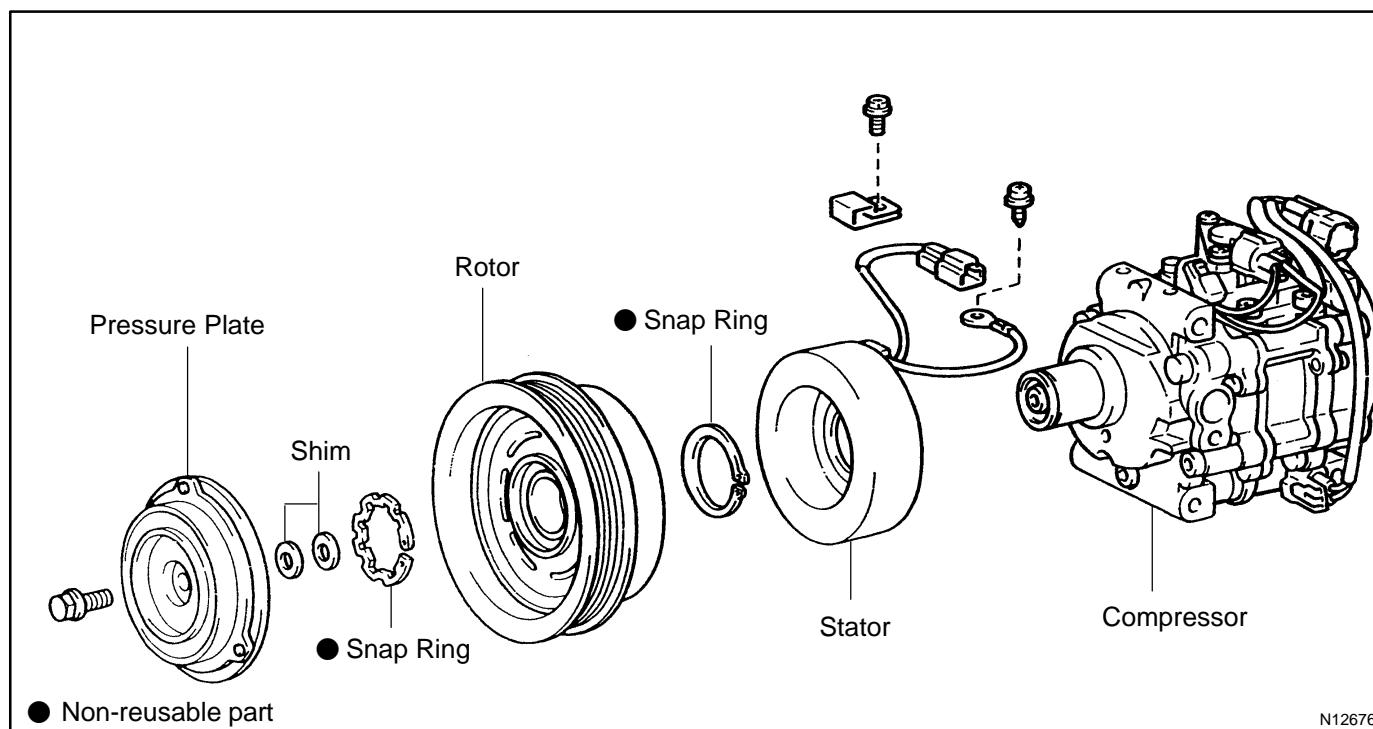
### INSPECT MAGNETIC CLUTCH

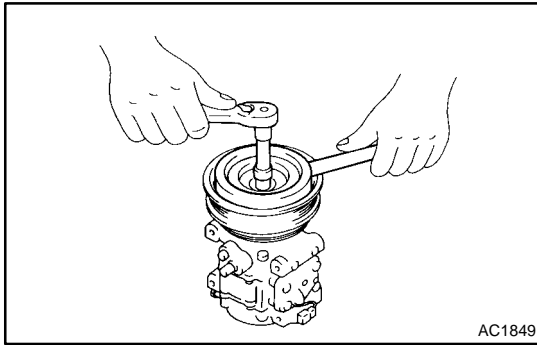
- (a) Inspect the pressure plate and the rotor for signs of oil.
- (b) Check the clutch bearings for noise and grease leakage.



- (c) Connect the positive (+) lead from the battery to the terminal on 4 and the negative (-) lead to the body ground.
  - (d) Check that the magnetic clutch is energized.
- If the magnetic clutch is not energized, replace the magnetic clutch.

## COMPONENTS





## DISASSEMBLY

### 1. REMOVE COMPRESSOR

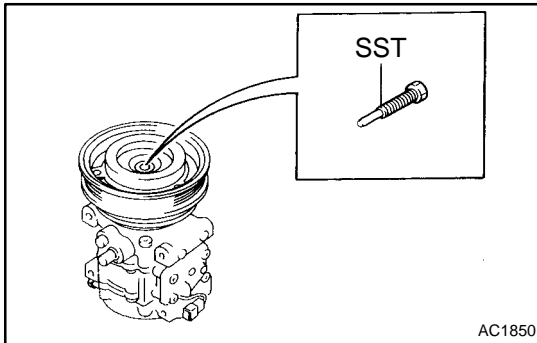
(See page [AC-38](#) )

### 2. REMOVE PRESSURE PLATE

- (a) USING SST and socket wrench, remove the shaft bolt.

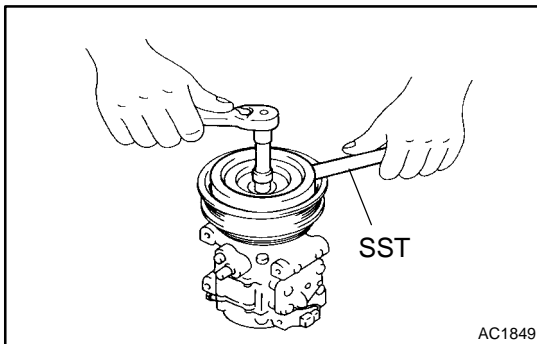
SST 07112-76050

**Torque: 14 N·m (140 kgf-cm, 10 ft-lbf)**



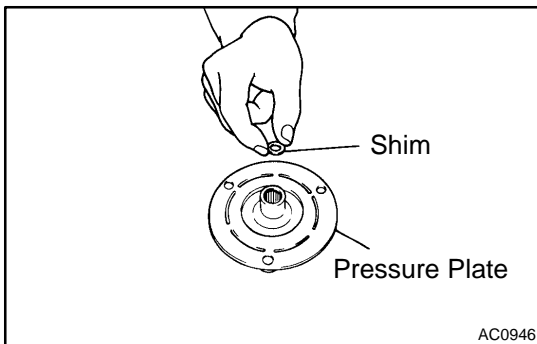
- (b) Install SST to the pressure plate.

SST 07112-66040

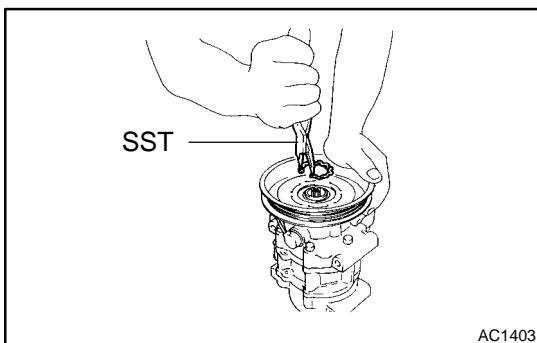


- (c) Using SST and a socket wrench, remove the pressure plate.

SST 07112-76050, 07112-66040



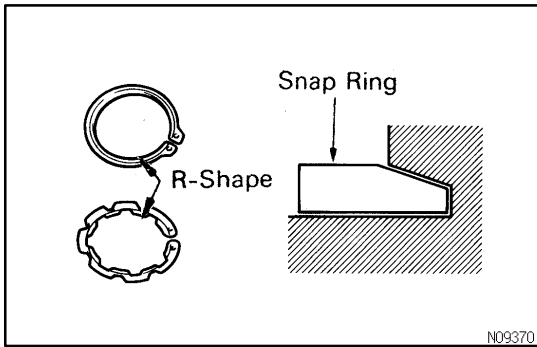
- (d) Remove the shims from the shaft.



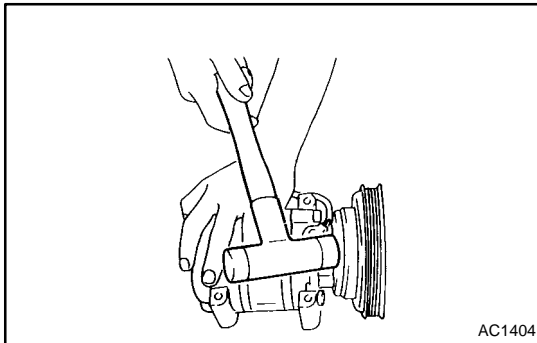
### 3. REMOVE ROTOR

- (a) Using SST, remove the snap ring.

SST 07114-84020

**NOTICE:**

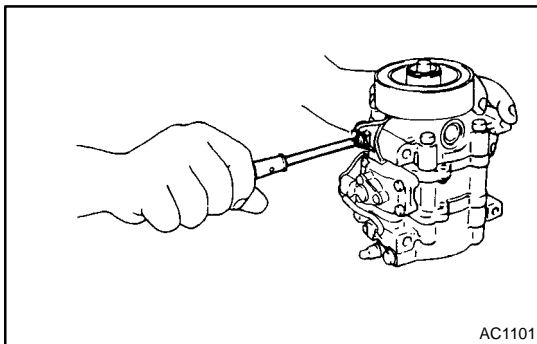
At the time of reassembly, the snap ring should be installed so that its beveled side faces up.



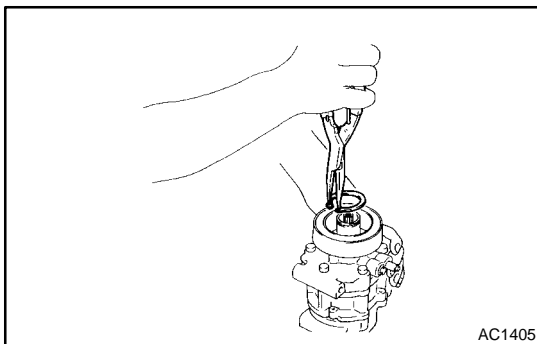
(b) Using a plastic hammer, tap the rotor off the shaft.

**NOTICE:**

Be careful not to damage the pulley when tapping on the rotor.

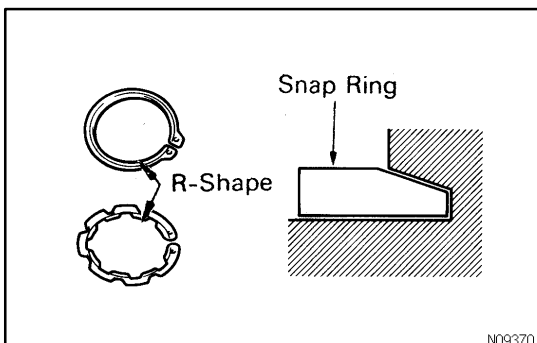
**4. REMOVE STATOR**

(a) Using a screwdriver disconnect the stator lead wires from the compressor housing.



(b) Using SST, remove the snap ring.

SST 07114-84020

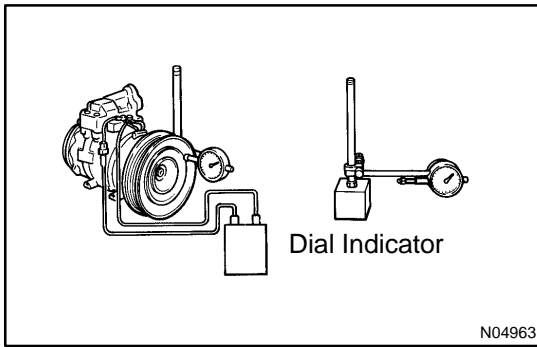
**NOTICE:**

At the time of reassembly, the snap ring should be installed so that its beveled side faces up.





(c) Remove the stator.



## REASSEMBLY

Reassembly is in the reverse order of disassembly (See page [AC-42](#) ).

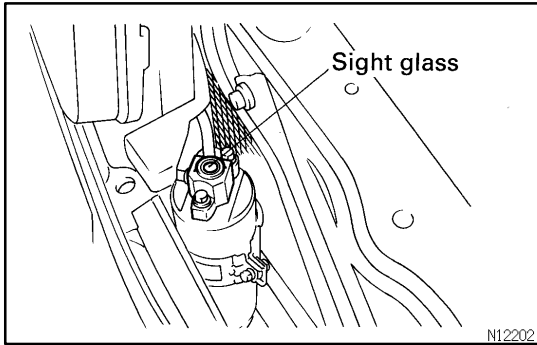
### INSPECT CLEARANCE OF MAGNETIC CLUTCH

- Set the dial-indicator to the pressure plate of the magnetic clutch.
- Connect the magnetic clutch lead wire to the positive (+) terminal of the battery.
- Check the clearance between the pressure plate and rotor, when connect the negative (-) terminal of the battery.

#### Standard clearance:

**$0.5 \pm 0.15 \text{ mm F}(0.020 \pm 0.0059 \text{ in.})$**

If the clearance is not within standard clearance adjust the clearance using shims to obtain the standard clearance.



## RECEIVER

AC3IR-01

### ON-VEHICLE INSPECTION

#### INSPECT SIGHT GLASS, FUSIBLE PLUG AND FITTINGS FOR LEAKAGE

Use a gas leak detector. Repair as necessary.

## REMOVAL

### 1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

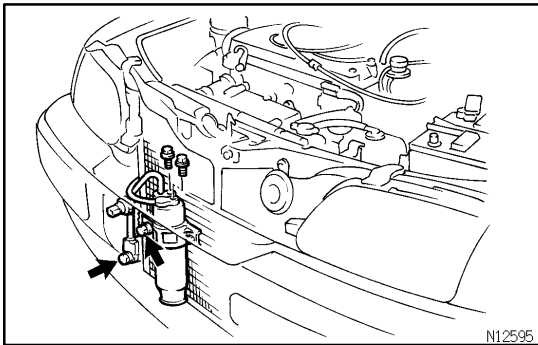
Charge system with refrigerant and inspect for leakage of refrigerant.

HINT:

At the time of installation, evacuate air from refrigeration system.

**Specified amount: 600 ± 50 g (21.16 ± 1.76 oz.)**

### 2. REMOVE FRONT GRILLE



### 3. DISCONNECT 2 LIQUID TUBES FROM RECEIVER

Remove the 2 bolts and both tubes.

**Torque: 5.4 N·m (55 kgf·cm, 48 in.-lbf)**

**NOTICE:**

**Cap the open fittings immediately to keep moisture dirt out of the system.**

HINT:

At the time of installation, lubricate 2 new O-rings with compressor oil and install the tubes.

### 4. REMOVE RECEIVER FROM RECEIVER HOLDER

Remove the holder bolts and pull the receiver up ward from the receiver holder.

HINT:

If receiver was replaced, add compressor oil to compressor.

**Add 10 cc (0.4 fl.oz.)**

**Compressor oil: ND-OIL 9 or equivalent**

### 5. REMOVE RECEIVER HOLDER

Remove the bolt and holder.

## INSTALLATION

Installation is in the reverse order of removal procedure (See page [AC-47](#) ).

# CONDENSER

AC1CX-02

## ON-VEHICLE INSPECTION

### 1. INSPECT CONDENSER FINS FOR BLOCKAGE OR DAMAGE

If the fins are clogged, wash them with water and dry with compressed air.

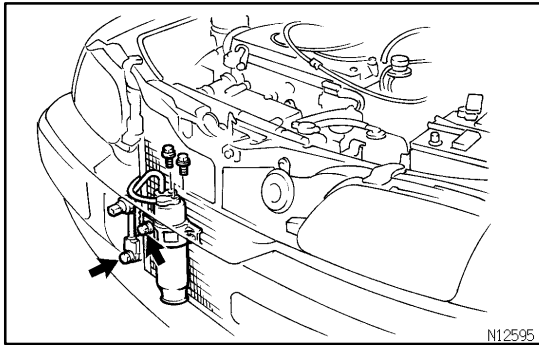
#### **NOTICE:**

**Be careful not to damage the fins.**

If the fins are bent, straighten them with a screwdriver or pliers.

### 2. INSPECT CONDENSER AND FITTINGS FOR LEAKAGE

Repair as necessary.



## REMOVAL

### 1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

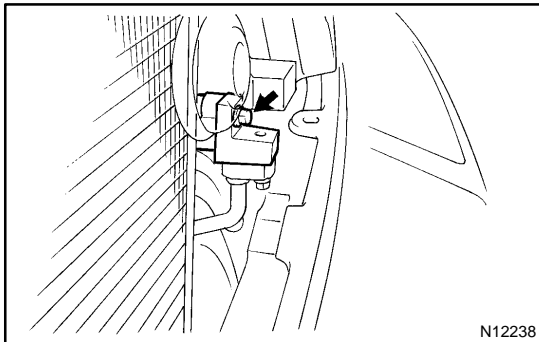
Charge system with refrigerant and inspect for leakage of refrigerant.

HINT:

At the time of installation, evacuate air from refrigeration system.

**Specified amount: 600 ± 50 g (21.16 ± 1.76 oz.)**

### 2. REMOVE RECEIVER (See page AC-47 )



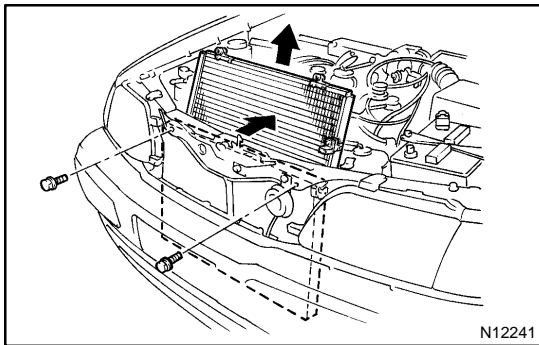
### 3. DISCONNECT LIQUID TUBE AND DISCHARGE TUBE Torque: 5.4 N·m (55 kgf·cm, 48 in.-lbf)

NOTICE:

**Cap the open fittings immediately to keep moisture or dirt out of the system.**

HINT:

Lubricate 2 new O-rings with compressor oil and install them to the tubes.



### 4. REMOVE CONDENSER

- Remove the 2 radiator upper mountings.
- Remove the 2 bolts from condenser upper mountings.
- Push the radiator toward the engine.
- Push the condenser toward radiator and pull it upward.

HINT:

If condenser was replaced, add compressor oil to compressor.

**Add 40 cc (1.4 fl.oz.)**

**Compressor oil: ND-OIL 9 or equivalent**

## INSTALLATION

Installation is in the reverse order of removal procedure (See page [AC-50](#) ).



# EVAPORATOR

## INSPECTION

AC2X0-02

1. REMOVE EVAPORATOR (See page [AC-27](#) )
2. INSPECT FINS FOR BLOCKAGE

If the fins are clogged, clean them with compressed air.

**NOTICE:**

**Never use water to clean the evaporator.**

3. INSPECT FITTINGS FOR CRACKS OR SCRATCHES

Repair as necessary.

4. REINSTALL EVAPORATOR (See page [AC-30](#) )

# HEATER RADIATOR

## INSPECTION

AC2WX-02

1. REMOVE HEATER RADIATOR (See page [AC-32](#) )
2. INSPECT FINS FOR BLOCKAGE

If the fins are clogged, clean them with compressed air.

3. REINSTALL HEATER RADIATOR (See page [AC-32](#) )

## EXPANSION VALVE

AC2XI-01

### ON-VEHICLE INSPECTION

1. **CHECK QUANTITY OF GAS DURING REFRIGERATION CYCLE**
2. **INSTALL MANIFOLD GAUGE SET**
3. **RUN ENGINE**

Run the engine at 1,500 rpm for at least 5 minutes. Then check that the high pressure reading is 1.37 - 1.57 MPa (14 - 16 kgf/cm<sup>2</sup>, 199 - 228 psi).

4. **CHECK EXPANSION VALVE**

If the expansion valve is faulty, the low pressure reading will drop to 0 kgf/cm<sup>2</sup>, 0 psi), otherwise it is OK.

HINT:

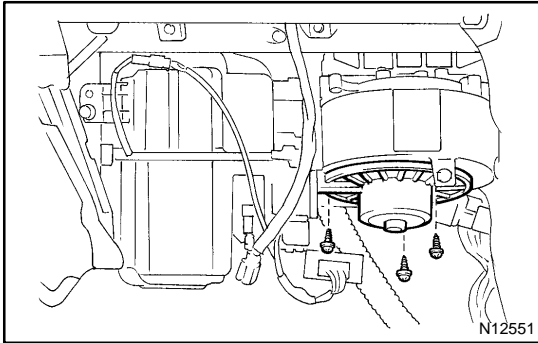
When the low pressure drops to 0 kPa (0 kgf/cm<sup>2</sup>, 0 psi), feel the receiver's IN and OUT sides for 0 temperature difference.

## BLOWER MOTOR INSPECTION

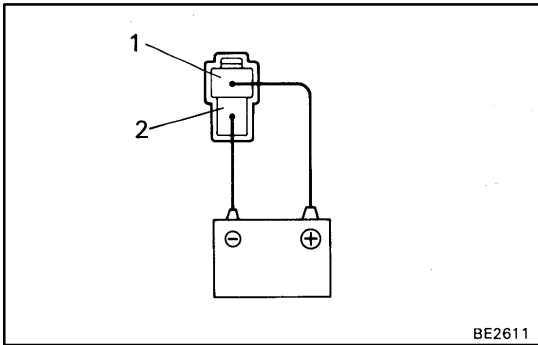
AC3IS-01

### 1. REMOVE BLOWER MOTOR

- (a) Remove the glove compartment parts.



- (b) Remove the A/C amplifier.  
(c) Disconnect the connector from the blower motor.  
(d) Remove the 3 screws and the blower motor.



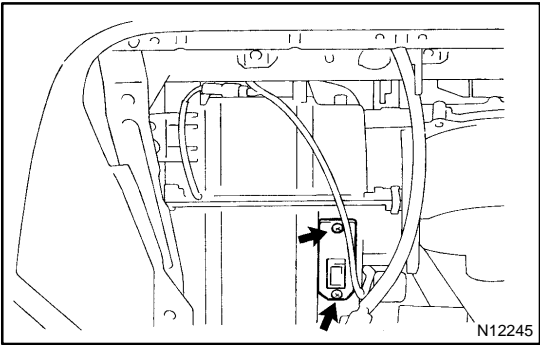
### 2. INSPECT BLOWER MOTOR OPERATION

Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, then check that the motor operations smoothly.

If operation is not as specified, replace the blower motor.

### 3. REINSTALL BLOWER MOTOR

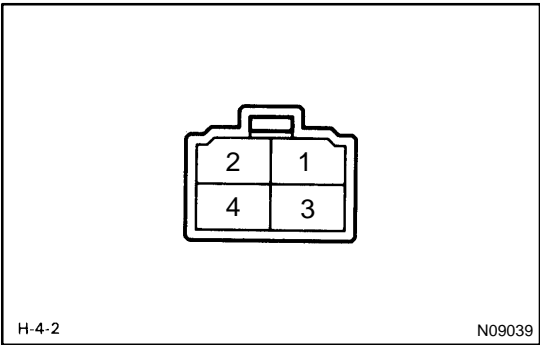
Install the motor in the reverse order of step1.



# BLOWER RESISTOR INSPECTION

AC3IT-01

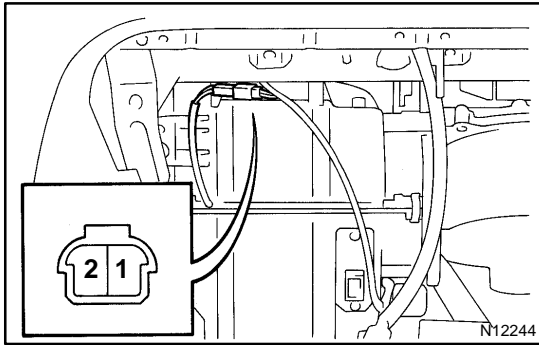
- 1. REMOVE BLOWER RESISTOR**
- (a) Remove the lower finish panel.
  - (b) Disconnect the connector from the blower resistor.
  - (c) Remove the 2 screws and blower resistor.



**2. INSPECT BLOWER RESISTOR CONTINUITY**

Condition	Tester connection	Specified condition
Constant	1 - 2 - 3 - 4	Continuity

If continuity is not as specified, replace the blower resistor.



AC2XM-01

## THERMISTOR

### ON-VEHICLE INSPECTION

1. REMOVE GLOVE COMPARTMENT PARTS  
(See page [BO-45](#) )
2. INSPECT THERMISTOR'S RESISTANCE

Measure resistance between terminals.

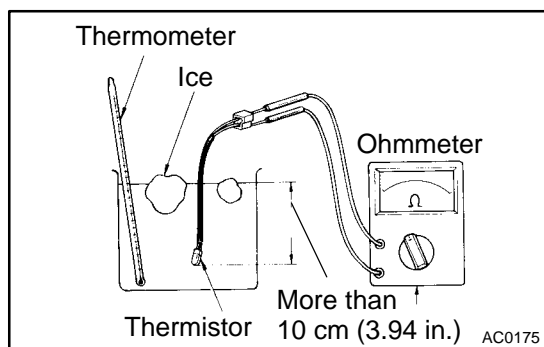
**Standard resistance:**

**1,500  $\Omega$  at 25°C (77°F)**

If resistance is not as specified, replace the thermistor.

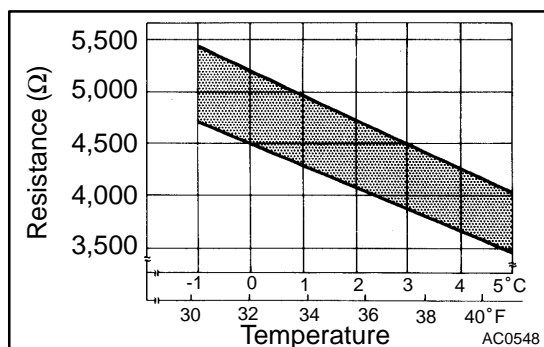
## INSPECTION

### 1. REMOVE THERMISTOR (See page [AC-27](#) )



### 2. INSPECT THERMISTOR RESISTANCE

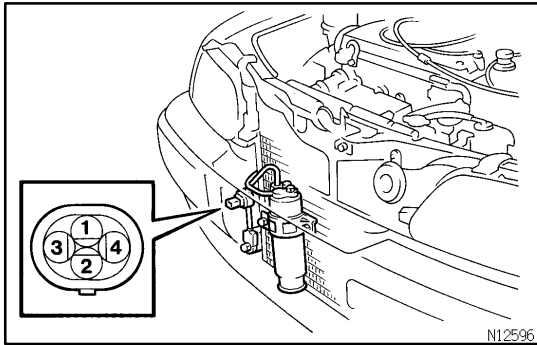
- (a) Place the thermistor in cold water. While changing temperature of the water, measure resistance at the connector and at the same time, measure temperature of water with a thermometer.



- (b) Compare the 2 readings on the chart.

If resistance value is not as specified, replace the thermistor.

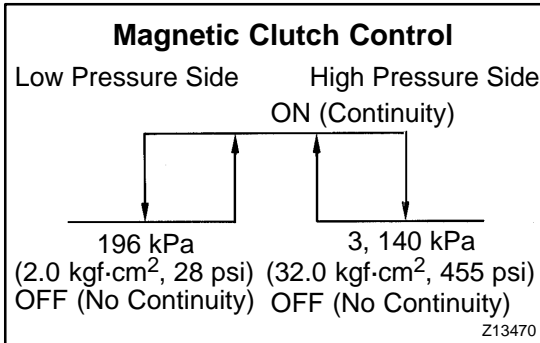
### 3. REINSTALL THERMISTOR (See page [AC-27](#) )



## PRESSURE SWITCH ON-VEHICLE INSPECTION

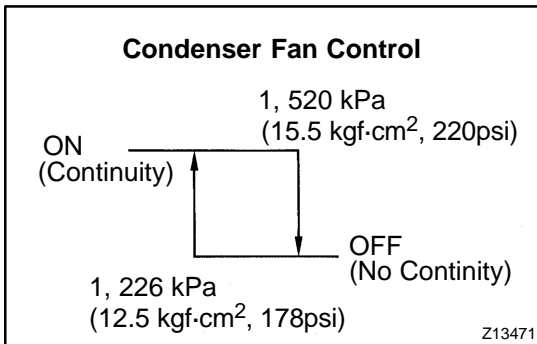
AC1D2-02

1. SET ON MANIFOLD GAUGE SET  
(See page AC-21 )
2. DISCONNECT CONNECTOR FROM PRESSURE SWITCH
3. RUN ENGINE AT APPROX. 2,000 RPM



4. **Magnetic Clutch Control:**  
**INSPECT PRESSURE SWITCH OPERATION**
  - (a) Connect the positive (+) lead from the ohmmeter to terminal 4 and the negative (-) lead to terminal 1.
  - (b) Check continuity between terminals when refrigerant pressure is charged, as shown in the illustration.

If operation is not as specified, replace the pressure switch.



5. **Condenser Fan Control:**  
**INSPECT PRESSURE SWITCH OPERATION**
  - (a) Connect the positive (+) lead from the ohmmeter to terminal 2 and the negative (-) lead to terminal 3.
  - (b) Check continuity between terminals when refrigerant pressure is changed, as shown in the illustration.

If operation is not as specified, replace the pressure switch.
6. STOP ENGINE AND SET OFF MANIFOLD GAUGE SET
7. CONNECT CONNECTOR TO PRESSURE SWITCH



## REMOVAL

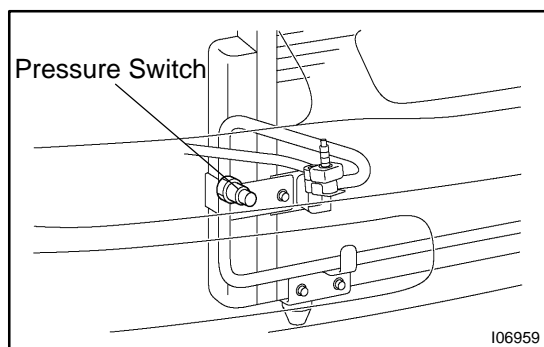
### 1. DISCHARGE REFRIGERANT FROM REFRIGERANT SYSTEM

Charge system with refrigerant and inspect for leakage of refrigerant.

HINT:

At the time of installation, evacuate air from refrigeration system.

**Specified amount: 600 ± 50 g (21.16 ± 1.76 oz.)**



### 2. REMOVE PRESSURE SWITCH FROM LIQUID TUBE

- Disconnect the connector.
- Remove the pressure switch from the liquid tube.

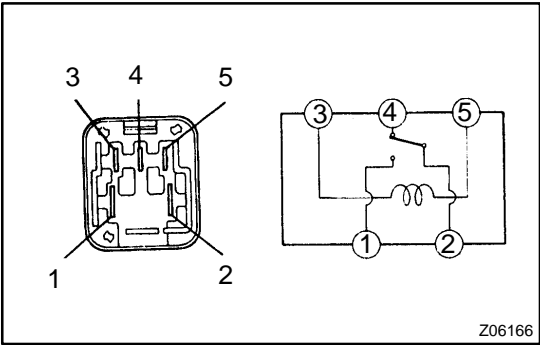
**Torque: 10 N·m (100 kgf-cm, 7 ft-lbf)**

HINT:

- Lock the switch mount on the tube with an open end wrench, being careful not to deform the tube, and remove the switch.
- At the time of installation, lubricate a new O-ring with compressor oil and install them to the switch.

## INSTALLATION

Installation is in the reverse order of removal procedure (See page [AC-60](#) ).



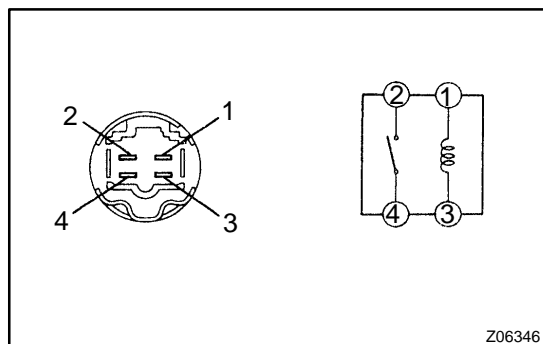
# HEATER MAIN RELAY INSPECTION

AC2X8-02

## INSPECT HEATER MAIN RELAY CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 - 3 2 - 4	Continuity
Apply B+ between terminals 3 and 5.	4 - 5	Continuity

If continuity is not as specified, replace the relay.



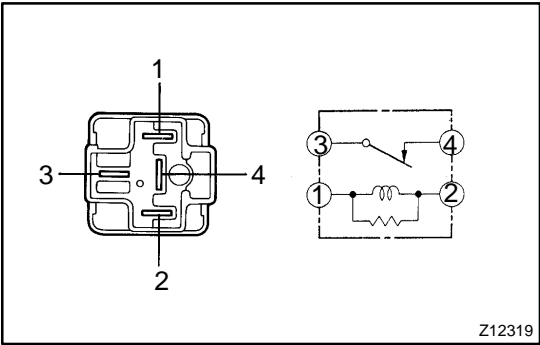
## MAGNETIC CLUTCH RELAY INSPECTION

AC2X9-01

### INSPECT MAGNETIC CLUTCH RELAY CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 - 3	Continuity
Apply B+ between terminals 3 and 5.	2 - 4	Continuity

If continuity is not as specified, replace the relay.



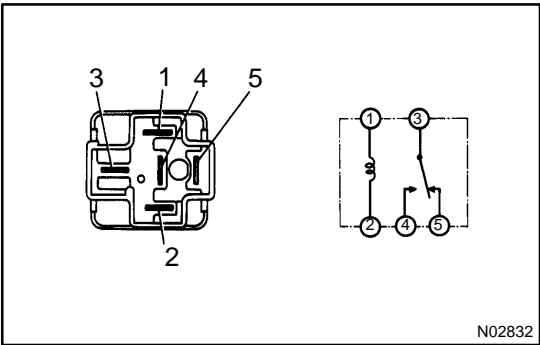
# COOLING FAN RELAY INSPECTION

AC2XA-01

## 1. INSPECT COOLING FAN RELAY No. 1 (Marking: FAN) CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 - 2 3 - 4	Continuity
Apply B+ between terminals 1 and 2.	3 - 4	No continuity

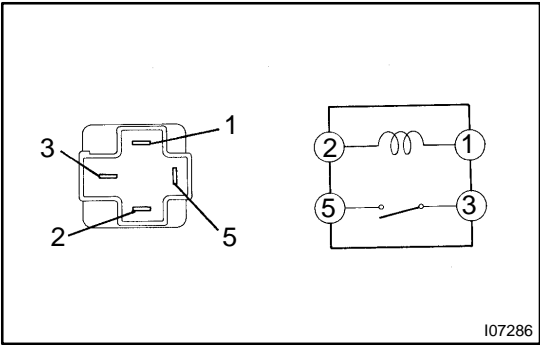
If continuity is not as specified, replace the relay.



## 2. INSPECT COOLING FAN RELAY No. 2 (Marking: A.C FAN No. 2) CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 - 2 3 - 4	Continuity
Apply B+ between terminals 1 and 2.	3 - 5	Continuity

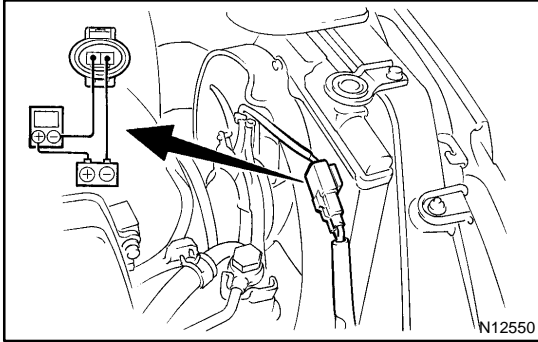
If continuity is not as specified, replace the relay.



## 3. INSPECT COOLING FAN RELAY No. 3 (Marking: A.C FAN No. 3) CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 - 2	Continuity
Apply B+ between terminals 1 and 2.	3 - 5	Continuity

If continuity is not as specified, replace the relay.



AC3IU-01

## CONDENSER FAN ON-VEHICLE INSPECTION

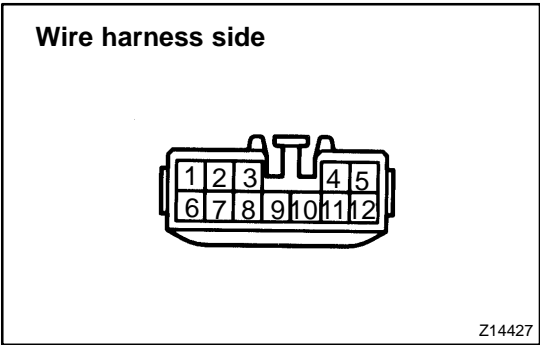
### INSPECT COOLING FAN MOTORS OPERATION

- (a) Disconnect the cooling fan connector.
- (b) Connect battery and ammeter.
- (c) Check that the cooling fan rotates smoothly, and then check that the reading on the ammeter.  
**Specified amperage:  $6.9 \pm 0.5$  A**
- (d) Connect the fan connector.

# AIR CONDITIONING AMPLIFIER ON-VEHICLE INSPECTION

AC1D0-04

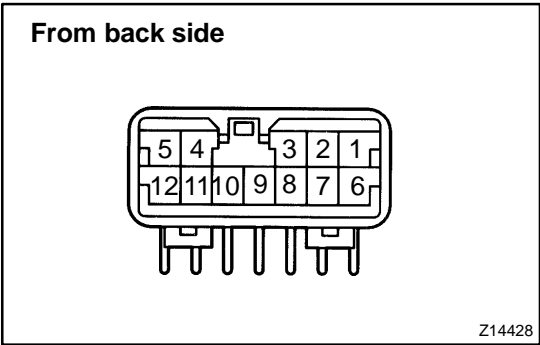
## 1. w/ Power Steering: INSPECT A/C AMPLIFIER CIRCUIT



- (a) Disconnect the connector from amplifier and inspect the connector on wire harness side, as shown in the chart.
- Test conditions:
- Turn ignition switch to ON
  - Blower speed control switch at "HI" position
  - A/C switch ON
  - Temperature control lever at MAX COOL

Tester connection	Condition	Specified condition
5 - Ground	Constant	Continuity
1 - Ground	Constant	Continuity
6 - Ground	Constant	Continuity
1 - ECM terminal AC1	Constant	Continuity
6 - ECM terminal ACT	Constant	Continuity
8 - 12	Constant	Approx. 1.5 kΩ at 25°C (77°F)
7 - Ground	A/C switch ON	Battery positive voltage
7 - Ground	A/C switch OFF	No voltage
9 - Ground	A/C switch ON	Battery positive voltage
9 - Ground	A/C switch OFF	No voltage
11 - Ground	Constant	Battery positive voltage

If circuit is as specified, try replacing the amplifier with a new one. If the circuit is not as specified, inspect the circuits connected to other parts.

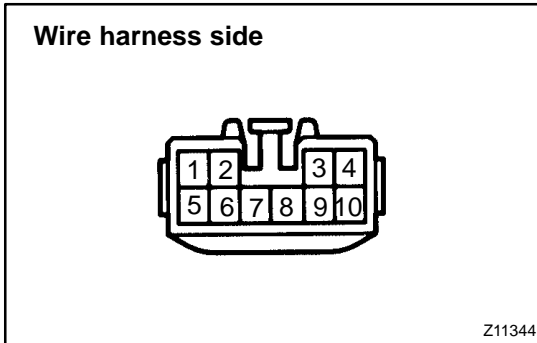


- (b) Connect the connector to A/C amplifier and inspect the wire harness connector from the back side, as shown in the chart below.
- Tester conditions:
- Running engine at idle speed
  - Blower speed control switch at HI position
  - Temperature control lever at MAX COOL position
  - A/C switch ON
  - Set manifold gauge set

AIR CONDITIONING - AIR CONDITIONING AMPLIFIER

Tester connection	Condition	Specified condition
2 - Ground	Refrigerant pressure 196 - 3,140 kPa	Battery positive voltage
2 - Ground	Refrigerant pressure less than 196 kPa or more than 3,140	No voltage

If circuit is as specified, try replacing the amplifier with a new one. If the circuit is not as specified, inspect the circuits connected to other parts.



**2. w/o Power steering:  
INSPECT A/C AMPLIFIER**

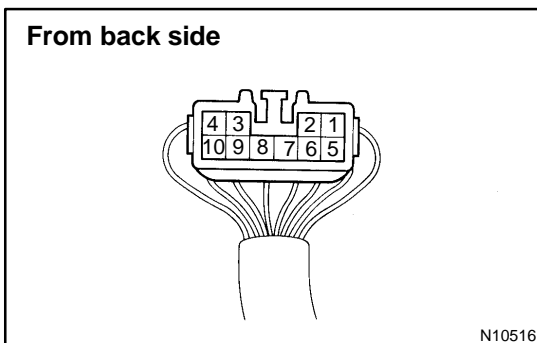
- (a) Disconnect the connector from amplifier and inspect the connector on wire harness side, as shown in the chart.

Test conditions:

- Turn ignition switch to ON
- Blower speed control switch at HI position
- A/C switch ON
- Temperature control lever at MAX COOL

Test connection	Condition	Speed condition
4 - Ground	Constant	Continuity
6 - ECM terminal ACT	Constant	Continuity
8 - ECM terminal AC1	Constant	Continuity
6 - 10	Constant	Approx. 1.5 kΩ at 25°C (77°F)
5 - Ground	A/C switch ON	Battery positive voltage
5 - Ground	A/C switch OFF	No voltage
9 - Ground	Ignition switch ON	Battery positive voltage
9 - Ground	Ignition switch ON	No voltage
7 - Ground	A/C switch ON	Battery positive voltage
7 - Ground	A/C switch OFF	No voltage

If circuit is as specified, try replacing the amplifier with a new one. If the circuit is not as specified, inspect the circuits connected to other parts.



- (b) Connect the connector to amplifier and inspect the wire harness connector from back side, as shown in the chart below.

Test conditions:

- Running engine at idle speed
- Blower speed control switch at HI position
- Temperature control lever at MAX COOL position
- A/C switch ON
- Set manifold gauge set



Tester connection	Condition	Specified condition
1 -Ground	Refrigeration pressure 196 - 3,140 kPa	Battery positive voltage
1 - Ground	Refrigeration pressure less than 196 or more than 3,140 kPa	No voltage

If circuit is as specified, try replacing the amplifier with a new one. If the circuit is not as specified, inspect the circuits connected to other parts.

# HEATER CONTROL ASSEMBLY

AC3IV-01

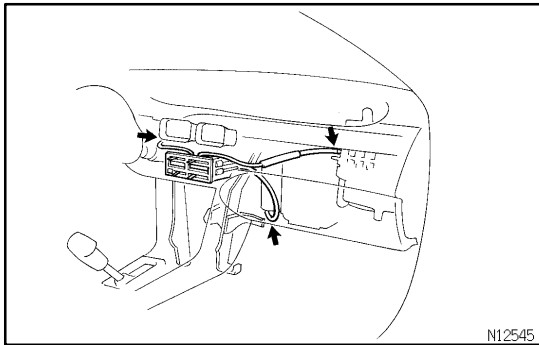
## ON-VEHICLE INSPECTION

### INSPECT A/C CONTROL LEVERS OPERATION

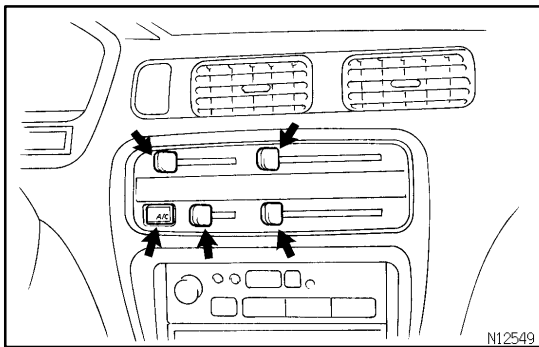
Move the control dials and lever left and right and check for stiffness and binding through the full range of the levers.

## REMOVAL

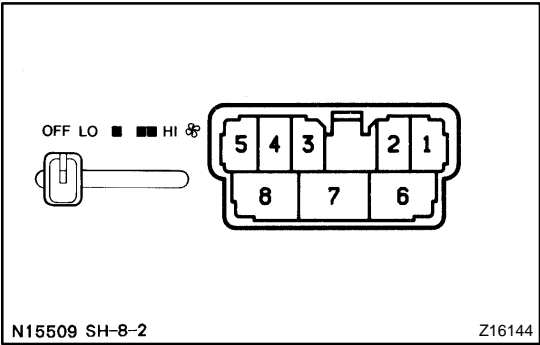
1. REMOVE GLOVE COMPARTMENT PARTS  
(See page [BO-45](#) ).
2. REMOVE INSTRUMENT LOWER FINISH PANEL  
(See page [BO-45](#) ).
3. REMOVE CENTER CLUSTER FINISH PANEL  
(See page [BO-45](#) ).



4. DISCONNECT A/C CONTROL CABLES



5. REMOVE A/C CONTROL ASSEMBLY
  - (a) Remove the heater control knobs.
  - (b) Remove the A/C switch.
  - (c) Remove the heater control panel.
  - (d) Remove the 4 screws and A/C control assembly.

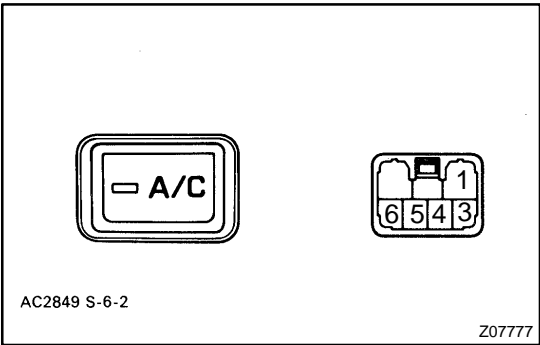


# INSPECTION

## 1. INSPECT BLOWER SWITCH CONTINUITY

Position / Circuit	Tester connection	Specified condition
OFF	-	No continuity
LO	5 - 6	Continuity
M1	1 - 5 - 6	Continuity
M2	2 - 5 - 8	Continuity
HI	5 - 6 - 8	Continuity
Illumination circuit	3 - 4	Continuity

If continuity is not as specified, replace the A/C control assembly.



## 2. INSPECT A/C SWITCH CONTINUITY

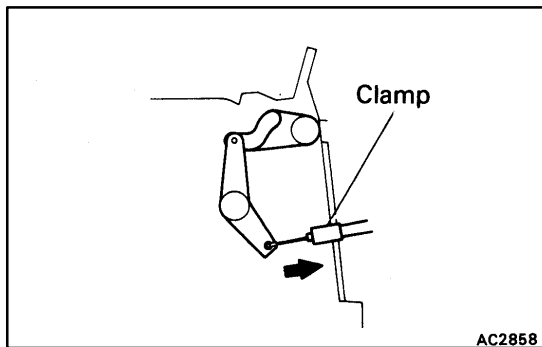
Condition/ Circuit	Tester connection	Specified condition
OFF	-	No continuity
ON	4 - 5 4 - 6	Continuity
Illumination circuit	1 - 3	Continuity

Switch continuity:

If continuity is not as specified, replace the switch.

Illumination circuit:

If continuity is not as specified, test the bulb.

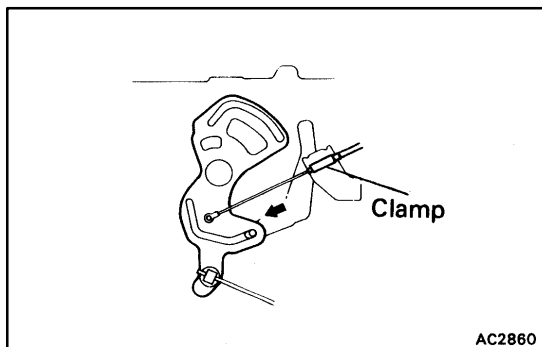


AC2858

## ADJUSTMENT

### 1. ADJUST AIR INLET DAMPER CONTROL CABLE

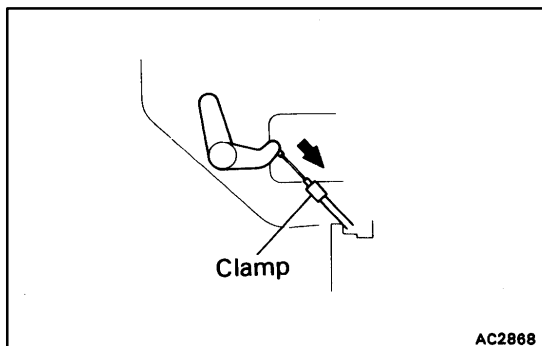
Set the air inlet damper on "RECIRC" position, install the control cable and lock clamp.



AC2860

### 2. ADJUST MODE DAMPER CONTROL CABLE

Set the air inlet damper on "FACE" position, install the control cable and lock the clamp.



AC2868

### 3. ADJUST AIR MIX DAMPER CONTROL CABLE

Set the air mix damper on "COOL" position, install the control cable and lock the clamp.

## INSTALLATION

Installation is in the reverse order of removal procedure (See page [AC-70](#) ).